3R - 77

GENERAL CORRESPONDENCE

YEAR(S): 2005 - 1990

NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

BILL RICHARDSON
Governor
Joanna Prukop
Cabinet Secretary

Mark E. Fesmire, P.E.
Director
Oil Conservation Division

September 12, 2005

TRANSFERRED TO
AP 51

CERTIFIED MAIL
RETURN RECEIPT NO: 7923 4641

Mr. Mike Call
President
Maverik Country Stores, Inc.
800 West Center Street
North Salt Lake, UT 84054

RE: REQUIREMENT TO SUBMIT ABATEMENT PLAN → AP 51
FORMER MAVERIK REFINERY - KIRTLAND, NEW MEXICO
3R0077

Dear Mr. Call:

The New Mexico Oil Conservation Division (OCD) has reviewed the *2004 Annual Groundwater Monitoring and Sampling Report* submitted on May 3, 2005, by R.T. Hicks Consultants, Ltd. on behalf of Maverik Country Stores, Inc. (Maverik). Maverik makes several recommendations in its report that OCD must deny, as discussed below.

In April 2005 Mr. Roland Jackson of Kirtland, New Mexico contacted the OCD - Aztec District Office and complained that one of his water wells was contaminated by petroleum hydrocarbons. On August 24, 2005, OCD had Mr. Jackson's water well sampled and analyzed by Envirotech, Inc. The analyses of Mr. Jackson's water well (see Attachment 1) indicate that his well has been contaminated by petroleum hydrocarbons. Mr. Jackson's water well is located immediately downgradient of Maverik's former refinery and OCD must assume that the recently detected contamination was released from the former refinery.

OCD rescinds its conditional approval of February 19, 1997, to Maverik's request of January 1997 to terminate its bio-remediation program and hereby requires Maverik to submit a Abatement Plan in accordance with the Water Control Commission Regulations (Sections 4103 through 4106, 20.6.2 NMAC). The Stage 1, or investigation phase, of Maverik's Abatement

Plan should include a comprehensive sampling and analysis of all nearby water wells as well as Maverik's own monitoring wells. The construction details of many of the local water wells are unknown; therefore, these water wells cannot permanently substitute for proper monitor wells in a ground water investigation program. Maverik must also propose a ground water investigation program that will enable it to characterize the petroleum hydrocarbon plume that originated from its refinery and to provide the data necessary to select and design an effective abatement option. Maverik must also provide alternate water supplies for any residences that have been impacted by the petroleum hydrocarbon contamination.

Because Maverik left contaminated soil in place inside the slurry wall and has not conducted any active remediation since 1997, it must also submit a Stage 2, or remediation work plan, of the Abatement Plan to address the remediation or removal of the remaining source of hydrocarbon contamination at its former refinery. Based on the results of Maverik's Stage 1 ground water investigation, OCD will determine what additional ground water remediation is required.

Maverik's Abatement Plan proposal must be submitted to the OCD Santa Fe Office with a copy provided to the OCD Aztec District Office by no later than November 14, 2005. Finally, all future submittals to the OCD must be sent from Maverik rather than being submitted by a consultant. Maverik should submit one paper copy and one electronic copy of all future workplans and/or reports.

If you have any questions, please contact Glenn von Gonten of my staff at (505) 476-3488.

Sincerely,

Roger C. Anderson
Environmental Bureau Chief

Attachment

cc: Mr. Denny Foust, OCD Aztec District Office
Mr. Roland Jackson
Mr. Andrew Parker, R.T. Hicks

ENVIROTECH INC.
PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

3R0077

New Mexico Oil Conservation Division
1220 South St Francis Drive
Santa Fe, New Mexico 87505

September 2, 2005

Attention: Mr. Ed Martin

Dear Mr. Martin

Attached are the results of the laboratory analysis from the San Juan Basin Health Department/Laboratory in Durango, CO. The samples were taken from the water well at Mr. Roland Jackson residence at # 20 CR 6271 in Kirtland, NM. The well was sampled on 08-24-05 and a sample was submitted to San Juan Labs in Durango for coliform bacteria analysis.

If you have any further questions or concerns, you can contact me and I will assist you in any way that I can.

Best regards,

Envirotech Inc.

C Jack Collins

C. Jack Collins, PG # 1822
Chief Environmental Scientist/Geologist
NCES #038

5796 U.S. Highway 64 • Farmington, NM 87401 • Tel 505 • 632 • 0615 • Fax 505 • 632 • 1865

San Juan Basin Health Department/Laboratory
281 Sawyer Drive
P.O. Box 140
Durango, CO 81302

Jesse Colbert
Microbiology/Chemistry
970 247 5702 ext 221

Results of Laboratory Analysis

Owner of Facility Envirotech - Jack Collins **County** ______

BillingAddress 5796 US Hwy 64 Farmington, NM 87410

Sampling Location to Kirtland NM **Type Of Sample** Well Water

Sampling Directions on other Side

Date and Time Collected : 05-08-24-10-55 (YY MM DD Hrs. Min.)

Date Received in Laboratory: 05-08-24-14-00 (YY MM DD Hrs. Min.)

If Composite Sample: __ __ - __ __ To __ __ - __ __ (Hrs. Min. Hrs. Min.)

Date Reported: 05-08-30 (YY MM DD)

*Effluent ph 6.0-9.0 (std. Units)				
* Effluent Dissolved Oxygen mg/l				
*Effluent Ttl. Residual Chlorine mg/l	Price	Lab #	Lab Results	
Influent Suspended Solids mg/l (Gravimetric) Std Methods 20th ed 2540 D	$ 15.00			
Effluent Suspended Solids mg/l (Gravimetric) Std Methods 20th ed2540 D	$15.00			
Fecal Coliform per 100 ml (Five Tube MPN) Std Methods 20th ed 9221 B&E	$38.00			
Total Coliform & E.Coli Per 100 ml (IDEXX MPN) Std Methods 20th ed 9223 D	$ 20.25	#220	TTl. Coliform : 34,480	E.Coli: < 1
Influent BOD mg/l (Winkler) Std Methods 20th ed 5210 B	$ 55.00		BOD:	CBOD:
Effluent BOD mg/l (Winkler) ~~Std Methods 20th ed 5210B~~	$ 55.00	#160	560	
Ttl. Dissolved Solids mg/l (Gravimetric) Std Methods 20th ed 2540C	$ 15.00		Effluent:	Raw Water:

*Provided by Sampler
H – Holding Time
Q – Questionable

Sampled By:______ Date:______

ENVIROTECH INC.

PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

New Mexico Oil Conservation Division
1220 South St Francis Drive
Santa Fe, New Mexico 87505

August 30, 2005

3R0077

Attention: Mr. Ed Martin

Dear Mr. Martin

Attached are the water sample laboratory results from the water well at Mr. Roland Jackson residence at # 20 CR 6271 in Kirtland, NM. The well was sampled on 08-24-05 and the sampled analyzed by Envirotech Labs for VOC's using EPA Method 8260 and Cation/Anions. A separate sample was submitted to San Juan Labs in Durango for coliform bacteria analysis.

The water sample was collected from the well after pumping for approximately five minutes using a 2" stainless steel submersible grunfoss pump. The well was pumped dry then allowed to recover, then sampled, using a clean disposable bailer. Recovery time was approximately 10 minutes.

Depth to water was approximately 7.63' and total depth was 10.23' (measured from top of casing, stickup = 8"). Well has 10" steel surface casing and appears to have silted in over the years, as the original depth was reported by the owner to be approximately 18'.

Lab analysis indicate the well water has been impacted with hydrocarbons, including BTEX, Naphthalene, and lesser amounts of chlorinated hydrocarbons including PCE, TCA, & TCE. While the total Coliform and BOD are high, it doesn't contain any fecal coliform, indicating it is not being impacted by raw sewage or a septic system.

Field notes are attached also.

Preliminary results from the fecal coliform analysis: (final results to follow)

Total Coliform: 34,480
Fecal (e coli) < 1.0
BOD 560 mg/l

Best regards,

Envirotech Inc.

C. Jack Collins

C. Jack Collins, PG # 1822
Chief Environmental Scientist/Geologist
NCES #038

ENVIROTECH LABS

PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

EPA Method 8260B
Volatile Organic Compounds by GC/MS

Client:	NMOCD	Project #:	04093-003
Sample ID:	R. Jackson MW #1	Date Reported:	08-26-05
Chain of Custody:	14450	Date Sampled:	08-24-05
Laboratory Number:	34133	Date Received:	08-24-05
Sample Matrix:	Water	Date Analyzed:	08-26-05
Preservative:	Cool	Analysis Requested:	8260 VOC
Condition:	Cool and Intact		

Parameter	Concentration (ug/L)	Units	Det. Limit	Dilution Factor
Benzene	**93.8**	**(ug/L)**	**1.0**	**1**
Toluene	**1,410**	**(ug/L)**	**1.0**	**10**
Ethylbenzene	**837**	**(ug/L)**	**1.0**	**10**
Xylenes, Total	**1,710**	**(ug/L)**	**1.0**	**10**
Methyl tert-butyl ether (MTBE)	**ND**	**(ug/L)**	**1.0**	**1**
1,2,4-Trimethylbenzene	**1,620**	**(ug/L)**	**1.0**	**10**
1,3,5-Trimethylbenzene	**891**	**(ug/L)**	**1.0**	**10**
1,2-Dichloroethane (EDC)	**ND**	**(ug/L)**	**1.0**	**1**
1,2-Dibromoethane (EDB)	**ND**	**(ug/L)**	**1.0**	**1**
Naphthalene	**550**	**(ug/L)**	**1.0**	**10**
1-Methylnaphthalene	**369**	**(ug/L)**	**2.0**	**10**
2-Methylnaphthalene	**543**	**(ug/L)**	**2.0**	**10**
Bromobenzene	**ND**	**(ug/L)**	**1.0**	**1**
Bromochloromethane	**ND**	**(ug/L)**	**1.0**	**1**
Bromodichloromethane	**27.4**	**(ug/L)**	**1.0**	**1**
Bromoform	**ND**	**(ug/L)**	**1.0**	**1**
Bromomethane	**ND**	**(ug/L)**	**1.0**	**1**
Carbon Tetrachloride	**ND**	**(ug/L)**	**1.0**	**1**
Chlorobenzene	**14.9**	**(ug/L)**	**1.0**	**1**
Chloroethane	**ND**	**(ug/L)**	**2.0**	**1**
Chloroform	**3.62**	**(ug/L)**	**1.0**	**1**
Chloromethane	**ND**	**(ug/L)**	**1.0**	**1**
2-Chlorotoluene	**ND**	**(ug/L)**	**1.0**	**1**
4-Chlorotoluene	**ND**	**(ug/L)**	**1.0**	**1**
cis-1,2-Dichloroethene	**ND**	**(ug/L)**	**1.0**	**1**
cis-1,3-Dichloropropene	**ND**	**(ug/L)**	**1.0**	**1**
1,2-Dibromo-3-chloropropane	**ND**	**(ug/L)**	**2.0**	**1**
Dibromochloromethane	**21.2**	**(ug/L)**	**1.0**	**1**
Dibromoethane	**ND**	**(ug/L)**	**2.0**	**1**
1,2-Dichlorobenzene	**ND**	**(ug/L)**	**1.0**	**1**
1,3-Dichlorobenzene	**ND**	**(ug/L)**	**1.0**	**1**
1,4-Dichlorobenzene	**ND**	**(ug/L)**	**1.0**	**1**
Dichlorodifluoromethane	**ND**	**(ug/L)**	**1.0**	**1**
1,1-Dichloroethane	**ND**	**(ug/L)**	**1.0**	**1**
1,1-Dichloroethene	**ND**	**(ug/L)**	**1.0**	**1**
1,2-Dichloropropane	**ND**	**(ug/L)**	**1.0**	**1**
1,3-Dichloropropane	**ND**	**(ug/L)**	**1.0**	**1**
2,2-Dichloropropane	**ND**	**(ug/L)**	**1.0**	**1**

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ENVIROTECH LABS
PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

EPA Method 8260B
Volatile Organic Compounds by GC/MS

Client:	NMOCD
Sample ID:	R. Jackson MW #1
Laboratory Number:	34133

Parameter	Concentration (ug/L)	Units	Det. Limit	Dilution Factor
1,1-Dichloropropene	ND	(ug/L)	1.0	1
Hexachlorobutadiene	ND	(ug/L)	1.0	1
Isopropylbenzene	411	(ug/L)	1.0	10
4-Isopropyltoluene	276	(ug/L)	1.0	10
Methylene Chloride	ND	(ug/L)	3.0	1
n-Butylbenzene	226	(ug/L)	1.0	10
n-Propylbenzene	606	(ug/L)	1.0	10
sec-Butylbenzene	389	(ug/L)	1.0	10
Styrene	ND	(ug/L)	1.0	1
tert-Butylbenzene	485	(ug/L)	1.0	10
Tetrachloroethene (PCE)	14.2	(ug/L)	1.0	1
1,1,1,2-Tetrachloroethane	ND	(ug/L)	1.0	1
1,1,2,2-Tetrachloroethane	232	(ug/L)	1.0	10
trans-1,2-Dichloroethene	ND	(ug/L)	1.0	1
trans-1,3-Dichloropropene	ND	(ug/L)	1.0	1
Trichloroethene (TCE)	7.83	(ug/L)	1.0	1
Trichlorofluoromethane	ND	(ug/L)	1.0	1
1,2,3-Trichlorobenzene	ND	(ug/L)	1.0	1
1,2,4-Trichlorobenzene	22.9	(ug/L)	1.0	1
1,1,1-Trichloroethane	ND	(ug/L)	1.0	1
1,1,2-Trichloroethane	ND	(ug/L)	1.0	1
1,2,3-Trichloropropane	ND	(ug/L)	2.0	1
Vinyl Chloride	ND	(ug/L)	2.0	1

Surrogates:			Rec. Limits	
Dibromofluoromethane	99.9	% Recovery	78.6-115	1
1,2-Dichloroethane-d4	99.9	% Recovery	74.6-123	1
Toluene-d8	100.0	% Recovery	84.2-115	1
4-Bromofluorobenzene	100.1	% Recovery	78.6-115	1

ND = Parameter not detected at the stated detection limit.

References: Method 5030, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, July 1992.
Method 8260,Volatile Organic Compounds by Gas Chromatography / Mass Spectrometry,Test Methods for Evaluating Solid Waste,SW-846, USEPA, July 1992

Comments: **Kirtland, NM.**

Analyst

Review

ENVIROTECH LABS

PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

QUALITY ASSURANCE / QUALITY CONTROL

DOCUMENTATION

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ENVIROTECH LABS
PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

EPA Method 8260B
Volatile Organic Compounds by GC/MS
Quality Assurance Report

Client:	QA/QC	Project #:	N/A
Sample ID:	Laboratory Blank	Date Reported:	08-26-05
Laboratory Number:	08-26 VOA	Date Sampled:	N/A
Sample Matrix:	Water	Date Received:	N/A
Preservative:	N/A	Date Analyzed:	08-26-05
Condition:	N/A	Analysis Requested:	8260 VOC

Parameter	Concentration (ug/L)	Units	Det. Limit	Dilution Factor
Benzene	**ND**	**(ug/L)**	**1.0**	**1**
Toluene	**ND**	**(ug/L)**	**1.0**	**1**
Ethylbenzene	**ND**	**(ug/L)**	**1.0**	**1**
Xylenes, Total	**ND**	**(ug/L)**	**1.0**	**1**
Methyl tert-butyl ether (MTBE)	**ND**	**(ug/L)**	**1.0**	**1**
1,2,4-Trimethylbenzene	**ND**	**(ug/L)**	**1.0**	**1**
1,3,5-Trimethylbenzene	**ND**	**(ug/L)**	**1.0**	**1**
1,2-Dichloroethane (EDC)	**ND**	**(ug/L)**	**1.0**	**1**
1,2-Dibromoethane (EDB)	**ND**	**(ug/L)**	**1.0**	**1**
Naphthalene	**ND**	**(ug/L)**	**1.0**	**1**
1-Methylnaphthalene	**ND**	**(ug/L)**	**2.0**	**1**
2-Methylnaphthalene	**ND**	**(ug/L)**	**2.0**	**1**
Bromobenzene	**ND**	**(ug/L)**	**1.0**	**1**
Bromochloromethane	**ND**	**(ug/L)**	**1.0**	**1**
Bromodichloromethane	**ND**	**(ug/L)**	**1.0**	**1**
Bromoform	**ND**	**(ug/L)**	**1.0**	**1**
Bromomethane	**ND**	**(ug/L)**	**1.0**	**1**
Carbon Tetrachloride	**ND**	**(ug/L)**	**1.0**	**1**
Chlorobenzene	**ND**	**(ug/L)**	**1.0**	**1**
Chloroethane	**ND**	**(ug/L)**	**2.0**	**1**
Chloroform	**ND**	**(ug/L)**	**1.0**	**1**
Chloromethane	**ND**	**(ug/L)**	**1.0**	**1**
2-Chlorotoluene	**ND**	**(ug/L)**	**1.0**	**1**
4-Chlorotoluene	**ND**	**(ug/L)**	**1.0**	**1**
cis-1,2-Dichloroethene	**ND**	**(ug/L)**	**1.0**	**1**
cis-1,3-Dichloropropene	**ND**	**(ug/L)**	**1.0**	**1**
1,2-Dibromo-3-chloropropane	**ND**	**(ug/L)**	**2.0**	**1**
Dibromochloromethane	**ND**	**(ug/L)**	**1.0**	**1**
Dibromoethane	**ND**	**(ug/L)**	**2.0**	**1**
1,2-Dichlorobenzene	**ND**	**(ug/L)**	**1.0**	**1**
1,3-Dichlorobenzene	**ND**	**(ug/L)**	**1.0**	**1**
1,4-Dichlorobenzene	**ND**	**(ug/L)**	**1.0**	**1**
Dichlorodifluoromethane	**ND**	**(ug/L)**	**1.0**	**1**
1,1-Dichloroethane	**ND**	**(ug/L)**	**1.0**	**1**
1,1-Dichloroethene	**ND**	**(ug/L)**	**1.0**	**1**
1,2-Dichloropropane	**ND**	**(ug/L)**	**1.0**	**1**
1,3-Dichloropropane	**ND**	**(ug/L)**	**1.0**	**1**
2,2-Dichloropropane	**ND**	**(ug/L)**	**1.0**	**1**

ENVIROTECH LABS
PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

EPA Method 8260B
Volatile Organic Compounds by GC/MS
Quality Assurance Report

Client: QA/QC
Sample ID: Laboratory Blank
Laboratory Number: 08-26 VOA

Parameter	Concentration (ug/L)	Units	Det. Limit	Dilution Factor
1,1-Dichloropropene	ND	(ug/L)	1.0	1
Hexachlorobutadiene	ND	(ug/L)	1.0	1
Isopropylbenzene	ND	(ug/L)	1.0	1
4-Isopropyltoluene	ND	(ug/L)	1.0	1
Methylene Chloride	ND	(ug/L)	1.0	1
n-Butylbenzene	ND	(ug/L)	1.0	1
n-Propylbenzene	ND	(ug/L)	1.0	1
sec-Butylbenzene	ND	(ug/L)	1.0	1
Styrene	ND	(ug/L)	1.0	1
tert-Butylbenzene	ND	(ug/L)	1.0	1
Tetrachloroethene (PCE)	ND	(ug/L)	1.0	1
1,1,1,2-Tetrachloroethane	ND	(ug/L)	1.0	1
1,1,2,2-Tetrachloroethane	ND	(ug/L)	1.0	1
trans-1,2-Dichloroethene	ND	(ug/L)	1.0	1
trans-1,3-Dichloropropene	ND	(ug/L)	1.0	1
Trichloroethene (TCE)	ND	(ug/L)	1.0	1
Trichlorofluoromethane	ND	(ug/L)	1.0	1
1,2,3-Trichlorobenzene	ND	(ug/L)	1.0	1
1,2,4-Trichlorobenzene	ND	(ug/L)	1.0	1
1,1,1-Trichloroethane	ND	(ug/L)	1.0	1
1,1,2-Trichloroethane	ND	(ug/L)	1.0	1
1,2,3-Trichloropropane	ND	(ug/L)	2.0	1
Vinyl Chloride	ND	(ug/L)	2.0	1

Surrogates:			Rec. Limits	
Dibromofluoromethane	100.2	% Recovery	78.6-115	1
1,2-Dichloroethane-d4	99.9	% Recovery	74.6-123	1
Toluene-d8	100.1	% Recovery	84.2-115	1
4-Bromofluorobenzene	100.0	% Recovery	78.6-115	1

ND = Parameter not detected at the stated detection limit.

References: Method 5030, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, July 1992.
Method 8260,Volatile Organic Compounds by Gas Chromatography / Mass Spectrometry,Test Methods for Evaluating Solid Waste,SW-846, USEPA, July 1992

Comments: **QA/QC for sample 34133.**

Analyst

Christine M Walters
Review

ENVIROTECH LABS
PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

EPA Method 8260B
Volatile Organic Compounds by GC/MS
Quality Assurance Report

Client:	QA/QC	Project #:	N/A
Sample ID:	Matrix Spikes	Date Reported:	08-26-05
Laboratory Number:	08-26-VOA - 34133	Date Sampled:	N/A
Sample Matrix:	Water	Date Received:	N/A
Preservative:	N/A	Date Analyzed:	08-26-05
Condition:	N/A	Analysis Requested:	8260 VOC

Spike Analyte	Sample	Units: uG/L Added	Result	%Recovery	Recovery Limits	Det. Limit
Benzene	**93.8**	**100.0**	**193**	**99.8%**	**85.3 - 120**	**1.0**
Toluene	**1,410**	**100.0**	**1,510**	**100.0%**	**73 - 123**	**1.0**
Chlorobenzene	**14.9**	**100.0**	**114**	**99.5%**	**84.7 - 119**	**1.0**
1,1-Dichloroethene	**ND**	**100.0**	**99.9**	**99.9%**	**83.4 - 122**	**1.0**
Trichloroethene (TCE)	**7.83**	**100.0**	**107**	**99.6%**	**76.1 - 126**	**1.0**

Spike Duplicate Analyte	Sample	Units: uG/L Added	Result	%Recovery	Recovery Limits	Det. Limit
Benzene	**93.8**	**100.0**	**193**	**99.6%**	**85.3 - 120**	**1.0**
Toluene	**1,410**	**100.0**	**1,500**	**99.3%**	**73 - 123**	**1.0**
Chlorobenzene	**14.9**	**100.0**	**114**	**99.5%**	**84.7 - 119**	**1.0**
1,1-Dichloroethene	**ND**	**100.0**	**100**	**100.0%**	**83.4 - 122**	**1.0**
Trichloroethene (TCE)	**7.83**	**100.0**	**107**	**99.6%**	**76.1 - 126**	**1.0**

ND = Parameter not detected at the stated detection limit.

References:

Method 5030, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, July 1992.
Method 8260,Volatile Organic Compounds by Gas Chromatography / Mass Spectrometry,Test Methods for Evaluating Solid Waste,SW-846, USEPA, July 1992

Comments: **QA/QC for samples 34133.**

Denn C. Ofreen
Analyst

Christine M Walters
Review

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EPA Method 8260B
Volatile Organic Compounds by GC/MS
Daily Calibration Report

Client:	QA/QC	Project #:	N/A
Sample ID:	Daily Calibration	Date Reported:	08-26-05
Laboratory Number:	08-26-VOA	Date Sampled:	N/A
Sample Matrix:	Water	Date Received:	N/A
Preservative:	N/A	Date Analyzed:	08-26-05
Condition:	N/A	Analysis Requested:	8260 VOC

Parameter	Concentration (ug/L)	Result	% Recovered	% Recovery Limits
Benzene	100	99.9	99.9	80 - 120
Toluene	100	99.8	99.8	80 - 120
Ethylbenzene	100	99.9	99.9	80 - 120
Xylenes, Total	100	99.8	99.8	80 - 120
Methyl tert-butyl ether (MTBE)	100	99.9	99.9	80 - 120
1,2,4-Trimethylbenzene	100	99.9	99.9	80 - 120
1,3,5-Trimethylbenzene	100	99.9	99.9	80 - 120
1,2-Dichloroethane (EDC)	100	99.9	99.9	80 - 120
1,2-Dibromoethane (EDB)	100	99.9	99.9	80 - 120
Naphthalene	100	99.9	99.9	80 - 120
1-Methylnaphthalene	100	99.7	99.7	80 - 120
2-Methylnaphthalene	100	99.9	99.9	80 - 120
Bromobenzene	100	99.8	99.8	80 - 120
Bromochloromethane	100	99.7	99.7	80 - 120
Bromodichloromethane	100	99.8	99.8	80 - 120
Bromoform	100	99.8	99.8	80 - 120
Bromomethane	100	99.8	99.8	80 - 120
Carbon Tetrachloride	100	99.9	99.9	80 - 120
Chlorobenzene	100	99.8	99.8	80 - 120
Chloroethane	100	99.9	99.9	80 - 120
Chloroform	100	99.8	99.8	80 - 120
Chloromethane	100	99.7	99.7	80 - 120
2-Chlorotoluene	100	99.6	99.6	80 - 120
4-Chlorotoluene	100	99.8	99.8	80 - 120
cis-1,2-Dichloroethene	100	99.7	99.7	80 - 120
cis-1,3-Dichloropropene	100	99.2	99.2	80 - 120
1,2-Dibromo-3-chloropropane	100	99.8	99.8	80 - 120
Dibromochloromethane	100	99.5	99.5	80 - 120
Dibromoethane	100	99.8	99.8	80 - 120
1,2-Dichlorobenzene	100	99.9	99.9	80 - 120
1,3-Dichlorobenzene	100	99.6	99.6	80 - 120
1,4-Dichlorobenzene	100	99.8	99.8	80 - 120
Dichlorodifluoromethane	100	99.8	99.8	80 - 120
1,1-Dichloroethane	100	99.6	99.6	80 - 120
1,1-Dichloroethene	100	99.8	99.8	80 - 120
1,2-Dichloropropane	100	99.6	99.6	80 - 120
1,3-Dichloropropane	100	99.6	99.6	80 - 120
2,2-Dichloropropane	100	99.3	99.3	80 - 120

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PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

EPA Method 8260B
Volatile Organic Compounds by GC/MS
Quality Assurance Report

Client:	QA/QC
Sample ID:	Daily Calibration
Laboratory Number:	08-26-VOA

Parameter	Concentration (ug/L)	Result	% Recovered	% Recovery Limits
1,1-Dichloropropene	100	99.4	99.4	80 - 120
Hexachlorobutadiene	100	99.6	99.6	80 - 120
Isopropylbenzene	100	99.9	99.9	80 - 120
4-Isopropyltoluene	100	99.4	99.4	80 - 120
Methylene Chloride	100	99.5	99.5	80 - 120
n-Butylbenzene	100	99.3	99.3	80 - 120
n-Propylbenzene	100	99.9	99.9	80 - 120
sec-Butylbenzene	100	99.4	99.4	80 - 120
Styrene	100	98.9	98.9	80 - 120
tert-Butylbenzene	100	99.8	99.8	80 - 120
Tetrachloroethene (PCE)	100	99.6	99.6	80 - 120
1,1,1,2-Tetrachloroethane	100	99.8	99.8	80 - 120
1,1,2,2-Tetrachloroethane	100	98.9	98.9	80 - 120
trans-1,2-Dichloroethene	100	99.9	99.9	80 - 120
trans-1,3-Dichloropropene	100	99.8	99.8	80 - 120
Trichloroethene (TCE)	100	99.8	99.8	80 - 120
Trichlorofluoromethane	100	99.9	99.9	80 - 120
1,2,3-Trichlorobenzene	100	99.6	99.6	80 - 120
1,2,4-Trichlorobenzene	100	99.3	99.3	80 - 120
1,1,1-Trichloroethane	100	99.5	99.5	80 - 120
1,1,2-Trichloroethane	100	99.7	99.7	80 - 120
1,2,3-Trichloropropane	100	99.5	99.5	80 - 120
Vinyl Chloride	100	99.3	99.3	80 - 120

Surrogates:			Rec. Limits
Dibromofluoromethane	99.5	% Recovery	78.6-115
1,2-Dichloroethane-d4	99.7	% Recovery	74.6-123
Toluene-d8	99.2	% Recovery	84.2-115
4-Bromofluorobenzene	97.2	% Recovery	78.6-115

ND = Parameter not detected at the stated detection limit.

References: Method 5030, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, July 1992.
Method 8260,Volatile Organic Compounds by Gas Chromatography / Mass Spectrometry,Test Methods for Evaluating Solid Waste,SW-846, USEPA, July 1992

Comments: **QA/QC for sample 34133.**

Analyst

Christine M Walters
Review

ENVIROTECH LABS
PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

CATION / ANION ANALYSIS

Client:	NMOCD	Project #:	04093-003
Sample ID:	R. Jackson MW #1	Date Reported:	08-25-05
Laboratory Number:	34133	Date Sampled:	08-24-05
Chain of Custody:	14450	Date Received:	08-24-05
Sample Matrix:	Water	Date Extracted:	N/A
Preservative:	Cool	Date Analyzed:	08-25-05
Condition:	Cool & Intact		

Parameter	Analytical Result	Units		
pH	**8.41**	s.u.		
Conductivity @ 25° C	**2,290**	umhos/cm		
Total Dissolved Solids @ 180C	**1,160**	mg/L		
Total Dissolved Solids (Calc)	**1,180**	mg/L		
SAR	**21.0**	ratio		
Total Alkalinity as CaCO3	**688**	mg/L		
Total Hardness as CaCO3	**53.3**	mg/L		
Bicarbonate as HCO3	**688**	mg/L	11.28	meq/L
Carbonate as CO3	**<0.1**	mg/L	0.00	meq/L
Hydroxide as OH	**<0.1**	mg/L	0.00	meq/L
Nitrate Nitrogen	**1.0**	mg/L	0.02	meq/L
Nitrite Nitrogen	**0.084**	mg/L	0.00	meq/L
Chloride	**159**	mg/L	4.48	meq/L
Fluoride	**0.48**	mg/L	0.03	meq/L
Phosphate	**7.6**	mg/L	0.24	meq/L
Sulfate	**153**	mg/L	3.18	meq/L
Iron	**0.425**	mg/L	0.02	meq/L
Calcium	**19.2**	mg/L	0.96	meq/L
Magnesium	**5.27**	mg/L	0.43	meq/L
Potassium	**12.4**	mg/L	0.32	meq/L
Sodium	**402**	mg/L	17.49	meq/L
Cations			19.21	meq/L
Anions			19.21	meq/L
Cation/Anion Difference			**0.02%**	

Reference: U.S.E.P.A., 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", 1983.
Standard Methods For The Examination of Water And Waste Water", 18th ed., 1992.

Comments: **Kirtland, NM.**

Christine M Walters
Analyst

Review

CHAIN OF CUSTODY RECORD

14450

Client / Project Name	Project Location	ANALYSIS / PARAMETERS
NM OCD	Kirtland NM	
Sampler: Jack Collins	Client No. 04093-003	

Sample No./ Identification	Sample Date	Sample Time	Lab Number	Sample Matrix	No. of Containers	VOC's EPA 8260	Cation Anion					Remarks
R. Jackson MW#1	8/24/05	10:55	34133 ~~34433~~	H_2O	3	✓	✓					

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Jack Collins	8/24/05	1230	Christine M Walters	8/24/05	1230
Relinquished by: (Signature)			Received by: (Signature)		
Relinquished by: (Signature)			Received by: (Signature)		

ENVIROTECH INC.

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Farmington, New Mexico 87401
(505) 632-0615

Sample Receipt	Y	N	N/A
Received Intact	✓		
Cool - Ice/Blue Ice	✓		

san juan reproduction 578-129

ENVIROTECH INC.
FARMINGTON, NM 5796 HIGHWAY 64
MONITOR WELL DATA

Date: 8-24-05 Project No: 04093-003

Project Name: NMOCD Chain of Custody No: ________

Location: Jackson Water Well

Project Manager: CJC Sampler: CJC / SLC

MONITOR WELL DATA

WELL #	TIME	OVM ppm	pH	COND. µS	TEMP. °F	DEPTH TO WATER FT.	TOTAL DEPTH FT.	WATER COLUMN FT.	BAILED Water Gal.	PRODUCT Ft.	WATER LEVEL FT.
WW#1	10:55		8.67	135		7.63	10.23				

Notes: TOC = Top of Casing
Bailed = 3 well volummes:
1.25" well = 0.19 gal/ft.
2.00" well = 0.49 gal/ft.
4.00" well = 1.96 gal/ft.
Note well diameter if not one of the above.

R. T. Hicks Consultants, Ltd.

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266-0745

3RP077

RECEIVED

MAY 06 2005

Oil Conservation Division
Environmental Bureau

May 03, 2005

Mr. Wayne Price
New Mexico Energy, Minerals and Natural Resources Department
Oil Conservation Division
1220 South St. Francis Dr
Santa Fe, NM 87505

RE: 2004 Annual Groundwater Monitoring and Sampling Report. Former Maverik Tank Farm and Refinery located near Kirtland, New Mexico

Dear Mr. Price:

On behalf of Maverik Country Stores, Inc. (Maverik), R.T. Hicks Consultants, Ltd. is submitting this 2004 Groundwater Monitoring and Sampling Report for the former Maverik Tank Farm and Refinery in Kirtland, New Mexico. This report represents the annual sampling event conducted on January 11th and 12th, 2005. An extension of time was granted (via email) by you approving our request to sample in 2005 to satisfy 2004 sampling requirements.

If you any questions or concerns, please do not hesitate to call me at (505) 266-5004.

Sincerely,
R.T. Hicks Consultants, Ltd

Andrew Parker

Andrew Parker
Staff Scientist

3RP077

May 2005

2004 Annual Sampling Report

Maverik Refinery
Kirtland, New Mexico

R.T. HICKS CONSULTANTS, LTD.

901 RIO GRANDE BLVD. NW, SUITE F-142, ALBUQUERQUE, NM 87104

Former Maverik Refinery and Tank Farm

2004 Ground Water Monitoring Report

Prepared for:
MAVERIK COUNTRY STORES, INC.
880 West Center Street
North Salt Lake, UT 84054

May 03, 2005

R. T. Hicks Consultants, Ltd.
901 Rio Grande Blvd NW Suite F-142
Albuquerque, NM 87104

1.0 Introduction

This report presents the results of the 2004 annual ground water monitoring and sampling event conducted at the Former Maverik Refinery Tank Farm, located in Kirtland, New Mexico (the Site). We also summarize past data to place the 2004 results in an overall context, and propose a path forward to close the regulatory file for the Site.

Maverik conducted semi-annual ground water monitoring at the Site from 1990 to 1998. Annual ground water monitoring began in 1999 and has continued until the present. The January 2005 ground water monitoring and sampling event constituted the sixth annual monitoring event since semi-annual monitoring was discontinued at the end of 1998. Due to weather conditions during our scheduled sampling event in December 2004, we sampled in January 2005. We submitted a request for an extension of time (via email) to the New Mexico Oil Conservation Division (NMOCD). Mr. Wayne Price of the NMOCD granted our request for an extension of time to satisfy our 2004 sampling and monitoring requirements

R. T. Hicks Consultants (Hicks Consultants) conducted ground water monitoring and sampling on behalf of Maverik Country Stores, Inc. on January 10^{th} and 11^{th}, 2005.

2.0 Description of Field Activities

Hicks Consultants completed field work as described in Section 5 of the 1998 Annual Ground Water Monitoring Report and agreed upon with modifications in a letter from the NMOCD dated March 19, 1999.

2.1 Ground Water Monitoring and Sampling

The 2004 annual ground water monitoring event was completed on January 12, 2005. Andrew Parker and Katie Lee of Hicks Consultants obtained fluid levels and ground water samples from the following monitoring wells:

- Located outside the slurry wall containment: MW-9, MW-10, MW-16, MW-18, MW-19, MW-20, MW-21; and
- Located inside the slurry wall containment: MW-17 and MW-22.

We did not sample or collect well depth data from MW-1, MW-2, or MW-15. MW-1 and MW-2 were not sampled in past monitoring events, and MW-15 has consistently exhibited hydrocarbon concentrations below laboratory detection limits. Additionally, an unknown obstruction was encountered in the casing at MW-14 at a depth of approximately 8 feet such that a ground water sample could not be collected. It was possible, however, to obtain fluid level measurements in the well. MW-18's outer steel casing was damaged from on-site trucking activities; causing the PCV well casing to bend at approximately 0.8-feet below ground surface. To gain access for ground water sampling equipment, we removed the steel outer casing and cut the PVC at the bend. After we collected our ground water samples, we set the outer steel casing over the damaged PVC to prevent debris from entering the monitoring well.

Plate 1 is a Site map of the former Refinery Tank Farm showing the locations and status of the monitoring wells and piezometers.

We measured depth to ground water and total well depth using an electronic oil-water interface probe. The probe was properly decontaminated prior to and after each measurement at each ground water monitoring well.

We purged three casing volumes from the monitoring wells with the exception of MW-10, MW-17, MW-18, MW-19, MW-21, and MW-22, which bailed dry. We recorded total depth of the well, depth to water, depth to product (if observed), casing purge volume, temperature, specific conductance, and dissolved oxygen measurements in a field log book. After purging, we collected samples from the wells using disposable bailers. We completed ground water sampling activities in accordance with standard United States Environmental Protection Agency (USEPA) protocols.

We delivered the ground water samples from the annual monitoring event to Hall Environmental Analysis Laboratory in Albuquerque, NM for analysis of benzene, toluene, ethyl benzene, xylene, (BTEX), and 1,2 Dichloroethane (1,2-DCA) using EPA Method 8260.

3.0 Summary of Monitoring and Sampling Results

3.1 Fluid Level Measurements

Table 1 summarizes fluid levels measured during this and past monitoring events. Plate 2 is a map showing the observed ground water elevations and potentiometric surface observed in January 2005.

We believe the lower ground water elevation within the Slurry Wall in 2005 is the product of the slurry wall acting as a horizontal hydraulic barrier and minimizing the hydraulic connection with the alluvial aquifer, damping the effect of recent precipitation events in the area. For ground water within the Slurry Wall to respond to regional changes in ground water surfaces, water must flow upwards from below the slurry wall where there is no man-made barrier to flow. Vertical hydraulic conductivity can be 10-20 times lower than horizontal conductivity; therefore changes in ground water elevation within the Slurry Wall area will respond more slowly than the surrounding ground water elevations where horizontal ground water flow occurs. Nevertheless, ground water elevations and gradient measured during the January 2005 sampling event are within the range of historical data (see Plate 3). Ground water flow is to the southwest at a hydraulic gradient of 0.007.

Historic ground water levels show a decline in ground water elevation from 1992 through 1997. From 1997 to January 2005 ground water elevations began to fluctuate. Plate 3 shows graphs of ground water levels over time at monitoring well MW-22 within the slurry wall, and wells downgradient and upgradient from MW-22 (MW-09 and MW-18, respectively).

We did not observe any phase-separated hydrocarbons (PSH) in the monitoring wells at the Site while obtaining fluid level measurements. However, after bailing MW-17 dry and allowing for the well to recharge, we observed 0.1-feet of PSH in the bailer. We observed slight hydrocarbon odor in monitoring wells MW-17, MW-18, and MW-22. In addition, we observed a slight sulfur odor in well MW-17.

3.2 Water Quality Analyses

Table 2 summarizes historic and the January 11-12th, 2005 sampling event ground water chemistry for all monitoring wells at the Site. Appendix A contains the Certificate of Analysis for the January 2005 sampling event. Benzene concentrations in ground water collected in January 2005 are shown on Plate 4.

Laboratory analysis results for MW-18 in December 2003 detected 1.4 ug/L benzene in MW-18, north and upgradient from the Slurry Wall. Laboratory analysis did not detect benzene concentrations above laboratory detection limits in MW-18 during the January 2005 sampling event, and benzene concentrations in this well have remained below New Mexico ground water standards since 1999. Laboratory analysis detected 5.7 ug/L of total xylene in MW-18 from the January 2005 sampling event. A previous detection of total xylene in MW-18 occurred in December 2001. Since 1994, total xylene concentrations in MW-18 have remained below the total xylene concentration limit of 620 ug/L established by the State of New Mexico for ground water.

Historically, monitoring wells MW-17 and MW-22 located inside of the slurry wall have shown hydrocarbon levels above the WQCC standards for chemicals of concern. These wells continue to show concentrations above WQCC standards.

4.0 Discussion and Conclusions

BTEX and 1,2 Dichloroethane were not detected in monitoring wells located downgradient or cross gradient from the Slurry Wall. Laboratory analysis results for chemicals of concern from monitoring wells downgradient and crossgradient from the Slurry Wall indicate that the slurry walls are maintaining their integrity and are performing their planned function of containing the petroleum impacted ground water. In fact, laboratory analysis has not detected benzene in ground water in off-site monitoring wells since sampling began in 1990.

Historical data suggest that natural attenuation reduced ground water BTEX concentrations within the slurry wall from 1990 through 1997. In 1997, ground water elevations ceased to decline and began to fluctuate. Examination of benzene concentrations and ground water elevations plotted over time (Plate 5) at MW-17 illustrates that benzene concentrations follow the same trend as fluctuating ground water elevations. As the ground water elevation decreases, samples show a decrease in benzene concentrations. We believe if the ground water elevation increases, contact with overlying hydrocarbon impacted soil will also increase, causing an increase in benzene concentrations as this contact causes hydrocarbon particles (molecules or non-aqueous phase liquid) bound to (or between) soil particles to dissolve into the ground water. As ground water levels decline, some of the dissolved hydrocarbons re-sorb to soil, such that ground water benzene concentrations decrease. We cannot reliably predict whether ground water levels will continue to drop as they are strongly influenced by precipitation in the area.

Site data strongly suggest that natural biodegradation is occurring; however, the periodic contact of ground water with impacted soil that occurs when ground water levels rise causes higher concentrations of dissolved BTEX constituents in ground water than one would expect if the ground water levels remained stable. If water levels continue to fluctuate, we predict this phenomenon of rising and falling BTEX levels will continue, with concentrations ultimately decreasing over time, albeit more slowly than they would if the ground water level remained below the more impacted soils.

Regression analysis at MW-17 suggests that benzene concentrations will meet WQCC water quality standards for benzene (10.0 ug/L) in 2032 (Figure 1). The regression coefficient (R^2 value) for this analysis is approximately 0.4. Regression coefficients near 1.0 are considered a "perfect fit". Regression coefficients greater than 0.7 are considered a "good fit". Regression coefficients less than 0.5 are generally considered a "poor fit" for certain sample populations, but for ground water data regression coefficients as low as 0.4 (as seen here) are not uncommon and may be used to draw conclusions regarding natural attenuation. The analysis presented in Figure 1 should not be construed as a conclusion that ground water within the slurry wall will meet state standards within 23 years. The analysis shows that natural restoration processes in ground water are reducing hydrocarbon concentrations over time and that complete restoration of ground water is proceeding but may require decades.

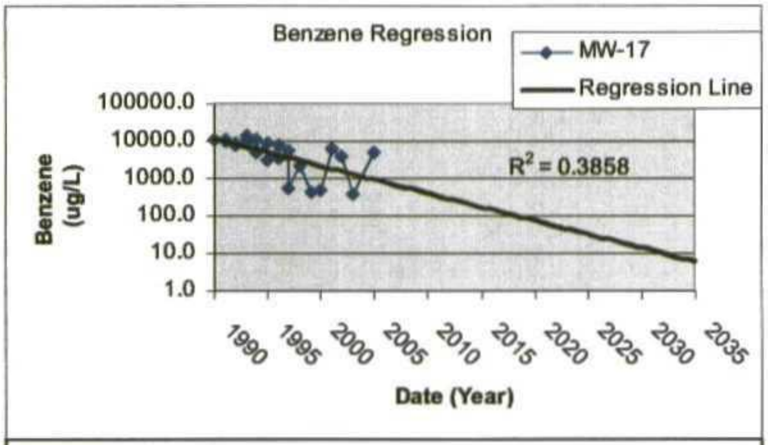


Figure 1: Regression Analysis

Our observations permit us to conclude that:

1. The environs outside the Slurry Wall are no longer impacted by past operations of the former refinery.

2. Benzene concentrations in ground water are above WQCC Standards within the Slurry Wall and will remain so for some time to come.

5.0 Proposed Path Forward

A. We ask the OCD to consider separating the former refinery into two separate "units": one within the slurry wall and the second outside of the slurry wall.

B. We ask the OCD to consider issuing a letter that formally closes the regulatory file for the area outside of the Slurry Wall (i.e. issue a No Further Action Letter).

C. We recommend monitored natural attenuation within the slurry wall.

D. We recommend continued annual sampling of MW-17 for five years followed by a report to NMOCD that summarizes the results of the sampling and modifies the approach, is appropriate.

TABLES

Table 1:
Fluid Levels

Well ID	Date	Ground Elevation (feet)	Datum Elevation (feet)	Depth to Water (feet)	Free Product Thickness (feet)	Corrected Elevation (ft)
Outside Slurry Wall						
MW-1	01/01/92	5,205.75	5,207.24	10.90	ND	5,196.34
	06/01/92	5,205.75	5,207.24	8.40	ND	5,198.84
	08/01/92	5,205.75	5,207.24	6.00	ND	5,201.24
	12/01/92	5,205.75	5,207.24	8.00	ND	5,199.24
	03/01/93	5,205.75	5,207.24	12.30	ND	5,194.94
	05/01/93	5,205.75	5,207.24	NM	NM	NM
	11/01/93	5,205.75	5,207.24	NM	NM	NM
	05/01/94	5,205.75	5,207.24	NM	NM	NM
	10/01/94	5,205.75	5,207.24	NM	NM	NM
	05/01/95	5,205.75	5,207.24	NM	NM	NM
	10/01/95	5,205.75	5,207.24	NM	NM	NM
	05/01/96	5,205.75	5,207.24	NM	NM	NM
	10/01/96	5,205.75	5,207.24	10.97	ND	5,196.27
	06/24/97	5,205.75	5,207.24	13.58	ND	5,193.66
	10/18/97	5,205.75	5,207.24	11.87	ND	5,195.37
	05/05/98	5,205.75	5,207.24	16.17	ND	5,191.07
	12/01/98	5,205.75	5,207.24	NM	NM	NM
	10/14/99	5,205.75	5,207.24	10.66	ND	5,196.58
	10/01/00	5,205.75	5,207.24	NM	NM	NM
MW-2	01/01/92	5,195.25	5,196.93	3.80	ND	5,193.13
	06/01/92	5,195.25	5,196.93	4.40	ND	5,192.53
	08/01/92	5,195.25	5,196.93	3.80	ND	5,193.13
	12/01/92	5,195.25	5,196.93	2.50	ND	5,194.43
	03/01/93	5,195.25	5,196.93	4.50	ND	5,192.43
	05/01/93	5,195.25	5,196.93	NM	NM	NM
	11/01/93	5,195.25	5,196.93	NM	NM	NM
	05/01/94	5,195.25	5,196.93	NM	NM	NM
	10/01/94	5,195.25	5,196.93	NM	NM	NM
	05/01/95	5,195.25	5,196.93	NM	NM	NM
	10/01/95	5,195.25	5,196.93	NM	NM	NM
	05/01/96	5,195.25	5,196.93	NM	NM	NM
	10/01/96	5,195.25	5,196.93	5.99	ND	5,190.94
	06/01/97	5,195.25	5,196.93	7.51	ND	5,189.42
	10/01/97	5,195.25	5,196.93	6.66	ND	5,190.27
	05/05/98	5,195.25	5,196.93	8.22	ND	5,188.71
	12/01/98	5,195.25	5,196.93	NM	NM	NM
	10/14/99	5,195.25	5,196.93	6.51	ND	5,190.42
	10/01/00	5,195.25	5,196.93	NM	NM	NM
MW-9	01/01/92	5,189.33	5,191.22	1.50	ND	5,189.72
	06/01/92	5,189.33	5,191.22	2.30	ND	5,188.92
	08/01/92	5,189.33	5,191.22	1.80	ND	5,189.42
	12/01/92	5,189.33	5,191.22	0.60	ND	5,190.62
	03/01/93	5,189.33	5,191.22	1.80	ND	5,189.42
	05/01/93	5,189.33	5,191.22	NM	NM	NM
	11/01/93	5,189.33	5,191.22	1.30	ND	5,189.92
	05/01/94	5,189.33	5,191.22	NM	NM	NM
	10/01/94	5,189.33	5,191.22	2.03	ND	5,189.19
	05/01/95	5,189.33	5,191.22	NM	NM	NM
	10/01/95	5,189.33	5,191.22	4.22	ND	5,187.00
	05/01/96	5,189.33	5,191.22	NM	NM	NM
	10/01/96	5,189.33	5,191.22	3.88	ND	5,187.34
	06/01/97	5,189.33	5,191.22	5.59	ND	5,185.63
	10/01/97	5,189.33	5,191.22	5.06	ND	5,186.16
	05/05/98	5,189.33	5,191.22	5.89	ND	5,185.33
	12/01/98	5,189.33	5,191.22	3.96	ND	5,187.26
	10/14/99	5,189.33	5,191.22	4.82	ND	5,186.40
	10/01/00	5,189.33	5,191.22	NM	NM	NM
	12/19/01	5,189.33	5,191.22	4.23	ND	5,186.99
	12/19/02	5,189.33	5,191.22	4.20	ND	5,187.02
	11/08/03	5,189.33	5,191.22	4.67	ND	5,186.55
	01/11/05	5,189.33	5,191.22	3.75	ND	5,187.47

Table 1:
Fluid Levels

Well ID	Date	Ground Elevation (feet)	Datum Elevation (feet)	Depth to Water (feet)	Free Product Thickness (feet)	Corrected Elevation (ft)
MW-10	01/01/92	5,187.47	5,189.30	1.60	ND	5,187.70
	06/01/92	5,187.47	5,189.30	2.70	ND	5,186.60
	08/01/92	5,187.47	5,189.30	2.90	ND	5,186.40
	12/01/92	5,187.47	5,189.30	0.90	ND	5,188.40
	03/01/93	5,187.47	5,189.30	1.60	ND	5,187.70
	05/01/93	5,187.47	5,189.30	2.80	ND	5,186.50
	11/01/93	5,187.47	5,189.30	1.80	ND	5,187.50
	05/01/94	5,187.47	5,189.30	4.47	ND	5,184.83
	10/01/94	5,187.47	5,189.30	2.97	ND	5,186.33
	05/01/95	5,187.47	5,189.30	4.42	ND	5,184.88
	10/01/95	5,187.47	5,189.30	4.60	ND	5,184.70
	05/01/96	5,187.47	5,189.30	4.28	ND	5,185.02
	10/01/96	5,187.47	5,189.30	4.23	ND	5,185.07
	06/01/97	5,187.47	5,189.30	5.37	ND	5,183.93
	10/01/97	5,187.47	5,189.30	4.90	ND	5,184.40
	05/05/98	5,187.47	5,189.30	5.52	ND	5,183.78
	12/01/98	5,187.47	5,189.30	3.76	ND	5,185.54
	10/14/99	5,187.47	5,189.30	4.85	ND	5,184.45
	10/01/00	5,187.47	5,189.30	3.93	ND	5,185.37
	12/19/01	5,187.47	5,189.30	4.22	ND	5,185.08
	12/19/02	5,187.47	5,189.30	3.80	ND	5,185.50
	12/08/03	5,187.47	5,189.30	4.61	ND	5,184.69
	01/11/05	5,187.47	5,189.30	3.32	ND	5,185.98
MW-13	01/01/92	5,187.56	5,187.76	NM	ND	NM
	06/01/92	5,187.56	5,187.76	2.80	ND	5,184.96
	08/01/92	5,187.56	5,187.76	2.70	ND	5,185.06
	12/01/92	5,187.56	5,187.76	1.10	ND	5,186.66
	03/01/93	5,187.56	5,187.76	1.70	ND	5,186.06
	05/01/93	5,187.56	5,187.76	NM	ND	NM
	11/01/93	5,187.56	5,187.76	1.40	ND	5,186.36
	05/01/94	5,187.56	5,187.76	NM	ND	NM
	10/01/94	5,187.56	5,187.76	2.91	ND	5,184.85
	05/01/95	5,187.56	5,187.76	NM	ND	NM
	10/01/95	5,187.56	5,187.76	3.23	ND	5,184.53
	05/01/96	5,187.56	5,187.76	NM	ND	NM
	10/01/96	5,187.56	5,187.76	2.52	ND	5,185.24
	06/01/97	5,187.56	5,187.76	4.08	ND	5,183.68
	10/01/97	5,187.56	5,187.76	4.12	ND	5,183.64
	05/05/98	5,187.56	5,187.76	4.03	ND	5,183.73
	12/01/98	5,187.56	5,187.76	2.17	ND	5,185.59
Well Destroyed	10/14/99	5,187.56	5,187.76	NA	NA	NM
MW-14	01/01/92	5,190.70	5,194.47	2.10	ND	5,192.37
	06/01/92	5,190.70	5,194.47	4.10	ND	5,190.37
	08/01/92	5,190.70	5,194.47	4.20	ND	5,190.27
	12/01/92	5,190.70	5,194.47	0.70	ND	5,193.77
	03/01/93	5,190.70	5,194.47	2.20	ND	5,192.27
	05/01/93	5,190.70	5,194.47	NM	NM	NM
	11/01/93	5,190.70	5,194.47	1.70	ND	5,192.77
	05/01/94	5,190.70	5,194.47	NM	NM	NM
	10/01/94	5,190.70	5,194.47	4.27	ND	5,190.20
	05/01/95	5,190.70	5,194.47	NM	NM	NM
	10/01/95	5,190.70	5,194.47	8.09	ND	5,186.38
	05/01/96	5,190.70	5,194.47	NM	NM	NM
	10/01/96	5,190.70	5,194.47	7.52	ND	5,186.95
	06/01/97	5,190.70	5,194.47	8.95	ND	5,185.52
	10/01/97	5,190.70	5,194.47	8.87	ND	5,185.60
	05/05/98	5,190.70	5,194.47	9.02	ND	5,185.45
	12/01/98	5,190.70	5,194.47	6.74	ND	5,187.73
	10/14/99	5,190.70	5,194.47	8.21	ND	5,186.26
	10/01/00	5,190.70	5,194.47	7.30	ND	5,187.17
	12/19/02	5,190.70	5,194.47	7.00	ND	5,187.47
	11/08/03	5,190.70	5,194.47	8.35	ND	5,186.12
	01/11/05	5,190.70	5,194.47	7.62	ND	5,186.85

Table 1:
Fluid Levels

Well ID	Date	Ground Elevation (feet)	Datum Elevation (feet)	Depth to Water (feet)	Free Product Thickness (feet)	Corrected Elevation (ft)
MW-15	01/01/92	5,185.40	5,188.80	0.80	ND	5,188.00
	06/01/92	5,185.40	5,188.80	2.20	ND	5,186.60
	08/01/92	5,185.40	5,188.80	2.40	ND	5,186.40
	12/01/92	5,185.40	5,188.80	0.10	ND	5,188.70
	03/01/93	5,185.40	5,188.80	0.60	ND	5,188.20
	05/01/93	5,185.40	5,188.80	NM	NM	NM
	11/01/93	5,185.40	5,188.80	0.60	ND	5,188.20
	05/01/94	5,185.40	5,188.80	NM	NM	NM
	10/01/94	5,185.40	5,188.80	1.86	ND	5,186.94
	05/01/95	5,185.40	5,188.80	NM	NM	NM
	10/01/95	5,185.40	5,188.80	5.79	ND	5,183.01
	05/01/96	5,185.40	5,188.80	NM	NM	NM
	10/01/96	5,185.40	5,188.80	5.32	ND	5,183.48
	06/01/97	5,185.40	5,188.80	6.07	ND	5,182.73
	10/01/97	5,185.40	5,188.80	5.57	ND	5,183.23
	05/05/98	5,185.40	5,188.80	5.53	ND	5,183.27
	12/01/98	5,185.40	5,188.80	4.39	ND	5,184.41
	10/14/99	5,185.40	5,188.80	5.86	ND	5,182.94
	10/01/00	5,185.40	5,188.80	NM	NM	NM
MW-16	01/01/92	5,193.74	5,194.98	3.40	ND	5,191.58
	06/01/92	5,193.74	5,194.98	4.50	ND	5,190.48
	08/01/92	5,193.74	5,194.98	3.30	ND	5,191.68
	12/01/92	5,193.74	5,194.98	1.90	ND	5,193.08
	03/01/93	5,193.74	5,194.98	4.00	ND	5,190.98
	05/01/93	5,193.74	5,194.98	NM	NM	NM
	11/01/93	5,193.74	5,194.98	3.00	ND	5,191.98
	05/01/94	5,193.74	5,194.98	NM	NM	NM
	10/01/94	5,193.74	5,194.98	4.53	ND	5,190.45
	05/01/95	5,193.74	5,194.98	NM	NM	NM
	10/01/95	5,193.74	5,194.98	6.03	ND	5,188.95
	05/01/96	5,193.74	5,194.98	NM	NM	NM
	10/01/96	5,193.74	5,194.98	7.61	ND	5,187.37
	06/01/97	5,193.74	5,194.98	7.72	ND	5,187.26
	10/01/97	5,193.74	5,194.98	7.20	ND	5,187.78
	05/05/98	5,193.74	5,194.98	8.36	ND	5,186.62
	12/01/98	5,193.74	5,194.98	5.58	ND	5,189.40
	10/14/99	5,193.74	5,194.98	6.72	ND	5,188.26
	10/01/00	5,193.74	5,194.98	5.76	ND	5,189.22
	12/19/01	5,193.74	5,194.98	5.85	ND	5,189.13
	12/19/02	5,193.74	5,194.98	5.95	ND	5,189.03
	11/08/03	5,193.74	5,194.98	8.43	ND	5,186.55
	01/11/05	5,193.74	5,194.98	5.50	ND	5,189.48
MW-18	01/01/92	5,199.14	5,201.75	NM	NM	NM
	06/01/92	5,199.14	5,201.75	7.10	ND	5,194.65
	08/01/92	5,199.14	5,201.75	5.00	ND	5,196.75
	12/01/92	5,199.14	5,201.75	4.50	ND	5,197.25
	03/01/93	5,199.14	5,201.75	6.70	ND	5,195.05
	05/01/93	5,199.14	5,201.75	7.10	ND	5,194.65
	11/01/93	5,199.14	5,201.75	5.20	ND	5,196.55
	05/01/94	5,199.14	5,201.75	9.58	ND	5,192.17
	10/01/94	5,199.14	5,201.75	8.60	ND	5,193.15
	05/01/95	5,199.14	5,201.75	11.82	ND	5,189.93
	10/01/95	5,199.14	5,201.75	10.69	ND	5,191.06
	05/01/96	5,199.14	5,201.75	11.81	ND	5,189.94
	10/01/96	5,199.14	5,201.75	10.35	ND	5,191.40
	06/01/97	5,199.14	5,201.75	12.46	ND	5,189.29
	10/01/97	5,199.14	5,201.75	11.96	ND	5,189.79
	05/05/98	5,199.14	5,201.75	13.72	ND	5,188.03
	12/01/98	5,199.14	5,201.75	10.37	ND	5,191.38
	10/14/99	5,199.14	5,201.75	11.51	ND	5,190.24
	10/01/00	5,199.14	5,201.75	10.48	ND	5,191.27
	12/19/01	5,199.14	5,201.75	10.61	ND	5,191.14
	12/19/02	5,199.14	5,201.75	11.10	ND	5,190.65
	11/08/03	5,199.14	5,201.75	11.30	ND	5,190.45
	01/12/05	5,199.14	5,201.75	11.70	ND	5,190.05

Table 1:
Fluid Levels

Well ID	Date	Ground Elevation (feet)	Datum Elevation (feet)	Depth to Water (feet)	Free Product Thickness (feet)	Corrected Elevation (ft)
MW-19	01/01/92	5188.58	5189.54	1.00	ND	5,188.54
	06/01/92	5188.58	5189.54	2.00	ND	5,187.54
	08/01/92	5188.58	5189.54	1.90	ND	5,187.64
	12/01/92	5188.58	5189.54	0.30	ND	5,189.24
	03/01/93	5188.58	5189.54	1.20	ND	5,188.34
	05/01/93	5188.58	5189.54	2.20	ND	5,187.34
	11/01/93	5188.58	5189.54	1.00	ND	5,188.54
	05/01/94	5188.58	5189.54	3.43	ND	5,186.11
	10/01/94	5188.58	5189.54	2.48	ND	5,187.06
	05/01/95	5188.58	5189.54	3.50	ND	5,186.04
	10/01/95	5188.58	5189.54	3.44	ND	5,186.10
	05/01/96	5188.58	5189.54	3.42	ND	5,186.12
	10/01/96	5188.58	5189.54	2.97	ND	5,186.57
	06/01/97	5188.58	5189.54	4.51	ND	5,185.03
	10/01/97	5188.58	5189.54	3.99	ND	5,185.55
	05/05/98	5188.58	5189.54	4.62	ND	5,184.92
	12/01/98	5188.58	5189.54	2.68	ND	5,186.86
	10/14/99	5188.58	5189.54	3.70	ND	5,185.84
	10/01/00	5188.58	5189.54	2.84	ND	5,186.70
	12/19/01	5188.58	5189.54	5.05	ND	5,184.49
	12/19/02	5188.58	5189.54	5.09	ND	5,184.45
	11/08/03	5188.58	5189.54	3.54	ND	5,186.00
	01/11/05	5188.58	5189.54	2.35	ND	5,187.19
MW-20	01/01/92	5,190.10	5,191.05	2.60	ND	5,188.45
	06/01/92	5,190.10	5,191.05	3.50	ND	5,187.55
	08/01/92	5,190.10	5,191.05	3.50	ND	5,187.55
	12/01/92	5,190.10	5,191.05	1.80	ND	5,189.25
	03/01/93	5,190.10	5,191.05	2.70	ND	5,188.35
	05/01/93	5,190.10	5,191.05	3.70	ND	5,187.35
	11/01/93	5,190.10	5,191.05	2.60	ND	5,188.45
	05/01/94	5,190.10	5,191.05	5.76	ND	5,185.29
	10/01/94	5,190.10	5,191.05	3.83	ND	5,187.22
	05/01/95	5,190.10	5,191.05	4.78	ND	5,186.27
	10/01/95	5,190.10	5,191.05	4.71	ND	5,186.34
	05/01/96	5,190.10	5,191.05	4.57	ND	5,186.48
	10/01/96	5,190.10	5,191.05	4.35	ND	5,186.70
	06/01/97	5,190.10	5,191.05	5.65	ND	5,185.40
	10/01/97	5,190.10	5,191.05	5.15	ND	5,185.90
	05/05/98	5,190.10	5,191.05	5.73	ND	5,185.32
	12/01/98	5,190.10	5,191.05	4.05	ND	5,187.00
	10/14/99	5,190.10	5,191.05	5.10	ND	5,185.95
	10/01/00	5,190.10	5,191.05	4.11	ND	5,186.94
	12/19/01	5,190.10	5,191.05	4.45	ND	5,186.60
	12/19/02	5,190.10	5,191.05	4.23	ND	5,186.82
	11/08/03	5,190.10	5,191.05	4.80	ND	5,186.25
	01/11/05	5,190.10	5,191.05	3.81	ND	5,187.24
MW-21	01/01/92	5,193.62	5,194.81	2.80	ND	5,192.01
	06/01/92	5,193.62	5,194.81	4.30	ND	5,190.51
	08/01/92	5,193.62	5,194.81	4.60	ND	5,190.21
	12/01/92	5,193.62	5,194.81	2.20	ND	5,192.61
	03/01/93	5,193.62	5,194.81	3.20	ND	5,191.61
	05/01/93	5,193.62	5,194.81	4.70	ND	5,190.11
	11/01/93	5,193.62	5,194.81	3.30	ND	5,191.51
	05/01/94	5,193.62	5,194.81	6.00	ND	5,188.81
	10/01/94	5,193.62	5,194.81	5.04	ND	5,189.77
	05/01/95	5,193.62	5,194.81	6.29	ND	5,188.52
	10/01/95	5,193.62	5,194.81	6.22	ND	5,188.59
	05/01/96	5,193.62	5,194.81	6.22	ND	5,188.59
	10/01/96	5,193.62	5,194.81	5.71	ND	5,189.10
	06/01/97	5,193.62	5,194.81	6.73	ND	5,188.08
	10/01/97	5,193.62	5,194.81	6.92	ND	5,187.89
	05/05/98	5,193.62	5,194.81	7.45	ND	5,187.36
	12/01/98	5,193.62	5,194.81	NM	NM	NM
	10/14/99	5,193.62	5,194.81	6.64	ND	5,188.17
	10/01/00	5,193.62	5,194.81	4.99	ND	5,189.82
	12/19/01	5,193.62	5,194.81	4.72	ND	5,190.09
	12/19/02	5,193.62	5,194.81	5.50	ND	5,189.31
	11/08/03	5,193.62	5,194.81	6.50	ND	5,188.31
	01/12/05	5,193.62	5,194.81	5.52	ND	5,189.29

Table 1:
Fluid Levels

Well ID	Date	Ground Elevation (feet)	Datum Elevation (feet)	Depth to Water (feet)	Free Product Thickness (feet)	Corrected Elevation (ft)
Inside Slurry Wall						
MW-17	01/01/92	5,193.43	5,195.91	NM	NM	NM
	06/01/92	5,193.43	5,195.91	3.70	ND	5,192.21
	08/01/92	5,193.43	5,195.91	3.40	ND	5,192.51
	12/01/92	5,193.43	5,195.91	2.10	ND	5,193.81
	03/01/93	5,193.43	5,195.91	3.10	ND	5,192.81
	05/01/93	5,193.43	5,195.91	3.90	ND	5,192.01
	11/01/93	5,193.43	5,195.91	2.90	ND	5,193.01
	05/01/94	5,193.43	5,195.91	5.71	ND	5,190.20
	10/01/94	5,193.43	5,195.91	5.47	ND	5,190.44
	05/01/95	5,193.43	5,195.91	8.30	ND	5,187.61
	10/01/95	5,193.43	5,195.91	8.29	ND	5,187.62
	05/01/96	5,193.43	5,195.91	8.11	ND	5,187.80
	10/01/96	5,193.43	5,195.91	8.02	ND	5,187.89
	06/01/97	5,193.43	5,195.91	9.32	ND	5,186.59
	10/01/97	5,193.43	5,195.91	9.48	ND	5,186.43
	05/05/98	5,193.43	5,195.91	9.42	0.01	5,186.50
	12/01/98	5,193.43	5,195.91	7.37	ND	5,188.54
	10/14/99	5,193.43	5,195.91	9.45	ND	5,186.46
	10/01/00	5,193.43	5,195.91	8.12	ND	5,187.79
	12/19/01	5,193.43	5,195.91	8.10	ND	5,187.81
	12/19/02	5,193.43	5,195.91	8.00	ND	5,187.91
	11/08/03	5,193.43	5,195.91	9.15	ND	5,186.76
	01/12/05	5,193.43	5,195.91	7.70	ND	5,188.21
MW-22	01/01/92	5,194.58	5,195.86	4.50	ND	5,191.36
	06/01/92	5,194.58	5,195.86	5.30	ND	5,190.56
	08/01/92	5,194.58	5,195.86	4.70	ND	5,191.16
	12/01/92	5,194.58	5,195.86	3.50	ND	5,192.36
	03/01/93	5,194.58	5,195.86	5.00	ND	5,190.86
	05/01/93	5,194.58	5,195.86	5.70	ND	5,190.16
	11/01/93	5,194.58	5,195.86	4.40	ND	5,191.46
	05/01/94	5,194.58	5,195.86	7.62	ND	5,188.24
	10/01/94	5,194.58	5,195.86	7.18	ND	5,188.68
	05/01/95	5,194.58	5,195.86	7.64	ND	5,188.22
	10/01/95	5,194.58	5,195.86	7.16	ND	5,188.70
	05/01/96	5,194.58	5,195.86	7.51	ND	5,188.35
	10/01/96	5,194.58	5,195.86	6.89	ND	5,188.97
	06/01/97	5,194.58	5,195.86	8.16	ND	5,187.70
	10/01/97	5,194.58	5,195.86	8.06	0.03	5,187.82
	05/05/98	5,194.58	5,195.86	9.02	0.01	5,186.85
	12/01/98	5,194.58	5,195.86	6.52	ND	5,189.34
	10/14/99	5,194.58	5,195.86	7.75	ND	5,188.11
	10/01/00	5,194.58	5,195.86	6.90	ND	5,188.96
	12/19/01	5,194.58	5,195.86	7.00	ND	5,188.86
	12/19/02	5,194.58	5,195.86	7.05	ND	5,188.81
	11/08/03	5,194.58	5,195.86	7.62	ND	5,188.24
	01/12/05	5,194.58	5,195.86	6.82	ND	5,189.04
P-1	01/01/92	5,195.74	5,197.66	NM	NM	NM
	06/01/92	5,195.74	5,197.66	5.40	ND	5,192.26
	08/01/92	5,195.74	5,197.66	4.20	ND	5,193.46
	12/01/92	5,195.74	5,197.66	3.30	ND	5,194.36
	03/01/93	5,195.74	5,197.66	5.50	ND	5,192.16
	05/01/93	5,195.74	5,197.66	6.10	ND	5,191.56
	11/01/93	5,195.74	5,197.66	4.40	ND	5,193.26
	05/01/94	5,195.74	5,197.66	7.21	ND	5,190.45
	10/01/94	5,195.74	5,197.66	7.57	ND	5,190.09
	05/01/95	5,195.74	5,197.66	8.62	ND	5,189.04
	10/01/95	5,195.74	5,197.66	7.82	ND	5,189.84
	05/01/96	5,195.74	5,197.66	8.54	0.01	5,189.13
	10/01/96	5,195.74	5,197.66	7.43	ND	5,190.23
	06/01/97	5,195.74	5,197.66	9.29	0.01	5,188.38
	10/01/97	5,195.74	5,197.66	8.91	0.01	5,188.76
	05/05/98	5,195.74	5,197.66	9.87	0.01	5,187.80
	12/01/98	5,195.74	5,197.66	NM	NM	NM
	10/01/99	5,195.74	5,197.66	NM	NM	NM
	10/01/00	5,195.74	5,197.66	NM	NM	NM

Maverik Tank Farm and Refinery
Kirtland, NM

Table 1:
Fluid Levels

Well ID	Date	Ground Elevation (feet)	Datum Elevation (feet)	Depth to Water (feet)	Free Product Thickness (feet)	Corrected Elevation (ft)
P-2	01/01/92	5,190.50	5,192.32	NM	NM	NM
	06/01/92	5,190.50	5,192.32	3.10	ND	5,189.22
	08/01/92	5,190.50	5,192.32	2.30	ND	5,190.02
	12/01/92	5,190.50	5,192.32	1.00	ND	5,191.32
	03/01/93	5,190.50	5,192.32	2.20	ND	5,190.12
	05/01/93	5,190.50	5,192.32	3.10	ND	5,189.22
	11/01/93	5,190.50	5,192.32	1.90	ND	5,190.42
	05/01/94	5,190.50	5,192.32	4.20	ND	5,188.12
	10/01/94	5,190.50	5,192.32	4.81	ND	5,187.51
	05/01/95	5,190.50	5,192.32	5.30	ND	5,187.02
	10/01/95	5,190.50	5,192.32	4.86	ND	5,187.46
	05/01/96	5,190.50	5,192.32	5.04	ND	5,187.28
	10/01/96	5,190.50	5,192.32	4.53	ND	5,187.79
	06/01/97	5,190.50	5,192.32	6.04	ND	5,186.28
	10/01/97	5,190.50	5,192.32	5.69	ND	5,186.63
	05/05/98	5,190.50	5,192.32	9.96	0.01	5,182.37
	12/01/98	5,190.50	5,192.32	NM	NM	NM
	10/14/99	5,190.50	5,192.32	NM	NM	NM
	10/01/00	5,190.50	5,192.32	NM	NM	NM
P-3	01/01/92	5,191.44	5,193.21	NM	NM	NM
	06/01/92	5,191.44	5,193.21	3.40	ND	5,189.81
	08/01/92	5,191.44	5,193.21	3.60	ND	5,189.61
	12/01/92	5,191.44	5,193.21	1.60	ND	5,191.61
	03/01/93	5,191.44	5,193.21	2.60	ND	5,190.61
	05/01/93	5,191.44	5,193.21	3.60	ND	5,189.61
	11/01/93	5,191.44	5,193.21	2.60	ND	5,190.61
	05/01/94	5,191.44	5,193.21	4.86	ND	5,188.35
	10/01/94	5,191.44	5,193.21	5.77	ND	5,187.44
	05/01/95	5,191.44	5,193.21	5.94	ND	5,187.27
	10/01/95	5,191.44	5,193.21	5.88	ND	5,187.33
	05/01/96	5,191.44	5,193.21	5.66	ND	5,187.55
	10/01/96	5,191.44	5,193.21	5.62	ND	5,187.59
	06/01/97	5,191.44	5,193.21	7.17	ND	5,186.04
	10/01/97	5,191.44	5,193.21	6.67	ND	5,186.54
	05/05/98	5,191.44	5,193.21	6.94	ND	5,186.27
	12/01/98	5,191.44	5,193.21	NM	NM	NM
	10/14/99	5,191.44	5,193.21	NM	NM	NM
	10/01/00	5,191.44	5,193.21	NM	NM	NM
P-4	01/01/92	5,197.06	5,198.82	NM	NM	NM
	06/01/92	5,197.06	5,198.82	7.00	ND	5,191.82
	08/01/92	5,197.06	5,198.82	6.20	ND	5,192.62
	12/01/92	5,197.06	5,198.82	5.10	ND	5,193.72
	03/01/93	5,197.06	5,198.82	7.10	ND	5,191.72
	05/01/93	5,197.06	5,198.82	7.60	ND	5,191.22
	11/01/93	5,197.06	5,198.82	6.10	ND	5,192.72
	05/01/94	5,197.06	5,198.82	8.09	ND	5,190.73
	10/01/94	5,197.06	5,198.82	8.93	0.28	5,190.11
	05/01/95	5,197.06	5,198.82	9.85	ND	5,188.97
	10/01/95	5,197.06	5,198.82	9.13	ND	5,189.69
	05/01/96	5,197.06	5,198.82	9.73	ND	5,189.09
	10/01/96	5,197.06	5,198.82	8.79	ND	5,190.03
	06/01/97	5,197.06	5,198.82	9.88	ND	5,188.94
	10/01/97	5,197.06	5,198.82	9.90	ND	5,188.92
	05/05/98	5,197.06	5,198.82	6.46	ND	5,192.36
	12/01/98	5,197.06	5,198.82	NM	NM	NM
	10/14/99	5,197.06	5,198.82	NM	NM	NM
	10/01/00	5,197.06	5,198.82	NM	NM	NM
Notes: NM = Not Measured						
ND = Non Detect						

Table 2
Ground Water Chemistry

Location	Date	1,2-DCA	B	E	X	T	BTEX	pH	SC
Within Slurry Wall		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L		uS
MW-17	09/13/90	360	11000.0	1,160	13,000	15,000	40160.0	7.01	2500
	03/18/91	400	11000.0	1,900	15,000	10,000	37900.0	7.04	2700
	06/13/91	420	9800.0	1,800	16,000	6,300	33900.0	7.04	2650
	01/20/92	MSG	MSG	MSG	MSG	MSG	MSG	MSG	MSG
	06/09/92	45	9240.0	1,150	7,190	7,580	25160.0	7.26	2730
	08/19/92	27	7710.0	669	5,130	1,920	15429.0	7.23	2810
	12/16/92	17.3	7990.0	638	4,600	4,740	17968.0	7.54	2970
	03/30/93	16.8	13800.0	1,110	6,930	6,830	28670.0	7.37	2610
	05/23/93	12.5	13700.0	993	10,530	6,360	31583.0	7.33	2470
	11/29/93	30.9	8590.0	636	4,880	2,820	16926.0	7.39	2360
	05/25/94	8.3	10900.0	823	5,660	4,340	21723.0	7.30	2830
	10/02/94	4.9	5130.0	409	2,818	1,160	9517.0	7.04	2470
Duplicate	10/02/94	< 1	2070.0	350	2,013	807	5240.0	7.04	2470
	05/17/95	< 10	9320.0	694	3,782	2,510	16306.0	7.49	2480
Duplicate	05/17/95	< 10	12800.0	944	5,710	4,460	23914.0	7.49	2480
**	10/18/95	2.3	3000.0	244	1,079	464	4787.0	7.09	2430
	05/01/96	2.2	7700.0	530	1,800	1,200	11230.0	7.20	2280
Duplicate	05/01/96	< 5	7300.0	490	1,800	1,200	10790.0	7.20	2280
	10/20/96	< 5	3600.0	290	1,500	880	6270.0	7.50	2290
	06/24/97	<0.5	5500.0	23	180	51	5754.0	7.52	2550
	10/28/97	<5	590.0	140	1,300	920	2950.0	7.42	2310
Duplicate	10/28/97	<5	490.0	95	930	680	2195.0	7.42	2310
	05/05/98	NS	NS	NS	NS	NS	0.0	NS	NS
Duplicate	12/09/98	180	4000.0	870	4,500	970	10340.0	7.57	1160
	12/09/98	<10	2300.0	370	1,300	44	4014.0	7.57	1160
	10/14/99	<5	440.0	110	930	140	1620.0	7.64	2030
	10/27/00	<5	500.0	180	1,600	57	2337.0	7.50	1920
	12/19/01	ND	6200.0	1,900	17,200	6,000	31300.0	7.61	1713
	12/19/02	ND	4200.0	1,700	13,000	1,900	20800.0	NS	2186
	11/08/03	ND	420.0	87	1,060	120	1687.0	NS	2145
	01/12/05	<100.0	4800.0	840	7,400	440	13480.0	NS	0.00532
MW-22	09/13/90	7,200	21000.0	1,100	8,300	20,000	50400.0	7.00	1500
	03/18/91	2,200	17000.0	910	6,600	9,500	34010.0	6.87	1900
	07/13/91	3,600	15000.0	760	3,000	3,200	21960.0	7.06	1700
	01/20/92	5,400	36000.0	1,900	13,500	27,000	78400.0	6.86	1600
	06/09/92	3,170	21200.0	1,040	5,730	7,540	35510.0	7.13	1690
	08/19/92	568	20500.0	588	3,280	4,610	28978.0	7.28	1545
	12/16/92	908	12100.0	514	3,254	4,220	20088.0	7.43	1508
	03/30/93	1,930	29800.0	1,170	7,030	14,100	52100.0	7.26	1408
	05/23/93	28	17000.0	1,100	6,150	6,520	30770.0	7.61	6550
	11/29/93	2,780	18400.0	1,150	7,300	8,480	35330.0	8.01	1610
	05/25/94	379	9340.0	845	3,725	2,250	16160.0	7.15	1505
	10/02/94	566	10500.0	1,390	8,350	5,890	26130.0	7.24	1710
	05/17/95	62	7510.0	1,000	6,520	1,750	16780.0	7.15	1517
Duplicate	05/17/95	67	9020.0	1,230	7,310	2,620	20180.0	7.15	1517
Duplicate **	10/18/95	42	5700.0	1,580	9,000	2,430	18710.0	7.25	1820
**	10/18/95	< 1	5120.0	1,540	8,320	2,130	17110.0	7.25	1820
	05/01/96	37	4600.0	1,300	10,000	410	16310.0	7.30	1325
	10/20/96	38	880.0	710	4,100	250	5940.0	7.49	1505
	06/24/97	24	4300.0	510	5,500	580	10890.0	7.31	1280
Duplicate	06/24/97	21	5800.0	750	7,300	930	14780.0	7.31	1280
	10/18/97	NS	NS	NS	NS	NS	0.0	NS	NS
	05/05/98	12	3300.0	610	3,400	300	7610.0	7.61	1290
Duplicate	05/05/98	14	3500.0	630	3,600	310	8040.0	7.61	1290
	12/09/98	190	3700.0	720	4,000	910	9330.0	7.40	1500
	10/14/99	<5	580.0	150	820	210	1760.0	7.72	1840
Duplicate	10/14/99	<5	730.0	180	1000	270	2180.0	7.72	1840
	10/27/00	<10	210.0	220	830	120	1380.0	7.70	1610
	12/19/01	ND	410.0	120	470	19	1019.0	7.50	1620
	12/19/02	ND	1200.0	220	640	30	2090.0	NS	706
	11/08/03	ND	330.0	200	222	20	772.0	NS	1630
	01/12/05	<10.0	770.0	820	120	18	1728.0	NS	1614

Table 2
Ground Water Chemistry

Location	Date	1,2-DCA	B	E	X	T	BTEX	pH	SC
P-1	05/23/93	< 1	4110.0	361	2,522	18.8	7011.8	7.04	2290
	11/29/93	< 1	3580.0	506	3,215	10.2	7311.2	7.22	1460
	05/25/94	NS	NS	NS	NS	NS	0.0	NS	NS
	10/02/94	< 1	8.9	1.9	11.8	< 1	22.6	7.04	2210
	05/17/95	NS	NS	NS	NS	NS	0.0	NS	NS
	10/18/95	NS	NS	NS	NS	NS	0.0	NS	NS
	05/02/96	NS	NS	NS	NS	NS	0.0	NS	NS
	10/20/96	NS	NS	NS	NS	NS	0.0	NS	NS
	06/24/97	NS	NS	NS	NS	NS	0.0	NS	NS
	10/18/97	NS	NS	NS	NS	NS	0.0	NS	NS
	05/05/98	NS	NS	NS	NS	NS	0.0	NS	NS
	12/09/98	NS	NS	NS	NS	NS	0.0	NS	NS
	10/14/99	NS	NS	NS	NS	NS	0.0	NS	NS
	10/27/00	NS	NS	NS	NS	NS	0.0	NS	NS
P-2	05/23/93	3.2	5.2	< 1	< 1	< 1	5.2	7.36	3910
	11/29/93	< 1	< 1	< 1	< 1	< 1	0.0	7.92	3540
	05/24/94	1.3	< 1	< 1	< 1	< 1	0.0	7.41	3980
	10/02/94	3.6	< 1	< 1	< 1	< 1	0.0	7.12	3480
	05/17/95	NS	NS	NS	NS	NS	0.0	NS	NS
	10/18/95	NS	NS	NS	NS	NS	0.0	NS	NS
	05/02/96	0.8	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.40	2980
	10/20/96	NS	NS	NS	NS	NS	0.0	NS	NS
	06/24/97	NS	NS	NS	NS	NS	0.0	NS	NS
	10/18/97	NS	NS	NS	NS	NS	0.0	NS	NS
	05/05/98	NS	NS	NS	NS	NS	0.0	NS	NS
	12/09/98	NS	NS	NS	NS	NS	0.0	NS	NS
	10/14/99	NS	NS	NS	NS	NS	0.0	NS	NS
	10/27/00	NS	NS	NS	NS	NS	0.0	NS	NS
P-3	05/23/93	10.6	< 1	< 1	< 1	< 1	0.0	7.24	11160
	11/29/93	11.5	< 1	< 1	< 1	< 1	0.0	7.31	9140
	05/24/94	12.1	< 1	< 1	< 1	< 1	0.0	7.28	8070
	10/02/94	12.6	< 1	< 1	< 1	< 1	0.0	7.06	5550
	05/17/95	NS	NS	NS	NS	NS	0.0	NS	NS
	10/18/95	NS	NS	NS	NS	NS	0.0	NS	NS
	05/01/96	3.4	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.40	4280
	10/20/96	NS	NS	NS	NS	NS	0.0	NS	NS
	06/24/97	NS	NS	NS	NS	NS	0.0	NS	NS
	10/18/97	NS	NS	NS	NS	NS	0.0	NS	NS
	05/05/98	NS	NS	NS	NS	NS	0.0	NS	NS
	12/09/98	NS	NS	NS	NS	NS	0.0	NS	NS
	10/14/99	NS	NS	NS	NS	NS	0.0	NS	NS
	10/27/00	NS	NS	NS	NS	NS	0.0	NS	NS
P-4	05/23/93	8.3	6690.0	559	6,260	4,090	17599.0	NA	NA
	11/29/93	2.1	6400.0	900	7,700	4,420	19420.0	NA	NA
	05/24/94	NS	NS	NS	NS	NS	0.0	NS	NS
	10/02/94	NS	NS	NS	NS	NS	0.0	NS	NS
	05/17/95	NS	NS	NS	NS	NS	0.0	NS	NS
	10/18/95	NS	NS	NS	NS	NS	0.0	NS	NS
	05/01/96	NA	NA	NA	NA	NA	0.0	6.60	1621
	10/20/96	NS	NS	NS	NS	NS	0.0	NS	NS
	06/24/97	NS	NS	NS	NS	NS	0.0	NS	NS
	10/18/97	NS	NS	NS	NS	NS	0.0	NS	NS
	05/05/98	NS	NS	NS	NS	NS	0.0	NS	NS
	12/09/98	NS	NS	NS	NS	NS	0.0	NS	NS
	10/14/99	NS	NS	NS	NS	NS	0.0	NS	NS
	10/27/00	NS	NS	NS	NS	NS	0.0	NS	NS

Table 2
Ground Water Chemistry

Location	Date	1,2-DCA	B	E	X	T	BTEX	pH	SC
							0.0		
On Site							0.0		
MW-10	09/13/90	1.4	< 0.5	< 0.5	< 1	< 0.5	0.0	6.95	1550
	05/18/91	< 1	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.29	1700
	06/13/91	NA	NA	NA	NA	NA	0.0	NA	NA
	01/20/92	< 5	< 5	< 5	< 5	< 5	0.0	7.31	1840
	06/09/92	1.6	< 1	< 1	< 1	< 1	0.0	7.65	1400
	08/19/92	< 1	< 1	< 1	< 1	< 1	0.0	7.85	1160
	12/16/92	< 1	< 1	< 1	< 1	< 1	0.0	7.64	6110
	03/30/93	< 1	< 1	< 1	< 1	< 1	0.0	7.22	9060
	05/23/93	< 1	< 1	< 1	< 1	< 1	0.0	7.93	2320
	11/29/93	< 1	< 1	< 1	< 1	< 1	0.0	7.73	1320
	05/25/94	< 1	< 1	< 1	< 1	< 1	0.0	7.75	1335
	10/02/94	< 1	< 1	< 1	< 1	< 1	0.0	7.56	1159
	05/17/95	< 1	< 1	< 1	< 1	< 1	0.0	7.64	1695
	10/18/95	< 1	< 1	< 1	< 1	< 1	0.0	7.41	1453
	05/01/96	1.0	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.70	1288
	10/20/96	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.69	1310
	06/24/97	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.63	2520
	10/20/97	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.61	1585
	05/05/98	1.0	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.60	1608
	12/09/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.64	1290
	10/14/99	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	7.68	1650
	10/27/00	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	7.50	1470
	12/19/01	ND	ND	ND	ND	ND	ND	7.28	1409
	12/19/02	ND	ND	ND	ND	ND	ND	NS	1594
	11/08/03	ND	ND	ND	ND	ND	ND	NS	1631
	01/11/05	<1.0	<1.0	<1.0	<1.0	<1.0	ND	NS	1900
							0.0		
MW-18	09/13/90	< 1	17.0	84.0	880	< 12	981.0	7.00	1500
	03/18/91	< 1	26.0	85.0	770	< 12	881.0	7.24	1200
	06/13/91	< 1	< 25	78.0	930	< 25	1008.0	6.77	1200
	01/20/92	MSG	MSG	MSG	MSG	MSG	0.0	MSG	MSG
	06/09/92	< 1	313.0	200	1,710	1.1	2224.1	7.07	1480
	08/19/92	< 1	527.0	258	2,075	10.8	2870.8	7.26	2100
	12/16/92	< 25	294.0	224	1,460	< 25	1978.0	7.31	1930
	03/30/93	< 1	117.0	96.0	226	8.0	447.0	7.07	2780
	05/23/93	< 1	73.0	31.2	259	< 1	363.2	7.15	2220
	11/29/93	< 1	337.0	261	1,352	4.9	1954.9	7.00	1870
	05/25/94	< 1	51.0	7.0	99	10.0	167.0	7.00	1510
	10/02/94	< 1	210.0	46.0	483	10.9	749.7	7.10	1530
	05/17/95	< 1	128.0	10.4	274	< 1	412.4	6.84	1370
	10/18/95	< 1	118.0	20.0	296	12.2	446.6	7.03	1299
	05/01/96	< 0.5	48.0	3.4	150	0.5	201.9	7.00	1270
	10/20/96	< 0.5	37.0	14.0	110	11.0	172.0	7.50	1314
Duplicate	10/20/96	< 0.5	33.0	12.0	120	0.8	165.8	7.50	1314
	06/24/97	< 0.5	130.0	15.0	200	<0.5	345.0	6.98	1399
	10/27/97	< 0.5	55.0	19.0	150	0.5	224.5	6.99	1280
	05/05/98	< 0.5	16.0	<0.5	2.1	<0.5	18.1	6.84	1374
	12/09/98	<2.5	44.0	21	<2.5	<2.5	65.0	7.04	1438
	10/14/99	0.50	33.0	11	60	4	108.0	7.13	1550
	10/27/00	0.90	9.5	<0.5	6.9	<0.5	6.9	6.90	3400
	12/19/01	ND	4.2	ND	ND	ND	4.2	6.89	3300
	12/19/02	ND	ND	ND	ND	ND	ND	NS	636
	11/08/03	ND	1.4	ND	ND	ND	1.4	NS	0.0063
	01/12/05	<1.0	<1.0	<1.0	5.70	<1.0	5.7	NS	0.0052
MW-19	09/13/90	45	< 0.5	1.1	1.9	< 0.5	3.0	6.95	3000
	05/18/91	35	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.22	2500
	06/13/91	44	< 0.5	5.9	< 0.5	< 0.5	5.9	7.10	2400
	01/20/92	14	< 5	< 5	< 5	< 5	0.0	7.66	460
	06/09/92	11.4	< 1	< 1	< 1	< 1	0.0	7.76	1970
	08/19/92	9.0	< 1	< 1	< 1	< 1	0.0	7.72	1320
	12/16/92	6.6	< 1	< 1	< 1	< 1	0.0	7.70	1620
	03/30/93	2.4	< 1	< 1	< 1	< 1	0.0	7.74	1750
	05/23/93	7.9	< 1	< 1	< 1	< 1	0.0	7.73	1630
	11/29/93	6.6	< 1	< 1	< 1	< 1	0.0	7.78	1380
	05/25/94	8.0	< 1	< 1	< 1	< 1	0.0	7.65	1762
	10/02/94	7.9	< 1	< 1	< 1	< 1	0.0	7.44	1258
	05/17/95	8.6	< 1	< 1	< 1	< 1	0.0	7.52	1624
	10/18/95	8.8	< 1	< 1	< 1	< 1	0.0	7.31	1411
	05/01/96	8.6	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.50	1361
	10/20/96	4.0	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.62	1340
	06/24/97	3.0	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.52	1573
	10/20/97	2.2	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.53	1346
	05/08/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.40	1672
	12/09/98	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.58	1381
	10/14/99	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	7.62	2000
	10/27/00	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	7.40	1490
	12/19/01	ND	ND	ND	ND	ND	ND	7.41	1420
	12/19/02	ND	ND	ND	ND	ND	ND	NS	1608
	11/08/03	ND	ND	ND	ND	ND	ND	NS	1661
	01/11/05	<1.0	<1.0	<1.0	<1.0	<1.0	ND	ND	1845

Table 2
Ground Water Chemistry

Location	Date	1,2-DCA	B	E	X	T	BTEX	pH	SC
							0.0		
MW-20	09/13/90	< 1	< 0.5	< 0.5	< 1	< 0.5	0.0	7.01	1350
	05/18/91	2.0	< 0.5	< 0.5	0.7	< 0.5	0.7	7.39	3000
	06/13/91	NA	NA	NA	NA	NA	0.0	NA	NA
	01/20/92	< 5	< 5	< 5	< 5	< 5	0.0	7.54	3750
	06/09/92	< 1	< 1	< 1	< 1	< 1	0.0	7.62	1600
	08/19/92	< 1	< 1	< 1	< 1	< 1	0.0	6.97	1310
	12/16/92	< 1	< 1	< 1	< 1	< 1	0.0	7.87	1340
	03/30/93	2.1	< 1	< 1	< 1	< 1	0.0	7.10	6740
	05/23/93	< 1	< 1	< 1	< 1	< 1	0.0	7.86	1430
	11/29/93	< 1	< 1	< 1	< 1	< 1	0.0	7.69	1230
	05/25/94	< 1	< 1	< 1	< 1	< 1	0.0	7.38	1292
	10/02/94	< 1	< 1	< 1	< 1	< 1	0.0	7.57	1308
	05/17/95	< 1	< 1	< 1	< 1	< 1	0.0	7.65	1434
	10/18/95	< 1	< 1	< 1	< 1	< 1	0.0	7.35	1525
	05/01/96	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.50	1417
	10/20/96	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.18	1545
	06/24/97	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.48	1540
	10/20/97	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.01	1452
	05/08/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.44	1890
	12/09/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.65	1153
	10/14/99	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	8.01	1600
	10/27/00	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	7.60	14840
	12/19/01	ND	ND	ND	ND	ND	ND	7.51	1695
	12/19/02	ND	ND	ND	ND	ND	ND	NS	1223
	11/08/03	ND	ND	ND	ND	ND	ND	NS	0.01751
	01/11/05	<1.0	<1.0	<1.0	<1.0	<1.0	ND	NS	1752
MW-21	09/16/90	67	< 0.5	1.1	5.0	1.5	7.6	7.01	1500
	03/18/91	44	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.62	1700
	06/13/91	40	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.44	1700
	01/20/92	8.8	< 5	< 5	< 5	< 5	0.0	8.31	5110
	06/09/92	21.9	< 1	< 1	< 1	< 1	0.0	7.37	2400
	08/19/92	8.3	< 1	< 1	< 1	< 1	0.0	6.96	1730
	12/16/92	1.7	< 1	< 1	< 1	< 1	0.0	7.69	2030
	03/30/93	5.9	< 1	< 1	< 1	< 1	0.0	7.58	1590
	05/23/93	14.8	< 1	< 1	< 1	< 1	0.0	7.63	2530
	11/29/93	3.7	< 1	< 1	< 1	< 1	0.0	7.58	1580
	05/25/94	8.3	< 1	< 1	< 1	< 1	0.0	7.66	1592
	10/02/94	5.5	< 1	< 1	< 1	< 1	0.0	7.55	1760
	05/17/95	< 1	< 1	< 1	< 1	< 1	0.0	7.59	1819
Duplicate	05/17/95	5.4	< 1	< 1	< 1	< 1	0.0	7.59	1819
	10/18/95	2.1	< 1	< 1	< 1	< 1	0.0	7.52	2060
	05/02/96	1.0	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.60	1824
	10/20/96	3.6	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.68	2100
	06/24/97	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	6.98	1642
	10/20/97	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	6.97	1653
	05/05/98	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	6.67	1760
	12/09/98	NS	NS	NS	NS	NS	0.0	NS	NS
	10/14/99	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	6.97	2180
	10/27/00	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	6.30	47500
Duplicate	10/27/00	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	6.30	47500
	12/19/01	ND	ND	ND	ND	ND	ND	6.51	3280
	12/19/02	ND	ND	ND	ND	ND	ND	NS	1905
	11/08/03	ND	ND	ND	ND	ND	ND	NS	0.04826
	01/12/05	<10.0	<10.0	<10.0	<10.0	<10.0	ND	NS	0.03258

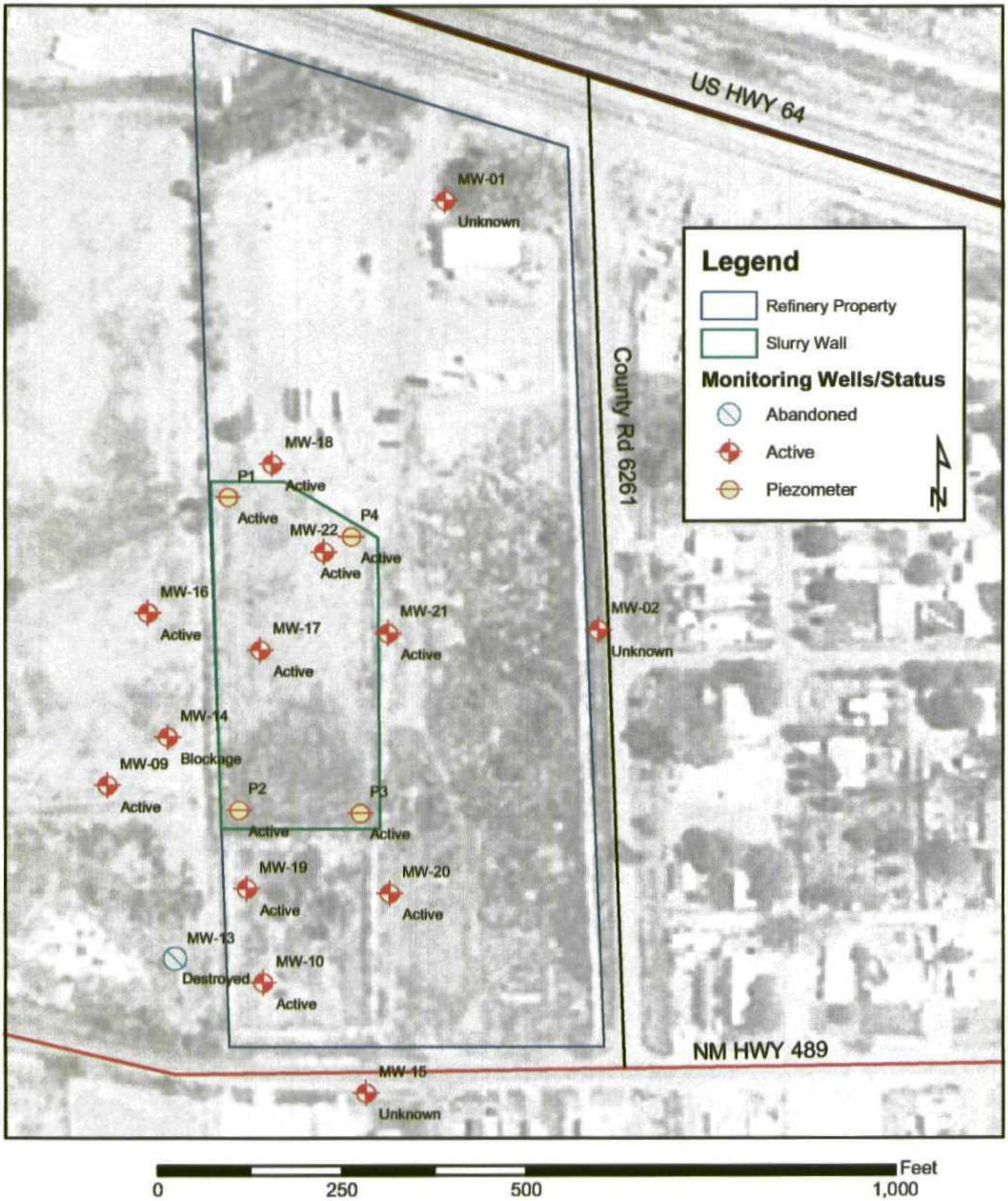
Table 2
Ground Water Chemistry

Location	Date	1,2-DCA	B	E	X	T	BTEX	pH	SC
Off Site									
MW-9	09/13/90	2.1	< 0.5	< 0.5	< 0.5	< 0.5	0.0	6.97	1550
	03/18/91	1.8	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.57	2000
	06/13/91	NA	NA	NA	NA	NA	0.0	NA	NA
	10/20/92	< 5	< 5	< 5	< 5	< 5	0.0	7.31	4360
	06/09/92	1.5	< 1	< 1	< 1	< 1	0.0	7.58	1680
	08/19/92	< 1	< 1	< 1	< 1	< 1	0.0	7.81	1325
	12/16/92	< 1	< 1	< 1	< 1	< 1	0.0	7.33	1827
	03/30/93	1.5	< 1	< 1	< 1	< 1	0.0	7.63	1640
	05/23/93	NA	NA	NA	NA	NA	0.0	NA	NA
	11/29/93	< 1	< 1	< 1	< 1	< 1	0.0	7.62	1460
	05/25/94	NS	NS	NS	NS	NS	0.0	NS	NS
	10/02/94	1.2	< 1	< 1	< 1	< 1	0.0	7.80	1610
	05/17/95	NS	NS	NS	NS	NS	0.0	NS	NS
	10/18/95	< 1	< 1	< 1	< 1	< 1	0.0	7.38	1523
	05/01/96	NS	NS	NS	NS	NS	0.0	NS	NS
	10/20/96	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.85	1645
	06/24/97	NS	NS	NS	NS	NS	0.0	NS	NS
	10/20/97	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	NV	NV
	05/05/98	NS	NS	NS	NS	NS	0.0	NS	NS
	12/09/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.51	1588
	10/14/99	NS	NS	NS	NS	NS	0.0	NS	NS
	12/19/01	ND	ND	ND	ND	ND	0.0	7.42	1610
	12/19/02	ND	ND	ND	ND	ND	ND	NS	380
	11/08/03	ND	ND	ND	ND	ND	ND	NS	2246
	01/11/05	<1.0	<1.0	<1.0	<1.0	<1.0	ND	NS	2310
MW-13	09/13/90	< 1	< 0.5	< 0.5	<1	1.5	1.5	7.02	2950
	03/18/91	< 1	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.84	3250
	06/13/91	NA	NA	NA	NA	NA	0.0	NA	NA
	01/20/92	NA	NA	NA	NA	NA	0.0	NA	NA
	06/09/92	<1	<1	<1	<1	<1	0.0	7.11	4260
	08/19/92	<1	<1	<1	<1	<1	0.0	7.06	2910
	12/16/92	NA	NA	NA	NA	NA	0.0	NA	NA
	03/30/93	<1	<1	<1	<1	<1	0.0	7.72	3410
	05/23/93	NA	NA	NA	NA	NA	0.0	NA	NA
	11/29/93	<1	<1	<1	<1	<1	0.0	7.45	4150
	05/25/94	NS	NS	NS	NS	NS	0.0	NS	NS
	10/02/94	<1	<1	<1	<1	<1	0.0	7.38	3160
	05/17/95	NS	NS	NS	NS	NS	0.0	NS	NS
	10/18/95	<1	<1	<1	<1	<1	0.0	7.41	3600
	05/01/96	NS	NS	NS	NS	NS	0.0	NS	NS
	10/20/96	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.54	3200
	06/24/97	NS	NS	NS	NS	NS	0.0	NS	NS
	10/20/97	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	NV	NV
	05/05/98	NS	NS	NS	NS	NS	0.0	NS	NS
	12/09/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.81	4100
Destroyed	10/14/99	NS	NS	NS	NS	NS	0.0	NS	NS
MW-14	09/13/90	2.0	< 0.5	< 0.5	< 1	< 0.5	0.0	6.97	5450
	03/18/91	< 1	< 0.5	< 0.5	1.7	< 0.5	1.7	7.51	8400
	06/13/91	NA	NA	NA	NA	NA	0.0	NA	NA
	01/20/92	< 5	< 5	< 5	< 5	< 5	0.0	7.20	19380
	06/09/92	2.3	< 1	< 1	< 1	< 1	0.0	7.62	4520
	08/19/92	< 1	< 1	< 1	< 1	< 1	0.0	7.38	5760
	12/16/92	< 1	< 1	< 1	< 1	< 1	0.0	7.40	9090
	03/30/93	< 1	< 1	< 1	< 1	< 1	0.0	7.02	15280
	05/23/93	NA	NA	NA	NA	NA	0.0	NA	NA
	11/29/93	1.2	< 1	< 1	< 1	< 1	0.0	7.61	6030
	05/25/94	NS	NS	NS	NS	NS	0.0	NS	NS
	10/02/94	1.9	< 1	< 1	< 1	< 1	0.0	7.34	4560
	05/17/95	NS	NS	NS	NS	NS	0.0	NS	NS
	10/18/95	< 1	< 1	< 1	< 1	< 1	0.0	7.15	6760
	05/01/96	NS	NS	NS	NS	NS	0.0	NS	NS
	10/20/96	0.7	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.15	6120
	06/24/97	NS	NS	NS	NS	NS	0.0	NS	NS
	10/20/97	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	NV	NV
	05/05/98	NS	NS	NS	NS	NS	0.0	NS	NS
	12/09/98	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.68	14100
	10/14/99	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	7.26	7830
	10/27/00	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	7.70	10500

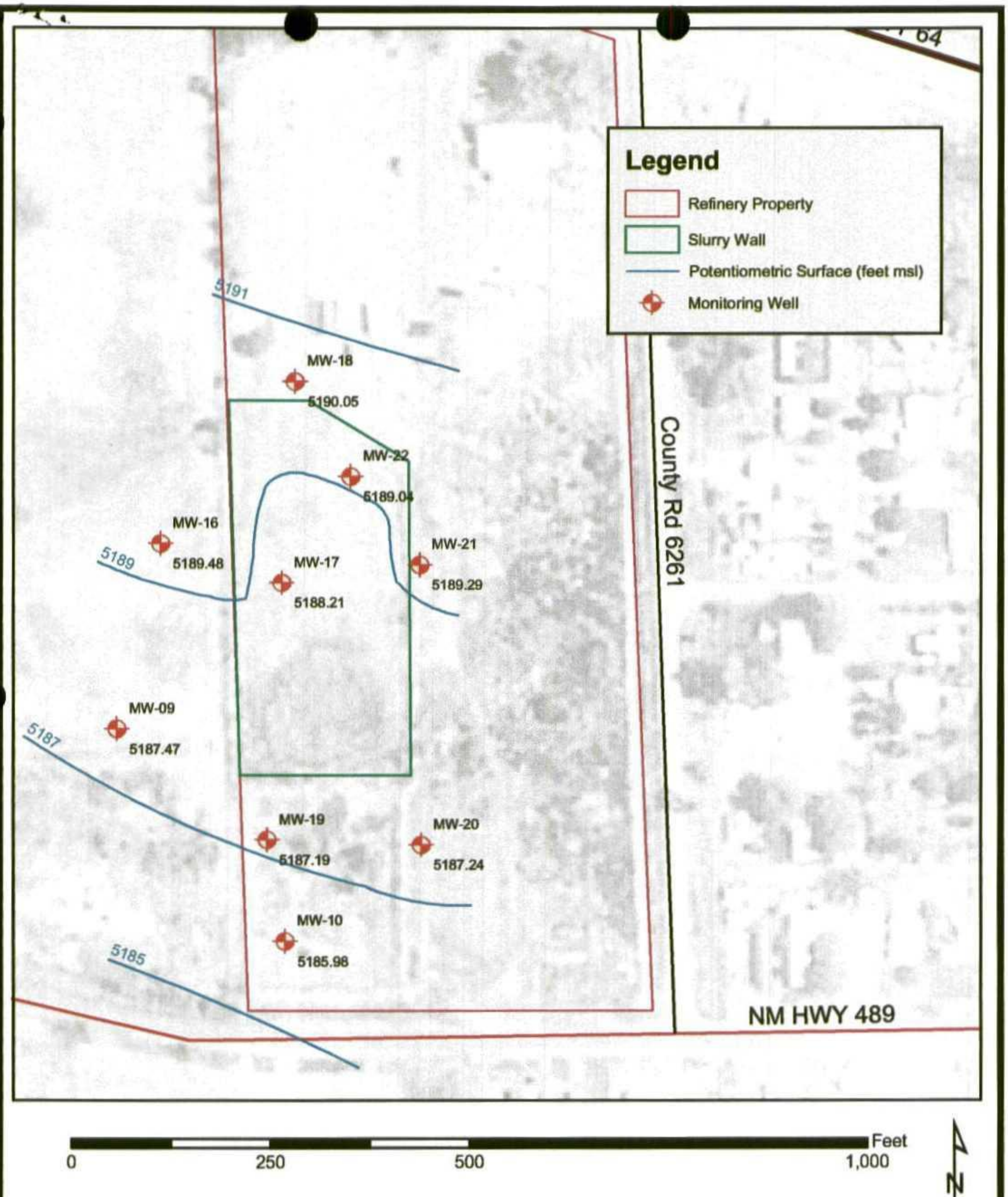
Table 2
Ground Water Chemistry

Location	Date	1,2-DCA	B	E	X	T	BTEX	pH	SC
MW-15	09/13/90	< 1	< 0.5	< 0.5	< 1	< 0.5	0.0	7.00	3250
	03/18/91	< 1	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.02	8500
	06/13/91	NA	NA	NA	NA	NA	0.0	NA	NA
	01/20/92	< 5	< 5	< 5	< 5	< 5	0.0	7.15	12120
	06/09/92	< 1	< 1	< 1	< 1	< 1	0.0	7.27	3430
	08/19/92	< 1	< 1	< 1	< 1	< 1	0.0	7.39	2450
	12/16/92	NA	NA	NA	NA	NA	0.0	NA	NA
	03/30/93	< 1	< 1	< 1	< 1	< 1	0.0	7.42	9810
	05/23/93	NA	NA	NA	NA	NA	0.0	NA	NA
	11/29/93	< 1	< 1	< 1	< 1	< 1	0.0	8.01	1630
	05/25/94	NS	NS	NS	NS	NS	0.0	NS	NS
	10/02/94	< 1	< 1	< 1	< 1	< 1	0.0	7.54	2500
	05/17/95	NS	NS	NS	NS	NS	0.0	NS	NS
	10/18/95	< 1	< 1	< 1	< 1	< 1	0.0	7.48	2260
	05/01/96	NS	NS	NS	NS	NS	0.0	NS	NS
	10/20/96	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	8.21	1939
	06/24/97	NS	NS	NS	NS	NS	0.0	NS	NS
	10/20/97	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	6.97	3250
	05/05/98	NS	NS	NS	NS	NS	0.0	NS	NS
	12/09/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.30	1980
	10/14/99	NS	NS	NS	NS	NS	0.0	NS	NS
MW-16	09/13/90	< 1	< 0.5	< 0.5	< 1	< 0.5	0.0	6.97	1370
	05/18/91	< 1	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.57	1200
	06/13/91	NA	NA	NA	NA	NA	0.0	NA	NA
	01/20/92	< 5	< 5	< 5	< 5	< 5	0.0	7.30	2050
	06/09/92	< 1	< 1	< 1	< 1	< 1	0.0	7.50	1430
	08/19/92	< 1	< 1	< 1	< 1	< 1	0.0	7.76	1230
	12/16/92	< 1	< 1	< 1	< 1	< 1	0.0	7.12	1735
	03/30/93	< 1	< 1	< 1	< 1	< 1	0.0	7.23	2400
	05/23/93	NA	NA	NA	NA	NA	0.0	NA	NA
	11/29/93	< 1	< 1	< 1	< 1	< 1	0.0	7.31	1760
	05/25/94	NS	NS	NS	NS	NS	0.0	NS	NS
	10/02/94	< 1	< 1	< 1	< 1	< 1	0.0	7.44	1253
	05/17/95	NS	NS	NS	NS	NS	0.0	NS	NS
	10/18/95	< 1	< 1	< 1	< 1	< 1	0.0	7.26	1421
	05/01/96	NS	NS	NS	NS	NS	0.0	NS	NS
	10/20/96	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	6.78	1665
	06/24/97	NS	NS	NS	NS	NS	0.0	NS	NS
	10/20/97	< 0.5	0.5	< 0.5	< 0.5	< 0.5	0.5	NV	NV
	05/08/98	NS	NS	NS	NS	NS	0.0	NS	NS
	12/09/98	< 0.5	0.5	< 0.5	< 0.5	< 0.5	0.5	7.26	3930
	10/14/99	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	7.30	1890
	10/27/00	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	7.30	1970
	12/19/01	ND	ND	ND	ND	ND	0.0	7.30	2320
	12/19/02	ND	ND	ND	ND	ND	0.0	NS	4478
	11/08/03	ND	ND	ND	ND	ND	0.0	NS	2322
	01/11/05	<1.0	<1.0	<1.0	<1.0	<1.0	0.0	NS	3093
Water Quality Standards									
New Mexico (ug/L)		10	10.0	750	620	750		6.90	---
EPA MCL (ug/L)		5	5.0	700	10,000	1,000		---	---
NOTES:	1,2-dichloroethane		SC =	Specific Conductivity			Organic values in ug/l		
	Benzene		TDS =	Total Dissolved Solids			pH in standard units		
	Toluene		MSG =	Well Missing			SC in umhos/cm		
	Ethylbenzene		NA =	Not Analyzed			NV=no value recorded		
	Total Xylenes		NS =	Not Sampled					
	Values in bold exceed New Mexico MCL for drinking water								
	** = Laboratory exceeded holding time before completing sample analyses.								

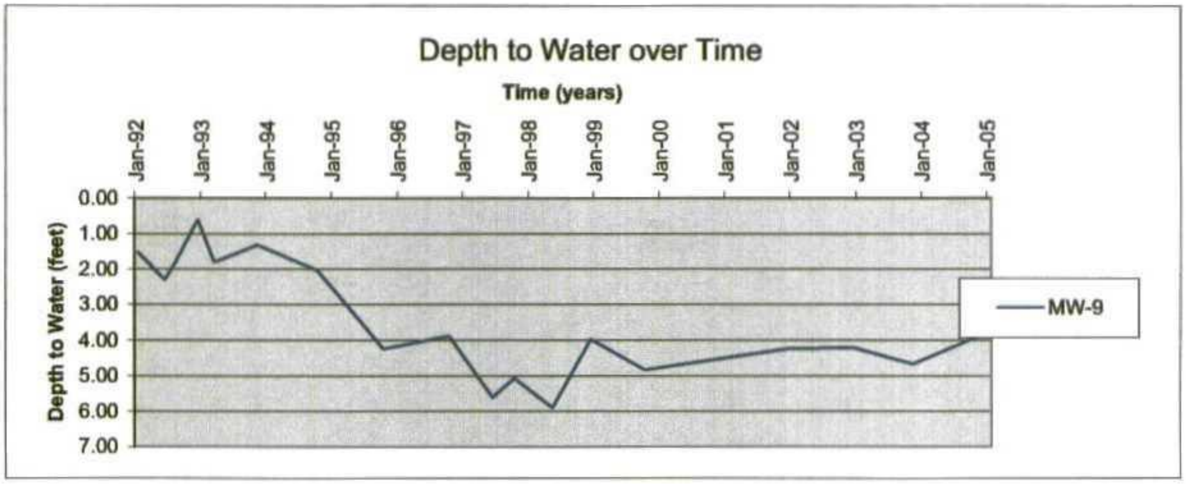
PLATES

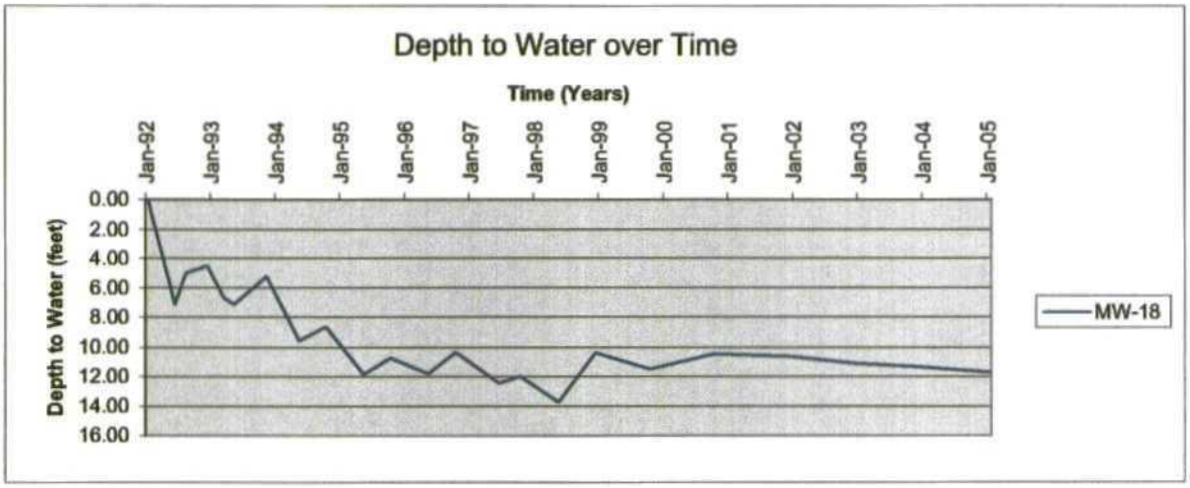


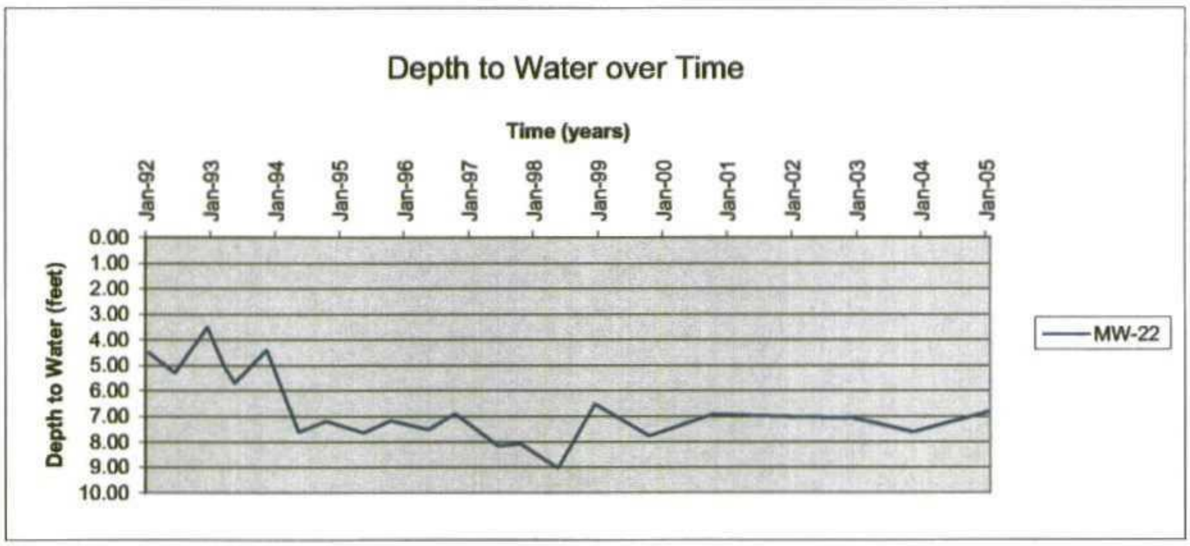
R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Site Map: Former Maverik Tank Farm and Refinery Kirtland, NM	Plate 1
	Maverik Country Stores, Inc	February 2005



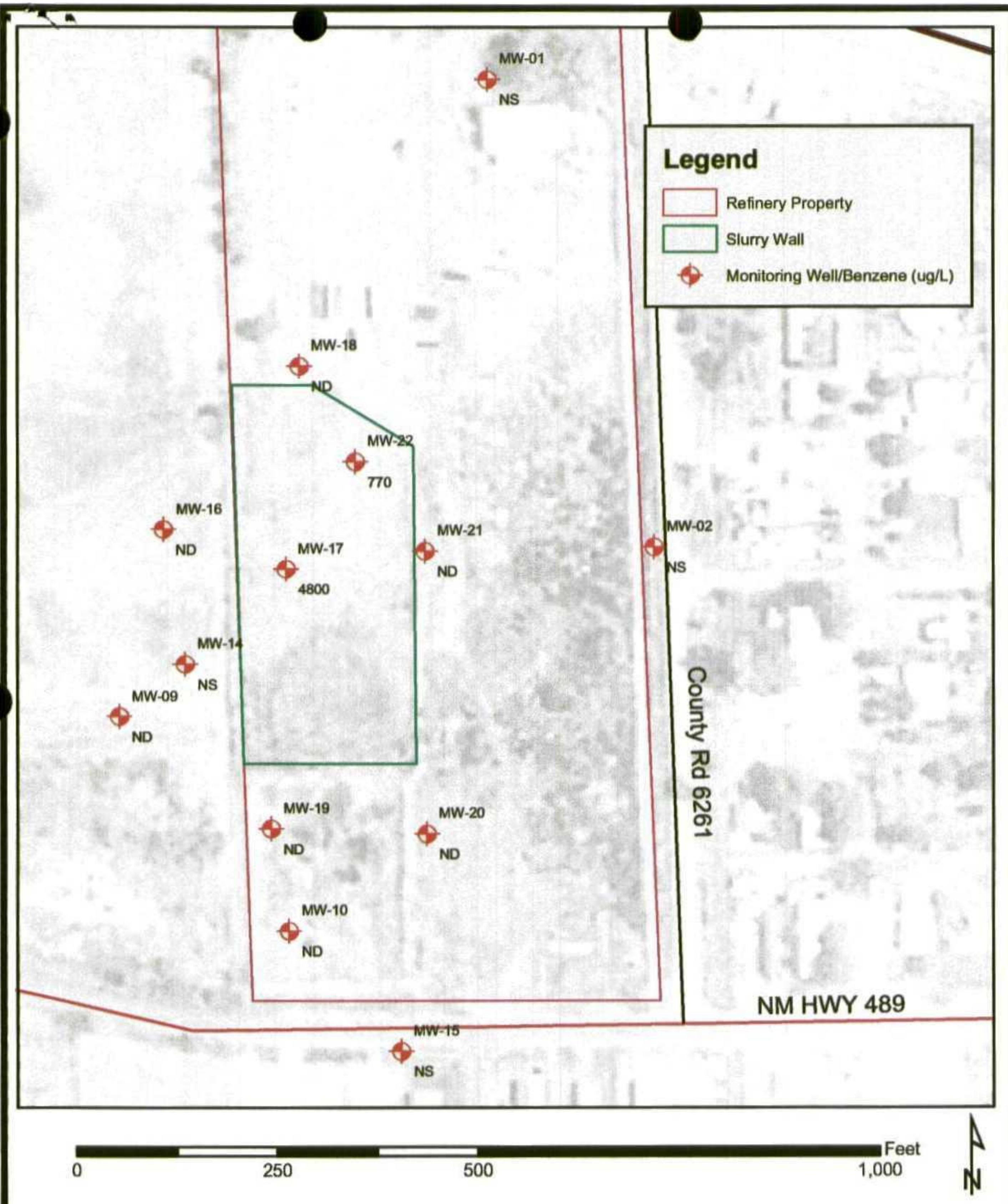
R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Potentiometric Surface: January 2005 Maverik Tank Farm and Refinery	Plate 2
	Maverik Country Stores, Inc.	February 2005



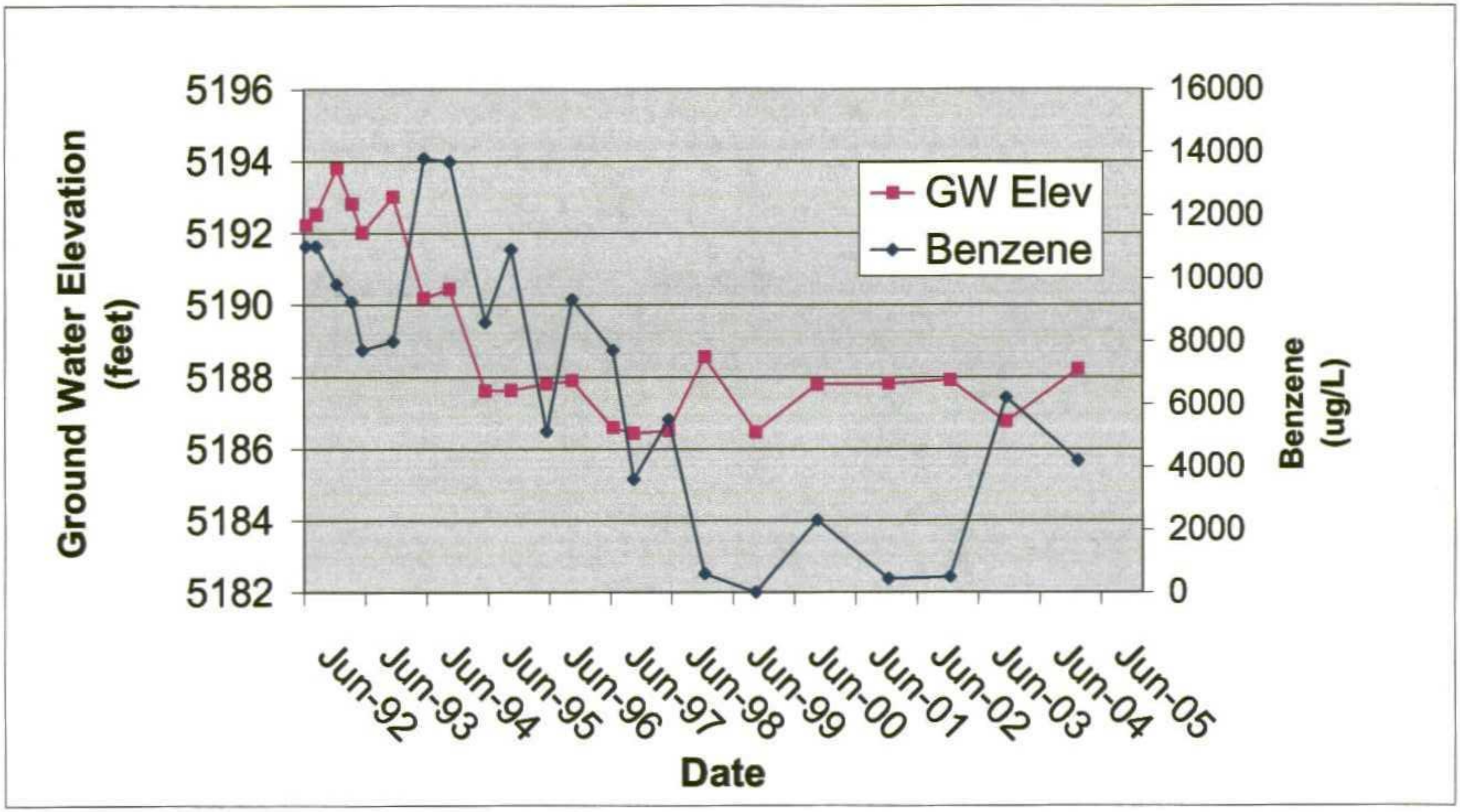




Depth to Water over Time; Former Maverik Tank Farm, Kirtland, NM	**Plate 3**
Maverik Country Stores	**February 2005**



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Benzene Concentration (ug/L): January 2005 Maverik Tank Farm and Refinery	Plate 4
	Maverik Country Stores, Inc.	February 2005



Ground Water Elevations Vs.
Benzene Concentration (MW-17)

3R77

R. T. Hicks Consultants, Ltd.

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266-0745

April 19, 2004

Mr. William Olsen
New Mexico Energy, Minerals and Natural Resources Department
Oil Conservation Division
1220 South St. Francis Dr
Santa Fe, NM 87505

RE: 2003 Annual Groundwater Monitoring and Sampling Event. Former Maverik Refinery Tank Farm located in **Kirtland, New Mexico**

Dear Mr. Olsen:

On behalf of Maverik Country Stores, Inc. (Maverik), R.T. Hicks Consultants, Ltd. is submitting this 2003 Groundwater Monitoring and Sampling Report for the former Maverik Refinery in Kirtland, New Mexico. This report represents the annual sampling event conducted on November 08, 2004. In addition, we propose a path forward toward site closure. If you any questions or concerns, please do not hesitate to call me at (505) 266-5004.

Andrew Parker

Andrew Parker
Staff Scientist

Former Maverik Refinery Tank Farm

2003 Ground Water Monitoring Report

Prepared for:
MAVERIK COUNTRY STORES, INC.
880 West Center Street
North Salt Lake, UT 84054

April 19, 2004

R. T. Hicks Consultants, Ltd.
901 Rio Grande Blvd NW Suite F-142
Albuquerque, NM 87104

1.0 Introduction

This report presents the results of the 2003 annual ground water monitoring and sampling event conducted at the Former Maverik Refinery Tank Farm, located in Kirtland, New Mexico (the Site). We also summarize past data to place the 2003 results in an overall context, and propose a path forward to close the regulatory file for this Site using institutional controls and a petition to the Water Quality Control Commission to adopt Alternate Abatement Standards at the Site.

Maverik conducted semi-annual ground water monitoring at the Site from 1990 to 1998. Annual ground water monitoring began in 1999 and has continued until the present. The November 2003 ground water monitoring and sampling event constituted the fifth annual monitoring event since semi-annual monitoring was discontinued at the end of 1998.

R. T. Hicks Consultants (Hicks Consultants) conducted ground water monitoring and sampling on behalf of Maverik Country Stores, Inc. on November 08, 2003. Plate 1 is a Site map of the former Refinery Tank Farm showing the locations of the monitoring wells.

2.0 Description of Field Activities

Hicks Consultants completed field work as described in Section 5 of the 1998 Annual Ground Water Monitoring Report and agreed upon with modifications in a letter from the New Mexico Oil Conservation Division (NMOCD) dated March 19, 1999.

2.1 Ground Water Monitoring and Sampling

The 2003 annual ground water monitoring event was completed on November 8, 2003. Andrew Parker of Hicks Consultants obtained fluid levels and ground water samples from the following monitoring wells:

- Located outside the slurry wall containment: MW-9, MW-10, MW-14, MW-16, MW-18, MW-19, MW-20, and MW-21; and
- Located inside the slurry wall containment: MW-17 and MW-22.

We did not sample or collect well depth data from MW-1, MW-2, or MW-15. MW-1 and MW-2 were not sampled in past monitoring events, and MW-15 has consistently exhibited hydrocarbon concentrations below laboratory detection limits. Additionally, an unknown obstruction was encountered in the casing at well MW-14 at a depth of approximately 8 feet such that a ground water sample could not be collected. It was possible, however, to obtain fluid level measurements in the well.

We measured depth to ground water and total well depth using an electronic oil-water interface probe. The probe was properly decontaminated prior to and after each measurement at each ground water monitoring well.

We purged three casing volumes from the monitoring wells with the exception of MW-10, MW-18, and MW-21, which bailed dry. We recorded total depth of the well, depth to water, depth to product (if found), casing purge volume, temperature, specific conductance, and dissolved oxygen measurements in a field log book. After purging, we collected samples from the wells using disposable bailers. We completed ground water sampling activities in accordance with standard United States Environmental Protection Agency (USEPA) protocols.

We delivered the ground water samples from the annual monitoring event to Assaigai Analytical Laboratories, Inc. in Albuquerque, NM for analysis of benzene, toluene, ethyl benzene, xylene, naphthalene (BTEXN), and 1,1 Dichloroethane using EPA Method 8260.

3.0 Summary of Monitoring and Sampling Results

3.1 Fluid Level Measurements

Table 1 summarizes ground water levels measured during this and past monitoring events. Plate 2 is a map showing the observed ground water elevations and potentiometric surface for November 2003. Ground water elevations and gradient measured during the November 2003 sampling event are within the range of historical data. Ground water flow is to the southwest with a hydraulic gradient of 0.008.

November 2003 fluid level measurements demonstrate that ground water levels are decreasing with time. Plate 3 shows graphs of ground water levels over time at downgradient monitoring well MW-09, monitoring well MW-22 within the slurry wall, and at upgradient monitoring well MW-18.

We did not observe any phase-separated hydrocarbons (PSH) in the monitoring wells at the Site. However, we did observe a slight hydrocarbon odor in monitoring wells MW-17 and MW-22. In addition, we observed a slight sulfur odor in wells MW-21 and MW-17.

3.2 Water Quality Analyses

Table 2 summarizes water quality monitoring results for the November 8th, 2003 annual sampling event. Appendix A contains the laboratory analysis report for the 2003 annual event. Benzene concentrations in the ground water samples collected on November 8th, 2003 are shown on Plate 4.

Laboratory analyses detected 1.4 ug/L of benzene in MW-18, north and upgradient from the slurry wall. A previous detection of benzene in MW-18 occurred on December 19, 2001. However, laboratory analysis in 2002 did not detect any benzene in MW-18. Additionally, the benzene concentration found in MW-18 is approximately one order of magnitude below the allowable benzene concentration limit of 10 ug/L established by the State of New Mexico for ground water.

Historically, monitoring wells MW-17 and MW-22 located inside of the slurry wall have shown hydrocarbon levels well above the allowable ground water concentration limits. Groundwater analysis results for MW-17 and MW-22 show a consistent decreasing benzene concentration trend over time.

4.0 Discussion and Conclusions

BTEXN and 1,1 Dichloroethane were not detected in monitoring wells located downgradient or cross gradient from the slurry wall. Laboratory analysis results for chemicals of concern from monitoring wells downgradient and crossgradient from the slurry wall indicate that the slurry wall is maintaining its integrity and is performing its planned function of containing the petroleum-affected ground water. In fact, the laboratory has not detected benzene in ground water in off-site monitoring wells since sampling began in 1990.

In addition, historical data suggest that natural attenuation is effectively reducing benzene concentrations within the slurry wall. Regression analysis at MW-17 suggests that benzene concentrations will meet WQCC water quality standards in 2024 (Figure 1). The regression coefficient (R^2 value) for this analysis is approximately 0.5. Regression coefficients near 1.0 are considered a "perfect fit". Regression coefficients greater than 0.7 are considered a "good fit". Regression coefficients less than 0.5 are considered a "poor fit" for certain sample populations. However, a regression coefficient of 0.5 for ground water data is not uncommon and may be used to draw conclusions regarding natural attenuation. The analysis presented in Figure 1 should not be construed as a conclusion that ground water within the slurry wall will meet state standards within 20 years. The analysis shows that natural restoration processes in ground water are reducing hydrocarbon concentrations over time and that complete restoration of ground water is proceeding but may require decades.

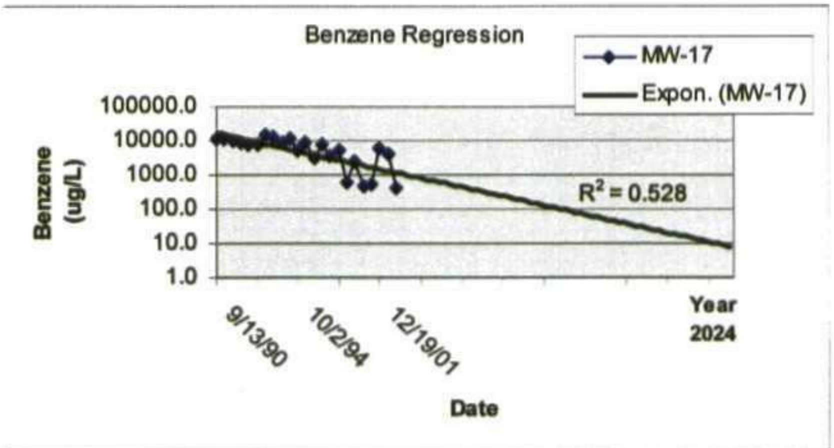


Figure 1: Regression analysis of Benzene Concentrations at MW-17

5.0 Recommended Path Forward

1. Maverik desires to meet with NMOCD in Santa Fe or via a conference call to discuss the steps required to gain your support for an Alternative Abatement Standards petition to the WQCC.
2. We plan to file an "environmental easement" with the San Juan County Clerk, the New Mexico State Engineer, and appropriate building and zoning offices. The easement will restrict the use of the area over, within, and adjacent to the slurry wall. We wish to discuss the required elements of such an easement in our conference with NMOCD.
3. With these controls in place and the support of NMOCD, we will prepare a petition to the WQCC for alternative abatement standards within the slurry wall area.

TABLES

Well ID	Date	Ground Elevation (feet)	Datum Elevation (feet)	Depth to Water (feet)	Free Product Thickness (feet)	Corrected Elevation (ft)
Outside Slurry Wall						
MW-1	01/01/92	5,205.75	5,207.24	10.90	0	5,196.34
	06/01/92	5,205.75	5,207.24	8.40	0	5,198.84
	08/01/92	5,205.75	5,207.24	6.00	0	5,201.24
	12/01/92	5,205.75	5,207.24	8.00	0	5,199.24
	03/01/93	5,205.75	5,207.24	12.30	0	5,194.94
	05/01/93	5,205.75	5,207.24	NM	0	NM
	11/01/93	5,205.75	5,207.24	NM	0	NM
	05/01/94	5,205.75	5,207.24	NM	0	NM
	10/01/94	5,205.75	5,207.24	NM	0	NM
	05/01/95	5,205.75	5,207.24	NM	0	NM
	10/01/95	5,205.75	5,207.24	NM	0	NM
	05/01/96	5,205.75	5,207.24	NM	0	NM
	10/01/96	5,205.75	5,207.24	10.97	0	5,196.27
	06/24/97	5,205.75	5,207.24	13.58	0	5,193.66
	10/18/97	5,205.75	5,207.24	11.87	0	5,195.37
	05/05/98	5,205.75	5,207.24	16.17	0	5,191.07
	12/01/98	5,205.75	5,207.24	NM	NM	NM
	10/14/99	5,205.75	5,207.24	10.66	0	5,196.58
	10/01/00	5,205.75	5,207.24	NM	NM	NM
MW-2	01/01/92	5,195.25	5,196.93	3.80	0	5,193.13
	06/01/92	5,195.25	5,196.93	4.40	0	5,192.53
	08/01/92	5,195.25	5,196.93	3.80	0	5,193.13
	12/01/92	5,195.25	5,196.93	2.50	0	5,194.43
	03/01/93	5,195.25	5,196.93	4.50	0	5,192.43
	05/01/93	5,195.25	5,196.93	NM	0	NM
	11/01/93	5,195.25	5,196.93	NM	0	NM
	05/01/94	5,195.25	5,196.93	NM	0	NM
	10/01/94	5,195.25	5,196.93	NM	0	NM
	05/01/95	5,195.25	5,196.93	NM	0	NM
	10/01/95	5,195.25	5,196.93	NM	0	NM
	05/01/96	5,195.25	5,196.93	NM	0	NM
	10/01/96	5,195.25	5,196.93	5.99	0	5,190.94
	06/01/97	5,195.25	5,196.93	7.51	0	5,189.42
	10/01/97	5,195.25	5,196.93	6.66	0	5,190.27
	05/05/98	5,195.25	5,196.93	8.22	0	5,188.71
	12/01/98	5,195.25	5,196.93	NM	NM	NM
	10/14/99	5,195.25	5,196.93	6.51	0	5,190.42
	10/01/00	5,195.25	5,196.93	NM	NM	NM
MW-9	01/01/92	5,189.33	5,191.22	1.50	0	5,189.72
	06/01/92	5,189.33	5,191.22	2.30	0	5,188.92
	08/01/92	5,189.33	5,191.22	1.80	0	5,189.42
	12/01/92	5,189.33	5,191.22	0.60	0	5,190.62
	03/01/93	5,189.33	5,191.22	1.80	0	5,189.42
	05/01/93	5,189.33	5,191.22	NM	0	NM
	11/01/93	5,189.33	5,191.22	1.30	0	5,189.92
	05/01/94	5,189.33	5,191.22	NM	0	NM
	10/01/94	5,189.33	5,191.22	2.03	0	5,189.19
	05/01/95	5,189.33	5,191.22	NM	0	NM
	10/01/95	5,189.33	5,191.22	4.22	0	5,187.00
	05/01/96	5,189.33	5,191.22	NM	0	NM
	10/01/96	5,189.33	5,191.22	3.88	0	5,187.34
	06/01/97	5,189.33	5,191.22	5.59	0	5,185.63
	10/01/97	5,189.33	5,191.22	5.06	0	5,186.16
	05/05/98	5,189.33	5,191.22	5.89	0	5,185.33
	12/01/98	5,189.33	5,191.22	3.96	0	5,187.26
	10/14/99	5,189.33	5,191.22	4.82	0	5,186.40
	10/01/00	5,189.33	5,191.22	NM	NM	NM
	12/19/01	5,189.33	5,191.22	4.23	0	5,186.99
	12/19/02	5,189.33	5,191.22	4.20	0	5,187.02
	11/08/03	5,189.33	5,191.22	4.67	0	5,186.55

Well ID	Date	Ground Elevation (feet)	Datum Elevation (feet)	Depth to Water (feet)	Free Product Thickness (feet)	Corrected Elevation (ft)
MW-10	01/01/92	5,187.47	5,189.30	1.60	0	5,187.70
	06/01/92	5,187.47	5,189.30	2.70	0	5,186.60
	08/01/92	5,187.47	5,189.30	2.90	0	5,186.40
	12/01/92	5,187.47	5,189.30	0.90	0	5,188.40
	03/01/93	5,187.47	5,189.30	1.60	0	5,187.70
	05/01/93	5,187.47	5,189.30	2.80	0	5,186.50
	11/01/93	5,187.47	5,189.30	1.80	0	5,187.50
	05/01/94	5,187.47	5,189.30	4.47	0	5,184.83
	10/01/94	5,187.47	5,189.30	2.97	0	5,186.33
	05/01/95	5,187.47	5,189.30	4.42	0	5,184.88
	10/01/95	5,187.47	5,189.30	4.60	0	5,184.70
	05/01/96	5,187.47	5,189.30	4.28	0	5,185.02
	10/01/96	5,187.47	5,189.30	4.23	0	5,185.07
	06/01/97	5,187.47	5,189.30	5.37	0	5,183.93
	10/01/97	5,187.47	5,189.30	4.90	0	5,184.40
	05/05/98	5,187.47	5,189.30	5.52	0	5,183.78
	12/01/98	5,187.47	5,189.30	3.76	0	5,185.54
	10/14/99	5,187.47	5,189.30	4.85	0	5,184.45
	10/01/00	5,187.47	5,189.30	3.93	0	5,185.37
	12/19/01	5,187.47	5,189.30	4.22	0	5,185.08
	12/19/02	5,187.47	5,189.30	3.80	0	5,185.50
	12/08/03	5,187.47	5,189.30	4.61	0	5,184.69
MW-13	01/01/92	5,187.56	5,187.76	NM	0	NM
	06/01/92	5,187.56	5,187.76	2.80	0	5,184.96
	08/01/92	5,187.56	5,187.76	2.70	0	5,185.06
	12/01/92	5,187.56	5,187.76	1.10	0	5,186.66
	03/01/93	5,187.56	5,187.76	1.70	0	5,186.06
	05/01/93	5,187.56	5,187.76	NM	0	NM
	11/01/93	5,187.56	5,187.76	1.40	0	5,186.36
	05/01/94	5,187.56	5,187.76	NM	0	NM
	10/01/94	5,187.56	5,187.76	2.91	0	5,184.85
	05/01/95	5,187.56	5,187.76	NM	0	NM
	10/01/95	5,187.56	5,187.76	3.23	0	5,184.53
	05/01/96	5,187.56	5,187.76	NM	0	NM
	10/01/96	5,187.56	5,187.76	2.52	0	5,185.24
	06/01/97	5,187.56	5,187.76	4.08	0	5,183.68
	10/01/97	5,187.56	5,187.76	4.12	0	5,183.64
	05/05/98	5,187.56	5,187.76	4.03	0	5,183.73
	12/01/98	5,187.56	5,187.76	2.17	0	5,185.59
Well Destroyed	10/14/99	5,187.56	5,187.76	NA	0	NA
MW-14	01/01/92	5,190.70	5,194.47	2.10	0	5,192.37
	06/01/92	5,190.70	5,194.47	4.10	0	5,190.37
	08/01/92	5,190.70	5,194.47	4.20	0	5,190.27
	12/01/92	5,190.70	5,194.47	0.70	0	5,193.77
	03/01/93	5,190.70	5,194.47	2.20	0	5,192.27
	05/01/93	5,190.70	5,194.47	NM	0	NM
	11/01/93	5,190.70	5,194.47	1.70	0	5,192.77
	05/01/94	5,190.70	5,194.47	NM	0	NM
	10/01/94	5,190.70	5,194.47	4.27	0	5,190.20
	05/01/95	5,190.70	5,194.47	NM	0	NM
	10/01/95	5,190.70	5,194.47	8.09	0	5,186.38
	05/01/96	5,190.70	5,194.47	NM	0	NM
	10/01/96	5,190.70	5,194.47	7.52	0	5,186.95
	06/01/97	5,190.70	5,194.47	8.95	0	5,185.52
	10/01/97	5,190.70	5,194.47	8.87	0	5,185.60
	05/05/98	5,190.70	5,194.47	9.02	0	5,185.45
	12/01/98	5,190.70	5,194.47	6.74	0	5,187.73
	10/14/99	5,190.70	5,194.47	8.21	0	5,186.26
	10/01/00	5,190.70	5,194.47	7.30	Slight Sheen	5,187.17
	12/19/02	5,190.70	5,194.47	7.00	0	5,187.47
	11/08/03	5,190.70	5,194.47	8.35	0	5,186.12

Well ID	Date	Ground Elevation (feet)	Datum Elevation (feet)	Depth to Water (feet)	Free Product Thickness (feet)	Corrected Elevation (ft)
MW-15	01/01/92	5,185.40	5,188.80	0.80	0	5,188.00
	06/01/92	5,185.40	5,188.80	2.20	0	5,186.60
	08/01/92	5,185.40	5,188.80	2.40	0	5,186.40
	12/01/92	5,185.40	5,188.80	0.10	0	5,188.70
	03/01/93	5,185.40	5,188.80	0.60	0	5,188.20
	05/01/93	5,185.40	5,188.80	NM	0	NM
	11/01/93	5,185.40	5,188.80	0.60	0	5,188.20
	05/01/94	5,185.40	5,188.80	NM	0	NM
	10/01/94	5,185.40	5,188.80	1.86	0	5,186.94
	05/01/95	5,185.40	5,188.80	NM	0	NM
	10/01/95	5,185.40	5,188.80	5.79	0	5,183.01
	05/01/96	5,185.40	5,188.80	NM	0	NM
	10/01/96	5,185.40	5,188.80	5.32	0	5,183.48
	06/01/97	5,185.40	5,188.80	6.07	0	5,182.73
	10/01/97	5,185.40	5,188.80	5.57	0	5,183.23
	05/05/98	5,185.40	5,188.80	5.53	0	5,183.27
	12/01/98	5,185.40	5,188.80	4.39	0	5,184.41
	10/14/99	5,185.40	5,188.80	5.86	0	5,182.94
	10/01/00	5,185.40	5,188.80	NM	NM	NM
MW-16	01/01/92	5,193.74	5,194.98	3.40	0	5,191.58
	06/01/92	5,193.74	5,194.98	4.50	0	5,190.48
	08/01/92	5,193.74	5,194.98	3.30	0	5,191.68
	12/01/92	5,193.74	5,194.98	1.90	0	5,193.08
	03/01/93	5,193.74	5,194.98	4.00	0	5,190.98
	05/01/93	5,193.74	5,194.98	NM	0	NM
	11/01/93	5,193.74	5,194.98	3.00	0	5,191.98
	05/01/94	5,193.74	5,194.98	NM	0	NM
	10/01/94	5,193.74	5,194.98	4.53	0	5,190.45
	05/01/95	5,193.74	5,194.98	NM	0	NM
	10/01/95	5,193.74	5,194.98	6.03	0	5,188.95
	05/01/96	5,193.74	5,194.98	NM	0	NM
	10/01/96	5,193.74	5,194.98	7.61	0	5,187.37
	06/01/97	5,193.74	5,194.98	7.72	0	5,187.26
	10/01/97	5,193.74	5,194.98	7.20	0	5,187.78
	05/05/98	5,193.74	5,194.98	8.36	0	5,186.62
	12/01/98	5,193.74	5,194.98	5.58	0	5,189.40
	10/14/99	5,193.74	5,194.98	6.72	0	5,188.26
	10/01/00	5,193.74	5,194.98	5.76	0	5,189.22
	12/19/01	5,193.74	5,194.98	5.85	0	5,189.13
	12/19/02	5,193.74	5,194.98	5.95	0	5,189.03
	11/08/03	5,193.74	5,194.98	8.43	0	5,186.55
MW-18	01/01/92	5,199.14	5,201.75	NM	0	NM
	06/01/92	5,199.14	5,201.75	7.10	0	5,194.65
	08/01/92	5,199.14	5,201.75	5.00	0	5,196.75
	12/01/92	5,199.14	5,201.75	4.50	0	5,197.25
	03/01/93	5,199.14	5,201.75	6.70	0	5,195.05
	05/01/93	5,199.14	5,201.75	7.10	0	5,194.65
	11/01/93	5,199.14	5,201.75	5.20	0	5,196.55
	05/01/94	5,199.14	5,201.75	9.58	0	5,192.17
	10/01/94	5,199.14	5,201.75	8.60	0	5,193.15
	05/01/95	5,199.14	5,201.75	11.82	0	5,189.93
	10/01/95	5,199.14	5,201.75	10.69	0	5,191.06
	05/01/96	5,199.14	5,201.75	11.81	0	5,189.94
	10/01/96	5,199.14	5,201.75	10.35	0	5,191.40
	06/01/97	5,199.14	5,201.75	12.46	0	5,189.29
	10/01/97	5,199.14	5,201.75	11.96	0	5,189.79
	05/05/98	5,199.14	5,201.75	13.72	0	5,188.03
	12/01/98	5,199.14	5,201.75	10.37	0	5,191.38
	10/14/99	5,199.14	5,201.75	11.51	Slight Sheen	5,190.24
	10/01/00	5,199.14	5,201.75	10.48	Slight Sheen	5,191.27
	12/19/01	5,199.14	5,201.75	10.61	Slight Sheen	5,191.14
	12/19/02	5,199.14	5,201.75	11.10	0	5,190.65
	11/08/03	5,199.14	5,201.75	11.30	0	5,190.45

Well ID	Date	Ground Elevation (feet)	Datum Elevation (feet)	Depth to Water (feet)	Free Product Thickness (feet)	Corrected Elevation (ft)
MW-19	01/01/92	5188.58	5189.54	1.00	0	5,188.54
	06/01/92	5188.58	5189.54	2.00	0	5,187.54
	08/01/92	5188.58	5189.54	1.90	0	5,187.64
	12/01/92	5188.58	5189.54	0.30	0	5,189.24
	03/01/93	5188.58	5189.54	1.20	0	5,188.34
	05/01/93	5188.58	5189.54	2.20	0	5,187.34
	11/01/93	5188.58	5189.54	1.00	0	5,188.54
	05/01/94	5188.58	5189.54	3.43	0	5,186.11
	10/01/94	5188.58	5189.54	2.48	0	5,187.06
	05/01/95	5188.58	5189.54	3.50	0	5,186.04
	10/01/95	5188.58	5189.54	3.44	0	5,186.10
	05/01/96	5188.58	5189.54	3.42	0	5,186.12
	10/01/96	5188.58	5189.54	2.97	0	5,186.57
	06/01/97	5188.58	5189.54	4.51	0	5,185.03
	10/01/97	5188.58	5189.54	3.99	0	5,185.55
	05/05/98	5188.58	5189.54	4.62	0	5,184.92
	12/01/98	5188.58	5189.54	2.68	0	5,186.86
	10/14/99	5188.58	5189.54	3.70	0	5,185.84
	10/01/00	5188.58	5189.54	2.84	0	5,186.70
	12/19/01	5188.58	5189.54	5.05	0	5,184.49
	12/19/02	5188.58	5189.54	5.09	0	5,184.45
	11/08/03	5188.58	5189.54	3.54		5,186.00
MW-20	01/01/92	5,190.10	5,191.05	2.60	0	5,188.45
	06/01/92	5,190.10	5,191.05	3.50	0	5,187.55
	08/01/92	5,190.10	5,191.05	3.50	0	5,187.55
	12/01/92	5,190.10	5,191.05	1.80	0	5,189.25
	03/01/93	5,190.10	5,191.05	2.70	0	5,188.35
	05/01/93	5,190.10	5,191.05	3.70	0	5,187.35
	11/01/93	5,190.10	5,191.05	2.60	0	5,188.45
	05/01/94	5,190.10	5,191.05	5.76	0	5,185.29
	10/01/94	5,190.10	5,191.05	3.83	0	5,187.22
	05/01/95	5,190.10	5,191.05	4.78	0	5,186.27
	10/01/95	5,190.10	5,191.05	4.71	0	5,186.34
	05/01/96	5,190.10	5,191.05	4.57	0	5,186.48
	10/01/96	5,190.10	5,191.05	4.35	0	5,186.70
	06/01/97	5,190.10	5,191.05	5.65	0	5,185.40
	10/01/97	5,190.10	5,191.05	5.15	0	5,185.90
	05/05/98	5,190.10	5,191.05	5.73	0	5,185.32
	12/01/98	5,190.10	5,191.05	4.05	0	5,187.00
	10/14/99	5,190.10	5,191.05	5.10	0	5,185.95
	10/01/00	5,190.10	5,191.05	4.11	Sheen	5,186.94
	12/19/01	5,190.10	5,191.05	4.45	0	5,186.60
	12/19/02	5,190.10	5,191.05	4.23	0	5,186.82
	11/08/03	5,190.10	5,191.05	4.80	0	5,186.25
MW-21	01/01/92	5,193.62	5,194.81	2.80	0	5,192.01
	06/01/92	5,193.62	5,194.81	4.30	0	5,190.51
	08/01/92	5,193.62	5,194.81	4.60	0	5,190.21
	12/01/92	5,193.62	5,194.81	2.20	0	5,192.61
	03/01/93	5,193.62	5,194.81	3.20	0	5,191.61
	05/01/93	5,193.62	5,194.81	4.70	0	5,190.11
	11/01/93	5,193.62	5,194.81	3.30	0	5,191.51
	05/01/94	5,193.62	5,194.81	6.00	0	5,188.81
	10/01/94	5,193.62	5,194.81	5.04	0	5,189.77
	05/01/95	5,193.62	5,194.81	6.29	0	5,188.52
	10/01/95	5,193.62	5,194.81	6.22	0	5,188.59
	05/01/96	5,193.62	5,194.81	6.22	0	5,188.59
	10/01/96	5,193.62	5,194.81	5.71	0	5,189.10
	06/01/97	5,193.62	5,194.81	6.73	0	5,188.08
	10/01/97	5,193.62	5,194.81	6.92	0	5,187.89
	05/05/98	5,193.62	5,194.81	7.45	0	5,187.36
	12/01/98	5,193.62	5,194.81	NM	NM	NM
	10/14/99	5,193.62	5,194.81	6.64	0	5,188.17
	10/01/00	5,193.62	5,194.81	4.99	0	5,189.82
	12/19/01	5,193.62	5,194.81	4.72	0	5,190.09
	12/19/02	5,193.62	5,194.81	5.50	0	5,189.31
	11/08/03	5,193.62	5,194.81	6.50	0	5,188.31

Well ID	Date	Ground Elevation (feet)	Datum Elevation (feet)	Depth to Water (feet)	Free Product Thickness (feet)	Corrected Elevation (ft)
Inside Slurry Wall						
MW-17	01/01/92	5,193.43	5,195.91	NM	0	NM
	06/01/92	5,193.43	5,195.91	3.70	0	5,192.21
	08/01/92	5,193.43	5,195.91	3.40	0	5,192.51
	12/01/92	5,193.43	5,195.91	2.10	0	5,193.81
	03/01/93	5,193.43	5,195.91	3.10	0	5,192.81
	05/01/93	5,193.43	5,195.91	3.90	0	5,192.01
	11/01/93	5,193.43	5,195.91	2.90	0	5,193.01
	05/01/94	5,193.43	5,195.91	5.71	0	5,190.20
	10/01/94	5,193.43	5,195.91	5.47	0	5,190.44
	05/01/95	5,193.43	5,195.91	8.30	0	5,187.61
	10/01/95	5,193.43	5,195.91	8.29	0	5,187.62
	05/01/96	5,193.43	5,195.91	8.11	0	5,187.80
	10/01/96	5,193.43	5,195.91	8.02	0	5,187.89
	06/01/97	5,193.43	5,195.91	9.32	0	5,186.59
	10/01/97	5,193.43	5,195.91	9.48	0	5,186.43
	05/05/98	5,193.43	5,195.91	9.42	0.01	5,186.49
	12/01/98	5,193.43	5,195.91	7.37	Sheen	5,188.54
	10/14/99	5,193.43	5,195.91	9.45	0.00	5,186.46
	10/01/00	5,193.43	5,195.91	8.12	Sheen	5,187.79
	12/19/01	5,193.43	5,195.91	8.10	0.00	5,187.81
	12/19/02	5,193.43	5,195.91	8.00	0.00	5,187.91
	11/08/03	5,193.43	5,195.91	9.15	0.00	5,186.76
MW-22	01/01/92	5,194.58	5,195.86	4.50	0	5,191.36
	06/01/92	5,194.58	5,195.86	5.30	0	5,190.56
	08/01/92	5,194.58	5,195.86	4.70	0	5,191.16
	12/01/92	5,194.58	5,195.86	3.50	0	5,192.36
	03/01/93	5,194.58	5,195.86	5.00	0	5,190.86
	05/01/93	5,194.58	5,195.86	5.70	0	5,190.16
	11/01/93	5,194.58	5,195.86	4.40	0	5,191.46
	05/01/94	5,194.58	5,195.86	7.62	0	5,188.24
	10/01/94	5,194.58	5,195.86	7.18	0	5,188.68
	05/01/95	5,194.58	5,195.86	7.64	0	5,188.22
	10/01/95	5,194.58	5,195.86	7.16	0	5,188.70
	05/01/96	5,194.58	5,195.86	7.51	0	5,188.35
	10/01/96	5,194.58	5,195.86	6.89	0	5,188.97
	06/01/97	5,194.58	5,195.86	8.16	0	5,187.70
	10/01/97	5,194.58	5,195.86	8.06	0.03	5,187.80
	05/05/98	5,194.58	5,195.86	9.02	0.01	5,186.84
	12/01/98	5,194.58	5,195.86	6.52	Sheen	5,189.34
	10/14/99	5,194.58	5,195.86	7.75	Slight Sheen	5,188.11
	10/01/00	5,194.58	5,195.86	6.90	Sheen	5,188.96
	12/19/01	5,194.58	5,195.86	7.00	0.00	5,188.86
	12/19/02	5,194.58	5,195.86	7.05	0.00	5,188.81
	11/08/03	5,194.58	5,195.86	7.62	0.00	5,188.24
P-1	01/01/92	5,195.74	5,197.66	NM	0	NM
	06/01/92	5,195.74	5,197.66	5.40	0	5,192.26
	08/01/92	5,195.74	5,197.66	4.20	0	5,193.46
	12/01/92	5,195.74	5,197.66	3.30	0	5,194.36
	03/01/93	5,195.74	5,197.66	5.50	0	5,192.16
	05/01/93	5,195.74	5,197.66	6.10	0	5,191.56
	11/01/93	5,195.74	5,197.66	4.40	0	5,193.26
	05/01/94	5,195.74	5,197.66	7.21	0	5,190.45
	10/01/94	5,195.74	5,197.66	7.57	0	5,190.09
	05/01/95	5,195.74	5,197.66	8.62	0	5,189.04
	10/01/95	5,195.74	5,197.66	7.82	0	5,189.84
	05/01/96	5,195.74	5,197.66	8.54	0.01	5,189.12
	10/01/96	5,195.74	5,197.66	7.43	0	5,190.23
	06/01/97	5,195.74	5,197.66	9.29	0.01	5,188.37
	10/01/97	5,195.74	5,197.66	8.91	0.01	5,188.75
	05/05/98	5,195.74	5,197.66	9.87	0.01	5,187.79
	12/01/98	5,195.74	5,197.66	NM	NM	NM
	10/01/99	5,195.74	5,197.66	NM	NM	NM
	10/01/00	5,195.74	5,197.66	NM	NM	NM

Well ID	Date	Ground Elevation (feet)	Datum Elevation (feet)	Depth to Water (feet)	Free Product Thickness (feet)	Corrected Elevation (ft)
P-2	01/01/92	5,190.50	5,192.32	NM	0	NM
	06/01/92	5,190.50	5,192.32	3.10	0	5,189.22
	08/01/92	5,190.50	5,192.32	2.30	0	5,190.02
	12/01/92	5,190.50	5,192.32	1.00	0	5,191.32
	03/01/93	5,190.50	5,192.32	2.20	0	5,190.12
	05/01/93	5,190.50	5,192.32	3.10	0	5,189.22
	11/01/93	5,190.50	5,192.32	1.90	0	5,190.42
	05/01/94	5,190.50	5,192.32	4.20	0	5,188.12
	10/01/94	5,190.50	5,192.32	4.81	0	5,187.51
	05/01/95	5,190.50	5,192.32	5.30	0	5,187.02
	10/01/95	5,190.50	5,192.32	4.86	0	5,187.46
	05/01/96	5,190.50	5,192.32	5.04	0	5,187.28
	10/01/96	5,190.50	5,192.32	4.53	0	5,187.79
	06/01/97	5,190.50	5,192.32	6.04	0	5,186.28
	10/01/97	5,190.50	5,192.32	5.69	0	5,186.63
	05/05/98	5,190.50	5,192.32	9.96	0.01	5,182.36
	12/01/98	5,190.50	5,192.32	NM	NM	NM
	10/14/99	5,190.50	5,192.32	NM	NM	NM
	10/01/00	5,190.50	5,192.32	NM	NM	NM
P-3	01/01/92	5,191.44	5,193.21	NM	0	NM
	06/01/92	5,191.44	5,193.21	3.40	0	5,189.81
	08/01/92	5,191.44	5,193.21	3.60	0	5,189.61
	12/01/92	5,191.44	5,193.21	1.60	0	5,191.61
	03/01/93	5,191.44	5,193.21	2.60	0	5,190.61
	05/01/93	5,191.44	5,193.21	3.60	0	5,189.61
	11/01/93	5,191.44	5,193.21	2.60	0	5,190.61
	05/01/94	5,191.44	5,193.21	4.86	0	5,188.35
	10/01/94	5,191.44	5,193.21	5.77	0	5,187.44
	05/01/95	5,191.44	5,193.21	5.94	0	5,187.27
	10/01/95	5,191.44	5,193.21	5.88	0	5,187.33
	05/01/96	5,191.44	5,193.21	5.66	0	5,187.55
	10/01/96	5,191.44	5,193.21	5.62	0	5,187.59
	06/01/97	5,191.44	5,193.21	7.17	0	5,186.04
	10/01/97	5,191.44	5,193.21	6.67	0	5,186.54
	05/05/98	5,191.44	5,193.21	6.94	0	5,186.27
	12/01/98	5,191.44	5,193.21	NM	NM	NM
	10/14/99	5,191.44	5,193.21	NM	NM	NM
	10/01/00	5,191.44	5,193.21	NM	NM	NM
P-4	01/01/92	5,197.06	5,198.82	NM	0	NM
	06/01/92	5,197.06	5,198.82	7.00	0	5,191.82
	08/01/92	5,197.06	5,198.82	6.20	0	5,192.62
	12/01/92	5,197.06	5,198.82	5.10	0	5,193.72
	03/01/93	5,197.06	5,198.82	7.10	0	5,191.72
	05/01/93	5,197.06	5,198.82	7.60	0	5,191.22
	11/01/93	5,197.06	5,198.82	6.10	0	5,192.72
	05/01/94	5,197.06	5,198.82	8.09	0	5,190.73
	10/01/94	5,197.06	5,198.82	8.93	0.28	5,189.89
	05/01/95	5,197.06	5,198.82	9.85	0	5,188.97
	10/01/95	5,197.06	5,198.82	9.13	0	5,189.69
	05/01/96	5,197.06	5,198.82	9.73	0	5,189.09
	10/01/96	5,197.06	5,198.82	8.79	0	5,190.03
	06/01/97	5,197.06	5,198.82	9.88	0	5,188.94
	10/01/97	5,197.06	5,198.82	9.90	0	5,188.92
	05/05/98	5,197.06	5,198.82	6.46	0	5,192.36
	12/01/98	5,197.06	5,198.82	NM	NM	NM
	10/14/99	5,197.06	5,198.82	NM	NM	NM
	10/01/00	5,197.06	5,198.82	NM	NM	NM
Notes:	NM = Not Measured					
	NA = Not Applicable, Well Destroyed					

Table 2
Water Quality Monitoring Results

Table 2 Summary of Groundwater Quality Monitoring Results
(Since Installation of Slurry Wall)
Former Maverik Refinery - Kirtland, New Mexico

Location	Date	DCA	B	E	X	T	Total BTEX	pH	SC
Within Slurry Wall		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L		uS
MW-17	9/13/90	360	11000.0	1,160	13,000	15,000	40160.0	7.01	2500
	3/18/91	400	11000.0	1,900	15,000	10,000	37900.0	7.04	2700
	6/13/91	420	9800.0	1,800	16,000	6,300	33900.0	7.04	2650
	1/20/92	MSG	MSG	MSG	MSG	MSG	0.0	MSG	MSG
	6/9/92	45	9240.0	1,150	7,190	7,580	25160.0	7.26	2730
	8/19/92	27	7710.0	669	5,130	1,920	15429.0	7.23	2810
	12/16/92	17.3	7990.0	638	4,600	4,740	17968.0	7.54	2970
	3/30/93	16.8	13800.0	1,110	6,930	6,830	28670.0	7.37	2610
	5/23/93	12.5	13700.0	993	10,530	6,360	31583.0	7.33	2470
	11/29/93	30.9	8590.0	636	4,880	2,820	16926.0	7.39	2360
	5/25/94	8.3	10900.0	823	5,660	4,340	21723.0	7.30	2830
	10/2/94	4.9	5130.0	409	2,818	1,160	9517.0	7.04	2470
Duplicate	10/2/94	< 1	2070.0	350	2,013	807	5240.0	7.04	2470
	5/17/95	< 10	9320.0	694	3,782	2,510	16306.0	7.49	2480
Duplicate	5/17/95	< 10	12800.0	944	5,710	4,460	23914.0	7.49	2480
**	10/18/95	2.3	3000.0	244	1,079	464	4787.0	7.09	2430
	5/1/96	2.2	7700.0	530	1,800	1,200	11230.0	7.20	2280
Duplicate	5/1/96	< 5	7300.0	490	1,800	1,200	10790.0	7.20	2280
	10/20/96	< 5	3600.0	290	1,500	880	6270.0	7.50	2290
	6/24/97	<0.5	5500.0	23	180	51	5754.0	7.52	2550
	10/28/97	<5	590.0	140	1,300	920	2950.0	7.42	2310
Duplicate	10/28/97	<5	490.0	95	930	680	2195.0	7.42	2310
	5/5/98	NS	NS	NS	NS	NS	0.0	NS	NS
Duplicate	12/9/98	180	4000.0	870	4,500	970	10340.0	7.57	1160
	12/9/98	<10	2300.0	370	1,300	44	4014.0	7.57	1160
	10/14/99	<5	440.0	110	930	140	1620.0	7.64	2030
	10/27/00	<5	500.0	180	1,600	57	2337.0	7.50	1920
	12/19/01	ND	6200.0	1,900	17,200	6,000	31300.0	7.61	1713
	12/19/02	ND	4200.0	1,700	13,000	1,900	20800.0	NS	2186
	11/8/03	ND	420.0	87	1,060	120	1687.0	NS	2145
MW-22	Sep 13-14, 1990	7,200	21000.0	1,100	8,300	20,000	50400.0	7.00	1500
	Mar 18-19, 1991	2,200	17000.0	910	6,600	9,500	34010.0	6.87	1900
	Jun 13, 1991	3,600	15000.0	760	3,000	3,200	21960.0	7.06	1700
	Jan 20-21, 1992	5,400	36000.0	1,900	13,500	27,000	78400.0	6.86	1600
	Jun 9 & 12, 1992	3,170	21200.0	1,040	5,730	7,540	35510.0	7.13	1690
	Aug 19-20-1992	568	20500.0	588	3,280	4,610	28978.0	7.28	1545
	Dec 16, 1992	908	12100.0	514	3,254	4,220	20088.0	7.43	1508
	Mar 30, 1993	1,930	29800.0	1,170	7,030	14,100	52100.0	7.26	1408
	May 23, 1993	28	17000.0	1,100	6,150	6,520	30770.0	7.61	6550
	Nov 29-30, 1993	2,780	18400.0	1,150	7,300	8,480	35330.0	8.01	1610
	May 25, 1994	379	9340.0	845	3,725	2,250	16160.0	7.15	1505
	Oct 2-3, 1994	566	10500.0	1,390	8,350	5,890	26130.0	7.24	1710
	May 17, 1995	62	7510.0	1,000	6,520	1,750	16780.0	7.15	1517
Duplicate	May 17, 1995	67	9020.0	1,230	7,310	2,620	20180.0	7.15	1517
Duplicate **	Oct 18-19, 1995	42	5700.0	1,580	9,000	2,430	18710.0	7.25	1820
**	Oct 18-19, 1995	< 1	5120.0	1,540	8,320	2,130	17110.0	7.25	1820
	May 1-2, 1996	37	4600.0	1,300	10,000	410	16310.0	7.30	1325
	Oct 20, 1996	38	880.0	710	4,100	250	5940.0	7.49	1505
	June 24, 1997	24	4300.0	510	5,500	580	10890.0	7.31	1280
Duplicate	June 24, 1997	21	5800.0	750	7,300	930	14780.0	7.31	1280
	October 18, 1997	NS	NS	NS	NS	NS	0.0	NS	NS
	May 5, 1998	12	3300.0	610	3,400	300	7610.0	7.61	1290
Duplicate	May 5, 1998	14	3500.0	630	3,600	310	8040.0	7.61	1290
	Dec. 9, 1998	190	3700.0	720	4,000	910	9330.0	7.40	1500
	Oct. 14, 1999	<5	580.0	150	820	210	1760.0	7.72	1840
Duplicate	Oct. 14, 1999	<5	730.0	180	1000	270	2180.0	7.72	1840
	Oct. 27, 2000	<10	210.0	220	830	120	1380.0	7.70	1610
	Dec. 19, 2001	ND	410.0	120	470	19	1019.0	7.50	1620
	December 19, 2002	ND	1200.0	220	640	30	2090.0	NS	706
	November 8, 2003	ND	330.0	200	222	20	772.0	NS	1630

Table 2 Summary of Groundwater Quality Monitoring Results
(Since Installation of Slurry Wall)
Former Maverik Refinery - Kirtland, New Mexico

Location	Date	DCA	B	E	X	T	Total BTEX	pH	SC
							0.0		
P-1	May 23, 1993	< 1	4110.0	361	2,522	18.8	7011.8	7.04	2290
	Nov 29-30, 1993	< 1	3580.0	506	3,215	10.2	7311.2	7.22	1460
	May 25, 1994	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 2-3, 1994	< 1	8.9	1.9	11.8	< 1	22.6	7.04	2210
	May 17, 1995	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 18-19, 1995	NS	NS	NS	NS	NS	0.0	NS	NS
	May 1-2, 1996	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 20, 1996	NS	NS	NS	NS	NS	0.0	NS	NS
	June 24, 1997	NS	NS	NS	NS	NS	0.0	NS	NS
	October 18, 1997	NS	NS	NS	NS	NS	0.0	NS	NS
	May 5, 1998	NS	NS	NS	NS	NS	0.0	NS	NS
	Dec. 9, 1998	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct. 14, 1999	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct. 27, 2000	NS	NS	NS	NS	NS	0.0	NS	NS
P-2	May 23, 1993	3.2	5.2	< 1	< 1	< 1	5.2	7.36	3910
	Nov 29-30, 1993	< 1	< 1	< 1	< 1	< 1	0.0	7.92	3540
	May 25, 1994	1.3	< 1	< 1	< 1	< 1	0.0	7.41	3980
	Oct 2-3, 1994	3.6	< 1	< 1	< 1	< 1	0.0	7.12	3480
	May 17, 1995	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 18-19, 1995	NS	NS	NS	NS	NS	0.0	NS	NS
	May 1-2, 1996	0.8	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.40	2980
	Oct 20, 1996	NS	NS	NS	NS	NS	0.0	NS	NS
	June 24, 1997	NS	NS	NS	NS	NS	0.0	NS	NS
	October 18, 1997	NS	NS	NS	NS	NS	0.0	NS	NS
	May 5, 1998	NS	NS	NS	NS	NS	0.0	NS	NS
	Dec. 9, 1998	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct. 14, 1999	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct. 27, 2000	NS	NS	NS	NS	NS	0.0	NS	NS
P-3	May 23, 1993	10.6	< 1	< 1	< 1	< 1	0.0	7.24	11160
	Nov 29-30, 1993	11.5	< 1	< 1	< 1	< 1	0.0	7.31	9140
	May 25, 1994	12.1	< 1	< 1	< 1	< 1	0.0	7.28	8070
	Oct 2-3, 1994	12.6	< 1	< 1	< 1	< 1	0.0	7.06	5550
	May 17, 1995	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 18-19, 1995	NS	NS	NS	NS	NS	0.0	NS	NS
	May 1-2, 1996	3.4	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.40	4280
	Oct 20, 1996	NS	NS	NS	NS	NS	0.0	NS	NS
	June 24, 1997	NS	NS	NS	NS	NS	0.0	NS	NS
	October 18, 1997	NS	NS	NS	NS	NS	0.0	NS	NS
	May 5, 1998	NS	NS	NS	NS	NS	0.0	NS	NS
	Dec. 9, 1998	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct. 14, 1999	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct. 27, 2000	NS	NS	NS	NS	NS	0.0	NS	NS
P-4	May 23, 1993	8.3	6690.0	559	6,260	4,090	17599.0	NA	NA
	Nov 29-30, 1993	2.1	6400.0	900	7,700	4,420	19420.0	NA	NA
	May 25, 1994	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 2-3, 1994	NS	NS	NS	NS	NS	0.0	NS	NS
	May 17, 1995	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 18-19, 1995	NS	NS	NS	NS	NS	0.0	NS	NS
	May 1-2, 1996	NA	NA	NA	NA	NA	0.0	6.60	1621
	Oct 20, 1996	NS	NS	NS	NS	NS	0.0	NS	NS
	June 24, 1997	NS	NS	NS	NS	NS	0.0	NS	NS
	October 18, 1997	NS	NS	NS	NS	NS	0.0	NS	NS
	May 5, 1998	NS	NS	NS	NS	NS	0.0	NS	NS
	Dec. 9, 1998	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct. 14, 1999	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct. 27, 2000	NS	NS	NS	NS	NS	0.0	NS	NS

Table 2
Water Quality Monitoring Results

Table 2 Summary of Groundwater Quality Monitoring Results
(Since Installation of Slurry Wall)
Former Maverik Refinery - Kirtland, New Mexico

Location	Date	DCA	B	E	X	T	Total BTEX	pH	SC
On Site							0.0		
MW-10	Sep 13-14, 1990	1.4	< 0.5	< 0.5	< 1	< 0.5	0.0	6.95	1550
	Mar 18-19, 1991	< 1	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.29	1700
	Jun 13, 1991	NA	NA	NA	NA	NA	0.0	NA	NA
	Jan 20-21, 1992	< 5	< 5	< 5	< 5	< 5	0.0	7.31	1840
	Jun 9 & 12, 1992	1.6	< 1	< 1	< 1	< 1	0.0	7.65	1400
	Aug 19-20-1992	< 1	< 1	< 1	< 1	< 1	0.0	7.85	1160
	Dec 16, 1992	< 1	< 1	< 1	< 1	< 1	0.0	7.64	6110
	Mar 30, 1993	< 1	< 1	< 1	< 1	< 1	0.0	7.22	9060
	May 23, 1993	< 1	< 1	< 1	< 1	< 1	0.0	7.93	2320
	Nov 29-30, 1993	< 1	< 1	< 1	< 1	< 1	0.0	7.73	1320
	May 25, 1994	< 1	< 1	< 1	< 1	< 1	0.0	7.75	1335
	Oct 2-3, 1994	< 1	< 1	< 1	< 1	< 1	0.0	7.56	1159
	May 17, 1995	< 1	< 1	< 1	< 1	< 1	0.0	7.64	1695
	Oct 18-19, 1995	< 1	< 1	< 1	< 1	< 1	0.0	7.41	1453
	May 1-2, 1996	1.0	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.70	1288
	Oct 20, 1996	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.69	1310
	June 24, 1997	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.63	2520
	October 20, 1997	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.61	1585
	May 5, 1998	1.0	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.60	1608
	Dec. 9, 1998	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.64	1290
	Oct. 14, 1999	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	7.68	1650
	Oct. 27, 2000	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	7.50	1470
	December 19, 2001	ND	ND	ND	ND	ND	ND	7.28	1409
	December 19, 2002	ND	ND	ND	ND	ND	ND	NS	1594
	November 8, 2003	ND	ND	ND	ND	ND	ND	NS	1631
							0.0		
MW-18	Sep 13-14, 1990	< 1	17.0	84.0	880	< 12	981.0	7.00	1500
	Mar 18-19, 1991	< 1	26.0	85.0	770	< 12	881.0	7.24	1200
	Jun 13, 1991	< 1	< 25	78.0	930	< 25	1008.0	6.77	1200
	Jan 20-21, 1992	MSG	MSG	MSG	MSG	MSG	0.0	MSG	MSG
	Jun 9 & 12, 1992	< 1	313.0	200	1,710	1.1	2224.1	7.07	1480
	Aug 19-20-1992	< 1	527.0	258	2,075	10.8	2870.8	7.26	2100
	Dec 16, 1992	< 25	294.0	224	1,460	< 25	1978.0	7.31	1930
	Mar 30, 1993	< 1	117.0	96.0	226	8.0	447.0	7.07	2780
	May 23, 1993	< 1	73.0	31.2	259	< 1	363.2	7.15	2220
	Nov 29-30, 1993	< 1	337.0	261	1,352	4.9	1954.9	7.00	1870
	May 25, 1994	< 1	51.0	7.0	99	10.0	167.0	7.00	1510
	Oct 2-3, 1994	< 1	210.0	46.0	483	10.9	749.7	7.10	1530
	May 17, 1995	< 1	128.0	10.4	274	< 1	412.4	6.84	1370
	Oct 18-19, 1995	< 1	118.0	20.0	296	12.2	446.6	7.03	1299
	May 1-2, 1996	< 0.5	48.0	3.4	150	0.5	201.9	7.00	1270
	Oct 20, 1996	< 0.5	37.0	14.0	110	11.0	172.0	7.50	1314
Duplicate	Oct 20, 1996	< 0.5	33.0	12.0	120	0.8	165.8	7.50	1314
	June 24, 1997	< 0.5	130.0	15.0	200	<0.5	345.0	6.98	1399
	October 20, 1997	< 0.5	55.0	19.0	150	0.5	224.5	6.99	1280
	May 5, 1998	< 0.5	16.0	<0.5	2.1	<0.5	18.1	6.84	1374
	Dec. 9, 1998	<2.5	44.0	21	<2.5	<2.5	65.0	7.04	1438
	Oct. 14, 1999	0.50	33.0	11	60	4	108.0	7.13	1550
	Oct. 27, 2000	0.90	9.5	<0.5	6.9	<0.5	6.9	6.90	3400
	Dec. 19, 2001	ND	4.2	ND	ND	ND	4.2	6.89	3300
	December 19, 2002	ND	ND	ND	ND	ND	ND	NS	636
	November 8, 2003	ND	1.4	ND	ND	ND	1.4	NS	0.0063
MW-19	Sep 13-14, 1990	45	< 0.5	1.1	1.9	< 0.5	3.0	6.95	3000
	Mar 18-19, 1991	35	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.22	2500
	Jun 13, 1991	44	< 0.5	5.9	< 0.5	< 0.5	5.9	7.10	2400
	Jan 20-21, 1992	14	< 5	< 5	< 5	< 5	0.0	7.66	460
	Jun 9 & 12, 1992	11.4	< 1	< 1	< 1	< 1	0.0	7.76	1970
	Aug 19-20-1992	9.0	< 1	< 1	< 1	< 1	0.0	7.72	1320
	Dec 16, 1992	6.6	< 1	< 1	< 1	< 1	0.0	7.70	1620
	Mar 30, 1993	2.4	< 1	< 1	< 1	< 1	0.0	7.74	1750
	May 23, 1993	7.9	< 1	< 1	< 1	< 1	0.0	7.73	1630
	Nov 29-30, 1993	6.6	< 1	< 1	< 1	< 1	0.0	7.78	1380
	May 25, 1994	8.0	< 1	< 1	< 1	< 1	0.0	7.65	1762
	Oct 2-3, 1994	7.9	< 1	< 1	< 1	< 1	0.0	7.44	1258
	May 17, 1995	8.6	< 1	< 1	< 1	< 1	0.0	7.52	1624
	Oct 18-19, 1995	8.8	< 1	< 1	< 1	< 1	0.0	7.31	1411
	May 1-2, 1996	8.6	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.50	1361
	Oct 20, 1996	4.0	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.62	1340
	June 24, 1997	3.0	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.52	1573
	October 20, 1997	2.2	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.53	1346
	May 5, 1998	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.40	1672
	Dec. 9, 1998	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.58	1381
	Oct 14, 1999	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	7.62	2000
	Oct 27, 2000	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	7.40	1490
	December 19, 2001	ND	ND	ND	ND	ND	ND	7.41	1420
	December 19, 2002	ND	ND	ND	ND	ND	ND	NS	1608
	November 8, 2003	ND	ND	ND	ND	ND	ND	NS	1661
							0.0		

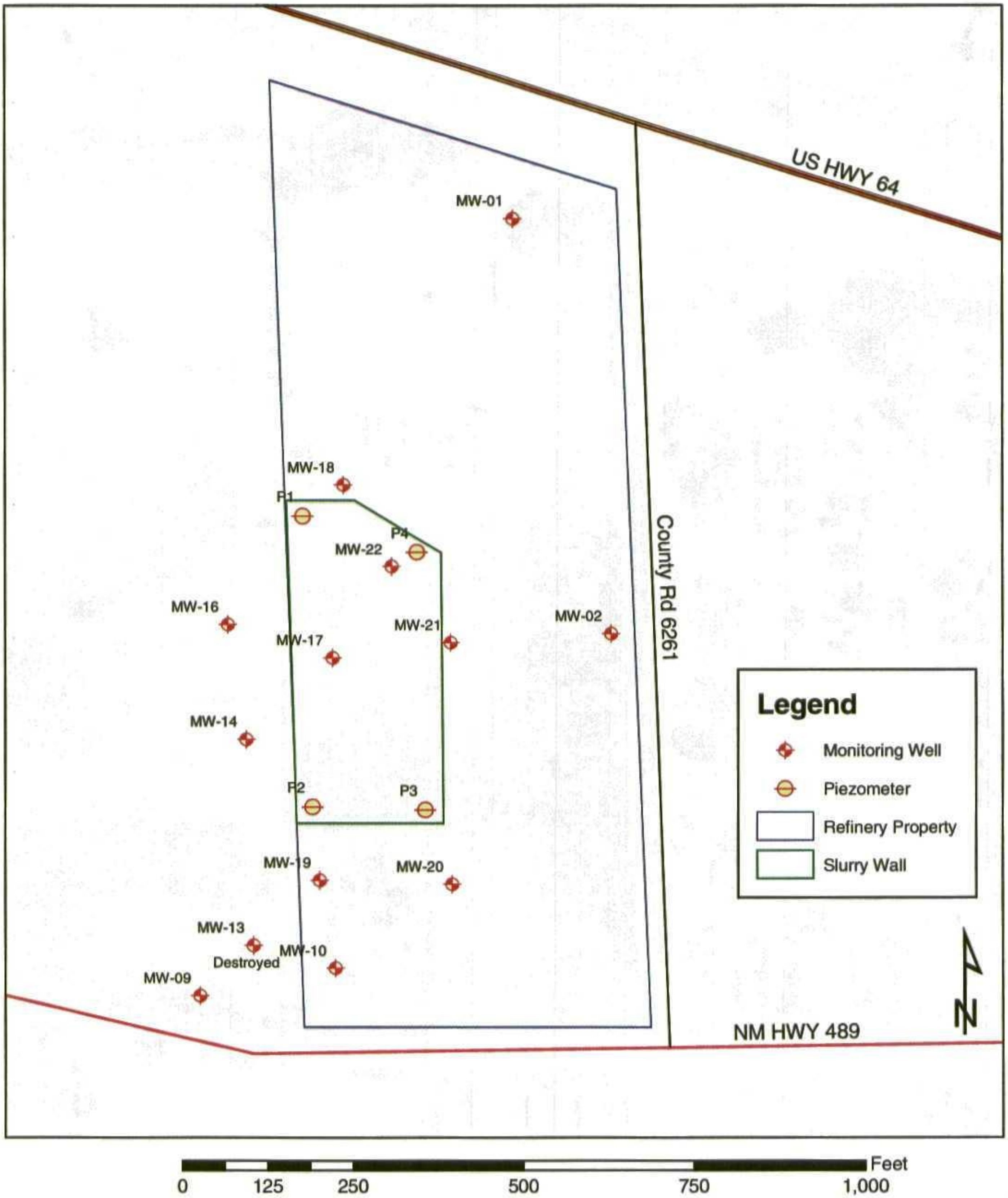
Table 2	Summary of Groundwater Quality Monitoring Results								
	(Since Installation of Slurry Wall)								
	Former Maverik Refinery - Kirtland, New Mexico								
Location	Date	DCA	B	E	X	T	Total BTEX	pH	SC
MW-20	Sep 13-14, 1990	< 1	< 0.5	< 0.5	< 1	< 0.5	0.0	7.01	1350
	Mar 18-19, 1991	2.0	< 0.5	< 0.5	0.7	< 0.5	0.7	7.39	3000
	Jun 13, 1991	NA	NA	NA	NA	NA	0.0	NA	NA
	Jan 20-21, 1992	< 5	< 5	< 5	< 5	< 5	0.0	7.54	3750
	Jun 9 & 12, 1992	< 1	< 1	< 1	< 1	< 1	0.0	7.62	1600
	Aug 19-20-1992	< 1	< 1	< 1	< 1	< 1	0.0	6.97	1310
	Dec 16, 1992	< 1	< 1	< 1	< 1	< 1	0.0	7.87	1340
	Mar 30, 1993	2.1	< 1	< 1	< 1	< 1	0.0	7.10	6740
	May 23, 1993	< 1	< 1	< 1	< 1	< 1	0.0	7.86	1430
	Nov 29-30, 1993	< 1	< 1	< 1	< 1	< 1	0.0	7.69	1230
	May 25, 1994	< 1	< 1	< 1	< 1	< 1	0.0	7.38	1292
	Oct 2-3, 1994	< 1	< 1	< 1	< 1	< 1	0.0	7.57	1308
	May 17, 1995	< 1	< 1	< 1	< 1	< 1	0.0	7.65	1434
	Oct 18-19, 1995	< 1	< 1	< 1	< 1	< 1	0.0	7.35	1525
	May 1-2, 1996	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.50	1417
	Oct 20, 1996	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.18	1545
	June 24, 1997	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.48	1540
	October 20, 1997	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.01	1452
	May 5, 1998	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.44	1890
	Dec. 9, 1998	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.65	1153
	Oct. 14, 1999	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	8.01	1600
	Oct. 27, 2000	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	7.60	14840
	Dec. 19, 2001	ND	ND	ND	ND	ND	ND	7.51	1695
	December 19, 2002	ND	ND	ND	ND	ND	ND	NS	1223
	November 8, 2003	ND	ND	ND	ND	ND	ND	NS	0.01751
							0.0		
MW-21	Sep 13-14, 1990	67	< 0.5	1.1	5.0	1.5	7.6	7.01	1500
	Mar 18-19, 1991	44	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.62	1700
	Jun 13, 1991	40	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.44	1700
	Jan 20-21, 1992	8.8	< 5	< 5	< 5	< 5	0.0	8.31	5110
	Jun 9 & 12, 1992	21.9	< 1	< 1	< 1	< 1	0.0	7.37	2400
	Aug 19-20-1992	8.3	< 1	< 1	< 1	< 1	0.0	6.96	1730
	Dec 16, 1992	1.7	< 1	< 1	< 1	< 1	0.0	7.69	2030
	Mar 30, 1993	5.9	< 1	< 1	< 1	< 1	0.0	7.58	1590
	May 23, 1993	14.8	< 1	< 1	< 1	< 1	0.0	7.63	2530
	Nov 29-30, 1993	3.7	< 1	< 1	< 1	< 1	0.0	7.58	1580
	May 25, 1994	8.3	< 1	< 1	< 1	< 1	0.0	7.66	1592
	Oct 2-3, 1994	5.5	< 1	< 1	< 1	< 1	0.0	7.55	1760
	May 17, 1995	< 1	< 1	< 1	< 1	< 1	0.0	7.59	1819
Duplicate	May 17, 1995	5.4	< 1	< 1	< 1	< 1	0.0	7.59	1819
	Oct 18-19, 1995	2.1	< 1	< 1	< 1	< 1	0.0	7.52	2060
	May 1-2, 1996	1.0	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.60	1824
	Oct 20, 1996	3.6	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.68	2100
	June 24, 1997	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	6.98	1642
	October 20, 1997	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	6.97	1653
	May 5, 1998	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	6.67	1760
	Dec. 9, 1998	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct. 14, 1999	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	6.97	2180
	Oct. 27, 2000	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	6.30	47500
Duplicate	Oct. 27, 2000	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	6.30	47500
	Dec. 19, 2001	ND	ND	ND	ND	ND	ND	6.51	3280
	December 19, 2002	ND	ND	ND	ND	ND	ND	NS	1905
	November 8, 2003	ND	ND	ND	ND	ND	ND	NS	0.04826

Table 2	Summary of Groundwater Quality Monitoring Results								
	(Since Installation of Slurry Wall)								
	Former Maverik Refinery - Kirtland, New Mexico								
Location	Date	DCA	B	E	X	T	Total BTEX	pH	SC
Off Site									
MW-9	Sep 13-14, 1990	2.1	< 0.5	< 0.5	< 0.5	< 0.5	0.0	6.97	1550
	Mar 18-19, 1991	1.8	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.57	2000
	Jun 13, 1991	NA	NA	NA	NA	NA	0.0	NA	NA
	Jan 20-21, 1992	< 5	< 5	< 5	< 5	< 5	0.0	7.31	4360
	Jun 9 & 12, 1992	1.5	< 1	< 1	< 1	< 1	0.0	7.58	1680
	Aug 19-20-1992	< 1	< 1	< 1	< 1	< 1	0.0	7.81	1325
	Dec 16, 1992	< 1	< 1	< 1	< 1	< 1	0.0	7.33	1827
	Mar 30, 1993	1.5	< 1	< 1	< 1	< 1	0.0	7.63	1640
	May 23, 1993	NA	NA	NA	NA	NA	0.0	NA	NA
	Nov 29-30, 1993	< 1	< 1	< 1	< 1	< 1	0.0	7.62	1460
	May 25, 1994	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 2-3, 1994	1.2	< 1	< 1	< 1	< 1	0.0	7.80	1610
	May 17, 1995	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 18-19, 1995	< 1	< 1	< 1	< 1	< 1	0.0	7.38	1523
	May 1-2, 1996	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 20, 1996	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.85	1645
	June 24, 1997	NS	NS	NS	NS	NS	0.0	NS	NS
	October 20, 1997	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	NV	NV
	May 5, 1998	NS	NS	NS	NS	NS	0.0	NS	NS
	Dec. 9, 1998	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.51	1588
	Oct. 14, 1999	NS	NS	NS	NS	NS	0.0	NS	NS
	Dec. 19, 2001	ND	ND	ND	ND	ND	0.0	7.42	1610
	December 19, 2003	ND	ND	ND	ND	ND	ND	NS	380
	November 8, 2003	ND	ND	ND	ND	ND	ND	NS	2246
MW-13	Sep 13-14, 1990	< 1	< 0.5	< 0.5	<1	1.5	1.5	7.02	2950
	Mar 18-19, 1991	< 1	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.84	3250
	Jun 13, 1991	NA	NA	NA	NA	NA	0.0	NA	NA
	Jan 20-21, 1992	NA	NA	NA	NA	NA	0.0	NA	NA
	Jun 9 & 12, 1992	<1	<1	<1	<1	<1	0.0	7.11	4260
	Aug 19-20-1992	<1	<1	<1	<1	<1	0.0	7.06	2910
	Dec 16, 1992	NA	NA	NA	NA	NA	0.0	NA	NA
	Mar 30, 1993	<1	<1	<1	<1	<1	0.0	7.72	3410
	May 23, 1993	NA	NA	NA	NA	NA	0.0	NA	NA
	Nov 29-30, 1993	<1	<1	<1	<1	<1	0.0	7.45	4150
	May 25, 1994	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 2-3, 1994	<1	<1	<1	<1	<1	0.0	7.38	3160
	May 17, 1995	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 18-19, 1995	<1	<1	<1	<1	<1	0.0	7.41	3600
	May 1-2, 1996	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 20, 1996	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.54	3200
	June 24, 1997	NS	NS	NS	NS	NS	0.0	NS	NS
	October 20, 1997	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	NV	NV
	May 5, 1998	NS	NS	NS	NS	NS	0.0	NS	NS
	Dec. 9, 1998	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.81	4100
Destroyed	Oct. 14, 1999	NS	NS	NS	NS	NS	0.0	NS	NS
MW-14	Sep 13-14, 1990	2.0	< 0.5	< 0.5	< 1	< 0.5	0.0	6.97	5450
	Mar 18-19, 1991	< 1	< 0.5	< 0.5	1.7	< 0.5	1.7	7.51	8400
	Jun 13, 1991	NA	NA	NA	NA	NA	0.0	NA	NA
	Jan 20-21, 1992	< 5	< 5	< 5	< 5	< 5	0.0	7.20	19380
	Jun 9 & 12, 1992	2.3	< 1	< 1	< 1	< 1	0.0	7.62	4520
	Aug 19-20-1992	< 1	< 1	< 1	< 1	< 1	0.0	7.38	5760
	Dec 16, 1992	< 1	< 1	< 1	< 1	< 1	0.0	7.40	9090
	Mar 30, 1993	< 1	< 1	< 1	< 1	< 1	0.0	7.02	15280
	May 23, 1993	NA	NA	NA	NA	NA	0.0	NA	NA
	Nov 29-30, 1993	1.2	< 1	< 1	< 1	< 1	0.0	7.61	6030
	May 25, 1994	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 2-3, 1994	1.9	< 1	< 1	< 1	< 1	0.0	7.34	4560
	May 17, 1995	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 18-19, 1995	< 1	< 1	< 1	< 1	< 1	0.0	7.15	6760
	May 1-2, 1996	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 20, 1996	0.7	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.15	6120
	June 24, 1997	NS	NS	NS	NS	NS	0.0	NS	NS
	October 20, 1997	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	NV	NV
	May 5, 1998	NS	NS	NS	NS	NS	0.0	NS	NS
	Dec. 9, 1998	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.68	14100
	Oct. 14, 1999	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	7.26	7830
	Oct. 27, 2000	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	7.70	10500

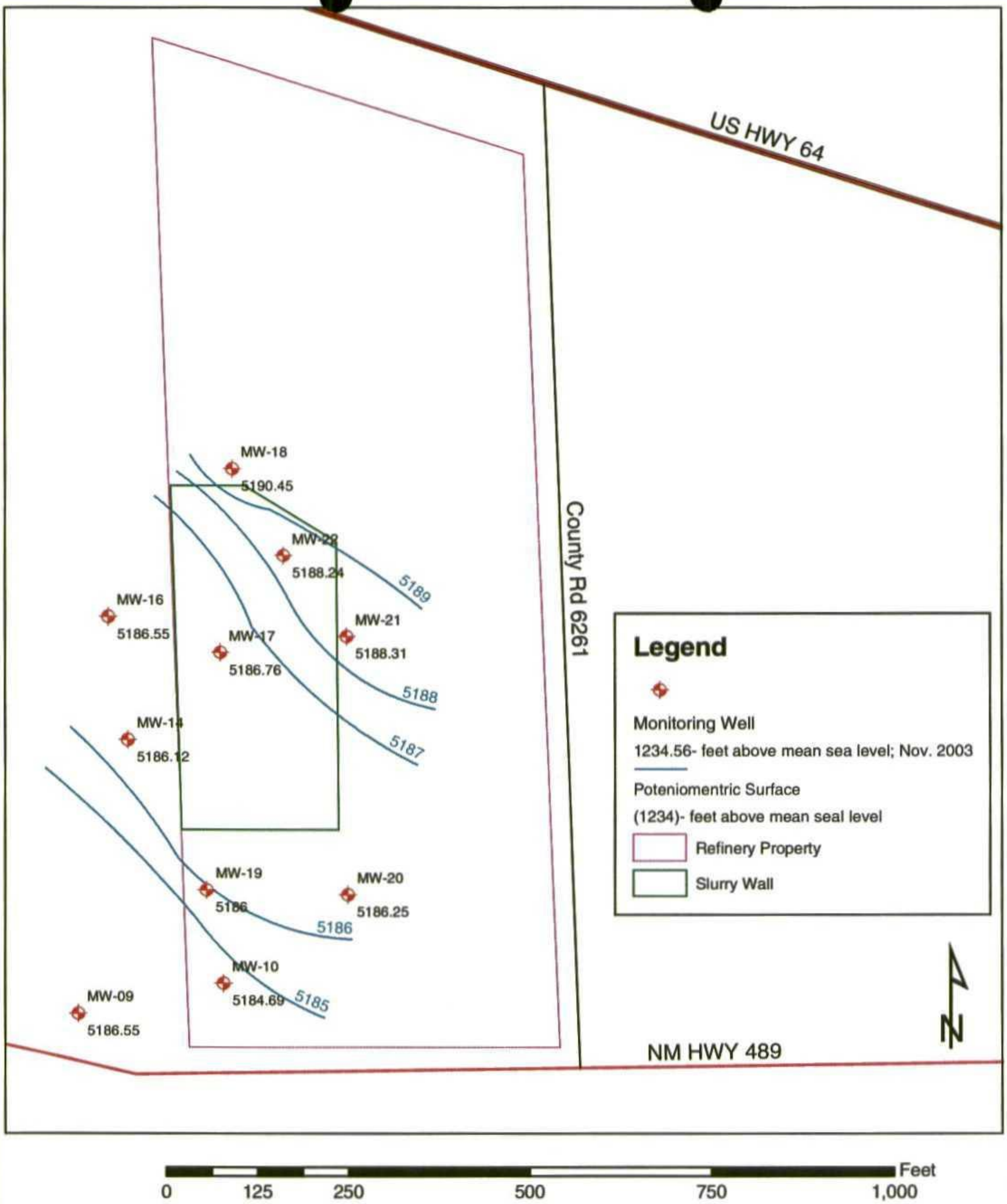
Table 2 Summary of Groundwater Quality Monitoring Results
(Since Installation of Slurry Wall)
Former Maverik Refinery - Kirtland, New Mexico

Location	Date	DCA	B	E	X	T	Total BTEX	pH	SC
MW-15	Sep 13-14, 1990	< 1	< 0.5	< 0.5	< 1	< 0.5	0.0	7.00	3250
	Mar 18-19, 1991	< 1	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.02	8500
	Jun 13, 1991	NA	NA	NA	NA	NA	0.0	NA	NA
	Jan 20-21, 1992	< 5	< 5	< 5	< 5	< 5	0.0	7.15	12120
	Jun 9 & 12, 1992	< 1	< 1	< 1	< 1	< 1	0.0	7.27	3430
	Aug 19-20-1992	< 1	< 1	< 1	< 1	< 1	0.0	7.39	2450
	Dec 16, 1992	NA	NA	NA	NA	NA	0.0	NA	NA
	Mar 30, 1993	< 1	< 1	< 1	< 1	< 1	0.0	7.42	9810
	May 23, 1993	NA	NA	NA	NA	NA	0.0	NA	NA
	Nov 29-30, 1993	< 1	< 1	< 1	< 1	< 1	0.0	8.01	1630
	May 25, 1994	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 2-3, 1994	< 1	< 1	< 1	< 1	< 1	0.0	7.54	2500
	May 17, 1995	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 18-19, 1995	< 1	< 1	< 1	< 1	< 1	0.0	7.48	2260
	May 1-2, 1996	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 20, 1996	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	8.21	1939
	June 24, 1997	NS	NS	NS	NS	NS	0.0	NS	NS
	October 20, 1997	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	6.97	3250
	May 5, 1998	NS	NS	NS	NS	NS	0.0	NS	NS
	Dec. 9, 1998	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.30	1980
	Oct. 14, 1999	NS	NS	NS	NS	NS	0.0	NS	NS
MW-16	Sep 13-14, 1990	< 1	< 0.5	< 0.5	< 1	< 0.5	0.0	6.97	1370
	Mar 18-19, 1991	< 1	< 0.5	< 0.5	< 0.5	< 0.5	0.0	7.57	1200
	Jun 13, 1991	NA	NA	NA	NA	NA	0.0	NA	NA
	Jan 20-21, 1992	< 5	< 5	< 5	< 5	< 5	0.0	7.30	2050
	Jun 9 & 12, 1992	< 1	< 1	< 1	< 1	< 1	0.0	7.50	1430
	Aug 19-20-1992	< 1	< 1	< 1	< 1	< 1	0.0	7.76	1230
	Dec 16, 1992	< 1	< 1	< 1	< 1	< 1	0.0	7.12	1735
	Mar 30, 1993	< 1	< 1	< 1	< 1	< 1	0.0	7.23	2400
	May 23, 1993	NA	NA	NA	NA	NA	0.0	NA	NA
	Nov 29-30, 1993	< 1	< 1	< 1	< 1	< 1	0.0	7.31	1760
	May 25, 1994	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 2-3, 1994	< 1	< 1	< 1	< 1	< 1	0.0	7.44	1253
	May 17, 1995	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 18-19, 1995	< 1	< 1	< 1	< 1	< 1	0.0	7.26	1421
	May 1-2, 1996	NS	NS	NS	NS	NS	0.0	NS	NS
	Oct 20, 1996	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.0	6.78	1665
	June 24, 1997	NS	NS	NS	NS	NS	0.0	NS	NS
	October 20, 1997	< 0.5	0.5	< 0.5	< 0.5	< 0.5	0.5	NV	NV
	May 5, 1998	NS	NS	NS	NS	NS	0.0	NS	NS
	Dec. 9, 1998	< 0.5	0.5	< 0.5	< 0.5	< 0.5	0.5	7.26	3930
	Oct. 14, 1999	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	7.30	1890
	Oct. 27, 2000	<0.5	<0.5	<0.5	<0.5	<0.5	0.0	7.30	1970
	Dec. 19, 2001	ND	ND	ND	ND	ND	0.0	7.30	2320
	December 19, 2002	ND	ND	ND	ND	ND	ND	NS	4478
	November 8, 2003	ND	ND	ND	ND	ND	ND	NS	2322
Water Quality Standards									
New Mexico (ug/L)		10	10.0	750	620	750		6.90	---
EPA MCL (ug/L)		5	5.0	700	10,000	1,000		---	---
NOTES:	1,2-dichloroethane		SC =	Specific Conductivity			Organic values in ug/l		
	Benzene		TDS =	Total Dissolved Solids			pH in standard units		
	Toluene		MSG =	Well Missing			SC in umhos/cm		
	Ethylbenzene		NA =	Not Analyzed			NV=no value recorded		
	Total Xylenes		NS =	Not Sampled					
	Values in bold exceed New Mexico MCL for drinking water								
	** = Laboratory exceeded holding time before completing sample analyses.								

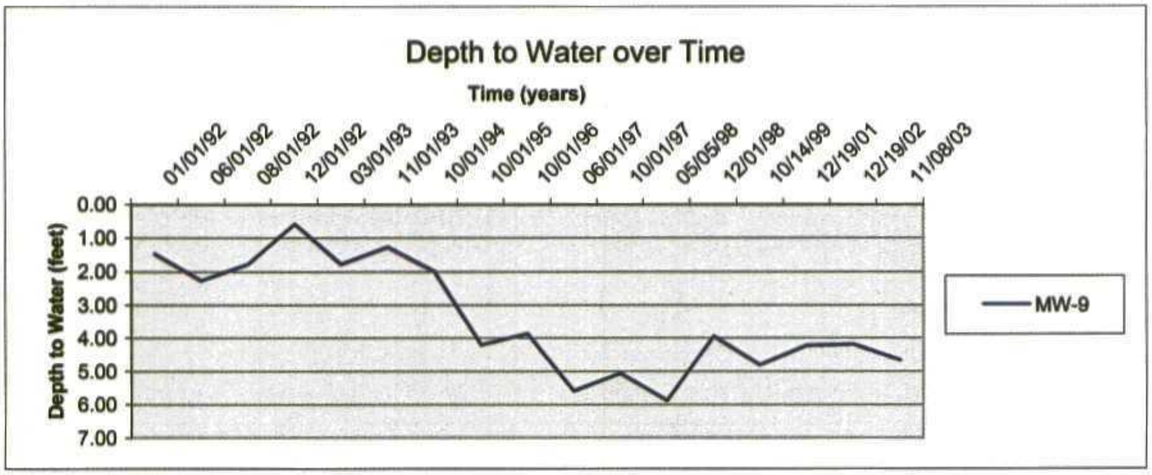
PLATES

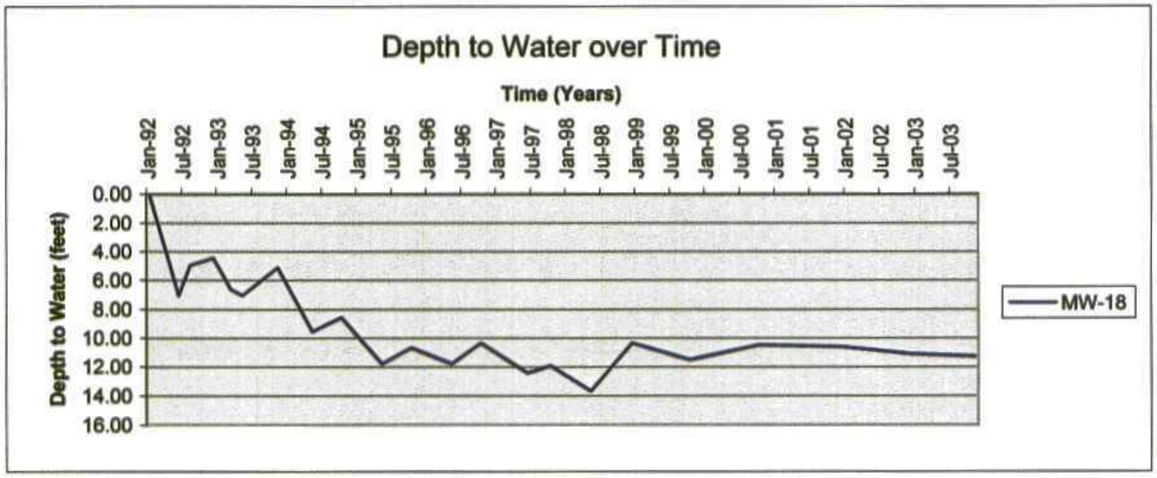


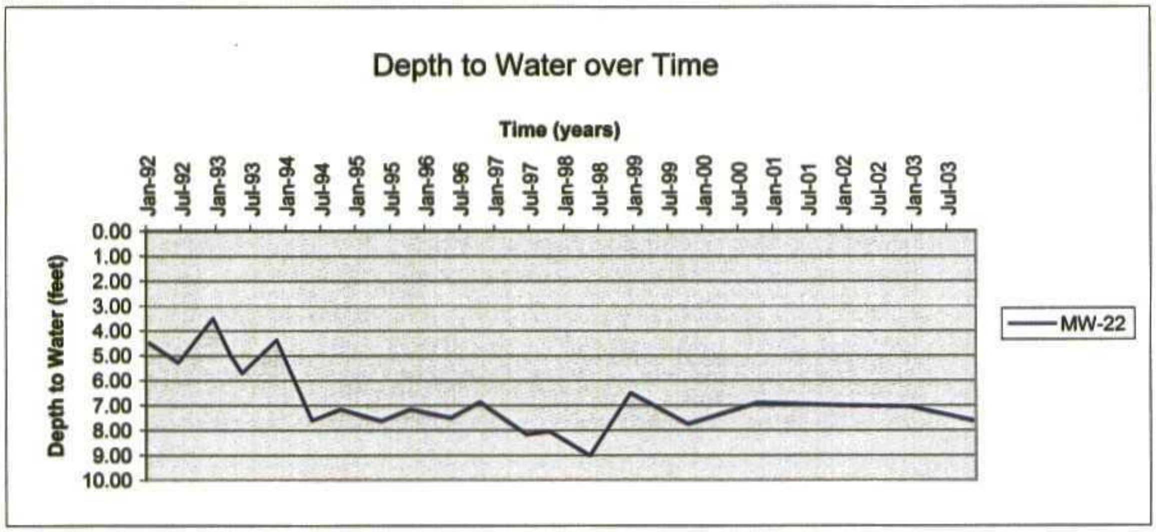
	Site Map: Former Maverik Tank Farm, Kirtland, NM	Plate 1
	Maverik Country Stores	February 2004



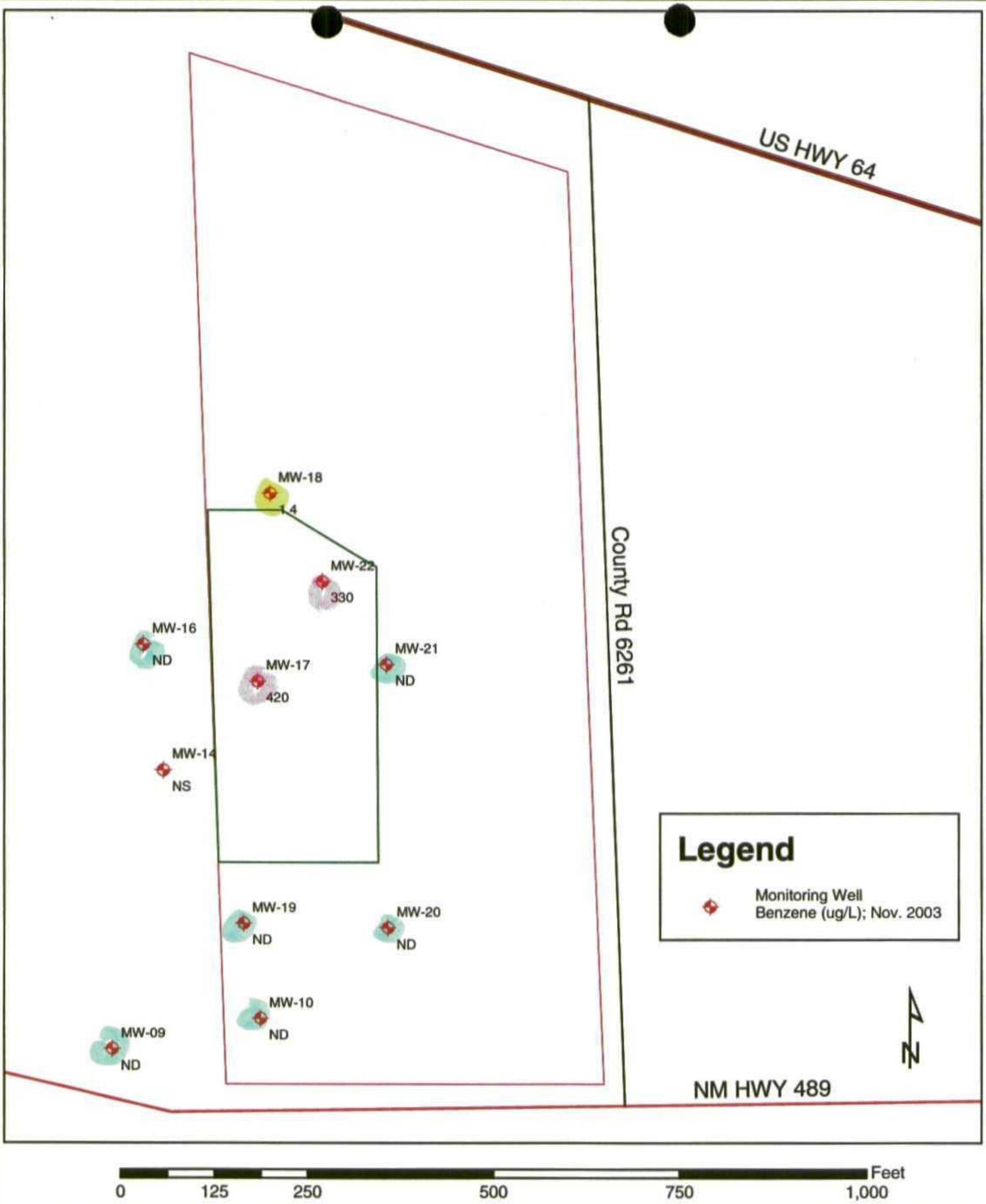
	Poteniometric Surface Map: Former Maverik Tank Farm; Kirtland, NM	Plate 2
	Maverik Country Stores	February 2004







Depth to Water over Time; Former Maverik Tank Farm, Kirtland, NM	**Plate 3**
Maverik Country Stores	**February 2004**



	Benzene Concentrations; Former Maverik Tank Farm, Kirtland, NM.	Plate 4
	Maverik Country Stores	February 2004

APPENDIX A

RT HICKS CONSULTING, LTD
attn: ANDREW PARKER
901 RIO GRANDE BLVD., NW, SUITE F-142
ALBUQUERQUE NM 87401

Explanation of codes	
B	analyte detected in Method Blank
E	result is estimated
H	analyzed out of hold time
N	tentatively identified compound
S	subcontracted
1-9	see footnote

STANDARD

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**
Project: **MAVERICK REFINERY**
Order: **0311183** **RTHC01** Receipt: **11-11-03**

William P. Biava: President of Assaigai Analytical Laboratories, Inc.

Sample: ***MW-16*** Collected: *11-08-03 8:45:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0311183-01A		**SW846 8260B Purgeable VOCs by GC/MS**					By:	JAA		
X03556	XG.2003.2025.14	75-34-3	1,1 Dichloroethane	ND	ug / L	1	1		11-14-03	11-14-03
X03556	XG.2003.2025.14	71-43-2	Benzene	ND	ug / L	1	1		11-14-03	11-14-03
X03556	XG.2003.2025.14	100-41-4	Ethylbenzene	ND	ug / L	1	1		11-14-03	11-14-03
X03556	XG.2003.2025.14	95-47-6	o-Xylene	ND	ug / L	1	1		11-14-03	11-14-03
X03556	XG.2003.2025.14	108-38-3/106-42	p/m-Xylenes	ND	ug / L	1	2		11-14-03	11-14-03
X03556	XG.2003.2025.14	108-88-3	Toluene	ND	ug / L	1	1		11-14-03	11-14-03

Sample: ***MW-9*** Collected: *11-08-03 9:20:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0311183-02A		**SW846 8260B Purgeable VOCs by GC/MS**					By:	JAA		
X03556	XG.2003.2025.17	75-34-3	1,1 Dichloroethane	ND	ug / L	1	1		11-14-03	11-14-03
X03556	XG.2003.2025.17	71-43-2	Benzene	ND	ug / L	1	1		11-14-03	11-14-03
X03556	XG.2003.2025.17	100-41-4	Ethylbenzene	ND	ug / L	1	1		11-14-03	11-14-03
X03556	XG.2003.2025.17	95-47-6	o-Xylene	ND	ug / L	1	1		11-14-03	11-14-03
X03556	XG.2003.2025.17	108-38-3/106-42	p/m-Xylenes	ND	ug / L	1	2		11-14-03	11-14-03
X03556	XG.2003.2025.17	108-88-3	Toluene	ND	ug / L	1	1		11-14-03	11-14-03

STANDARD

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: RT HICKS CONSULTING, LTD

Project: MAVERICK REFINERY

Order: 0311183 RTHC01 Receipt: 11-11-03

Sample: *MW-10* Collected: *11-08-03 10:33:00* By: *AP*

Matrix: *AQ*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0311183-03A		**SW846 8260B Purgeable VOCs by GC/MS**					By:	JAA		
X03556	XG.2003.2025.18	75-34-3	1,1 Dichloroethane	ND	ug / L	1	1		11-14-03	11-14-03
X03556	XG.2003.2025.18	71-43-2	Benzene	ND	ug / L	1	1		11-14-03	11-14-03
X03556	XG.2003.2025.18	100-41-4	Ethylbenzene	ND	ug / L	1	1		11-14-03	11-14-03
X03556	XG.2003.2025.18	95-47-6	o-Xylene	ND	ug / L	1	1		11-14-03	11-14-03
X03556	XG.2003.2025.18	108-38-3/106-42	p/m-Xylenes	ND	ug / L	1	2		11-14-03	11-14-03
X03556	XG.2003.2025.18	108-88-3	Toluene	ND	ug / L	1	1		11-14-03	11-14-03

Sample: *MW-19* Collected: *11-08-03 11:00:00* By: *AP*

Matrix: *AQ*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0311183-04A		**SW846 8260B Purgeable VOCs by GC/MS**					By:	JAA		
X03556	XG.2003.2025.19	75-34-3	1,1 Dichloroethane	ND	ug / L	1	1		11-14-03	11-14-03
X03556	XG.2003.2025.19	71-43-2	Benzene	ND	ug / L	1	1		11-14-03	11-14-03
X03556	XG.2003.2025.19	100-41-4	Ethylbenzene	ND	ug / L	1	1		11-14-03	11-14-03
X03556	XG.2003.2025.19	95-47-6	o-Xylene	ND	ug / L	1	1		11-14-03	11-14-03
X03556	XG.2003.2025.19	108-38-3/106-42	p/m-Xylenes	ND	ug / L	1	2		11-14-03	11-14-03
X03556	XG.2003.2025.19	108-88-3	Toluene	ND	ug / L	1	1		11-14-03	11-14-03

Sample: *MW-20* Collected: *11-08-03 11:40:00* By: *AP*

Matrix: *AQ*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0311183-05A		**SW846 8260B Purgeable VOCs by GC/MS**					By:	JAA		
X03556	XG.2003.2025.20	75-34-3	1,1 Dichloroethane	ND	ug / L	1	1		11-14-03	11-14-03
X03556	XG.2003.2025.20	71-43-2	Benzene	ND	ug / L	1	1		11-14-03	11-14-03
X03556	XG.2003.2025.20	100-41-4	Ethylbenzene	ND	ug / L	1	1		11-14-03	11-14-03
X03556	XG.2003.2025.20	95-47-6	o-Xylene	ND	ug / L	1	1		11-14-03	11-14-03
X03556	XG.2003.2025.20	108-38-3/106-42	p/m-Xylenes	ND	ug / L	1	2		11-14-03	11-14-03
X03556	XG.2003.2025.20	108-88-3	Toluene	ND	ug / L	1	1		11-14-03	11-14-03

Sample: *MW-21* Collected: *11-08-03 13:15:00* By: *AP*

Matrix: *AQ*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0311183-06A		**SW846 8260B Purgeable VOCs by GC/MS**					By:	JAA		
X03556	XG.2003.2029.8	75-34-3	1,1 Dichloroethane	ND	ug / L	5	1		11-17-03	11-17-03

STANDARD

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**

Project: **MAVERICK REFINERY**

Order: **0311183** **RTHC01** Receipt: **11-11-03**

Sample: ***MW-21*** Collected: *11-08-03 13:15:00* By: *AP*

Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0311183-06A		**SW846 8260B Purgeable VOCs by GC/MS**					By:	JAA		
X03556	XG.2003.2029.8	71-43-2	Benzene	ND	ug / L	5	1		11-17-03	11-17-03
X03556	XG.2003.2029.8	100-41-4	Ethylbenzene	ND	ug / L	5	1		11-17-03	11-17-03
X03556	XG.2003.2029.8	95-47-6	o-Xylene	ND	ug / L	5	1		11-17-03	11-17-03
X03556	XG.2003.2029.8	108-38-3/106-42	p/m-Xylenes	ND	ug / L	5	2		11-17-03	11-17-03
X03556	XG.2003.2029.8	108-88-3	Toluene	ND	ug / L	5	1		11-17-03	11-17-03

Sample: ***MW-18*** Collected: *11-08-03 13:37:00* By: *AP*

Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0311183-07A		**SW846 8260B Purgeable VOCs by GC/MS**					By:	JAA		
X03556	XG.2003.2029.4	75-34-3	1,1 Dichloroethane	ND	ug / L	1	1		11-17-03	11-17-03
X03556	XG.2003.2029.4	71-43-2	Benzene	1.4	ug / L	1	1		11-17-03	11-17-03
X03556	XG.2003.2029.4	100-41-4	Ethylbenzene	ND	ug / L	1	1		11-17-03	11-17-03
X03556	XG.2003.2029.4	95-47-6	o-Xylene	ND	ug / L	1	1		11-17-03	11-17-03
X03556	XG.2003.2029.4	108-38-3/106-42	p/m-Xylenes	ND	ug / L	1	2		11-17-03	11-17-03
X03556	XG.2003.2029.4	108-88-3	Toluene	ND	ug / L	1	1		11-17-03	11-17-03

Sample: ***MW-17*** Collected: *11-08-03 15:21:00* By: *AP*

Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0311183-08A		**SW846 8260B Purgeable VOCs by GC/MS**					By:	JAA		
X03556	XG.2003.2025.25	75-34-3	1,1 Dichloroethane	ND	ug / L	5	1		11-14-03	11-14-03
X03556	XG.2003.2025.25	71-43-2	Benzene	420	ug / L	5	1		11-14-03	11-14-03
X03556	XG.2003.2025.25	100-41-4	Ethylbenzene	87	ug / L	5	1		11-14-03	11-14-03
X03556	XG.2003.2025.25	95-47-6	o-Xylene	220	ug / L	5	1		11-14-03	11-14-03
X03556	XG.2003.2025.25	108-38-3/106-42	p/m-Xylenes	840	ug / L	5	2		11-14-03	11-14-03
X03556	XG.2003.2025.25	108-88-3	Toluene	120	ug / L	5	1		11-14-03	11-14-03

Sample: ***MW-22*** Collected: *11-08-03 14:16:00* By: *AP*

Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0311183-09A		**SW846 8260B Purgeable VOCs by GC/MS**					By:	JAA		
X03556	XG.2003.2025.26	75-34-3	1,1 Dichloroethane	ND	ug / L	5	1		11-14-03	11-14-03
X03556	XG.2003.2025.26	71-43-2	Benzene	330	ug / L	5	1		11-14-03	11-14-03

STANDARD

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**
Project: **MAVERICK REFINERY**
Order: **0311183** **RTHC01** Receipt: **11-11-03**

Sample: ***MW-22*** Collected: *11-08-03 14:16:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0311183-09A		**SW846 8260B Purgeable VOCs by GC/MS**					By:	JAA		
X03556	XG.2003.2025.26	100-41-4	Ethylbenzene	200	ug / L	5	1		11-14-03	11-14-03
X03556	XG.2003.2025.26	95-47-6	o-Xylene	22	ug / L	5	1		11-14-03	11-14-03
X03556	XG.2003.2025.26	108-38-3/106-42	p/m-Xylenes	200	ug / L	5	2		11-14-03	11-14-03
X03556	XG.2003.2025.26	108-88-3	Toluene	20	ug / L	5	1		11-14-03	11-14-03

Unless otherwise noted, all samples were received in acceptable condition and all sampling was performed by client or client representative. Sample result of ND indicates Not Detected, ie result is less than the sample specific Detection Limit. Sample specific Detection Limit is determined by multiplying the sample Dilution Factor by the listed Reporting Detection Limit. All results relate only to the items tested. Any miscellaneous workorder information or foonotes will appear below.

STATE OF NEW MEXICO
ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
DISTRICT I OFFICE
4131 MONTGOMERY BLVD. NE
ALBUQUERQUE, NEW MEXICO 87109
TELEPHONE: (505) 841-9460
FAX: (505) 881-9645
www.nmenv.state.nm.us

BILL RICHARDSON
Governor

RON CURRY
Secretary

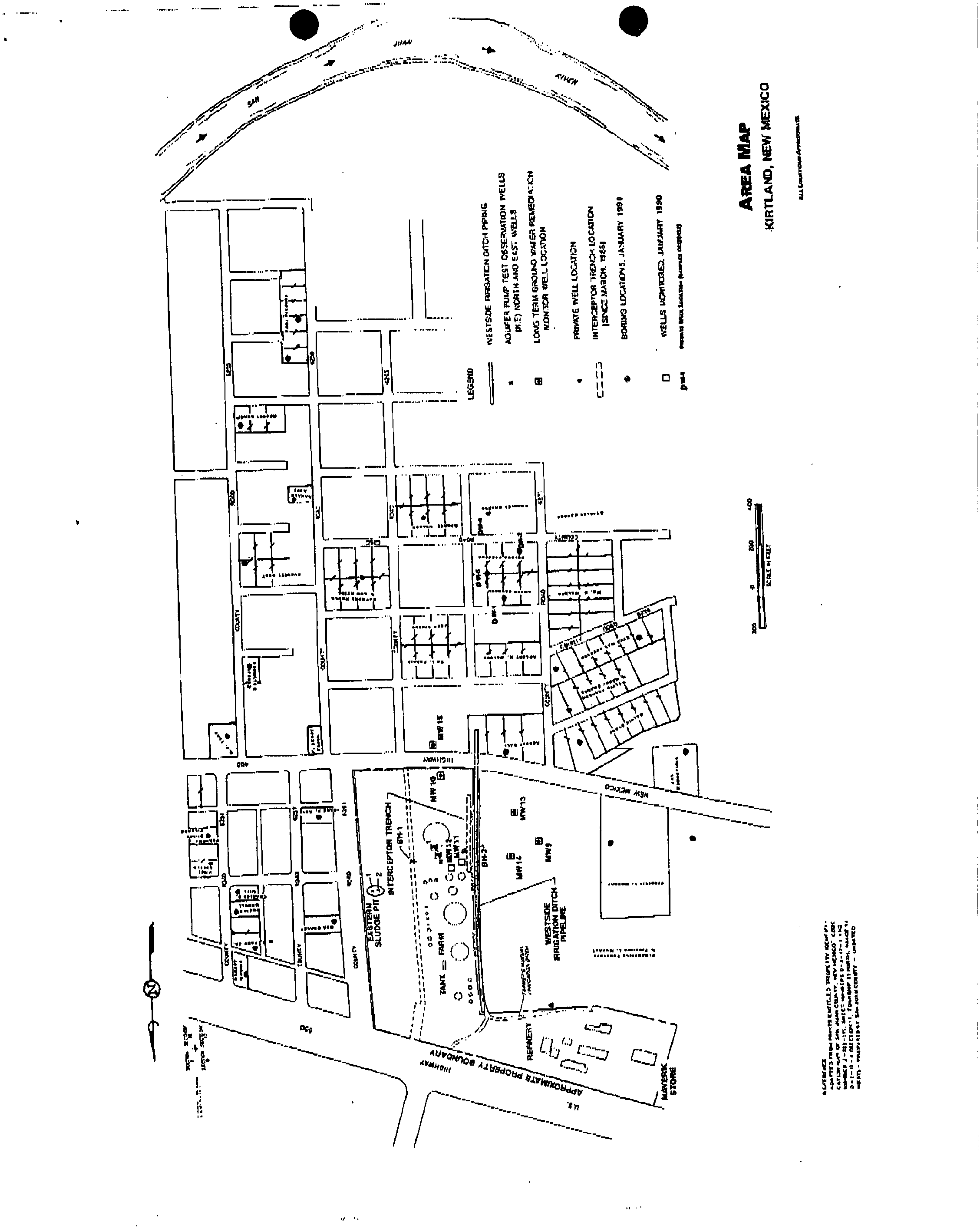
FACSIMILE TRANSMITTAL SHEET

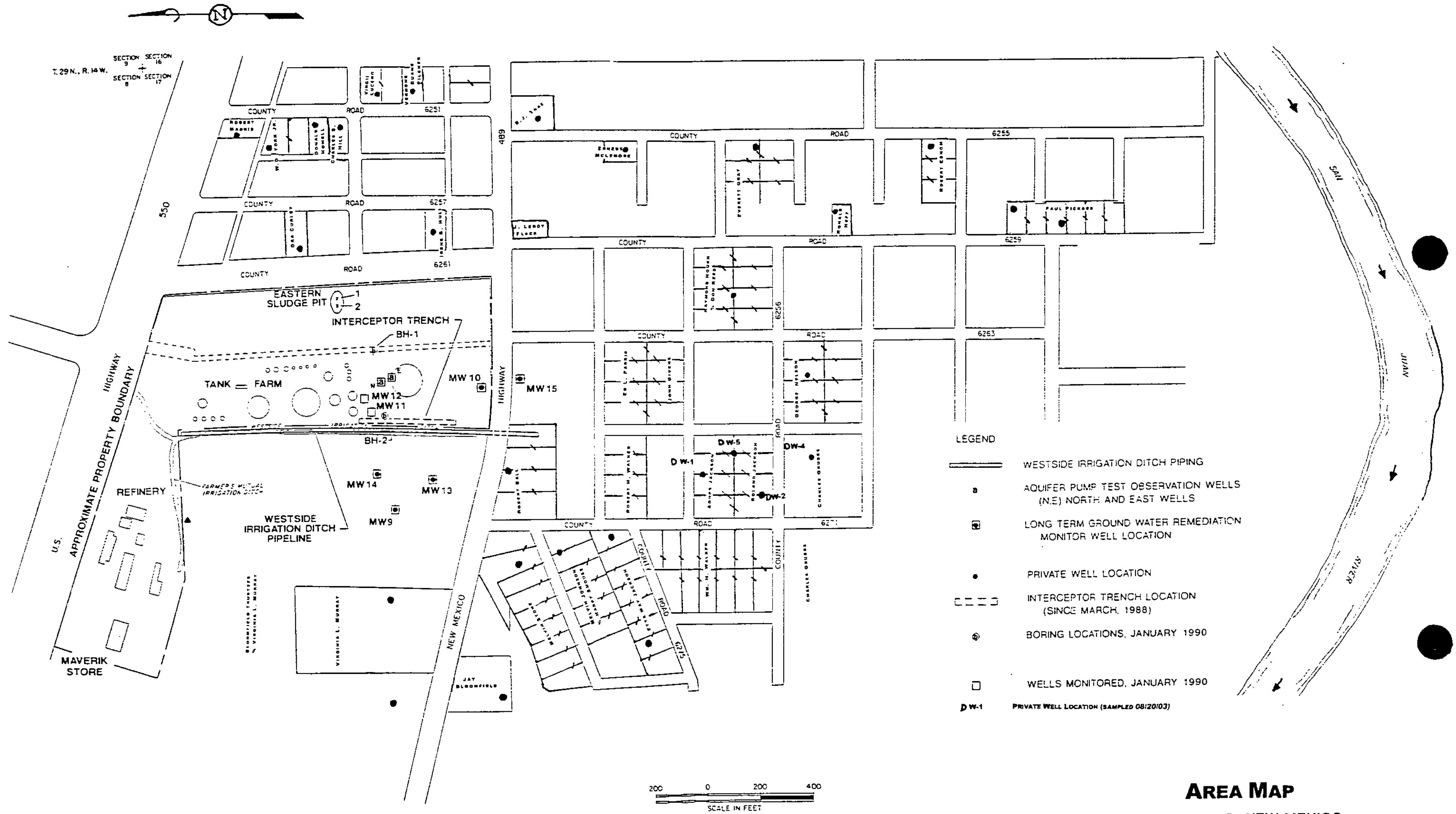
TO: William Olson	**FROM:** Michael Leger
COMPANY: EMNRD – Environmental Bureau	**DATE:** 12/1/2003
FAX NUMBER: 476-3462	**TOTAL NO. OF PAGES INCLUDING COVER:** 19
PHONE NUMBER: 476-3491	**SENDER'S PHONE NUMBER:** 841-9189
RE: Kirtland, NM Water Quality Analysis Information	**SENDER'S FAX NUMBER:** 881-9645

☑ URGENT ☑ FOR REVIEW ☐ PLEASE COMMENT ☐ PLEASE REPLY ☐ PLEASE RECYCLE

NOTES/COMMENTS:

Bill – Attached is a site map and aqueous sample analysis results for the Grubbs and Jackson properties in Kirtland, NM. If you have any further questions, please do not hesitate contacting me by e-mail at michael_leger@nmenv.state.nm.us or by phone at (505) 841-9189.


AREA MAP
KIRTLAND, NEW MEXICO
LEGEND
WESTSIDE IRRIGATION DITCH PIPING
AQUIFER PUMP TEST OBSERVATION WELLS (N.E) NORTH AND EAST WELLS
LONG TERM GROUND WATER REMEDIATION MONITOR WELL LOCATION
PRIVATE WELL LOCATION
INTERCEPTOR TRENCH LOCATION (SINCE MARCH, 1986)
BORING LOCATIONS, JANUARY 1990
WELLS MONITORED, JANUARY 1990
SAN JUAN RIVER
EASTERN SLUDGE PIT
INTERCEPTOR TRENCH
TANK FARM
WESTSIDE IRRIGATION DITCH PIPELINE
REFINERY
MAVERIK STORE
APPROXIMATE PROPERTY BOUNDARY
NEW MEXICO HIGHWAY
U.S. HIGHWAY 550
COUNTY ROAD
MW 15
MW 16
MW 13
MW 14
MW 9
MW 11
MW 12
BH-1
BH-2
SCALE IN FEET



LEGEND

- WESTSIDE IRRIGATION DITCH PIPING
- AQUIFER PUMP TEST OBSERVATION WELLS (N,E) NORTH AND EAST WELLS
- LONG TERM GROUND WATER REMEDIATION MONITOR WELL LOCATION
- PRIVATE WELL LOCATION
- INTERCEPTOR TRENCH LOCATION (SINCE MARCH, 1988)
- BORING LOCATIONS, JANUARY 1990
- WELLS MONITORED, JANUARY 1990
- DW-1 PRIVATE WELL LOCATION (SAMPLED 08/20/03)

AREA MAP

KIRTLAND, NEW MEXICO

ALL LOCATIONS APPROXIMATE

REFERENCE
ADAPTED FROM PRINTS ENTITLED "PROPERTY IDENTIFICATION MAP OF SAN JUAN COUNTY, NEW MEXICO" CODE NUMBER 2-083-171, SHEET NUMBERS D-3-17-1 AND D-3-17-4 (SECTION 17, TOWNSHIP 29 NORTH, RANGE 14 WEST) - PREPARED BY SAN JUAN COUNTY - UNDATED

PINNACLE LABORATORIES

RECEIVED
SEP - 4 2003
NMED
PETROLEUM STORAGE TANK BUREAU

COPY

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Pinnacle Lab ID number **308100**
August 31, 2003

NMED-PST BUREAU
4131 MONTGOMERY BLVD. NE
ALBUQUERQUE, NM 87109

Project Name	MAVERIK #59
Project Number	2491

Attention: MICHAEL LEGER

On 08/21/03 Pinnacle Laboratories Inc., (ADHS Lincense No. AZ0643), received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

If you have any questions or comments, please do not hesitate to contact us at (505) 344-3777.

H. Mitchell Rubenstein, Ph.D.
General Manager, Pinnacle Laboratories, Inc.

MR: jt

Enclosure

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

CLIENT	: NMED-PST BUREAU	PINNACLE ID	: 308100
PROJECT #	: 2491	DATE RECEIVED	: 08/21/03
PROJECT NAME	: MAVERIK #59	REPORT DATE	: 08/31/03

PINNACLE ID #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
308100 - 01	DW-1	AQUEOUS	08/20/03
308100 - 02	DW-2	AQUEOUS	08/20/03
308100 - 03	DW-3 *	AQUEOUS	08/20/03
308100 - 04	DW-4	AQUEOUS	08/20/03
308100 - 05	TRIP BLANK	AQUEOUS	08/20/03

* split sample of DW-2

PINNACLE LABORATORIES

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Phone (505) 344-3777
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GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260B	PINNACLE I.D. :	308100
CLIENT	: NMED-PST BUREAU	DATE RECEIVED :	08/21/03
PROJECT #	: 2491	INSTRUMENT ID :	GCMS1
PROJECT NAME	: MAVERIK #59	ANALYST :	DSR

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
308100-01	DW-1	AQUEOUS	08/20/03	N/A	08/25/03	1

PARAMETER (CAS#)	DET. LIMIT	RESULT	UNITS
Dichlorodifluoromethane (75-71-8)	5.0	< 5.0	ug/L
Chloromethane (74-87-3)	5.0	< 5.0	ug/L
Vinyl Chloride (75-01-4)	5.0	< 5.0	ug/L
Bromomethane (74-83-9)	5.0	< 5.0	ug/L
Chloroethane (75-00-3)	5.0	< 5.0	ug/L
Trichlorofluoromethane (75-69-4)	5.0	< 5.0	ug/L
Acetone (67-64-1)	10	< 10	ug/L
Acrolein (107-02-8)	5.0	< 5.0	ug/L
1,1-Dichloroethene (75-35-4)	1.0	< 1.0	ug/L
Iodomethane (74-88-4)	5.0	< 5.0	ug/L
Methylene Chloride (75-09-2)	1.0	< 1.0	ug/L
Acrylonitrile (107-13-1)	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene (156-59-2)	1.0	< 1.0	ug/L
Methyl-t-butyl Ether (1634-04-4)	1.0	< 1.0	ug/L
1,1,2-Trichlorotrifluoroethane (76-13-1)	5.0	< 5.0	ug/L
1,1-Dichloroethane (75-34-3)	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene (156-60-5)	1.0	< 1.0	ug/L
2-Butanone (78-93-3)	10	< 10	ug/L
Carbon Disulfide (75-15-0)	1.0	< 1.0	ug/L
Bromochloromethane (74-97-5)	1.0	< 1.0	ug/L
Chloroform (67-66-3)	1.0	< 1.0	ug/L
2,2-Dichloropropane (594-20-7)	1.0	< 1.0	ug/L
1,2-Dichloroethane (107-06-2)	1.0	< 1.0	ug/L
Vinyl Acetate (108-05-4)	5.0	< 5.0	ug/L
1,1,1-Trichloroethane (71-55-6)	1.0	< 1.0	ug/L
1,1-Dichloropropene (563-58-6)	1.0	< 1.0	ug/L
Carbon Tetrachloride (56-23-5)	1.0	< 1.0	ug/L
Benzene (71-43-2)	1.0	< 1.0	ug/L
1,2-Dichloropropane (78-87-5)	1.0	< 1.0	ug/L
Trichloroethene (79-01-6)	1.0	< 1.0	ug/L
Bromodichloromethane (75-27-4)	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether (110-75-8)	10	< 10	ug/L
cis-1,3-Dichloropropene (10061-01-5)	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene (10061-02-6)	1.0	< 1.0	ug/L
1,1,2-Trichloroethane (79-00-5)	1.0	< 1.0	ug/L
1,3-Dichloropropane (142-28-9)	1.0	< 1.0	ug/L
Dibromomethane (74-95-3)	1.0	< 1.0	ug/L
Toluene (108-88-3)	1.0	< 1.0	ug/L
1,2-Dibromoethane (106-93-4)	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone (108-10-1)	10	< 10	ug/L
2-Hexanone (591-78-6)	10	< 10	ug/L
Dibromochloromethane (124-48-1)	1.0	< 1.0	ug/L
Tetrachloroethene (127-18-4)	1.0	< 1.0	ug/L
Chlorobenzene (108-90-7)	1.0	< 1.0	ug/L

PINNACLE LABORATORIES

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CLIENT	: NMED-PST BUREAU	PINNACLE ID	: 308100
PROJECT #	: 2491	DATE RECEIVED	: 08/21/03
PROJECT NAME	: MAVERIK #59	REPORT DATE	: 08/31/03

PINNACLE ID #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
308100 - 01	DW-1	AQUEOUS	08/20/03
308100 - 02	DW-2	AQUEOUS	08/20/03
308100 - 03	DW-3 *	AQUEOUS	08/20/03
308100 - 04	DW-4	AQUEOUS	08/20/03
308100 - 05	TRIP BLANK	AQUEOUS	08/20/03

* split sample of DW-2

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GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260B	PINNACLE I.D. :	308100
CLIENT	: NMED-PST BUREAU	DATE RECEIVED :	08/21/03
PROJECT #	: 2491	INSTRUMENT ID :	GCMS1
PROJECT NAME	: MAVERIK #59	ANALYST :	DSR

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
308100-01	DW-1	AQUEOUS	08/20/03	N/A	08/25/03	1

PARAMETER (CAS#)	DET. LIMIT	RESULT	UNITS
Dichlorodifluoromethane (75-71-8)	5.0	< 5.0	ug/L
Chloromethane (74-87-3)	5.0	< 5.0	ug/L
Vinyl Chloride (75-01-4)	5.0	< 5.0	ug/L
Bromomethane (74-83-9)	5.0	< 5.0	ug/L
Chloroethane (75-00-3)	5.0	< 5.0	ug/L
Trichlorofluoromethane (75-69-4)	5.0	< 5.0	ug/L
Acetone (67-64-1)	10	< 10	ug/L
Acrolein (107-02-8)	5.0	< 5.0	ug/L
1,1-Dichloroethene (75-35-4)	1.0	< 1.0	ug/L
Iodomethane (74-88-4)	5.0	< 5.0	ug/L
Methylene Chloride (75-09-2)	1.0	< 1.0	ug/L
Acrylonitrile (107-13-1)	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene (156-59-2)	1.0	< 1.0	ug/L
Methyl-t-butyl Ether (1634-04-4)	1.0	< 1.0	ug/L
1,1,2-Trichlorotrifluoroethane (76-13-1)	5.0	< 5.0	ug/L
1,1-Dichloroethane (75-34-3)	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene (156-60-5)	1.0	< 1.0	ug/L
2-Butanone (78-93-3)	10	< 10	ug/L
Carbon Disulfide (75-15-0)	1.0	< 1.0	ug/L
Bromochloromethane (74-97-5)	1.0	< 1.0	ug/L
Chloroform (67-66-3)	1.0	< 1.0	ug/L
2,2-Dichloropropane (594-20-7)	1.0	< 1.0	ug/L
1,2-Dichloroethane (107-06-2)	1.0	< 1.0	ug/L
Vinyl Acetate (108-05-4)	5.0	< 5.0	ug/L
1,1,1-Trichloroethane (71-55-6)	1.0	< 1.0	ug/L
1,1-Dichloropropene (563-58-6)	1.0	< 1.0	ug/L
Carbon Tetrachloride (56-23-5)	1.0	< 1.0	ug/L
Benzene (71-43-2)	1.0	< 1.0	ug/L
1,2-Dichloropropane (78-87-5)	1.0	< 1.0	ug/L
Trichloroethene (79-01-6)	1.0	< 1.0	ug/L
Bromodichloromethane (75-27-4)	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether (110-75-8)	10	< 10	ug/L
cis-1,3-Dichloropropene (10061-01-5)	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene (10061-02-6)	1.0	< 1.0	ug/L
1,1,2-Trichloroethane (79-00-5)	1.0	< 1.0	ug/L
1,3-Dichloropropane (142-28-9)	1.0	< 1.0	ug/L
Dibromomethane (74-95-3)	1.0	< 1.0	ug/L
Toluene (108-88-3)	1.0	< 1.0	ug/L
1,2-Dibromoethane (106-93-4)	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone (108-10-1)	10	< 10	ug/L
2-Hexanone (591-78-6)	10	< 10	ug/L
Dibromochloromethane (124-48-1)	1.0	< 1.0	ug/L
Tetrachloroethene (127-18-4)	1.0	< 1.0	ug/L
Chlorobenzene (108-90-7)	1.0	< 1.0	ug/L

PINNACLE LABORATORIES

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GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260B	PINNACLE I.D.	:	308100
CLIENT	: NMED-PST BUREAU	DATE RECEIVED	:	08/21/03
PROJECT #	: 2491	INSTRUMENT ID	:	GCMS1
PROJECT NAME	: MAVERIK #59	ANALYST	:	DSR

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
308100-01	DW-1	AQUEOUS	08/20/03	N/A	08/25/03	1

PARAMETER (CAS#)	DET. LIMIT	RESULT	UNITS
Ethylbenzene (100-41-4)	1.0	< 1.0	ug/L
1,1,1,2-Tetrachloroethane (630-20-6)	1.0	< 1.0	ug/L
m&p Xylenes (108-38-3, 106-42-3)	1.0	< 1.0	ug/L
o-Xylene (95-47-6)	1.0	< 1.0	ug/L
Styrene (100-42-5)	1.0	< 1.0	ug/L
Bromoform (75-25-2)	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane (79-34-5)	2.0	< 2.0	ug/L
1,2,3-Trichloropropane (96-18-4)	2.0	< 2.0	ug/L
Isopropyl Benzene (98-82-8)	1.0	< 1.0	ug/L
Bromobenzene (108-86-1)	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene (110-57-6)	2.0	< 2.0	ug/L
n-Propylbenzene (103-65-1)	1.0	< 1.0	ug/L
2-Chlorotoluene (95-49-8)	1.0	< 1.0	ug/L
4-Chlorotoluene (106-43-4)	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene (108-67-8)	1.0	< 1.0	ug/L
tert-Butylbenzene (98-06-6)	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene (95-63-6)	1.0	< 1.0	ug/L
sec-Butylbenzene (135-98-8)	1.0	< 1.0	ug/L
1,3-Dichlorobenzene (541-73-1)	1.0	< 1.0	ug/L
1,4-Dichlorobenzene (106-46-7)	1.0	< 1.0	ug/L
p-Isopropyltoluene (99-87-6)	1.0	< 1.0	ug/L
1,2-Dichlorobenzene (95-50-1)	1.0	< 1.0	ug/L
n-Butylbenzene (104-51-8)	1.0	< 1.0	ug/L
1,2-Dibromo-3-chloropropane (96-12-8)	5.0	< 5.0	ug/L
1,2,4-Trichlorobenzene (120-82-1)	2.0	< 2.0	ug/L
Naphthalene (91-20-3)	3.0	< 3.0	ug/L
Hexachlorobutadiene (87-68-3)	2.0	< 2.0	ug/L
1,2,3-Trichlorobenzene (87-61-6)	2.0	< 2.0	ug/L

SURROGATE % RECOVERY	
1,2-Dichloroethane-d4	92 (76 - 114)
Toluene-d8	96 (88 - 110)
Bromofluorobenzene	91 (86 - 115)

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GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260B	PINNACLE I.D.	:	308100
CLIENT	: NMED-PST BUREAU	DATE RECEIVED	:	08/21/03
PROJECT #	: 2491	INSTRUMENT ID	:	GCMS1
PROJECT NAME	: MAVERIK #59	ANALYST	:	DSR

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
308100-02	DW-2	AQUEOUS	08/20/03	N/A	08/25/03	1

PARAMETER (CAS#)	DET. LIMIT	RESULT	UNITS
Dichlorodifluoromethane (75-71-8)	5.0	< 5.0	ug/L
Chloromethane (74-87-3)	5.0	< 5.0	ug/L
Vinyl Chloride (75-01-4)	5.0	< 5.0	ug/L
Bromomethane (74-83-9)	5.0	< 5.0	ug/L
Chloroethane (75-00-3)	5.0	< 5.0	ug/L
Trichlorofluoromethane (75-69-4)	5.0	< 5.0	ug/L
Acetone (67-64-1)	10	< 10	ug/L
Acrolein (107-02-8)	5.0	< 5.0	ug/L
1,1-Dichloroethene (75-35-4)	1.0	< 1.0	ug/L
Iodomethane (74-88-4)	5.0	< 5.0	ug/L
Methylene Chloride (75-09-2)	1.0	< 1.0	ug/L
Acrylonitrile (107-13-1)	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene (156-59-2)	1.0	< 1.0	ug/L
Methyl-t-butyl Ether (1634-04-4)	1.0	< 1.0	ug/L
1,1,2-Trichlorotrifluoroethane (76-13-1)	5.0	< 5.0	ug/L
1,1-Dichloroethane (75-34-3)	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene (156-60-5)	1.0	< 1.0	ug/L
2-Butanone (78-93-3)	10	< 10	ug/L
Carbon Disulfide (75-15-0)	1.0	< 1.0	ug/L
Bromochloromethane (74-97-5)	1.0	< 1.0	ug/L
Chloroform (67-66-3)	1.0	< 1.0	ug/L
2,2-Dichloropropane (594-20-7)	1.0	< 1.0	ug/L
1,2-Dichloroethane (107-06-2)	1.0	< 1.0	ug/L
Vinyl Acetate (108-05-4)	5.0	< 5.0	ug/L
1,1,1-Trichloroethane (71-55-6)	1.0	< 1.0	ug/L
1,1-Dichloropropene (563-58-6)	1.0	< 1.0	ug/L
Carbon Tetrachloride (56-23-5)	1.0	< 1.0	ug/L
Benzene (71-43-2)	1.0	< 1.0	ug/L
1,2-Dichloropropane (78-87-5)	1.0	< 1.0	ug/L
Trichloroethene (79-01-6)	1.0	< 1.0	ug/L
Bromodichloromethane (75-27-4)	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether (110-75-8)	10	< 10	ug/L
cis-1,3-Dichloropropene (10061-01-5)	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene (10061-02-6)	1.0	< 1.0	ug/L
1,1,2-Trichloroethane (79-00-5)	1.0	< 1.0	ug/L
1,3-Dichloropropane (142-28-9)	1.0	< 1.0	ug/L
Dibromomethane (74-95-3)	1.0	< 1.0	ug/L
Toluene (108-88-3)	1.0	< 1.0	ug/L
1,2-Dibromoethane (106-93-4)	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone (108-10-1)	10	< 10	ug/L
2-Hexanone (591-78-6)	10	< 10	ug/L
Dibromochloromethane (124-48-1)	1.0	< 1.0	ug/L
Tetrachloroethene (127-18-4)	1.0	< 1.0	ug/L
Chlorobenzene (108-90-7)	1.0	< 1.0	ug/L

PINNACLE LABORATORIES

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GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260B	PINNACLE I.D.	:	308100
CLIENT	: NMED-PST BUREAU	DATE RECEIVED	:	08/21/03
PROJECT #	: 2491	INSTRUMENT ID	:	GCMS1
PROJECT NAME	: MAVERIK #59	ANALYST	:	DSR

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
308100-02	DW-2	AQUEOUS	08/20/03	N/A	08/25/03	1

PARAMETER (CAS#)	DET. LIMIT	RESULT	UNITS
Ethylbenzene (100-41-4)	1.0	< 1.0	ug/L
1,1,1,2-Tetrachloroethane (630-20-6)	1.0	< 1.0	ug/L
m&p Xylenes (108-38-3, 106-42-3)	1.0	< 1.0	ug/L
o-Xylene (95-47-6)	1.0	< 1.0	ug/L
Styrene (100-42-5)	1.0	< 1.0	ug/L
Bromoform (75-25-2)	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane (79-34-5)	2.0	< 2.0	ug/L
1,2,3-Trichloropropane (96-18-4)	2.0	< 2.0	ug/L
Isopropyl Benzene (98-82-8)	1.0	< 1.0	ug/L
Bromobenzene (108-86-1)	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene (110-57-6)	2.0	< 2.0	ug/L
n-Propylbenzene (103-65-1)	1.0	< 1.0	ug/L
2-Chlorotoluene (95-49-8)	1.0	< 1.0	ug/L
4-Chlorotoluene (106-43-4)	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene (108-67-8)	1.0	< 1.0	ug/L
tert-Butylbenzene (98-06-6)	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene (95-63-6)	1.0	< 1.0	ug/L
sec-Butylbenzene (135-98-8)	1.0	< 1.0	ug/L
1,3-Dichlorobenzene (541-73-1)	1.0	< 1.0	ug/L
1,4-Dichlorobenzene (106-46-7)	1.0	< 1.0	ug/L
p-Isopropyltoluene (99-87-6)	1.0	< 1.0	ug/L
1,2-Dichlorobenzene (95-50-1)	1.0	< 1.0	ug/L
n-Butylbenzene (104-51-8)	1.0	< 1.0	ug/L
1,2-Dibromo-3-chloropropane (96-12-8)	5.0	< 5.0	ug/L
1,2,4-Trichlorobenzene (120-82-1)	2.0	< 2.0	ug/L
Naphthalene (91-20-3)	3.0	< 3.0	ug/L
Hexachlorobutadiene (87-68-3)	2.0	< 2.0	ug/L
1,2,3-Trichlorobenzene (87-61-6)	2.0	< 2.0	ug/L

SURROGATE % RECOVERY	
1,2-Dichloroethane-d4	91 (76 - 114)
Toluene-d8	96 (88 - 110)
Bromofluorobenzene	90 (86 - 115)

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GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260B	PINNACLE I.D.	:	308100
CLIENT	: NMED-PST BUREAU	DATE RECEIVED	:	08/21/03
PROJECT #	: 2491	INSTRUMENT ID	:	GCMS1
PROJECT NAME	: MAVERIK #59	ANALYST	:	DSR

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
308100-03	DW-3	AQUEOUS	08/20/03	N/A	08/25/03	1

PARAMETER (CAS#)	DET. LIMIT	RESULT	UNITS
Dichlorodifluoromethane (75-71-8)	5.0	< 5.0	ug/L
Chloromethane (74-87-3)	5.0	< 5.0	ug/L
Vinyl Chloride (75-01-4)	5.0	< 5.0	ug/L
Bromomethane (74-83-9)	5.0	< 5.0	ug/L
Chloroethane (75-00-3)	5.0	< 5.0	ug/L
Trichlorofluoromethane (75-69-4)	5.0	< 5.0	ug/L
Acetone (67-64-1)	10	< 10	ug/L
Acrolein (107-02-8)	5.0	< 5.0	ug/L
1,1-Dichloroethene (75-35-4)	1.0	< 1.0	ug/L
Iodomethane (74-88-4)	5.0	< 5.0	ug/L
Methylene Chloride (75-09-2)	1.0	< 1.0	ug/L
Acrylonitrile (107-13-1)	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene (156-59-2)	1.0	< 1.0	ug/L
Methyl-t-butyl Ether (1634-04-4)	1.0	< 1.0	ug/L
1,1,2-Trichlorotrifluoroethane (76-13-1)	5.0	< 5.0	ug/L
1,1-Dichloroethane (75-34-3)	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene (156-60-5)	1.0	< 1.0	ug/L
2-Butanone (78-93-3)	10	< 10	ug/L
Carbon Disulfide (75-15-0)	1.0	< 1.0	ug/L
Bromochloromethane (74-97-5)	1.0	< 1.0	ug/L
Chloroform (67-66-3)	1.0	< 1.0	ug/L
2,2-Dichloropropane (594-20-7)	1.0	< 1.0	ug/L
1,2-Dichloroethane (107-06-2)	1.0	< 1.0	ug/L
Vinyl Acetate (108-05-4)	5.0	< 5.0	ug/L
1,1,1-Trichloroethane (71-55-6)	1.0	< 1.0	ug/L
1,1-Dichloropropene (563-58-6)	1.0	< 1.0	ug/L
Carbon Tetrachloride (56-23-5)	1.0	< 1.0	ug/L
Benzene (71-43-2)	1.0	< 1.0	ug/L
1,2-Dichloropropane (78-87-5)	1.0	< 1.0	ug/L
Trichloroethene (79-01-6)	1.0	< 1.0	ug/L
Bromodichloromethane (75-27-4)	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether (110-75-8)	10	< 10	ug/L
cis-1,3-Dichloropropene (10061-01-5)	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene (10061-02-6)	1.0	< 1.0	ug/L
1,1,2-Trichloroethane (79-00-5)	1.0	< 1.0	ug/L
1,3-Dichloropropane (142-28-9)	1.0	< 1.0	ug/L
Dibromomethane (74-95-3)	1.0	< 1.0	ug/L
Toluene (108-88-3)	1.0	< 1.0	ug/L
1,2-Dibromoethane (106-93-4)	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone (108-10-1)	10	< 10	ug/L
2-Hexanone (591-78-6)	10	< 10	ug/L
Dibromochloromethane (124-48-1)	1.0	< 1.0	ug/L
Tetrachloroethene (127-18-4)	1.0	< 1.0	ug/L
Chlorobenzene (108-90-7)	1.0	< 1.0	ug/L

PINNACLE LABORATORIES

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GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260B	PINNACLE I.D. :	308100
CLIENT	: NMED-PST BUREAU	DATE RECEIVED :	08/21/03
PROJECT #	: 2491	INSTRUMENT ID :	GCMS1
PROJECT NAME	: MAVERIK #59	ANALYST :	DSR

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
308100-03	DW-3	AQUEOUS	08/20/03	N/A	08/25/03	1

PARAMETER (CAS#)	DET. LIMIT	RESULT	UNITS
Ethylbenzene (100-41-4)	1.0	< 1.0	ug/L
1,1,1,2-Tetrachloroethane (630-20-6)	1.0	< 1.0	ug/L
m&p Xylenes (108-38-3, 106-42-3)	1.0	< 1.0	ug/L
o-Xylene (95-47-6)	1.0	< 1.0	ug/L
Styrene (100-42-5)	1.0	< 1.0	ug/L
Bromoform (75-25-2)	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane (79-34-5)	2.0	< 2.0	ug/L
1,2,3-Trichloropropane (96-18-4)	2.0	< 2.0	ug/L
Isopropyl Benzene (98-82-8)	1.0	< 1.0	ug/L
Bromobenzene (108-86-1)	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene (110-57-6)	2.0	< 2.0	ug/L
n-Propylbenzene (103-65-1)	1.0	< 1.0	ug/L
2-Chlorotoluene (95-49-8)	1.0	< 1.0	ug/L
4-Chlorotoluene (106-43-4)	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene (108-67-8)	1.0	< 1.0	ug/L
tert-Butylbenzene (98-06-6)	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene (95-63-6)	1.0	< 1.0	ug/L
sec-Butylbenzene (135-98-8)	1.0	< 1.0	ug/L
1,3-Dichlorobenzene (541-73-1)	1.0	< 1.0	ug/L
1,4-Dichlorobenzene (106-46-7)	1.0	< 1.0	ug/L
p-Isopropyltoluene (99-87-6)	1.0	< 1.0	ug/L
1,2-Dichlorobenzene (95-50-1)	1.0	< 1.0	ug/L
n-Butylbenzene (104-51-8)	1.0	< 1.0	ug/L
1,2-Dibromo-3-chloropropane (96-12-8)	5.0	< 5.0	ug/L
1,2,4-Trichlorobenzene (120-82-1)	2.0	< 2.0	ug/L
Naphthalene (91-20-3)	3.0	< 3.0	ug/L
Hexachlorobutadiene (87-68-3)	2.0	< 2.0	ug/L
1,2,3-Trichlorobenzene (87-61-6)	2.0	< 2.0	ug/L

SURROGATE % RECOVERY	
1,2-Dichloroethane-d4	93 (76 - 114)
Toluene-d8	98 (88 - 110)
Bromofluorobenzene	92 (86 - 115)

PINNACLE LABORATORIES

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GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260B	PINNACLE I.D.	:	308100
CLIENT	: NMED-PST BUREAU	DATE RECEIVED	:	08/21/03
PROJECT #	: 2491	INSTRUMENT ID	:	GCMS1
PROJECT NAME	: MAVERIK #59	ANALYST	:	DSR

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
308100-04	DW-4	AQUEOUS	08/20/03	N/A	08/25/03	1

PARAMETER (CAS#)	DET. LIMIT	RESULT	UNITS
Dichlorodifluoromethane (75-71-8)	5.0	< 5.0	ug/L
Chloromethane (74-87-3)	5.0	< 5.0	ug/L
Vinyl Chloride (75-01-4)	5.0	< 5.0	ug/L
Bromomethane (74-83-9)	5.0	< 5.0	ug/L
Chloroethane (75-00-3)	5.0	< 5.0	ug/L
Trichlorofluoromethane (75-69-4)	5.0	< 5.0	ug/L
Acetone (67-64-1)	10	< 10	ug/L
Acrolein (107-02-8)	5.0	< 5.0	ug/L
1,1-Dichloroethene (75-35-4)	1.0	< 1.0	ug/L
Iodomethane (74-88-4)	5.0	< 5.0	ug/L
Methylene Chloride (75-09-2)	1.0	< 1.0	ug/L
Acrylonitrile (107-13-1)	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene (156-59-2)	1.0	< 1.0	ug/L
Methyl-t-butyl Ether (1634-04-4)	1.0	< 1.0	ug/L
1,1,2-Trichlorotrifluoroethane (76-13-1)	5.0	< 5.0	ug/L
1,1-Dichloroethane (75-34-3)	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene (156-60-5)	1.0	< 1.0	ug/L
2-Butanone (78-93-3)	10	< 10	ug/L
Carbon Disulfide (75-15-0)	1.0	< 1.0	ug/L
Bromochloromethane (74-97-5)	1.0	< 1.0	ug/L
Chloroform (67-66-3)	1.0	< 1.0	ug/L
2,2-Dichloropropane (594-20-7)	1.0	< 1.0	ug/L
1,2-Dichloroethane (107-06-2)	1.0	< 1.0	ug/L
Vinyl Acetate (108-05-4)	5.0	< 5.0	ug/L
1,1,1-Trichloroethane (71-55-6)	1.0	< 1.0	ug/L
1,1-Dichloropropene (563-58-6)	1.0	< 1.0	ug/L
Carbon Tetrachloride (56-23-5)	1.0	< 1.0	ug/L
Benzene (71-43-2)	1.0	< 1.0	ug/L
1,2-Dichloropropane (78-87-5)	1.0	< 1.0	ug/L
Trichloroethene (79-01-6)	1.0	< 1.0	ug/L
Bromodichloromethane (75-27-4)	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether (110-75-8)	10	< 10	ug/L
cis-1,3-Dichloropropene (10061-01-5)	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene (10061-02-6)	1.0	< 1.0	ug/L
1,1,2-Trichloroethane (79-00-5)	1.0	< 1.0	ug/L
1,3-Dichloropropane (142-28-9)	1.0	< 1.0	ug/L
Dibromomethane (74-95-3)	1.0	< 1.0	ug/L
Toluene (108-88-3)	1.0	< 1.0	ug/L
1,2-Dibromoethane (106-93-4)	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone (108-10-1)	10	< 10	ug/L
2-Hexanone (591-78-6)	10	< 10	ug/L
Dibromochloromethane (124-48-1)	1.0	< 1.0	ug/L
Tetrachloroethene (127-18-4)	1.0	< 1.0	ug/L
Chlorobenzene (108-90-7)	1.0	< 1.0	ug/L

PINNACLE LABORATORIES

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GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260B	PINNACLE I.D.	:	308100
CLIENT	: NMED-PST BUREAU	DATE RECEIVED	:	08/21/03
PROJECT #	: 2491	INSTRUMENT ID	:	GCMS1
PROJECT NAME	: MAVERIK #59	ANALYST	:	DSR

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
308100-04	DW-4	AQUEOUS	08/20/03	N/A	08/25/03	1

PARAMETER (CAS#)	DET. LIMIT	RESULT	UNITS
Ethylbenzene (100-41-4)	1.0	< 1.0	ug/L
1,1,1,2-Tetrachloroethane (630-20-6)	1.0	< 1.0	ug/L
m&p Xylenes (108-38-3, 106-42-3)	1.0	< 1.0	ug/L
o-Xylene (95-47-6)	1.0	< 1.0	ug/L
Styrene (100-42-5)	1.0	< 1.0	ug/L
Bromoform (75-25-2)	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane (79-34-5)	2.0	< 2.0	ug/L
1,2,3-Trichloropropane (96-18-4)	2.0	< 2.0	ug/L
Isopropyl Benzene (98-82-8)	1.0	< 1.0	ug/L
Bromobenzene (108-86-1)	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene (110-57-6)	2.0	< 2.0	ug/L
n-Propylbenzene (103-65-1)	1.0	< 1.0	ug/L
2-Chlorotoluene (95-49-8)	1.0	< 1.0	ug/L
4-Chlorotoluene (106-43-4)	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene (108-67-8)	1.0	< 1.0	ug/L
tert-Butylbenzene (98-06-6)	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene (95-63-6)	1.0	< 1.0	ug/L
sec-Butylbenzene (135-98-8)	1.0	< 1.0	ug/L
1,3-Dichlorobenzene (541-73-1)	1.0	< 1.0	ug/L
1,4-Dichlorobenzene (106-46-7)	1.0	< 1.0	ug/L
p-Isopropyltoluene (99-87-6)	1.0	< 1.0	ug/L
1,2-Dichlorobenzene (95-50-1)	1.0	< 1.0	ug/L
n-Butylbenzene (104-51-8)	1.0	< 1.0	ug/L
1,2-Dibromo-3-chloropropane (96-12-8)	5.0	< 5.0	ug/L
1,2,4-Trichlorobenzene (120-82-1)	2.0	< 2.0	ug/L
Naphthalene (91-20-3)	3.0	< 3.0	ug/L
Hexachlorobutadiene (87-68-3)	2.0	< 2.0	ug/L
1,2,3-Trichlorobenzene (87-61-6)	2.0	< 2.0	ug/L

SURROGATE % RECOVERY	
1,2-Dichloroethane-d4	92 (76 - 114)
Toluene-d8	95 (88 - 110)
Bromofluorobenzene	90 (86 - 115)

PINNACLE LABORATORIES

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GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260B	PINNACLE I.D. :	308100
CLIENT	: NMED-PST BUREAU	DATE RECEIVED :	08/21/03
PROJECT #	: 2491	INSTRUMENT ID :	GCMS1
PROJECT NAME	: MAVERIK #59	ANALYST :	DSR

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
308100-05	TRIP BLANK	AQUEOUS	08/20/03	N/A	08/25/03	1

PARAMETER (CAS#)	DET. LIMIT	RESULT	UNITS
Dichlorodifluoromethane (75-71-8)	5.0	< 5.0	ug/L
Chloromethane (74-87-3)	5.0	< 5.0	ug/L
Vinyl Chloride (75-01-4)	5.0	< 5.0	ug/L
Bromomethane (74-83-9)	5.0	< 5.0	ug/L
Chloroethane (75-00-3)	5.0	< 5.0	ug/L
Trichlorofluoromethane (75-69-4)	5.0	< 5.0	ug/L
Acetone (67-64-1)	10	< 10	ug/L
Acrolein (107-02-8)	5.0	< 5.0	ug/L
1,1-Dichloroethene (75-35-4)	1.0	< 1.0	ug/L
Iodomethane (74-88-4)	5.0	< 5.0	ug/L
Methylene Chloride (75-09-2)	1.0	< 1.0	ug/L
Acrylonitrile (107-13-1)	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene (156-59-2)	1.0	< 1.0	ug/L
Methyl-t-butyl Ether (1634-04-4)	1.0	< 1.0	ug/L
1,1,2-Trichlorotrifluoroethane (76-13-1)	5.0	< 5.0	ug/L
1,1-Dichloroethane (75-34-3)	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene (156-60-5)	1.0	< 1.0	ug/L
2-Butanone (78-93-3)	10	< 10	ug/L
Carbon Disulfide (75-15-0)	1.0	< 1.0	ug/L
Bromochloromethane (74-97-5)	1.0	< 1.0	ug/L
Chloroform (67-66-3)	1.0	< 1.0	ug/L
2,2-Dichloropropane (594-20-7)	1.0	< 1.0	ug/L
1,2-Dichloroethane (107-06-2)	1.0	< 1.0	ug/L
Vinyl Acetate (108-05-4)	5.0	< 5.0	ug/L
1,1,1-Trichloroethane (71-55-6)	1.0	< 1.0	ug/L
1,1-Dichloropropene (563-58-6)	1.0	< 1.0	ug/L
Carbon Tetrachloride (56-23-5)	1.0	< 1.0	ug/L
Benzene (71-43-2)	1.0	< 1.0	ug/L
1,2-Dichloropropane (78-87-5)	1.0	< 1.0	ug/L
Trichloroethene (79-01-6)	1.0	< 1.0	ug/L
Bromodichloromethane (75-27-4)	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether (110-75-8)	10	< 10	ug/L
cis-1,3-Dichloropropene (10061-01-5)	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene (10061-02-6)	1.0	< 1.0	ug/L
1,1,2-Trichloroethane (79-00-5)	1.0	< 1.0	ug/L
1,3-Dichloropropane (142-28-9)	1.0	< 1.0	ug/L
Dibromomethane (74-95-3)	1.0	< 1.0	ug/L
Toluene (108-88-3)	1.0	< 1.0	ug/L
1,2-Dibromoethane (106-93-4)	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone (108-10-1)	10	< 10	ug/L
2-Hexanone (591-78-6)	10	< 10	ug/L
Dibromochloromethane (124-48-1)	1.0	< 1.0	ug/L
Tetrachloroethene (127-18-4)	1.0	< 1.0	ug/L
Chlorobenzene (108-90-7)	1.0	< 1.0	ug/L

PINNACLE LABORATORIES

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GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260B	PINNACLE I.D.	:	308100
CLIENT	: NMED-PST BUREAU	DATE RECEIVED	:	08/21/03
PROJECT #	: 2491	INSTRUMENT ID	:	GCMS1
PROJECT NAME	: MAVERIK #59	ANALYST	:	DSR

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
308100-05	TRIP BLANK	AQUEOUS	08/20/03	N/A	08/25/03	1

PARAMETER (CAS#)	DET. LIMIT	RESULT	UNITS
Ethylbenzene (100-41-4)	1.0	< 1.0	ug/L
1,1,1,2-Tetrachloroethane (630-20-6)	1.0	< 1.0	ug/L
m&p Xylenes (108-38-3, 106-42-3)	1.0	< 1.0	ug/L
o-Xylene (95-47-6)	1.0	< 1.0	ug/L
Styrene (100-42-5)	1.0	< 1.0	ug/L
Bromoform (75-25-2)	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane (79-34-5)	2.0	< 2.0	ug/L
1,2,3-Trichloropropane (96-18-4)	2.0	< 2.0	ug/L
Isopropyl Benzene (98-82-8)	1.0	< 1.0	ug/L
Bromobenzene (108-86-1)	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene (110-57-6)	2.0	< 2.0	ug/L
n-Propylbenzene (103-65-1)	1.0	< 1.0	ug/L
2-Chlorotoluene (95-49-8)	1.0	< 1.0	ug/L
4-Chlorotoluene (106-43-4)	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene (108-67-8)	1.0	< 1.0	ug/L
tert-Butylbenzene (98-06-6)	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene (95-63-6)	1.0	< 1.0	ug/L
sec-Butylbenzene (135-98-8)	1.0	< 1.0	ug/L
1,3-Dichlorobenzene (541-73-1)	1.0	< 1.0	ug/L
1,4-Dichlorobenzene (106-46-7)	1.0	< 1.0	ug/L
p-Isopropyltoluene (99-87-6)	1.0	< 1.0	ug/L
1,2-Dichlorobenzene (95-50-1)	1.0	< 1.0	ug/L
n-Butylbenzene (104-51-8)	1.0	< 1.0	ug/L
1,2-Dibromo-3-chloropropane (96-12-8)	5.0	< 5.0	ug/L
1,2,4-Trichlorobenzene (120-82-1)	2.0	< 2.0	ug/L
Naphthalene (91-20-3)	3.0	< 3.0	ug/L
Hexachlorobutadiene (87-68-3)	2.0	< 2.0	ug/L
1,2,3-Trichlorobenzene (87-61-6)	2.0	< 2.0	ug/L

SURROGATE % RECOVERY	
1,2-Dichloroethane-d4	93 (76 - 114)
Toluene-d8	97 (88 - 110)
Bromofluorobenzene	92 (86 - 115)

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GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260B	PINNACLE I.D.	:	308100
CLIENT	: NMED-PST BUREAU			
PROJECT #	: 2491	INSTRUMENT ID	:	GCMS1
PROJECT NAME	: MAVERIK #59	ANALYST	:	DSR

SAMPLE ID #	BATCH	MATRIX	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
REAGENT BLANK	082503E	AQUEOUS	N/A	08/25/03	1

PARAMETER (CAS#)	DET. LIMIT	RESULT	UNITS
Dichlorodifluoromethane (75-71-8)	5.0	< 5.0	ug/L
Chloromethane (74-87-3)	5.0	< 5.0	ug/L
Vinyl Chloride (75-01-4)	5.0	< 5.0	ug/L
Bromomethane (74-83-9)	5.0	< 5.0	ug/L
Chloroethane (75-00-3)	5.0	< 5.0	ug/L
Trichlorofluoromethane (75-69-4)	5.0	< 5.0	ug/L
Acetone (67-64-1)	10	< 10	ug/L
Acrolein (107-02-8)	5.0	< 5.0	ug/L
1,1-Dichloroethene (75-35-4)	1.0	< 1.0	ug/L
Iodomethane (74-88-4)	5.0	< 5.0	ug/L
Methylene Chloride (75-09-2)	1.0	< 1.0	ug/L
Acrylonitrile (107-13-1)	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene (156-59-2)	1.0	< 1.0	ug/L
Methyl-t-butyl Ether (1634-04-4)	1.0	< 1.0	ug/L
1,1,2-Trichlorotrifluoroethane (76-13-1)	5.0	< 5.0	ug/L
1,1-Dichloroethane (75-34-3)	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene (156-60-5)	1.0	< 1.0	ug/L
2-Butanone (78-93-3)	10	< 10	ug/L
Carbon Disulfide (75-15-0)	1.0	< 1.0	ug/L
Bromochloromethane (74-97-5)	1.0	< 1.0	ug/L
Chloroform (67-66-3)	1.0	< 1.0	ug/L
2,2-Dichloropropane (594-20-7)	1.0	< 1.0	ug/L
1,2-Dichloroethane (107-06-2)	1.0	< 1.0	ug/L
Vinyl Acetate (108-05-4)	5.0	< 5.0	ug/L
1,1,1-Trichloroethane (71-55-6)	1.0	< 1.0	ug/L
1,1-Dichloropropene (563-58-6)	1.0	< 1.0	ug/L
Carbon Tetrachloride (56-23-5)	1.0	< 1.0	ug/L
Benzene (71-43-2)	1.0	< 1.0	ug/L
1,2-Dichloropropane (78-87-5)	1.0	< 1.0	ug/L
Trichloroethene (79-01-6)	1.0	< 1.0	ug/L
Bromodichloromethane (75-27-4)	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether (110-75-8)	10	< 10	ug/L
cis-1,3-Dichloropropene (10061-01-5)	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene (10061-02-6)	1.0	< 1.0	ug/L
1,1,2-Trichloroethane (79-00-5)	1.0	< 1.0	ug/L
1,3-Dichloropropane (142-28-9)	1.0	< 1.0	ug/L
Dibromomethane (74-95-3)	1.0	< 1.0	ug/L
Toluene (108-88-3)	1.0	< 1.0	ug/L
1,2-Dibromoethane (106-93-4)	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone (108-10-1)	10	< 10	ug/L
2-Hexanone (591-78-6)	10	< 10	ug/L
Dibromochloromethane (124-48-1)	1.0	< 1.0	ug/L
Tetrachloroethene (127-18-4)	1.0	< 1.0	ug/L
Chlorobenzene (108-90-7)	1.0	< 1.0	ug/L

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260B	PINNACLE I.D.	:	308100
CLIENT	: NMED-PST BUREAU			
PROJECT #	: 2491	INSTRUMENT ID	:	GCMS1
PROJECT NAME	: MAVERIK #59	ANALYST	:	DSR

SAMPLE ID #	BATCH	MATRIX	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
REAGENT BLANK	082503E	AQUEOUS	N/A	08/25/03	1

PARAMETER (CAS#)	DET. LIMIT	RESULT	UNITS
Ethylbenzene (100-41-4)	1.0	< 1.0	ug/L
1,1,1,2-Tetrachloroethane (630-20-6)	1.0	< 1.0	ug/L
m&p Xylenes (108-38-3, 106-42-3)	1.0	< 1.0	ug/L
o-Xylene (95-47-6)	1.0	< 1.0	ug/L
Styrene (100-42-5)	1.0	< 1.0	ug/L
Bromoform (75-25-2)	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane (79-34-5)	2.0	< 2.0	ug/L
1,2,3-Trichloropropane (96-18-4)	2.0	< 2.0	ug/L
Isopropyl Benzene (98-82-8)	1.0	< 1.0	ug/L
Bromobenzene (108-86-1)	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene (110-57-6)	2.0	< 2.0	ug/L
n-Propylbenzene (103-65-1)	1.0	< 1.0	ug/L
2-Chlorotoluene (95-49-8)	1.0	< 1.0	ug/L
4-Chlorotoluene (106-43-4)	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene (108-67-8)	1.0	< 1.0	ug/L
tert-Butylbenzene (98-06-6)	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene (95-63-6)	1.0	< 1.0	ug/L
sec-Butylbenzene (135-98-8)	1.0	< 1.0	ug/L
1,3-Dichlorobenzene (541-73-1)	1.0	< 1.0	ug/L
1,4-Dichlorobenzene (106-46-7)	1.0	< 1.0	ug/L
p-Isopropyltoluene (99-87-6)	1.0	< 1.0	ug/L
1,2-Dichlorobenzene (95-50-1)	1.0	< 1.0	ug/L
n-Butylbenzene (104-51-8)	1.0	< 1.0	ug/L
1,2-Dibromo-3-chloropropane (96-12-8)	5.0	< 5.0	ug/L
1,2,4-Trichlorobenzene (120-82-1)	2.0	< 2.0	ug/L
Naphthalene (91-20-3)	3.0	< 3.0	ug/L
Hexachlorobutadiene (87-68-3)	2.0	< 2.0	ug/L
1,2,3-Trichlorobenzene (87-61-6)	2.0	< 2.0	ug/L

SURROGATE % RECOVERY	
1,2-Dichloroethane-d4	90 (76 - 114)
Toluene-d8	91 (88 - 110)
Bromofluorobenzene	88 (86 - 115)

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

LABORATORY CONTROL SPIKE RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260B	PINNACLE I.D.	: 308100
BATCH	: 082503E	DATE ANALYZED	: 08/25/03
CLIENT	: NMED-PST BUREAU	UNITS	: ug/L (PPB)
PROJECT #	: 2491	INSTRUMENT ID	: GCMS1
PROJECT NAME	: MAVERIK #59	ANALYST	: DSR

COMPOUND	SPIKE ADDED	LCS RESULT	LCS % RECOVERY	QC LIMITS %RECOVERY
1,1-DICHLOROETHENE	50.0	49.0	98	61-145
BENZENE	50.0	47.2	94	76-127
TRICHLOROETHENE	50.0	47.1	94	71-120
TOLUENE	50.0	45.9	92	76-125
CHLOROBENZENE	50.0	46.7	93	75-130

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260B	PINNACLE I.D.	: 308100
SPIKED SAMPLE	: 308100-01	DATE ANALYZED	: 08/25/03
CLIENT	: NMED-PST BUREAU	UNITS	: ug/L (PPB)
PROJECT #	: 2491	INSTRUMENT ID	: GCMS1
PROJECT NAME	: MAVERIK #59	ANALYST	: DSR

COMPOUND	SAMPLE CONC.	SPIKE ADDED	MS RESULT	MSD RESULT	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS %RECOVERY
1,1-DICHLOROETHENE	<1.0	50.0	51.2	49.3	102	99	4	14	61-145
BENZENE	<1.0	50.0	48.6	47.4	97	95	3	11	76-127
TRICHLOROETHENE	<1.0	50.0	47.3	46.6	95	93	1	14	71-120
TOLUENE	<1.0	50.0	46.7	45.3	93	91	3	13	76-125
CHLOROBENZENE	<1.0	50.0	47.9	46.3	96	93	3	13	75-130

PINNACLE LABORATORIES

Pinnacle Laboratories Inc.

CHAIN OF CUSTODY

DATE: 8/20/03 PAGE: 1 OF 1

PLI Accession #: 308100

SHADED AREAS ARE FOR LAB USE ONLY.

PROJECT MANAGER: Michael Leger

COMPANY: NMED / PSTB

ADDRESS: 4131 Montgomery Blvd. NE
Albuquerque, NM 87109

PHONE: (505) 841-9189

FAX: (505) 881-9645

BILL TO: PSTB

COMPANY:

ADDRESS:

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct Inject	(M8015) Gas/Purge & Trap	8021 (BTEX)/8015 (Gasoline) MTBE	8021 (BTEX) ☐MTBE ☐TMB ☐PCE	8021 (TCL)	8021 (EDX)	8021 (HALO)	8021 (CUST)	504.1 EDB ☐/DBCP ☐	8260 (TCL) Volatile Organics	8260 (Full) Volatile Organics ☐PBMS	8260 (CUST) Volatile Organics	8260 (Landfill) Volatile Organics	Pesticides/PCB (608/8081/8082)	Herbicides (615/8151)	Base/Neutral/Acid Compounds GC/MS (625/8270)	Polynuclear Aromatics (610/8310/8270-SIMS)	General Chemistry:	Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method1311)	Metals:	NUMBER OF CONTAINERS
DW-1	8/20	1828	H_2O	01												✓													3
DW-2	8/20	1835	H_2O	02												✓													3
DW-3	8/20	1840	H_2O	03												✓													3
DW-4	8/20	1846	H_2O	04												✓													3
Trip Blank	8/20	1122	〃	05												✓													2

WEEKEND ANALYSES MAY RESULT IN AN ADDITIONAL SURCHARGE - PLEASE INQUIRE.

PROJECT INFORMATION

PROJ. NO.: 2491

PROJ. NAME: Maverik #59

P.O. NO.: 2021 (Plan #)

SHIPPED VIA:

SAMPLE RECEIPT

NO CONTAINERS	14
CUSTODY SEALS	Y/N/NA
RECEIVED INTACT	Yes
BLUE ICE/ICE	4.6°C

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐24hr* ☐48hr* ☐72hr* ☐1 WEEK (NORMAL) ☑

*NOT AVAILABLE ON ALL ANALYSES

CERTIFICATION REQUIRED ☐NM ☐SDWA ☐AZ ☐OTHER

METHANOL PRESERVATION ☐ METALS ☐TOTAL ☐DISSOLVED

COMMENTS:

RELINQUISHED BY: 1.

Signature: [signature] Time: 1635

Printed Name: Michael Leger Date: 8/21/03

Company: PSTB

See Reverse side (Force Majeure)

RELINQUISHED BY: 2.

Signature: Time:

Printed Name: Date:

Company:

RECEIVED BY: 1.

Signature: Time:

Printed Name: Date:

Company:

RECEIVED BY: (LAB) 2.

Signature: [signature] Time: 1635

Printed Name: Maxine Torres Date: 8/21/03

Pinnacle Laboratories Inc.

PLEASE FILL THIS FORM IN COMPLETELY.

State of New Mexico
ENVIRONMENT DEPARTMENT
Petroleum Storage Tank Bureau
4131 Montgomery Blvd., N.E.
Albuquerque, New Mexico 87109
Telephone (505) 841-9459
Fax (505) 881-9645
www.nmenv.state.nm.us

BILL RICHARDSON
GOVERNOR

RON CURRY
SECRETARY

RECEIVED

NOV 2 0 2003

OIL CONSERVATION
DIVISION

November 19, 2003

Mr. William Olson
EMNRD Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

Re: Private Water Well Sampling Results, #24 County Road 6721, Kirtland, New Mexico

Dear Mr. Olson:

The New Mexico Environment Department (Department) received a report of a suspected petroleum hydrocarbon contamination of water wells on August 14, 2003. The Department collected water samples from two domestic (DW-1 and DW-2) and one irrigation well (DW-4) on August 20, 2003. The Department was unable to collect a viable water sample from an irrigation well (DW-5) on the Jackson Property due to the high turbidity of the purged groundwater. However, a noticeable hydrocarbon sheen and odor was observed in the water that was purged from this well.

The results of the water quality analysis indicated that the wells sampled were free of contaminants detected by EPA Method 8260B. The test results indicated an absence of hydrocarbon contamination to the wells sampled. The laboratory reports and chain of custody documentation for this sampling event, as well as a site map indicating the general area where the samples were obtained are attached.

The Department has determined that the New Mexico Energy, Minerals and Natural Resources Department Oil Conservation Division may have jurisdiction in this matter.

If you have any questions concerning this correspondence, please contact me at (505) 841-9189.

Sincerely,

Michael Leger
Geologist
Petroleum Storage Tank Bureau

ML:keb

encl: laboratory results and chain of custody
site map

cc: James H. Davis, Ph.D., Bureau Chief, PSTB
Joyce Shearer, Manager, PSTB Remedial Action Program
Stephen G. Reuter, Geologist Manager, PSTB District I Office
David Tomko, Manager, NMED Farmington Field Office

State of New Mexico
ENVIRONMENT DEPARTMENT
Petroleum Storage Tank Bureau
4131 Montgomery Blvd., N.E.
Albuquerque, New Mexico 87109
Telephone (505) 841-9459
Fax (505) 881-9645
www.nmenv.state.nm.us

BILL RICHARDSON
GOVERNOR

RON CURRY
SECRETARY

RECEIVED
NOV 2 0 2003
OIL CONSERVATION
DIVISION

November 19, 2003

Mr. Roland E. Jackson
PO Box 586
Kirtland, New Mexico 87417

Re: Private Water Well Sampling Results, County Road 6721 #18, Kirtland, New Mexico

Dear Mr. Jackson:

The New Mexico Environment Department (Department) received a report of a suspected petroleum hydrocarbon contamination of water wells on your property on August 14, 2003. The Department collected water samples from two domestic water wells (DW-1 and DW-2) on your property on August 20, 2003. The Department was unable to collect a viable water sample from the irrigation well (DW-5) due to the high turbidity of the purged groundwater. However, a noticeable hydrocarbon sheen and odor was observed in the water that was purged from this well.

The results of the water quality analysis indicated that the wells that were sampled were free of contaminants detected by EPA Method 8260B. These test results indicate an absence of hydrocarbon contamination to the wells sampled. The laboratory reports and chain of custody documentation for this sampling event, as well as a site map indicating the general area where the samples were obtained are attached.

The Department has determined that the New Mexico Energy, Minerals and Natural Resources Department Oil Conservation Division may have jurisdiction in this matter. All information gathered has been forwarded to the Oil Conservation Division (OCD). The OCD can be contacted at (505) 476-3440.

If you have any questions concerning this correspondence, please contact me at (505) 841-9189.

Sincerely,

Michael Leger

Michael Leger
Geologist
Petroleum Storage Tank Bureau

ML:keb

encl: laboratory results and chain of custody
site map

cc: James H. Davis, Ph.D., Bureau Chief, PSTB
Joyce Shearer, Manager, PSTB Remedial Action Program
Stephen G. Reuter, Geologist Manager, PSTB District I Office
David Tomko, Manager, NMED Farmington Field Office
William Olson, ENMRD/OCD

BILL RICHARDSON
GOVERNOR

State of New Mexico
ENVIRONMENT DEPARTMENT
Petroleum Storage Tank Bureau
4131 Montgomery Blvd., N.E.
Albuquerque, New Mexico 87109
Telephone (505) 841-9459
Fax (505) 881-9645
www.nmenv.state.nm.us

RON CURRY
SECRETARY

RECEIVED
NOV 20 2003
OIL CONSERVATION DIVISION

November 19, 2003

Mr. Charles Grubbs
#24 County Road 6271
Kirtland, New Mexico 87417

Re: Private Water Well Sampling Results, #24 County Road 6721, Kirtland, New Mexico

Dear Mr. Grubbs:

The New Mexico Environment Department (Department) received a report of a suspected petroleum hydrocarbon contamination of water wells on August 14, 2003. The Department collected water samples from one irrigation water well (DW-4) on your property on August 20, 2003.

The results of the water quality analysis indicated that the well sampled was free of contaminants detected by EPA Method 8260B. The test results indicate an absence of hydrocarbon contamination to the well sampled. The laboratory reports and chain of custody documentation for this sampling event, as well as a site map indicating the general area where the samples were obtained are attached.

The Department has determined that the New Mexico Energy, Minerals and Natural Resources Department Oil Conservation Division may have jurisdiction in this matter. All information gathered has been forwarded to the Oil Conservation Division (OCD). The OCD can be contacted at (505) 476-3440.

If you have any questions concerning this correspondence, please contact me at (505) 841-9189.

Sincerely,

Michael Leger

Michael Leger
Geologist
Petroleum Storage Tank Bureau

ML:keb

encl: laboratory results and chain of custody
site map

cc: James H. Davis, Ph.D., Bureau Chief, PSTB
Joyce Shearer, Manager, PSTB Remedial Action Program
Stephen G. Reuter, Geologist Manager, PSTB District I Office
David Tomko, Manager, NMED Farmington Field Office
~~William~~ Olson, ENMRD/OCD

Olson, William

From: Andrew Parker [andrew@rthicksconsult.com]

Sent: Wednesday, April 23, 2003 12:09 PM

To: WOLSON@state.nm.us

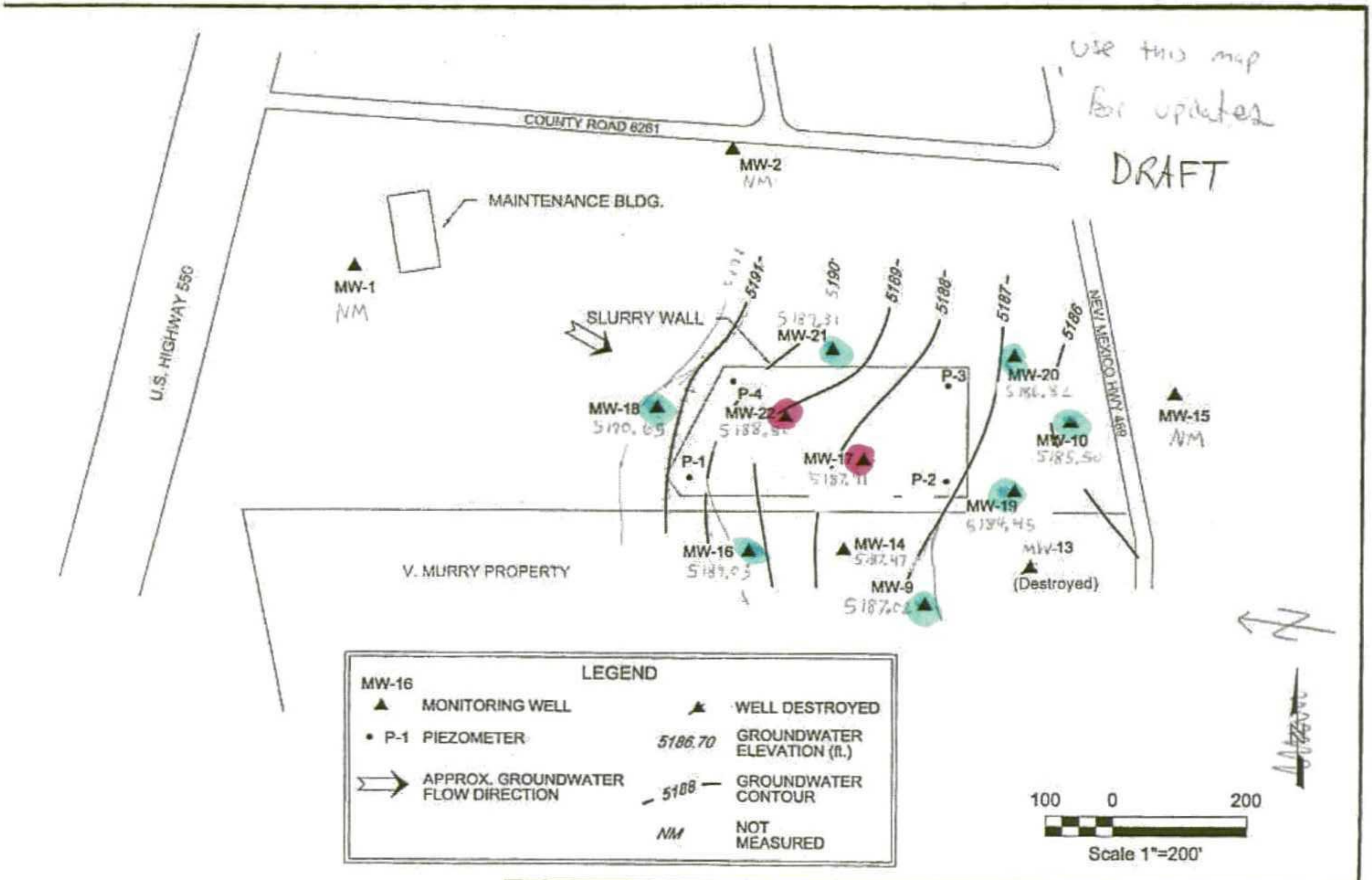
Subject: Maverick Refinery Draft Map

Mr. Olsen:

Attached is a draft potentiometric map of the site at the Maverick Refinery in Kirtland, NM. Please file the map with our 2002 Annual Report.

That's all,

Andrew Parker
Hicks Consultants



ThermoRetec

~~2000~~ Annual Report 2002 Kirtland Refinery, Kirtland, NM (MCS00-03050-311)	GROUNDWATER ELEVATION MAP OCTOBER 27, 2000
DATE: 11/29/00 · DRWN: E.S.S. · FILE: 132AN001-1	Plate (1/2) ~~FIGURE 1~~

Olson, William

From: Olson, William
Sent: Wednesday, March 26, 2003 9:29 AM
To: 'Andrew Parker'
Subject: RE: 2002 Annual Report Maverik Refinery

Andrew,

Next week would be fine. My current time frame for review of documents is running at about 60 days, so there is not an immediate need for it.

If you have any questions please contact me.

Sincerely,

William C. Olson
Hydrologist
New Mexico Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505
(505) 476-3491

-----Original Message-----
From: Andrew Parker [mailto:andrew@rthicksconsult.com]
Sent: Wednesday, March 26, 2003 10:26 AM
To: 'Olson, William'
Subject: RE: 2002 Annual Report Maverik Refinery

Our graphic artist is leaving town tomorrow and she shall return next Wednesday. Do you need the maps today or is next week okay.

That's all,

Andrew Parker

-----Original Message-----
From: Olson, William [mailto:WOLSON@state.nm.us]
Sent: Wednesday, March 26, 2003 7:14 AM
To: 'Andrew Parker'
Subject: RE: 2002 Annual Report Maverik Refinery

Andrew,

In glancing at the report I noticed that there are no maps of the site, or water table potentiometric maps showing the water table elevation in all site ground water monitoring wells and the direction and magnitude of the hydraulic gradient. These maps are required to be submitted for each sampling event conducted. In order to evaluate the report, please submit this information for the 2002 sampling events and also include these maps in future reports.

If you have any questions please contact me.

Sincerely,

William C. Olson
Hydrologist
New Mexico Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505
(505) 476-3491

-----Original Message-----
From: Andrew Parker [mailto:andrew@rthicksconsult.com]
Sent: Thursday, March 20, 2003 11:06 AM
To: Dennis Riding; wolson@state.nm.us
Subject: 2002 Annual Report Maverik Refinery

Mr. Olsen:

Attached is the 2002 annual ground water report for the Maverik Refinery in Kirtland, NM. Please contact me at 505-266-5004 or via email with any questions or comments.

That's all,

Andrew Parker
Hicks Consultants

Olson, William

From: Olson, William
Sent: Wednesday, March 26, 2003 8:14 AM
To: 'Andrew Parker'
Subject: RE: 2002 Annual Report Maverik Refinery

Andrew,

In glancing at the report I noticed that there are no maps of the site, or water table potentiometric maps showing the water table elevation in all site ground water monitoring wells and the direction and magnitude of the hydraulic gradient. These maps are required to be submitted for each sampling event conducted. In order to evaluate the report, please submit this information for the 2002 sampling events and also include these maps in future reports.

If you have any questions please contact me.

Sincerely,

William C. Olson
Hydrologist
New Mexico Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505
(505) 476-3491

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To: Dennis Riding; wolson@state.nm.us
Subject: 2002 Annual Report Maverik Refinery

Mr. Olsen:

Attached is the 2002 annual ground water report for the Maverik Refinery in Kirtland, NM. Please contact me at 505-266-5004 or via email with any questions or comments.

That's all,

Andrew Parker
Hicks Consultants

3R 77

Olson, William

From: Michelle Hunter [mgh@rthicksconsult.com]

Sent: Monday, March 25, 2002 1:33 PM

To: wolson@state.nm.us

Bill:

Hi, I just got back from resampling a monitor well at the old Maverik Refinery in Kirtland. The original analysis for this particular well showed BTEX levels 10 times higher than historical data. Analysis for all other wells were exactly where I would've predicted. I had Assaigai re-run the original analysis because I was sure it was a dilution factor problem. Alas, it was not. Unfortunately, there is a layer of hydrocarbon on the water in this well (it is within the slurry wall) that we missed during the original sampling event. I am thinking that maybe someone is vandalizing the well (the hydrocarbon is light yellow, and looks very new. I thought about putting it in the rental car!). I wanted you to know the status. We will bail out the product and secure the wells (before I submit the report).

Regards,

Michelle

Michelle Hunter
Project Scientist
R.T. Hicks Consultants Ltd.
505.266.5004
fax 505.266.7738

Letter of Transmittal

RECEIVED
JAN 12 2001
CONSERVATION DIVISION

ThermoRetec
Smart Solutions. Positive Outcomes.

1726 Cole Boulevard
Building 22, Suite 150
Golden, CO 80401-3213
(303) 271-2100
Fax (303) 277-0110

TO: Mr. William C. Olson, Hydrogeologist
State Office New Mexico Oil Conservation Division
Environmental Bureau
2040 So. Pacheco
Santa Fe, NM 87505

DATE: January 10, 2001

RE: 1999 Annual Groundwater
Monitoring Report
Former Maverik Refinery Tank Farm
Kirtland, New Mexico

JOB NO: MCS00-04073-301

PLEASE FIND: ☒ Attached ☐ Under separate cover via: ________

☐ Copy of Letter ☐ Change Order ☐ Drawings/Figures ☐ Plans/Specs

☐ Samples ☐ Other: ________

Copies	Date	No.	Description
1	12-20-00		Subject report

☐ For Approval ☐ Approved as Submitted ☐ Resubmit ____ Copies for Approval

☐ For Your Use ☐ Approved as Noted ☐ Submit ____ Copies for Distribution

☐ As Requested ☐ Returned for Corrections ☐ Return ____ Corrected Prints

☐ For Review & Comment ☐ Other: ________

Remarks:

On behalf of Maverik Country Stores, Inc. we are submitting the 2000 Annual Groundwater Monitoring Report for the Former Maverik Refinery, Kirtland, NM.

Should you have any questions, please feel free to call me.

Sincerely,

ThermoRetec Consulting Corporation

BH

Bill Hendrix, Project Manager

cc: Paul Weissenborn – Maverik Country Stores

M:\MAVERIK\KRTLDREF\Annual Rpt\2000Annual\txt\00ANNTRS.doc

Letter of Transmittal

ThermoRetec
Smart Solutions. Positive Outcomes.
1726 Cole Boulevard
Building 22, Suite 150
Golden, CO 80401-3213
(303) 271-2100
Fax (303) 277-0110

RECEIVED
DEC 17 1999
OIL CONSERVATION DIVISION

TO: Mr. William C. Olson Hydrogeologist
State Office New Mexico Oil Conservation Division
Environmental Bureau
2040 So. Pacheco
Santa Fe, NM 87505

DATE: December 13, 1999

RE: 1999 Annual Groundwater
Monitoring Report
Former Maverik Refinery Tank Farm
Kirtland, New Mexico

JOB NO: MCS00-03050-311

PLEASE FIND: ☒ Attached ☐ Under separate cover via: ______

☐ Copy of Letter ☐ Change Order ☐ Drawings/Figures ☐ Plans/Specs

☐ Samples ☐ Other: ______

Copies	Date	No.	Description
1	12-13-99		Subject report

☐ For Approval ☐ Approved as Submitted ☐ Resubmit ______ Copies for Approval

☐ For Your Use ☐ Approved as Noted ☐ Submit ______ Copies for Distribution

☐ As Requested ☐ Returned for Corrections ☐ Return ______ Corrected Prints

☐ For Review & Comment ☐ Other: ______

Remarks:

On behalf of Maverik Country Stores, Inc. we are submitting the 1999 Annual Groundwater Monitoring Report for the Former Maverik Refinery, Kirtland, NM.

Should you have any questions, please feel free to call me.

Sincerely,

ThermoRetec Consulting Corporation

BH

Bill Hendrix, Project Manager

cc: Paul Weissenborn – Maverik Country Stores

M:\MAVERIK\KRTLDREF\3050\311\COR\98ANNTRS.DOC

ThermoRetec
Smart Solutions. Positive Outcomes.

Letter of Transmittal

1726 Cole Boulevard
Building 22, Suite 150
Golden, CO 80401-3213
(303) 271-2100
Fax (303) 277-0110

RECEIVED
FEB 12 1999
OIL CONSERVATION DIVISION

TO: Mr. William C. Olson Hydrogeologist
State Of New Mexico Oil Conservation Division
Environmental Bureau
2040 So. Pacheco
Santa Fe, NM 87505

DATE: February 9, 1999

RE: 1998 Annual Groundwater
Monitoring Report
Former Maverik Refinery Tank Farm
Kirtland, New Mexico

JOB NO: 3-3050-311

PLEASE FIND: ☒ Attached ☐ Under separate cover via: ______
☐ Copy of Letter ☐ Change Order ☐ Drawings/Figures ☐ Plans/Specs
☐ Samples ☐ Other: ______

Copies	Date	No.	Description
1	2-8-99	1	Subject report

☐ For Approval ☐ Approved as Submitted ☐ Resubmit ____ Copies for Approval
☐ For Your Use ☐ Approved as Noted ☐ Submit ____ Copies for Distribution
☐ As Requested ☐ Returned for Corrections ☐ Return ____ Corrected Prints
☐ For Review & Comment ☐ Other: ______

Remarks:
On behalf of Maverik Country Stores, Inc. we are submitting the 1998 Annual Groundwater Monitoring Report for the Former Maverik Refinery, Kirtland, NM.

Should you have any questions, please feel free to call me.

Sincerely,

ThermoRetec Consulting Corporation

BH

Bill Hendrix, Project Manager

cc: Paul Weissenborn – Maverik Country Stores

\\GEOWEST2\DATA\MAVERIK\KRTLDREF\3050\311\COR\98anntrs.doc

Transmittal

RECEIVED
JAN 14 1998
CONSERVATION DIVISION

To:

Mr. William C. Olson Hydrogeologist
State Of New Mexico Oil Conservation Division
2040 So Pacheco
Santa Fe Nm 87505

Date:

January 12, 1998

Item(s):

1997 Annnual Groundwater Monitoring Report
Former Maverik Refinery Tank Farm
Kirtland, New Mexico

Job:

3-3050-301

Message or Action Required:

On behalf of Maverik Country Stores, Inc., we are submitting the above-named report.

No. of Copies: 1
Copies to:

Paul Weissenborn, Maverik Country Stores

Sent Via:

U. S. Mail

TriTechnics Corp.

Bill Hendrix

Remediation Technologies, Inc.

1726 Cole Boulevard
Building 22, Suite 150
Golden, Colorado 80401

(303) 271-2100 Phone
(303) 277-0110 Fax

TriTechnics
CORPORATION
Air, Water and Soil Management

1726 Cole Boulevard
Building 22, Suite 150
Golden, Colorado 80401-3213
(303) 271-2100 · (303) 277-0110 Fax

RECEIVED
JAN 28
OIL CONSERVATION

January 23, 1997

Mr. William C. Olson, Hydrogeologist
State of New Mexico Oil Conservation Division
2040 So Pacheco
Santa Fe, New Mexico 87505

**RE: 1996 ANNUAL GROUNDWATER MONITORING REPORT
FORMER MAVERIK REFINERY AND TANK FARM
KIRTLAND, NEW MEXICO**

Dear Bill:

On behalf of our client, Maverik Country Stores, Inc., we are transmitting the enclosed groundwater monitoring report describing activities performed during May and October, 1996, at the Maverik Refinery Tank Farm, Kirtland, New Mexico.

As set out in Section 6 of the report, Maverik recommends that the current scope of work be modified. The semi-annual report will be discontinued and only an annual report will be submitted in the future. Additionally, the annual bioremediation event will be terminated.

Sincerely,
TriTechnics Corporation

BH

Bill Hendrix
Project Manager

cc: Paul Weissenborn, Maverik Country Stores

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TriTechnics
CORPORATION
Air, Water and Soil Management

1726 Cole Boulevard
Building 22, Suite 150
Golden, Colorado 80401-3213
(303) 271-2100 · (303) 277-0110 Fax

October 31, 1996

Mr. Bill Olson
New Mexico Oil Conservation Division
2040 S. Pacheco
Santa Fe, NM 87505

**RE: ANNUAL REQUIREMENTS
FORMER MAVERIK REFINERY
KIRTLAND, NM**

Dear Mr. Olson:

In accordance with past conversations with you regarding the subject site, TriTechnics, on behalf of Maverik Country Stores, Inc., is requesting modifications to the annual requirements which are presently directed by the New Mexico Oil Conservation Division at Maverik's former refinery in Kirtland, New Mexico. Two modifications which affect the annual bioremediation event and the semi-annual reporting of monitoring/sampling activities are requested and explained below.

As you are aware, an annual bioremediation event is performed at the subject site. This event consists of applying 6,000 pounds of ammonium phosphate fertilizer to the area within the slurry walls. After the fertilizer is spread, it is worked into the ground by ripping the area with a caterpillar. Finally, approximately 150,000 gallons of water are applied to the area. Data, to date, do not show that this application significantly affects groundwater quality, perhaps due to the likelihood that oxygen, not nutrients, is the limiting factor for microbial degradation at the site. We believe, therefore, that continued application of nutrients, and the associated expense, may be without merit and request that you approve termination of this activity. This request is consistent with your thoughts during past discussions.

Semi-annual monitoring and sampling of specified monitoring wells are presently required. A brief data report is submitted to the New Mexico Oil Conservation Division after the spring monitoring/sampling event and an annual report is submitted after the fall monitoring/sampling event is completed. As you initially suggested, TriTechnics requests that the brief data report not be submitted in the future. Monitoring/sampling will continue as presently required; however, only the annual report which includes all the sampling results from both the Spring and Fall events will be submitted. This request is made to reduce paperwork and costs involved with the project but will not affect any of the data which are being gathered.

Please contact me at (303)271-2108 if you need any additional information.

Sincerely,
TriTechnics Corporation

BH

Bill Hendrix, Cert. Sci. #182
Project Manager

cc: P. Weissenborn, Maverik Country Stores

(801) 295-5557

TriTechnics
CORPORATION
Air, Water and Soil Management

1726 Cole Boulevard
Building 22, Suite 150
Golden, Colorado 80401-3213
(303) 271-2100 · (303) 277-0110 Fax

OIL CONSERVATION DIVISION
RECEIVED
'96 JUL 22 AM 8 52

July 17, 1996

Mr. Bill Olson
New Mexico Oil Conservation Division
2040 S. Pacheco
Santa Fe, NM 87505

RE: GROUNDWATER ELEVATION MAP
FORMER MAVERIK REFINERY
KIRTLAND, NM

Dear Mr. Olson:

In accordance with your request, TriTechnics on behalf of Maverik is submitting a groundwater elevation map for the subject site. The datums are based on the measurements taken for the last Annual Report. Please contact me at (303)271-2108 if you need any additional information.

Sincerely,
TriTechnics Corporation

BH

Bill Hendrix, Cert. Sci. #182
Project Manager

cc: P. Weissenborn, Maverik Country Stores

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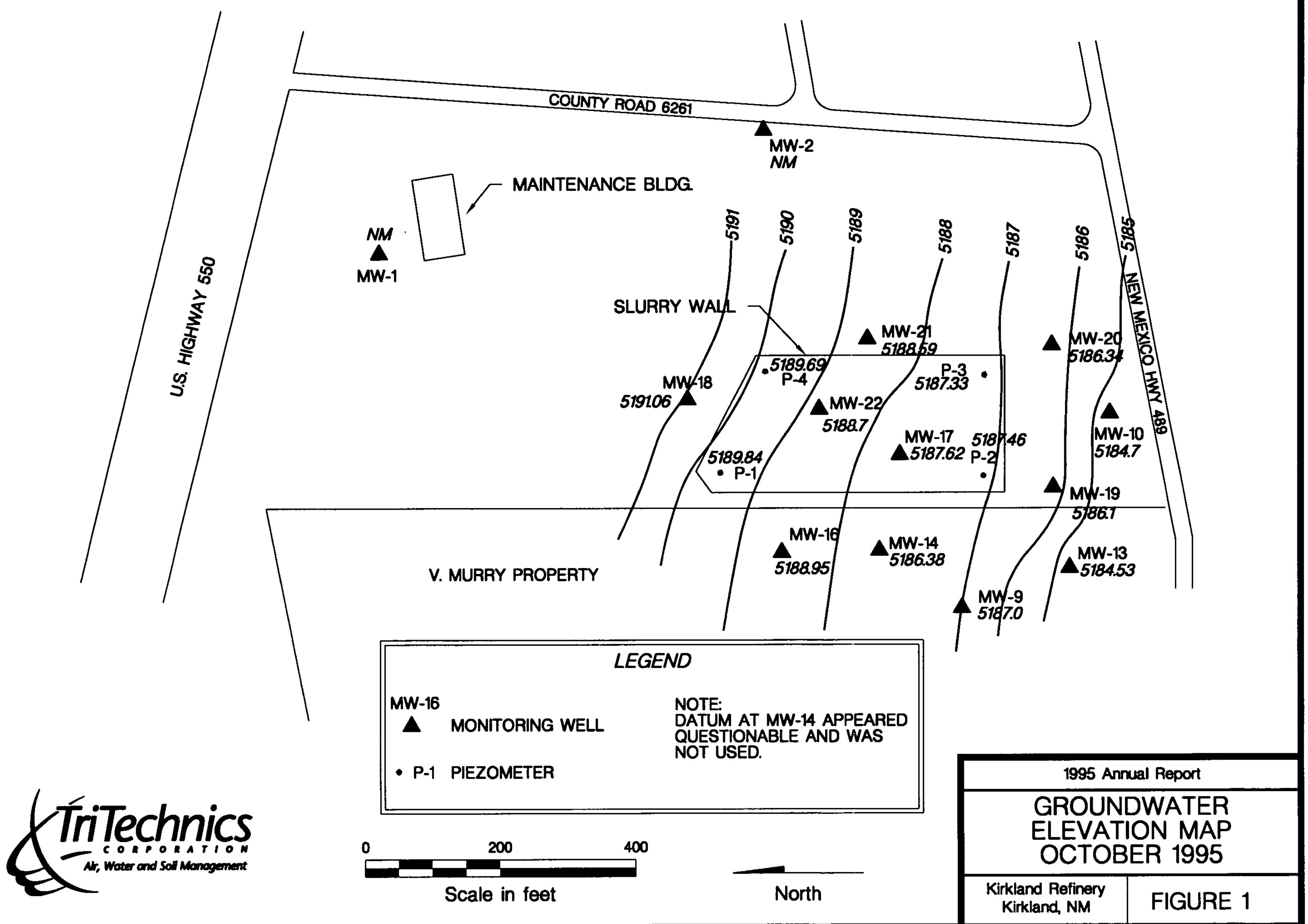
File Name: 027AN951 Date: 3/15/96 Drawn By: E.S.S. Checked By: D.R.R.



1995 Annual Report

GROUNDWATER ELEVATION MAP OCTOBER 1995

Kirkland Refinery
Kirkland, NM

FIGURE 1

TriTechnics
CORPORATION
Air, Water and Soil Management

1726 Cole Boulevard
Building 22, Suite 150
Golden, Colorado 80401-3213
(303) 271-2100 · (303) 277-0110 Fax

RECEIVED
JUN 20 1996
OIL CONSERVATION DIV.

June 17, 1996

Mr. William C. Olson, Hydrogeologist
State of New Mexico Oil Conservation Division
2040 South Pacheco
Santa Fe, New Mexico 87505

RE: SPRING GROUNDWATER MONITORING RESULTS
FORMER MAVERIK REFINERY AND TANK FARM
KIRTLAND, NEW MEXICO

Dear Bill:

On behalf of Maverik Country Stores, TriTechnics Corporation is submitting the results of the spring groundwater monitoring event for the subject site. The sampling event was completed May 1 and 2, 1996. As agreed in previous communications, the results have been summarized in the attached table, and the analytical data has also been included.

The nutrient addition activity which was accomplished last year, is planned again for this year. This activity should be completed in June. The fall groundwater sampling event will be completed in October or November.

If you need additional information regarding this site, please contact me at (303) 271-2108.

Sincerely,
TriTechnics Corporation

BH

Bill Hendrix, N. Mex. Cert. Sci. #182
Project Manager

Attachments

cc: P. Weissenborn - Maverik Country Stores

mavkl027\cor\027sprpt.trn

TABLE 1

SUMMARY OF GROUNDWATER QUALITY MONITORING RESULTS (SINCE INSTALLATION OF SLURRY WALL)

Former Maverik Refinery, Kirtland, NM

Location	Sampling Period		DCA ug/L	B ug/L	T ug/L	E ug/L	X ug/L	BTEX ug/L	pH	SC umhos/cm
Within Slurry Wall										
MW-17	1	Sep-90	**360**	**11,000**	**15,000**	**1,160**	**13,000**	40,160	7.01	2,500
	2	Mar-91	**400**	**11,000**	**10,000**	**1,900**	**15,000**	37,900	7.04	2,700
	3	Jun-91	**420**	**9,800**	**6,300**	**1,800**	**16,000**	33,900	7.04	2,650
	4	Jan-92	MSG	MSG	MSG	MSG	MSG	MSG	MSG	MSG
	5	Jun-92	**45**	**9,240**	**7,580**	**1,150**	**7,190**	25,160	7.26	2,730
	6	Aug-92	**27**	**7,710**	**1,920**	669	**5,130**	15,429	7.23	2,810
	7	Dec-92	**17.3**	**7,990**	**4,740**	638	**4,600**	17,968	7.54	2,970
	8	Mar-93	**16.8**	**13,800**	**6,830**	**1,110**	**6,930**	28,670	7.37	2,610
	9	May-93	**12.5**	**13,700**	**6,360**	**993**	**10,530**	31,583	7.33	2,470
	10	Nov-93	**30.9**	**8,590**	**2,820**	636	**4,880**	16,926	7.39	2,360
	11	May-94	8.3	**10,900**	**4,340**	**823**	**5,660**	21,723	7.30	2,830
	12a	Oct-94	4.9	**5,130**	**1,160**	409	**2,818**	9,517	7.04	2,470
	12b	Oct-94	< 1	**2,070**	**807**	350	**2,013**	5,240	7.04	2,470
	13a	May-95	< 10	**9,320**	**2,510**	694	**3,782**	16,306	7.49	2,480
	13b	May-95	< 10	**12,800**	**4,460**	944	**5,710**	23,914	7.49	2,480
	14	Oct-95 **	2.3	**3,000**	464	244	**1,079**	4,787	7.09	2,430
	15	May-96	2.2	**7,700**	**1,200**	530	**1,800**	11,230	7.20	2,280
	15	May-96 dup	< 5	**7,300**	**1,200**	490	**1,800**	10,790		
MW-22	1	Sep-90	**7,200**	**21,000**	**20,000**	**1,100**	**8,300**	50,400	7.00	1,500
	2	Mar-91	**2,200**	**17,000**	**9,500**	**910**	**6,600**	34,010	6.87	1,900
	3	Jun-91	**3,600**	**15,000**	**3,200**	**760**	**3,000**	21,960	7.06	1,700
	4	Jan-92	**5,400**	**36,000**	**27,000**	**1,900**	**13,500**	78,400	6.86	1,600
	5	Jun-92	**3,170**	**21,200**	**7,540**	**1,040**	**5,730**	35,510	7.13	1,690
	6	Aug-92	**568**	**20,500**	**4,610**	588	**3,280**	28,978	7.28	1,545
	7	Dec-92	**908**	**12,100**	**4,220**	514	**3,254**	20,088	7.43	1,508
	8	Mar-93	**1,930**	**29,800**	**14,100**	**1,170**	**7,030**	52,100	7.26	1,408
	9	May-93	**28**	**17,000**	**6,520**	**1,100**	**6,150**	30,770	7.61	6,550
	10	Nov-93	**2,780**	**18,400**	**8,480**	**150**	**7,300**	34,330	8.01	1,610
	11	May-94	**379**	**9,340**	**2,250**	**845**	**3,725**	16,160	7.15	1,505
	12	Oct-94	**566**	**10,500**	**5,890**	**1,390**	**8,350**	26,130	7.24	1,710
	13a	May-95	**62**	**7,510**	**1,750**	**1,000**	**6,520**	16,780	7.15	1,517
	13b	May-95	**67**	**9,020**	**2,620**	**1,230**	**7,310**	20,180	7.15	1,517
	14	Oct-95 **	**41.9**	**5,700**	**2,430**	**1,580**	**9,000**	18,710	7.25	1,820
	14	Oct-95 ** dup	< 1	**5,120**	**2,130**	**1,540**	**8,320**	17,110	7.25	1,820
	15	May-96	**37**	**4,600**	410	**1,300**	**10,000**	16,310	7.30	1,325
P-1	9	May-93	< 1	**4,110**	18.8	361	**2,522**	7,012	7.04	2,290
	10	Nov-93	< 1	**3,580**	10.2	506	**3,215**	7,311	7.22	1,460
	11	May-94	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
	12	Oct-94	< 1	8.9	< 1	1.9	11.8	22.6	7.04	2,210
	13	May-95	NS	NS	NS	NS	NS	NS	NS	NS
	14	Oct-95	NS	NS	NS	NS	NS	NS	NS	NS
	15	May-96	NS	NS	NS	NS	NS	NS	NS	NS
P-2	9	May-93	3.2	5.2	< 1	< 1	< 1	5.2	7.36	3,910
	10	Nov-93	< 1	< 1	< 1	< 1	< 1	< 1	7.92	3,540
	11	May-94	1.3	< 1	< 1	< 1	< 1	< 1	7.48	3,980
	12	Oct-94	3.6	< 1	< 1	< 1	< 1	< 1	7.12	3,480
	13	May-95	NS	NS	NS	NS	NS	NS	NS	NS
	14	Oct-95	NS	NS	NS	NS	NS	NS	NS	NS
	15	May-96	0.8	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	7.40	2,980
P-3	9	May-93	**10.6**	< 1	< 1	< 1	< 1	< 1	7.24	11,160
	10	Nov-93	**11.5**	< 1	< 1	< 1	< 1	< 1	7.31	9,140
	11	May-94	**12.1**	< 1	< 1	< 1	< 1	< 1	7.28	8,070

TABLE 1

SUMMARY OF GROUNDWATER QUALITY MONITORING RESULTS (SINCE INSTALLATION OF SLURRY WALL)

Former Maverik Refinery, Kirtland, NM

Location	Sampling Period		DCA ug/L	B ug/L	T ug/L	E ug/L	X ug/L	BTEX ug/L	pH	SC umhos/cm
	12	Oct-94	**12.6**	< 1	< 1	< 1	< 1	< 1	7.06	5,550
	13	May-95	NS	NS	NS	NS	NS	NS	NS	NS
	14	Oct-95	NS	NS	NS	NS	NS	NS	NS	NS
	15	May-96	3.4	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	7.40	4,420
P-4	9	May-93	8.3	**6,690**	**4,090**	559	**6,260**	17,599	NA	NA
	10	Nov-93	2.1	**6,400**	**4,420**	**900**	**7,700**	19,420	NA	NA
	11	May-94	NS	NS	NS	NS	NS	NS	NS	NS
	12	Oct-94	NS	NS	NS	NS	NS	NS	NS	NS
	13	May-95	NS	NS	NS	NS	NS	NS	NS	NS
	14	Oct-95	NS	NS	NS	NS	NS	NS	NS	NS
	15	May-96	NS	NS	NS	NS	NS	NS	NS	NS
On-Site										
MW-10	1	Sep-90	1.4	< 0.5	< 0.5	< 0.5	< 1	< 1	6.95	1,550
	2	Mar-91	< 1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	7.29	1,700
	3	Jun-91	NA	NA	NA	NA	NA	NA	NA	NA
	4	Jan-92	< 5	< 5	< 5	< 5	< 5	< 5	7.31	1840
	5	Jun-92	1.6	< 1	< 1	< 1	< 1	< 1	7.65	1,400
	6	Aug-92	< 1	< 1	< 1	< 1	< 1	< 1	7.85	1,160
	7	Dec-92	< 1	< 1	< 1	< 1	< 1	< 1	7.64	6,110
	8	Mar-93	< 1	< 1	< 1	< 1	< 1	< 1	7.22	9,060
	9	May-93	1	< 1	< 1	< 1	< 1	< 1	7.93	2,320
	10	Nov-93	< 1	< 1	< 1	< 1	< 1	< 1	7.73	1,320
	11	May-94	< 1	< 1	< 1	< 1	< 1	< 1	7.75	1,335
	12	Oct-94	2.1	< 1	< 1	< 1	< 1	< 1	7.56	1,159
	13	May-95	< 1	< 1	< 1	< 1	< 1	< 1	7.64	1,695
	14	Oct-95	< 1	< 1	< 1	< 1	< 1	< 1	7.41	1,453
	15	May-96	1.0	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	7.70	1,328
MW-18	1	Sep-90	< 1	**17**	< 12	84	**880**	981	7.00	1,500
	2	Mar-91	< 1	**26**	< 12	85	**770**	881	7.24	1,200
	3	Jun-91	< 1	< 25	< 25	78	**930**	1,008	6.77	1200
	4	Jan-92	MSG	MSG	MSG	MSG	MSG	MSG	MSG	MSG
	5	Jun-92	< 1	**313**	1.1	200	**1,710**	2,224	7.07	1,480
	6	Aug-92	< 1	**527**	10.8	258	**2,075**	2,871	7.26	2,100
	7	Dec-92	< 25	**294**	< 25	224	**1,460**	1,978	7.31	1,930
	8	Mar-93	< 1	**117**	8.0	96.0	226	447.0	7.07	2,780
	9	May-93	1	**73**	< 1	31.2	259	363.2	7.15	2,220
	10	Nov-93	< 1	**337**	4.9	261	**1,352**	1,955	7.00	1,870
	11	May-94	< 1	**51**	10.0	7.0	99.0	167.0	7.00	1,510
	12	Oct-94	< 1	**210**	10.9	46.0	482.8	749.7	7.10	1,530
	13	May-95	< 1	**128**	< 1	10.4	274.0	412.4	6.84	1,370
	14	Oct-95 **	< 1	**118**	12.2	20.0	296.4	446.6	7.03	1,299
	15	May-96	< 0.5	**48**	0.5	3.4	150	201.9	7.00	1,270
MW-19	1	Sep-90	**45**	< 0.5	< 0.5	1.1	1.9	3.0	6.95	3,000
	2	Mar-91	**35**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	7.22	2,500
	3	Jun-91	**44**	< 0.5	< 0.5	5.9	< 0.5	5.9	7.1	2400
	4	Jan-92	**14**	< 5	< 5	< 5	< 5	< 5	7.66	460
	5	Jun-92	**11.4**	< 1	< 1	< 1	< 1	< 1	7.76	1,970
MW-19 (continued)	6	Aug-92	9.0	< 1	< 1	< 1	< 1	< 1	7.72	1,320
	7	Dec-92	6.6	< 1	< 1	< 1	< 1	< 1	7.70	1,620
	8	Mar-93	2.4	< 1	< 1	< 1	< 1	< 1	7.74	1,750
	9	May-93	7.9	< 1	< 1	< 1	< 1	< 1	7.73	1,630
	10	Nov-93	6.6	< 1	< 1	< 1	< 1	< 1	7.78	1,380
	11	May-94	8.0	< 1	< 1	< 1	< 1	< 1	7.65	1,762

TABLE 1

SUMMARY OF GROUNDWATER QUALITY MONITORING RESULTS (SINCE INSTALLATION OF SLURRY WALL)

Former Maverik Refinery, Kirtland, NM

Location	Sampling Period		DCA ug/L	B ug/L	T ug/L	E ug/L	X ug/L	BTEX ug/L	pH	SC umhos/cm
	12	Oct-94	7.9	< 1	< 1	< 1	< 1	< 1	7.44	1,258
	13	May-95	8.6	< 1	< 1	< 1	< 1	< 1	7.52	1,624
	14	Oct-95	8.8	< 1	< 1	< 1	< 1	< 1	7.31	1,411
	15	May-96	8.6	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	7.50	1,360
MW-20	1	Sep-90	< 1	< 0.5	< 0.5	< 0.5	< 1	< 1	7.01	1,350
	2	Mar-91	2.0	< 0.5	< 0.5	< 0.5	0.7	0.7	7.39	3,000
	3	Jun-91	NA	NA	NA	NA	NA	NA	NA	NA
	4	Jan-92	< 5	< 5	< 5	< 5	< 5	< 5	7.54	3750
	5	Jun-92	< 1	< 1	< 1	< 1	< 1	< 1	7.62	1,600
	6	Aug-92	< 1	< 1	< 1	< 1	< 1	< 1	6.97	1,310
	7	Dec-92	< 1	< 1	< 1	< 1	< 1	< 1	7.87	1,340
	8	Mar-93	2.1	< 1	< 1	< 1	< 1	< 1	7.10	6,740
	9	May-93	< 1	< 1	< 1	< 1	< 1	< 1	7.86	1,430
	10	Nov-93	< 1	< 1	< 1	< 1	< 1	< 1	7.69	1,230
	11	May-94	< 1	< 1	< 1	< 1	< 1	< 1	7.38	1,292
	12	Oct-94	< 1	< 1	< 1	< 1	< 1	< 1	7.57	1,308
	13	May-95	< 1	< 1	< 1	< 1	< 1	< 1	7.65	1,434
	14	Oct-95	< 1	< 1	< 1	< 1	< 1	< 1	7.35	1,525
	15	May-96	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	7.60	1,430
MW-21	1	Sep-90	**67**	< 0.5	1.5	1.1	5.0	7.6	7.01	1,500
	2	Mar-91	**44**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	7.62	1,700
	3	Jun-91	**40**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	7.44	1700
	4	Jan-92	8.8	< 5	< 5	< 5	< 5	< 5	8.31	5110
	5	Jun-92	**21.9**	< 1	< 1	< 1	< 1	< 1	7.37	2,400
	6	Aug-92	8.3	< 1	< 1	< 1	< 1	< 1	6.96	1,730
	7	Dec-92	1.7	< 1	< 1	< 1	< 1	< 1	7.69	2,030
	8	Mar-93	5.9	< 1	< 1	< 1	< 1	< 1	7.58	1,590
	9	May-93	**14.8**	< 1	< 1	< 1	< 1	< 1	7.63	2,530
	10	Nov-93	3.7	< 1	< 1	< 1	< 1	< 1	7.58	1,580
	11	May-94	8.3	< 1	< 1	< 1	< 1	< 1	7.66	1,592
	12	Oct-94	5.5	< 1	< 1	< 1	< 1	< 1	7.55	1,760
	13	May-95	< 1	< 1	< 1	< 1	< 1	< 1	7.59	1,819
	13	May-95 dup	5.4	< 1	< 1	< 1	< 1	< 1	7.59	1,819
	14	Oct-95	2.1	< 1	< 1	< 1	< 1	< 1	7.52	2,060
	15	May-96	1.0	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	7.50	1,853
Off-Site										
MW-9	1	Sep-90	2.1	< 0.5	< 0.5	< 0.5	< 1	< 1	6.97	1,550
	2	Mar-91	1.8	< 0.5	< 0.5	< 0.5	1.2	1.2	7.57	2,000
	3	Jun-91	NA	NA	NA	NA	NA	NA	NA	NA
	4	Jan-92	< 5	< 5	< 5	< 5	< 5	< 5	7.31	4360
	5	Jun-92	1.5	< 1	< 1	< 1	< 1	< 1	7.58	1,680
	6	Aug-92	< 1	< 1	< 1	< 1	< 1	< 1	7.81	1,325
	7	Dec-92	< 1	< 1	< 1	< 1	< 1	< 1	7.33	1,827
	8	Mar-93	1.5	< 1	< 1	< 1	< 1	< 1	7.63	1,640
MW-9 (continued)	9	May-93	NA	NA	NA	NA	NA	NA	NA	NA
	10	Nov-93	< 1	< 1	< 1	< 1	< 1	< 1	7.62	1,460
	11	May-94	NS	NS	NS	NS	NS	NS	NS	NS
	12	Oct-94	1.2	< 1	< 1	< 1	< 1	< 1	7.80	1,610
	13	May-95	NS	NS	NS	NS	NS	NS	NS	NS
	14	Oct-95	< 1	< 1	< 1	< 1	< 1	< 1	7.38	1,523
	15	May-96	NS	NS	NS	NS	NS	NS	NS	NS
MW-13	1	Sep-90	< 1	< 0.5	1.5	< 0.5	< 1	1.5	7.02	2,950
	2	Mar-91	< 1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	7.84	3,250

TABLE 1

SUMMARY OF GROUNDWATER QUALITY MONITORING RESULTS
(SINCE INSTALLATION OF SLURRY WALL)

Former Maverik Refinery, Kirtland, NM

Location	Sampling Period		DCA ug/L	B ug/L	T ug/L	E ug/L	X ug/L	BTEX ug/L	pH	SC umhos/cm
	3	Jun-91	NA	NA	NA	NA	NA	NA	NA	NA
	4	Jan-92	NA	NA	NA	NA	NA	NA	NA	NA
	5	Jun-92	< 1	< 1	< 1	< 1	< 1	< 1	7.11	4,260
	6	Aug-92	< 1	< 1	< 1	< 1	< 1	< 1	7.06	2,910
	7	Dec-92	NA	NA	NA	NA	NA	NA	NA	NA
	8	Mar-93	< 1	< 1	< 1	< 1	< 1	< 1	7.58	3,410
	9	May-93	NA	NA	NA	NA	NA	NA	NA	NA
	10	Nov-93	< 1	< 1	< 1	< 1	< 1	< 1	7.58	4,150
	11	May-94	NS	NS	NS	NS	NS	NS	NS	NS
	12	Oct-94	< 1	< 1	< 1	< 1	< 1	< 1	7.55	3,160
	13	May-95	NS	NS	NS	NS	NS	NS	NS	NS
	14	Oct-95	< 1	< 1	< 1	< 1	< 1	< 1	7.52	3,600
	15	May-96	NS	NS	NS	NS	NS	NS	NS	NS
MW-14	1	Sep-90	2.0	< 0.5	1.5	< 0.5	< 1	1.5	6.97	5,450
	2	Mar-91	< 1	< 0.5	< 0.5	< 0.5	1.7	1.7	7.51	8,400
	3	Jun-91	NA	NA	NA	NA	NA	NA	NA	NA
	4	Jan-92	< 5	< 5	< 5	< 5	< 5	< 5	7.20	19380
	5	Jun-92	2.3	< 1	< 1	< 1	< 1	< 1	7.62	4,520
	6	Aug-92	< 1	< 1	< 1	< 1	< 1	< 1	7.38	5,760
	7	Dec-92	< 1	< 1	< 1	< 1	< 1	< 1	7.40	9090
	8	Mar-93	< 1	< 1	< 1	< 1	< 1	< 1	7.02	15,280
	9	May-93	NA	NA	NA	NA	NA	NA	NA	NA
	10	Nov-93	1.2	< 1	< 1	< 1	< 1	< 1	7.61	6,030
	11	May-94	NS	NS	NS	NS	NS	NS	NS	NS
	12	Oct-94	1.9	< 1	< 1	< 1	< 1	< 1	7.34	4,560
	13	May-95	NS	NS	NS	NS	NS	NS	NS	NS
	14	Oct-95	< 1	< 1	< 1	< 1	< 1	< 1	7.15	6,760
	15	May-96	NS	NS	NS	NS	NS	NS	NS	NS
MW-15	1	Sep-90	< 1	< 0.5	< 0.5	< 0.5	< 1	< 1	7.00	3,250
	2	Mar-91	< 1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	7.02	8,500
	3	Jun-91	NA	NA	NA	NA	NA	NA	NA	NA
	4	Jan-92	< 5	< 5	< 5	< 5	< 5	< 5	7.15	12120
	5	Jun-92	< 1	< 1	< 1	< 1	< 1	< 1	7.27	3,430
	6	Aug-92	< 1	< 1	< 1	< 1	< 1	< 1	7.39	2,450
	7	Dec-92	NA	NA	NA	NA	NA	NA	NA	NA
	8	Mar-93	< 1	< 1	< 1	< 1	< 1	< 1	7.42	9,810
	9	May-93	NA	NA	NA	NA	NA	NA	NA	NA
	10	Nov-93	< 1	< 1	< 1	< 1	< 1	< 1	8.01	1,630
	11	May-94	NS	NS	NS	NS	NS	NS	NS	NS
	12	Oct-94	< 1	< 1	< 1	< 1	< 1	< 1	7.54	2,500
	13	May-95	NS	NS	NS	NS	NS	NS	NS	NS
	14	Oct-95	< 1	< 1	< 1	< 1	< 1	< 1	7.48	2,260
MW-15	15	May-96	NS	NS	NS	NS	NS	NS	NS	NS
MW-16	1	Sep-90	< 1	< 0.5	< 0.5	< 0.5	< 1	< 1	6.97	1,370
	2	Mar-91	< 1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	7.57	1,200
	3	Jun-91	NA	NA	NA	NA	NA	NA	NA	NA
	4	Jan-92	< 5	< 5	< 5	< 5	< 5	< 5	7.30	2050
	5	Jun-92	< 1	< 1	< 1	< 1	< 1	< 1	7.50	1,430
	6	Aug-92	< 1	< 1	< 1	< 1	< 1	< 1	7.76	1,230
	7	Dec-92	< 1	< 1	< 1	< 1	< 1	< 1	7.12	1,735
	8	Mar-93	< 1	< 1	< 1	< 1	< 1	< 1	7.23	2,400
	9	May-93	NA	NA	NA	NA	NA	NA	NA	NA
	10	Nov-93	< 1	< 1	< 1	< 1	< 1	< 1	7.31	1,760
	11	May-94	NS	NS	NS	NS	NS	NS	NS	NS
	12	Oct-94	< 1	< 1	< 1	< 1	< 1	< 1	7.44	1,253

TABLE 1

SUMMARY OF GROUNDWATER QUALITY MONITORING RESULTS (SINCE INSTALLATION OF SLURRY WALL)

Former Maverik Refinery, Kirtland, NM

Location	Sampling Period		DCA ug/L	B ug/L	T ug/L	E ug/L	X ug/L	BTEX ug/L	pH	SC umhos/cm
	13	May-95	NS	NS	NS	NS	NS	NS	NS	NS
	14	Oct-95	< 1	< 1	< 1	< 1	< 1	< 1	7.26	1,421
	15	May-96	NS	NS	NS	NS	NS	NS	NS	NS
Water Quality Standards										
New Mexico			10	10	750	750	620		6 - 9	---
EPA MCL			5	5	1,000	700	10,000		---	---

NOTES:

Abbreviations:

DCA = 1,2-dichloroethane
B = Benzene
T = Toluene
E = Ethylbenzene
X = Xylenes
SC = Specific Conductivity
TDS = Total Dissolved Solids
MSG = Well Missing - could not be located
NA = Not Analyzed
NS = Not Sampled

Sampling Dates:

1 Sept. 13 & 14, 1990
2 March 18 & 19, 1991
3 June 13, 1991
4 January 20 & 21, 1992
5 June 9 & 12, 1992
6 August 19 & 20, 1992
7 December 16, 1992
8 March 30, 1993
9 May 23, 1993
10 November 29 & 30, 1993
11 May 25, 1994
12 October 2 & 3, 1994
13 May 17, 1995
14 October 18 & 19, 1995
15 May 1 and 2, 1996

From sampling period 5 onward, samples were obtained from replacement wells MW-17 and MW-18.

Values in bold exceed New Mexico MCL for drinking water.

** = Laboratory exceeded holding time before completing sample analysis.

American Environmental Network, Inc.

AEN I.D. **605308**

May 8, 1996

Tritechnics
1726 Cole Blvd, Bldg 22
Suite 150
Golden, CO 80401

Project Name/Number: KIRTLAND REFINERY MAVKL02896

Attention: Bill Hendrix

On **05/03/96**, American Environmental Network (NM), Inc., (ADHS License No. AZ0015) received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

If you have any questions or comments, please do not hesitate to contact us at (505) 344-3777.

KDMcNeill

Kimberly D. McNeill
Project Manager

H Mitchell Rubenstein

H. Mitchell Rubenstein, Ph.D.
General Manager

MR:jt

Enclosure

2709-D Pan American Freeway, NE • Albuquerque, NM 87107 • (505) 344-3777 • Fax (602) 344-4413

American Environmental Network, Inc.

CLIENT	: TRITECHNICS	DATE RECEIVED	: 05/03/96
PROJECT #	: MAVKL02896		
PROJECT NAME	: KIRTLAND REFINERY	REPORT DATE	: 05/08/96

AEN ID: 605308

AEN #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	MW-18	AQUEOUS	05/01/96
02	MW-21	AQUEOUS	05/01/96
03	MW-20	AQUEOUS	05/01/96
04	P2-3	AQUEOUS	05/01/96
05	P2-2	AQUEOUS	05/01/96
06	MW-19	AQUEOUS	05/01/96
07	MW-10	AQUEOUS	05/01/96
08	MW-22	AQUEOUS	05/02/96
09	MW-71	AQUEOUS	05/02/96
10	MW-17	AQUEOUS	05/02/96
11	EQP BLANK	AQUEOUS	05/02/96
12	TRIP BLANK C	AQUEOUS	04/26/96

---TOTALS---

MATRIX	#SAMPLES
AQUEOUS	12

AEN STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

American Environmental Network, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 602)/EDC (EPA 601)
CLIENT : TRITECHNICS ATI I.D.: 605308
PROJECT # : MAVKL02896
PROJECT NAME : KIRTLAND REFINERY

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
01	MW-18	AQUEOUS	05/01/96	NA	05/03/96	1
02	MW-21	AQUEOUS	05/01/96	NA	05/04/96	1
03	MW-20	AQUEOUS	05/01/96	NA	05/04/96	1

PARAMETER	UNITS	01	02	03
BENZENE	**UG/L**	**48**	<0.5	<0.5
1,2-DICHLOROETHANE (EDC)	**UG/L**	<0.5	**1.0**	<0.5
ETHYLBENZENE	**UG/L**	**3.4**	<0.5	<0.5
TOLUENE	**UG/L**	**0.5**	<0.5	<0.5
TOTAL XYLENES	**UG/L**	**150**	<0.5	<0.5
SURROGATES:				
BROMOCHLOROMETHANE (%)		86	85	84
TRIFLUOROTOLUENE (%)		95	94	97

American Environmental Network, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 602)/EDC (EPA 601)
CLIENT : TRITECHNICS ATI I.D.: 605308
PROJECT # : MAVKL02896
PROJECT NAME : KIRTLAND REFINERY

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
04	P2-3	AQUEOUS	05/01/96	NA	05/04/96	1
05	P2-2	AQUEOUS	05/01/96	NA	05/04/96	1
06	MW-19	AQUEOUS	05/01/96	NA	05/04/96	1

PARAMETER	UNITS	04	05	06
BENZENE	UG/L	<0.5	<0.5	<0.5
1,2-DICHLOROETHANE (EDC)	**UG/L**	**3.4**	**0.8**	**8.6**
ETHYLBENZENE	UG/L	<0.5	<0.5	<0.5
TOLUENE	UG/L	<0.5	<0.5	<0.5
TOTAL XYLENES	UG/L	<0.5	<0.5	<0.5
SURROGATES:				
BROMOCHLOROMETHANE (%)		92	88	90
TRIFLUOROTOLUENE (%)		97	93	89

American Environmental Network, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 602)/EDC (EPA 601)
CLIENT : TRITECHNICS ATI I.D.: 605308
PROJECT # : MAVKL02896
PROJECT NAME : KIRTLAND REFINERY

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
07	MW-10	AQUEOUS	05/01/96	NA	05/04/96	1
08	MW-22	AQUEOUS	05/02/96	NA	05/06/96	100
09	MW-71	AQUEOUS	05/02/96	NA	05/06/96	100

PARAMETER	UNITS	07	08	09
BENZENE	**UG/L**	<0.5	**4600**	**7300**
1,2-DICHLOROETHANE (EDC)	**UG/L**	**1.0**	**37 D(25)**	<5.0 D(10)
ETHYLBENZENE	**UG/L**	<0.5	**1300**	**490**
TOLUENE	**UG/L**	<0.5	**410**	**1200**
TOTAL XYLENES	**UG/L**	<0.5	**10000**	**1800**
SURROGATES:				
BROMOCHLOROMETHANE (%)		103	95	83
TRIFLUOROTOLUENE (%)		114	88	92

D(25)=DILUTED 25X, ANALYZED 05/04/96
D(10)=DILUTED 10X, ANALYZED 05/04/96

American Environmental Network, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX, MTBE (EPA 602)/EDB, EDC (EPA 601)
CLIENT : TRITECHNICS ATI I.D.: 605308
PROJECT # : MAVKL02896
PROJECT NAME : KIRTLAND REFINERY

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
10	MW-17	AQUEOUS	05/02/96	NA	05/08/96	100
11	EQP BLANK	AQUEOUS	05/02/96	NA	05/06/96	1
12	TRIP BLANK C	AQUEOUS	04/26/96	NA	05/06/96	1

PARAMETER	UNITS	10	11	12
BENZENE	**UG/L**	**7700**	<0.5	<0.5
1,2-DICHLOROETHANE (EDC)	**UG/L**	**2.2 D(1)**	<0.5	<0.5
ETHYLBENZENE	**UG/L**	**530**	<0.5	<0.5
TOLUENE	**UG/L**	**1200**	<0.5	<0.5
TOTAL XYLENES	**UG/L**	**1800**	<0.5	<0.5
SURROGATES:				
BROMOCHLOROMETHANE (%)		82	87	82
TRIFLUOROTOLUENE (%)		98	92	93

D(1)=DILUTED 1X, ANALYZED 05/07/96

American Environmental Network, Inc.

GAS CHROMATOGRAPHY RESULTS - QUALITY CONTROL

REAGENT BLANK
PURGEABLE HALOCARBONS/AROMATICS

TEST : BTEX (EPA 602)/EDC (EPA 601)

		ATI I.D.	: 605308
BLANK I.D.	: 050396	MATRIX	: AQUEOUS
CLIENT	: TRITECHNICS	DATE EXTRACTED	: NA
PROJECT #	: MAVKL02896	DATE ANALYZED	: 05/03/96
PROJECT NAME	: KIRTLAND REFINERY	DIL. FACTOR	: 1

PARAMETER	UNITS	
BENZENE	UG/L	<0.5
1,2-DICHLOROETHANE (EDC)	UG/L	<0.5
ETHYLBENZENE	UG/L	<0.5
TOLUENE	UG/L	<0.5
TOTAL XYLENES	UG/L	<0.5
SURROGATES:		
BROMOCHLOROMETHANE (%)		87
TRIFLUOROTOLUENE (%)		96

American Environmental Network, Inc.

GAS CHROMATOGRAPHY RESULTS - QUALITY CONTROL

REAGENT BLANK
PURGEABLE HALOCARBONS/AROMATICS

TEST	: BTEX (EPA 602)/EDC (EPA 601)		
		ATI I.D.	: 605308
BLANK I.D.	: 050696	MATRIX	: AQUEOUS
CLIENT	: TRITECHNICS	DATE EXTRACTED	: NA
PROJECT #	: MAVKL02896	DATE ANALYZED	: 05/06/96
PROJECT NAME	: KIRTLAND REFINERY	DIL. FACTOR	: 1

PARAMETER	UNITS	
BENZENE	UG/L	<0.5
1,2-DICHLOROETHANE (EDC)	UG/L	<0.5
ETHYLBENZENE	UG/L	<0.5
TOLUENE	UG/L	<0.5
TOTAL XYLENES	UG/L	<0.5
SURROGATES:		
BROMOCHLOROMETHANE (%)		91
TRIFLUOROTOLUENE (%)		91

American Environmental Network, Inc.

GAS CHROMATOGRAPHY RESULTS - QUALITY CONTROL

REAGENT BLANK
PURGEABLE HALOCARBONS/AROMATICS

TEST : BTEX (EPA 602)/EDC (EPA 601)

		ATI I.D.	: 605308
BLANK I.D.	: 050796	MATRIX	: AQUEOUS
CLIENT	: TRITECHNICS	DATE EXTRACTED	: NA
PROJECT #	: MAVKL02896	DATE ANALYZED	: 05/07/96
PROJECT NAME	: KIRTLAND REFINERY	DIL. FACTOR	: 1

PARAMETER	UNITS	
BENZENE	UG/L	<0.5
1,2-DICHLOROETHANE (EDC)	UG/L	<0.5
ETHYLBENZENE	UG/L	<0.5
TOLUENE	UG/L	<0.5
TOTAL XYLENES	UG/L	<0.5
SURROGATES:		
BROMOCHLOROMETHANE (%)		87
TRIFLUOROTOLUENE (%)		95

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

TEST : BTEX (EPA 602)/EDC (EPA 601)

MSMSD #	: 60530803	ATI I.D.	: 605308
CLIENT	: TRITECHNICS	DATE EXTRACTED	: NA
PROJECT #	: MAVKL02896	DATE ANALYZED	: 05/03/96
PROJECT NAME	: KIRTLAND REFINERY	SAMPLE MATRIX	: AQUEOUS
REF. I.D.	: 60530803	UNITS	: UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD
BENZENE	<0.5	10.0	12.1	121	10.7	107	12
1,2-DICHLOROETHANE (EDC)	<0.5	10.0	12.2	122	10.6	106	14
ETHYLBENZENE	<0.5	10.0	12.3	123	11.4	114	8
TOLUENE	<0.5	10.0	12.0	120	10.7	107	11
TOTAL XYLENES	<0.5	30.0	36.1	120	33.6	112	7

$$\% \text{ Recovery} = \frac{\text{(Spike Sample Result - Sample Result)}}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{\text{(Sample Result - Duplicate Result)}}{\text{Average Result}} \times 100$$

American Environmental Network, Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

TEST : BTEX (EPA 602)/EDC (EPA 601)

MSMSD #	: 60530807	ATI I.D.	: 605308
CLIENT	: TRITECHNICS	DATE EXTRACTED	: NA
PROJECT #	: MAVKL02896	DATE ANALYZED	: 05/07/96
PROJECT NAME	: KIRTLAND REFINERY	SAMPLE MATRIX	: AQUEOUS
REF. I.D.	: 60530807	UNITS	: UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD
BENZENE	<0.5	10.0	10.9	109	9.4	94	15
1,2-DICHLOROETHANE (EDC)	1.0	10.0	12.2	112	10.4	94	16
ETHYLBENZENE	<0.5	10.0	11.4	114	9.4	94	19
TOLUENE	<0.5	10.0	11.2	112	9.2	92	20
TOTAL XYLENES	<0.5	30.0	33.3	111	27.2	91	20

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

American Environmental Network (NM), Inc.
Albuquerque • Phoenix • Pensacola • Portland • Pleasant Hills • Columbia

CHAIN OF CUSTODY

DATE: 5/2/96 PAGE: 1 OF 2

AEN LAB I.D. 605308

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: Bill Hendrix

COMPANY: Tribechnics
ADDRESS: 1726 Cole Blvd Bldg 22 Ste 150
Golden, CO 80401
PHONE: (303) 271-2100
FAX: (303) 277-0110
BILL TO: Maverik Country Stores
COMPANY:
ADDRESS:

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct/Inject	(M8015) Gas/Purge & Trap	Gasoline/BTEX & MTBE (M8015/8020)	BTXE/MTBE (8020)	BTEX & Chlorinated Aromatics (602/8020)	BTEX/MTBE/EDC & EDB (8020/8010/Short)	Chlorinated Hydrocarbons (601/8010)	504 EDB ☐ / DBCP ☐	Polynuclear Aromatics (610/8310)	Volatile Organics (624/8240) GC/MS	Volatile Organics (8260) GC/MS	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral/Acid Compounds GC/MS (625/8270)	General Chemistry:	Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	Metals:	NUMBER OF CONTAINERS
MW-18	5/1/96	1400	W	-01							✓															3
MW-21		1430		-02							✓															
MW-20		1515		-03							✓															
PZ-3		1545		-04							✓															
PZ-2		1645		-05							✓															
MW-19		1730		-06							✓															
MW-10		1815		-07							✓															
MW-22	5/2/96	1015		-08							✓															
MW-71		1030		-09							✓															
MW-17		1045		-10							✓															

PROJECT INFORMATION

PROJ. NO.: MAVKL02896
PROJ. NAME: Kirtland Refinery
P.O. NO.: MAVKL02896
SHIPPED VIA: Fed Ex

SAMPLE RECEIPT

NO. CONTAINERS: 30
CUSTODY SEALS: Y / N / NA (N)
RECEIVED INTACT: Y
BLUE ICE/ICE: 6

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐24hr ☐48hr ☐72hr ☐1 WEEK (NORMAL) ☑
CERTIFICATION REQUIRED: ☐NM ☐SDWA ☐OTHER
METHANOL PRESERVATION ☐
COMMENTS: FIXED FEE ☐
Analysis reqd: BTEX & DCA

RELINQUISHED BY: 1.
Signature: [signature] Time: 1200
Printed Name: John Gardner Date: 5/2/96
Company: Tribechnics

RELINQUISHED BY: 2.
Signature: Time:
Printed Name: Date:
Company:

RECEIVED BY: 1.
Signature: Time:
Printed Name: Date:
Company:

RECEIVED BY: (LAB) 2.
Signature: [signature] Time: 1000
Printed Name: John Caldwell Date: 5/3/96
American Environmental Network (NM), Inc.

American Environmental Network (NM), Inc.
Albuquerque • Phoenix • Pensacola • Portland • Pleasant Hills • Columbia

CHAIN OF CUSTODY

DATE: 5/2/96 PAGE: 2 OF 2

AEN LAB I.D. 605308

PLEASE FILL THIS FORM IN COMPLETELY.

SHADED AREAS ARE FOR LAB USE ONLY.

PROJECT MANAGER: Bill Hendrix

COMPANY: Tritechnics
ADDRESS: 1726 Cole Blvd Bldg 22 Ste 150
Golden, CO 80401
PHONE: (303) 271-2100
FAX: (303) 277-0110
BILL TO: Maverik Country Stores
COMPANY:
ADDRESS:

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct/Inject		(M8015) Gas/Purge & Trap	Gasoline/BTEX & MTBE (M8015/8020)	BTXE/MTBE (8020)	BTEX & Chlorinated Aromatics (602/8020)	BTEX/MTBE/EDC & EDB (8020/8010/Short)	Chlorinated Hydrocarbons (601/8010)		504 EDB ☐ / DBCP ☐	Polynuclear Aromatics (610/8310)	Volatile Organics (624/8240) GC/MS	Volatile Organics (8260) GC/MS		Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral/Acid Compounds GC/MS (625/8270)		General Chemistry:			Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	Metals:		NUMBER OF CONTAINERS
Eqp blank	5/2/96	1115	w	-11								✓																					3
Trip blank C	4/26		w	-12								✓																					1

PROJECT INFORMATION

PROJ. NO.: MavKL02896
PROJ. NAME: Kirtland Refinery
P.O. NO.: MavKL02896
SHIPPED VIA: Fed Ex

SAMPLE RECEIPT

NO. CONTAINERS	4
CUSTODY SEALS	Y/N/NA
RECEIVED INTACT	Y
BLUE ICE/ICE	0

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☑

CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

METHANOL PRESERVATION ☐

COMMENTS: FIXED FEE ☐

Analysis reqd: BTEX & DCA

RELINQUISHED BY: 1.
Signature: [signature] Time: 1200
Printed Name: John Garcher Date: 5/2/96
Company: Tritechnics

RELINQUISHED BY: 2.
Signature: Time:
Printed Name: Date:
Company:

RECEIVED BY: 1.
Signature: Time:
Printed Name: Date:
Company:

RECEIVED BY: (LAB) 2.
Signature: John Caldwell Time: 1000
Printed Name: JOHN CALDWELL Date: 5/3/96
American Environmental Network (NM), Inc.

TriTechnics
CORPORATION
Air, Water and Soil Management

First Commerce Center · Suite 2006
175 West 200 South Street
Salt Lake City, Utah 84101-1456
(801) 359-3059 · (801) 359-3307 Fax

March 29, 1996

RECEIVED
APR 01 1996
Environmental Bureau
Oil Conservation Division

Mr. William C. Olson, Hydrogeologist
State of New Mexico Oil Conservation Division
P. O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87504

RE: Groundwater Quality Monitoring Report, Maverik Refinery and Tank Farm Kirtland, New Mexico

Dear Bill:

On behalf of our client, Maverik Country Stores, Inc., we are transmitting the enclosed groundwater monitoring report describing activities performed during May and October, 1995, at the Maverik Refinery Tank Farm, Kirtland, New Mexico.

During 1996, Maverik anticipates performing the activities requested in your May 17, 1993 letter addressed to Maverik. These activities include semi-annual sampling of on-site wells, annual sampling of off-site wells, and nutrient addition to the area within the slurry wall to encourage biodegradation.

We will advise you in advance of these field activities. We anticipate that the first groundwater sampling event will occur in May or June.

Sincerely,

Dennis Riding
Project Engineer

cc: Paul Weissenborn, Maverik Country Stores

MAVKL027\RP\TXT\131OLS95.DOC

ECOVA

ECOVA CORPORATION
An Amoco Company

175 West 200 South, Suite 2006
Salt Lake City, Utah 84101
(801) 359-3059
FAX (801) 359-3307

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FEB 06 1995

Environmental Bureau
Oil Conservation Division

January 31, 1995

Mr. William C. Olson, Hydrogeologist
State of New Mexico Oil Conservation Division
P.O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87504

RE: Ground Water Quality Monitoring Report, Maverik Refinery and Tank Farm
Kirtland, New Mexico

Dear Bill:

On behalf of our client, Maverik Country Stores, Inc., we are transmitting a report describing the ground water monitoring activities conducted during May and October 1994, at the Maverik Refinery Tank Farm, Kirtland, New Mexico. The results of the May sampling were transmitted to you informally in a letter report dated June 21, 1994.

During 1995, Maverik anticipates performing those activities requested in your May 17, 1993 letter to Maverik consisting of semi-annual sampling of on-site wells, annual sampling of off-site wells, and nutrient addition to the area within the slurry wall confines to stimulate biodegradation.

We will advise you in advance of the conduct of these field activities. We anticipate that the first ground water sampling event and the nutrient addition activities will take place in May or June. Please note in the Annual Report that a February 15th reporting date has been proposed as a target for submittal of future Annual Reports.

Sincerely,

Ecova Corporation

Paul R. Weissenborn

Paul R. Weissenborn
Project Geologist

cc Denny Foust, New Mexico OCD
Dan Murray, Maverik Country Stores

9131.01\COR\131OLS94.LTR

ECOVA
Ecova Corporation
An Amoco Company

800 Jefferson County Parkway
Golden, Colorado 80401 U.S.A.
FAX (303) 279-9716
(303) 279-9712

December 21, 1994

Mr. William C. Olson, Hydrogeologist
State of New Mexico Oil Conservation Division
P. O. Box 2088
State Land Office Building
Santa Fe, NM 87504

RE: Annual Report-Maverik Refinery and Tank Farm, Kirtland, New Mexico

Dear Bill:

As discussed in our December 21, 1994, telephone conversation, the annual Groundwater Monitoring Report for the referenced site has been delayed due to scheduling conflicts. The report will be submitted to your office by January 31, 1995.

Thank you for your assistance. It was good talking with you again.

Sincerely yours,
Ecova Corporation

Paul R. Weissenborn

Paul R. Weissenborn
Project Geologist

cc: Mike Paules
Robert Krueger

9131.01\COR\RPT.LTR

100% Recycled paper
15% Post-consumer fiber

State of New Mexico
ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT
Santa Fe, New Mexico 87505

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

[X] Telephone [ ] Personal	Time 0840	Date 5/17/94

Originating Party	Other Parties
Paul Weissenborn - Geowest (801) 359-3059	Bill Olson - Envir. Bureau

Subject

Semi-annual Sampling at Caribou Refinery

Discussion

Sampling on May 24th - 25th for Semi-annual sampling

Conclusions or Agreements

I will inform Denny Foust of Aztec OCD

Distribution file

Signed Bill Olson

GEOWEST
Golden, Inc.

May 3, 1993

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MAY 0 4 1993

OIL CONSERVATION DIV.
SANTA FE

Mr. William C. Olsen
New Mexico Oil Conservation Division
P.O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87504

Dear Bill:

This is to transmit the results of the last three quarterly sampling events conducted at the Maverik Country Stores Kirtland Refinery and Tank Farm. These were conducted during August and December 1992 and March 1993.

As a result of these and earlier findings, in the report we have proposed for your consideration some modifications to the basic monitoring program. These consist of eliminating the off-site wells from water quality sampling and reducing the number of sampling events to two per year, one in May-June and the other in October-November. We would like to institute these changes May-June 1993 which would be the time of the next scheduled sampling whether you agree to the proposed reduced frequency of monitoring or not. If possible, we would appreciate your decision on this matter prior to this time.

Please call if you wish to discuss any of the findings or proposed modifications.

Sincerely,
GeoWest Golden Inc.

Peter F. Olsen
Senior Project Manager

cc: Dan Murray, Maverik Country Stores

First Commerce Center, Suite 2006 • 175 West 200 South • Salt Lake City, Utah 84111 • (801) 359-3059

TRANSMITTAL OF DOCUMENTS/DRAWINGS

From: Date: 5/3/93

GeoWest Denver ______________________

GeoWest SLC Pete Olsen

RECEIVED GeoWest Project No. 9131.01

MAY 04 1993

OIL CONSERVATION DIV.
SANTA FE

RE: Maverik Country Stores
Refinery and Tank Farm
Kirtland, New Mexico

Distribution	For comments	Information only	File
Dan Murray Maverik	____	1	____
William Olsen NM Oil Conservation	____	1	____
Pete Olsen GeoWest	____	1	____
Bill Highland GeoWest	____	1	____

DESCRIPTION: Report-Ground Water Quality Monitoring Results, Maverik Refinery Tank Farm, Kirtland, New Mexico, April 26, 1993.

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

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

October 21, 1992

Mr. Peter F. Olsen
GeoWest Golden, Inc.
First Commerce Center, Suite 2006
175 West 200 South
Salt Lake City, Utah 84111

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

Dear Mr. Olsen:

On June 16, 1992, the New Mexico Oil Conservation Division (OCD) split ground water samples from select Caribou/Maverik refinery monitor wells with GeoWest Golden, Inc. Samples were analyzed for aromatic and halogenated volatile organics using EPA method 8010/8020. Enclosed you will find copies of the analytical results for monitor wells MW-17 and MW-18.

If you have any questions, please contact me at (505) 827-5885.

Sincerely,

Will C. Olson

William C. Olson
Hydrogeologist
Environmental Bureau

Enclosures

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

GEOWEST
Golden, Inc.

OIL CONSERVATION DIVISION
RECEIVED
'92 JUL 20 AM 9 15

July 15, 1992

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

RE: 1992 2nd Quarter Sampling Results, Maverik Kirtland Refinery

Dear Bill:

This is to transmit the results of the 1992 second quarter sampling conducted at the Maverik Country Stores Kirtland Refinery from June 9-12, 1992. A formal interpretive report will be prepared following the third quarter sampling as previously suggested.

Enclosed are the laboratory report forms and four summary tables. The latter consist of (1) the ground water analytical results for the June sampling; (2) a summary of these results combined with previous results since the slurry wall was installed; (3) the analytical results of testing a soil sample taken from the boreholes in which the two replacement monitor wells were installed; and (4) the water level elevations recorded during the June sampling period.

Replacement wells were installed for the two missing wells (MW-17 and 18) with the same specifications and in approximately the same locations. In addition, four piezometers were installed inside the slurry wall, one being placed near each of the four corners.

Water quality sampling results, in general, were not unexpected. None of the target analytes were above New Mexico MCL's in any of the off-site wells. In the on-site wells

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DCA, exceeded the MCL in MW-19 and 21 as it has in the previous sampling events and at about the same concentrations. In replacement MW-18, located upgradient of the slurry wall, benzene exceeded the MCL and it, along with ethylbenzene and xylenes, were reported at higher concentrations than previously encountered; DCA was below detection limits in this well. The concentrations of target analytes in the two wells within the slurry wall confines were high and not unexpected with the exception that DCA was an order of magnitude lower than previously encountered in MW-17.

In the two borehole soil samples analyzed for BTEX, the concentrations of each of the individual BTEX components were low, virtually all less than 1 ppm. These samples were taken at 10.5 and at 15.5 feet below ground surface. These low BTEX concentrations are in agreement with previous samples in this area taken at these depths. Much higher concentrations were obtained in previous borehole soil samples taken at shallower depths.

Water levels typically decreased by about a foot since January except in upgradient MW-1 which rose nearly 2.5 feet. The water levels in this well are strongly influenced by the presence or absence of water in the Farmers Mutual irrigation ditch.

Based upon water level measurements in the new piezometers and monitor wells inside the slurry wall, a ground water gradient of about 0.006 ft/ft toward the southwest was indicated. Outside the slurry wall, a gradient is in the same direction but at about 0.01 ft/ft was measured. Further investigation of the cause and significance of the slurry wall ground water gradient will be performed.

I understand that Denny Foust obtained ground water samples from the two replacement wells for analysis by the State laboratory. I will be interested in receiving the results of this testing for comparative purposes when they are available.

Please call if you wish to discuss any of these findings.

Sincerely,
GeoWest Golden Inc.

Peter F. Olsen
Senior Project Manager

cc: Dan Murray, Maverik Country Stores

TABLE 1

RESULTS OF ANALYTICAL TESTING OF GROUND WATER AT MAVERIK KIRTLAND REFINERY, JUNE 1992

Location	DCA	B	T	E	X	pH	SC	Sulfate	Sulfide
Within Slurry Wall									
MW-17R	45.3	9,240	7,580	1,150	7,190	7.26	2,730	91	<1
MW-22	3,170	21,200	7,540	1,040	5,730	7.13	1,690	7	<1
On-Site									
MW-10	1.6	<1	<1	<1	<1	7.65	1,400	NA	NA
MW-18R	<1	313	1.1	200	1,710	7.07	1,480	NA	NA
MW-19	11.4	<1	<1	<1	<1	7.76	1,970	NA	NA
MW-20	<1	<1	<1	<1	<1	7.62	1,670	NA	NA
MW-21	21.9	<1	<1	<1	<1	7.37	2,400	NA	NA
Off-Site									
MW-9	1.5	<1	<1	<1	<1	7.58	1,680	NA	NA
MW-13	<1	<1	<1	<1	<1	7.11	4,260	NA	NA
MW-14	2.3	<1	<1	<1	<1	7.62	4,520	NA	NA
MW-15	<1	<1	<1	<1	<1	7.27	3,430	NA	NA
MW-16	<1	<1	<1	<1	<1	7.50	1,430	NA	NA

NOTES:

Samples taken June 9 & 12, 1992

Abbreviations: DCA = 1,2-dichloroethane; B = benzene; T = toluene; E = ethylbenzene; X = total xylenes; SC = specific conductance; NA = not analyzed

Organic values in μg/l; pH in standard units; SC in μmhos/cm; sulfate and sulfide in mg/l

TABLE 2

SUMMARY OF GROUND WATER QUALITY MONITORING RESULTS SINCE INSTALLATION OF SLURRY WALL

Location	Sampling Period	DCA	B	T	E	X	pH	SC	TDS	Sulfate	Chloride
Within Slurry Wall											
MW-17	1	360*	11,000*	15,000*	1,160*	13,000*	7.01	2,500	2,160*	27	401*
	2	400*	11,000*	10,000*	1,900*	15,000*	7.04	2,700	1,860*	12	344*
	3	420*	9,800*	6,300*	1,800*	16,000*	7.04	2,650	1,890*	<5	358*
	4	MSG	MSG	MSG	MSG	MSG	MSG	MSG	MSG	MSG	MSG
	5	45*	9,240*	7,580*	1,150*	7,190*	7.26	2,730	NA	91	NA
MW-22	1	7,200*	21,000*	20,000*	1,100*	8,300*	7.00	1,500	1,300*	18	216
	2	2,200*	17,000*	9,500*	910*	6,600*	6.87	1,900	1,220*	12	163
	3	3,600*	15,000*	3,200*	760*	3,000*	7.06	1,700	1,180*	59	135
	4	5,400*	36,000*	27,000*	1,900*	13,500*	6.86	1,600	948	<1	164
	5	3,170*	21,200*	7,540*	1,040*	5,730*	7.13	1,690	NA	7	NA
On-Site											
MW-10	1	1.4	<0.5	<0.5	<0.5	<1	6.95	1,550	952	436	39
	2	<1	<0.5	<0.5	<0.5	<0.5	7.29	1,700	1,620*	5	118
	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4	<5	<5	<5	<5	<5	7.31	1,840	942	422	37
	5	1.6	<1	<1	<1	<1	7.65	1,400	NA	NA	NA
MW-18	1	<1	17*	<12	84	880*	7.00	1,500	682	67	44
	2	<1	26*	<12	85	770*	7.24	1,200	758	163	41
	3	<1	<25	<25	78	930*	6.77	1,200	812	181	41
	4	MSG	MSG	MSG	MSG	MSG	MSG	MSG	MSG	MSG	MSG
	5	<1	313*	1.1	200	1,710*	7.07	1,480	NA	NA	NA
MW-19	1	45*	<0.5	<0.5	1.1	1.9	6.95	3,000	2,210*	292	620*
	2	35*	<0.5	<0.5	<0.5	<0.5	7.22	2,500	1,830*	354	494*
	3	44*	<0.5	<0.5	5.9	<0.5	7.10	2,400	1,750*	359	430*
	4	14*	<5	<5	<5	<5	7.66	460	1,220*	457	98
	5	11.4*	<1	<1	<1	<1	7.76	1,970	NA	NA	NA

TABLE 2 (continued)

SUMMARY OF GROUND WATER QUALITY MONITORING RESULTS SINCE INSTALLATION OF SLURRY WALL

Location	Sampling Period	DCA	B	T	E	X	pH	SC	TDS	Sulfate	Chloride
MW-20	1	<1	<0.5	<0.5	<0.5	<1	7.01	1,350	1,310*	650*	46
	2	2.0	<0.5	<0.5	<0.5	0.7	7.39	3,000	1,630*	735*	110
	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4	<5	<5	<5	<5	<5	7.54	3,750	952	427	32
	5	<1	<1	<1	<1	<1	7.62	1,600	NA	NA	NA
MW-21	1	67*	<0.5	1.5	1.1	5	7.01	1,500	917	386	78
	2	44*	<0.5	<0.5	<0.5	<0.5	7.62	1,700	1,130*	342	68
	3	40*	<0.5	<0.5	<0.5	<0.5	7.44	1,700	1,100*	309	61
	4	8.8	<5	<5	<5	<5	8.31	5,110	NA	NA	NA
	5	21.9*	<1	<1	<1	<1	7.37	2,400	NA	NA	NA
Off-Site											
MW-9	1	2.1	<0.5	<0.5	<0.5	<1	6.97	1,550	1,140*	551	35
	2	1.8	<0.5	<0.5	<0.5	1.2	7.57	2,000	1,280*	664*	43
	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4	<5	<5	<5	<5	<5	7.31	4,360	1,260*	638*	38
	5	1.5	<1	<1	<1	<1	7.58	1,680	NA	NA	NA
MW-13	1	<1	<0.5	1.5	<0.5	<1	7.02	2,950	3,040*	1,630*	140
	2	<1	<0.5	<0.5	<0.5	<0.5	7.84	3,250	2,900*	1,540*	122
	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5	<1	<1	<1	<1	<1	7.11	4,260	NA	NA	NA
MW-14	1	2.0	<0.5	<0.5	<0.5	<1	6.97	5,450	3,920*	2,080*	174
	2	<1	<0.5	<0.5	<0.5	1.7	7.51	8,400	8,370*	4,520*	440*
	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4	<5	<5	<5	<5	<5	7.20	19,380	12,800*	6,840*	691*
	5	2.3	<1	<1	<1	<1	7.62	4,520	NA	NA	NA

TABLE 2 (continued)

SUMMARY OF GROUND WATER QUALITY MONITORING RESULTS SINCE INSTALLATION OF SLURRY WALL

Location	Sampling Period	DCA	B	T	E	X	pH	SC	TDS	Sulfate	Chloride
MW-15	1	<1	<0.5	<0.5	<0.5	<1	7.00	3,250	2,540*	1,380*	163
	2	<1	<0.5	<0.5	<0.5	<0.5	7.02	8,500	8,580*	3,890*	934*
	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4	<5	<5	<5	<5	<5	7.15	12,120	7,780*	3,970*	920*
	5	<1	<1	<1	<1	<1	7.27	3,430	NA	NA	NA
MW-16	1	<1	<0.5	<0.5	<0.5	<1	6.97	1,370	867	292	28
	2	<1	<0.5	<0.5	<0.5	<0.5	7.57	1,200	804	230	28
	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4	<5	<5	<5	<5	<5	7.30	2,050	1,101*	345	45
	5	<1	<1	<1	<1	<1	7.50	1,430	NA	NA	NA
Water Quality Stds.											
New Mexico		10	10	750	750	620	6-9	-----	1,000	600	250
EPA MCL		5	5	1,000	700	10,000	-----	-----	500	250	250

NOTES:
Abbreviations: DCA = 1,2-dichloroethane; B = benzene; T = toluene; E = ethylbenzene; X = xylenes; SC = specific conductivity; TDS = total dissolved solids; MSG = well missing; NA = not analyzed
Organic values in µg/l; plt in standard units; SC in µmhos/cm; TDS, sulfate and chloride in mg/l
Sampling dates: 1 = Sept. 13 & 14, 1990; 2 = March 18 & 19, 1991; 3 = June 13, 1991; 4 = January 20 & 21, 1992; 5 = June 9 & 12, 1992
* = exceeds New Mexico MCL for drinking water
During period 5, samples were obtained from replacement wells at MW-17 and MW-18

TABLE 4

WATER LEVEL ELEVATIONS
JUNE 1992

Location	Datum (ft, msl)	Water Level (ft, msl)	Change in Water Level Since 1/92 (ft)	Depth to Water Below Ground Surface (ft)
MW-1	5207.24	5197.38	2.49	8.4
MW-2	5196.93	5190.88	-0.61	4.4
MW-9	5191.22	5187.25	-3.97	2.3
MW-10	5189.30	5184.74	-1.13	2.7
MW-13	5187.76	5184.74	----	2.8
MW-14	5194.47	5186.60	-1.98	4.1
MW-15	5188.80	5183.19	-1.45	2.2
MW-16	5194.98	5188.47	-1.08	4.5
MW-17	5195.91	5190.84	----	3.7
MW-18	5201.75	5186.37	----	7.1
MW-19	5189.54	5186.57	-0.96	2.0
MW-20	5191.05	5189.32	-4.48	3.5
MW-21	5194.81	5189.28	-1.49	4.3
MW-22	5195.86	5190.36	-0.79	5.3
P-1	5197.66	5190.36	----	5.4
P-2	5192.32	5187.40	----	3.1
P-3	5193.21	5188.04	----	3.4
P-4	5198.82	5190.06	----	7.0

TABLE 3

RESULTS OF ANALYTICAL TESTING OF SOIL SAMPLES AT MAVERIK KIRTLAND REFINERY, JUNE 1992

Location	Sample Depth (ft below ground surface)	Benzene	Toluene	Ethylbenzene	Xylenes	Total BTEX	Moisture Percentage
MW-17R	10.5-11.0	0.090	0.377	0.080	0.673	1.220	23.8
MW-18R	15.5-16.0	<0.010	0.918	0.179	1.669	2.776	16.2

Notes:

Samples taken during installation of replacement monitor wells, June 10, 1992
Concentrations expressed in mg/kg (ppm) on a dry weight basis

Analytical Report

Mountain States Analytical
The Quality Solution

JUN 25 1992

CLIENT: Geowest Golden Inc. SLC
175 West 200 South # 2006
Salt Lake City, UT 84101-
Phone: 801-359-3059 801-359-3307 (FAX)
ATTN: Mr. Pete Olsen
Project: Maverick Kirtland Ref.

Date Samples Rec'd: 06/15/92
MSAI Group No.: 6384
Sample Matrix: Aqueous
Report Date: 06/24/92
P.O. Number: 9131.01

LAB NO.	SAMPLE DATE	SAMP TIME	SAMPLE DESCRIPTION	ANALYSES PERFORMED	RESULT
28018	06/09/92	1710	MW-9	BTEX, w/ww	See Attach ---
				Chromatograms/Etc.	See Attach
				Unheated P&T-DCA,8010	See Attach ---
28019	06/09/92	1520	MW-10	BTEX, w/ww	See Attach ---
				Chromatograms/Etc.	See Attach
				Unheated P&T-DCA,8010	See Attach ---
28020	06/09/92	1645	MW-13	BTEX, w/ww	See Attach ---
				Chromatograms/Etc.	See Attach
				Unheated P&T-DCA,8010	See Attach ---
28021	06/09/92	1730	MW-14	BTEX, w/ww	See Attach ---
				Chromatograms/Etc.	See Attach
				Unheated P&T-DCA,8010	See Attach ---
28022	06/09/92	1610	MW-15	BTEX, w/ww	See Attach ---
				Chromatograms/Etc.	See Attach
				Unheated P&T-DCA,8010	See Attach ---
28023	06/09/92	1750	MW-16	BTEX, w/ww	See Attach ---
				Chromatograms/Etc.	See Attach
				Unheated P&T-DCA,8010	See Attach ---
28024	06/09/92	1215	MW-21	BTEX, w/ww	See Attach ---
				Chromatograms/Etc.	See Attach
				Unheated P&T-DCA,8010	See Attach ---
28025	06/09/92	1540	MW-19	BTEX, w/ww	See Attach ---
				Chromatograms/Etc.	See Attach
				Unheated P&T-DCA,8010	See Attach ---
28026	06/09/92	1415	MW-20	BTEX, w/ww	See Attach ---
				Chromatograms/Etc.	See Attach
				Unheated P&T-DCA,8010	See Attach ---

Analytical Report

Mountain States Analytical

The Quality Solution

CLIENT:	Geowest Golden Inc. SLC 175 West 200 South # 2006 Salt Lake City, UT 84101-	Date Samples Rec'd:	06/15/92
		MSAI Group No.:	6386
		Sample Matrix:	Aqueous
Phone:	801-359-3059 801-359-3307 (FAX)	Report Date:	06/24/92
ATTN:	Mr. Pete Olsen	P.O. Number:	9131.01
Project:	Maverik Kirtland Ref.		

LAB NO.	SAMPLE DATE	SAMP TIME	SAMPLE DESCRIPTION	ANALYSES PERFORMED	RESULT
28030	06/12/92	1030	MW-17	BTEX, w/ww	See Attach ---
				Chromatograms/Etc.	See Attach
				Unheat P&T-DCA, 8010	See Attach ---
				Sulfate, Turbidimetric	91 mg/l
				Sulfide w/ww	<1 mg/l
28031	06/12/92	1200	MW-22	BTEX, w/ww	See Attach ---
				Chromatograms/Etc.	See Attach
				Unheat P&T-DCA, 8010	See Attach ---
				Sulfate, Turbidimetric	7 mg/l
				Sulfide w/ww	<1 mg/l

Respectfully submitted,

Douglas W Later

Douglas W. Later, Ph.D.
Laboratory Director

Glenn A. Sorensen

Glenn A. Sorensen, B.S.
Manager, Technical Operations

Analytical Report

Mountain States Analytical

The Quality Solution

CLIENT:	Geowest Golden Inc. SLC 175 West 200 South # 2006 Salt Lake City, UT 84101-	Date Samples Rec'd:	06/15/92
Phone:	801-359-3059 801-359-3307 (FAX)	MSAI Group No.:	6389
ATTN:	Mr. Pete Olsen	Sample Matrix:	Aqueous
Project:	Maverik Kirtland Ref.	Report Date:	06/24/92
		P.O. Number:	9131.01

LAB SAMPLE NO.	DATE	SAMP TIME	SAMPLE DESCRIPTION	ANALYSES PERFORMED	RESULT
28034	06/12/92	1015	MW-18	BTEX, w/ww	See Attach ---
				Chromatograms/Etc.	See Attach ---
				Unheat P&T-DCA	See Attach ---

Respectfully submitted,

Douglas W. Later

Douglas W. Later, Ph.D.
Laboratory Director

Glenn A. Sorensen, B.S.
Manager, Technical Operations

Analytical Report

Mountain States Analytical

The Quality Solution

CLIENT:	Geowest Golden Inc. SLC 175 West 200 South # 2006 Salt Lake City, UT 84101-	Date Samples Rec'd:	06/15/92
Phone:	801-359-3059 801-359-3307 (FAX)	MSAI Group No.:	6384
ATTN:	Mr. Pete Olsen	Sample Matrix:	Aqueous
Project:	Maverick Kirtland Ref.	Report Date:	06/24/92
		P.O. Number:	9131.01

LAB SAMPLE NO.	SAMPLE DATE	SAMP TIME	SAMPLE DESCRIPTION	ANALYSES PERFORMED	RESULT
28027	06/09/92	1100	MW-24	BTEX, w/ww	See Attach ---
				Chromatograms/Etc.	See Attach
				Unheated P&T-DCA,8010	See Attach ---

Respectfully submitted,

Douglas W. Later

Douglas W. Later, Ph.D.
Laboratory Director

Glenn A. Sorensen

Glenn A. Sorensen, B.S.
Manager, Technical Operations

Analytical Report

Mountain States Analytical

The Quality Solution

CLIENT: Geowest Golden Inc. SLC
175 West 200 South # 2006
Salt Lake City, UT 84101-
Phone: 801-359-3059 801-359-3307 (FAX)
ATTN: Mr. Pete Olsen
Project: Maveric Kirtland Ref.

Date Samples Rec'd: 06/15/92
MSAI Group No.: 6385
Sample Matrix: Non-Aqueous/Solid
Report Date: 06/25/92
P.O. Number: 9131.01

LAB NO.	SAMPLE DATE	SAMP TIME	SAMPLE DESCRIPTION	ANALYSES PERFORMED	RESULT
28028	06/12/92	1030	MW-17 Soil	BTEX, sw	See Attach ---
				Chromatograms/Etc.	See Attach
				Homogenization-Vol. GC	Complete ---
				Moisture	23.8 %
28029	06/12/92	1015	MW-18 Soil	BTEX, sw	See Attach ---
				Chromatograms/Etc.	See Attach
				Homogenization-Vol. GC	Complete ---
				Moisture	16.2 %

Respectfully submitted,

Douglas W. Later

Douglas W. Later, Ph.D.
Laboratory Director

Glenn A. Sorensen

Glenn A. Sorensen, B.S.
Manager, Technical Operations

Analytical Report

Mountain States Analytical

The Quality Solution

CLIENT: Geowest Golden Inc. SLC
175 West 200 South # 2006
Salt Lake City, UT 84101-
Phone: 801-359-3059 801-359-3307 (FAX)
ATTN: Mr. Pete Olsen
Project: Maverik Kirtland Ref.

Date Samples Rec'd: 06/15/92
MSAI Group No.: 6388
Sample Matrix: Aqueous
Report Date: 06/24/92
P.O. Number: 9131.01

LAB NO.	SAMPLE DATE	SAMP TIME	SAMPLE DESCRIPTION	ANALYSES PERFORMED	RESULT
28033	06/09/92	1530	TRIP BLANK	BTEX, w/ww	See Attach ---
				Chromatograms/Etc.	See Attach ---
				Unheat P&T-DCA	See Attach ---

Respectfully submitted,

Douglas W. Later

Douglas W. Later, Ph.D.
Laboratory Director

Glenn A. Sorensen, B.S.
Manager, Technical Operations

Analytical Report

Mountain States Analytical

The Quality Solution

CLIENT: Geowest Golden Inc. SLC
175 West 200 South # 2006
Salt Lake City, UT 84101-

ATTN: Mr. Pete Olsen

SAMPLE ID: MW-9

LAB NO: 28018
GROUP NO: 6384
DATE SAMPLED: 06/09/92
TIME SAMPLED: 1710
DATE RECEIVED: 06/15/92
DATE REPORTED: 06/24/92
DISPOSAL DATE: 07/24/92

ANALYSIS: Gasoline Contamination in Water (BTEX) [EPA 602]
Unheated P&T-DCA [EPA 8010]

COMPOUND(s)		RESULT	LIMIT OF QUANTITATION
Benzene	<	1.0 ug/l	1.0 ug/l
Toluene	<	1.0 ug/l	1.0 ug/l
Ethylbenzene	<	1.0 ug/l	1.0 ug/l
m,p-Xylene	<	1.0 ug/l	1.0 ug/l
o-Xylene/Styrene*	<	1.0 ug/l	1.0 ug/l
1,2-Dichloroethane		1.5 ug/l	1.0 ug/l

Date Analyzed: 06/19/92

*These compounds coelute under the conditions used. The result represents the total amount for these compounds.

Respectfully submitted,

Kenneth A. Roberts

Kenneth A. Roberts, B.S.
Manager, Organics Department

Mountain States Analytical

The Quality Solution

CLIENT: Geowest Golden Inc. SLC
175 West 200 South # 2006
Salt Lake City, UT 84101-

ATTN: Mr. Pete Olsen

SAMPLE ID: MW-10

LAB NO: 28019
GROUP NO: 6384
DATE SAMPLED: 06/09/92
TIME SAMPLED: 1520
DATE RECEIVED: 06/15/92
DATE REPORTED: 06/24/92
DISPOSAL DATE: 07/24/92

ANALYSIS: Gasoline Contamination in Water (BTEX) [EPA 602]
Unheated P&T-DCA [EPA 8010]

COMPOUND(s)		RESULT	LIMIT OF QUANTITATION
Benzene	<	1.0 ug/l	1.0 ug/l
Toluene	<	1.0 ug/l	1.0 ug/l
Ethylbenzene	<	1.0 ug/l	1.0 ug/l
m,p-Xylene	<	1.0 ug/l	1.0 ug/l
o-Xylene/Styrene*	<	1.0 ug/l	1.0 ug/l
1,2-Dichloroethane		1.6 ug/l	1.0 ug/l

Date Analyzed: 06/20/92

*These compounds coelute under the conditions used. The result represents the total amount for these compounds.

Respectfully submitted,

Kenneth A. Roberts

Kenneth A. Roberts, B.S.
Manager, Organics Department

1645 West 2200 South, Salt Lake City, Utah 84119 (801) 973-0050 FAX (801) 972-6278

Member: American Council of Independent Laboratories, Inc.

Analytical Report

Mountain States Analytical

The Quality Solution

CLIENT:	Geowest Golden Inc. SLC 175 West 200 South # 2006 Salt Lake City, UT 84101-	LAB NO:	28020
		GROUP NO:	6384
		DATE SAMPLED:	06/09/92
		TIME SAMPLED:	1645
ATTN:	Mr. Pete Olsen	DATE RECEIVED:	06/15/92
		DATE REPORTED:	06/24/92
SAMPLE ID:	MW-13	DISPOSAL DATE:	07/24/92

ANALYSIS: Gasoline Contamination in Water (BTEX) [EPA 602]
Unheated P&T-DCA [EPA 8010]

COMPOUND(s)	RESULT	LIMIT OF QUANTITATION
Benzene	< 1.0 ug/l	1.0 ug/l
Toluene	< 1.0 ug/l	1.0 ug/l
Ethylbenzene	< 1.0 ug/l	1.0 ug/l
m,p-Xylene	< 1.0 ug/l	1.0 ug/l
o-Xylene/Styrene*	< 1.0 ug/l	1.0 ug/l
1,2-Dichloroethane	< 1.0 ug/l	1.0 ug/l

Date Analyzed: 06/22/92

*These compounds coelute under the conditions used. The result represents the total amount for these compounds.

Respectfully submitted,

Kenneth A. Roberts

Kenneth A. Roberts, B.S.
Manager, Organics Department

Analytical Report

Mountain States Analytical

The Quality Solution

CLIENT:	Geowest Golden Inc. SLC 175 West 200 South # 2006 Salt Lake City, UT 84101-	LAB NO:	28021
		GROUP NO:	6384
		DATE SAMPLED:	06/09/92
		TIME SAMPLED:	1730
ATTN:	Mr. Pete Olsen	DATE RECEIVED:	06/15/92
		DATE REPORTED:	06/24/92
SAMPLE ID:	MW-14	DISPOSAL DATE:	07/24/92

ANALYSIS: Gasoline Contamination in Water (BTEX) [EPA 602]
Unheated P&T-DCA [EPA 8010]

COMPOUND(s)		RESULT	LIMIT OF QUANTITATION
Benzene	<	1.0 ug/l	1.0 ug/l
Toluene	<	1.0 ug/l	1.0 ug/l
Ethylbenzene	<	1.0 ug/l	1.0 ug/l
m,p-Xylene	<	1.0 ug/l	1.0 ug/l
o-Xylene/Styrene*	<	1.0 ug/l	1.0 ug/l
1,2-Dichloroethane		2.3 ug/l	1.0 ug/l

Date Analyzed: 06/22/92

*These compounds coelute under the conditions used. The result represents the total amount for these compounds.

Respectfully submitted,

Kenneth A. Roberts

Kenneth A. Roberts, B.S.
Manager, Organics Department

Analytical Report

Mountain States Analytical

The Quality Solution

CLIENT: Geowest Golden Inc. SLC
175 West 200 South # 2006
Salt Lake City, UT 84101-

ATTN: Mr. Pete Olsen

SAMPLE ID: MW-15

LAB NO: 28022
GROUP NO: 6384
DATE SAMPLED: 06/09/92
TIME SAMPLED: 1610
DATE RECEIVED: 06/15/92
DATE REPORTED: 06/24/92
DISPOSAL DATE: 07/24/92

ANALYSIS: Gasoline Contamination in Water (BTEX) [EPA 602]
Unheated P&T-DCA [EPA 8010]

COMPOUND(s)	RESULT	LIMIT OF QUANTITATION
Benzene	< 1.0 ug/l	1.0 ug/l
Toluene	< 1.0 ug/l	1.0 ug/l
Ethylbenzene	< 1.0 ug/l	1.0 ug/l
m,p-Xylene	< 1.0 ug/l	1.0 ug/l
o-Xylene/Styrene*	< 1.0 ug/l	1.0 ug/l
1,2-Dichloroethane	< 1.0 ug/l	1.0 ug/l

Date Analyzed: 06/22/92

*These compounds coelute under the conditions used. The result represents the total amount for these compounds.

Respectfully submitted,

Kenneth A. Roberts

Kenneth A. Roberts, B.S.
Manager, Organics Department

Mountain States Analytical
The Quality Solution

CLIENT:	Geowest Golden Inc. SLC 175 West 200 South # 2006 Salt Lake City, UT 84101-	LAB NO:	28023
		GROUP NO:	6384
		DATE SAMPLED:	06/09/92
		TIME SAMPLED:	1750
ATTN:	Mr. Pete Olsen	DATE RECEIVED:	06/15/92
		DATE REPORTED:	06/24/92
SAMPLE ID:	MW-16	DISPOSAL DATE:	07/24/92

ANALYSIS: Gasoline Contamination in Water (BTEX) [EPA 602]
Unheated P&T-DCA [EPA 8010]

COMPOUND(s)	RESULT	LIMIT OF QUANTITATION
Benzene	< 1.0 ug/l	1.0 ug/l
Toluene	< 1.0 ug/l	1.0 ug/l
Ethylbenzene	< 1.0 ug/l	1.0 ug/l
m,p-Xylene	< 1.0 ug/l	1.0 ug/l
o-Xylene/Styrene*	< 1.0 ug/l	1.0 ug/l
1,2-Dichloroethane	< 1.0 ug/l	1.0 ug/l

Date Analyzed: 06/22/92

*These compounds coelute under the conditions used. The result represents the total amount for these compounds.

Respectfully submitted,

Kenneth A. Roberts

Kenneth A. Roberts, B.S.
Manager, Organics Department

Analytical Report

Mountain States Analytical

The Quality Solution

CLIENT:	Geowest Golden Inc. SLC 175 West 200 South # 2006 Salt Lake City, UT 84101-	LAB NO:	28030
		GROUP NO:	6386
		DATE SAMPLED:	06/12/92
		TIME SAMPLED:	1030
ATTN:	Mr. Pete Olsen	DATE RECEIVED:	06/15/92
		DATE REPORTED:	06/24/92
SAMPLE ID:	MW-17	DISPOSAL DATE:	07/24/92

ANALYSIS: Gasoline Contamination in Water (BTEX) [EPA 602]
Unheated P&T-DCA [EPA 8010]

COMPOUND(s)	RESULT	LIMIT OF QUANTITATION
Benzene	9,240 ug/l	100 ug/l
Toluene	7,580 ug/l	100 ug/l
Ethylbenzene	1,150 ug/l	100 ug/l
m,p-Xylene	4,980 ug/l	100 ug/l
o-Xylene/Styrene*	2,210 ug/l	100 ug/l
1,2-Dichloroethane	45.3 ug/l	1.0 ug/l

Date Analyzed: 06/22/92

*These compounds coelute under the conditions used. The result represents the total amount for these compounds.

Respectfully submitted,

Kenneth A Roberts

Kenneth A. Roberts, B.S.
Manager, Organics Department

1645 West 2200 South, Salt Lake City, Utah 84119 (801) 973-0050 FAX (801) 972-6278

Member: American Council of Independent Laboratories, Inc.

Analytical Report

Mountain States Analytical

The Quality Solution

CLIENT:	Geowest Golden Inc. SLC 175 West 200 South # 2006 Salt Lake City, UT 84101-	LAB NO:	28034
		GROUP NO:	6389
		DATE SAMPLED:	06/12/92
		TIME SAMPLED:	1015
ATTN:	Mr. Pete Olsen	DATE RECEIVED:	06/15/92
		DATE REPORTED:	06/24/92
SAMPLE ID:	MW-18	DISPOSAL DATE:	07/24/92

ANALYSIS: Gasoline Contamination in Water (BTEX) [EPA 602]
Unheated P&T-DCA [EPA 8010]

COMPOUND(s)	RESULT	LIMIT OF QUANTITATION
Benzene	313 ug/l	100 ug/l
Toluene	1.1 ug/l	1.0 ug/l
Ethylbenzene	200 ug/l	100 ug/l
m,p-Xylene	1,700 ug/l	100 ug/l
o-Xylene/Styrene*	9.6 ug/l	1.0 ug/l
1,2-Dichloroethane	< 1.0 ug/l	1.0 ug/l

Date Analyzed: 06/19/92

*These compounds coelute under the conditions used. The result represents the total amount for these compounds.

Respectfully submitted,

Kenneth A. Roberts

Kenneth A. Roberts, B.S.
Manager, Organics Department

Analytical Report

Mountain States Analytical

The Quality Solution

CLIENT:	Geowest Golden Inc. SLC 175 West 200 South # 2006 Salt Lake City, UT 84101-	LAB NO:	28025
		GROUP NO:	6384
		DATE SAMPLED:	06/09/92
		TIME SAMPLED:	1540
ATTN:	Mr. Pete Olsen	DATE RECEIVED:	06/15/92
		DATE REPORTED:	06/24/92
SAMPLE ID:	MW-19	DISPOSAL DATE:	07/24/92

ANALYSIS: Gasoline Contamination in Water (BTEX) [EPA 602]
Unheated P&T-DCA [EPA 8010]

COMPOUND(s)		RESULT	LIMIT OF QUANTITATION
Benzene	<	1.0 ug/l	1.0 ug/l
Toluene	<	1.0 ug/l	1.0 ug/l
Ethylbenzene	<	1.0 ug/l	1.0 ug/l
m,p-Xylene	<	1.0 ug/l	1.0 ug/l
o-Xylene/Styrene*	<	1.0 ug/l	1.0 ug/l
1,2-Dichloroethane		11.4 ug/l	1.0 ug/l

Date Analyzed: 06/22/92

*These compounds coelute under the conditions used. The result represents the total amount for these compounds.

Respectfully submitted,

Kenneth A. Roberts

Kenneth A. Roberts, B.S.
Manager, Organics Department

Mountain States Analytical

The Quality Solution

CLIENT:	Geowest Golden Inc. SLC 175 West 200 South # 2006 Salt Lake City, UT 84101-	LAB NO:	28026
		GROUP NO:	6384
		DATE SAMPLED:	06/09/92
		TIME SAMPLED:	1415
ATTN:	Mr. Pete Olsen	DATE RECEIVED:	06/15/92
		DATE REPORTED:	06/24/92
SAMPLE ID:	MW-20	DISPOSAL DATE:	07/24/92

ANALYSIS: Gasoline Contamination in Water (BTEX) [EPA 602]
Unheated P&T-DCA [EPA 8010]

COMPOUND(s)	RESULT	LIMIT OF QUANTITATION
Benzene	< 1.0 ug/l	1.0 ug/l
Toluene	< 1.0 ug/l	1.0 ug/l
Ethylbenzene	< 1.0 ug/l	1.0 ug/l
m,p-Xylene	< 1.0 ug/l	1.0 ug/l
o-Xylene/Styrene*	< 1.0 ug/l	1.0 ug/l
1,2-Dichloroethane	< 1.0 ug/l	1.0 ug/l

Date Analyzed: 06/22/92

*These compounds coelute under the conditions used. The result represents the total amount for these compounds.

Respectfully submitted,

Kenneth A Roberts

Kenneth A. Roberts, B.S.
Manager, Organics Department

1645 West 2200 South, Salt Lake City, Utah 84119 (801) 973-0050 FAX (801) 972-6278

Member: American Council of Independent Laboratories, Inc.

Mountain States Analytical

The Quality Solution

CLIENT:	Geowest Golden Inc. SLC 175 West 200 South # 2006 Salt Lake City, UT 84101-	LAB NO:	28024
		GROUP NO:	6384
		DATE SAMPLED:	06/09/92
		TIME SAMPLED:	1215
ATTN:	Mr. Pete Olsen	DATE RECEIVED:	06/15/92
		DATE REPORTED:	06/24/92
SAMPLE ID:	MW-21	DISPOSAL DATE:	07/24/92

ANALYSIS: Gasoline Contamination in Water (BTEX) [EPA 602]
Unheated P&T-DCA [EPA 8010]

COMPOUND(s)	RESULT	LIMIT OF QUANTITATION
Benzene	< 1.0 ug/l	1.0 ug/l
Toluene	< 1.0 ug/l	1.0 ug/l
Ethylbenzene	< 1.0 ug/l	1.0 ug/l
m,p-Xylene	< 1.0 ug/l	1.0 ug/l
o-Xylene/Styrene*	< 1.0 ug/l	1.0 ug/l
1,2-Dichloroethane	21.9 ug/l	1.0 ug/l

Date Analyzed: 06/22/92

*These compounds coelute under the conditions used. The result represents the total amount for these compounds.

Respectfully submitted,

Kenneth A. Roberts

Kenneth A. Roberts, B.S.
Manager, Organics Department

Mountain States Analytical

The Quality Solution

CLIENT:	Geowest Golden Inc. SLC 175 West 200 South # 2006 Salt Lake City, UT 84101-	LAB NO:	28027
		GROUP NO:	6384
		DATE SAMPLED:	06/09/92
		TIME SAMPLED:	1100
ATTN:	Mr. Pete Olsen	DATE RECEIVED:	06/15/92
		DATE REPORTED:	06/24/92
SAMPLE ID:	MW-24	DISPOSAL DATE:	07/24/92

ANALYSIS: Gasoline Contamination in Water (BTEX) [EPA 602]
Unheated P&T-DCA [EPA 8010]

COMPOUND(s)		RESULT	LIMIT OF QUANTITATION
Benzene	<	1.0 ug/l	1.0 ug/l
Toluene	<	1.0 ug/l	1.0 ug/l
Ethylbenzene	<	1.0 ug/l	1.0 ug/l
m,p-Xylene	<	1.0 ug/l	1.0 ug/l
o-Xylene/Styrene*	<	1.0 ug/l	1.0 ug/l
1,2-Dichloroethane		28.4 ug/l	1.0 ug/l

Date Analyzed: 06/22/92

*These compounds coelute under the conditions used. The result represents the total amount for these compounds.

Blind Dup
of MW 21

Respectfully submitted,

Kenneth A. Roberts

Kenneth A. Roberts, B.S.
Manager, Organics Department

Mountain States Analytical

The Quality Solution

CLIENT: Geowest Golden Inc. SLC
175 West 200 South # 2006
Salt Lake City, UT 84101-

ATTN: Mr. Pete Olsen

SAMPLE ID: MW-22

LAB NO: 28031
GROUP NO: 6386
DATE SAMPLED: 06/12/92
TIME SAMPLED: 1200
DATE RECEIVED: 06/15/92
DATE REPORTED: 06/24/92
DISPOSAL DATE: 07/24/92

ANALYSIS: Gasoline Contamination in Water (BTEX) [EPA 602]
Unheated P&T-DCA [EPA 8010]

COMPOUND(s)	RESULT	LIMIT OF QUANTITATION
Benzene	21,200 ug/l	200 ug/l
Toluene	7,540 ug/l	200 ug/l
Ethylbenzene	1,040 ug/l	200 ug/l
m,p-Xylene	4,040 ug/l	200 ug/l
o-Xylene/Styrene*	1,690 ug/l	200 ug/l
1,2-Dichloroethane	3,170 ug/l	200 ug/l

Date Analyzed: 06/23/92

*These compounds coelute under the conditions used. The result represents the total amount for these compounds.

Respectfully submitted,

Kenneth A. Roberts

Kenneth A. Roberts, B.S.
Manager, Organics Department

Mountain States Analytical

The Quality Solution

CLIENT: Geowest Golden Inc. SLC
175 West 200 South # 2006
Salt Lake City, UT 84101

ATTN: Mr. Pete Olsen

SAMPLE ID: MW-17

LAB NO: 28028
GROUP NO: 6385
DATE SAMPLED: 06/12/92
TIME SAMPLED: 1030
DATE RECEIVED: 06/15/92
DATE REPORTED: 06/23/92
DISPOSAL DATE: 07/23/92

ANALYSIS: Gasoline Contamination in Soil (BTEX) [EPA SW846 8020]

COMPOUND(s)	RESULT DRY WEIGHT	LIMIT OF QUANTITATION
Moisture	23.8 %	
Benzene	90.4 ug/kg	10.0 ug/kg
Toluene	377 ug/kg	10.0 ug/kg
Ethylbenzene	79.6 ug/kg	10.0 ug/kg
m,p-Xylene	479 ug/kg	10.0 ug/kg
o-Xylene/Styrene*	194 ug/kg	10.0 ug/kg

BTEX Analysis Date: 06/23/92

*These compounds coelute under the conditions used. The result represents the total amount for these compounds.

Respectfully submitted,

Kenneth A. Roberts

Kenneth A. Roberts, B.S.
Manager, Organics Department

1645 West 2200 South, Salt Lake City, Utah 84119 (801) 973-0050 FAX (801) 972-6278

Member: American Council of Independent Laboratories, Inc.

Analytical Report

Mountain States Analytical

The Quality Solution

CLIENT: Geowest Golden Inc. SLC
175 West 200 South # 2006
Salt Lake City, UT 84101

ATTN: Mr. Pete Olsen

SAMPLE ID: MW-18

LAB NO: 28029
GROUP NO: 6385
DATE SAMPLED: 06/12/92
TIME SAMPLED: 1015
DATE RECEIVED: 06/15/92
DATE REPORTED: 06/23/92
DISPOSAL DATE: 07/23/92

ANALYSIS: Gasoline Contamination in Soil (BTEX) [EPA SW846 8020]

COMPOUND(s)		RESULT DRY WEIGHT	LIMIT OF QUANTITATION
Moisture		16.2 %	
Benzene	<	10.0 ug/kg	10.0 ug/kg
Toluene		918 ug/kg	10.0 ug/kg
Ethylbenzene		179 ug/kg	10.0 ug/kg
m,p-Xylene		1,300 ug/kg	10.0 ug/kg
o-Xylene/Styrene*		369 ug/kg	10.0 ug/kg

BTEX Analysis Date: 06/23/92

*These compounds coelute under the conditions used. The result represents the total amount for these compounds.

Respectfully submitted,

Kenneth A. Roberts

Kenneth A. Roberts, B.S.
Manager, Organics Department

Mountain States Analytical
The Quality Solution

CLIENT: Geowest Golden Inc. SLC
175 West 200 South # 2006
Salt Lake City, UT 84101-

ATTN: Mr. Pete Olsen

SAMPLE ID: TRIP BLANK

LAB NO: 28033
GROUP NO: 6388
DATE SAMPLED: 06/09/92
TIME SAMPLED: 1530
DATE RECEIVED: 06/15/92
DATE REPORTED: 06/24/92
DISPOSAL DATE: 07/24/92

ANALYSIS: Gasoline Contamination in Water (BTEX) [EPA 602]
Unheated P&T-DCA [EPA 8010]

COMPOUND(s)	RESULT	LIMIT OF QUANTITATION
Benzene	< 1.0 ug/l	1.0 ug/l
Toluene	< 1.0 ug/l	1.0 ug/l
Ethylbenzene	< 1.0 ug/l	1.0 ug/l
m,p-Xylene	< 1.0 ug/l	1.0 ug/l
o-Xylene/Styrene*	< 1.0 ug/l	1.0 ug/l
1,2-Dichloroethane	< 1.0 ug/l	1.0 ug/l

Date Analyzed: 06/19/92

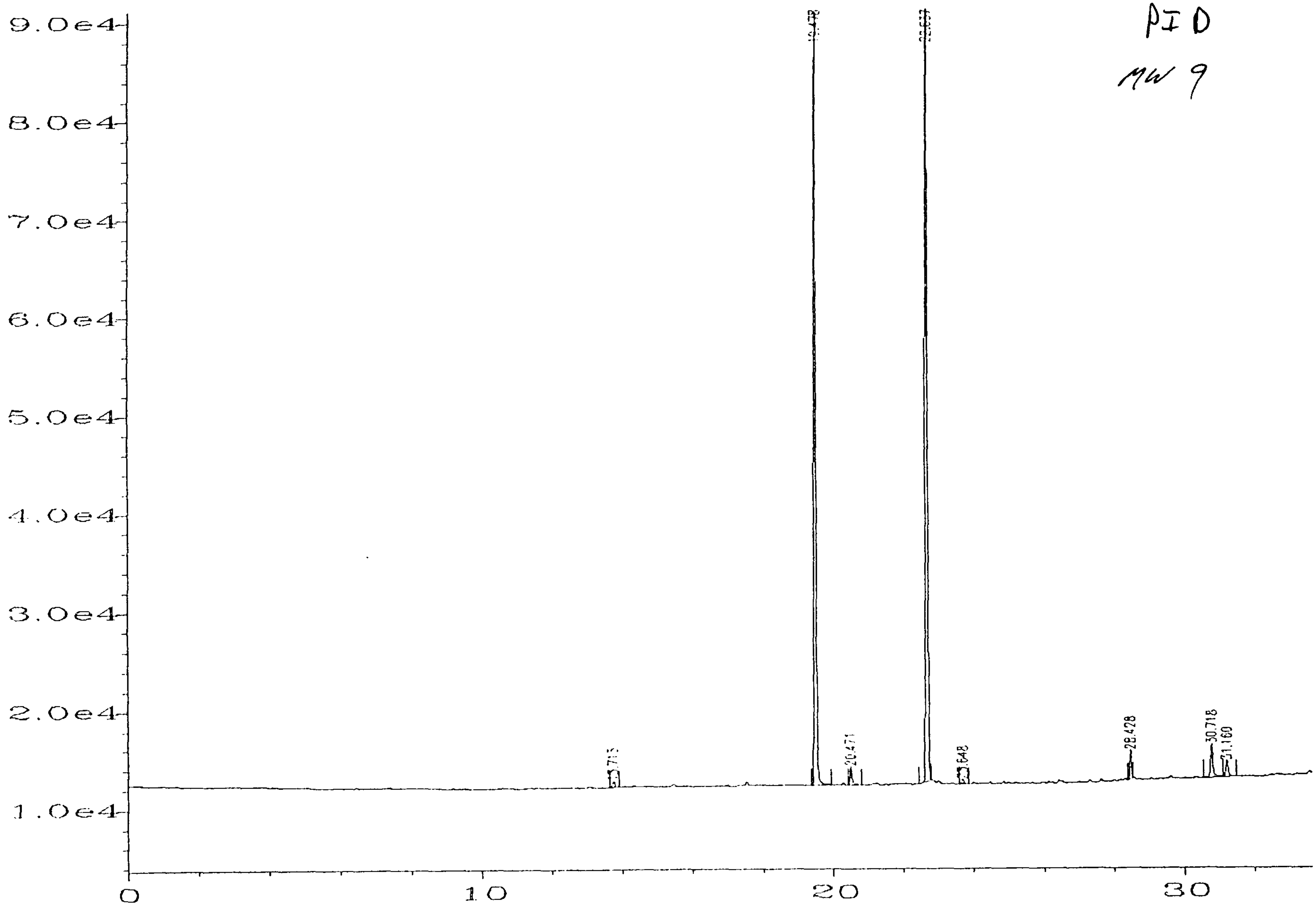
*These compounds coelute under the conditions used. The result represents the total amount for these compounds.

Respectfully submitted,

Kenneth A Roberts

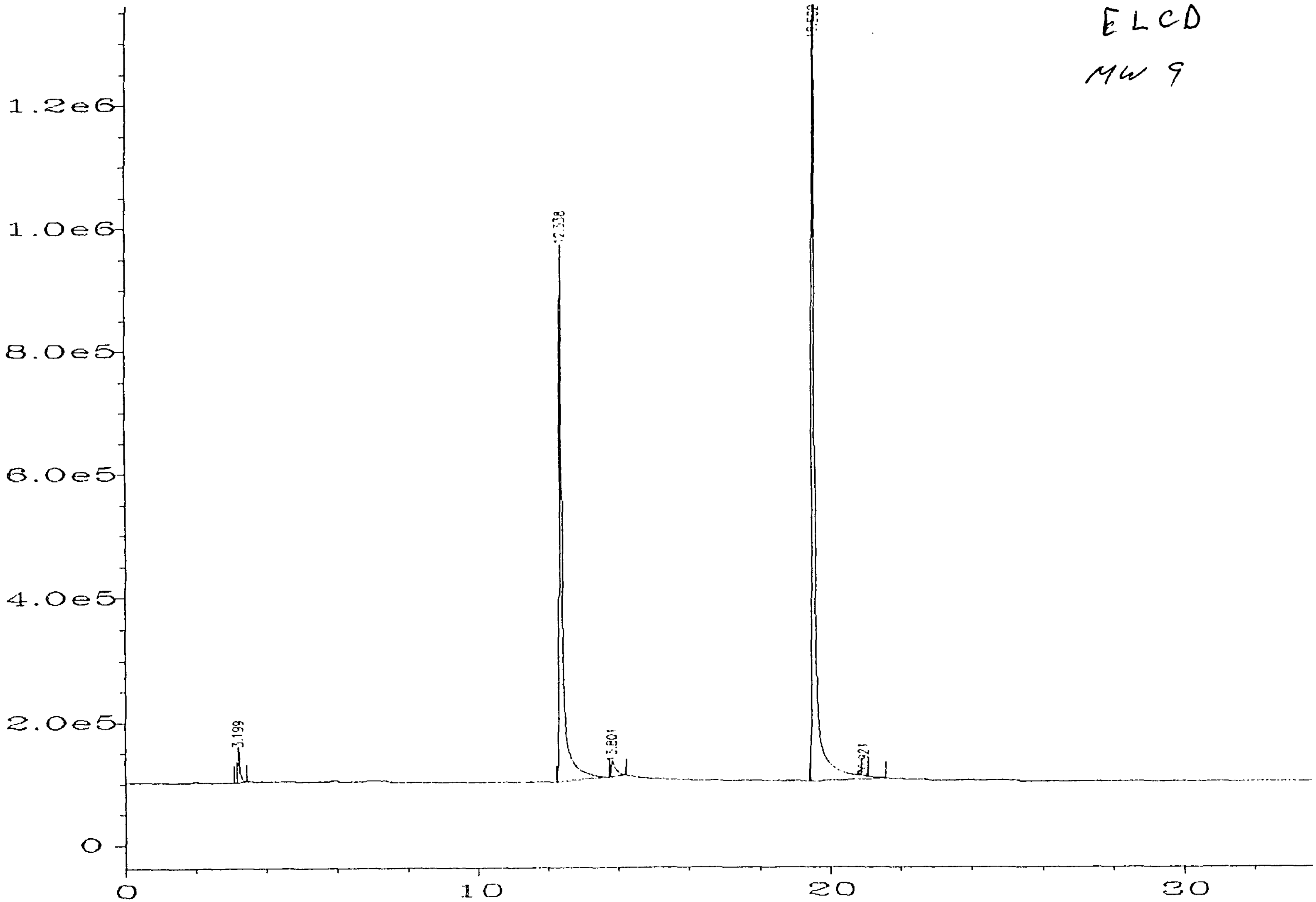
Kenneth A. Roberts, B.S.
Manager, Organics Department

Sample # 28018
DF 1
PID
MW 9



Sig. 2 in C:\HPCHEM\1\DATA\19JUNVOL\014R0701.D

Sample # 28018
OF 1
ELCD
MW 9



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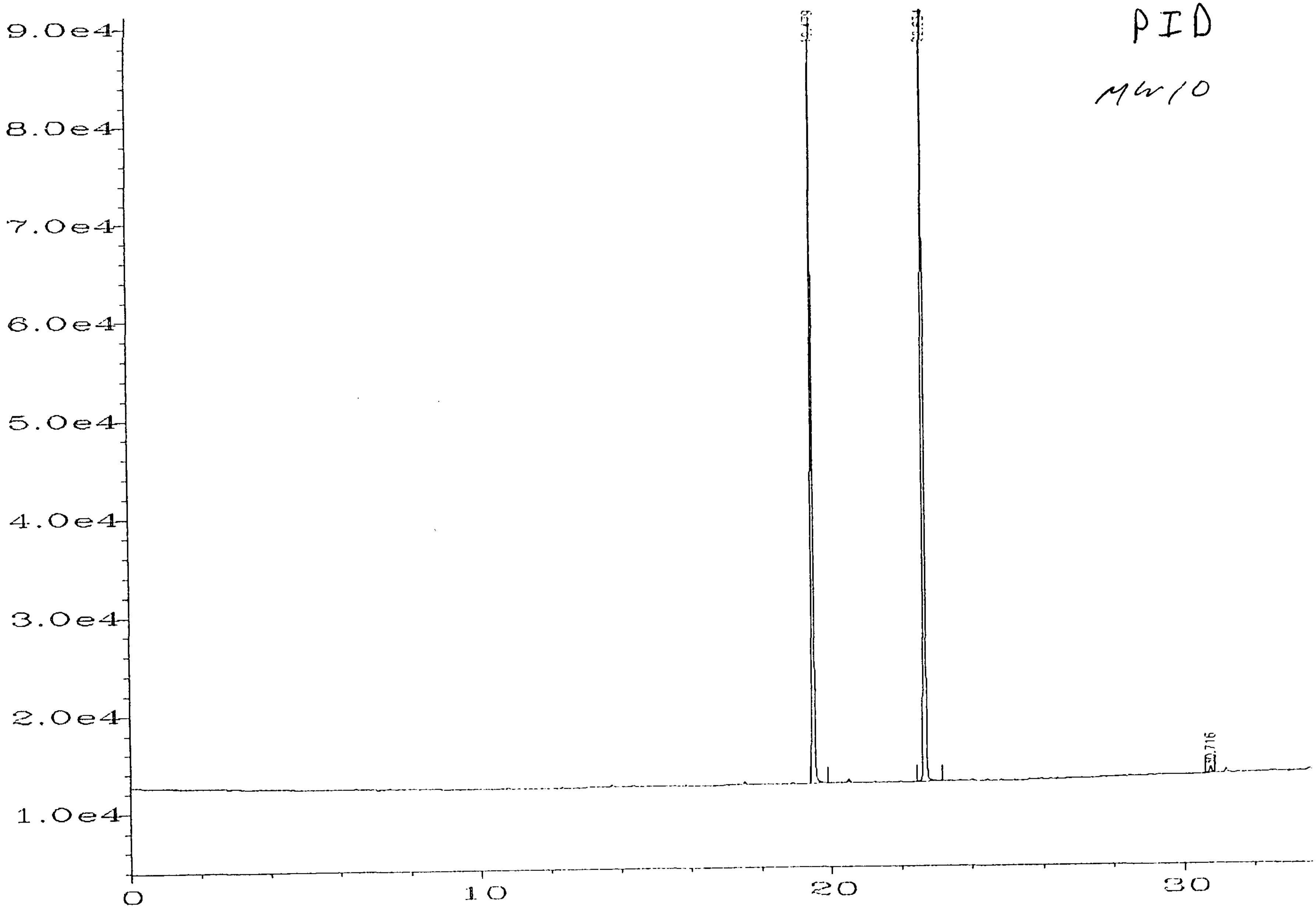
Sample # 28019
DF 1
PID
MW/10



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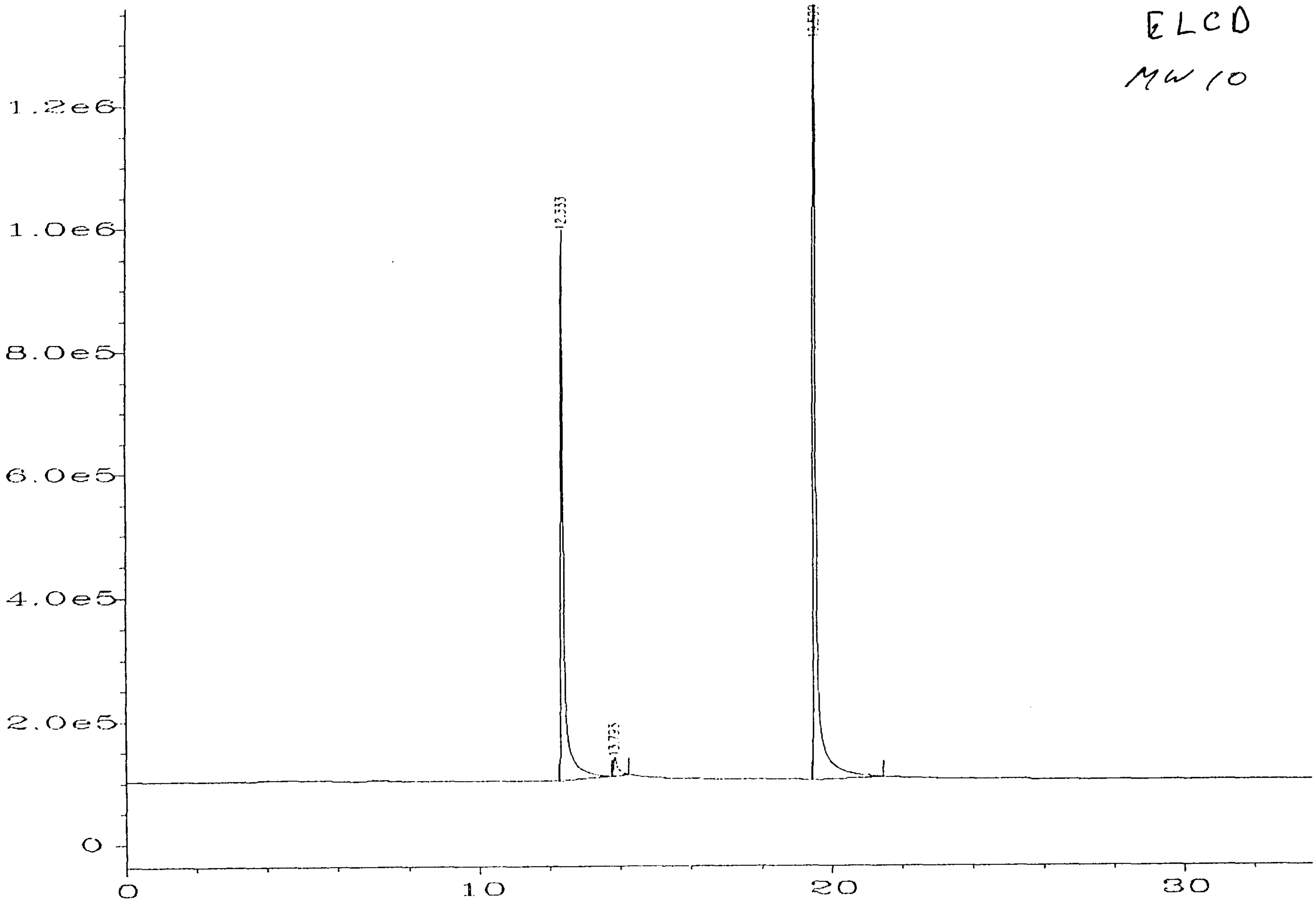
Sample # 28019
DF 1
ELCD
MW 10



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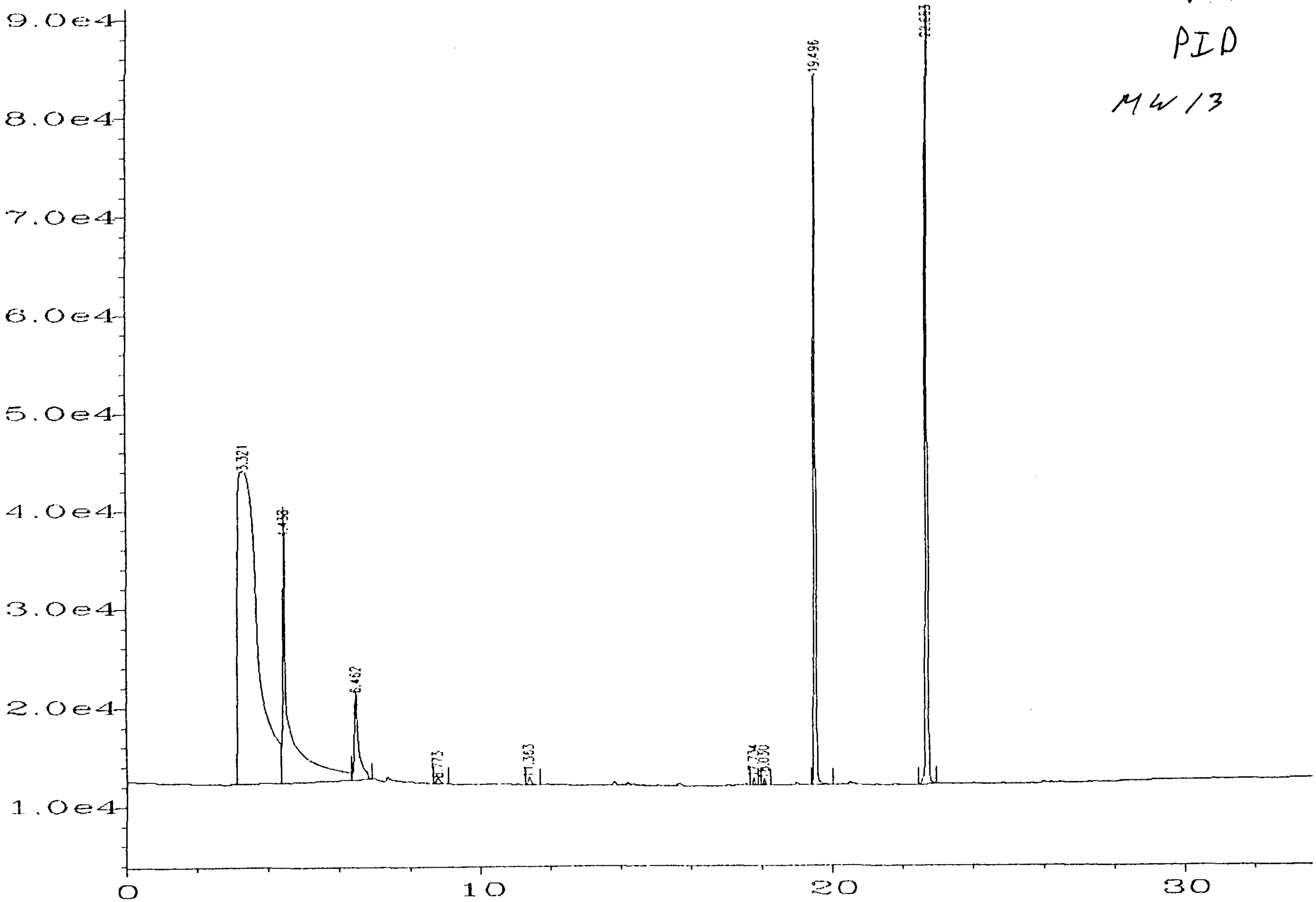
Sample # 28020
DF 1
PID
MW/13



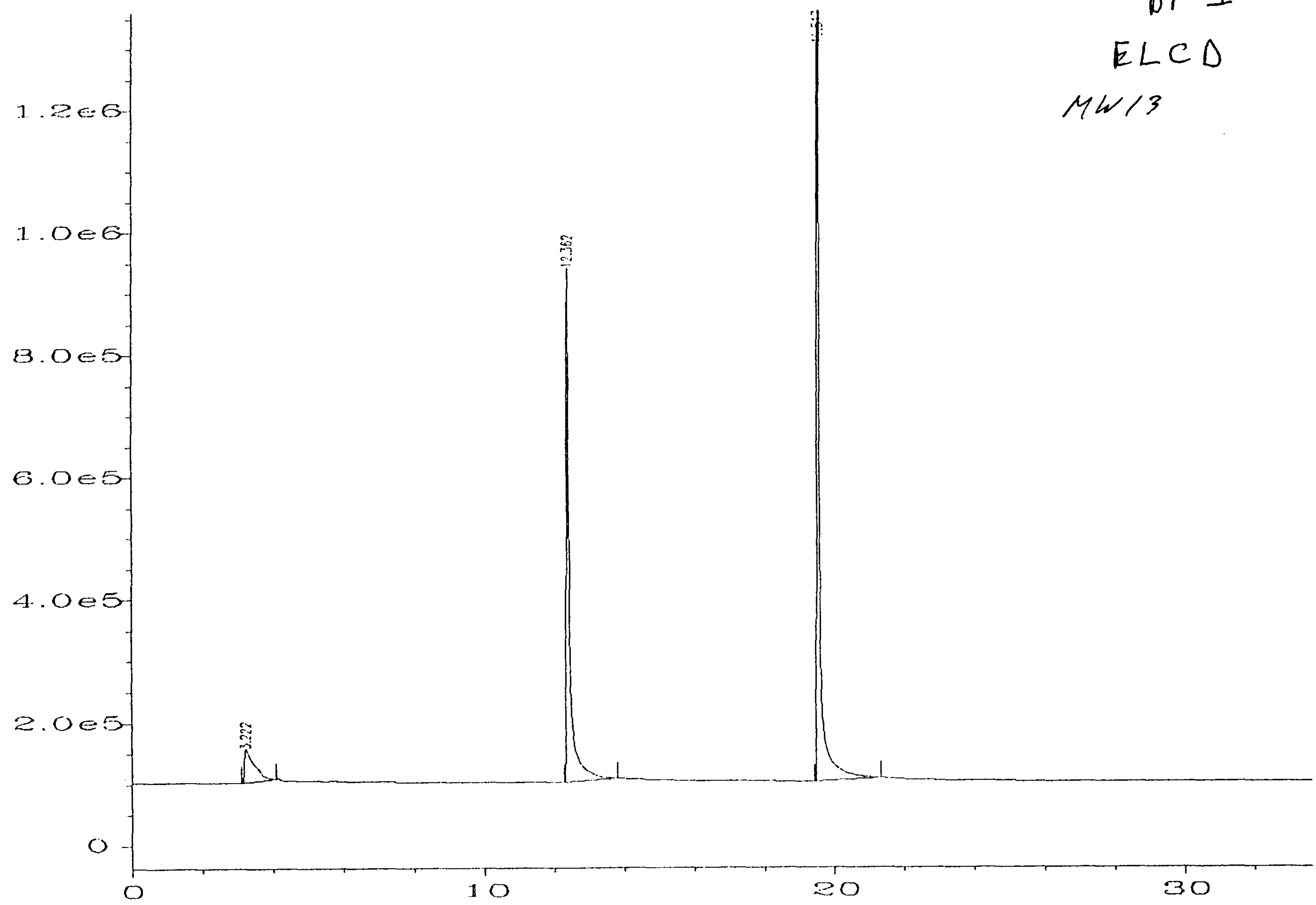
Sig. 2 in C:\HPCHEM\1\DATA\19JUNVOL\031R0101.D

Sample # 28020

DF 1

ELCD

MW/13



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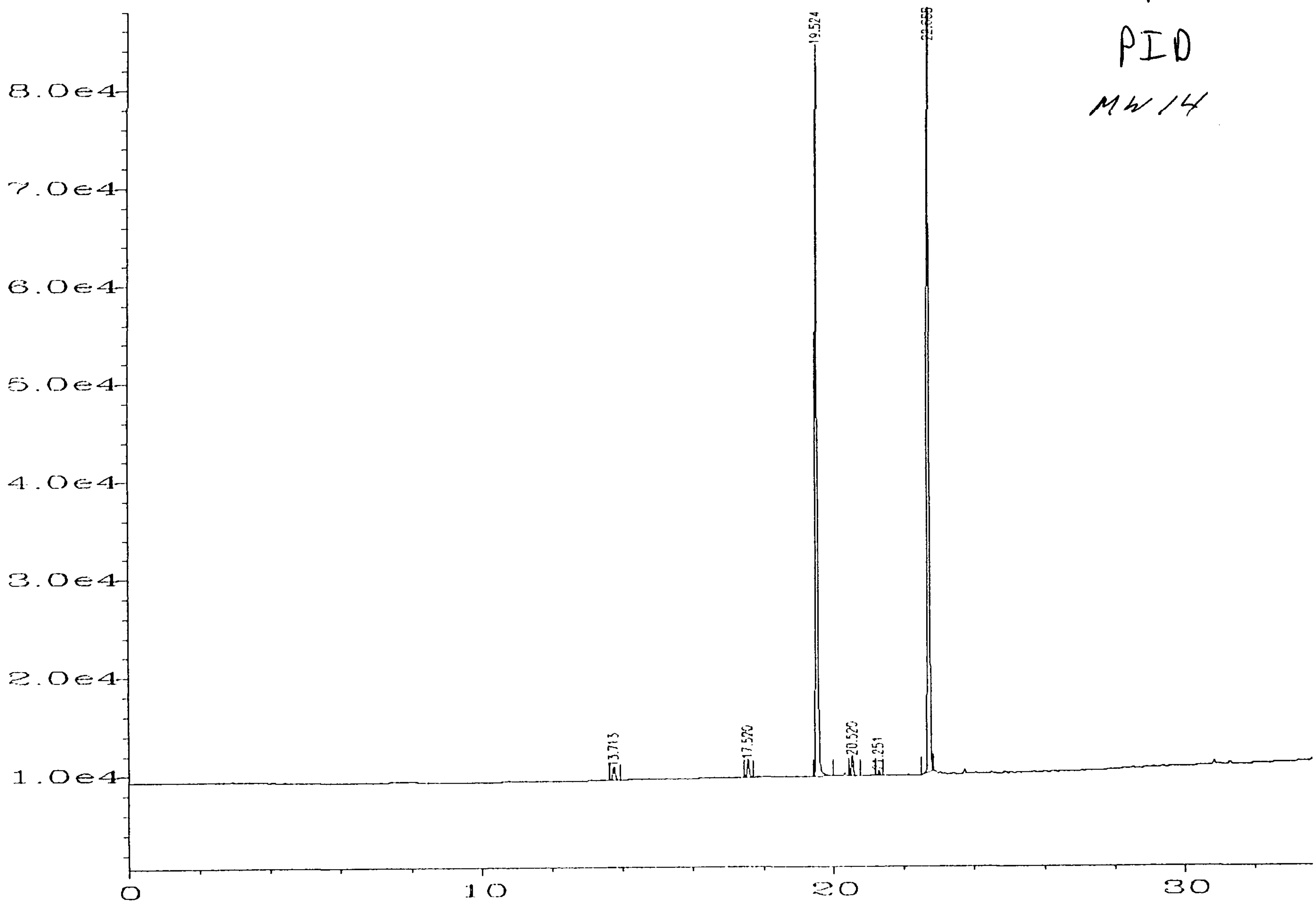
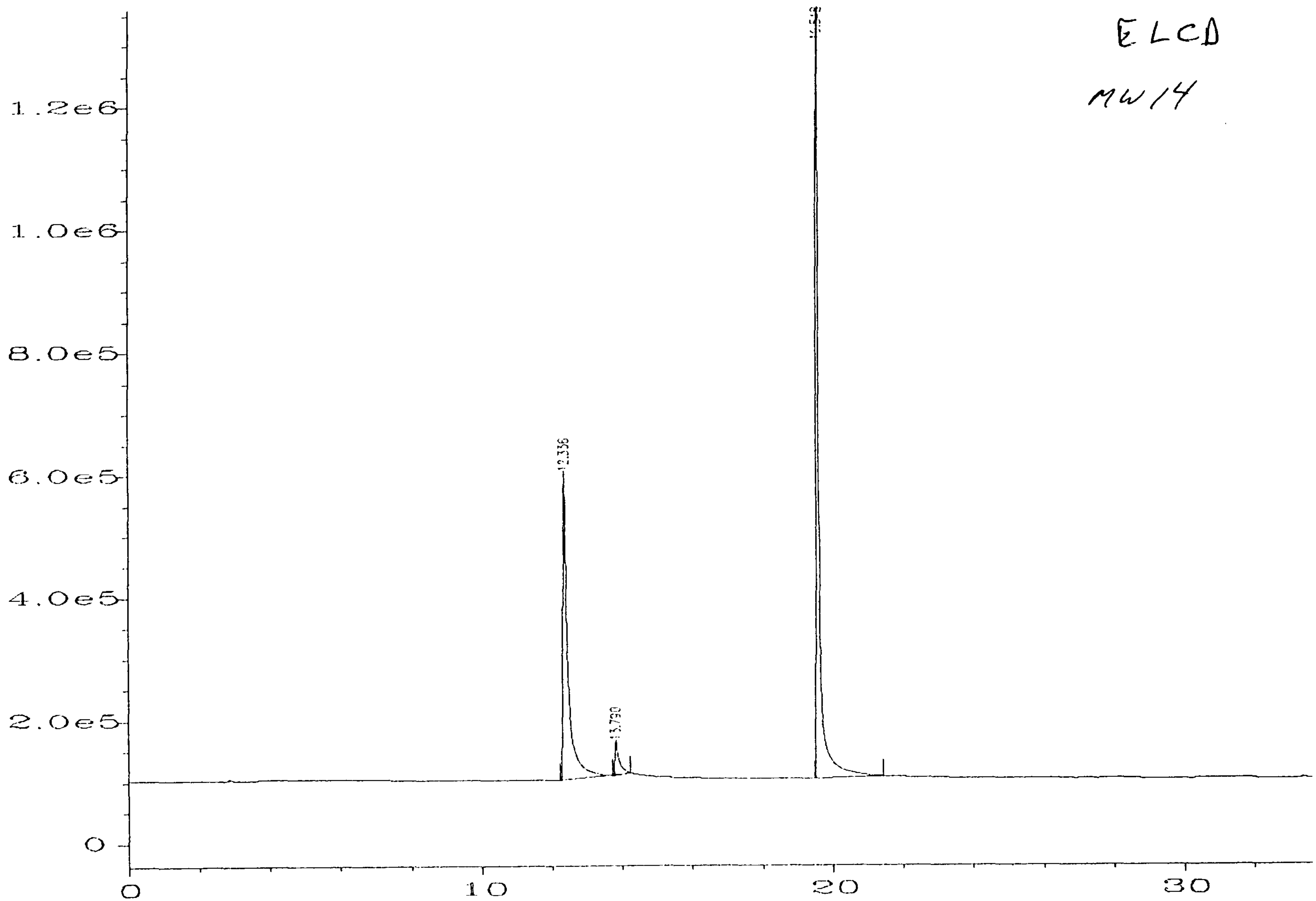
Sample # 28021
DF 1
PID
MW/14



Sig. 2 in C:\HPCHEM\1\DATA\19JUNVOL\017R0701.D

Sample # 28021
DF 1
ELCD
MW/14



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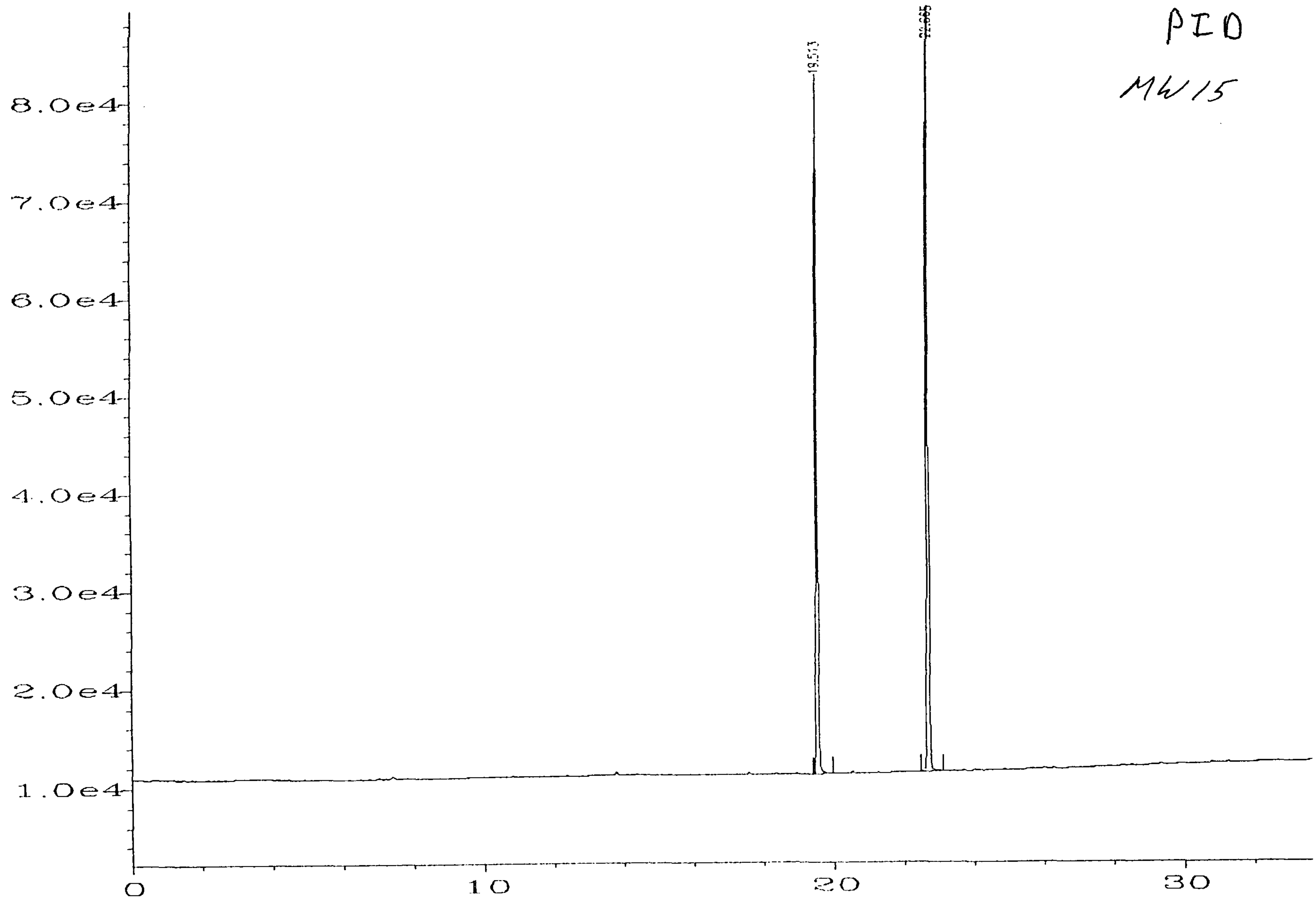
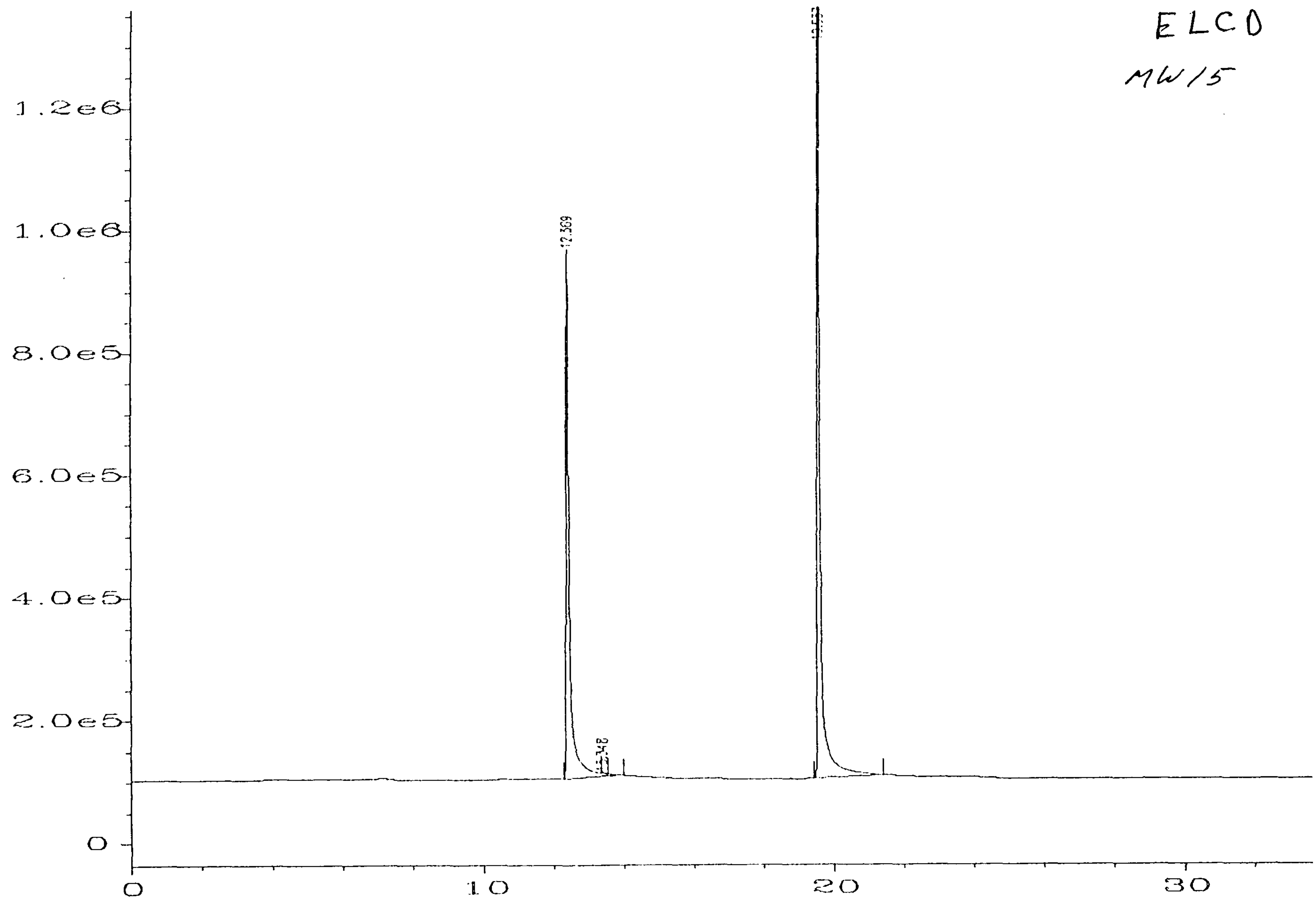
Sample # 28022
DF 1
PID
MW15



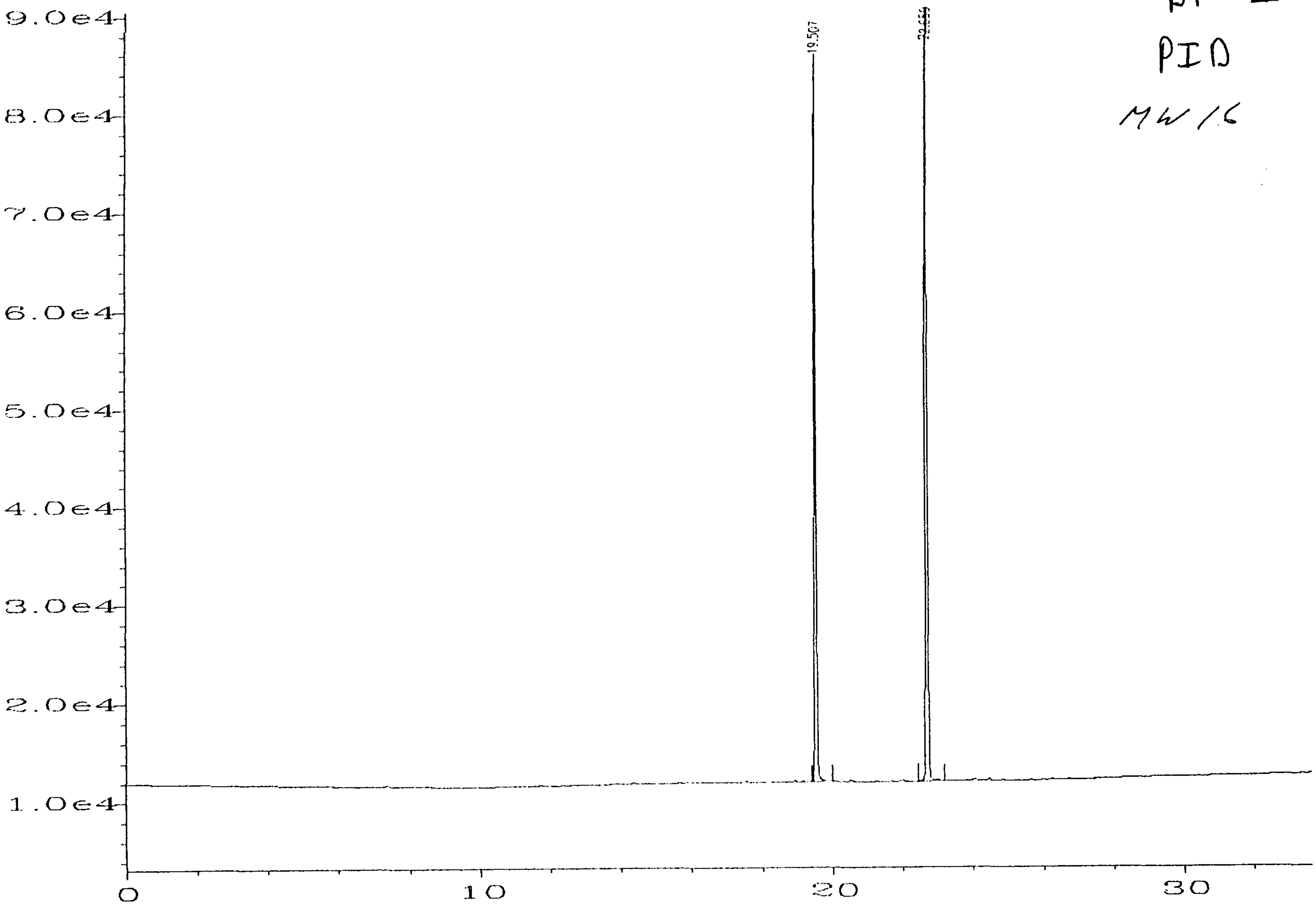
Sig. 2 in C:\HPCHEM\1\DATA\19JUNVOL\018R0701.D

Sample # 28022
DF 1
ELCD
MW/5



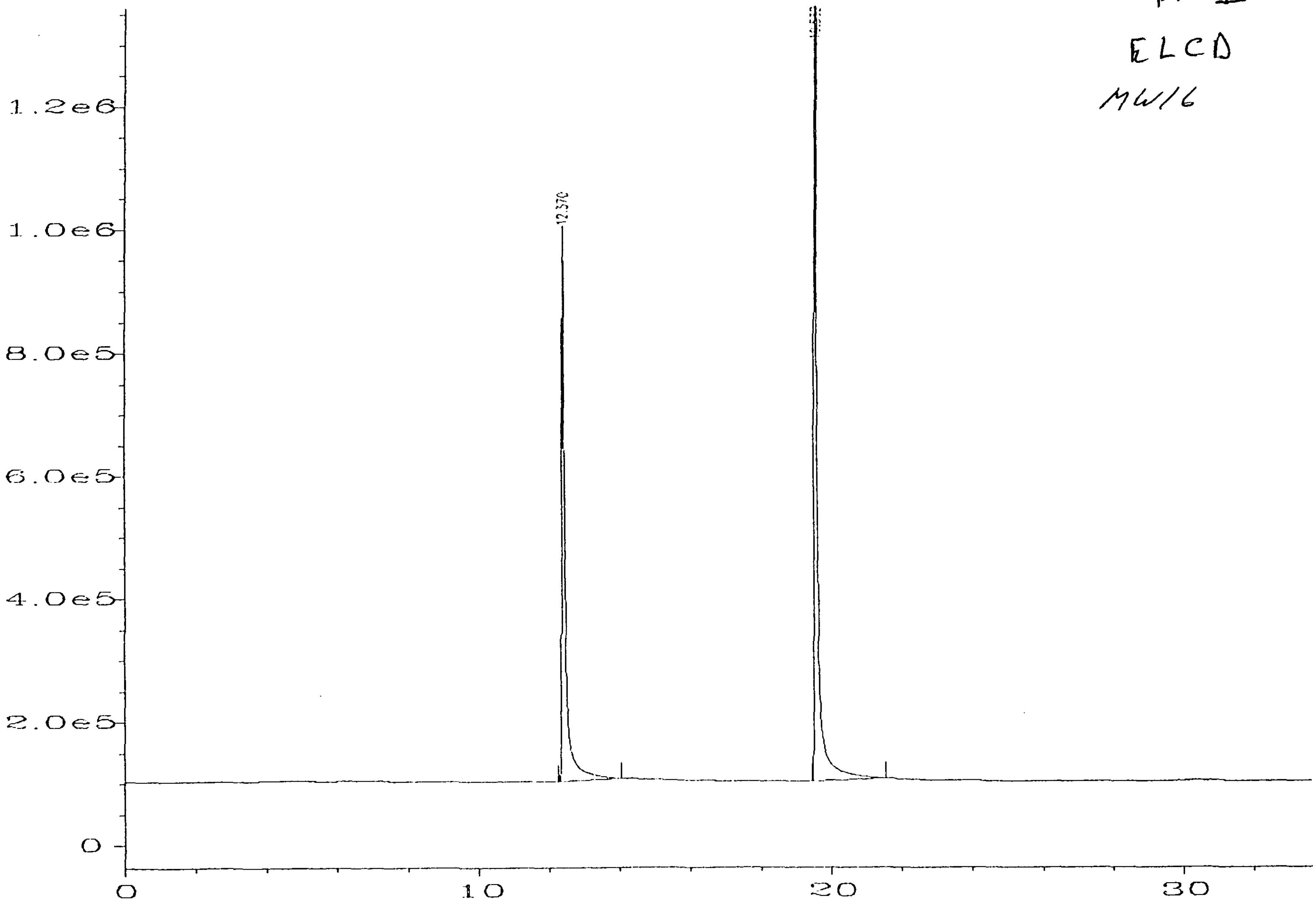
Sig. 1 in C:\HPCHEM\1\DATA\19JUNVOL\018F0701.D

Sample # 28023
DF 1
PID
MW/16



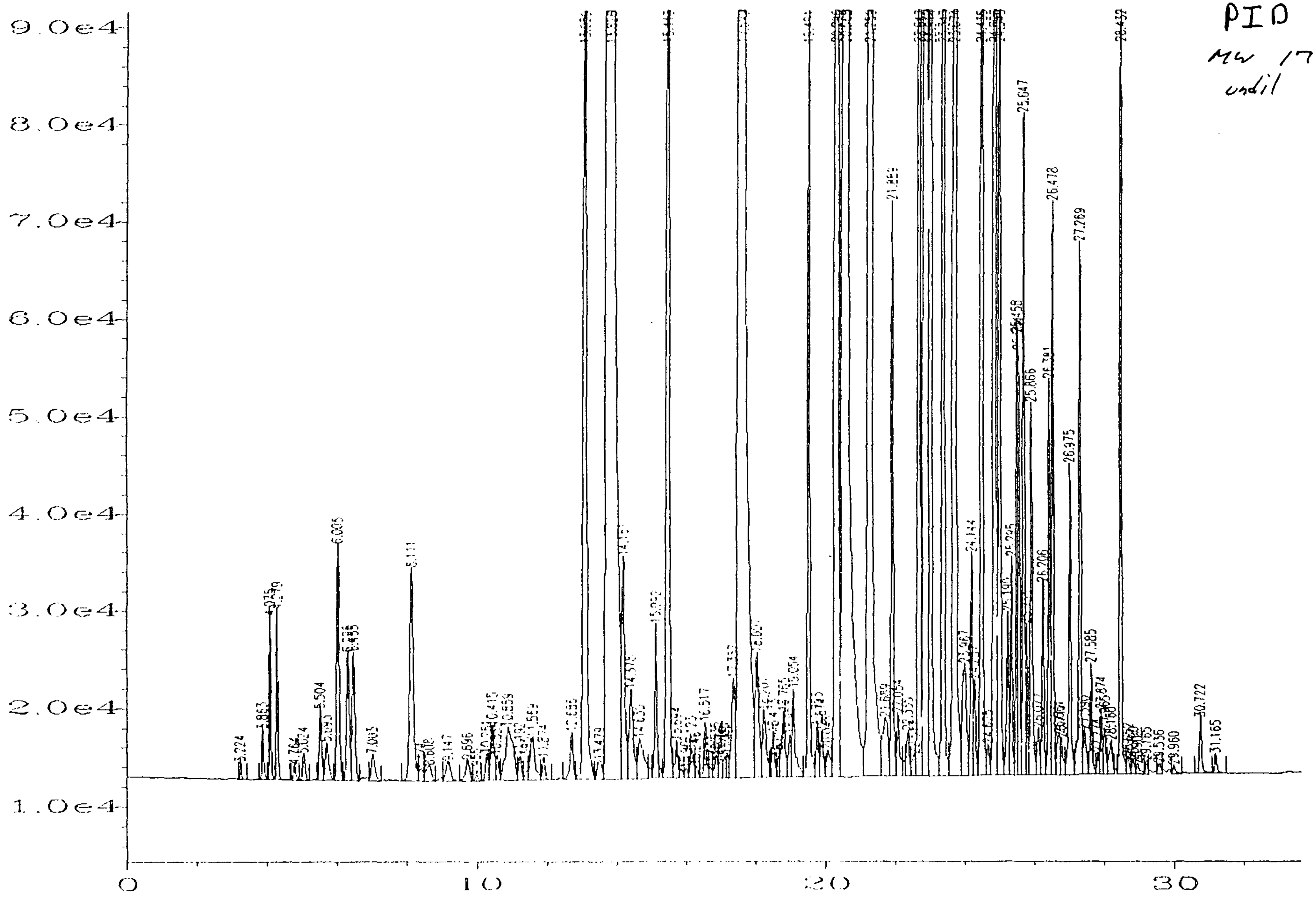
Sig. 2 in C:\HPCHEM\1\DATA\19JUNVOL\019R0701.D

Sample # 28023
DF 1
ELCD
MW/6



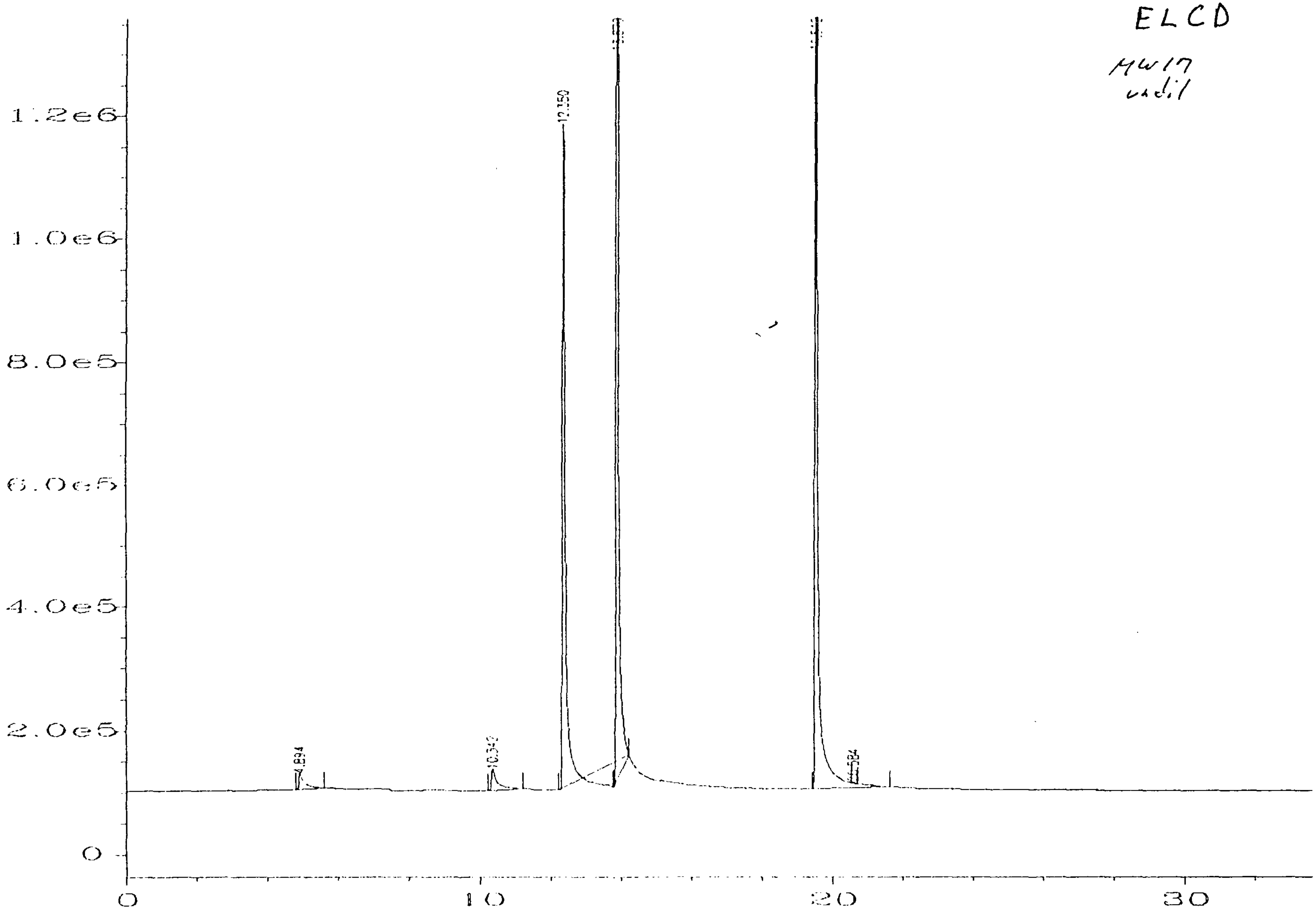
Sig. 1 in C:\HPCHEM\1\DATA\19JUNVOL\019F0701.D

Sample # 28030
DF 1
PID
MW 17
undil



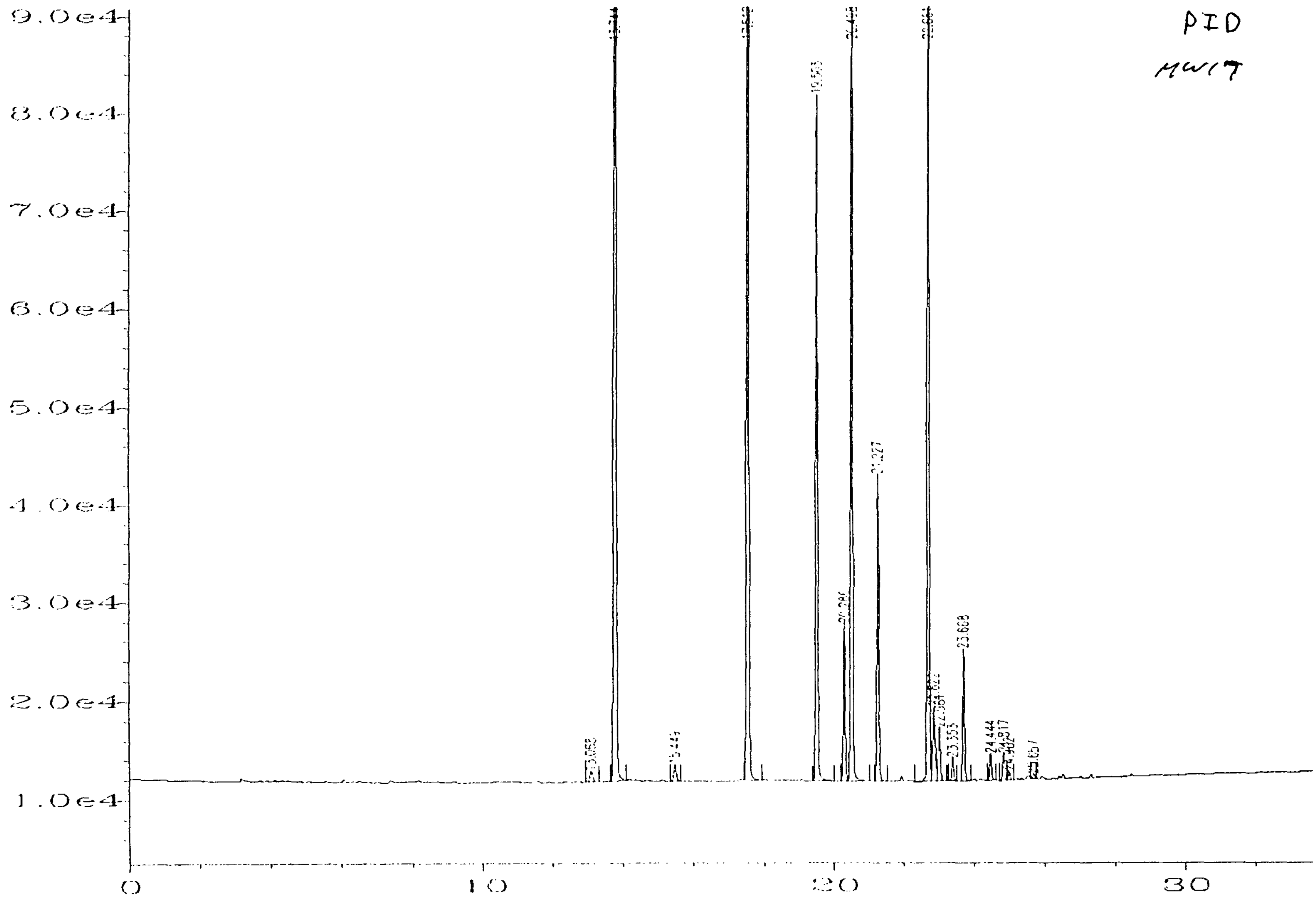
Sig. 2 in C:\HPCHEM\1\DATA\19JUNVOL\008R0701.D

Sample # 28030
DF 1
ELCD
MW17
undil



Sig. 1 in C:\HPCHEM\1\DATA\19JUNVOL\008F0701.D

Sample # 28030
AF 100
PID
MW17



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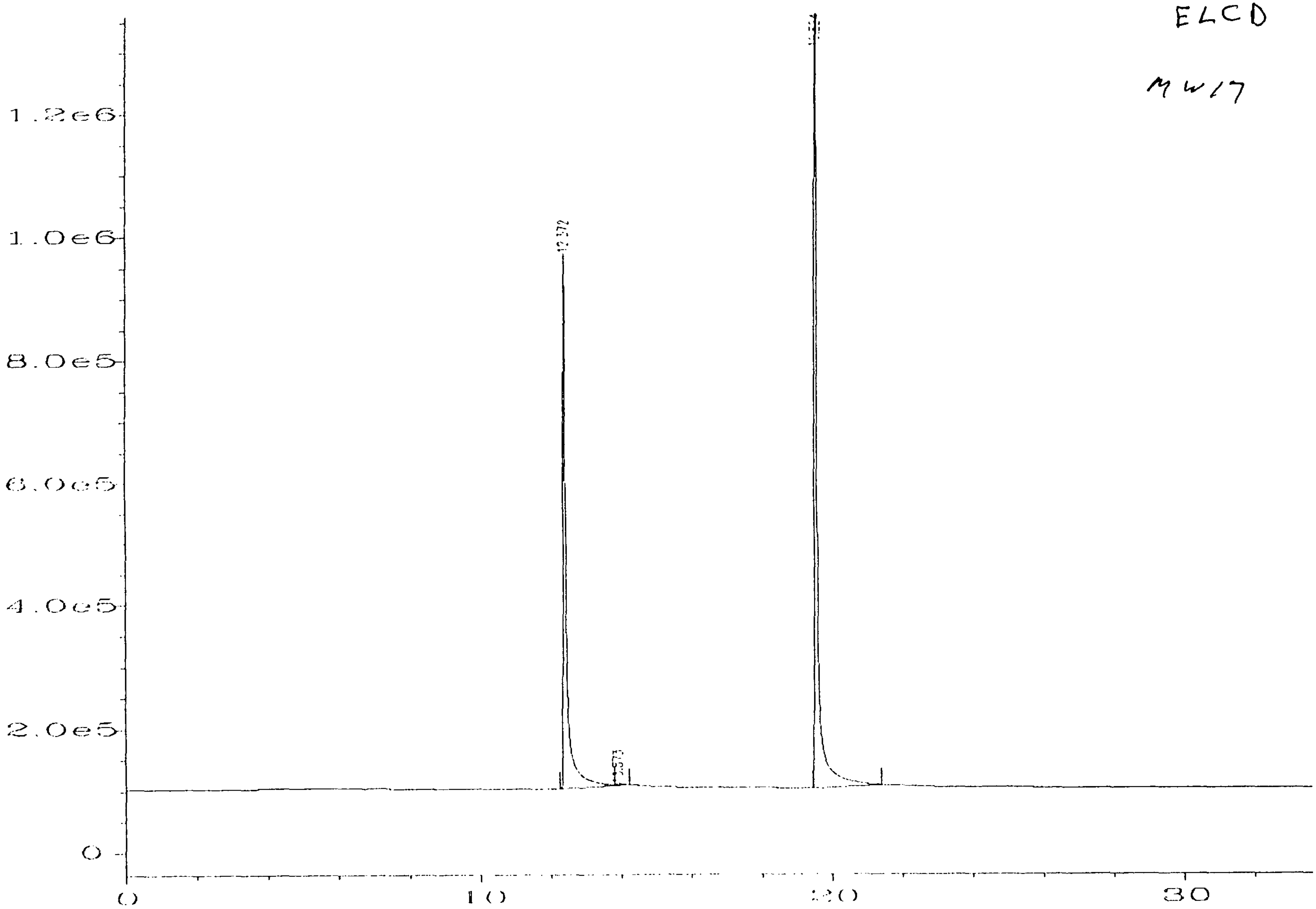
Sample # 28030
DF 100
ELCD

MW/7



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Sample # 28034

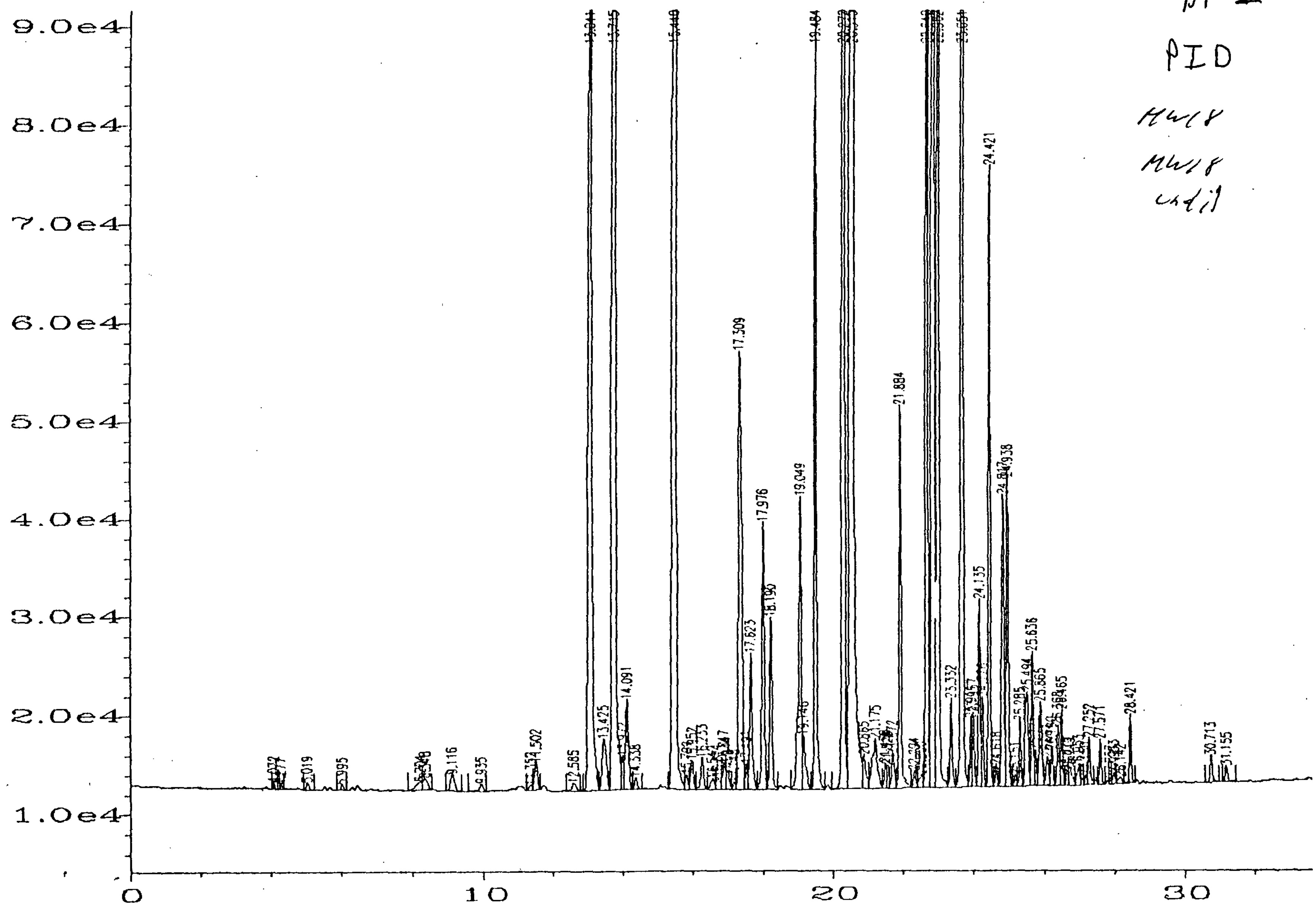
DF 1

PID

MW18

MW18

undil



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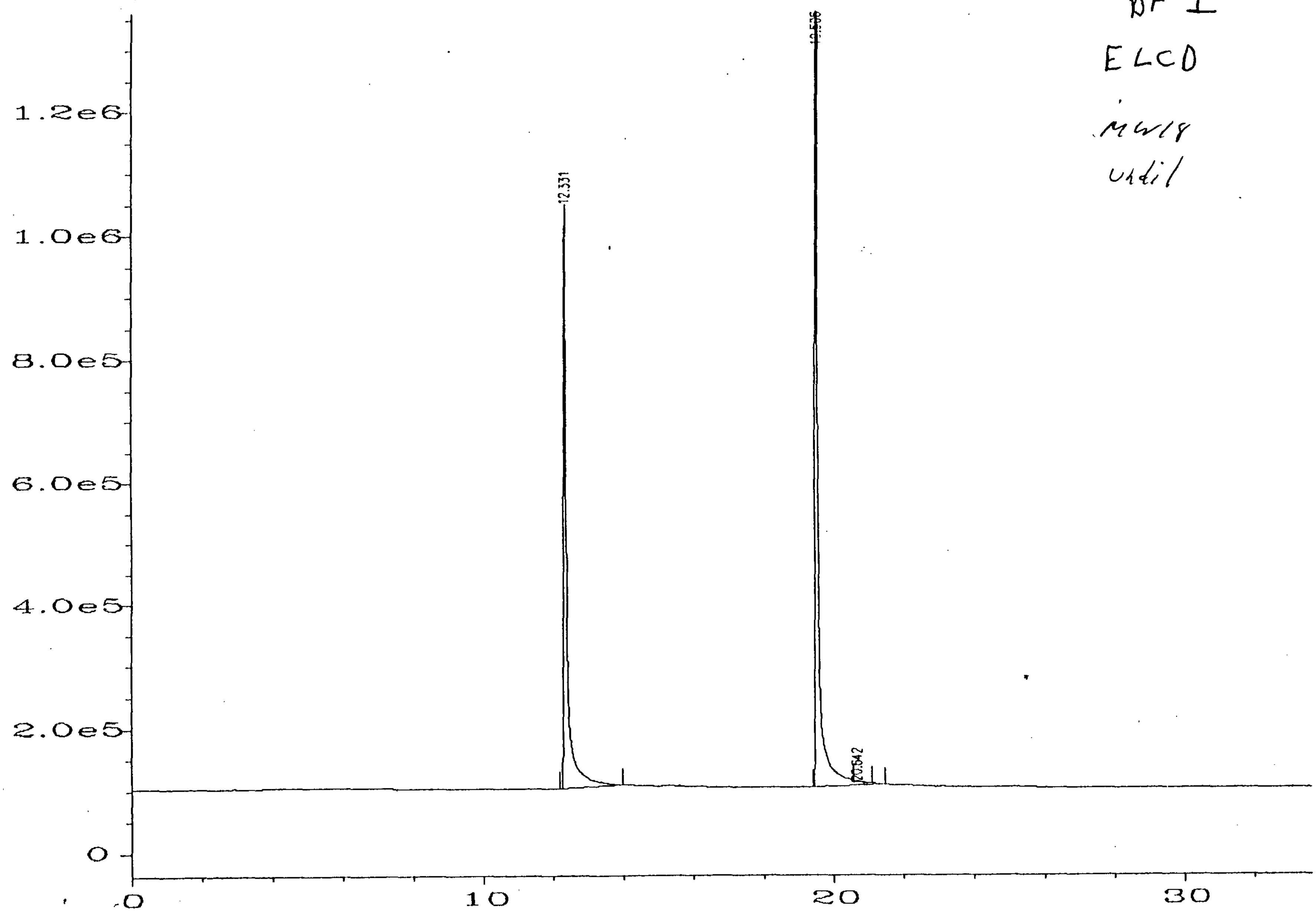
Sample # 28034
DF 1
ELCD
MW18
Udil



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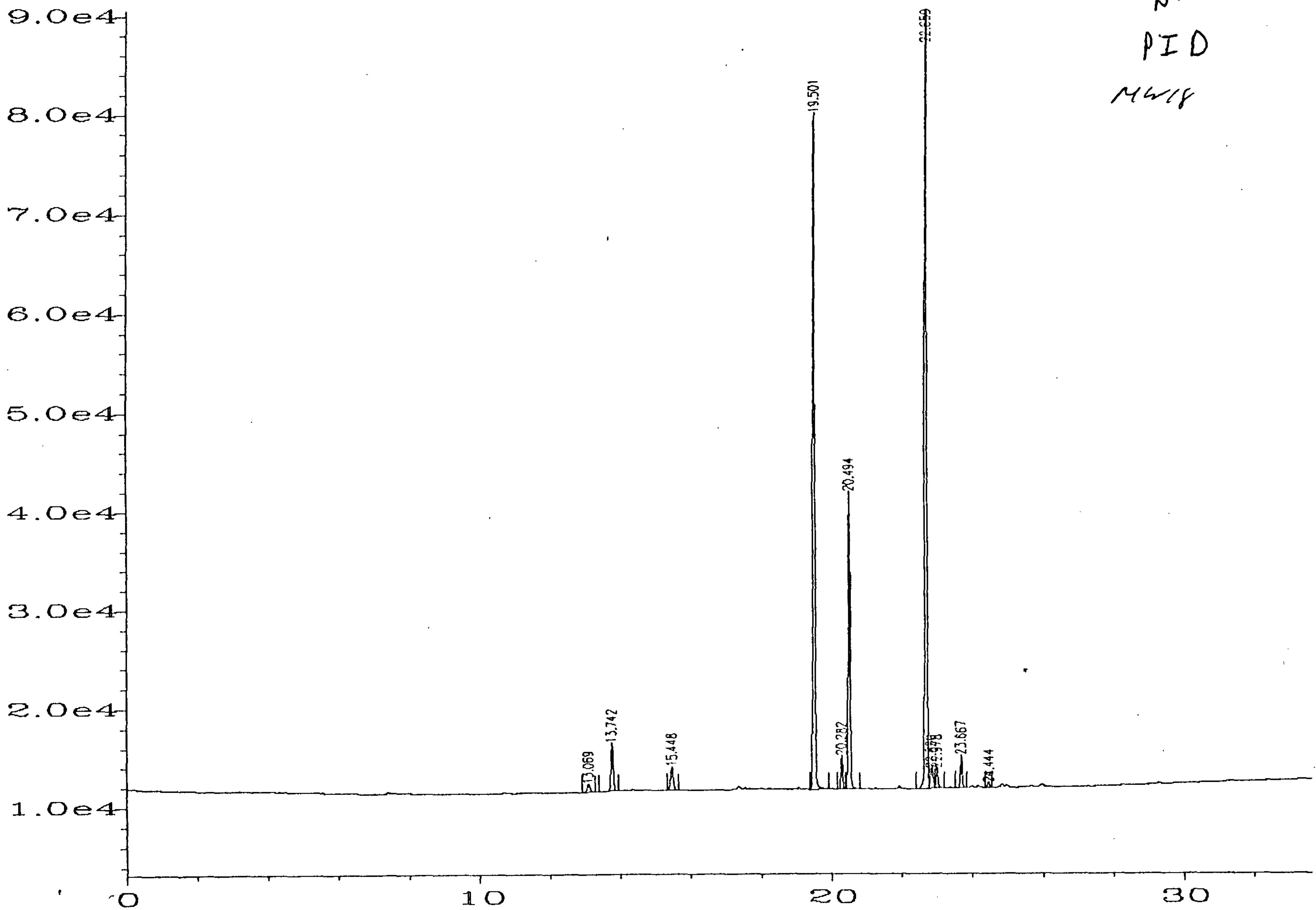
Sample # 28034
DF 100
PID
MW18



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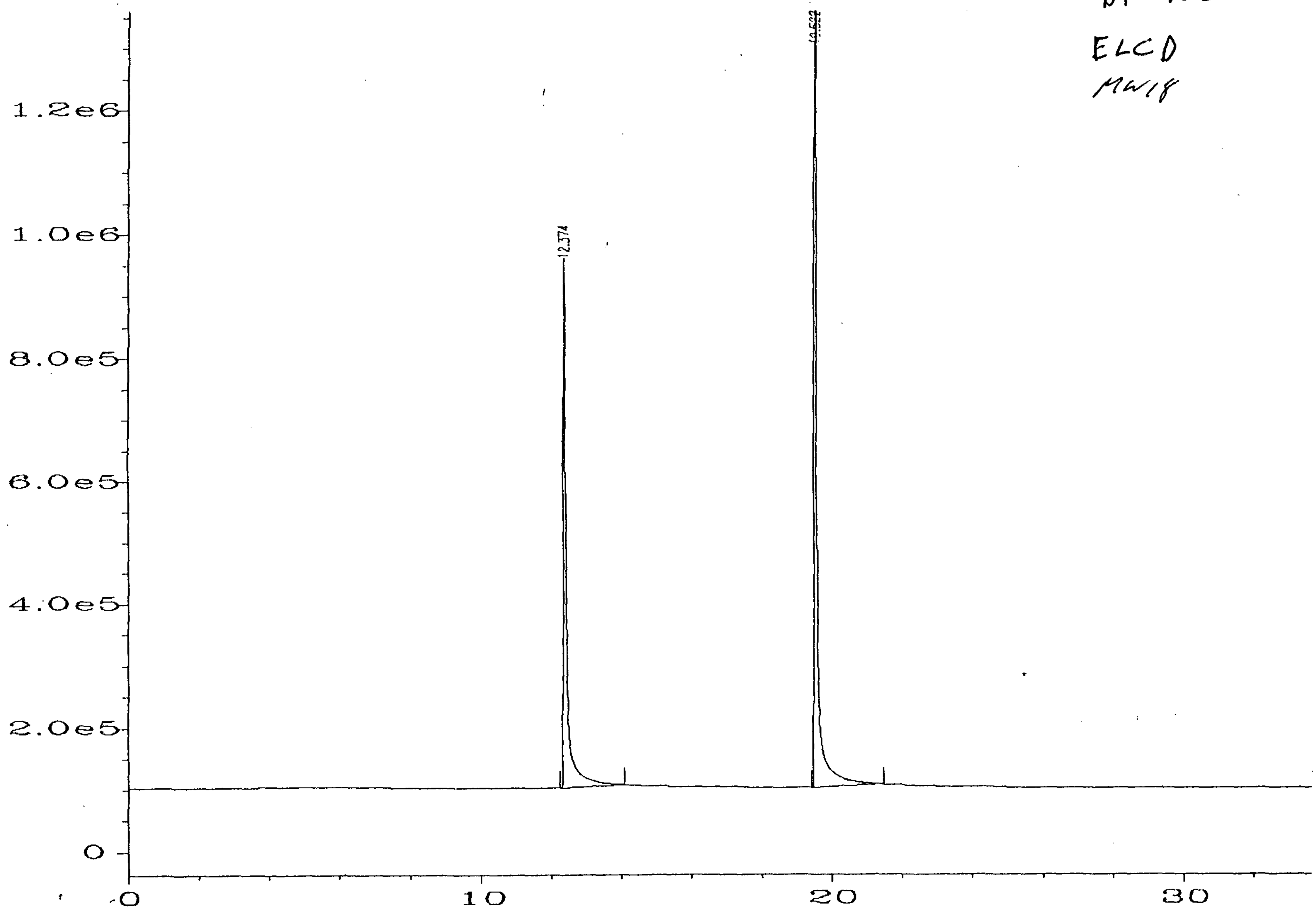
Sample # 28034
DF 100
ELCD
MW18



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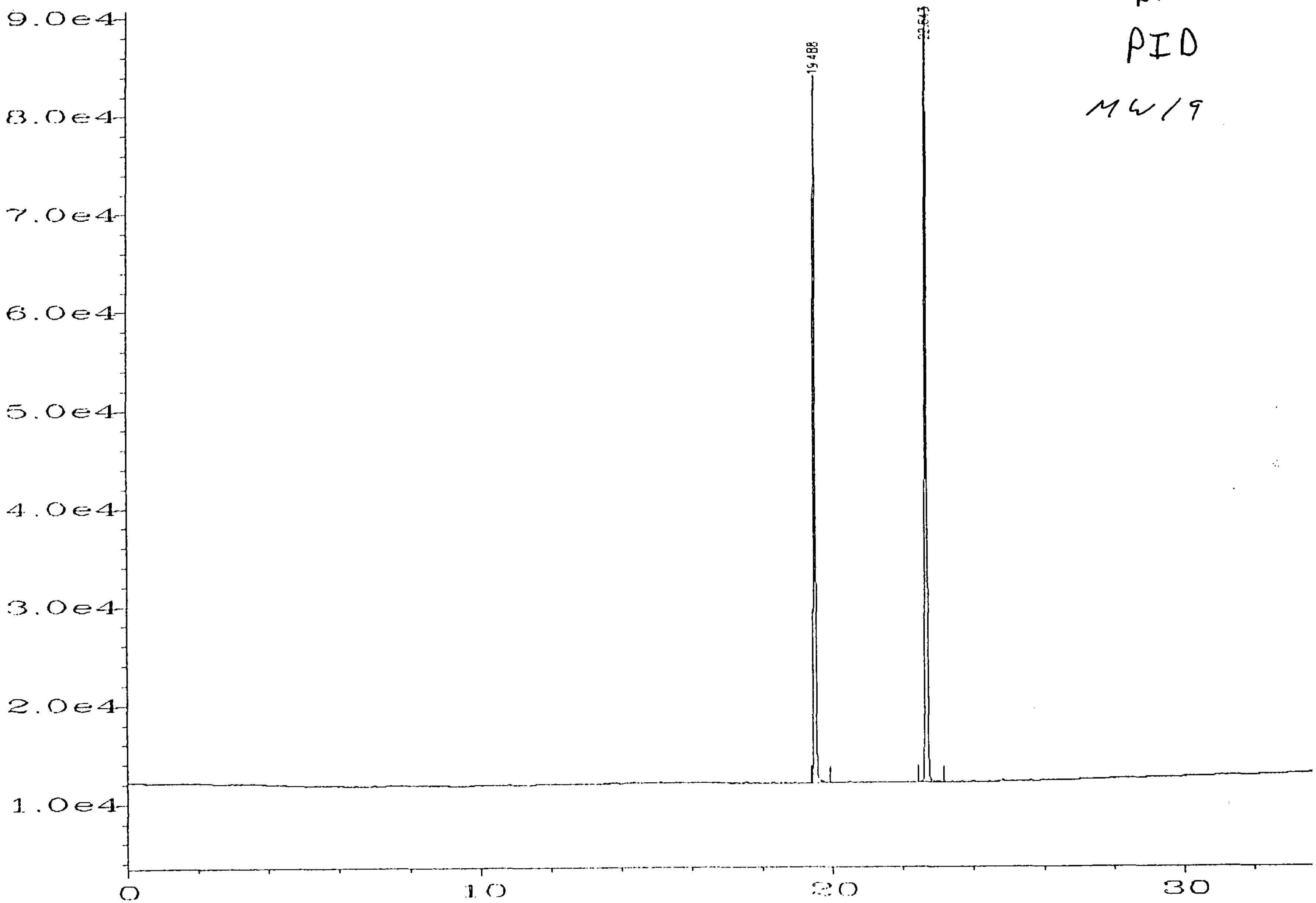
Sample # 28025
DF 1
PID
MW/9



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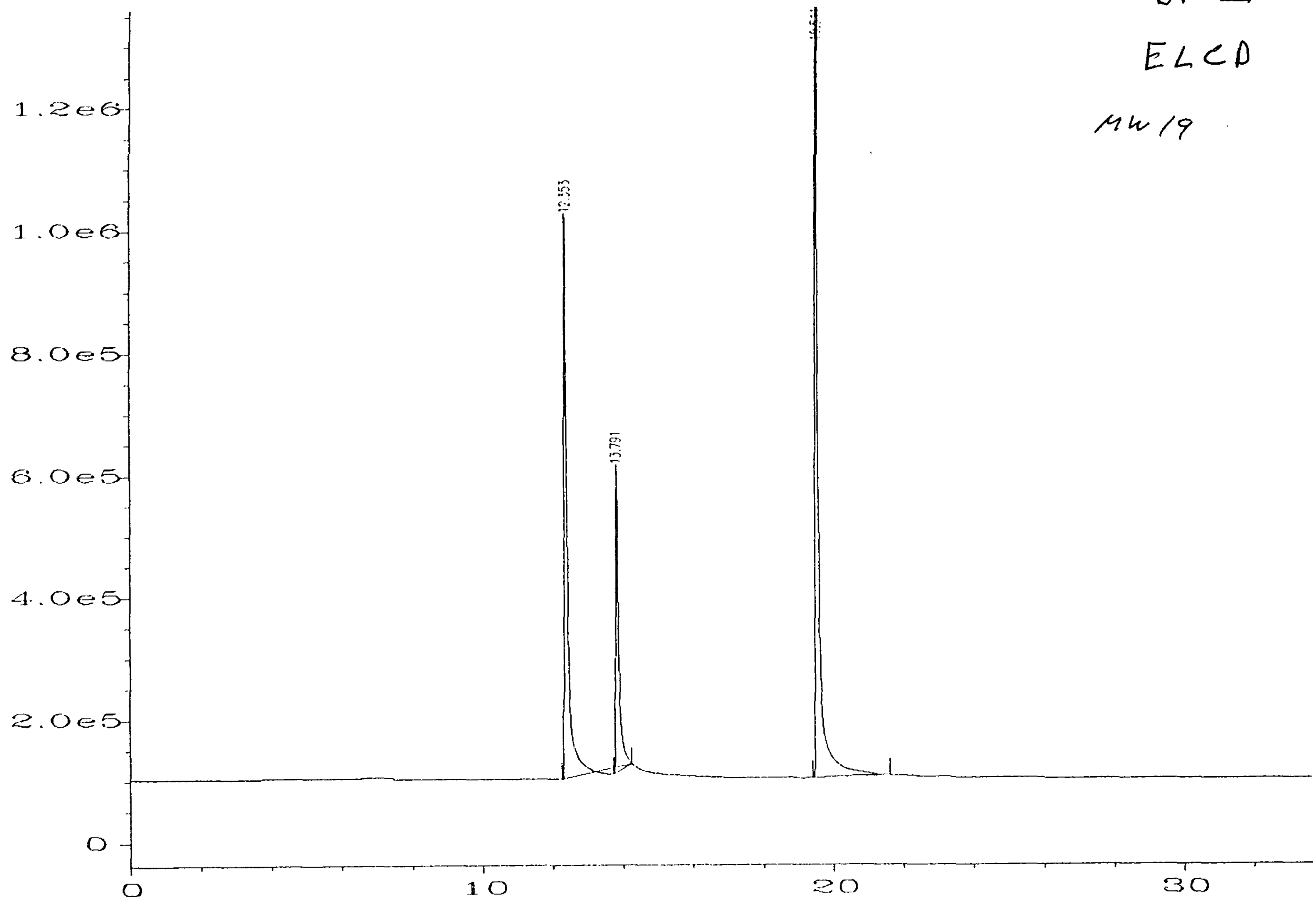
Sample # 28025
DF 1
ELCD
MW/19



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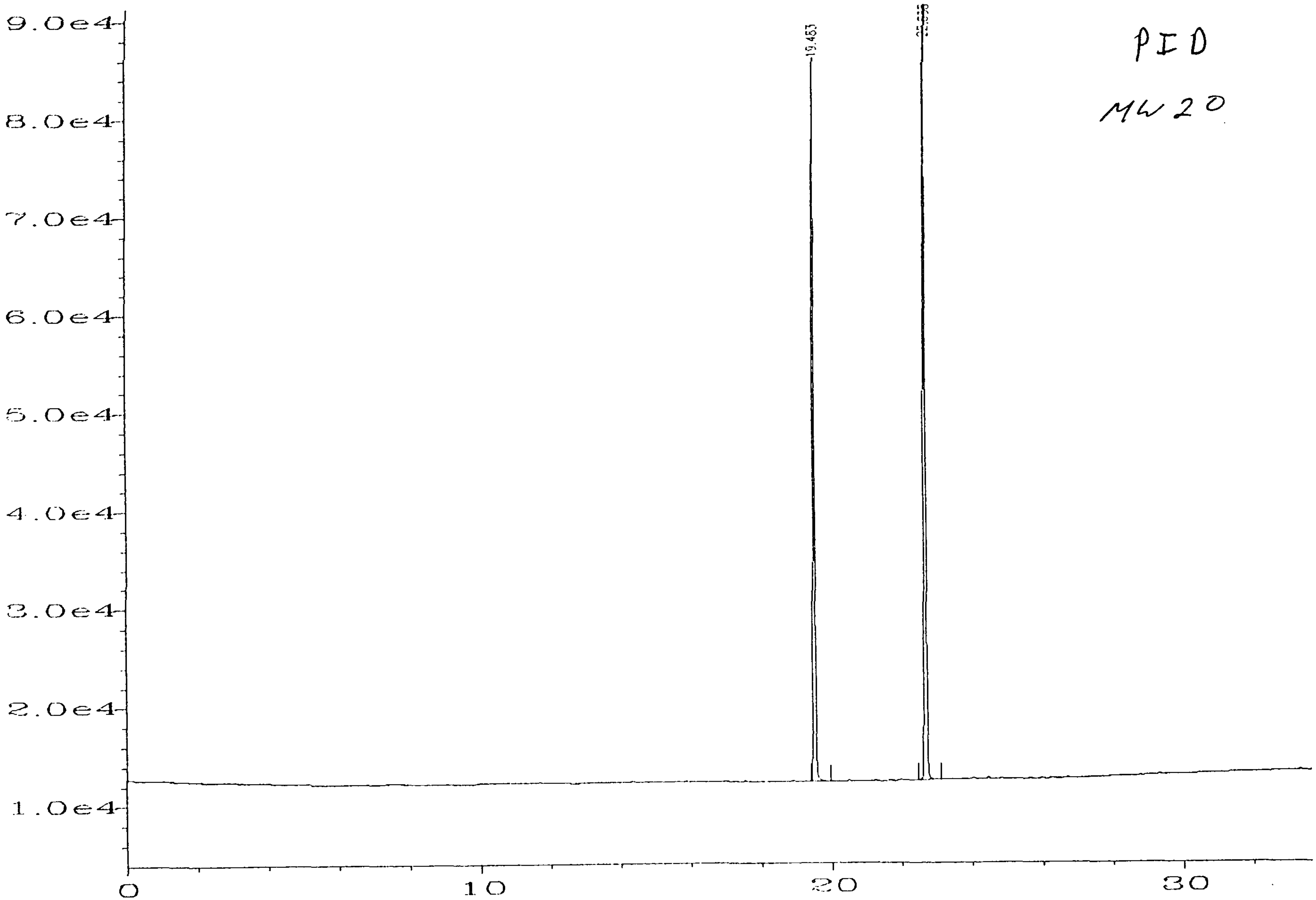
Sample # 28026
DF 1
PID
MW 20



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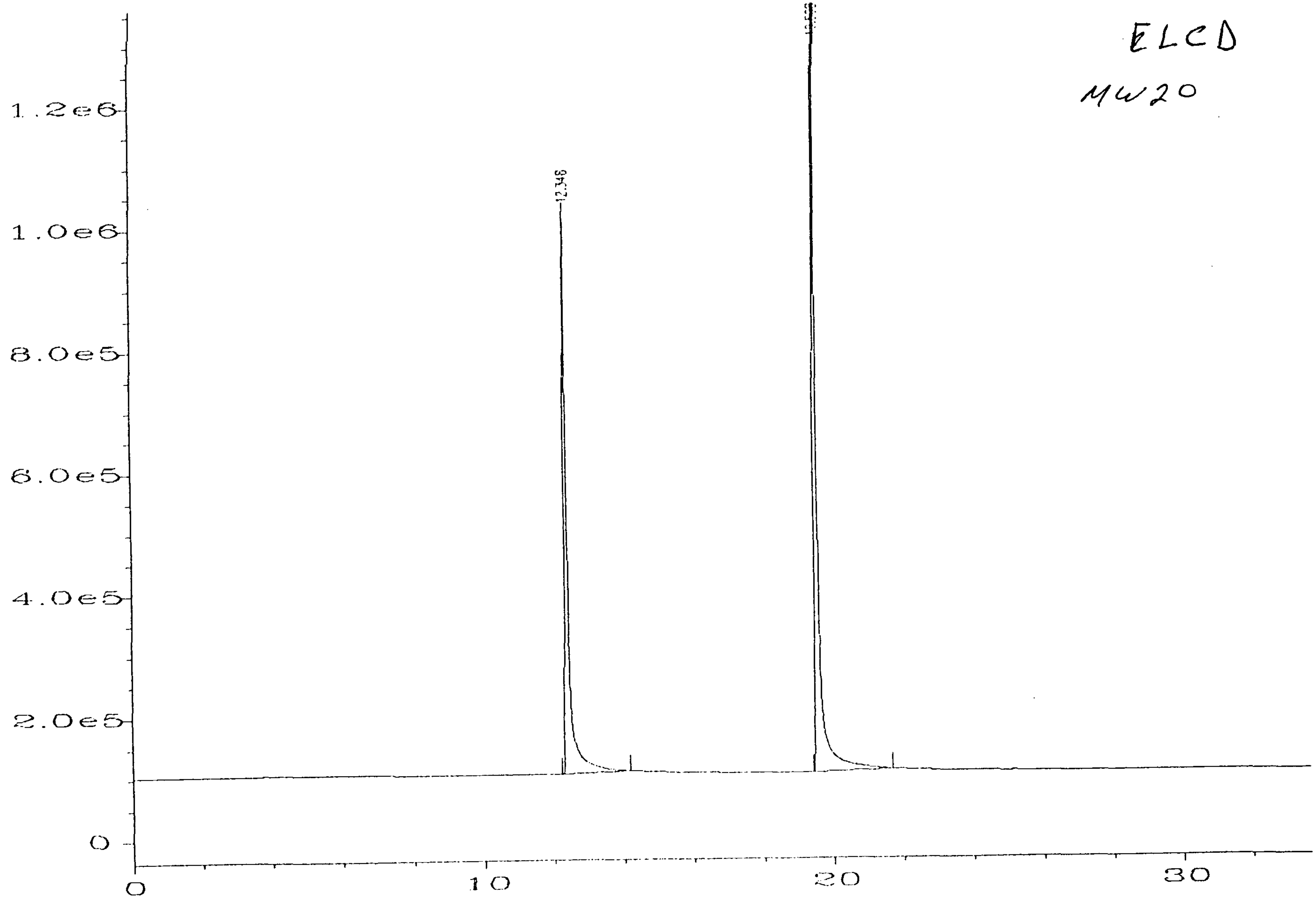
Sample # 28026
DF 1
ELCD
MW20



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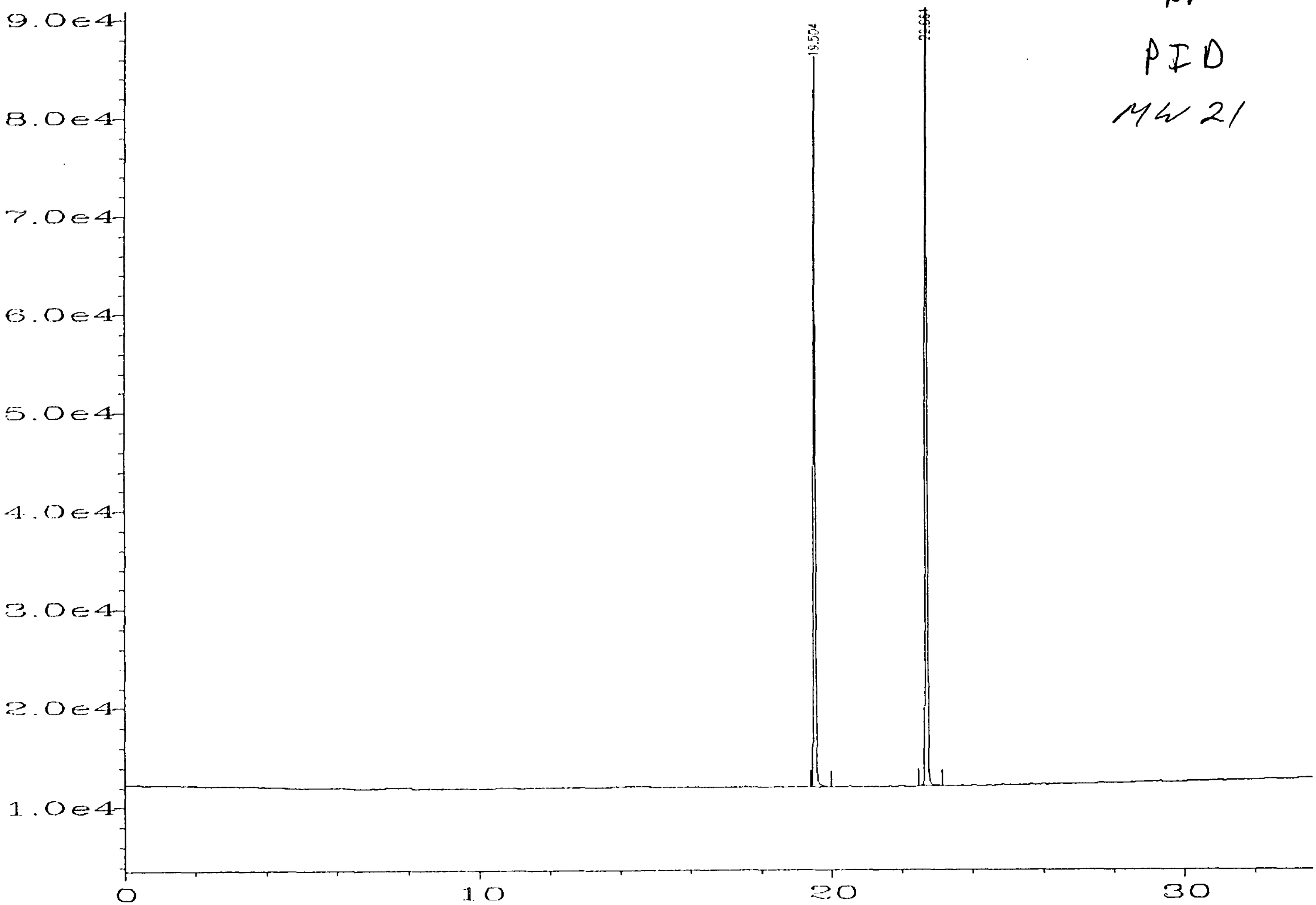
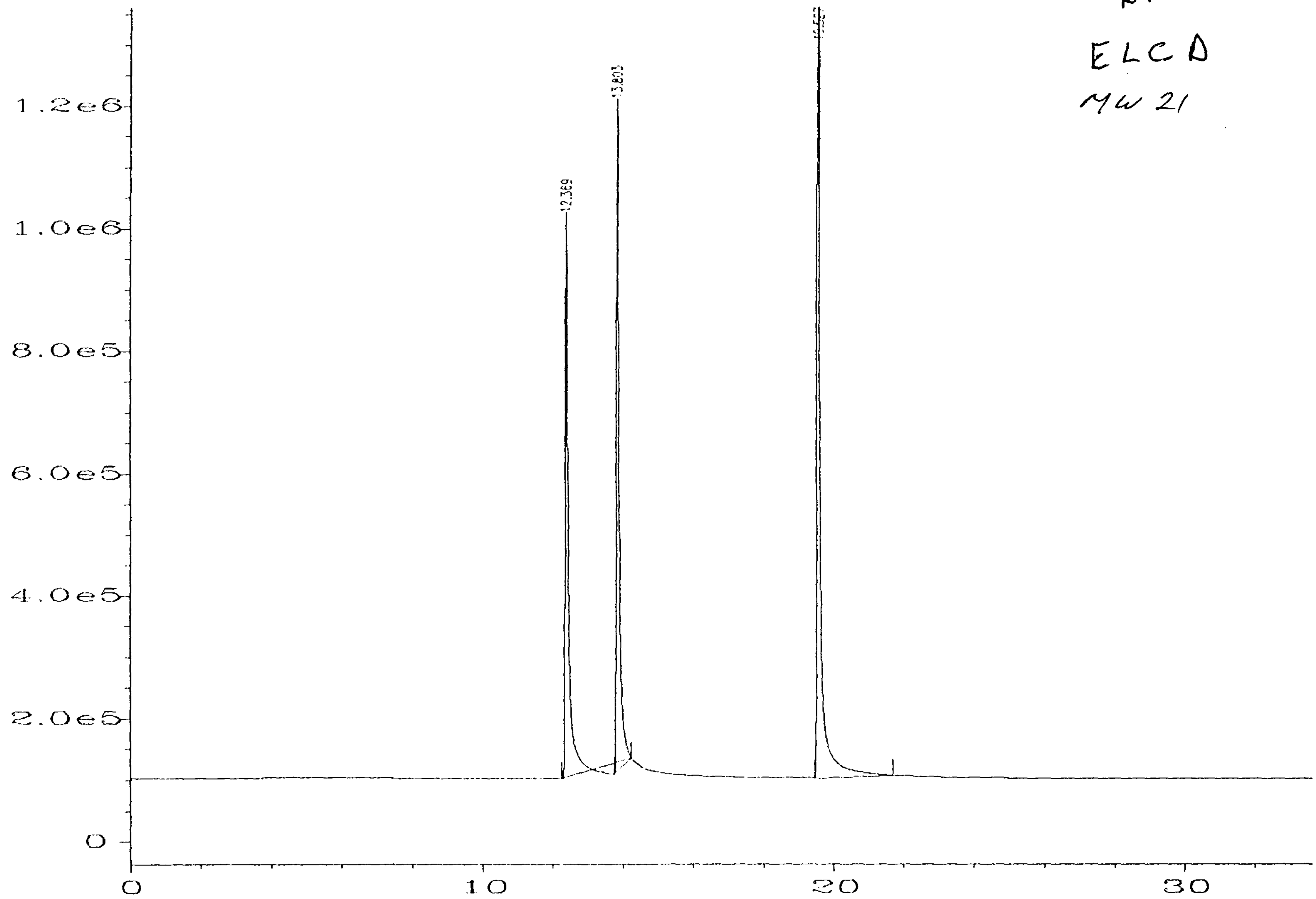
Sample # 28024
DF 1
PID
MW 21



Sig. 2 in C:\HPCHEM\1\DATA\19JUNVOL\021R0701.D

Sample # 28024
DF 1
ELCD
MW 21



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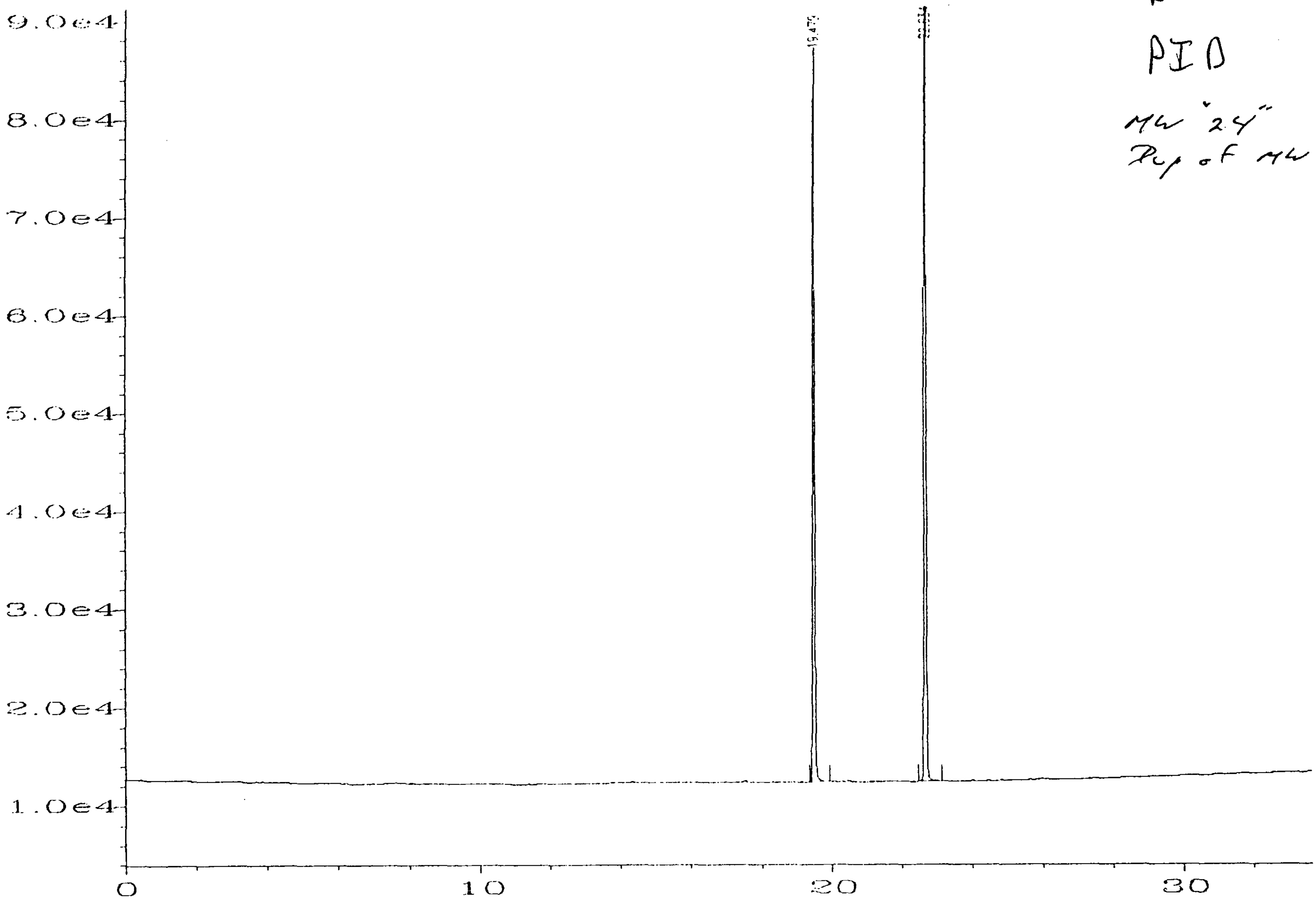
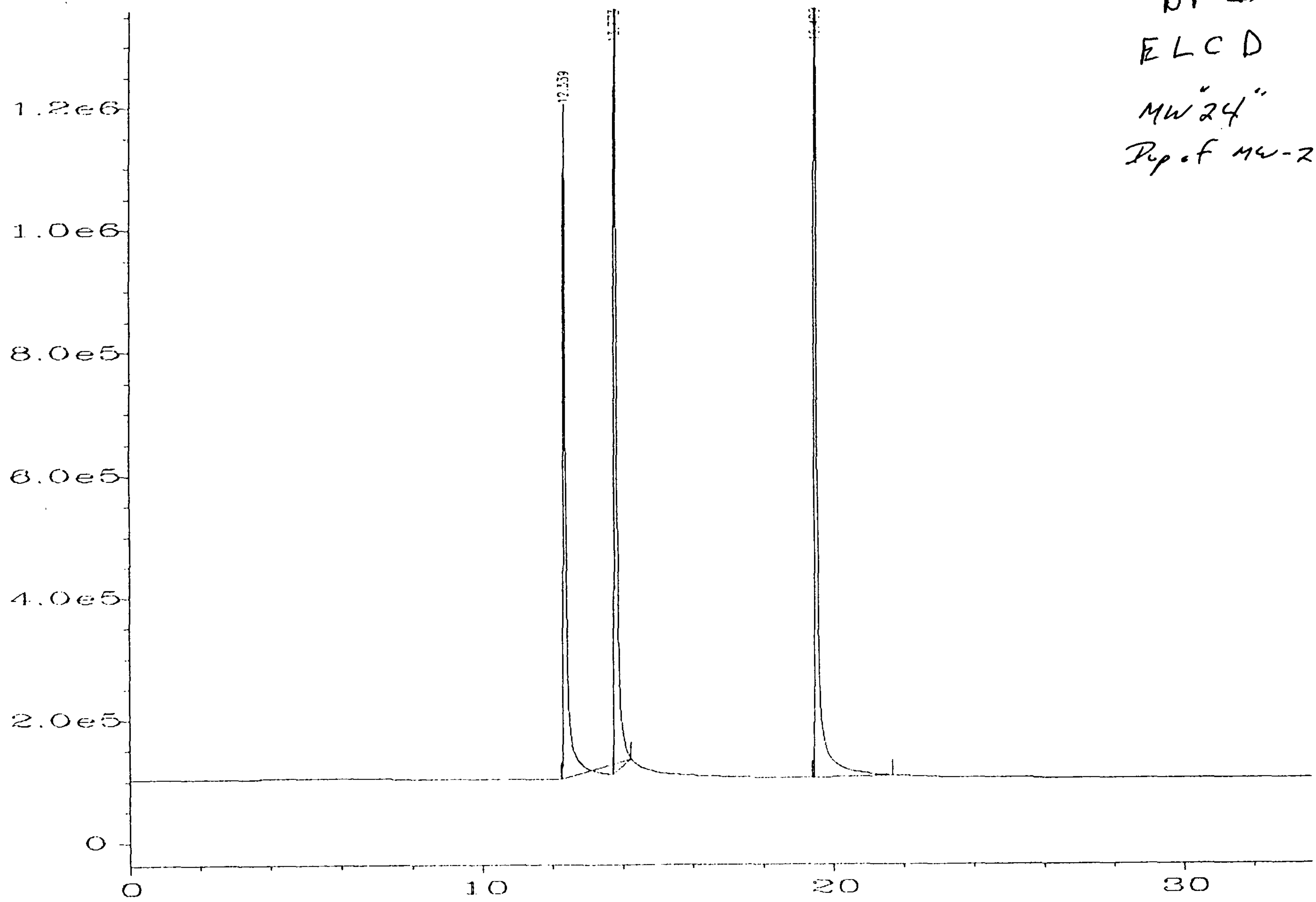
Sample # 28027
DF 1
PID
MW "24"
Dup of MW-21



Sig. 2 in C:\HPCHEM\1\DATA\19JUNVOL\024R0701.D

Sample # 28027
DF 1
ELCD
MW "24"
Dup. of MW-21



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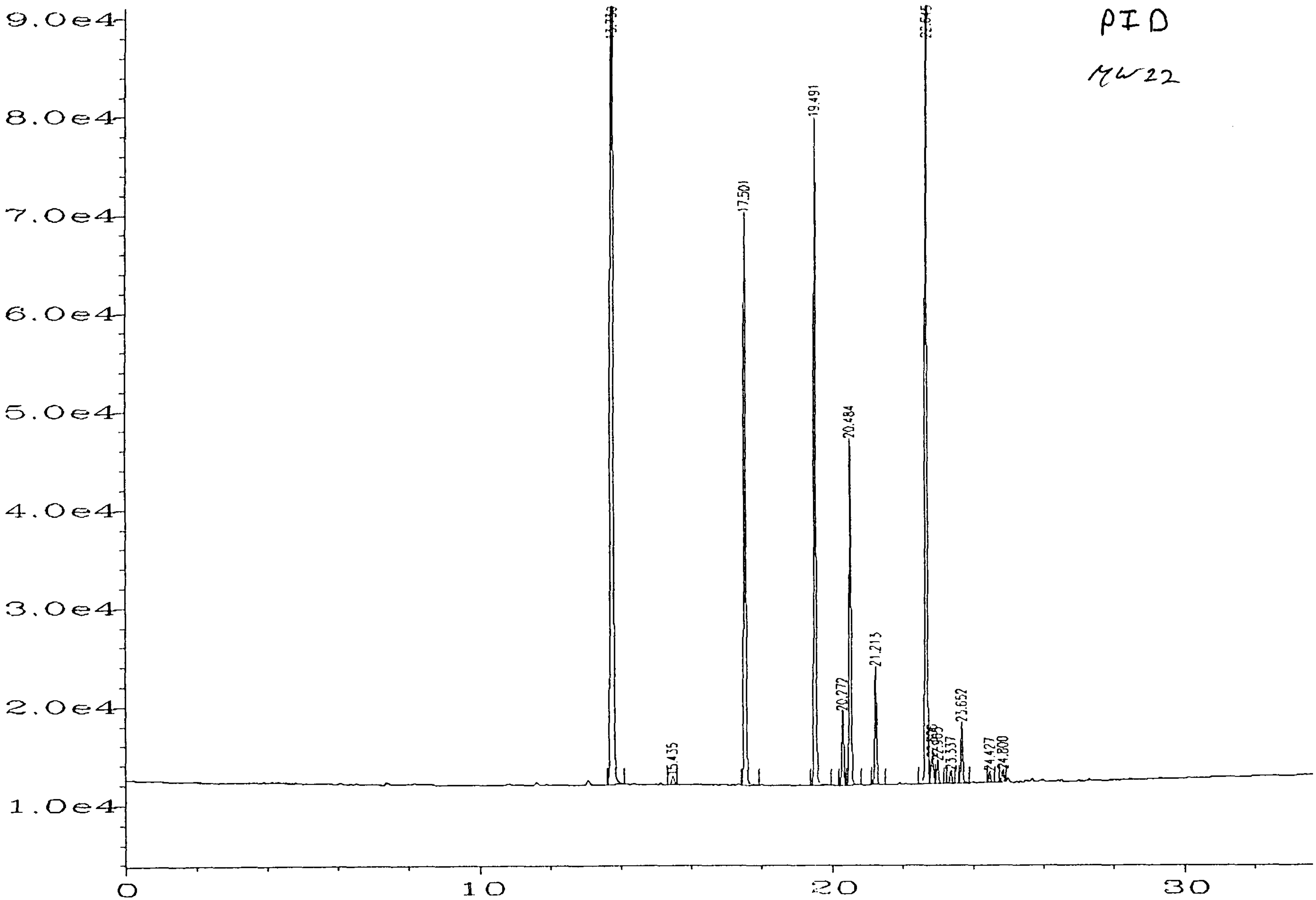
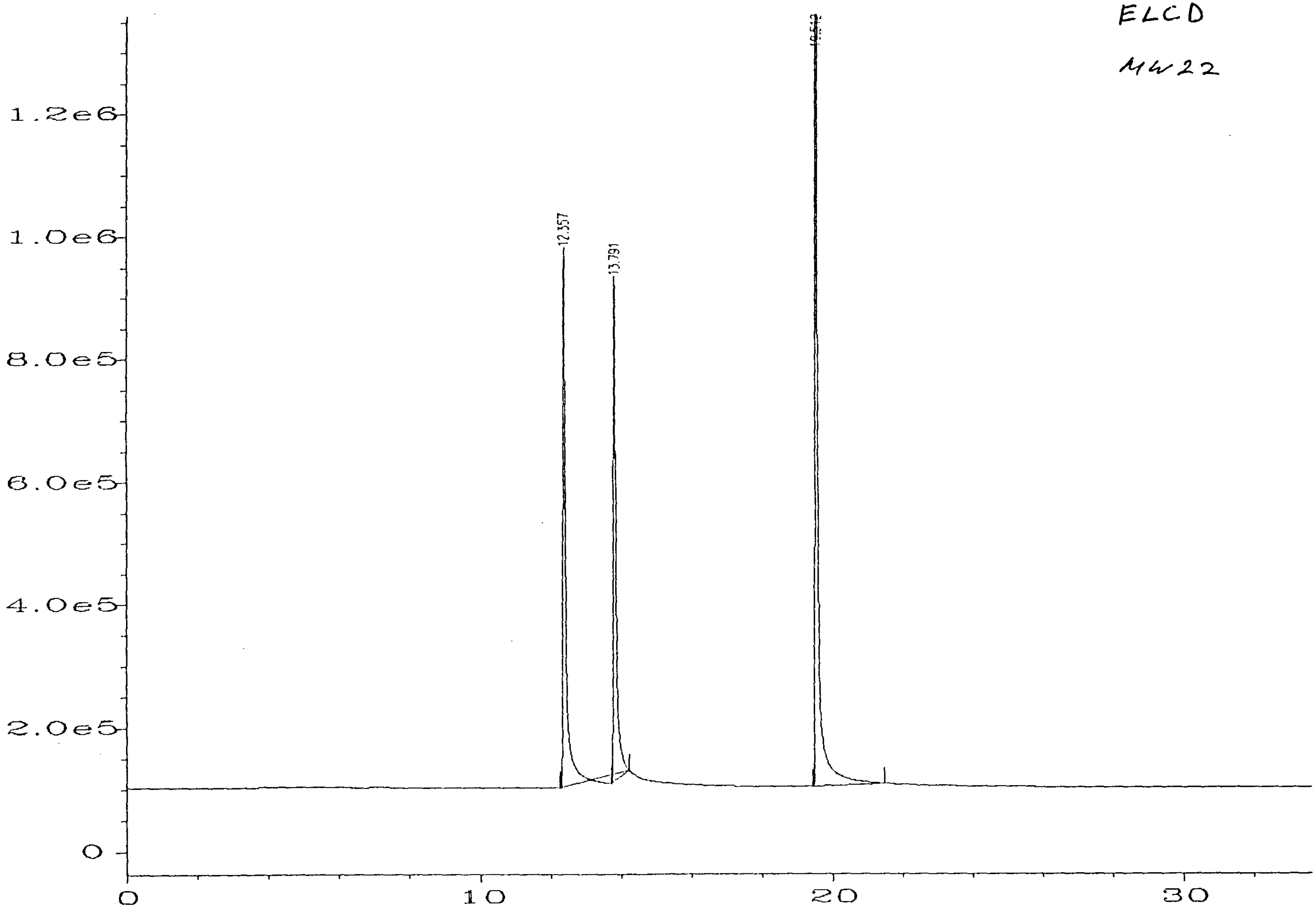
Sample # 28031
DF 200
PID
MW22



Sig. 2 in C:\HPCHEM\1\DATA\19JUNVOL\049R0101.D

Sample # 28031
NF 200
ELCD
MW22



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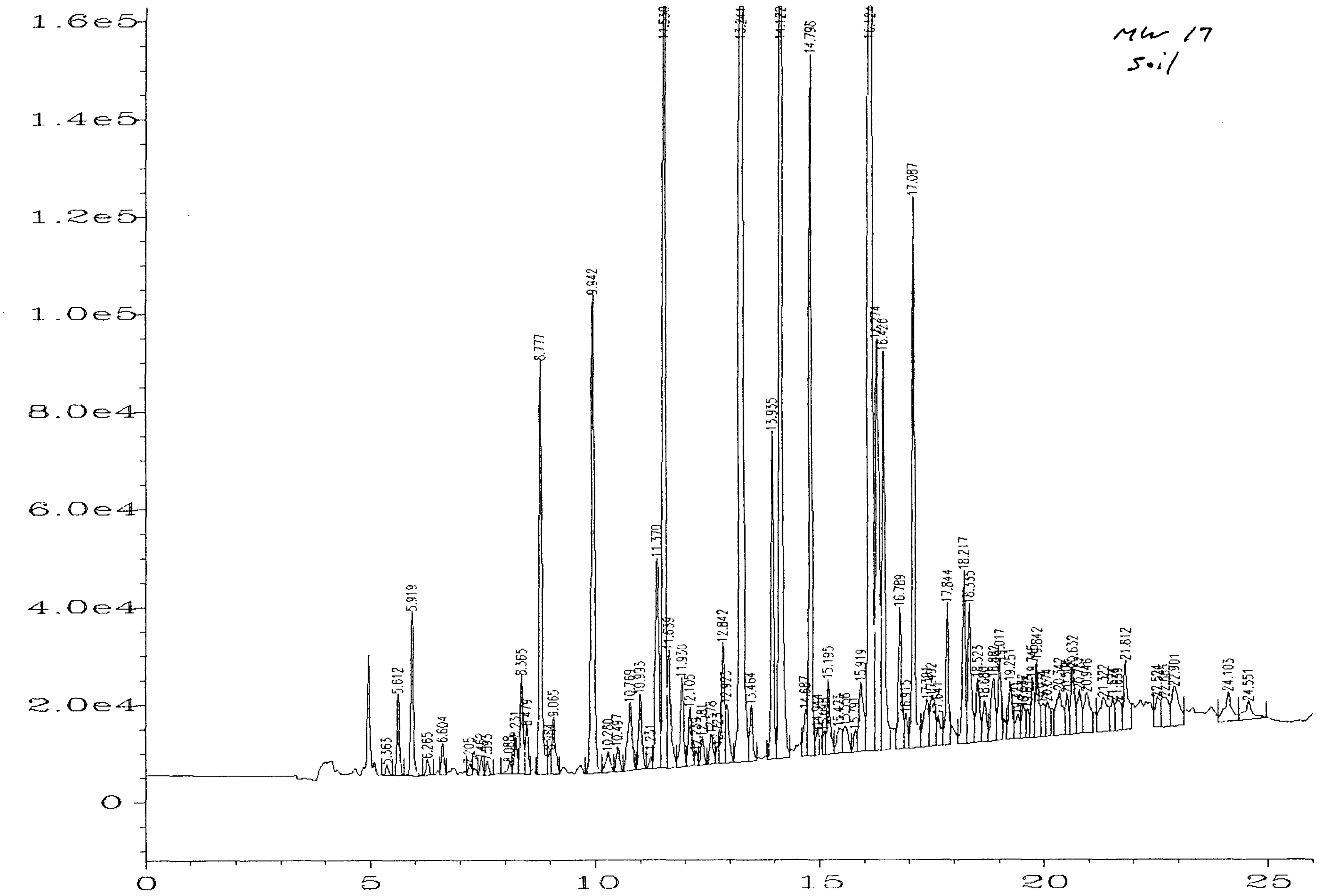
Sample # 28028
DF 20

MW 17
Soil



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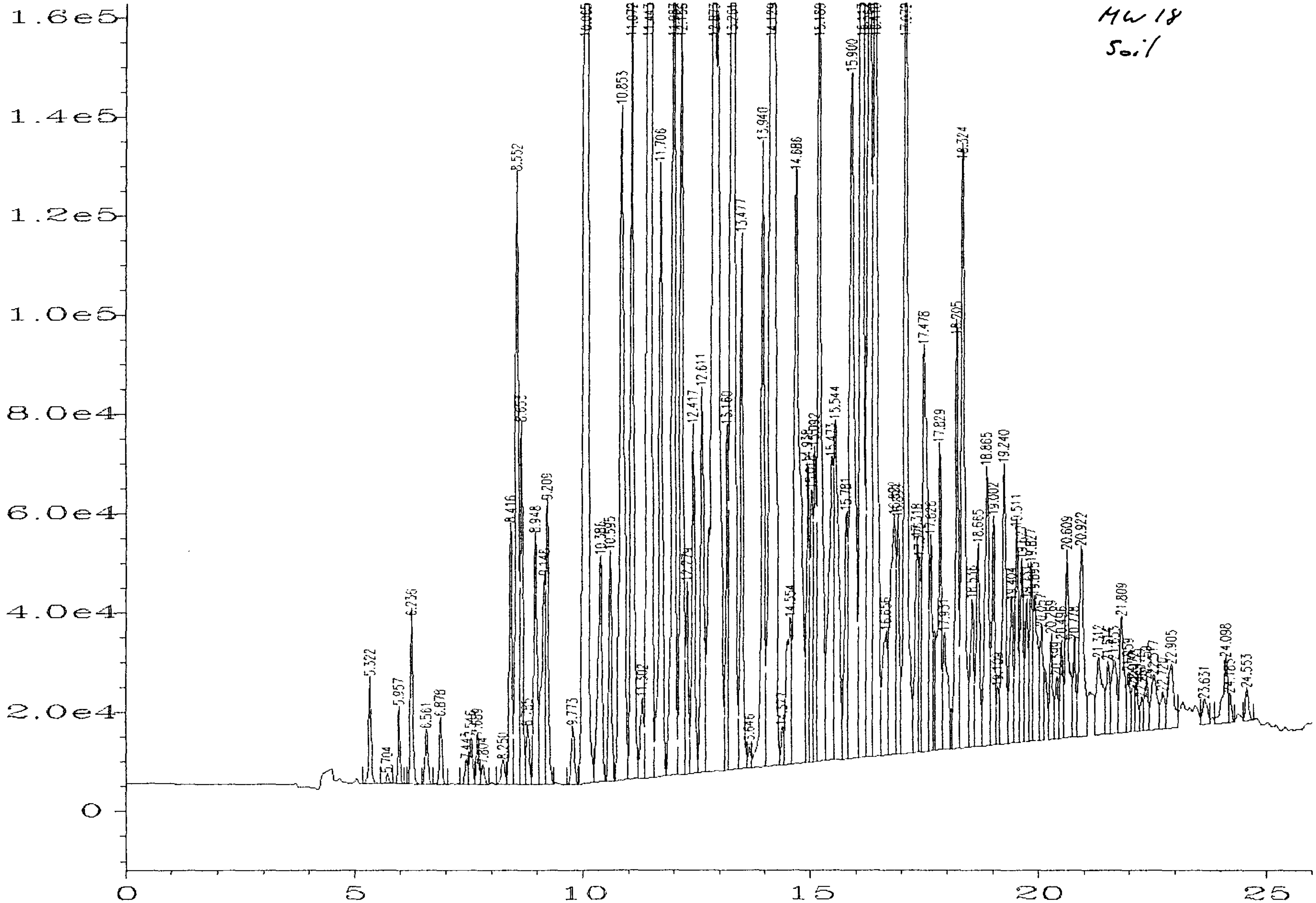
Sample # 28029
DF 20

MW 18
Soil



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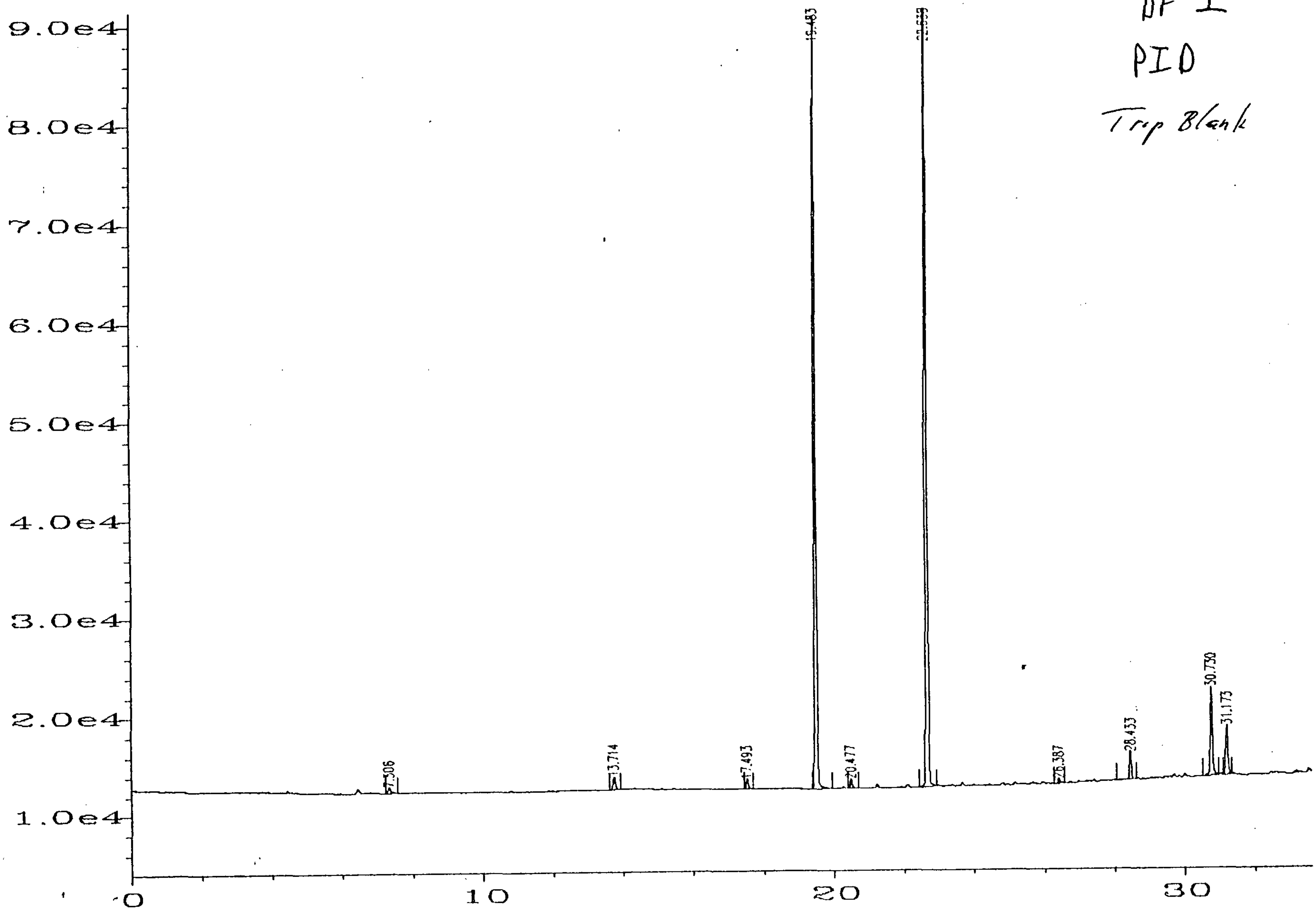
Sample # 28033
DF 1
PID
Trip Blank



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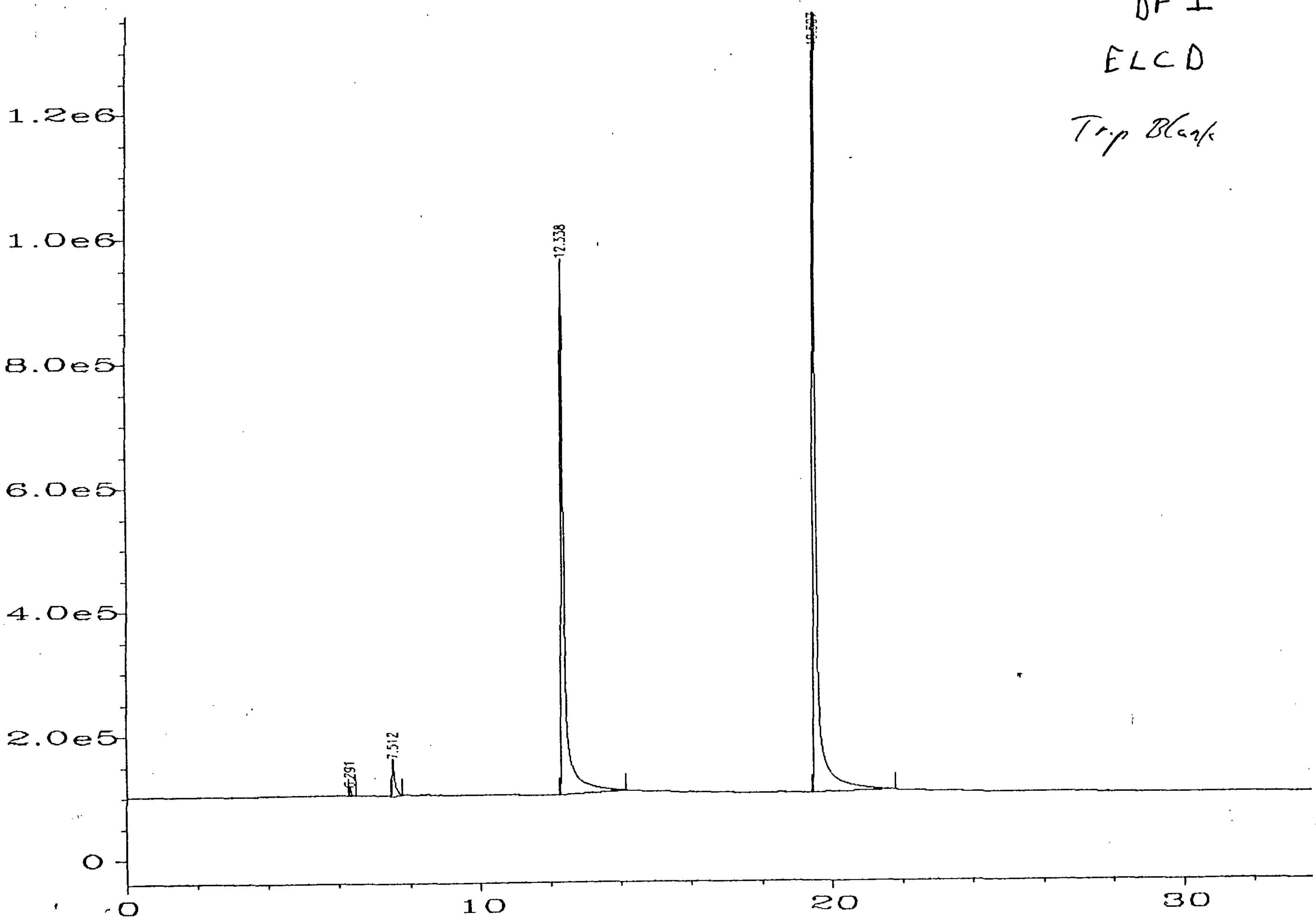
Sample # 28033
DF 1
ELCD
Trip Blank



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CHAIN-OF-CUSTODY

Project No. 9131.01

Project Name: 2nd Qtr 1992 GW MON Maverik Kirtland Refinery

Samplers: (Signature) PRW/TMC

Sample No.	Date	Time	Sample Location	No. of Containers	BTEX 8020	DCA 8010	Sulfide	Sulfate	BTEX(sw)		Remarks
MW-9	6/9/92	17:10		4	2	2					
MW-10		15:20		4	2	2					
MW-13		16:45		4	2	2					
MW-14		17:30		4	2	2					
MW-15		16:10		4	2	2					
MW-16		17:50		4	2	2					
MW-21		12:15		3	2	1					
MW-19		15:40		4	2	2					
MW-20		14:15		3	2	1					
MW-24		11:00		3	2	1					
MW17	6/12/92	10:30		7	2	2	1	1	1		
MW22	6/12/92	12:00		6	2	2	1	1			
MW18	6/12/92	10:15		5	2	2			1		

Relinquished by: (Signature)	Date/Time	Recieved by: (Signature)	Relinquished by: (Signature)	Date/Time	Recieved by: (Signature)
[illegible]	6/12 13:30	[illegible]	[illegible]	6/15 8:43	[illegible]
Relinquished by: (Signature)	Date/Time	Recieved by: (Signature)	Relinquished by: (Signature)	Date/Time	Recieved by: (Signature)
Relinquished by: (Signature)	Date/Time	Recieved for Laboratory by: (Signature)	Date/Time		

Remarks:

GeoWest Golden, Inc.

530 Commons Drive Golden, CO 80401 (303) 526-9838

06 13 92
~~06~~ A

CHAIN-OF-CUSTODY 1837

Project No. 9202.02

Project Name: MAVERIK - AZTEC

Samplers: (Signature) TRW, AMC

Sample No.	Date	Time	Sample Location	No. of Containers	MTBE	BTEX	EDB	EDC			Remarks
MW-2	6/11/92	1730	Monitor Well MW-2	4	X	X	X	X			

(Analysis Requested)

Relinquished by: (Signature)	Date/Time	Recieved by: (Signature)	Relinquished by: (Signature)	Date/Time	Recieved by: (Signature)
[signature]	6/12 1330	[signature]	[signature]	6/15 8:43	[signature]
Relinquished by: (Signature)	Date/Time	Recieved by: (Signature)	Relinquished by: (Signature)	Date/Time	Recieved by: (Signature)

Relinquished by: (Signature)	Date/Time	Recieved for Laboratory by: (Signature)	Date/Time

Remarks:

GeoWest Golden, Inc.
530 Commons Drive Golden, CO 80401 (303) 526-9838

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

(Carey)

CONSER... ...N DIVISION
RE... ...ED
'92 JU... ... AM 9 18

RECEIVED

JUN 29 1992

GROUND WATER BUREAU

Mr. Steve Carey, Chief
Groundwater Protection and
Remediation Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

Re: Preliminary Assessment (PA) and/or
Site Inspection (SI) Reports

Dear Mr. Carey:

Enclosed for your information and files are copies of Superfund Site Strategy Recommendations (SSSR) and associated reports prepared by the Environmental Protection Agency (EPA), for the following sites:

Site Name	EPA I.D.
Los Lunas Drug Lab	NMD986670057
Espanola Wells	NMD986670156
Mountainview Subdivision	NMD981523955
Artesia Tar Pits	NMD982311581
Old Socorro Landfill	NMD981523004
Hop Canyon	NMD981600455
Carnue-Deadman's Curve Site	NMD986667392
G.E. Aircraft Engines	NMD052684578
Motorola Ceramic Products	NMD000804229
Goodman Mill Site	NMD986661864
Salome Transformers	NMD986668416
Hillsboro Smelter Site	NMD986681872
Tucumcari Carbon Tetrachloride	NMD986677201
Caribou Refinery	NMD981151608

Should you have any questions, please contact me or have your staff call Lonnie Ross at (214) 655-6740.

Sincerely,

Eddie A. Sierra

Eddie A. Sierra, Chief
Site Assessment Section (6H-MA)

Enclosure

Printed on Recycled Paper

Superfund Site Strategy Recommendation

SITE NAME: Caribou Refinery SITE NUMBER: NMD981151608

ALIAS SITE NAME:

ADDRESS:

CITY/COUNTY OR PARISH: Kirtland / San Juan

STATE: NM ZIP:

RECOMMENDATION:

1. NO FURTHER ACTION PLANNED/UNDER SUPERFUND: X

2. FURTHER PRE-REMEDIAL INVESTIGATION ACTION NEEDED UNDER SUPERFUND:

PA:
SSI: PRIORITY: HIGH: LOW:
LSI:
OTHER:
TO BE PERFORMED:

3. ACTION MAY BE APPROPRIATE UNDER OTHER AUTHORITY: X RCRA: X
NPDES: SPCC: 404: TSCA: UIC:
SMCRA: STATE: X OTHER: ERB

DISCUSSION:

Caribou Refinery was tasked to FIT as Site Inspection Prioritization (SIP). As an SIP, a HRS Prescore analysis was performed using existing data.

Caribou Refinery is an inactive crude topping refinery. The site is comprised of an inactive tank farm area, refinery apparatus, and a Maverick Convenience store. Within the tank farm area, several above-ground tanks and two waste pits were identified.

The pathways of concern for this site are groundwater and surface water. Contamination attributable to the refinery has been detected in two downgradient residential wells. The contamination in one well was above health based bench mark for 1,2-dichloroethane (Level I). However even with the observed release to groundwater and the contamination in two drinking water wells, the site lacks significant population to influence

(con't pg 1 of 2)

Copies to (please list): NMED, ATSDR, 6E-E, 6W-SP

RECOMMENDED BY: [signature] DATE: 01/23/92

APPROVED BY: [signature] DATE: 2/12/92

the groundwater pathway for NPL consideration.

The site also has been impacting the surface water in the area. Contaminants were detected in Brimhall irrigation ditch. Surface water in this area is use for irrigation of cash crop, hay and field corn. Resources is the only surface water target impacted by the refinery.

Therefore, based on the prescore evaluation of Caribou Refinery, it is recommended that a No Further Remedial Action be Planned under Superfund decision assigned to the site.

RECOMMENDATION: NFRAP

Copies to (please list): NMED, ATSDR, 6E-E, 6W-SP

RECOMMENDED BY: Lonnie Ross DATE: 01/23/92

APPROVED BY : ______________ DATE: ________

Reading File

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

RECEIVED

JUN 29 1992

GROUND WATER BUREAU

June 18, 1992

Mr. Steve Carey, Chief
Groundwater Protection and
Remediation Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

Dear Mr. Carey:

Enclosed for your information and files, is a copy of the Superfund Site Strategy Recommendation (SSSR) and Preliminary Assessment (PA) for the following sites:

Site Name	EPA ID	Report Reviewed/ Site Recommendation
Beeline Refinery	NMD986673416	PA/No further remedial action planned
Bear Creek Tailings	NMD986676906	PA/Screening Site Inspection (SSI)
Gooch's Tank Service	NMD986676880	PA/No further remedial action planned
Van Waters and Rogers	NMD080370786	PA/No further remedial action planned

Should you have any questions, please contact me, or have your staff contact Lonnie Ross, at (214) 655-6740.

Sincerely,

Eddie A. Sierra

Eddie A. Sierra, Chief
Superfund Site Assessment Section (6H-MA)

Enclosures

Superfund Site Strategy Recommendation

SITE NAME: Beeline Refinery SITE NUMBER: NMD986673416

ALIAS SITE NAME:

ADDRESS: 1/16 mile SE of Kira Lane

CITY/COUNTY OR PARISH: Farmington / San Juan

STATE: NM ZIP:

RECOMMENDATION:

1. NO FURTHER ACTION PLANNED UNDER SUPERFUND: X

2. FURTHER PRE-REMEDIAL INVESTIGATION ACTION NEEDED UNDER SUPERFUND:

PA:
SSI: PRIORITY: HIGH: MEDIUM:
LSI:
OTHER:
TO BE PERFORMED:

3. ACTION MAY BE APPROPRIATE UNDER OTHER AUTHORITY: RCRA:
NPDES: SPCC: 404: TSCA: UIC:
SMCRA: STATE: OTHER:

DISCUSSION:

A citizen compliant alleged that 100,000 gallons easte oil from Beeline Refinery was dumped into an arroyo. These allegations remain unconfirmed due to snow coverage limited visual identification of the spill area. However, environmental targets are lacking for groundwater, surface water, soil exposure, and air pathways.

RECOMMENDATION: NO FURTHER REMEDIAL ACTION PLANNED (NFRAP)

Copies to (please list): NMED ~~TWC~~, ATSDR, 6W-SP, 6E

RECOMMENDED BY: Ronnie Ross DATE: 12/26/91

APPROVED BY: Keith Williamson DATE: 1/6/92

Inter-Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

CASE NARRATIVE

On June 16, 1992, 2 water samples were received by Inter-Mountain Laboratories - College Station, Texas. They were received warm and intact and were identified by Client Name "Maverik Rerinery". Analysis for Method 601 - Purgable Halocarbons was performed according to the accompanying chain of custody form.

The elevated detection limit for 1,2-Dichloroethane in the report for sample MW-17 (C921134/8963) is due to a dilution factor necessary to bring the analyte concentration to within calibration limits. The elevated detection limit for 1,1,2,2-Tetrachloroethane in all reports is due to surrogate interference with the analyte .

It is the policy of this laboratory to employ, whenever possible, preparatory and analytical methods which have been approved by regulatory agencies. The methods used in the analyses of samples reported here are found in "Code of Federal Regulations", 40 CFR Part 136, USEPA, 1984.

Quality Control reports have been included for your information and use. These reports appear at the end of the analytical package and may be identified by title. If there are any questions regarding the information presented in this package, please feel free to call at your convenience.

Sincerely,

Lance Looper

Lance Looper
Project Manager

IMLF1134

Inter-Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

METHOD 601
PURGEABLE HALOCARBONS

Client:	**MAVERIK REFINERY**		
Project Name:	Kirtland, NM	Report Date:	06/22/92
Sample ID:	MW-17	Date Sampled:	06/12/92
Sample Number:	C921134 / 8963	Date Received:	06/16/92
Sample Matrix:	Water	Date Analyzed:	06/19/92
Preservative:	None		
Condition:	Intact		

Analyte	Concentration (ug/L)	Detection Limit (ug/L)
Bromodichloromethane	ND	1.0
Bromoform	ND	1.0
Bromomethane	ND	1.0
Carbon tetrachloride	ND	1.0
Chlorobenzene	ND	1.0
Chloroethane	ND	1.0
2-Chloroethylvinyl ether	ND	1.0
Chloroform	ND	1.0
Chloromethane	ND	1.0
Dibromochloromethane	ND	1.0
1,2-Dichlorobenzene	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0
Dichlorodifluoromethane	ND	1.0
1,1-Dichloroethane	2.3	1.0
1,2-Dichloroethane	67.2	5.0
1,1-Dichloroethene	ND	1.0
trans-1,2-Dichloroethene	ND	1.0
1,2-Dichloropropane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
Methylene Chloride	2.2 B	1.0
1,1,2,2-Tetrachloroethane	ND	5.0
Tetrachloroethene	ND	1.0
1,1,1-Trichloroethane	ND	1.0
1,1,2-Trichloroethane	ND	1.0
Trichloroethene	ND	1.0
Trichlorofluoromethane	1.7 B	1.0
Vinyl chloride	3.1	1.0

ND - Analyte not detected at stated detection limit.
B - Analyte detected in blank.

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

METHOD 601
PURGEABLE HALOCARBONS
Page 2 - Quality Control

Client:	**MAVERIK REFINERY**		
Project Name:	Kirtland, NM	Report Date:	06/22/92
Sample ID:	MW-17	Date Sampled:	06/12/92
Sample Number:	C921134 / 8963	Date Received:	06/16/92
Sample Matrix:	Water	Date Analyzed:	06/19/92
Preservative:	None		
Condition:	Intact		

Quality Control:	Surrogate	Percent Recovery	Acceptance Limits
	1,2-Dichloroethane-d4	93%	76-114%

Reference: Method 601 - Purgeable Halocarbons
Code of Federal Regulations, 40 CFR Part 136, USEPA, October 1984

Comments:

Lance Cooper
Analyst

Wenda M Hogan
Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

METHOD 601
PURGEABLE HALOCARBONS

Client:	**MAVERIK REFINERY**		
Project Name:	Kirtland, NM	Report Date:	06/23/92
Sample ID:	MW-18	Date Sampled:	06/12/92
Sample Number:	C921135 / 8964	Date Received:	06/16/92
Sample Matrix:	Water	Date Analyzed:	06/19/92
Preservative:	None		
Condition:	Intact		

Analyte	Concentration (ug/L)	Detection Limit (ug/L)
Bromodichloromethane	ND	1.0
Bromoform	ND	1.0
Bromomethane	ND	1.0
Carbon tetrachloride	ND	1.0
Chlorobenzene	ND	1.0
Chloroethane	ND	1.0
2-Chloroethylvinyl ether	ND	1.0
Chloroform	ND	1.0
Chloromethane	ND	1.0
Dibromochloromethane	ND	1.0
1,2-Dichlorobenzene	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0
Dichlorodifluoromethane	ND	1.0
1,1-Dichloroethane	ND	1.0
1,2-Dichloroethane	ND	1.0
1,1-Dichloroethene	ND	1.0
trans-1,2-Dichloroethene	ND	1.0
1,2-Dichloropropane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
Methylene Chloride	4.2 B	1.0
1,1,2,2-Tetrachloroethane	ND	5.0
Tetrachloroethene	ND	1.0
1,1,1-Trichloroethane	ND	1.0
1,1,2-Trichloroethane	ND	1.0
Trichloroethene	ND	1.0
Trichlorofluoromethane	18.1 B	1.0
Vinyl chloride	ND	1.0

ND - Analyte not detected at stated detection limit.
B - Analyte detected in blank.

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

METHOD 601
PURGEABLE HALOCARBONS
Page 2 - Quality Control

Client:	**MAVERIK REFINERY**		
Project Name:	Kirtland, NM	Report Date:	06/23/92
Sample ID:	MW-18	Date Sampled:	06/12/92
Sample Number:	C921135 / 8964	Date Received:	06/16/92
Sample Matrix:	Water	Date Analyzed:	06/19/92
Preservative:	None		
Condition:	Intact		

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
1,2-Dichloroethane-d4	83%	76-114%

Reference: Method 601 - Purgeable Halocarbons
Code of Federal Regulations, 40 CFR Part 136, USEPA, October 1984

Comments:

Lance Looper
Analyst

Wanda M Roger
Review

Inter-Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

QUALITY CONTROL REPORT - MATRIX SPIKE
Method 601 - PURGEABLE HALOCARBONS

Sample Number: C921135 SPK
Sample Matrix: Water
Preservative: None
Condition: Intact

Date Sampled: 06/12/92
Date Received: 06/16/92
Date Analyzed: 06/22/92

Analyte	Spike Added (ug/L)	Sample Result (ug/L)	Spike Result (ug/L)	Percent Recovery	Acceptance Limit
Carbon tetrachloride	10.0	ND	5.8	58%	43-143%
Chlorobenzene	10.0	ND	5.0	50%	38-150%
1,2 - Dichlorobenzene	10.0	ND	4.3	43%	D-208%
1,3 - Dichlorobenzene	10.0	ND	5.0	50%	7-187%
1,4 - Dichlorobenzene	10.0	ND	5.2	52%	42-143%
1,1-Dichloroethane	10.0	ND	6.8	68%	47-132%
1,2-Dichloroethane	10.0	ND	6.8	68%	51-147%
1,1-Dichloroethene	10.0	ND	7.8	78%	28-167%
trans-1,2-Dichloroethen	10.0	ND	6.9	69%	38-155%
1,2-Dichloropropane	10.0	ND	6.2	62%	44-156%
cis-1,2-Dichloropropene	10.0	ND	6.2	62%	22-178%
trans-1,3-Dichloroprope	10.0	ND	4.6	46%	22-178%
Methylene Chloride	10.0	4.2 B	8.5 B	43%	25-162%
1,1,2,2-Tetrachloroethen	10.0	ND	8.4	84%	26-162%
Tetrachloroethene	10.0	ND	6.4	64%	39-136%
1,1,1-Trichloroethane	10.0	ND	5.8	58%	35-146%
1,1,2-Trichloroethane	10.0	ND	5.8	58%	21-156%
Trichloroethene	10.0	ND	6.9	69%	21-156%

ND - Analyte not detected at stated detection limit.
B - Analyte detected in blank.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
1,2-Dichloroethane-d4	97%	76-114%

Reference: Method 601 - Purgeable Halocarbons
Environmental Protection Agency, 40 CFR Part 136, October 1984.

Comments:

Lamar Cooper
Analyst

Wonda M Logan
Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

QUALITY CONTROL REPORT - METHOD BLANK
Method 601 - PURGEABLE HALOCARBONS

Sample Number: MB061992V1
Sample Matrix: Water

Date Sampled: NA
Date Received: NA
Date Analyzed: 06/19/92

Analyte	Concentration (ug/L)	Detection Limit (ug/L)
Bromodichloromethane	ND	1.0
Bromoform	ND	1.0
Bromomethane	ND	1.0
Carbon tetrachloride	ND	1.0
Chlorobenzene	ND	1.0
Chloroethane	ND	1.0
2-Chloroethylvinyl ether	ND	1.0
Chloroform	ND	1.0
Chloromethane	ND	1.0
Dibromochloromethane	ND	1.0
1,2-Dichlorobenzene	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0
Dichlorodifluoromethane	ND	1.0
1,1-Dichloroethane	ND	1.0
1,2-Dichloroethane	ND	1.0
1,1-Dichloroethene	ND	1.0
trans-1,2-Dichloroethene	ND	1.0
1,2-Dichloropropane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
Methylene Chloride	5.3	1.0
1,1,2,2-Tetrachloroethane	ND	5.0
Tetrachloroethene	ND	1.0
1,1,1-Trichloroethane	ND	1.0
1,1,2-Trichloroethane	ND	1.0
Trichloroethene	ND	1.0
Trichlorofluoromethane	1.1	1.0
Vinyl chloride	ND	1.0

ND - Analyte not detected at stated detection limit.

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

QUALITY CONTROL REPORT - METHOD BLANK
Method 601 - PURGEABLE HALOCARBONS

Sample Number: MB061992V1 Date Analyzed: 06/19/92
Sample Matrix: Water

Quality Control:	Surrogate	Percent Recovery	Acceptance Limits
	1,2-Dichloroethane-d4	88%	76-114%

Reference: Method 601 - Purgeable Halocarbons
Code of Federal Regulations, 40 CFR Part 136, USEPA, October 1984

Comments:

Lance Cooper
Analyst

Wanda M Logan
Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

QUALITY CONTROL REPORT - METHOD BLANK
Method 601 - PURGEABLE HALOCARBONS

Sample Number: MB062292V1
Sample Matrix: Water

Date Sampled: NA
Date Received: NA
Date Analyzed: 06/22/92

Analyte	Concentration (ug/L)	Detection Limit (ug/L)
Bromodichloromethane	ND	1.0
Bromoform	ND	1.0
Bromomethane	ND	1.0
Carbon tetrachloride	ND	1.0
Chlorobenzene	ND	1.0
Chloroethane	ND	1.0
2-Chloroethylvinyl ether	ND	1.0
Chloroform	ND	1.0
Chloromethane	ND	1.0
Dibromochloromethane	ND	1.0
1,2-Dichlorobenzene	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0
Dichlorodifluoromethane	ND	1.0
1,1-Dichloroethane	ND	1.0
1,2-Dichloroethane	ND	1.0
1,1-Dichloroethene	ND	1.0
trans-1,2-Dichloroethene	ND	1.0
1,2-Dichloropropane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
Methylene Chloride	ND	1.0
1,1,2,2-Tetrachloroethane	ND	5.0
Tetrachloroethene	ND	1.0
1,1,1-Trichloroethane	ND	1.0
1,1,2-Trichloroethane	ND	1.0
Trichloroethene	ND	1.0
Trichlorofluoromethane	1.5	1.0
Vinyl chloride	ND	1.0

ND - Analyte not detected at stated detection limit.

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

QUALITY CONTROL REPORT - METHOD BLANK
Method 601 - PURGEABLE HALOCARBONS
Page 2

Sample Number:	MB062292V1	Date Analyzed:	06/22/92
Sample Matrix:	Water		

Quality Control:	Surrogate	Percent Recovery	Acceptance Limits
	1,2-Dichloroethane-d4	88%	76-114%

Reference: Method 601 - Purgeable Halocarbons
Code of Federal Regulations, 40 CFR Part 136, USEPA, October 1984

Comments:

Lance Lopez
Analyst

Wenda M Rogers
Review

Inter·Mountain
Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

Case Narrative

On June 12, 1992, Inter-Mountain Labs-Farmington received two samples from the Oil Conservation District, designated Maverik Refinery. The samples were received cool and intact. Analysis for Benzene-Toluene-Ethylbenzene-Xylenes (BTEX) was performed according to the accompanying chain of custody form.

BTEX analysis was performed By EPA 5030, Purge and Trap, and Method 8020, Aromatic Volatile Hydrocarbons using an OI Analytical Purge and Trap and A Hewlett-Packard 5890 Gas Chromatograph. BTEX analytes were detected above the stated detection limits, as indicated on the report sheets.

It is the policy of this laboratory to employ, whenever possible, preparatory and analytical methods which have been approved by regulatory agencies. The methods used in the analyses of samples reported here are found in "Test Methods for Evaluating Solid Waste", SW-846, USEPA, 1986.

Quality Control reports have been included for your information. These reports appear at the end of the analytical package and may be identified by title. If there are any questions regarding the information presented in this package, feel free to call me at your convenience.

Sincerely,

Dr. Denise Bohemier
Organic Chemist

Inter·Mountain Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

BTEX
Volatile Aromatic Hydrocarbons

Oil Conservation District

Project Name:	Maverik Refinery	Report Date:	6/16/92
Sample ID:	MW-17	Date Sampled:	6/12/92
Sample Number:	9206121030/8963	Date Received:	6/12/92
Sample Matrix:	Water	Date Analyzed:	6/16/92
Preservative:	Cool		
Condition:	Intact		

Analyte	Concentration (ppm),C	Detection Limit (ppm)
Benzene	13.5	0.25
Toluene	10.7	0.25
Ethylbenzene	2.4	0.25
m,p-xylene	8.3	0.25
o-xylene	2.7	0.25

ND - Analyte not detected at stated detection limit.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
Toluene-d8	96%	88-110%
4-Bromofluorobenzene	101%	86-115%

Reference: Method 5030, Purge and Trap
Method 8020, Aromatic Volatile Organics
SW-846, Test Methods for Evaluating Solid Wastes, United States Environmental Protection Agency, September 1986.

Comments:

Analyst

Review

Inter·Mountain
Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

BTEX
Volatile Aromatic Hydrocarbons

Oil Conservation District

Project Name:	Maverik Refinery	Report Date:	6/17/92
Sample ID:	MW-18	Date Sampled:	6/12/92
Sample Number:	9206121015/8964	Date Received:	6/12/92
Sample Matrix:	Water	Date Analyzed:	6/16/92
Preservative:	Cool		
Condition:	Intact		

Analyte	Concentration (ppb)	Detection Limit (ppb)
Benzene	187	50
Toluene	ND	50
Ethylbenzene	416	50
m,p-xylene	2315	100
o-xylene	ND	100

ND - Analyte not detected at stated detection limit.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
Toluene-d8	92%	88-110%
4-Bromofluorobenzene	99%	86-115%

Reference: Method 5030, Purge and Trap
Method 8020, Aromatic Volatile Organics
SW-846, Test Methods for Evaluating Solid Wastes, United States Environmental Protection Agency, September 1986.

Comments:

Analyst

Linda Spencer
Review

Inter·Mountain Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

QUALITY CONTROL REPORT
METHOD BLANK - VOLATILE AROMATIC HYDROCARBONS

Laboratory ID: 8963-4 Method Blank
Sample Matrix: Water
Date Analyzed: 06/16/92

Analyte	Concentration (ug/L)	Detection Limit (ug/L)
Benzene	ND	0.2
Toluene	ND	0.2
Ethylbenzene	ND	0.2
p,m-Xylene	ND	0.2
o-Xylene	ND	0.2

ND - Analyte not detected at stated detection limit.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
Toluene-d8	94%	88-110%
Bromofluorobenzene	108%	86-115%

Reference:

Method 5030, Purge and Trap
Method 8020, Aromatic Volatile Organics
Test Methods for Evaluating Solid Wastes, SW-846, United States Environmental Protection Agency, November 1986.

Comments:

Dennis Pohl
Analyst

Linda Spencer
Review

Inter·Mountain Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

Quality Control Report
Matrix Duplicate: Volatile Aromatic Hydrocarbons

Client:	OCD	Date Sampled:	6/12/92
Sample Matrix:	Water	Date Received:	6/12/92
Preservative:	Cool	Date Analyzed:	6/16/92
Condition:	Intact		

Analyte	Duplicate Concentration (ppm)	Sample Concentration (ppm)	% Difference
Benzene	13.6	13.5	0.1%
Toluene	11.0	10.7	0.9%
Ethylbenzene	2.4	2.4	0.5%
p,m-xylene	8.5	8.3	0.3%
o-xylene	2.8	2.7	0.7%

ND-Analyte not detected at detection limit.

Quality Control: Duplicate acceptance limit at 20%.

Surrogate	Percent Recovery	Acceptance Limit
Toluene-d8	104%	88-110%
4-Bromofluorobenzene	107%	86-115%

Analyst

Review

Inter·Mountain
Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

Quality Control Report
Spike: Volatile Aromatic Hydrocarbons

Sample Number:	8963	Report Date:	06/16/92
Sample Matrix:	Water	Date Sampled:	06/12/92
Preservative:	Cool	Date Received:	06/12/92
Condition:	Intact	Date Analyzed:	06/16/92

Analyte	Spike Added (ug/L)	Sample Result (ug/L)	Spike Result (ug/L)	Percent Recovery	Acceptance Limit
Benzene	10	13546	16913	67%	39-150%
Toluene	10	10651	14926	85%	46-148%
Ethylbenzene	10	2376	6644	85%	32-160%
p,m-Xylene	20	8344	18610	103%	NE
o-Xylene	20	2727	12718	100%	NE

Quality Control:	Surrogate	Percent Recovery	Acceptance Limits
	Toluene-d8	90%	88-110%
	4-Bromofluorobenzene	97%	86-115%

Reference: Method 5030, Purge and Trap

Method 8020, Aromatic Volatile Organics

SW-846, Test Methods for Evaluating Solid Wastes, United States Environmental Protection Agency, November 1986.

Comments:

Analyst

Review

iml
Inter-Mountain Laboratories, Inc.

CHAIN OF CUSTODY RECORD

Client/Project Name: Maverik Refinery

Project Location: Kirtland, NM

Sampler: (Signature) Denny G. Foust

Chain of Custody Tape No.

ANALYSES / PARAMETERS

Sample No./ Identification	Date	Time	Lab Number	Matrix	No. of Containers	601	602			Remarks
MW-17	6/12/92	10:30	9206121030	water	2					no preservative
MW-18	6/12/92	10:15	9206121015	water	2					" "

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Denny G. Foust	6/12/92	11:30	Dennis Bohlen	6/12/92	11:30

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time

Relinquished by: (Signature)	Date	Time	Received by laboratory: (Signature)	Date	Time

Inter-Mountain Laboratories, Inc.

☐ 1633 Terra Avenue, Sheridan, Wyoming 82801, Telephone (307) 672-8945

☐ 1714 Phillips Circle, Gillette, Wyoming 82716, Telephone (307) 682-8945

☐ 2506 West Main Street, Farmington, NM 87401, Telephone (505) 326-4737

☐ 910 Technology Blvd. Suite B, Bozeman, Montana 59715, Telephone (406) 586-8450

☐ Route 3, Box 256, College Station, TX 77845, Telephone (409) 776-8945

☐ 3304 Longmire Drive, College Station, TX 77845, Telephone (409) 774-4999

05812

GEOWEST
Golden, Inc.

OIL CONSER... ...N DIVISION
REC... ...ED
'92 JUN 4 AM 8 57

May 29, 1992

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

Dear Bill:

This is to confirm our recent telephone conversation that ground water sampling and installation of monitor wells and piezometers as indicated in our March 16, 1992 report and modified in your May 14, 1992 letter to Wm. Call, will take place starting Tuesday June 9, 1992.

Mr. Paul Weissenborn of GeoWest will conduct the operations and will be assisted by Tony Cannon of Maverik Country Stores. We anticipate installing and developing the wells and piezometers on the 9th and 10th and taking water level measurements and taking water quality samples on the 11th, perhaps extending into the 12th. I will have Paul give you a call when the sampling time is better defined.

Sincerely,
GeoWest Golden, Inc.

Peter F. Olsen
Senior Project Manager

cc: Dan Murray, Maverik
Denny Foust, OCD Aztec Office

First Commerce Center, Suite 2006 • 175 West 200 South • Salt Lake City, Utah 84111 • (801) 359-3059

OIL CONSERV[illegible]N DIVISION
REC[illegible]ED

'91 DEC 23 AM 9 26

MAVERIK COUNTRY STORE

MAVERIK COUNTRY STORES, INC.
380 North 200 West, Suite 260
Bountiful, Utah 84010
801-295-5557

December 17, 1991

Mr. William Olson
State of New Mexico, OCD
P.O. Box 2088
Sante Fe, New Mexico 87504

Dear Bill,

Following up on a telephone conversation of yesterday, December 16, 1991, I wanted to provide you with the name and address of the Engineering firm that we'll be using on our former refinery site in Kirtland, New Mexico. The Engineer will be Peter F. Olsen, Ph.D., Pete's address is:

GEOWEST Golden, Inc.
First Commerce Center, Suite 2006
175 West 200 South
Salt Lake City, Utah 84111

Being familiar with Pete, I'm sure that you'll agree that he brings an understanding of our project and great experience in working with Refinery related properties.

As a result of this change, we have delayed until January the site visit and groundwater sampling planned for this month.

We appreciate your help and patience.

Respectfully,

Dan L. Murray

Dan L. Murray
Real Estate Manager

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

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

New Mexico DRUG FREE It's a State of Mind!

December 9, 1991

Michael Cunningham
Attorney at Law
P. O. Box 268
Farmington, New Mexico 87499-0268

Re: Caribou Refinery, Kirtland, New Mexico

Dear Mr. Cunningham:

In response to your letter of September 19, 1991, we cannot give you very conclusive answers. But here are the specific answers to the questions which you have asked.

1. While the tracts haven't really specifically been segregated into contaminated and uncontaminated areas, the area with contaminated soils and ground water have been identified in the investigations by Dames and Moore, consultants to Maverik Country Stores, Inc. We have a vast amount of information on this site based upon these investigations and our own investigations and if you wish to review those files they are here in Santa Fe. The information is to voluminous for us to be able to copy and send to you.

2. The OCD does not have any authority to "release" portions of the tract for any particular use. Our only function is to monitor the remedial action being taken at the site to comply with OCD requirements. Again, information on the satisfaction of those requirements is in files here in Santa Fe.

3. Maverik County Store is currently in compliance with OCD clean-up requirements to date. It does not mean, however, that the site has been totally and satisfactorily remediated.

4. The Oil Conservation Division always retains the authority to require future remediation action if those steps which have been taken do not effectively reduce or eliminate the contamination at the site. Normally those actions are required of the person responsible for the clean-up of the site, and whether that would include a future owner or not has never been tested under state law. However, Federal laws may impose an obligation upon purchasers.

If you wish to examine in more detail the nature of the contamination and the remediation actions at the site, you may call me to set up an appointment to review the files.

Sincerely,

Bill Olson

BILL OLSON
Environmental Bureau

BO/RGS/dr

December 3, 1991

OIL CONSERVATION DIVISION
RECEIVED

'91 DEC 11 AM 8 47

MAVERIK COUNTRY STORES, INC.
380 North 200 West, Suite 260
Bountiful, Utah 84010
801-295-5557

Mr. William J. LeMay
State of New Mexico
Energy, Minerals and Natural Resources Department
Oil Conservation Division
P.O. Box 2088
Sante Fe, New Mexico 87504-5800

Re: Notice of Violation
Caribou/Maverik Refinery and Tank Farm
Kirtland, New Mexico

Dear Mr. LeMay,

Pursuant to telephone conversations with Mr. William Olson, and in response to the above referenced "Notice of Violation", I would like to provide our understanding of activities witnessed by OCD at our Kirtland, New Mexico site on November 21, 1991.

The salvage contractor, in removing the large tank, got his crane stuck in the mud. One of Maverik's representatives, Mr. Jim Cahoon, requested that the contractor restore the area to its prior condition. Grading was performed, purely for cosmetic reasons, to level out the burroughs caused by the crane. It is our understanding that no soils were removed.

Maverik's contract with the salvage company allows for their removal of the tanks and in no way requires, or authorizes them to perform any soil removal, any excavation beyond what's reasonably required to remove the tanks, or soil remediation at the site.

Pursuant to conversations with Mr. Olson, I've scheduled to visit the Kirtland property on December 16th and 17th, 1991, to pull groundwater samples, to review whether earlier estimates of stained soil removal should be increased to include some of the soils in the former tank areas, and to coordinate the installation of several piezometers.

We apologize for the concern generated by the contractors actions and hope that this adequately explains the events.

Respectfully,

Dan L. Murray

Dan L. Murray
Real Estate Manager

cc: William Olson
William Call

State of New Mexico
ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT
Santa Fe, New Mexico 87505

OIL CONSERVATION DIVISION

New Mexico DRUG FREE It's a State of Mind!

BRUCE KING
GOVERNOR

November 26, 1991

ANITA LOCKWOOD
CABINET SECRETARY

MATTHEW BACA
DEPUTY SECRETARY

CERTIFIED MAIL
RETURN RECEIPT NO. P-756-903-835

William Call
Maverik Country Stores, Inc.
P.O. Box 457
Afton, WY 83110

**RE: NOTICE OF VIOLATION
CARIBOU/MAVERIK REFINERY AND TANK FARM
KIRTLAND, NEW MEXICO**

Dear Mr Call:

A representative of the New Mexico Oil Conservation Division (OCD) visited the Caribou/Maverik Four Corners Refinery in Kirtland, New Mexico on November 21, 1991 to ascertain the status of equipment removal activities being carried out by Maverik Country Stores, Inc.

During this visit, OCD observed heavy equipment excavating contaminated soils at the former location of the 2.4 million gallon leaded gasoline storage tank. This area has never been identified as having contaminated soils in past reports and OCD has no record of Maverik notifying OCD of the discovery of a release of contaminants at this location during the fall 1991 equipment removal at the site. In addition, OCD noted that the soils at the former locations of other tanks appear to have been excavated and replaced with clean soils.

The OCD also has no record of Maverik notifying OCD prior to commencement of soil remediation activities at the site. OCD's September 16, 1991 approval of soil remediation at the site was specifically conditioned upon Maverik notifying OCD one week prior to soil remediation activities such that OCD could be present to witness the activities and/or sample contaminated areas.

You are hereby notified that Maverik Country Stores, Inc. is in violation of the OCD's September 16, 1991 approval of soil remediation work at the Caribou/Maverik Four Corners Refinery in Kirtland, New Mexico. Consequently Maverik will:

1. Upon receipt of this letter, cease all soil remedial activities until further notice.

2. Within 7 days of receipt of this letter, provide OCD with a complete report detailing all observations of contaminated soils and any waste characterizations and remedial activities performed during and after the dismantling of all refinery equipment.

Please be advised that violation of New Mexico Water Quality Control Commission regulations could subject Maverik Country Stores, Inc. to civil penalties under section 74-6-10 of the New Mexico Water Quality Act.

If you have any questions, please contact Bill Olson of my staff at (505) 827-5885.

Sincerely,

William J. LeMay
Director

WJL/WO

xc: OCD Aztec District Office

RICHARD T.C. TULLY, P.A.
ATTORNEY AT LAW
111 NORTH ORCHARD AVENUE
POST OFFICE BOX 268
FARMINGTON, NEW MEXICO 87499-0268
505-327-3388

RICHARD T.C. TULLY
MICHAEL CUNNINGHAM

OIL CONSERV ON DIVISION
REC ED
'91 SEP 23 AM 9 42

September 19, 1991

Bill Olson
Oil Spill Regulatory Program
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87501

Re: Caribou Refinery, Kirtland, New Mexico

Dear Mr. Olson:

Our client is considering purchasing the Caribou Refinery tract in Kirtland, New Mexico and operating a livestock auction business on the property. It is our understanding the tract has been the subject of environmental contamination of which you are familiar. Therefore, we are asking your help in advising us of the current status of the tract in regards to those environmental matters. Of particular concern are:

1. Whether the tract has been segregated into contaminated and uncontaminated areas, and if so, identification of the areas.

2. Whether the tract, or portions of the tract, have been released by your agency for use as indicated above.

3. Whether the tract and facility has complied with all environmental clean-up requirements to date.

4. Whether future environmental clean-up or remedial actions remain concerning the tract.

Thank you in advance for your assistance and cooperation.

Sincerely,

Michael Cunningham

Michael Cunningham

MC:sak

cc: Ray Hatch
5108 Schmitt Rd.
Farmington, NM 87401

S160/50482L

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

September 16, 1991

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

CERTIFIED MAIL
RETURN RECEIPT NO. P-106-675-367

William Call
Maverik Country Stores, Inc.
P.O. Box 457
Afton, WY 83110

**RE: SEMIANNUAL GROUND WATER MONITORING REPORT
MAVERIK REFINERY AND TANK FARM
KIRTLAND, NEW MEXICO**

Dear Mr Call:

The New Mexico Oil Conservation Division (OCD) has reviewed the data and recommendations in the "REPORT, SEMIANNUAL GROUND WATER MONITORING REPORT, JULY 29, 1991 CARIBOU-FOUR CORNERS KIRTLAND REFINERY, MAVERIK COUNTRY STORES" submitted on behalf of Maverik Country Stores, Inc. by Maverik's consultant Dames and Moore.

The OCD approves of Maverik's recommendations for removal of the remaining contaminated soils and a joint Maverik/OCD review of the containment management and remediation measures after completion of the 1991 ground water monitoring with the following conditions:

1. Maverik will notify OCD one week prior to the contaminated soil removal such that OCD can arrange to have a representative present.

2. Maverik will submit to OCD an evaluation of the effectiveness of the remedial system by February 29, 1991.

The OCD remains concerned about the presence of dissolved phase volatile organics at concentrations above New Mexico Water Quality Control Commission (WQCC) ground water standards in the monitor wells directly outside of the containment system, however, the OCD recognizes that these contaminants do not appear to be migrating offsite. The OCD is also concerned about the reappearance of floating product in monitor well MW-17 inside the slurry wall. Effective bioremediation of dissolved phase volatile organics inside the containment system will not occur if free phase product remains within the slurry wall. The OCD expects that these issues and any additional remedial measures necessary to minimize environmental risks at the site be addressed in the February 29, 1991 evaluation of the effectiveness of the remedial system.

Please be advised that OCD approval does not limit you to the work performed if the remediation fails to effectively mitigate environmental damage related to Maverik's activities. In addition, OCD approval does not relieve you of liability which may be actionable under any other laws and/or regulations.

If you have any questions please contact me at (505) 827-5885.

Sincerely,

William C. Olson
Hydrogeologist

xc: David E. Stice, Dames and Moore
OCD Aztec District Office

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

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

April 12, 1991

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

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		LOCATION
On: 18-Mar-91	*By:* Ols . . .	Monitor Well MW-19
At: 14:30 hrs.	*In/Near:* Kirtland	

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.)

RECEIVED
APR 05 1991
OIL CONSERVATION DIV.
SANTA FE

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: [signature]
Michael J. Owen
Analyst, Organic Chemistry

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

ORGANIC CHEMISTRY ANALYTICAL REQUEST FORM

SCIENTIFIC LABORATORY DIVISION
700 CAMINO DE SALUD N.E., ALBUQUERQUE, NM 87106
Organic Chemistry Section - Telephone: (505) 841-2570

1 SLD No.

Date Received:

Request ID No. 004351-C

2 User Code #: 7 0 3 2 1 0

3 Request ID No.:

4 Priority Code #: 3 (If "1" or "2", call EID-SLD Coordinator)

5 Facility Name: Caribou Refinery

6 County: San Juan

7 City: Kirtland

8 State NM

9 Sample Location: Monitor Well, MW-19

10 Collected By: William Olson (First / Last)

On: 91/03/18 Date: (YY/MM/DD)

At: 1430 hrs. Time: 24 hr. clock 3:00 pm = 1500 hrs.

11 Codes: Submitter · WSS # · Organization

12 Latitude (DDMMSS) · Longitude (DDDMMSS) · 2 Digit ID (if needed)

13 Report To: Name David G. Boyer

14 Phone #: (505) 827-5812

Address: New Mexico Oil Conservation Division
P. O. Box 2088

City, State Zip: Santa Fe, New Mexico 87504-2088

15 Sample Purpose:
- ☐ Compliance
- ☐ Check
- ☒ Monitoring
- ☐ Special

Sampling Information:
- ☒ Grab
- ☐ Composite ______ (Composite Time Period)
- ☐ Flow Proportioned
- ☐ Equal Aliquot
- ☒ Sample Split w/Permittee
- ☐ Chain of Custody

16 Field Data: pH: 7.22, Conductivity: 2500 umhos @ 9.5 °C, Temperature: ______ °C, Chlorine Residual: ______ mg/l, Flow: ______

17 Sample Source:
- ☐ Stream
- ☐ Lake
- ☐ Drain
- ☐ Pool
- ☐ WWTP
- ☒ Well; Depth: ______
- ☐ Spring
- ☐ Distribution
- ☐ Point-of-Entry
- ☐ Other: ______

18 Field Notes/ Sample #:

19 Sample Type: ☒ Water, ☐ Soil, ☐ Food, ☐ Wastewater, ☐ Other ______

This form accompanies a **single sample** consisting of:
- ____ septum vial(s) (volume = ______)
- 2 glass jugs (volume = liter)
- ____ ______ (volume = ______)

20 Preservation:
- ☐ NP No Preservation; Sample stored at room temperature
- ☒ P-Ice Sample stored in an ice bath (Not Frozen)
- ☐ P-TS Sample Preserved with Sodium Thiosulfate to remove chlorine residual
- ☐ P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)
- ☐ Other ______

21 Analyses Requested: Please check the appropriate box(es) below to indicate the type of analytical screen(s) required. Whenever possible, list specific compounds suspected or required.

Volatile Screens:

- ☐ - (753) Aliphatic Headspace (1-5 Carbons)
- ☐ - (754) Aromatic & Halogenated Purgeables (EPA 601 & 602)
- ☐ - (765) Mass Spectrometer Purgeables (EPA 624)
- ☐ - (766) SDWA Total Trihalomethanes (EPA 501.1)
- ☐ - (774) SDWA VOC's I [8 Regulated +] (EPA 502.2)
- ☐ - (775) SDWA VOC's II [EDB & DBCP] (EPA 504)
- ☐
- ☐

Other Specific Compounds or Classes:

- ☐ - ( ) ______
- ☐ - ( ) ______
- ☐ - ( ) ______

Semivolatile Screens:

- ☐ - (763) Acid Extractables
- ☐ - (751) Aliphatic Hydrocarbons
- ☐ - (755) Base/Neutral Extractables (EPA 625)
- ☐ - (756) Base/Neutral/Acid Extractables (EPA 8270)
- ☐ - (758) Herbicides, Chlorophenoxy Acid
- ☐ - (759) Herbicides, Triazines
- ☐ - (760) Organochlorine Pesticides
- ☐ - (761) Organophosphate Pesticides
- ☐ - (767) Polychlorinated Biphenyls (PCB's)
- ☒ - (764) Polynuclear Aromatic Hydrocarbons
- ☐ - (762) SDWA Pesticides & Herbicides

Remarks:

SLD 8912-OR Form New 12/89 This Form Will NOT Be Returned With Your Results. Please RETAIN A COPY!

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		*LOCATION*
On: 18-Mar-91	*By:* Ols . . .	Monitor Well MW-21
At: 12:15 hrs.	*In/Near:* Kirtland	

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☒; 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.)

RECEIVED
APR 05 1991
OIL CONSERVATION DIV.
SANTA FE

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: [signature]
Michael J. Owen
Analyst, Organic Chemistry

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

ORGANIC CHEMISTRY ANALYTICAL REQUEST FORM

SCIENTIFIC LABORATORY DIVISION
700 CAMINO DE SALUD N.E., ALBUQUERQUE, NM 87106
Organic Chemistry Section - Telephone: (505) 841-2570

1 SLD No.:
Date Received:

Request ID No. 004353-C

2 User Code #: 7 0 3 2 0
3 Request ID No.:
4 Priority Code #: 3 [If "1" or "2", call EID-SLD Coordinator]

5 Facility Name: Cariboo Refinery
6 County: San Juan
7 City: Kirtland
8 State: NM

9 Sample Location: Monitor Well

10 Collected By: William Olson (First / Last)
On: 91/03/18 Date: (YY/MM/DD)
At: 1215 hrs. Time: 24 hr. clock, 3:00 pm = 1500 hrs.

11 Codes: Submitter / WSS # / Organization

12 Latitude (DDMMSS)
Longitude (DDDMMSS)
2 Digit ID (if needed)

13 Report To: Name: David G. Boyer
14 Phone #: (505) 827-5812
Address: New Mexico Oil Conservation Division
P. O. Box 2088
City, State Zip: Santa Fe, New Mexico 87504-2088

15 Sample Purpose:
- [ ] Compliance
- [ ] Check
- [x] Monitoring
- [ ] Special

Sampling Information:
- [x] Grab
- [ ] Composite ______ (Composite Time Period)
- [ ] Flow Proportioned
- [ ] Equal Aliquot
- [x] Sample Split w/Permittee
- [ ] Chain of Custody

16 Field Data: pH: 7.6, Conductivity: 1700 umhos @ 12.1 °C, Temperature: ______ °C, Chlorine Residual: ______ mg/l, Flow: ______

17 Sample Source:
- [ ] Stream
- [ ] Lake
- [ ] Drain
- [ ] Pool
- [ ] WWTP
- [x] Well; Depth: ______
- [ ] Spring
- [ ] Distribution
- [ ] Point-of-Entry
- [ ] Other: ______

18 Field Notes/ Sample #:

19 Sample Type: [x] Water, [ ] Soil, [ ] Food, [ ] Wastewater, [ ] Other ______

This form accompanies a single sample consisting of:
______ - septum vial(s) (volume = ______)
2 - glass jugs (volume = liter)
______ - ______ (volume = ______)

20 Preservation:
- [ ] NP No Preservation; Sample stored at room temperature
- [x] P-Ice Sample stored in an ice bath (Not Frozen)
- [ ] P-TS Sample Preserved with Sodium Thiosulfate to remove chlorine residual
- [ ] P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)
- [ ] Other ______

21 Analyses Requested: Please check the appropriate box(es) below to indicate the type of analytical screen(s) required. Whenever possible, list specific compounds suspected or required.

Volatile Screens:

- [ ] - (753) Aliphatic Headspace (1-5 Carbons)
- [ ] - (754) Aromatic & Halogenated Purgeables (EPA 601 & 602)
- [ ] - (765) Mass Spectrometer Purgeables (EPA 624)
- [ ] - (766) SDWA Total Trihalomethanes (EPA 501.1)
- [ ] - (774) SDWA VOC's I [8 Regulated +] (EPA 502.2)
- [ ] - (775) SDWA VOC's II [EDB & DBCP] (EPA 504)
- [ ]
- [ ]

Other Specific Compounds or Classes:

- [ ] - ( ) ______
- [ ] - ( ) ______
- [ ] - ( ) ______

Semivolatile Screens:

- [ ] - (763) Acid Extractables
- [ ] - (751) Aliphatic Hydrocarbons
- [ ] - (755) Base/Neutral Extractables (EPA 625)
- [ ] - (756) Base/Neutral/Acid Extractables (EPA 8270)
- [ ] - (758) Herbicides, Chlorophenoxy Acid
- [ ] - (759) Herbicides, Triazines
- [ ] - (760) Organochlorine Pesticides
- [ ] - (761) Organophosphate Pesticides
- [ ] - (767) Polychlorinated Biphenyls (PCB's)
- [x] - (764) Polynuclear Aromatic Hydrocarbons
- [ ] - (762) SDWA Pesticides & Herbicides

Remarks:

 This Form Will NOT Be Returned With Your Results. Please RETAIN A COPY!

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

LABORATORY SAMPLE RECORD

PROJ. NO.:

PROJECT NAME: Caribon Refinery

SAMPLERS: (Signature) Olson

DATE	TIME	STATION LOCATION	NO. OF CONTAINERS	8010/8020		PAH's				REMARKS
910318	1000	Monitor Well MW-16	4	2		2				
	1330	" MW-18	4	2		2				
	1430	" MW-19	4	2		2				
	1215	" MW-21	4	2		2				

Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Will Olson	3/19/91	
Relinquished by: (Signature)	Date / Time	Received by: (Signature)
W. Boyd	3/19/91 2:30	Bruce Casias
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)

SEALS INTACT ☐ YES ☐ NO

: (Signature)

: (Signature)

Date / Time

Remarks

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

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		LOCATION
On: 18-Mar-91	*By:* Ols . . .	Monitor Well MW-18
At: 13:30 hrs.	*In/Near:* Kirtland	

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 ☒; 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.)

RECEIVED
APR 05 1991
OIL CONSERVATION DIV.
SANTA FE

% 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: [signature]
Michael J. Owen
Analyst, Organic Chemistry

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

ORGANIC CHEMISTRY ANALYTICAL REQUEST FORM

SCIENTIFIC LABORATORY DIVISION
700 CAMINO DE SALUD N.E., ALBUQUERQUE, NM 87106
Organic Chemistry Section - Telephone: (505) 841-2570

1 SLD No.:
Date Received:

2 User Code #: 7 0 3 2 0
3 Request ID No.:
Request ID No. 004349-C
4 Priority Code #: 3 [If "1" or "2", call EID-SLD Coordinator]

5 Facility Name: Cariboo Refinery
6 County: San Juan
7 City: Kirtland
8 State: NM

9 Sample Location: Monitor Well MW-18

10 Collected By: William (First) Olson (Last)
On: 91/03/18 Date: (YY/MM/DD)
At: 1330 hrs. Time: 24 hr. clock 3:00 pm = 1500 hrs.

11 Codes: Submitter / WSS # / Organization

12 Latitude (DDMMSS)
Longitude (DDDMMSS)
2 Digit ID (if needed)

13 Report To: Name David G. Boyer
14 Phone #: (505) 827-5812
Address New Mexico Oil Conservation Division
P. O. Box 2088
City, State Zip Santa Fe, New Mexico 87504-2088

15 Sampling Information:
Sample Purpose:
- [ ] Compliance
- [ ] Check
- [x] Monitoring
- [ ] Special

- [x] Grab
- [ ] Composite (Composite Time Period)
- [ ] Flow Proportioned
- [ ] Equal Aliquot
- [x] Sample Split w/Permittee
- [ ] Chain of Custody

16 Field Data: pH: 7.42 Conductivity: 1200 umhos @ 12.6 °C, Temperature: ___ °C, Chlorine Residual: ___ mg/l, Flow: ___

17 Sample Source:
- [ ] Stream
- [ ] Lake
- [ ] Drain
- [ ] Pool
- [ ] WWTP
- [x] Well; Depth: ___
- [ ] Spring
- [ ] Distribution
- [ ] Point-of-Entry
- [ ] Other: ___

18 Field Notes/ Sample #:

19 Sample Type: [x] Water, [ ] Soil, [ ] Food, [ ] Wastewater, [ ] Other ___

This form accompanies a single sample consisting of:
___ - septum vial(s) (volume = ___)
2 - glass jugs (volume = liter)
___ - ___ (volume = ___)

20 Preservation:
- [ ] NP No Preservation; Sample stored at room temperature
- [x] P-Ice Sample stored in an ice bath (Not Frozen)
- [ ] P-TS Sample Preserved with Sodium Thiosulfate to remove chlorine residual
- [ ] P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)
- [ ] Other ___

21 Analyses Requested: Please check the appropriate box(es) below to indicate the type of analytical screen(s) required. Whenever possible, list specific compounds suspected or required.

Volatile Screens:

- [ ] - (753) Aliphatic Headspace (1-5 Carbons)
- [ ] - (754) Aromatic & Halogenated Purgeables (EPA 601 & 602)
- [ ] - (765) Mass Spectrometer Purgeables (EPA 624)
- [ ] - (766) SDWA Total Trihalomethanes (EPA 501.1)
- [ ] - (774) SDWA VOC's I [8 Regulated +] (EPA 502.2)
- [ ] - (775) SDWA VOC's II [EDB & DBCP] (EPA 504)
- [ ]
- [ ]
- [ ] - ( ) ___
- [ ] - ( ) ___
- [ ] - ( ) ___

Other Specific Compounds or Classes:

Semivolatile Screens:

- [ ] - (763) Acid Extractables
- [ ] - (751) Aliphatic Hydrocarbons
- [ ] - (755) Base/Neutral Extractables (EPA 625)
- [ ] - (756) Base/Neutral/Acid Extractables (EPA 8270)
- [ ] - (758) Herbicides, Chlorophenoxy Acid
- [ ] - (759) Herbicides, Triazines
- [ ] - (760) Organochlorine Pesticides
- [ ] - (761) Organophosphate Pesticides
- [ ] - (767) Polychlorinated Biphenyls (PCB's)
- [x] - (764) Polynuclear Aromatic Hydrocarbons
- [ ] - (762) SDWA Pesticides & Herbicides

Remarks:

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.)

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APR 05 1991

OIL CONSERVATION DIV.
SANTA FE

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: [signature]
Michael J. Owen
Analyst, Organic Chemistry

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

ORGANIC CHEMISTRY ANALYTICAL REQUEST FORM

SCIENTIFIC LABORATORY DIVISION
700 CAMINO DE SALUD N.E., ALBUQUERQUE, NM 87106
Organic Chemistry Section - Telephone: (505) 841-2570

SLD No. 1

Date Received:

2 User Code #: 7 0 3 2 0	3 Request ID No.:	Request ID No. 004347-C	4 Priority Code #: 3 (If "1" or "2", call EID-SLD Coordinator)
5 Facility Name: Caribou Refinery	6 County: San Juan	7 City: Kirtland	8 State NM

9 Sample Location: Monitor Well MW-16

10 Collected By: William (First) Olson (Last) On: 91/03/18 Date: (YY/MM/DD) At: 1000 hrs. Time: 24 hr. clock 3:00 pm = 1500 hrs.

11 Codes: Submitter | WSS # | Organization

12 Latitude (DDMMSS) Longitude (DDDMMSS) 2 Digit ID (If needed)

13 Report To: Name David G. Boyer

14 Phone #: (505) 827-5812

Address New Mexico Oil Conservation Division
P. O. Box 2088
City, State Zip Santa Fe, New Mexico 87504-2088

15 Sample Purpose:
- ☐ Compliance
- ☐ Check
- ☒ Monitoring
- ☐ Special

Sampling Information:
- ☒ Grab
- ☐ Composite (Composite Time Period)
- ☐ Flow Proportioned
- ☐ Equal Aliquot
- ☒ Sample Split w/Permittee
- ☐ Chain of Custody

16 Field Data: pH: 7.57, Conductivity: 1200 umhos @ 9.2 °C, Temperature: °C, Chlorine Residual: mg/l, Flow:

17 Sample Source:
- ☐ Stream
- ☐ Lake
- ☐ Drain
- ☐ Pool
- ☐ WWTP
- ☒ Well; Depth:
- ☐ Spring
- ☐ Distribution
- ☐ Point-of-Entry
- ☐ Other:

18 Field Notes/ Sample #:

19 Sample Type: ☒ Water, ☐ Soil, ☐ Food, ☐ Wastewater, ☐ Other

This form accompanies a **single sample** consisting of:
- ____ septum vial(s) (volume =)
- 2 glass jugs (volume = Liter)
- ____ (volume =)

20 Preservation:
- ☐ NP No Preservation; Sample stored at room temperature
- ☒ P-Ice Sample stored in an ice bath (Not Frozen)
- ☐ P-TS Sample Preserved with Sodium Thiosulfate to remove chlorine residual
- ☐ P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)
- ☐ Other

21 Analyses Requested: Please check the appropriate box(es) below to indicate the type of analytical screen(s) required. Whenever possible, list specific compounds suspected or required.

Volatile Screens:
- ☐ - (753) Aliphatic Headspace (1-5 Carbons)
- ☐ - (754) Aromatic & Halogenated Purgeables (EPA 601 & 602)
- ☐ - (765) Mass Spectrometer Purgeables (EPA 624)
- ☐ - (766) SDWA Total Trihalomethanes (EPA 501.1)
- ☐ - (774) SDWA VOC's I [8 Regulated +] (EPA 502.2)
- ☐ - (775) SDWA VOC's II [EDB & DBCP] (EPA 504)
- ☐
- ☐

Other Specific Compounds or Classes:
- ☐ - ( )
- ☐ - ( )
- ☐ - ( )

Semivolatile Screens:
- ☐ - (763) Acid Extractables
- ☐ - (751) Aliphatic Hydrocarbons
- ☐ - (755) Base/Neutral Extractables (EPA 625)
- ☐ - (756) Base/Neutral/Acid Extractables (EPA 8270)
- ☐ - (758) Herbicides, Chlorophenoxy Acid
- ☐ - (759) Herbicides, Triazines
- ☐ - (760) Organochlorine Pesticides
- ☐ - (761) Organophosphate Pesticides
- ☐ - (767) Polychlorinated Biphenyls (PCB's)
- ☒ - (764) Polynuclear Aromatic Hydrocarbons
- ☐ - (762) SDWA Pesticides & Herbicides

Remarks:

SLD 8912-OR Form New 12/89 This Form Will NOT Be Returned With Your Results. Please RETAIN A COPY!

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		*LOCATION*
On: 18-Mar-91	*By:* Ols . . .	Monitor Well MW-18
At: 13:30 hrs.	*In/Near:* Kirtland	

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☒; 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.)

RECEIVED
MAR 29 1991
OIL CONSERVATION DIV.
SANTA FE

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
Gary C. Eden
Analyst, Organic Chemistry

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

ORGANIC CHEMISTRY ANALYTICAL REQUEST FORM

SCIENTIFIC LABORATORY DIVISION
700 CAMINO DE SALUD N.E., ALBUQUERQUE, NM 87106
Organic Chemistry Section - Telephone: (505) 841-2570

SLD No. [1]

Date Received:

Request ID No. 004348-C

2 User Code #: 7 0 3 2 0	3 Request ID No.:	4 Priority Code #: 3 [If "1" or "2", call EID-SLD Coordinator]
5 Facility Name: Caribou Refinery	6 County: San Juan	7 City: Kirtland — 8 State: NM

9 Sample Location: Monitor Well MW-18

10 Collected By: William Olision (First / Last) On: 91/03/18 Date: (YY/MM/DD) At: 1330 hrs. Time: 24 hr. clock 3:00 pm = 1500 hrs.

11 Codes: Submitter ___ WSS # ___ Organization ___

12 Latitude (DDMMSS) ___ Longitude (DDDMMSS) ___ 2 Digit ID (If needed)

13 Report To: Name David G. Boyer

14 Phone #: (505) 827-5812

Address New Mexico Oil Conservation Division
P. O. Box 2088

City, State Zip Santa Fe, New Mexico 87504-2088

15 Sample Purpose:
- ☐ Compliance
- ☐ Check
- ☒ Monitoring
- ☐ Special

Sampling Information:
- ☒ Grab
- ☐ Composite ______ (Composite Time Period)
- ☐ Flow Proportioned
- ☐ Equal Aliquot
- ☒ Sample Split w/Permittee
- ☐ Chain of Custody

16 Field Data: pH: 7.42 Conductivity: 1200 umhos @ 12.6 °C, Temperature: ____ °C, Chlorine Residual: ____ mg/l, Flow: ____

17 Sample Source:
- ☐ Stream
- ☐ Lake
- ☐ Drain
- ☐ Pool
- ☐ WWTP
- ☒ Well; Depth: ____
- ☐ Spring
- ☐ Distribution
- ☐ Point-of-Entry
- ☐ Other: ____

18 Field Notes/ Sample #:

19 Sample Type: ☒ Water, ☐ Soil, ☐ Food, ☐ Wastewater, ☐ Other ____

This form accompanies a single sample consisting of:
2 - septum vial(s) (volume = 40 ml)
____ - glass jugs (volume = ____)
____ - ____ (volume = ____)

20 Preservation:
- ☐ NP No Preservation; Sample stored at room temperature
- ☒ P-Ice Sample stored in an ice bath (Not Frozen)
- ☐ P-TS Sample Preserved with Sodium Thiosulfate to remove chlorine residual
- ☐ P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)
- ☒ Other ____

21 Analyses Requested: Please check the appropriate box(es) below to indicate the type of analytical screen(s) required. Whenever possible, list specific compounds suspected or required.

Volatile Screens:

- ☐ - (753) Aliphatic Headspace (1-5 Carbons)
- ☒ - (754) Aromatic & Halogenated Purgeables (EPA 601 & 602)
- ☐ - (765) Mass Spectrometer Purgeables (EPA 624)
- ☐ - (766) SDWA Total Trihalomethanes (EPA 501.1)
- ☐ - (774) SDWA VOC's I [8 Regulated +] (EPA 502.2)
- ☐ - (775) SDWA VOC's II [EDB & DBCP] (EPA 504)
- ☐
- ☐

Other Specific Compounds or Classes:

- ☐ - ( ) ____
- ☐ - ( ) ____
- ☐ - ( ) ____

Semivolatile Screens:

- ☐ - (763) Acid Extractables
- ☐ - (751) Aliphatic Hydrocarbons
- ☐ - (755) Base/Neutral Extractables (EPA 625)
- ☐ - (756) Base/Neutral/Acid Extractables (EPA 8270)
- ☐ - (758) Herbicides, Chlorophenoxy Acid
- ☐ - (759) Herbicides, Triazines
- ☐ - (760) Organochlorine Pesticides
- ☐ - (761) Organophosphate Pesticides
- ☐ - (767) Polychlorinated Biphenyls (PCB's)
- ☐ - (764) Polynuclear Aromatic Hydrocarbons
- ☐ - (762) SDWA Pesticides & Herbicides

Remarks:

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

RECEIVED
MAR 29 1991
OIL CONSERVATION DIV.
SANTA FE

(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] ml

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 Eden
Gary C. Eden
Analyst, Organic Chemistry

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

ORGANIC CHEMISTRY ANALYTICAL REQUEST FORM

SCIENTIFIC LABORATORY DIVISION
700 CAMINO DE SALUD N.E., ALBUQUERQUE, NM 87106
Organic Chemistry Section - Telephone: (505) 841-2570

1 SLD No.

Date Received:

2 User Code #: 7 0 3 2 0 0

3 Request ID No.: Request ID No. 004346-C

4 Priority Code #: 3 (If "1" or "2", call EID-SLD Coordinator)

5 Facility Name: Cariboo Refinery

6 County: San Juan

7 City: Kirtland

8 State: NM

9 Sample Location: Monitor Well MW-16

10 Collected By: William Olson (First, Last) On: 91/03/18 Date: (YY/MM/DD) At: 1000 hrs. Time: 24 hr. clock 3:00 pm = 1500 hrs.

11 Codes: Submitter; WSS #; Organization

12 Latitude (DDMMSS) Longitude (DDDMMSS) 2 Digit ID (if needed)

13 Report To: Name David G. Boyer

14 Phone #: (505) 827-5812

Address New Mexico Oil Conservation Division
P. O. Box 2088
City, State Zip Santa Fe, New Mexico 87504-2088

15 Sample Purpose:
- ☐ Compliance
- ☐ Check
- ☒ Monitoring
- ☐ Special

Sampling Information:
- ☐ Grab
- ☐ Composite (Composite Time Period)
  - ☐ Flow Proportioned
  - ☐ Equal Aliquot
- ☒ Sample Split w/Permittee
- ☐ Chain of Custody

16 Field Data: pH: 7.57, Conductivity: 1200 umhos @ 9.2 °C, Temperature: ____ °C, Chlorine Residual: ____ mg/l, Flow: ____

17 Sample Source:
- ☐ Stream
- ☐ Lake
- ☐ Drain
- ☐ Pool
- ☐ WWTP
- ☒ Well; Depth: ____
- ☐ Spring
- ☐ Distribution
- ☐ Point-of-Entry
- ☐ Other: ____

18 Field Notes/ Sample #:

19 Sample Type: ☒ Water, ☐ Soil, ☐ Food, ☐ Wastewater, ☐ Other ____

This form accompanies a **single sample** consisting of:
2 - septum vial(s) (volume = 40 ml)
____ - glass jugs (volume = ____)
____ - ____ (volume = ____)

20 Preservation:
- ☐ NP No Preservation; Sample stored at room temperature
- ☒ P-Ice Sample stored in an ice bath (Not Frozen)
- ☐ P-TS Sample Preserved with Sodium Thiosulfate to remove chlorine residual
- ☐ P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)
- ☒ Other $HgCl_2$

21 Analyses Requested: Please check the appropriate box(es) below to indicate the type of analytical screen(s) required. Whenever possible, list specific compounds suspected or required.

Volatile Screens:

- ☐ - (753) Aliphatic Headspace (1-5 Carbons)
- ☒ - (754) Aromatic & Halogenated Purgeables (EPA 601 & 602)
- ☐ - (765) Mass Spectrometer Purgeables (EPA 624)
- ☐ - (766) SDWA Total Trihalomethanes (EPA 501.1)
- ☐ - (774) SDWA VOC's I [8 Regulated +] (EPA 502.2)
- ☐ - (775) SDWA VOC's II [EDB & DBCP] (EPA 504)

Other Specific Compounds or Classes:

- ☐ - ( ) ____
- ☐ - ( ) ____
- ☐ - ( ) ____

Semivolatile Screens:

- ☐ - (763) Acid Extractables
- ☐ - (751) Aliphatic Hydrocarbons
- ☐ - (755) Base/Neutral Extractables (EPA 625)
- ☐ - (756) Base/Neutral/Acid Extractables (EPA 8270)
- ☐ - (758) Herbicides, Chlorophenoxy Acid
- ☐ - (759) Herbicides, Triazines
- ☐ - (760) Organochlorine Pesticides
- ☐ - (761) Organophosphate Pesticides
- ☐ - (767) Polychlorinated Biphenyls (PCB's)
- ☐ - (764) Polynuclear Aromatic Hydrocarbons
- ☐ - (762) SDWA Pesticides & Herbicides

Remarks:

GEOWEST
Golden, Inc.

March 17, 1992

RECEIVED

MAR 20 1992

OIL CONSERVATION DIV.
SANTA FE

Mr. William C. Olsen
New Mexico Oil Conservation Division
P. O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87504

Dear Bill:

On behalf of our client, Maverik Country Stores, Inc., I am submitting a copy of a report presenting the results of the January 1992 ground water quality monitoring at the Maverik Refinery tank farm in Kirtland.

When you have finished reviewing this report, I would like to suggest having a conference call among Dan Murray of Maverik, you and I, to discuss the findings and recommendations presented and also other issues you may wish to bring up regarding the site.

Sincerely,
GeoWest Golden, Inc.

Peter F. Olsen
Senior Project Manager

Enclosure

cc Dan Murray, Maverik

9131.01\cor\131wco.ltr

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		*LOCATION*
On: 18-Mar-91	*By:* Ols . . .	Monitor Well MW-19
At: 14:30 hrs.	*In/Near:* Kirtland	

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☒; 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.)

RECEIVED
MAR 29 1991
OIL CONSERVATION DIV.
SANTA FE

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.)

ANALYTICAL REPORT
SLD Accession No. OR-91-0936

COMPOUND DETECTED	CONCENTRATION (PPB)
[redacted]	[redacted] my

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 Jahn
Richard F. Meyerhein 03/25/91
Supervisor, Organic Chemistry Section

ORGANIC CHEMISTRY ANALYTICAL REQUEST FORM

SCIENTIFIC LABORATORY DIVISION
700 CAMINO DE SALUD N.E., ALBUQUERQUE, NM 87106
Organic Chemistry Section - Telephone: (505) 841-2570

1 SLD No.

Date Received:

2 User Code #: 7 0 3 2 0

3 Request ID No.: Request ID No. 004350-C

4 Priority Code #: [If "1" or "2", call EID-SLD Coordinator]

5 Facility Name: Cariboo Refinery

6 County:

7 City:

8 State

9 Sample Location: Monitor Well MW-19

10 Collected By: William Olson (First / Last) On: 91/03/18 Date: (YY/MM/DD) At: 1430 hrs. Time: 24 hr. clock 3:00 pm = 1500 hrs.

11 Codes: Submitter / WSS # / Organization

12 Latitude (DDMMSS) / Longitude (DDDMMSS) / 2 Digit ID (if needed)

13 Report To: Name David G. Boyer

14 Phone #: (505) 827-5812

Address New Mexico Oil Conservation Division
P. O. Box 2088

City, State Zip Santa Fe, New Mexico 87504-2088

15 Sample Purpose:
- ☐ Compliance
- ☐ Check
- ☒ Monitoring
- ☐ Special

Sampling Information:
- ☒ Grab
- ☐ Composite ______ (Composite Time Period)
- ☐ Flow Proportioned
- ☐ Equal Aliquot
- ☒ Sample Split w/Permittee
- ☐ Chain of Custody

16 Field Data: pH: 7.22, Conductivity: 2500 umhos @ 9.5 °C, Temperature: ______ °C, Chlorine Residual: ______ mg/l, Flow: ______

17 Sample Source:
- ☐ Stream
- ☐ Lake
- ☐ Drain
- ☐ Pool
- ☐ WWTP
- ☒ Well; Depth: ______
- ☐ Spring
- ☐ Distribution
- ☐ Point-of-Entry
- ☐ Other: ______

18 Field Notes/ Sample #:

19 Sample Type: ☒ Water, ☐ Soil, ☐ Food, ☐ Wastewater, ☐ Other ______

This form accompanies a single sample consisting of:
2 - septum vial(s) (volume = 40 ml)
______ - glass jugs (volume = ______)
______ - ______ (volume = ______)

20 Preservation:
- ☐ NP No Preservation; Sample stored at room temperature
- ☒ P-Ice Sample stored in an ice bath (Not Frozen)
- ☐ P-TS Sample Preserved with Sodium Thiosulfate to remove chlorine residual
- ☐ P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)
- ☒ Other HgCl

21 Analyses Requested: Please check the appropriate box(es) below to indicate the type of analytical screen(s) required. Whenever possible, list specific compounds suspected or required.

Volatile Screens:

- ☐ - (753) Aliphatic Headspace (1-5 Carbons)
- ☒ - (754) Aromatic & Halogenated Purgeables (EPA 601 & 602)
- ☐ - (765) Mass Spectrometer Purgeables (EPA 624)
- ☐ - (766) SDWA Total Trihalomethanes (EPA 501.1)
- ☐ - (774) SDWA VOC's I [8 Regulated +] (EPA 502.2)
- ☐ - (775) SDWA VOC's II [EDB & DBCP] (EPA 504)

Other Specific Compounds or Classes:

- ☐
- ☐
- ☐ - ( ) ______
- ☐ - ( ) ______
- ☐ - ( ) ______

Semivolatile Screens:

- ☐ - (763) Acid Extractables
- ☐ - (751) Aliphatic Hydrocarbons
- ☐ - (755) Base/Neutral Extractables (EPA 625)
- ☐ - (756) Base/Neutral/Acid Extractables (EPA 8270)
- ☐ - (758) Herbicides, Chlorophenoxy Acid
- ☐ - (759) Herbicides, Triazines
- ☐ - (760) Organochlorine Pesticides
- ☐ - (761) Organophosphate Pesticides
- ☐ - (767) Polychlorinated Biphenyls (PCB's)
- ☐ - (764) Polynuclear Aromatic Hydrocarbons
- ☐ - (762) SDWA Pesticides & Herbicides

Remarks:

SLD 8912-OR Form New 12/89 This Form Will NOT Be Returned With Your Results. Please RETAIN A COPY!

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☑; 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.)

RECEIVED
MAR 29 1991
OIL CONSERVATION DIV.
SANTA FE

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~~	~~0.0~~ mg

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 Jules
Richard F. Meyerhein 03/25/91
Supervisor, Organic Chemistry Section

ORGANIC CHEMISTRY ANALYTICAL REQUEST FORM

SCIENTIFIC LABORATORY DIVISION
700 CAMINO DE SALUD N.E., ALBUQUERQUE, NM 87106
Organic Chemistry Section - Telephone: (505) 841-2570

1 SLD No.:

Date Received:

Request ID No. 004352-C

2 User Code #: 7 0 3 2 0
3 Request ID No.:
4 Priority Code #: 3 [If "1" or "2", call EID-SLD Coordinator]

5 Facility Name: Caribon Refinery
6 County: San Juan
7 City: Kirtland
8 State: NM

9 Sample Location: Monitor Well MW-21

10 Collected By: William (First) Olsion (Last)
On: 91/03/18 Date: (YY/MM/DD)
At: 1215 hrs. Time: 24 hr. clock 3:00 pm = 1500 hrs.

11 Codes: Submitter ____ WSS # ____ Organization ____

12 Latitude (DDMMSS) ____ Longitude (DDDMMSS) ____ 2 Digit ID (if needed) ____

13 Report To: Name David G. Boyer
14 Phone #: (505) 827-5812
Address: New Mexico Oil Conservation Division
P. O. Box 2088
City, State Zip: Santa Fe, New Mexico 87504-2088

15 Sample Purpose:
- ☐ - Compliance
- ☐ - Check
- ☒ - Monitoring
- ☐ - Special

Sampling Information:
- ☒ - Grab
- ☐ - Composite ____ (Composite Time Period)
- ☐ - Flow Proportioned
- ☐ - Equal Aliquot
- ☒ - Sample Split w/Permittee
- ☐ - Chain of Custody

16 Field Data: pH: 7.6, Conductivity: 1700 umhos @ 12.1 °C, Temperature: ____ °C, Chlorine Residual: ____ mg/l, Flow: ____

17 Sample Source:
- ☐ -Stream
- ☐ -Lake
- ☐ -Drain
- ☐ -Pool
- ☐ -WWTP
- ☒ -Well; Depth: ____
- ☐ -Spring
- ☐ -Distribution
- ☐ -Point-of-Entry
- ☐ -Other: ____

18 Field Notes/ Sample #:

19 Sample Type: ☒ -Water, ☐ -Soil, ☐ -Food, ☐ -Wastewater, ☐ -Other ____
This form accompanies a single sample consisting of:
2 - septum vial(s) (volume = 40 ml)
____ - glass jugs (volume = ____)
____ - ____ (volume = ____)

20 Preservation:
- ☐ - NP No Preservation; Sample stored at room temperature
- ☒ - P-Ice Sample stored in an ice bath (Not Frozen)
- ☐ - P-TS Sample Preserved with Sodium Thiosulfate to remove chlorine residual
- ☐ - P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)
- ☒ - Other HCl

21 Analyses Requested: Please check the appropriate box(es) below to indicate the type of analytical screen(s) required. Whenever possible, list specific compounds suspected or required.

Volatile Screens:

- ☐ - (753) Aliphatic Headspace (1-5 Carbons)
- ☒ - (754) Aromatic & Halogenated Purgeables (EPA 601 & 602)
- ☐ - (765) Mass Spectrometer Purgeables (EPA 624)
- ☐ - (766) SDWA Total Trihalomethanes (EPA 501.1)
- ☐ - (774) SDWA VOC's I [8 Regulated +] (EPA 502.2)
- ☐ - (775) SDWA VOC's II [EDB & DBCP] (EPA 504)
- ☐
- ☐

Other Specific Compounds or Classes:

- ☐ - ( ) ____
- ☐ - ( ) ____
- ☐ - ( ) ____

Semivolatile Screens:

- ☐ - (763) Acid Extractables
- ☐ - (751) Aliphatic Hydrocarbons
- ☐ - (755) Base/Neutral Extractables (EPA 625)
- ☐ - (756) Base/Neutral/Acid Extractables (EPA 8270)
- ☐ - (758) Herbicides, Chlorophenoxy Acid
- ☐ - (759) Herbicides, Triazines
- ☐ - (760) Organochlorine Pesticides
- ☐ - (761) Organophosphate Pesticides
- ☐ - (767) Polychlorinated Biphenyls (PCB's)
- ☐ - (764) Polynuclear Aromatic Hydrocarbons
- ☐ - (762) SDWA Pesticides & Herbicides

Remarks:

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

OIL CONSERVATION DIVISION
RECEIVED
'91 FEB 19 AM 9 02

February 13, 1991

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

Dear Bill:

Site Remediation
Maverik Refinery and Tank Farm
Kirtland, New Mexico

This is in response to your letter of January 23, 1991 and our telephone conversation of February 4, 1991 relating to the referenced matter.

In March and September of 1991, we will be sampling 12 monitor wells, namely MW 9, 10, 13, 14, 15, 16, 17, 18, 19, 20, 21, and 22. These samples will be analyzed for B,T,X,E, DCA, chloride, sulfate and TDS; field measurements of pH, conductivity, and temperature will also be made. In addition, samples will be taken from MW 16, 18, 19 and 21 during the March sampling for analysis of Skinner List semivolatiles. The samples from MW 16 and 18 will be extracted and analyzed upon receipt by the laboratory, whereas those from MW 19 and 21 will be extracted only; these will be analyzed only if positive findings result from MW 16 and/or 18. Water levels will be obtained from all the above-noted wells plus MW 1 and 2 during all four 1991 sampling events.

During June and December of 1991, we will be sampling, in addition to the requested MW 18, 19 and 21, MW 17 and 22, the latter two located within the slurry wall. These samples will be analyzed for B,T,X,E, DCA, chloride, sulfate, and TDS, plus the field measurements noted above. Depending on the March results, samples may be taken from monitor wells outside the slurry wall for semivolatile organic analyses.

The purpose of sampling for Skinner List semivolatiles is to determine whether these compounds, typically associated with the heavier ends present on the northern part of the tank farm, are being released to ground water. The quarterly, rather than the requested semi-annual, sampling of the two wells within the slurry wall will permit a better evaluation to be made of the progress of biodegradation.

Monitoring reports containing all data will be submitted to OCD on a semi-annual basis, the first following receipt of the June analytical results and the second following receipt of the December results.

We believe the above complies with or exceeds the requests made in items 2, 3, and 4 of your January 23 letter. We will, of course, notify you in advance of the dates when we will be conducting field operations at the site.

With regard to item 1 of the referenced letter, dealing with removal of visually stained soils to an approved disposal facility, we agree that TPH levels are well in excess of OCD cleanup levels. While Maverik will undoubtedly remove these soils as requested, we would like to postpone this activity until the late summer or early fall after the results of the semivolatile analyses of the ground water samples are available. This will allow an evaluation to be made of the extent to which the constituents which comprise the high TPH levels are impacting the ground water.

During our February 4 telephone conversation, we also discussed the possibility of performing additional remediation within the area enclosed by the slurry wall such as extraction of ground water, hydrocarbon stripping, and reinjection of the water. The problem with this has been that the water within the slurry wall would fail the toxicity characteristic and we would then be considered as managing a hazardous waste, thus involving the site in RCRA Subtitle C regulations. As you pointed out to me, on November 7, 1990, EPA proposed to extend the effective date when such recovered waters would be considered hazardous under the TC rule from the originally extended date of January 25, 1991 to January 25, 1993. In a February 1, 1991 Federal Register notice, EPA extended this date to March 25, 1991 to allow time for the Agency to evaluate comments they had received regarding the proposed two-year extension. API sources have indicated to me that they believe the two-year extension will be granted.

Even assuming that this extension is granted, it may not be relevant to the Kirtland site. This is because, as noted in the preamble to the proposed regulations, the hydrocarbon recovery and remediation activities to which this would apply are those which recover free-floating hydrocarbons from the contaminated aquifer, and include as part of the recovery, reinjection of contaminated ground water via underground injection wells or reinfiltration via an infiltration gallery into the same aquifer from which it was withdrawn. We do not have a free-floating hydrocarbon phase within the slurry wall and, therefore, this is not an objective of remediation at the Kirtland site. API sources have indicated to me that some of the comments received by EPA have addressed the application of the TC extension to similar situations and it was their opinion that it would not apply. They thought that EPA would address this in their final rule.

Should you have questions regarding any of the above, please contact me at your earliest convenience.

Sincerely,

DAMES & MOORE

Peter F. Olsen
Associate

cc: Wm. Call, Maverik Country Stores

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

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

January 23, 1991

CERTIFIED MAIL
RETURN RECEIPT NO. P-106-675-317

William Call
Maverik Country Stores, Inc.
P.O. Box 457
Afton, WY 83110

RE: SITE REMEDIATION
MAVERIK REFINERY AND TANK FARM
KIRTLAND, NEW MEXICO

Dear Mr Call:

The New Mexico Oil Conservation Division (OCD) has completed review of the December, 1990 "STATUS REPORT: REMEDIATION WORK AND ROUND 5 LONG TERM GROUND WATER QUALITY MONITORING DATA RESULTS FOR MAVERIK REFINERY AND TANK FARM, KIRTLAND, NEW MEXICO FOR MAVERIK COUNTRY STORES, INC." submitted by your consultant Dames and Moore.

Based upon a review of this document, the OCD accepts the recommendations in the report conditioned upon the following requirements:

1. Composite samples taken after removal of contaminated soils from the excavations at the 5 contaminated soil sites show levels of total petroleum hydrocarbons (TPH) well in excess of OCD cleanup levels. OCD's inspection of the excavation sites on September 15, 1990 noted that there were still oily, stained soil horizons, up to six inches thick, at or near the surface along edges of the excavations in the tank farm.

   The OCD requires that Maverik remove all remaining visually stained soils to an approved disposal facility along with a buffer of unstained soil and resample soils upon completion of excavation. The OCD recommends that separate samples be taken of the bottoms and sides of the excavated sites so that any remaining lateral or vertical extent of contamination can be distinguished. The need for additional work will be determined after the analytical results of the final soil sampling have been reviewed by OCD.

2. Ground water samples from monitor wells MW-19 and MW-21, which are outside of the slurry wall, show 1,2-dichloroethane in excess of New Mexico Water Quality Control Commission (WQCC) ground water standards. The ground water sample from MW-18, also outside of the slurry wall, shows benzene and xylene in excess of New Mexico WQCC ground water standards.

   The OCD is concerned that these wells are outside of the containment system and that contaminants in these wells have the potential to migrate away from the facility. However, since there are discrepancies between OCD and Maverik sampling results on MW-19 and because these are one time sampling results, the OCD does not at this time have confidence in the accuracy of this data.

   Therefore, the OCD requires that monitor wells MW-18, MW-19, and MW-21 be resampled to confirm the presence and concentrations of these contaminants. The OCD also requires that monitor wells MW-18, MW-19 and MW-21 be monitored on a quarterly basis instead of the recommended semi-annual sampling. If further ground water quality sampling of these wells confirms that petroleum-related volatile organic contaminants are present in excess of WQCC ground water standards, remedial actions for those areas will be required.

3. The OCD requires that water level measurements be taken from all monitor wells semi-annually.

4. The document does not commit to submitting monitoring reports to OCD. The OCD requires that semi-annual reports be submitted containing all monitoring data.

The OCD appreciates your cooperation in developing and implementing remedial actions at the refinery. The OCD looks forward to working with you to resolve any remaining issues. If you have any questions please contact me at (505) 827-5885.

Sincerely,

William C. Olson
Hydrogeologist
Environmental Bureau

xc: Terry D. Vandell, Dames and Moore
    OCD Aztec District Office

TRANSMITTAL SHEET

Dames & Moore

OIL CONSERVATION DIVISION
RECEIVED

'90 DEC 27 PM 5 01

To: Oil Conservation Division
P.O. Box 2088
Old Santa Fe Trail
Santa Fe, New Mexico 87501

Date December 17, 1990

Your Order No.

Our Job No. 14819-005-31

Attention: Mr. Bill Olson

Subject: Maverik Refinery
Kirtland, New Mexico

We are sending you via U.S. Mail

the following STATUS REPORT REMEDIATION WORK AND ROUND 5 LONG-TERM GROUND WATER QUALITY MONITORING DATA RESULTS, FOR MAVERIK REFINERY TANK FARM KIRTLAND, NEW MEXICO, FOR MAVERIK COUNTRY STORES, INC.

~~This is~~
These are for Your review

No. of copies submitted: One

Copies to:
Mr. Dave Tomko - EID
Mr. William Call - Maverik

Dames & Moore

By Terry D. Vandell
Terry D. Vandell

114.6

New Mexico Health and Environment Department

'90 NOV 8 AM 9 41

GARREY CARRUTHERS
Governor

DENNIS BOYD
Secretary

MICHAEL J. BURKHART
Deputy Secretary

RICHARD MITZELFELT
Director

November 5, 1990

Barbara Driscoll, 6H-MA
USEPA
1445 Ross Avenue
Dallas, Texas 75202-2733

Dear Barbara:

Enclosed is the information provided to me by William Olson, of the New Mexico Oil Conservation Division (OCD), regarding status of remediation efforts at the Caribou Refinery in Kirtland, New Mexico. I understand EPA is considering whether to rescore this site using the revised Hazard Ranking System and, if appropriate, pursue inclusion of this site on the Superfund National Priorities List (NPL).

The responsible party, under direction from OCD, appears to be accomplishing needed investigation and cleanup work at the site. At this time, threat of placement of this site on the NPL may be counter-productive. EID recommends progress at the site be monitored and the site not be rescored unless OCD efforts fail.

Sincerely,

Gordon Dilam for

Steven J. Cary
Acting Chief
Toxic Sites Bureau

Enclosures

cc: William Olson, OCD
Mark Satterwhite, EPA, 6H-SS

— ENVIRONMENTAL IMPROVEMENT DIVISION —
Harold Runnels Building
1190 St. Francis Dr.
Santa Fe, New Mexico 87503

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

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

October 26, 1990

Steve Cary
N.M. Environmental Improvement Division
Toxic Sites Bureau
1190 St. Francis Drive
Santa Fe, N.M. 87504-0968

**RE: CARIBOU/MAVERIK REFINERY AND TANK FARM
KIRTLAND, NEW MEXICO**

Dear Mr. Cary:

On October 18, 1990, you requested information regarding the status of investigations and remedial activities related to petroleum contaminated ground water at the Caribou/Maverik Refinery in Kirtland, New Mexico.

At this time, ground water contamination onsite consists of high levels of dissolved phase volatile organics (benzene, toluene, ethylbenzene, xylene and 1,2 dichloroethane). Offsite ground water contamination of these dissolved phase volatile organics has been well below state ground water standards and is approaching non-detectable levels.

The N.M. Oil Conservation Division (OCD) is actively enforcing N.M. Water Quality Control Commission (WQCC) ground water regulations in their oversight of remedial actions at the refinery. Maverik Country Stores, Inc., the current owner of the refinery, has been cooperating in developing and implementing a soil and ground water remediation plan for the facility. Remedial actions to date have included piping the Westside Irrigation Ditch to eliminate the potential for surface water contamination, removal of contaminated soils, installation of a slurry wall to isolate ground water in the source area, application of fertilizers to enhance biodegradation of contaminants inside the slurry wall, in addition to onsite and offsite ground water monitoring.

As per your request, enclosed you will find copies of my July 11, 1988 N.M. Environmental Improvement Division (EID) memorandum and my May 15, 1990 N.M. OCD memorandum listing state regulatory actions that have occurred from 1986 through May 15, 1990 regarding petroleum contaminated ground water at the Caribou/Maverik Refinery in Kirtland, New Mexico. Both of these documents were presented to the WQCC in support of changes in the delegation of authority over the case. The memorandums do not list previous actions taken by either the EID Superfund Section or the U.S. Environmental Protection Agency (EPA).

In addition to the actions listed in the enclosed memorandums, the following list chronologically summarizes remedial and regulatory actions that have occurred from May 15, 1990 to the present under OCD's authority (References to Maverik also include Maverik's consultants, Dames and Moore, actions and correspondence):

May 15, 1990	-	WQCC approves of an EID and OCD request for a change in the delegation of authority to return legal authority for Caribou/Maverik Refinery regulatory actions to OCD.
May 25, 1990	-	OCD notifies Maverik of state requirements for an approved discharge plan for any remedial discharge at the facility.
June 1, 1990	-	OCD notifies resident William Walker that trace levels of 1,2 Dichloroethane were detected in the April 12, OCD sampling of their private irrigation and stock well.
June 7, 1990	-	Maverik submits additional information on slurry wall and monitor well design requested in OCD's April 20, 1990 correspondence.
June 15, 1990	-	OCD approves of Maverik's proposal to install a slurry wall to limit migration of petroleum contaminated ground water. OCD reminds Maverik that review of the proposed remediation system cannot proceed without the remainder of information requested by OCD on April 20, 1990.
June 18, 1990	-	Maverik begins slurry wall installation.
June 19, 1990	-	OCD observes slurry wall installation and samples the William Walker private pond one mile south of the refinery in response to a complaint of oil contamination.
July 18, 1990	-	Maverik notifies OCD of their concern that enactment of EPA's Toxicity Characteristic Rule on September 25, 1990 will cause remedial work to cease until an EPA RCRA permit has been obtained.
July 26, 1990	-	OCD sends William Walker analytical results of samples taken from private pond. No volatile organics detected.

July 26, 1990	-	Maverik submits a remedial plan for sludge and petroleum contaminated soil from the crude oil tank bottom pit and contaminated soils from the fuel oil tank drain areas to OCD.
August 13, 1990	-	OCD approves of Maverik's July 26, 1990 soil/sludge remediation plan with conditions.
August 13, 1990	-	Maverik submits the "STATUS REPORT REMEDIATION WORK AND ROUND 4 LONG-TERM GROUND WATER QUALITY MONITORING DATA RESULTS FOR MAVERIK REFINERY AND TANK FARM" to OCD.
August 27, 1990	-	Maverik begins soil/sludge remedial activities.
September 5, 1990	-	OCD inspects soil/sludge remedial work.
September 7, 1990	-	Maverik submits the "STATUS: REMEDIATION WORK" report to OCD
September 10, 1990	-	Maverik begins installation of additional monitoring wells to evaluate the effectiveness of the slurry wall.
September 13, 1990	-	OCD and Maverik split samples of ground water from monitor wells.
October 16, 1990	-	OCD transmits OCD's September 13, 1990 sampling results to Maverik.

If you have any further questions regarding remedial activities at the Caribou/Maverik Refinery, please contact me at 827-5885.

Sincerely,

Will C. Olson

William C. Olson
Geologist III
Environmental Bureau

xc w/enclosures: OCD Aztec Office
Terry Vandell, Dames and Moore
EID Farmington Office

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

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

October 16, 1990

Terry D. Vandell
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 Ms. Vandell:

On September 13, 1990, 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. Enclosed you will find copies of the analytical results for monitor wells MW-9, MW-10, MW-14, MW-16 and MW-19.

Halogenated volatile organics were not detected in any of the samples. Low levels of purgeable volatile organics (benzene, toluene, ethylbenzene and xylene) were detected in samples from monitor wells MW-10, MW-14, MW-16 and MW-19. No purgeable volatile organics were detected in the sample from monitor well MW-9.

If you have any questions, please contact me at (505)827-5885.

Sincerely,
Will C. Olson

William C. Olson
Hydrogeologist

Enclosures

xc: Aztec OCD Office
Dave Tomko, Farmington EID Office
William Call, Maverik Country Stores, Inc.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

[x] Telephone [ ] Personal	Time 1130	Date

Originating Party	Other Parties
Bill Olson - OCD	Terry Vandell - Dames & Moore (801) 521-9255

Subject

Caribou Refinery

Discussion

Informed her of results of OCD 9/13/90 sampling

She stated that they have not recieved the results of their sampling and that report will be sent out approximately 2 weeks after receipt of lab results. Report will also address insitu remediation

Conclusions or Agreements

Distribution

file

Signed Bill Olson

Inter·Mountain Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT:	NMOCD-Caribou	DATE REPORTED:	09/27/90
ID:	9009131615	DATE ANALYZED:	09/18/90
SITE:	MW-9	DATE RECEIVED:	09/14/90
LAB NO:	F4994	DATE COLLECTED:	09/13/90

Analysis Requested: Purgeable aromatics in water.

Parameter	Concentration		Units
Benzene	ND	(0.2)	ug/l
Toluene	ND	(0.2)	ug/l
Ethylbenzene	ND	(0.2)	ug/l
m/p-Xylene	ND	(0.2)	ug/l
o-Xylene	ND	(0.2)	ug/l
1,4-Dichlorobenzene	ND	(0.4)	ug/l
1,3-Dichlorobenzene	ND	(0.3)	ug/l
1,2-Dichlorobenzene	ND	(0.4)	ug/l
Chlorobenzene	ND	(0.2)	ug/l

Method:
8020 Aromatic Volatile Organics, SW-846, USEPA (1982).
602 Purgeable Aromatics, 40 CFR, Part 136.

(Detection limit in parenthesis.)
ND - Parameter not detected at the stated detection limit.

C. Neal Schaeffer

C. Neal Schaeffer
Senior Chemist

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SANTA FE

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OCT 1 1990

OIL CONSERVATION DIV.
SANTA FE

iml
Inter-Mountain Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: NMOCD-Caribou | DATE REPORTED: 09/27/90
ID: 9009131615 | DATE ANALYZED: 09/18/90
SITE: MW-9 | DATE RECEIVED: 09/14/90
LAB NO: F4994 | DATE COLLECTED: 09/13/90

Analysis Requested: Purgeable halocarbons in water.

Parameter	Concentration
Chloromethane, ug/l.................	ND (10)
Bromomethane, ug/l..................	ND (10)
Dichlorodifluoromethane, ug/l.......	ND (10)
Vinyl chloride, ug/l................	ND (10)
Chloroethane, ug/l..................	ND (1.0)
Dichloromethane (methylene chloride)	ND (1.0)
Trichlorofluoromethane, ug/l........	ND (1.0)
1,1-dichloroethene, ug/l............	ND (1.0)
1,1-dichloroethane, ug/l............	ND (1.0)
trans-1,2-dichloroethene, ug/l......	ND (1.0)
cis-1,2-dichloroethene, ug/l......	ND (1.0)
Chloroform, ug/l....................	ND (1.0)
1,2-dichloroethane, ug/l............	ND (1.0)
1,1,1-trichloroethane, ug/l.........	ND (1.0)
Carbon tetrachloride, ug/l..........	ND (1.0)
Bromodichloromethane, ug/l..........	ND (1.0)
Bromochloromethane, ug/l............	ND (1.0)
1,2-Dichloropropane, ug/l...........	ND (1.0)
1,3-Dichloropropane, ug/l...........	ND (1.0)
1,2-Dibromoethane, ug/l.............	ND (1.0)
1,2-Dibromo-3-chloropropane, ug/l...	ND (1.0)
Trichloroethene, ug/l...............	ND (1.0)
Dibromochloromethane, ug/l..........	ND (1.0)
1,1,2-Trichloroethane, ug/l.........	ND (1.0)
1,1-dichloropropene, ug/l...........	ND (1.0)
2-chloroethyl vinyl ether, ug/l.....	ND (10)
Bromoform, ug/l.....................	ND (1.0)
1,1,1,2-tetrachloroethane, ug/l.....	ND (1.0)
1,1,2,2-tetrachloroethane, ug/l.....	ND (1.0)
Tetrachloroethene, ug/l.............	ND (1.0)
Chlorobenzene, ug/l.................	ND (1.0)
1,3-dichlorobenzene, ug/l...........	ND (1.0)
1,2-dichlorobenzene, ug/l...........	ND (1.0)
1,4-dichlorobenzene, ug/l...........	ND (1.0)
bis(2-cloroisopropyl)ether, ug/l....	ND (1.0)
Bromobenzene, ug/l..................	ND (1.0)
2-Chlorotoluene, ug/l...............	ND (1.0)
Dibromomethane, ug/l................	ND (1.0)
1,2,3-Trichloropropane, ug/l........	ND (1.0)

Method:
601 Purgeable Halocarbons, 40 CFR Part 136, USEPA (1984).
8010 Halogenated Volatile Organics, SW-846, USEPA (1982).
(Detection limit in parenthesis.)
ND - Parameter not detected at the stated detection limit.

C. Neal Schaeffer

C. Neal Schaeffer
Senior Chemist

Inter·Mountain
Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT:	NMOCD-Caribou	DATE REPORTED:	09/27/90
ID:	9009131715	DATE ANALYZED:	09/18/90
SITE:	MW-10	DATE RECEIVED:	09/14/90
LAB NO:	F4995	DATE COLLECTED:	09/13/90

Analysis Requested: Purgeable aromatics in water.

Parameter	Concentration		Units
Benzene	ND	(0.2)	ug/l
Toluene	ND	(0.2)	ug/l
Ethylbenzene	ND	(0.2)	ug/l
m/p-Xylene	0.6	(0.2)	ug/l
o-Xylene	ND	(0.2)	ug/l
1,4-Dichlorobenzene	ND	(0.4)	ug/l
1,3-Dichlorobenzene	ND	(0.3)	ug/l
1,2-Dichlorobenzene	ND	(0.4)	ug/l
Chlorobenzene	ND	(0.2)	ug/l

Method:
8020 Aromatic Volatile Organics, SW-846, USEPA (1982).
602 Purgeable Aromatics, 40 CFR, Part 136.

(Detection limit in parenthesis.)
ND - Parameter not detected at the stated detection limit.

C. Neal Schaeffer

C. Neal Schaeffer
Senior Chemist

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Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: NMOCD-Caribou
ID: 9009131715
SITE: MW-10
LAB NO: F4995

DATE REPORTED: 09/27/90
DATE ANALYZED: 09/18/90
DATE RECEIVED: 09/14/90
DATE COLLECTED: 09/13/90

Analysis Requested: Purgeable halocarbons in water.

Parameter	Concentration	
Chloromethane, ug/l.................	ND	(10)
Bromomethane, ug/l..................	ND	(10)
Dichlorodifluoromethane, ug/l.......	ND	(10)
Vinyl chloride, ug/l................	ND	(10)
Chloroethane, ug/l..................	ND	(1.0)
Dichloromethane (methylene chloride)	ND	(1.0)
Trichlorofluoromethane, ug/l........	ND	(1.0)
1,1-dichloroethene, ug/l............	ND	(1.0)
1,1-dichloroethane, ug/l............	ND	(1.0)
trans-1,2-dichloroethene, ug/l......	ND	(1.0)
cis-1,2-dichloroethene, ug/l......	ND	(1.0)
Chloroform, ug/l....................	ND	(1.0)
1,2-dichloroethane, ug/l............	ND	(1.0)
1,1,1-trichloroethane, ug/l.........	ND	(1.0)
Carbon tetrachloride, ug/l..........	ND	(1.0)
Bromodichloromethane, ug/l..........	ND	(1.0)
Bromochloromethane, ug/l............	ND	(1.0)
1,2-Dichloropropane, ug/l...........	ND	(1.0)
1,3-Dichloropropane, ug/l...........	ND	(1.0)
1,2-Dibromoethane, ug/l.............	ND	(1.0)
1,2-Dibromo-3-chloropropane, ug/l...	ND	(1.0)
Trichloroethene, ug/l...............	ND	(1.0)
Dibromochloromethane, ug/l..........	ND	(1.0)
1,1,2-Trichloroethane, ug/l.........	ND	(1.0)
1,1-dichloropropene, ug/l...........	ND	(1.0)
2-chloroethyl vinyl ether, ug/l.....	ND	(10)
Bromoform, ug/l.....................	ND	(1.0)
1,1,1,2-tetrachloroethane, ug/l.....	ND	(1.0)
1,1,2,2-tetrachloroethane, ug/l.....	ND	(1.0)
Tetrachloroethene, ug/l.............	ND	(1.0)
Chlorobenzene, ug/l.................	ND	(1.0)
1,3-dichlorobenzene, ug/l...........	ND	(1.0)
1,2-dichlorobenzene, ug/l...........	ND	(1.0)
1,4-dichlorobenzene, ug/l...........	ND	(1.0)
bis(2-cloroisopropyl)ether, ug/l....	ND	(1.0)
Bromobenzene, ug/l..................	ND	(1.0)
2-Chlorotoluene, ug/l...............	ND	(1.0)
Dibromomethane, ug/l................	ND	(1.0)
1,2,3-Trichloropropane, ug/l........	ND	(1.0)

Method:

601 Purgeable Halocarbons, 40 CFR Part 136, USEPA (1984).
8010 Halogenated Volatile Organics, SW-846, USEPA (1982).

(Detection limit in parenthesis.)
ND - Parameter not detected at the stated detection limit.

C. Neal Schaeffer

C. Neal Schaeffer
Senior Chemist

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Tel. (505) 326-4737

CLIENT:	NMOCD-Caribou	DATE REPORTED:	09/27/90
ID:	9009131530	DATE ANALYZED:	09/18/90
SITE:	MW-14	DATE RECEIVED:	09/14/90
LAB NO:	F4996	DATE COLLECTED:	09/13/90

Analysis Requested: Purgeable aromatics in water.

Parameter	Concentration		Units
Benzene	ND	(0.2)	ug/l
Toluene	ND	(0.2)	ug/l
Ethylbenzene	ND	(0.2)	ug/l
m/p-Xylene	0.4	(0.2)	ug/l
o-Xylene	ND	(0.2)	ug/l
1,4-Dichlorobenzene	ND	(0.4)	ug/l
1,3-Dichlorobenzene	ND	(0.3)	ug/l
1,2-Dichlorobenzene	ND	(0.4)	ug/l
Chlorobenzene	ND	(0.2)	ug/l

Method:
8020 Aromatic Volatile Organics, SW-846, USEPA (1982).
602 Purgeable Aromatics, 40 CFR, Part 136.

(Detection limit in parenthesis.)
ND - Parameter not detected at the stated detection limit.

C Neal Schaeffer

C. Neal Schaeffer
Senior Chemist

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CLIENT: NMOCD-Caribou
ID: 9009131530
SITE: MW-14
LAB NO: F4996

DATE REPORTED: 09/27/90
DATE ANALYZED: 09/18/90
DATE RECEIVED: 09/14/90
DATE COLLECTED: 09/13/90

Analysis Requested: Purgeable halocarbons in water.

Parameter	Concentration
Chloromethane, ug/l.................	ND (10)
Bromomethane, ug/l..................	ND (10)
Dichlorodifluoromethane, ug/l.......	ND (10)
Vinyl chloride, ug/l................	ND (10)
Chloroethane, ug/l..................	ND (1.0)
Dichloromethane (methylene chloride)	ND (1.0)
Trichlorofluoromethane, ug/l........	ND (1.0)
1,1-dichloroethene, ug/l............	ND (1.0)
1,1-dichloroethane, ug/l............	ND (1.0)
trans-1,2-dichloroethene, ug/l......	ND (1.0)
cis-1,2-dichloroethene, ug/l......	ND (1.0)
Chloroform, ug/l....................	ND (1.0)
1,2-dichloroethane, ug/l............	ND (1.0)
1,1,1-trichloroethane, ug/l.........	ND (1.0)
Carbon tetrachloride, ug/l..........	ND (1.0)
Bromodichloromethane, ug/l..........	ND (1.0)
Bromochloromethane, ug/l............	ND (1.0)
1,2-Dichloropropane, ug/l...........	ND (1.0)
1,3-Dichloropropane, ug/l...........	ND (1.0)
1,2-Dibromoethane, ug/l.............	ND (1.0)
1,2-Dibromo-3-chloropropane, ug/l...	ND (1.0)
Trichloroethene, ug/l...............	ND (1.0)
Dibromochloromethane, ug/l..........	ND (1.0)
1,1,2-Trichloroethane, ug/l.........	ND (1.0)
1,1-dichloropropene, ug/l...........	ND (1.0)
2-chloroethyl vinyl ether, ug/l.....	ND (10)
Bromoform, ug/l.....................	ND (1.0)
1,1,1,2-tetrachloroethane, ug/l.....	ND (1.0)
1,1,2,2-tetrachloroethane, ug/l.....	ND (1.0)
Tetrachloroethene, ug/l.............	ND (1.0)
Chlorobenzene, ug/l.................	ND (1.0)
1,3-dichlorobenzene, ug/l...........	ND (1.0)
1,2-dichlorobenzene, ug/l...........	ND (1.0)
1,4-dichlorobenzene, ug/l...........	ND (1.0)
bis(2-cloroisopropyl)ether, ug/l....	ND (1.0)
Bromobenzene, ug/l..................	ND (1.0)
2-Chlorotoluene, ug/l...............	ND (1.0)
Dibromomethane, ug/l................	ND (1.0)
1,2,3-Trichloropropane, ug/l........	ND (1.0)

Method:
601 Purgeable Halocarbons, 40 CFR Part 136, USEPA (1984).
8010 Halogenated Volatile Organics, SW-846, USEPA (1982).
(Detection limit in parenthesis.)
ND - Parameter not detected at the stated detection limit.

C. Neal Schaeffer

C. Neal Schaeffer
Senior Chemist

Inter·Mountain Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT:	NMOCD-Caribou	DATE REPORTED:	09/27/90
ID:	9009131430	DATE ANALYZED:	09/18/90
SITE:	MW-16	DATE RECEIVED:	09/14/90
LAB NO:	F4997	DATE COLLECTED:	09/13/90

Analysis Requested: Purgeable aromatics in water.

Parameter	Concentration		Units
Benzene	ND	(0.2)	ug/l
Toluene	0.6	(0.2)	ug/l
Ethylbenzene	0.4	(0.2)	ug/l
m/p-Xylene	1.0	(0.2)	ug/l
o-Xylene	1.8	(0.2)	ug/l
1,4-Dichlorobenzene	ND	(0.4)	ug/l
1,3-Dichlorobenzene	ND	(0.3)	ug/l
1,2-Dichlorobenzene	ND	(0.4)	ug/l
Chlorobenzene	ND	(0.2)	ug/l

Method:
8020 Aromatic Volatile Organics, SW-846, USEPA (1982).
602 Purgeable Aromatics, 40 CFR, Part 136.

(Detection limit in parenthesis.)
ND - Parameter not detected at the stated detection limit.

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2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: NMOCD-Caribou
ID: 9009131430
SITE: MW-16
LAB NO: F4997

DATE REPORTED: 09/27/90
DATE ANALYZED: 09/18/90
DATE RECEIVED: 09/14/90
DATE COLLECTED: 09/13/90

Analysis Requested: Purgeable halocarbons in water.

Parameter	Concentration
Chloromethane, ug/l.................	ND (10)
Bromomethane, ug/l..................	ND (10)
Dichlorodifluoromethane, ug/l.......	ND (10)
Vinyl chloride, ug/l................	ND (10)
Chloroethane, ug/l..................	ND (1.0)
Dichloromethane (methylene chloride)	ND (1.0)
Trichlorofluoromethane, ug/l........	ND (1.0)
1,1-dichloroethene, ug/l............	ND (1.0)
1,1-dichloroethane, ug/l............	ND (1.0)
trans-1,2-dichloroethene, ug/l......	ND (1.0)
cis-1,2-dichloroethene, ug/l......	ND (1.0)
Chloroform, ug/l....................	ND (1.0)
1,2-dichloroethane, ug/l............	ND (1.0)
1,1,1-trichloroethane, ug/l.........	ND (1.0)
Carbon tetrachloride, ug/l..........	ND (1.0)
Bromodichloromethane, ug/l..........	ND (1.0)
Bromochloromethane, ug/l............	ND (1.0)
1,2-Dichloropropane, ug/l...........	ND (1.0)
1,3-Dichloropropane, ug/l...........	ND (1.0)
1,2-Dibromoethane, ug/l.............	ND (1.0)
1,2-Dibromo-3-chloropropane, ug/l...	ND (1.0)
Trichloroethene, ug/l...............	ND (1.0)
Dibromochloromethane, ug/l..........	ND (1.0)
1,1,2-Trichloroethane, ug/l.........	ND (1.0)
1,1-dichloropropene, ug/l...........	ND (1.0)
2-chloroethyl vinyl ether, ug/l.....	ND (10)
Bromoform, ug/l.....................	ND (1.0)
1,1,1,2-tetrachloroethane, ug/l.....	ND (1.0)
1,1,2,2-tetrachloroethane, ug/l.....	ND (1.0)
Tetrachloroethene, ug/l.............	ND (1.0)
Chlorobenzene, ug/l.................	ND (1.0)
1,3-dichlorobenzene, ug/l...........	ND (1.0)
1,2-dichlorobenzene, ug/l...........	ND (1.0)
1,4-dichlorobenzene, ug/l...........	ND (1.0)
bis(2-cloroisopropyl)ether, ug/l....	ND (1.0)
Bromobenzene, ug/l..................	ND (1.0)
2-Chlorotoluene, ug/l...............	ND (1.0)
Dibromomethane, ug/l................	ND (1.0)
1,2,3-Trichloropropane, ug/l........	ND (1.0)

Method:
601 Purgeable Halocarbons, 40 CFR Part 136, USEPA (1984).
8010 Halogenated Volatile Organics, SW-846, USEPA (1982).
(Detection limit in parenthesis.)
ND - Parameter not detected at the stated detection limit.

C Neal Schaeffer

C. Neal Schaeffer
Senior Chemist

Inter·Mountain Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT:	NMOCD-Caribou	DATE REPORTED:	09/27/90
ID:	9009131800	DATE ANALYZED:	09/18/90
SITE:	MW-19	DATE RECEIVED:	09/14/90
LAB NO:	F4998	DATE COLLECTED:	09/13/90

Analysis Requested: Purgeable aromatics in water.

Parameter	Concentration		Units
Benzene	0.6	(0.2)	ug/l
Toluene	0.7	(0.2)	ug/l
Ethylbenzene	0.5	(0.2)	ug/l
m/p-Xylene	0.9	(0.2)	ug/l
o-Xylene	1.1	(0.2)	ug/l
1,4-Dichlorobenzene	ND	(0.4)	ug/l
1,3-Dichlorobenzene	ND	(0.3)	ug/l
1,2-Dichlorobenzene	ND	(0.4)	ug/l
Chlorobenzene	ND	(0.2)	ug/l

Method:
8020 Aromatic Volatile Organics, SW-846, USEPA (1982).
602 Purgeable Aromatics, 40 CFR, Part 136.

(Detection limit in parenthesis.)
ND - Parameter not detected at the stated detection limit.

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2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT:	NMOCD-Caribou	DATE REPORTED:	10/09/90
ID:	9009131800	DATE ANALYZED:	09/20/90
SITE:	MW-19	DATE RECEIVED:	09/14/90
LAB NO:	F4998	DATE COLLECTED:	09/13/90

Analysis Requested: Purgeable halocarbons in water.

Parameter	Concentration
Chloromethane, ug/l..................	ND (100)
Bromomethane, ug/l..................	ND (100)
Dichlorodifluoromethane, ug/l.......	ND (100)
Vinyl chloride, ug/l................	ND (100)
Chloroethane, ug/l..................	ND (10)
Dichloromethane (methylene chloride)	ND (10)
Trichlorofluoromethane, ug/l........	ND (10)
1,1-dichloroethene, ug/l............	ND (10)
1,1-dichloroethane, ug/l............	ND (10)
trans-1,2-dichloroethene, ug/l......	ND (10)
cis-1,2-dichloroethene, ug/l......	ND (10)
Chloroform, ug/l....................	ND (10)
1,2-dichloroethane, ug/l............	ND (10)
1,1,1-trichloroethane, ug/l.........	ND (10)
Carbon tetrachloride, ug/l..........	ND (10)
Bromodichloromethane, ug/l..........	ND (10)
Bromochloromethane, ug/l............	ND (10)
1,2-Dichloropropane, ug/l...........	ND (10)
1,3-Dichloropropane, ug/l...........	ND (10)
1,2-Dibromoethane, ug/l.............	ND (10)
1,2-Dibromo-3-chloropropane, ug/l...	ND (10)
Trichloroethene, ug/l...............	ND (10)
Dibromochloromethane, ug/l..........	ND (10)
1,1,2-Trichloroethane, ug/l.........	ND (10)
1,1-dichloropropene, ug/l...........	ND (10)
2-chloroethyl vinyl ether, ug/l.....	ND (100)
Bromoform, ug/l.....................	ND (10)
1,1,1,2-tetrachloroethane, ug/l.....	ND (10)
1,1,2,2-tetrachloroethane, ug/l.....	ND (10)
Tetrachloroethene, ug/l.............	ND (10)
Chlorobenzene, ug/l.................	ND (10)
1,3-dichlorobenzene, ug/l...........	ND (10)
1,2-dichlorobenzene, ug/l...........	ND (10)
1,4-dichlorobenzene, ug/l...........	ND (10)
bis(2-cloroisopropyl)ether, ug/l....	ND (10)
Bromobenzene, ug/l..................	ND (10)
2-Chlorotoluene, ug/l...............	ND (10)
Dibromomethane, ug/l................	ND (10)
1,2,3-Trichloropropane, ug/l........	ND (10)

Method:
601 Purgeable Halocarbons, 40 CFR Part 136, USEPA (1984).
8010 Halogenated Volatile Organics, SW-846, USEPA (1982).
(Detection limit in parenthesis.)
ND - Parameter not detected at the stated detection limit.

C Neal Schaeffer

C. Neal Schaeffer
Senior Chemist

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

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September 7, 1990 '90 SEP 10 AM 9 51

State Land Office Building, Room 206
Oil Conservation Division
310 Old Sante Fe Trail
Santa Fe, NM 87501

Attention: Mr. William Olson

Subject: STATUS: REMEDIATION WORK
Maverik Country Stores, Inc.
Tank Farm,
Kirtland, New Mexico

Dear Bill:

As per your verbal request of August 29, 1990, this letter serves as an update of the remediation work that has recently been completed and that is scheduled for completion in September of this year at the Maverik Country Stores Inc. Tank Farm in Kirtland, New Mexico.

The following work was completed the week of August 20, 1990:

1. Approximately 1300 cubic yards (108-12 cubic yard truckloads) of contaminated soil and crude and fuel oil sludge were removed from the tank farm (See Figure 1 for locations of excavated sites 1 through 5, and Table 1 for approximate volumes excavated) and disposed of at Envirotech's disposal facility near Bloomfield, New Mexico. The total amount of material removed from the site was about 4 times the original amount estimated. The material excavated included those soils that were discolored (e.g. gray or black), soils in which organic vapors were detected at elevated levels based on readings measured in the field using an organic vapor analyzer (OVA meter) and all of the sludge encountered.

2. Approximately 130 cubic yards (7-18 cubic yard truckloads) of sludge and the upper 4 inches of soil were excavated and removed from the eastern sludge pit, for disposal to CSI's facility in Bennett, Colorado.

3. Composite samples representative of the soils at the base of the five excavations have been submitted to Data Chem Laboratory in Salt Lake City, Utah, an EPA contract laboratory certified by the State of Utah. As agreed to and as per your letter of August 13, 1990, the 5 composite soil samples from the 5 excavations are being

analyzed for BTEX, TPH (method 418.1) and EP Tox metals. The laboratory analytical test results are scheduled to be completed by September 17, 1990. If the soils meet the criteria as stipulated in your letter of August 13, 1990 (BTEX < 50 ppm or benzene < 10 ppm; TPH < 100 ppm; and EP Tox metals < .20 RCRA EP TOX levels), and if the site excavation and clean-up meets with your approval, then the excavations will be backfilled with clean fill.

4. In addition to the above remediation work conducted, and as we discussed, soils in the southwest corner of the tank farm within the slurry wall were aerated to a depth of about 4 feet using backhoes and a D-6 and D-8. Three samples of composite soils taken in the north, central and southern parts within the slurry wall were submitted to Data Chem Laboratory in Salt Lake City. Each sample is being analyzed for BTEX. Eighty 50 pound bags of ammonium phosphate fertilizer were turned in with the soil to enhance biodegradation.

During the week of September 10, 1990, the following remediation work will be completed:

1. Fresh water from the Lower Valley Water Users, from the fire hydrant which is located on-site, will be sprayed on top of the fertilized soil within the slurry wall to aid in bacterial nutrient absorption of the ammonium and phosphate fertilizer to enhance bacterial growth and biodegradation of the tank farm contaminants.

2. Seven new monitor wells (designated MW-16 through MW-22) will be drilled and geologically logged, developed, static water levels measured and water quality samples taken for laboratory analysis of aromatic volatile organics (EPA Method 602), halogenated volatile organic compounds (EPA Method 601), chloride, sulfate and total dissolved solids. Field analytical tests for pH, conductivity and temperature will also be conducted.

3. The five existing monitor wells that have been used for long-term ground water quality monitoring (MW-9,10,13,14 and 15) will also be monitored and sampled at this time for the same parameters as for the new monitor wells.

4. If, upon site inspection by the OCD during the week of September 10, 1990, additional soil clean-up is required, such work will be completed under the supervision of Dames & Moore with soil disposal to Envirotech's disposal site near Bloomfield, New Mexico.

5. As per your letter of August 13, 1990, a report which details the above remediation work conducted, including the limits of the excavated areas, volumes excavated, transportation manifests and soil and ground water quality laboratory analytical test results, will be completed and submitted to the OCD within two weeks after all of the water quality data have been received.

I am looking forward to seeing you on-site the week of September 10, 1990 for site inspection and duplicate ground water quality sampling of selected new and old monitor wells. Monitor well drilling will commence on Monday September 10, 1990 and should be completed by Thursday, September 13, 1990. I will be staying at the Holiday Inn in Farmington, New Mexico and can be reached there at (505) 327-9811.

Very Truly Yours,

DAMES & MOORE

Terry D. Vandell

Terry D. Vandell
Senior Hydrogeologist

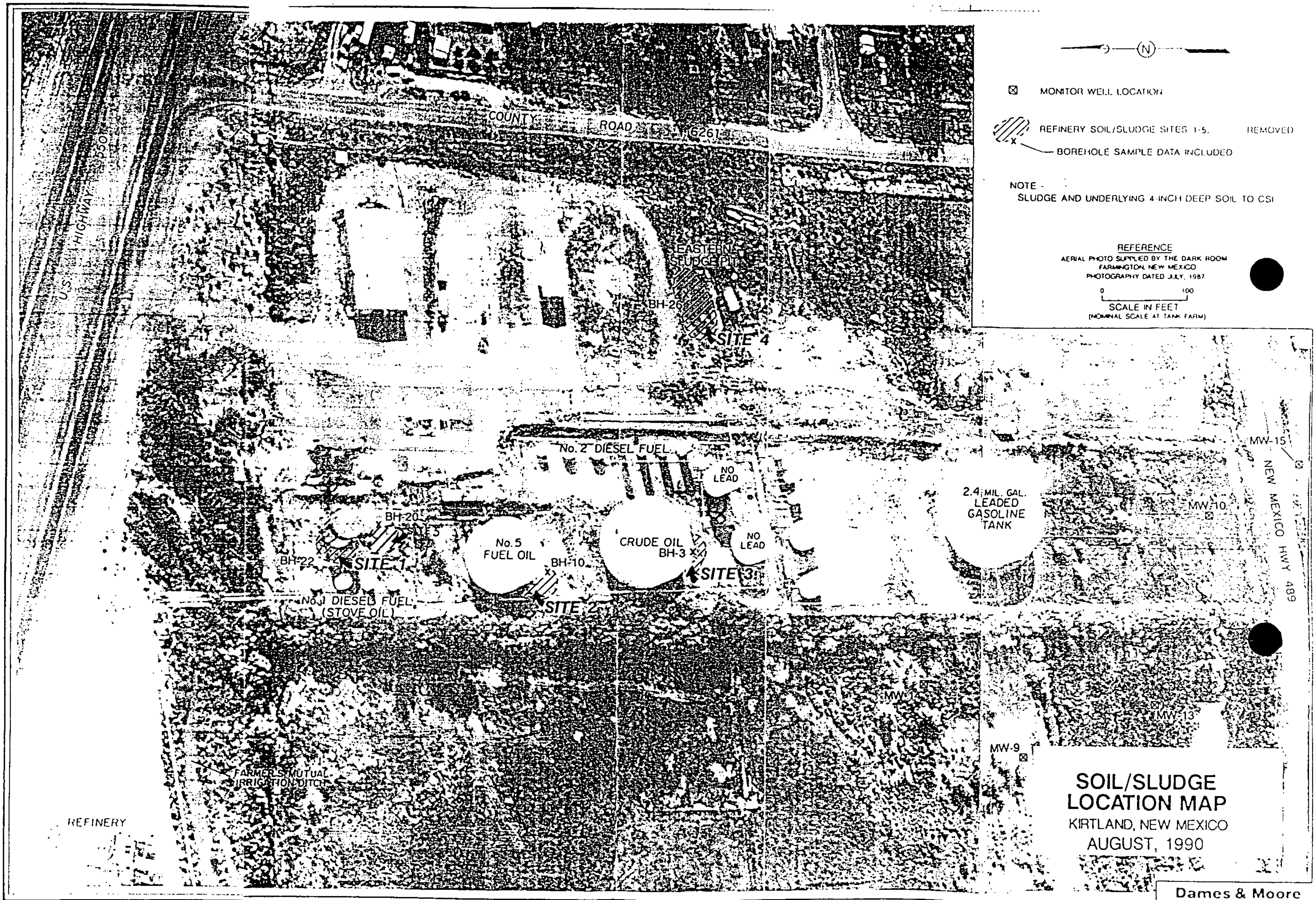
cc: William Call
Peter F. Olsen

TABLE 1

APPROXIMATE VOLUMES OF SOIL/SLUDGE EXCAVATED FROM SITES 1-5

	No. of Truckloads	Estimated Volume (@ 12 cubic yards/load)
SITE 1	9	108
SITE 2	18	216
SITE 3	31	372
(10 DRUMS)	4	48
SITE 4	27 (1)	324 (1)
SITE 5	19	228
TOTAL	108 TRUCKLOADS	1,296 CYDS.

Footnote:
(1) Does not include the additional 7 truckloads (@ 18 cubic yards per truckload, or 126 cubic yards) taken to CSI.



SOIL/SLUDGE LOCATION MAP
KIRTLAND, NEW MEXICO
AUGUST, 1990

Dames & Moore

FIGURE 1

FILE 14819-005 BY DATE CHECKED BY DATE

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal | Time 1000 | Date 8/29/90

Originating Party	Other Parties
Terry Vardell - Dames + Moore	Bill Olson - OCD Santa Fe

Subject

Soil Remediation Caribou Refinery

Discussion

CSI has already been to site (Tues) and removed all of sludge from eastern sludge pit in 7 ~~?~~ lined trucks to be disposed of at CSI

Stove oil area appeared to only be contaminated to a depth of 2'

Crude oil tank drain area is worse than expected. Hydrocarbons have moved laterally ~~?~~ very little but it does extend to about the water table.

Conclusions or Agreements

Requested update of remedial activities, she will send

Distribution

file

Signed Bill Olson

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time 1145	Date 8/21/90

Originating Party	Other Parties
Terry Vandell - Dames & Moore	Bill Olson - OCD Santa Fe

Subject

Caribou Soil/Sludge Remediation

Discussion

Soil excavation remediation to begin Mon 8/27 around tank areas to be trucked to Envirotech Landfarm

East sludge pit to be started by CSI on Tues. 8/28. Seven lined trucks will arrive to transport to CSI in Bennet, Colo.

Want to install monitor wells week of Sept 4th, 1990

Conclusions or Agreements

I will get out approval letter for monitor wells by approx. 8/30/90

She will call next Tues to brief me on soil removal

Distribution file

Signed Bill Olson

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

OIL CONSERVATION DIVISION
RECEIVED

'90 AUG 16 AM 9 44

August 14, 1990

Envirotech
3111 Knudsen
Farmington, NM 87401

Attention: Mr. Morris Young,
President

Re: Disposal of Tank Farm Contaminated Wastes and Soils to Thriftway Disposal Site

Dear Mr. Young:

As per our telephone conversation of August 8 and 10, 1990, this letter serves as a written formal request to dispose of certain refinery-related contaminated soils and sludges from the Maverik Country Stores Inc. abandoned tank farm (Caribou) near Kirtland, New Mexico to your disposal facility located at the Thriftway Refinery in Bloomfield, New Mexico.

As per our discussions with Mr. Bill Olson of the Oil Conservation Division, the soils and sludges on-site at the aforementioned tank farm (with the exception of the sludge and underlying 4 to 6 inches of soil at the Eastern Sludge Pit) can be disposed of at the Thriftway Disposal Site. Figure 1 shows the locations of the sites, designated sites 1 through 4, where soils and sludges are to be removed and disposed of to Thriftway. Laboratory analytical data for the material are also attached which demonstrate that these wastes from the fuel oil, diesel and crude oil tanks are not hazardous (i.e., do not fail EP toxicity tests). Specifically, we have attached the laboratory analytical test results for:

1. Sludges near the northern diesel fuel tanks (Site 1),

2. Soils near the fuel oil tank (Site 2),

3. The crude oil tank sludge (Site 3), which was removed from the crude oil tank by Rocky Mountain Construction Services, Inc. (some of which is currently stored in 55-gallon drums on-site, to be disposed of to Thriftway),

4. The sludge and underlying soils at the eastern sludge pit (Site 4), and

5. A composite sample taken from surficial sludges and soils at the three areas (Sites 1, 2 and 3) near the diesel fuel, fuel oil and crude oil tanks.

With respect to the underlying soils in the Eastern Sludge Pit, at depths greater than 4 to 6 inches, these deeper soils can be disposed of at Thriftway. The overlying sludge and soils will, however, be disposed of at CSI in Bennett, Colorado.

The volume (depth and extent) of soil/sludge removal will be determined in the field during excavation, both visually and via headspace analysis for volatile organics. However, we have estimated that approximately 350 cubic yards of waste material will be disposed of at the Thriftway Refinery. As per our conversation of August 10, 1990, the cost for such disposal will be about $8.00/ton (or cubic yard). Attached is a manifest form that can be used for this project.

A copy of this letter has been forwarded to Mr. Bill Olson for his review and records. As we understand and, upon Mr. Olson's verbal and/or written approval of this request the waste material as described can be delivered and appropriately disposed of at the Thriftway Disposal Site. If possible, we would like to begin disposal the week of August 27, 1990, the same week that CSI is scheduled to begin removal of sludge and upper soil from the Eastern Sludge Pit.

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP

We appreciate your time and cooperation in this matter. If you have any questions, please call (801) 521-9255.

Very truly yours,
DAMES & MOORE

Peter F. Olsen
Associate

T.D. Vandell

Terry D. Vandell
Senior Hydrogeologist

PFO/TDV:fl

cc: Bill Olson
With Attachments

Bill Call
With Attachments

Levi Todd
With Attachments

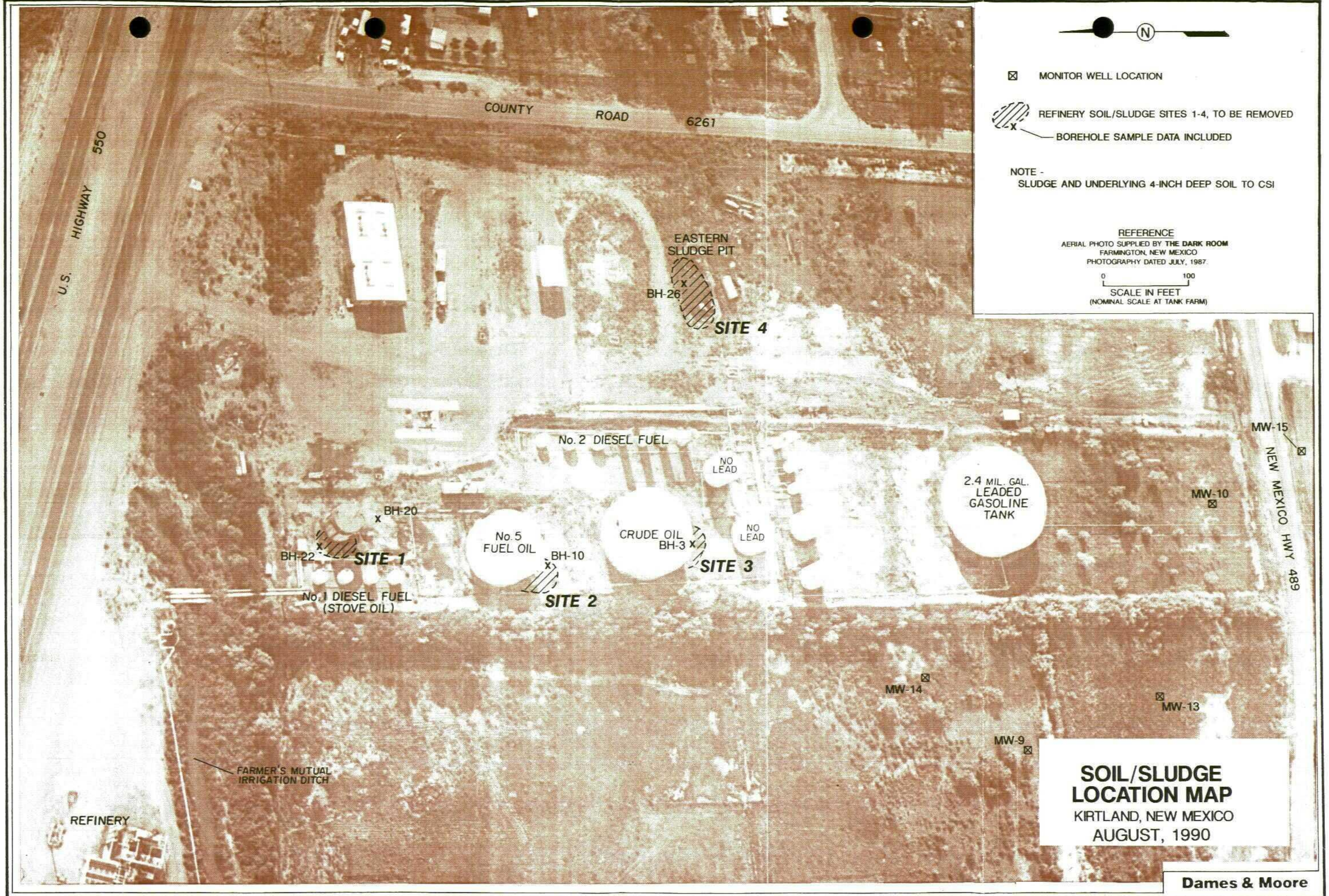


FIGURE 1

FILE 14819-005 BY DATE CHECKED BY DATE

46612 (11/82)

No

INDUSTRIAL WASTE DISPOSAL MANIFEST

PART I: TO BE COMPLETED BY SHIPPER/GENERATOR

COMPANY NAME Maverik Country Stores, Inc.

BUSINESS ADDRESS P.O. Box 457, Afton, Wyoming 83110-0457

ADDRESS OF SHIPMENT ORIGIN U.S. Highway 550, Kirtland, NM

AUTHORIZED CONTACT Terry Vandell, Dames & Moore EMERGENCY PHONE (801) 521-9255

RECEIVER'S NAME Envirotech/Thriftway Disposal Site

BUSINESS ADDRESS Bloomfield, New Mexico OFFICE PHONE (505)326-2822

SITE ADDRESS Hammond Ditch Road SITE PHONE (505) 632-3363

ESTIMATED QUANTITY	UNITS	WASTE DESCRIPTION
40	C.yd.	Site 1 Sludge/Soil Near Diesel Fuel Tanks
60	C.yd.	Site 2 Sludge/Soil Near Fuel Tank
60	C.yd.	Site 3 Sludge/Soil From Crude Oil Tank (Drums too)
200	C.yd.	Site 4 Soil, >/4 Inches Below Sludge In Eastern Sludge Pit

The materials described above were consigned to the Carrier named below. I certify that the foregoing is true and correct to the best of my knowledge.

SIGNATURE OF AUTHORIZED Contact X

DATE:

TYPE OR PRINT ABOVE NAME: Terry D. Vandell

PART II: TO BE COMPLETED BY CARRIER/DRIVER

CARRIER NAME

BUSINESS ADDRESS

PHONE NO.

I certify that the materials in the quantity described above are received by me for shipment to the above destination.

SIGNATURE OF AUTHORIZED AGENT X

DATE:

TYPE OR PRINT ABOVE NAME:

PART III: TO BE COMPLETED BY RECEIVER

RECEIVERS NAME Morris Young

PHONE NO. (505) 326-2822

SITE ADDRESS Thriftway-Refinery/Hammond Ditch Road /Bloomfield, NM

RECEIVER'S COMMENTS

I certify that the materials in the quantity described in Part I are received by me.

SIGNATURE OF AUTHORIZED AGENT X

DATE:

TYPE OR PRINT ABOVE NAME:

SLUDGES NEAR DIESEL FUEL TANKS

(SITE 1)

AROMATIC VOLATILE ORGANICS

EPA METHOD 8020

Client Name: DAMES AND MOORE

Client ID: BH-20

Laboratory ID: 67196-001 Enseco ID: 67196-001

Matrix: Soil Sampled: 04/21/88 Received: 04/22/88

Authorized: 04/22/88 Analyzed: 05/03/88

Parameter	Result	Units (as received)	Reporting Limit
Benzene	75	ug/kg	50
Chlorobenzene	N.D.	ug/kg	50
1,2-Dichlorobenzene	N.D.	ug/kg	50
1,3-Dichlorobenzene	N.D.	ug/kg	50
1,4-Dichlorobenzene	N.D.	ug/kg	50
Ethylbenzene	76	ug/kg	50
Toluene	120	ug/kg	50
m-Xylene	130	ug/kg	50
o & p-Xylene(s)	150	ug/kg	50

N.D. = Not detected

Reported by: Helmer Morse Approved by: Susan Brillante

Enseco

ANALYTICAL RESULTS FOR TOTAL CHROMATOGRAPHABLE ORGANICS

Client Name: DAMES AND MOORE
Client ID: BH-20
Laboratory ID: 67196-001 Enseco ID: 67196-001
Matrix: Soil Sampled: 04/21/88 Received: 04/22/88
Authorized: 04/22/88 Prepared: 04/27/88 Analyzed: 04/29/88

	Value	Units	Detection Limit
Total Chromatographable Organics	54,000,000	ug/kg	830,000
Initial Boiling Point*	250	°C	-
Final Boiling Point*	450	°C	-
Gasoline	ND	ug/kg	8,300,000
Stoddard Solvent	ND	ug/kg	8,300,000
Jet Fuel	ND	ug/kg	8,300,000
Kerosene	ND	ug/kg	8,300,000
Diesel	54,000,000	ug/kg	8,300,000
Motor Oil	ND	ug/kg	83,000,000

* The initial and final boiling points define the range of compounds detected. The method is capable of detecting compounds between 100°C and 500°C.

** Primary components of this product were detected in the sample. Due to the overall complexity of the chromatogram, reliable identification of this product cannot be achieved.

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: BH-20

Laboratory ID: 67196-001 Enseco ID: 67196-001

Matrix: Soil Sampled: 04/21/88 Received: 04/22/88

Authorized: 04/22/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Oil	10.3	%	0.1		05/03/88
Water	10.9	%	0.1		05/03/88
Solids	78.8	%	0.1		05/03/88

N.D. = Not detected

Approved by: Lindsay Breyer

Enseco

AROMATIC VOLATILE ORGANICS

EPA METHOD 8020

Client Name: DAMES AND MOORE

Client ID: BH-22

Laboratory ID: 67196-003 Enseco ID: 67196-003

Matrix: Waste Sampled: 04/21/88 Received: 04/22/88

Authorized: 04/22/88 Analyzed: 05/03/88

Parameter	Result	Units (as received)	Reporting Limit
Benzene	2000	ug/kg	100
Chlorobenzene	N.D.	ug/kg	100
1,2-Dichlorobenzene	N.D.	ug/kg	100
1,3-Dichlorobenzene	N.D.	ug/kg	100
1,4-Dichlorobenzene	N.D.	ug/kg	100
Ethylbenzene	1800	ug/kg	100
Toluene	11000	ug/kg	100
m-Xylene	10000	ug/kg	100
o & p-Xylene(s)	6100	ug/kg	100

N.D. = Not detected

Reported by: Helmer Morse Approved by: Susan Brillante

Sample: 67196-003

Enseco

ANALYTICAL RESULTS FOR TOTAL CHROMATOGRAPHABLE ORGANICS

Client Name: DAMES AND MOORE
Client ID: BH-22
Laboratory ID: 67196-003 Enseco ID: 67196-003
Matrix: Waste Sampled: 04/21/88 Received: 04/22/88
Authorized: 04/22/88 Prepared: 04/27/88 Analyzed: 04/29/88

	Value	Units	Detection Limit
Total Chromatographable Organics	130,000,000	ug/kg	830,000
Initial Boiling Point*	100	°C	-
Final Boiling Point*	500	°C	-
Gasoline	ND	-	8,300,000
Stoddard Solvent	ND	-	8,300,000
Jet Fuel	ND	-	8,300,000
Kerosene	ND	-	8,300,000
Diesel	ND	-	8,300,000
Motor Oil	ND	-	83,000,000

* The initial and final boiling points define the range of compounds detected. The method is capable of detecting compounds between 100°C and 500°C.

** Primary components of this product were detected in the sample. Due to the overall complexity of the chromatogram, reliable identification of this product cannot be achieved.

METALS PARAMETERS
TOTAL METALS

Client Name: DAMES AND MOORE

Client ID: BH-22

Laboratory ID: 67196-003 Enseco ID: 67196-003

Matrix: Waste Sampled: 04/21/88 Received: 04/22/88

Authorized: 04/22/88

Parameter	Result	Units (as received)	Reporting Limit	Analytical Method	Analyzed
Antimony	N.D.	mg/kg	5	6010	04/29/88
Arsenic	N.D.	mg/kg	0.3	7060	05/06/88
Barium	9.4	mg/kg	0.5	6010	04/29/88
Beryllium	N.D.	mg/kg	0.1	6010	04/29/88
Cadmium	N.D.	mg/kg	0.5	6010	04/29/88
Chromium	N.D.	mg/kg	1	6010	04/29/88
Cobalt	N.D.	mg/kg	1	6010	04/29/88
Lead	N.D.	mg/kg	5	6010	04/29/88
Mercury	N.D.	ug/kg	50	7471	04/29/88
Nickel	N.D.	mg/kg	4	6010	04/29/88
Selenium	N.D.	mg/kg	0.2	7740	05/05/88
Vanadium	N.D.	mg/kg	1	6010	04/29/88

N.D. = Not detected

Approved by: Will Pratt

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: BH-22

Laboratory ID: 67196-003 Enseco ID: 67196-003

Matrix: Waste Sampled: 04/21/88 Received: 04/22/88

Authorized: 04/22/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Oil	93.7	%	0.1		05/03/88
Water	2.0	%	0.1		05/03/88
Solids	4.3	%	0.1		05/03/88

N.D. = Not detected

Approved by: Lindsay Breyer

SOILS NEAR FUEL OIL TANK

(SITE 2)

AROMATIC VOLATILE ORGANICS

EPA METHOD 8020

Client Name: DAMES AND MOORE

Client ID: BH-10 12'

Laboratory ID: 67161-004 Enseco ID: 67161-004

Matrix: Solid Sampled: 04/17/88 Received: 04/19/88

Authorized: 04/19/88 Analyzed: 04/28/88

Parameter	Result	Units (as received)	Reporting Limit
Benzene	410	ug/kg	200
Chlorobenzene	N.D.	ug/kg	200
1,2-Dichlorobenzene	N.D.	ug/kg	200
1,3-Dichlorobenzene	N.D.	ug/kg	200
1,4-Dichlorobenzene	N.D.	ug/kg	200
Ethylbenzene	10000	ug/kg	200
Toluene	870	ug/kg	200
m-Xylene	63000	ug/kg	200
o & p-Xylene(s)	13000	ug/kg	200

N.D. = Not detected

Reported by: Helmer Morse Approved by: Susan Brillante

Enseco

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: BH-10 15'

Laboratory ID: 67161-005 Enseco ID: 67161-005

Matrix: Solid Sampled: 04/17/88 Received: 04/19/88

Authorized: 04/19/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Oil	0.7	%	0.1		05/03/88
Water	15.8	%	0.1		05/03/88
Solids	83.5	%	0.1		05/03/88

N.D. = Not detected

Approved by: Lindsay Breyer

Sample: 67161-005

CRUDE OIL TANK ANALYSES

(MATERIAL IN DRUMS)

(SITE 3)

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (708) 953-9300

SINCE 1908

Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
490 ORCHARD ST., GOLDEN, CO 80401
TELEPHONE: (303) 278-9521
FAX: (303) 278-1779

Conservation Services Inc.
777 West 62nd Avenue
Denver, Colorado 80216

Date: February 23, 1990
IAD #97-120870-01
Received: 02/22/90

Attention: Mr. Mark A. Molen

Material: Oil Sludge (From Crude Oil Tank Bottom)

Procedure: EP Toxicity per EPA Reference SW-846, Test Methods for Evaluating Solid Wastes.

Results: EP Toxicity results are reported as milligrams per liter, (mg/L), on an extract basis.

The weight of the sample prepared for the analysis is reported in grams (gm).

The volume of 0.5N acetic acid required for the pH adjustment of the extract is reported in milliliters (ml).

The volume of de-ionized water added and final volume of the extract are also reported in milliliters (ml).

The initial and final pH values of each extract are reported directly.

If you have any questions concerning these results, please feel free to call.

Tony Stoyke for
Byron C. Gaton
Laboratory Manager

dld/csi0870

Conservation Services Inc.
IAD #97-120870-01
February 23, 1990
Page 2

EP Toxic Extract Elements

Parameter	03486
Cadmium, Cd	<0.01
Chromium, Cr	0.07
Lead, Pb	0.20
Sample Weight	101.6
Volume of 0.5N Acetic Acid required for pH adjustment	66
Volume of deionized water added to the extract	1934
[illegible] pH	10.3
Final pH	5.1

Original Copy Watermarked
For Your Protection

CONSERVATION SERVICES, INC. LABORATORY WORKSHEET

CUSTOMER: Rocky Mtn. Const. CONTACT: ______
WASTE CODE: CO-01- ______ - 03486 MANIFEST NO.: ______
RECIEVED: DATE 2/20/90 TIME ______ VOLUME ______

tank bottom sludge

PHYSICAL STATE (top to bottom 1 2 3 4) __LIQUID_____% __SOLID_____%
__OIL_____% /SLUDGE 100 % __OTHER______

DESCRIPTION COLOR black ODOR mild LOOK oil sludge

DENSITY 9.46 [] lb/cu.yd [X] lb/gal [] g/cc 113.47 g/100ml

MISCIBILITY Miscible in water? [] yes [X] no

SOLUBILITY Soluble in water? [] very [] slight [] none

IGNITABILITY %LEL — at — °F

CLOSED CUP FLASH POINT >150 °F

CORROSIVITY INITIAL pH 8.2 (10 % sample solution)

REACTIVITY Any reactions with [] AIR [] WATER [] KILN DUST

ACID ADJUST: 20 ml of a 10 % sample solution
took 1.0 ml of 10% HCl, final pH 1.5
REACTIONS non

BASE ADJUST: 20 ml of a 10 % sample solution
took 1.0 ml of 10% NaOH, final pH 12.6
REACTIONS none

SULFIDES Spot test []positive []negative QUANTITATIVE —

CYANIDES QUANTITATIVE ______ AMMONIA QUANTITATIVE —

CHLORIDES Spot test []very []slight [X]none

RADIOACTIVITY Greater[] or Less[X] than background

SUSPENDED SOLIDS After Centrifuge — % of total volume

MOISTURE — % VISCOSITY — cp (centipoises)

COMMENTS ______

AMOUNT OF SAMPLE REMAINING ~~1/3 Quart~~ none - sample jar broke during move.

ANALYST Al. Morales DATE 2/21/90

CUSTOMER: Rocky Mtn. Const.   DATE: 2/21/90
WASTE CODE: CO-01-______-03486

SOLIDIFICATION REQUIREMENTS

KILN DUST TYPE M.M.   WEIGHT OF WASTE 50 MLS= 567 grams

WASTE/WATER RATIO 50 % WASTE   50 % WATER
RATIO FIGURES   START: 200 MLS KD= 264.2 G
FINISH: 156.7 MLS KD= 207.0 G
TOTAL: 43.3 MLS KD= 57.2 G

233.4
26.4
207.0

$\frac{200 \text{ MLS KD}}{x} = \frac{\cancel{154.0}\ 264.2 \text{ G KD}}{207.0 \text{ g. dust left}}$ x= 156.7

KILN DUST TYPE ______   WEIGHT OF WASTE ____ MLS= ______

WASTE/WATER RATIO ______ % WASTE   ______ % WATER
RATIO FIGURES   START: ______ MLS KD= ______ G
FINISH: ______ MLS KD= ______ G
TOTAL: ______ MLS KD= ______ G

$\frac{200 \text{ MLS KD}}{x} = 154.0 \text{ G KD}$ x=

RATIO 0.45   VOLUME INCREASE 1.25

COMMENTS ______

NEUTRALIZATION REQUIREMENTS
STARTING SAMPLE VOLUME ______
TITRANT USED: ______

	START	FINISH	MLS USED	FINAL pH
INDICATOR TYPE				

To get a pH of ______ approximately ______ gallons of ______ is needed for each ______ of waste.

COMMENTS ______

ANALYST Al Mandler   DATE 2/21/90

CONSERVATION SERVICES, INC.
OFFICES
2090 E. 104th Ave.
Denver, CO 80233
(303) 280-9336
FAX 280-9848

FACILITY
41800 East 88th Ave.
Bennett, CO 80102
(303) 644-4335

CHAIN OF CUSTODY RECORD
ANALYTICAL SERVICES REQUEST

Collected by: (Sampler) (Signature)		Print Name: STAN Kuchera	
Employer of Sampler: Rocky Mtn. Construction	Address: Same as below		Telephone:
Generator Name: Rocky Mtn. Construction	Sampling Address: 959 U.S. Hwy 64 Farmington N.M.		Telephone: (505) 632-3542
Sampler Project No.	CSI Lab Control No.: 03486	Condition/Temp of Sample	
CSI Customer No.	CSI Salesman	Priority: 48 hr	

SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	COMPOSITE (TYPE)	GRAB (TYPE)	WATER (PHASE)	SOLID (PHASE)	OIL (PHASE)	SLUDGE (PHASE)	CSI RCRA ANALYSIS	IGNITABILITY	CORROSIVITY	EP TOXICITY EXTRACTION	TCLP EXTRACTION	Lead	Cad	Chrom						FIELD TEST RESULTS					CSI LAB CONTROL No.
Tank Bottom Sludge	2-14-90	9:10		X				X	X					X	N	X											03486

COMMENTS: Split original sample and sent to CTE for Ep Tox Aon 2/21/90

FIELD INFORMATION:

SPECIAL HANDLING AND/OR STORAGE:

RELINQUISHED BY:	REPRESENTING:	TO WHOM:	DATE/TIME:
MJ	CSI	Greg D	2-20-90 15:00
Greg DuBois	CSI	A. Marden	2/20/90 – 4:00 P.M.

AROMATIC VOLATILE ORGANICS

EPA METHOD 8020

Client Name: DAMES AND MOORE

Client ID: BH-3 5'-7'

Laboratory ID: 67161-011 Enseco ID: 67161-011

Matrix: Solid Sampled: 04/17/88 Received: 04/19/88

Authorized: 04/19/88 Analyzed: 05/02/88

Parameter	Result	Units (as received)	Reporting Limit
Benzene	5200	ug/kg	500
Chlorobenzene	N.D.	ug/kg	500
1,2-Dichlorobenzene	N.D.	ug/kg	500
1,3-Dichlorobenzene	N.D.	ug/kg	500
1,4-Dichlorobenzene	N.D.	ug/kg	500
Ethylbenzene	26000	ug/kg	500
Toluene	13000	ug/kg	500
m-Xylene	17000	ug/kg	500
o & p-Xylene(s)	90000	ug/kg	500

N.D. = Not detected

Reported by: Helmer Morse Approved by: Susan Brillante

Enseco

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: BH-3 5'-7'

Laboratory ID: 67161-011 Enseco ID: 67161-011

Matrix: Solid Sampled: 04/17/88 Received: 04/19/88

Authorized: 04/19/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Oil	1.5	%	0.1		05/03/88
Water	14.0	%	0.1		05/03/88
Solids	84.5	%	0.1		05/03/88

N.D. = Not detected

Approved by: Lindsay Breyer

Sample: 67161-011

METALS PARAMETERS
EPI TOXICITY METALS

Client Name: DAMES AND MOORE

Client ID: BH-3 11'

Laboratory ID: 67161-012 Enseco ID: 67161-012

Matrix: Solid Sampled: 04/17/88 Received: 04/19/88

Authorized: 04/19/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Arsenic	N.D.	mg/L	0.1	200.7	05/02/88
Barium	2.7	mg/L	0.005	200.7	05/02/88
Cadmium	N.D.	mg/L	0.005	200.7	05/02/88
Chromium	N.D.	mg/L	0.01	200.7	05/02/88
Lead	N.D.	mg/L	0.05	200.7	05/02/88
Mercury	N.D.	ug/L	1	245.1	04/29/88
Selenium	N.D.	mg/L	0.02	7740	05/05/88
Silver	N.D.	mg/L	0.005	200.7	05/02/88

N.D. = Not detected

Approved by: Will Pratt

EASTERN SLUDGE PIT

SOIL/SLUDGE ANALYSES

(SITE 4)

SAMPLE DESCRIPTION INFORMATION
for
Dames and Moore

Lab ID	Client ID		Matrix	Sampled Date	Sampled Time	Received Date
008144-0001-SA	MESP-SL1	(Eastern Sludge Pit Sludge)	SOIL	18 JAN 90	15:00	20 JAN 90
008144-0002-SA	MESP-Sol	(Eastern Sludge Pit Soils, 0.5 to 5.0 feet)	SOIL	18 JAN 90	15:00	20 JAN 90

General Inorganics

Client Name: Dames and Moore
Client ID: MESP-SL1
Lab ID: 008144-0001-SA
Matrix: SOIL
Authorized: 20 JAN 90

Enseco ID: 1064809
Sampled: 18 JAN 90
Prepared: See Below

Received: 20 JAN 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Reactive	ND	mg/kg	0.1	EPA/OSW	NA	23 JAN 90
Ignitability	>160	deg. F	--	1010/1020	NA	23 JAN 90
Oil and Grease	129000	mg/kg	100	9070 Mod.	NA	24 JAN 90
pH	7.2	units	--	9045/ASTM	NA	23 JAN 90
Sulfide, Reactive	ND	mg/kg	0.5	EPA/OSW	NA	23 JAN 90
Total Petroleum Hydrocarbons	13300	mg/kg	50	9070	NA	23 JAN 90

Note o : This test is unreliable for any sample other than a non-aqueous liquid.

ND = Not detected
NA = Not applicable

Reported By: Ron Maiorana

Approved By: Kimberly Conroy

Metals

EP Toxicity Leachate

Client Name: Dames and Moore
Client ID: MESP-SL1
Lab ID: 008144-0001-SA Enseco ID: 1064809
Matrix: SOIL Sampled: 18 JAN 90 Received: 20 JAN 90
Authorized: 20 JAN 90 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	0.1	6010	24 JAN 90	25 JAN 90
Barium	0.10	mg/L	0.01	6010	24 JAN 90	25 JAN 90
Cadmium	ND	mg/L	0.005	6010	24 JAN 90	25 JAN 90
Chromium	ND	mg/L	0.01	6010	24 JAN 90	25 JAN 90
Lead	0.18	mg/L	0.05	6010	24 JAN 90	25 JAN 90
Silver	ND	mg/L	0.01	6010	24 JAN 90	25 JAN 90
Mercury	ND	mg/L	0.002	7470	24 JAN 90	25 JAN 90
Selenium	ND	mg/L	0.05	7740	24 JAN 90	25 JAN 90

ND = Not detected
NA = Not applicable

Reported By: Fred Velasquez Approved By: Kimberly Conroy

SAMPLE DESCRIPTION INFORMATION
for
Dames and Moore

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
009523-0001-SA	ESP-Soil	SOIL	05 MAY 90	04:00	08 MAY 90

General Inorganics

Client Name: Dames and Moore
Client ID: MESP-Sol
Lab ID: 008144-0002-SA   Enseco ID: 1064810
Matrix: SOIL   Sampled: 18 JAN 90   Received: 20 JAN 90
Authorized: 20 JAN 90   Prepared: See Below   Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Reactive	ND	mg/kg	0.1	EPA/OSW	NA	23 JAN 90
Ignitability	>160	deg. F	--	1010/1020	NA	23 JAN 90
Oil and Grease	20300	mg/kg	100	9070 Mod.	NA	24 JAN 90
pH	7.7	units	--	9045/ASTM	NA	23 JAN 90
Sulfide, Reactive	ND	mg/kg	0.5	EPA/OSW	NA	23 JAN 90
Total Petroleum Hydrocarbons	2560	mg/kg	50	9070	NA	23 JAN 90

Note a : This test is unreliable for any sample other than a non-aqueous liquid.

ND = Not detected
NA = Not applicable

Reported By: Ron Maiorana   Approved By: Kimberly Conroy

Enseco
A Corning Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Dames and Moore
Client ID: ESP-Soil
Lab ID: 009523-0001-SA Enseco ID: 1075792
Matrix: SOIL Sampled: 05 MAY 90 Received: 08 MAY 90
Authorized: 15 MAY 90 Prepared: NA Analyzed: 16 MAY 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Janet Heida Approved By: Kim Zilis

Metals

EP Toxicity Leachate

Client Name: Dames and Moore
Client ID: MESP-Sol
Lab ID: 008144-0002-SA   Enseco ID: 1064810
Matrix: SOIL   Sampled: 18 JAN 90   Received: 20 JAN 90
Authorized: 20 JAN 90   Prepared: See Below   Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	0.1	6010	24 JAN 90	25 JAN 90
Barium	1.6	mg/L	0.01	6010	24 JAN 90	25 JAN 90
Cadmium	ND	mg/L	0.005	6010	24 JAN 90	25 JAN 90
Chromium	ND	mg/L	0.01	6010	24 JAN 90	25 JAN 90
Lead	ND	mg/L	0.05	6010	24 JAN 90	25 JAN 90
Silver	ND	mg/L	0.01	6010	24 JAN 90	25 JAN 90
Mercury	ND	mg/L	0.002	7470	24 JAN 90	25 JAN 90
Selenium	ND	mg/L	0.05	7740	24 JAN 90	25 JAN 90

ND = Not detected
NA = Not applicable

Reported By: Fred Velasquez   Approved By: Kimberly Conroy

Enseco

ANALYTICAL RESULTS FOR TOTAL CHROMATOGRAPHABLE ORGANICS

Client Name: DAMES AND MOORE
Client ID: BH-26 (Eastern Sludge Pit Sludge)
Laboratory ID: 67196-006 Enseco ID: 67196-006
Matrix: Waste Sampled: 04/21/88 Received: 04/22/88
Authorized: 04/22/88 Prepared: 04/27/88 Analyzed: 04/29/88

	Value	Units	Detection Limit
Total Chromatographable Organics	130,000,000	ug/kg	170,000
Initial Boiling Point*	170	°C	-
Final Boiling Point*	500	°C	-
Gasoline	ND	ug/kg	1,400,000
Stoddard Solvent	ND	ug/kg	1,400,000
Jet Fuel	ND	ug/kg	1,400,000
Kerosene	ND	ug/kg	1,400,000
Diesel	**	ug/kg	1,400,000
Motor Oil	ND	ug/kg	17,000,000

* The initial and final boiling points define the range of compounds detected. The method is capable of detecting compounds between 100°C and 500°C.

** Primary components of this product were detected in the sample. Due to the overall complexity of the chromatogram, reliable identification of this product cannot be achieved.

Enseco

METALS PARAMETERS
TOTAL METALS

Client Name: DAMES AND MOORE

Client ID: BH-26

Laboratory ID: 67196-006 Enseco ID: 67196-006

Matrix: Waste Sampled: 04/21/88 Received: 04/22/88

Authorized: 04/22/88

Parameter	Result	Units (as received)	Reporting Limit	Analytical Method	Analyzed
Arsenic	9.0	mg/kg	0.6	7060	05/06/88
Barium	63	mg/kg	0.5	6010	04/29/88
Cadmium	N.D.	mg/kg	0.5	6010	04/29/88
Chromium	12	mg/kg	1	6010	04/29/88
Lead	98	mg/kg	5	6010	04/29/88
Mercury	N.D.	ug/kg	50	7471	04/29/88
Selenium	N.D.	mg/kg	0.2	7740	05/05/88
Silver	N.D.	mg/kg	0.5	6010	04/29/88

N.D. = Not detected

Approved by: Will Pratt

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: BH-26

Laboratory ID: 67196-006 Enseco ID: 67196-006

Matrix: Waste Sampled: 04/21/88 Received: 04/22/88

Authorized: 04/22/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Oil	51.3	%	0.1		05/03/88
Water	9.0	%	0.1		05/03/88
Solids	39.7	%	0.1		05/03/88

N.D. = Not detected

Approved by: Lindsay Breyer

COMPOSITE SURFICIAL SLUDGE/SOIL

(SITES 1,2 AND 3)

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (708) 953-9300

SINCE 1904

Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
490 ORCHARD ST., GOLDEN, CO 80401
TELEPHONE: (303) 278-9521
FAX: (303) 278-1779

Conservation Services Inc.
777 West 62nd Avenue
Denver, Colorado 80216

Date: July 11, 1990
IAD #97-129880-01
Received: 07/05/90

Attention: Mr. Mark A. Molen

Material: Oil (Surficial Sludge, Sites 1,2,3)

Procedure: EP Toxicity per EPA Reference SW-846, Test Methods for Evaluating Solid Wastes.

Results: EP Toxicity results are reported as milligrams per liter, (mg/L), on an extract basis.

The weight of the sample prepared for the analysis is reported in grams (gm).

The volume of 0.5N acetic acid required for the pH adjustment of the extract is reported in milliliters (ml).

The volume of de-ionized water added and final volume of the extract are also reported in milliliters (ml).

The initial and final pH values of each extract are reported directly.

If you have any questions concerning these results, please feel free to call.

Byron C. Caton
Byron C. Caton
Laboratory Manager

dld/csi9880

Conservation Services Inc.
IAD #97-129880-01
July 11, 1990
Page 2

EP Toxic Extract Elements

Parameter	03847
Arsenic, As	<0.2
Barium, Ba	0.02
Cadmium, Cd	<0.01
Chromium, Cr	<0.02
Lead, Pb	<0.05
Mercury, Hg	<0.0002
Selenium, Se	<0.2
Silver, Ag	<0.01
Sample Weight	100.0
Volume of 0.5N Acetic Acid required for pH adjustment	0
Volume of deionized water added to the extract	2,000
Final volume of the extract	2,000
Initial pH	4.3
Final pH	4.4

Original Copy Watermarked
For Your Protection

CONSERVATION SERVICES, INC. LABORATORY WORKSHEET

CUSTOMER: ROCKY MTN. CONST. CONTACT: ____________
WASTE CODE: CO-01- ________ -03847 MANIFEST NO.: ____________
RECIEVED: DATE 7-3-90 TIME ________ VOLUME ________

PHYSICAL STATE (top to bottom 1 2 3 4) 1 LIQUID 1.0 % __ SOLID ____ %
__ OIL ____ % __ SLUDGE ____ % 2 OTHER oily sludge 99%

light brown/
DESCRIPTION COLOR brown ODOR mild LOOK ________

DENSITY 9.86 [] lb/cu.yd [x] lb/gal [] g/cc

MISCIBILITY Miscible in water? [x] yes [] no

SOLUBILITY Soluble in water? [] very [] slight [x] none

IGNITABILITY %LEL - at - °F

CLOSED CUP FLASH POINT > 150 °F

CORROSIVITY INITIAL pH 7.5 (1.0 % sample solution)

REACTIVITY Any reactions with [] AIR [] WATER [] KILN DUST

ACID ADJUST: 20 ml of a 1.0 % sample solution
took 1.0 ml of 10% HCl, final pH 2.0
REACTIONS none

BASE ADJUST: 20 ml of a 1.0 % sample solution
took 1.0 ml of 10% NaOH, final pH 12.5
REACTIONS none

SULFIDES Spot test []positive []negative QUANTITATIVE -

CYANIDES QUANTITATIVE - AMMONIA QUANTITATIVE -

CHLORIDES Spot test []very []slight [x]none

RADIOACTIVITY Greater[] or Less[x] than background

SUSPENDED SOLIDS After Centrifuge - % of total volume

MOISTURE - % VISCOSITY - cp (centipoises)

COMMENTS Sludge liquifies during flashpoint test heating.
A composite of the 3 samples submitted was used for this analysis, and the outside lab work.

AMOUNT OF SAMPLE REMAINING ½ qt.

ANALYST Al. Morales DATE 7-10-90

CUSTOMER: ROCKY MTN. CONST. DATE: 7-11-90

WASTE CODE: CO-01-________-03847

SOLIDIFICATION REQUIREMENTS

KILN DUST TYPE M.M. WEIGHT OF WASTE 45 MLS= 53.2 grams

WASTE/WATER RATIO 45 % WASTE 55 % WATER

RATIO FIGURES START: 200 MLS KD= ~~264.2~~ G

FINISH: 151.55 MLS KD= ~~200.2~~ G

TOTAL: ~~48.45~~ MLS KD= 64.0 G

$$\frac{200 \text{ MLS KD}}{x} = \frac{\overset{264.2}{\cancel{154.0 \text{ G KD}}}}{200.2 \text{ g. dust left}} \qquad x = 151.55$$

KILN DUST TYPE ________ WEIGHT OF WASTE ____ MLS= ______

WASTE/WATER RATIO ______ % WASTE ______ % WATER

RATIO FIGURES START: ______ MLS KD= ______ G

FINISH: ______ MLS KD= ______ G

TOTAL: ______ MLS KD= ______ G

$$\frac{200 \text{ MLS KD}}{x} = \underline{154.0 \text{ G KD}} \qquad x =$$

RATIO 0.5 VOLUME INCREASE 1.25

COMMENTS ______________________________

NEUTRALIZATION REQUIREMENTS

STARTING SAMPLE VOLUME ________

TITRANT USED: ________

	START	FINISH	MLS USED	FINAL pH
INDICATOR TYPE				

To get a pH of ______ approximately ______ gallons of ______ is needed for each ______ of waste.

COMMENTS ______________________________

ANALYST *R. Morales* DATE 7/11/90

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

August 13, 1990

Oil Conservation District
State Land Office Building
P.O. Box 2088
Old Santa Fe Trail
Santa Fe, New Mexico 87501

Attention: Mr. William Olson

Dear Bill:

Enclosed is a copy of "Status Report Remediation Work and Round 4 Long-Term Ground Water Quality Monitoring Data Results for Maverik Refinery Tank Farm."

If you have any questions, please do not hesitate to contact me.

Very truly yours,

DAMES & MOORE

Peter F. Olsen
Associate

Terry D. Vandell
Senior Hydrogeologist

PFO/TDV:fl

cc: Mr. William Call
Mr. Vince Memmott
Mr. Dave Tomko
Mr. Levi Todd

RECEIVED
AUG 16 1990
OIL CONSERVATION DIV.
SANTA FE

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

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

August 13, 1990

CERTIFIED MAIL
RETURN RECEIPT NO. P-918-402-339

Terry D. Vandell
Dames and Moore
127 South 500 East, Suite 300
Salt Lake City, Utah 84102

RE: SOIL/SLUDGE DISPOSAL PLAN
MAVERIK REFINERY AND TANK FARM
KIRTLAND, NEW MEXICO

Dear Ms. Vandell:

The New Mexico Oil Conservation Division (OCD) has completed review of the July 26, 1990 "SOIL/SLUDGE DISPOSAL" proposal submitted by Dames and Moore for the Maverik Country Stores, Inc. Refinery and Tank Farm in Kirtland, New Mexico. The OCD approves of Dames and Moores proposal for removal of contaminated soil from the eastern sludge pit and tank farm area with the following changes and conditions as agreed during conversations between OCD and Dames and Moore on August 9, 1990:

1) The OCD will allow disposal of contaminated soils at the Envirotech Solids Disposal Facility south of Bloomfield, New Mexico.

2) Sludge from the eastern sludge pit will not be taken to the Envirotech Solids Disposal Facility. Dames and Moore will transport the sludge to CSI for proper disposal.

3) The definition of sludge from the eastern sludge pit will include a four inch buffer of soil surrounding the physical limit of the sludge.

4) Contaminated soils from the bottom of each excavated area will be sampled and submitted for appropriate laboratory analyses to determine if further remediation is required.

5) All soils above the following contaminant levels, determined by laboratory analysis, will be remediated:

   - If the sum of all detected aromatics is greater than 50 part per million (ppm), or the benzene concentration is greater than 10 ppm.

   - If the concentration of total petroleum hydrocarbons is greater than 100 ppm.

   - If the concentration of any heavy metals are greater than one-fifth of RCRA EP toxic levels.

6) Clean fill will be used for all backfilling of excavated areas.

7) Soil samples will be taken from the excavated areas prior to backfilling to confirm that remediation levels have been attained.

8) A report will be submitted to OCD upon completion documenting remediation performed including the limits of the excavated areas, volumes excavated, transportation manifests, all laboratory analyses performed and any other pertinent information.

OCD approval of the soil/sludge disposal remediation plan does not limit remediation to the areas proposed if other areas of contaminated soil related to refinery activities are identified during future investigations.

Please be advised that OCD approval of the soil/sludge remediation plan does not relieve you of liability which may be actionable under any other laws and/or regulations. If you have any questions please call me at (505) 827-5885.

Sincerely,

William C. Olson
Hydrogeologist

WCO

xc: William Call, Maverik Country Stores, Inc.
Frank Chavez, OCD Aztec District Office
Dave Tomko, EID Farmington

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time 1130	Date 8/6/90

Originating Party	Other Parties
Bill Olson - OCD Santa Fe	Terry Vandell - Dames & Moore (801) 521-9255

Subject

Caribou / Maverick Refinery

Discussion Requested additional MW approx. 200' north of MW-14

Called to ask about waste sample analyses from sludge pit south of refinery. She said the former plant manager said they did not have a pit in that location. I requested sample analyses of boreholes from this area since it was identified as a sludge area in the Phase II report.

She asked about the Status of the Envirotech Landfarm. I told her that it was approved for operation on 8/1/90

I told her they should apply for interim status so that remediation can continue.

Informed her that the state will press to have remediation continue regardless of TCLP

Conclusions or Agreements

They will sample south sludge area in next couple weeks

I will send letter by end of week on soil removal, monitor well, and continuing remediation

Distribution File

Signed Bill Olson

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

July 26, 1990

RECEIVED

JUL 27 1990

OIL CONSERVATION DIV.
SANTA FE

State Land Office Building, Room 206
Oil Conservation Division
310 Old Sante Fe Trail
Santa Fe, NM 87501

Attention: Mr. William Olson

Subject: Soil/Sludge Disposal At Maverik Country Stores, Inc. Tank Farm, Kirtland, New Mexico

Dear Bill:

As per our telephone conversation of July 24, 1990, enclosed are the laboratory analytical data for the contaminated soil and sludge from crude oil (the eastern sludge pit) and from fuel oil (northern part of site) from the Maverik Country Stores, Inc. Tank Farm in Kirtland, New Mexico. The analytical data indicate that neither the soils or sludges are EP toxic with respect to metals leachability, reactivity, ignitability and/or corrosivity (See Attachments 1 and 2 and Figure 1).

With respect to your concern over the origin of the sludge in the eastern sludge pit, according to Vince Memmott (previous engineer on-site at the Maverik Kirtland Tank Farm), and as stated in a January 1987 letter response to Allyn M. Davis, EPA-Dallas, Texas from Mr. William Call, sludge was cleaned from the bottom of the crude tank in the mid-1970's and a small pit was dug southeast of the tank where the sludge was then deposited and where it still remains. In addition, this letter response also addressed EPA's prior concern regarding any hazardous wastes that may have been generated at the facility (e.g. API separator sludge, slop oil, emulsion solids, corrosive waste, additives, etc.). The response from Mr. William Call was " No RCRA regulated hazardous wastes have been generated at the refinery."

As you are aware, Maverik Country Stores, Inc. would like to dispose of this material at the Thriftway Refinery Disposal Site as soon as possible in order to complete off-site disposal prior to September 25, 1990, the effective date of EPA-TC regulations. We therefore appreciate your timely consideration in the review and approval of such disposal to the Thriftway Refinery Disposal Site. If you have any questions regarding the enclosed information, please do not hesitate to contact us at (801) 521-9255.

Very Truly Yours,

DAMES & MOORE

Peter F. Olsen
Associate

Terry D. Vandell
Senior Hydrogeologist

PFO/fl

cc:

Mr. William Call, With Attachments
Mr. Vince Memmott, With Attachments

FILE 14819-005 BY ____ DATE ____ CHECKED BY ____ DATE ____

466.12 (11-82)

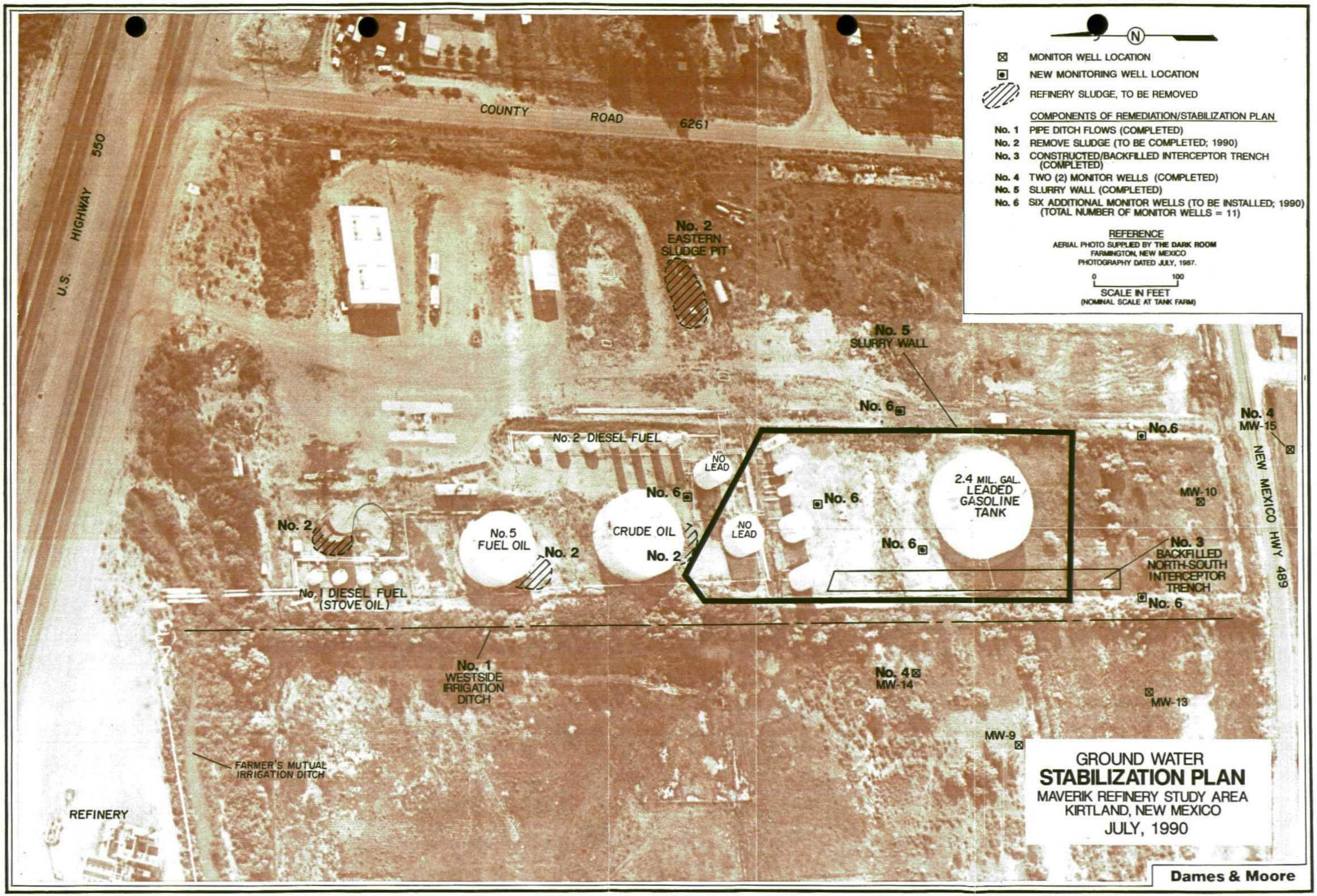


FIGURE 1

What if facility exempt &

nonexempt non hazardous soils before

Sept 25th ~~with thing~~ & do not

accept hazardous waste after Sept 25, 1990

are they now haz-waste landfarm?

ATTACHMENT 1

ANALYTICAL RESULTS OF EASTERN SLUDGE PIT SOILS AND SLUDGE, CONDUCTED BY ENSECO LABORATORY FOR DAMES & MOORE

LABORTORY ANALYTICAL TEST RESULTS OF DETECTED CONSTITUENTS
AND RCRA EP TOXICITY TEST RESULTS OF THE SLUDGE
FROM THE EASTERN SLUDGE PIT (1)

Sample Site(2) Designation	Barium(3) (mg/1)	Lead(3) (mg/1)	Ignitability (°F)	Oil and Grease (mg/kg)	pH (ph Units)	Total Petroleum Hydrocarbons (mg/kg)
SL1	0.10	0.18	>160	129,000	7.2	13,300
S01	1.6	<0.05	>160	20,300	7.7	2,560

(1) Sampled January 18, 1990; Composite samples taken from 1 to 5 feet in depth.

(2) Designated as MESP-SL1 and MESP-S01 in the laboratory reports. SL1 sample composited sludge from 0.0 to 0.5 and 0.75 feet in depth. S01 sample composited underlying soils from 0.5 to 5 feet in depth.

(3) EP Toxicity Leachate

<0.05 indicates below detection limit

SAMPLE DESCRIPTION INFORMATION
for
Dames and Moore

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
009523-0001-SA	ESP-Soil	SOIL	05 MAY 90	04:00	08 MAY 90

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Dames and Moore
Client ID: ESP-Soil
Lab ID: 009523-0001-SA   Enseco ID: 1075792
Matrix: SOIL   Sampled: 05 MAY 90   Received: 08 MAY 90
Authorized: 15 MAY 90   Prepared: NA   Analyzed: 16 MAY 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Janet Heida   Approved By: Kim Zilis

SAMPLE DESCRIPTION INFORMATION
for
Dames and Moore

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
008144-0001-SA	MESP-SL1	SOIL	18 JAN 90	15:00	20 JAN 90
008144-0002-SA	MESP-Sol	SOIL	18 JAN 90	15:00	20 JAN 90

Metals

EP Toxicity Leachate

Client Name: Dames and Moore
Client ID: MESP-SL1
Lab ID: 008144-0001-SA   Enseco ID: 1064809
Matrix: SOIL   Sampled: 18 JAN 90   Received: 20 JAN 90
Authorized: 20 JAN 90   Prepared: See Below   Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	0.1	6010	24 JAN 90	25 JAN 90
Barium	0.10	mg/L	0.01	6010	24 JAN 90	25 JAN 90
Cadmium	ND	mg/L	0.005	6010	24 JAN 90	25 JAN 90
Chromium	ND	mg/L	0.01	6010	24 JAN 90	25 JAN 90
Lead	0.18	mg/L	0.05	6010	24 JAN 90	25 JAN 90
Silver	ND	mg/L	0.01	6010	24 JAN 90	25 JAN 90
Mercury	ND	mg/L	0.002	7470	24 JAN 90	25 JAN 90
Selenium	ND	mg/L	0.05	7740	24 JAN 90	25 JAN 90

ND = Not detected
NA = Not applicable

Reported By: Fred Velasquez   Approved By: Kimberly Conroy

General Inorganics

Client Name: Dames and Moore
Client ID: MESP-SLI
Lab ID: 008144-0001-SA
Matrix: SOIL
Authorized: 20 JAN 90

Enseco ID: 1064809
Sampled: 18 JAN 90
Prepared: See Below

Received: 20 JAN 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Reactive	ND	mg/kg	0.1	EPA/OSW	NA	23 JAN 90
Ignitability	>160	deg. F	--	1010/1020	NA	23 JAN 90
Oil and Grease	129000	mg/kg	100	9070 Mod.	NA	24 JAN 90
pH	7.2	units	--	9045/ASTM	NA	23 JAN 90
Sulfide, Reactive	ND	mg/kg	0.5	EPA/OSW	NA	23 JAN 90
Total Petroleum Hydrocarbons	13300	mg/kg	50	9070	NA	23 JAN 90

Note o : This test is unreliable for any sample other than a non-aqueous liquid.

ND = Not detected
NA = Not applicable

Reported By: Ron Maiorana

Approved By: Kimberly Conroy

Metals

EP Toxicity Leachate

Client Name: Dames and Moore
Client ID: MESP-Sol
Lab ID: 008144-0002-SA   Enseco ID: 1064810
Matrix: SOIL   Sampled: 18 JAN 90   Received: 20 JAN 90
Authorized: 20 JAN 90   Prepared: See Below   Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	0.1	6010	24 JAN 90	25 JAN 90
Barium	1.6	mg/L	0.01	6010	24 JAN 90	25 JAN 90
Cadmium	ND	mg/L	0.005	6010	24 JAN 90	25 JAN 90
Chromium	ND	mg/L	0.01	6010	24 JAN 90	25 JAN 90
Lead	ND	mg/L	0.05	6010	24 JAN 90	25 JAN 90
Silver	ND	mg/L	0.01	6010	24 JAN 90	25 JAN 90
Mercury	ND	mg/L	0.002	7470	24 JAN 90	25 JAN 90
Selenium	ND	mg/L	0.05	7740	24 JAN 90	25 JAN 90

ND = Not detected
NA = Not applicable

Reported By: Fred Velasquez   Approved By: Kimberly Conroy

General Inorganics

Client Name: Dames and Moore
Client ID: MESP-Sol
Lab ID: 008144-0002-SA
Matrix: SOIL
Authorized: 20 JAN 90

Enseco ID: 1064810
Sampled: 18 JAN 90
Prepared: See Below

Received: 20 JAN 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Reactive	ND	mg/kg	0.1	EPA/OSW	NA	23 JAN 90
Ignitability	>160	deg. F	--	1010/1020	NA	23 JAN 90
Oil and Grease	20300	mg/kg	100	9070 Mod.	NA	24 JAN 90
pH	7.7	units	--	9045/ASTM	NA	23 JAN 90
Sulfide, Reactive	ND	mg/kg	0.5	EPA/OSW	NA	23 JAN 90
Total Petroleum Hydrocarbons	2560	mg/kg	50	9070	NA	23 JAN 90

Note c : This test is unreliable for any sample other than a non-aqueous liquid.

ND = Not detected
NA = Not applicable

Reported By: Ron Maiorana

Approved By: Kimberly Conroy

ATTACHMENT 2

ANALYTICAL RESULTS OF FUEL OIL TANK BOTTOM SLUDGE
CONDUCTED BY COMMERCIAL TESTING & ENGINEERING COMPANY
FOR CONSERVATION SERVICES, INC. DISPOSAL SITE

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (708) 953-9300
SINCE 1908
Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
400 ORCHARD ST., GOLDEN, CO 80401
TELEPHONE: (303) 279-9621
FAX: (303) 278-1779

Conservation Services Inc.
777 West 62nd Avenue
Denver, Colorado 80216

Date: July 11, 1990
IAD #97-129880-01
Received: 07/05/90

Attention: Mr. Mark A. Molen

Material: Oil

Procedure: EP Toxicity per EPA Reference SW-846, Test Methods for Evaluating Solid Wastes.

Results: EP Toxicity results are reported as milligrams per liter, (mg/L), on an extract basis.

The weight of the sample prepared for the analysis is reported in grams (gm).

The volume of 0.5N acetic acid required for the pH adjustment of the extract is reported in milliliters (ml).

The volume of de-ionized water added and final volume of the extract are also reported in milliliters (ml).

The initial and final pH values of each extract are reported directly.

If you have any questions concerning these results, please feel free to call.

Byron C. Caton
Byron C. Caton
Laboratory Manager

dld/csi9880

OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS.
TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

CONSERVATION SERVICES, INC.
2090 E. 104th Avenue
Denver, CO 80233
(303) 280-9336
FAX 280-9848

FAX TRANSMITTAL MEMO

TO: Levi Todd

COMPANY: Dames & Moore

DEPARTMENT:

FAX #: 1-801-521-0380

NUMBER OF PAGES: 5

FROM: Mike Jennings

MESSAGE:

EP Toxic Extract Elements

Parameter	03847
Arsenic, As	<0.2
Barium, Ba	0.02
Cadmium, Cd	<0.01
Chromium, Cr	<0.02
Lead, Pb	<0.05
Mercury, Hg	<0.0002
Selenium, Se	<0.2
Silver, Ag	<0.01
Sample Weight	100.0
Volume of 0.5N Acetic Acid required for pH adjustment	0
Volume of deionized water added to the extract	2,000
Final volume of the extract	2,000
Initial pH	4.3
Final pH	4.4

Original Copy Watermarked
For Your Protection

CONSERVATION SERVICES, INC. LABORATORY WORKSHEET

CUSTOMER: ROCKY MTN. CONST. CONTACT: ____________
WASTE CODE: CO-01-________-03847 MANIFEST NO.: ____________
RECIEVED: DATE 7-3-90 TIME ________ VOLUME ____________

PHYSICAL STATE (top to bottom 1 2 3 4) 1 LIQUID 1.0 % __ SOLID ____ %
__ OIL ____ % __ SLUDGE ____ % 2 OTHER oily sludge 99%

DESCRIPTION COLOR light brown/ brown ODOR mild LOOK ____________

DENSITY 9.86 [] lb/cu.yd [x] lb/gal [] g/cc

MISCIBILITY Miscible in water? [x] yes [] no

SOLUBILITY Soluble in water? [] very [] slight [x] none

IGNITABILITY %LEL - at - °F

CLOSED CUP FLASH POINT > 150 °F

CORROSIVITY INITIAL pH 7.5 (1.0 % sample solution)

REACTIVITY Any reactions with [] AIR [] WATER [] KILN DUST

ACID ADJUST: 20 ml of a 1.0 % sample solution
took 1.0 ml of 10% HCl, final pH 2.0
REACTIONS none

BASE ADJUST: 20 ml of a 1.0 % sample solution
took 1.0 ml of 10% NaOH, final pH 12.5
REACTIONS none

SULFIDES Spot test []positive []negative QUANTITATIVE -

CYANIDES QUANTITATIVE - AMMONIA QUANTITATIVE -

CHLORIDES Spot test []very []slight [x]none

RADIOACTIVITY Greater[] or Less[x] than background

SUSPENDED SOLIDS After Centrifuge - % of total volume

MOISTURE - % VISCOSITY - cp (centipoises)

COMMENTS Sludge liquifies during flashpoint test heating.
A composite of the 3 samples submitted was used for this analysis, and the outside lab work.

AMOUNT OF SAMPLE REMAINING ¼ qt.

ANALYST Al. Morales DATE 7-10-90

CUSTOMER: ROCKY MTN. CONST. DATE: 7-11-90
WASTE CODE: CO-01-________-03847

SOLIDIFICATION REQUIREMENTS

KILN DUST TYPE M.M. WEIGHT OF WASTE 45 MLS= 53.2 grams

WASTE/WATER RATIO 45 % WASTE 55 % WATER
RATIO FIGURES START: 200 MLS KD= ~~264.2~~ G
FINISH: 151.55 MLS KD= ~~200.2~~ G
TOTAL: ~~48.45~~ MLS KD= 64.0 G

200 MLS KD / x = 264.2 ~~154.0 G~~ KD / 200.2 g. dust left x= 151.55

KILN DUST TYPE________ WEIGHT OF WASTE ____MLS=______

WASTE/WATER RATIO ______% WASTE ______% WATER
RATIO FIGURES START: ______MLS KD=______G
FINISH: ______MLS KD=______G
TOTAL: ______MLS KD=______G

200 MLS KD / x = 154.0 G KD x=

RATIO 0.5 VOLUME INCREASE 1.25

COMMENTS________

NEUTRALIZATION REQUIREMENTS
STARTING SAMPLE VOLUME________
TITRANT USED:________ START FINISH MLS USED FINAL pH

INDICATOR TYPE
____

To get a pH of ______ approximately ______ gallons of ________ is needed for each ________ of waste.

COMMENTS________

ANALYST M. Morales DATE 7/11/90

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

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

July 26, 1990

Mrs. William Walker
P.O. Box 252
Kirtland, New Mexico 87417

Dear Mrs. Walker:

On June 19, 1990, the New Mexico Oil Conservation Division (OCD) collected a water sample from a pond on your property which receives surface water from the Westside Irrigation Ditch when your alfalfa fields are irrigated. The water was sampled because you were concerned that petroleum hydrocarbons related to the Caribou Four Corners/Maverik Country Stores Refinery in Kirtland, New Mexico were present in the pond.

Water from the pond was analyzed for aromatic and halogenated volatile organics which are constituents of petroleum products. Enclosed you will find the results of the analysis. No aromatic or halogenated volatile organics were present in the sample.

If you have any questions please contact me at 827-5885.

Sincerely,

William C. Olson
Hydrogeologist

Enclosure

xc: Frank Chavez, OCD Aztec District Office
Terry Vandell, Dames and Moore
Dave Tomko, EID Farmington Office

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

July 18, 1990

State Land Office Building, Room 206
Oil Conservation Division
310 Old Sante Fe Trail
Santa Fe, NM 87501

RECEIVED
JUL 19 1990
OIL CONSERVATION DIV.
SANTA FE

Attention: Mr. William Olson

Subject: <u>STATUS: REMEDIATION/STABILIZATION PLAN</u>
Maverik Country Stores, Inc.
Tank Farm
Kirtland, New Mexico

Dear Bill:

This letter summarizes our telephone conversation of July 16, 1990 regarding regulatory concerns with implementation of the Remediation/Stabilization Plan at the Maverik Country Stores Inc. Tank Farm in Kirtland, New Mexico. The federal Environmental Protection Agency (EPA) Toxicity Characteristic (TC) Rule which goes into effect on September 25, 1990 impacts the scheduled remediation plan at the Maverik Tank Farm. Any pumping and treating of the ground water (which will, after September 25, 1990 be considered a hazardous waste) will require an EPA-RCRA Permit for the treatment, storage and disposal of a hazardous waste. Consequently, if the remediation plan is implemented as planned (in early September 1990), remediation work would have to stop on September 25, 1990 or the facility, and Maverik Country Stores, Inc., would be in violation of federal EPA regulations. Based on conversations with both the EPA and the New Mexico EID Hazardous Waste Bureau, because the ground water will be classified as a hazardous waste, remediation work will be regulated initially by the federal EPA, and eventually by both the EPA and the New Mexico EID.

Over the past two years, on-site and off-site surface and subsurface tank farm-related contamination has been and still is being cleaned up and controlled (Figure 1). The work that has been completed to date includes the following:

- Significant on-site subsurface free product contamination was cleaned up via pumping and product removal from the interceptor trench which was installed in March of 1988.
- All of the remaining and significant potential sources of contamination (sludge and product in the storage tanks) were removed and properly disposed of in 1989.

- o Sludge and associated contaminated soils on-site are scheduled to be removed and properly disposed of, either to the Thriftway Refinery or to CSI within the next few months.

- o The Westside Irrigation Ditch waters were piped in April 1989, thereby eliminating free product seepage off-site into the local irrigation water systems.

- o An existing on-site deep well was grouted in 1989 in order to prevent potential vertical movement of shallow aquifer contaminants to the underlying deep aquifer.

- o Construction of the slurry wall was completed in June 1990. This wall encloses the upper shallow contaminated aquifer in the south-western corner of the Tank Farm, the site of the leaded gasoline spill. The final "As-Built" alignment and construction data for this slurry wall are enclosed as Attachment 1 as provided by Envirocon, Inc. Please note that the approximate location of the potential underground pipe shown in Figure 5 of the report is 50 feet west of the 8+75 station.

In addition to the above remedial measures that have been implemented to clean up and control on-site and off-site contamination from the Tank Farm, Maverik has been conducting soil, ground and surface water quality monitoring since November of 1987, and has installed and monitored a total of 5 monitor wells on-site and 10 monitor wells off-site. The results of the sampling and laboratory analyses have been reported to the New Mexico EID, and to the OCD since March of 1990 (when site regulatory authority was granted to the OCD). The water quality data show that on-site ground water contamination from the Tank Farm has decreased significantly since initial monitoring in 1987. Contaminant constituents in the ground and surface waters located immediately downgradient from the facility both on and off-site are either non-detectable or are at or near laboratory analytical detection limits and do not present a threat to human health or the environment.

In conclusion, the remediation work conducted since 1988 has resulted in continued improvement in the quality of both the surface and ground waters on and off-site. Recent completion of the on-site slurry wall will virtually eliminate the potential for any further off-site releases of contamination from the Tank Farm. Therefore, as a result of September 25, 1990 EPA TC Rule which would force cessation of the remediation plan as currently designed (June 7, 1990 letter to OCD from Dames & Moore), we propose that no additional remediation work be implemented at this time. We do however propose that the existing on and off-site monitor wells (MW-10 and MW-9, 13, 14 and 15) continue to be monitored, and that 6 additional ground water monitoring wells be installed this year, both inside and outside the boundaries of the slurry wall and monitored and sampled, on a semiannual basis (See Figure 1). The new monitor wells would be located at strategic points to monitor: the on-site ground water quality (and biodegradation processes) in the highly contaminated zone within the slurry wall; the ground waters outside and adjacent to the slurry wall boundaries (to detect any lateral contaminant movement around the slurry wall); and the ground waters at points downgradient and on-site which will serve as "Early Warning" monitor points for subsurface contaminant migration downgradient of the slurry wall, to the south.

We appreciate your time and consideration of this matter and hope that in the near future the EPA will be in a better position of defining the regulatory roles of the states in implementing the TC Rule. If you have any questions or comments regarding the enclosed information, please do not hesitate to contact me at (801) 521-9255.

Very Truly Yours,

DAMES & MOORE

Peter F. Olsen
Associate

T. D. Vandell

Terry D. Vandell
Senior Hydrologist

PFO/TDV:fl

cc: William Call
Vince Memmott

FILE 14819-005 BY DATE CHECKED BY DATE

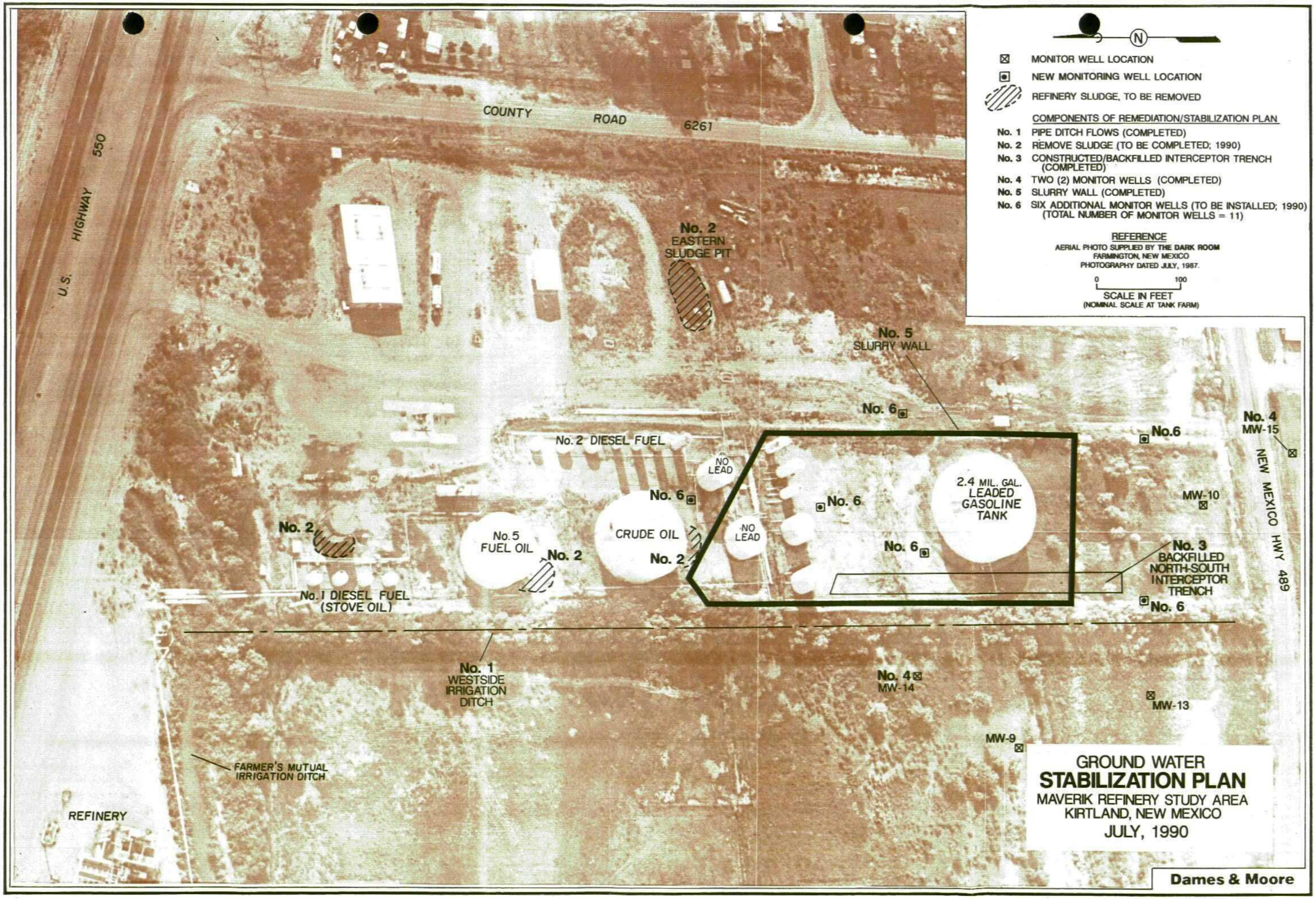


FIGURE 1

466 12 (11 82)

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud, NE
Albuquerque, NM 87106 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

June 27, 1990

ANALYTICAL REPORT
SLD Accession No. OR-90-0975

Distribution
(_) User 62000
(※) Submitter 67
(■) SLD Files

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

Submitter: David Boyer
EID Field Office, Farmington
724 W. Animas
Farmington, NM 87401

Re: **A water,Purgeable sample submitted to this laboratory on June 21, 1990**

DEMOGRAPHIC DATA

COLLECTION		LOCATION
On: 19-Jun-90	*By:* Ols . . .	Caribou Ref./ East Walker Pond
At: 16:15 hrs.	*In/Near:* Kirtland	

ANALYTICAL RESULTS: Aromatic & Halogenated Purgeable Screen {754}

Parameter	Value	Note	MDL	Units
Halogenated Purgeables (33)	0.00	N	1.00	ppb
Aromatic Purgeables (6)	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☒; Intact: No☐, Yes☐ & Broken By: __________ Date: ________

Laboratory Remarks:

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)
No Compounds Detected	

SURROGATE RECOVERIES:

SURROGATE	CONCENTRATION	% RECOVERY
Fluorobenzene	25.0 ppb	92.9

(Continued on page 2.)

2-Bromo-1-chloropropane	15.0	ppb	93.9

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
1,2-Dichloroethane	50.0	ppb	65.4
Vinyl chloride	50.0	ppb	71.8
Carbontetrachloride	50.0	ppb	67.0

Analyst: Gary C. Eden 6/21/90
Gary C. Eden
Analyst, Organic Chemistry
Analysis Date

Reviewed By: Mark [illegible] for RM 3 July 90
Richard F. Meyerhein 06/26/90
Supervisor, Organic Chemistry Section

ORGANIC CHEMISTRY ANALYTIC REQUEST FORM

SCIENTIFIC LABORATORY DIVISION
700 CAMINO DE SALUD N.E., ALBUQUERQUE, NM 87106
Organic Chemistry Section - Telephone: (505) 841-2570

SLD No. 90-0975-C

Date Received: 6/21/90

2 User Code #: 8 2 2 3 5
3 Request ID No.: Place Form ID Sticker Here
4 Priority Code #: 3 (If "1" or "2" call EID-SLD Coordinator)

5 Facility Name: Caribou Refinery
6 County: San Juan
7 City: Kirtland
8 State: NM

9 Sample Location: EAST WALKER POND

10 Collected By: Bill OLSON (First, Last) On: 90/06/19 Date: (YY/MM/DD) At: 1615 hrs. Time: 24 hr. clock 3:00 pm = 1500 hrs.

11 Codes: Submitter ____ WSS # ____ Organization ____

12 Latitude (DDMMSS) ____ Longitude (DDDMMSS) ____ 2 Digit ID (if needed) ____

13 Report To: Name David G. Boyer
14 Phone #: (505) 827-5812

Address: New Mexico Oil Conservation Division
P. O. Box 2088
City, State Zip: Santa Fe, New Mexico 87504-2088

15 Sample Purpose:
☐ - Compliance
☑ - Check
☐ - Monitoring
☐ - Special

Sampling Information:
☑ - Grab
☐ - Composite (Composite Time Period)
☐ - Flow Proportioned
☐ - Equal Aliquot
☐ - Sample Split w/Permittee
☐ - Chain of Custody

16 Field Data: pH: 6.5, Conductivity: ____ umhos @ ____ °C, Temperature: ____ °C, Chlorine Residual: ____ mg/l, Flow: ____

17 Sample Source:
☐ -Stream
☑ -Lake
☐ -Drain
☐ -Pool
☐ -WWTP
☐ -Well; Depth: ____
☐ -Spring
☐ -Distribution
☐ -Point-of-Entry
☐ -Other: ____

18 Field Notes/ Sample #: Walker Pond, East End

19 Sample Type: ☑ -Water, ☐ -Soil, ☐ -Food, ☐ -Wastewater, ☐ -Other ____

This form accompanies a **single sample** consisting of:
2 - septum vial(s) (volume = 40 ml)
____ - glass jugs (volume = ____)
____ - ____ (volume = ____)

20 Preservation:
☐ - NP No Preservation; Sample stored at room temperature
☑ - P-Ice Sample stored in an ice bath (Not Frozen)
☐ - P-TS Sample Preserved with Sodium Thiosulfate to remove chlorine residual
☐ - P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)
☐ - Other ____

21 Analyses Requested: Please check the appropriate box(es) below to indicate the type of analytical screen(s) required. Whenever possible, list specific compounds suspected or required.

Volatile Screens:

☐ - (753) Aliphatic Headspace (1-5 Carbons)
☒ - (754) Aromatic & Halogenated Purgeables (EPA 601 & 602)
☐ - (765) Mass Spectrometer Purgeables (EPA 624)
☐ - (766) SDWA Total Trihalomethanes (EPA 501.1)
☐ - (774) SDWA VOC's I [8 Regulated +] (EPA 502.2)
☐ - (775) SDWA VOC's II [EDB & DBCP] (EPA 504)

Other Specific Compounds or Classes:

☐
☐
☐ - ( ) ____
☐ - ( ) ____
☐ - ( ) ____

Semivolatile Screens:

☐ - (763) Acid Extractables
☐ - (751) Aliphatic Hydrocarbons
☐ - (755) Base/Neutral Extractables (EPA 625)
☐ - (756) Base/Neutral/Acid Extractables (EPA 8270)
☐ - (758) Herbicides, Chlorophenoxy Acid
☐ - (759) Herbicides, Triazines
☐ - (760) Organochlorine Pesticides
☐ - (761) Organophosphate Pesticides
☐ - (767) Polychlorinated Biphenyls (PCB's)
☐ - (764) Polynuclear Aromatic Hydrocarbons
☐ - (762) SDWA Pesticides & Herbicides

Remarks:

 This Form Will NOT Be Returned With Your Results. Please RETAIN A COPY!

OIL CONSERV ON DIVISION
RECEIVED

'90 JUL 19 AM 8 37

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time 1110	Date 6/13/90

Originating Party	Other Parties
Bill Olson - OCD Santa Fe	Mrs Walker - Kirtland resident
	598-5954

Subject

Sampling at their drainage pond

Discussion

I will not be in Farmington Area until early next week to sample the pond.

She said that they only see oil what appears to them as an oily film soon after the ditch is turned on.

I told her I would sample next week.
I told her to contact me next time before they irrigate so I can be present to observe and sample if necessary

Conclusions or Agreements

She will contact me before next irrigation

Distribution file

Signed Bill Olson

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP

127 SOUTH 500 EAST, SUITE 300, SALT LAKE CITY, UTAH 84102-1959 (801) 521-9255

June 7, 1990

8 PM 2 00

State Land Office Building, Room 206
Oil Conservation Division
310 Old Sante Fe Trail
Santa Fe, NM 87501

Attention: Mr. William Olson

Subject: Additional Information For Slurry Wall Design and Location at Maverik Country Stores, Inc. Tank Farm, Kirtland, New Mexico

Dear Bill:

As per our telephone conversation of June 4, 1990, enclosed is the additional detailed borehole log information used in the design and location of the future slurry wall at the Maverik Country Stores Inc. Tank Farm in Kirtland, New Mexico (Plate 1). As indicated on Plate 2 attached, the location of the slurry wall has been expanded to the north and to the south several hundred feet from the location originally proposed in our original plan (reference: Dames & Moore report, Plate 3, March, 1990). The locations of the boreholes used to determine the slurry wall boundaries are shown on Plate 3, and the detailed borehole logs are presented on Plates 4, 5 and 6 attached. As indicated on Plate 3 and on the borehole logs, subsurface soil measurements taken with the photoionization (HNU) meter indicate that hydrocarbon contamination is greatest at depths of around 5 feet (and less), and that at depths of about 10 feet (within the vertical boundary of the slurry wall-clay contact), the hydrocarbon contamination is either non-detectable or is very low. The HNU measurements represent the maximum values obtained using the headspace analytical technique as currently defined by the New Mexico Environmental Improvement Division's Underground Storage Tank (UST) Bureau Policy.

As you are aware, slurry wall construction is scheduled to begin the week of June 11, 1990 and we understand that you may be on-site on or around the middle of the week to observe the construction. Brett Mickelson, civil engineer with the Dames & Moore Salt Lake City office will be on-site supervising the construction. He will be happy to answer any questions you may have.

If you have any questions regarding the enclosed information, please do not hesitate to contact me at (801) 521-9255.

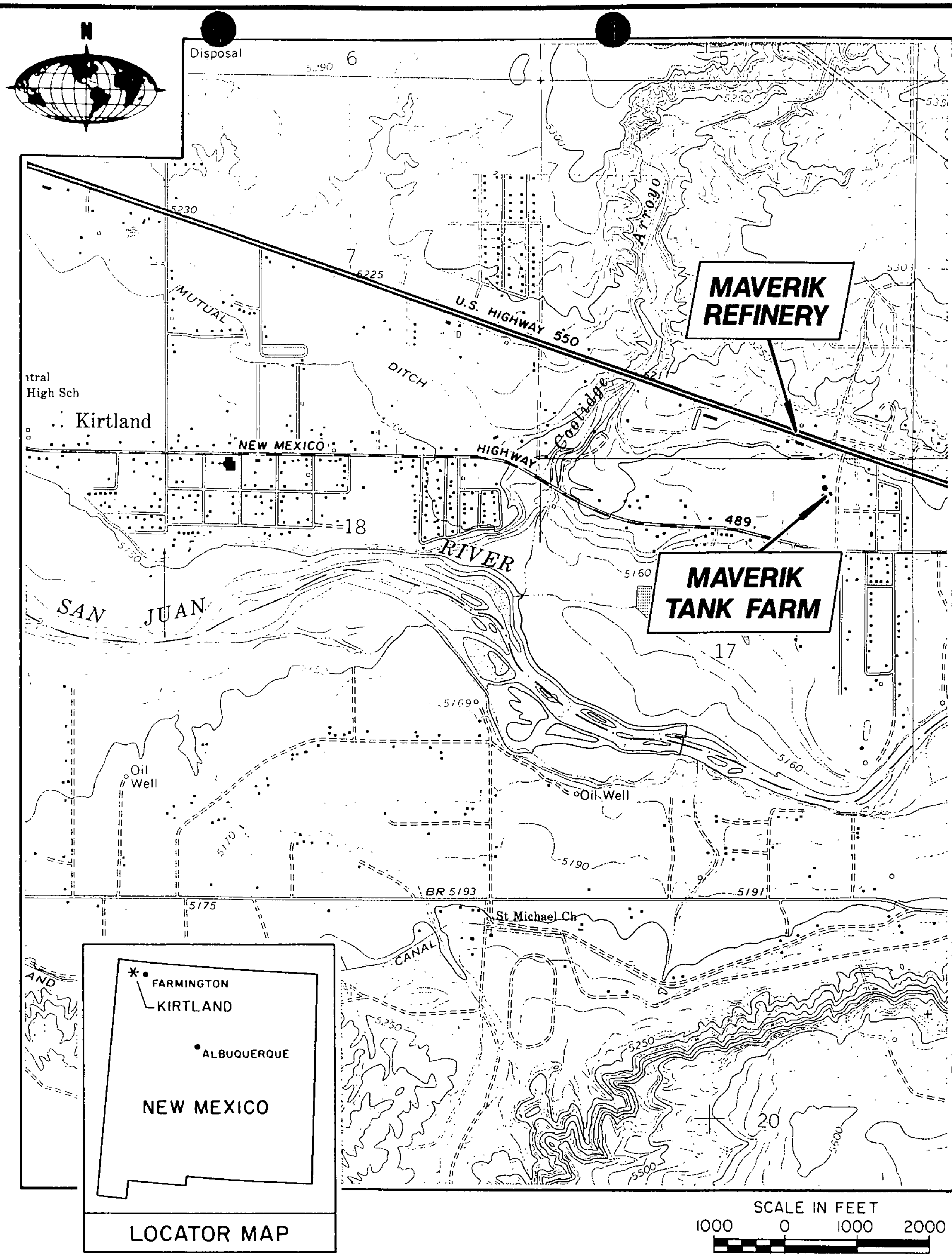
Very Truly Yours,

DAMES & MOORE

Terry D. Vandell
Senior Hydrogeologist

TDV:fl

cc: William Call
Vince Memmott
Peter Olsen



SCALE IN FEET
1000 0 1000 2000

VICINITY MAP

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

Dames & Moore

PLATE 1

FILE 14819-005-031 BY ______ DATE 12-1-87 CHECKED BY ______ DATE ______

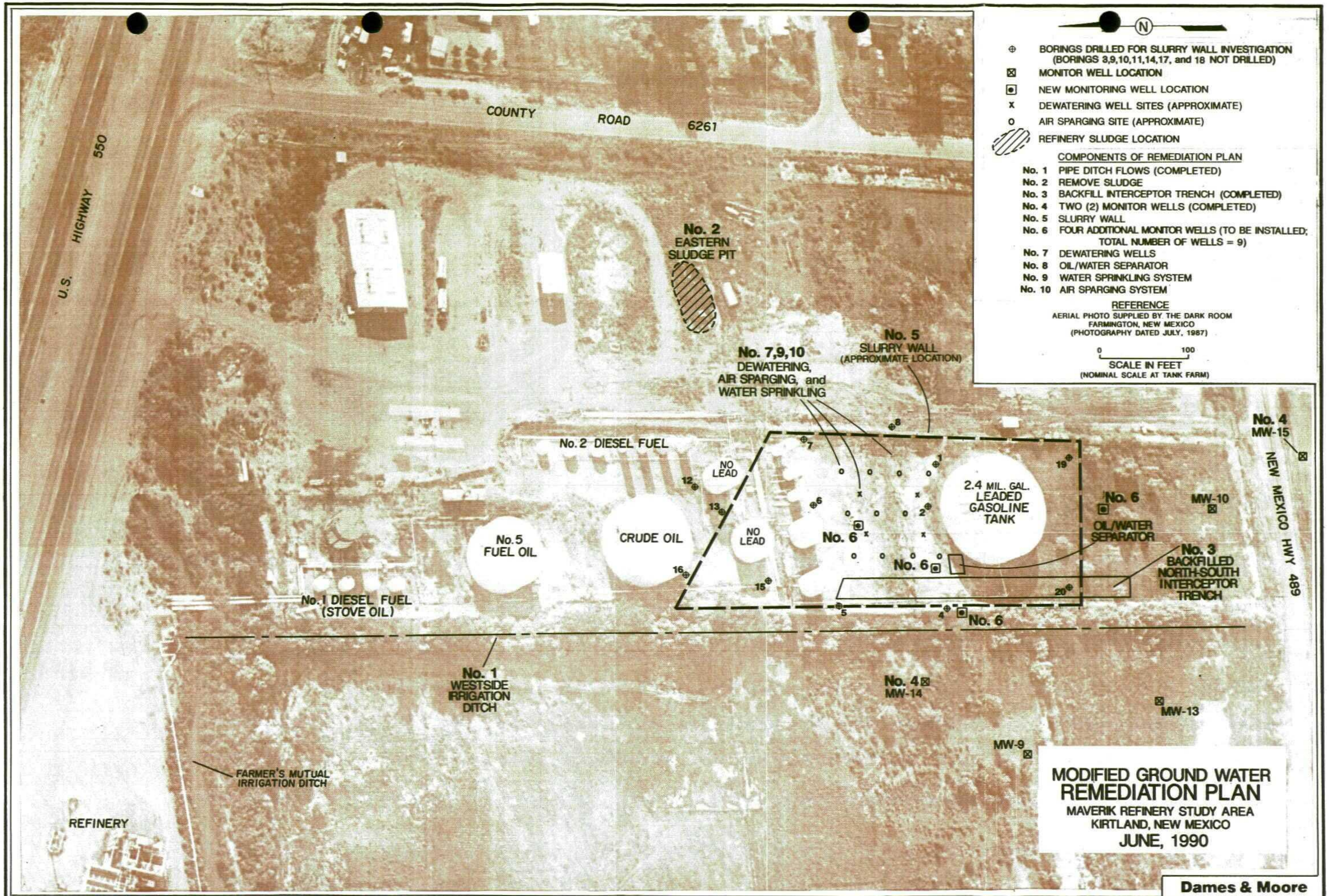
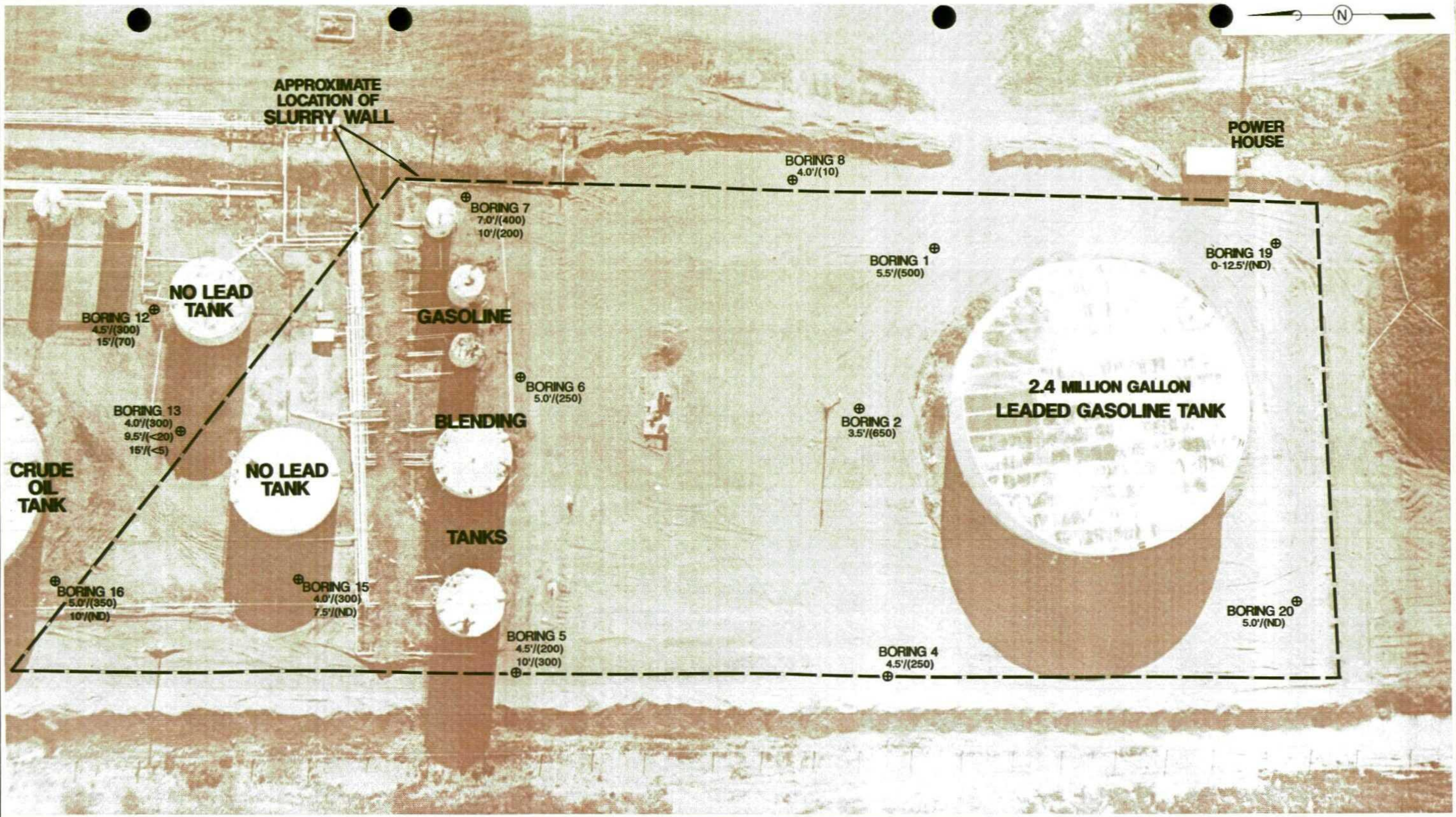


PLATE 2

FILE 14819-005 BY ____ DATE ____ CHECKED BY ____ DATE ____

466.12 (11-82)



20 0 20 40
SCALE IN FEET
(APPROXIMATE)

BORING LOCATION — ⊕BORING 4 — BORING IDENTIFICATION NUMBER
4.5'/(250)
DEPTH AT WHICH BORING WAS SAMPLED — HMU READING OF SAMPLE AT DEPTH INDICATED IN PARTS PER MILLION (ppm) (ND) = NOT DETECTABLE

REFERENCE-
AERIAL PHOTO BASE SUPPLIED BY DAVE TAYLOR, SPECIAL PHOTOGRAPHY - FARMINGTON, N.M. - DATED MAY 5,1990.

HNU CONCENTRATIONS IN SOILS AT DEPTHS SHOWN (ppm)

Dames & Moore

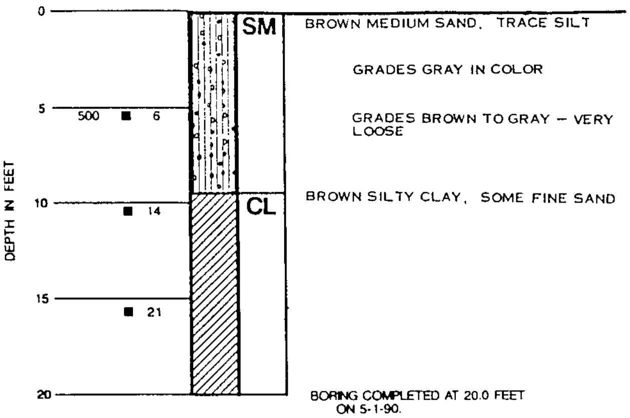
PLATE 3

FILE 14819-005 BY ____ DATE ____ CHECKED BY ____ DATE ____

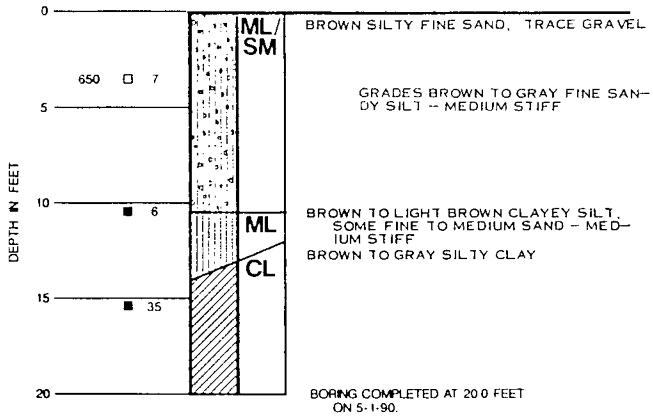
466 12 (11-82)

FILE ______ BY ______ DATE ______ CHECKED BY ______ DATE ______

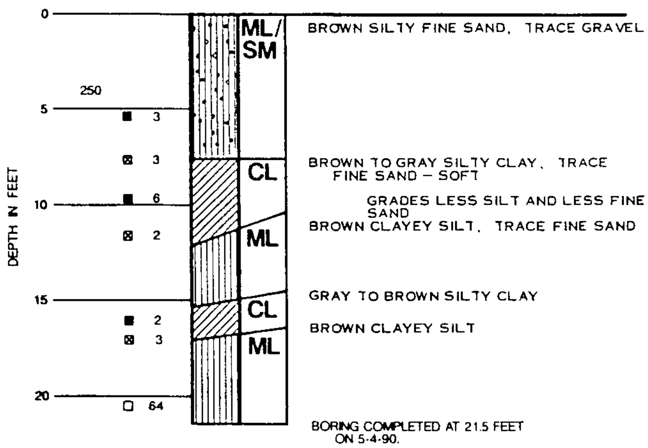
BORING 1



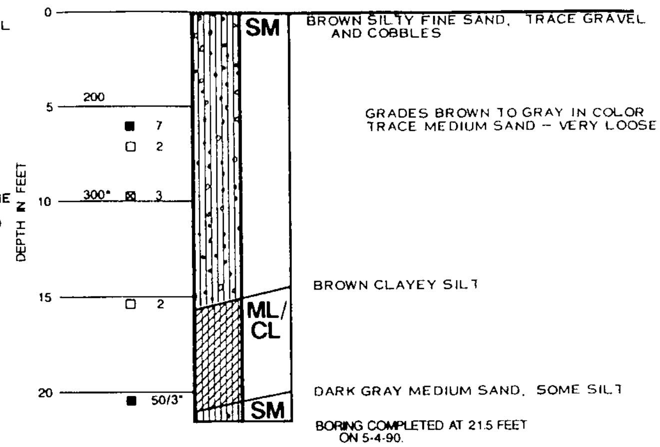
BORING 2



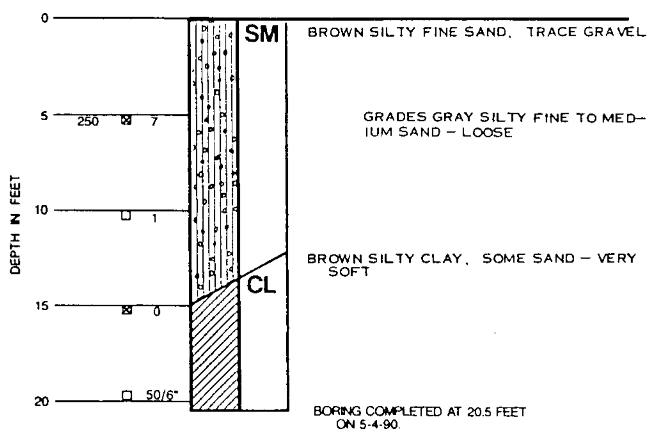
BORING 4



BORING 5



BORING 6



KEY

250 ■ 18

- BLOWS REQUIRED TO DRIVE A D&M TYPE U SAMPLER ONE FOOT WITH A 140 LB. HAMMER DROPPING 30 INCHES
- HNU READING EXPRESSED IN PARTS PER MILLION
  - * – HNU READING OF DISTURBED SAMPLE
  - ND – NOT DETECTABLE

■ DEPTH AT WHICH UNDISTURBED SAMPLE WAS EXTRACTED

⊠ DEPTH AT WHICH DISTURBED SAMPLE WAS EXTRACTED

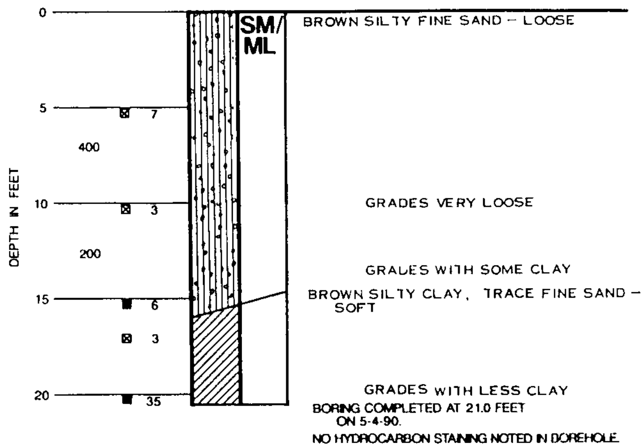
□ SAMPLING ATTEMPT WITH NO RECOVERY

NOTE:
BORINGS 3, 9 , 10, 11, 14, 17 AND 18 WERE NOT DRILLED.

LOG OF BORINGS

Dames & Moore

BORING 7



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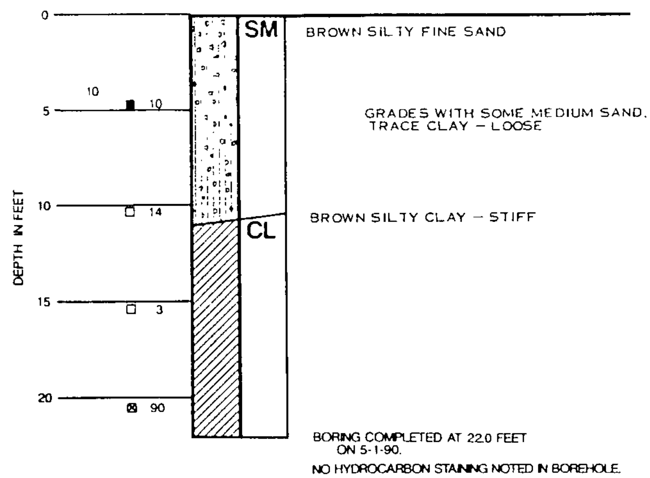

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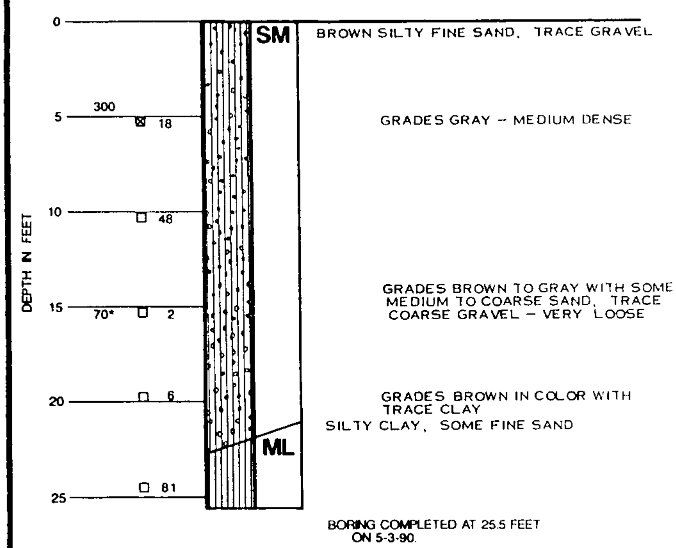

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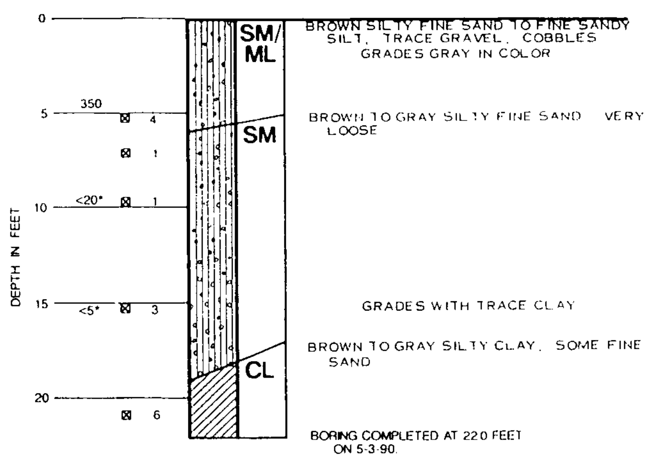

LOG OF BORINGS

Dames & Moore

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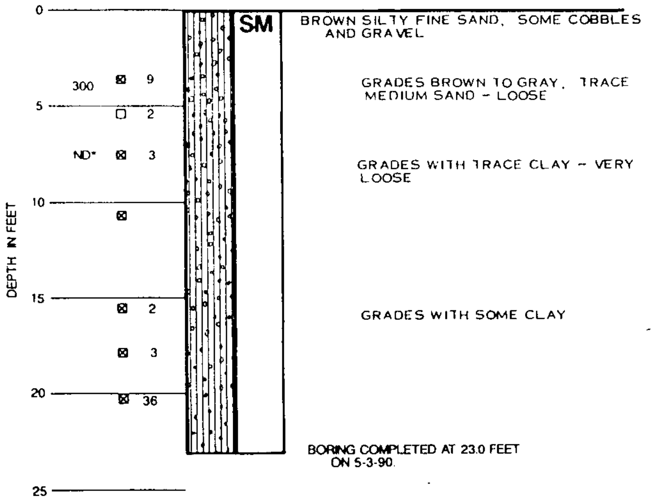

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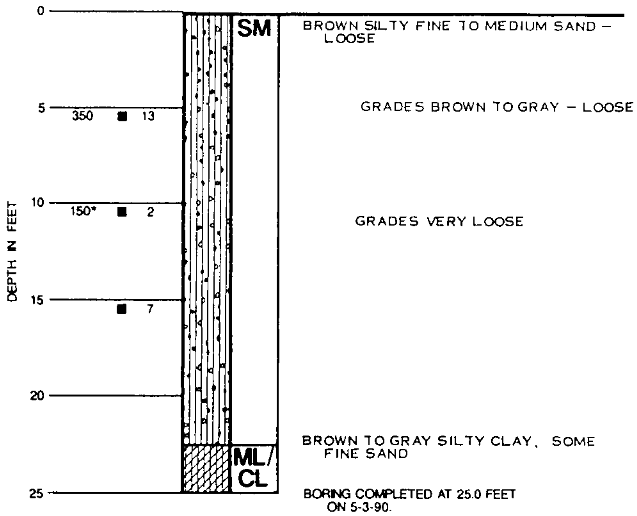

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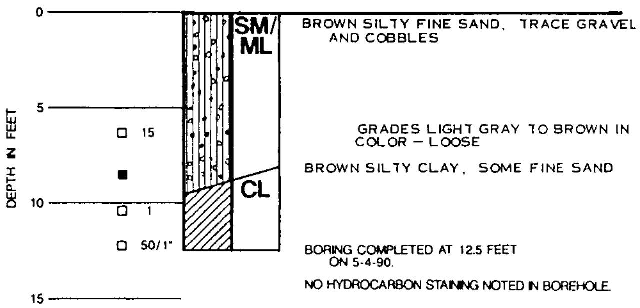

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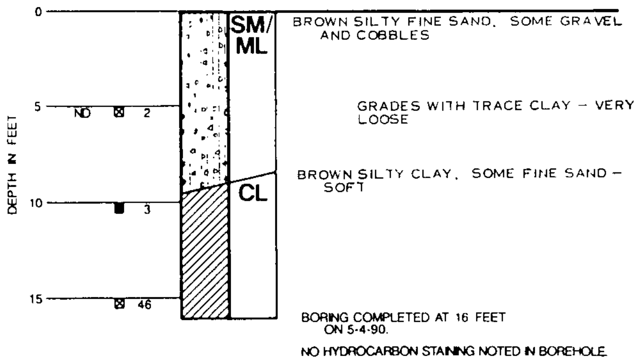

LOG OF BORINGS

Dames & Moore

PLATE 6

FILE ______ BY ______ DATE ______ CHECKED BY ______ DATE ______

TRANSMITTAL SHEET **Dames & Moore**

RECEIVED

MAY 30 1990

OIL CONSERVATION DIV.
SANTA FE

To: Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87504

Date May 24, 1990

Your Order No.

Our Job No. 14819-005-5303-31

Attention: Mr. William Olson

Subject: Maverik Country Stores, Inc.
Kirtland, New Mexico Refinery
Slurry Wall Design

We are sending you via U.S. Mail

the following
Sections 6 and 7 of the slurry wall construction bid document, "Scope of Work And Technical Specifications" and "Drawings"

~~This is~~
These are for your review, and address #1 of your April 20, 1990 letter.

No. of copies submitted: 1

Copies to: _

Dames & Moore

By T. D. Vandell

Terry D. Vandell

SECTION 6

SCOPE OF WORK

AND

TECHNICAL SPECIFICATIONS

SECTION 01010

SUMMARY OF WORK AND DEFINITIONS

PART 1

1.1 SCOPE OF WORK

The Specifications and Drawings contained herein set out the details for construction of a soil bentonite slurry trench cutoff wall. Site preparation shall be performed to provide access, storage areas, a slurry mixing/hydration area and a level slurry trench excavation surface. CONTRACTOR will be responsible for a comprehensive site cleanup. The slurry trench cutoff wall shall be a minimum of 2 feet wide, extending a maximum depth of approximately 25 feet as required to attain the design bottom elevations shown on the drawings. A slurry wall backfill permeability of 1×10^{-7} cm/sec or less is required. The slurry wall shall be aligned as shown in the Drawings.

The CONTRACTOR shall provide all plant, labor, materials, and equipment to complete the project as specified.

1.2 DEFINITIONS

The terms of this specification are defined as follows:

A. Slurry Trench Specialist - a slurry trench specialist is an individual who has had proven and successful experience in slurry trench construction and is knowledgeable with all facets of the construction of soil-bentonite slurry trench cutoff walls, including: the proper mixing methods employed to mix the slurry and backfill material; excavation and backfill operations; and a thorough knowledge of construction equipment and testing requirements needed for slurry trench construction.

B. Slurry Trench Cutoff Walls - slurry trench cutoff walls are trenches excavated into the existing overburden by the bentonite slurry material to form an "impervious" barrier.

C. Slurry Trench Method of Excavation - the slurry trench method of excavation consists of excavating a vertical trench in the overburden and at the same time keeping the trench filled with a bentonite slurry. The purpose of the slurry is to support the walls of the trench.

D. Bentonite - bentonite is an ultrafine natural clay whose principal mineral constituent is sodium cation montmorillionite.

E. Bentonite Slurry - the bentonite slurry is a stable colloidal suspension of powdered bentonite in water.

F. Organic Slurry- - an organic slurry is a biodegradable colloidal suspension of powdered organic polymers in water.

G. Working Surface - the working surface is the existing ground surface at the site.

1.3 CONTRACTOR'S WORK PLAN

The CONTRACTOR shall submit a work plan outlining the CONTRACTOR'S plan for performing all the work outlined in this specification including proposed personnel, equipment, schedule and any subcontractors.

END OF SECTION

SECTION 01505

MOBILIZATION, PREPARATORY WORK, AND DEMOBILIZATION

PART 1 GENERAL

1.1 DESCRIPTION

A. This specification section covers the requirements for mobilization, preparatory work, temporary facilities, and demobilization after the work.

1.2 SUBMITTALS

A. Within 5 days after receipt of notice to proceed, submit a plan identifying Contractor's requirements for preparatory work, for temporary structures and storage of materials to the owner and engineer. Submit proposed plan and layout for all temporary site access, temporary offices, sanitary facilities, storage buildings, storage yards, distribution, and temporary drainage control facilities, as required, to the Program Manager.

1.3 MEASUREMENT AND PAYMENT

A. There shall be no measurement for payment for mobilization and preparatory work.

B. Payment shall be made at the lump sum price bid in Section 2 and shall include all mobilization, preparatory work, temporary facilities, site access, water control and demobilization and site cleanup.

PART 2 PRODUCTS AND EQUIPMENT

A. Utilize adequate products and equipment as required for the work.

B. Temporary office space will be provided by CONTRACTOR.

C. CONTRACTOR shall request storage areas and access routes. Resident Project Representative shall coordinate these requests with the Owner and provide approvals. CONTRACTOR is responsible for controlling working area access, barricading both the open trench and placed backfill areas, minimizing inherent construction hazards.

D. Construction water will be suppled by Owner.

PART 3

3.1 MOBILIZATION

A. Following the Notice to Proceed, Contractor shall mobilize and move onto the site all such equipment as may be necessary for performing the Work.

3.2 INSTALLATION OF FACILITIES

A. All facilities installed under this section shall meet the requirements of all applicable codes.

3.3 TRAFFIC REGULATION

A. Provide whatever means necessary or directed by the Resident Project representative for the safety of the public and all elements of this Project.

3.4 DEMOBILIZATION AND CLEANUP

A. Following completion of the Work, Contractor shall decontaminate then remove all equipment and temporary facilities not incorporated into the permanent work from the site.

B. Waste Materials generated by the Contractor shall be properly collected and disposed off-site in accordance with local, state and federal laws and regulations.

C. Remove from the site or otherwise suitably dispose of all rubbish, debris, and materials not to be incorporated into the Work and all other accumulations resulting from the Work of this Contract.

D. Comply with all applicable laws and regulations for the proper collection, storage, transportation, and disposal of waste materials generated under Work of this Contract.

E. Leave all site work areas in a clean, stable condition.

END OF SECTION

SECTION 02020

PART 1 GENERAL

1.1 RELATED WORK

A. Section 02168 - Slurry Wall Construction

1.2 SITE CONDITIONS

A. FACILITY DESCRIPTION AND BACKGROUND - Maverik Country Stores, Inc., previously known as Caribou Four Corners Inc., operated a small crude topping refinery near Kirtland, New Mexico from 1963 until April 1982 at which time it was shut down. During operation, crude oil was refined into regular and leaded gasoline, diesel fuel and No. 5 fuel oil. Within a few months of shutdown, all remaining product, feedstocks and intermediate products were removed from stgorage tanks and sold. Additional verification to ensure that all of the tanks were properly abandoned will be included in the Phase II work.

1.3 SUBSURFACE CONDITIONS

A. Thirteen soil borings were augered and sampled to assess surburface conditions. The locations and lithologic interpretation on selected borings represenative of the subsurface site conditions along the slurry wall alignment are shown on the Drawings. Other subsurface data may be examined at the office of the Engineer.

B. General subsurface data are provided as best available information only; the CONTRACTOR shall satisfy itself as to the value of this information. Engineer and Owner make no warranty as to quality or completeness.

C. Additional Investigations

1. CONTRACTOR shall visit the site and become acquainted with site conditions before submitting a bid. Submission of a bid will be evidence that the visit has been performed.

2. Prior to bidding, CONTRACTOR may make its own investigations to understand site and subsurface conditions.

1.4 QUALITY ASSURANCE

A. Make no deviations from the Contract without specific and written approval of the Owner.

B. Obtain approval from Owner before performing any exploratory excavations.

END OF SECTION

SECTION 02168

SLURRY TRENCH CONSTRUCTION

PART 1 GENERAL

1.1 RELATED WORK

a. Section 01010 - Summary of Work and Definitions

b. Section 02020 - Site and Subsurface Conditions

1.2 DESCRIPTION

A. This section describes the requirements for construction of the slurry trench, complete, including site preparation, excavation, backfill, treatment of the top of the slurry trench, restoration of the upper trench area, and protection of existing structures.

1.3 QUALITY CONTROL

A. General - The CONTRACTOR shall have a slurry trench specialist at the site, whose duties and responsibilities are solely limited to quality control. The CONTRACTOR shall establish and maintain quality control for all slurry trench construction operations to assure compliance with contract requirements and maintain records of his quality control for all construction operations. These records, as well as testing equipment to perform Marsh viscosity, density, gradation, filtrate loss, and sounding tests shall be made available to Owner and Resident Project Representative or their agents. CONTRACTOR shall supply two copies of all test records to Resident Project Representative.

B. Bentonite - The CONTRACTOR shall furnish a statement from the supplier that the bentonite furnished complies with these specifications, together with a copy of the test report. The quality of bentonite powder shall be checked as specified above at least once each time a shipment of bentonite is received by the CONTRACTOR.

C. Slurry - The quality of the initial slurry at the time of introduction into the trench shall be checked for pH, density and viscosity (Marsh funnel method) at least twice daily. The auliity of the slurry mixture in the trench shall also be checked for pH, filtrate loss, density and viscosity (Marsh funnel method) at least once daily. At a minimum, the CONTRACTOR will be required to obtain five test samples from the trench near the top of the slurry, at mid depth, at the bottom of the trench, and close to the top of the backfill slope. The Resident Project Representative will determine the locations along the trench at which samples are to be taken.

D. <u>Excavation</u> - The CONTRACTOR shall make and record the bottom elevation by performing soundings every 20 feet along the trench centerline. Soundings shall be made with a weighted cable or similar device approved by the Program Manager, immedaitely after excavating and immediately before backfilling.

The CONTRACTOR shall obtain samples from the bottom of the trench excavation at maximum intervals of 50 feet along the centerline of the excavated trench after excavation is complete and before backfilling. A drive tube, push tube, or other approved sampler shall be used which has a minimum inside diameter of 1-3/8 inches.

The sampler shall be used to penetrate the trench bottom at least 1 foot and recover a suitable sample. All samples obtained shall be preserved in airtight containers at the site and each container shall be marked or labeled to indicate the station and elevation at which the sample was obtained.

E. <u>Backfill</u> - At least one slump cone test (ASTM C143) and one density test shall be performed for each 100 lineal feet of trench backfilled or twice daily, whichever is greater. A gradation test (ASTM D422) shall be performed at least once per 300 feet of trench backfilled.

The slope of the in-place backfill shall be measured with soundings. CONTRACTOR shall take backfill sounding at 50-foot horizontal interals beginning at the toe of the backfill and ending at the top of the backfill slope. A set of backfill slope soundings shall be made each day.

1.4 PROTECTION OF EXISTING FACILITIES

A. The CONTRACTOR shall take the necessry precautions to insure that on-site utilities and structures are not damaged during excavation of the slurry trench and subsequent backfilling. If any damage is caused to the existing structures, or completed portions of the work for this contract due to the acts or omissions of CONTRACTOR, CONTRACTOR shall repair them at no additional cost to Owner.

1.5 MEASUREMENT AND PAYMENT

A. Measurement for payment for the slurry trench will be made of the actual square feet of wall installed as specified.

B. Payment will be made at the unit price per square foot bid in the Proposal and will include all materials, equipment, and labor required to complete the slurry wall and all associated subsurface and surface work specified herein.

PART 2 PRODUCTS

2.1 SLURRY

A. Slurry mixing and placement equipment shall be capable of supplying adequate quantities during excavation. A Venturi (flash) mixer or equivalent shall be used to mix the initial slurry.

B. Initial slurry shall have a density of no less than 65 LB/CF and be sufficiently hydrated before it is introduced into the trench.

C. At all times, the slurry in the trench shall be maintained at a density between 65 and 90 LB/CF and be sufficient to maintain a stable trench excavation. The slurry at the bottom of the trench and at the top of the backfill slope shall have a density of at least 15 LB/CF less than the backfill material density. At all times the slurry shall have a viscosity of no less than 40 seconds at 65°F as measured with a Marsh funnel. The slurry itself shall contain a minimum of 8 percent bentonite by dry weight.

2.2 BENTONITE

A. Bentonite shall be a sodium cation base montmorillonite powder (Wyoming-type bentonite) that conforms to the standards set forth in the American Petroleum Institute (API) Spec. 13A, Specifications for Oil Well Drilling Fluid Material as last revised.

2.3 BACKFILL

A. The material to be used for backfill shall be composed of slurry and select soils obtained from the excavation of the trench and/or from borrow sources approved by the Program Manager. All clay materials used in the backfill mixture shall be disked, pulverized, or otherwise processed prior to addition of the clay material into the backfill mixture so that at least 95 percent of the clay material passes the No. 4 sieve. The backfill material shall be free from roots, organic matter, and other deleterious materials, shall be finer than 1 inch sieve size, and have a minimum of 25 percent passing the No. 200 sieve and ~~8~~ 3 percent by dry weight bentonite.

B. The density of the backfill shall always be at least 15 LB/CF greater than that of the slurry as measured in the trench.

C. The backfill shall be moisture conditioned through the addition of bentonitic slurry to a moisture content of between 20 and 30 percent (ASTM D2216) in order to produce a backfill having a slump of 4 to 6 inches (ASTM C143) at the time of placement.

2.4 GENERAL STRUCTURAL BACKFILL FOR UPPER TRENCH AREA

A. General structural backfill shall be composed of well graded granular materials free of organics, debris, ice, trash, or other deleterious materials and have the following gradation:

U.S. Standard Sieve Size	Percent Passing
3 inch	100
1-1/2 inch	95 - 85
3/4 inch	90 - 75
No. 4	75 - 55
No. 40	45 - 20
No. 200	Less than 25

PART 3 EXECUTION

3.1 SITE PREPARATION

A. CONTRACTOR shall perform site grading as necessary to provide a level surface for slurry trench excavation.

B. Slurry hydration pond shall be located within the boundry of the slurry trench. Hydration pond might be used for storage of final trench slurry or other contaminated construction materials.

3.2 EXCAVATION

A. Excavation of the slurry trench shall initiate at Station 0+00 and be made using the method commonly referred to as the "slurry trench method of excavation." Excavation of the slurry trench may be done with a backhoe, or clamshell or a combination of both or any other suitable excavation equipment CONTRACTOR has available.

B. Regardless of the method of construction, the slurry trench excavation shall proceed in a manner so that when completed a trench at least 2 feet wide is provided extending to the design elevations at all points along the centerline of the excavation. Construction of a trench exceeding 3 feet in width will not be permitted without prior approval of the Resident Project Representative. CONTRACTOR shall be responsible for documenting the vertical alignment and continuity of the trench.

C. If for any reason, the excavation method begins to result in a trench width greater than 3 feet at or below the minimum specified slurry level or begins to result in misalignment of the trench, the CONTRACTOR shall cease trench excavation and shall install approved guidewalls or use other methods of preventing enlargement or misalignment of the trench to stabilize the excavation as approved by the Program Manager.

D. Slurry shall be introduced into the trench at the same time trenching is begun and shall be maintained in the trench during excavation and until backfilled. The level of the slurry in the trench shall be maintained at a level no more than 1 foot below the level of the graded or excavated surface immediately adjacent to the trench.

E. The CONTRACTOR shall maintain the stability of the excavated trench at all times for its full depth and shall be responsible to control slurry densities, equipment surcharges, stockpile surcharges, and any other loading situations so that the trench remains stable. To this end, it shall be the responsibility of CONTRACTOR to conduct all construction activities to minimize to the maximum extent possible, all caving, sliding, or sloughing of the trench walls. In the event instability of the trench walls does occur prior to completion of backfilling, the CONTRACTOR shall, upon approval of the Resident Project Representative and at CONTRACTOR'S expense, re-excavate the trench to remove all material displaced into the trench and take approved corrective action to prevent further deterioration of the area affected by the caving, sliding, or sloughing.

F. After excavation of the trench to the design elevations and immediately prior to backfilling, the bottom of the trench shall be sounded. Backfill may then be placed after approval of the Resident Project Representative. Additional samples of the trench bottom will be taken when directed by the Resident Project Representative. Sediments that are deposited at the base of the trench before backfilling shall be removed by airlift pumps, clamshell, or other suitable equipment approved by the Resident Project Representative.

3.3 BACKFILL PLACEMENT

A. <u>Backfrill Placement</u> - No backfill shall be placed until the trench has been inspected and approved by the Resident Project Representative. The required material mixing and placement of backfill, as well as treatment of the top of the slurry trench, shall conform to the following conditions:

1. <u>Materials</u>

   a. The material for trench backfilling (as specified in PART 2 shall be composed of slurry, bentonite and select soils obtained from the excavation or from an approved borrow source. With the exception of the uppermost 4 feet (miscellaneous fill soils), all suitable excavated soils shall be combined to form the backfill.

2. <u>Mixing</u>

   a. Excavated materials and/or materials from approved borrow sources shall be thoroughly mixed with dry bentonite and slurry to form a homogeneous mass just prior to the backfilling operation. The backfill mixture shall contain a minimum 3 percent bentonite (dry weight basis). During mixing, additional dry bentonite may be added or the material may be sluiced with slurry, as necessary to control the slump, but sluicing with water will not be permitted.

   b. If the natural moisture content of the backfill materials prior to being sluiced with slurry is found to be excessive, the CONTRACTOR shall, with the prior approval of the Resident Project Representative, add dry bentonite and/or approved borrow materials to the backfill mixture prior to or during backfill mixing. The backfill shall be free of lumps of clay or silt, and pockets of slurry or sand and gravel.

c. The consistency of the backfill mix shall be that which will produce a slump cone reading of 4 to 6 inches. Mixing of backfill may be accomplished only in locations approved by the Resident Project Representative. The Resident Project Representative will determine the suitability of the backfill mix before placement.

3. Placement

a. Approved backfill shall be placed in the trench by displacing the bentonite slurry. The backfill mix shall initially be lowered or otherwise conveyed to the bottom of the trench and deposited by means of clamshell bucket or other approved equipment.

b. The bucket shall be lowered to the bottom of the trench or top of the in-place backfill before opening. No free-dropping of backfill material directly into the trench or any other method of construction which will produce segregation of material will be allowed. CONTRACTOR may use other means to convey the backfill material to the bottom of the trench or to the top of the backfill if approved by the Program Manager.

c. The placement of backfill material in one location shall continue until the backfill emerges from below the slurry surface and until its natural angle of repose is achieved from the bottom of the trench to the top of emergent backfill.

d. The remaining backfill shall be placed in such a manner that the natural angle of repose of the backfill will be maintained and so that no pockets of slurry are present in the completed slurry trench. This material shall be bladed into the trench by the use of loader or other backfill so that the backfill below the slurry surface will be pushed along the trench.

e. As necessary, the Resident Project Representative will require CONTRACTOR to rod or excavate backfill below the slurry. Backfill material shall be maintained at a minimum of 30 feet and at a maximum of 100 feet behind the face of the excavation at the bottom of the trench. The slope of the backfill shall be no more than 5H:1V and no less than 10H:1V. The toe of the backfill material that rises to the top of the trench at the terminal end of the trench shall be re-excavated as necessary to remove any entrapped slurry, silts, and sands that may exist. This material shall be replaced with new backfill material.

4. Treatment of Top of Slurry Trench

a. After the backfill reaches within 1 foot of the top of the slurry trench and before any drying out of the backfill can occur, the top of the slurry trench shall be covered with a 20 mil thick layer of polyvinyl chloride. Joints shall overlap a minimum of 12 inches. A detail of the protective cap is shown on Drawings No. 3. After the liner has been placed, compacted structural backfill material shall be placed to the working surface.

b. As backfill proceeds along the trench, CONTRACTOR shall place the protective cap over the backfilled trench area so that a maximum distance of 75 feet is maintained between the edge of the completed protective cap and the top of slope of the emergent backfill.

5. Site Cleanup

a. After the slurry wall construction is complete, the excess slurry and backfill shall be properly disposed of in accordance with the directions given by Resident Project Representative. The excess slurry, backfill, and other contaminated materials will be stored within the slurry trench bounds.

3.4 RESTORATION OF UPPER TRENCH AREA

A. In general, the upper 1 foot of trench will be backfilled with compacted structural fill placed directly on top of 20 mill PVC.

B. Placement and Compaction - General structural backfill shall be placed in loose lifts not exceeding 12 inches in thickness and compacted to 90 percent of the maximum dry density as determined by ASTM D698, Standard Compaction Test.

3.5 UNANTICIPATED SUBSURFACE STRUCTURES

A. In the event any unidentified subsurface structures or utilities are encountered, excavation shall immediately be halted and the Program Manager notified. Excavation shall not proceed until receiving written instructions from the Program Manager.

END OF SECTION

SECTION 7

DRAWINGS

The drawings incorporated into the contract documents are inclusive of the following:

Drawing No.	Revision No.	Title
1		General Vicinity and Site Location Maps
2		Slurry Trench Alignment
3		Subsurface Conditions and Slurry Trench Details

EXHIBIT A

CONTRACT NO. ______________

FINAL RELEASE AND WAIVER OF LIEN

____ (OWNER)

____ (CONTRACTOR)

Contract Date ____________________

Final Total Price $ ____________
Less Partial Payment $ ____________
Final Payment $ ____________

CONTRACTOR, in consideration and receipt of final payment in the above stated amount, does hereby remise, release and forever discharge OWNER from any and all actions, causes of action, debts, dues, accounts, covenants, agreements, judgments, claims and demands of whatsoever nature or character which said CONTRACTOR now has or ever has against the OWNER, its successors and assigns, which shall have arisen or may arise out of or be incidental to work undertaken or done under in connection with the CONTRACT and related CHANGE AGREEMENTS thereto.

CONTRACTOR hereby certifes and warrants that all charges for labor, materials, supplies, equipment, lands, licenses and another expense for which the OWNER or ENGINEER might be sued or for which a lien might be filed, have been fully satisfied and paid and in consideration of final payment hereunder, hereby waives for itself, its subcontractors, material men, successors and assigns, all lien rights arising out of the performance of the CONTRACT and will defend and save harmless the OWNER and ENGINEER from and against all suits, actions, claims, liens or demands of laborers, mechanics, material men or others, filed against the OWNER and/or ENGINEER or the buildings, structures, additions or improvements constructed under the CONSTRUCTION MANAGEMENT CONTRACT and arising out of the performance of the CONTRACT.

CONTRACTOR hereby agrees that the aforesaid final payment is the final amount due and to become due under the CONTRACT and that changes in computations made hereafter shall not insure to the benefit or loss of CONTRACTOR.

IN WITNESS WHEREOF, CONTRACTOR has executed this receipt, release, waiver of lien and final discharge on the _________day of ____________________, 19___.

Witness or Attest:

____
(Contractor)

____

By: _________________________

____
Name & Title (Typed or Printed)

EXHIBIT B

COMPLETE
WAIVER OF RISK AND RELEASE OF LIABILITY

FOR AND IN CONSIDERATION of receiving permission as a licensee or a business invitee, to enter into and upon ______________________________ project site near ____ the undersigned HEREBY WAIVES ALL RIGHT TO FILE ANY CLAIM OR CLAIMS against, and hereby exempts and releases ____________________________ (OWNER) and DAMES & MOORE (ENGINEER) (hereinafter referred to as "Permitter"), its respective officers, directors, agents and employees from ALL CLAIMS FOR INJURIES, ACCIDENTS, SICKNESS, AND DAMAGES OF WHATSOEVER NATURE SUSTAINED BY THE UNDERSIGNED whether due to negligence (including active and passive negligence) of said Permitters, their respective officers, directors, agents and employees, or otherwise, and the UNDERSIGNED FURTHER AGREES TO PROTECT, INDEMNIFY AND HOLD HARMLESS said Permitters, their respective officers, directors, agents and employees, from any and all CLAIMS AND COSTS AND EXPENSES in connection therewith resulting from or growing out of any injury or alleged injury, accident, sickness, death or otherwise to the undersigned, no matter when occurring, HEREBY BINDING THE UNDERSIGNED, HIS HEIRS, ADMINSTRATORS, AND ASSIGNEES firmly by these presents.

WARNING

The UNDERSIGNED HEREBY ACKNOWLEDGES THAT HE HAS BEEN INFORMED AND WARNED WITH RESPECT TO DANGERS that entrance upon the job site may entail and that there may be hidden as well as apparent dangers because of the use of large and powerful machines and equipment, high-voltage electrical equipment and lines, high-pressure air equipment and lines, because of any and all other factors.

Dated: ______________________ Signature: ______________________

Witness: ______________________ Print Name: ______________________

Firm: ______________________

GARREY CARRUTHERS
GOVERNOR

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

June 1, 1990

Mrs. William Walker
15 Road 6271
Kirtland, New Mexico 87417

Dear Mrs. Walker:

On April 12, 1990, the New Mexico Oil Conservation Division (OCD) collected a water sample from your private well for analysis of the presence of petroleum hydrocarbons which may be related to the past activities of the Caribou/Maverik Refinery in Kirtland, New Mexico. Enclosed you will find the results of the analyses.

The analytical results show that your well water contains a trace amount of 1,2-Dichloroethane, an organic chemical often associated with leaded gasoline. Although 1,2-Dichloroethane was detected, the concentration could not be quantified because it was present at a concentration lower than the one ppb detection limit of the laboratory equipment. The state of New Mexico Water Quality Control Commission ground water standard for 1,2-Dichloroethane is 10 parts per billion (ppb). The presence of 1,2-dichloroethane in your well indicates that very low levels of this petroleum related contaminant are present in the shallow ground water, but the amount of the contaminant is too small to be a threat to human health.

The OCD would like to contact you in the future to resample your well in order to monitor the water quality of the aquifer in your area. If you have any questions please contact me at 827-5885.

Sincerely,

William C. Olson

William C. Olson
Hydrogeologist

Enclosures

xc: Frank Chavez, OCD Aztec District Office
Terry Vandell, Dames and Moore
Dave Tomko, EID Farmington Office

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

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

May 25, 1990

CERTIFIED MAIL
RETURN RECEIPT NO. P-918-402-316

Terry D. Vandell
Dames and Moore
127 South 500 East
Suite 300
Salt Lake City, Utah 84102-1959

RE: Discharge Plan Requirement
Maverick Refinery Remediation Project
San Juan County, New Mexico

Dear Ms. Vandell:

Under the provisions of the Water Quality Control Commission (WQCC) Regulations you are hereby notified that the filing of a discharge plan is required for the Kirtland New Mexico Maverick Refinery Remediation Project located in the NE/4 NE/4, Section 17 and the SE/4 SE/4, Section 8, Township 29 North, Range 14 West, NMPM, San Juan County, New Mexico.

This notification of discharge plan requirement is pursuant to Sections 3-104 and 3-106 of the WQCC Regulations The discharge plan, defined in Section 1.101.P of the WQCC Regulations, should cover all discharges of effluent or leachate at the site or adjacent to the site. Included in the application should be plans for controlling spills and accidental discharges at the site.

A copy of the regulations is enclosed for your convenience. Three copies of the discharge plan application should be submitted.

Section 3-106.A. of the regulations requires a submittal of the discharge plan within 120 days of receipt of this notice unless an extension of this time period is sought and approved for good cause.

If there are any questions on this matter, please feel free to call David Boyer at 827-5812, Roger Anderson at 827-5884 or Bill Olsen at 827-5885 as they have the assigned responsibility for review of all discharge plans.

Sincerely,

William J. LeMay
Director

WJL/RCA/sl

cc: OCD Aztec Office

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time 1010	Date 5/24/90

Originating Party	Other Parties
Bill Olson - OCD Santa Fe	Mrs. Dobson - Kirtland resident

Subject

Maverik Refinery + Tank Farm

Discussion

I notified Mrs. Dobson of my inspection of refinery on May 15, 1990 in response to her complaint of chemicals in the open.
I told her there was a couple of pallets of Kastite a mortar for fire bricks, resin beads and approximately 6-5 gallon metal cans of some unknown substance. I told her that with exception of cans substances were nonhazardous.
I told her I have directed Dames and Moore to remove and dispose of these substances and identify substance in cans.

Conclusions or Agreements

Distribution File

Signed Bill Olson

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal | Time 0930 | Date 5/23/90

Originating Party	Other Parties
Jerry Vanhell - Dames + Moore	Bill Olson - Santa Fe OCD

Subject

Maverik Refinery and Tank Farm

Discussion

They are currently finishing specs for grout wall system to be sent to us. Expect grout wall to be installed week of

I notified her of my inspection on May 15, 1990 in response to Mrs. Dobson's complaint of chemicals left in open which her kids play with.

I told her I found a couple of pallets containing mortar which are disintegrating, resin beads on the ground and approximately half a dozen 5 gallon metal containers containing some unknown sludge + fluid

I directed Dames + Moore to indentify and remove these materials

Conclusions or Agreements

Dames and Moore will move these materials to one of the locked buildings on site in the interim.

I will call

Distribution

Signed

Farmington Daily '90 MAY 18 AM 8 53
05-16-90

Hinds speaks to water panel

Mark Lewis
Staff writer

A realization that local governments cannot afford federal environmental regulations has led to a strategy of combining public and private money, said Keith Hinds, an agent of Public/Private Partnerships Initiative of the Environmental Protection Agency.

Hinds said the combination of private with government money may be the only alternative to just ignoring federal regulations.

Speaking to the New Mexico Water Quality Control Commission at San Juan College Tuesday afternoon, Hinds said the disparity between what regulations require and the money states and local governments have to meet them have led to the development of the public/private strategy.

Nationwide, local governments not only don't have the money to meet federal regulations, but the amount they lack will grow because there are additional regulations in the works, he said.

Currently, the nationwide shortfall is about $20 billion, all of which would have to come from local governments if no other alternative is found, Hinds explained.

The EPA fears that such a large lack of funds during a time when local revenues in many areas are not increasing would lead to rampant disregard of federal regulations and an impasse in enforcement, he said.

However, by forming partnerships, some of the financial burden can be lifted from government and shared with private enterprise, who could make a profit, Hinds said.

The EPA has developed a self-help program for local governments to establish partnerships and has set aside some funding for this, Hinds added.

However, the EPA is not promoting strict privatization of waste management through the program, but a combination designed to benefit the public and private sector, Hinds said.

Some entities use private business to create or maintain waste facilities, while others may use them for planning or monitoring sites, he explained.

The goal of the program is to tailor programs to the needs of a community or a state, and can include both solid and liquid waste management, Hinds added.

Solid waste is more attractive to private enterprise than liquid waste because liquid waste is tied up with many more regulations, he said.

But in the future, using the private sector for some parts of liquid waste management will most certainly become a more viable alternative, Hinds added.

Panel votes to return cleanup control

The New Mexico Water Quality Control Commission voted unanimously to return control of a Kirtland oil refinery cleanup to the Oil Conservation Commission.

The commission approved the change during a meeting Tuesday afternoon at San Juan College.

William Olsen, with the OCC, said the commission has the authority to oversee the cleanup of the Caribou-Maverick refinery near Kirtland which was transferred to the state Environmental Improvement Division in 1988.

That switch was made because the oil commission did not have the expertise necessary at that time to make a determination of how the cleanup should take place, Olsen said.

The oil commission had been in control of the cleanup since 1986, when it was determined spills and leaks from the refinery had contaminated ground water and wells in the area, he said.

Some of the cleanup procedures includes flushing underground water sources, aerating soil and removing some contaminated soil to the Rio Rancho landfill for disposal, Olsen explained.

In addition, a sludge pit had to be enclosed and an irrigation ditch piped to avoid contamination that was leaching into irrigation water, he added.

cc: Dave Boyer, OCD

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

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

MEMORANDUM

TO: David Boyer, OCD Environmental Bureau Chief

FROM: Bill Olson, Geologist III

DATE: May 15, 1990

RE: **SUMMARY OF REMEDIAL ACTIONS AT THE CARIBOU/MAVERIK REFINERY AND TANK FARM IN KIRTLAND, NEW MEXICO**

Numerous regulatory actions have occurred over the years regarding petroleum contaminated ground water at the Caribou/Maverik Refinery and Tank Farm in Kirtland, New Mexico. On July 11, 1988, while employed by the New Mexico Environmental Improvement Division's (EID) Ground Water Bureau, I wrote a memorandum to Dennis McQuillan summarizing EID actions from September 11, 1986 to May 27, 1988 related to the Caribou/Maverik Refinery. This document was presented to the New Mexico Water Quality Control Commission (WQCC) on July 12, 1988 when the WQCC approved a change in the delegation of authority from the New Mexico Oil Conservation Division (OCD) to EID, due to OCD's shortage of technical staff.

A summary of the major events and regulatory actions that have occurred from July 8, 1988 to the present are listed below. References to Maverik also include actions and correspondence with Maverik's consultant Dames and Moore.

July 8, 1988 - EID sends Maverik EID's "PROCEDURES FOR THE DISPOSAL OF INVESTIGATION WASTES AT PETROLEUM CONTAMINATION SITES" and notifies Maverik that air stripper operations must be permitted through EID's Air Quality Bureau.

July 11, 1988 - EID prepares a memorandum summarizing major events and actions taken from September 11, 1986 to May 27, 1988.

July 12, 1988 - EID and OCD present a request to the WQCC for a change in the delegation of legal authority for Caribou/Maverik Refinery regulatory actions from OCD to EID. The request was approved by the WQCC.

July 20, 1988	-	Two Kirtland residents inform EID that they were never reimbursed for community water hookups as promised by Caribou/Maverik. EID notifies Maverik of the residents concerns.
July 21, 1988	-	Maverik submits a report on the "PHASE II SUBSURFACE SOIL AND SOLID WASTE CONTAMINANT EVALUATION".
August 2, 1988	-	Maverik notifies residents that did not receive reimbursements for community water hookups to submit receipts for reimbursement and notifies EID of Maverik's intent to reimburse the residents.
August 26, 1988	-	Maverik submits to EID a "PROPOSAL: GROUND WATER REMEDIATION PLAN FOR THE MAVERIK COUNTRY STORES, INC. KIRTLAND, NEW MEXICO REFINERY AND TANK FARM". The plan includes a pump and treat system for remediating contaminated ground water along with a soil vapor recovery system and bioremediation bench tests.
September 12, 1988	-	Maverik submits the "ROUND III GROUND WATER QUALITY SAMPLING/ANALYTICAL PLAN" to EID.
September 14, 1988	-	Maverik submits a revised ground water remediation plan.
September 19, 1988	-	EID approves of Maverik's September 12, 1988 "ROUND III GROUND WATER QUALITY SAMPLING/ANALYTICAL PLAN".
October 12, 1988	-	EID and Maverik sample monitor wells.
December 15, 1988	-	Maverik sends a letter of agreement for EID's signature to document EID concurrence with Maverik's ground water remediation plan and deferring a negotiated settlement agreement until 1989.
January 25, 1989	-	EID signs Maverik's letter of agreement and requests that Maverik submit details of the proposed air stripper system.
January 26, 1989	-	Maverik submits the "WATER QUALITY DATA SUMMARY REPORT FOR COMPLETION OF THE HYDROGEOLOGIC EVALUATION" to EID.

April 11, 1989	-	Maverik submits, to EID, the "ESTIMATED TIME SCHEDULE - PHASE I PLAN FOR GROUND WATER REMEDIATION". Maverik also notifies EID that Maverik is working with the adjacent landowners and the ditch association to pipe the Westside Irrigation ditch through the refinery and tank farm area.
April 17, 1989	-	EID sends Maverik EID's October 12, 1988 monitor well water quality analyses.
April 21, 1989	-	EID sends nearby landowner Roland Jackson a copies of Maverik's November 19, 1987 and February 22, 1988 water quality analyses from the monitor well on his property as requested.
June 2, 1989	-	EID samples Roland Jackson's private well in response to his water quality concerns.
July 28, 1989	-	Maverik submits the "STATUS REPORT - REMEDIATION WORK, AQUIFER PUMP TEST AND ROUND I LONG TERM GROUND WATER QUALITY MONITORING DATA RESULTS" to EID.
August 8, 1989	-	Maverik submits an "AMENDED GROUND WATER REMEDIATION PLAN" due to the low site hydraulic conductivity.
August 17, 1989	-	EID sends Roland Jackson the water quality results of EID's June 2, 1989 sampling of his private well. No volatile organics were detected.
August 22, 1989	-	Maverik contracts with San Juan Engineering to clean all refinery tanks and piping of residual product.
September 7, 1989	-	Maverik submits preliminary information on the biodegradation feasibility study to EID.
October 17, 1989	-	Maverik requests that all residual product removed during the tank and piping cleaning be taken to Mesa Oil.
October 19, 1989	-	EID approves of Mesa Oil for disposal of residual product removed during cleaning of tanks and piping.

October 24, 1989	-	EID approves of Maverik's August 8, 1989 "AMENDED GROUND WATER REMEDIATION PLAN" and requests Maverik file a Notice of Intent to Discharge for all ground water with EID's Ground Water Section.
November 15, 1989	-	Maverik submits the "STATUS REPORT REMEDIATION WORK AND OFF-SITE AND ROUND 2 LONG-TERM GROUND WATER QUALITY MONITORING DATA RESULTS" to EID.
December 5, 1989	-	Rocky Mountain Construction begins cleaning residual product from all tanks and piping.
December 13, 1989	-	EID samples on and off-site monitor wells.
January 18, 1990	-	Maverik notifies EID that bioremediation bench tests have been completed. EID suggests the use of air sparging for ground water remediation in the event that ground water pumping is not feasible due to low hydraulic conductivity of the formation.
January 23, 1990	-	EID sends Maverik the results of EID's December 13, 1989 water quality sampling.
February 21, 1990	-	Maverik submits, to OCD, the "STATUS REPORT - REMEDIATION WORK AND ROUND 3 LONG TERM GROUND WATER QUALITY MONITORING DATA RESULTS".
March 29, 1990	-	Maverik submits the "ON-SITE GROUND, SURFACE WATER AND SLUDGE LABORATORY ANALYTICAL DATA AND MODIFIED GROUND WATER REMEDIATION PLAN" to OCD. The modified remediation plan proposed a continuous grout wall surrounding the contaminated area with ground water treatment by air sparging and bioremediation.
April 12, 1990	-	OCD samples the private water well of nearby resident William Walker in response to his water quality concerns.
April 20, 1990	-	OCD conceptually agrees with Maverik's March 29, 1990 "MODIFIED GROUND WATER REMEDIATION PLAN" but requests additional information to complete the review process. OCD reminds Maverik that no discharges can occur at the refinery without an approved discharge plan.

May 1, 1990	-	Maverik requests approval from EID's Special Waste Bureau for disposal of hydrocarbon contaminated soil at the Rio Rancho Landfill.
May 15, 1990	-	OCD and EID present a request to the WQCC to return the legal authority for Caribou/Maverik Refinery regulatory actions to OCD.

STATE OF NEW MEXICO

WATER QUALITY CONTROL COMMISSION

CONSTITUENT AGENCIES:

Environmental Improvement Division
State Engineer & Interstate Stream Commission
Game and Fish Department
Oil Conservation Division
Department of Agriculture
State Park & Recreation Division
Soil and Water Conservation Bureau
Bureau of Mines and Mineral Resources
Member-at-Large

~~May 7, 1990~~

TO: NM Water Quality Control Commission Members

FROM: Richard Mitzelfelt, Chairman

SUBJECT: Proposed Agenda for Tuesday, May 15, 1990,

WQCC meeting at San Juan College, 4601 College Blvd., Farmington. Meeting room adjacent to student center lunchroom, Room 1008/1010.

1. Roll call

2. Approval of agenda

3. Review of the minutes of the March 13, 1990, Water Quality Control Commission meeting.

4. Presentation by the U. S. Environmental Protection Agency on Public - Private Partnerships (Privatization).

5. Presentation and request by the Oil Conservation Division and the Environmental Improvement Division to change the delegation of authority by returning legal authority over cleanup actions at the Caribou/Maverik Refinery, Kirtland, New Mexico to OCD.

6. Presentation by the City of Las Cruces and the EID regarding NPDES permitting issues and the EPA's proposed listing of the City on the 304(1) list. Request by the City for WQCC determination on issue of low flow determination in the Rio Grande as it affects their NPDES permit and listing on the 304(1) listing.

7. Report on litigation

The Commission is not confined to the items listed on the agenda. Other items may be considered that are not listed on the agenda.

Wednesday, May 16th - Leave for Coal Gas Tour at 7:00 am.

1190 St. Francis Drive
Santa Fe, New Mexico 87503

MAY 08 '90 14:36 NM HED/EID

Post Office Box 968
Santa Fe, New Mexico 87504-0968

ENVIRONMENTAL IMPROVEMENT DIVISION

Michael J. Burkhart
Director

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

MEMORANDUM

TO: Dennis McQuillan, Water Resource Spec. III, Technical Support Section

FROM: Bill Olson, Water Resource Spec. II, Technical Support Section

RE: Summary of Remedial Actions at the Caribou-Maverick Refinery and Tank Farm, Kirkland, New Mexico

DATE: July 11, 1988

The following summarizes, in chronological order, the major events and remedial actions undertaken since the EID Technical Support Section began overseeing the remediation of the old Caribou-Maverick Refinery and Tank Farm:

September 11, 1986 - NM Oil Conservation Division (OCD) refers clean up of contaminated ground water from past refinery operations to EID Superfund Section due to lack of staff for a technical review of the case.

December 31, 1986 - Case assigned to EID Technical Support Section. Caribou directed to submit a remedial investigation proposal and to provide drinking water to nearby residents with contaminated water wells.

February 16, 1987 - Caribou submits Proposed Work Plan to Evaluate Ground Water Contamination, Caribou Four Corners, Inc. Refinery to EID.

April 2, 1987 - EID contacts local residents about analyzing private water wells and performs door to door survey of residents well water.

May 11, 1987 - EID, with conditions, approves Proposed Work Plan to Evaluate Ground Water Contamination at the refinery.

July 30, 1987	- Caribou requests consent of access for soil gas survey and installation of monitor wells from local landowners.
August 14, 1987	- Caribou completes soil gas survey and agrees to pay for community water supply hookups of private water well users with contaminated drinking water.
November 12, 1987	- Monitor wells and private water well survey completed. Caribou sets schedule of work to be performed at the site.
December 10, 1987	- Preliminary Ground Water Evaluation, Caribou-Maverick Refinery and Farm Tank submitted to EID. Report covers field and lab work performed to date.
December 15, 1987	- Meeting between EID and Caribou-Maverick officials to set deadlines for investigation reports.
March 1, 1988	- Phase I Hydrogeologic Evaluation, Caribou-Maverick Refinery and Tank Farm submitted to EID.
March 21, 1988	- Westside Irrigation Ditch cleaned of free floating product. Interception trench installed upgradient of Westside Irrigation Ditch to capture free product that was seeping into the ditch.
March 25, 1988	- Phase II Hydrogeologic Investigation proposal submitted to EID. Report covers source investigations and soil contamination by means of a soil boring and sampling program.
April 4, 1988	- EID approves of proposed Phase II Hydrogeologic Investigation with some modifications.
April 27, 1988	- Phase II field investigation complete. A total of 25 borings were performed in various potential source areas of the refinery.
May 27, 1988	- Addendum to Phase I Hydrogeologic Evaluation submitted to EID. Report includes a second round of water quality analyses performed during February of 1988.

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
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MEMORANDUM

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FROM: Bill Olson, Geologist III

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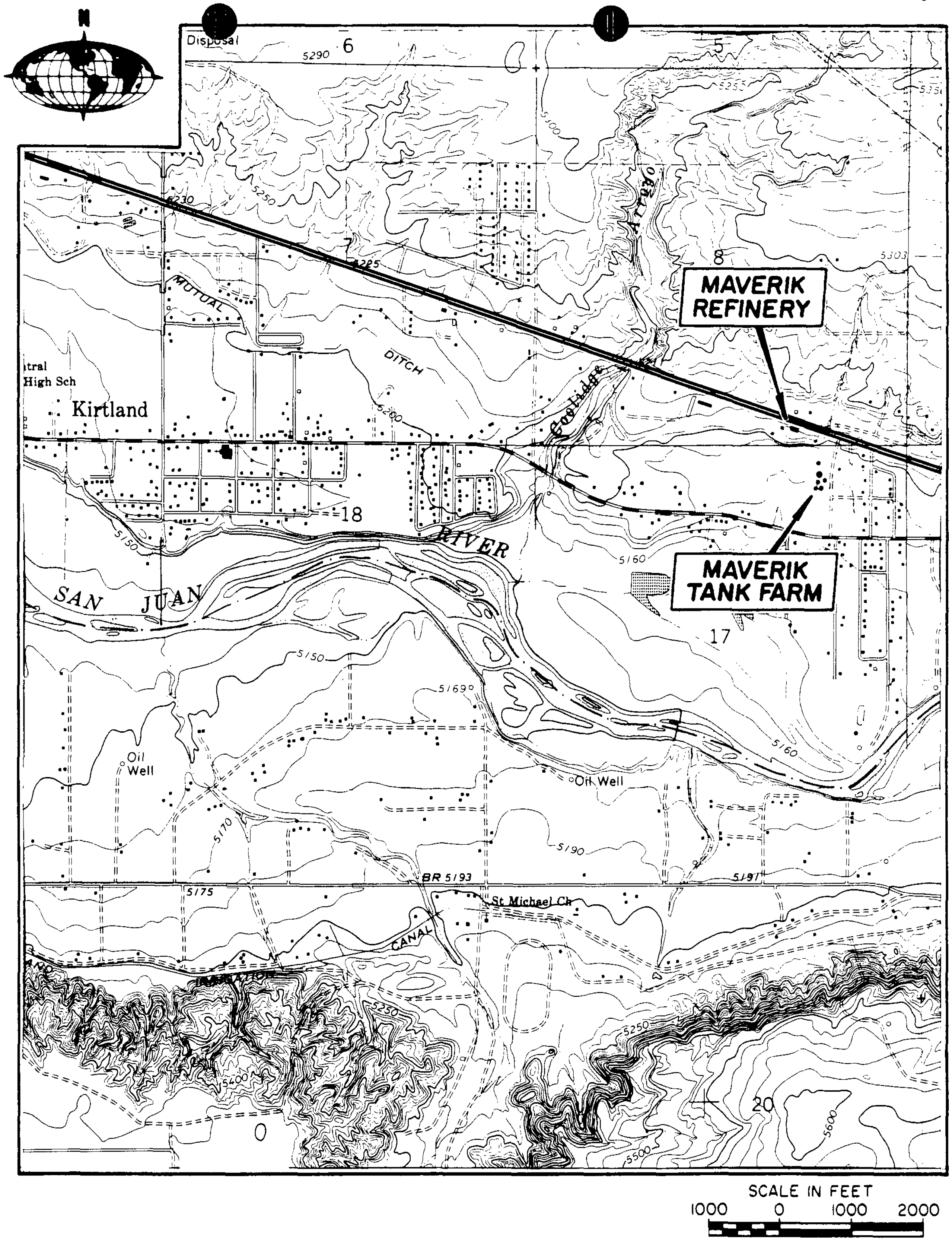
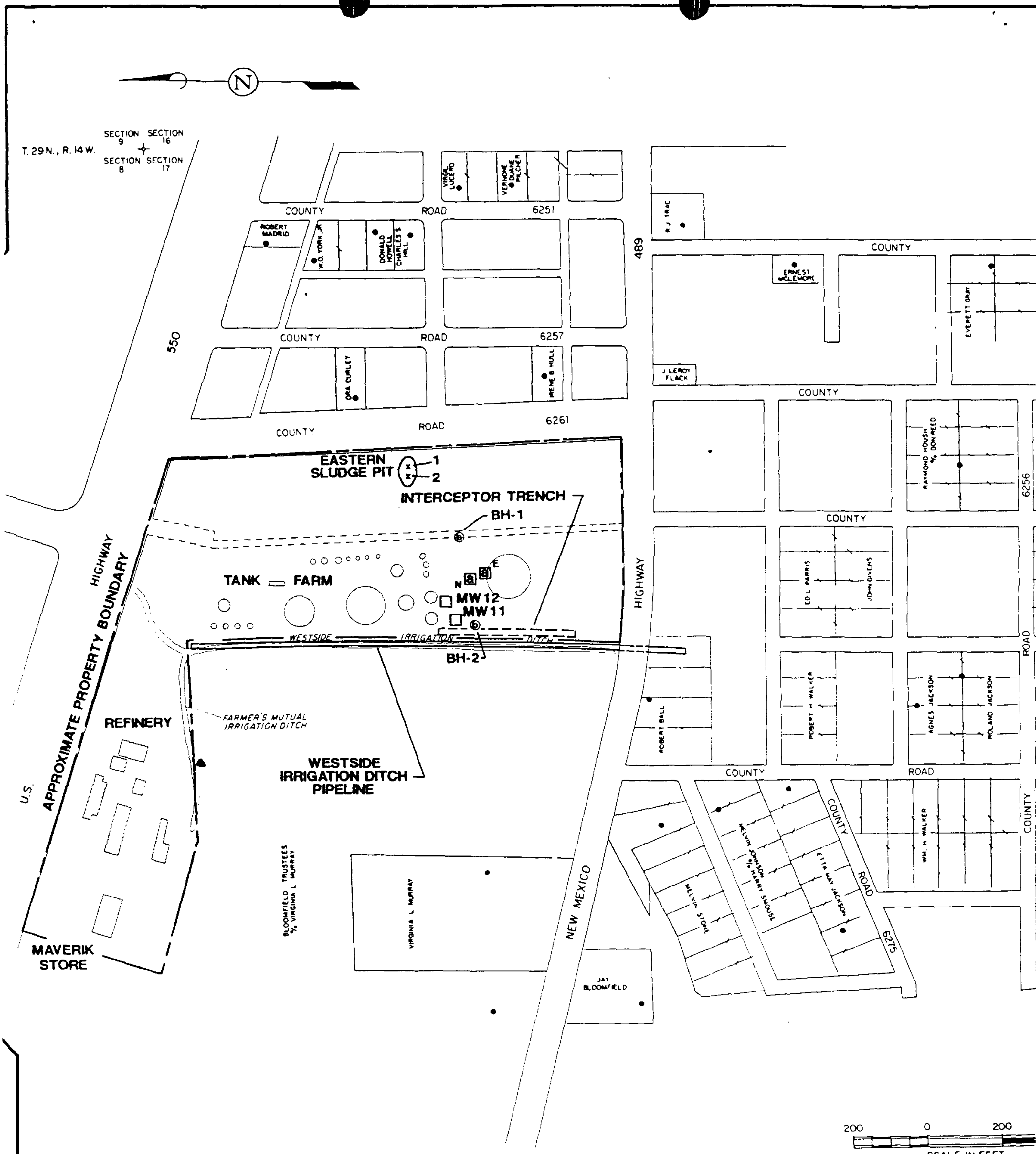


REFERENCE
U.S.G.S. QUADRANGLE ENTITLED "KIRTLAND, NEW MEXICO" – 1966, PHOTOREVISED 1979.

Dames & Moore

PLATE I



REFERENCE

ADAPTED FROM PRINTS ENTITLED "PROPERTY IDENTIFICATION MAP OF SAN JUAN COUNTY, NEW MEXICO" CODE NUMBER 2-083-171, SHEET NUMBERS D-3-17-1 AND D-3-17-4 (SECTION 17, TOWNSHIP 29 NORTH, RANGE 14 WEST) - PREPARED BY SAN JUAN COUNTY - UNDATED.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time 1030	Date 5/9/90

Originating Party	Other Parties
Bill Olson - OCD Santa Fe	Mrs. B.J. Dobson - Kirtland resident 325-5762

Subject

Caribou Refinery

Discussion

Called about her reporting chemicals on surface behind Maverick Convenience Store next to Caribou Refinery. She said there is frac sand on ground and bags of chemicals (powdered) spilled on ground. She does not know what it is. Her kids have played in it and she wants to know what it is.
I told her I have directed Maverick's consultant to investigate and that I will inspect on 5/15.

Conclusions or Agreements

I will call her after inspecting the site on 5/15

Distribution File

Signed Bill Olson

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time 1320	Date 5/8/90

Originating Party	Other Parties
Bill Olson - OCD Santa Fe	Mrs. B.J. Dobson - Kirtland resident 325-5762

Subject

Caribou Refinery

Discussion

No Answer, called again at 1430 still no answer

Called again at 1545 no answer

Conclusions or Agreements

Distribution file

Signed Bill Olson

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time 1300	Date 5/8/90

Originating Party	Other Parties
Terry Vandell - Dimes + Moore	Bill Olson - OCD Santa Fe

Subject

Caribou Refinery

Discussion

Notified them of call from Mrs. Robson to EID Farmington. I requested that they investigate any materials stored behind the Maverik Convienience Store and ~~[illegible]~~ notify OCD as to there nature

Conclusions or Agreements

She will contact the Maverik person on site to investigate

Distribution file

Signed Bill Olson

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time	Date 5/7/90

Originating Party	Other Parties
Dave Tomko - EID Farmington	Bill Olson - OCD Santa Fe

Subject

Cariboo Refinery

Discussion

Mrs. B.J Dobson called Tomko about her kids playing in chemicals in bags behind the Maverik Convience Store next to the Maverik Refinery Process Area
I asked if this was in the chemical storage bldg. which has been continually vandalized but he was not sure
He asked OCD contact Mrs. Dobson
(Mrs Dobson - 325-5762)

Conclusions or Agreements

I will call Dames & Moore then Mrs. Dobson

Distribution file

Signed Bill Olson

New Mexico Health and Environment Department

'90 MAY 11 AM 9 09

GARREY CARRUTHERS
Governor

DENNIS BOYD
Secretary

MICHAEL J. BURKHART
Deputy Secretary

RICHARD MITZELFELT
Director

May 7, 1990

Terry Vandell, Senior Hydrogeologist
Dames & Moore
127 South, 500 East
Suite 300
Salt Lake City, Utah 84102-1959

Dear Ms. Vandell:

This letter is in response to your May 1, 1990 request to dispose of hydrocarbon contaminated soil from the Maverik Country Stores Inc. Kirtland tank farm, at the Rio Rancho Landfill. The EID understands that Maverik's cleanup involves removal of both sludge and underlying soil. Sludge disposal in landfills in New Mexico is specifically prohibited by Section 104.D of the N.M. Solid Waste Management Regulations. Therefore, the soil must be free of sludge prior to disposal.

A petroleum-contaminated soil disposal policy developed by the EID's Underground Storage Tank Bureau (copy enclosed) is applied by the Solid Waste Program for disposal of such soil at landfills. Maverik's soil still meets the definition of "highly contaminated" under this policy, and therefore cannot be disposed of at a landfill at this time. The soil should be spread into a single layer no greater than six inches thick in a bermed area, followed by turning or discing once every two weeks until analysis shows the levels specified by the UST policy have been met. Only after the soil has met these levels can it be approved for disposal at a landfill. The Rio Rancho facility has not indicated in the permit application they have a separate area of the landfill for treatment of petroleum contaminated soil.

Sincerely,

J. David Duran

J. David Duran
Water Resource Engineering Specialist
Special Waste Bureau

xc Garth Graves, District 1
Bill Olson, OCD
Lance P. Robinson, Waste Management of North America, Inc.
Marcy Leavitt, UST Bureau

STATE OF NEW MEXICO

WATER QUALITY CONTROL COMMISSION

CONSTITUENT AGENCIES:

Environmental Improvement Division
State Engineer & Interstate Stream Commission
Game and Fish Department
Oil Conservation Division
Department of Agriculture
State Park & Recreation Division
Soil and Water Conservation Bureau
Bureau of Mines and Mineral Resources
Member-at-Large

May 7, 1990

TO: NM Water Quality Control Commission Members

FROM: Richard Mitzelfelt, Chairman

SUBJECT: Proposed Agenda for Tuesday, May 15, 1990,

WQCC meeting at San Juan College, 4601 College Blvd., Farmington. Meeting room adjacent to student center lunchroom, Room 1008/1010.

1. Roll call

2. Approval of agenda

3. Review of the minutes of the March 13, 1990, Water Quality Control Commission meeting.

4. Presentation by the U. S. Environmental Protection Agency on Public - Private Partnerships (Privatization).

5. Presentation and request by the Oil Conservation Division and the Environmental Improvement Division to change the delegation of authority by returning legal authority over cleanup actions at the Caribou/Maverik Refinery, Kirtland, New Mexico to OCD.

6. Presentation by the City of Las Cruces and the EID regarding NPDES permitting issues and the EPA's proposed listing of the City on the 304(1) list. Request by the City for WQCC determination on issue of low flow determination in the Rio Grande as it affects their NPDES permit and listing on the 304(1) listing.

7. Report on litigation

The Commission is not confined to the items listed on the agenda. Other items may be considered that are not listed on the agenda.

Wednesday, May 16th - Leave for Coal Gas Tour at 7:00 am.

1190 St. Francis Drive
Santa Fe, New Mexico 87503

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP

'90 MAY 3 AM 9 26

May 1, 1990

Environmental Improvement Division
Special Waste Bureau
Harold Runnels Building
1190 St. Francis Drive N2256
Santa Fe, New Mexico 87503

Attention: Mr. David Duran
Special Waste Bureau
Environmental Engineer

Subject: EID Approval for Disposal of Hydrocarbon Contaminated Soils to the Rio Rancho Landfill Facility

Dear Mr. Duran:

As per our recent telephone conversation, enclosed are soils chemistry data for gasoline-contaminated soils located at the Maverik Country Stores Inc. abandoned tank farm in Kirtland, New Mexico (Plate 1). Dames & Moore has been contracted to remediate this site. We are currently working with Mr. Bill Olsen of the Oil Conservation Division in conducting the remediation, one of the tasks which involves clean up of about 800 cubic yards of the aforementioned contaminated soil.

The data show (Table 1 and Attachment #1) that the contaminated soil is not characterized as hazardous. The total petroleum hydrocarbon (TPH) concentration is only 2,560 mg/kg as compared to 50,000 mg/kg TPH in wastes that are currently accepted by the Rio Rancho Landfill. Therefore, we would like to dispose of this soil to the Rio Rancho Landfill.

According to Mr. Bill Olsen, approval must first come from the New Mexico Environmental Improvement Division (EID), specifically, the Special Waste Bureau. The OCD would then concurrently approve of the disposal. Based on a previous discussion with Jack Elvenger of the EID's Hazardous Waste Bureau, since the soil is not characterized as hazardous, the Hazardous Waste Bureau will not be involved in this project.

In addition, Waste Management of North America, Inc. (WMNA), the owner of the Rio Rancho Landfill Facility must have letters of approval from both the EID and the OCD prior to disposal. Consequently, copies of this letter and the data have been forwarded to Mr. Bill Olsen as well as to Mr. Lance P. Robinson of WMNA.

Your prompt review and response to this request to dispose of these contaminated soils to the Rio Rancho Landfill are greatly appreciated. We would like to dispose of these soils by the end of May, if possible. Copies of your response will be forwarded to the OCD and to WMNA. If you have any questions, please contact me at (801) 521-9255.

Very truly yours,

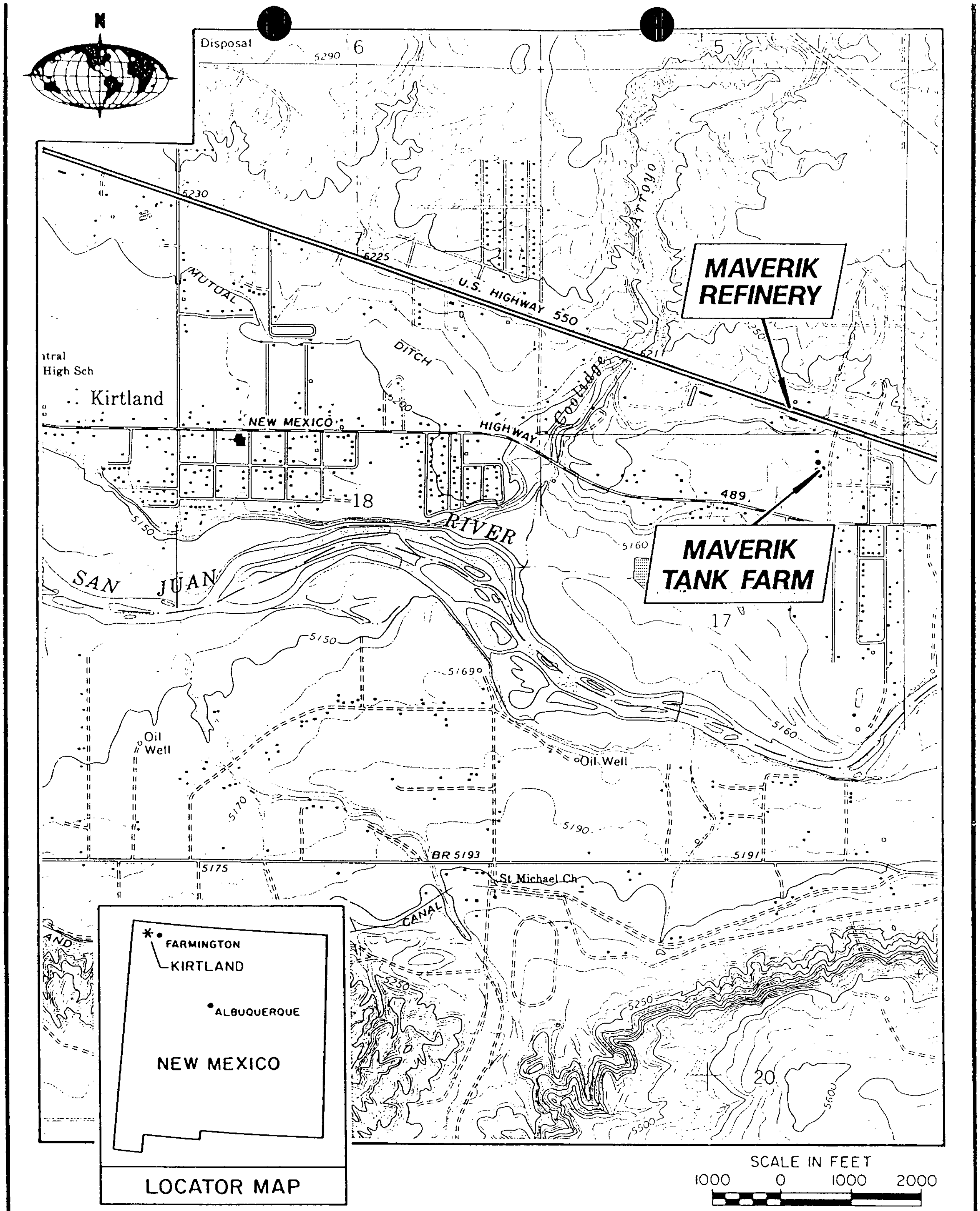
DAMES & MOORE

Terry D. Vandell

Terry D. Vandell
Senior Hydrogeologist

TDV:fl

cc: Mr. Bill Olsen, With Attachments
Mr. Lance P. Robinson, With Attachments



VICINITY MAP

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

Dames & Moore

PLATE 1

TABLE 1

LABORTORY ANALYTICAL TEST RESULTS OF DETECTED CONSTITUENTS
AND RCRA EP TOXICITY TEST RESULTS OF THE SOILS
FROM THE EASTERN SLUDGE PIT (1)

Sample Site (2) Designation	Barium (3) (mg/1)	Lead (3) (mg/1)	Ignitability (°F)	Oil and Grease (mg/kg)	pH (pH Units)	Total Petroleum Hydrocarbons (mg/kg)
S01	1.6	<0.05	>160	20,300	7.7	2,560

(1) Sampled January 18, 1990; Composite samples taken from 1 to 5 feet in depth.

(2) Designated as MESP-S01 in the laboratory reports. S01 sample composited underlying soils from 0.5 to 5 feet in depth.

(3) EP Toxicity Leachate

<0.05 indicates below detection limit

Rocky Mountain
Analytical Laboratory

Enseco Incorporated

ANALYTICAL RESULTS

FOR

DAMES & MOORE

ENSECO-RMAL NO. 008144

JANUARY 26, 1990

Enseco

Reviewed by: Randall Thompson

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611

Facsimile: 303/431-7171

SAMPLE DESCRIPTION INFORMATION
for
Dames and Moore

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
008144-0002-SA	MESP-Sol	SOIL	18 JAN 90	15:00	20 JAN 90

General Inorganics

Client Name: Dames and Moore
Client ID: MESP-Sol
Lab ID: 008144-0002-SA
Matrix: SOIL
Authorized: 20 JAN 90

Enseco ID: 1064810
Sampled: 18 JAN 90
Prepared: See Below

Received: 20 JAN 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Reactive	ND	mg/kg	0.1	EPA/OSW	NA	23 JAN 90
Ignitability	>160	deg. F	--	1010/1020	NA	23 JAN 90
Oil and Grease	20300	mg/kg	100	9070 Mod.	NA	24 JAN 90
pH	7.7	units	--	9045/ASTM	NA	23 JAN 90
Sulfide, Reactive	ND	mg/kg	0.5	EPA/OSW	NA	23 JAN 90
Total Petroleum Hydrocarbons	2560	mg/kg	50	9070	NA	23 JAN 90

Note o : This test is unreliable for any sample other than a non-aqueous liquid.

ND = Not detected
NA = Not applicable

Reported By: Ron Maiorana

Approved By: Kimberly Conroy

Metals

EP Toxicity Leachate

Client Name: Dames and Moore
Client ID: MESP-Sol
Lab ID: 008144-0002-SA   Enseco ID: 1064810
Matrix: SOIL   Sampled: 18 JAN 90   Received: 20 JAN 90
Authorized: 20 JAN 90   Prepared: See Below   Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyz Date
Arsenic	ND	mg/L	0.1	6010	24 JAN 90	25 JAN
Barium	1.6	mg/L	0.01	6010	24 JAN 90	25 JAN
Cadmium	ND	mg/L	0.005	6010	24 JAN 90	25 JAN
Chromium	ND	mg/L	0.01	6010	24 JAN 90	25 JAN
Lead	ND	mg/L	0.05	6010	24 JAN 90	25 JAN
Silver	ND	mg/L	0.01	6010	24 JAN 90	25 JAN
Mercury	ND	mg/L	0.002	7470	24 JAN 90	25 JAN
Selenium	ND	mg/L	0.05	7740	24 JAN 90	25 JAN

ND = Not detected
NA = Not applicable

Reported By: Fred Velasquez   Approved By: Kimberly Conroy

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

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

April 20, 1990

Terry D. Vandell
Dames and Moore
127 South 500 East
Suite 300
Salt Lake City, Utah 84102-1959

RE: MODIFIED GROUND WATER REMEDIATION PLAN FOR THE KIRTLAND NEW MEXICO MAVERICK REFINERY

Dear Ms. Vandell:

The New Mexico Oil Conservation Division (NMOCD) is in the process of reviewing the March 1990 "ON-SITE GROUND, SURFACE WATER AND SLUDGE LABORATORY ANALYTICAL DATA AND MODIFIED GROUND WATER REMEDIATION PLAN FOR MAVERICK TANK FARM KIRTLAND, NEW MEXICO FOR MAVERICK COUNTRY STORES INC". The conceptual remedial plan presented in the above document appears sufficient to remediate contaminated ground water and prevent further ground water contamination but, the NMOCD requires the following information to complete the review process:

1. Design specifications for the slurry wall, such as physical dimensions, method of emplacement and composition of the slurry, were not included in the remediation plan. NMOCD understands that Dames and Moore will initiate a boring program the week of April 30, 1990 in order to complete design criteria of the slurry wall. Please submit all design specifications upon completion of evaluation of the boreholes.

2. The NMOCD requests submission of design specifications for the air sparging system, dewatering wells and additional monitoring wells including depth of wells, completion intervals, methods of construction, piping and types of pumps.

3. Where will the additional monitoring wells be located?

4. Please submit design specifications for the water application or sprinkling process for enhanced bioremediation including area of application, types of equipment to be used and the locations of equipment and piping.

5. What measures will be taken to ensure that sprayed water will not leave the application area and that excess ponding does not occur during the application process?

The NMOCD would like to remind you that no remedial discharges can occur until the site has an approved discharge plan. Oversight responsibility, including authority for discharge plan approval, is expected to be formally returned to this agency at the Water Quality Control Commission meeting in Farmington on Tuesday, May 15, 1990. You will find enclosed the time and location of this meeting. An agenda for the meeting will be prepared shortly. If you have questions or comments on requests in this letter, please call me at (505) 827-5885.

Sincerely,

Will Olson

William Olson
Hydrogeologist

WO/sl

cc: William Call, Maverick County Stores, Inc.
OCD Aztec District Office
Dave Tomko, EID Farmington

P-106 675 348

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL
(See Reverse)

Sent to William Call	
Street and No.	
P.O., State and ZIP Code	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	$
Postmark or Date	

PS Form 3800, June 1985

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

[x] Telephone [ ] Personal	Time 1400	Date 4/3/90

Originating Party	Other Parties
Bill Olson - NMOCD	William Walker - Caribou area resident 598-5954

Subject

Caribou Refinery

Discussion

Informed Mrs. Walker that I will be in Kirtland area during the week of 4/9/90 and can sample her well which froze up during the winter (wasn't sampled)

Conclusions or Agreements

She will be home all week except Tues from 11-1 pm

I will call her on Mon. 4/9 from the Farmington area to set up a time to sample well

Distribution

file

Signed Bill Olson

ORGANIC CHEMISTRY ANALYTICAL REQUEST FORM

SCIENTIFIC LABORATORY DIVISION
700 CAMINO DE SALUD N.E., ALBUQUERQUE, NM 87106
Organic Chemistry Section - Telephone: (505) 841-2570

Request ID No. 000783-C

1 SLD No. 90-0549-C

Date Received: 4/16/90

2 User Code #: 82235

3 Request ID No.:

4 Priority Code #: 3 [If "1" or "2", call EID-SLD Coordinator]

5 Facility Name: Caribou Refinery

6 County: San Juan

7 City: Kirtland

8 State N.M.

9 Sample Location:

10 Collected By: Bill Olson (First, Last) On: 90/04/12 Date: (YY/MM/DD) At: 1800 hrs. Time: 24 hr. clock 3:00 pm = 1500 hrs.

11 Codes: 2610 Submitter; WSS #; Organization

12 Latitude (DDMMSS); Longitude (DDDMMSS); 2 Digit ID (if needed)

13 Report To: Name Bill Olson

14 Phone #: 827-5885

Address: N.M. Oil Conservation Division
P.O. Box 2088

City, State Zip: Santa Fe N.M. 87504-2088

15 Sample Purpose:
- ☐ Compliance
- ☐ Check
- ☒ Monitoring
- ☐ Special

Sampling Information:
- ☒ Grab
- ☐ Composite ________ (Composite Time Period)
  - ☐ Flow Proportioned
  - ☐ Equal Aliquot
- ☐ Sample Split w/Permittee
- ☐ Chain of Custody

16 Field Data: pH: ______, Conductivity: ______ umhos @ ______ °C, Temperature: ______ °C, Chlorine Residual: ______ mg/l, Flow: ______

17 Sample Source:
- ☐ Stream
- ☐ Lake
- ☐ Drain
- ☐ Pool
- ☐ WWTP
- ☒ Well; Depth: ______
- ☐ Spring
- ☐ Distribution
- ☐ Point-of-Entry
- ☐ Other: ______

18 Field Notes/ Sample #: Walker Private Well

19 Sample Type: ☒ Water, ☐ Soil, ☐ Food, ☐ Wastewater, ☐ Other ______

This form accompanies a **single sample** consisting of:
2 - septum vial(s) (volume = 40 ml)
___ - glass jugs (volume = ______)
___ - ______ (volume = ______)

20 Preservation:
- ☐ NP No Preservation; Sample stored at room temperature
- ☒ P-Ice Sample stored in an ice bath (Not Frozen)
- ☐ P-TS Sample Preserved with Sodium Thiosulfate to remove chlorine residual
- ☐ P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)
- ☐ Other ______

21 Analyses Requested: Please check the appropriate box(es) below to indicate the type of analytical screen(s) required. Whenever possible, list specific compounds suspected or required.

Volatile Screens:
- ☐ - (753) Aliphatic Headspace (1-5 Carbons)
- ☒ - (754) Aromatic & Halogenated Purgeables (EPA 601 & 602)
- ☐ - (765) Mass Spectrometer Purgeables (EPA 624)
- ☐ - (766) SDWA Total Trihalomethanes (EPA 501.1)
- ☐ - (774) SDWA VOC's I [8 Regulated +] (EPA 502.2)
- ☐ - (775) SDWA VOC's II [EDB & DBCP] (EPA 504)

Other Specific Compounds or Classes:
- ☐ - ( ) ______
- ☐ - ( ) ______
- ☐ - ( ) ______

Semivolatile Screens:
- ☐ - (763) Acid Extractables
- ☐ - (751) Aliphatic Hydrocarbons
- ☐ - (755) Base/Neutral Extractables (EPA 625)
- ☐ - (756) Base/Neutral/Acid Extractables (EPA 8270)
- ☐ - (758) Herbicides, Chlorophenoxy Acid
- ☐ - (759) Herbicides, Triazines
- ☐ - (760) Organochlorine Pesticides
- ☐ - (761) Organophosphate Pesticides
- ☐ - (767) Polychlorinated Biphenyls (PCB's)
- ☐ - (764) Polynuclear Aromatic Hydrocarbons
- ☐ - (762) SDWA Pesticides & Herbicides

Remarks:

DEFINITIONS:

The term ***SDWA Pesticides & Herbicides*** shall mean that the following parameters will be determined: Endrin, Lindane, Methoxychlor, Toxaphene, 2, 4-D, and 2, 4, 5-TP (Silvex). Special container(s) required. Sample should be refrigerated.

The term ***SDWA VOC's I*** shall mean that the following parameters shall be determined: Aromatic and Halogenated purgeables to determine the presence of Benzene, Carbon tetrachloride, 1,1-Dichloroethylene, 1,2-Dichloroethane, para-Dichlorobenzene, Trichloroetylene, and Vinyl chloride plus 49 unregulated contaminants. Special container(s) required. Sample should be refrigerated.

The term ***SDWA VOC's II*** shall mean that the following parameters shall be determined: Ethylene dibromide (EDB) and 1,2-Dibromo-3-chloropropane (DBCP). Special container(s) required. Sample should be refrigerated.

The term ***SDWA Total Trihalomethanes*** that the following parameters shall be determined: Total Trihalomethanes. Special container(s) required. Sample should be refrigerated.

SAMPLE CONTAINERS:

All Volatile Screens require two 40 ml VOC Septum Vials.

All Semivolatile Screens (except 762) require two 1-liter bottles filled approximately 4/5ths full.

SDWA Pesticides & Herbicides Screen (762) requires three 1-liter bottles filled approximately 4/5ths full.

Refrigerated means keep cool (0-4°C), but do not freeze.

Please contact the Organic Section with questions on sampling or interpretation of data/results.

Use Only When Necessary

CHAIN OF CUSTODY

I certify that this sample was transferred from ______________________ to ______________________

at (location) ______________________________ on ____________ at ____________
Date Time

Evidentiary Seals: ☐-Not Sealed Seals Intact: ☐-Yes ☐-No

Signatures ______________________ ______________________

and from (if applicable) ______________________ to ______________________

at (location) ______________________________ on ____________ at ____________
Date Time

Evidentiary Seals: ☐-Not Sealed Seals Intact: ☐-Yes ☐-No

Signatures ______________________ ______________________

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud, NE
Albuquerque, NM 87106 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

April 27, 1990

Request
ID No. 000783

ANALYTICAL REPORT
SLD Accession No. OR-90-0549

Distribution
(■) Submitter
(※) SLD Files

To: Olson
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 April 16, 1990

DEMOGRAPHIC DATA

COLLECTION		*LOCATION*
On: 12-Apr-90	*By:* Ols . . .	Caribon Refinery/Walker Well
At: 18:00 hrs.	*In/Near:* Kirtland	

ANALYTICAL RESULTS: Aromatic & Halogenated Purgeable Screen

Parameter	Value	Note	MDL	Units
1,2-Dichloroethane	0.00	T	1.00	ppb
Aromatic Purgeables (6)	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☑; Intact: No☐, Yes☐ & Broken By: ______________ Date: ______

Laboratory Remarks:

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)
No Compounds Detected	

SURROGATE RECOVERIES:

SURROGATE	CONCENTRATION	% RECOVERY
Fluorobenzene	25 ppb	105.8
2-Bromo-1-chloropropane	15 ppb	91.4

SPIKE RECOVERY: The % recoveries for compounds in the batch

(Continued on page 2.)

spike were from 80% to 120% with the exception of the compounds listed below:

COMPOUND	CONCENTRATION	% RECOVERY
Vinyl chloride	50.0 ppb	54.4
Dichloroethene-1,1	50.0 ppb	79.8
Trichloroethane-1,1,1	50.0 ppb	77.4
Dichloroethane-1,2	50.0 ppb	123.6
Dichlorobenzene-1,4	50.0 ppb	126.4

Analyst: 4-20-90 **Reviewed By:** 4/27/90

Steve R. Davis
Analyst, Organic Chemistry

Analysis
Date

Richard F. Meyerhein 04/25/90
Supervisor, Organic Chemistry Section

754 Wpu

SCIENTIFIC LABORATORY DIVISION
ORGANIC ANALYSIS REQUEST FORM
Organic Section - Phone: 841-2570

OR89-1972 C

REPORT TO: William Olson, Attn: Ground Water Bureau S.L.D. No. OR-

N.M. Environmental Improvement Div DATE REC. 12-15-89

1190 Saint Francis Dr. PRIORITY 3

Santa Fe, N.M. 87503 PHONE(S): 827-2899

COLLECTION CITY: Kirtland ; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 8 9 | 1 2 | 1 3 | 1 4 3 0

LOCATION CODE: (Township-Range-Section-Tracts) | | | + | | + | + | | |(10N06E24342)

USER CODE: 5 5 4 3 0 SUBMITTER: Olson CODE: W 9 0

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER:

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____

Samples were preserved as follows:

JAN 23 1990

GROUND WATER BUREAU

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
- [ ] P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ]
- [ ]

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks:

FIELD DATA:

pH=____; Conductivity=____umho/cm at ____°C; Chlorine Residual=____mg/l

Dissolved Oxygen=____mg/l; Alkalinity=____mg/l; Flow Rate ____ ____/____

Depth to water ____ft.; Depth of well____ft.; Perforation Interval ____-____ft.; Casing:____

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Caribou Refinery, MW-11

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Will Olson Method of Shipment to the Lab: hand

CHAIN OF CUSTODY

I certify that this sample was transferred from ____ to ____

at (location) ____ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [ ] No [ ]

Signatures ____ ____

ANALYSES PERFORMED

LAB. No.: OR- ______________

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- ☐ (753) Aliphatic Headspace (1-5 Carbons)
- ☐ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes
- ☐ (774) SDWA VOC's I (8 Regulated +)
- ☐ (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- ☐ ______________
- ☐ ______________

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (755) Base/Neutral Extractables
- ☐ (758) Herbicides, Chlorophenoxy acid
- ☐ (759) Herbicides, Triazines
- ☐ (760) Organochlorine Pesticides
- ☐ (761) Organophosphate Pesticides
- ☐ (767) Polychlorinated Biphenyls (PCB's)
- ☐ (764) Polynuclear Aromatic Hydrocarbons
- ☐ (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
* DETECTION LIMIT * ✱		+ DETECTION LIMIT + †	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______________

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Not Sealed ☐ Intact: Yes ☐ No ☐. Seal(s) broken by: ______________ date: ______________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: ______________. Analyst's signature: ______________

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: ______________

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time 0940	Date 3/30/90

Originating Party	Other Parties
Bill Olson - OCD	William Walker - Kirtland Resident 598-5954

Subject

Caribou Refinery

Discussion

Called to request access to resample their private well downgradient from Caribou

Mr. Walkers son answered and said neither his father nor mother were home but he would leave a message to return call.

Conclusions or Agreements

Distribution file

Signed Bill Olson

TRANSMITTAL SHEET **Dames & Moore**

To: Oil Conservation Division
State Land Office Building
P.O. Box 2088
Old Santa Fe Trail
Santa Fe, New Mexico 87501

Date March 29, 1990

Your Order No.

Our Job No. 14819-005-031

Attention: Mr. Bill Olsen

Subject: Maverik Refinery and Tank Farm
Kirtland, New Mexico
Data and Remediation Plan Report

We are sending you via Federal Express

the following REPORT

"On-Site Ground, Surface Water and Sludge Laboratory Analytical Data and Modified Ground Water Remediation Plan For Maverik Tank Farm, Kirtland, New Mexico For Maverik Country Stores, Inc." dated March 1990

This is ~~These are~~ for your information and review

No. of copies submitted: 1

Copies to: Mr. Vince Memmott
Mr. William Call

Dames & Moore

By T. D. Vandell

Terry D. Vandell

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time 1500	Date 3/9/90

Originating Party	Other Parties
Bill Olson - OCD	Terry Vandell - Dames & Moore

Subject

Caribou Refinery

Discussion

Biodegradation time 4-6 yrs

Looking at water sparging in conjunction with a grout wall

Dames & Moore is meeting with William Call next week to discuss it

Conclusions or Agreements

Distribution file

Signed Bill Olson

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

February 21, 1990

Oil Conservation District
State Land Office Building
P.O. Box 2088
Old Santa Fe Trail
Santa Fe, New Mexico 87501

Attention: Mr. William Olson

Dear Bill:

Enclosed is a copy of "Status Report Remediation Work and Round 3 Long-Term Ground Water Quality Monitoring Data Results for Maverik Refinery And Tank Farm."

If you have any questions please do not hesitate to contact me.

Very truly yours,

DAMES & MOORE

Pete F Olsen

Peter F. Olsen
Associate

TD Vandell

Terry D. Vandell
Senior Hydrogeologist

PFO:fl

cc: William Call
Levi Todd
Mary Richardson
Vince Memmott
Dave Tomko

TRANSMITTAL SHEET

Dames & Moore

OIL CONSERVATION DIVISION
RECEIVED

'90 FEB 22 AM 9 19

To: Oil Conservation District
State Land Office Building
P.O. Box 2088
Old Santa Fe Trail
Santa Fe, NM 87501

Date February 21, 1990

Your Order No.

Our Job No. 14819-005-31 (5303)

Attention: [redacted]

Subject: Maverik Refinery and Tank Farm
Kirtland, New Mexico
Data report

We are sending you via U.S. Mail the following

STATUS REPORT
REMEDIATION WORK AND ROUND 3
LONG-TERM GROUND WATER QUALITY
MONITORING DATA RESULTS FOR
MAVERIK REFINERY AND TANK FARM,
KIRTLAND, NEW MEXICO FOR MAVERIK
COUNTRY STORES, INC. dated
February 1990

This is ~~These are~~ for your review and files

No. of copies submitted: 1

Copies to: Mr. Dave Tomko (1)
New Mexico Environmental Improvement Div.
District 1 Field Office
724 West Animas
Farmington, NM 87401

Mr. William Call, Maverik
Vince Memmott "

PFO, EO, SLC Files (2), LT
Mary Richardson, D&M Denver

Dames & Moore

By Terry Vandell
T. D. Vandell

114.6

New Mexico Health and Environment Department

GARREY CARRUTHERS
Governor

DENNIS BOYD
Secretary

MICHAEL J. BURKHART
Deputy Secretary

RICHARD MITZELFELT
Director

January 31, 1990

Terry D. Vandell
Dames and Moore
250 East Broadway, Suite 200
Salt Lake City, Utah 84111-2480

Dear Ms. Vandell

Enclosed you will find the New Mexico Environmental Improvement Division's laboratory results from the December 13, 1989 sampling of selected monitor wells at the Maverick Refinery and Tank Farm in Kirtland, N.M. Included are the results for monitor wells MW-6, MW-9, MW-10, MW-11 and MW-14. Low levels of 1,2 Dichloroethane (EDC) were observed in the samples taken from monitor wells MW-9, MW-10 and MW-14.

Also included are the results of the blind field blank designated as monitor well MW-FB1. The field blank was prepared by filling a sample vial from a field decontaminated bailer containing deionized water. Because the deionized water was obtained from a deionizer connected to a chlorinated Santa Fe city water supply, low levels of trihalomethanes, consistent with those found in Santa Fe city water, were observed in the field blank. If you have any questions regarding the analyses or if I can be of any assistance, please call me at (505)827-2899.

Sincerely,

Will Olson

William Olson
Hydrologist
Ground Water/Technical Support

Enclosures

xc: William Call, Maverick Country Stores, Inc.
Stuart Castle, Ground Water Bureau Chief
Bill Bartels, Technical Support Program Manager
Dave Tomko, EID Farmington Office

— ENVIRONMENTAL IMPROVEMENT DIVISION —
Harold Runnels Building
1190 St. Francis Dr.
Santa Fe, New Mexico 87503

1/30/90

Bill:

As you see, Billings cannot forward a copy of this (UST remediation) report to us.

Any chance the E.O can copy & bill us? or send a copy to us, we will copy & send back?

Thanks

Terry

RECEIVED

FEB 06 1990

GROUND WATER BUREAU

Dames & Moore

BILLINGS & ASSOCIATES, INC.
3816 Academy Pkwy. North-N.E.
Albuquerque, NM 87109
(505) 345-1116

January 26, 1990

Ms. Terry Van Dell
Dames & Moore
250 East Broadway
Salt Lake City, Utah
84111

Dear Ms. Van Dell,

This letter is in reference to our telephone conversation of yesterday. After discussions with our client, we are not able to release the information you requested. You may contact the EID and inquire if they will release the information. As we developed the system you are inquiring about, and several patents are pending on it, we will be pleased to work with you and develop similar technology for your client in New Mexico.

If you have any questions, or we can provide additional information, feel free to contact me.

Regards,

Rick M. Billings
Vice-President
Billings & Associates, Inc.

STATE OF NEW MEXICO ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

[X] Telephone [ ] Personal	Time 1000	Date 1/29/90

Originating Party	Other Parties
Bill Olson - EID/GWB	Terry Vandell - Dames & Moore (801) 521-9255

Subject

Caribou Refining

Discussion

EID has the lab. results from Dec. 13, 1989 sampling at monitor well

Conclusions or Agreements

I will send to William Call of Maverick with cc's to Terry Vandell

Distribution file.

Signed Bill Olson.

STATE OF NEW MEXICO
ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

[x] Telephone [ ] Personal	Time 1500	Date 1/18/90

Originating Party	Other Parties
Terry Vandell - Dames & Moore	Bill Olson - EID/GWB

Subject

Caribou Refinery

Discussion

Discussed injection of pumped waters at class III OCD UIC permitted well
Bioremediation studies complete
Bioremediation marginal because of tightness of soils
Back to original proposal
I suggested some type of aeration system for ground water remediation
I mentioned that they may need water withdrawal permit from SEO
Tanks all cleaned
All product to Mesa except for sludge
10 - 55 gallon drums of sludge to be characterized and disposed of with site sludges

Conclusions or Agreements

I will talk with UST about alternate

Distribution, file

Signed Bill Olson

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud, NE
Albuquerque, NM 87106 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

December 29, 1989

ANALYTICAL REPORT
SLD Accession No. OR-89-1970

Distribution
(■) Submitter
(※) SLD Files

To: Ground Water Bureau
Environmental Improvement Division
1190 St. Francis Dr.
Santa Fe, 87503

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

Re: **A purgeable water sample submitted to this laboratory on December 15, 1989**

DEMOGRAPHIC DATA

COLLECTION

On: 13-Dec-89 *By:* Ols . . .
At: 9:30 hrs. *In/Near:* Kirtland

LOCATION

ANALYTICAL RESULTS: Aromatic & Halogenated Purgeable Screen

Parameter	Value	Note	MDL	Units
1,2-Dichloroethane	1.70		0.50	ppb
Aromatic Purgeables (6)	0.00	N	0.50	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☒; Intact: No☐, Yes☐ & Broken By: ____________ Date: ________

Laboratory Remarks: Caribon Refinery MW-10
1,2-dichloroethane confirmed by GC/MS.

Analyst: ____________ 12-18-89 **Reviewed By:** ____________
Steve R. Davis — *Analyst, Organic Chemistry*
Analysis Date
Richard F. Meyerhein 12/28/89 — *Supervisor, Organic Chemistry Section*

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud, NE
Albuquerque, NM 87106 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

December 28, 1989

ANALYTICAL REPORT
SLD Accession No. OR-89-1972

Distribution
(■) Submitter
(※) SLD Files

To: Ground Water Bureau
Environmental Improvement Division
1190 St. Francis Dr.
Santa Fe, 87503

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

Re: **A purgeable water sample submitted to this laboratory on December 15, 1989**

DEMOGRAPHIC DATA

COLLECTION		*LOCATION*
On: 13-Dec-89	*By:* Ols . . .	
At: 14:30 hrs.	*In/Near:* Kirtland	

ANALYTICAL RESULTS: Aromatic & Halogenated Purgeable Screen

Parameter	Value	Note	MDL	Units
Halogenated Purgeables (33)	0.00	N	0.50	ppb
Aromatic Purgeables (6)	0.00	N	0.50	ppb

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: Caribon Refinery MW-11

Analyst: [signature] 12-18-89
Steve R. Davis — Analysis Date
Analyst, Organic Chemistry

Reviewed By: [signature]
Richard F. Meyerhein 12/28/89
Supervisor, Organic Chemistry Section

754
WPU

SCIENTIFIC LABORATORY DIVISION
ORGANIC ANALYSIS REQUEST FORM
Organic Section - Phone: 841-2570

REPORT TO: William Olson, Attn: Ground Water Bureau — S.L.D. No. OR- 0R89-1973-C
N.M. Environmental Improvement Div — DATE REC. 12-15-89
1190 Saint Francis Dr. — PRIORITY 3
Santa Fe, N.M. 87503 — PHONE(S): 827-2899

COLLECTION CITY: Kirtland; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 8 9 | 1 2 | 1 3 | 1 3 3 0

LOCATION CODE: (Township-Range-Section-Tracts) |__|__|__| + |__|__|__| + |__| + |__|__|__|(10N06E24342)

USER CODE: 5 5 4 3 0 SUBMITTER: Olson CODE: W C 0

SAMPLE TYPE: WATER [✓], SOIL [ ], FOOD [ ], OTHER:

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [✓] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
- [ ] P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)

JAN 23 1990
GROUND WATER BUREAU

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [✓] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ] ____
- [ ] ____

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks:

FIELD DATA:

pH=____; Conductivity=____ umho/cm at ____ °C; Chlorine Residual=____ mg/l

Dissolved Oxygen=____ mg/l; Alkalinity=____ mg/l; Flow Rate ____ ____/____

Depth to water ____ ft.; Depth of well ____ ft.; Perforation Interval ____-____ ft.; Casing:

Sampling Location, Methods and Remarks (i.e. odors, etc.)
Caribou Refinery - MW - FB2

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Will Olson Method of Shipment to the Lab: hand

CHAIN OF CUSTODY

I certify that this sample was transferred from ____ to ____

at (location) ____ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [ ] No [ ]

Signatures ____ ____

ANALYSES PERFORMED

LAB. No.: OR-

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- ☐ (753) Aliphatic Headspace (1-5 Carbons)
- ☐ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes
- ☐ (774) SDWA VOC's I (8 Regulated +)
- ☐ (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- ☐ ______
- ☐ ______

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (755) Base/Neutral Extractables
- ☐ (758) Herbicides, Chlorophenoxy acid
- ☐ (759) Herbicides, Triazines
- ☐ (760) Organochlorine Pesticides
- ☐ (761) Organophosphate Pesticides
- ☐ (767) Polychlorinated Biphenyls (PCB's)
- ☐ (764) Polynuclear Aromatic Hydrocarbons
- ☐ (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
* DETECTION LIMIT * *		+ DETECTION LIMIT + +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Not Sealed ☐ Intact: Yes ☐ No ☐. Seal(s) broken by: ______ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: ______. Analyst's signature: ______

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: ______

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud, NE
Albuquerque, NM 87106 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

December 28, 1989

ANALYTICAL REPORT
SLD Accession No. OR-89-1973

Distribution
(■) Submitter
(▩) SLD Files

To: Ground Water Bureau
Environmental Improvement Division
1190 St. Francis Dr.
Santa Fe, 87503

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

Re: **A purgeable water sample submitted to this laboratory on December 15, 1989**

DEMOGRAPHIC DATA

COLLECTION		*LOCATION*
On: 13-Dec-89	*By:* Ols . . .	0
At: 13:30 hrs.	*In/Near:* Kirtland	

ANALYTICAL RESULTS: Aromatic & Halogenated Purgeable Screen

Parameter	Value	Note	MDL	Units
Chloroform	0.80		0.50	ppb
Bromodichloromethane	1.30		0.50	ppb
Dibromochloromethane	4.20		0.50	ppb
Bromoform	3.70		0.50	ppb
Halogenated Purgeables (33)	0.00	N	0.50	ppb

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: Caribon Refinery MW-FB2

Analyst: ____________ 12-18-89 Reviewed By: R Meyerhein
Steve R. Davis — *Analyst, Organic Chemistry*
Analysis Date
Richard F. Meyerhein 12/28/89
Supervisor, Organic Chemistry Section

754
WPU

SCIENTIFIC LABORATORY DIVISION
ORGANIC ANALYSIS REQUEST FORM
Organic Section - Phone: 841-2570

DR89-1974-C

REPORT TO: William Olson, Attn: Ground Water Bureau S.L.D. No. OR-
N.M. Environmental Improvement Div DATE REC. 12-15-89
1190, Saint Francis Dr. PRIORITY 3
Santa Fe, N.M. 87503 PHONE(S): 827-2899

COLLECTION CITY: Kirtland ; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) |8|9|/|1|2|/|1|3|/|1|3|0|0|

LOCATION CODE: (Township-Range-Section-Tracts) |__|__|__|+|__|__|__|+|__|__|+|__|__|__|__|(10N06E24342)

USER CODE: |5|5|4|3|0| SUBMITTER: Olson CODE: |W|9|0|

SAMPLE TYPE: WATER |X|, SOIL |__|, FOOD |__|, OTHER: ______

This form accompanies 2 Septum Vials, ______ Glass Jugs, and/or ______ ______

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
- [ ] P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)

JAN 23 1990
GROUND WATER BUREAU

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: ______

FIELD DATA:

pH=______; Conductivity=______umho/cm at ______°C; Chlorine Residual=______mg/l

Dissolved Oxygen=______mg/l; Alkalinity=______mg/l; Flow Rate ______ ______/______

Depth to water ______ft.; Depth of well______ft.; Perforation Interval ______-______ft.; Casing:______

Sampling Location, Methods and Remarks (i.e. odors, etc.)
Caribou Refinery - MW-6

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): [signature] Method of Shipment to the Lab: hand

CHAIN OF CUSTODY

I certify that this sample was transferred from ______ to ______

at (location) ______ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [ ] No [ ]

Signatures ______ ______

ANALYSES PERFORMED

LAB. NO.: OR-

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- ☐ (753) Aliphatic Headspace (1-5 Carbons)
- ☐ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes
- ☐ (774) SDWA VOC's I (8 Regulated +)
- ☐ (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- ☐ ____________________
- ☐ ____________________

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (755) Base/Neutral Extractables
- ☐ (758) Herbicides, Chlorophenoxy acid
- ☐ (759) Herbicides, Triazines
- ☐ (760) Organochlorine Pesticides
- ☐ (761) Organophosphate Pesticides
- ☐ (767) Polychlorinated Biphenyls (PCB's)
- ☐ (764) Polynuclear Aromatic Hydrocarbons
- ☐ (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
* DETECTION LIMIT * *		+ DETECTION LIMIT + +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ____________________

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Not Sealed ☐ Intact: Yes ☐ No ☐. Seal(s) broken by: ____________________ date: __________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: __________. Analyst's signature: ____________________

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: ____________________

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud, NE
Albuquerque, NM 87106 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

December 29, 1989

ANALYTICAL REPORT
SLD Accession No. OR-89-1971

Distribution
(■) Submitter
(※) SLD Files

To: Ground Water Bureau
Environmental Improvement Division
1190 St. Francis Dr.
Santa Fe, 87503

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

Re: **A purgeable water sample submitted to this laboratory on December 15, 1989**

DEMOGRAPHIC DATA

COLLECTION		*LOCATION*
On: 13-Dec-89	*By:* Ols . . .	
At: 10:30 hrs.	*In/Near:* Kirtland	

ANALYTICAL RESULTS: Aromatic & Halogenated Purgeable Screen

Parameter	Value	Note	MDL	Units
1,2-Dichloroethane	2.60		0.50	ppb
Aromatic Purgeables (6)	0.00	N	0.50	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 ☒ Intact: No☐, Yes☐ & Broken By: ______ Date: ______

Laboratory Remarks: Caribon Refinery MW-14
1,2-dichloroethane not confirmed by GC/MS because second bottle was broken in transit.

Analyst: [signature] 12/18-89 **Reviewed By:** [signature]
Steve R. Davis — *Analyst, Organic Chemistry* | Analysis Date | Richard F. Meyerhein 12/28/89 — *Supervisor, Organic Chemistry Section*

754 WPU

SCIENTIFIC LABORATORY DIVISION
ORGANIC ANALYSIS REQUEST FORM
Organic Section - Phone: 841-2570

OR89-1970-C

REPORT TO: William Olson, Attn: Ground Water Bureau S.L.D. No. OR-
N.M. Environmental Improvement Div DATE REC. 12-15-89
1190 Saint Francis Dr. PRIORITY 3
Santa Fe, N.M. 87503 PHONE(S): 827-2899

COLLECTION CITY: Kirtland ; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 8 9 1 2 1 3 0 9 3 0

LOCATION CODE: (Township-Range-Section-Tracts) __ __ __ + __ __ + __ + __ __ (10N06E24342)

USER CODE: 5 5 4 3 0 SUBMITTER: Olson CODE: W C O

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER:

This form accompanies 2 Septum Vials, ___ Glass Jugs, and/or

Samples were preserved as follows:

JAN 23 1990
GROUND WATER BUREAU

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
- [ ] P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ]
- [ ]

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks:

FIELD DATA:

pH= ___; Conductivity= ___ umho/cm at ___ °C; Chlorine Residual= ___ mg/l

Dissolved Oxygen= ___ mg/l; Alkalinity= ___ mg/l; Flow Rate ___ ___/___

Depth to water ___ ft.; Depth of well ___ ft.; Perforation Interval ___-___ ft.; Casing:

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Caribou Refinery, MW-10

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Will Olson Method of Shipment to the Lab: hand

CHAIN OF CUSTODY

I certify that this sample was transferred from ___ to ___

at (location) ___ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [ ] No [ ]

Signatures

ANALYSES PERFORMED

LAB. NO.: OR-

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- ☐ (753) Aliphatic Headspace (1-5 Carbons)
- ☐ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes
- ☐ (774) SDWA VOC's I (8 Regulated +)
- ☐ (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- ☐ ______________________
- ☐ ______________________

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (755) Base/Neutral Extractables
- ☐ (758) Herbicides, Chlorophenoxy acid
- ☐ (759) Herbicides, Triazines
- ☐ (760) Organochlorine Pesticides
- ☐ (761) Organophosphate Pesticides
- ☐ (767) Polychlorinated Biphenyls (PCB's)
- ☐ (764) Polynuclear Aromatic Hydrocarbons
- ☐ (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
* DETECTION LIMIT * *		+ DETECTION LIMIT + †	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS:______________________

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Not Sealed ☐ Intact: Yes ☐ No ☐. Seal(s) broken by: ______________ date:__________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis:______________. Analyst's signature:______________________

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: ______________________

154 wpu

SCIENTIFIC LABORATORY DIVISION
ORGANIC ANALYSIS REQUEST FORM
Organic Section - Phone: 841-2570

0R89-0745-C

REPORT TO: William Olson
EID Ground Water Bureau
1190 St. Francis Dr.
Santa Fe, N.M. 87504-0968

S.L.D. No. OR-
DATE REC. 10-2-89
PRIORITY 2
PHONE(S): 827-2899

COLLECTION CITY: Kirtland; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 8 9 0 6 0 2 1 0 3 0

LOCATION CODE: (Township-Range-Section-Tracts) | | + | | + | + | | (10N06E24342)

USER CODE: 5 9 3 0 0 SUBMITTER: Olson CODE: W C O

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER:

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
- [ ] P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ]
- [ ]

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks:

FIELD DATA:

pH= 7; Conductivity= 1650 umho/cm at 17.5 °C; Chlorine Residual= ____ mg/l

Dissolved Oxygen= ____ mg/l; Alkalinity= ____ mg/l; Flow Rate ____ ____/____

Depth to water ____ ft.; Depth of well 38 ft.; Perforation Interval ____-____ ft.; Casing:

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Caribou Refinery - Roland Jackson Well

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Will Olson Method of Shipment to the Lab: hand

CHAIN OF CUSTODY

I certify that this sample was transferred from ____ to ____

at (location) ____ on ___/___/___ - ___:___ and that the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [ ] No [ ]

Signatures

ANALYSES PERFORMED

LAB. No.: OR-

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- ☐ (753) Aliphatic Headspace (1-5 Carbons)
- ☐ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes
- ☐ (774) SDWA VOC's I (8 Regulated +)
- ☐ (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- ☐ ______________________
- ☐ ______________________

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (755) Base/Neutral Extractables
- ☐ (758) Herbicides, Chlorophenoxy acid
- ☐ (759) Herbicides, Triazines
- ☐ (760) Organochlorine Pesticides
- ☐ (761) Organophosphate Pesticides
- ☐ (767) Polychlorinated Biphenyls (PCB's)
- ☐ (764) Polynuclear Aromatic Hydrocarbons
- ☐ (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
* DETECTION LIMIT *		+ DETECTION LIMIT +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______________________

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Not Sealed ☐ Intact: Yes ☐ No ☐. Seal(s) broken by: ______________ date: ________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: ____________. Analyst's signature: ______________________

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: ______________________

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud, NE
Albuquerque, NM 87106 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

December 28, 1989

ANALYTICAL REPORT
SLD Accession No. OR-89-1974

Distribution
(■) Submitter
(※) SLD Files

To: Ground Water Bureau
Environmental Improvement Division
1190 St. Francis Dr.
Santa Fe, 87503

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

Re: **A purgeable water sample submitted to this laboratory on December 15, 1989**

DEMOGRAPHIC DATA

COLLECTION		*LOCATION*
On: 13-Dec-89	*By:* Ols . . .	
At: 13:00 hrs.	*In/Near:* Kirtland	

ANALYTICAL RESULTS: Aromatic & Halogenated Purgeable Screen

Parameter	Value	Note	MDL	Units
Halogenated Purgeables (33)	0.00	N	0.50	ppb
Aromatic Purgeables (6)	0.00	N	0.50	ppb

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: Caribon Refinery MW-6

Analyst: [signature] 12-18-89
Steve R. Davis
Analyst, Organic Chemistry
Analysis Date

Reviewed By: R Meyerhein
Richard F. Meyerhein 12/28/89
Supervisor, Organic Chemistry Section

754
WPU

SCIENTIFIC LABORATORY DIVISION
ORGANIC ANALYSIS REQUEST FORM
Organic Section - Phone: 841-2570

0R89-1975-C

REPORT TO: William Olson, Attn: Ground Water Bureau
N.M. Environmental Improvement Div
1190 Saint Francis Dr.
Santa Fe, N.M. 87503

S.L.D. No. OR-
DATE REC. 12-15-89
PRIORITY 3
PHONE(S): 827-2899

COLLECTION CITY: Kirtland ; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 8 9 / 1 2 / 1 3 / / 1 0 0

LOCATION CODE: (Township-Range-Section-Tracts) | | | + | | + | + | | |(10N06E24342)

USER CODE: 5 5 4 3 0 SUBMITTER: Olson CODE: W S 9

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER:

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____

Samples were preserved as follows:

JAN 23 1990
GROUND WATER BUREAU

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
- [ ] P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ] ____
- [ ] ____

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks:

FIELD DATA:

pH=____; Conductivity=____umho/cm at ____°C; Chlorine Residual=____mg/l

Dissolved Oxygen=____mg/l; Alkalinity=____mg/l; Flow Rate ____ ____/____

Depth to water ____ft.; Depth of well ____ft.; Perforation Interval ____-____ft.; Casing:

Sampling Location, Methods and Remarks (i.e. odors, etc.)
Caribou Refinery, MW-9

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): [signature] Method of Shipment to the Lab: Hand

CHAIN OF CUSTODY

I certify that this sample was transferred from ____ to ____

at (location) ____ on __/__/__ - __:__ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [ ] No [ ]

Signatures ____ ____

ANALYSES PERFORMED

LAB. NO.: OR-

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- ☐ (753) Aliphatic Headspace (1-5 Carbons)
- ☐ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes
- ☐ (774) SDWA VOC's I (8 Regulated +)
- ☐ (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- ☐ ______________________
- ☐ ______________________

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (755) Base/Neutral Extractables
- ☐ (758) Herbicides, Chlorophenoxy acid
- ☐ (759) Herbicides, Triazines
- ☐ (760) Organochlorine Pesticides
- ☐ (761) Organophosphate Pesticides
- ☐ (767) Polychlorinated Biphenyls (PCB's)
- ☐ (764) Polynuclear Aromatic Hydrocarbons
- ☐ (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
* DETECTION LIMIT * *		+ DETECTION LIMIT + +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT
T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)
[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______________________

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Not Sealed ☐ Intact: Yes ☐ No ☐. Seal(s) broken by: ______________ date: ________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: ____________. Analyst's signature: ______________

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: ______________

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud, NE
Albuquerque, NM 87106 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

December 28, 1989

ANALYTICAL REPORT
SLD Accession No. OR-89-1975

Distribution
(■) Submitter
(※) SLD Files

To: Ground Water Bureau
Environmental Improvement Division
1190 St. Francis Dr.
Santa Fe, 87503

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

Re: **A purgeable water sample submitted to this laboratory on December 15, 1989**

DEMOGRAPHIC DATA

COLLECTION		*LOCATION*
On: 13-Dec-89	*By:* Ols . . .	
At: 11:00 hrs.	*In/Near:* Kirtland	

ANALYTICAL RESULTS: Aromatic & Halogenated Purgeable Screen

Parameter	Value	Note	MDL	Units
1,2-Dichloroethane	1.20		0.50	ppb
Aromatic Purgeables (6)	0.00	N	0.50	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☐; Intact: No☐, Yes☐ & Broken By: ______ Date: ______

Laboratory Remarks: Caribon Refinery MW-9
Confirmed by GC/MS.

Analyst: [signature] 12-18-89 **Reviewed By:** R Meyerhein

Steve R. Davis, *Analyst, Organic Chemistry* — Analysis Date

Richard F. Meyerhein 12/28/89, *Supervisor, Organic Chemistry Section*

154 WPU
ONE BOTTLE ONLY

SCIENTIFIC LABORATORY DIVISION
ORGANIC ANALYSIS REQUEST FORM
Organic Section - Phone: 841-2570

REPORT TO: William Olson, Attn: Ground Water Bureau
N.M. Environmental Improvement Div
1190, Saint Francis Dr.
Santa Fe, N.M. 87503

S.L.D. No. OR- OR89-1971-B
DATE REC. 12-15-89
PRIORITY 3
PHONE(S): 827-2899

COLLECTION CITY: Kirtland ; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 8|9|1|2|1|3|1|0|3|0

LOCATION CODE: (Township-Range-Section-Tracts) |__|__|__| + |__|__|__| + |__| + |__|__|__|(10N06E24342)

USER CODE: |5|5|4|3|0| SUBMITTER: Olson CODE: |W|C|0|

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER: ______

This form accompanies 12 Septum Vials, ______ Glass Jugs, and/or ______ One broken in transit

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
- [ ] P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)

JAN 23 1990
GROUND WATER BUREAU

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: * BROKEN IN TRANSIT

FIELD DATA:

pH=______; Conductivity=______umho/cm at ______°C; Chlorine Residual=______mg/l

Dissolved Oxygen=______mg/l; Alkalinity=______mg/l; Flow Rate______ ____/____

Depth to water ______ft.; Depth of well______ft.; Perforation Interval ____-____ft.; Casing:______

Sampling Location, Methods and Remarks (i.e. odors, etc.)
Caribou Refinery MW-14

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Will Olson Method of Shipment to the Lab: hand

CHAIN OF CUSTODY

I certify that this sample was transferred from ______ to ______

at (location) ______ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [ ] No [ ]

Signatures ______ ______

ANALYSES PERFORMED

LAB. No.: OR-

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- ☐ (753) Aliphatic Headspace (1-5 Carbons)
- ☐ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes
- ☐ (774) SDWA VOC's I (8 Regulated +)
- ☐ (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- ☐ ______
- ☐ ______

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (755) Base/Neutral Extractables
- ☐ (758) Herbicides, Chlorophenoxy acid
- ☐ (759) Herbicides, Triazines
- ☐ (760) Organochlorine Pesticides
- ☐ (761) Organophosphate Pesticides
- ☐ (767) Polychlorinated Biphenyls (PCB's)
- ☐ (764) Polynuclear Aromatic Hydrocarbons
- ☐ (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
* DETECTION LIMIT * *		+ DETECTION LIMIT + +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT
T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)
[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Not Sealed ☐ Intact: Yes ☐ No ☐. Seal(s) broken by: ______ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: ______. Analyst's signature: ______

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: ______

2 45 PM 12-12-89

Bill:

~~Sorry~~ to miss you. I phoned your office re. staffmeeting. Since we finished well grouting W3 and water quality sampling, I'm flying out this PM ~ 4 20.

So that your trip is not lost, I have left a set of keys to the wells at the EID field office. Please mail them back to me when you're finished.

* I have just sampled MW9, MW10, MW13, MW14, MW15 as per the 3/yr. sampling.

If you have time & $$ would you sample the Walker's well. They would be interested in such.

* The high WL's in the wells and ditch reflect the fact that the Farmer's Mutual Ditch flowed longer than usual this year due to lack of ppt. The seepage to the ground from the ditch is particularly evident NOW.

Call me ~~tommorrow~~ re. sampling etc.

Best Regards,
Terry

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
250 EAST BROADWAY, SUITE 200, SALT LAKE CITY, UTAH 84111-2480 (801) 521-9255

TO: Bill Olsen

FROM: Terry Vandell

DATE: 12-4-89 CHARGE:

NUMBER OF PAGES (INCLUDING COVER SHEET)

TELECOPIER PHONE NUMBER: (801) 521-0380 - AUTOMATIC XEROX 7021

CONFIRMATION PHONE NUMBER: (801) 521-9255

PLEASE LET US KNOW IF THE TELECOPY IS UNSATISFACTORY. THANKS.

87 JAN 26 P4:44

STATE ENGINEER OFFICE
STATE OF NEW MEXICO
Bataan Memorial Building
Santa Fe, New Mexico 87503

Order No. 139 January 26, 1987

87 JAN 29 P 1:36
ALBUQUERQUE, N. MEX.

IN THE MATTER OF THE PROMULGATION
OF ARTICLE 1-17 OF THE RULES
AND REGULATIONS OF THE STATE
ENGINEER GOVERNING DRILLING
OF WELLS AND APPROPRIATION
AND USE OF GROUND WATER IN NEW MEXICO

RECOMMENDED FINDINGS AND ORDER

This matter came on for hearing upon State Engineer Proposed Order No. 139 pursuant to N.M. Stat. Ann. Section 72-2-8, (1978). By Order dated December 15, 1986, M.B. Compton, Chief, Water Rights Division, was appointed Hearing Examiner. Opportunity was given for anyone who may be affected by the proposed order to appear and testify. The Hearing Examiner, having considered the testimony presented at the hearing and the memoranda and responses timely filed, and being otherwise fully advised in the premises, makes the following Findings:

1. N.M. Stat. Ann. Section 72-2-1 (1978) provides that the state engineer has general supervision of the waters of the state and of the measurement, appropriation, distribution thereof and such other duties as required.

2. N.M. Stat. Ann. Section 72-8-4 (1978) provides that the unauthorized use of water to which another person is entitled, or the willful waste of surface or underground water to the detriment of another or the public is a misdemeanor.

3. The protection of the public health and welfare may require expedited installation and operation of groundwater pollution plume control and monitoring systems and the withdrawal and discharge of public ground water with possible consequent detriment to or impairment of existing surface and groundwater rights.

4. Proposed Order No. 139 to promulgate Article 1-17 of the State Engineer's Rules and Regulations Governing Drillings of Wells and Appropriation and Use of Ground Water in New Mexico was duly and lawfully issued on October 14, 1986.

87 JAN 23 P4:44

5. Notice of Proposed Order No. 139 was duly published as required by law.

6. The hearing on Proposed Order No. 139 was held pursuant to the published notice as required by law.

7. Article 1-17 as hereinafter recommended would prevent waste and detriment to or impairment of existing water rights to the extent practicable while allowing groundwater pollution abatement necessary for the protection of the public health and welfare.

NOW THEREFORE IT IS RECOMMENDED that Article 1-17 of the State Engineer's Rules and Regulations Governing Drilling of Wells and Appropriation and Use of Ground Water in New Mexico (1966) be adopted as follows:

Article 1-17 APPLICATIONS FOR POLLUTION PLUME CONTROL WELLS AND POLLUTION RECOVERY WELLS

1-17.1. FORM OF APPLICATION. Any person intending to drill or use existing wells for control or recovery of pollution from aquifers within the State of New Mexico shall file an application to do so, in triplicate, on a form provided by the state engineer and accompanied by the appropriate filing fee as required for an application to appropriate ground water (Article 6). The application shall be complete and adequate to determine the need for the pollution control or recovery operation; the underground water source; the location of points of withdrawal and discharge; the maximum annual quantity of water intended to be withdrawn from such source; the amount, method and place of discharge of the water withdrawn from such wells and the estimated maximum period of time for completion of the pollution control or recovery operations.

1-17.2. EXEMPTION FROM OR MODIFICATION OF THE REQUIREMENT FOR PUBLICATION OF NOTICE OR FILING OF APPLICATION. The requirement for publication of notice of application required by other articles of these rules and regulations may be waived or modified if the state engineer determines that the effects which may result from the proposed pollution control or recovery operation would not permanently impair existing water rights or that an emergency exists and the delay caused by publication and hearing would not be in the public interest. Publication of notice of the application will be required after the application is approved, if not required before approval. Monitoring wells used exclusively for water level measuring and water sampling shall be exempt from the requirement for filing an application under this article but shall meet the requirements for construction, cementing, casing, testing and plugging where artesian water is encountered (Article 4-15 through 4-20).

1-17.3. CONSIDERATIONS BY THE STATE ENGINEER BEFORE APPROVAL OR DENIAL. Consideration by the state engineer of an application filed pursuant to Article 1-17 shall include but not be limited to the following:

1. Methods for measurement of the amount of water withdrawn, the amount of water discharged and determination of the amount of water depleted from the aquifer and any related stream system.

87 JAN 26 P4:44

2. The granting of any permit under this article shall not establish a water right or relieve the permittee of any liability for detriment to or impairment of existing water rights.

3. Construction of pollution control, pollution recovery and monitoring wells shall be in a manner that will preclude the commingling of water between an artesian aquifer and water in overlying formations (Article 4-15).

4. Upon completion of the pollution control, recovery or monitoring operation all wells shall be plugged (Article 4) or otherwise maintained so that no water may be diverted from said wells unless a permit authorizing the use of the well is approved by the state engineer in accordance with the other articles of these rules and regulations.

5. The state engineer will retain jurisdiction over permits issued pursuant to this article in order to prevent waste and detriment to or impairment of existing water rights to the extent practicable.

1-17.4. APPLICABILITY OF OTHER RULES AND REGULATIONS. The other articles of these rules and regulations shall also apply if water withdrawn from wells described in this article within a declared underground water basin (Article 7) is to be applied to beneficial use or as otherwise relevant to the application submitted.

87 JAN 29 P 1:33

ALBUQUERQUE, N. M.

Respectfully submitted,

M. B. Compton
Hearing Examiner

I ACCEPT AND ADOPT the Recommended Findings and Order of the Hearing Examiner.

WITNESS my hand and official seal this 26th day of January, 1987.

S. E. Reynolds
State Engineer

eviewed and Approved:

ierry Tippett
ancy Attorney

ite Engineer of the State of New Mexico
er No. 139

January 26, 1987

STATE OF NEW MEXICO
ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time 10:00 am	Date 11/29/89

Originating Party	Other Parties
Stan Kuchera - Rocky Mtn Construction	Bill Olson - EID/GWB

Subject

Caribou Refinery

Discussion

Rocky Mtn Constr. is doing tank cleaning at Caribou under contract with Dames & Moore.
They will be using hot oiler tank to ~~clean~~ steam clean tanks. All fluids will be contained in tank trucks which will then be transferred to the large hydrostatic tested tank. They will coordinate transportation of product to Mesa. Daily logs (diary) will be kept of all work including manifests of product transportation.
He wants to know if there is anything else that EID needs to know or wants them to do.

Conclusions or Agreements

I stated that Dames & Moore had already cleared disposition of product to Mesa with EID.
Dames and Moore will be given all information on work performed.
If any problems arise Rocky Mtn will inform EID

Distribution

file

Signed Bill Olson

STATE OF NEW MEXICO ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time 2:30 pm	Date 11/20/89

Originating Party	Other Parties
Terry Vandell - Dames & Moore	Bill Olson - EID/GWB

Subject

Caribou Refinery

Discussion

Dames & Moore is finishing the DP application and expects to submit to EID in approx. 2 weeks

Dames & Moore plans to ~~ingrout~~ pressure the well designated W-3 because of concerns that it may be a conduit for contamination. This well existed on site when D&M started work and there is no information (ie well logs cementing logs) on the well

Dames & Moore plans to be on site for sampling in mid Dec.

Conclusions or Agreements

Dames & Moore will contact me prior to sampling so EID can split samples

Distribution

file
John Parker

Signed Bill Olson

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
250 EAST BROADWAY, SUITE 200, SALT LAKE CITY, UTAH 84111-2480 (801) 521-9255

November 15, 1989

New Mexico Environmental
Improvement Division
Harold Runnels Building
1190 St. Francis Drive
Santa Fe, New Mexico 87503

Attention: Mr. William Olson

Dear Bill:

Enclosed is a copy of "Status Report Remediation Work and Round 2 Long-Term Ground Water Quality Monitoring Data Results for Maverik Refinery And Tank Farm."

This report has been delayed as a result of the pending bioremediation laboratory analytical data received from ENSR Consulting & Engineering. Unfortunately, ENSR's report was not received until October 16, 1989 and we have not yet completed our evaluation of the analytical results. Consequently, the bioremediation report will be included in a separate report to be submitted to you shortly, by the end of November 1989.

If you have any questions please do not hesitate to contact me.

Very truly yours,

DAMES & MOORE

Peter F. Olsen
Associate

Terry D. Vandell
Senior Hydrogeologist

PFO:fl

cc: William Call
Tim Holbrook
Vince Memmott
Dave Tomko

TRANSMITTAL SHEET

Dames & Moore

NOV 16 1989
ROUND

To: New Mexico Ground Water Bureau
Environmental Improvement Division
1190 St. Francis Drive
Harold Runnels Building
Santa Fe, New Mexico 87503

Date November 15, 1989

Your Order No.

Our Job No. 14819-005-31 (5303)

Attention: Mr. Bill Olsen (Fed Express)

Subject: Maverik Refinery and Tank Farm
Kirtland, New Mexico
Data report

We are sending you via U.S. Mail

the following
STATUS REPORT
REMEDIATION WORK AND OFF-SITE AND
ROUND 2 LONG-TERM GROUND WATER
QUALITY MONITORING DATA RESULTS
FOR MAVERIK REFINERY AND TANK FARM,
KIRTLAND, NEW MEXICO
FOR MAVERIK COUNTRY STORES, INC.
dated November 1989

This is ~~These are~~ for your review and files

No. of copies submitted: 1

Copies to: Mr. Dave Tomko (1)
New Mexico Environmental Improvement Div.
District 1 Field Office
724 West Animas
Farmington, NM 87401

William Call, Maverik
Vince Memmott, "
Pete Olsen, D&M
Tim Holbrook, D&M DEN

Dames & Moore

By T.D.Vandell
T. D. Vandell

New Mexico Health and Environment Department

Dennis Boyd
Secretary

MICHAEL J. BURKHART
Deputy Secretary

RICHARD MITZELFELT
Director

October 24, 1989

William Call
Maverick Country Stores, Inc.
P.O. Box 457
Afton, WY 83110

Dear Mr. Call

The New Mexico Environmental Improvement Division (EID) has completed review of the following three documents regarding the Caribou Refinery in Kirtland, New Mexico which were submitted to EID by Maverick's consultant Dames and Moore:

- The July 1989 STATUS REPORT ON REMEDIATION WORK, AQUIFER PUMP TEST AND ROUND 1 LONG TERM GROUND WATER QUALITY MONITORING DATA RESULTS FOR MAVERICK REFINERY AND TANK FARM, KIRTLAND, NEW MEXICO FOR MAVERICK COUNTRY STORES, INC.

- The August 8, 1989 AMENDED (AUGUST 1989) GROUND WATER REMEDIATION PLAN FOR MAVERICK COUNTRY STORES, INC., KIRTLAND, NEW MEXICO, REFINERY TANK FARM.

- The September 7, 1989 PRELIMINARY INFORMATION ON THE BIODEGRADATION FEASIBILITY STUDY FOR THE KIRTLAND, NEW MEXICO, REFINERY TANK FARM.

EID approves of the following amendments to the September 14, 1988 Ground Water Remediation Plan for the Maverick Country Stores, Inc. Kirtland, New Mexico Refinery Tank Farm:

1) Continued use of and possible additional excavation of the existing north-south interceptor trench for more effective hydraulic control and continued free product capture along the southwestern boundary of the tank farm (component 3).

2) Relocation of the east-west interceptor trench to the north about 25 feet closer to the contaminant source area, while intercepting the existing north-south interceptor trench (component 5).

3) The location of large (2-3 feet in diameter) recharge wells to the north of the interceptor trenches for reinjection of treated ground waters. EID defers approval of the downgradient reinjection wells until there is a demonstrated need for them.

4) The concept of bioremediation rather than soil vapor recovery including bacterial enhancement in both the saturated and unsaturated zones through oxygen and nutrient injection, and aeration, respectively (Component 10). EID understands that bioremediation laboratory bench tests using soils from the refinery are currently being carried out. EID defers approval of the bioremediation process pending a review of these laboratory bench tests.

Although EID approves of the location of the recharge wells and the concept of bioremediation, no reinjection of treated waters can occur prior to the permitting of this system through the EID's Ground Water Section's Discharge Plan process. The purpose of the discharge plan is to provide EID with specific information about the operation of the system and contingency measures to ensure that the activity will not cause the New Mexico Water Quality Control Commission Regulations to be violated. Enclosed you will find a Notice of Intent to discharge, Guidelines for Preparing Ground Water Discharge Plans and a Discharge Plan Application. EID recommends that you complete these documents as soon as possible in order to expedite the review process. If there is a need to implement the remediation system due to the health concerns of nearby ground water users, EID would consider the issuance of a temporary discharge permit.

EID thanks you for your patience and cooperation in this matter. If you have any questions regarding the discharge plan process or require any assistance with the discharge plan application, please call John Parker of the Ground Water Section at (505)827-0027. If you have any other questions regarding remediation, please call William Olson of my staff at (505)827-2899.

Sincerely,

for Richard Mitzelfelt
Director EID

RM/WO

Enclosures

xc: Jon Thompson, EID Deputy Director for Water Programs
Stuart Castle, Ground Water Bureau Chief
Bill Bartels, Technical Support Section Program Manager
Ernest Rebuck, Ground Water Section Program Manager
Dave Tomko, EID Farmington Field Office
William Olson, Technical Support Section
John Parker, Ground Water Section
Terry Vandell, Dames and Moore

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time 11:10 am	Date 10/19/89

Originating Party	Other Parties
Bill Olson - EID/GWB	Terry Vandell - Dames & Moore

Subject

Caribou Refinery

Discussion

Haz-waste said Mesa is ok for disposal of waste oil to be incinerated. Petro fluids can therefore be taken to Mesa

Bill Call president of Maverick will soon recieve EID letter about pump & treat and Bioremediation

Conclusions or Agreements

Distribution

file

Signed Bill Olson

STATE OF NEW MEXICO
HEALTH AND ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time	Date 10/17/89

Originating Party	Other Parties
Terry Vandell – Dames & Moore	Bill Olson – EID/GWB

Subject

Caribou Refinery

Discussion

D & M is cleaning out the old storage tanks and has contacted Mesa Oil to take petroleum products from tank. They want to know if it's ok with EID

Conclusions or Agreements

I will call back after checking with Haz-waste

Distribution

File

Signed Bill Olson

STATE OF NEW MEXICO
ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 8:30 am	Date 10/3/89

Originating Party	Other Parties
Tory Vandell - Dames & Moore	Bill Olson - GW/B/TSS

Subject

Caribou Refining Remediation Plan

Discussion

D&M requested timetable for EID review of documents and stated that EID will soon receive the latest water quality results including bioremediation bench tests

Conclusions or Agreements

EID will send a response to Bill Call, President of Maverick agreeing with the concepts of pump & treat with bioremediation but will defer approval until results of bench tests are available

Distribution file.

Signed Bill Olson

HEALTH STATE OF NEW MEXICO ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 15:10	Date 9/26/89

Originating Party	Other Parties
Stan Kuchera 325-8979	D. McQ.
Rocky Mtn. Construction Co.	

Subject Clean up at Caribou

Discussion They are going to remove liquids & solids from tanks & take to disposal facility permitted by OCD.
They will remove soil to Parabo in SE NM also OCD permitted.

Conclusions or Agreements

I said it was fine & to let us know in writing after clean up.
They must get permission from disposal facilities as well.

Distribution

Signed Dennis McQuillan

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
250 EAST BROADWAY, SUITE 200, SALT LAKE CITY, UTAH 84111-2480 (801) 521-9255

TO: Bill Olsen

FROM: Terry Vandell

DATE: 9-7-89 CHARGE: 14819-005-5303

NUMBER OF PAGES (INCLUDING COVER SHEET) 6

TELECOPIER PHONE NUMBER: (801) 521-0380 - AUTOMATIC XEROX 7021

CONFIRMATION PHONE NUMBER: (801) 521-9255

PLEASE LET US KNOW IF THE TELECOPY IS UNSATISFACTORY. THANKS.

As per your request, some preliminary information on the biodegradation/feasibility study for Kirtland-Maverik Tank Farm.

*Results will be included in the next data report for the Round 2 Water Quality Monitoring.

cc: PFO
Tim Holbrook

Terry

Bioremediation feasibility studies for haz waste

Reprinted with permission from Pollution Engineering July 1988

Dr. Richard E. Woodward

Senior Project Scientist/Microbiologist
ENSR Consulting and Engineering
(formerly ERT)

Bioremediation is a process that uses naturally occurring microorganisms to decompose toxic substances. This process has proven an effective remedy for hazardous waste site cleanup in certain situations.

Bioremediation works because many organic compounds found in hazardous waste mixtures can be used as feed by microorganisms. This natural process, called *biodegradation*, breaks down organic waste to the basic chemical elements. For example, polychlorinated phenols (PCP) can be broken down into the following chemical elements: carbon, oxygen, hydrogen, chlorine. Without biodegradation, we would be permanently buried in an avalanche of leaves and stems as the carbon fixed by plants became forever locked in plant tissues.

our Approach using ENSR for this feasibility testing

To accurately assess the feasibility of biodegradation for remediation of hazardous waste mixtures, a series of experiments and analyses are conducted. This series involves four tasks: *characterization, primary degradation screen, scaled-up treatment program, and data interpretation.*

Task 1. Characterization

Physical, chemical and biological characterization of the target waste provides strong guidance for the design of subsequent experiments and a bioremediation program. The physical characterization determines the percent total solids, percent volatile solids and other physical parameters such as viscosity and surface tension, where appropriate.

Chemical characterization is used to identify potential inhibitors or toxicants and provide direction for monitoring the progress of biodegradation. Changes in the concentration of specific compounds such as benzene, toluene, xylene (BTX), trichloroethylene or 1,2-dichloroethylene are monitored when only a few, well defined contaminants are of concern. General categories like hydrocarbon oil and grease (HO&G), total organic halogens (TOX), total organic carbon (TOC) or chemical oxygen demand (COD) are useful and inexpensive parameters for monitoring the progress of biodegradation in the primary screen and in the actual field implementation.

Biological characterization measures the initial microbial consortium and its relative metabolic activity. The population of microorganisms can be determined directly by counting them [illegible] preparation under the microscope or estimated by counting colony forming units (CFU) growing on various nutrient media. Metabolic activity is determined by enzyme activity, e.g., (catalase, oxygenase), ATP content, oxygen uptake rate or carbon dioxide production. In addition to biological activity, the overall toxicity of the waste is evaluated by a bioassay. The assay assists in determining an initial loading capacity for subsequent experiments. It is also useful in monitoring changes in toxicity during biodegradation.

Oxygen consumption rates and the relative toxicity of hazardous waste sludges are evaluated in a laboratory respirometer.

Task 2. Primary Degradation Screen

Based on evaluation of the data in Task 1, a series of experiments are designed and executed to optimize microbial activity. These studies are conducted in a liquid medium (1-2 liters) on a rotary shaker with a waste concentration, or load, low enough to permit biodegradation. Many variables, including nutrient ratios and concentration, dispersants, emulsifiers, pH, and composition are evaluated. The progress of biodegradation is regularly monitored by changes in the general chemical characteristics (TOX, HO&G, COD) and in the overall toxicity. Treatments that exhibit outstanding degradation activity may also be analyzed for specific compounds associated with the site decontamination objectives.

If the variables evaluated fail to stimulate biodegradation or to accelerate biodegradation compared to the untreated control, the feasibility study is terminated or an alternate remediation approach selected. Often, additional variables are considered in a second primary screen experiment. A second study is frequently seeded with indigenous organisms previously exposed to a gradient of the waste mixture on site. Typical seed collection areas include the berm of a lagoon or the edge of a contaminated groundwater plume.

the feasibility study proceeds to Task 3. [redacted]

[redacted]

Results of the primary degradation screen are used to design a scaled-up evaluation (typically 10-15 liters) of an optimum treatment and corresponding untreated control. The scaled-up evaluation uses the medium (solid or liquid) best suited for the actual field remediation. [redacted] For sludges from lagoons containing water, the scale-up is conducted in a liquid medium with aeration-mediated mixing.

The larger volume of the scaled-up treatment allows for frequent sampling and analysis. [redacted]

Based on the results of the scaled-up study, specific control parameters and monitoring parameters are recommended for field operation. [redacted] count and toxicity analysis.

Task 4. Data Interpretation

Data developed or suggested by the primary degradation screen and confirmed in the scaled-up treatment are useful in the design phase and subsequent bioremediation program.

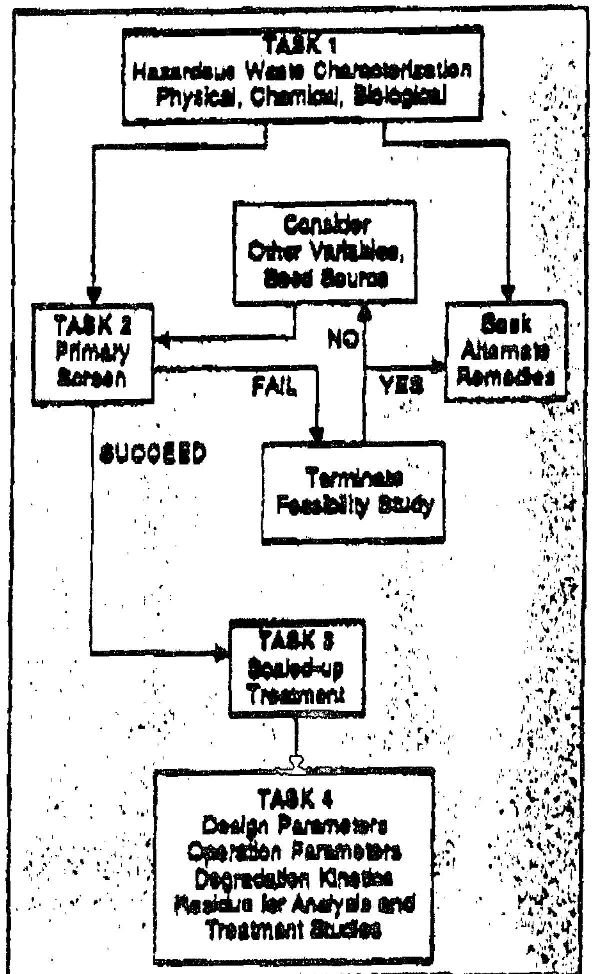
[redacted] The time required to reach a specific decontamination objective can then be estimated from changes in the specific concentration of each waste chemical. Therefore, scientists can predict how long it will take to remediate a site using biodegradation.

[redacted] In the field, degradation rates are influenced by many factors including temperature, completeness of mixing and aeration, and changes in pH.

Analytical costs are minimized by [redacted]

The unique nature of many waste mixtures and site locations justifies the use of a biodegradation feasibility study early in the remedial investigation phase. The flow diagram charting the progress of a typical biodegradation feasibility study shows that even if the primary screen is unsuccessful, the characterization data provides guidance for other remedies. Successful completion of the primary screen (task 2) leads directly to the development of design and operation parameters and to an estimate of the degradation time required in the field.

The scaled-up treatment also provides enough residue for final analysis of specific waste chemicals (e.g., priority pollutant analysis), TCLP analysis and some rudimentary fixation studies if necessary. **PE**



[redacted]

About the Author:

Dr. Richard E. Woodward is a Senior Project Scientist/Microbiologist with ENSR Consulting and Engineering (formerly ERT), based in Houston, Texas. He has more than 14 years experience specializing in biodegradation feasibility and implementation investigations for Superfund and other hazardous waste sites, and field demonstrations of remediation technologies.

FOR MAVER
KIRTLAND PROJECT
9/89

1.0 BIODEGRADATION STUDIES

Biodegradation studies will consist of two phases: a loading rate study to define treatment concentration and a primary screen to determine degradability and to define optimum nutrient requirements.

ONGOING — To be Completed by mid-Sept.

1.1 Loading Rate Study

The loading rate study will estimate a rate at which sludge or contaminated soils can be loaded into a water matrix for nutrient studies without excessive toxicity to the indigenous microorganisms. The Microtox™ bioassay system is used to assess the toxicity of a series of sample dilutions. An estimate of the loading rate for the primary screen will be made from these data.

While the data accurately reflect relative toxicity, they must be interpreted to balance the short time of the primary screen, the amount of material needed for accurate analytical sampling, and the need to demonstrate significant changes in toxicity for kinetic interpretations. The loading rate is adjusted so that the primary screen runs to completion within 14 days. This provides good separation of treatment variables on the basis of biological activity (by oxygen uptake rate), toxicity (by Microtox™) and chemical constituent (e.g. TPH). Higher loading rates are typically employed in the actual, optimized field remediation.

To be Completed by End of Sept.

1.2 Primary Screen

The screening study will consist of seven (7) flask reactors; two (2) controls, and five (5) amended reactors. The sludge loading will be determined based on the loading rate study and will be the same in all seven reactors. All reactors will be monitored and adjusted as needed for the control parameters, pH and dissolved oxygen. The pH will be adjusted to 7.0 initially.

The two control reactors will consist of an unamended sludge or soil loading and an abiotic, azide poisoned loading. The purpose of the live control treatment is to observe the progress of biodegradation additional nutrients. The poisoned control will account for non-biological changes in the incubation mixture. The five treatment reactors will be amended with three different nitrogen to phosphorus (N:P) nutrient ratio combinations and by two higher concentrations of one of the N:P ratios. This matrix allows an estimation of the proper N:P ratio and concentration of nitrogen and phosphorus needed to stimulate microbial growth and activity.

Microbial activity and toxicity will be monitored by oxygen uptake rate and the Microtox bioassay respectively. Reduction of relative toxicity is a good, integrated indicator of bioremediation and removal of priority and non-priority pollutants. Upon completion of the primary screen, only the three (3) most active treatments (as determined from the Microtox Bioassay and the OUR analyses) of each sample will be analyzed for TPH.

This screening study will verify the biodegradability of the sludge or soil borne contaminants and indicate the nutrient ratio and concentration needed to stimulate biodegradation.

PRIMARY SCREEN SCHEDULE

Flask No.	CONTROLS Live 1		CONTROLS Abiotic 2		Amendments 3		4		5		6		7	
Day	A	B	A	B	A	B	A	B	A	B	A	B	A	B
0	*	*	*	*	*	*	*	*	*	*	*	*	*	*
3	*		*		*		*		*		*		*	
7	*		*		*		*		*		*		*	
10	*		*		*		*		*		*		*	
14	*	*	*	*	*	(*)	*	(*)	*	(*)	*	(*)	*	(*)

A = Oxygen Uptake Rates (OUR) and Microtox™ Bioassay

B = TPH (*) (analyze only the 3 most active treatments)

STATE OF NEW MEXICO
HEALTH AND ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 10:00 am	Date 8/22/89

Originating Party	Other Parties
Terry Vandell, Dames & Moore	Bill Olson - EID/GWB

Subject

Cariban Refinery Remediation

Discussion

Results from latest pump test shows lower permeability than expected so they are reevaluating options.
Can't flush system with pumping alone
They will propose pump & treat with bioremediation to EID
D&M have taken soil samples for bench scale tests of types of bacteria present will present to EID
San Juan Engineering has drained & cleaned 2 tanks on site, some of other tanks have residual product in bottom

Conclusions or Agreements

D&M will inform EID of fate of disposal of products prior to disposal

Distribution
file

Signed Bill Olson

New Mexico Health and Environment Department

MARALYN BUDKE
Acting Secretary

CARLA L. MUTH
Deputy Secretary

MICHAEL J. BURKHART
Deputy Secretary

RICHARD MITZELFELT
Director

August 17, 1989

Roland Jackson
P.O. Box 586
Kirtland, NM 87417

Dear Mr. Jackson:

On June 2, 1989, I sampled your private residential well in response to concerns you had over the possibility of petroleum contaminants from the Caribou Refinery in your well water. Enclosed you will find copies of the laboratory results of these ground water samples.

No detectable petroleum related organic compounds from the Caribou Refinery were observed in the samples. In addition, the general chemistry analysis results reveals that your well water has 1478 mg/l of total dissolved solids. Total dissolved solids are a measure of the amount of minerals in solution. This level is above the N.M. Water Quality Control Commission (WQCC) standard of 1000 mg/l indicating that the water is slightly saline. The major ion in solution appears to be sulfate at a concentration of 691 mg/l. This level is slightly above the N.M. WQCC standard of 600 mg/l. Although these standards are exceeded, both the total dissolved solids and sulfate standards are asthetic standards and not health based standards. High total dissolved solids concentrations may impart a salty taste to the water. High sulfates typically can result in odor and taste problems. Sulfates are naturally occuring throughout the San Juan Basin due to the abundance of gypsum in the San Juan Basin's sedimentary deposits.

I thank you for your patience in awaiting the results of ground water samples from your well. If you have any questions regarding these analyses or the Caribou Refinery please feel free to call me at 827-2899.

Sincerely,

Bill Olson

William Olson
Hydrogeologist
Ground Water/Technical Support

Enclosures

cc: Dave Tomko, EID Farmington Office
Bill Bartels, Technical Support Program Manager
Stuart Castle, Ground Water Bureau Chief
Terry Vandell, Dames and Moore

TRANSMITTAL SHEET **Dames & Moore**

RECEIVED

JUL 31 1989

GROUND WATER BUREAU

To: New Mexico Ground Water Bureau
Environmental Improvement Division
1190 St. Francis Drive
Harold Runnels Building
Santa Fe, New Mexico 87503

Date July 28, 1989

Your Order No.

Our Job No. 14819-005-31 (5303)

Attention: Mr. Bill Olsen

Subject: Maverik Refinery and Tank Farm
Kirtland, New Mexico
Data report

We are sending you via U.S. Mail

the following

STATUS REPORT
REMEDIATION WORK, AQUIFER PUMP TEST AND
ROUND 1 LONG-TERM GROUND WATER QUALITY
MONITORING DATA RESULTS
FOR MAVERIK REFINERY AND TANK FARM
KIRTLAND, NEW MEXICO
FOR MAVERIK COUNTRY STORES, INC.
dated July 1989

This is ~~These are~~ for your review and files

No. of copies submitted: 2

Copies to: Mr. Dave Tomko (1)
New Mexico Environmental Improvement Div.
District 1 Field Office
724 West Animas
Farmington, NM 87401

William Call, Maverik
Vince Memmott, "
Pete Olsen, D&M

Dames & Moore

By T.D. Vandell

T. D. Vandell

114.6

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
250 EAST BROADWAY, SUITE 200, SALT LAKE CITY, UTAH 84111-2480 (801) 521-9255

August 8, 1989

Mr. Bill Olsen
Hydrogeologist
Ground Water Bureau, EID
P.O. Box 968
Santa Fe, NM 87504-0968

Subject: Amended (August 1989) Ground Water Remediation Plan For Maverik Country Stores, Inc., Kirtland, New Mexico, Refinery Tank Farm

Dear Bill:

Enclosed is an "Amended Ground Water Remediation Plan" for the Maverik Country Stores, Inc. Kirtland, New Mexico Refinery Tank Farm. Your expeditious review and approval of the enclosed plan is respectfully requested to ensure that timely remedial activities can proceed. The original plan (September 14, 1988) has been amended as indicated. These changes are necessary due to the results of the recent shallow aquifer pumping test. The test was conducted by Dames & Moore in May 1989 in the southwest corner of the tank farm, to further characterize the site in support of the remedial action design.

The shallow aquifer pumping test indicated that the hydraulic conductivity of the upper shallow water table aquifer (saturated thickness of 8 feet, from about 4 feet to 12 feet in depth below ground surface) is considerably lower (about 5 ft/day) than that indicated by previous shallow well slug test data and deeper aquifer pump test data. As a result, the volume of water that can be pumped, treated and reinjected into the aquifer is now estimated to be about 10 gpm from the interceptor trench/recovery well system.

RECEIVED

AUG 24 1989

GROUND WATER BUREAU

The original "Ground Water Remediation Plan" has been amended to account for the low hydraulic conductivity (about 5 ft/day) and resultant low transmissivity of this zone (about 300 gpd/ft). The changes are detailed in Attachment 1 and are shown on Plate 1. The plan includes the following key changes:

1. Continued use of and possible additional excavation of the existing north-south interceptor trench for more effective hydraulic control and continued free product capture along the southwestern boundary of the tank farm (Component 3).

2. Relocation of the east-west interceptor trench to the north about 25 feet closer to the contaminant source area, while intercepting the existing north-south interceptor trench (Component 5).

3. Utilization of large (2-3 feet in diameter) recharge wells, primarily to the north, for reinjection of treated water. If needed to maintain a water balance additional recharge wells will be installed downgradient to recharge any excess waters that are treated. Additional recharge wells would also serve to create a ground water mound (hydraulic barrier) to the south to aid in controlling potential off-site contaminant migration (Component 9). An automatic shutoff will be installed at the water treatment site such that the reinjection system would shut down automatically if the treatment system should fail.

4. Bioremediation rather than soil vapor recovery, including bacterial enhancement in both the saturated and unsaturated zones through oxygen and nutrient injection, and aeration, respectively (Component 10).

In addition, the tanks and pipelines will be rechecked to ensure that they have been properly emptied. Any product found will be appropriately disposed of off-site. The open-ended pipes will be capped and the tanks locked to prevent any future potential unauthorized use of the tanks and pipes.

The remediation plan as amended will be initiated immediately, upon your approval, as per the Implementation Schedule in Table 1. As you are aware, the project was delayed for about one month in May 1989 during negotiations between Maverik Country Stores, Inc. and a potential buyer of the tank farm. In addition, the results of the aquifer pumping test required a schedule delay during which time the necessary modifications were made to the original plan.

If you have any questions on the enclosed, please do not hesitate to contact us at (801) 521-9255. As per your request, we have also sent a copy of this proposal to Dave Tomko in your Farmington office. We are looking forward to hearing from you so that the remediation work can begin as soon as possible. Our client, Maverik Country Stores, Inc., remains committed to completing the remedial actions presented in the attached plan.

Very truly yours,

DAMES & MOORE

Peter F. Olsen
Associate

Terry D. Vandell
Project Hydrogeologist

PFO/TDV/fl

cc: Mr. Bill Call, President (with attachments
Maverik Country Stores, Inc.
Mr. Vince Memmott (with attachments)
Mr. Dave Tomko (with attachments)
Mr. Tim Holbrook, Dames & Moore

ATTACHMENT 1

MODIFIED GROUND WATER REMEDIATION PLAN FOR
MAVERIK COUNTRY STORES, INC.
KIRTLAND, NEW MEXICO REFINERY TANK FARM

This Remediation Plan addresses the shallow soil and ground water contamination in the southern portion of the tank farm area. Bioremediation components include ground water pumping, treatment, nutrient addition and reinjection. This plan is designed to enhance natural biodegradation.

The 10 components of the Plan include the following, as shown on Plate 1 and as designated by the following numbers:

*1. The Westside Irrigation Ditch waters which flow along the entire western edge of the tank farm property boundary will be contained in 10-inch diameter plastic pipe to prevent contamination of the irrigation waters (completed in March 1989).

2. The refinery sludge in the eastern part of the tank farm will be characterized, excavated and disposed of off-site and backfilled with clean soil.

3. The existing north-south interceptor trench will be excavated further and will continue to be utilized for capturing free product along the southwestern boundary of the tank farm.

*4. Two additional off-site monitor wells will be constructed to monitor the effectiveness of remediation off-site, downgradient to the south and southwest of the tank farm. Water levels will be measured and samples analyzed for volatile organics (aromatic and halogenated) and total dissolved solids, sulfate and chloride from these two new monitor wells and existing monitor wells MW9, MW10 and MW13 three times in year 1, two times in year 2, one time in year 3, with monitoring only as needed thereafter (Round 1 completed in April 1989).

5. An east-west ground water interceptor trench, about 12 feet deep, 3-feet wide, 160 feet long, backfilled with coarse gravel, will be constructed in the southwest area.

6. A two dual recovery pump system (i.e., each with a drawdown pump and skimmer pump in 2-feet diameter, 12-feet deep wells) will be installed in the interceptor trench.

7. An oil/water separator will treat ground water recovered from the interceptor trench. Free product will be stored on-site in the existing 2.4 million gallon storage tank. The water phase will be further treated by air stripping. After nutrients are added, the treated water will be used to recharge the shallow soils and the shallow aquifer to enhance the natural biodegradation.

8. Ground water from the oil/water separator (25 gpm capacity) will be treated by air stripping to remove the volatile organic components.

9. Treated water from the interceptor trench wells will be discharged to shallow large (2-3 feet in diameter) wells that will be constructed with a caisson drilling rig. These recharge wells will be located to the north and upgradient about 100 feet from the east-west interceptor trench. Treated ground waters and oxygen and nutrients will be injected into these wells to aid in flushing contaminants from this zone and to enhance biodegradation. A few recharge wells may be located immediately downgradient south-southeast of the 2.4 million gallon tank to handle any excess ground waters that have been pumped and treated. The recharge wells will be completed only in the shallow contaminated zone (about 12-feet deep). The total number of recharge wells is currently estimated at about 6. The exact number and locations will be determined after the interceptor trench has been constructed and on-site conditions are better defined. Additional methods of infiltration may be needed and could include sprinkling, shallow (1 to 2 feet deep) trenches or shallow ponds upgradient from the east-west interceptor trench.

10. Bioremediation will be implemented by adding nutrients and an oxygen source to the upgradient recharge wells. This will enhance the growth and activity of the current bacterial population to aid in contaminant degradation. Laboratory tests of the soils and ground water will be completed prior to system start-up to define the types and proportions of hydrocarbon degrading bacteria and the types and quantities of nutrients and oxygen necessary for efficient biodegradation.

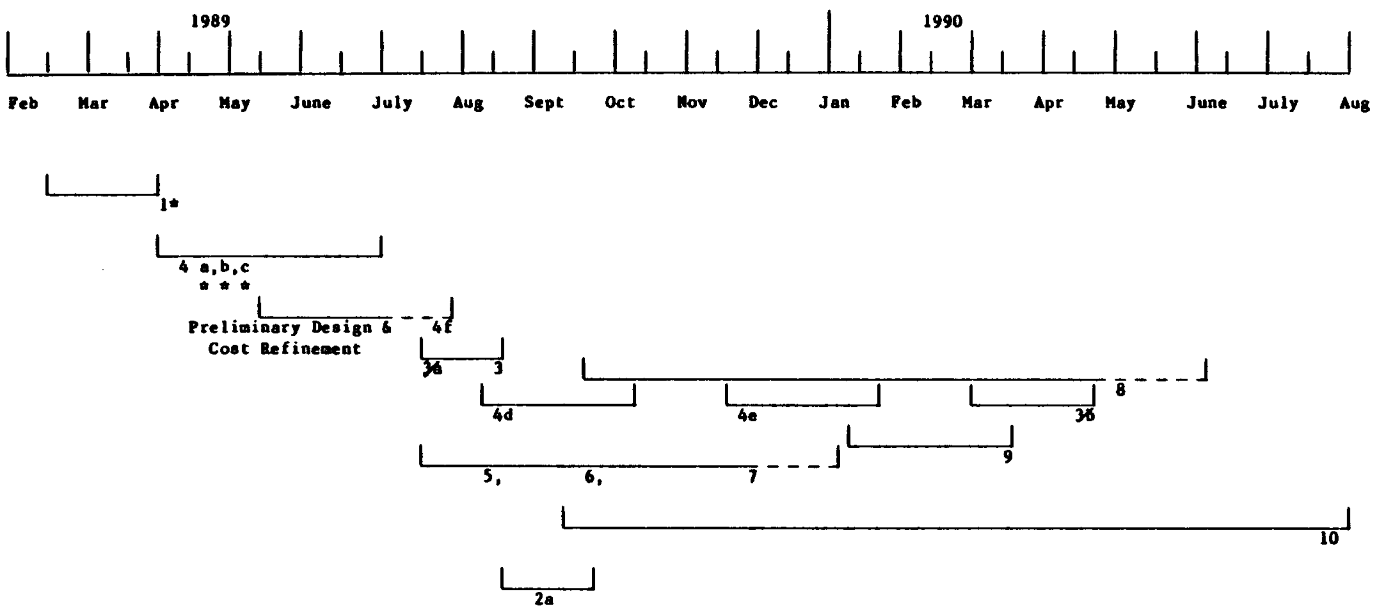
    Surface soils between the recharge wells and interceptor trenches will be scarified to induce volatilization of gasoline contamination in the unsaturated zone. Soils excavated during trench and recharge well construction will be spread in shallow lifts in the same area to be scarified. Nutrients may be added to the upper soils to enhance biodegradation of the contaminants in this zone also.

---

* Indicates already completed as per the original Phase I Plan (September 14, 1989).

TABLE 1

REVISED TIME SCHEDULE, AMENDED GROUND WATER REMEDIATION PLAN
FOR MAVERIK COUNTRY STORES, INC. (AUGUST 1989)
KIRTLAND, NEW MEXICO, REFINERY TANK FARM



No.	Components (1)
*1	Pipe Westside Ditch Flows
2a	Sludge Evaluation
2b	Sludge Removal/Disposal
3a	Backfill North-South Interceptor Trench, Partial
3b	Backfill North-South Interceptor Trench, Total
3	Utilize North-South Interceptor Trench
*4a	Install Two New Monitor Wells
*4b	Water Quality Monitoring Data Report, Round 1
*4c	Conduct Pump Test
4d	Water Quality Monitoring Data Report, Round 2
4e	Water Quality Monitoring Data Report, Round 3
4f	Refine Plan
5	Excavate East-West Interceptor Trench
6	Install Dual Recovery Pump System
7	Install Primary Product Recovery/Disposal System
8	Install Air Stripper System
9	Install Recharge Trench/System
10a	Install Pilot Scale Soil Vapor Recovery System
10b	Install Full Scale Soil Vapor Recovery System
10	Bioremediation, Including Laboratory Testing

(1) Components as defined in Amended (August 1989) Ground Water Remediation Plan for Maverik Country Stores, Inc., Kirtland, New Mexico Refinery Tank Farm. Times for completion reflect, where required, data collection, laboratory analysis, final design specifications, contract and equipment procurement, construction and start-up.

* Indicates work completed as of August 1989

_ _ ┘ Indicates time extension from original plan

/ Indicates deleted in the amended plan

FILE 14819-005-5205 BY ________ DATE ________ CHECKED BY ________ DATE ________

466.12 (11-82)

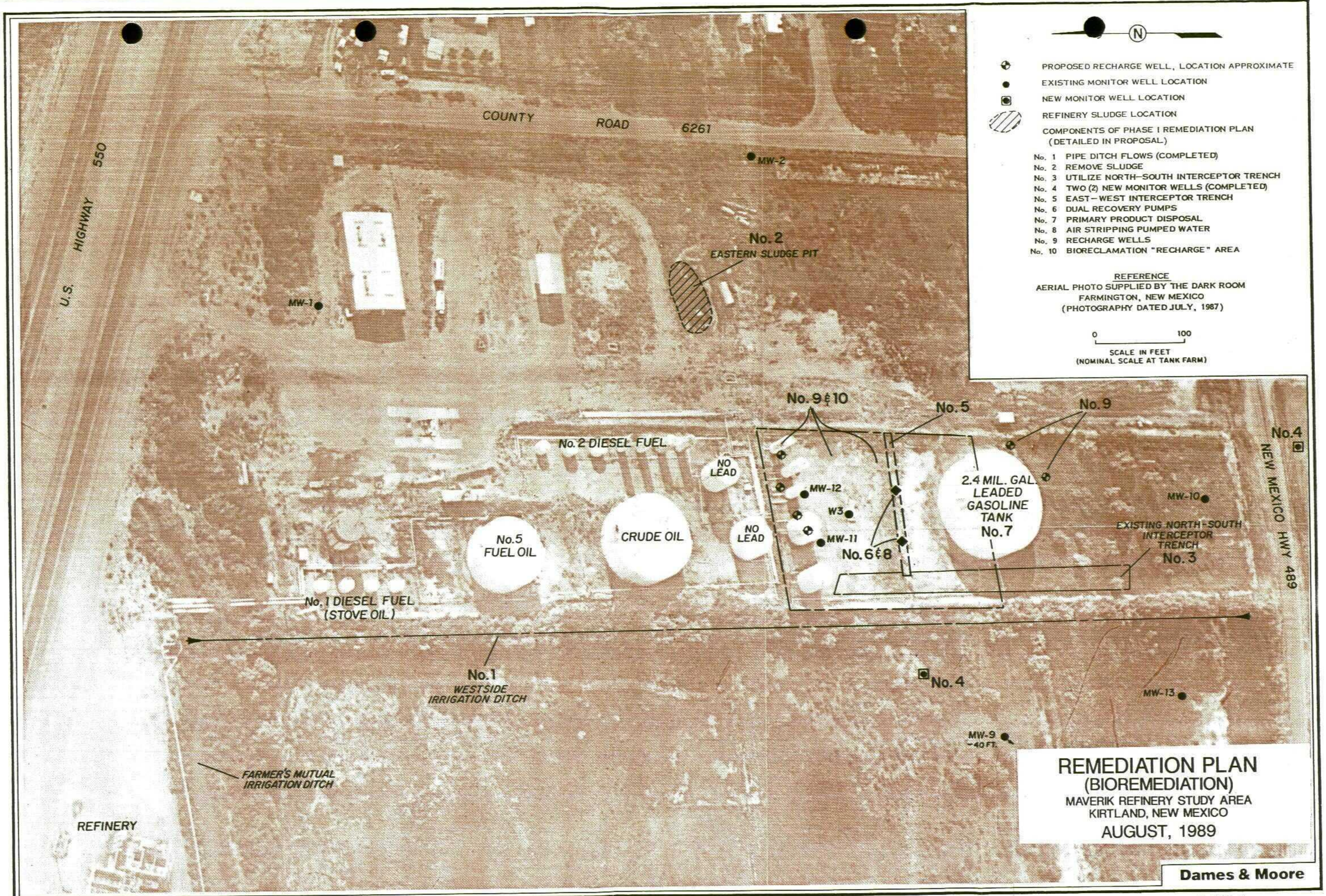


PLATE 1

New Mexico Health and Environment Department

CARLA L. MUTH
Deputy Secretary
MICHAEL J. BURKHART
FLORENCERUTH J. BROWN
General Counsel
LOUIS W. ROSE
Deputy General Counsel

RECEIVED

JUL 17 1989

GROUND WATER BUREAU

M E M O R A N D U M

TO: Stuart Castle, Chief, Ground Water Bureau, EID

FROM: Jennifer J. Pruett, Assistant General Counsel, HED JJP

DATE: July 14, 1989

RE: Miscellaneous Ground Water Cases

In going through my files for our new system, I came across a number of old ground water cases, most of which have not needed work in over a year. I have therefore closed the files, but will retain them in case they again become active. Below I have listed the case name, and the last person with whom I worked on the case. (As some of these people have left EID, the case may have been re-assigned.) If one of these cases needs legal attention in the future, please feel free to submit another Legal Request mentioning my past work.

ATSF-Clovis	Doug Jones
Maverick-Caribou Refinery	Bill Olson
Molina Court (DP 467) Tim Watson	Albert Dye
La Plata Mobile Home Park	Greg Baker
Kennecott, L-Bar	Terry Morgan

cc. Louis W. Rose, Deputy General Counsel, HED
Ernest Rebuck, Ground Water Program Manager, EID
Bill Bartels, Technical Services Program Manager, EID

— OFFICE OF GENERAL COUNSEL —
Harold Runnels Building
(505) 827-2990
1190 St. Francis Dr.
Santa Fe, New Mexico 87503

New Mexico Health and Environment Department

MARALYN BUDKE
Acting Secretary

CARLA L. MUTH
Deputy Secretary

MICHAEL J. BURKHART
Deputy Secretary

RICHARD MITZELFELT
Director

June 16, 1989

Daniel H. Michalak
Vice-President
Sundance Petroleum
1840 East Chula Vista Rd.
Tucson, AZ 85718

RE: Kirtland, N.M. Maverick Refinery Ground Water Remediation Plan

Dear Mr. Michalak:

The New Mexico Environmental Improvement Division (EID) has reviewed your May 17, 1989 correspondence regarding the Maverick Refinery in Kirtland, NM owned by Maverick Country Stores, Inc. In this letter you have stated that Sundance Petroleum is considering purchasing the Refinery. In addition, Sundance requested EID approval of modifications to Maverick's remediation plan for contaminated ground water and soils at the facility.

Sundance's proposal conceptually offers an alternate technical approach to treat contaminated ground water and soils with bacterial agents to promote biodegradation of volatile organics but provides no specific information about the types, amounts, nutrients required, rates of degradation, degradation products or effectiveness of the bacteria to be used. The proposal also does not address what steps would be taken to prevent the migration of volatile organics from contaminated soils, proposed to be landfarmed on refinery property, into surrounding or underlying soils and ground water. Ground water at the site is at a very shallow depth and EID does not generally approve of landfarming contaminated soils in shallow ground water areas. EID assumes that other remedial efforts not mentioned, such as removal and proper disposal of lead contaminated sludge, will be carried out as agreed upon with Maverick.

Before EID could consider modifications to Maverick's existing remediation plan, documentation addressing the above concerns would have to be submitted to EID for review. I would like to remind you that on January 27, 1989 EID signed a Letter of Agreement with Maverick Country Stores, Inc. documenting concurrence on the manner in which the site will be cleaned up. This agreement is a legally binding document committing Maverick, with EID's approval, to a specific remediation plan for the refinery.

Additionally, the following legal questions which would need to be studied by EID:

1) Is the previously signed letter of agreement binding on Maverick, Sundance or both if the property is eventually sold?

2) Can EID give prior approval for modifications to an existing and agreed upon remediation plan for a site to an entity that does not possess ownership?

On June 12, 1989, you requested copies of the State of New Mexico's standards for soils and ground water. Enclosed you will find a copy of the N.M. Water Quality Control Commission (WQCC) regulations. Standards for ground water can be found on pages 21, 21.1 and 21.2. New Mexico does not currently have standards for contaminants in soils and only requires that contaminants in soil do not migrate into ground water or surface water bodies in excess of allowable standards.

EID appreciates your concern for prompt remediation of soils and ground water at the Kirtland, Maverick Refinery. If you have any further questions in this matter, please call me at (505)827-2899.

Sincerely,

Bill Olson

William Olson
Hydrogeologist
Ground Water/Technical Support

Enclosure

cc: Stuart Castle, Ground Water Bureau Chief
Bill Bartels, Technical Support Section Program Manager
William Call, President, Maverick Country Stores, Inc.
Terry Vandell, Project Hydrogeologist, Dames and Moore

STATE OF NEW MEXICO
HEALTH AND ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 9:00 a	Date 6/12/89

Originating Party	Other Parties
Bill Olson - EID/GWB	Dan Michalak - Sundance Petroleum (818) 347-4844

Subject

Cariba - Maverick Refinery, Kirtland N.M. Remediation Alternative if Sundance Petro. Purchases the Refinery

Discussion

I stated that EID will need more information on bioreclamation, types of bugs, effectiveness, etc., before any approval of the plan. Especially due to the fact that EID has a signed Letter of Agreement with Maverick Refinery on petroleum remediation.

He stated that they would do an analysis of soil + water to determine the type of bacteria present and would add Biotech to soil samples from the site on a pilot scale to determine effectiveness. He requested copies of N.M. standards for soil and water

Conclusions or Agreements EID will send letter requesting more info on the proposal including WQCC standards.

He will gather info on bioreclamation

Distribution
file
Bill Bartels

Signed Bill Olson

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud, NE
Albuquerque, NM 87106 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

June 8, 1989

Distribution
(■) Submitter
(※) SLD Files

ANALYTICAL REPORT
SLD Accession No. OR-89-0745

To: Ground Water Bureau
Environmental Improvement Division
1190 St. Francis Dr.
Santa Fe, 87503

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

Re: **A purgeable water sample submitted to this laboratory on June 2, 1989**

User:
EID GROUND WATER
P. O. Box 968
Santa Fe, NM 87504-0968

DEMOGRAPHIC DATA

COLLECTION		*LOCATION*
On: 2-Jun-89	*By:* Ols . . .	
At: 10:30 hrs.	*In/Near:* Kirtland	

ANALYTICAL RESULTS: Aromatic & Halogenated Purgeable Screen

Parameter	Value	Note	MDL	Units
Aromatic Purgeables (6)	0.00	N	0.50	ppb
Halogenated Purgeables (33)	0.00	N	0.50	ppb

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: Caribu Refinery

Analyst: ______________________ ________
Gary C. Eden — Analysis Date
Analyst, Organic Chemistry

Reviewed By: R Meyerhein
Richard F. Meyerhein 06/08/89
Supervisor, Organic Chemistry Section

RECEIVED
JUN 21 1989
GROUND WATER BUREAU

859
WNN

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED 06 02 89	LAB NO. WC 2002	USER CODE ☒ 59300 ☐ 59600 ☐ OTHER:
Collection DATE 6 2 89	SITE INFORMATION ►	Sample location Caribou Refinery, Kirtland N.M.
Collection TIME 1030		Collection site description
Collected by — Person/Agency Olson		

SEND FINAL REPORT TO ►
GROUND WATER ~~& HAZARDOUS WASTE~~ BUREAU
NM ENVIRONMENT IMPROVEMENT DIVISION/HED
~~PO Box 968~~
Santa Fe, NM 87504-0968
Attn: William Olson

Station/well code: Roland Jackson Well
Owner: Roland Jackson

SAMPLING CONDITIONS

☐ Bailed ☒ Pump ☐ Dipped ☐ Tap	Water level	Discharge	Sample type grab
pH (00400) 7	Conductivity (Uncorrected) 1650 µmho	Water Temp. (00010) 17.5 °C	Conductivity at 25°C (00094) µmho

Field comments

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted: 1
☒ NF: Whole sample (Non-filtered) ☐ F: Filtered in field with 0.45 µmembrane filter ☐ A: 2 ml H_2SO_4/L added
☒ NA: No acid added ☐ Other-*specify:*

ANALYTICAL RESULTS from SAMPLES

NF, NA		Units	Date analyzed
☒ Conductivity (Corrected) 25°C (00095)	1997	µmho	6-16
☐ Total non-filterable residue (suspended) (00530)		mg/l	
☐ Other:			
☐ Other:			
☐ Other:			

F, NA		Units	Date analyzed
☒ Calcium (00915)	108	mg/l	7/14
☒ Magnesium (00925)	17.1	mg/l	7/14
☒ Sodium (00930)	303	mg/l	6/13
☒ Potassium (00935)	3	mg/l	6/13
☒ Bicarbonate (00440)	319	mg/l	6/12
☒ Chloride (00940)	115	mg/l	6/15
☒ Sulfate (00945)	691	mg/l	7/20
☒ Total filterable residue (dissolved) (70300)	1478	mg/l	6/14
☒ Other:	Cation-Anion Balance		

NF, A-H_2SO_4		Units	
☐ Nitrate-N⁺, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

F, A-H_2SO_4		Units	
☐ Nitrate-N⁺, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst	Date Reported	Reviewed by
	7/21/89	C. [illegible]

Laboratory remarks

STATE OF NEW MEXICO
ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 10:30 am	Date 5/23/89

Originating Party	Other Parties
Roland Jackson - citizen Work (599-2132) Home (598-5955)	Bill Olson - EID/GWB

Subject

Caribou Refinery Ground Water Quality

Discussion

He would like to use his private well for irrigation, lawn-garden. Asked if water was ok.

Roland Jackson
P.O. Box 586
Kirtland N.M. 87417

Conclusions or Agreements

He will have to check with State Engineers Office on use of well. I will check water quality on June 2, 1989

Distribution file

Signed Bill Olson

SUNDANCE PETROLEUM
1840 East Chula Vista Road
Tuscon, AZ 85718

17 May 1989

State of New Mexico
Environmental Improvement Board
P O Box 968
Santa Fe, NM 87504-0968

Attn: Bill Olsen, Hydrologist

Subject: Remediation Plan for Maverik Kirtland Refinery

Gentlemen:

We are reviewing the option of purchasing the Maverik Refinery in Kirtland, NM. We are aware of the spill pollution problems on the present site and the proposed procedures for cleaning the spill as developed by Dames & Moore of Salt Lake City for the Maverick Corp. Should we enter an agreement to purchase the property, we would prefer to use an alternate decontamination method.

Our purpose in changing the procedure is to complete the decontamination as speedily as is possible. We feel our greatest savings will be in spending the least time to clean the site and we would use all approved methods to minimize our time. Our changes are minimal in concept.

We plan to use bioreclamation from the outset. Our first operation would be to excavate that contaminated soil from the spill location above the water table and spread it onto the southern section of the property. This spreading would be done according to State of New Mexico's approved procedures and using the latest techniques for soil decontamination through the use of bacteria. We would spread the soil in 6 inch lifts and inject the bacteria during the spreading. The soil would be left in a location under conditions which would prevent further spread of the contamination.

Since the groundwater table is shallow at the site, we would dig two trenches, one at the upslope side of the contamination and one at the downslope edge. We would install an air stripper and circulate the water as previously approved. We would additionally add bacteria to the water to promote biodegradation of hydrocarbons as well. This circulation would continue until water quality met the State Water Resources standards.

After the water was cleaned, we would back fill the excavation to bring the surface back to presently existing grades. The back fill would be done either with the decontaminated soil or with uncontaminated soil excavated for foundations for our new plant. No soil would be used for back fill unless it met soil quality standards.

We would use your accepted procedures for the sampling of both soil and ground water to determine the rate of decontamination. We would have our tests confirmed by an independent laboratory periodically to confirm our assessment of the progress. We would take samples from those wells presently drilled for sample taking.

RECEIVED

MAY 23 1989

GROUND WATER BUREAU

The suggested procedure differs from the previously approved procedure only in the method for installing ground water circulation facilities and in using bioreclamation from the outset. We feel that our costs would not be significantly less if simple air stripping was used without bioreclamation. Our objective is to clean up the pollution as rapidly as possible.

Our specific concern with the Environmental Improvement Board is whether our alternate plan is acceptable. We would like to go to full scale treatment from the outset and ask what concerns you may have regarding our proposed procedures.

We thank you for your timely consideration.

Very truly yours
Sundance Petroleum
Daniel H Michalak
Daniel H. Michalak, Vice-Pres

New Mexico Health and Environment Department

MARALYN BUDKE
Acting Secretary

CARLA L. MUTH
Deputy Secretary

MICHAEL J. BURKHART
Deputy Secretary

RICHARD MITZELFELT
Director

April 21, 1989

Roland Jackson
P.O. Box 586
Kirtland, N.M. 87417

Dear Mr. Jackson:

Enclosed you will find a copy of ground water analyses from the monitor well in front of your house, taken by Caribu Refinery's consultant, Dames and Moore, on November 10, 1987 and February 22, 1988. No petroleum contamination was observed in these samples. If you have any questions about these analyses or any other questions regarding the Caribu Refinery site please call me at 827-2899.

Sincerely,

Will Olson

William Olson
Hydrologist
Ground Water/Technical Support

Enclosure

cc: Dave Tomko, EID Farmington Field Office

TABLE B-2 (Cont. 4)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION	MW-4	MW-4
DATE SAMPLED	11-10-87	2-22-88
INORGANIC PARAMETERS (mg/L except as noted)		
Calcium (Ca)	142.0	131.0
Magnesium (Mg)	20.0	19.0
Sodium (Na)	337.0	294.0
Potassium (K)	< 5.0	< 5.0
Iron (Fe)	< .05	< .05
Manganese (Mn)	*	.780
Ammonia (as N)	< .1	< .1
Chloride (Cl)	87.0	73.0
Sulfate (SO4)	654.	601.
Fluoride (F)	.8	.7
Nitrate and Nitrite (as N)	.3	.2
Total Alkalinity	332.0	332.0
Bicarbonate Alkalinity	332.0	332.0
Carbonate Alkalinity	< 5.0	*
Bicarbonate (HCO3)	404.8	404.8
Carbonate (CO3)	< 3.0	*
FIELD AND LABORATORY MEASUREMENTS		
Temperature (Degrees C)	14.1	*
Field pH	7.46	7.31
Lab pH (units)	7.44	7.84
Field Conductivity (umhos/cm	1510.0	1500.0
Lab Conductivity (umhos/cm)	2060.0	1920.0
Total Dissolved Solids(mg/l)	1540.0	1380.0
VOLATILE ORGANICS DETECTED (ug/L)		
Benzene	< .50	< .50
Ethylbenzene	< .50	< .50
Toluene	< .50	< .50
m-Xylene	< .50	< .50
o,p-Xylene	< .50	< .50
Total Xylene	*	*
1,2 Dichloroethane	< 1.00	< 1.00
TOTAL ORGANIC LEAD (mg/L)		
Total Organic Lead	< .002	.003

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

New Mexico Health and Environment Department

MARALYN BUDKE
Acting Secretary

CARLA L. MUTH
Deputy Secretary

MICHAEL J. BURKHART
Deputy Secretary

RICHARD MITZELFELT
Director

April 17, 1989

Terry D. Vandell
Dames and Moore
250 East Broadway, Suite 200
Salt Lake City, Utah 84111-2480

Dear Ms. Vandell

As per your request, enclosed you will find the New Mexico Environmental Improvement Division's results from the October 12, 1988 sampling of monitor wells at the Maverick Refinery and Tank Farm in Kirtland, N.M. I apologize for not sending these to you earlier. If you have any questions regarding the analyses please call me at (505)827-2899.

Sincerely,

William Olson
Hydrologist
Ground Water/Technical Support

Enclosures

— ENVIRONMENTAL IMPROVEMENT DIVISION —
Harold Runnels Building
1190 St. Francis Dr.
Santa Fe, New Mexico 87503

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time: 11:30 am	Date: 4/10/89

Originating Party	Other Parties
Bill Olson - EID/GWB.	Terry Vandell - Dames & Moore
	(801) 521-9255

Subject

Caribou Refinery

Discussion

Larry Bardwell will be on site the week of 4/24/89 to install 2 new monitor wells and a test hole for pump test to determine upper zone conditions.

I told her that I observed a leak in one of the process units at the refinery. One valve was dripping product on the ground.

She is sending out a timetable under William Call for remediation schedule.

She asked for results of EID sampling

Conclusions or Agreements

She will call refinery guard on site to fix leak.

I will send analytical results

Distribution file.

Signed Bill Olson.

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
250 EAST BROADWAY, SUITE 200, SALT LAKE CITY, UTAH 84111-2480 (801) 521-9255

April 11, 1989

RECEIVED

APR 14 1989

GROUND WATER BUREAU

Mr. Bill Olsen
Hydrogeologist
Ground Water Bureau, EID
P.O. Box 968
Santa Fe, NM 87504-0968

Subject: Estimated Time Schedule, Phase I Plan For Ground Water Remediation For Maverik Country Stores, Inc., Kirtland, New Mexico, Refinery Tank Farm

Dear Bill:

As per the EID's "Letter of Agreement for Implementation of the Ground Water Remediation Plan for Maverik Country Stores, Inc., Kirtland, New Mexico, Refinery Tank Farm" (January 25, 1989), the estimated time schedule for project implementation is included in Table 1 of this letter. We are submitting this for your records and for your convenience in scheduling site construction visits at specific phases of project construction.

As you are aware, the first component of the remediation plan, that of piping the Westside Irrigation Ditch waters is ongoing and should be completed by April 1, 1989. We have been working closely with Mr. William Walker, the irrigation ditch water user, in designing the pipeline and associated fittings such that the system will serve his needs. This initial phase of the remediation work should eliminate the immediate problem and concern of contaminated ground waters from the Maverik Tank Farm seeping into the ditch through the eastern bank.

Scheduled completion dates for the 10 components of the remediation plan are presented in Table 1. However, in order to refine the preliminary design of project components 5 through 10, a long-term steady-rate aquifer pumping test must first be conducted. Pumping will be conducted in May 1989 until water levels in the observation well stabilize or within 24-hours of pumping. Recovery water level data will also be collected. The hydraulic coefficients determined from this test (transmissivity and permeability) will then be used to define more accurately the ground water flow rates and volumes of water to be treated and reinjected. If the hydraulic coefficients vary significantly from the values used for the preliminary design, significant design changes may result. These changes would result in the alteration of the volumes of water handled. Such changes would be submitted to the EID prior to any further on-site remediation construction.

If you have any questions on the attached, please do not hesitate to call me. Remediation work is proceeding as outlined.

Very truly yours,

DAMES & MOORE

Peter F. Olsen
Associate

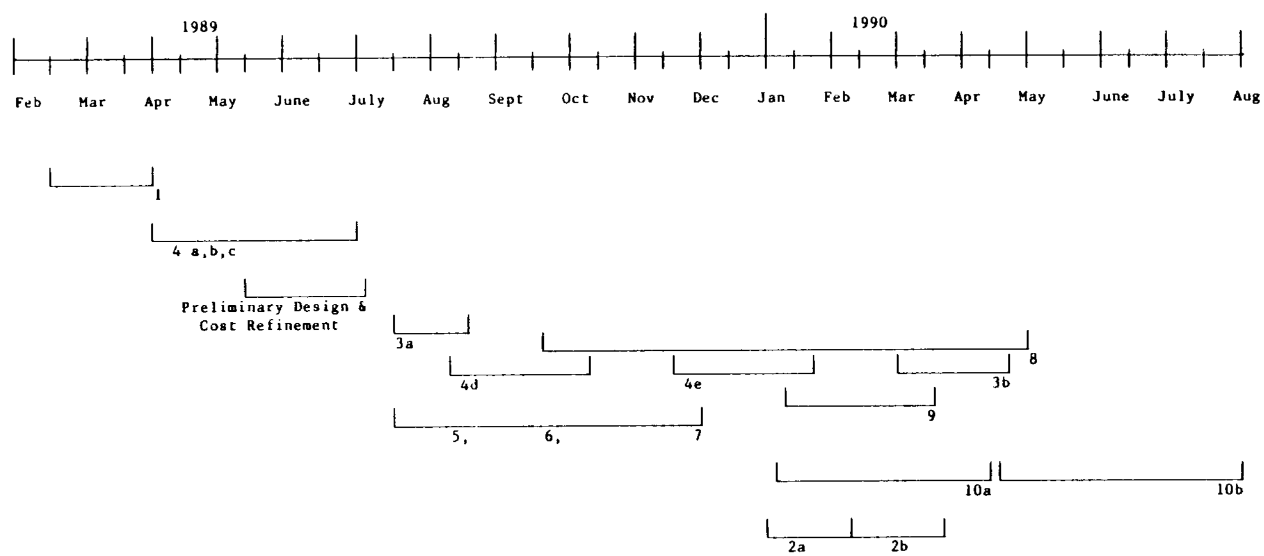
Terry D. Vandell
Senior Hydrogeologist

PFO/TDV/fl

cc: Mr. William Call
Mr. Vince Memmott

TABLE 1

ESTIMATED TIME SCHEDULE, PHASE I PLAN FOR GROUND WATER REMEDIATION
FOR MAVERIK COUNTRY STORES, INC.
KIRTLAND, NEW MEXICO, REFINERY TANK FARM



No.	Components (1)
1	Pipe Westside Ditch Flows
2a	Sludge Evaluation
2b	Sludge Removal/Disposal
3a	Backfill Interceptor Trench, Partial
3b	Backfill Interceptor Trench, Total
4a	Install Two New Monitor Wells
4b	Water Quality Monitoring Data Report, Round 1
4c	Conduct Pump Test
4d	Water Quality Monitoring Data Report, Round 2
4e	Water Quality Monitoring Data Report, Round 3
5	Excavate East-West Interceptor Trench
6	Install Dual Recovery Pump System
7	Install Primary Product Recovery/Disposal System
8	Install Air Stripper System
9	Install Recharge Trench
10a	Install Pilot Scale Soil Vapor Recovery System
10b	Install Full Scale Soil Vapor Recovery System

(1) Components as defined in September 14, 1988 Ground Water Remediation Plan for Maverik Country Stores, Inc., Kirtland, New Mexico Refinery Tank Farm. Times for completion reflect, where required, data collection, laboratory analysis, final design specifications, contract and equipment procurement, construction and start-up.

TRANSMITTAL SHEET

Dames & Moore

RECEIVED
JAN 30 1989
GROUND WATER BUREAU

To: New Mexico Ground Water Bureau
Environmental Improvement Division
1190 St. Francis Drive
Harold Runnels Building
Santa Fe, New Mexico 87503

Date January 26, 1989

Your Order No.

Our Job No. 14819-003-31

Attention: Mr. Bill Olsen

Subject: Maverik Country Stores, Inc.
Kirtland, New Mexico Refinery

We are sending you via U.S. Mail

the following
REPORT: "Water Quality Data Summary Repo[illegible]
For Completion of the Hydrogeolo[illegible]
Evaluation, Maverik Refinery and
Tank Farm, Kirtland, New Mexico
for Maverik Country Stores, Inc."
dated January 1989

This is ~~These are~~ for your use

No. of copies submitted: 1

Copies to: Mr. Dave Tomko
New Mexico Environmental Improvement Div.
District 1 Field Office
724 West Animas
Farmington, NM 87401

William Call, Maverik
V. J. Memmott
TDV, PFO

Dames & Moore

By T. D. Vandell

T. D. Vandell

114.6

EID BUCKSLIP

CHECK ONE:

[X] LETTER TO Maverick Country Stores, Inc.

FOR Jon Thompson SIGNATURE

[ ] MEMO TO

[ ] PRESS RELEASE

[ ] OTHER

SUBJECT: Caribou Refinery Cleanup Letter of Agreement

DRAFTED BY: Bill Olson. 1/25/89 (DATE)

CONCURRENCES:

NAME:		INITIAL	DATE REC'D	DATE APPROVED
Dennis McQuillan	Prog. Mgr.	D. McQ	1/25	1/25
Stuart P. Castle	Bur. Chief	SC		1/25
	Deputy Dir.			
Jon Thompson	Deputy Dir.	JT		1/27
Richard Mitzelfelt	Director			
	Legal Review			
	Branch Admin.			

FINAL DECISION NEEDED BY ______________ (Date) BECAUSE ______________

COMMENTS BY DRAFTER OR REVIEWER(S):

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

ENVIRONMENTAL IMPROVEMENT DIVISION
Harold Runnels Bldg.-1190 St. Francis Drive
Santa Fe, New Mexico 87503

Richard Mitzelfelt
Director

GARREY CARRUTHERS
Governor
CARLA L. MUTH
Secretary
MICHAEL J. BURKHART
Deputy Secretary

January 25, 1989

William Call
Maverick Country Stores, Inc.
P.O. Box 457
Afton, WY 83110

Subject: Letter of Agreement for Implementation of The Ground Water Remediation Plan For Maverick Country Stores, Inc., Kirtland, New Mexico Refinery Tank Farm.

Dear Mr. Call,

On December 19, 1988 the New Mexico Environmental Improvement Division (EID) received a letter from Maverick Country Stores, Inc. asking EID to sign a Letter of Agreement to document that the EID and Maverick are in agreement with the September 14, 1988 remediation plan for the Maverick Country Stores, Inc., Kirtland, New Mexico Refinery Tank Farm.

The EID is in agreement with Maverick on the remediation plan proposed for the facility as outlined in the August 26, 1988 and September 14, 1988 remediation proposals presented by Maverick's consultant Dames and Moore. Enclosed you will find a signed copy of the Letter of Agreement. The EID currently does not have the legal staff necessary to complete a settlement agreement. A formal settlement agreement including the remediation schedule and ground water quality compliance levels will be drafted later this year.

As the design for the air stripper system is developed, EID requires that Maverick provide EID with the details for monitoring the effluent from the air stripper and shutting down the air stripper and infiltration galley in case of upsets or malfunctions. In addition, EID requests that Maverick inform EID of the fate of all contaminated water, soil and sludge removed from the facility.

We are pleased that Maverick is willing to begin ground water remediation at the site under the framework of a Letter of Agreement and look forward to implementation of this remediation system. If you have any questions please call Bill Olson at (505)827-2899.

Sincerely,

Stuart Castle

Stuart Castle
Ground Water Bureau Chief

SC/WO

enclosure

cc: Richard Mitzelfelt, Director EID
Dave Tomko, EID Farmington Field Office
Louis Rose, Office of Legal Counsel
Jennifer Pruett, Office of Legal Counsel
Terry Vandell, Dames and Moore
Pete Olsen, Dames and Moore

STATE OF NEW MEXICO
HEALTH ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

[X] Telephone [ ] Personal	Time 8:30 a	Date 1/10/89

Originating Party	Other Parties
Bill Olson - EID TSS	Dave Tomko EID Farmington

Subject

Caribou Refinery

Discussion

Roland Jackson, an adjacent citizen, was promised the chemical analyses of a monitor well that Dames & Moore installed on his property

I have results on Charles Grubbs well that shows nondetectable organics.

Conclusions or Agreements

I will call Terry Vandell (Dames & Moore) and ~~ask~~ request analyses for Roland Jackson, and I will send Grubbs results to Farmington office

Distribution

file

Signed Bill Olson

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☐ Telephone ☒ Personal

Time 10 AM

Date 12/19/88

Originating Party	Other Parties
Attached	Dave Boyer

Subject Caribou - 4 - Corners

Discussion These consultants came by to talk about operating an asphalt Refinery at 4-Corners. I went over the discharge plan info, gave them info and told them to go talk to EID Air Quality H.W. and Superfund.

THOMAS W. COOPER
PRESIDENT

office:
MAHAFFEY BLDG.
190TH & NORMANDIE

mailing:
P. O. BOX 4253
TORRANCE, CA 90510
(213) 328-1180

T. W. COOPER, INC.
ENGINEERS • CONSTRUCTORS

International Industrial Developers
TECHNICAL CONSULANTS

processes designs projects procedures IID

Daniel H. Michalak

22238 Ybarra Road
Woodland Hills, CA 91364

(818) 347-4844

Conclusio

Distribution Caribou File.

Signed D. G. Boyer

MAVERIK COUNTRY STORE

MAVERIK COUNTRY STORES, INC.
P.O. Box 457 / Afton, WY 83110
Phone: 307-886-3861

December 15, 1988

RECEIVED

DEC 19 1988

GROUND WATER
B

Mr. Bill Olsen
Hydrogeologist
Ground Water Bureau, EID
P.O. Box 968
Santa Fe, New Mexico 87504-0968

Subject: Letter of Agreement
For Implementation of The Ground
Water Remediation Plan
For Maverik Country Stores, Inc.,
Kirtland, New Mexico
Refinery Tank Farm

Dear Mr. Olsen:

As per your previous communications with Ms. Terry Vandell of Dames & Moore and November 16, 1988 telephone conversation between Ms. Vandell and Mr. Dennis McQuillan, it is my understanding that due to time and staffing constraints in your legal department, preparation of a settlement agreement for ground water remediation at the Maverik-Kirtland tank farm will not be possible until early in 1989.

The first phase of the remediation plan (which was presented in the September 14, 1988 letter report to Bill Olsen) involves installation of a pipeline to conduct waters which now flow in the West Side Irrigation Ditch. This construction must be conducted when there is no flow in the irrigation ditch and was proposed for the winter/early spring of 1988-1989. If we wait until a settlement agreement is drafted, negotiated and signed, remediation would be delayed by one year since this work must be completed before the other remedial actions can commence.

The purpose of this letter is to document that the New Mexico EID and Maverik Country Stores, Inc. are in agreement with the September 14, 1988 remediation plan and that implementation of this plan can begin this winter. In addition, it is agreed that a formal settlement agreement will be drafted and negotiated in 1989 that will include the remediation schedule and ground water quality compliance levels.

I am enclosing a signed copy of this letter, which after signing by an authorized EID official, should be returned to me to complete this agreement. The EID's signature on this letter will document EID approval of Maverik's September 14, 1988 remediation plan and approval for implementation of this plan prior to a settlement agreement. The plan does not, as previously noted, include scheduling or compliance levels associated with remediation. These will be addressd in the formal settlement agreement.

Sincerely,

William Call

William Call
President

Ed J. Thompson
Authorized Signature, New Mexico EID

Deputy Director, Community Protection Branch
Typed Name and Title

1/27/89
Date

STATE OF NEW MEXICO
HEALTH ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 15:15	Date 11/15/88

Originating Party	Other Parties
Terry Vandel, Dames + Moore	D. McQ.

Subject Maverick Refinery Cleanup

Discussion She is drafting a letter of understanding for EID & the company to agree on cleanup technology w/ a disclaimer that the duration and cleanup standards will be negotiated at a later date w/ a SA.

In this way cleanup will begin w/ technology approved by EID.

Conclusions or Agreements

Distribution
Jennifer Pruett

Signed Dennis McQuillan

HEALTH ENVIRONMENT STATE OF NEW MEXICO

MEMORANDUM OF MEETING OR CONVERSATION

[X] Telephone [ ] Personal	Time 9:15	Date 11/10/88

Originating Party	Other Parties
Terry Vandel Dames & Moore 801-521-9255	D. McQ.

Subject Legal Status of Maverick Refinery

Discussion I explained that this matter was referred to J. Pruett but that she had a backlog & couldn't get to it until 1989.

We can either proceed w/o a SA or ask to have another atty assigned.

Conclusions or Agreements

She will talk to Maverick & see what they desire.

Distribution

Signed Dennis McQuillan

859
WNW

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED 10 | 17 | 88 LAB NO. WC-4164 USER CODE ☒ 59300 ☐ 59600 ☐ OTHER:

Collection DATE 10 | 12 | 88

Collection TIME ∅

Collected by — Person/Agency Bill Olsen

SITE INFORMATION ►

Sample location C2-1600 MW9

Collection site description

RECEIVED

DEC 20 1988

GROUND WATER B

Station/ well code

Owner

SEND FINAL REPORT TO ►
GROUND WATER & HAZARDOUS WASTE BUREAU
NM ENVIRONMENT IMPROVEMENT DIVISION/HED
PO Box 968
Santa Fe, NM 87504-0968
Attn: Bill Olsen

SAMPLING CONDITIONS

☒ Bailed ☐ Pump ☐ Dipped ☐ Tap	Water level 3.24	Discharge	Sample type
pH (00400) 6.52	Conductivity (Uncorrected) — µmho	Water Temp. (00010) °C	Conductivity at 25°C (00094) µmho

Field comments no odor, scum on surface, silty brown water.

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted | ☒ NF: Whole sample (Non-filtered) | ☐ F: Filtered in field with 0.45 µmembrane filter | ☐ A: 2 ml H_2SO_4/L added

☒ NA: No acid added ☐ Other-*specify:*

ANALYTICAL RESULTS from SAMPLES

NF, NA		Units	Date analyzed
☒ Conductivity (Corrected) 25°C (00095)	1398	µmho	11/3
☒ Total non-filterable residue (suspended) (00530)	2755	mg/l	10/28
☐ Other:			
☐ Other:			
☐ Other:			

F, NA		Units	Date analyzed
☒ Calcium (00915)	200	mg/l	11/03
☐ Magnesium (00925)	39.0	mg/l	11/03
☐ Sodium (00930)	116	mg/l	10/31
☐ Potassium (00935)	2	mg/l	10/31
☐ Bicarbonate (00440)	276	mg/l	10/31
☐ Chloride (00940)	34	mg/l	11/2-?
☐ Sulfate (00945)	515	mg/l	11/2-?
☒ Total filterable residue (dissolved) (70300)	1032	mg/l	11/8
☐ Other:			

NF, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

F, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst	Date Reported	Reviewed by
	11 / 28 / 88	C

113

Laboratory remarks
34

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

859
WNN

GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED 10/17/88 LAB NO. WC-4161	USER CODE ☑ 59300 ☐ 59600 ☐ OTHER:
Collection DATE 10/12/88	SITE INFORMATION ► Sample location: Caribou MW13
Collection TIME 1600	Collection site description
Collected by — Person/Agency: Bill Olsen	

SEND FINAL REPORT TO ►
GROUND WATER & HAZARDOUS WASTE BUREAU
NM ENVIRONMENT IMPROVEMENT DIVISION/HED
PO Box 968
Santa Fe, NM 87504-0968
Attn: Bill Olsen

Station/ well code
Owner

SAMPLING CONDITIONS

☑ Bailed ☐ Pump ☐ Dipped ☐ Tap	Water level .86	Discharge	Sample type
pH (00400) 7.51	Conductivity (Uncorrected) 3100 µmho	Water Temp. (00010) 21 °C	Conductivity at 25°C (00094) µmho

Field comments: slow producer

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted	☑ NF: Whole sample (Non-filtered)	☐ F: Filtered in field with 0.45 µmembrane filter	☐ A: 2 ml H_2SO_4/L added

☑ NA: No acid added ☐ Other-*specify*:

ANALYTICAL RESULTS from SAMPLES

NF, NA		Units	Date analyzed
☑ Conductivity (Corrected) 25°C (00095)	4663	µmho	11/3
☑ Total non-filterable residue (suspended) (00530)	3144	mg/l	10/28
☐ Other:			
☐ Other:			
☐ Other:			

F, NA		Units	Date analyzed
☑ Calcium (00915)	428	mg/l	11/02
☐ Magnesium (00925)	142	mg/l	11/02
☐ Sodium (00930)	720	mg/l	10/31
☐ Potassium (00935)	4	mg/l	10/31
☐ Bicarbonate (00440)	630	mg/l	10/31
☐ Chloride (00940)	207	mg/l	11/21
☐ Sulfate (00945)	2183	mg/l	11/25
☐ Total filterable residue (dissolved) (70300)	4082	mg/l	11/8
☐ Other:			

NF, A-H_2SO_4		Units	
☐ Nitrate-N +, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)	RECEIVED	mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)	DEC 20 1988	mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:	GROUND WATER		
☐ Other:	B		

F, A-H_2SO_4		Units	
☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst	Date Reported	Reviewed by
	11/28/88	[illegible]

105

Laboratory remarks: 203

SLD 726 (8/85) *DISTRIBUTION:* **WHITE** — EID, GW&HW Bureau **CANARY** — WS System **PINK** — EID Local Office **GOLDENROD** — SLD

859 WNN

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED 10 | 17 | 88 LAB NO. WC-4163 USER CODE ☒ 59300 ☐ 59600 ☐ OTHER:

Collection DATE 10 | 12 | 88

Collection TIME 15 30

Collected by — Person/Agency Bill Olsen

SITE INFORMATION ► Sample location C21600 MW 8

Collection site description

RECEIVED

DEC 20 1988

Station/ well code GROUND WATER B

Owner

SEND FINAL REPORT TO ►
GROUND WATER & HAZARDOUS WASTE BUREAU
NM ENVIRONMENT IMPROVEMENT DIVISION/HED
PO Box 968
Santa Fe, NM 87504-0968
Attn: Bill Olsen

SAMPLING CONDITIONS

☒ Bailed ☐ Pump ☐ Dipped ☐ Tap	Water level 8.4.80	Discharge	Sample type
pH (00400) 7.6	Conductivity (Uncorrected) 1600 μmho	Water Temp. (00010) 17.5 °C	Conductivity at 25°C (00094) μmho

Field comments no oder, turbid

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted | ☒ NF: Whole sample (Non-filtered) | ☐ F: Filtered in field with 0.45 μmembrane filter | ☐ A: 2 ml H_2SO_4/L added

☒ NA: No acid added ☐ Other-*specify:*

ANALYTICAL RESULTS from SAMPLES

NF, NA		Units	Date analyzed
☒ Conductivity (Corrected) 25°C (00095)	1409	μmho	11/3
☒ Total non-filterable residue (suspended) (00530)	260	mg/l	10/28
☐ Other:			
☐ Other:			
☐ Other:			

F, NA		Units	Date analyzed
☒ Calcium (00915)	136	mg/l	11/02
☐ Magnesium (00925)	25.6	mg/l	11/02
☐ Sodium (00930)	158	mg/l	10/31
☐ Potassium (00935)	3	mg/l	10/31
☐ Bicarbonate (00440)	295	mg/l	10/31
☐ Chloride (00940)	47.5	mg/l	11/21
☐ Sulfate (00945)	445	mg/l	11/28
☒ Total filterable residue (dissolved) (70300)	960	mg/l	11/8
☐ Other:			

NF, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ *Chemical oxygen demand* (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

F, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst	Date Reported	Reviewed by
	11 / 28 / 88	[illegible]

Laboratory remarks
56

101

SLD 726 (8/85) *DISTRIBUTION:* **WHITE** — EID, GW&HW Bureau **CANARY** — WS System **PINK** — EID Local Office **GOLDENROD** — SLD

859
WNN

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED 10 17 88	LAB NO. WC-4162	USER CODE ☒ 59300 ☐ 59600 ☐ OTHER:	
Collection DATE 10 12 88	SITE INFORMATION ►	Sample location Cariboo MW6	
Collection TIME 1500		Collection site description	
Collected by — Person/Agency Bill Olsen			

SEND FINAL REPORT TO ►
GROUND WATER & HAZARDOUS WASTE BUREAU
NM ENVIRONMENT IMPROVEMENT DIVISION/HED
PO Box 968
Santa Fe, NM 87504-0968
Attn: Bill Olsen

Station/well code

Owner

SAMPLING CONDITIONS

☒ Bailed ☐ Pump ☐ Dipped ☐ Tap	Water level 5.28	Discharge	Sample type
pH (00400) —	Conductivity (Uncorrected) 2250 @ 18° µmho	Water Temp. (00010) °C	Conductivity at 25°C (00094) µmho

Field comments H_2S odor

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted | ☒ NF: Whole sample (Non-filtered) | ☐ F: Filtered in field with 0.45 µmembrane filter | ☐ A: 2 ml H_2SO_4/L added

☒ NA: No acid added ☐ Other-*specify:*

ANALYTICAL RESULTS from SAMPLES

NF, NA		Units	Date analyzed
☒ Conductivity (Corrected) 25°C (00095)	2308	µmho	11/3
☒ Total non-filterable residue (suspended) (00530)	1621	mg/l	10/28
☐ Other:			
☐ Other:			
☐ Other:			

F, NA		Units	Date analyzed
☒ Calcium (00915)	220	mg/l	11/02
☒ Magnesium (00925)	24.2	mg/l	11/02
☒ Sodium (00930)	307	mg/l	10/31
☒ Potassium (00935)	4	mg/l	10/31
☒ Bicarbonate (00440)	344	mg/l	10/31
☒ Chloride (00940)	128	mg/l	11/21
☒ Sulfate (00945)	764	mg/l	11/21
☒ Total filterable residue (dissolved) (70300)	1686	mg/l	11/8
☐ Other:			

NF, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

RECEIVED
DEC 20 1988
GROUND WATER B

F, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst	Date Reported	Reviewed by
	11 28 88	[signature]

Laboratory remarks
161

SLD 726 (8/85) *DISTRIBUTION:* **WHITE** — EID, GW&HW Bureau **CANARY** — WS System **PINK** — EID Local Office **GOLDENROD** — SLD

859
WNM

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED	10 17 88
LAB NO.	WC-4160
USER CODE	[X] 59300 [ ] 59600 [ ] OTHER:
Collection DATE	10 12 88
Collection TIME	1230
Collected by — Person/Agency	Bill Olsen
SITE INFORMATION ► Sample location	Cerbou MW12
Collection site description	
Station/ well code	
Owner	

SEND FINAL REPORT TO ►
GROUND WATER & HAZARDOUS WASTE BUREAU
NM ENVIRONMENT IMPROVEMENT DIVISION/HED
PO Box 968
Santa Fe, NM 87504-0968
Attn: Bill Olsen

SAMPLING CONDITIONS

[X] Bailed [ ] Pump [ ] Dipped [ ] Tap	Water level 5.96	Discharge	Sample type
pH (00400)	Conductivity (Uncorrected) 1725 μmho	Water Temp. (00010) 20.5 °C	Conductivity at 25°C (00094) μmho

Field comments: Strong hydrocarbon odor

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted | [X] NF: Whole sample (Non-filtered) | [ ] F: Filtered in field with 0.45 μmembrane filter | [ ] A: 2 ml H_2SO_4/L added

[X] NA: No acid added [ ] Other-*specify:*

ANALYTICAL RESULTS from SAMPLES

NF, NA		Units	Date analyzed
[X] Conductivity (Corrected) 25°C (00095)	1807	μmho	11/3
[X] Total non-filterable residue (suspended) (00530)	52	mg/l	10/28
[ ] Other:			
[ ] Other:			
[ ] Other:			

F, NA		Units	Date analyzed
[X] Calcium (00915)	136	mg/l	11/02
[X] Magnesium (00925)	41.5	mg/l	11/02
[X] Sodium (00930)	208	mg/l	10/31
[X] Potassium (00935)	1	mg/l	10/31
[X] Bicarbonate (00440)	557	mg/l	10/31
[X] Chloride (00940)	325	mg/l	11/25
[X] Sulfate (00945)	37.2	mg/l	11/21
[X] Total filterable residue (dissolved) (70300)	1096	mg/l	11/8
[ ] Other:			

NF, A-H_2SO_4		Units	Date analyzed
[ ] Nitrate-N + , Nitrate-N total (00630)		mg/l	
[ ] Ammonia-N total (00610)		mg/l	
[ ] Total Kjeldahl-N ( )		mg/l	
[ ] Chemical oxygen demand (00340)		mg/l	
[ ] Total organic carbon ( )		mg/l	
[ ] Other:			
[ ] Other:			

F, A-H_2SO_4		Units	Date analyzed
[ ] Nitrate-N + , Nitrate-N dissolved (00631)		mg/l	
[ ] Ammonia-N dissolved (00608)		mg/l	
[ ] Total Kjeldahl-N ( )		mg/l	
[ ] Other:			

RECEIVED
DEC 20 1988
GROUND WATER
B

Analyst	Date Reported	Reviewed by
	11 28 88	

10\

Laboratory remarks: 535.

859
WNN

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED 10 17 88	LAB NO. WC-4159	USER CODE ☒ 59300 ☐ 59600 ☐ OTHER:
Collection DATE 10 12 88	SITE INFORMATION ►	Sample location C21600 MW 11
Collection TIME 1210		Collection site description OP
Collected by — Person/Agency Bill Olsen		

SEND FINAL REPORT TO ►
GROUND WATER & HAZARDOUS WASTE BUREAU
NM ENVIRONMENT IMPROVEMENT DIVISION/HED
PO Box 968
Santa Fe, NM 87504-0968
Attn: Bill Olsen

Station/ well code

Owner

SAMPLING CONDITIONS

☒ Bailed ☐ Pump ☐ Dipped ☐ Tap	Water level 6.80	Discharge	Sample type
pH (00400) 6.94	Conductivity (Uncorrected) 2100 µmho	Water Temp. (00010) 18 °C	Conductivity at 25°C (00094) µmho

Field comments slight steen, clear water

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted	☒ NF: Whole sample (Non-filtered)	☐ F: Filtered in field with 0.45 µmembrane filter	☐ A: 2 ml H_2SO_4/L added

☒ NA: No acid added ☐ Other-*specify:*

ANALYTICAL RESULTS from SAMPLES

NF, NA		Units	Date analyzed
☒ Conductivity (Corrected) 25°C (00095)	2392	µmho	11/3
☒ Total non-filterable residue (suspended) (00530)	106	mg/l	10/28
☐ Other:			
☐ Other:			
☐ Other:			

F, NA do 21 Ne Se

F, NA		Units	Date analyzed
☒ Calcium (00915)	226	mg/l	11/02
☒ Magnesium (00925)	29.3	mg/l	11/02
☒ Sodium (00930)	310	mg/l	10/31
☒ Potassium (00935)	4	mg/l	10/31
☒ Bicarbonate (00440)	260	mg/l	10/31
☒ Chloride (00940)	71.9	mg/l	11/22
☒ Sulfate (00945)	1111	mg/l	11/22
☒ Total filterable residue (dissolved) (70300)	1896	mg/l	11/8
☐ Other:			

NF, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

RECEIVED
DEC 20 1988
GROUND WATER
B

F, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst	Date Reported	Reviewed by
	11 28 88	CG

Laboratory remarks
93 58

SLD 726 (8/85) *DISTRIBUTION:* **WHITE** — EID, GW&HW Bureau **CANARY** — WS System **PINK** — EID Local Office **GOLDENROD** — SLD

859
WNN

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED 10 17 88	LAB NO. WC-4158	USER CODE ☐ 59300 ☐ 59600 ☐ OTHER:
Collection DATE 10 12 88	SITE INFORMATION ►	Sample location Cariboul MW 10
Collection TIME 10 30		Collection site description
Collected by — Person/Agency Bill Olsen		

RECEIVED
DEC 20 1988
GROUND WATER B

SEND FINAL REPORT TO ►
GROUND WATER & HAZARDOUS WASTE BUREAU
NM ENVIRONMENT IMPROVEMENT DIVISION/HED
PO Box 968
Santa Fe, NM 87504-0968
Attn: Bill Olsen

Station/ well code

Owner

SAMPLING CONDITIONS

☒ Bailed ☐ Pump ☐ Dipped ☐ Tap	Water level 3.78	Discharge	Sample type
pH (00400) 6.25	Conductivity (Uncorrected) 1075 µmho	Water Temp. (00010) 17 °C	Conductivity at 25°C (00094) µmho

Field comments light sheen, no odors

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted	☒ NF: Whole sample (Non-filtered)	☐ F: Filtered in field with 0.45 µmembrane filter	☐ A: 2 ml H_2SO_4/L added

☒ NA: No acid added ☐ Other-*specify:*

ANALYTICAL RESULTS from SAMPLES

NF, NA		Units	Date analyzed
☒ Conductivity (Corrected) 25°C (00095)	1314	µmho	11/3
☒ Total non-filterable residue (suspended) (00530)	3126	mg/l	10/28
☐ Other:			
☐ Other:			
☐ Other:			

F, NA		Units	Date analyzed
☒ Calcium (00915)	140	mg/l	11/02
☒ Magnesium (00925)	29.3	mg/l	11/02
☒ Sodium (00930)	173	mg/l	10/31
☒ Potassium (00935)	2	mg/l	10/31
☒ Bicarbonate (00440)	296	mg/l	10/31
☒ Chloride (00940)	24.2	mg/l	11/22
☒ Sulfate (00945)	337	mg/l	11/22
☒ Total filterable residue (dissolved) (70300)	924	mg/l	11/8
☐ Other:			

NF, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

F, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst	Date Reported	Reviewed by
	11 28 88	CG

Laboratory remarks
27

135

SLD 726 (8/85) *DISTRIBUTION:* WHITE — EID, GW&HW Bureau CANARY — WS System PINK — EID Local Office GOLDENROD — SLD

754
WPU

SCIENTIFIC LABORATORY DIVISION
ORGANIC ANALYSIS REQUEST FORM
Organic Section - Phone: 841-2570

88-1713-C

REPORT TO: William Olson
EID Ground Water Bureau
1190 St. Francis Dr.
Santa Fe, N.M. 87504-0968

S.L.D. No. OR-
DATE REC. 10-14-88
PRIORITY must be purged 14 days from sampling
PHONE(S): 827-2899

COLLECTION CITY: Kirtland; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 8 8 1 0 1 2 1 0 3 0

LOCATION CODE: (Township-Range-Section-Tracts) ___ + ___ + ___ + ___ (10N06E24342)

USER CODE: 5 9 3 0 0 SUBMITTER: Bill Olsen CODE:

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER:

RECEIVED

This form accompanies 2 Septum Vials, ___ Glass Jugs, and/or ___

DEC 20 1988

GROUND WATER

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
- [ ] P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS	EXTRACTABLE SCREENS
[ ] (753) Aliphatic Headspace (1-5 Carbons)	[ ] (751) Aliphatic Hydrocarbons
[X] (754) Aromatic & Halogenated Purgeables	[ ] (755) Base/Neutral Extractables
[ ] (765) Mass Spectrometer Purgeables	[ ] (758) Herbicides, Chlorophenoxy acid
[ ] (766) Trihalomethanes	[ ] (759) Herbicides, Triazines
[ ] (774) SDWA VOC's I (8 Regulated +)	[ ] (760) Organochlorine Pesticides
[ ] (775) SDWA VOC's II (EDB & DBCP)	[ ] (761) Organophosphate Pesticides
Other Specific Compounds or Classes	[ ] (767) Polychlorinated Biphenyls (PCB's)
[ ] ___	[ ] (764) Polynuclear Aromatic Hydrocarbons
[ ] ___	[ ] (762) SDWA Pesticides & Herbicides

Remarks: light sheen, no odor

FIELD DATA:

pH= 6.25; Conductivity= 1075 umho/cm at 17 °C; Chlorine Residual= ___ mg/l

Dissolved Oxygen= 0 mg/l; Alkalinity= ___ mg/l; Flow Rate ___ ___/___

Depth to water 3.7 ft.; Depth of well 12.5 ft.; Perforation Interval ___-___ ft.; Casing:

Sampling Location, Methods and Remarks (i.e. odors, etc.)

MW 10 5 gal purged

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Will Olson Method of Shipment to the Lab: hand

CHAIN OF CUSTODY William Olson to

I certify that this sample was transferred from Marcy Leavitt to Ken Shorrell

at (location) SLD on 10/14/88 - 2:37 and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [X] No [ ]

Signatures M Leavitt Ken Shorrell

Will Olson 10/14/88 1215

ANALYSES PERFORMED **LAB. NO.: OR- 1713**

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)
- Other Specific Compounds or Classes
- [ ] __________
- [ ] __________

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	ND		
1,2 Dichloroethane	1		
* DETECTION LIMIT * *	.5 µg/l	+ DETECTION LIMIT + +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT
T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)
[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: Seal broken on 1713B on 10-25-88 JRH

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Not Sealed [ ] Intact: Yes [x] No [ ]. Seal(s) broken by: [signature] date: 10-18-88

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 10-18-88. Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: K. Meyer-Lee

754
WPU

SCIENTIFIC LABORATORY DIVISION
ORGANIC ANALYSIS REQUEST FORM
Organic Section - Phone: 841-2570

88- 1712-C

REPORT TO: William Olson
EID Ground Water Bureau
1190 St. Francis Dr.
Santa Fe, N.M. 87504-0968

S.L.D. No. OR-

DATE REC. 10-14-88

PRIORITY must be purged 14 days from sampling

PHONE(S): 827-2899

COLLECTION CITY: Kirtland; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 8 8 1 0 1 2 1 2 1 0

LOCATION CODE: (Township-Range-Section-Tracts) 8 | + | + | + | (10N06E24342)

USER CODE: 5 9 3 0 0 SUBMITTER: Bill Olsen CODE:

RECEIVED

SAMPLE TYPE: WATER [ ], SOIL [ ], FOOD [ ], OTHER:

This form accompanies ____ Septum Vials, ____ Glass Jugs, and/or ____

DEC 20 1988

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
- [ ] P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)

GROUND WATER
B

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes
- [ ] ____
- [ ] ____

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: slight sheen

FIELD DATA:

pH= 6.94; Conductivity= 2100 umho/cm at 18 °C; Chlorine Residual= ____ mg/l

Dissolved Oxygen= ____ mg/l; Alkalinity= ____ mg/l; Flow Rate ____ ____/____

Depth to water 6.80 ft.; Depth of well 33 ft.; Perforation Interval ____-____ ft.; Casing: ____

Sampling Location, Methods and Remarks (i.e. odors, etc.)

MW 11 13 gal purged

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): William Olson Method of Shipment to the Lab: hand

CHAIN OF CUSTODY William Olson to

I certify that this sample was transferred from Marcy Leavitt to Ken Sherrell

at (location) SLD on 10/14/88 - 2:38 and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [X] No [ ]

Signatures M Leavitt Kenneth S. Sherrell

William Olson 10/14/88 1215

ANALYSES PERFORMED

LAB. NO.: OR- 1712

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [x] (754) ~~Aromatic~~ & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ] ______________________
- [ ] ______________________

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	ND		
halogenated purgeables	ND		
* DETECTION LIMIT * *	.5 µg/l	+ DETECTION LIMIT + +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT
T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)
[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Not Sealed [ ] Intact: Yes [x] No [ ]. Seal(s) broken by: ______________ date: ________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 10-18-88. Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: K Meyerhan

754
wpu

SCIENTIFIC LABORATORY DIVISION
ORGANIC ANALYSIS REQUEST FORM
Organic Section - Phone: 841-2570

88-1717-C

REPORT TO: William Olson
EID Ground Water Bureau
1190 St. Francis Dr.
Santa Fe, N.M. 87504-0968

S.L.D. No. OR-
DATE REC. 10-14-88
PRIORITY must be purged in 14 days
PHONE(S): 827-2899

COLLECTION CITY: Kirtland; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 8 8 1 0 1 2 1 5 0 0

LOCATION CODE: (Township-Range-Section-Tracts) + + + (10N06E24342)

USER CODE: 5 9 3 0 0 SUBMITTER: Bill Olsen CODE:

SAMPLE TYPE: WATER ☑, SOIL ☐, FOOD ☐, OTHER:

RECEIVED

DEC 20 1988

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____

Samples were preserved as follows:

- ☐ NP: No Preservation; Sample stored at room temperature.
- ☑ P-Ice Sample stored in an ice bath (Not Frozen).
- ☐ P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
- ☐ P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)

GROUND WATER
B

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS	EXTRACTABLE SCREENS
☐ (753) Aliphatic Headspace (1-5 Carbons)	☐ (751) Aliphatic Hydrocarbons
☑ (754) Aromatic & Halogenated Purgeables	☐ (755) Base/Neutral Extractables
☐ (765) Mass Spectrometer Purgeables	☐ (758) Herbicides, Chlorophenoxy acid
☐ (766) Trihalomethanes	☐ (759) Herbicides, Triazines
☐ (774) SDWA VOC's I (8 Regulated +)	☐ (760) Organochlorine Pesticides
☐ (775) SDWA VOC's II (EDB & DBCP)	☐ (761) Organophosphate Pesticides
Other Specific Compounds or Classes	☐ (767) Polychlorinated Biphenyls (PCB's)
☐	☐ (764) Polynuclear Aromatic Hydrocarbons
☐	☐ (762) SDWA Pesticides & Herbicides

Remarks: 1st bailer clear 2nd light brown no surface sheen
H_2S odor

FIELD DATA:

pH= ____; Conductivity= 2250 umho/cm at 18 °C; Chlorine Residual= ____ mg/l

Dissolved Oxygen= ____ mg/l; Alkalinity= ____ mg/l; Flow Rate ____ ____/____

Depth to water 5.28 ft.; Depth of well 15.5 ft.; Perforation Interval ____-____ ft.; Casing:

Sampling Location, Methods and Remarks (i.e. odors, etc.)
MW 6 6 gals purged

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Will Olson Method of Shipment to the Lab: hand

CHAIN OF CUSTODY

I certify that this sample was transferred from William Olson to Marcy Leavitt to Ken Sherrell at (location) SLD on 10/14/88 - 2:39 and that the statements in this block are correct. Evidentiary Seals: Not Sealed ☐ OR Seals Intact: Yes ☒ No ☐

Signatures M Leavitt Kenneth G. Sherrell

Will Olson

ANALYSES PERFORMED

LAB. NO.: OR- 1717

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ] ______________________
- [ ] ______________________

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	ND		
1,2 Dichloroethane	2		
* DETECTION LIMIT * *	.5 μg/l	+ DETECTION LIMIT + +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT
T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)
[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______________________

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Not Sealed [ ] Intact: Yes [x] No [ ]. Seal(s) broken by: ______________ date: ________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 10-18-88. Analyst's signature: Richardson-Hill

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: K Meyerhh

754
WP

SCIENTIFIC LABORATORY DIVISION
ORGANIC ANALYSIS REQUEST FORM
Organic Section - Phone: 841-2570

88-1711-C

REPORT TO: William Olson
EID Ground Water Bureau
1190 St. Francis Dr.
Santa Fe, N.M 87504-0968

S.L.D. No. OR-
DATE REC. 10-14-88
PRIORITY must be purged 14 days from sampling
PHONE(S): 827-2899

COLLECTION CITY: Kirtland; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 8 8 1 0 1 2 1 2 3 0

LOCATION CODE: (Township-Range-Section-Tracts) + + + (10N06E24342)

USER CODE: 5 9 3 0 0 SUBMITTER: Bill Olson CODE:

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER:

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____

RECEIVED

DEC 20 1988

GROUND WATER B

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
- [ ] P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ] ____
- [ ] ____

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: strong hydrocarbon odor, sheen

FIELD DATA:

pH= 6.93; Conductivity= 1725 umho/cm at 20.5 °C; Chlorine Residual= ____ mg/l

Dissolved Oxygen= ____ mg/l; Alkalinity= ____ mg/l; Flow Rate ____ / ____

Depth to water 5.96 ft.; Depth of well 12 ft.; Perforation Interval ____ - ____ ft.; Casing:

Sampling Location, Methods and Remarks (i.e. odors, etc.)

MW12 3 gal purged

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): William Olson Method of Shipment to the Lab: hand

CHAIN OF CUSTODY William Olson to

I certify that this sample was transferred from Mary Leavitt to Ken Shorrell

at (location) SLD on 10/14/88 2:35 and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [X] No [ ]

Signatures M Leavitt Ken Shorrell

William Olson 10/14/88 1215

ANALYSES PERFORMED

LAB. NO.: OR- 1711

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
1,2 Dichloroethane	37		
Benzene	6000		
Toluene	800		
p & m xylene	136		
o-xylene	60		
* DETECTION LIMIT * *	50	+ DETECTION LIMIT + +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: Detection limit for the halogenated compound is 1 ppb

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Not Sealed [ ] Intact: Yes [x] No [ ]. Seal(s) broken by: ______ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 10-18-88. Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: [signature]

754
wpa

SCIENTIFIC LABORATORY DIVISION
ORGANIC ANALYSIS REQUEST FORM
Organic Section - Phone: 841-2570

88-1714-C

REPORT TO: William Olson
EID Ground Water Bureau
1190 St. Francis Dr.
Santa Fe, N.M 87504-0968

S.L.D. No. OR-
DATE REC. 10-14-88
PRIORITY must be purged 14 days from sampling
PHONE(S): 827-2899

COLLECTION CITY: Kirtland; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 8 8 1 0 1 2 1 7 0 0

LOCATION CODE: (Township-Range-Section-Tracts) ___ + ___ + ___ + ___ (10N06E24342)

USER CODE: 5 9 3 0 0 SUBMITTER: ______ CODE: ______

RECEIVED
DEC 20 1988

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER: ______

This form accompanies 2 Septum Vials, ______ Glass Jugs, and/or ______

Samples were preserved as follows:

GROUND WATER
B

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
- [ ] P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: scum on surface, no floating product

FIELD DATA:

pH= 6.52; Conductivity= ______ umho/cm at ______ °C; Chlorine Residual= ______ mg/l

Dissolved Oxygen= ______ mg/l; Alkalinity= ______ mg/l; Flow Rate ______ ______/______

Depth to water 3.2 ft.; Depth of well 15 ft.; Perforation Interval ______-______ ft.; Casing: ______

Sampling Location, Methods and Remarks (i.e. odors, etc.)

MW9 6 gals purged

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): William Olson Method of Shipment to the Lab: By hand

CHAIN OF CUSTODY William Olson to

I certify that this sample was transferred from Marcy Leavitt to Ken Sherrell

at (location) SLD on 10/14/88 - 2:39 and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [X] No [ ]

Signatures M Leavitt Kenneth S. Sherrell

William Olson 10/14/88 1215

ANALYSES PERFORMED

LAB. NO.: OR- 1714

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	ND		
1,2 Dichloroethane	2		
* DETECTION LIMIT *	.5 ug/l	+ DETECTION LIMIT +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT
T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)
[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Not Sealed [ ] Intact: Yes [x] No [ ]. Seal(s) broken by: ______ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 10-18-88. Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: K Meyerhein

SCIENTIFIC LABORATORY DIVISION 754 wpu
ORGANIC ANALYSIS REQUEST FORM
Organic Section - Phone: 841-2570

88-1716-C

REPORT TO: William Olson
EID Ground Water Bureau
1190 St. Francis Dr.
Santa Fe, N.M. 87504-0968

S.L.D. No. OR-
DATE REC. 10-14-88
PRIORITY must be purged in 14 days
PHONE(S): 827-2899

COLLECTION CITY: Kirtland ; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 8 8 1 0 1 2 1 6 3 0

LOCATION CODE: (Township-Range-Section-Tracts) | | | + | | + | + | | |(10N06E24342)

USER CODE: 5 9 3 0 0 SUBMITTER: Bill Olsen CODE:

RECEIVED

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER:

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or

DEC 20 1988

Samples were preserved as follows:

GROUND WATER
B

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
- [ ] P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ] ____
- [ ] ____

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks:

FIELD DATA:

pH=____; Conductivity=____umho/cm at ____°C; Chlorine Residual=____mg/l

Dissolved Oxygen=____mg/l; Alkalinity=____mg/l; Flow Rate ____ ____/____

Depth to water ____ft.; Depth of well____ft.; Perforation Interval ____-____ft.; Casing:

Sampling Location, Methods and Remarks (i.e. odors, etc.)
MWF1 (Field Blank)

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Will Olson Method of Shipment to the Lab: hand

CHAIN OF CUSTODY William Olson to
I certify that this sample was transferred from Mary Leavitt to Karen Sherrell
at (location) SLD on 10/14/88 - 2:40 and that
the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [X] No [ ]
Signatures M. Leavitt Kenneth L. Sherrell

Will Olson 10/14/88 1215

ANALYSES PERFORMED

LAB. NO.: OR- 1716

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ] ______________________
- [ ] ______________________

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
Bromodichloromethane	TRACE		
Dibromochloromethane	TRACE		
Bromoform	TRACE		
aromatic purgeables			
(see remarks)			
* DETECTION LIMIT *	.5 µg/l	+ DETECTION LIMIT +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: Three unidentified compounds were detected in the ~~at~~ early eluting unsaturated compound region at about 1-5 ppb. One unidentified compound was detected in the aromatic screen region at about 1-5 ppb.

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Not Sealed ☐ Intact: Yes ☑ No ☐. Seal(s) broken by: ______________________ date: __________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 10-18-88. Analyst's signature: [signature] Richardson-Hall

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: K Meyerhen

SCIENTIFIC LABORATORY DIVISION 754a WPa
ORGANIC ANALYSIS REQUEST FORM
Organic Section - Phone: 841-2570

88-1709-C

REPORT TO: William Olson
EID Ground Water Bureau
1190 St. Francis Dr.
Santa Fe, N.M. 87504-0968

S.L.D. No. OR-
DATE REC. 10-14-88
PRIORITY must be purged 14 days from sampling
PHONE(S): 827-2899

COLLECTION CITY: Kirtland ; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 8 8 1 0 1 2 1 6 0 0

LOCATION CODE: (Township-Range-Section-Tracts) | | | + | | + | + | | |(10N06E24342)

USER CODE: 5 9 3 0 0 SUBMITTER: Bill Olsen CODE:

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER: RECEIVED

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____

DEC 20 1988

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
- [ ] P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)

GROUND WATER B

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ] ____
- [ ] ____

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: bailed dry, long recovery period

FIELD DATA:

pH= 7.51; Conductivity= 3100 umho/cm at 21 °C; Chlorine Residual= ____ mg/l

Dissolved Oxygen= ____ mg/l; Alkalinity= ____ mg/l; Flow Rate ____ ____/____

Depth to water .86 ft.; Depth of well 5 ft.; Perforation Interval ____-____ ft.; Casing: ____

Sampling Location, Methods and Remarks (i.e. odors, etc.)
MW13 purged to 1/2" above drop pipe

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Willi Olson Method of Shipment to the Lab: hand

CHAIN OF CUSTODY Willi Olson to
I certify that this sample was transferred from Marcy Leavitt to Ken Sherrell
at (location) SLD on 10/14/88 - 2:42 and that the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [X] No [ ]
Signatures Mj Leavitt Kenneth L. Sherrell

Willi Olson 10/14/88 1215

ANALYSES PERFORMED

LAB. NO.: OR- 1709

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ] ______________________
- [ ] ______________________

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
1,2 Dichloroethane	TRACE		
~~Aromatic purgeables~~	~~ND~~		
Benzene	1		
* DETECTION LIMIT * *	.5ug/l	+ DETECTION LIMIT + +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT
T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)
[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______________________

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Not Sealed [ ] Intact: Yes [x] No [ ]. Seal(s) broken by: __________ date: __________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 10-18-88. Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: K Meyerhein

754
WPU

SCIENTIFIC LABORATORY DIVISION
ORGANIC ANALYSIS REQUEST FORM
Organic Section - Phone: 841-2570

88-1715-C

REPORT TO: William Olson
EID Ground Water Bureau
1190 St. Francis Dr.
Santa Fe, N.M 87504-0968

S.L.D. No. OR-
DATE REC. 10-14-88
PRIORITY must be purged in 14 days
PHONE(S): 827-2899

COLLECTION CITY: Kirtland; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 8 8 1 0 1 2 1 5 3 0

LOCATION CODE: (Township-Range-Section-Tracts) (10N06E24342)

USER CODE: 5 9 3 0 0 SUBMITTER: Bill Olsen CODE:

RECEIVED

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER:

This form accompanies 2 Septum Vials, ___ Glass Jugs, and/or ___

DEC 20 1988

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
- [ ] P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)

GROUND WATER
B

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ]
- [ ]

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: no odor, turbid

FIELD DATA:

pH= 7.6; Conductivity= 1600 umho/cm at 17.5 °C; Chlorine Residual= ___ mg/l

Dissolved Oxygen= ___ mg/l; Alkalinity= ___ mg/l; Flow Rate ___ ___/___

Depth to water 9.8 ft.; Depth of well 15 ft.; Perforation Interval ___-___ ft.; Casing: ___

Sampling Location, Methods and Remarks (i.e. odors, etc.)

MW 8 5g2b purged

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): ___ Method of Shipment to the Lab: ___

CHAIN OF CUSTODY Willi Olson to

I certify that this sample was transferred from Marcy Leavitt to Ken Sherrell

at (location) SLD on 10/14/88 - 2:37 and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [X] No [ ]

Signatures M Leavitt Kenneth S. Sherrell

Willi Olson 10/14/88 12:15

ANALYSES PERFORMED — LAB. NO.: OR- 1715

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	ND		
1,2 Dichloroethane	TRACE		
* DETECTION LIMIT * ✱	.5 µg/l	+ DETECTION LIMIT + †	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Not Sealed [ ] Intact: Yes [x] No [ ]. Seal(s) broken by: ______ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 10-18-88. Analyst's signature: Judi Richardson-Hill

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: K Meyerhoff

RECEIVED

OCT 12 1988

GROUND WATER/HAZARDOUS WASTE BUREAU

HEALTH & ENVIRONMENT DEPARTMENT

STATE OF NEW MEXICO

OFFICE OF GENERAL COUNSEL
1190 St. Francis Drive
Santa Fe. New Mexico 87503
(505) 827-2990

GARREY CARRUTHERS
GOVERNOR
CARLA L. MUTH
SECRETARY
MICHAEL J. BURKHART
DEPUTY SECRETARY

M E M O R A N D U M

TO: William Olson, Technical Support
Dennis McQuillan, Technical Support

FROM: Jennifer J. Pruett, Assistant General Counsel

DATE: October 11, 1988

RE: Maverick-Caribou Refinery

This case was referred to me September 27, 1988, for negotiation of a Settlement Agreement. Due to the fact that we have had one vacancy for almost three months, and have been unable to create an additional position for almost four months, I am severely overloaded. As I do not have time to pursue matters already assigned to me, I cannot proceed with new cases. It is ironic that the Water Quality Control Commission changed its delegation of this case from OCD to EID, as we are not in a much better position to proceed with it. I do not envision an improvement in my situation for six months.

Steve Cary informs me that his effort about a year ago to rank Caribou on the National Priorities List was unsuccessful. He therefore referred the case back to Technical Support for state enforcement. However, he advised me that it would be still possible to reopen the issue, and that a re-ranking package may well succeed.

I apologize for not being able to do more for you at this time. I agree with your conclusion that if a responsible party wants to sign an enforceable commitment for cleanup, we should encourage and follow through on the request. However, you do not indicate in your case summary that Caribou-Maverick has agreed to negotiate a Settlement Agreement, and in the past Caribou-Maverick has refused to admit any liability or to sign any such agreement (preferring to proceed only a voluntary basis).

You have at least three future options in this matter:

1. Ask Deputy General Counsel Louis W. Rose to assign another less-overworked attorney to the case;

2. Wait six months until we either have more attorneys or until I have wrapped up some currently pending matters; or

3. Ask your supervisors to re-evaluate Bureau priorities and relieve this office of another case.

Let me know if you wish to discuss this further.

JPP

:vmj

cc: Louis W. Rose, Deputy General Counsel
Stuart Castle, Groundwater Bureau Chief
Richard Mitzelfelt, EID Director

mmolson2.mvr

STATE OF NEW MEXICO
HEALTH ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 9:30 a	Date 9/28/88

Originating Party	Other Parties
Terry Vandell - Dames & Moore	Bill Olson - EID/GW

Subject

Caribou - Maverick Refinery, Kirtland, N.M.

Discussion

Called to set up schedule for October sampling. Dames & Moore will not sample for inorganics but doesn't mind if we sample inorganics as well as organics

Conclusions or Agreements

Set tentative sampling date of 10/12/88 & 10/13/88
Larry Bardwell will be field person for Dames & Moore
I will contact him on Fri. to see if schedule is final

Distribution
file

Signed Bill Olson

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

September 19, 1988

Terry D. Vandell
Project Hydrologist
Dames & Moore
250 East Broadway, Suite 200
Salt Lake City, Utah 84111-2480

Dear Terry:

The N.M. EID has currently received and reviewed Dames & Moore's letter of September 12, 1988, Round III - October 1988 Ground Water Quality Sampling And Analytical Plan For Maverick Country Stores Kirtland, New Mexico Refinery Tank Farm. EID agrees with Dames & Moore's recommendation to analyze water samples for volatile and semivolatile organics from the monitor wells where organics have been previously detected, notably MW-10, MW-11, MW-12, MW-6, MW-8, MW-9 and MW-13. Due to the elevated levels of TDS in some of these same monitor wells, EID may also want to analyze these water samples for inorganic constituents. If this presents a problem please let me know.

As stated in our conversation of September 8, 1988, EID would like to split samples with Dames & Moore during the October Round III sampling. At this time, I am scheduled to be drilling monitor wells in southern New Mexico during the first week of October. Please notify me in advance so that I can coordinate my schedule with the Round III water sampling. I look forward to working with you on this next round of water quality sampling at the Maverick Refinery.

Sincerely,

William Olson

William Olson
Hydrologist
Ground Water/Technical Support

cc: Stuart Castle, EID, Ground Water Bureau Chief
Dave Tomko, EID, Farmington Field Office
William Call, Maverick Country Stores

~~9/24/87~~

ENVIRONMENTAL IMPROVEMENT DIVISION

REQUEST FOR LEGAL SERVICES

NAME OF CASE: Maverick-Caribou Refinery, Kirtland, N.M.

REQUEST MADE BY: William Olson, Water Resource Spec II, Ground Water Bureau
Name, Title, and Bureau

APPROVAL OF BUREAU CHIEF: Stuart R Castle
(Signature)
[signature] 9/22/88

RECEIVED
SEP 2 1 1988
LEGAL

DATE OF REQUEST: Sept. 17, 1988

PERSON ATTORNEY SHOULD CONTACT: William Olson No.-2899

PRIORITY: ____ EMERGENCY (explain) ____
✓ NORMAL
____ LOW

DUE DATE (Deadline) ____

NATURE OF REQUEST:

Please provide a memo or narrative description, and attach any other documentation explaining the assistance sought.

PLEASE FILL IN AS APPLICABLE:

SPECIAL INSTRUCTIONS: ____

To be completed by Deputy General Counsel

This matter has been referred to Jennifer Pruett on 9/22/88

with the following instructions ____

(Where applicable) This matter has been transferred to ____

on ____ with the following instructions ____

Internal #
320-88

[signature]
Deputy General Counsel

Date Completed ____

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

ENVIRONMENTAL IMPROVEMENT DIVISION

Michael J. Burkhart
Director

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

September 17, 1988

MEMORANDUM

TO: Office of General Counsel, HED

FROM: Bill Olson, Water Resource Specialist II
Technical Support Section, EID

RE: Maverick - Caribou Refinery, Kirtland, N.M.

The Maverick - Caribou refinery is an old unused refinery located in Kirtland, N.M. Past leaks and spills during operation of the refinery have resulted in the contamination of shallow ground water at the site. Free-floating product is found on the water table under refinery property. Additionally, some dissolved phase petroleum constituents are also found off refinery property in an adjacent residential area.

Originally this case was remanded to the N.M. Oil Conservation Division (OCD) under the Water Quality Control Commission (WQCC) delegation of responsibilities to EID and OCD. Due to the lack of staffing for a technical review of the case, OCD referred the cleanup of contaminated ground water from past refinery operations to EID.

The attached memorandum summarizes the remedial investigations and actions taken at the refinery from September 11,1986 to May 27,1988. On July 12, 1988 the WQCC approved of a request by EID and OCD for a change in the delegation of authority from OCD to EID, giving EID legal authority over cleanup actions. Maverick has currently submitted a draft remediation plan based on investigations carried out over the last year by their consultant Dames and Moore. The EID Technical Support Section is now in a position to negotiate a settlement agreement covering the overall remediation of contaminated ground water at the refinery and thereby requests legal assistance in this matter.

EQUAL OPPORTUNITY EMPLOYER

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
250 EAST BROADWAY, SUITE 200, SALT LAKE CITY, UTAH 84111-2480 (801) 521-9255

RECEIVED

DEC 2 1988

GROUND WATER/HAZARDOUS WASTE
BUREAU

September 14, 1988

Mr. Bill Olsen
Hydrogeologist
Ground Water Bureau, EID
P.O. Box 968
Santa Fe, NM 87504-0968

Subject: Ground Water Remediation Plan For Maverik Country Stores, Inc., Kirtland, New Mexico, Refinery Tank Farm

Dear Bill:

As per our conversation of September 8 and 9, 1988 regarding your suggested changes to the August 26, 1988 Remediation Plan, we have enclosed a revised Ground Water Remediation Plan for Maverik Country Stores, Inc., refinery tank farm in Kirtland, New Mexico. (Attachments 1 and 2). The revised plan is identical to the original plan with the exception that in addition to the long-term ground water monitoring for volatile organic compounds, total dissolved solids (TDS), sulfate and chloride will be analyzed to determine the effectiveness of remediation in cleaning up high TDS ground waters (see Attachments 1 and 2; Component 4). The Remediation Plan as outlined should serve to remove much of the high TDS ground waters. The effectiveness of the Remediation Plan in cleaning up the high TDS ground waters will be determined from the monitoring data collected during remediation.

If you have any questions on the enclosed, please do not hesitate to contact us at (801) 521-9255. As per your request, we have also sent a copy of this proposal to Dave Tomko in your Farmington office. We are looking forward to hearing from you so that negotiations can be completed and remediation work started this fall.

Very truly yours,

DAMES & MOORE

Peter F. Olsen
Associate

Terry D. Vandell
Project Hydrogeologist

PFO/TDV/fl

cc: Mr. Bill Call, President (with attachments)
Maverik Country Stores, Inc.

Mr. Vince Memmott (with attachments)

Mr. Dave Tomko (with attachments)

ATTACHMENT 1

PROPOSED GROUND WATER REMEDIATION PLAN FOR
MAVERIK COUNTRY STORES, INC.
KIRTLAND, NEW MEXICO REFINERY TANK FARM

PHASE I PLAN

The Phase I Plan consists of ground water pumping, treatment and discharge, and a pilot-scale investigation of soil vapor recovery in the southwest area. If soil vapor recovery proves successful, the system will be expanded to include the entire southwest area. Phase II soil flushing and bioreclamation would be implemented in this area only if soil vapor recovery is determined to be infeasible in the southwest area.

The components of the Phase I Plan include the following, as shown on Plate 1 and as designated by the following numbers:

1. The Westside Irrigation Ditch waters which flow along the entire western edge of the tank farm property boundary will be contained in 12-inch diameter plastic pipe to prevent contamination of the irrigation waters.

2. The refinery sludge in the eastern part of the tank farm will be removed and disposed of and backfilled with clean soil.

3. The existing north-south interceptor trench will be backfilled to prevent interference with ground water recovery and recharge trenches.

4. Two additional off-site monitor wells will be constructed to monitor the effectiveness of remediation off-site, downgradient to the south and southwest of the tank farm. Water levels will be measured and samples analyzed for volatile organics (aromatic and halogenated) and total dissolved solids, sulfate and chloride from these two new monitor wells and existing monitor wells MW9, MW10 and MW13 three times in year 1, two times in year 2, one time in year 3, with monitoring only as needed thereafter.

5. A 15-foot deep 3-foot wide, 200-foot long east-west ground water interceptor trench, backfilled with coarse gravel, will be constructed in the southwest area.

6. One dual recovery pump system (i.e., a drawdown pump and skimmer pump in a 2-foot diameter, 20-foot deep well) will be installed in the interceptor trench.

ATTACHMENT 1 (Continued)

7. Primary product recovery, with separation of the ground waters pumped from the interceptor trench skimmer pump, will be piped to the 2.4 million gallon capacity tank on-site.

8. Ground waters (48 gpm capacity) from the interceptor trench well will be treated by air stripping.

9. Treated water from the interceptor trench well will be discharged to a shallow recharge trench downgradient (about 4 feet deep, 2 feet wide, 200 feet long and backfilled with gravel), that will be constructed with eleven 20-foot deep recharge wells into the more permeable sands and gravels, at 20 foot spacings in the base to create a ground water mound (hydraulic barrier) to prevent potential off-site contaminant movement.

10. A pilot-scale investigation of soil vapor recovery will be conducted in the southwest area in the unsaturated zone, with scale up if successful to an active recovery system.

ATTACHMENT 2

PHASE II PLAN

The Phase II Plan will be implemented only if the Phase I pilot-scale soil vapor recovery efforts in the southwest area prove unsuccessful. The Phase II Plan consists of increased ground water pumping and treatment for soil flushing and bioreclamation in the southwest area.

The components of the Phase II Plan include the following, as shown on Plate 2 and as designated by the following numbers:

1.* The Westside Irrigation Ditch waters which flow along the entire western edge of the tank farm property boundary will be contained in 12-inch diameter plastic pipe to prevent contamination of the irrigation waters.

2.* The refinery sludge in the eastern part of the tank farm will be removed and disposed of and backfilled with clean soil.

3.* The existing north-south interceptor trench will be backfilled to prevent interference with ground water recovery and recharge trenches.

4.* Two additional off-site monitor wells will be constructed to monitor the effectiveness of remediation off-site, downgradient to the south and southwest of the tank farm. Water levels will be measured and samples analyzed for volatile organics (aromatic and halogenated) and total dissolved solids, sulfate and chloride from these two new monitor wells and existing monitor wells MW9, MW10 and MW13 three times in year 1, two times in year 2, one time in year 3, with monitoring only as needed thereafter.

5.* A 15-foot deep 3-foot wide, 200-foot long east-west ground water interceptor trench, backfilled with coarse gravel, will be constructed in the southwest area.

6. Two dual recovery pump systems will be constructed in the interceptor trench (i.e., drawdown and skimmer pumps in two 2-foot diameter, 20-foot deep wells).

7.* Primary product recovery, with separation of the ground waters pumped from the interceptor trench skimmer pump will be piped to the 2.4 million gallon capacity tank on-site.

---

* Already Completed in Phase I

8. Ground waters (scale-up to 96 gpm capacity) from the interceptor trench wells will be treated by air stripping.

9. Treated water from the interceptor trench well will be discharged to a shallow recharge trench downgradient (about 4 feet deep, 2 feet wide, 200 feet long and backfilled with coarse gravel), that will be constructed with eleven 20-foot deep recharge wells into the more permeable sands and gravels at 20 foot spacings in the base to create a ground water mound (hydraulic barrier) to prevent potential off-site contaminant movement. Up to 48 gpm will be recirculated to an upgradient infiltration gallery (a shallow trench lined along the northern face and designed with wells, similar to the downgradient recharge trench) to serve in flushing contaminants and supplying nutrients and oxygen through the aquifer and the unsaturated zone to enhance bioreclamation.

10. A pilot-scale bioreclamation program will be conducted in the south-west area with mixing facilities and chemical feed addition and aquifer flushing, with scale-up if successful.

FILE ______ BY ______ DATE ______ CHECKED BY ______ DATE ______

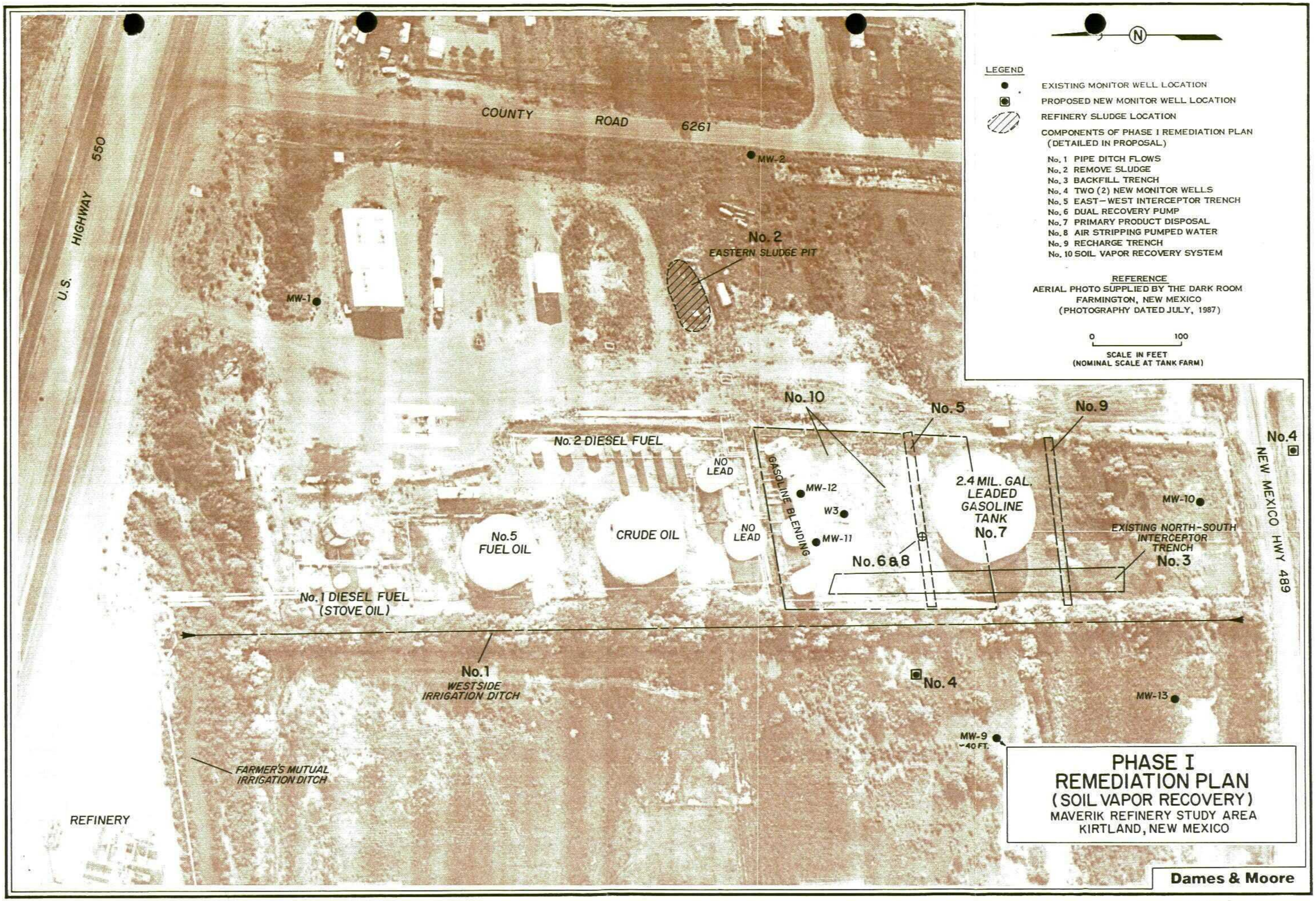


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PLATE 1

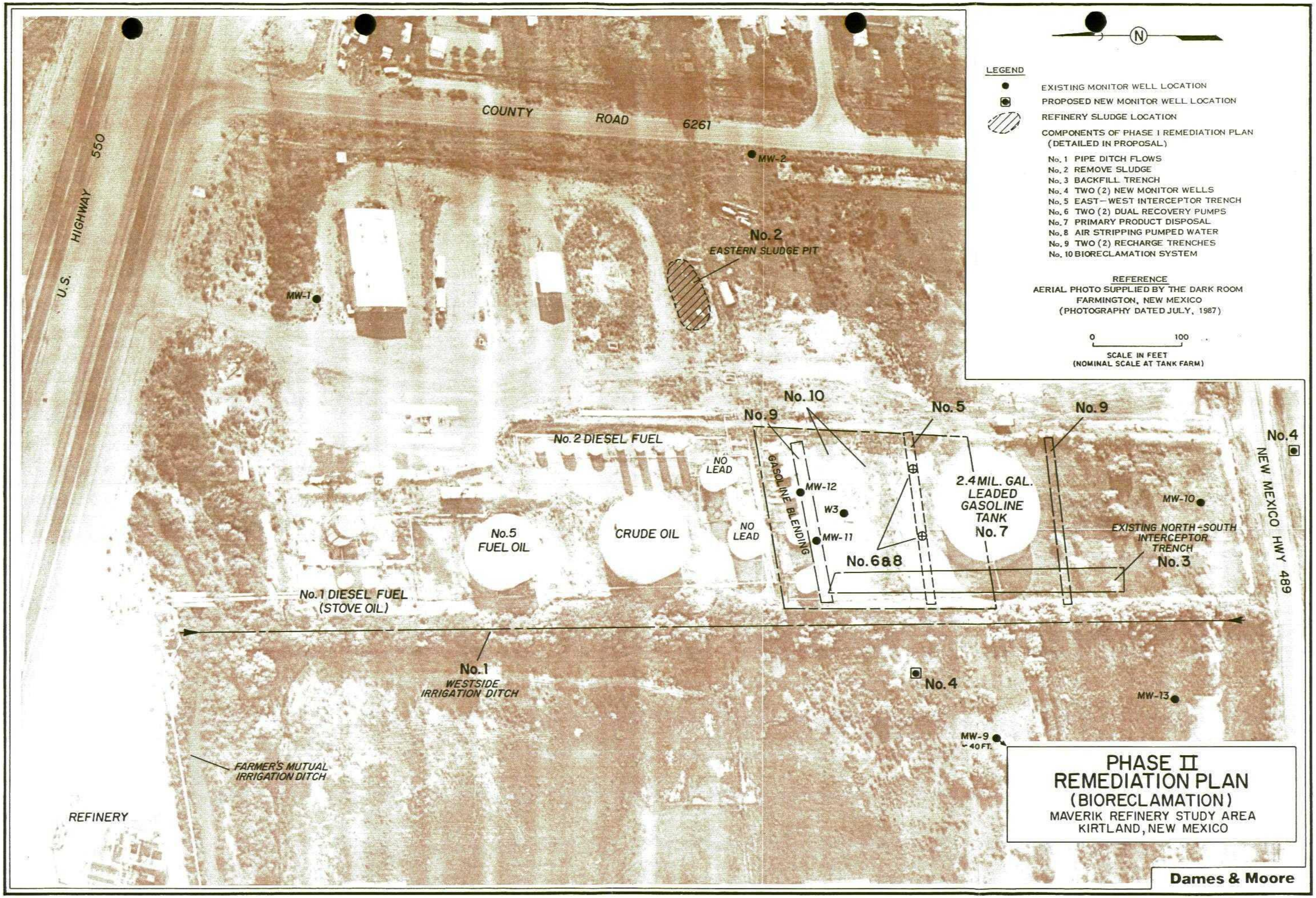


PLATE 2

FILE ______ BY ______ DATE ______ CHECKED BY ______ DATE ______

466.12 (11-82)

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
250 EAST BROADWAY, SUITE 200, SALT LAKE CITY, UTAH 84111-2480 (801) 521-9255

September 12, 1988

RECEIVED

SEP 14 1988

GROUND WATER/HAZARDOUS WASTE
BUREAU

Mr. Bill Olsen
Hydrogeologist
Ground Water Bureau, EID
P.O. Box 968
Santa Fe, NM 87504-0968

Subject: Round III - October 1988
Ground Water Quality Sampling/
Analytical Plan For
Maverik Country Stores, Inc.
Kirtland, New Mexico,
Refinery Tank Farm

Dear Bill:

As per our telephone conversation of September 8, 1988, this letter outlines the Round III October 1988 ground water quality sampling and analytical plan for the Maverik Country Stores Kirtland, New Mexico refinery tank farm.

This plan follows the preliminary Round III sampling/analytical plan presented in the January 8, 1988 letter to Bruce Frederick (NMEID). Only the volatile and semivolatile (base/neutral and acid fractions) organics are to be analyzed, primarily from those wells where these organics have been previously detected.

The Round III sampling/analytical plan will consist of sampling on-site monitor wells MW-10, MW-11 and MW-12 and off-site monitor wells MW-6, MW-8, MW-9 and MW-13. The isoconcentration map of 1,2-dichloroethane (taken from Dames & Moore's June 1988 report[1]) shows the locations of these 7 wells with

[1] Dames & Moore, June 1988. Addendum to Phase I Hydrogeologic Evaluation Maverik Refinery and Tank Farm, Kirtland, New Mexico, For Maverik Country Stores, Inc.

respect to the principal organic contaminant plume. Static water levels will be measured in all of the monitor wells, well points, surface water sites and nearby private wells, prior to water quality sampling. Monitor well purging and all sampling and field measurements (for static water levels, pH, conductivity, temperature and free-oil phase) will be conducted as per Phase I Rounds 1 and 2 water quality sampling and analysis, as detailed in Appendices A and B of Dames & Moore's June 1988 report.

The water quality samples will be analyzed by Rocky Mountain Analytical Laboratory for the constituents listed in Table 1 attached.

As stated in the January 8, 1988 letter, the results from the Round III sampling and analysis and the water level data will be presented to the NMEID in a data evaluation report, about two months after sample collection (December 1988).

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP

If you have any questions on the Round III water quality sampling/ analytical plan, please do not hesitate to call me at 801-521-9255. We are planning to be on-site in mid-October 1988 and will notify you of the exact dates such that you may schedule a site visit at the same time.

Very truly yours,

DAMES & MOORE

Pete F. Olsen

Peter F. Olsen
Associate

Terry D. Vandell

Terry D. Vandell
Project Hydrogeologist

PFO/fl

cc: Mr. Bill Call, President
Maverik Country Stores, Inc.

Mr. Vince Memmott

TABLE 1

SAMPLE ROUND 3 LABORATORY WATER QUALITY PARAMETERS

HALOGENATED VOLATILE ORGANICS
EPA METHOD 601

Bromoform
Carbon Tetrachloride
Chlorobenzene
Chloroethane
Chloroform
Dibromochloromethane
Bromodichloromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethene
1,2-Dichloropropane
cis-1,3-Dichloropropene
trans-1,3-dichloropropene
Bromoethane
Chloromethane
Methylene chloride
1,1,2,2-Tetrachloroethane
Tetrachloroethene
trans-1,2-Dichloroethene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Vinyl chloride
1,1,2-Trichloro-
2,2,1-trifluoroethane
1,2-Dibromoethane (EDB)

AROMATIC VOLATILE ORGANICS
EPA METHOD 602

Benzene
Chlorobenzene
Ethylbenzene
Toluene
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
m-Xylene
o & p-Xylene(s)

REFINERY HAZARDOUS CONSTITUENT VOLATILES
EPA METHOD 8240

Benzene
Carbon disulfide
Chlorobenzene
Chloroform
1,2-Dibromoethane
1,2-Dichloroethane
1,4-Dioxane
Methyl ethyl ketone
Styrene
Ethylbenzene
Toluene
m-Xylene
o & p-Xylene(s)

REFINERY HAZARDOUS CONSTITUENT SEMIVOLATILES
EPA METHOD 8270

Anthracene
Benzo(a)anthracene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(a)pyrene
bis(2-Ethylhexyl)phthalate
Butylbenzyl phthalate
Chrysene
Dibenz(a,h)anthracene
Di-n-butyl phthalate
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
Diethyl phthalate
7,12-Dimethylbenzanthracene
Dimethyl phthalate
Di-n-octyl phthalate
Fluoranthene
Indene
1-Methylnaphthalene
Naphthalene
Phenanthrene
Pyrene
Pyridine
Quinoline
Benzenethiol
o-Cresol
p & m-Cresol
2,4-Dimethylphenol
2,4-Dinitrophenol
4-Nitrophenol
Phenol

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
250 EAST BROADWAY, SUITE 200, SALT LAKE CITY, UTAH 84111-2480 (801) 521-9255

August 26, 1988

RECEIVED
AUG 30 1988
GROUND WATER BUREAU

Mr. Bill Olsen
Hydrogeologist
Ground Water Bureau, EID
P.O. Box 968
Santa Fe, NM 87504-0968

Subject: Proposal: Ground Water Remediation Plan For Maverik Country Stores, Inc., Kirtland, New Mexico, Refinery Tank Farm

Dear Bill:

As per our previous conversations, we have enclosed in outline form for your review and comments our proposed Ground Water Remediation Plan for Maverik Country Stores, Inc., refinery tank farm in Kirtland, New Mexico. (Attachments 1 and 2). The proposed plan is presented in two phases. Phase II is presented as a backup plan, although it is unlikely that it will be implemented and only if warranted by the results of the Phase I pilot project. Both phases utilize ground water pumping and treatment and trenches for ground water interception and recharge.

The Phase I plan utilizes soil vapor recovery whereas the Phase II plan, similar to the Phase I plan, utilizes bioreclamation. If the Phase I soil vapor recovery pilot testing program is successful, a full-scale active soil vapor recovery system will be completed. Plates 1 and 2 attached illustrate the locations of the components of the Phase I and II plans, respectively.

The southwest corner of the tank farm has been the source area for ground water contamination detected off-site. Consequently, the proposed clean-up and control efforts have been concentrated in this area. Since the southwest corner of the tank farm is hydraulically downgradient from the contaminated soils to the north, any ground waters which may become contaminated in the northern part of the tank farm would ultimately flow south and would be collected by the proposed ground water recovery system.

As we agreed, the proposed Ground Water Remediation Plan is presented in outline form for your initial review and comments. Upon receiving your comments, we will finalize a more detailed and refined plan and if appropriate, will be happy to meet with you to discuss in detail the individual components of the plan.

We are looking forward to receiving your review comments so that negotiations can proceed as scheduled with a final Remediation Plan to be completed in the fall of 1988. This will allow us to proceed with at least the initial phase of remediation, that of installing the pipeline that is required to contain the Westside Irrigation Ditch waters. Because the Westside Irrigation Ditch flow is typically shut down in late November with flows resuming the following spring, piping would need to be completed during this time period.

If you have any questions on the enclosed, please do not hesitate to contact us at (801) 521-9255. As per your request, we have also sent a copy of this proposal to Dave Tomko in your Farmington office.

Very truly yours,

DAMES & MOORE

Peter F. Olsen
Associate

Terry D. Vandell
Project Hydrogeologist

PFO/TDV/fl

cc: Mr. Bill Call, President (with attachments)
Maverik Country Stores, Inc.

Mr. Vince Memmott (with attachments)

Mr. Dave Tomko (with attachments)

PROPOSED GROUND WATER REMEDIATION PLAN FOR MAVERIK COUNTRY STORES, INC. KIRTLAND, NEW MEXICO REFINERY TANK FARM

PHASE I PLAN

The Phase I Plan consists of ground water pumping, treatment and discharge, and a pilot-scale investigation of soil vapor recovery in the southwest area. If soil vapor recovery proves successful, the system will be expanded to include the entire southwest area. Phase II soil flushing and bioreclamation would be implemented in this area only if soil vapor recovery is determined to be infeasible in the southwest area.

The components of the Phase I Plan include the following, as shown on Plate 1 and as designated by the following numbers:

1. The Westside Irrigation Ditch waters which flow along the entire western edge of the tank farm property boundary will be contained in 12-inch diameter plastic pipe to prevent contamination of the irrigation waters.

2. The refinery sludge in the eastern part of the tank farm will be removed and disposed of and backfilled with clean soil.

3. The existing north-south interceptor trench will be backfilled to prevent interference with ground water recovery and recharge trenches.

4. Two additional off-site monitor wells will be constructed to monitor the effectiveness of remediation off-site, downgradient to the south and southwest of the tank farm. Water levels will be measured and samples analyzed for volatile organics (aromatic and halogenated) from these two new monitor wells and existing monitor wells MW9, MW10 and MW13 three times in year 1, two times in year 2, one time in year 3, with monitoring only as needed thereafter.

5. A 15-foot deep 3-foot wide, 200-foot long east-west ground water interceptor trench, backfilled with coarse gravel, will be constructed in the southwest area.

6. One dual recovery pump system (i.e., a drawdown pump and skimmer pump in a 2-foot diameter, 20-foot deep well) will be installed in the interceptor trench.

7. Primary product recovery, with separation of the ground waters pumped from the interceptor trench skimmer pump, will be piped to the 2.4 million gallon capacity tank on-site.

8. Ground waters (48 gpm capacity) from the interceptor trench well will be treated by air stripping.

9. Treated water from the interceptor trench well will be discharged to a shallow recharge trench downgradient (about 4 feet deep, 2 feet wide, 200 feet long and backfilled with gravel), that will be constructed with eleven 20-foot deep recharge wells into the more permeable sands and gravels, at 20 foot spacings in the base to create a ground water mound (hydraulic barrier) to prevent potential off-site contaminant movement.

10. A pilot-scale investigation of soil vapor recovery will be conducted in the southwest area in the unsaturated zone, with scale up if successful to an active recovery system.

PHASE II PLAN

The Phase II Plan will be implemented only if the Phase I pilot-scale soil vapor recovery efforts in the southwest area prove unsuccessful. The Phase II Plan consists of increased ground water pumping and treatment for soil flushing and bioreclamation in the southwest area.

The components of the Phase II Plan include the following, as shown on Plate 2 and as designated by the following numbers:

1.* The Westside Irrigation Ditch waters which flow along the entire western edge of the tank farm property boundary will be contained in 12-inch diameter plastic pipe to prevent contamination of the irrigation waters.

2.* The refinery sludge in the eastern part of the tank farm will be removed and disposed of and backfilled with clean soil.

3.* The existing north-south interceptor trench will be backfilled to prevent interference with ground water recovery and recharge trenches.

4.* Two additional off-site monitor wells will be constructed to monitor the effectiveness of remediation off-site, downgradient to the south and southwest of the tank farm. Water levels will be measured and samples analyzed for volatile organics (aromatic and halogenated) from these two new monitor wells and existing monitor wells MW9, MW10 and MW13 three times in year 1, two times in year 2, one time in year 3, with monitoring only as needed thereafter.

5.* A 15-foot deep 3-foot wide, 200-foot long east-west ground water interceptor trench, backfilled with coarse gravel, will be constructed in the southwest area.

6. Two dual recovery pump systems will be constructed in the interceptor trench (i.e., drawdown and skimmer pumps in two 2-foot diameter, 20-foot deep wells).

7.* Primary product recovery, with separation of the ground waters pumped from the interceptor trench skimmer pump will be piped to the 2.4 million gallon capacity tank on-site.

8. Ground waters (scale-up to 96 gpm capacity) from the interceptor trench wells will be treated by air stripping.

---

* Already Completed in Phase I

ATTACHMENT 2 (Continued)

9. Treated water from the interceptor trench well will be discharged to a shallow recharge trench downgradient (about 4 feet deep, 2 feet wide, 200 feet long and backfilled with coarse gravel), that will be constructed with eleven 20-foot deep recharge wells into the more permeable sands and gravels at 20 foot spacings in the base to create a ground water mound (hydraulic barrier) to prevent potential off-site contaminant movement. Up to 48 gpm will be recirculated to an upgradient infiltration gallery (a shallow trench lined along the northern face and designed with wells, similar to the downgradient recharge trench) to serve in flushing contaminants and supplying nutrients and oxygen through the aquifer and the unsaturated zone to enhance bioreclamation.

10. A pilot-scale bioreclamation program will be conducted in the southwest area with mixing facilities and chemical feed addition and aquifer flushing, with scale-up if successful.

FILE ____ BY ____ DATE ____ CHECKED BY ____ DATE ____

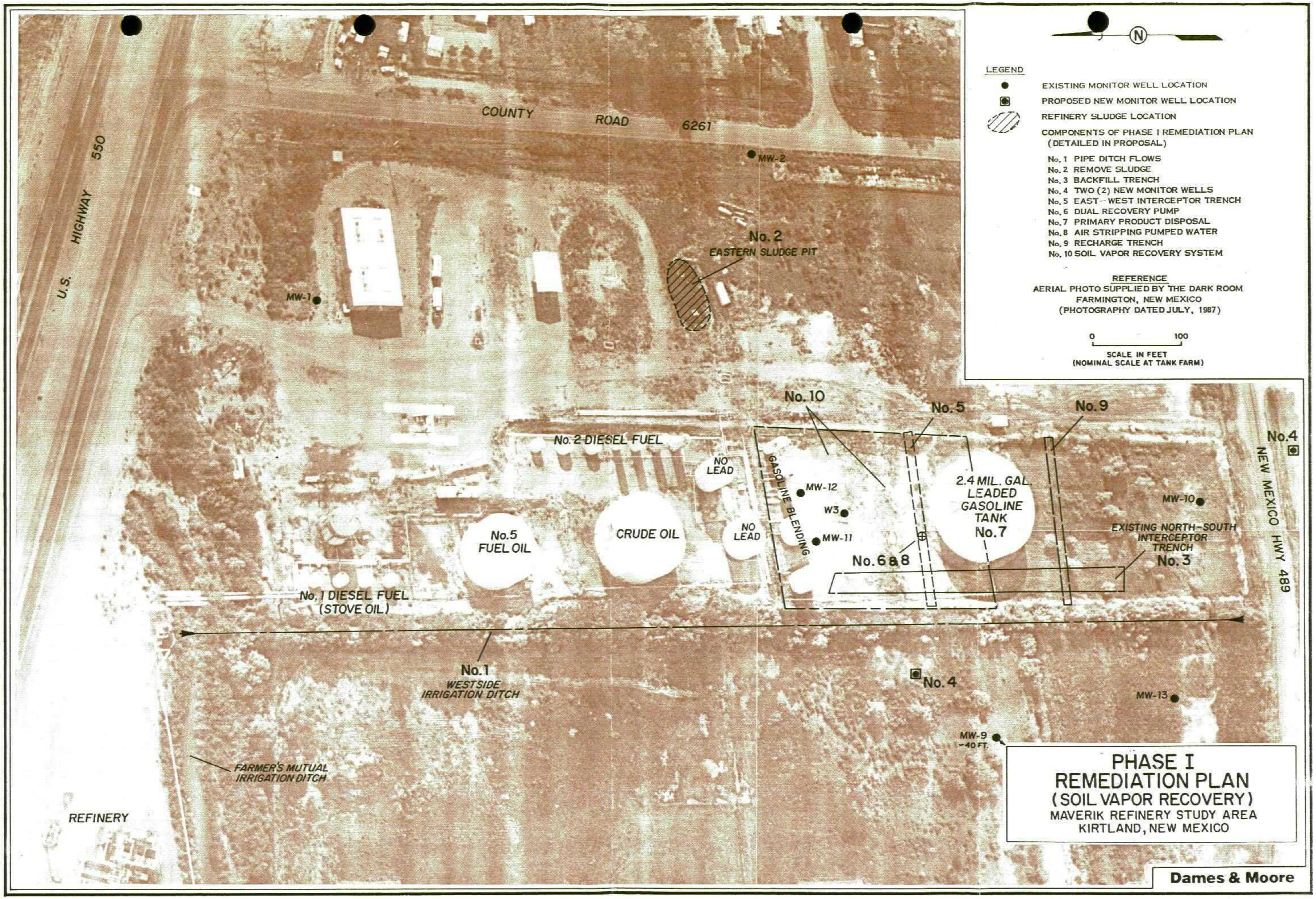
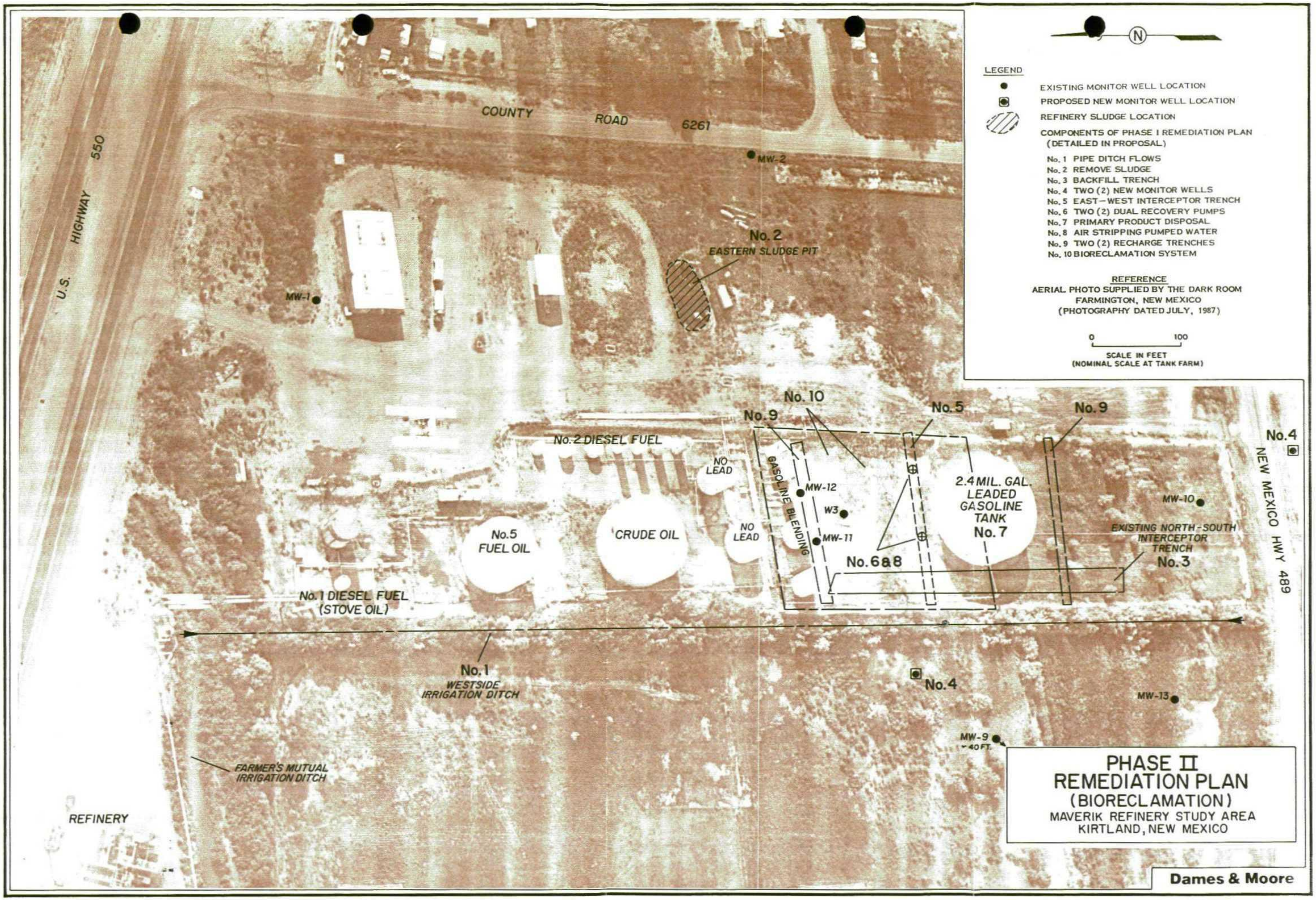


PLATE 1

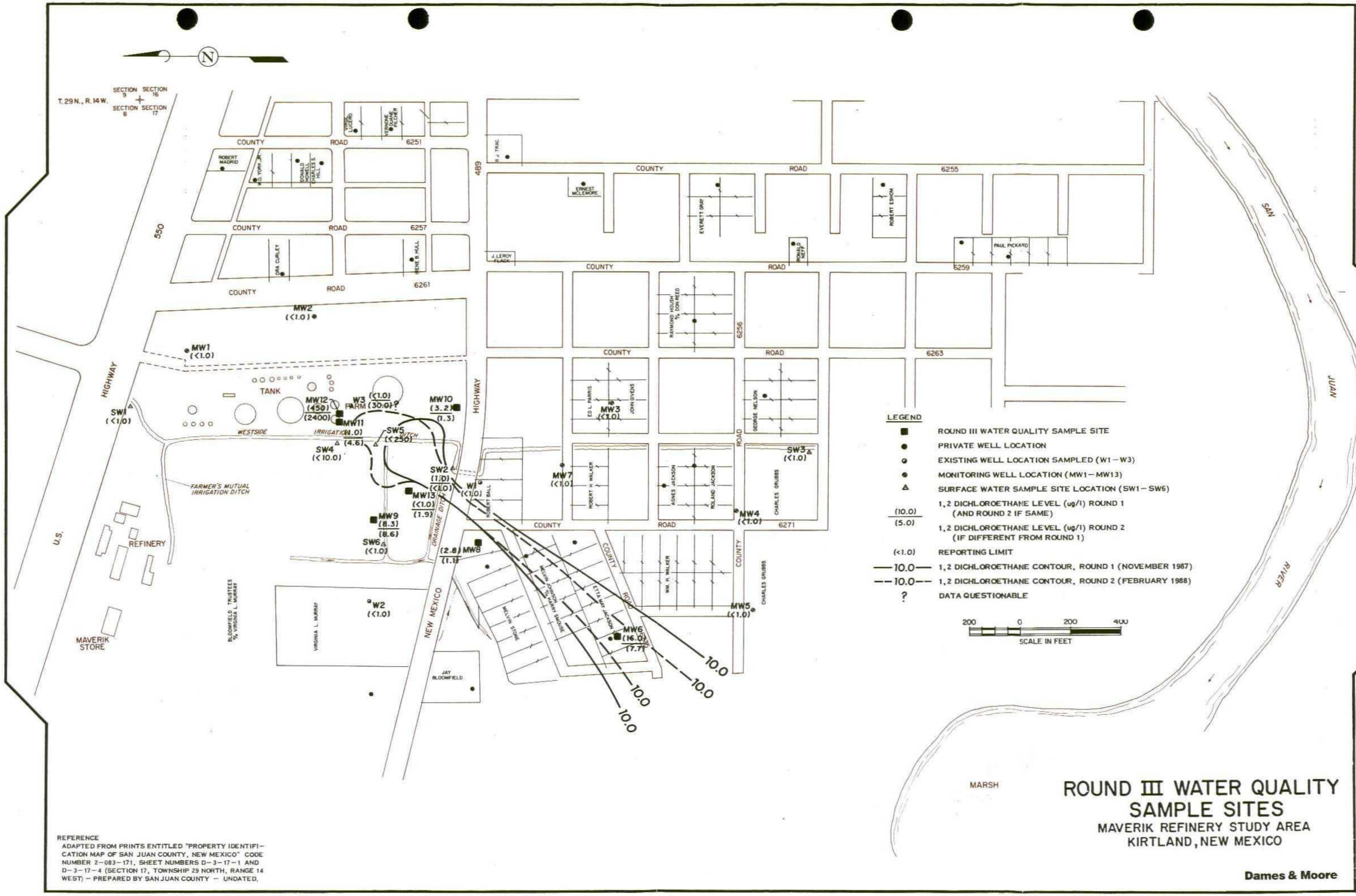
46612 (11-82)

FILE ______ BY ______ DATE ______ CHECKED BY ______ DATE ______



466.12 (11-82)

PLATE 2



ROUND III WATER QUALITY SAMPLE SITES

MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO

Dames & Moore

PLATE 1

GW

PART B: SITE OR AREA INFORMATION (Complete for Each Site Identified) 08/17/88

Last Revised: 03/19/87

I. Site ID: 001670 Agency Name (same as Part A): Environmental Improvement Division State: New Mexico

Respondent: ~~Steven Cary~~

II. DESCRIPTION OF CLOSED OR RESTRICTED SITE

What is the *name* of the site? Caribou - Four Corners Refinery

Where is it located? (give address, city, county and zip code) ____

City: ____ County: ____ Zip Code: ____-____

What type of site is involved? (check all that apply)

___ Land Area X Surface Waters X Groundwater ___ Waste Lagoon/Pond ___ Buildings ___ Other (specify):

How many groundwater wells have been restricted or closed? 3 (Mark 'UNK' if unknown)

What is the general character of toxic substances present? (check all that apply)

X Organic (other than petroleum fuel) ___ Inorganic (e.g. heavy metals, etc.) ___ Radionuclides ___ Petroleum Fuel ___ Other

Contaminants of Major Concern: DCA

Is the site on the U.S. EPA National Priorities List for 'Superfund' action? ___ Yes X No

If not on the National Priorities List, is it an EPA CERCLIS site? X Yes ~~X~~ No

Federal or State ID Number: ___ ____ (indicate whether Federal or State)

OMB Approval #: 0920-0194 Expiration Date: 10/89

PART B: SITE OR AREA INFORMATION (continued)

III. <u>NATURE OF LIMITATIONS ON SITE USE</u> (Complete those portions of this section that match the site or area type(s) checked previously.

LAND AREA SITES (Complete this portion if you checked LAND AREA)

___ 1. Site is CLOSED for all uses

___ 2. Site not totally closed, but following uses RESTRICTED:

___ a. Agriculture
___ b. Hunting, Gathering
___ c. Recreational
___ d. Other (specify): ______________________________

SURFACE WATER SITES (Complete this portion if you checked SURFACE WATERS)

___ 1. Site is CLOSED for all uses

___ 2. Site not totally closed, but following uses RESTRICTED:

___ a. Fishing and/or Shellfishing
___ b. Swimming and/or Boating
___ c. Drinking Water Supply
___ d. Other (specify): ______________________________

GROUNDWATER SITES (Complete this portion if you checked GROUNDWATER)

___ 1. Site is CLOSED for all uses

___ 2. Site not totally closed, but following uses RESTRICTED:

___ a. Drinking Water Supply
___ b. Irrigation
___ c. Commercial Food Processing
___ d. Other (specify): ______________________________

PART B: SITE OR AREA INFORMATION Continued)

WASTE POND/LAGOON SITES (Complete this portion if you checked WASTE POND/LAGOON)

___ 1. Site is CLOSED for all uses

___ 2. Site not totally closed, but following uses RESTRICTED:

___ a. Recreational
___ b. Hunting, Gathering
___ c. Other (specify): ______

BUILDING SITES (Complete this portion if you checked BUILDINGS)

___ 1. Site is CLOSED for all uses

___ 2. Site not totally closed, but following uses RESTRICTED:

___ a. Human Habitation
___ b. Other (specify): ______

IV. <u>PUBLIC'S NOTIFICATION</u> (check applicable items)

___ Area fenced or cordoned off	X Letter to private residents
___ Warning/instruction signs	___ Deed notice or restriction
X Media announcements	___ Other (specify): ______

V. <u>CURRENT STATUS OF SITE</u> (check applicable items)

___ Under Investigation	___ No Action Taken (since closed or restriction)
___ Clean up in Progress	___ Remediation Completed
___ Long Term Monitoring	___ Other (specify): ______

Have any site-related health studies been conducted on neighboring populations? ___ Yes ___ No

STATE OF NEW MEXICO HEALTH ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

[X] Telephone [ ] Personal	Time 9:30	Date 8/10/88

Originating Party	Other Parties
Terry Vandell - Dames & Moore (801) 521-9255	Bill Olson - EID/GW

Subject

Caribou - Maverick

Discussion

Called to inform that FS report should come to EID next week. I informed that I could not review before Sept. 2 because of San Jose comment period and paper I'm writing

D&M received bids from Lower Valley Water Users Association for water hook ups and sent to Maverick. Maverick indicated that it will take 3 to 4 weeks to process

Conclusions or Agreements

Distribution

file

Signed Bill Olson

STATE OF NEW MEXICO HEALTH ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 3:30 p	Date 8/2/88

Originating Party	Other Parties
Bill Olson - EID/GW	Terry Vandell - Dames & Moore

Subject

Caribou - Maverick Refinery

Discussion

Asked about residential hookups. She said Walkers asked to submit a bill. Dames & Moore had plumbing contractor with Lower Valley Water Users Association go to the Miller-Jackson residence to make estimate on hookups. They will send bill directly to Dames & Moore and Dames & Moore then will pay the contractor to hook them up.

Told her I reviewed the soils investigation and it looked good except they neglected to discuss high lead levels in eastern sludge pit.

Conclusions or Agreements

She acknowledged neglect of lead levels and said they will be addressed in FS

Distribution

file

Signed Bill Olson

RECEIVED

JUL 29 1988

GROUND WATER/HAZARDOUS WASTE
BUREAU

Failure to give water blamed on communications

By Tori Adams
Daily Times Staff

KIRTLAND — A company's failure to pay for good water service to two Kirtland homes — in exchange for the wells it contaminated — has been blamed on a state agency's failure to communicate.

And at least one Kirtland resident reported she had to pay about $700 to be connected to city water — despite the state agency's statements that the company had paid, instead.

Ellen Walker, whose well was contaminated by gasoline product spills from the Caribou Refinery, said she had to pay to get city water.

But the problem will be corrected soon, all parties involved said.

Tests by the state's Environmental Improvement Division revealed the Walker well and one other were contaminated by a gasoline additive and products such as benzene and toluene, EID Hydrologist Bill Olson reported from Santa Fe.

But Olson said he thinks the EID is responsible for the water connection problem, rather than Caribou. And he admitted the end result has been bad feelings between the affected residents and Caribou.

In a letter to the state agency a year ago, Caribou offered to pay to connect affected families' houses to city water, but apparently that information never was passed on to those people, Olson said.

Based on that letter, EID officials several times announced that Caribou had paid for the water connections — when it hadn't because no one had requested reimbursement, he added.

Mrs. Walker said she was told last week, by a representative of Caribou consultant Dames and Moore of Salt Lake City, to send a copy of her water connection bill. The representative promised payment soon, she added.

The Dames and Moore representative asked her to contact others affected to advise them they also should send bills in for reimbursement, she said.

Olson said a change in personnel at EID last year caused an oversight of the contamination case for four or five months — until he took over this spring.

Progress toward mitigating the damage to area ground water also is being made, he said. Dames and Moore's proposal to clean the ground water is due this week, Olson noted.

But he added that he expects it to be two or more weeks before he has a chance to evaluate the proposal and negotiate with Caribou representatives on the type of cleaning effort and when it will start.

He said he expects negotiations to start within about six months, and to take 10 to 21 years to complete. Anything involving ground water takes a long time, he explained.

The contaminated water probably will be pumped into a treatment facility where the oily materials could be skimmed off and resold to refineries, and the water soluble additives could be filtered out, he said.

When the treated water meets or exceeds state standards, it could be pumped back into the ground, he added.

The process would need to continue for 10 to 20 years to remove contaminates from all the affected ground water, he noted.

Farmington Daily Times
7-29-88

RECEIVED
AUG 01 1988
GROUND WATER/HAZARDOUS WASTE
BUREAU

Clarification

Environmental Improvement Division hydrologist Bill Olson said he did not think a story in Wednesday's Daily Times made it clear enough that the EID is not responsible for connecting Kirtland area residents to the public water supply.

Caribou, the owner of the Kirtland refinery where gasoline spilled years ago and contaminated well water, is responsible for paying for the water connections, Olson said.

Olson said Thursday that Caribou was notified in late October of the names of the two families who needed the public water connections because their wells were contaminated. The state did fail to check to see that Caribou had paid for the public water connections before announcing that the company had done so, he added.

cc: Bill Olson, GW
Tito O. Madrid

cc: Bill Olson
Tito O. Madrid

STATE OF NEW MEXICO
HEALTH ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

[X] Telephone [ ] Personal	Time 2:50 p	Date 7/26/88

Originating Party	Other Parties
Bill Olson - EID/GW	Terry Vandell - Dames & Moore

Subject

Caribou/Maverick Water Hookups

Discussion

I requested that she phone Ginger Miller as she had not talked to Dames & Moore yet about hookups. Terry stated that she informed Mrs. Walker to have the Miller-Jackson's submit estimates for hookups along with the Walkers receipts for their hookups.

Conclusions or Agreements

Dames & Moore will contact Ginger Miller about hookups

Distribution file

Signed Bill Olson

STATE OF NEW MEXICO
HEALTH ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

[X] Telephone [ ] Personal	Time 10:30a	Date 7/25/88

Originating Party	Other Parties
Bill Olson - EID/GW	Ginger Miller - resident adjacent to Caribou (598-5010)

Subject

Residential water hookups for Caribou residents

Discussion

Last Nov. Ginger got estimate from Queens Construction for laying water lines to house
estimate $500 for water lines
$400 for water meter / hook ups
She has 4 building units on site but only requests 3 hookups
She has not been contacted by Dames + Moore

Conclusions or Agreements

I will contact Dames + Moore and have them contact her

Distribution File

Signed Bill Olson

STATE OF NEW MEXCO
HEALTH ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 3:00 p	Date 7/22/88

Originating Party	Other Parties
Bill Olson	Terry Vandell - Dames & Moore

Subject

Residential Hookups, Caribou Refinery, Kirtland, N.M.

Discussion

D&M Brought up residential water hookups with William Call at Maverick. Terry contacted the Walkers and asked them to submit receipts for water hookups and they will pay

D&M contacted Air Quality about permits for air strippers and is looking at options for air stripping

EP Tox tests on sludge area ok

Conclusions or Agreements

Distribution
file

Signed [signature]

RANSMITTAL SHEET **Dames & Moore**

To: New Mexico Ground Water Bureau
Environmental Improvement Division
P. O. Box 968
Santa Fe, New Mexico 87504-0968

Date July 21, 1988

Your Order No.

Our Job No. 14819-005-31

Attention: Mr. Bill Olsen

Subject: Maverik Country Stores, Inc.
Kirtland, New Mexico Refinery

We are sending you via U.S. Mail the following

Report:
PHASE II SUBSURFACE SOIL AND SOLID WASTE
CONTAMINANT EVALUATION
MAVERIK REFINERY AND TANK FARM
KIRTLAND, NEW MEXICO
FOR MAVERIK COUNTRY STORES, INC.

This is ~~These are~~ for your information and file

No. of copies submitted: 2

Copies to: PFO
LRB

Dames & Moore

By T.D. Vandell

T. D. Vandell

114.6

STATE OF NEW MEXICO

HEALTH ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 10:30 am	Date 7/20/88

Originating Party	Other Parties
Bill Olson - EID/GW	Jerry Vandell - Dames & Moore

Subject

Maverick - Caribou Refinery, Kirtland N.M.

Discussion

Residents Bill Walker and Jackson - Millers never recieved payment for hookup to community water as promised by Caribou. Dames & Moore thought residents already paid

Problems with plates in Phase II report. Plates should be completed today and will express mail to me ASAP

Conclusions or Agreements Dames & Moore will be meeting with William Call of Maverick tomorrow to work out payment to residents

Distribution

file

Signed Bill Olson

July 13, 1988

Kathy Sisneros, Glenn Saums, Shelda Sutton-Mendoza, Ann Young, Alex Puglisi, Dennis McQuillan, Bill Olson, Maxine Goad, Lou Rose and Doug Jones

Please review the attached draft minutes of the July 12, 1988 WQCC meeting. If we do not have corrections/deletions/additions from you by 1:00 PM, Friday, July 15, we will assume that you have none.

Thank you.

Richard Mitzelfelt

Re: change in delegation of authority Caribou Refinery

NM WATER QUALITY CONTROL COMMISSION MEETING
JULY 12, 1988

The New Mexico Water Quality Control Commission met on Tuesday, July 12, 1988, at 9:00 am, in Room 341 of the State Capitol Building, Santa Fe, New Mexico with the following members in attendance:

Mr. Michael Burkhart, Chairman	Environmental Improvement Division
Mr. David Boyer	Oil Conservation Division
Mrs. Lynn Brandvold	Bureau of Mines and Mineral Resources
Mr. Wayne P. Cunningham	Department of Agriculture
Mr. David Johnson	State Park & Recreation Division
Ms. Ruth L. Kovnat	Member-at-Large
Mr. Steve Reynolds	State Engineer Office

Others present were:

Ms. Alicia Mason, Asst. Atty. General	Attorney General's Office
Patsy Sandoval, Recording Secretary	Environmental Improvement Division
Richard Virtue	Sutin, Thayor and Brown
Mary H. Smith	La Cienega Resident
Jodi Van Hewvelen	New Mexico Fellows
Thomas Wethington	New Mexico Utility Operator Advisory Board
Thomas P. Miller	New Mexico Utility Operator Advisory Board
Oscar Lackey	General Electric
Ken Burns	General Electric
Claude Suhleyer	Geoscience Consultants
Alberto A. Gutierrez	Geoscience Consultants
Dorothy Boynton	League of Women Voters
Ken Thompson	City of Santa Fe
Thomas E. Baca	City of Santa Fe
David Stoliker	City of Santa Fe
Ernest E. Gonzales	USDA-SCS
Doug Jones	Environmental Improvement Division
Bill Bartels	Environmental Improvement Division
Dennis McQuillan	Environmental Improvement Division
Bill Olson	Environmental Improvement Division
Alex A. Puglisi	Environmental Improvement Division
Shelda Sutton Mendoza	Environmental Improvement Division
David Tague	Environmental Improvement Division
Kathleen M. Sisneros	Environmental Improvement Division
Richard Mitzelfelt	Environmental Improvement Division
Glenn Saums	Environmental Improvement Division
Dedie Snow	Environmental Improvement Division
Ann Young	Environmental Improvement Division
Neil Williams	Environmental Improvement Division
Shelda Sutton-Mendoza	Environmental Improvement Division
Louis W. Rose	HED Office of General Counsel
Tracy Hughes	HED Office of General Counsel
John Constantine	Environmental Improvement Division
Maxine Goad	Environmental Improvement Division

Chairman Burkhart called the meeting to order at 9:05 am

AGENDA ITEM #1: Mr. David Boyer requested that the agenda be amended to include discussion and consideration by they Commission to allow him to write Mr. Jay H. Lehr, Editor, Ground Water Journal, in response to an editorial, on Commission stationer as agenda item #6. Mr. Richard Mitzelfelt requested that the agenda be amended to include a discussion on the EID/City of Santa Fe deadlock over the state certificatio of Santa Fe's proposed amended NPDES permit involving and relating to nitrate and total nitrogen issues as agenda item #7. David Johnson moved to have the agenda approved as amended. Steve Reynolds seconded the motion. Motion was unanimously adopted. (Side 1 CR 020)

AGENDA ITEM #2: Mr. Steve Reynolds moved for Commission approval of the June 14, 1988 minutes as amended. Ruth Kovnat seconded the motion. Motion was unanimously adopted. (Side 1 CR 080)

AGENDA ITEM #3: Mr. Alberto Gutierrez, Geoscience Consultant, Ltd. and Mr. Ken Burns, General Electric Co. presented information to the Commisison for consideration and action on the State's certification of General Electric's NPDES Permit for stormwate Mr. Steve Reynolds made a motion to have the Commisison authorize and instruct EID to amend the NPDES Permit certification by removing any effluent limitation on COD. Mr. Reynolds stated that this was with the understanding that monitoring of COD is still required and that if and when some problem daylights the certification can be amended and the problem can be corrected. These last two points are not a part of the motion. Mr. Wayne Cunningham seconded the motion. Mr. David Boyer amended Mr. Reynolds motion to include a provision that the EID come back to the Commission within two years or at the end of a two year period to brief the Commision on what has happened, with respect to negotiations concerning the NPDES permit and certification. Mr. Reynolds accepted the amendment. Mr. Cunningham seconded the amendment. Motion was unanimously adopted. (Side 1 CR 90).

AGEND ITEM #4. Mr. Alex Puglisi, Environmental Improvement Division; Mr. Thomas Wethington and Mr. Thomas P. Miller of the New Mexico Utility Operators Certification Board presented five names and resumes to the Commission for their approval and appointment to the New Mexico Utility Operators Certification Advisory Board to serve three year terms. Mr. David Salcido and Mr. Frank Joe Bailey were presented as Board members and Mr. Fred Ragsdale, Mr. Gary Martinez and Mr. Gilbert Morales as alternates. Mr. David Johnson moved that the Commission certify the representatives as presented by the Board. Mr. Steve Reynolds seconded the motion. Motion was unanimously adopted.
(Side 4 CR 831)

AGENDA ITEM #5. Mr. David Boyer, Mr. Dennis McQuillan and Mr. Bill Olson presented information for discussion and requested a change of delegation of authority from Oil Conservation Division to the Environmental Improvement Division allowing EID to work on the Caribou/Maverick Refinery, Kirkland, New Mexico case and to have legal authority over cleanup actions at the refinery. Mr. David Boyer requested, for this particular instance (for remedial action only, not in permitting) that the delegation of responsibility be returned to EID for this refinery. Steve Reynolds made a motion to approve this request. Ruth Kovnat seconded the motion. Motion was unanimously adopted.
(Side 4 CR 950)

AGENDA ITEM #6. Mr. David Boyer presented a letter to the Commission written to Dr. Jay H. Lehr, Editor, Ground Water Journal, in response to an editorial printed in the May-June issue. Mr. Boyer requested permission to send this letter out under

Water Quality Control Commission Stationery. Mr. Steve Reynolds made a motion to approve Mr. Boyer's request. Ms. Lynn Brandvold seconded the motion. Motion was unanimously adopted.
(Side 4 CR 1034)

AGENDA ITEM #7. Mr. Richard Mitzelfelt, EID; Louis Rose, HED Legal Counsel and Mr. Thomas E. Baca, City Manager, City of Santa Fe presented information for discussion on the EID/City of Santa Fe deadlock over the State's certification of Santa Fe's proposed amended NPDES permit involving and relating to nitrate and total nitrogen issues. Mr. David Johnson made a motion to table the issue until the next meeting and take it up as an official agenda item (which would provide proper public notice) allowing all interested parties to prepare more information before the Commission takes action on this issue. After further discussion, Mr. David Johnson amended his motion to have this item brought before the Commission at the September meeting instead of the August meeting. Ms. Ruth Kovnat seconded the motion. Motion was unanimously adopted.
(Side 4 CR 1100)

AGENDA ITEM #8: Mr. Wayne Cunningham moved to have the Commission go into executive session for the report on litigation. Mr. Dave Johnson seconded the motion. Motion was unanimously adopted. The Commission returned to public session. Meeting adjourned at 12:50 pm.

STATE OF NEW MEXICO

WATER QUALITY CONTROL COMMISSION

CONSTITUENT AGENCIES:

Environmental Improvement Division
State Engineer & Interstate Stream Commission
Game and Fish Department
Oil Conservation Division
Department of Agriculture
State Park & Recreation Division
Soil and Water Conservation Division
Bureau of Mines and Mineral Resources
Member-at-Large

PROPOSED AGENDA*

NM WATER QUALITY CONTROL COMMISSION MEETING
Tuesday
July 12, 1988
9:00 AM
Room 341, Capitol Building
Santa Fe, New Mexico

---

1. Approval of Agenda.

2. Review and approval of the minutes of the June 14, 1988 Water Quality Control Commission meeting.

3. Consideration and action by the Commission on the state's certification of General Electric's NPDES Permit for stormwater.

4. Appointment of two members to the NM Utility Operators Certification Advisory Board.

5. Discussion and request by the Environmental Improvement Division and the Oil Conservation Division to change the delegation of authority allowing EID to work on the Caribou/Maverick Refinery, Kirkland, New Mexico case and to have legal authority over cleanup actions at the refinery.

6. Report on litigation.

*The Commission is not confined to the items listed on the agenda. Other items may be considered that are not listed on the agenda.

P.O. Box 968
Santa Fe, New Mexico 87504-0968

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

ENVIRONMENTAL IMPROVEMENT DIVISION

Michael J. Burkhart
Director

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

MEMORANDUM

TO: Dennis McQuillan, Water Resource Spec. III, Technical Support Section

FROM: Bill Olson, Water Resource Spec. II, Technical Support Section WO

RE: Summary of Remedial Actions at the Caribou-Maverick Refinery and Tank Farm, Kirkland, New Mexico

DATE: July 11, 1988

The following summarizes, in chronological order, the major events and remedial actions undertaken since the EID Technical Support Section began overseeing the remediation of the old Caribou-Maverick Refinery and Tank Farm:

September 11, 1986 - NM Oil Conservation Division (OCD) refers clean up of contaminated ground water from past refinery operations to EID Superfund Section due to lack of staff for a technical review of the case.

December 31, 1986 - Case assigned to EID Technical Support Section. Caribou directed to submit a remedial investigation proposal and to provide drinking water to nearby residents with contaminated water wells.

February 16, 1987 - Caribou submits Proposed Work Plan to Evaluate Ground Water Contamination, Caribou Four Corners, Inc. Refinery to EID.

April 2, 1987 - EID contacts local residents about analyzing private water wells and performs door to door survey of residents well water.

May 11, 1987 - EID, with conditions, approves Proposed Work Plan to Evaluate Ground Water Contamination at the refinery.

July 30, 1987	- Caribou requests consent of access for soil gas survey and installation of monitor wells from local landowners.
August 14, 1987	- Caribou completes soil gas survey and agrees to pay for community water supply hookups of private water well users with contaminated drinking water.
November 12, 1987	- Monitor wells and private water well survey completed. Caribou sets schedule of work to be performed at the site.
December 10, 1987	- Preliminary Ground Water Evaluation, Caribou-Maverick Refinery and Farm Tank submitted to EID. Report covers field and lab work performed to date.
December 15, 1987	- Meeting between EID and Caribou-Maverick officials to set deadlines for investigation reports.
March 1, 1988	- Phase I Hydrogeologic Evaluation, Caribou-Maverick Refinery and Tank Farm submitted to EID.
March 21, 1988	- Westside Irrigation Ditch cleaned of free floating product. Interception trench installed upgradient of Westside Irrigation Ditch to capture free product that was seeping into the ditch.
March 25, 1988	- Phase II Hydrogeologic Investigation proposal submitted to EID. Report covers source investigations and soil contamination by means of a soil boring and sampling program.
April 4, 1988	- EID approves of proposed Phase II Hydrogeologic Investigation with some modifications.
April 27, 1988	- Phase II field investigation complete. A total of 25 borings were performed in various potential source areas of the refinery.
May 27, 1988	- Addendum to Phase I Hydrogeologic Evaluation submitted to EID. Report includes a second round of water quality analyses performed during February of 1988.

Bill,

This was on the front page of the Sunday paper

RECEIVED

JUL 11 1988

GROUND WATER/HAZARDOUS WASTE
BUREAU

7-3

Cleanup of Kirtland ground, water contamination near?

By Tori Adams
Daily Times Staff

The full extent of ground and water contamination around Caribou Refinery in Kirtland will be known soon and cleaning up the chemicals could begin this fall.

Contamination from gasoline additives was found more than a year ago in two private water wells near the refinery, said David Tomko of the state Environmental Improvement Division's Farmington office.

More of the contamination by carcinogenic gasoline additives was found seeping into an irrigation ditch on the border of the property in March, Tomko added.

Shortly after the contamination was found the Afton, Wyoming-based, Caribou-Four Corners agreed to study the extent of the problem, report back to the EID and then clean up the contamination, Tomko said.

Caribou's consulting firm of Dames and Moore of Salt Lake City is due to submit its report before the end of July and cleanup efforts should be able to start sometime this fall, said Bill Olson, a hydrologist with EID's groundwater division in Santa Fe.

"It's nice that things are moving along out there now," Olson added.

Minor contamination from the EDC was found in the two private wells last summer. Caribou, which is now being called Maverick Country Stores, paid to hook up the two families who had depended on the wells to public water sources, he said.

When diesel fuel was discovered seeping into the Westside Irrigation Ditch in March, Caribou built an interception device to catch the fuel before it reached the ditch. The device was in place before the irrigation season started, Olson said.

The refinery closed in April 1982.

Caribou was cooperative and responded quickly to that fuel seepage problem, he added.

Preliminary results indicate that contamination ranges from slight in the water wells to concentrations of xylene as high as 57,000 ppb near the ditch, he said.

All the gas additives are water soluble and are considered harmful and carcinogenic. However, the EDC does not contain enough lead to cause lead poisoning, he said.

During the study, Dames and Moore representatives drilled monitor wells to determine the extent and severity of groundwater contamination and went over the area around and below the refinery with a soil gas sniffer to identify plumes of gasoline contamination.

Contamination has not yet reached the San Juan River, Olson said.

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

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

July 8, 1988

M E M O R A N D U M

TO: TOM BAHR, Secretary, EMNRD
THROUGH: WILLIAM J. LEMAY, Director, OCD
FROM: DAVID G. BOYER, Environmental Bureau Chief

SUBJECT: WATER QUALITY CONTROL COMMISSION, JULY MEETING

You have asked to be kept informed of Commission issues affecting this Division and the Department. Agenda Item #5 to be presented at the July meeting directly affects activities of the OCD and a brief explanation of background issues will be helpful.

In early 1986 EID's Superfund group tested ground water and domestic wells near the inactive Caribou/Maverick Refinery at Kirtland and found hydrocarbon contamination with characteristics similar to refinery fluids. A solvent used in the refinery process was also detected. Since domestic wells were affected, Superfund listing was a possibility. The company was anxious to take immediate action to investigate and propose site remedial action under state regulations to avoid federal Superfund listing. State involvement in similar remedial actions has required an estimated 1/8 to 1/4 man-year for each site. Both technical and legal time is required to review and negotiate state settlement agreements that may run for 20 years or longer to achieve ground water cleanup.

As I am OCD's only hydrogeologist and have multiple technical and administrative responsibilities that include permitting at active and proposed facilities and supervision of ground water clean-up, I declined on behalf of OCD to take the lead role for this action unless and until I had adequate additional technical staff, or until current high priority projects were completed. I notified EID of my position and authorized them to procede independently with investigation and remedial actions at the facility. I also agreed to support WQCC action to formalize this remedial agreement as long as my staffing and/or workload is at current levels. The OCD retains the water quality authority for permitting if the refinery again becomes operational.

If you need additional information please contact me at 827-5812.

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

ENVIRONMENTAL IMPROVEMENT DIVISION

Michael J. Burkhart
Director

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

July 8, 1988

Linda Rock
Dames and Moore
1626 Coal Blvd.
Golden, Colorado 80401-3387

Dear Ms. Rock:

Included with this letter you will find a copy of the Procedures for the Disposal of Investigation Wastes at Petroleum Contamination Sites. These disposal procedures were developed by the Underground Storage Tank Section of the New Mexico Environmental Improvement Division (EID). These disposal procedures are applied to non RCRA petroleum wastes in the state of New Mexico. Regarding Qir Quality permits the Air Quality Bureau of EID issues emergency Air Quality permits for air stripper operations. The Air Quality Bureau must be contacted before operation of the air stripper begins. Contact either Jim Shively (827-0068), Bob Kirkpatrick (827-0067) or Bruce Nicholson (827-0078) regarding air quality permits.If you have any questions please call me.

Sincerely,

Bill Olson

Bill Olson
Hydrologist
Ground Water Bureau/Technical Support

BO/js

Enclosures

UNDERGROUND STORAGE TANK PROGRAM
PROCEDURE FOR THE DISPOSAL OF INVESTIGATION WASTES
AT PETROLEUM CONTAMINATION SITES

OCTOBER 26, 1987

Investigation wastes are materials generated during the investigation of contamination sites. These include contaminated drill cuttings; earth materials excavated during tank removal; trenching or soil auguring; water produced during well evacuation for sampling; water produced during aquifer testing or well development procedures, and any other earth materials or water which is contaminated beyond a predetermined threshold level.

The Underground Storage Tank Program (UST) has developed simple procedures for handling investigation wastes from petroleum leaks and spills. These procedures have been developed after early testing indicated that gasoline-contaminated soils were not EP toxic using standard EPA methods and thus did not satisfy the criteria for being Hazardous Wastes as defined in RCRA. These procedures are appropriate for hydrocarbon fuel contamination sites, however, other procedures might have to be developed for wastes generated by other types of leaks. These procedures are as follows:

1. Hydrocarbon saturated soils must be removed from the site and disposed of at a landfill approved by the UST program. A simple criteria as to whether a soil is "saturated" is to observe whether the soil has observable free hydrocarbon product or whether fuel will drain freely when the soil is suspended on filter paper. If free fuel is present, then the soil must be removed from the site and properly disposed. Non-saturated soils or drill cuttings may be left in place or on site.

2. Criteria for approval of a landfill for disposal of petroleum saturated hydrocarbons. The landfill must be at a location where the depth to ground water be at least 100 feet. The vadose zone must have a saturated hydraulic conductivity of less than 0.01 cm/sec. The Ground Water Bureau must approve the landfill in advance of disposal. The responsible party must locate an appropriate landfill and gain the necessary approvals from the landfill management. UST will provide technical advice to the landfill, but cannot give them waivers of responsibility for environmental liability.

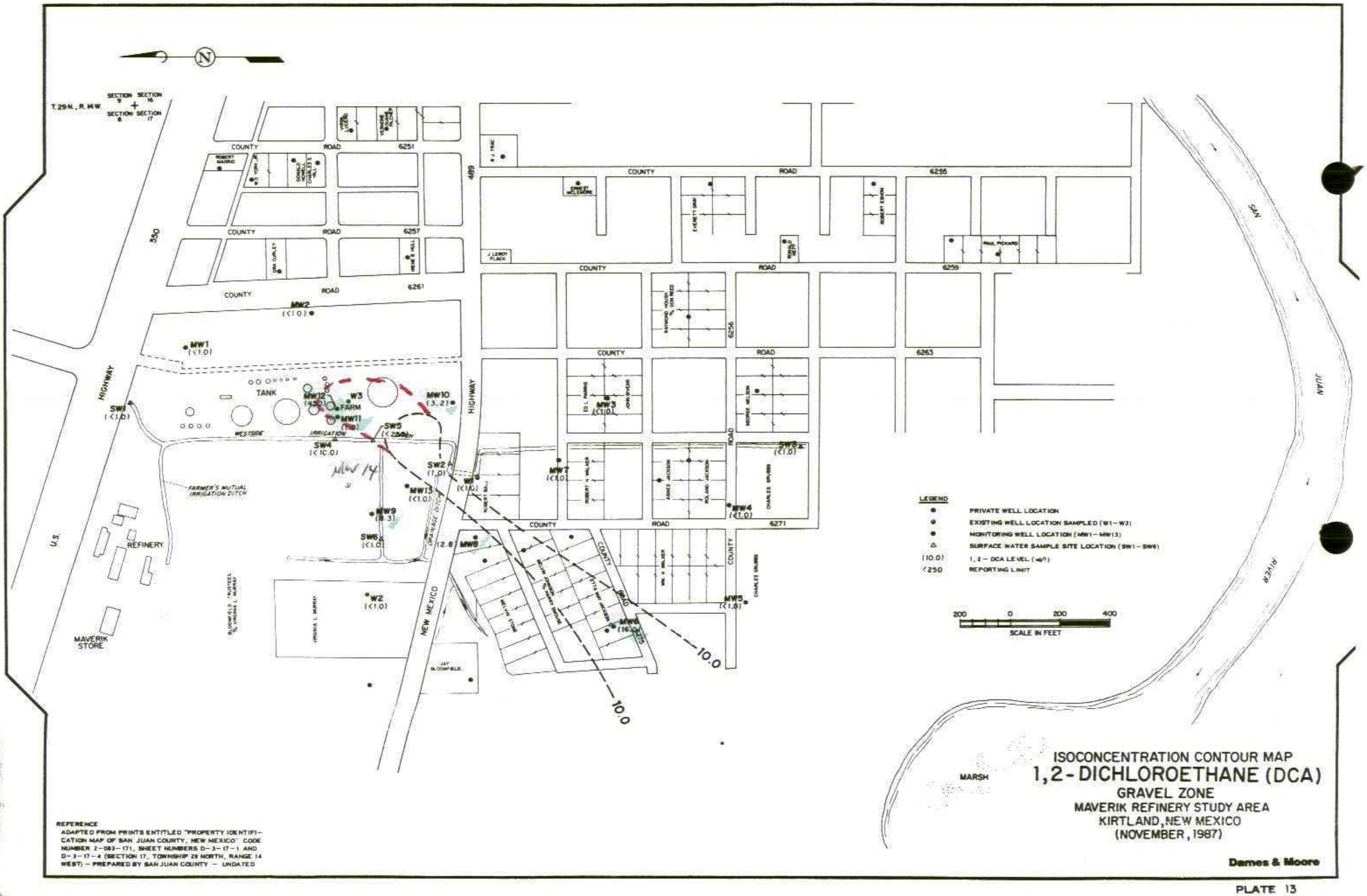
3. Disposal of hydrocarbon saturated soils at a landfill approved for that purpose. Such disposal shall be in no more than six-inch lifts on the ground surface. Wastes are not to be buried.

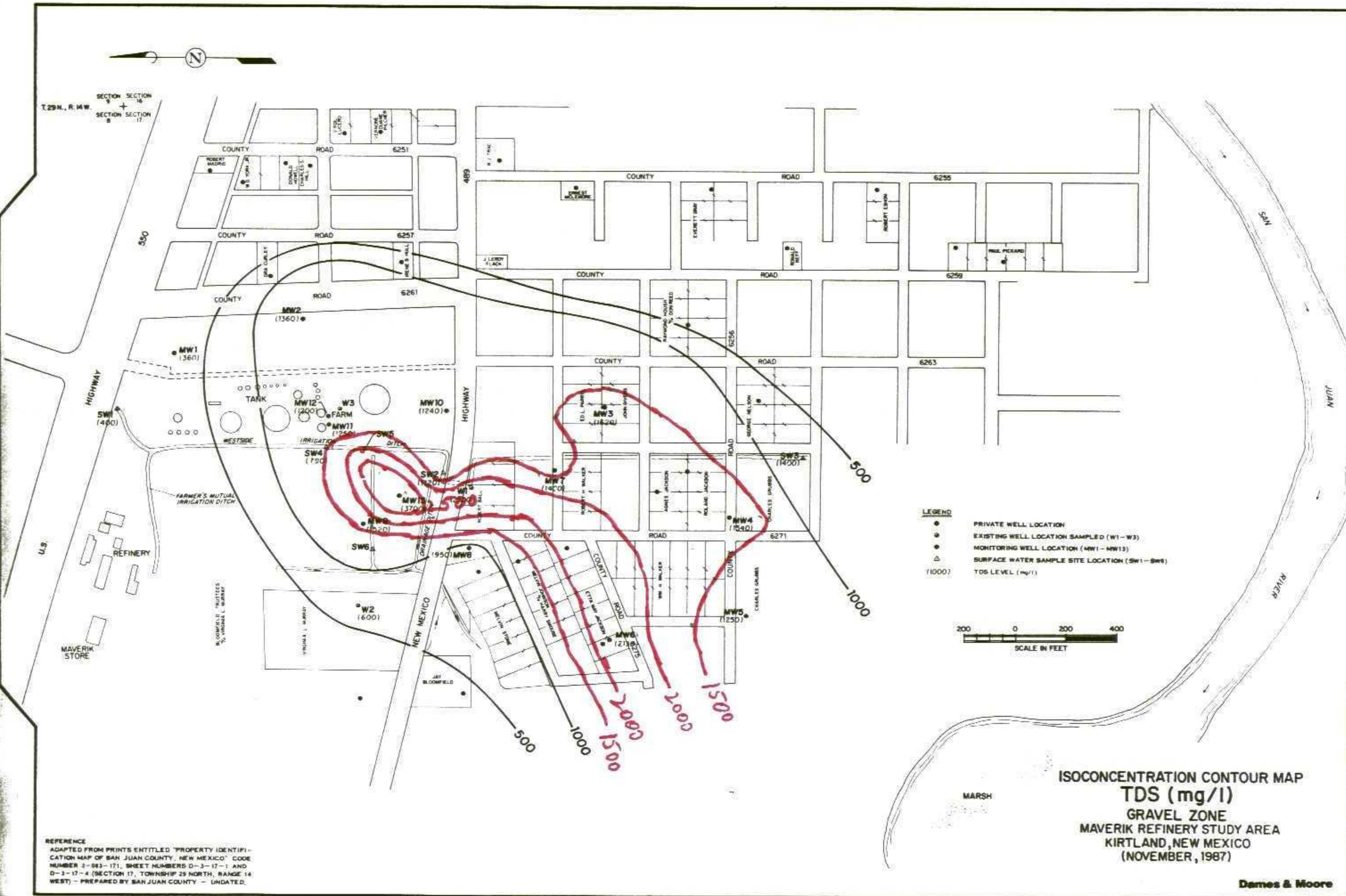
4. <u>Hydrocarbon-contaminated water produced during sampling may be disposed onto the ground provided that this provides no danger to public health or safety</u>.

5. <u>Hydrocarbon-contaminated water produced during well development procedures or small-volume aquifer tests is allowed to be discharged onto the ground if the following conditions are met</u>. Such disposal is allowed provided that the total amount is not greater than 2000 gallons and that the disposal is done pursuant to an approved remedial action plan or has been otherwise approved by the Ground Water Bureau, and provided that such disposal does not pose a threat to public health or safety. This type of disposal is allowed only within the area of existing groundwater contamination.

6. <u>Disposal of volumes of contaminated water in excess of 2000 gallons</u>. Such disposal is allowed only after a "Notice of Intent to Discharge" pursuant to Section 1-201 of the Water Quality Control Commission (WQCC) Ground Water Regulations has been evaluated by the Ground Water Section of the Environmental Improvement Division or a " Good-cause Permission to Discharge Without a Discharge Plan" has been approved by the Bureau Chief of the Ground Water Bureau, EID pursuant to Section 3-106.B. of the WQCC Ground Water Regulations.

7. <u>Disposal of recovered petroleum fuel is never allowed on site</u>. All petroleum products must be removed from the site and taken to an approved recycling facility.


ISOCONCENTRATION CONTOUR MAP
1,2-DICHLOROETHANE (DCA)
GRAVEL ZONE
MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO
(NOVEMBER, 1987)
LEGEND
PRIVATE WELL LOCATION
EXISTING WELL LOCATION SAMPLED (W1–W3)
MONITORING WELL LOCATION (MW1–MW13)
SURFACE WATER SAMPLE SITE LOCATION (SW1–SW6)
(10.0) 1,2 – DCA LEVEL (ug/l)
‹250 REPORTING LIMIT
200 0 200 400
SCALE IN FEET
SAN JUAN RIVER
MARSH
T.29N., R.14W.
SECTION 9 SECTION 16
SECTION 8 SECTION 17
U.S. HIGHWAY 550
NEW MEXICO HIGHWAY 489
COUNTY ROAD 6251
COUNTY ROAD 6257
COUNTY ROAD 6261
COUNTY ROAD 6255
COUNTY ROAD 6259
COUNTY ROAD 6263
COUNTY ROAD 6256
COUNTY ROAD 6271
COUNTY ROAD 6275
REFINERY
MAVERIK STORE
TANK FARM
WESTSIDE IRRIGATION DITCH
FARMER'S MUTUAL IRRIGATION DITCH
DRAINAGE DITCH
MW1 (<1.0)
MW2 (<1.0)
MW3 (<1.0)
MW4 (<1.0)
MW5 (<1.0)
MW6 (16.0)
MW7 (<1.0)
MW8 (2.8)
MW9 (8.3)
MW10 (3.2)
MW11
MW12
MW13 (<1.0)
W1 (<1.0)
W2 (<1.0)
W3
SW1 (<1.0)
SW2 (1.0)
SW3 (<1.0)
SW4 (<10.0)
SW5 (<250)
SW6 (<1.0)
10.0
10.0
MW 14
REFERENCE
ADAPTED FROM PRINTS ENTITLED "PROPERTY IDENTIFICATION MAP OF SAN JUAN COUNTY, NEW MEXICO" CODE NUMBER 2-083-171, SHEET NUMBERS D-3-17-1 AND D-3-17-4 (SECTION 17, TOWNSHIP 29 NORTH, RANGE 14 WEST) – PREPARED BY SAN JUAN COUNTY – UNDATED
Dames & Moore
PLATE 13



ISOCONCENTRATION CONTOUR MAP
TDS (mg/l)
GRAVEL ZONE

MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO
(NOVEMBER, 1987)

REFERENCE
ADAPTED FROM PRINTS ENTITLED "PROPERTY IDENTIFICATION MAP OF SAN JUAN COUNTY, NEW MEXICO" CODE NUMBER 2-063-171, SHEET NUMBERS D-3-17-1 AND D-3-17-4 (SECTION 17, TOWNSHIP 29 NORTH, RANGE 14 WEST) – PREPARED BY SAN JUAN COUNTY – UNDATED.

Dames & Moore

PLATE 9

STATE OF NEW MEXICO
HEALTH ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 3:00 pm	Date 7/7/88

Originating Party	Other Parties
Linda Rock - Dames & Moore Legal (Denver) (303)232-6262	Bill Olson - EID/GW

Subject

Maverick - Caribou Refinery, Kirtland, N.M

Discussion

Dames & Moore looking for info on disposal of contaminated soils, and air quality regs. on air strippers and soil venting

Conclusions or Agreements

I will get available info and fax to them

Distribution

file

Signed Bill Olson

STATE OF NEW MEXICO HEALTH ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 10:45 am	Date 7/5/88

Originating Party	Other Parties
Bill Olson - EID/GW	Terry Vandell - Dames & Moore

Subject

Maverick - Caribou Refinery, Kirtland, N.M.

Discussion

Called to discuss cont. soils and remedial alternatives.
Told them EID actions for cont. soils usually ~~[illegible]~~
involve some form of soil gas venting
She will be on vacation next week so if EID
needs to contact Dames & Moore refer to
Pete Olsen

Conclusions or Agreements

Distribution
File

Signed Bill Olson

STATE OF NEW MEXICO
HEALTH ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time: 11:00 am	Date: 6/21

Originating Party	Other Parties
Dames & Moore, Terry Vandell	Bill Olson - EID/GW

Subject

Maverick (Caribou) Refinery, Kirtland, N.M.

Discussion

Dames & Moore has a few questions

1.) If they look at treating GW on site. Do they need a NPDES permit for surface discharges.

2.) Do contaminated soils need to be treated

3.) Does N.M. EID know of other remediation sites in the area similar to Maverick that they could talk to.

Conclusions or Agreements

1.) I think they need a NPDES permit for any surface discharge Referred them to Glenn Saums (Surface Water)

2.) I will check on remediation alternatives for cont. soils

3.) Contact Robert McClenahan (Giant Refining)

Distribution

file

Signed Bill Olson

STATE OF NEW MEXICO
HEALTH
ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 11:00 am	Date 6/2/88

Originating Party	Other Parties
Bill Olson - EID Ground Water	Terry Vandell - Dames & Moore

Subject Addendum to Phase I Hydrogeologic Evaluation
Maverick Refinery and Tank Farm, Kirtland, N.M.

Discussion

I stated that I had recieved the Addendum but could not look at it immedietely
Dames and Moore working on finishing up Phase II report
EID scheduled to get report June 15th but they would like to have another week to discuss with Maverick.

Conclusions or Agreements

I will review and comment on report in approximately 2 weeks
Dames and Moore will submit Phase II report the week of June 13th

Distribution
file

Signed Bill Olson

TRANSMITTAL SHEET

Dames & Moore

To: Ground Water Bureau, EID
P. O. Box 968
Santa Fe, New Mexico 87504-0968

Date May 27, 1988

Your Order No.

Our Job No.
14819-005-31

Attention: Mr. Bill Olsen
Water Resource Specialist

Subject:
Maverik Refinery and Tank Farm
Kirtland, New Mexico

We are sending you via U.S. Mail

the following Report:

ADDENDUM TO
PHASE I HYDROGEOLOGIC EVALUATION
MAVERIK REFINERY AND TANK FARM
KIRTLAND, NEW MEXICO
FOR MAVERIK COUNTRY STORES, INC.
dated June 1988

~~This is~~
These are for Your review

No. of copies submitted: 2

Copies to: Mr. Vincent J. Memmott (rev. page 12)
Mr. William Call (rev. page 12)
P.F.Olsen

Dames & Moore

By TDVandell

T. D. Vandell

114.6

HEALTH ENVIRONMENT STATE OF NEW MEXICO

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 11:15 am	Date 4/27/88

Originating Party	Other Parties
Terry Vandell, Dames & Moore	Bill Olson - EID Ground Water

Subject Disposal of Product taken from interceptor trench at Maverick Refinery, Kirtland, N.M.

Discussion

Dames and Moore is having trouble finding disposal facility for product from interceptor trench. Currently product is taken by Chief Transport to Basin Disposal.

I recommended 3 options 1) continue using Chief Transport
2) sell to local refinery (Bloomfield Refining)
3) sell to Mesa Petroleum in ABQ.

Also informed that 25 soil borings were undertaken during soil investigation

Conclusions or Agreements

Dames and Moore will look into the options suggested

Distribution
file

Signed Bill Olson

HEALTH STATE OF NEW MEXICO ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 12:00 noon	Date 4/14/88

Originating Party	Other Parties
Bill Olson, EID Ground Water	Terry Vandell, Dames & Moore

Subject Maverick, Caribou Refinery, Kirtland N.M.

Discussion

Westside ditch cleaned out and water opened to ditch.
Trench still operating well with ditch flowing
1st bore hole completed
Performed visual inspection of tank, was OK,
then filled with 6" of water from trench

Conclusions or Agreements

Ok to use water from ditch, proceed with
investigation

Distribution
file

Signed Bill Olson

STATE OF NEW MEXICO
HEALTH ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 3:00 pm	Date 4/8/88

Originating Party	Other Parties
Terry Vandell (Dames + Moore)	Bill Olson (EID G.W.)

Subject Tank testing of large tank at Maverick (Caribou) Kirtland N.M.

Discussion

She has discussed large above ground tank testing with a local refinery. Tanks are tested hydrostatically She wants to fill tank with 1' water from trench (70000 gal) then measure water elevation with time to determine integrity. I relayed that I had contacted Giant Refiners in Gallup and was told the same thing. Giant also suggested a visual inspection of the tank bottom prior to filling. Also discussed performing EP toxic test for heavy metals on one or two samples if sludges encountered during source identification

Conclusions or Agreements

Prior to putting water in large tank, visual inspection of tank bottom will be made. Then perform hydrostatic test as described above.
They will perform one EP tox test of worst possible sludge encountered.

Distribution
file

Signed Bill Olson

STATE OF NEW MEXICO
HEALTH ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 11:00 am	Date 4/7/88

Originating Party	Other Parties
Bill Olson EID Santa Fe	Terry Vandell - Dames & Moore

Subject Integrity testing of refinery tanks

Discussion

District office concerned with integrity of large storage tank to be used for storage

OCD says tank should be tested if not used for long period of time

I suggested alternatives - 500 bbl frac tank
210 bbl frac tank
smaller tank on site that could be tested

Also suggested EP Toxic Test for Metals on soil borings in possible sludge area

Conclusions or Agreements

She will check on management decision on tanks and said EP Toxic Test in sludge areas is a good idea

Distribution
File

Signed Bill Olson

HEALTH ENVIRONMENT STATE OF NEW MEXICO

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time	Date 4/4/88

Originating Party	Other Parties
Bill Olson - EID Santa Fe	Terry Vandel - Dames + Moore

Subject EID review of proposed work plan for the Phase II Hydrogeologic Investigation at Maverick Country Stores Inc. Refinery tank farm in Kirtland, N.M.

Discussion

- Discussed general location of soil borings
- Suggested that they perform a heavy metals analysis of soils augered from possible sludge or tank bottom disposal pits located during source identification.
- Relayed that District office would like to observe final cleaning of Westside Ditch prior to turning on.

Discussed use of large tank at tank farm for storage of product recovered

Conclusions or Agreements

District office will be notified prior to work on Westside Ditch
I will check on integrity testing of large tanks

Distribution file

Signed Bill Olson

DAMES & MOORE ... PARTNERSHIP
2... EAST BROADWAY, SUITE 200, SALT LAKE CITY, UTAH 84111-2480 (801) 521-9255

March 25, 1988

RECEIVED

MAR 28 1988

GROUND WATER/HAZARDOUS WASTE
BUREAU

Mr. Bill Olsen
Water Resource Specialist
Ground Water Bureau, EID
P.O. Box 968
Santa Fe, New Mexico 87504-0968

Dear Bill:

Enclosed is a copy of the proposed work plan for the Phase II Hydrogeologic Investigation at Maverik Country Stores, Inc. Refinery tank farm in Kirtland, New Mexico.

The Phase II field work is scheduled to begin in mid-April 1988 in order to complete the Phase II work and report by mid-June 1988, as agreed to.

Your expediency in reviewing this proposed work plan is appreciated. If you have any questions, please do not hesitate to contact me.

Very truly yours,

DAMES & MOORE

Pete F. Olsen

Peter F. Olsen
Associate

TDV:si
cc: William Call
Vince Memmott
Terry Vandell
P. Casey Knapp, NM EID

STATE OF NEW MEXICO HEALTH ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 1300	Date 3/22/88

Originating Party	Other Parties
Bill Olson, EID, Tech Support	Terry Vandell, Dames & Moore

Subject Fate of recovered oil at Maverick-Caribou refinery Kirtland, N.M.

Discussion

I called to relay concerns of Farmington District office as to disposal of oil recovered from interceptor trench to be installed near the western boundary of Caribou refinery. Also relayed District office info on location of old waste pit on site

She informed that last week they also had a vacuum truck out to Westside Irrigation Ditch to clean out ditch. They also cleaned some cont. surface soil out of ditch.

Conclusions or Agreements

She stated that all recovered oil would be transported to an EPA certified disposal facility. She will notify me of the specific disposal site when oil is 1st going to be removed. Disposal pit on site relayed by District office has already been located and targeted for soil borings

Distribution

file

Signed Bill Olson

HEALTH STATE OF NEW MEXICO ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 11:30 am	Date 3/22/88

Originating Party	Other Parties
Casey Knapp - EID Farmington	Bill Olson, EID Tech Support

Subject: Maverick - Caribou refinery, Kirtland, N.M.

Discussion: District office concerned about where oil removed from interceptor trench is to be disposed of.

Also wanted to inform Santa Fe about old waste pit location used when refinery in operation

Conclusions or Agreements

I stated I would contact Dames + Moore to determine fate of recovered oil

Distribution: file

Signed: Bill Olson

STATE OF NEW MEXICO
HEALTH ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 11:00 am	Date 3/18/88

Originating Party	Other Parties
Terry Vandell - Dames & Moore	Bill Olson
	EID - Tech. Support G.V.

Subject Phase I report and Interceptor trenches to be installed at Maverick (Caribou) Refinery, Kirtland N.M.

Discussion

Dames & Moore called to find out if Phase I report had been reviewed. Also wanted to inform that they had designed an interceptor trench, refinery piping in the way needed to be removed. Trench to be approx. 17-20' wide and 6 feet deep. They are waiting for Maverick OK.

Phase I report review. Expressed my concerns.

Conclusions or Agreements

They will try to have trench installed by 3/23/88

Phase I report reviewed, I would like to see a MW downgradient of MW-6 to define extent of OCA (EPC) contamination

Distribution

Signed Bill Olson

HEALTH ENVIRONMENT STATE OF NEW MEXICO

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 9:30 am	Date 3/14/88

Originating Party	Other Parties
Bill Olson	Terry Vandel, Dames & Moore (801) 521-9255

Subject

Discussion

Ted Eng, tommorrow digging test pits to determine what needed for interceptor trench

- W.T. at @ 5'

4 test pits this week

~~Trench~~ next week will install interceptor trench 3/21 - 3/25

Conclusions or Agreements

Interceptor trench will be installed next week to recover product. Trench will be parallel to Westside Irr. ditch. Trench design will be based on test pits dug this week. Dames & Moore will notify us of all actions.

Distribution

Signed William Olson

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

GARREY CARUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

March 10, 1988

William Call
President Maverick Country Stores, Inc.
1431 South 1800 West
P.O. Box 26
Woods Cross, UT 84087

Subject: Product seepage into the Westside Irrigation Ditch, Caribou Refinery, Kirtland, NM.

Dear Mr. Call:

On March 9, 1988 Len Murray and Casey Napp of the Farmington EID District Office, observed free floating product in the Westside Irrigation Ditch adjacent to the Caribou Refinery in Kirtland, NM. The District office personnel have stated that the ditch contains l/2 foot of water and currently receives no irrigation water but acts, as drain for shallow ground water. In the ditch they observed discontinuous patches of oil floating on the surface of the water in the vicinity of the Caribou tank farm. Similar observations of free product seeping into the ditch from the tank farm have also been made by Dames and Moore in the February, 1988 Phase I Hydrogeologic Evaluation Maverick Refinery and Tank Farm, Kirtland, NM. For Maverick Country Stores, Inc.

During their site visit the District personnel also taked with Virginia Murray, and adjacent landowner, who stated that occasionally the ditch overflows during the irrigation season onto her property leaving a oily residue on the ground surface. She has stated that the most recent overflow occurred during the summer 1987 irrigation season.

As this irrigation ditch system is a direct conduit to the nearby San Juan River, the EID staff is quite concerned as to the potential of contaminating a major surface water system with free floating product as well as ground surface contamination from overflows of the Westside Irrigation Ditch. When this ditch system comes on line for the 1988 irrigation season the EID sees free product discharge into the ditch as ~~poisons~~ posing a threat to the health and environment of downstream water users.

Based on this the EID requests that you provide within two (2) weeks written notification regarding steps to be taken to contain remove or mitigate any damage caused by free product discharging to the Westside Irrigation Ditch. If you have any questions please feel free to call me at 827-2899.

Sincerely,

William Olson
Hydrologist
Ground Water Bureau

WO/pv

cc: Peter F. Olsen, Dames & Moore, Salt Lake City Office
David Tomko, EID Farmington Office
Jennifer Pruett, Office of General Counsel

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
250 EAST BROADWAY, SUITE 200, SALT LAKE CITY, UTAH 84111-2480 (801) 521-9255

March 1, 1988

RECEIVED

Mr. Bill Olsen
Water Resource Specialist
Ground Water Bureau, EID
P.O. Box 968
Santa Fe, New Mexico 87504-0968

Phase I
Hydrogeologic Evaluation
Maverik Refinery And Tank Farm
Kirtland, New Mexico
February 1988
For Maverik Country Stores, Inc.

Dear Mr. Olsen:

As agreed to in the January 8, 1988 letter to EID from William Call, President, Maverik Country Stores, Inc., enclosed are two copies of the Phase I Hydrogeologic Evaluation, Maverik Refinery And Tank Farm, Kirtland, New Mexico (February 1988).

If you have any questions during your review of the report, please do not hesitate to contact either myself or Terry Vandell at (801) 521-9255.

We appreciate your time in reviewing this report and are looking forward to working with you on the Phase II study.

Very truly yours,

DAMES & MOORE

Peter F. Olsen
Associate

PFO/fl

cc: Mr. William Call
Mr. Vince Memmott

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
250 EAST BROADWAY, SUITE 200, SALT LAKE CITY, UTAH 84111-2480 (801) 521-9255

January 25, 1988

RECEIVED
JAN 29 1988

Mr. Len Murray
New Mexico EID
724 West Animas
Farmington, New Mexico 87401

Dear Mr. Murray:

Water Quality Sample Site Locations
Maverik Country Stores, Inc.
Kirtland, New Mexico Site

As per our telephone conversation of January 22, 1988, enclosed are a map and eight (8) site descriptions for the private wells which you sampled in April and May of 1987. I could not locate seven of them on our map. Could you please indicate for these seven sites the approximate distances from the county road shaded on the enclosed map, and verify the location of site 9.

Thank you for your time and effort in completing this work.

Sincerely,

DAMES & MOORE

Terry D. Vandell

Terry D. Vandell

cc: Bruce Frederik w/out enc.
Pete Olsen " "

January 8, 1988

MAVERIK COUNTRY STORE
MAVERIK COUNTRY STORES, INC.
1431 South 1800 West
P.O. Box 26 / Woods Cross, UT 84087
Phone: 801-295-5557

RECEIVED
JAN 12 1988

Mr. Bruce Frederick
Water Resource Specialist II
Ground Water Bureau, EID
P.O. Box 968
Santa Fe, New Mexico 87504-0968

Response to EID December 28, 1987 Letter Concerning Maverik Country Stores Kirtland Refinery Investigation and 1988 Work Plan

Dear Mr. Frederick:

This is in response to your referenced letter and sets forth changes to the planned activities and dates contained therein as verbally agreed to during a telephone conversation on January 7, 1988 between yourself and Mr. Peter Olsen and Ms. Terry Vandell of Dames & Moore.

During that telephone conversation, the high impact of the irrigation canals, (especially the Westside Irrigation Canal, which is a lateral of the Farmers' Mutual Irrigation Canal), on ground water quality in the Kirtland Refinery area, was discussed. This impact relates to ground water recharge from the canals and the effect this may have on contaminant levels observed in the ground water and the surface waters. Water is turned into the Farmers' Mutual Canal on March 1 and is turned off on December 1. Water is typically present in the Westside Canal from about April 1 to November 1. In 1987, water was turned off in the Westside Canal about October 29, approximately two weeks prior to collection of the first round of ground water and surface water samples in mid-November. As a result, while contaminant levels in the surface water samples may reflect "worst case" conditions (since the only water present in the Westside ditch was from ground water discharge), the contaminant levels in the ground water samples may reflect somewhat diluted conditions accompanying the high water table resulting from several months of recharge from the irrigation canals.

It was suggested by Dames & Moore that, rather than sample wells on a quarterly basis in order to assess seasonal fluctuations in contaminant concentrations, it would be more appropriate to conduct sampling at times during the year corresponding to major changes in irrigation canal flow. It was agreed to postpone the sampling planned for early January 1988 until mid-March 1988 shortly before water is turned into the Westside Canal. At this time, there will have been no ground water recharge from the canal for about 4-1/2 months; this will probably have reduced the water table in the area and the samples should reflect contaminant concentrations least affected by dilution.

The samples taken at this time will be analyzed for the same comprehensive list of parameters as were the November 1987 samples.

It was also agreed that another round of sampling will be conducted near the end of the irrigation season shortly before water is turned off in the Westside Canal. This will take place during the first half of October 1988. During this sampling event, the number of wells sampled and the analytes will be reduced. The sites sampled will be restricted primarily to those where contaminants have been detected in previous sampling rounds and the analytes will be restricted to the volatile organics, the only contaminants thus far detected. We understand that NMEID will be taking split samples from wells during the March 1988 sampling event and will be analyzing these for organic contaminants not only in the volatile fraction but also in the base/neutral and acid fractions. If refinery contaminants are detected in these other fractions by NMEID, the October 1988 samples will also be analyzed by Maverik for these constituents.

The change in sampling schedule necessitates a change in the reporting schedule proposed in your December 28, 1987 letter. It was agreed that rather than submit a Phase I report on March 30, 1988 which would include all hydrogeologic information including the results of both the November 1987 and January 1988 samplings, a report will be submitted on March 1, 1988 which will include all hydrogeologic information but will include only the results of the November 1987 sampling. A "Phase I Addendum Report" will be submitted by June 1, 1988, which will present the results of the March 1988 sampling, compare these with the November 1987 sampling results, and make any revisions to the conclusions as are necessary. We anticipate that the March 1988 NMEID sampling results will be made available to us prior to June 1 so that these can be compared, evaluated and included in the report.

Results of the October 1988 sampling will be presented in a separate report submitted two months after sample collection (mid-December 1988).

In order to allow more time for on-site activities, it was agreed that the Phase II proposal will be submitted by April 1, 1988 rather than by April 15, 1988 as suggested in your letter.

All of the preceding discussion is in response to Items 1 through 4 of your letter. With regard to the remaining items, we are not in disagreement with the issues or dates. The results of the Phase II investigation will be submitted to NMEID by June 15, 1988 (Item 5). If the results of the Phase I and Phase II investigations indicate that ground water and/or soil remediation are necessary, an appropriate remedial plan will be developed and submitted in written form to NMEID by July 15, 1988 (Item 6). Negotiations to arrive at long-term solutions should, as you have stated, be considered only after the NMEID has reviewed all of the data, reports and proposals submitted by Maverik. Setting a date of August 15, 1988 to discuss the final results of the Phase I and II work and recommendations appears to be appropriate (Item 7).

An attached project milestone chart which incorporates the agreed changes places the activities and dates referred to in perspective.

We appreciate NMEID's cooperation and look forward to a continuance of same during 1988 in order to further define and to resolve in a mutually agreeable manner the issues at the Kirtland refinery site.

Sincerely,

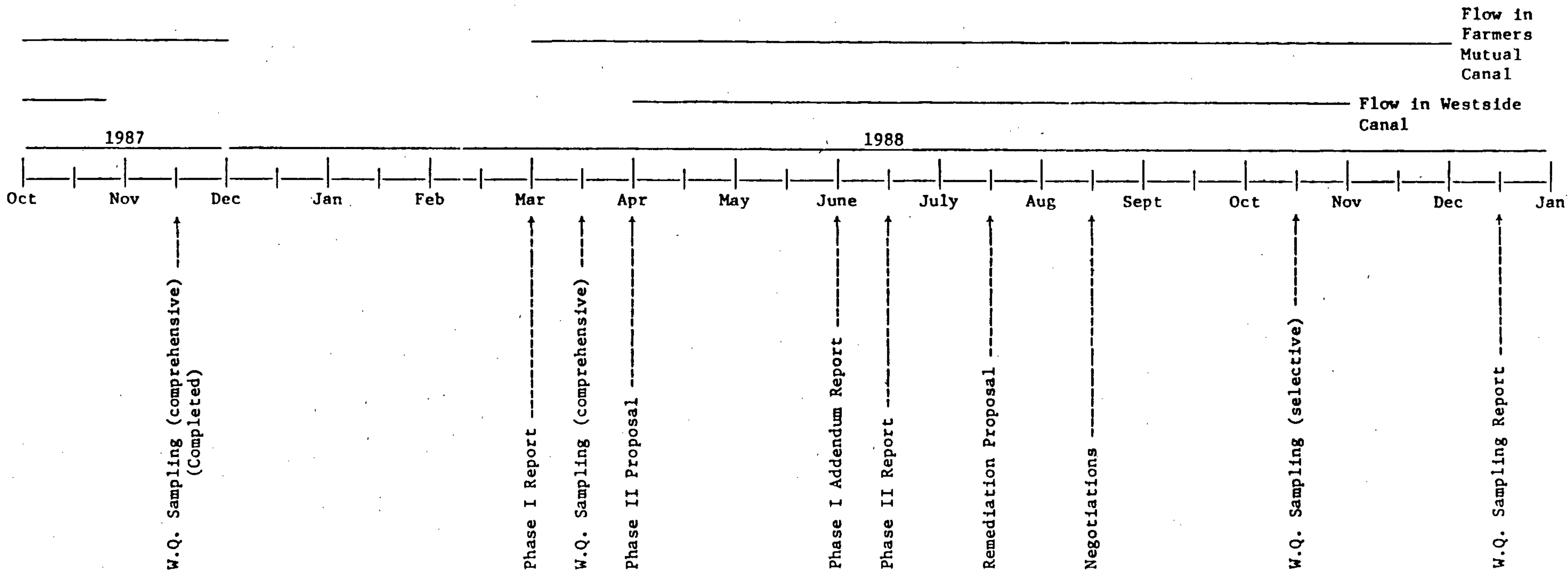
MAVERIK COUNTRY STORES, INC.

William Call

William Call
President

PROJECT MILESTONE CHART

MAVERIK KIRTLAND, N.M. REFINERY INVESTIGATIONS



NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

OFFICE OF GENERAL COUNSEL
Post Office Box 968
Santa Fe, New Mexico 87504-0968
(505) 827-2990

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

CONFIDENTIAL
SUBJECT TO ATTORNEY CLIENT
PRIVILEGE

MEMORANDUM

TO: Bruce Gallaher
Ground Water Technical Support Section

FROM: Jennifer J. Pruett, Assistant General Counsel
Office of General Counsel

DATE: December 29, 1987

SUBJECT: **CARIBOU REFINERY - KIRTLAND NEW MEXICO (MAVERICK COUNTRY STORES)**

Technical staff recently met with Caribou representatives and consultants to discuss the status of this case and plans for remediation. Caribou's initial investigation indicates that contamination at the site may not be as severe as EID had feared. Staff agreed with Caribou on a long-term investigation schedule which should culminate in Caribou delivering, to EID a comprehensive investigation report in late summer 1988. EID has agreed to delay negotiation of any settlement agreement until that time. As the requirements of this project for the next 7-9 months will be purely technical, I am referring the case back to the Bureau.

If next year you decide that you wish to negotiate a settlement agreement, or if the case again requires legal assistance, please feel free to send a new Request for Legal Services.

JJP:dmv

cc: Richard Mitzelfelt, Chief, Ground Water Bureau
Bruce Frederick, Ground Water Bureau
Dennis McQuillan, Ground Water Bureau
Louis W. Rose, Deputy General Counsel

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

ENVIRONMENTAL IMPROVEMENT DIVISION

Michael J. Burkhart
Director

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

December 28, 1987

William Call, President
Maverick Country Stores
P.O. Box 457
Afton, Wyoming 83110

RE: Caribou Refinery Investigation and Cleanup.

Dear Mr. Call:

I would like to summarize the main argeements reached during the 12/15/87 meeting between the Environmental Improvement Division(EID), Maverick Country Stores, and Dames and Moore. In the summary below I have also included several dates that EID proposes, to insure that work at the refinery progresses in a timely manner.

The main agreements reached at our meeting were:

1) The work completed thus far, including the projected early January sampling, will be considered as Phase I of the hydrogeologic investigation.

2) A written report containing all data and conclusions generated from the Phase I investigation will be submitted to the EID for review by March 30, 1988.

3) Maverick will continue to periodically monitor wells in the area in order to assess seasonal fluctuations of contaminant concentrations in the ground water. EID proposes that Maverick sample wells in the area on a quarterly basis. The duration of this quarterly sampling will depend on data generated from future activities at the site.

4) Maverick will submit a proposal for the Phase II hydrogeologic investigation in Spring, 1988. EID proposes that this date be set at April 15, 1988. The proposal will describe in detail the work proposed to define the areal and vertical extent of soil contamination at the refinery, and the potential for such soil contamination to act as a continued source of ground-water contamination.

5) The data and conclusions generated from the Phase II investigation will be submitted in a written report to EID for review in late-Spring, 1988. EID proposes that this date be set at June 15, 1988.

EQUAL OPPORTUNITY EMPLOYER

6) Incorporating information gathered from the Phase I and II investigations, Maverick will submit to EID for review a proposal for ground water and/or soil remediation at the site in mid- to late-Summer, 1988. EID proposes that this date be set at July 15, 1988.

7) EID and Maverick will begin negotiating a long-term solution in mid- to late-Summer, 1988. EID proposes that these negotiations begin by August 15, 1988, presumably after EID reviews the written reports and proposals submitted by Maverick.

A word about EID report review procedures is in order. Written reports will be reviewed by EID within 15 days of EID's receipt of the report. Within this time, EID will either approve the report or notify Maverick, in writing, of the inadaquacies of the material. Within 30 days of such a notice of inadaquacy, Maverick should modify the report and submit it to EID for review and written approval or disapproval. Proposal review will follow the same procedure as report review.

Please examine the material in this letter, especially the dates, and notify EID in writing within 10 days as to your agreement or disagreement. Obviously the dates mentioned above are subject to change as new data comes in.

EID appreciates Maverick's continued cooperation.

Sincerely,

Bruce Frederick
Water Resource Specialist II
Ground Water Bureau

BF/bf

cc: T.D. Vandell, Dames & Moore, Salt Lake City Office
Vincent J. Memmott, V. J. Engineering
Stuart Castle, Drinking Water Section
Steve Cary, Superfund Section
David Tomko, EID Farmington Office
EID District I Office
Dave Boyer, OCD
Jennifer Pruett, Office of General Counsel

RECEIVED

DEC 1 1987

LIQUID WASTE/GROUND WATER SURVEILLANCE

December 10, 1987

Mr. Bruce Frederick
Water Resource Specialist II
Ground Water Bureau, EID
P.O. Box 968
Santa Fe, New Mexico 87504-0968

Re: Maverik Country Stores, Inc., Kirtland, New Mexico: Refinery Preliminary Hydrogeologic Evaluation

Dear Bruce:

As per your written request of November 25, 1987 to Bill Call, enclosed is a Progress Report which includes data and a preliminary evaluation of these data.

Specifically, the report includes:

1. A summary of the field and laboratory work completed to date, and

2. Seven plates which summarize the preliminary evaluations and which show the study area and sample sites, the TRC soil-water-gas survey results, the laboratory DCA levels, the surface water elevation levels and ground water level contours and on-site and off-site geologic cross sections.

We appreciate your review of this report prior to the December 15, 1987 meeting. If you have any questions, please do not hesitate to contact me at (801)521-9255.

Sincerely,

DAMES & MOORE

Peter F. Olsen
Associate

PFO/fl

cc: Mr. Bill Call
Mr. Vince Memmott
Ms. T. D. Vandell

PROGRESS REPORT

PRELIMINARY GROUND WATER EVALUATION
MAVERIK REFINERY AND TANK FARM
KIRTLAND, NEW MEXICO
FOR MAVERIK COUNTRY STORES, INC.

BY

DAMES & MOORE
SALT LAKE CITY, UTAH

December 10, 1987

TABLE OF CONTENTS

LIST OF TABLES

LIST OF PLATES

SUMMARY

This progress report presents preliminary data evaluations for the ongoing hydrogeologic study at the Maverik Refinery and Tank Farm, Kirtland, New Mexico. Hydrogeologic and hydrologic conditions are being evaluated both on-site and off-site approximately 0.7 miles from the refinery property boundaries. The general site location map and detailed plot plan showing the monitor wells, private wells, well points, borehole, geologic cross sections and the TRC sample locations are included on Plate 1.

This study has been authorized by Maverik Country Stores, Inc. following preliminary studies by the Federal EPA and the New Mexico Environmental Improvement Division (EID). The EID, in a letter to Maverik dated December 31, 1986, concluded from these studies that past refinery operations resulted in contamination of private water wells and surface waters southwest of the Maverik Refinery Tank Farm.

Dames & Moore first conducted an extensive visual site inspection of the Tank Farm and Refinery areas. Current surface conditions as well as previous spills and leaks indicated that the source of the ground water contamination was from the Tank Farm, and primarily from the southwestern bermed area.

To verify the source and to define the direction and lateral and vertical extent of the contaminant movement, the following field work was conducted:

1. A soil-gas, soil-water and surface water evaluation was conducted by Tracer Research Corporation (Plate 2).

2. Thirteen monitor wells, five well points and a deep borehole were completed (Plate 1).

3. Thirteen monitor wells, three existing wells and six surface water sites were sampled once in November 1987, and will be sampled again in December 1987, or January 1988, and analyzed for volatile organics, total organic lead and specified cations.

4. Water level elevation data have been obtained at nearby private water wells, monitor wells and well points and surface water sites (Plate 4).

5. A 9-hour aquifer pumping test was conducted on the river channel alluvial gravel aquifer.

The preliminary data evaluation completed to date has consisted of:

1. Evaluation of all existing EPA and EID water quality data and the results of the TRC survey, in order to optimally locate the 13 monitor well drill sites (Plate 2).

2. Evaluation of the subsurface geology with respect to the hydraulic characteristcs, water level elevations and water quality, to define the direction and rate of movement of the ground water and contaminants (Plates 3-7).

3. Evaluation of surface water flows and quality to better define contaminant movement to the irrigation and drainage ditches, and the influence of these surface water diversion structures on the ground water flow direction.

During the course of our study, in early November 1987, Dames & Moore discovered fuel oil along the west side irrigation ditch as well as along the adjacent drainage ditch. Maverik implemented immediate clean-up measures after being notified of this situation. A series of absorbent pads were placed along the ditch to intercept the fuel oil product which was evidently moving offsite from the southwest corner of the Tank Farm area in a major ground water discharge area.

This progress report was prepared upon completion of the Round 1 field sampling and preliminary laboratory data evaluation.

The final report, scheduled for completion in March 1988, will include all of the data collected and a final data evaluation, Round 2 water quality laboratory data results, as well as a discussion of the significance of the contamination and general recommendations for further remediation, if needed.

PRELIMINARY CONCLUSIONS

Based on the hydrogeologic and water quality data currently available for the Maverik Refinery and Tank Farm in Kirtland, New Mexico, the following preliminary conclusions have been reached:

1. Ground water contamination of the shallow alluvial aquifer and west-side irrigation ditch has occurred over an area approximately 600-feet wide in an east-west direction and 1,500-feet long in a north-south direction. The contaminant plume is restricted to the highly permeable subsurface river channel deposits that trend northeast to southwest to the San Juan River.

2. Based on the laboratory water quality data currently available, the contaminants present on site include xylene, toluene, ethylbenzene, 1,2-dichloroethane, benzene and trace amounts of total organic lead.

   Concentrations of the contaminants are elevated on site at the tank farm and to the southwest of the tank farm, in the west-side irrigation ditch, in the ground water in the adjacent field and to the southwest toward the San Juan River. Elevated levels of contaminants, when detected in off-site wells, are at or just barely exceed allowable drinking water concentration levels (ref. EID report, October 7, 1987). The 1,2 DCA concentrations obtained from the preliminary TRC survey are not comparable to the actual concentrations measured for the water samples in the laboratory (Plates 2 and 3).

3. The contaminant source area appears to be the tank farm, specifically the southern part, between the largest tank to the south, and the two smaller tanks to the north (Plate 1).

4. The direction of ground water flow is to the south-southwest toward the San Juan River. The ground water flow velocity in the coarse river channel alluvial deposits has been estimated to be about 3 ft/day, based on a hydraulic gradient of 0.01 ft/ft, a hydraulic conductivity of 100 ft/day and an effective porosity of 0.3.

5. As a result of the coarse subsurface river channel deposits consisting of sands, gravels and some cobbles, contaminants from the Kirtland Tank Farm have migrated through this aquifer off-site to the southwest.

As a result of the high permeability of this aquifer and large volumes of water moving through this aquifer, the aquifer tends to be flushed out quite quickly. This results in very low levels of contaminants observed in the downgradient monitor wells and in particular the private water wells, which were generally drilled to a depth of 20 feet and probably open throughout the saturated zone.

SCOPE OF WORK

The total project scope of work to be completed by Dames & Moore was approved by the EID (May 11, 1987). To date, the following work tasks have been performed:

TASK I - FIELD INVESTIGATIONS

- Fifteen soil-gas, 21 soil-water and 2 surface water samples were analyzed by Tracer Research Corporation (TRC), to evaluate the relative concentrations of nine volatile organic compounds, both on-site and off-site.

- Five shallow (3-foot long, No. 10-slot size) galvanized steel well points were driven in key locations for additional water level elevation data.

- Twelve 2-inch diameter PVC cased and one 2-inch stainless steel drive point water quality monitor wells and one deep boring were completed at critical locations. The wells were drilled with an air-rotary casing driver drill rig, using little or no water. Drill cuttings were logged and cuttings from three of the contaminated wells on site were tested for potential classification as RCRA hazardous waste. Five of the 13 monitor wells were completed on site.

- One aquifer pumping test and 12 slug tests were performed on the monitor wells.

- A site investigation of surface waters, on-site and off-site, to visually inspect for oil refinery product was conducted. As a result, two additional surface water sample sites were added to the original water quality sampling program.

- One round of comprehensive water quality sampling was conducted in mid-November 1987. A total of 13 monitor wells, 2 private wells, one on-site 8-inch diameter, steel-cased well and 6 surface water sites were sampled. Water quality samples from the wells were obtained with a teflon bailer. Field pH, specific conductance and temperature were analyzed in the field (Table 2). A trip blank, a field-equipment blank and a duplicate sample were also included as part of the QA program.

- A private water well inventory was completed, water levels measured and those wells without pumps were depth sounded (Table 1).

- The monitor wells, 6 surface water sites and 27 private water wells were surveyed by San Juan Engineers, a licensed surveyor from Farmington, New Mexico.

TASK II - LABORATORY INVESTIGATIONS

- Rocky Mountain Analytical Laboratory (RMAL) a division of ENSECO, Incorporated, a well known multi-state certified and EPA Contract Laboratory Program laboratory, analyzed the water quality samples for those constituents listed in Table 2. All of the sample bottles, preservatives, sample bottle labels, sampling instructions and chain-of-custody forms were sent directly to the site from RMAL. Samples were collected and sent for next day delivery to RMAL via Federal Express, where they were logged in immediately, stored and analyzed according to EPA procedures.

- Drill cuttings from the contaminated on-site monitor wells 10, 11 and 12 were sent to RMAL to evaluate their hazardous characteristics.

TASK III - PRELIMINARY DATA EVALUATIONS

- Evaluated the TRC soil-gas and soil-water data in conjunction with the existing water quality data obtained by the EPA and the EID, for optimizing the locations of the 13 monitor wells with respect to defining subsurface contamination (Plate 2).

- Evaluated the subsurface geology at the 13 monitor wells and one deep borehole, and the water quality data from these 13 monitor wells, surface water sites and private well sites to define the vertical and lateral extent of ground water contamination, both on-site and off-site (Plates 5-7).

- Evaluated the water level elevation, aquifer pump test and slug test data to define the direction and rate of movement of the ground water in the study area (Plate 4).

- Prepared this progress report.

TABLE 1 WATER LEVEL ELEVATION DATA[1]

(Maverik Country Stores, Inc., Kirtland, New Mexico)

Site Designation		Depth to[1] Water From Measuring Point (ft)	Measuring Point Elevation (ft)		Water Level Elevation (ft)	Ground Surface Elevation (ft)	Well Depth From Ground Surface (ft)
Surface Water Sites							
Westside Irrigation Ditch							
Staff Gauge 1		3.90		5194.65	-----	-----	
Staff Gauge 2		0.90		5186.60	5184.59	-----	
Staff Gauge 3		2.70		5186.22	5183.45	-----	
Staff Gauge 4		2.83		5171.59	5167.59	-----	
San Juan River							
Staff Gauge 5		3.70		-----	-----		
Monitor Well Sites			Steel Casing	PVC Casing			
MW-1		8.15	5207.79	5207.24	5199.09	5205.75	21.5
MW-2		3.85	5197.10	5196.93	5193.08	5195.25	15
MW-3	(steel)	3.40	5183.00	5181.46	5179.6	5181.06	14.5
MW-4	(steel)	6.71	5178.41	5177.10	5171.7	5176.14	15
MW-5		5.72	5175.62	5175.09	5169.37	5173.67	15
MW-6		4.37	5176.40	5176.01	5172.03	5174.23	15.5
MW-7	(steel)	5.13	5183.71	5182.84	5178.58	5181.73	15
MW-8		4.09	5186.00	5185.87	5181.78	5184.02	15
MW-9		2.51	5191.39	5191.22	5188.71	5189.53	15
MW-10		2.70	5189.80	5189.30	5186.6	5187.47	12.5
MW-11		5.89	5197.26	5197.15	5191.26	5194.97	33
MW-12		4.86	5196.66	5196.19	5191.33	5194.80	12
MW-13		0.34	5187.76	N.A.	5187.42	5187.56	5
W-3		5.10	5196.40	N.A.	5191.30	5194.62	21
Well Drive Point Sites							
WP1		-		5175.61	-----	5175.07	
WP2		3.65[2]		5173.43	5169.78	5173.30	
WP3		3.0 [2]		5180.92	5177.92	5180.79	
WP4		1.36		5193.19	5191.83	5193.11	
WP5		0.34		5189.54	5189.20	5189.23	
Private Wells (Inventoried)							
William Walker		No Access		5177.21	-----		40
E.M. Jackson (House)		4.0		5175.73	5171.73		30.7
(Field)		3.5		5175.85	5172.35		40
H. Smouse		No Access		(Build. Locked)	-----		-
M. Stone		No Access		-----	-----		-
J. Bloomfield		8.06		5188.10	5180.04		25
V. Murray (Corral)		3.2		5191.69	5188.49		20
(House)		3.55		-----	-----		18.5
R. Ball		2.33		5184.73	5182.40		58.8
A. Jackson		No Access		5177.12	-----		-
R. Jackson (Field)		4.95		5178.02	5173.07		12.7
R. Housh		No Access		-----	-----		-
R. Neff		5.22		5179.53	5174.31		20.2
P. Pickard (Shed)		9.25		5180.14	5170.89		17.3
(House)		----		5180.15	-----		----
R. Eshome		6.65		5179.76	5173.11		12.5
G. Nelson		7.50		5178.40	5170.90		19.7
E. Mclemore		1.59		5186.15	5184.56		17.7
E. Grey		No Access		-----	-----		-
I. Hull		4.49		5194.32	5189.83		15.2
C. Curley		4.68		5199.95	5195.27		23.0
R. Madrid		8.23		5208.89	5200.66		34.9
W. York		8.80		5206.05	5197.25		21.6
C. Hill		6.40		5202.54	5196.14		21.0
D. Pilcher		6.61		5201.51	5194.90		25.8
D. Howell		8.18		5204.53	5196.35		24.1
R. Tracey		1.63		5190.32	5188.69		21.0
V. Lucero		7.33		5200.16	5192.83		34.6

(1) Measured November 22 - 27, 1987, except where footnote (2) designated
(2) Measured October 30, 1987

TABLE 2 FIELD WATER QUALITY DATA(1)

(Maverik Country Stores, Inc., Kirtland, New Mexico)

Sample Site Designation	Conductivity (umhos/cm)	pH	Temperature °C	Flow CFS	Remarks
Ground Water					
MW-1	400	9.64	15.3	-	No oil or sheen noted in glass bailer
MW-2	1,100	7.75	14.2	-	No oil or sheen noted in glass bailer
MW-3	1,080	7.78	12.0	-	No oil or sheen noted in glass bailer
MW-4	1,510	7.46	14.1	-	No oil or sheen noted in glass bailer
MW-5	1,310	7.85	15.5	-	No oil or sheen noted in glass bailer
MW-6	1,880	7.51	12.1	-	No oil or sheen noted in glass bailer
MW-7	1,060	7.66	13.5	-	No oil or sheen noted in glass bailer
MW-8	1,060	7.41	14.8	-	No oil or sheen noted in glass bailer
MW-9	1,400	7.11	13.3	-	No oil or sheen noted in glass bailer
MW-10	1,280	7.66	12.5	-	No oil or sheen noted in glass bailer
MW-11	1,050	7.85	14.5	-	No oil or sheen noted in glass bailer
MW-12	1,510	6.74	17.0	-	Yellow floaters, odoriferous
MW-13	2,300	8.14	8.1	-	Yellow floaters, no odor, multi-colored sheen
Ball Well	3,500	7.96	14.3	-	No oil or sheen noted in glass bailer
V. Murray Well	700	8.06	12.9	-	No oil or sheen noted in glass bailer
Surface Water					
SW-1 Farmers Mutual Irrigation Ditch (Upgradient)	280	8.5	6.5	1,125	Metered ½" coagulated yellow fuzz (product related)
SW-2 West Irrigation Ditch (at Hwy 489)	1,080	7.60	10.0	<5 gpm	Estimated
SW-3 West Irrigation Ditch (Downgradient)	1,210	8.05	6.8	5 gpm	Estimated
SW-4 West Irrigation Ditch (Across from Tank Farm)	565	7.28	7.8	<5 gpm	Estimated
SW-5 West Irrigation Ditch (Across from Tank Farm)	Upper surface layer too contaminated to lower probes through			<5 gpm	Estimated
SW-6 V. Murray's Ditch (West of Tank Farm)	3,080	7.28	14.2	<2 gpm	Estimated

(1) Measured in November 1987

TABLE 2

LABORATORY WATER QUALITY PARAMETERS

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Bromoform
Carbon tetrachloride
Chlorobenzene
Chloroethane
Chloroform
Dibromochloromethane
Bromodichloromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethene
1,2-Dichloropropane
cis-1,3-Dichloropropene
trans-1,3-Dichloropropene
Bromomethane
Chloromethane
Methylene chloride
1,1,2,2-Tetrachloroethane
Tetrachloroethene
trans-1,2-Dichloroethene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Vinyl chloride
1,1,2-Trichloro-
2,2,1-trifluoroethane
1,2-Dibromoethane (EDB)

INORGANIC PARAMETERS

pH
Specific Conductance @ 25C
Total Dissolved Solids
Fluoride
Chloride
Nitrate + Nitrite as N
Sulfate
Total Alkalinity as $CaCO_3$
Bicarbonate Alkalinity
Carbonate Alkalinity as $CaCO_3$
Ammonia as N
Total Cations
Total Anions
% Difference

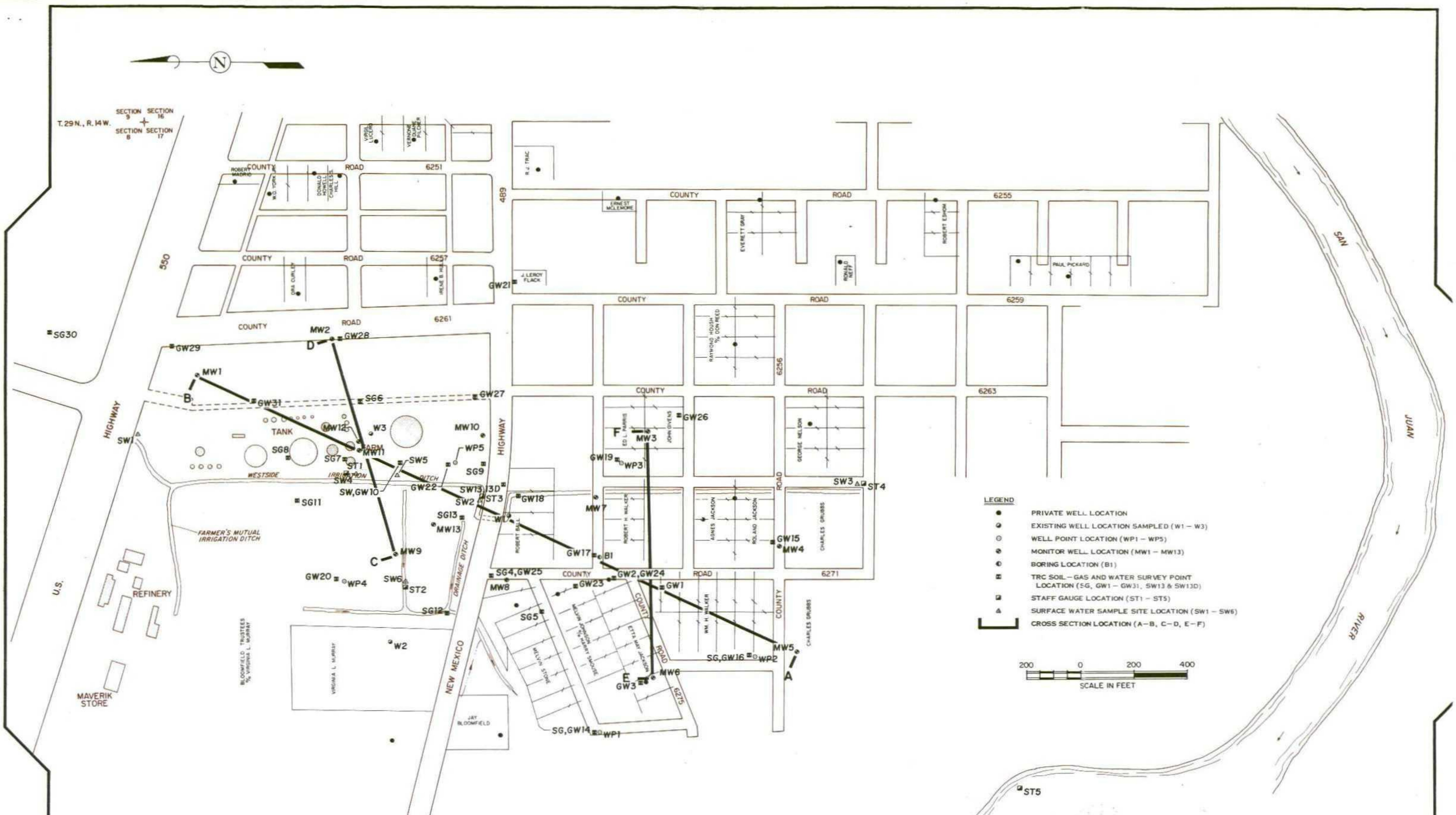
AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Benzene
Chlorobenzene
Ethylbenzene
Toluene
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
m-Xylene
o & p-Xylene(s)

METALS PARAMETERS

Calcium
Iron
Magnesium
Potassium
Sodium
Total Organic Lead



SITE SAMPLING LOCATION MAP

MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO

REFERENCE
ADAPTED FROM PRINTS ENTITLED "PROPERTY IDENTIFICATION MAP OF SAN JUAN COUNTY, NEW MEXICO" CODE NUMBER 2–083–171, SHEET NUMBERS D–3–17–1 AND D–3–17–4 (SECTION 17, TOWNSHIP 29 NORTH, RANGE 14 WEST) – PREPARED BY SAN JUAN COUNTY – UNDATED.

Dames & Moore

PLATE 1

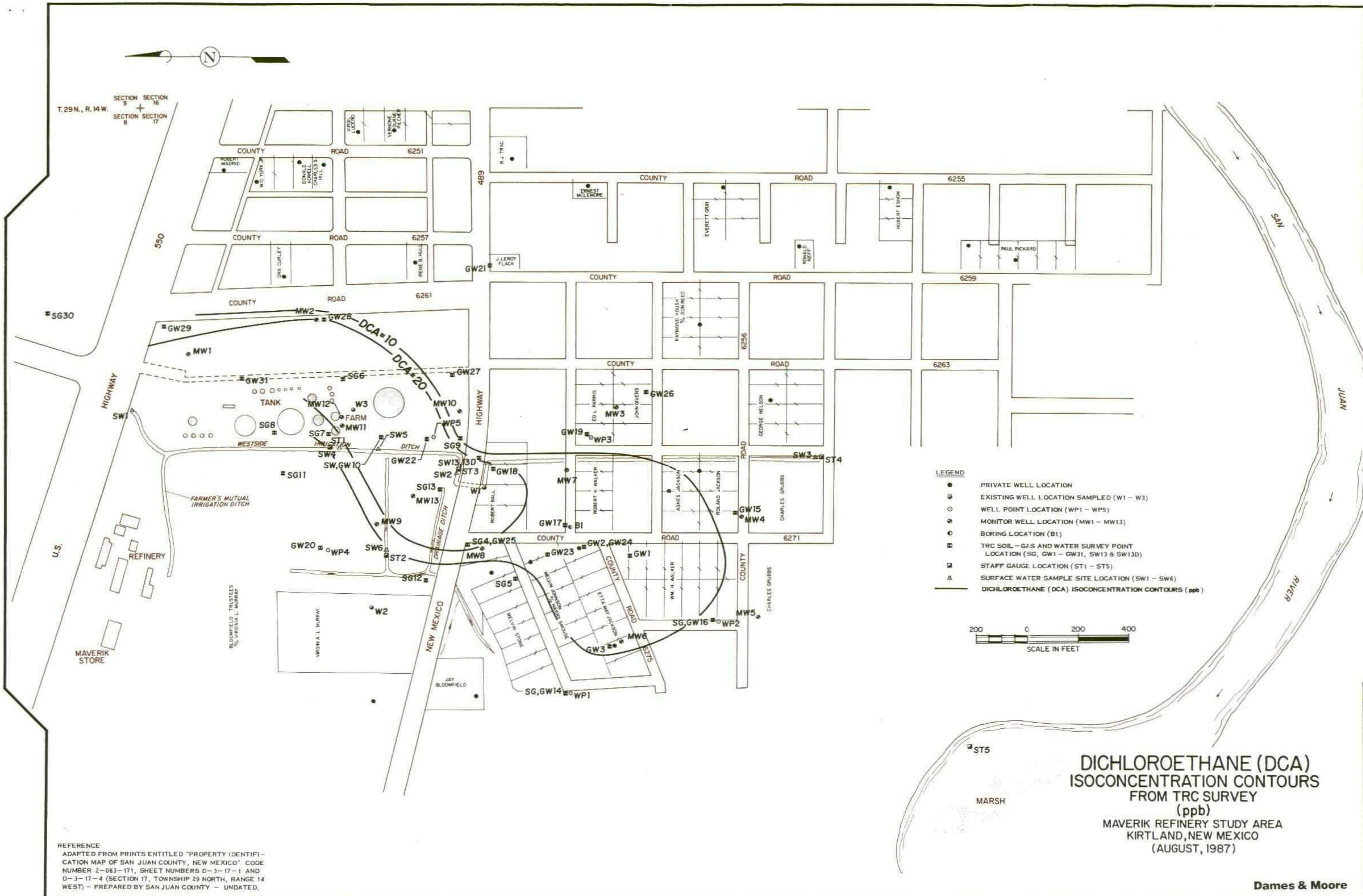
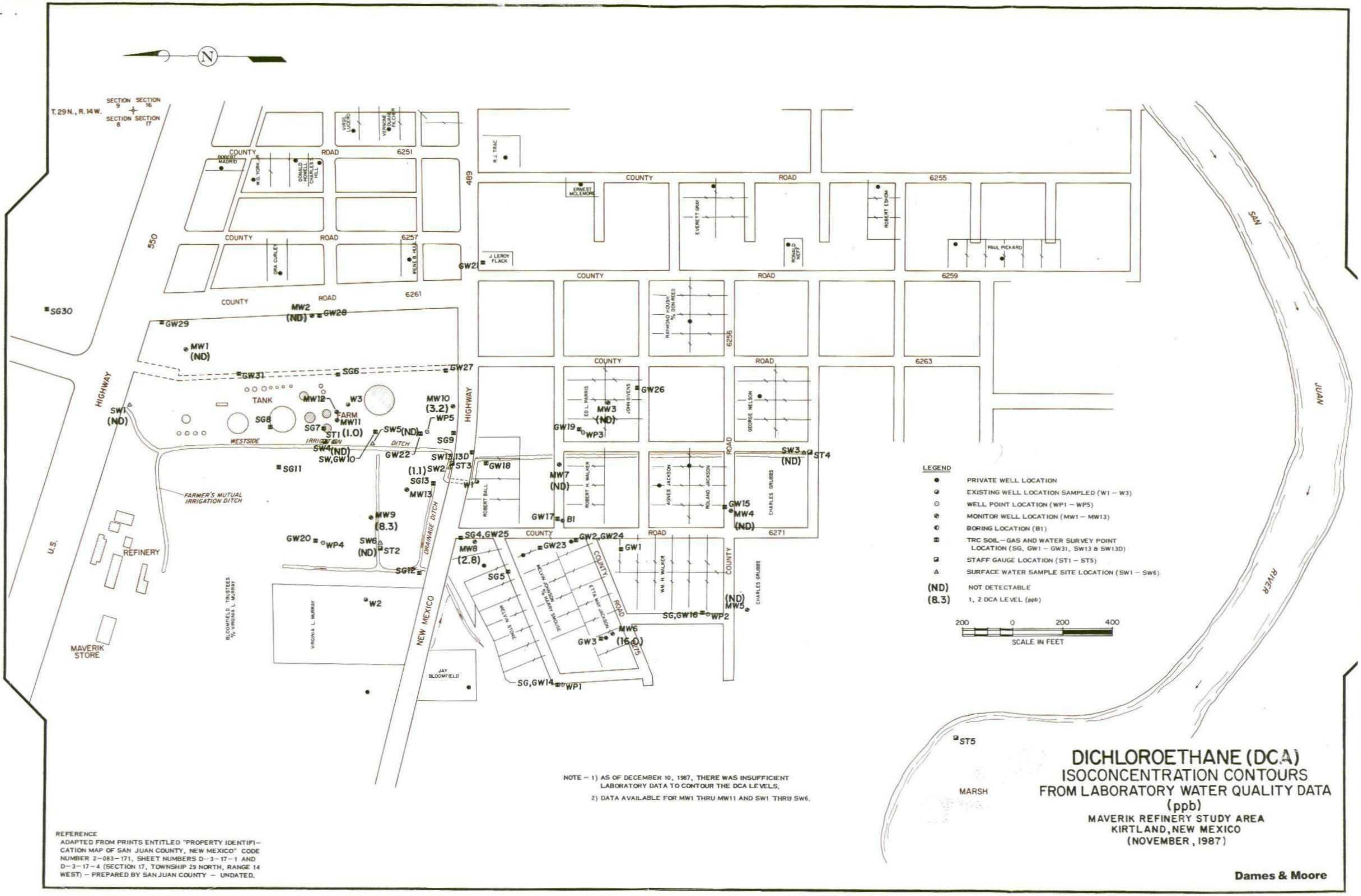

T. 29 N., R. 14 W.
SECTION 9 SECTION 16
SECTION 8 SECTION 17
COUNTY ROAD 6251
COUNTY ROAD 6257
COUNTY ROAD 6261
COUNTY ROAD 6255
COUNTY ROAD 6259
COUNTY ROAD 6256
COUNTY ROAD 6263
COUNTY ROAD 6271
COUNTY ROAD 6275
U.S. HIGHWAY 550
NEW MEXICO HIGHWAY 489
SAN JUAN RIVER
DCA=10
DCA=20
TANK FARM
REFINERY
MAVERIK STORE
WESTSIDE IRRIGATION DITCH
FARMER'S MUTUAL IRRIGATION DITCH
DRAINAGE DITCH
MARSH
LEGEND
PRIVATE WELL LOCATION
EXISTING WELL LOCATION SAMPLED (W1 – W3)
WELL POINT LOCATION (WP1 – WP5)
MONITOR WELL LOCATION (MW1 – MW13)
BORING LOCATION (B1)
TRC SOIL – GAS AND WATER SURVEY POINT LOCATION (SG, GW1 – GW31, SW13 & SW13D)
STAFF GAUGE LOCATION (ST1 – ST5)
SURFACE WATER SAMPLE SITE LOCATION (SW1 – SW6)
DICHLOROETHANE (DCA) ISOCONCENTRATION CONTOURS (ppb)
200 0 200 400
SCALE IN FEET
DICHLOROETHANE (DCA)
ISOCONCENTRATION CONTOURS
FROM TRC SURVEY
(ppb)
MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO
(AUGUST, 1987)
REFERENCE
ADAPTED FROM PRINTS ENTITLED "PROPERTY IDENTIFICATION MAP OF SAN JUAN COUNTY, NEW MEXICO" CODE NUMBER 2-083-171, SHEET NUMBERS D-3-17-1 AND D-3-17-4 (SECTION 17, TOWNSHIP 29 NORTH, RANGE 14 WEST) – PREPARED BY SAN JUAN COUNTY – UNDATED.
Dames & Moore

PLATE 2



LEGEND

- ● PRIVATE WELL LOCATION
- EXISTING WELL LOCATION SAMPLED (W1 – W3)
- WELL POINT LOCATION (WP1 – WP5)
- MONITOR WELL LOCATION (MW1 – MW13)
- BORING LOCATION (B1)
- TRC SOIL–GAS AND WATER SURVEY POINT LOCATION (SG, GW1 – GW31, SW13 & SW13D)
- STAFF GAUGE LOCATION (ST1 – ST5)
- △ SURFACE WATER SAMPLE SITE LOCATION (SW1 – SW6)
- (ND) NOT DETECTABLE
- (8.3) 1, 2 DCA LEVEL (ppb)

NOTE – 1) AS OF DECEMBER 10, 1987, THERE WAS INSUFFICIENT LABORATORY DATA TO CONTOUR THE DCA LEVELS.

2) DATA AVAILABLE FOR MW1 THRU MW11 AND SW1 THRU SW6.

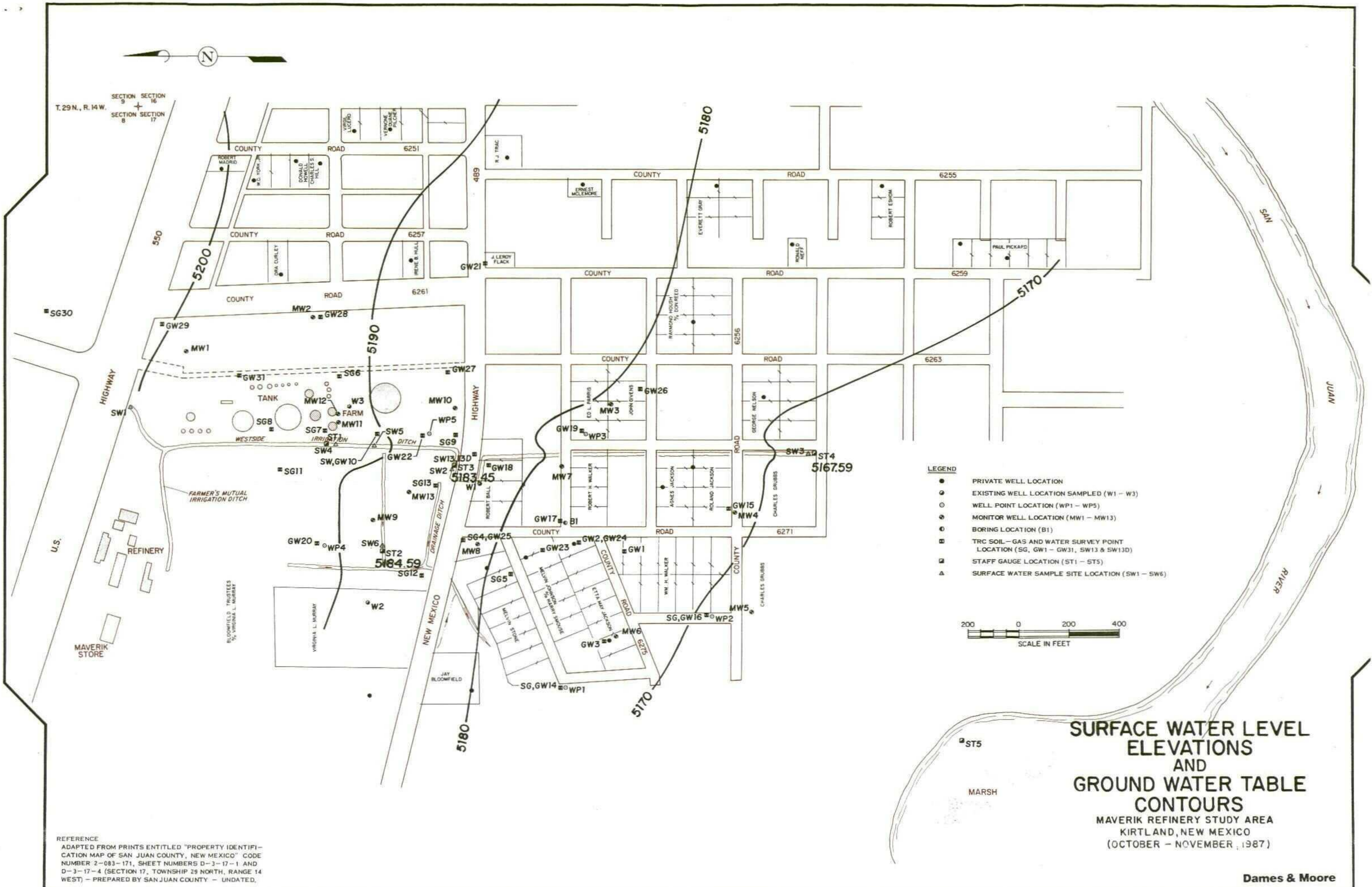
REFERENCE
ADAPTED FROM PRINTS ENTITLED "PROPERTY IDENTIFICATION MAP OF SAN JUAN COUNTY, NEW MEXICO" CODE NUMBER 2–083–171, SHEET NUMBERS D–3–17–1 AND D–3–17–4 (SECTION 17, TOWNSHIP 29 NORTH, RANGE 14 WEST) – PREPARED BY SAN JUAN COUNTY – UNDATED.

DICHLOROETHANE (DCA)
ISOCONCENTRATION CONTOURS FROM LABORATORY WATER QUALITY DATA (ppb)

MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO
(NOVEMBER, 1987)

Dames & Moore

PLATE 3



SURFACE WATER LEVEL ELEVATIONS AND GROUND WATER TABLE CONTOURS

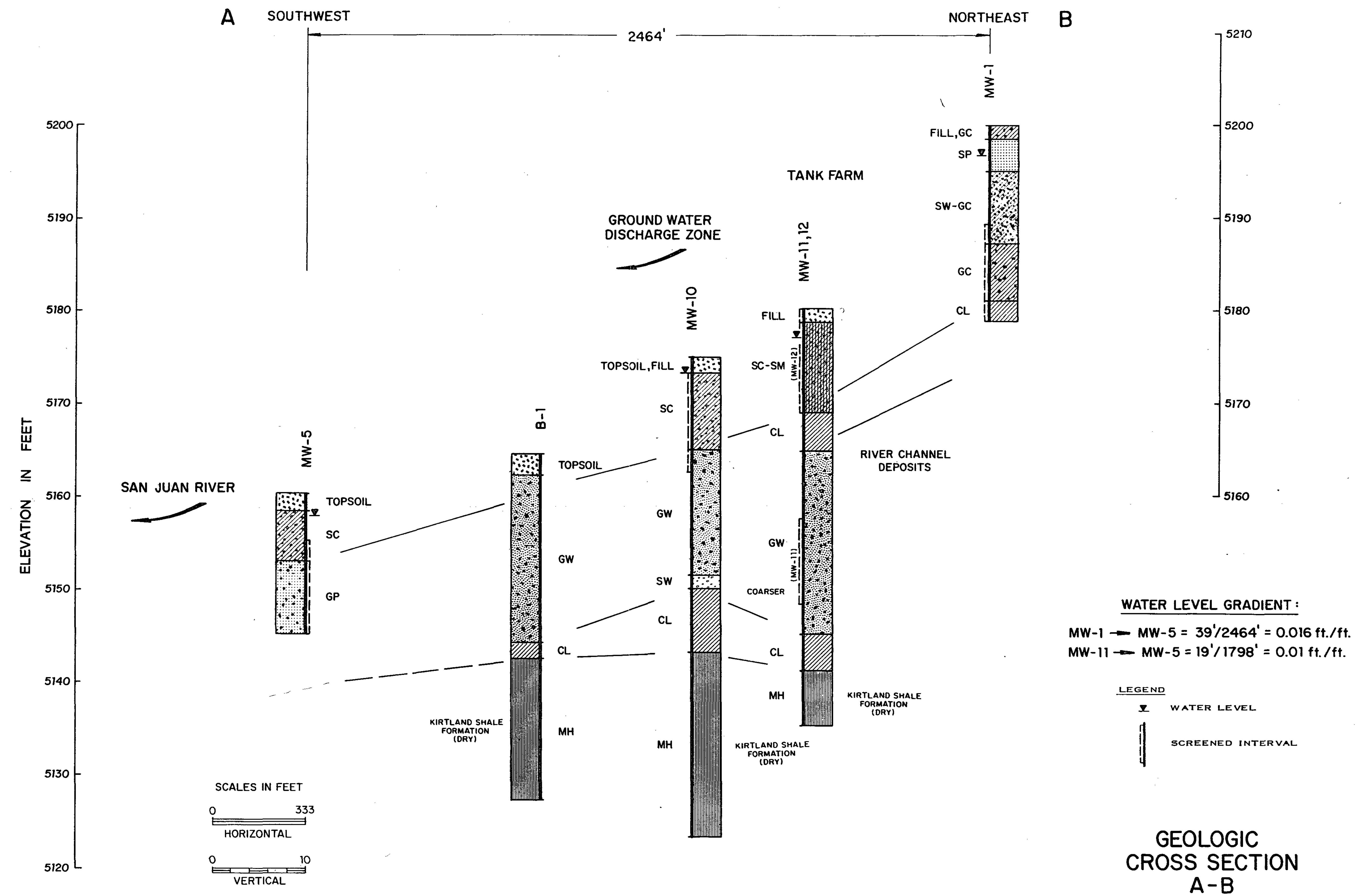
MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO
(OCTOBER – NOVEMBER, 1987)

REFERENCE
ADAPTED FROM PRINTS ENTITLED "PROPERTY IDENTIFICATION MAP OF SAN JUAN COUNTY, NEW MEXICO" CODE NUMBER 2-083-171, SHEET NUMBERS D-3-17-1 AND D-3-17-4 (SECTION 17, TOWNSHIP 29 NORTH, RANGE 14 WEST) – PREPARED BY SAN JUAN COUNTY – UNDATED.

Dames & Moore

PLATE 4

FILE 14519-005-031 BY DATE 11-30-87 CHECKED BY DATE



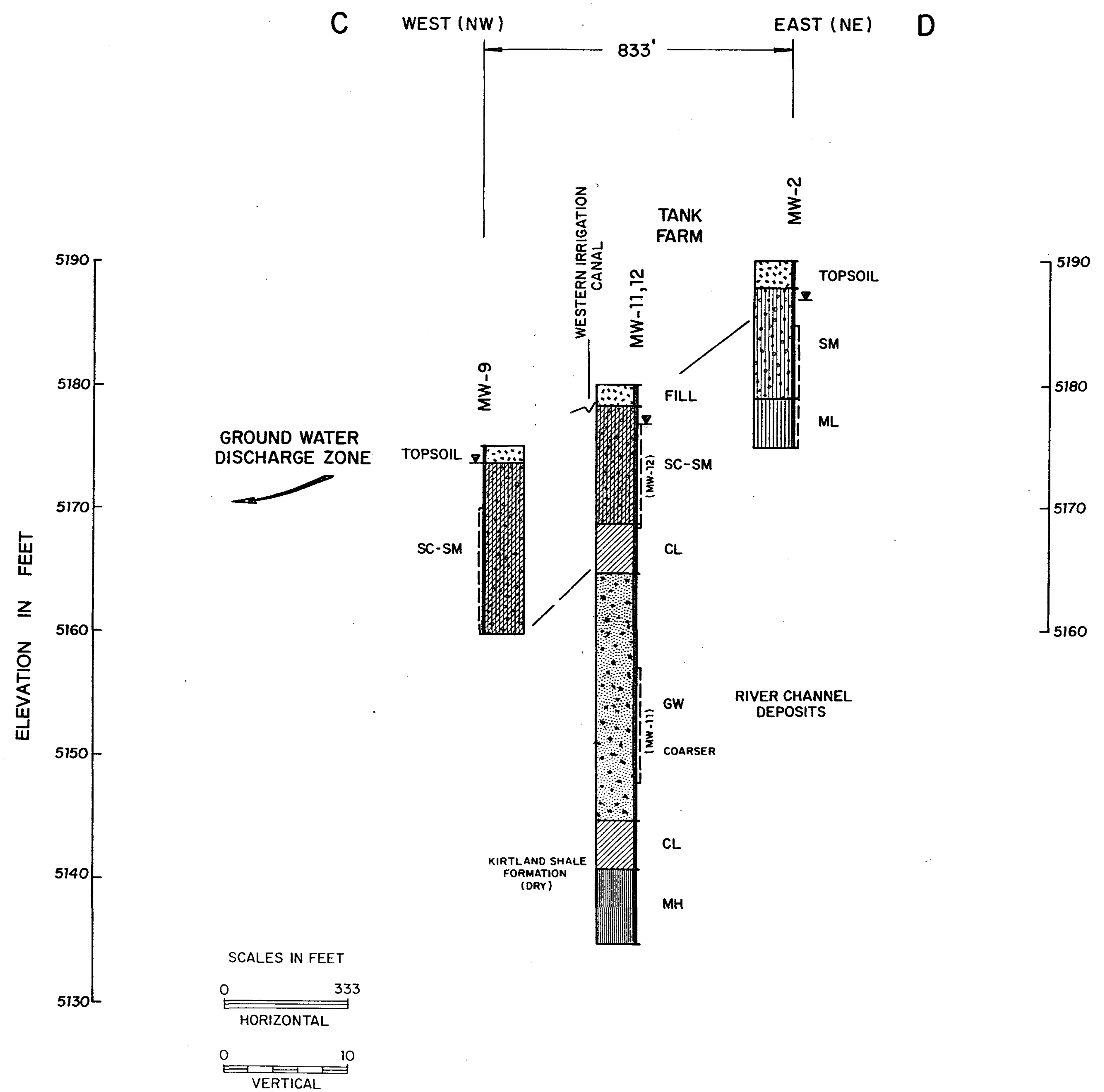
GEOLOGIC CROSS SECTION A-B

Dames & Moore

PLATE 5

46612 (11-82)

FILE 14817-005-031 BY DATE 11-30-87 CHECKED BY DATE



LEGEND

WATER LEVEL

SCREENED INTERVAL

WATER LEVEL GRADIENT :

MW-2 → MW-9 = 13'/833' = 0.016 ft./ft.

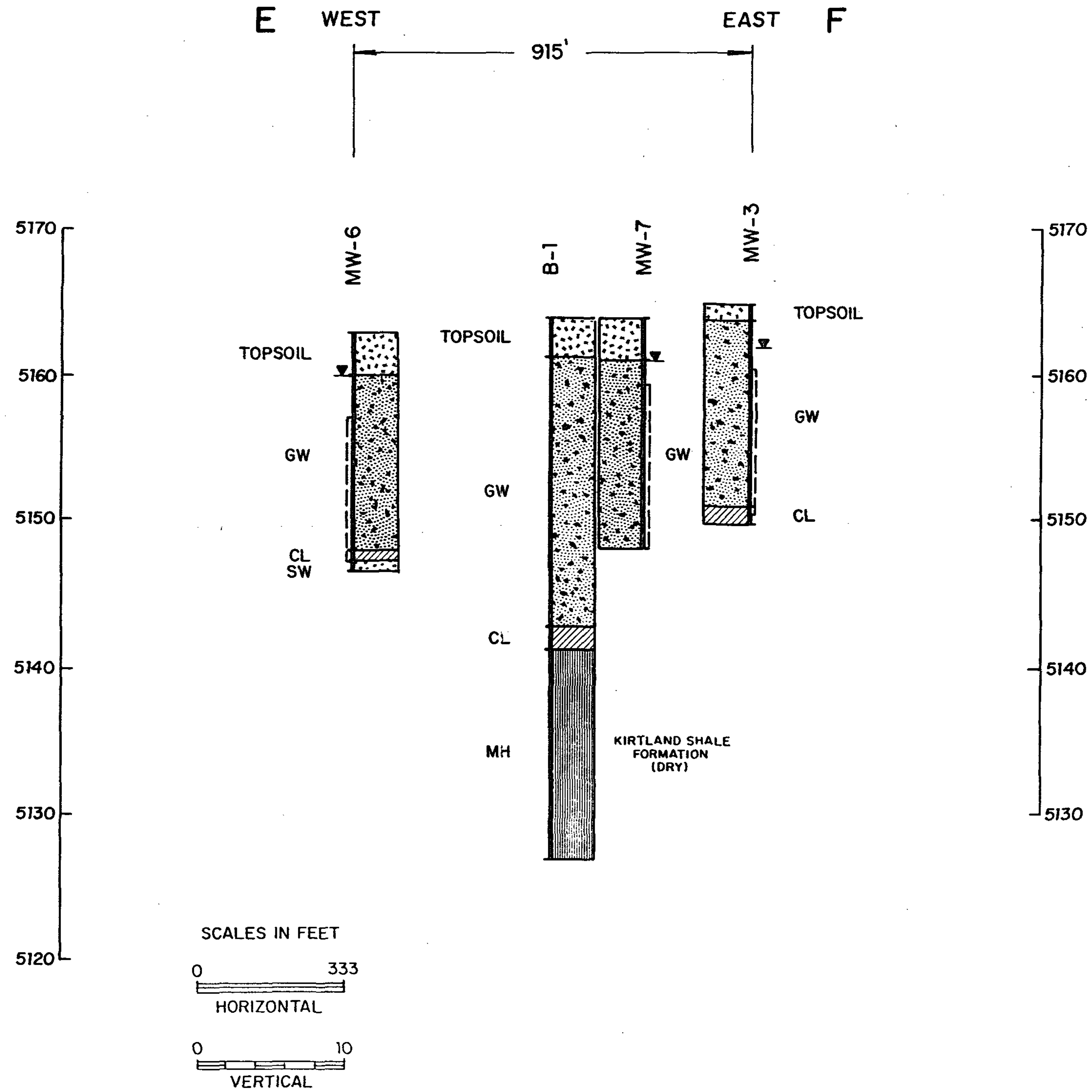
MW-11 → MW-9 = 3'/410' = 0.007 ft./ft.

GEOLOGIC CROSS SECTION C - D

Dames & Moore

PLATE 6

FILE 14819-005-031 BY DATE 11-30-87 CHECKED BY DATE



LEGEND

▼ WATER LEVEL

SCREENED INTERVAL

WATER LEVEL GRADIENT:

MW-3 → MW-6 = 2'/915' = 0.002 ft./ft.

GEOLOGIC CROSS SECTION E-F

Dames & Moore

PLATE 7

PROGRESS REPORT

PRELIMINARY GROUND WATER EVALUATION
MAVERIK REFINERY AND TANK FARM
KIRTLAND, NEW MEXICO
FOR MAVERIK COUNTRY STORES, INC.

BY

DAMES & MOORE
SALT LAKE CITY, UTAH

December 10, 1987

TABLE OF CONTENTS

LIST OF TABLES

LIST OF PLATES

SUMMARY

This progress report presents preliminary data evaluations for the on-going hydrogeologic study at the Maverik Refinery and Tank Farm, Kirtland, New Mexico. Hydrogeologic and hydrologic conditions are being evaluated both on-site and off-site approximately 0.7 miles from the refinery property boundaries. The general site location map and detailed plot plan showing the monitor wells, private wells, well points, borehole, geologic cross sections and the TRC sample locations are included on Plate 1.

This study has been authorized by Maverik Country Stores, Inc. following preliminary studies by the Federal EPA and the New Mexico Environmental Improvement Division (EID). The EID, in a letter to Maverik dated December 31, 1986, concluded from these studies that past refinery operations resulted in contamination of private water wells and surface waters southwest of the Maverik Refinery Tank Farm.

Dames & Moore first conducted an extensive visual site inspection of the Tank Farm and Refinery areas. Current surface conditions as well as previous spills and leaks indicated that the source of the ground water contamination was from the Tank Farm, and primarily from the southwestern bermed area.

To verify the source and to define the direction and lateral and vertical extent of the contaminant movement, the following field work was conducted:

1. A soil-gas, soil-water and surface water evaluation was conducted by Tracer Research Corporation (Plate 2).

2. Thirteen monitor wells, five well points and a deep borehole were completed (Plate 1).

3. Thirteen monitor wells, three existing wells and six surface water sites were sampled once in November 1987, and will be sampled again in December 1987, or January 1988, and analyzed for volatile organics, total organic lead and specified cations.

4. Water level elevation data have been obtained at nearby private water wells, monitor wells and well points and surface water sites (Plate 4).

5. A 9-hour aquifer pumping test was conducted on the river channel alluvial gravel aquifer.

The preliminary data evaluation completed to date has consisted of:

1. Evaluation of all existing EPA and EID water quality data and the results of the TRC survey, in order to optimally locate the 13 monitor well drill sites (Plate 2).

2. Evaluation of the subsurface geology with respect to the hydraulic characteristcs, water level elevations and water quality, to define the direction and rate of movement of the ground water and contaminants (Plates 3-7).

3. Evaluation of surface water flows and quality to better define contaminant movement to the irrigation and drainage ditches, and the influence of these surface water diversion structures on the ground water flow direction.

During the course of our study, in early November 1987, Dames & Moore discovered fuel oil along the west side irrigation ditch as well as along the adjacent drainage ditch. Maverik implemented immediate clean-up measures after being notified of this situation. A series of absorbent pads were placed along the ditch to intercept the fuel oil product which was evidently moving offsite from the southwest corner of the Tank Farm area in a major ground water discharge area.

This progress report was prepared upon completion of the Round 1 field sampling and preliminary laboratory data evaluation.

The final report, scheduled for completion in March 1988, will include all of the data collected and a final data evaluation, Round 2 water quality laboratory data results, as well as a discussion of the significance of the contamination and general recommendations for further remediation, if needed.

PRELIMINARY CONCLUSIONS

Based on the hydrogeologic and water quality data currently available for the Maverik Refinery and Tank Farm in Kirtland, New Mexico, the following preliminary conclusions have been reached:

1. Ground water contamination of the shallow alluvial aquifer and west-side irrigation ditch has occurred over an area approximately 600-feet wide in an east-west direction and 1,500-feet long in a north-south direction. The contaminant plume is restricted to the highly permeable subsurface river channel deposits that trend northeast to southwest to the San Juan River.

2. Based on the laboratory water quality data currently available, the contaminants present on site include xylene, toluene, ethylbenzene, 1,2-dichloroethane, benzene and trace amounts of total organic lead.

   Concentrations of the contaminants are elevated on site at the tank farm and to the southwest of the tank farm, in the west-side irrigation ditch, in the ground water in the adjacent field and to the southwest toward the San Juan River. Elevated levels of contaminants, when detected in off-site wells, are at or just barely exceed allowable drinking water concentration levels (ref. EID ? report, October 7, 1987). The 1,2 DCA concentrations obtained from the preliminary TRC survey are not comparable to the actual concentrations measured for the water samples in the laboratory (Plates 2 and 3).

   based on TRC data

3. The contaminant source area appears to be the tank farm, specifically the southern part, between the largest tank to the south, and the two smaller tanks to the north (Plate 1).

4. The direction of ground water flow is to the south-southwest toward the San Juan River. The ground water flow velocity in the coarse river channel alluvial deposits has been estimated to be about 3 ft/day, based on a hydraulic gradient of 0.01 ft/ft, a hydraulic conductivity of 100 ft/day and an effective porosity of 0.3.

5. As a result of the coarse subsurface river channel deposits consisting of sands, gravels and some cobbles, contaminants from the Kirtland Tank Farm have migrated through this aquifer off-site to the southwest.

based on well-data

As a result of the high permeability of this aquifer and large volumes of water moving through this aquifer, the aquifer tends to be flushed out quite quickly. This results in very low levels of contaminants observed in the downgradient monitor wells and in particular the private water wells, which were generally drilled to a depth of 20 feet and probably open throughout the saturated zone.

$S_y = n - S_r$

SCOPE OF WORK

The total project scope of work to be completed by Dames & Moore was approved by the EID (May 11, 1987). To date, the following work tasks have been performed:

TASK I - FIELD INVESTIGATIONS

- Fifteen soil-gas, 21 soil-water and 2 surface water samples were analyzed by Tracer Research Corporation (TRC), to evaluate the relative concentrations of nine volatile organic compounds, both on-site and off-site.

- Five shallow (3-foot long, No. 10-slot size) galvanized steel well points were driven in key locations for additional water level elevation data.

- Twelve 2-inch diameter PVC cased and one 2-inch stainless steel drive point water quality monitor wells and one deep boring were completed at critical locations. The wells were drilled with an air-rotary casing driver drill rig using little or no water. Drill cuttings were logged and cuttings from three of the contaminated wells on site were tested for potential classification as RCRA hazardous waste. Five of the 13 monitor wells were completed on site.

- One aquifer pumping test and 12 slug tests were performed on the monitor wells.

- A site investigation of surface waters, on-site and off-site, to visually inspect for oil refinery product was conducted. As a result, two additional surface water sample sites were added to the original water quality sampling program.

- One round of comprehensive water quality sampling was conducted in mid-November 1987. A total of 13 monitor wells, 2 private wells, one on-site 8-inch diameter, steel-cased well and 6 surface water sites were sampled. Water quality samples from the wells were obtained with a teflon bailer. Field pH, specific conductance and temperature were analyzed in the field (Table 2). A trip blank, a field-equipment blank and a duplicate sample were also included as part of the QA program.

- A private water well inventory was completed, water levels measured and those wells without pumps were depth sounded (Table 1).

- The monitor wells, 6 surface water sites and 27 private water wells were surveyed by San Juan Engineers, a licensed surveyor from Farmington, New Mexico.

TASK II - LABORATORY INVESTIGATIONS

- Rocky Mountain Analytical Laboratory (RMAL) a division of ENSECO, Incorporated, a well known multi-state certified and EPA Contract Laboratory Program laboratory, analyzed the water quality samples for those constituents listed in Table 2. All of the sample bottles, preservatives, sample bottle labels, sampling instructions and chain-of-custody forms were sent directly to the site from RMAL. Samples were collected and sent for next day delivery to RMAL via Federal Express, where they were logged in immediately, stored and analyzed according to EPA procedures.

- Drill cuttings from the contaminated on-site monitor wells 10, 11 and 12 were sent to RMAL to evaluate their hazardous characteristics.

TASK III - PRELIMINARY DATA EVALUATIONS

- Evaluated the TRC soil-gas and soil-water data in conjunction with the existing water quality data obtained by the EPA and the EID, for optimizing the locations of the 13 monitor wells with respect to defining subsurface contamination (Plate 2).

- Evaluated the subsurface geology at the 13 monitor wells and one deep borehole, and the water quality data from these 13 monitor wells, surface water sites and private well sites to define the vertical and lateral extent of ground water contamination, both on-site and off-site (Plates 5-7).

- Evaluated the water level elevation, aquifer pump test and slug test data to define the direction and rate of movement of the ground water in the study area (Plate 4).

- Prepared this progress report.

TABLE 1 WATER LEVEL ELEVATION DATA[1]

(Maverik Country Stores, Inc., Kirtland, New Mexico)

Site Designation		Depth to[1] Water From Measuring Point (ft)	Measuring Point Elevation (ft)		Water Level Elevation (ft)	Ground Surface Elevation (ft)	Well Depth From Ground Surface (ft)
Surface Water Sites							
Westside Irrigation Ditch							
Staff Gauge 1		3.90	5194.65		-----	-----	
Staff Gauge 2		0.90	5186.60		5184.59	-----	
Staff Gauge 3		2.70	5186.22		5183.45	-----	
Staff Gauge 4		2.83	5171.59		5167.59	-----	
San Juan River							
Staff Gauge 5		3.70	-----		-----		
Monitor Well Sites			Steel Casing	PVC Casing			
MW-1		8.15	5207.79	5207.24	5199.09	5205.75 6.66	21.5
MW-2		3.85	5197.10	5196.93	5193.08	5195.25 2.17	15
MW-3	(steel)	3.40	5183.00	5181.46	5179.6	5181.06 1.46	14.5
MW-4	(steel)	6.71	5178.41	5177.10	5171.7	5176.14 4.44	15
MW-5		5.72	5175.62	5175.09	5169.37	5173.67 4.3	15
MW-6		4.37	5176.40	5176.01	5172.03	5174.23 2.2	15.5
MW-7	(steel)	5.13	5183.71	5182.84	5178.58	5181.73 3.15	15
MW-8		4.09	5186.00	5185.87	5181.78	5184.02 2.24	15
MW-9		2.51	5191.39	5191.22	5188.71	5189.53 .82	15
MW-10		2.70	5189.80	5189.30	5186.6	5187.47 .87	12.5
MW-11		5.89	5197.26	5197.15	5191.26	5194.97 3.71	33
MW-12		4.86	5196.66	5196.19	5191.33	5194.80 3.42	12
MW-13		0.34	5187.76	N.A.	5187.42	5187.56 .14	5
W-3		5.10	5196.40	N.A.	5191.30	5194.62 3.32	21
Well Drive Point Sites							
WP1		-	5175.61		-----	5175.07	
WP2		3.65[2]	5173.43		5169.78	5173.30	
WP3		3.0 [2]	5180.92		5177.92	5180.79	
WP4		1.36	5193.19		5191.83	5193.11	
WP5		0.34	5189.54		5189.20	5189.23	
Private Wells (Inventoried)							
William Walker		No Access	5177.21		-----		40
E.M. Jackson (House)		4.0	5175.73		5171.73		30.7
(Field)		3.5	5175.85		5172.35		40
H. Smouse		No Access	(Build. Locked)		-----		-
M. Stone		No Access	-----		-----		-
J. Bloomfield		8.06	5188.10		5180.04		25
V. Murray (Corral)		3.2	5191.69		5188.49		20
(House)		3.55	-----		-----		18.5
R. Ball		2.33	5184.73		5182.40		58.8
A. Jackson		No Access	5177.12		-----		-
R. Jackson (Field)		4.95	5178.02		5173.07		12.7
R. Housh		No Access	-----		-----		-
R. Neff		5.22	5179.53		5174.31		20.2
P. Pickard (Shed)		9.25	5180.14		5170.89		17.3
(House)		----	5180.15		-----		----
R. Eshome		6.65	5179.76		5173.11		12.5
G. Nelson		7.50	5178.40		5170.90		19.7
E. Mclemore		1.59	5186.15		5184.56		17.7
E. Grey		No Access	-----		-----		-
I. Hull		4.49	5194.32		5189.83		15.2
C. Curley		4.68	5199.95		5195.27		23.0
R. Madrid		8.23	5208.89		5200.66		34.9
W. York		8.80	5206.05		5197.25		21.6
C. Hill		6.40	5202.54		5196.14		21.0
D. Pilcher		6.61	5201.51		5194.90		25.8
D. Howell		8.18	5204.53		5196.35		24.1
R. Tracey		1.63	5190.32		5188.69		21.0
V. Lucero		7.33	5200.16		5192.83		34.6

(1) Measured November 22 - 27, 1987, except where footnote (2) designated
(2) Measured October 30, 1987

TABLE 2 FIELD WATER QUALITY DATA[1]

(Maverik Country Stores, Inc., Kirtland, New Mexico)

Sample Site Designation	Conductivity (umhos/cm)	pH	Temperature °C	Flow CFS	Remarks
Ground Water					
MW-1	400	9.64	15.3	-	No oil or sheen noted in glass bailer
MW-2	1,100	7.75	14.2	-	No oil or sheen noted in glass bailer
MW-3	1,080	7.78	12.0	-	No oil or sheen noted in glass bailer
MW-4	1,510	7.46	14.1	-	No oil or sheen noted in glass bailer
MW-5	1,310	7.85	15.5	-	No oil or sheen noted in glass bailer
MW-6	1,880	7.51	12.1	-	No oil or sheen noted in glass bailer
MW-7	1,060	7.66	13.5	-	No oil or sheen noted in glass bailer
MW-8	1,060	7.41	14.8	-	No oil or sheen noted in glass bailer
MW-9	1,400	7.11	13.3	-	No oil or sheen noted in glass bailer
MW-10	1,280	7.66	12.5	-	No oil or sheen noted in glass bailer
MW-11	1,050	7.85	14.5	-	No oil or sheen noted in glass bailer
MW-12	1,510	6.74	17.0	-	Yellow floaters, odoriferous
MW-13	2,300	8.14	8.1	-	Yellow floaters, no odor, multi-colored sheen
Ball Well	3,500	7.96	14.3	-	No oil or sheen noted in glass bailer
V. Murray Well	700	8.06	12.9	-	No oil or sheen noted in glass bailer
Surface Water					
SW-1 Farmers Mutual Irrigation Ditch (Upgradient)	280	8.5	6.5	1,125	Metered
SW-2 West Irrigation Ditch (at Hwy 489)	1,080	7.60	10.0	<5 gpm	Estimated
SW-3 West Irrigation Ditch (Downgradient)	1,210	8.05	6.8	5 gpm	Estimated
SW-4 West Irrigation Ditch (Across from Tank Farm)	565	7.28	7.8	<5 gpm	Estimated
SW-5 West Irrigation Ditch (Across from Tank Farm)	Upper surface layer too contaminated to lower probes through			<5 gpm	Estimated
SW-6 V. Murray's Ditch (West of Tank Farm)	3,080	7.28	14.2	<2 gpm	Estimated

(1) Measured in November 1987

TABLE 2

LABORATORY WATER QUALITY PARAMETERS

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

- Bromoform
- Carbon tetrachloride
- Chlorobenzene
- Chloroethane
- Chloroform
- Dibromochloromethane
- Bromodichloromethane
- 1,1-Dichloroethane
- 1,2-Dichloroethane
- 1,1-Dichloroethene
- 1,2-Dichloropropane
- cis-1,3-Dichloropropene
- trans-1,3-Dichloropropene
- Bromomethane
- Chloromethane
- Methylene chloride
- 1,1,2,2-Tetrachloroethane
- Tetrachloroethene
- trans-1,2-Dichloroethene
- 1,1,1-Trichloroethane
- 1,1,2-Trichloroethane
- Trichloroethene
- Vinyl chloride
- 1,1,2-Trichloro-2,2,1-trifluoroethane
- 1,2-Dibromoethane (EDB)

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

- Benzene
- Chlorobenzene
- Ethylbenzene
- Toluene
- 1,2-Dichlorobenzene
- 1,3-Dichlorobenzene
- 1,4-Dichlorobenzene
- m-Xylene
- o & p-Xylene(s)

INORGANIC PARAMETERS

- pH
- Specific Conductance @ 25C
- Total Dissolved Solids
- Fluoride
- Chloride
- Nitrate + Nitrite as N
- Sulfate
- Total Alkalinity as $CaCO_3$
- Bicarbonate Alkalinity
- Carbonate Alkalinity as $CaCO_3$
- Ammonia as N
- Total Cations
- Total Anions
- % Difference

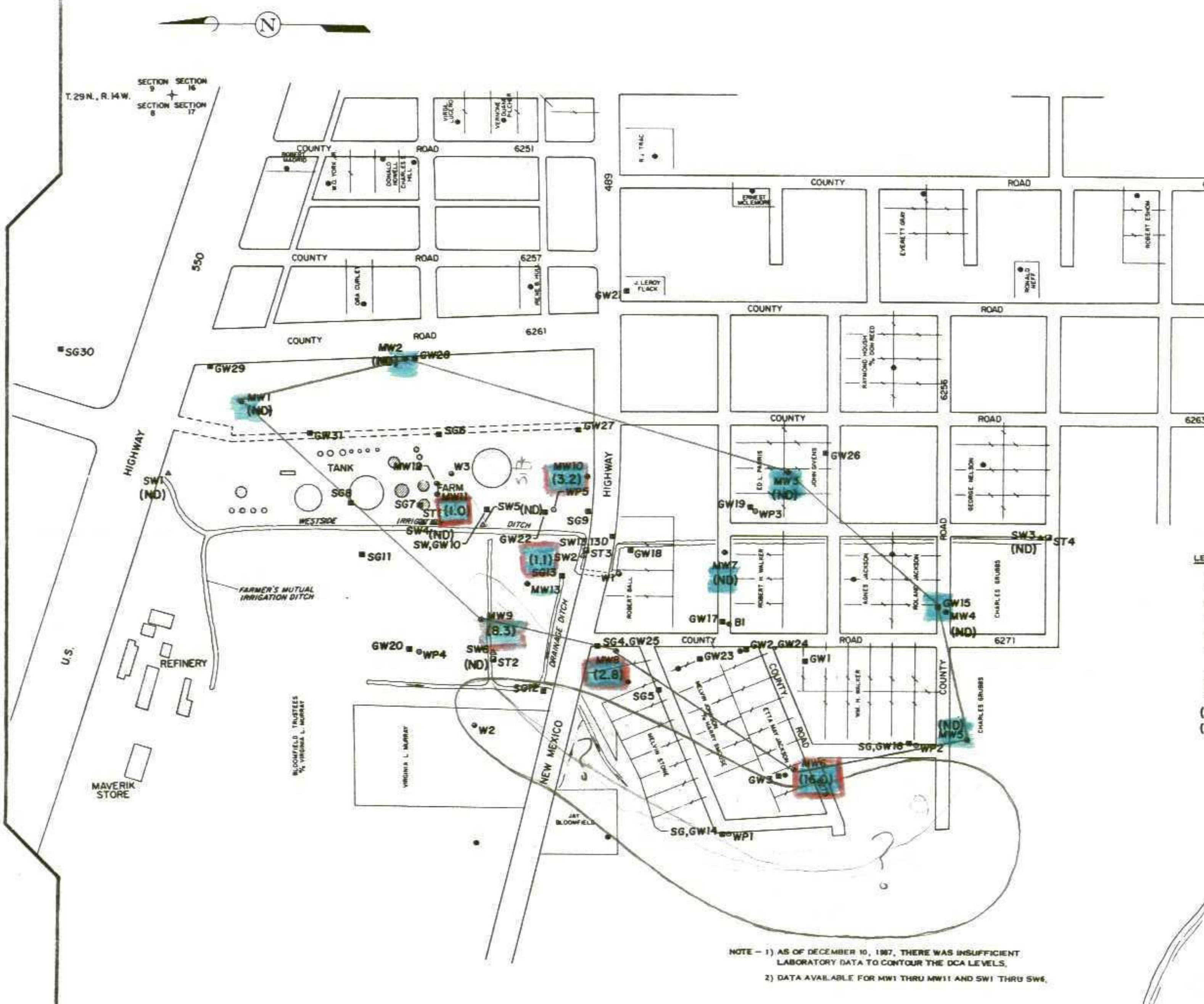
METALS PARAMETERS

- Calcium
- Iron
- Magnesium
- Potassium
- Sodium
- Total Organic Lead

Miller Jackson: 8
Jay Bloomfield: TF
Walker: 1

		(W/R To T.F.) Location	(TRC) DCA	WL	Screen	Shale
O	MW-1	NW	(20) —	3'	10 - 20 silt	
O	MW-2	E	(10-20) —	3'	5' - 15	
	MW-3	S	—	3'	4.5 - 14.5	
	MW-4	S-SW	(—)			
	MW-5	S-SW	(—)	2.5	5 - 15	NO
✓	MW-6	SW	(10.0) 16.0	3.0'	6 - 16	
O	MW-7	S-SW	(10) —	3.0'	4.5 - 14.5	
O	MW-8	SW	(10) 2.8			
✓	MW-9	SW-W	(10) 8.3	1.5'	5 - 15	
☆	MW-10	S-TF	(—) 3.2	2.0'	2 - 12	YES - 31'
O	MW-11	C-TF	20.0 1.0	3.0'	23 - 33	38'-39'
O	MW-12	C-TF	(20.0) —	3.0'	0 - 10	?
O	MW-13	SW	(20) —			
	B-1	SW (450)				YES - 22'

☆ TRC < WELL
✓ TRC ≈ WELL
O TRC > WELL



LEGEND

- ● PRIVATE WELL LOCATION
- EXISTING WELL LOCATION SAMPLED (W1 – W3)
- WELL POINT LOCATION (WP1 – WP5)
- MONITOR WELL LOCATION (MW1 – MW13)
- BORING LOCATION (B1)
- TRC SOIL – GAS AND WATER SURVEY POINT LOCATION (SG, GW1 – GW31, SW13 & SW13D)
- STAFF GAUGE LOCATION (ST1 – ST5)
- ▲ SURFACE WATER SAMPLE SITE LOCATION (SW1 – SW6)
- (ND) NOT DETECTABLE
- (8.3) 1, 2 DCA LEVEL (ppb)

200 0 200 400

SCALE IN FEET

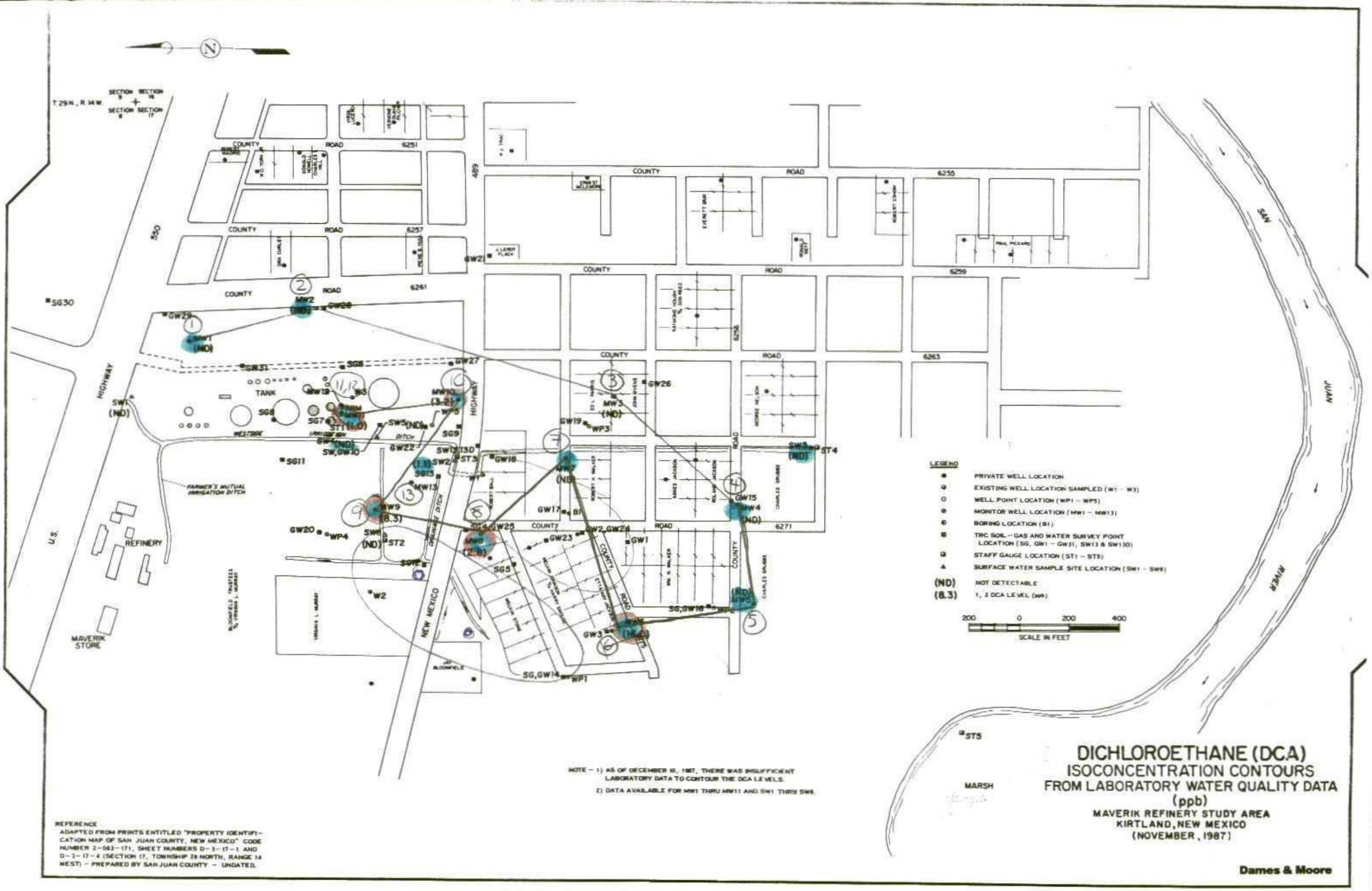
NOTE – 1) AS OF DECEMBER 10, 1987, THERE WAS INSUFFICIENT LABORATORY DATA TO CONTOUR THE DCA LEVELS.
2) DATA AVAILABLE FOR MW1 THRU MW11 AND SW1 THRU SW6.

REFERENCE
ADAPTED FROM PRINTS ENTITLED "PROPERTY IDENTIFICATION MAP OF SAN JUAN COUNTY, NEW MEXICO" CODE NUMBER 2-083-171, SHEET NUMBERS D-3-17-1 AND D-3-17-4 (SECTION 17, TOWNSHIP 29 NORTH, RANGE 14 WEST) – PREPARED BY SAN JUAN COUNTY – UNDATED.

DICHLOROETH

ISOCONCENTRATIC
FROM LABORATORY WAT
(ppb)

MAVERIK REFINERY S
KIRTLAND, NEW M
(NOVEMBER, 19



NOTE – 1) AS OF DECEMBER 10, 1987, THERE WAS INSUFFICIENT LABORATORY DATA TO CONTOUR THE DCA LEVELS.
2) DATA AVAILABLE FOR MW1 THRU MW11 AND SW1 THRU SW8.

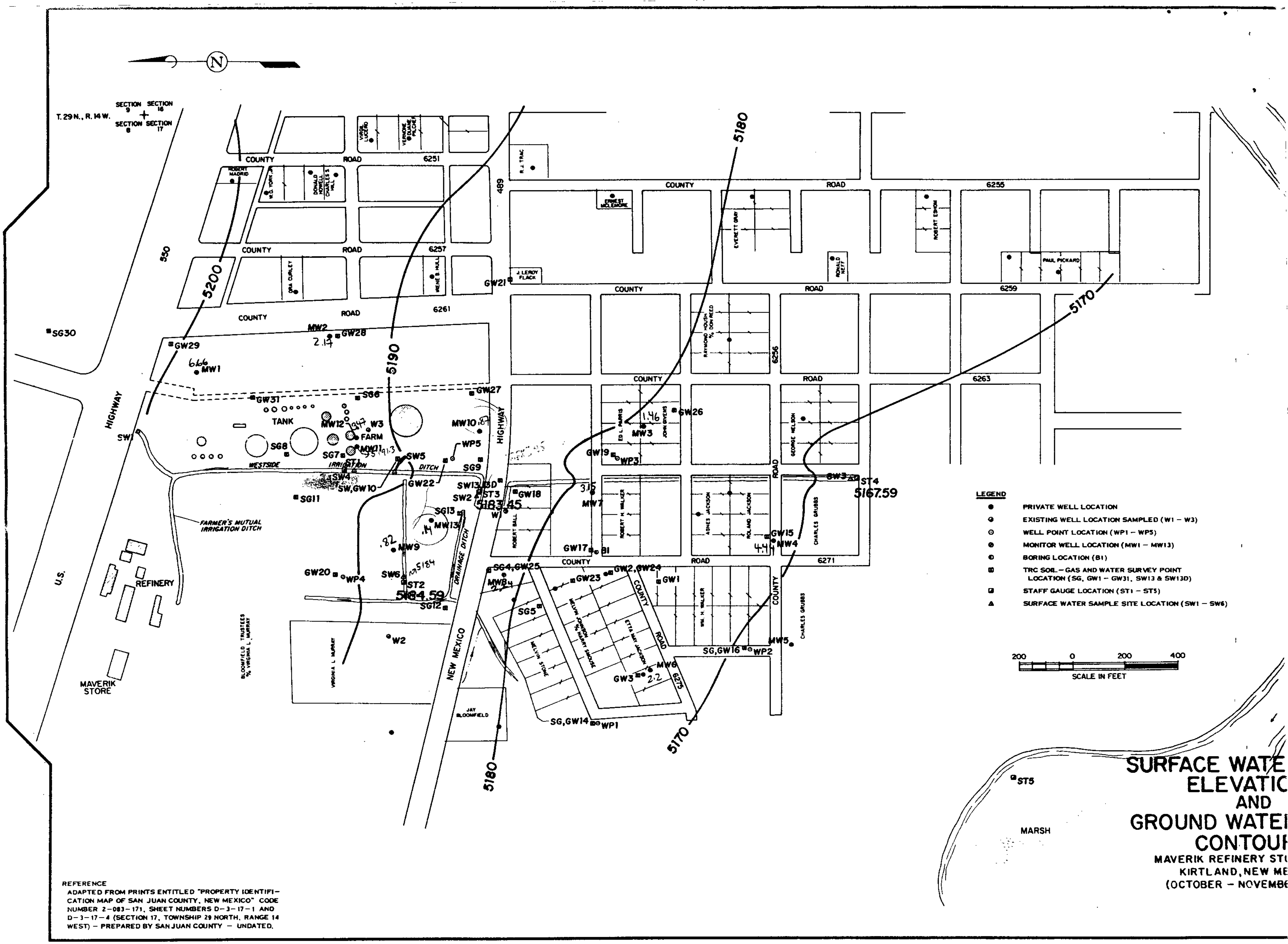
REFERENCE
ADAPTED FROM PRINTS ENTITLED "PROPERTY IDENTIFICATION MAP OF SAN JUAN COUNTY, NEW MEXICO" CODE NUMBER 2-063-171, SHEET NUMBERS D-3-17-1 AND D-3-17-4 (SECTION 17, TOWNSHIP 29 NORTH, RANGE 14 WEST) – PREPARED BY SAN JUAN COUNTY – UNDATED.

DICHLOROETHANE (DCA)
ISOCONCENTRATION CONTOURS FROM LABORATORY WATER QUALITY DATA (ppb)

MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO
(NOVEMBER, 1987)

Dames & Moore

PLATE 3



SURFACE WATE
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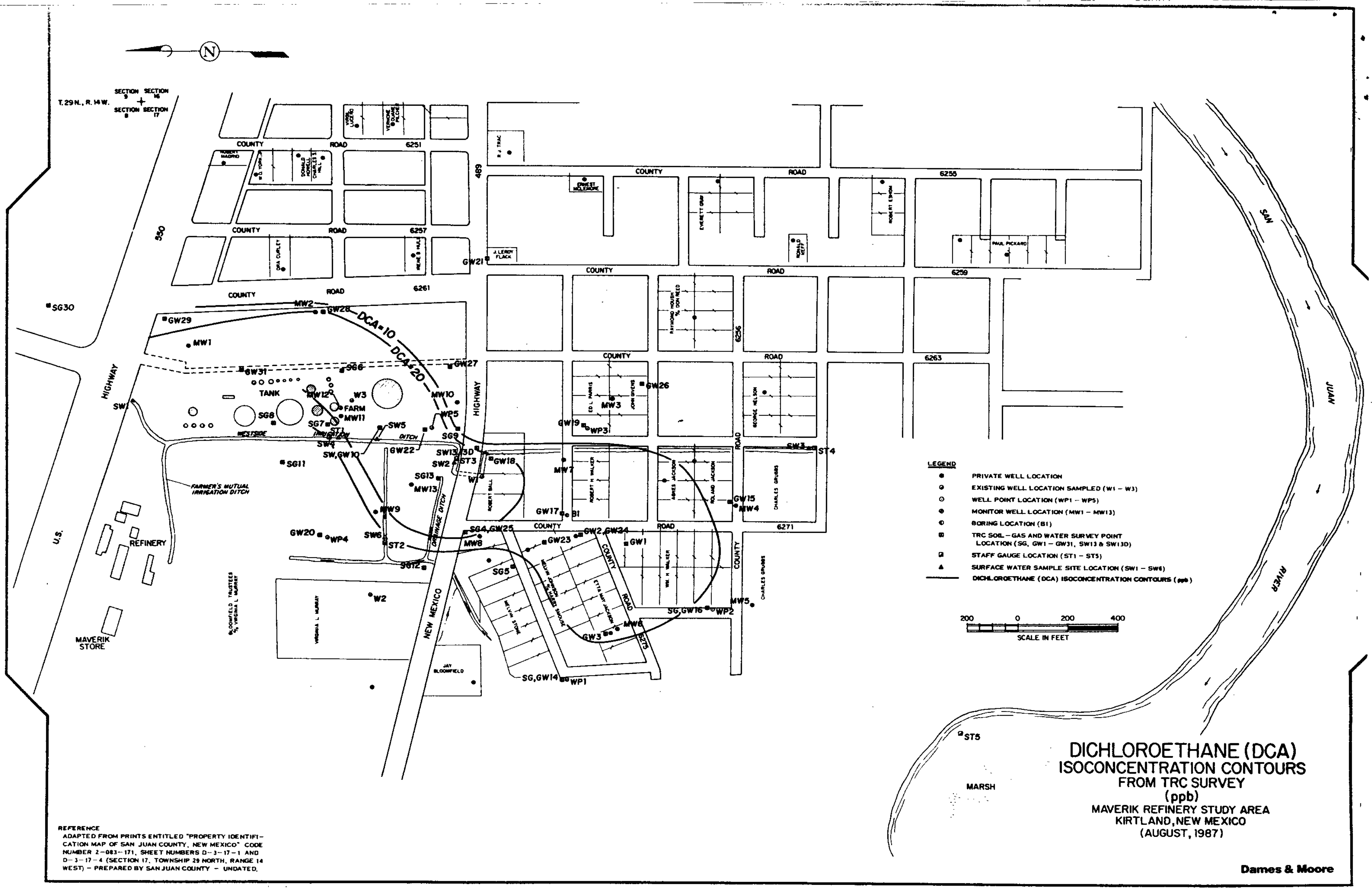
AND
GROUND WATEI
CONTOUI
MAVERIK REFINERY STI
KIRTLAND, NEW ME
(OCTOBER – NOVEMBE
LEGEND
PRIVATE WELL LOCATION
EXISTING WELL LOCATION SAMPLED (W1 – W3)
WELL POINT LOCATION (WP1 – WP5)
MONITOR WELL LOCATION (MW1 – MW13)
BORING LOCATION (B1)
TRC SOIL–GAS AND WATER SURVEY POINT LOCATION (SG, GW1 – GW31, SW13 & SW13D)
STAFF GAUGE LOCATION (ST1 – ST5)
SURFACE WATER SAMPLE SITE LOCATION (SW1 – SW6)
200 0 200 400
SCALE IN FEET
T. 29 N., R. 14 W.
SECTION 9
SECTION 16
SECTION 8
SECTION 17
5200
5190
5180
5170
5167.59
5183.45
5184.59
COUNTY ROAD 6251
COUNTY ROAD 6257
COUNTY ROAD 6261
COUNTY ROAD 6255
COUNTY ROAD 6259
COUNTY ROAD 6263
COUNTY ROAD 6256
COUNTY ROAD 6271
COUNTY ROAD 6275
489
550
HIGHWAY
NEW MEXICO
U.S.
TANK
FARM
REFINERY
MAVERIK STORE
MARSH
WESTSIDE IRRIGATION DITCH
DRAINAGE DITCH
FARMER'S MUTUAL IRRIGATION DITCH
SG30
GW29
MW1
MW2
GW28
GW31
SG6
GW27
MW12
W3
MW10
WP5
SG8
MW11
SW5
SG7
ST1
SW4
SW,GW10
GW22
SG9
SG11
SW13
SW13D
SW2
ST3
GW18
W1
SG13
MW13
MW9
GW20
WP4
SW6
ST2
SG12
W2
SW1
GW21
GW26
MW3
GW19
WP3
MW7
GW17
B1
SG4,GW25
MW8
GW23
GW2,GW24
GW1
SG5
GW3
MW6
SG,GW14
WP1
SG,GW16
WP2
MW5
GW15
MW4
SW3
ST4
ST5
ROBERT MADRID
W.D. YORK, JR.
DONALD HOWELL
CHARLES S. HILL
VIRGIL LUCERO
VERNONE DUANE PILCHER
ORA CURLEY
IRENE B. HULL
R.J. TRAC
J. LEROY FLACK
ERNEST MCLEMORE
EVERETT GRAY
RONALD NEFF
ROBERT EDMON
PAUL PICKARD
RAYMOND HOUSH % DON REED
ED L. PARRIS
JOHN GIVENS
GEORGE NELSON
ROBERT H. WALKER
AGNES JACKSON
ROLAND JACKSON
CHARLES GRUBBS
ROBERT BALL
MELVIN JOHNSON % HARRY SMOUSE
ETTA MAY JACKSON
WM. H. WALKER
MELVIN STONE
JAY BLOOMFIELD
VIRGINIA L. MURRAY
BLOOMFIELD TRUSTEES % VIRGINIA L. MURRAY
2.14
6.66
1.46
3.15
4.41
2.2
.82
.14
REFERENCE
ADAPTED FROM PRINTS ENTITLED "PROPERTY IDENTIFICATION MAP OF SAN JUAN COUNTY, NEW MEXICO" CODE NUMBER 2-083-171, SHEET NUMBERS D-3-17-1 AND D-3-17-4 (SECTION 17, TOWNSHIP 29 NORTH, RANGE 14 WEST) – PREPARED BY SAN JUAN COUNTY – UNDATED.


DICHLOROETHANE (DCA)
ISOCONCENTRATION CONTOURS
FROM TRC SURVEY
(ppb)
MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO
(AUGUST, 1987)
Dames & Moore
LEGEND
PRIVATE WELL LOCATION
EXISTING WELL LOCATION SAMPLED (W1 – W3)
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TRC SOIL – GAS AND WATER SURVEY POINT LOCATION (SG, GW1 – GW31, SW13 & SW13D)
STAFF GAUGE LOCATION (ST1 – ST5)
SURFACE WATER SAMPLE SITE LOCATION (SW1 – SW6)
DICHLOROETHANE (DCA) ISOCONCENTRATION CONTOURS (ppb)
200 0 200 400
SCALE IN FEET
T. 29 N., R. 14 W.
SECTION 9 SECTION 16
SECTION 8 SECTION 17
SAN JUAN RIVER
MARSH
ST5
DCA=10
DCA=20
COUNTY ROAD 6251
COUNTY ROAD 6257
COUNTY ROAD 6261
COUNTY ROAD 6255
COUNTY ROAD 6259
COUNTY ROAD 6263
COUNTY ROAD 6256
COUNTY ROAD 6271
COUNTY ROAD 6275
HIGHWAY 489
U.S. HIGHWAY 550
NEW MEXICO
TANK
FARM
REFINERY
MAVERIK STORE
WESTSIDE IRRIGATION DITCH
FARMER'S MUTUAL IRRIGATION DITCH
DRAINAGE DITCH
GW29
MW1
GW31
SG6
GW27
MW2
GW28
MW10
WP5
SG9
MW12
W3
MW11
SG8
SG7
ST1
SW5
SW4
SW,GW10
GW22
SW13,13D
ST3
SW2
GW18
W1
SG11
SG13
MW13
MW9
GW20
WP4
SW6
ST2
SG12
W2
SG4,GW25
MW8
GW17
B1
MW7
GW9
WP3
MW3
GW26
GW21
SW3
ST4
GW15
MW4
GW2,GW24
GW23
GW1
SG5
SG,GW14
WP1
GW3
MW6
SG,GW16
WP2
MW5
SW1
SG30
REFERENCE
ADAPTED FROM PRINTS ENTITLED "PROPERTY IDENTIFICATION MAP OF SAN JUAN COUNTY, NEW MEXICO" CODE NUMBER 2-083-171, SHEET NUMBERS D-3-17-1 AND D-3-17-4 (SECTION 17, TOWNSHIP 29 NORTH, RANGE 14 WEST) – PREPARED BY SAN JUAN COUNTY – UNDATED.

PLATE 2

TABLE 2 (Continued)

PRELIMINARY LABORATORY RESULTS FOR KEY ORGANIC CONSTITUENTS
FOR MAVERIK COUNTRY STORES, INC., KIRTLAND, NEW MEXICO

Sample Site[1] Designation	1-2 DCA[2] (ppb) 10[3]	Total Xylene[2] (ppb) 0.62[3]	Ethylbenzene[2] (ppb) 750[3]	Toluene[2] (ppb) 750[3]	Benzene[2] (ppb) 10[3]
Wells					
MW1	< 1	< 0.5	< 0.5	< 0.5	0.53
MW2	< 1	< 0.5	< 0.5	< 0.5	< 0.5
MW3	< 1	< 0.5	< 0.5	< 0.5	< 0.5
MW4	< 1	< 0.5	< 0.5	< 0.5	< 0.5
MW5	< 1	< 0.5	< 0.5	< 0.5	< 0.5
MW6	16	< 0.5	< 0.5	< 0.5	< 0.5
MW7	< 1	< 0.5	< 0.5	< 0.5	< 0.5
MW8	2.8	< 0.5	< 0.5	< 0.5	< 0.5
MW9	8.3	< 0.5	< 0.5	< 0.5	< 0.5
MW10	3.2	< 0.5	< 0.5	< 0.5	< 0.5
MW11	1.0	< 0.5	< 0.5	< 0.5	0.81
MW12[4]	450.	3,000.	1,300.	2,000.	19,000.
MW13	< 1	2.23	0.54	< 0.5	< 0.5
W-3	< 1	5.8	1.3	< 0.5	< 0.5
R. Ball Well	< 1	< 0.5	0.89	< 0.5	< 0.5
V. Murray Well	< 1	< 0.5	< 0.5	< 0.5	1.0
West Side Irrigation Ditch					
SW1	< 1	< 0.5	< 0.5	< 0.5	< 0.5
SW2	1.1	1.6	< 0.5	< 0.5	< 0.5
SW3	< 1	< 0.5	< 0.5	< 0.5	< 0.5
SW4	<10	61	<10	<10	<10
SW5	<250	57,000	2,500	470	<250
V. Murray's Drainage Ditch					
SW6	< 1	< 0.5	< 0.5	< 0.5	< 0.5

Drill Cuttings Sample

MW11 & MW12 (composite). No results to date. Are being analyzed for EP Toxicity for 8 RCRA metals and sulfide and cyanide reactivity.

---

(1) Sampled during the period 11/10/87 through 11/27/87.

(2) The values indicated as less than (<) are detection levels only, and not actual concentrations.

(3) New Mexico MCL's for the above for drinking water standards are: 1,2 DCA $\leq$ 10 ppb; toluene $\leq$ 750 ppb; benzene $\leq$ 10 ppb; total xylene $\leq$ 0.62 620 ppb; ethylbenzene $\leq$ 750 ppb.

EPA MCL's for the above are: 1,2 DCA $\leq$ 5 ppb; toluene $\leq$ 2,000 ppb; benzene $\leq$ 5~~0~~ ppb. .005 mg/l

(4) MW12 Water quality sample was analyzed using the GC. All others were analyzed with GC/MS.

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

ENVIRONMENTAL IMPROVEMENT DIVISION

Michael J. Burkhart
Director

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

November 25, 1987

William Call, President
Maverick Country Stores
P.O. Box 457
Afton, Wyoming 83110

Dear Mr. Call:

In reference to your letter dated November 12, 1987, EID looks forward to meeting with Maverick and Dames and Moore concerning the Maverick Kirtland Refinery. For this purpose I have reserved a conference room at our District I Albuquerque office from 1:00 p.m. to 5:00 p.m., December 15, 1987. The office is located at 4219 Montgomery Blvd. N.E., Heritor Square, Albuquerque. Prior to our meeting, please provide EID with as much technical data gathered during the site investigation as possible.

If you have any questions please call me at (505) 827-2914.

Sincerely,

Bruce Frederick
Water Resource Specialist II
Ground Water Bureau

BF/pv

cc: T.D. Vandell, Dames & Moore, Salt Lake City Office
Vincent J. Memmott, V. J. Engineering
Stuart Castle, Drinking Water Section
Steve Cary, Superfund Section
David Tomko, EID Farmington Office
EID District I Office
Dave Boyer, OCD
Jennifer Pruett, Office of General Counsel

EQUAL OPPORTUNITY EMPLOYER

November 12, 1987

RECEIVED

NOV 19 1987

LIQUID WASTE/GROUND WATER SURVEILLANCE

MAVERIK COUNTRY STORES, INC.
1431 South 1800 West
P.O. Box 26 / Woods Cross, UT 84087
Phone: 801-295-5557

Mr. Bruce Frederick
Water Resource Specialist II
Ground Water Bureau
Environmental Improvement Division
P.O. Box 968
Santa Fe, New Mexico 87504-0968

Dear Mr. Frederick:

Maverik Kirtland Refinery/Tank Farm

This letter is in response to your request of October 22, 1987 for: (1) a revised schedule for completion of the project work tasks, and (2) the results of the soil-gas and water surveys by Tracer Research Corporation.

Attached is Table 1 which summarizes the work completed to date (tasks 1-4) and the projected completion dates for the remaining tasks 5 through 7. As indicated in Table 1, the final report submittal to the EID is scheduled for March 1988. The major time delay between now and final report release is, as indicated, due to the time for laboratory analysis(4 weeks) and the time interval of one month between sampling Rounds 1 and 2.

The scope of work as originally outlined in the Dames & Moore proposed scope of work (see Work Plan, February 16, 1987) has been modified and expanded as a result of the actual field conditions encountered. The number of new monitor wells has increased from 10 to 13, surface water sample points have increased from 4 to 6, three additional existing wells have been included for water quality sampling, an additional deep boring was drilled to verify the presence and continuity of the "unsaturated" Farmington shale zone, and an extensive (50 site) private well inventory and elevation survey, for water level data for the ground water elevation contour map, has been added.

As indicated in Table 1, all of the monitor wells and the five well points have been completed. The wells are currently being developed and slug tested and a pump test run, and they will be sampled for Round 1 analysis by the middle of November. The six surface water sites and two private well sites will also be sampled at this time. Laboratory analysis will take at least four weeks. In addition, the elevation survey will also be completed by mid-November.

Round 2 water quality sampling will be conducted approximately one month after Round 1, with laboratory analysis completed by early February, 1988. The draft and final written reports will be completed in February and March, 1988, respectively.

The soil-gas and water survey was conducted in August, 1987, with a final report from TRC to be received in mid-November, 1987. The data from the TRC study indicate slightly elevated levels of dichloroethane off-site to the southwest. Because the data from a soil-gas and water survey is semiquantitative, conclusions cannot be made based only on these data. The TRC soil-gas and water survey was conducted strictly to aid in the location of the monitor wells. Consequently, the soil-gas and water data results can and should be considered only in conjunction with the final monitor well water quality data results from both Rounds 1 and 2 sampling.

Maverik and Dames & Moore would like to meet with you and your staff in early to mid-December 1987, after the preliminary laboratory data from Round 1 sampling have been reviewed, to present and discuss these data as well as the soil-gas and water survey data. Geologic logs, water level elevation data and flow rates and directions will be discussed with respect to defining the contaminant movement from the Maverik tank farm site.

If you have any questions or would like to discuss this further, please call me at (307) 886-3861.

Very truly yours,

MAVERIK COUNTRY STORES, INC.

William Call

William Call
President

WC/TDV:si

cc: Peter Olsen, Dames & Moore
Terry Vandell, Dames & Moore
Vincent Memmott

TABLE 1

MAVERIK REFINERY PROJECT WORK COMPLETION TIME SCHEDULE

Task	Projected Completion Dates							
	Aug. '87	Sept.'87	Oct. '87	Nov. '87	Dec. '87	Jan. '88	Feb. '88	Mar. '88
1) Drilling Consent Documents Obtained	|---	------	---→|					
2) Soil-Water-Gas Survey	|--→|							
3) Private Well Inventory Surveying (27)	|--→|			|→|				
4) Monitor Well Drilling and Testing (13 Wells)			|---	---→|				
5) Water Quality Sampling and Lab Analysis (22 Sites)								
a. Round 1				|---	---→|			
b. Round 2					|---	---→|		
6) Data Evaluation and Final Draft Report Preparation and Submittal to Maverik				|---	------	------	---→|	
7) Final Report Submittal to EID							|---	---→|

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968
ENVIRONMENTAL IMPROVEMENT DIVISION
COMMUNITY SERVICES BUREAU
DRINKING WATER SECTION

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

RECEIVED
NOV - 2 1987
OIL CONSERVATION DIVISION
SANTA FE

October 29, 1987

William Call, President
Caribou Four Corner, Inc.
Post Office Box 457
Afton, Wyoming 83110

Re: Drinking water "hook ups" in the Kirtland Refinery area.

Dear Mr. Call:

I am providing you with information on the the households that need to be hooked-up, or financially reimbursed, to the Lower Valley Water Users Association. These individuals are:

1) Ginger Miller
Etta May Jackson
Rt. 1, Box 363 H
Farmington, N.M. 87401
(505) 598-5010 (Home)
— One lot containing several trailers which need connections.

2) Bill and Ellen Walker
P.O. Box 252
Kirtland, N.M. 87417
(505) 598-5954 (Home)
(505) 598-6611, Ext. 770 (Work)
— One home which has been connected, but owners are seeking reimbursement.

If I can provide you with any additional information, please contact me at (505) 827-2778.

Sincerely,

Stuart P. Castle

Stuart P. Castle, Program Manager
Drinking Water Section

cc: Jon F. Thompson, Bureau Chief, CSB
Louis Rose, Chief General Counsel
Pete Olsen, Dames and Moore, Salt Lake City Office
Steve Cary, CERCLA Section
David Tomko, EID Farmington Office
Dave Boyer, OCD ✓
Jennifer Pruett, Office of General Counsel
Dennis McQuillan, Ground Water Bureau
Maxine Goad, Ground Water Bureau

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

ENVIRONMENTAL IMPROVEMENT DIVISION

Michael J. Burkhart
Director

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

October 22, 1987

William Call, President
Caribou Four Corners, Inc.
Post Office Box 457
Afton, Wyoming 83110

RE: Maverik Kirtland Refinery

Dear Mr. Call:

E.I.D. has received a letter from T.D. Vandell indicating that drilling operations at the Maverik Kirtland Refinery will not begin until late October to early November, 1987, one month after EID anticipated receiving your final report on the completed site investigation. EID understands that certain delays have been caused by third party property owners unwilling to allow drilling. As requested in a previous letter to you from Dennis McQuillan, October 7, 1987, please provide EID with a revised schedule for the investigations, including the date when EID may expect your final report. Also, EID requests that you send as soon as possible the already complete soil gas survey report by Tracer Research Corporation.

EID would appreciate a timely response to these inquires. Please direct your response to me, as Dennis McQuillan has transferred this case to me.

Thank you for your cooperation.

Sincerely,

Marjorie S. Hood

for Bruce Frederick
Water Resource Specialist II
Ground Water Bureau (505) 827-2914

BF/pv

cc: T.D. Vandell, Dames & Moore, Salt Lake City Ofice
Stuart Castle, Drinking Water Section
Steve Cary, Superfund Section
David Tomko, EID Farmington Office
EID District I Office
Dave Boyer, Oil Conservation Division
Jennifer Pruett, Office of General Counsel

EQUAL OPPORTUNITY EMPLOYER

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
250 EAST BROADWAY, SUITE 200, SALT LAKE CITY, UTAH 84111-2480 (801) 521-9255

October 12, 1987

Ground Water/Hazardous Waste Bureau
Technical Services Section
New Mexico Health & Environment Dept.
P. O. Box 968
Santa Fe, New Mexico 87504-0968

RECEIVED
OCT 15 1987
GROUND WATER/HAZARDOUS WASTE BUREAU

Attention: Mr. Dennis McQuillan, WRS III

Dear Mr. McQuillan:

As per our telephone conversation of October 9, 1987, this letter summarizes the changes to the original February 16, 1987 work plan for monitor well completions at the Maverik Kirtland Refinery. These changes upgrade and refine the original program, to include three additional monitor wells located at points strategic for defining and monitoring the contaminant plume. Well construction specifications have not changed, with drilling scheduled to begin the latter part of October 1987. The modifications to the monitor well program will result in water quality and water level data from sites that will better define the vertical and lateral extent of the contaminant plume.

Attached is a copy of the locations of the 13 monitor wells. The locations are similar to the original plan, with the primary exception that the three (3) nested wells will be shifted to an on-site location where the highest contaminant levels have been detected. As we discussed, this should give us water quality data that define "worst case" vertical contamination, since the water table is so shallow (approximately 3 feet deep) and the river channel alluvial deposits are so coarse. This is true both on-site and off-site, along the zone to the southwest, where contamination has been observed in five private wells.

The subsurface geologic data obtained from the monitor well drilling and vertical water level elevation data will better define if any low permeable zones are present, either on-site or off-site, that could impact the contaminant plume movement, either laterally or vertically.

If you have any questions, please call me at (801) 521-9255.

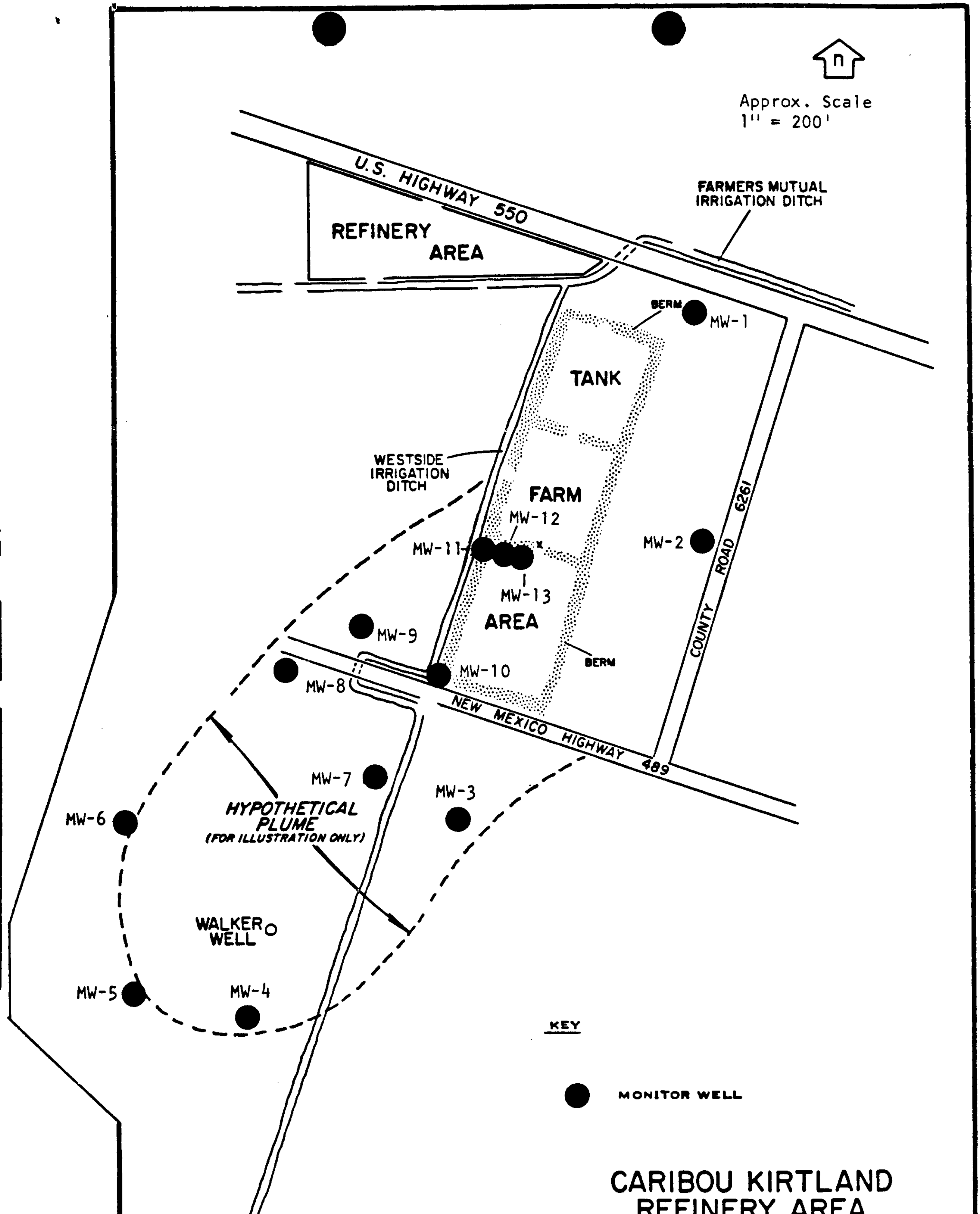
Sincerely,

DAMES & MOORE

TD Vandell

T. D. Vandell

enclosure
TDV:si
cc: Vince Memmott, Maverik
Len Murray, EID, Farmington



CARIBOU KIRTLAND
REFINERY AREA

Dames & Moore

PLATE 1

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
250 EAST BROADWAY, SUITE 200, SALT LAKE CITY, UTAH 84111-2480

14819-005

SALT LAKE UTAH OCT 13 '87

U.S. POSTAGE

022

PB METER 1202176

Mr. Dennis McQuillan, WRS III
Technical Services Section
Ground Water/Hazardous Waste Bureau
New Mexico Health & Environment Dept.
P. O. Box 968
Santa Fe, New Mexico 87504-0968

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

ENVIRONMENTAL IMPROVEMENT DIVISION

Michael J. Burkhart
Director

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

October 7, 1987

William Call, President
Caribou Four Corners, Inc.
Post Office Box 457
Afton, Wyoming 83110

Re Kirtland Refinery

Dear Mr. Call:

Please find enclosed the results of our private well sampling program in Kirtland, N.M. The residences are identified by County Road and lot numbers.

Mr. Stuart Castle with the Division's Drinking Water Section will furnish you with information on the households that need to be hooked up to public water or need to be reimbursed for hooking up within the next week.

I realize that you are somewhat behind on the site investigation schedule originally proposed by Dames and Moore. Please send me a revised schedule.

If there is anything else that I can do to assist you or your consultant, please let me know.

Sincerely,

Dennis McQuillan

Dennis McQuillan, Geologist
Ground Water Bureau

c.c. w/enc.
Pete Olsen, Dames and Moore, Salt Lake City office
c.c. w/o enc.
Stuart Castle, Drinking Water Section
Steve Cary, CERCLA Section
David Tomko, EID Farmington Office
✓Dave Boyer, OCD
Jennifer Pruett, Office of General Counsel

RECEIVED
OCT - 9 1987
OIL CONSERVATION DIVISION
SANTA FE

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

ENVIRONMENTAL IMPROVEMENT DIVISION
COMMUNITY SERVICES BUREAU
DRINKING WATER SECTION

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

MEMORANDUM

TO: Jennifer J. Pruett, HED Legal Counsel

FROM: Stuart P. Castle, Program Manager, Drinking Water Section

DATE: August 24, 1987

SUBJECT: **Caribou Four Corners, Inc.**

I applaud and support your August 7, 1987 letter to Mr. Call regarding remediation at the Kirtland Refinery site. Contaminated groundwater in the area serves as the drinking water supply for a number of New Mexico residents. I believe the use of EPA's maximum contaminant levels as clean-up standards is entirely appropriate. Thank you for your good work and please contact me if the Drinking Water Section can be of any assistance.

SPC/ra

cc: Louis Rose, HED Legal Counsel
Dennis McQuillan, WRS, Groundwater Surveillance Section
Jon Thompson, Bureau Chief, Community Services Bureau

EQUAL OPPORTUNITY EMPLOYER

RECEIVED

AUG 25 1987

LIQUID WASTE/GROUND WATER
SURVEILLANCE

Caribou

Four Corners, Inc.

(801) 295-5557 - Post Office Box 26 - Woods Cross, Utah 84087

RECEIVED
AUG 20 1987
LEGAL

August 14, 1987

Ms. Jennifer J. Pruett
Assistant General Counsel
New Mexico Health and Environment Dept.
P.O. Box 968
Santa Fe, New Mexico 87504-0968

Dear Ms. Pruett:

Caribou does not agree that the existing data confirms that Caribou is solely responsible for the existance of a 1,2 -Dichloroethane (EDC) plume or that such a plume is an immediate threat to human health and the environment in the area. Although Dames and Moore received some verbal results from Mr. McQuillan, we have not yet been able to review the written results of EID's water well sampling program. My understanding is that the EDC concentrations measured in the recent study are lower than those measured earlier. As stated in earlier correspondence, even the best laboratories have difficulty accurately measuring concentrations near one part per billion with a high level of confidence that a false positive result has not been reported.

However, without accepting responsibility for any contamination of the ground water, ~~Caribou hereby agrees to reimburse Walkers~~ for the cost of the city water hook-up. Caribou will also agree to ~~reimburse the Miller-Jacksons~~ for the cost of their hook-up, provided that the $2.00 per foot extension cost stated in your letter is for the distance from the home to the adjacent street. If you will kindly send us a bill with the name, address and amount, a reimbursement check will be will be sent promptly to both parties.

Caribou believes that it is premature to determine a ground water cleanup standard. Drinking water standards may not be appropriate. Background concentrations or alternate concentration limits as defined by federal regulations may be a more appropriate standard. Caribou proposes that the appropriate standard be determined once the need for clean up is established following the Dames and Moore study.

Caribou has not yet committed to remediate ground water contamination because it has not yet been technically established that Caribou is solely responsible for such contamination. Also, the degree of contamination and the need for clean up has not yet been determined. Hopefully these questions will be answered by the Dames and Moore study. Once these issues have been addressed, Caribou will be willing to make a committment for the appropriate clean up. It is certainly premature for Caribou to negotiate a cleanup agreement until the source, nature and extent of contamination is confirmed.

We believe that a meeting with EID to discuss clean up and related issues is appropriate following the Dames and Moore study. At that time the results of the study will be available and Caribou will be prepared to begin negotiations for a clean up settlement. We will notify you to schedule a meeting when the study has been completed.

Please let me know if you have any questions.

Sincerely,

William A. Call
President

Vincent J. Memmott
V.J. Engineering, Co.

VJM/j

cc: Pete Olsen

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

OFFICE OF GENERAL COUNSEL

August 7, 1987

William Call, President
Caribou Four Corners, Inc.
Post Office Box 457
Afton, Wyoming 83110

Re Kirtland Refinery Site Investigation and Remediation

Dear Mr. Call:

In early March of this year, Richard Young of this office wrote to you asking "that you consider proceeding immediately with the alternate water supply provision" of EID's December 1986 request letter. My understanding is that no alternate water supply has been provided, and in April 1987 you requested EID's assistance in locating additional domestic water wells potentially threatened by the Caribou plume. As you know, last spring EID staff did a door to door water supply survey, and advertised by radio and television to discover any threatened wells. At this time, it appears that the Miller-Jackson home remains to be hooked up; the Walker home must be re-imbursed for its hook-up which cost $492. Mr. Dennis McQuillan of EID's Ground Water Bureau provided the results of EID's detailed water well sampling program to your consultants, Dames & Moore, by telephone last month. When EID receives written results from the State Laboratory, we will forward copies to you. EID's total estimate of hook-up costs is a minimum of $1000, plus $2 per foot for any extension in the main service line (if necessary, due to the location of the Miller-Jackson home.)

Since we last corresponded, the U.S. Environmental Protection Agency has finalized maximum contaminant levels in drinking water for several constituents detected in Caribou's plume, including EDC (1, 2 - Dichloroethane). EID will use these numbers as the standards for protection of public health.

Much correspondence has passed between Caribou and EID, although Caribou has not yet committed to remediate ground-water contamination, nor to replace threatened or contaminated domestic wells. While EID is pleased with Caribou's progress in beginning an investigation, EID is disappointed at Caribou's continued failure to negotiate a cleanup agreement of the sort first described by Mr. Young in December 1986.

EQUAL OPPORTUNITY EMPLOYER

EID suggests a meeting in Santa Fe in the first week of September to discuss:

1. Caribou's plans for providing an alternate water supply;

2. the preliminary results of Caribou's investigation of ground water;

3. Caribou's plans, if any, concerning remediation of ground water;

4. recovery of EID's response costs; and

5. implications of the above for Superfund.

As Mr. Young is no longer with this office, please direct your response to me. I will coordinate the meetings with EID's Ground Water Surveillance, CERCLA and Drinking Water Sections.

Sincerely,

Jennifer J. Pruett

JENNIFER J. PRUETT
Assistant General Counsel

JJP:lr

cc: Dennis McQuillan, Ground Water Surveillance Section
Steve Cary, CERCLA Section
Stuart Castle, Drinking Water Section
EID District I Office
EID Farmington Field Office
Dave Boyer, Oil Conservation Division

OFFICE MEMORANDUM

SALT LAKE CITY

ACTION	INFO	
To: Bill Call		File: Job 14819-005-31
Maverik, Afton, WY		Maverik Country Stores, Inc.
		Kirtland, NM
Vince Memmott		Ground Water Contamination
VJ Memmott Engineering Co., UT		X-Ref:
Dennis McQuillan		
NMEID, Santa Fe, NM		
		Date: July 30, 1987

From: Pete Olsen - D&M, SL PO

Reply Required By:

Subject: Maverik, Kirtland, NM Project

Reference(s):

Attached is an example of material sent today to each of 14 landowners in the Kirtland area to initiate the process of obtaining t heir permission to conduct field investigations on their property.

RECEIVED

AUG 3 1987

LIQUID WASTE/GROUND WATER SURVEILLANCE

Dames & Moore

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
250 EAST BROADWAY, SUITE 200, SALT LAKE CITY, UTAH 84111-2480 (801) 521-9255

July 30, 1987

Mr. Robert L. Ball
#4 Road 6271
Farmington, NM 87401

Dear Mr. Ball,

The New Mexico Environmental Improvement Division (EID) is requiring that Maverik Country Stores, Inc. (Formerly Caribou-Four Corners, Inc.) conduct an investigation to determine the nature, extent, and significance of ground water contamination which may have its source at the company's refinery near Kirtland. The consulting engineering firm of Dames & Moore, Salt Lake City, Utah was selected by Maverik to prepare and implement a plan for this investigation. The New Mexico EID has reviewed the plan and given its approval (see attached letter).

As part of the investigation it is necessary to evaluate ground water flow patterns and water quality downgradient (south-southwest) of the refinery. To do this efficiently and effectively, it will be necessary to perform a soil-gas investigation and to install shallow monitor wells on property not owned by Maverik. In reviewing aerial photographs of the area and land ownership maps obtained from the San Juan County Assessor's Office, we have identified property owned by you (and outlined on the attached map) as a site where it may be appropriate to obtain a soil-gas sample and/or place a monitor well.

We will appreciate the opportunity to meet with you, describe what we are proposing to do, answer any questions you may have and, hopefully, to obtain your written permission to conduct these activities on your property. We are enclosing a Consent Form for you to look over prior to our meeting; it is this form which we will be asking you to sign if you are willing to allow us to utilize your property for a part of this work. Several other owners of property (list attached) in close proximity to yours are also being contacted.

In approximately one week we will be contacting you by telephone to make sure you have received this letter and accompanying material, and set up a date and time when we can discuss this with you in person. Perhaps we could meet with several of the property owners together if this is agreeable.

We look forward to contacting you and will appreciate your cooperation.

Very truly yours,

DAMES & MOORE

Peter F. Olsen
Associate

PFO/fl

Attachments:

1. Authorization letter, State of New Mexico
2. Consent Form with Property Map

KIRTLAND LANDOWNERS

Robert L. Ball
#4 Road 6271
Farmington, NM 87401

Charles W. Grubbs
Rt. 1, Box 363-E
Farmington, NM 87401

Raymond E. Housh
13009 Deer Dancer Trail, NE
Albuquerque, NM 87112

Agnes B. Jackson
4300 Prospect Avenue NE Sp
Albuquerque, NM 87110

Etta May Jackson
P.O. Box 332
Fruitland, NM 87416

Roland E. Jackson
P.O. Box 586
Kirtland, NM 87417

Wendell R. Jordan
P.O. Box 1741
Kirtland, NM 87417

Anthony Lucero
#8 Road 6271 NBU-15
Kirtland, NM 87417

Virginia Murray
P.O. Box 3238
Farmington, NM 87499

George Nelson
P.O. Box 154
Kirtland, NM 87417

Dan Reed
P.O. Box 1404
Kirtland, NM 87417

Marvin H. Stone
#3 Road 6271
Farmington, NM 87401

Robert H. Walker
P.O. Box 252
Kirtland, NM 87417

William H. Walker
P.O. Box 252
Kirtland, NM 87417

Pete Olsen

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

OFFICE OF GENERAL COUNSEL

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

JUL 1987
RECEIVED
MAVERIK COUNTRY STORES, INC.

July 2, 1987

William Call, President
Caribou Four Corners, Inc.
Post Office Box 457
Afton, Wyoming 83110

Re: Kirtland Refinery Site Investigation and Remediation

Dear Mr. Call:

I am writing concerning some third-party access questions which have apparently arisen in the course of performing your site investigation. As you know, the Environmental Improvement Division (EID) has approved your Investigation Proposal (with one minor technical addition), and EID is eager to see the investigation completed. By this letter, on behalf of EID, I encourage off-site third-party landowners to grant access to you and your contractors to perform the site investigation. Your contractors, Dames and Moore, are highly respected experts in their field and have proposed a thorough investigation. This investigation is crucial in determining the extent and nature of contamination, and in evaluating whether it poses any threat to public health or the environment.

Please feel free to send copies of this letter to third parties who are considering granting access. If any off-site landowners wish to discuss this matter further or to ask questions, either Dennis McQuillan of EID's Ground Water/Hazardous Waste Bureau (827-2912) or I (827-2985) would be happy to do so.

Sincerely,

Jennifer J. Pruett

JENNIFER J. PRUETT
Assistant General Counsel

JJP/lr

cc: Dennis McQuillan, Ground Water/Hazardous Waste Bureau
EID District I Office
EID Farmington Field Office
Stuart Castle, Drinking Water Section
Dave Boyer, Oil Conservation Division

EQUAL OPPORTUNITY EMPLOYER

CONSENT

Consent is hereby given to Maverik Country Stores, Inc. and its agents, employees and contractors (the "Company") to enter upon "The Property" of the undersigned Owner for the purpose of obtaining soil gas samples, installing shallow ground water monitor wells, and obtaining and testing ground water samples from such monitor wells. The Property is located in San Juan County, New Mexico and is more particularly described in "Exhibit A" attached hereto.

This consent is given upon the following terms and conditions:

1. The Company shall not interfere with Owner's or his assigns' use or enjoyment of The Property.

2. Any and all activities conducted by the Company while on The Property shall be done in a safe manner and in compliance with all governmental rules and regulations and with a minimum of inconvenience to the Owner or his assigns.

3. The Company shall pay reasonable amounts to Owner for loss, cost, expense and damage caused by Company's activity on the Property.

4. The term of this Consent is for one year or for such additional period as is reasonably necessary to conduct and complete appropriate ground water investigations.

5. This Consent may be terminated at any time by thirty (30) days written notice from Owner to Company personally delivered or mailed postage prepaid to Company at the address given below.

6. Upon completion of the work and testing to be performed hereunder, the Company shall seal and close the well(s) pursuant to all applicable laws.

Executed this _______ day of _______________, 1987.

Maverik Country Stores, Inc.	Owner
By: ______________________________	______________________________
Address: P. O. Box 457 Afton, Wyoming 83110-0457	Address: ________________ ______________________________

EXHIBIT A ROBERT L. BAL

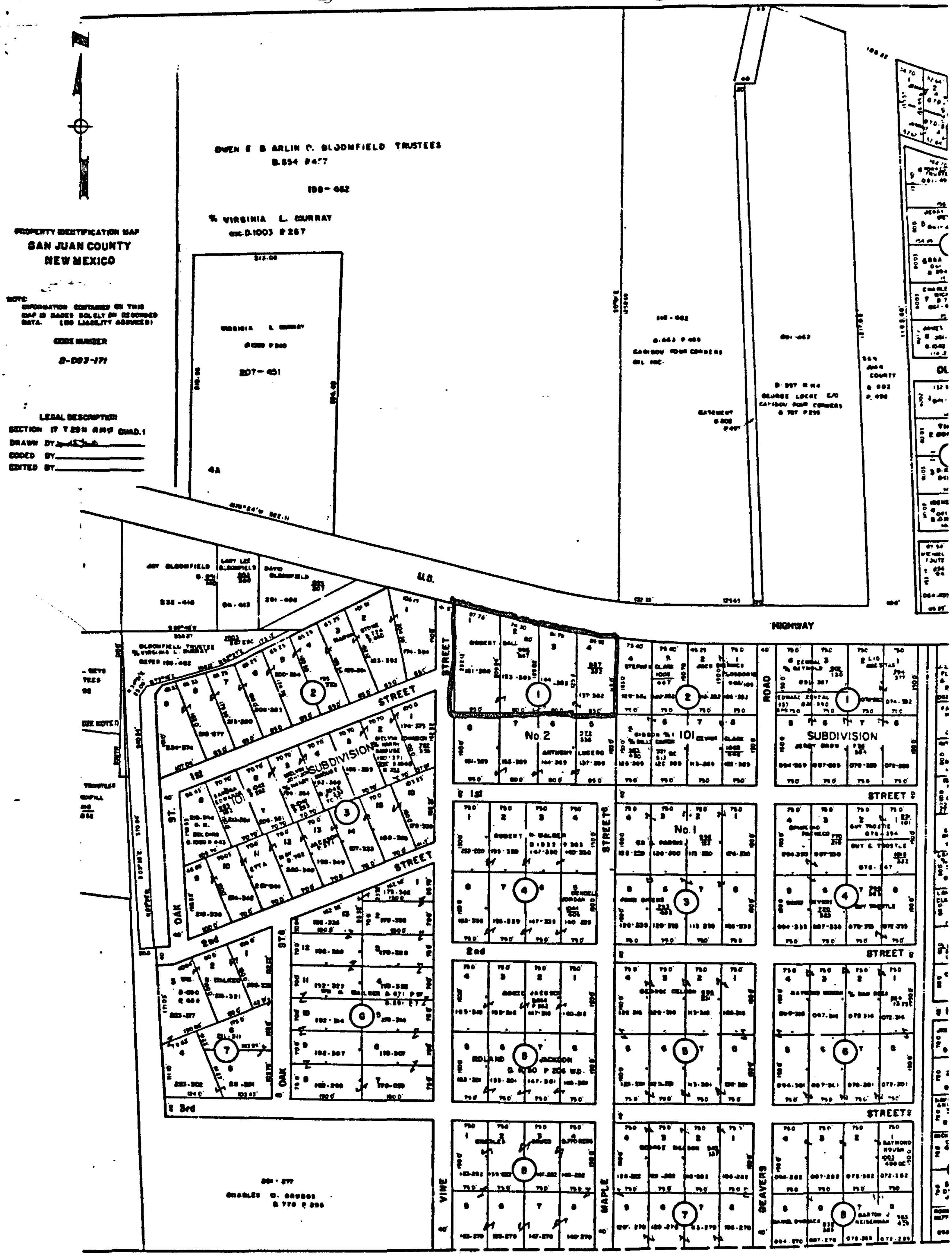


EXHIBIT A CHARLES W. GRUBBS

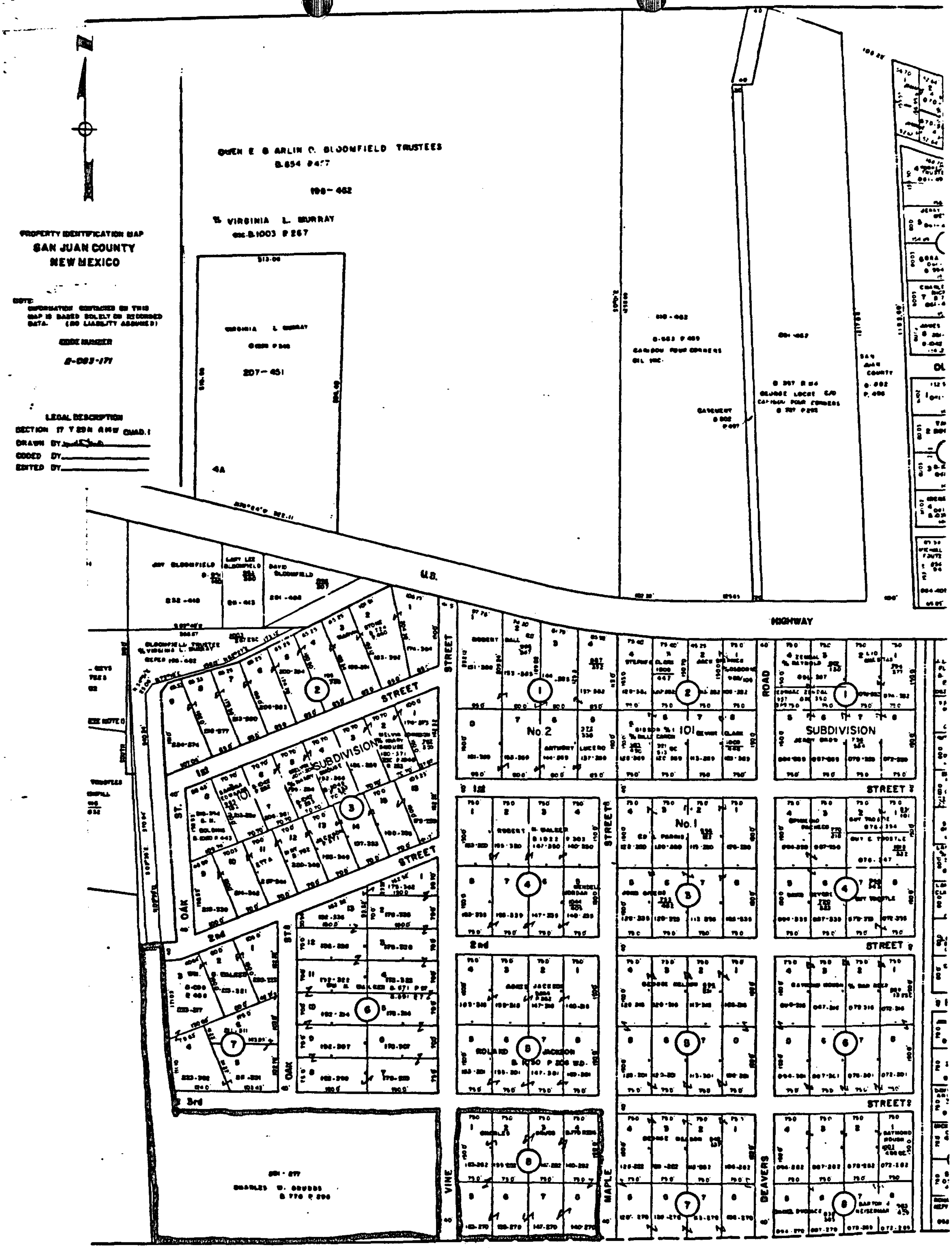


EXHIBIT A RAYMOND E. HO

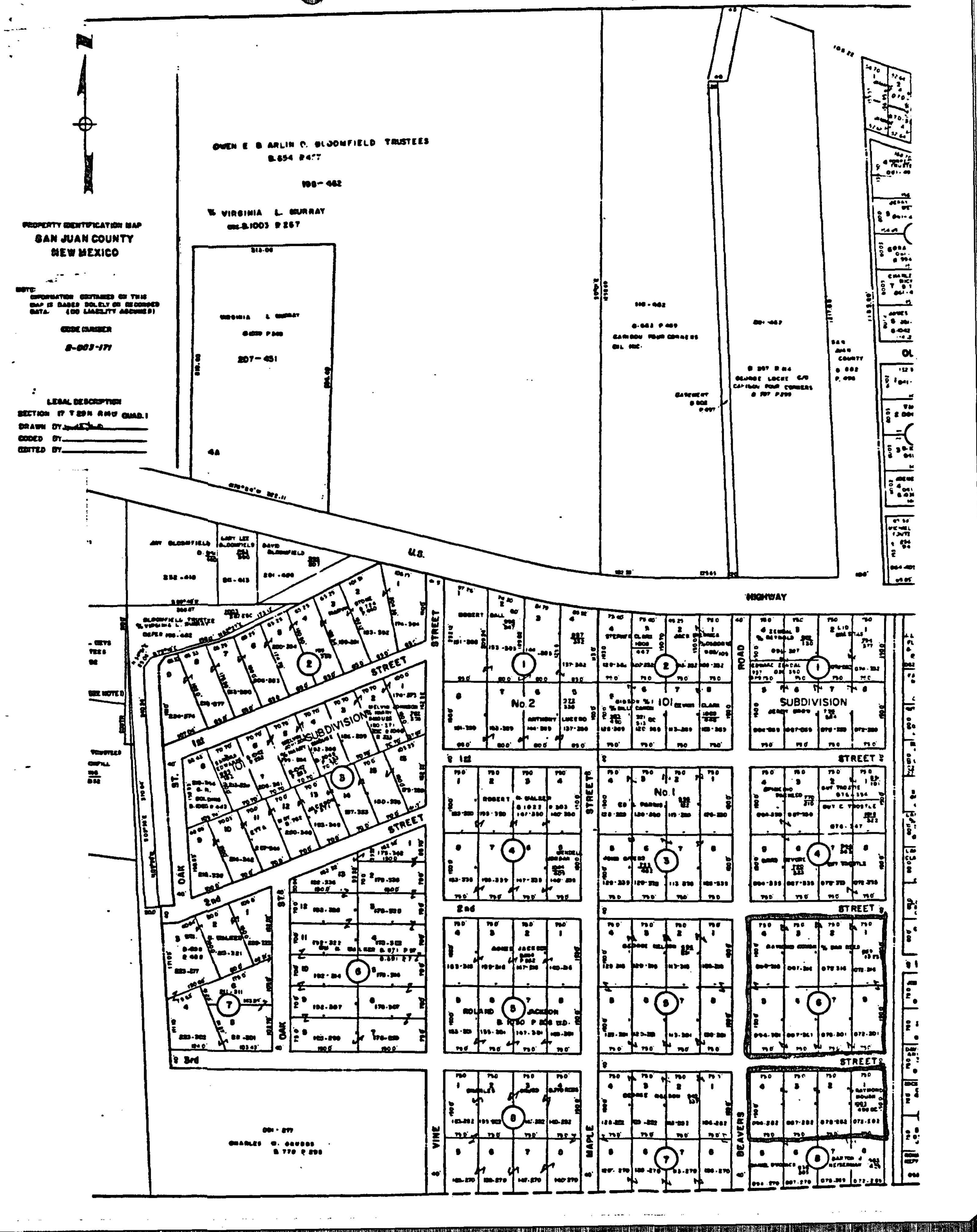


EXHIBIT A AGNES B. JACKS

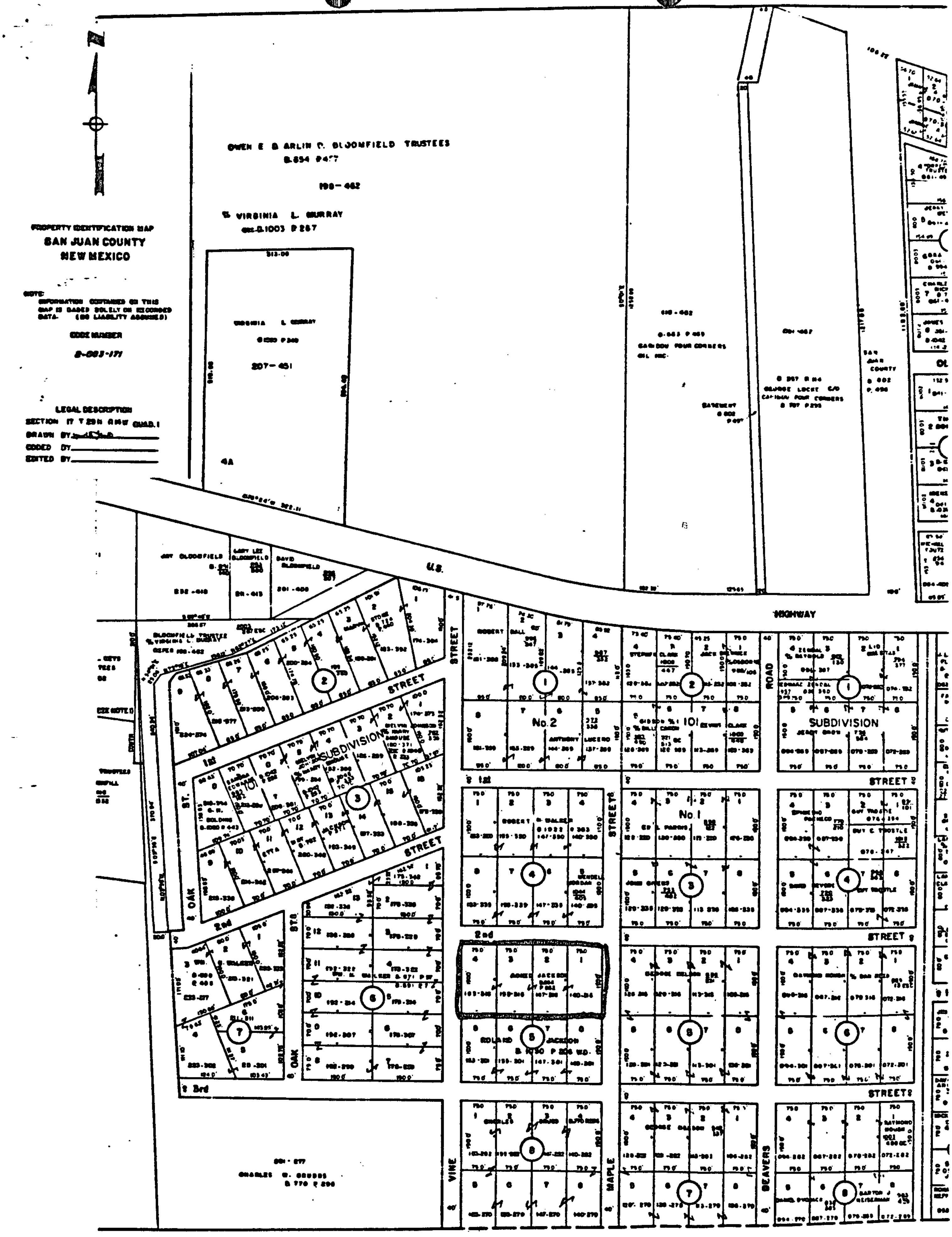


EXHIBIT A ETTA MAY JACKSON

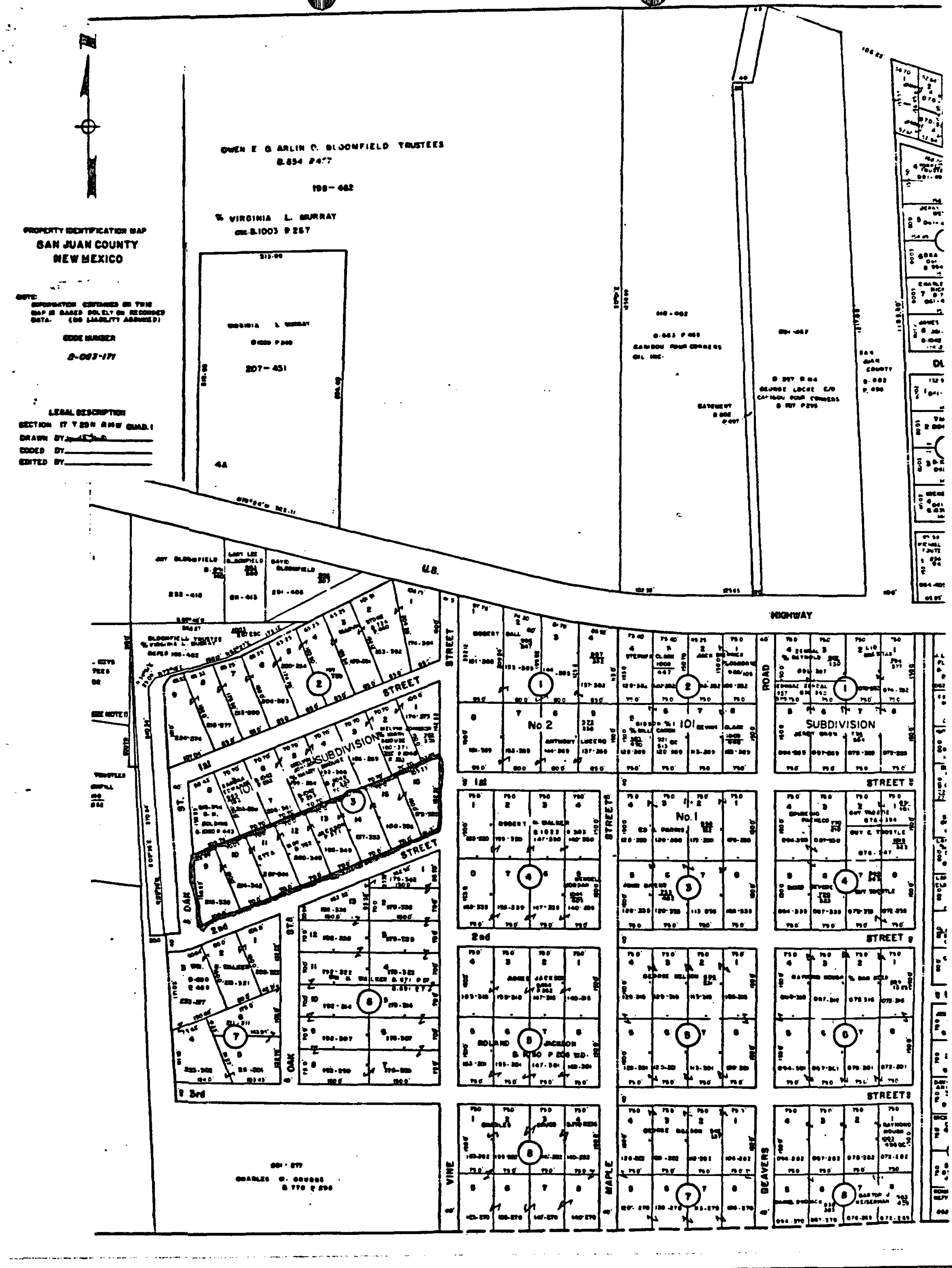


EXHIBIT A ROLAND E. JAC N

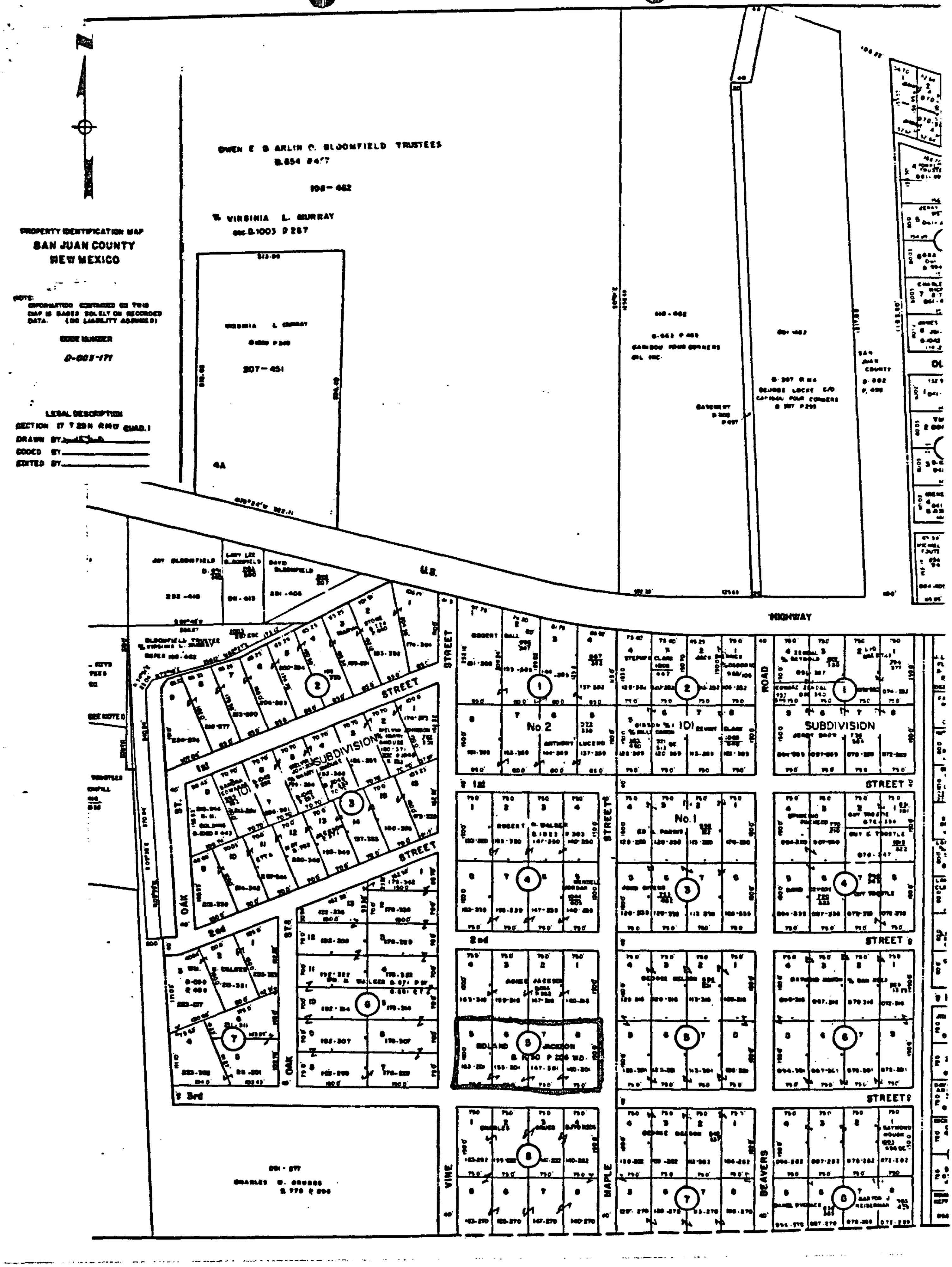


EXHIBIT A WENDELL R. JOR[illegible]N

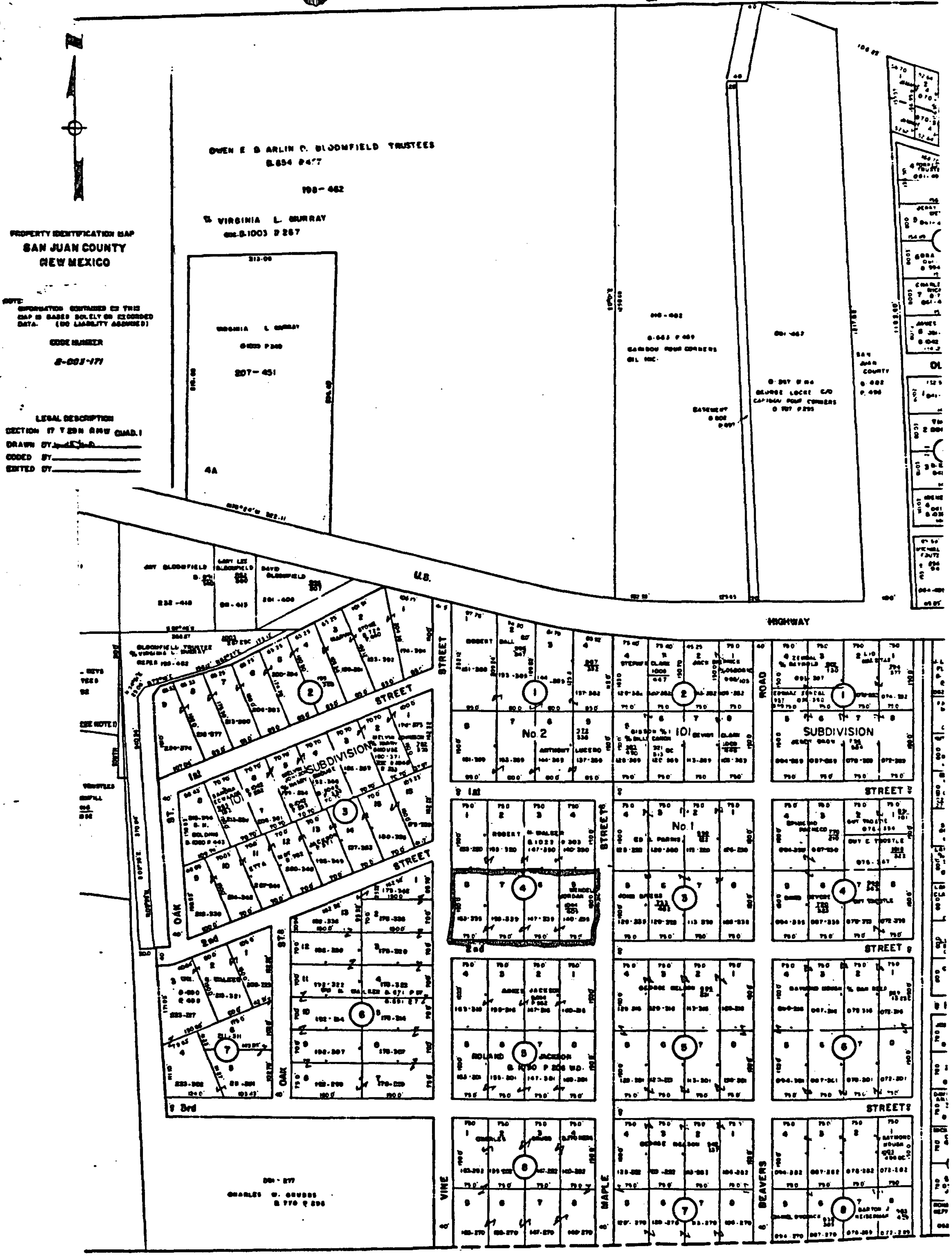


EXHIBIT A ANTHONY LUCERO

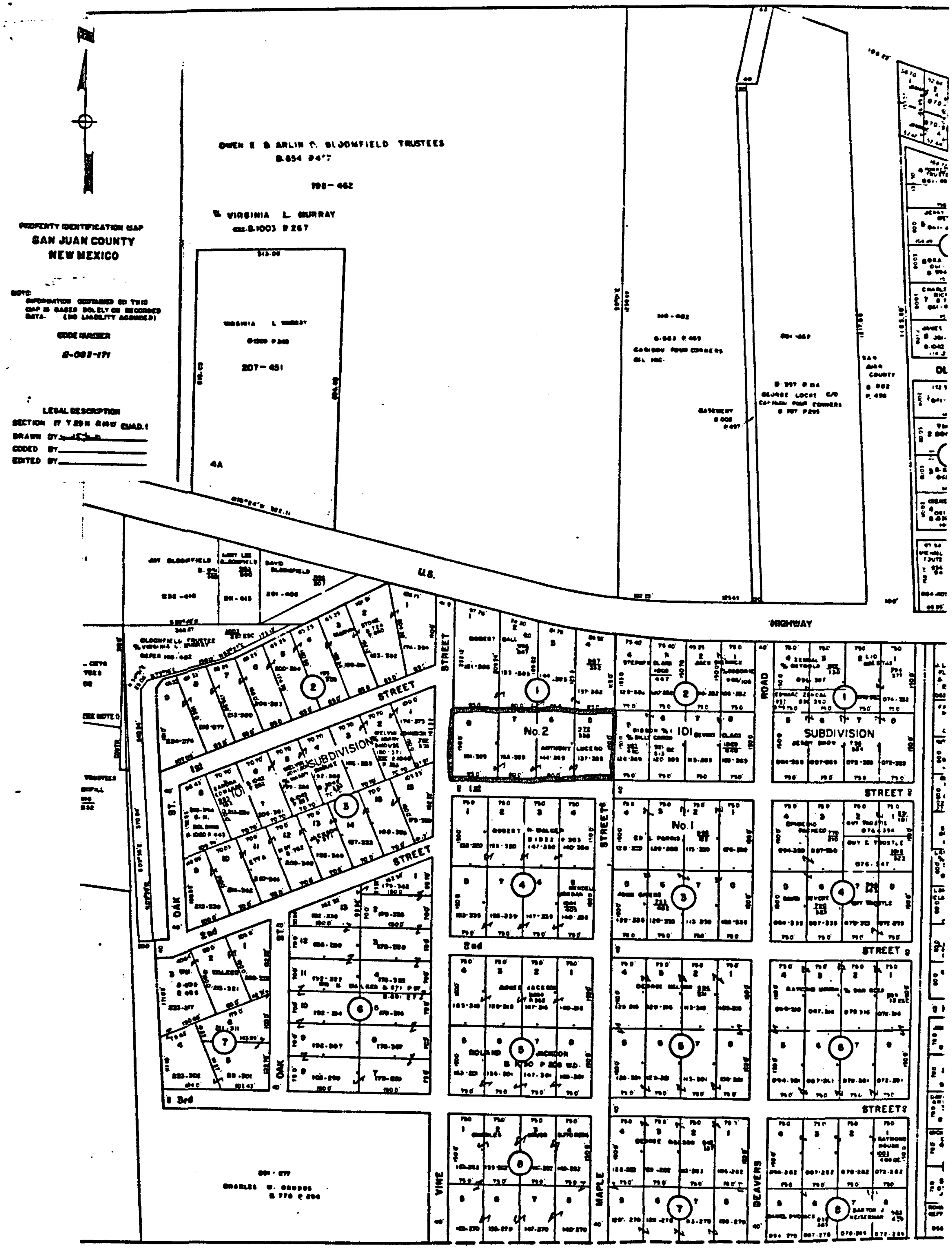


EXHIBIT A VIRGINIA MURRAY

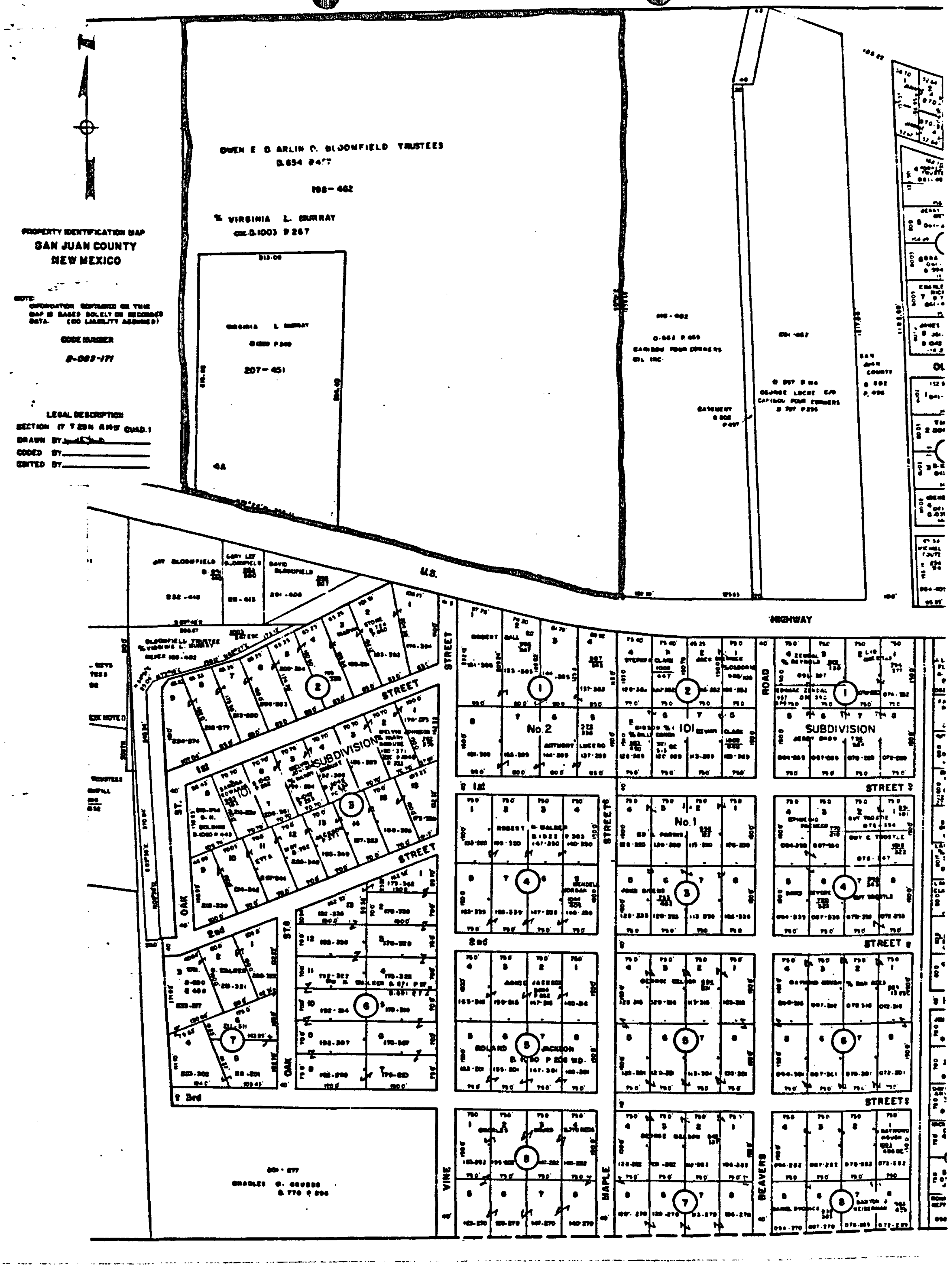
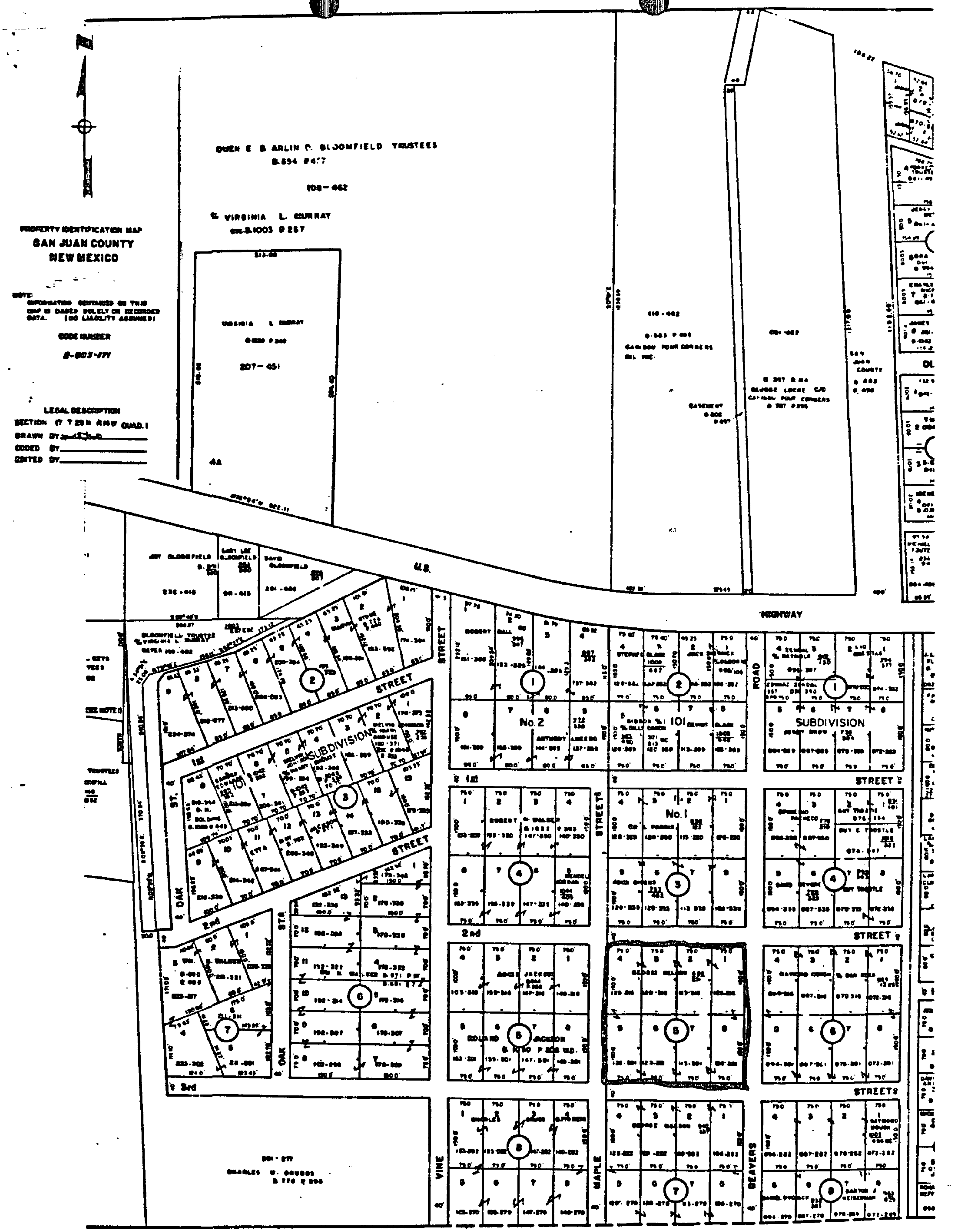


EXHIBIT A GEORGE NELSON



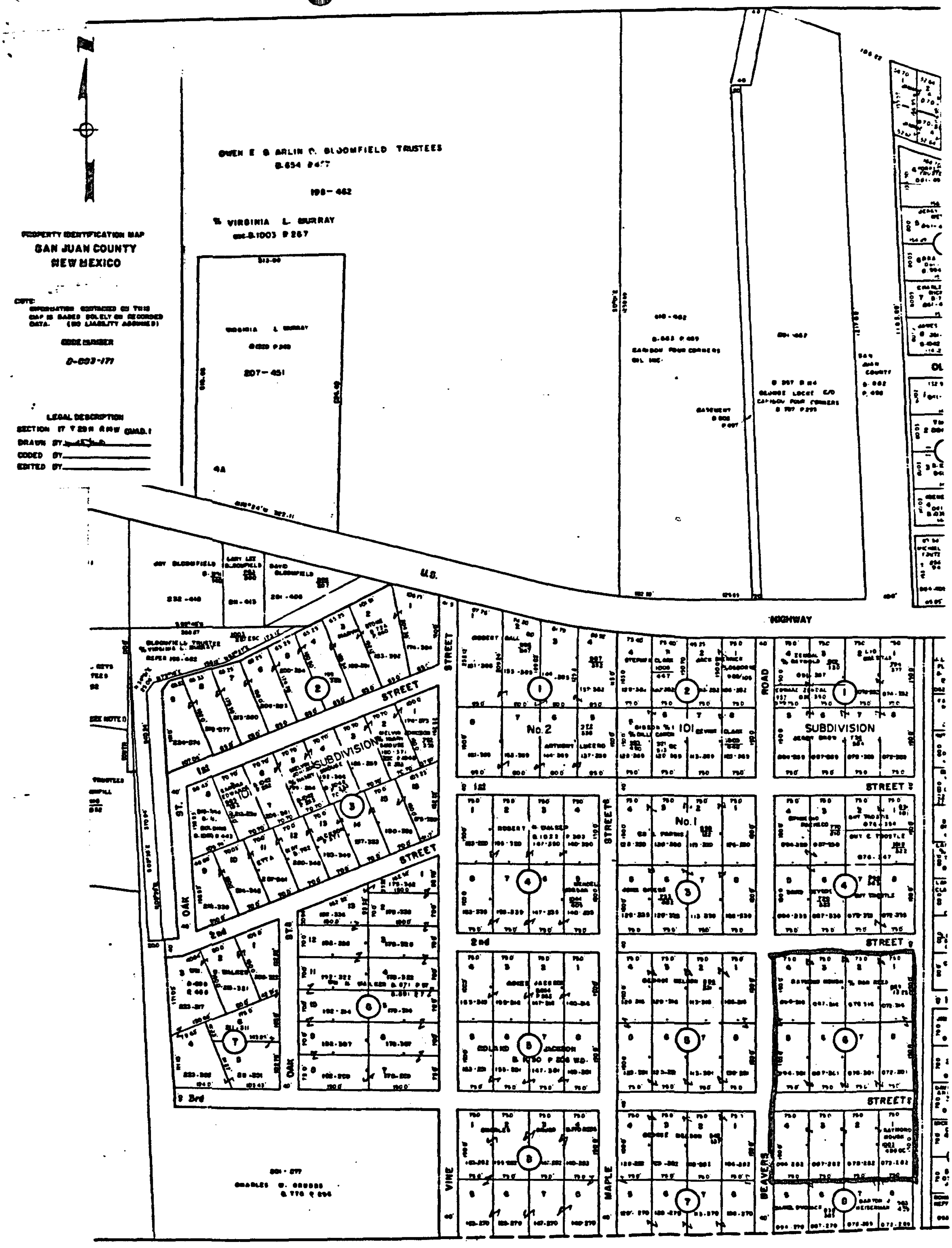

PROPERTY IDENTIFICATION MAP
SAN JUAN COUNTY
NEW MEXICO
LEGAL DESCRIPTION
SECTION 17 T 29 N R 11 W QUAD. I
DRAWN BY
CODED BY
EDITED BY
OWEN E & ARLIN P. BLOOMFIELD TRUSTEES
U.S.
HIGHWAY
STREET
SUBDIVISION
No. 2
No. 1
101
OAK
VINE
MAPLE
BEAVERS
ROAD
1st
2nd
3rd

EXHIBIT A MARVIN H. STO

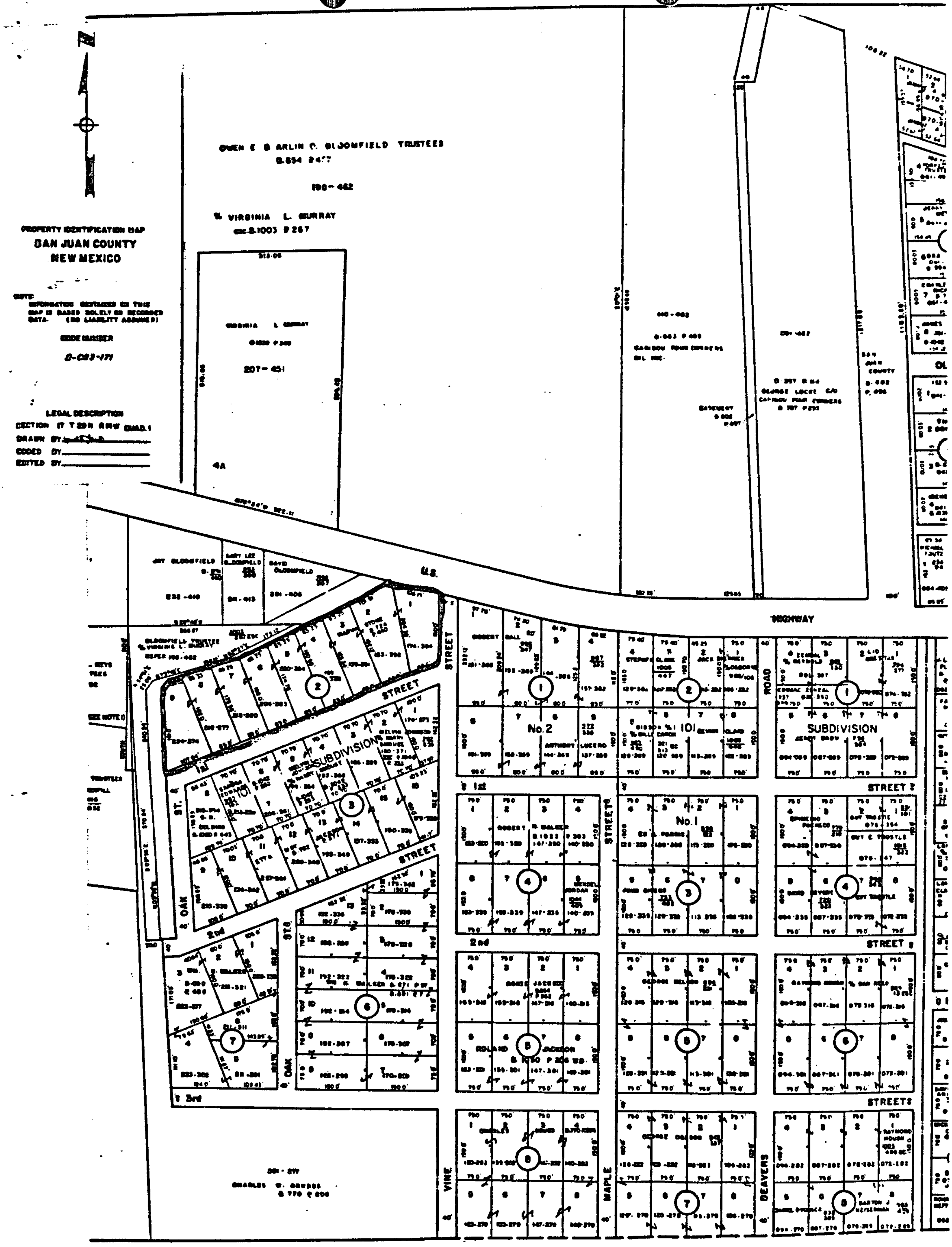
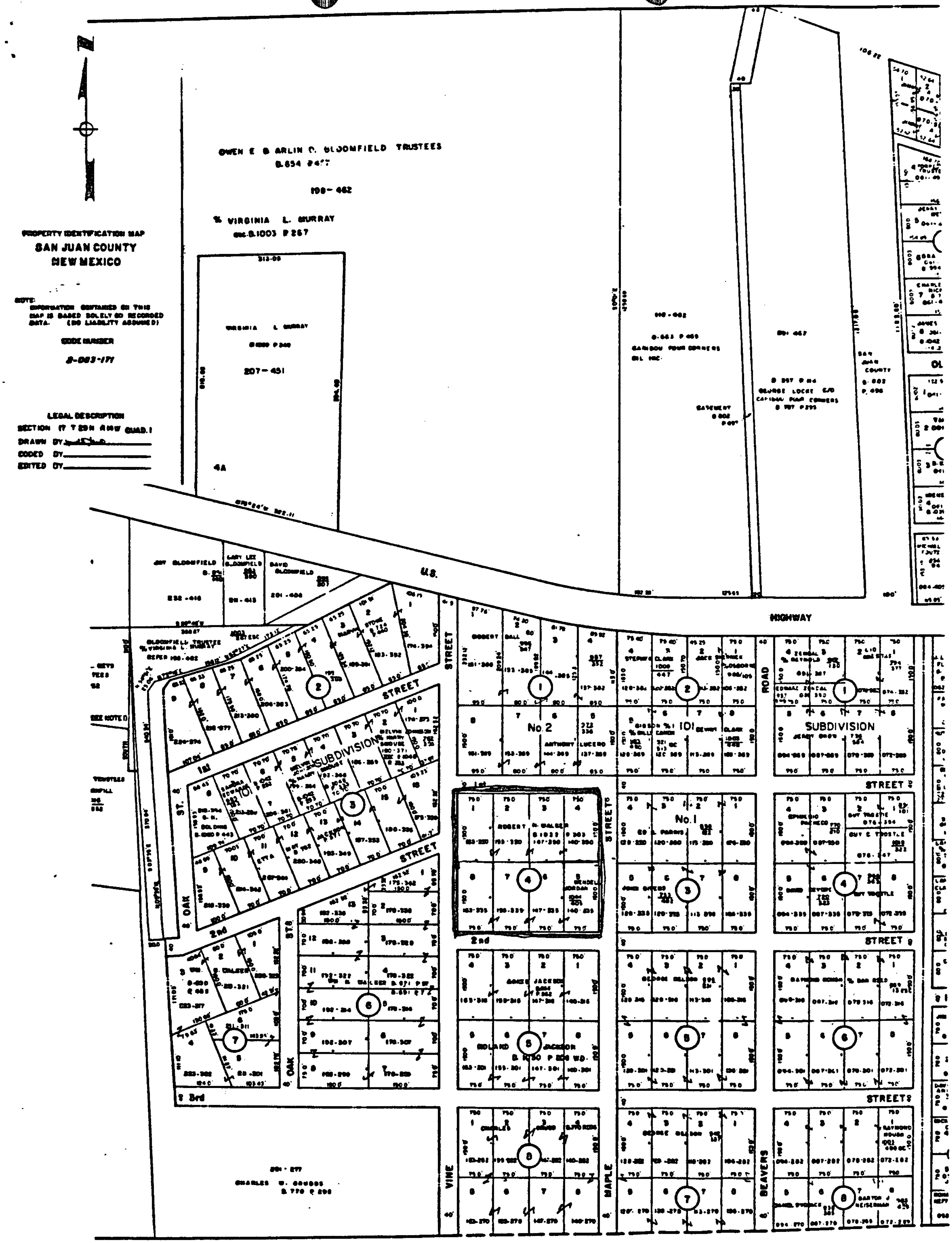


EXHIBIT A ROBERT H. WALKER



DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
250 EAST BROADWAY, SUITE 200, SALT LAKE CITY, UTAH 84111-2480 (801) 521-9255

July 30, 1987

Example of Letters to homeowners

Mr. Robert L. Ball
#4 Road 6271
Farmington, NM 87401

Dear Mr. Ball,

The New Mexico Environmental Improvement Division (EID) is requiring that Maverik Country Stores, Inc. (Formerly Caribou-Four Corners, Inc.) conduct an investigation to determine the nature, extent, and significance of ground water contamination which may have its source at the company's refinery near Kirtland. The consulting engineering firm of Dames & Moore, Salt Lake City, Utah was selected by Maverik to prepare and implement a plan for this investigation. The New Mexico EID has reviewed the plan and given its approval (see attached letter).

As part of the investigation it is necessary to evaluate ground water flow patterns and water quality downgradient (south-southwest) of the refinery. To do this efficiently and effectively, it will be necessary to perform a soil-gas investigation and to install shallow monitor wells on property not owned by Maverik. In reviewing aerial photographs of the area and land ownership maps obtained from the San Juan County Assessor's Office, we have identified property owned by you (and outlined on the attached map) as a site where it may be appropriate to obtain a soil-gas sample and/or place a monitor well.

We will appreciate the opportunity to meet with you, describe what we are proposing to do, answer any questions you may have and, hopefully, to obtain your written permission to conduct these activities on your property. We are enclosing a Consent Form for you to look over prior to our meeting; it is this form which we will be asking you to sign if you are willing to allow us to utilize your property for a part of this work. Several other owners of property (list attached) in close proximity to yours are also being contacted.

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP

In approximately one week we will be contacting you by telephone to make sure you have received this letter and accompanying material, and set up a date and time when we can discuss this with you in person. Perhaps we could meet with several of the property owners together if this is agreeable.

We look forward to contacting you and will appreciate your cooperation.

Very truly yours,

DAMES & MOORE

Peter F. Olsen
Associate

PFO/fl

Attachments:

1. Authorization letter, State of New Mexico
2. Consent Form with Property Map

NEW MEXICO
HEALTH AND ENVIRONMENT DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

OFFICE OF GENERAL COUNSEL

RECEIVED
JUL - 6 1987
OIL CONSERVATION DIVISION
SANTA FE

July 2, 1987

William Call, President
Caribou Four Corners, Inc.
Post Office Box 457
Afton, Wyoming 83110

Re: Kirtland Refinery Site Investigation and Remediation

Dear Mr. Call:

I am writing concerning some third-party access questions which have apparently arisen in the course of performing your site investigation. As you know, the Environmental Improvement Division (EID) has approved your Investigation Proposal (with one minor technical addition), and EID is eager to see the investigation completed. By this letter, on behalf of EID, I encourage off-site third-party landowners to grant access to you and your contractors to perform the site investigation. Your contractors, Dames and Moore, are highly respected experts in their field and have proposed a thorough investigation. This investigation is crucial in determining the extent and nature of contamination, and in evaluating whether it poses any threat to public health or the environment.

Please feel free to send copies of this letter to third parties who are considering granting access. If any off-site landowners wish to discuss this matter further or to ask questions, either Dennis McQuillan of EID's Ground Water/Hazardous Waste Bureau (827-2912) or I (827-2985) would be happy to do so.

Sincerely,

Jennifer J. Pruett

JENNIFER J. PRUETT
Assistant General Counsel

JJP/lr

cc: Dennis McQuillan, Ground Water/Hazardous Waste Bureau
EID District I Office
EID Farmington Field Office
Stuart Castle, Drinking Water Section
Dave Boyer, Oil Conservation Division

EQUAL OPPORTUNITY EMPLOYER

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Secretary

CARLA L. MUTH
Deputy Secretary

MEMORANDUM

TO: Dennis McQuillan, Surveillance Section
Steve Cary, Superfund Section

FROM: Jennifer J. Pruett, Assistant General Counsel

DATE: June 30, 1987

SUBJECT: Cost Recovery Documentation

In my file review of the Caribou case (which I have taken over now that Dick Young has left), I discovered the attached. It is a portion of a letter from Dick to the President of Caribou, and seems to limit our response costs to direct documented costs. I have discussed cost recovery in this case with you only in general terms, but I am working on a reseach memo on just what costs are recoverable, what documentation is required and whether the funds recovered can come straight to EID (to your particular program budgets). In the meantime, I ask that you document your time as promised in the attachment; I am doing the same. Call me (x2985) if you have questions.

JJP/lr

cc: Louis W. Rose, Deputy General Counsel (w/enclosure)
Richard Mitzelfelt, Chief, Ground Water/Hazardous Waste Bureau (w/enclosure)

3. As soon as the requisite data is available from the site investigation, Caribou will design and submit to EID for approval a proposed remedial action plan. Both parties will act in good faith to arrive at a mutually acceptable plan, to the end that adequate protection of the public health, safety and the environment is achieved at minimal cost to Caribou.

4. Caribou agrees in principle to reimburse the State for past and future response costs incurred by the State, provided that such costs are direct costs (not general administrative or overhead costs), are limited to documented time by technical staff or documented lab expenses, and are demonstrably reasonable in light of EID's responsibilities to ensure that the site is properly investigated and remediated.

5. The issue of compensation by Caribou to the State for any damage to ground water or other natural resources of the State is expressly reserved, there being no necessity for Caribou to take any position on this issue at this juncture.

With the exception of the latter point, I believe that all of the above matters were discussed by Mr. Memmott and Steve Cary last summer. It is my understanding that the possibility of adding your refinery to the federal Superfund list was mentioned by Mr. Cary. My feeling is that if we can work together voluntarily to accomplish a satisfactory site investigation and remedial action, there will be no need for the State to press EPA for Superfund listing of your company's facility.

I would ask that promptly after your receipt of this letter, you either indicate in writing your agreement with the substance of this letter, or else inform me when I may expect to receive a more detailed, point-by-point response (in the event that you disagree with what I have outlined). By "promptly," I mean a week or ten days from your receipt of this certified letter.

Thank you for your kind cooperation in this matter. If you have any questions, please feel free to contact Dennis McQuillan, Richard Perkins or myself at any time. For your information, I am enclosing an exemplary

6/24/87 16:35

Call from Vince Memmot 801-298-7733

@ Caribou

o wants letter from EID re land access so 3rd parties will know their investigation is consistent w/ EID's wishes

o I will talk to J. Pruett (new atty.) + get back w/ him.

To: Dennis McQuillan 5/28/87

From: Lew Murray

Subject: Residences needing water hookups either paid for after the fact or needing now in Kirtland, below Caribou Refinery

Ellen & Bill Walker	Ginger Miller & Etta May Jackson
#15, CR 6271	#11, CR 6271
Hm phone: 598-5954	Hm phone: 598-5010
wk " : 598-6611, Ext 770	wk " : 327-7701, Ext 409

Want to paid for Installation

Need installation of LVWUA

~~5??~~ 325-5900 24hr #

Virginia Murray

Due West of Caribou Refinery - ~~Pasture~~

Runoff from Caribou onto property in pasture,

Odor of gasoline detected in area. animals are ill.

Liver & kidney problems
105-106°. 98°F

60

QUALITY ASSURANCE REVIEW - CARIBOU REFINERY
(Dave Egan)
27 May 1987

A quality assurance (QA) review has been completed on Caribou Refinery. Specific comments on the factors evaluated for the ground water and surface water pathways are given below.

In general, it appears that much of the waste at this site is CERCLA-exempt. Substances associated with petroleum refining that are considered eligible under CERCLA are the wastes that are generated during the refining process. However, materials and additives used in the preparation of the final product are not eligible unless they also appear in the waste. At this site, although 1,2-dichloroethane (EDC) was evaluated as an additive to petroleum during the production process, EDC must be present in the waste in order to be eligible under CERCLA. As an example, spills and leaks from gas stations are CERCLA-exempt, even though the spilled materials contain additives to the original petroleum crude, such as EDC. Therefore, the HRS package must include only those hazardous substances attributed to the waste at the site. Since the areas of hazardous substance deposition at this site consist of two waste pits, all HRS factor values must relate only to these pits.

In addition, this site was closed in 1982. Since the operation of this site overlaps with the time period for RCRA regulation, it is necessary to gather the pertinent information regarding RCRA at this site for determining CERCLA eligibility.

GROUND WATER

Observed Release

An observed release to ground water is justified if contaminants in ground water can be attributed to the waste pits instead of other portions of the facility. Since the contaminants found in ground water are the same as would be expected in petroleum products, it appears problematic to attribute these contaminants in to the waste pits rather than product spills or storage tanks. Thus, two alternatives exist. Either a rationale supported by analytical data can be formulated to document that contaminants in ground water originated from the waste pits, or the pathway score is based on route characteristics from the waste pits. At present, it appears that additional analytical data and monitoring locations would be required to document an observed release from the waste pits.

Depth to Aquifer of Concern

Although the description of the aquifer of concern is good, it could be improved by stating that the lateral boundaries of the valley fill deposits are shown in Reference 12, as taken from Reference 4, page 19.

The depth of the lowest point of waste contamination at the site is based on the observed release to ground water. If the observed release to ground water can not be attributed to the waste pits, then the depth of the pits should be used for the lowest point of waste contamination. The difference between depth to water at the on site well and depth of the pit must include any differences in elevation between these two areas.

Physical State

Evaluate only the hazardous substances in the waste pits. Spills and leaks of liquids should not be evaluated for CERCLA-exempt materials.

Toxicity/Persistence

If the observed release to ground water can not be attributed to the waste pits, evaluate the hazardous substances found in actual waste pit samples. According to Reference 3, elevated levels of ~~lead, chromium and arseni~~c were found in the ~~small~~ and ~~large waste pit samples~~.

Ground Water Use

Reference 11 is used to establish that one well in the 3-mile radius does not have alternate unthreatened supply. However, Reference 11 states that the Fergie Trailer Park well is not hooked up to the Lower Valley Waters Users Association (LVWUA) although the nearest line is 100 yards away. As a result, it appears that the Fergie Trailer Park has access to another supply. Therefore, an HRS value of 3 for this factor is only appropriate if the other supply does not represent an alternate unthreatened source or if hookup to the system does not meet minimum hookup requirements. The maximum value can be assigned by resolving these issues or by showing another alluvial well that is outside the area served by LVWUA. A definition of the area served by LVWUA would also be helpful in evaluating population; in particular, why is the population of Kirtland not counted?

Distance to Nearest Well

Distance to the contaminated private wells can only be considered zero if the contaminants can be attributed to the waste disposal pits. If the observed release to the private wells can not be attributed to the waste pits, this factor represents the distance between the waste pits (or any other contamination attributable to these pits) and the nearest private well.

SURFACE WATER

Observed Release

Difficulties with documenting an observed release to ground water are identical for surface water in that contaminants detected in surface water must be attributable to the waste pits before scoring an observed release. Unless a rationale can be developed that discriminates between the waste pits and other spills and leaks for contaminants found in the Brimhall Ditch, route characteristics should be used to evaluate this pathway.

In addition, the surface water pathway evaluates overland migration of contaminants. Hence, the possibility that contaminants enter ground water and are then introduced to surface water is not a consideration, unless documentation of contaminated ground water entering surface water is shown by analytical sampling of the ground water at the point of entrance into surface water. Therefore, because Reference 3 states that berms separate this site from the Brimhall Ditch, it appears that there is no overland migration pathway from the waste pits to this ditch. Unless an overland pathway can be identified, the surface water pathway can not be evaluated to that ditch.

Facility Slope and Intervening Terrain

If an observed release to surface water from the waste pits can not be documented, these factors are evaluated from the waste pits themselves (or from other areas of contamination attributable to the pits). Please identify the migration pathways on a map and evaluate slopes accordingly.

Distance to Nearest Downslope Surface Water

If an observed release to surface water from the pits can not be documented, measure distance from surface water to the waste pits (or to other areas of contamination attributable to the pits).

Physical State

(See Ground Water)

Toxicity/Persistence

(See Ground Water)

Population Served by Surface Water

If an observed release to surface water from the pits can not be documented, measure distance to intake from the probable point of entry. The probable point of entry represents the point at which an identified potential overland migration route from the waste pits enter surface water.

As a final note, although the surface water comments are based on migration to the Brimhall Ditch, they also apply to the evaluation of the Farmer's Mutual Irrigation Ditch (FMID). However, it is unclear why a different waste quantity was chosen in the evaluation of FMID.

SITE INSPECTION FOLLOW-UP REPORT

CARIBOU REFINERY SITE

KIRTLAND, NEW MEXICO

CONCLUSIONS

Based on work conducted under this Site Inspection Follow-up investigation, the following conclusions are drawn:

1. 1,2-dichloroethane in shallow ground water at the site is originating at the Caribou facility; there are no alternate sources.
2. Shallow ground water is used in the area for private and public/community drinking purposes.
3. The alluvial aquifer along the San Juan River is not transected by Coolidge Arroyo.
4. Water from the Brimhall Ditch is used to irrigate 75 acres of forage crops within 0.5 miles of the extended site boundary.
5. A waste disposal pit on-site holds 689 cubic yards of non-exempt sludge containing up to 140 ppm lead; this waste is available to ground water and surface water. (.05)

INTRODUCTION

A Site Inspection (SI) was performed at the Caribou Refinery site (NM01902) by the New Mexico Environmental Improvement Division's (EID) CERCLA PA/SI staff in December 1985. Data obtained during the SI indicated that volatile organics from the site were entering surface water and ground water. On the refinery property, ground water was observed seeping into the Brimhall Ditch. This ground water contained benzene, toluene, ethylbenzene, xylenes, and EDC. The Walker private well, located downgradient from the site, produced water containing 9 ppb of 1,2-dichloroethane. Due to the seriousness of contamination at the site, EID PA/SI staff proposed to perform SIF work in order to document an HRS package and nominate the site for the NPL. 10 ppb

WORK PLAN OVERVIEW

Further study was recommended on both the ground water and surface water routes at the Caribou site. To properly evaluate the ground water route, it was necessary to sample upgradient ground water, perform a well inventory and quantify the population at risk, and quantify waste volume, toxicity, and persistence at the site. The surface water route was more complex because there are two distinct pathways. Both pathways were evaluated to determine which produced the highest HRS score. For one there was clearly a release, but no documented use. For the other there was a use, but no documented release. The amount and nature of wastes available to each pathway was also determined.

RESULTS

Field notes from the two site visits made by PA/SI staff for this SIF are given in Appendix II. Raw data from these visits, as well as from relevant site visits made by the Oil Conservation Division and the EID Farmington Field Office, are given in Appendix III.

GROUND WATER ROUTE

Water Well Inventory

In order to determine the population potentially at risk from contaminated shallow ground water, attempts were made to identify and locate all water supply wells tapping the shallow alluvial aquifer within three miles of the site. Information was obtained by perusing the files of the New Mexico State Engineer Office (SEO) and the EID Water Supply Section (WSS). EID staff stationed at the Farmington Field Office (FFO) assisted by conducting a survey of houses in the neighborhood south of the site.

This part of the SIF also produced valuable data such as well depth, construction, and use. Using drillers' logs, staff identified which water supply wells tap the shallow alluvial aquifer along the San Juan River. Information on alluvial wells in the area is summarized in the table below. Appendix I contains available well records for alluvial wells within three miles of the site. Locations of these wells are given on Figure 1.

CARIBOU AREA WELL DATA

owner	location	depth (ft)	aquifer	use	source
Hastings (Miller)	17,29N,14W	38	alluvium	dom/stk	SEO
Hastings (Jackson)	17,29N,14W	35	alluvium	dom/stk	SEO
Harris	7,29N,14W	39	alluvium	dom/stk	SEO
Urbach	18,29N,14W	28	alluvium	dom	SEO
Blaylock	13,29N,15W	30	alluvium	dom/stk	SEO
Sweek	17,29N,14W	31	alluvium	dom/stk	SEO
Fergie's Tr. Pk.	7,29N,14W	50	alluvium	public	EID-WSS
Walker	17,29N,14W	26	alluvium	dom	EID-FFO
Grubbs	17,29N,14W	unk.	alluvium	dom	EID-FFO

While all the above wells are finished in the alluvial aquifer, three are on the other side of Coolidge Arroyo from the refinery (see Figure 1). In order to be able to use these wells for HRS purposes it is necessary to show that the alluvial aquifer is continuous beneath Coolidge Arroyo. This can be done by comparing the elevation of the bottom of Coolidge Arroyo with the elevation of the top of the bedrock as identified in area drillers' logs. Drillers' logs are available for most of the above wells (Appendix I). None of the wells having drillers' logs encounters bedrock; all are completed in alluvium. By subtracting the known well depths from land surface elevations estimated from Figure 1 it is possible to estimate minimum thicknesses of the alluvium and upper limits for the top of the bedrock beneath the alluvium (see Table below).

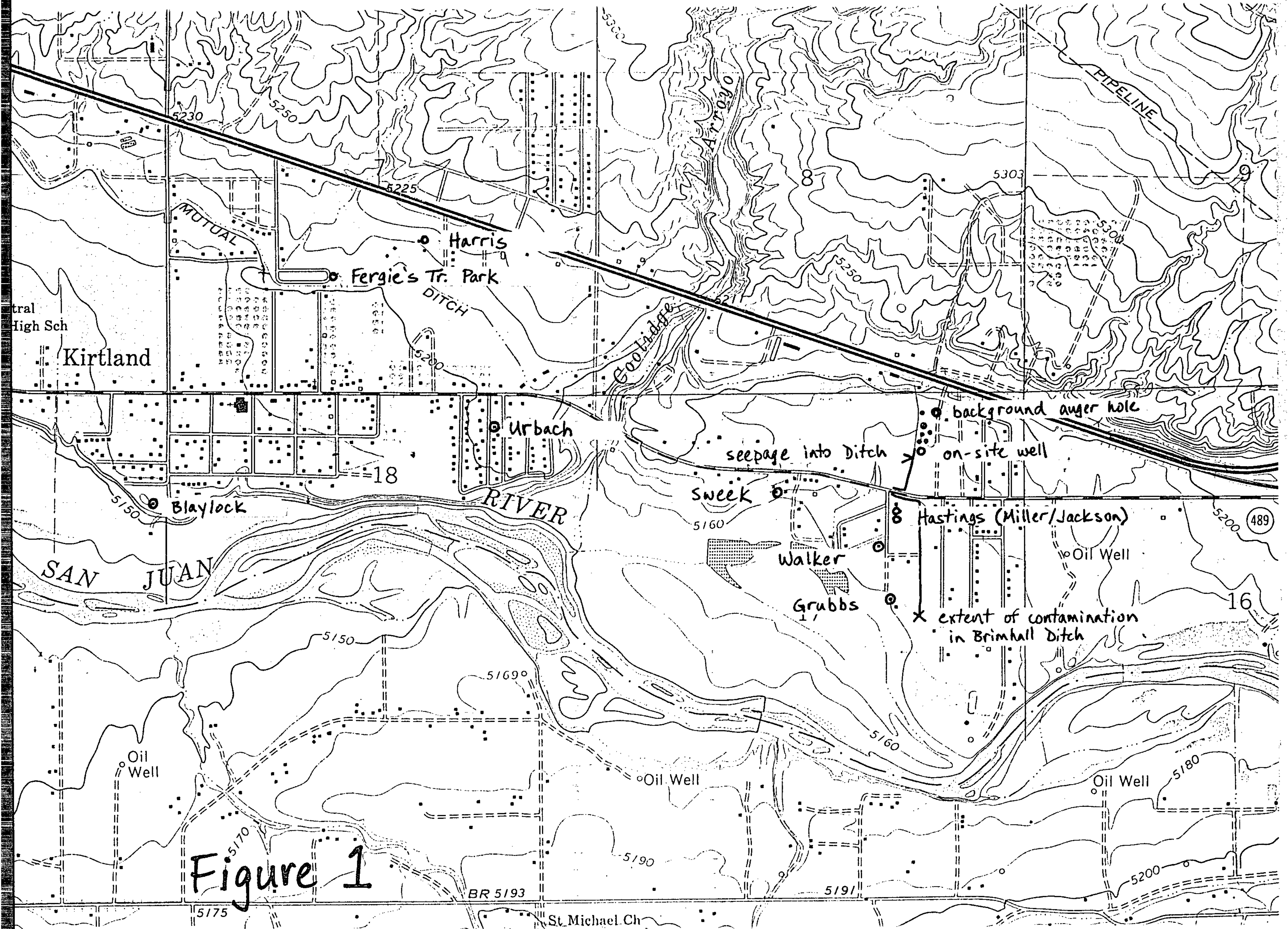

PIPELINE
Arroyo
Coolidge
Kirtland
tral
High Sch
MUTUAL
DITCH
Harris
Fergie's Tr. Park
Urbach
Blaylock
SAN JUAN
RIVER
background auger hole
on-site well
seepage into Ditch
Sweek
Hastings (Miller/Jackson)
Walker
Grubbs
extent of contamination
in Brimhall Ditch
Oil Well
Oil Well
Oil Well
Oil Well
St. Michael Ch
BR 5193
489
5230
5250
5225
5200
5300
5303
5150
5160
5169
5170
5175
5180
5190
5191
8
9
16
18

Figure 1

ALLUVIAL AQUIFER THICKNESS

owner	land surf. elev. (ft)	well depth (ft)	top of bedrock elev. (ft)
Hastings (Miller)	5167	38	<5129
Hastings (Jackson)	5167	35	<5132
Harris	5210	39	<5171
Urbach	5204	28	<5176
Blaylock	5145	30	<5115
Sweek	5170	31	<5139
Fergie's Tr. Pk.	5204	50	unknown
Walker	5165	26	unknown
Grubbs	5160	unknown	unknown

From Figure 1 the minimum elevation of Coolidge Arroyo near the San Juan River is seen to be 5150 feet. The bottom of the Arroyo rises to the northeast. Data in the above table show that sand and gravel extends down to an elevation of 5115 feet near the San Juan River. Four of the six wells for which data are available show alluvium down at least to an elevation of 5139 feet. This is more than 10 feet lower than the bottom of Coolidge Arroyo. It is therefore concluded that Coolidge Arroyo does not transect the alluvial aquifer.

Ground Water Sampling

Additional ground water sampling was conducted during the SIF. The results of this effort were confirmation of earlier lab results, better description of the extent of contamination, and conclusive determination that Caribou Refinery was the source of ground water contamination.

The Walker private well was sampled during the SI; that sample contained 9 ppb of 1,2-dichloroethane (EDC). During the SIF, the Walker well was resampled to verify the earlier findings. Three other private domestic wells in the area, those owned by Miller, Jackson, and Grubbs, also were sampled. These wells were sampled at spigots nearest the well heads. Samples were placed in duplicate 40-ml teflon-capped glass vials and stored on ice for shipment to the laboratory, where they were tested for volatile organics, including EDC.

Resampling of the Walker well confirmed the presence of EDC. Of the three additional wells sampled, one was found to be uncontaminated; the other two wells contained amounts of EDC comparable to the Walker well. No other volatile organic contaminants were found in shallow ground water in the area. All of the private domestic wells tested are located within one mile to the south or southwest of the refinery in the presumed direction of ground water flow, obliquely down valley.

To demonstrate that EDC found in down-gradient private wells originated at the Caribou refinery site it was necessary to confirm that upgradient ground water does not contain EDC. Near the northeast boundary of the site a hole was bored approximately 6 feet to the water table with a 3-inch diameter hand-operated soil auger. A sample was bailed using a 1-inch PVC bailer. The sample was placed in duplicate 40-ml teflon-capped glass vials and stored on ice for shipment to the laboratory, where it was tested for volatile organics, including EDC. This sample contained no contamination with volatile organics of any kind. Therefore it is concluded that the EDC in shallow ground water south of the Caribou Refinery is originating at the refinery.

The results of all ground water sampling performed at this site to date are summarized in the table below. Raw data for these samples are given in Appendix II.

GROUND WATER SAMPLING RESULTS

sample location	date	EDC (ppb)	other VOCs (ppb)
background	2/18/86	<1	<1
on-site well	2/17/86	<1	<1
seep into ditch	2/17/86	**60**	**BTEXs**
Miller-Jackson #1	4/1/86	**6**	<1
Miller-Jackson #2	4/1/86	**8**	<1
Walker well	12/5/85	**9**	<2
Walker well	2/10/86	**2**	<1
Grubbs well	4/1/86	<1	<1

Quality control (QC) samples collected during the SIF indicate that no artificial contamination of samples occurred and that the concentrations presented above represent actual concentrations in ground water. Three QC procedures were employed in the ground water portion of this SIF. The state's Scientific Laboratory Division (SLD) and the Farmington Field Office (FFO) each supplied distilled water travel blanks. In the field, PA/SI staff used de-ionized water to rinse the soil auger and bailing equipment; these rinse waters were collected in 40-ml teflon-capped glass vials and stored on ice for shipment to the laboratory, where they were tested for volatile organics, including EDC. As the third QC measure, all samples for VOC analysis, incuding blanks, were collected and submitted in duplicate. The results of QC sampling and analyses are presented in the table below.

QUALITY CONTROL SAMPLES - GROUND WATER

sample type	date	EDC (ppb)	other VOCs (ppb)
travel blank (FFO)	2/10/86	<2	<2
travel blank (SLD)	2/13/86	<1	<1
field blank #1 bailer rinse	2/17/86	<1	<1
field blank #2 soil auger rinse	2/18/86	<1	<1
field blank #3 siol auger rinse	2/18/86	<1	<1
field blank #4 bailer rinse	2/18/86	<1	<1
travel blank (FFO)	4/1/86	<1	<1

SURFACE WATER ROUTE

Investigations into the surface water route were necessary to sort out the confusing array of irrigation ditches and diversions in the immediate vicinity of the site. The Farmers Mutual Irrigation Ditch potentially affects a large target population, but there is no documented release and characteristics of available wastes and the overland flow route are extremely problematic. A release to the Brimhall Ditch was documented and a target population was identified through irrigation of forage crops. Volume of waste available to this pathway is sufficient to make this route useful for HRS purposes.

Surface water at the site consists of the Farmers' Mutual Irrigation Ditch (FMID) and diversions therefrom, which flow eventually to the San Juan River. The main ditch (FMID) obtains water from the Animas River several miles east of the site and transports it westward along the north side of the San Juan River valley. The

FMID splits the refinery property; the refining apparatus and the former tank farm are to the north of the FMID and the present tank farm, lead mixing area and loading area are to the south of the FMID.

Along its route the FMID is tapped for irrigation purposes. At the refinery property a headgate is used to divert water from the FMID into the so-called Brimhall Ditch. The Brimhall Ditch (BD) carries water south and west to irrigate fields along the San Juan River. The BD exits the FMID at the refinery apparatus and flows along the west boundary of the present tank farm. Numerous other headgates draw water from the FMID after it traverses the refinery property and continues downvalley. These diversions are used by local property owners to water private gardens, to grow small amounts of cash crops, such as melons and sweet corn, and to irrigate alfalfa, hay, and field corn for livestock consumption. Tailwater from the BD and other diversions flows to the San Juan River. A schematic diagram of the ditch configuration is shown in Figure 2.

Approximately 5 miles west of the refinery the FMID supplies water for community drinking purposes. The San Juan River, which receives the tailwater from the FMID, is also used for drinking water purposes about 5 miles downstream from the refinery.

Wastes at the site may enter surface water through two distinct pathways. One pathway of concern is the FMID, which may have received wastes from the refinery apparatus or from the former tank farm. From the FMID the wastes could have been diverted into the BD or into other diversions to the west. Through the second pathway, wastes from the present tank farm area could enter the Brimhall Ditch directly, with potential risks to users of water from that single lateral or from the San Juan River.

As a part of this investigation, PA/SI staff researched historical records and interviewed officials to determine the nature of past spills or leaks. According to Don McGonigle, San Juan County Fire Marshal, there was poor housekeeping at the old tank farm near the refinery proper (see Appendix II, p. 26). Spills and leaks, some resulting in fires, were apparently commonplace. Correspondence between the New Mexico Oil Conservation Division (OCD) and the NMEID in 1973 (Appendix IV) indicates that spills, leaks, and seepage of hydrocarbons into the FMID were serious enough to warrant construction of a concrete retaining wall and a concrete pipe to completely enclose the FMID as it traversed the refinery property. These concrete structures are still in place and, upon inspection, were found to be capable of preventing spills or leaks from flowing overland and entering the FMID.

PA/SI staff also tried to document a release to the FMID by sampling the ditch-bottom sediments upstream and downstream of the refinery. The samples were collected in February, when the FMID was not running. The upper two inches of sediment were collected with spoons, placed into 8-ounce glass jars, and submitted for metals and Volatile Organic Carbons (VOC) analysis. The results are summarized in the table below.

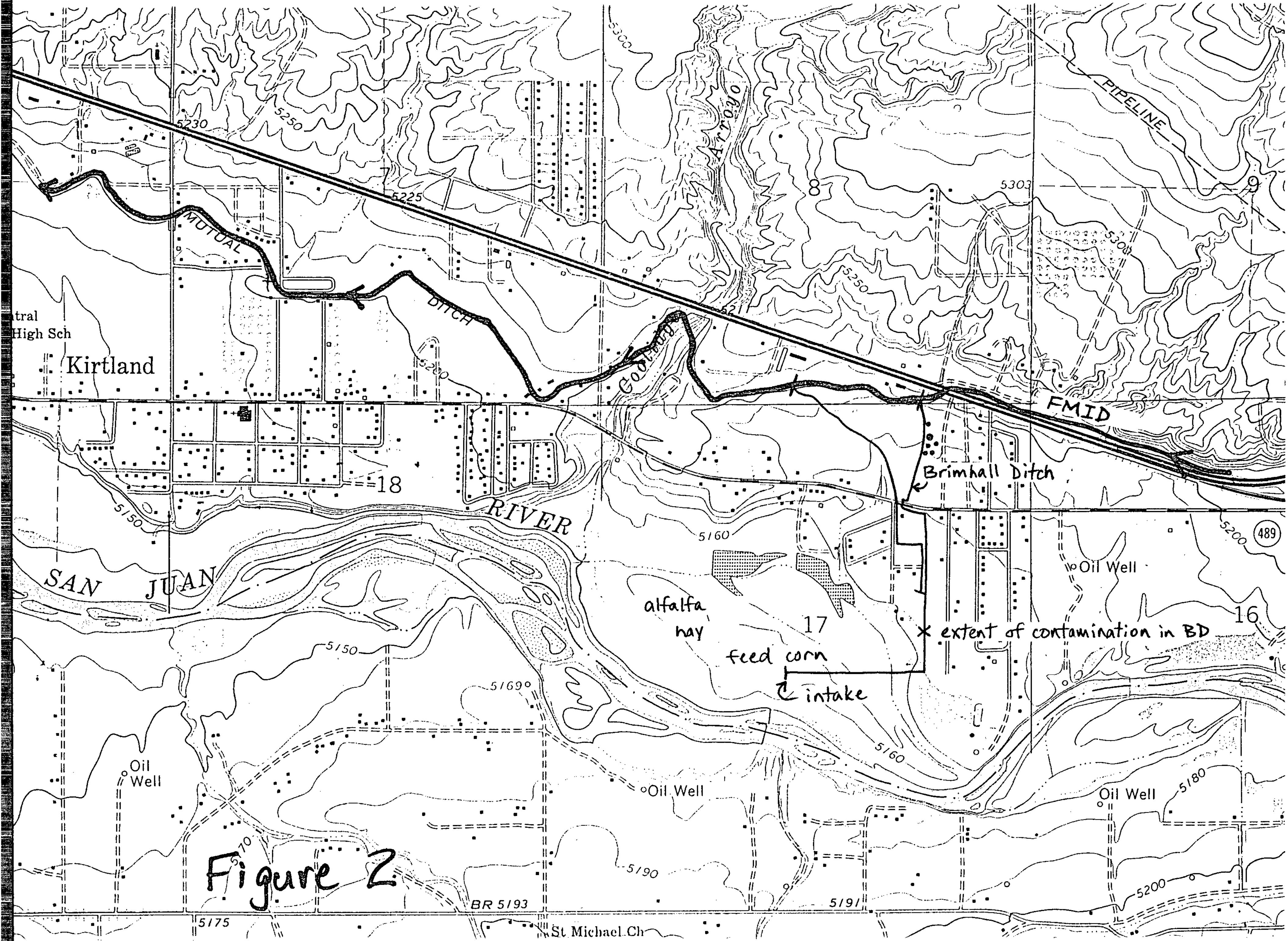

PIPELINE
FMID
Brimhall Ditch
extent of contamination in BD
intake
feed corn
alfalfa
hay
17
16
18
8
9
MUTUAL
DITCH
Arroyo
RIVER
SAN JUAN
Kirtland
High Sch
Oil Well
Oil Well
Oil Well
Oil Well
489
St Michael Ch
BR 5193
5303
5300
5250
5230
5225
5200
5160
5150
5169
5190
5191
5180
5175

Figure 2

FMID SEDIMENT SAMPLING RESULTS (ug/g)

constituent	upstream	downstream
As	1.0	1.7
B	<5	10
Co	<5	5
Cu	10	15
Pb	25	55
Mn	500	800
Ni	<5	5
V	5	<5
Zn	140	225
VOCs	<500	<500

Results for lead are suggestive, with the downstream sample having 55 ppm in comparison to only 25 ppm upstream, but these values are not sufficiently different to be convincing. Results fail to indicate any likely refinery contaminant that is significantly elevated in the downstream sample.

It is therefore clear that hydrocarbons were released from the facility to the FMID in the past. However, these materials most likely qualify for the CERCLA petroleum exemption. PA/SI staff were unsuccessful in ascertaining the exact nature of materials spilled, leaked and seeped into the FMID. Without knowing exactly what wastes were lost to the FMID, the petroleum exemption cannot be evaluated. Accordingly, a release of non-exempt waste to the FMID cannot be documented.

Because staff was unable to document a release to the FMID and because of potential problems with waste characteristics on that pathway, further SIF effort was focussed on the Brimhall Ditch pathway. A release of EDC to the BD can be documented with data from the SI. SI data also allowed extension of the site boundary along the Brimhall Ditch 0.3 miles south of the refinery.

During the SIF, PA/SI staff attempted to determine the location and size of the target population for this pathway. PA/SI staff walked the Brimhall Ditch on July 8, 1986. The only diversions from the BD were located 0.45 miles (2376 ft) downstream from the hazardous substance (Appendix II, p. 27). At that location a gate diverts BD water into 75 acres of fields owned by Mr. Brimhall and Mr. Walker and used to grow hay, feed corn, and alfalfa for livestock consumption (Appendix V). No irrigation was observed downstream from these properties. Tailwater goes to the San Juan River (Appendix V).

A 3-acre plot of sweet corn and melons was identified immediately adjacent to the BD right at the hazardous substance (site) boundary. However, this field, which is owned by Mr. Grubbs and leased to Mr. Kinlichee, is irrigated from a lateral that exits the FMID about 1000 ft west of the BD headgate, and so is not vulnerable to contamination in the BD.

WASTE CHARACTERISTICS

PA/SI staff ascertained that 689 cubic yards of non-exempt, lead-containing wastes had been deposited of at the site in a manner that left the wastes available to both surface water and ground water routes.

On February 17, 1986, two waste disposal areas were identifed at the site. Mr. Omer Morrison, a former refinery employee, stated that tank bottoms from the 50,000-barrel crude oil tank had been removed and placed in these two disposal pits. This material is considered non-exempt under CERCLA because it is a waste product of the refining process. The sludge is not petroleum, crude oil, or any fraction thereof.

The largest of the two waste pits is located just south of the refueling platform. Mr. Morrison stated that it was 10 to 15 feet deep. Using a steel measuring tape, PA/SI staff measured the horizontal dimensions to be 62 x 30 feet. Therefore, the volume of waste in this pit is conservatively estimated to be 10 x 62 x 30 = 18,600 cubic feet, or 689 cubic yards. The second pit is located adjacent to the 50,000-barrel tank. Mr. Morrison gave its depth as 5 to 6 feet. The pit has been filled in with earth material and covered over and only seeps are visible at the surface; the horizontal dimensions, and therefore the waste volume, are unknown.

Both these pits were excavated in sand and gravel alluvium, are unlined, have inadequate freeboard and unsound runon diversion structures. Both are available to the ground water route. Although Mr. Morrison indicated that the large pit was dry when it was excavated, the seasonal high water table probably rises into the waste material in this pit.

Surface runoff from the pits cannot leave the site because of a berm at the south end of the refinery property, nor can it flow overland to the BD because of a berm along the BD. However, shallow ground water flows southwest from the pits toward the BD which is less than 100 yards away. Therefore both pits are available to the BD surface water pathway by way of shallow ground water.

In addition to the two waste disposal pits, Mr. Morrison identified the area in which gasoline was blended with tetra-ethyl lead to make leaded gasoline. This area is in the middle of the new tank farm. It is bermed so that surface runon/runoff is not a factor, but the area is unlined and movement to ground water is not prevented.

Chemical characteristics of wastes in these areas can be assessed from samples collected on February 17 - 18, 1986. From the large disposal pit staff obtained two 8-oz. glass jars of sludge and two 40-ml teflon-capped glass vials of fluid ponded at the surface of the pit. From the small pit staff collected two 8-oz. glass jars of cover soil. From the area near the lead blending pump, staff collected two 8-oz. glass jars of surface soil.

Results of all sampling for waste characteristics are summarized in the table below. The results indicate that the sludge in the waste pit and the soil in the lead blending area contain elevated levels of lead, chromium, and arsenic. Lead, for example, occurs at about 11 ppm in native soils, but is elevated to more than 10 times that level in on-site wastes.

WASTE SAMPLING RESULTS

sample location	date	VOCs	lead	chromium	arsenic
bkgd surface soil	2/18/86		11 ppm	2.6 ppm	1.9 ppm
bkgd. soil @ 24" dpth.	2/18/86		10	2.6	1.7
sm. waste pit (soil)	2/17/86		20	2.6	2.8
lg. waste pit (liquid)	2/17/86	<3 ppb			
lg. waste pit (sludge)	2/17/86		**140**	**31**	**23**
lead mixing area (soil)	2/17/86		**260**	**15**	**5**

All of the above wastes are in or near the present tank farm. No official waste disposal was indicated in the area near the actual refinery apparatus and former tank farm north of the FMID. The lead storage shed was in that area and there is historical documentation that the old tank farm was a source of spills and leaks that saturated the underlying soil and contaminated the FMID, but there is no identifiable or measurable volume of non-exempt CERCLA hazardous waste in that area.

SUMMARY AND APPLICATION

The SIF confirmed that benzene, toluene, xylenes and 1,2-dichloroethane had been released from the site to shallow ground water and surface water and that there were no alternate sources for this contamination. The SIF showed that ground water is used extensively for drinking purposes in proximity to the site and that surface water is used for irrigation of forage crops in the vicinity of the site. Waste characteristics were also quantified as a result of data collected for this SIF. The site holds 689 cubic yards of waste that contains elevated levels of lead. This material is a refinery waste product and is deemed not exempt from CERCLA law. The waste materials are available to both surface water and ground water.

Information obtained through this SIF will be used to document an HRS package for the Caribou Refinery site. Data are sufficient to support a Ground Water Route score that will stand on its own and a Surface Water Route score that will also be of value.

APPENDIX I

Well Records and Drillers' Logs

Caribou Four Corners, Inc. Phone (307) 886-3861 - P. O. Box 457 - Afton, Wyoming 83110

RECEIVED
MAY 18 1987
LEGAL

May 12, 1987

Richard L. Young
Assistant General Counsel
Post Office Box 968
Santa Fe, NM 87504-0968

Dear Mr. Young:

In answer to my letter dated April 7, 1987, Dennis McQuillan called our office on April 30 and left word with the secretary, giving approval for Caribou to proceed with the investigation.

This verbal approval not withstanding, prior to any action that might be taken in regard to the issues addressed in the above mentioned letter, Caribou needs a written response to the questions addressed therin.

Sincerely,

CARIBOU FOUR CORNERS, INC.

William Call

William Call
President

WC/km

Dennis 5/18/87
I assume your May 11 letter addresses this, but you might want to call Mr. Call & make sure.
Dick
Called 5/18/87.

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

RECEIVED
MAY 14 1987
OIL CONSERVATION DIVISION
SANTA FE

May 11, 1987

William Call, President
Caribou Tour Corners, Inc.
P.O. Box 457
Afton, Wyoming 83110

Dear Mr. Call:

Thank you for submitting the site investigation proposal for your Kirtland refinery prepared by Dames & Moore. This proposal is hereby approved with the following conditon:

° For those water-quality monitoring wells in which the top of screen must be placed below the water table, please have your contractor note the presence or absence of a floating oil phase during the drilling process.

Regarding the hook up of homeowners to the city water system, the EID can provide some assistance in acquiring the technical data needed to do so. We recently conducted a detailed water well sampling program in the area to identify all wells that may be threatened by contamination. I will provide the results of these tests to you upon completion. Additionally, we can estimate the costs hooking up the households whose water wells are threatened.

Thanks again for your cooperation in this matter.

Sincerely,

Dennis McQuillan

Dennis McQuillan, WRS III
Technical Services Section
Ground Water/Hazardous Waste Bureau

DM:dlr

cc: Richard Young, Office of General Counsel
Stuart Castle, Water Supply Section
David Tomko, Farmington Office
David Boyer, Oil Conservation Division

EQUAL OPPORTUNITY EMPLOYER

Refinery Offers Help To Find Contaminant

5/6/87

THE ASSOCIATED PRESS Alb Journal

FARMINGTON — A refinery has offered to test ground water to help identify the source of a gasoline additive contaminating some wells near Kirtland, officials said.

The state Environmental Improvement Division was negotiating with Caribou Refinery about tracking the contaminant plume to its source when Caribou made the offer, said EID spokesman David McQuillan.

He said he is pleased about the Caribou offer to test the water near its Kirtland refinery and that the company is being cooperative.

Contamination of water wells with a chemical commonly called EDC was first noticed about a year ago in an area south of the refinery. EDC has been linked to cancer.

Sampling of the wells indicated contamination levels were eight or nine parts per billion, said David Tomko of the EID's Farmington office.

The state standard for EDC contamination in drinking water is 10 parts per billion, but the U.S. Environmental Protection Agency standard is zero parts per billion.

Preliminary results of water sample tests during the last few weeks show that, of nine samples, one was contaminated with 10 parts per billion of EDC, Tomko said. Results are not available for seven other samples from area wells.

EDC is added to leaded gasoline during refining to enhance octane and to keep lead deposits from building up in the engine.

Few people in the area get their drinking water from wells. Tomko said most drinking water is piped in from public water supplies, which are not contaminated.

RECEIVED

MAY 7 1987

GROUND WATER/HAZARDOUS WASTE BUREAU

12

NMS 5/6/87

State will need waste center soon, study concludes

ALBUQUERQUE (AP) — New Mexico might need a hazardous waste storage-and-transfer center in a year or two, a study concluded.

The 12-month study by Jacobs Engineering Group of Albuquerque said New Mexico does not generate enough hazardous waste to justify a center at the present time.

The company studied the possibility of building a storage station to house hazardous waste until it can be shipped out of state for permanent disposal.

New Mexico businesses currently have no place except their premises to store hazardous waste until enough builds up to fill a truckload for transfer.

The Jacobs study said the city and state should decide whether to publicly subsidize a waste facility if a private business does not do so.

The study named six locations as possible sites for a waste transfer-and-storage station. All are in the Albuquerque area, where 43 percent of New Mexico's hazardous waste is generated.

William Bennett, head of the city's Environmental Services Division, said the six sites would meet federal and state requirements for a waste storage facility.

87-0779-0

ENVIRONMENT

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

RECE[illegible] 1987

REPORT TO: David Tomko
EID
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 779
DATE REC. 5-7-87
PRIORITY 2
PHONE(S): 327-9851

COLLECTION CITY: Kirtland ; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) |8|7|0|5|0|4|1|1|5|0|

LOCATION CODE: (Township-Range-Section-Tracts) |2|9|N+|1|4|W+|1|7+| | | |(10N06E24342)

USER CODE: |5|9|3|0|0|0| SUBMITTER: Len Murray CODE:| | | | |

SAMPLE TYPE: WATER |X|, SOIL |_|, FOOD |_|, OTHER: ______

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____ ______

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [x] P-Ice Sample stored in an ice bath (Not Frozen).
- [x] P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [x] 1,2-Dichlorethane
- [ ] ____
- [ ] ____
- [ ] ____
- [ ] ____

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: vials: PP-1 & PP-2

FIELD DATA:

pH=____; Conductivity=____umho/cm at ____°C; Chlorine Residual=____mg/l

Dissolved Oxygen=____mg/l; Alkalinity=____mg/l; Flow Rate ____ ___/___

Depth to water uk ft.; Depth of well uk ft.; Perforation Interval ___-___ft.; Casing: uk

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Paul Pickard wellhouse tap, CR 6259 #52

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab: Purolator

CHAIN OF CUSTODY

I certify that this sample was transferred from ______ to ______

at (location) ______ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [ ] No [ ]

Signatures ______ ______

ANALYSES PERFORMED

LAB. No.: OR- 779

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	N.D		
halogenated purgeables	N.D.		
* DETECTION LIMIT *	1 µg/L	+ DETECTION LIMIT +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT
T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)
[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [x] Seal(s) broken by: not sealed date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 5/12/87 . Analyst's signature: Gary C. Eden

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: Richard Meyer Lu

87-0782-C

SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

RECEIVED MAY

754-wpu

REPORT TO: David Tomko
EID
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 782
DATE REC. 5-7-87
PRIORITY 2
PHONE(S): 327-9851

COLLECTION CITY: Kirtland ; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 8 7 0 5 0 4 1 1 3 5

LOCATION CODE: (Township-Range-Section-Tracts) 2 9 N + 1 4 W + 1 8 + (10N06E24342)

USER CODE: 5 2 0 1 1 SUBMITTER: Len Murray CODE:

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER:

This form accompanies 2 Septum Vials, ___ Glass Jugs, and/or ___

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [X] 1,2-Dichloroethane
- [ ]
- [ ]
- [ ]
- [ ]

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: Vials: CC-1 & CC-2

FIELD DATA:

pH=___; Conductivity=___ umho/cm at ___ °C; Chlorine Residual=___ mg/l

Dissolved Oxygen=___ mg/l; Alkalinity=___ mg/l; Flow Rate ___ ___/___

Depth to water uk ft.; Depth of well uk ft.; Perforation Interval ___-___ ft.; Casing: uk

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Charlotte Christensen wellhouse tap, CR 6330, #26

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab: Parolator

CHAIN OF CUSTODY

I certify that this sample was transferred from ___ to ___

at (location) ___ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [ ] No [ ]

Signatures ___ ___

ANALYSES PERFORMED LAB. No. OR- 782

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	N.D.		
halogenated purgeables	N.D.		
* DETECTION LIMIT *	1 ug/L	+ DETECTION LIMIT +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [x] Seal(s) broken by: not sealed date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 5/12/87. Analyst's signature: Gary C. Eden

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: K Meyerhein MAY 22 1987

87-0781-C

ENVIRONMENT department

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

RECEIVED ... 2 8 1987

754-0477

REPORT TO: David Tomko
EID
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 781
DATE REC. 5-7-87
PRIORITY 2
PHONE(S): 327-9851

COLLECTION CITY: Kirtland ; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 8 7 0 5 0 4 1 0 4 6

LOCATION CODE: (Township-Range-Section-Tracts) 2 9 N + 1 4 W + 1 8 + (10N06E24342)

USER CODE: 5 2 0 1 1 SUBMITTER: Len Murray CODE:

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER:

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [X] P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [X] 1,2-Dichloroethane
- [ ]
- [ ]
- [ ]
- [ ]

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: Vials: JF-1 & JF-2

FIELD DATA:

pH=____; Conductivity=____ umho/cm at ____ °C; Chlorine Residual=____ mg/l

Dissolved Oxygen=____ mg/l; Alkalinity=____ mg/l; Flow Rate ____ ____/____

Depth to water UK ft.; Depth of well UK ft.; Perforation Interval ____-____ ft.; Casing: UK

Sampling Location, Methods and Remarks (i.e. odors, etc.)

James Frasure wellhouse tap, CR 6332, #41

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab: Purolator

CHAIN OF CUSTODY

I certify that this sample was transferred from ____ to ____

at (location) ____ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [ ] No [ ]

Signatures ____ ____

ANALYSES PERFORMED

LAB. No. OR- 781

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	N.D.		
halogenated purgeables	N.D.		
* DETECTION LIMIT *	1 ug/L	+ DETECTION LIMIT +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Not Sealed [ ] Intact: Yes [ ] No [x] Seal(s) broken by: not sealed date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 5/12/87 Analyst's signature: Gary C Eelim

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: K Meyerhein MAY 22 1987

87-0700-C

ENVIRONMENT

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

RECEIVED ... 1987

REPORT TO: David Tomko
EID
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 7(0
DATE REC. 5-7-87
PRIORITY 2
PHONE(S): 327-9851

COLLECTION CITY: Farmington; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) |8|7|0|5|0|4|0|9|0|0|

LOCATION CODE: (Township-Range-Section-Tracts) |2|9|N|+|1|3|W|+|1|6|+| | | | |(10N06E24342)

USER CODE: |5|2|0|1|1| SUBMITTER: Len Murray CODE:| | | | |

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER:

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [X] P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [X] 1,2-Dichloroethane
- [ ]
- [ ]
- [ ]
- [ ]

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: Vials: Blank-1 & Blank-2, distilled water

FIELD DATA:

pH=____; Conductivity=____umho/cm at ____°C; Chlorine Residual=____mg/l

Dissolved Oxygen=____mg/l; Alkalinity=____mg/l; Flow Rate____ ____/____

Depth to water ____ft.; Depth of well____ft.; Perforation Interval ____-____ft.; Casing:

Sampling Location, Methods and Remarks (i.e. odors, etc.)

EID Field Office, 724 W. Animas

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab: Paralavot

CHAIN OF CUSTODY

I certify that this sample was transferred from ____ to ____

at (location) ____ on ___/___/___ - ____ ____ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [ ] No [ ]

Signatures ____ ____

ANALYSES PERFORMED

LAB. No.: OR- 780

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	N.D.		
halogenated purgeables	N.D.		
* DETECTION LIMIT *	1 µg/l	+ DETECTION LIMIT +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT
T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)
[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [x] Seal(s) broken by: not sealed date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 5/12/87. Analyst's signature: Gary C. Edens

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: Richard Meyerhein MAY 22 1987

87-0678-C

754 WP-1

Mail

RECEIVED MAY 14 1987

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

STATE OF NEW MEXICO
ENVIRONMENT

REPORT TO: David Tomko
Environmental Improvement Div.
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- Org. 678
DATE REC. 4-24-87
PRIORITY 2

PHONE(S): 327-9851 USER CODE: 5 2 0 1 1
SUBMITTER: Len Murray CODE: ___
SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 0 4 2 0 1 2 1 5 L E M
SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER: ___
COUNTY: San Juan ; CITY: Kirtland
LOCATION CODE: (Township-Range-Section-Tracts) 2 9 N + 1 4 W + 1 8 + ___ (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [X] 1,2-Dichloroethane
- [ ] ___
- [ ] ___
- [ ] ___
- [ ] ___

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: Vials: BL-1 & BL-2

FIELD DATA:

pH=___; Conductivity=___umho/cm at ___°C; Chlorine Residual=___mg/l

Dissolved Oxygen=___mg/l; Alkalinity=___mg/l; Flow Rate___ ___/___

Depth to water UK ft.; Depth of well 30 ft.; Perforation Interval ___-___ft.; Casing: UK

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Bernard Laudenslager wellhouse tap, #23 CR 6319

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab: ___

This form accompanies 2 Septum Vials, ___ Glass Jugs, and/or ___

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from ___ to ___

at (location) ___ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] Seals Intact: Yes [ ] No [ ]

Signatures ___ ___

ANALYSES PERFORMED

LAB. No. OR- 678

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	ND		
tetrachloroethene	TR		
aromatic * DETECTION LIMIT * *	1ppb	halogenated + DETECTION LIMIT + +	0.5ppb

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [x]. Seal(s) broken by: ______ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4-21-87. Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block

Reviewers signature: K Meyerhen

87-0679-C .754 wp9

RECEIVED MAY 14 1987

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

HEALTH ENVIRONMENT department STATE OF NEW MEXICO

REPORT TO: David Tomko
Environmental Improvement Div.
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 679
DATE REC. 4-24-87
PRIORITY 2

PHONE(S): 327-9851 USER CODE: 5 2 0 1 1 1

SUBMITTER: Len Murray CODE: ____

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 0 4 2 0 1 1 5 5 L E M

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER: ________

COUNTY: San Juan; CITY: Kirtland

LOCATION CODE: (Township-Range-Section-Tracts) 2 9 N + 1 4 W + 0 7 + ___ (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [X] 1,2-Dichloroethane
- [ ] ________
- [ ] ________
- [ ] ________
- [ ] ________

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: Vials: TG-1 & TG-2

FIELD DATA:

pH=____; Conductivity=____ umho/cm at ____ °C; Chlorine Residual=____ mg/l

Dissolved Oxygen=____ mg/l; Alkalinity=____ mg/l; Flow Rate ____ ____/____

Depth to water 8 ft.; Depth of well 31 ft.; Perforation Interval ____-____ ft.; Casing: UK

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Troy & Margie Guillory wellhouse tap, #11 CR 6345

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab: ________

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____ ________

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from ________ to ________

at (location) ________ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] Seals Intact: Yes [ ] No [ ]

Signatures ________ ________

ANALYSES PERFORMED

LAB. No.: OR- 679

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ____
- [ ] ____
- [ ] ____
- [ ] ____
- [ ] ____

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	ND		
halogenated purgeables	ND		
aromatic * DETECTION LIMIT *	1 ppb	halogenated + DETECTION LIMIT +	0.5 ppb

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT
T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)
[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ____

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [x]. Seal(s) broken by: ____ date: ____

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4-24-87 . Analyst's signature: A. Finney

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this [illegible].

Reviewers signature: R. Mayerhen

87-0680-C 754 mail wpd

RECEIVED MAY 14 1987

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

HEALTH ENVIRONMENT STATE OF NEW MEXICO

REPORT TO: David Tomko
Environmental Improvement Div.
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 8,680
DATE REC. 4-24-87
PRIORITY 2

PHONE(S): 327-9851
USER CODE: 5 2 0 1 1 1

SUBMITTER: Len Murray
CODE:

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 0 4 2 0 1 1 4 0 L E M

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER:

COUNTY: San Juan ; CITY: Kirtland

LOCATION CODE: (Township-Range-Section-Tracts) 2 9 N+ 1 4 W+ 0 7 + (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [X] 1,2-Dichloroethane
- [ ]
- [ ]
- [ ]
- [ ]

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: Vials: KD-1 & KD-2

FIELD DATA:

pH=___; Conductivity=___umho/cm at ___°C; Chlorine Residual=___mg/l

Dissolved Oxygen=___mg/l; Alkalinity=___mg/l; Flow Rate ___ ___/___

Depth to water uk ft.; Depth of well 25 ft.; Perforation Interval ___-___ft.; Casing: uk

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Kennye Decker wellhouse tap; #20 CR6353

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab:

This form accompanies 2 Septum Vials, ___ Glass Jugs, and/or

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from ___ to ___

at (location) ___ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] Seals Intact: Yes [ ] No [ ]

Signatures

need contract 5-15-87

ANALYSES PERFORMED

LAB. No.: OR- 680

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	ND		
tetrachloroethene	TR		
aromatic * DETECTION LIMIT *	1 ppb	halogenated + DETECTION LIMIT +	0.5 ppb

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: There is a possible trace amount of one other compound that was detected by the halogenated screen that was not identified

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [x]. Seal(s) broken by: ______ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4-24-97 . Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this ...

Reviewers signature: R Meyerhein

87-0681-C 754 w/4

RECEIVED MAY 14 1987

normal

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

ENVIRONMENT STATE OF NEW MEXICO

REPORT TO: David Tomko
Environmental Improvement Div.
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- Org. 681
DATE REC. 4-24-87
PRIORITY 2

PHONE(S): 327-9851
USER CODE: 5 2 0 1 1
SUBMITTER: Len Murray
CODE:

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 0 4 2 0 1 1 0 0 L E M

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER:

COUNTY: San Juan ; CITY: Kirtland

LOCATION CODE: (Township-Range-Section-Tracts) 2 9 N + 1 5 W + 1 3 + (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [X] 1,2-Dichlorethane
- [ ]
- [ ]
- [ ]
- [ ]

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: Vials: CR-1 & CR-2

FIELD DATA:

pH= ; Conductivity= umho/cm at °C; Chlorine Residual= mg/l

Dissolved Oxygen= mg/l; Alkalinity= mg/l; Flow Rate /

Depth to water 7 ft.; Depth of well 30 ft.; Perforation Interval - ft.; Casing: 25'

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Tom & Chris Reynold wellhouse tap, #8 CR6553

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab:

This form accompanies 2 Septum Vials, Glass Jugs, and/or

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from to

at (location) on / / - : and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] Seals Intact: Yes [ ] No [ ]

Signatures

ANALYSES PERFORMED

LAB. No. OR- 681

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	ND		
halogenated purgeables	ND		
aromatic DETECTION LIMIT * *	1 ppb	halogenated DETECTION LIMIT + +	0.5 ppb

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT
T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)
[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [x]. Seal(s) broken by: ______ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4-24-87 . Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this ...

Reviewers signature: K Meyahen

87-0682-C 754 wp4

no mail ✓

RECEIVED MAY 4 1987

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

ENVIRONMENT

STATE OF NEW MEXICO

REPORT TO: David Tomko
Environmental Improvement Div
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- Org. 682
DATE REC. 4-24-87
PRIORITY 2

PHONE(S): 327-9851 USER CODE: 5 2 0 1 1
SUBMITTER: Len Murray CODE: ___
SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 0 4 2 0 1 0 4 0 L E M
SAMPLE TYPE: WATER ☒, SOIL ☐, FOOD ☐, OTHER: ___
COUNTY: San Juan ; CITY: Fruitland
LOCATION CODE: (Township-Range-Section-Tracts) 2 9 N + 1 5 W + 1 2 + ___ (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- ☐ (753) Aliphatic Purgeables (1-3 Carbons)
- ☒ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes

Other Specific Compounds or Classes

- ☒ 1,2-Dichloroethane
- ☐ ___
- ☐ ___
- ☐ ___
- ☐ ___

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (760) Organochlorine Pesticides
- ☐ (755) Base/Neutral Extractables
- ☐ (758) Herbicides, Chlorophenoxy acid
- ☐ (759) Herbicides, Triazines
- ☐ (760) Organochlorine Pesticides
- ☐ (761) Organophosphate Pesticides
- ☐ (767) Polychlorinated Biphenyls (PCB's)
- ☐ (764) Polynuclear Aromatic Hydrocarbons
- ☐ (762) SDWA Pesticides & Herbicides

Remarks: Vials: JF-1 & JF-2

FIELD DATA:

pH= ___; Conductivity= ___ umho/cm at ___ °C; Chlorine Residual= ___ mg/l

Dissolved Oxygen= ___ mg/l; Alkalinity= ___ mg/l; Flow Rate ___ ___/___

Depth to water 3 ft.; Depth of well 33 ft.; Perforation Interval ___-___ ft.; Casing: 33'

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Jeff Fleming wellhouse tap, #34 CR 6675

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab: ___

This form accompanies 2 Septum Vials, ___ Glass Jugs, and/or ___ ___

Samples were preserved as follows:

- ☐ NP: No Preservation; Sample stored at room temperature.
- ☒ P-Ice Sample stored in an ice bath (Not Frozen).
- ☐ P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from ___ to ___

at (location) ___ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐

Signatures ___ ___

ANALYSES PERFORMED

LAB. No. OR- 682

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ____
- [ ] ____
- [ ] ____
- [ ] ____
- [ ] ____

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	ND		
halogenated purgeables	ND		
aromatic * DETECTION LIMIT *	1 ppb	halogenated DETECTION LIMIT +	0.5 ppb

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ____

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [X]. Seal(s) broken by: ____ date: ____

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4-24-87 . Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this book

Reviewers signature: K Meagher MAY 8 1987

87- 0683 -C 754 WPA

RECEIVED 1987

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

HEALTH ENVIRONMENT STATE OF NEW MEXICO

REPORT TO: David Tomko
Environmental Improvement Div.
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 615,683
DATE REC. 4-24-87
PRIORITY 2

PHONE(S): 327-9851 USER CODE: 5 2 0 1 1 1

SUBMITTER: Len Murray CODE:

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 0 4 2 0 0 8 3 0 L E M

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER:

COUNTY: San Juan ; CITY: Farmington

LOCATION CODE: (Township-Range-Section-Tracts) ___ + ___ + ___ + ___ (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [X] 1,2-Dichloroethane
- [ ]
- [ ]
- [ ]
- [ ]

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: Vials: B-1 & B-2 Blank

FIELD DATA:

pH=____; Conductivity=____umho/cm at ____°C; Chlorine Residual=____mg/l

Dissolved Oxygen=____mg/l; Alkalinity=____mg/l; Flow Rate____ ____/____

Depth to water NA ft.; Depth of well NA ft.; Perforation Interval ____-____ft.; Casing: NA

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Farmington Field Office Distilled water

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab:____

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from ____ to ____

at (location) ____ on ____/____/____ - ____:____ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] Seals Intact: Yes [ ] No [ ]

Signatures ____ ____

ANALYSES PERFORMED   LAB. No. OR- 683

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	ND		
halogenated purgeables	ND		
aromatic * DETECTION LIMIT *	1 ppb	halogenated + DETECTION LIMIT +	0.5 ppb

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [x]. Seal(s) broken by: ______ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4-24-87 . Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

MAY 8 1987

Reviewers signature: K Meyerhen

87-0631-C wpu 154

RECEIVED MAY 2 1987

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

ENVIRONMENT STATE OF NEW MEXICO

REPORT TO: David Tomko
Environmental Improvement Div
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- Org. 631
DATE REC. 4-16-87
PRIORITY 2

PHONE(S): 327-9851 USER CODE: 59300
SUBMITTER: Len Murray CODE: ____

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 870413 1205 LEM

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER: ____

COUNTY: San Juan ; CITY: Kirtland

LOCATION CODE: (Township-Range-Section-Tracts) 29N + 14W + 17 + ___ (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables wpu
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [X] 1,2 - Dichloroethane
- [ ]
- [ ]
- [ ]
- [ ]

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: Vials: EW-1 & EW-2

FIELD DATA:

pH=____; Conductivity=____umho/cm at ____°C; Chlorine Residual=____mg/l

Dissolved Oxygen=____mg/l; Alkalinity=____mg/l; Flow Rate____ ____/____

Depth to water UK ft.; Depth of well UK ft.; Perforation Interval ____-____ft.; Casing: UK

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Bill & Ellen Walker well house tap, County Road 6271

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab: ____

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____ ____

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from ____ to ____

at (location) ____ on ___/___/___ - ___:___ and that the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] Seals Intact: Yes [ ] No [ ]

Signatures ____ ____

ANALYSES PERFORMED LAB. No. OR-631

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ____
- [ ] ____
- [ ] ____
- [ ] ____
- [ ] ____

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	ND		
1,2-dichloroethane	1 ppb		
aromatic * DETECTION LIMIT * *	1 ppb	halogenated + DETECTION LIMIT + +	0.5 ppb

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ____

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [x] Seal(s) broken by: ____ date: ____

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4-22-87. Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: [signature] MAY 18 1987 no mail

RECEIVED MAY 14 1987

SCIENTIFIC LABORATORY DIVISION

87-0630-C

HEALTH ENVIRONMENT department NEW MEXICO

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

REPORT TO: David Tomko
Environmental Improvement Div.
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 630 A+B

DATE REC. 4-16-87

PRIORITY 2

PHONE(S): 327-9851

USER CODE: 59300

SUBMITTER: Len Murray

CODE:

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 870413113 5LEM

SAMPLE TYPE: WATER ☒, SOIL ☐, FOOD ☐, OTHER:

COUNTY: San Juan ; CITY: Kirtland

LOCATION CODE: (Township-Range-Section-Tracts) 29N+14W+17+ (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- ☐ (753) Aliphatic Purgeables (1-3 Carbons)
- ☒ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes

Other Specific Compounds or Classes

- ☒ 1,2-Dichloroethane
- ☐
- ☐
- ☐
- ☐

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (760) Organochlorine Pesticides
- ☐ (755) Base/Neutral Extractables
- ☐ (758) Herbicides, Chlorophenoxy acid
- ☐ (759) Herbicides, Triazines
- ☐ (760) Organochlorine Pesticides
- ☐ (761) Organophosphate Pesticides
- ☐ (767) Polychlorinated Biphenyls (PCB's)
- ☐ (764) Polynuclear Aromatic Hydrocarbons
- ☐ (762) SDWA Pesticides & Herbicides

Remarks: vials: HC-1 & HC-2

FIELD DATA:

pH=____; Conductivity=____umho/cm at ____°C; Chlorine Residual=____mg/l

Dissolved Oxygen=____mg/l; Alkalinity=____mg/l; Flow Rate ____ ____/____

Depth to water 18 ft.; Depth of well 40 ft.; Perforation Interval ____-____ft.; Casing: 40 ft.

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Henry Caston Wellhouse tap, CR 6100, #351

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab:

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____

Samples were preserved as follows:

- ☐ NP: No Preservation; Sample stored at room temperature.
- ☒ P-Ice Sample stored in an ice bath (Not Frozen).
- ☐ P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from ____ to ____

at (location) ____ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐

Signatures

ANALYSES PERFORMED

LAB. No.: OR- 630

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ____
- [ ] ____
- [ ] ____
- [ ] ____
- [ ] ____

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	ND *		
trichloroethene	TR		
tetrachloroethene	TR		
aromatic * DETECTION LIMIT *	1 ppb	halogenated + DETECTION LIMIT +	0.5 ppb

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ____

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [X]. Seal(s) broken by: ____ date: ____

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4-22-87. Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this ...

Reviewers signature: R Meyerhein MAY 8 1987

RECEIVED MAY 1 4 1987

SCIENTIFIC LABORATORY DIVISION

87-0626-C

ENVIRONMENT

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

REPORT TO: David Tomko
Environmental Improvement Div.
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 626 A+B

DATE REC.

PRIORITY 2

PHONE(S): 327-9851

USER CODE: 5 9 3 0 0

SUBMITTER: Len Murray

CODE:

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 0 4 1 3 1 1 0 5 L E M

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER: ____

COUNTY: San Juan ; CITY: Kirtland

LOCATION CODE: (Township-Range-Section-Tracts) 2 9 N + 1 4 W + 1 7 + ____ (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [X] 1,2- Dichloroethane
- [ ]
- [ ]
- [ ]
- [ ]

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: Vials: GB-1 & GB-2

FIELD DATA:

pH= ____; Conductivity= ____ umho/cm at ____ °C; Chlorine Residual= ____ mg/l

Dissolved Oxygen= ____ mg/l; Alkalinity= ____ mg/l; Flow Rate ____ ____/____

Depth to water UK ft.; Depth of well 27 ft.; Perforation Interval ____-____ ft.; Casing: 27'

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Glenn Bloomfield wellhouse tap, CR 6100, #337

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab: ____

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____ ____

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from ____ to ____

at (location) ____ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] Seals Intact: Yes [ ] No [ ]

Signatures ____ ____

ANALYSES PERFORMED

LAB. No. OR- 626

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	ND *		
halogenated purgeables	ND +		
* DETECTION LIMIT * *	1 ppb	+ DETECTION LIMIT + +	0.5 ppb

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT
T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)
[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: One other compound was detected by the halogenated screen that was not identified that appears to be lab contamination.

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [X]. Seal(s) broken by: ______ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 21&24 Apr 87. Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this

Reviewers signature: ______

RECEIVED MAY 14 1987

87-0628-C

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

HEALTH ENVIRONMENT

REPORT TO: David Tomko
Environmental Improvement Div.
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 628 A+B
DATE REC. 4-16-87
PRIORITY 2

PHONE(S): 327-9851
USER CODE: 5 9 3 0 0
SUBMITTER: Len Murray
CODE:

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 0 4 1 3 1 0 4 5 L E M

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER: ______

COUNTY: San Juan ; CITY: Kirtland

LOCATION CODE: (Township-Range-Section-Tracts) 2 9 N + 1 4 W + 1 7 + _ _ _ (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

wpw

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [X] 1,2- Dichloroethane
- [ ]
- [ ]
- [ ]
- [ ]

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: Vials; DP-1 & DP-2

FIELD DATA:

pH=____; Conductivity=____ umho/cm at ____ °C; Chlorine Residual=____ mg/l

Dissolved Oxygen=____ mg/l; Alkalinity=____ mg/l; Flow Rate ____ ____/____

Depth to water uk ft.; Depth of well uk ft.; Perforation Interval ____-____ ft.; Casing: uk

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Duane Pilcher wellhouse tap, CR 6251, #2

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab: ______

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____ ______

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from ______ to ______

at (location) ______ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] Seals Intact: Yes [ ] No [ ]

Signatures ______ ______

need contact 5-15-87

ANALYSES PERFORMED

LAB. NO. OR- 628

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- ☐ (753) Aliphatic Purgeables (1-3 Carbons)
- ☒ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes

Other Specific Compounds or Classes

- ☐ ____________
- ☐ ____________
- ☐ ____________
- ☐ ____________
- ☐ ____________

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (760) Organochlorine Pesticides
- ☐ (755) Base/Neutral Extractables
- ☐ (758) Herbicides, Chlorophenoxy acid
- ☐ (759) Herbicides, Triazines
- ☐ (760) Organochlorine Pesticides
- ☐ (761) Organophosphate Pesticides
- ☐ (767) Polychlorinated Biphenyls (PCB's)
- ☐ (764) Polynuclear Aromatic Hydrocarbons
- ☐ (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	ND*		
halogenated purgeables	ND+		
* DETECTION LIMIT * *	1 ppb	+ DETECTION LIMIT + +	0.5 ppb

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT
T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)
[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ____________

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes ☐ No ☒. Seal(s) broken by: ____________ date: ____________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4-22-87. Analyst's signature: H Finney

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this ...

Reviewers signature: K Meyerhen MAY 8 1987

mail

RECEIVED MAY 14 1987

87-0624-C

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

STATE OF NEW MEXICO
ENVIRONMENT department

REPORT TO: David Tomko
Environmental Improvement Div.
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 624 A+B

DATE REC. ______

PRIORITY 2

PHONE(S): 327-9851

USER CODE: 5 9 3 0 0

SUBMITTER: Len Murray

CODE: ______

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 0 4 1 3 1 0 2 5 L E M

SAMPLE TYPE: WATER ☒, SOIL ☐, FOOD ☐, OTHER: ______

COUNTY: San Juan ; CITY: Kirtland

LOCATION CODE: (Township-Range-Section-Tracts) 29N+14W+17+ ___ (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS	EXTRACTABLE SCREENS
☐ (753) Aliphatic Purgeables (1-3 Carbons)	☐ (751) Aliphatic Hydrocarbons
☒ (754) Aromatic & Halogenated Purgeables	☐ (760) Organochlorine Pesticides
☐ (765) Mass Spectrometer Purgeables	☐ (755) Base/Neutral Extractables
☐ (766) Trihalomethanes	☐ (758) Herbicides, Chlorophenoxy acid
Other Specific Compounds or Classes	☐ (759) Herbicides, Triazines
☒ 1,2-Dichloroethane	☐ (760) Organochlorine Pesticides
☐ ______	☐ (761) Organophosphate Pesticides
☐ ______	☐ (767) Polychlorinated Biphenyls (PCB's)
☐ ______	☐ (764) Polynuclear Aromatic Hydrocarbons
☐ ______	☐ (762) SDWA Pesticides & Herbicides

Remarks: Vials: VL-1 & VL-2

FIELD DATA:

pH=______; Conductivity=______umho/cm at ______°C; Chlorine Residual=______mg/l

Dissolved Oxygen=______mg/l; Alkalinity=______mg/l; Flow Rate______ ____/____

Depth to water 2' ft.; Depth of well 40 ft.; Perforation Interval ____-____ft.; Casing: UK

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Virgil Lucero wellhouse tap, CR 6251, #14

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab: ______

This form accompanies 2 Septum Vials, ______ Glass Jugs, and/or ______ ______

Samples were preserved as follows:

☐ NP: No Preservation; Sample stored at room temperature.

☒ P-Ice Sample stored in an ice bath (Not Frozen).

☐ P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from ______ to ______

at (location) ______ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐

Signatures ______ ______

ANALYSES PERFORMED

LAB. No. OR- 624

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	ND *		
halogenated purgeables	ND +		
* DETECTION LIMIT *	1 ppb	+ DETECTION LIMIT +	0.5 ppb

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [x]. Seal(s) broken by: ______ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 21 & 24 Apr. 87. Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this [illegible]

Reviewers signature: K Meyerhof MAY 8 1987

mail

RECEIVED MAY 4 1987

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

87-0629-C

REPORT TO: David Tomko
Environmental Improvement Div.
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 629 A+B
DATE REC. 4-16-87
PRIORITY 2

PHONE(S): 327-9851 USER CODE: 5 9 3 0 0

SUBMITTER: Len Murray CODE:

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 0 4 1 3 1 0 0 5 L E M

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER:

COUNTY: San Juan ; CITY: Kirtland

LOCATION CODE: (Township-Range-Section-Tracts) 2 9 N + 1 4 W + 1 7 + (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [X] 1,2-Dichloroethane
- [ ]
- [ ]
- [ ]
- [ ]

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: Vials: DH-1 & DH-2

FIELD DATA:

pH= ; Conductivity= umho/cm at °C; Chlorine Residual= mg/l

Dissolved Oxygen= mg/l; Alkalinity= mg/l; Flow Rate /

Depth to water 7 ft.; Depth of well 20 ft.; Perforation Interval - ft.; Casing: 20'

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Donald Howell wellhouse tap, CR 6255, #44

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab:

This form accompanies 2 Septum Vials, Glass Jugs, and/or

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from ____ to ____

at (location) ____ on __/__/__ - __:__ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] Seals Intact: Yes [ ] No [ ]

Signatures

ANALYSES PERFORMED

LAB. No.: OR- 629

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	ND *		
halogenated purgeables	ND +		
* DETECTION LIMIT * *	1 ppb	+ DETECTION LIMIT + +	0.5 ppb

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [X]. Seal(s) broken by: ______ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4-22-87. Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this ...

Reviewers signature: K Meyerhei MAY 8 1987

mail

RECEIVED MAY 1 4 1987

87-0627-C

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

HEALTH ENVIRONMENT NEW MEXICO

REPORT TO: David Tomko
Environmental Improvement Div.
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 627 A&B

DATE REC. 4-16-87

PRIORITY 2

PHONE(S): 327-9851

USER CODE: 5 9 3 0 0

SUBMITTER: Len Murray

CODE:

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 0 4 1 3 0 9 5 0 L E M

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER:

COUNTY: San Juan ; CITY: Kirtland

LOCATION CODE: (Township-Range-Section-Tracts) 2 9 N + 1 4 W + 1 7 + (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [X] 1,2-Dichloroethane
- [ ]
- [ ]
- [ ]
- [ ]

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: Vials: RT-1 & RT-2

FIELD DATA:

pH= ; Conductivity= umho/cm at °C; Chlorine Residual= mg/l

Dissolved Oxygen= mg/l; Alkalinity= mg/l; Flow Rate /

Depth to water UK ft.; Depth of well UK ft.; Perforation Interval - ft.; Casing: UK

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Ruth Tracy wellhouse tap, CR 6255, #2

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab:

This form accompanies 2 Septum Vials, Glass Jugs, and/or

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from to

at (location) on / / - : and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] Seals Intact: Yes [ ] No [ ]

Signatures

ANALYSES PERFORMED

LAB. No. OR- 627

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ______________________
- [ ] ______________________
- [ ] ______________________
- [ ] ______________________
- [ ] ______________________

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	ND *		
halogenated purgeables	ND +		
* DETECTION LIMIT *	1 ppb	+ DETECTION LIMIT +	0.5 ppb

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT
T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)
[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: Three or four other compounds were detected by the halogenated screen in one of the duplicate samples that were not identified because the sample was improper, i.e. the septum was upside down. One other compound was detected by the halogenated screen that was not identified that appears to be lab contamination, i.e. from the other duplicate sample.

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [x]. Seal(s) broken by: ______________ date: ______________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 21 & 24 Apr. 87 Analyst's signature: M. Tuiney

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block

Reviewers signature: K Meyerhein

RECEIVED MAY 14 1987

87-0632-C

NEW MEXICO HEALTH ENVIRONMENT department

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

REPORT TO: David Tomko
Environmental Improvement Div.
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 632 A+B
DATE REC. 4-16-87
PRIORITY 2

PHONE(S): 327-9851 USER CODE: |5|9|3|0|0|

SUBMITTER: Len Murray CODE: | | | |

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) |8|7|0|4|1|3|0|8|3|0|L|E|M|

SAMPLE TYPE: WATER ☒, SOIL ☐, FOOD ☐, OTHER: ____

COUNTY: San Juan ; CITY: Farmington

LOCATION CODE: (Township-Range-Section-Tracts) |2|9|N+|1|3|W+|1|6+| | | |(10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- ☐ (753) Aliphatic Purgeables (1-3 Carbons)
- ☒ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes

Other Specific Compounds or Classes

- ☒ 1,2-Dichloroethane
- ☐ ____
- ☐ ____
- ☐ ____
- ☐ ____

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (760) Organochlorine Pesticides
- ☐ (755) Base/Neutral Extractables
- ☐ (758) Herbicides, Chlorophenoxy acid
- ☐ (759) Herbicides, Triazines
- ☐ (760) Organochlorine Pesticides
- ☐ (761) Organophosphate Pesticides
- ☐ (767) Polychlorinated Biphenyls (PCB's)
- ☐ (764) Polynuclear Aromatic Hydrocarbons
- ☐ (762) SDWA Pesticides & Herbicides

W 1

Remarks: Vials: Blanks 1 & 2 - Distilled Water
1 Vial broken in Transit

FIELD DATA:

pH= ____; Conductivity= ____ umho/cm at ____ °C; Chlorine Residual= ____ mg/l

Dissolved Oxygen= ____ mg/l; Alkalinity= ____ mg/l; Flow Rate ____ ____/____

Depth to water ____ ft.; Depth of well ____ ft.; Perforation Interval ____-____ ft.; Casing: ____

Sampling Location, Methods and Remarks (i.e. odors, etc.)
Farmington Field Office

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab: ____

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____ ____

Samples were preserved as follows:

- ☐ NP: No Preservation; Sample stored at room temperature.
- ☒ P-Ice Sample stored in an ice bath (Not Frozen).
- ☐ $P\text{-}Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from ____ to ____

at (location) ____ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed: ☐ Seals Intact: Yes ☐ No ☐

Signatures ____ ____

ANALYSES PERFORMED

LAB. No.: OR- 632

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	N.D		
halogenated purgeables	N.D.		
aromatic * DETECTION LIMIT *	1 ppb	halogenated + DETECTION LIMIT +	0.5 ppb

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [X]. Seal(s) broken by: ______ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4-22-87 . Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block

Reviewers signature: [signature] MAY 8 1987

87-0567-C

RECEIVED

SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

HEALTH ENVIRONMENT STATE OF NEW MEXICO

REPORT TO: David Tomko
Environmental Improvement Div.
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 567 A+B 754

DATE REC. 4-8-87

PRIORITY 2

PHONE(S): 327-9851

USER CODE: 5 9 3 0 0 0

SUBMITTER: Len Murray

CODE:

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 0 4 0 7 1 0 0 5 L E M

SAMPLE TYPE: WATER ☒, SOIL ☐, FOOD ☐, OTHER: ______

COUNTY: San Juan ; CITY: Kirtland

LOCATION CODE: (Township-Range-Section-Tracts) 2 9 N + 1 4 W + 1 7 + (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- ☐ (753) Aliphatic Purgeables (1-3 Carbons)
- ☒ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes

Other Specific Compounds or Classes

- ☒ 1,2-Dichloroethane
- ☐
- ☐
- ☐
- ☐

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (760) Organochlorine Pesticides
- ☐ (755) Base/Neutral Extractables
- ☐ (758) Herbicides, Chlorophenoxy acid
- ☐ (759) Herbicides, Triazines
- ☐ (760) Organochlorine Pesticides
- ☐ (761) Organophosphate Pesticides
- ☐ (767) Polychlorinated Biphenyls (PCB's)
- ☐ (764) Polynuclear Aromatic Hydrocarbons
- ☐ (762) SDWA Pesticides & Herbicides

Remarks: Vials: JD-1 and JD-2

FIELD DATA:

pH=____; Conductivity=____umho/cm at ____°C; Chlorine Residual=____mg/l

Dissolved Oxygen=____mg/l; Alkalinity=____mg/l; Flow Rate____ ____/____

Depth to water 20 ft.; Depth of well 43 ft.; Perforation Interval ____-____ft.; Casing: uk

Sampling Location, Methods and Remarks (i.e. odors, etc.)

John Davis house Tap, CR 6285, #7, no observable odor or color

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab: ______

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____

Samples were preserved as follows:

- ☐ NP: No Preservation; Sample stored at room temperature.
- ☒ P-Ice Sample stored in an ice bath (Not Frozen).
- ☐ P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from ______ to ______

at (location) ______ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐

Signatures ______ ______

ANALYSES PERFORMED

LAB. No. OR- 567

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
Aromatic purgeables	ND		
halogenated purgeables	ND		
1,2 Dichloroethane	ND		
* DETECTION LIMIT *	1 ppb	+ DETECTION LIMIT +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [x] Seal(s) broken by: ______ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4/20/87 Analyst's signature: Jeanne Barrera

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this ...

Reviewers signature: K Meyerhein

mail

87-0566-C

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

ENVIRONMENT — STATE OF NEW MEXICO

REPORT TO: David Tomko
Environmental Improvement Div
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 566 A+B
DATE REC. 4-8-87
PRIORITY 2

754 wpu

PHONE(S): 327-9851 USER CODE: 5 9 3 0 0 0
SUBMITTER: Len Murray CODE:
SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 0 4 0 6 1 6 1 5 L E M
SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER:
COUNTY: San Juan ; CITY: Kirtland
LOCATION CODE: (Township-Range-Section-Tracts) 2 9 N + 1 4 W + 1 7 + (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [X] 1,2 - Dichloroethane
- [ ]
- [ ]
- [ ]
- [ ]

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: Vials: EC-1 and EC-2

FIELD DATA:

pH=____; Conductivity=____umho/cm at ____°C; Chlorine Residual=____mg/l

Dissolved Oxygen=____mg/l; Alkalinity=____mg/l; Flow Rate____ ____/____

Depth to water UK ft.; Depth of well UK ft.; Perforation Interval ____-____ft.; Casing: UK

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Ed Clark well tap, CR 6100, #293. No observable odor or color

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab: ____

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____ ____

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from ____ to ____

at (location) ____ on ___/___/___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] Seals Intact: Yes [ ] No [ ]

Signatures ____ ____

ANALYSES PERFORMED LAB. NO. OR- 566

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ____
- [ ] ____
- [ ] ____
- [ ] ____
- [ ] ____

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
Aromatic purgeables	ND		
Halogenated purgeables	ND		
1,2 Dichloroethane	ND		
* DETECTION LIMIT *	1 ppb	+ DETECTION LIMIT +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ____

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [x]. Seal(s) broken by: ____ date: ____

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4/20/87 . Analyst's signature: Jeanne Barrera

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in ...

Reviewers signature: R. Meyerhein

87-0563-C

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

RECEIVED ... HEALTH ENVIRONMENT STATE OF NEW MEXICO

REPORT TO: David Tomko
Environmental Improvement Div.
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 563 A+B 954
DATE REC. 4-8-87 wpn

PRIORITY 2

PHONE(S): 327-9851 USER CODE: 5 9 3 0 0

SUBMITTER: Len Murray CODE:

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 0 4 0 6 1 6 0 0 L E M

SAMPLE TYPE: WATER ☒, SOIL ☐, FOOD ☐, OTHER:

COUNTY: San Juan ; CITY: Kirtland

LOCATION CODE: (Township-Range-Section-Tracts) 2 9 N+ 1 4 W+ 1 7+ (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- ☐ (753) Aliphatic Purgeables (1-3 Carbons)
- ☒ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes

Other Specific Compounds or Classes

- ☒ 1,2-Dichloroethane
- ☐
- ☐
- ☐
- ☐

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (760) Organochlorine Pesticides
- ☐ (755) Base/Neutral Extractables
- ☐ (758) Herbicides, Chlorophenoxy acid
- ☐ (759) Herbicides, Triazines
- ☐ (760) Organochlorine Pesticides
- ☐ (761) Organophosphate Pesticides
- ☐ (767) Polychlorinated Biphenyls (PCB's)
- ☐ (764) Polynuclear Aromatic Hydrocarbons
- ☐ (762) SDWA Pesticides & Herbicides

Remarks: Vials: CB-1 and CB-2

FIELD DATA:

pH=____; Conductivity=____ umho/cm at ____ °C; Chlorine Residual=____ mg/l

Dissolved Oxygen=____ mg/l; Alkalinity=____ mg/l; Flow Rate ____ ____/____

Depth to water 12 ft.; Depth of well 60 ft.; Perforation Interval ____-____ ft.; Casing: 30 ft.

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Cleo Brimhall house tap, CR 6100, # 336. No observable odor or color

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab:

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or

Samples were preserved as follows:

- ☐ NP: No Preservation; Sample stored at room temperature.
- ☒ P-Ice Sample stored in an ice bath (Not Frozen).
- ☐ P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from ____ to ____

at (location) ____ on __/__/__ - __:__ and that the statements in this block are correct. Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐

Signatures

ANALYSES PERFORMED

LAB. No.: OR- 563

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	ND		
halogenated purgeables	ND		
1,2 Dichloroethane	ND		
* DETECTION LIMIT * *	1 ppb	+ DETECTION LIMIT + +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT
T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)
[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [x] Seal(s) broken by: ______ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4/20/87 Analyst's signature: Jeanne Barrera

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this

Reviewers signature: R Meyerhein

87- 0564 -C

mail ✓

RECEIVED MAY ... 1987

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

HEALTH ENVIRONMENT DEPARTMENT STATE OF NEW MEXICO

REPORT TO: David Tomko
Environmental Improvement Div.
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 564 AYB

754 wpa

DATE REC. 4-8-87

PRIORITY 2

PHONE(S): 327-9851

USER CODE: 5 9 3 0 0 0

SUBMITTER: Len Murray

CODE:

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 0 4 0 6 1 5 4 5 L E M

SAMPLE TYPE: WATER ☒, SOIL ☐, FOOD ☐, OTHER:

COUNTY: San Juan ; CITY: Kirtland

LOCATION CODE: (Township-Range-Section-Tracts) 2 9 N + 1 4 W + 1 7 + (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- ☐ (753) Aliphatic Purgeables (1-3 Carbons)
- ☒ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes

Other Specific Compounds or Classes

- ☒ 1,2-Dichloroethane
- ☐
- ☐
- ☐
- ☐

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (760) Organochlorine Pesticides
- ☐ (755) Base/Neutral Extractables
- ☐ (758) Herbicides, Chlorophenoxy acid
- ☐ (759) Herbicides, Triazines
- ☐ (760) Organochlorine Pesticides
- ☐ (761) Organophosphate Pesticides
- ☐ (767) Polychlorinated Biphenyls (PCB's)
- ☐ (764) Polynuclear Aromatic Hydrocarbons
- ☐ (762) SDWA Pesticides & Herbicides

Remarks: Vials: JB-1 and JB-2

FIELD DATA:

pH=____; Conductivity=____ umho/cm at ____ °C; Chlorine Residual=____ mg/l

Dissolved Oxygen=____ mg/l; Alkalinity=____ mg/l; Flow Rate ____ ____/____

Depth to water 3 ft.; Depth of well 30 ft.; Perforation Interval ____-____ ft.; Casing: uk

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Jay Bloomfield wellhouse tap, CR 6100, #333

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab:

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____

Samples were preserved as follows:

- ☐ NP: No Preservation; Sample stored at room temperature.
- ☒ P-Ice Sample stored in an ice bath (Not Frozen).
- ☐ P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from ____ to ____

at (location) ____ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐

Signatures ____ ____

ANALYSES PERFORMED

LAB. No.: OR- 564

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ____
- [ ] ____
- [ ] ____
- [ ] ____
- [ ] ____

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
Aromatic purgeables	ND		
halogenated purgeables	ND		
1,2 Dichloroethane	T.R.		
* DETECTION LIMIT *	1ppb	+ DETECTION LIMIT +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT
T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)
[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ____

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [x] Seal(s) broken by: ____ date: ____

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4/20/87 . Analyst's signature: Jeanne Barrera

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this [illegible]

Reviewers signature: K Meyerhe[illegible]

87- 0559 -C

RECEIVED MAY - 4 1987

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

HEALTH ENVIRONMENT STATE OF NEW MEXICO

REPORT TO: David Tomko
Environmental Improvement Div.
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 559 A+B
DATE REC. 4-8-87
PRIORITY 2

754 wpn

PHONE(S): 327-9851 USER CODE: 5 9 3 0 0 0

SUBMITTER: Len Murray CODE: ___

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 0 4 0 6 1 5 1 5 L E M

SAMPLE TYPE: WATER [X] SOIL [ ], FOOD [ ], OTHER: ____

COUNTY: San Juan ; CITY: Kirtland

LOCATION CODE: (Township-Range-Section-Tracts) 2 9 N+ 1 4 W+ 1 7 + ___ (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [X] 1,2-Dichloroethane
- [ ] ____
- [ ] ____
- [ ] ____
- [ ] ____

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: Vials: KS-1 and KS-2

FIELD DATA:

pH= ____; Conductivity= ____ umho/cm at ____ °C; Chlorine Residual= ____ mg/l

Dissolved Oxygen= ____ mg/l; Alkalinity= ____ mg/l; Flow Rate ____ ____/____

Depth to water 3 ft.; Depth of well 30 ft.; Perforation Interval ____-____ ft.; Casing: UK

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Ken Sweek well house tap, CR 6281, #7. No observable odor or color.

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab: ____

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____ ____

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from ____ to ____

at (location) ____ on ____/____/____ - ____:____ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] Seals Intact: Yes [ ] No [ ]

Signatures ____ ____

ANALYSES PERFORMED

LAB. No.: OR- 559

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
halogenated purgables	N.D		
aromatic purgables	N.D		
1,2 dichloroethane	N.D		
* DETECTION LIMIT * *	1 ppb	+ DETECTION LIMIT + +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) ~~Intact~~: Yes [ ] No [ ]. Seal(s) broken by: ______ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4/20/87 . Analyst's signature: Jeanne Barrera

I certify that I have reviewed and concur with the analytical results for this sample and with the statements on ...

Reviewers signature: R Meyerhein

87-0565-C

RECEIVED ... 1987 ... 12

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

HEALTH ENVIRONMENT — STATE OF NEW MEXICO

REPORT TO: David Tomko
Environmental Improvement Div.
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 565 A+B 754
DATE REC. 4-8-87 wpu
PRIORITY 2

PHONE(S): 327-9851 USER CODE: |5|9|3|0|0|

SUBMITTER: Len Murray CODE: | | | |

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) |8|7|0|4|0|6|1|4|4|0|L|E|M|

SAMPLE TYPE: WATER ☒, SOIL ☐, FOOD ☐, OTHER:

COUNTY: San Juan; CITY: Kirtland

LOCATION CODE: (Township-Range-Section-Tracts) |2|9|N+ |1|4|W+ |1|7+ | | | |(10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- ☐ (753) Aliphatic Purgeables (1-3 Carbons)
- ☒ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes

Other Specific Compounds or Classes

- ☒ 1,2-Dichloroethane
- ☐
- ☐
- ☐
- ☐

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (760) Organochlorine Pesticides
- ☐ (755) Base/Neutral Extractables
- ☐ (758) Herbicides, Chlorophenoxy acid
- ☐ (759) Herbicides, Triazines
- ☐ (760) Organochlorine Pesticides
- ☐ (761) Organophosphate Pesticides
- ☐ (767) Polychlorinated Biphenyls (PCB's)
- ☐ (764) Polynuclear Aromatic Hydrocarbons
- ☐ (762) SDWA Pesticides & Herbicides

Remarks: Vials: CG-1 and CG-2

FIELD DATA:

pH=____; Conductivity=____umho/cm at ____°C; Chlorine Residual=____mg/l

Dissolved Oxygen=____mg/l; Alkalinity=____mg/l; Flow Rate____ ____/____

Depth to water uk ft.; Depth of well uk ft.; Perforation Interval ____-____ft.; Casing: uk

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Charles Grubbs wellhouse tap, CR 6271. No observable odor or color

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab:____

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____

Samples were preserved as follows:

- ☐ NP: No Preservation; Sample stored at room temperature.
- ☒ P-Ice Sample stored in an ice bath (Not Frozen).
- ☐ P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from ____ to ____

at (location) ____ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐

Signatures ____ ____

ANALYSES PERFORMED

LAB. No. OR- 565

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
Aromatic purgeables	ND		
halogenated purgeables	ND		
1,2 Dichloroethane	ND		
* DETECTION LIMIT * *	1 ppb	+ DETECTION LIMIT + +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [✓]. Seal(s) broken by: ______ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4/30/87. Analyst's signature: Jeanne Barrera

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this

Reviewers signature: K Mayerhöfer

87- 0562 -C

✓

RECEIVED ... 1987

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

HEALTH ENVIRONMENT DEPARTMENT — STATE OF NEW MEXICO

REPORT TO: David Tomko
Environmental Improvement Div.
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 562 A+B 754
DATE REC. 4-8-87
PRIORITY 2

PHONE(S): 327-9851 USER CODE: 5 9 3 0 0
SUBMITTER: John Nelson CODE: ___
SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 0 4 0 6 1 4 3 0 J S N
SAMPLE TYPE: WATER ☒, SOIL ☐, FOOD ☐, OTHER: ______
COUNTY: San Juan ; CITY: Kirtland
LOCATION CODE: (Township-Range-Section-Tracts) 2 9 N+ 1 4 W+ 1 7+ | | | (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS	EXTRACTABLE SCREENS
☐ (753) Aliphatic Purgeables (1-3 Carbons)	☐ (751) Aliphatic Hydrocarbons
☒ (754) Aromatic & Halogenated Purgeables	☐ (760) Organochlorine Pesticides
☐ (765) Mass Spectrometer Purgeables	☐ (755) Base/Neutral Extractables
☐ (766) Trihalomethanes	☐ (758) Herbicides, Chlorophenoxy acid
Other Specific Compounds or Classes	☐ (759) Herbicides, Triazines
☒ 1,2-Dichloroethane	☐ (760) Organochlorine Pesticides
☐ ______	☐ (761) Organophosphate Pesticides
☐ ______	☐ (767) Polychlorinated Biphenyls (PCB's)
☐ ______	☐ (764) Polynuclear Aromatic Hydrocarbons
☐ ______	☐ (762) SDWA Pesticides & Herbicides

Remarks: Vials: N-1 and N-2. Bubbles in vials.

FIELD DATA:

pH= ____; Conductivity= ____ umho/cm at ____ °C; Chlorine Residual= ____ mg/l

Dissolved Oxygen= ____ mg/l; Alkalinity= ____ mg/l; Flow Rate ____ ____/____

Depth to water uk ft.; Depth of well uk ft.; Perforation Interval ____-____ ft.; Casing: uk

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Nelson wellhouse Tap, CR 6263. No observable odor or color

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): John E. Nelson Method of Shipment to the Lab: ______
This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____ ______

Samples were preserved as follows:
☐ NP: No Preservation; Sample stored at room temperature.
☒ P-Ice Sample stored in an ice bath (Not Frozen).
☐ $P-Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from ______ to ______
at (location) ______ on ___/___/___ - ___:___ and that the statements in this block are correct. Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐

Signatures ______ ______

ANALYSES PERFORMED

LAB. No.: OR- 562

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______
- [ ] ______

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgables	ND		
halogenated purgables	ND		
1,2 Dichloroethane	N.D		
* DETECTION LIMIT * *	1 ppb	+ DETECTION LIMIT + +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: ______

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [x] Seal(s) broken by: ______ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4/20/87. Analyst's signature: Jeanne Barrera

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: K Meyerhein

87-0560-C

RECEIVED MAY - 1987

STATE OF NEW MEXICO
ENVIRONMENT

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

REPORT TO: David Tomko
Environmental Improvement Div.
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 560 A+B

DATE REC. 4-8-87

PRIORITY 2

754 wpa

PHONE(S): 327-9851

USER CODE: 5 9 3 0 0

SUBMITTER: Len Murray

CODE:

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 0 4 0 6 1 4 2 5 L E M

SAMPLE TYPE: WATER ☒, SOIL ☐, FOOD ☐, OTHER:

COUNTY: San Juan; CITY: Kirtland

LOCATION CODE: (Township-Range-Section-Tracts) 2 9 N+ 1 4 W+ 1 7+ (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- ☐ (753) Aliphatic Purgeables (1-3 Carbons)
- ☒ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes

Other Specific Compounds or Classes

- ☒ 1,2-Dichloroethane
- ☐
- ☐
- ☐
- ☐

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (760) Organochlorine Pesticides
- ☐ (755) Base/Neutral Extractables
- ☐ (758) Herbicides, Chlorophenoxy acid
- ☐ (759) Herbicides, Triazines
- ☐ (760) Organochlorine Pesticides
- ☐ (761) Organophosphate Pesticides
- ☐ (767) Polychlorinated Biphenyls (PCB's)
- ☐ (764) Polynuclear Aromatic Hydrocarbons
- ☐ (762) SDWA Pesticides & Herbicides

Remarks: vials: CH-1 and CH-2

FIELD DATA:

pH=___; Conductivity=___umho/cm at ___°C; Chlorine Residual=___mg/l

Dissolved Oxygen=___mg/l; Alkalinity=___mg/l; Flow Rate___ ___/___

Depth to water 4 ft.; Depth of well 32 ft.; Perforation Interval ___-___ft.; Casing: 20 ft.

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Charles Hill wellhouse Tap, CR 6251, #17. No observable odor or color

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab:

This form accompanies 2 Septum Vials, ___ Glass Jugs, and/or

Samples were preserved as follows:

- ☐ NP: No Preservation; Sample stored at room temperature.
- ☒ P-Ice Sample stored in an ice bath (Not Frozen).
- ☐ P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

CHAIN OF CUSTODY

I certify that this sample was transferred from ___ to ___

at (location) ___ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐

Signatures ___

ANALYSES PERFORMED

LAB. No. OR- 560

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [x] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ]
- [ ]
- [ ]
- [ ]
- [ ]

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
halogenated purgables	ND		
aromatic purgables	N.D		
1,2 Dichloroethane	ND		
* DETECTION LIMIT *	1 ppb	+ DETECTION LIMIT +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT
T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)
[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [x] Seal(s) broken by: ______ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4/20/87 . Analyst's signature: Jeanne Barrera

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewer's signature: K Meyerhen

87-0561-C

mail ✓

SCIE●TIFIC LABORATORY DIV●ON

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

RECEIVED ... -4 1987

HEALTH ENVIRONMENT STATE OF NEW MEXICO

REPORT TO: Dave Tomko
Environmental Improvement Div.
724 W. Animas
Farmington, NM 87401

S.L.D. No. OR- 561 A+B 754
DATE REC. 4-8-87
PRIORITY 2

PHONE(S): 327-9851
USER CODE: 5 9 3 0 0 0

SUBMITTER: Len Murray
CODE:

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 0 4 0 6 1 0 5 3 L E M

SAMPLE TYPE: WATER ☒, SOIL ☐, FOOD ☐, OTHER:

COUNTY: San Juan ; CITY: Kirtland

LOCATION CODE: (Township-Range-Section-Tracts) 29N + 14W + 17 + (10N06E24342)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- ☐ (753) Aliphatic Purgeables (1-3 Carbons)
- ☒ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes

Other Specific Compounds or Classes

- ☒ 1,2-Dichloroethane
- ☐
- ☐
- ☐
- ☐

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (760) Organochlorine Pesticides
- ☐ (755) Base/Neutral Extractables
- ☐ (758) Herbicides, Chlorophenoxy acid
- ☐ (759) Herbicides, Triazines
- ☐ (760) Organochlorine Pesticides
- ☐ (761) Organophosphate Pesticides
- ☐ (767) Polychlorinated Biphenyls (PCB's)
- ☐ (764) Polynuclear Aromatic Hydrocarbons
- ☐ (762) SDWA Pesticides & Herbicides

Remarks: Vials: M-J-1 and M-J-2

FIELD DATA:

pH=___; Conductivity=___umho/cm at ___°C; Chlorine Residual=___mg/l

Dissolved Oxygen=___mg/l; Alkalinity=___mg/l; Flow Rate ___ ___/___

Depth to water 6 ft.; Depth of well 45 ft.; Perforation Interval ___-___ft.; Casing: UK

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Miller-Jackson well #1, wellhouse Tap, no observable odor or color
CR 6271

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Len Murray Method of Shipment to the Lab:

This form accompanies 2 Septum Vials, ___ Glass Jugs, and/or

Samples were preserved as follows:

- ☐ NP: No Preservation; Sample stored at room temperature.
- ☒ P-Ice Sample stored in an ice bath (Not Frozen).
- ☐ P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

RECEIVED
MAY 27 1987
LIQUID WASTE/GROUND WATER SURVEILLANCE

CHAIN OF CUSTODY

I certify that this sample was transferred from ___ to ___

at (location) ___ on ___/___/___ - ___:___ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐

Signatures

ANALYSES PERFORMED   LAB. No. OR- 561

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- [ ] (753) Aliphatic Purgeables (1-3 Carbons)
- [ ] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes

Other Specific Compounds or Classes

- [ ]
- [ ]
- [ ]
- [ ]
- [ ]

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (760) Organochlorine Pesticides
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
halogenated purgeables	N.D		
aromatic purgeables	N.D		
1,2 dichloroethane	8		
* DETECTION LIMIT * *	1ppb	+ DETECTION LIMIT + +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes [ ] No [✓]. Seal(s) broken by: ____________ date: ________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4/20/87 . Analyst's signature: Jeanne Barrera

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this

Reviewers signature: K Meyer Lee

RECEIVED
APR 13 1987
LEGAL

Caribou Four Corners, Inc. Phone (307) 886-3861 - P. O. Box 457 - Afton, Wyoming 83110

April 7, 1987

Richard L. Young
Assistant General Counsel
Post Office Box 968
Santa Fe, NM 87504-0968

Dear Mr. Young:

In my letter of February 2, 1987, Caribou agreed to perform a site investigation of the Kirtland refinery. We have received proposals from outside contractors and are enclosing a copy of the proposal that we have selected for your review. Once Caribou and EID have resolved any differences of opinion concerning the proposal, a contract will be awarded to perform the investigation.

I have reviewed your response to my letter including Mr. McQuillan's memo. I agree that essentially all of the technical questions addressed in my letter will be resolved by the site investigation. I propose that any further discussion of these items be deferred until the site investigation is complete.

Caribou is considering contributing toward the reimbursement of home owner's costs who wish to hook on to the city water system as a source of cullinery water. Any such contribution would, of course, be contingent on the prior agreement of the specific number of home owners involved and the specific time that the contribution would be made. However, because Caribou has no refinery representative in the area, acquiring the technical data needed to determine the amount of the costs, the legal work that would be needed, etc. is a difficulty that would have to be worked out. We would be pleased to know what assistance EID can offer in this regard.

Please let me know if you have any further questions.

Very truly yours,

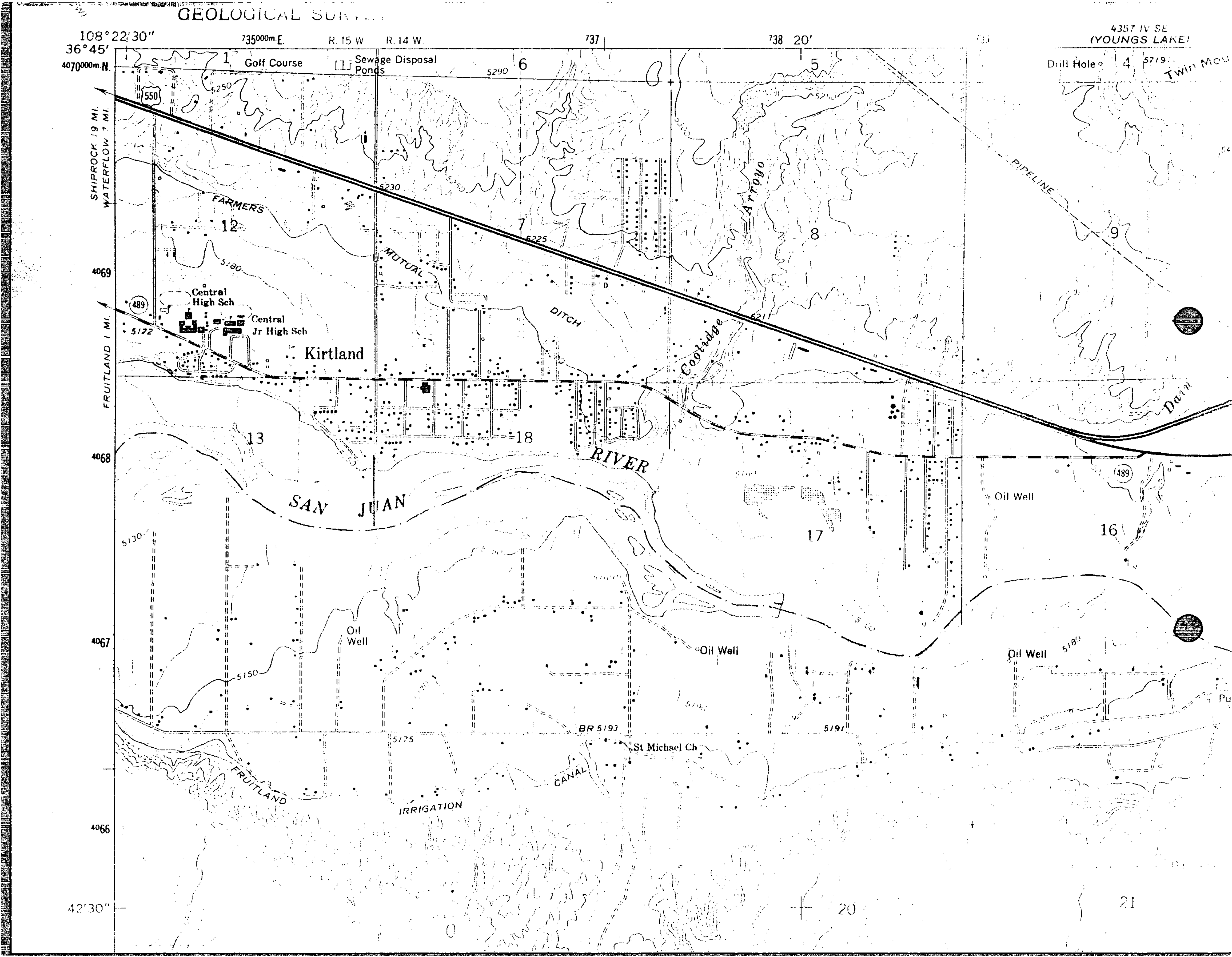
CARIBOU FOUR CORNERS, INC.

William Call
President

WC/knh

Enclosure

xc: Vince Memmott
335 W. Willow Wood Circle
Centerville, UT 84014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(YOUNGS LAKE)
4070000m.N.
Golf Course
Sewage Disposal Ponds
Drill Hole
Twin Mou
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SHIPROCK 19 MI.
WATERFLOW 7 MI.
FRUITLAND 1 MI.
FARMERS
MUTUAL
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Coolidge
Arroyo
PIPELINE
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Central High Sch
Central Jr High Sch
Kirtland
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42'30"
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Farmington
DAILY TIMES
E APR 7 1987
New Mexico Press Clipping Bureau
Albuquerque N M

Well Trouble May Be 8 Years Old

By Tori Adams
Daily Times Staff

A man who hauled replacement gasoline said water contamination in a small area of Kirtland may have been caused in 1979 when a valve on a tank of gasoline was left open overnight at the Caribou Refinery. 343

The man, who asked not to be identified, said he was driving a truck for Chief Transport on Feb. 7, 1979 when he was sent to the refinery in southeast Kirtland to haul gasoline to make up what had spilled out of Caribou's tank when a 2-inch valve was left open overnight.

A Caribou employee told the truckdriver that the valve had been left open during the previous night and the lost gasoline would have to be replaced, then showed him the area where the gas had run into the ground.

In the snow, he said he could see that a large quantity of gasoline had drained out of the tank. "That stuff was very high-grade. It was so pure that, at first, I thought it was water because I couldn't taste it or smell it," he said. But the Caribou employee assured him that it was very high-grade gasoline.

The state Environmental Improvement Division discovered about a year ago that some water wells within about one-quarter mile of the Caribou Refinery, located near the Old Kirtland Highway and Lions Park, show contamination by low levels of an additive to leaded gasoline called 1,2-dichloroethane, or EDC, said local environmental office representative David Tomko.

The Environmental Division is currently offering free well water testing in the area around the refinery to determine the extent and level of contamination, he said.

Tests have shown that the wells are contaminated with eight to nine parts per billion of the EDC, which has been proven to cause cancer in laboratory animals and is suspected of causing cancer in humans as well, he said.

"Everything we've seen so far indicates a minor problem at this time" because most people in that area rely on piped public water supplies, which are not contaminated, he added.

State standards for EDC levels in drinking water are 10 parts per billion, but the U.S. Environmental Protection standard is zero parts per billion, Tomko said.

During the day of the spill the Chief truckdriver said he hauled three 1,000-gallon loads of gasoline to replace the gas that had drained into the ground during the night.

He said he remembers the date and circumstances of the spill so well because the high-grade replacement gasoline he hauled in later caused his truck to explode in a wash bay. He received injuries in the explosion that he said he is still receiving medical treatment for.

Tomko said the EID has no record of this spill, but does have records of several others. The Oil Conservation Division also does not have records of it and, in 1979, Caribou was not required to turn in records of spills of refined products, said local Oil Conservation representative Frank Chavez.

As of late this morning, the Chief truckdriver had not reported this spill to the envoronmental office, Tomko said.

For free well water testing call the EID at 327-9851.

15

Chief Transport Owner: Firm Doesn't Haul Gasoline

By Tori Adams
Daily Times Staff

Chief Transport owner B.C. Turner said Tuesday if a Chief truck was used to haul replacement gasoline to the Caribou Refinery in Kirtland, it was without his permission. 343

His company does not haul gasoline, he said.

Steve George, Bloomfield, said in a story Tuesday that, in early 1979 while he was working for Chief, he was called to the refinery to haul 3,000 gallons of high-grade gasoline to the refinery to replace what had spilled when a valve was left open overnight.

The spill could have been that source of contamination from 1,2-dichloroethane, a cancer-causing gasoline additive, the state Environmental Improvement Division recently found in some water wells close to the refinery in Kirtland.

Chief hauls water and does some transportation of oil in the oilfield, but is not licensed for hauling gasoline to a refinery, Turner said.

If George hauled gasoline the day of the spill, Feb. 7, 1979, he must have used the Chief truck without permission to do it, Turner added.

George was working for Chief at the time of the incident, but no records are available to show what his job was that day because the trucking company keeps records for only seven years, and the incident happened eight years ago, Turner said.

George reported the gasoline spill to the Farmington office of the Environmental Improvement Division Tuesday afternoon.

George said a Caribou employee told him that a 2-inch valve on the tank containing the gasoline was left open overnight.

Environmental office spokesman David Tomko said free water well tests are available.

New Mexico Press Clipping Bureau
Albuquerque, N. M.
APR 08 1987
DAILY TIMES
FARMINGTON

21

FARMINGTON
DAILY TIMES
APR 3 1987
New Mexico Press Clipping Bureau

Some Kirtland Area Wells Show Contamination

By Tori Adams
Daily Times Staff 343

Some water wells in the southeast Kirtland area have shown low levels of contamination with a gasoline additive, and the state Environmental Improvement Division wants to test other wells to determine if a health risk exists.

Limited sampling of five wells in the Kirtland area over about the last year has turned up 1,2-dichloroethane, commonly known as EDC, a gasoline additive that causes cancer in laborotory animals and is suspected of causing cancer in humans as well, said David Tomko, a scientist with the Environmental Improvement Division's Farmington office.

Tests of the wells, which are within about one-quarter mile of the old Caribou refinery near Lions Park, have shown EDC at levels of about eight to nine parts per billion. The state standard for EDC in drinking water is 10 parts per billion, and the U.S. Environmental Protection standard is zero parts per billion, Tomko said.

"Everything we've seen so far indicates a minor problems at this point" because most people in that area rely on public water supplies, which are piped in from elsewhere and are not contaminated.

The area contaminated or suspected of being contaminated with EDC is within about one-quarter mile east and west of the Caribou refinery and south to the San Juan River. No contamination of the river has been found, he said.

The refinery, between U.S. 550 and the Old Kirtland Highway, has been closed for several years and has not been identified as the source of the EDC, he said.

Environmental officials are negotiating with Caribou officials at the company's headquarters in Wyoming about investigating the problem and doing groundwater surveillance to find the source of the contamination.

To find out how far the contamination has spread, where it is coming from and what levels of EDC are involved, Tomko and other scientists from the Farmington enviromental office want to test private wells south of County Road 6100 and west from County Road 6255 to County Road 6281.

The tests of well water will be free. Each takes three to four weeks to complete.

To arrange for well-water testing or for more information call the Farmington environmental office at 327-9851, Tomko said.

14

EID NEWS

NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT • Larry Gordon, Secretary • Carla L. Muth, Deputy Secretary

ENVIRONMENTAL IMPROVEMENT DIVISION, Michael J. Burkhart, Director

PUBLIC INFORMATION OFFICE
Post Office Box 968
Santa Fe, New Mexico 87504-0968
Phone (505) 827-2841

FOR IMMEDIATE RELEASE: CONTACT:

April 2, 1987

Dennis McQuillan 827-2912
David Tomko 327-9851

SANTA FE, NEW MEXICO -- The State Environmental Improvement Division wants to identify all residences in the Kirtland Valley area, near Farmington, that rely on private wells for drinking, cooking and bathing to determine if a health risk is related to use of water supplies.

Environmental Scientist David Tomko said limited sampling of wells in the area has turned up low levels of 1, 2 - dichloroethane (EDC), a gasoline additive which is suspected of causing cancer. Residents who consume or use water from private wells should contact the EID Farmington office to arrange for sampling of their wells, Tomko said. EID will test water for EDC and other gasoline constituents that may contribute to ground water contamination. Tomko noted EID is investigating all possible causes of the ground water contamination.

Notices will be distributed to residences south of county road 6100, including county roads 6255 through 6281, advising well water consumers to contact the EID Farmington office at 327-9851 to request sampling of their wells, Tomko said. "There will be no charge to residents for analysis of the samples. Participants will be notified of the results and advised if measures are needed to prevent undue health risks," he stated.

-30-

STATE OF NEW MEXICO
ENVIRONMENT department

MEMORANDUM

DATE: March 24, 1987

TO: Steven Cary, Program Manager, Superfund Section, GW/HWB
Stuart Castle, Program Manager, Water Supply Section
Dev Lynn, Public Information Officer, Director's Office
Dennis McQuillan, Water Resource Specialist, Ground Water Surveillance

FROM: David Tomko, Program Manager, Farmington Field Office

SUBJECT: DRAFT NEWS RELEASE & HANDOUT FOR CARIBOU REFINERY AREA WELL SAMPLING

As requested, the attached news release and handout are submitted for review and refinement. These are my best efforts at drafting the releases without mentioning Caribou Refinery by name. I'm sure they can be improved by your collective review and coordination. Dev Lynn has offered to assist with the final draft and to coordinate the release to the media.

I would like to deal with the local media if at all possible. However, I'm sure the media will be asking what the Division's course of action will be regarding the contamination, clean-up and responsible party. An official position should be established and communicated to involved individuals prior to release. Please contact me for final coordination of the news release.

RECEIVED

MAR 27 1987

LIQUID WASTE/GROUND WATER SURVEILLANCE

lm

cc: Tito O. Madrid, District I Environmental Manager
Len Pardee, EPA, Public Water Supplies
File

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

ENVIRONMENTAL IMPROVEMENT DIVISION
DISTRICT I FIELD OFFICE/724 WEST ANIMAS
FARMINGTON, NEW MEXICO 87401
(505)327-9851

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

(News Release)

Residents of Kirtland's Valley Acres area that consume or use water from private wells are requested to contact the Farmington Office of the New Mexico Health & Environment Department's Environmental Improvement Division to arrange for sampling of their well. Previous analysis of several area wells indicated low levels of 1,2 - dichloroethane (EDC), which were below the state ground water standard of 10 parts per billion. EDC is an additive to gasoline and is suspected to cause cancer.

The EID will distribute notices to residences south of County Road 6100 to include County Roads 6255 through 6281. The notices will advise well water consumers to contact EID's Farmington Office at 327-9851 to request sampling of their wells. This area is near a refinery that has been closed for several years. Other residents in the area using wells are encouraged to call EID for sampling.

The EID wants to identify all residences in the area relying on private wells for drinking, cooking and bathing uses and to determine if a health risk exists, and if so, to what extent. Participants will be notified of the sample results and be advised if measures are needed to prevent undue health risk.

EQUAL OPPORTUNITY EMPLOYER

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

ENVIRONMENTAL IMPROVEMENT DIVISION
DISTRICT I FIELD OFFICE/724 WEST ANIMAS
FARMINGTON, NEW MEXICO 87401
(505)327-9851

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

(Handout Notice)

Dear Resident:

Recent investigation by the Environmental Improvement Division indicates the presence of organic contamination of the ground water in the area. Low levels of 1,2 - dichloroethane (EDC), a gasoline additive suspected to cause cancer, was present in several local wells. The concentrations were below the state ground water standards of 10 parts per billion.

The EID wants to identify all residences relying on private well water for drinking, cooking or bathing uses and to determine if the contamination poses any risk to the health of local residents. If you are currently using water from a well, please call the EID's Farmington Field Office to arrange for sampling of your well. The phone number is 327-9851. The office hours are 8:00 a.m. - 5:00 p.m. Monday through Friday, and an answering machine will take calls after hours.

EID staff will collect the samples and there will be no charge to you for analysis. Participants will be notified of the sample results and be advised if measures are needed to prevent any undue health risk.

Thank you for your cooperation.

EQUAL OPPORTUNITY EMPLOYER

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

OFFICE OF GENERAL COUNSEL

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

RECEIVED
MAR 9 1987
LIQUID WASTE/GROUND WATER
SURVEILLANCE

CERTIFIED MAIL
RETURN RECEIPT REQUESTED
No. P 331 627 133

March 6, 1987

Mr. Bill Call
Caribou - Four Corners, Inc.
Highway 89, Route 1
Afton, Wyoming 83110

Dear Mr. Call:

Thanks for your letter of February 2, 1987, regarding the ground water problem at your refinery site. It seems to me that we are making good progress toward reaching a mutually acceptable solution to the problem. In that spirit, I offer the following comments on your February 2 letter:

A. We are in agreement.

B. I have referred your comments to Dennis McQuillan, who is our most experienced expert on petroleum-related groundwater contamination. Mr. McQuillan's enclosed memorandum should, I believe, answer the questions you raised as to the bases for our conclusion that the Caribou refinery is indeed the cause of EDC contamination in the ground water immediately down-gradient from the refinery. In the event that you should wish to have an expert of your own choosing meet with Mr. McQuillan and/or independently review and verify the data in question, we would be happy to cooperate with you in this regard.

C. After examining Mr. McQuillan's memorandum, we hope that you will reconsider your position that, "based on the previous discussion," Caribou is not the source of the EDC contamination which we have found in the groundwater downgradient (but not upgradient) from your facility. As for your disclaimer that the concentration of EDC in the downgradient wells is high enough to threaten the health of persons or livestock or otherwise to constitute a public nuisance, the present level of EDC in those wells is below the applicable New Mexico water quality standard but above the currently proposed federal drinking water standard, which we expect will become binding upon the states in the near future. Further, EDC levels upgradient of the private domestic wells with which we are concerned are substantially above New Mexico's current standard, and it appears likely that the more heavily contaminated water which we have detected at the boundary of your refinery will move downgradient and cause the levels at the private wells to increase above the state standard in the reasonably foreseeable future. At the same time, we recognize the possibility that dispersion could produce the opposite effect, decreasing rather than increasing the EDC levels at the downgradient wells.

At this juncture, I am not really concerned that you admit to the particular levels of EDC or the legal conclusions to be drawn from such facts. Rather, my concern is that Caribou take prompt action to hook up the downgradient property owners to an alternative, non-contaminated drinking water supply, and that Caribou proceed to investigate the nature and extent of ground water contamination at the site. Apparently, Caribou is willing to do the latter task without further delay. We hope that after reviewing this letter and the enclosed technical memorandum from Mr. McQuillan, you will reconsider your position and decide voluntarily to take action with regard to the alternate water supply provision, as well.

D.1 You state that Caribou "will agree to implement item D.1" [the provision of an alternate supply of drinking water], "should it be determined that 1, 2-dichloroethane contamination is in fact a threat to the health of persons or livestock in the vicinity and that the refinery was the source of the contamination . . . ." [Emphasis added.] The site investigation you propose to do will presumably determine whether (as our data already have determined, to our satisfaction) your refinery is the source of the contamination. However, I do not understand by what process you would determine whether the EDC contamination "is in fact a threat to the health of persons or livestock . . . ." Assuming your investigation affirms our data that current or reasonably projected contamination levels exceed state and/or federal drinking water standards, are you prepared to accept such standards as conclusive of the question whether the levels you have detected and measured are sufficient to be "in fact a threat to . . . health"? Unless we can arrive at a mutual understanding of how the "threat to health" question is to be resolved, it may well be that your conditional willingness to provide an alternate drinking water supply will still be subject to debate, even after your own site study has independently established the causation by Caribou of EDC contamination in downgradient drinking water at concentrations in excess of standards. I am not inclined to continue to pursue negotiations for voluntary compliance by Caribou, unless Caribou is willing to be more specific as to precisely what proof of "threat to health" will be needed, before Caribou will "agree to implement item D.1." And with respect to the public health threat to the downgradient private well owners, I am reluctant to delay the decision as to providing them with an alternate drinking water supply until your proposed site investigation has been completed.

Consequently, I hereby offer the following proposals with respect to item D.1:

a. That Caribou not wait for the full site study to be completed, in order to verify EID's conclusions as to downgradient EDC contamination from the refinery, but rather proceed immediately to perform independent sampling and laboratory analysis for the limited purpose of verifying EID's conclusions as to upgradient and downgradient conditions with respect to EDC contamination of the aquifer supplying the wells in question. [Technical staff have advised me that Caribou could easily do this limited study within two months.]

b. Either after such a limited study or without waiting for or doing such a limited study, that Caribou reconsider its position and simply proceed without further delay to provide the necessary hook-ups for the few property owners in the affected down-gradient area. [Our information is that the cost of this action would be considerably less than the site investigation which Caribou is already willing to do.]

D.2. We are in agreement, and we assume that Caribou is proceeding on this item without further input from EID.

D.3. We are in agreement.

D.4. We recognize that there is not yet a firm agreement on this item. Although we do have an interest in recovering response costs, frankly this item is of less importance to us than item D.1, which deals with our primary obligation to protect the health and safety of the citizens of New Mexico. Consequently, I suggest that we defer further consideration of this item until we get item D.1 resolved to our mutual satisfaction.

In conclusion, I again ask that you consider proceeding immediately with the alternate water supply provision of item D.1, simultaneously with preparing and submitting your site investigation under item D.2. In the event that you still feel that you cannot justify implementing item D.1 until you have better proof of EDC contamination by the refinery operation, then I suggest that Caribou immediately perform its own sampling and analysis of the upgradient and downgradient wells sampled and analyzed by EID, to obtain a quick verification of EID's data and conclusions as to the causation and concentrations of EDC contamination in the downgradient area. Finally, I ask that you consider what I have said as to the "public health" question left open in your February 2 letter, and that as soon as reasonably possible you inform me as to how you would propose to resolve the issue of what level of EDC contamination Caribou would accept as sufficient to constitute a "threat to health." Of course the latter question need not be answered at this juncture, if Caribou should decide voluntarily to provide the drinking water hook-ups to the downgradient property owners.

Thanks for your continued cooperation. I look forward to your prompt reply.

Sincerely,

Richard Young

RICHARD L. YOUNG
Assistant General Counsel

RLY/lr

Enclosure

cc: Dennis McQuillan
Richard Perkins

MEMORANDUM

TO: Richard Young
FROM: Dennis McQuillen D. McQ.
DATE: March 2, 1987
SUBJECT: Technical Response to Caribou's 2/2/87 Letter.

You have asked me for a technical evaluation of paragraphs B and C of Mr. Call's letter dated February 2, 1987, giving our reasons for concluding that Caribou is responsible for EDC contamination found in the ground water down-gradient from Caribou's refinery site. After careful consideration of Mr. Call's letter and after again reviewing the data we have obtained and analyzed, here is my response to the technical matters referred to by Mr. Call:

PARAGRAPH B.

There simply is no question but that 1,2-Dichloroethane (EDC) is a common constituent of leaded gasoline, which Mr. Call admits was produced by the Caribou refinery.

Contrary to Mr. Call's assertion as to the difficulties of accurately measuring small quantities of EDC, the quantification of EDC in water at levels less than 100 ppb is a common procedure for qualified professional laboratories. In fact, the minimum quantification limits reported by some such laboratories can be as low as 0.1 ppb for EDC.

Mr. Call's suggestion that the positive analyses could easily be the result of EDC vapors permeating the laboratory is refuted by the laboratory data in this particular instance, as well as by my personal knowledge of the laboratory procedures employed by the New Mexico State Laboratory to prevent the kind of false readings that Mr. Call suggests. The particular group of specimens in question were analyzed along with numerous blanks, all of which were negative for EDC. The State laboratory is well qualified to perform such analyses and in my personal experience has long conducted such analyses in a highly reliable manner. I can see no reasonable basis for doubting that the results we obtained from the State laboratory in this case are correct. In any event, the hydrogeologic investigation which Caribou has agreed to do will presumably resolve the question which Mr. Call has raised as to the validity of the sampling and analysis for EDC at the site.

With respect to background conditions, I can assure Mr. Call that EDC was among a number of particular volatile hydrocarbons that were tested for and not detected in the upgradient wells.

PARAGRAPH C.

A review of all available data clearly indicates that the Caribou refinery is the source of EDC contamination of ground water.

I trust that this will answer the technical questions raised in Mr. Call's letter, but please let me know if anything further is needed.

PROPOSED WORK PLAN
EVALUATE GROUND WATER CONTAMINATION
CARIBOU FOUR CORNERS INC. REFINERY
KIRTLAND, NEW MEXICO

DAMES & MOORE
SALT LAKE CITY, UTAH

February 16, 1987

TABLE OF CONTENTS

PROPOSED WORK PLAN
EVALUATE GROUND WATER CONTAMINATION
CARIBOU FOUR CORNERS INC. REFINERY
KIRTLAND, NEW MEXICO

INTRODUCTION

Dames & Moore is pleased to submit for your consideration this proposal to conduct investigations evaluating ground water contamination which may result from the Caribou Four Corners Inc. Refinery near Kirtland, New Mexico. Our understanding of the site and requirements is based upon information included in the request for proposal (including the site inspection report, analytical results, and correspondence from and to the New Mexico Environmental Improvement Division and Region VI EPA) as well a a one-day site inspection conducted by Dames & Moore personnel.

BACKGROUND AND OBJECTIVES

Caribou operated a small crude topping refinery near Kirtland, New Mexico from 1963 until April 1982 at which time it was shut down. During operation crude oil was refined into regular and leaded gasoline, diesel fuel and No. 5 fuel oil. Within a few months of shutdown, all remaining product, feedstocks and intermediate products were removed from storage tanks and sold.

New Mexico EID personnel made a site inspection following standard EPA procedures in December 1985. As part of this inspection, samples for chemical analysis were taken of soil, waste, surface water and ground water at and near the refinery. One of the samples, an oily water sample from a drainage ditch along the west boundary of the site, contained significant concentrations (280-1850 ppb) of the typical refinery-related volatile organics benzene, toluene, ethylbenzene and xylenes; in addition this sample contained 15 ppb of 1,2-dichloroethane (ethylene dichloride or EDC). EDC was also detected in a water sample about one mile further down this ditch at the detection limit of 1 ppb. This same compound was also detected at 9 ppb in a sample from a 40-foot deep private well ("Walker well") approximately one-quarter mile down-gradient of the refinery site; EDC was the only organic detected in the aromatic and halogenated hydrocarbon volatile screen analysis performed (detection limits 1-2 ppb).

EID concluded in a letter dated December 31, 1986 to Caribou, that the refinery was the source of ground water contamination on the refinery and extending beyond refinery boundaries. EID also stated that this contamination constituted a threat to human health and to livestock, was a violation of state ground water regulations, was a public nuisance under New Mexico law, may be an unlawful release under CERCLA which could make the facility a potential Superfund site, and may make the company liable to the State in federal court for recovery of response costs and damages to natural resources.

In the same letter, EID requested that Caribou submit a proposal describing how it intends to investigate the nature and extent of ground water contamination emanating from the refinery. Specifically, EID stated that:

> "The final, acceptable proposal by Caribou will describe in sufficient detail an investigation which outlines the vertical depth and lateral extent of contaminated ground water, identify and quantify all contaminants present; identify all contaminant sources known or suspected, and determine ground water flow direction(s), velocities etc. Caribou will include in its proposal a schedule of activities and periodic progress reports."

It is our understanding that EID will review Caribou's proposal and within 20 days after receipt transmit its comments to the company. Caribou will then, within 30 days of receipt of EID's comments, develop a final proposal addressing these comments.

Following completion of the site investigation, it is our understanding that Caribou is to design and submit to EID for approval, a proposed remedial action plan which will achieve adequate protection of the public health, safety and the environment at minimal cost to Caribou.

The proposed work plan has been designed to meet EID's requirements to investigate the nature and extent of ground water contamination at and near the refinery bearing in mind that remediation may be required following completion of the investigation. Through all phases of the field program Dames & Moore personnel will operate under the guidance of our health and safety plan for refinery investigations. In accordance with new governmental regulations, all our field personnel are safety trained and monitored by a medical surveillance program.

PROPOSED SCOPE OF WORK

The proposed scope of work to evaluate contamination of ground and surface waters in the vicinity of the refinery consists of the following program:

1. Conducting a preliminary ground water contamination survey in the site vicinity employing a field analytical van capable of obtaining samples of ground water and soil gas and determining within minutes by GC methodology the kinds and concentrations of volatile organic compounds present. Samples will be taken at approximately 45 sites.

2. On the basis of data obtained in (1), installing 10 monitor wells at 8 sites (one site will consist of a nest of 3 wells screened at different depths) to provide ground water samples for analysis. Six piezometers will also be installed to provide additional data regarding ground water flow directions and gradients.

3. Obtaining aquifer characterization data by conducting slug and/or pumping tests.

4. Collecting water samples for analysis from the 10 monitor wells and at four surface water sampling sites once shortly after well completion and then again approximately 30 days later.

5. Analyzing the water samples for volatile organic contaminants using GC or GC/MS methodology.

6. Preparing a report which summarizes and interprets all information obtained and makes an evaluation of ground and surface water contamination in the site vicinity and the significance thereof.

Details of and the rationale for the proposed activities are discussed in the following sections.

PRELIMINARY GROUND WATER CONTAMINATION SURVEY

To aid in the later placement of monitor wells and to characterize contaminants that may be present in the ground water, we propose to conduct a preliminary chemical survey of the ground water and soil gas under the refinery site itself and the downgradient private land. This will consist of identifying and determining the concentration of the individual components of the volatile organic hydrocarbons in the soil water and gas utilizing an analytical field van designed to collect ground water and soil gas samples through hydraulically-driven probes and perform the gas chromatography analyses within minutes. For this work, we propose to utilize, as a sub-contractor, the services of Tracer Research Corporation (TRC), Tucson, Arizona, with whom Dames & Moore has worked in the past on major projects in Phoenix and a smaller project in Salt Lake City. Appended material provides a description of the equipment and services provided by TRC, the methodology employed and its applicability to this type of investigation, and a listing of past and on-going TRC jobs to attest to the firm's experience in this field.

We anticipate that approximately 45 detailed soil water or gas samples will be sufficient to detect and identify volatile organic contaminants present in the water and determine their individual concentrations at the site and the land downgradient and have allocated time accordingly. Tentative locations of these sites as well as monitor well, piezometer and surface water sampling locations are indicated on Plate 1. Because of site soil conditions, discussed later, we anticipate that the maximum depth of these water samples will be about three feet which will be sufficient for the purposes of this survey. Since we cannot, of course, predict in advance the results of the soil gas or ground water analyses and it may be desirable to take additional samples based upon results which become available as the work progresses, we request that a Caribou representative be available whom we could contact during the TRC sampling who can authorize additional sampling if required either to further follow a plume or identify a source.

Prior to mobilizing the field analytical subcontractor, the necessary permission will be obtained from the landowners surrounding the site for access by the sampling equipment and possible placement of monitor wells on their property. It may be necessary to design the field survey around certain blocks of land where it is not possible to obtain the owner's permission to enter. We recommend that the process of obtaining landowner consent be started immediately after authorization of the work by Caribou. Past experience has shown that this can often be a long and time-consuming process requiring several meetings with the property owner.

MONITOR WELL AND PIEZOMETER INSTALLATIONS

LOCATIONS AND NUMBERS

After the completion of the field analytical survey, the resulting data will be plotted on a series of contaminant concentration maps to delineate any plumes that may be leaving the site. Based on these plots, a monitor well/piezometer system will be designed that will define the areal extent and vertical depth of any plume. The monitor well/piezometer system will also be used to determine the ground water flow direction and velocity. Before drilling, all appropriate permits will be obtained from the State Engineer's office.

Because of drilling difficulties discussed below, monitor wells from which ground water quality samples can be obtained will be installed only in locations where analytical data is necessary to define any plume. In areas where ground water chemical data is not essential but ground water surface elevation is necessary to define the local hydrologic gradient, shallow piezometers will be installed for collecting static water level data.

At this time we anticipate four monitor wells and two piezometers will be installed on the refinery/tank farm property itself. One monitor well will be placed at the northeast corner of the tank farm property to serve as an upgradient monitor well. The three remaining monitor wells will be placed along the downgradient edge of the refinery and tank farm (south and southwest sides) to test for the existence of migrating contaminants. While final location of the wells will be determined from the results of the field analytical survey, our preliminary estimate of their placement would be between the workshop and boiler shed in the refinery area, along the western side of the central bermed area of the tank farm and at the extreme southwest corner of the tank farm. The two piezometers would be placed along the north edge of the refinery area near the northeast corner of the refinery office building and near County Road 6261 about 400 feet north of its junction of State Route 489.

Off-site monitor wells and piezometers will be located as indicated by the field analytical survey. Our preliminary estimate is that six monitor wells and four piezometers will be required. This number may be decreased or increased depending upon the extent of off-site contamination, if any, found during the preliminary survey. At least one monitor well will be placed beyond the farthest extent of any contamination found during the initial survey to verify the lack of contaminants. In the central portion of the possible contamination plume, a series of three "nested" monitor wells will be placed to determine the vertical extent of contamination. These wells will be screened between 3 to 13 feet, 20 to 25 feet, and 35 to 40 feet, respectively.

After completion, all wells and piezometers will be surveyed for horizontal and vertical control by a licensed land surveyor. Vertical control will be to within 0.01 foot. The top of the well casings will be marked so that future water level measurements will be taken from the same reference point.

CONSTRUCTION

The monitor wells will be constructed of 2-inch diameter threaded flush-joint PVC pipe installed to a typical depth of 13 to 20 feet in a 6-inch diameter drill hole. The lower 10 feet of the well will be screened using commercially slotted pipe of a slot size appropriate for the formation.

If possible, the well will be constructed so that the ground water surface intersects the screened interval. Due to the very shallow depth to ground water (1.5 feet and less south of the site) we anticipate difficulties in maintaining an adequate surface seal. In these cases the top of the screen will be placed as close to the ground water surface as possible and still maintain an adequate seal. The screened section will be surrounded with an artificial sand pack consisting of Colorado silica sand, or equivalent, graded so the sand pack is at least 90 percent retained by the screen. The sand pack will extend from the base of the well to a minimum of one foot above the screened section. A six inch to one foot grout seal consisting of granular or pelleted bentonite will be placed above this sand pack. Above the seal to the surface a thick bentonite slurry grout will be installed to seal the well from surface water contamination. Both the sand pack and bentonite grout will be tremied into place.

Piezometers will consist of two-inch diameter PVC pipe installed in a four-inch drill hole. These holes will be drilled using a bucket type hand auger through the sandy surface soils until refusal. We anticipate these wells to typically be about three feet in depth. The bottom one foot of the well will be screened using commercially prepared slotted PVC similar to that in the monitor wells. The annular space around the well will be sand packed and sealed in a manner similar to the monitor wells.

Both monitor wells and piezometers will be completed at the surface with a six inch steel protective casing and a locking steel cap. The protective casing will be set into a three-foot diameter sloping concrete pad to secure the casing and protect the well from precipitation and runoff.

SITE CONDITIONS AFFECTING EMPLACEMENT

The Caribou Kirtland Refinery is located on the alluvial sands and gravels of the north embankment of the San Juan River. During a site visit it was found that the surface soils beneath the tank farm consist of medium to fine-grained silty sand with some coarse gravels. At the refinery portion of the site, which rests on a slightly elevated bench north of the tank farm, these sands are overlain with a thin veneer of coarse gravels and cobbles. The local bedrock (the lower member of the Kirtland shale) outcrops as low bluffs about 50 yards north of the refinery. Verbal communication with Mr. Ernie Busch of the New Mexico Oil Conservation Division disclosed that, based on Mr. Busch's prior drilling experience in the area, the thickness of the alluvium in the area just south of the tank farm is about 75 feet and consists mostly of river cobbles and "boulders." The sandy surface soil only extends to a depth of about three feet. Based on this information, we anticipate very difficult drilling conditions in spite of the shallow depths of the monitor wells.

Several drilling methods are capable of penetrating this type of cobble terrain. In most cases, however, these involve very large and expensive equipment with a considerable risk of breakage and down-time. We therefore recommend the somewhat slower, but proven and EPA accepted method of cable-tool drilling with continuous casing. No additives are used during drilling and the possibility of contamination of the well is thus reduced. Because of the simplicity of the equipment, the overall cost is reduced from other types of drilling in cobble ground. The drawback to this drilling method is the greater time involved.

WELL DEVELOPMENT AND HYDROLOGIC TESTING

After each monitor well and piezometer is completed it will be developed utilizing a combination of pumping and mechanical surging. Piezometers will be developed to a sand free state, while the monitor wells will be developed to a state suitable for water quality sampling.

After the development of each monitor well, the well will be slug tested to determine the hydraulic conductivity of the screened section. Because of the high conductivities expected, electric transducers equipped with continuous recording devices will be used. At least one monitor well will be chosen for a short-term (8 to 10 hour) pump test. Hydraulic data collected from slug and pump tests will be used to calculate ground water velocities at the site.

GROUND WATER AND SURFACE WATER SAMPLING AND ANALYSIS

ANALYTES

We believe that the best initial evaluation of ground water contamination resulting from refinery activities can be obtained by analyzing water samples for volatile organics. The volatiles, because of their generally higher solubility and lower retardation by aquifer materials, are usually better indicators of refinery-related contaminant plumes than are the base-neutral or acid fraction compounds. The limited data available and experience at other refineries does not suggest that contamination by heavy metals is a concern.

The preliminary soil gas and ground water analyses will provide data regarding the relative numbers and concentrations of volatiles in the vicinity of each monitor well. This will dictate whether GC/MS or GC methods will be utilized for analysis of the well samples. For those wells which are relatively clean, GC methods (601/602 = 8010/8020) will be employed to provide the lower detection limits (1 ppb or less) achievable by GC. For those samples which the preliminary field analyses or the presence of oil in the well indicate may contain a number of volatiles, a GC/MS method (624 = 8240) will be utilized to provide the better resolution of individual compounds achievable by this method at the sacrifice of somewhat higher detection limits (generally about 5 ppb). Halogenated and aromatic volatiles associated with refineries and the priority pollutant list will be detectable by either method.

We propose that all analyses be performed by Rocky Mountain Analytical Laboratory, Arvada, Colorado. This laboratory is an EPA contract laboratory and is highly experienced in analyzing refinery waters and wastes.

Each monitor well and surface water sampling station will be sampled following the completion of well development and aquifer testing. For verification of results, especially since contaminants may be present at or near detection limits, we propose that a second round of water quality sampling be conducted at all previously sampled sites, about 30 days after the first sampling event when laboratory results have been obtained and reviewed. If significant levels of refinery-related volatiles are encountered in certain wells or surface waters, it may be appropriate to enlarge the scope of analyses at such sites to include organics in the base/neutral and acid fractions.

MONITOR WELL SAMPLING

Before sampling each monitor well, the static water level will be measured to within 0.01 foot using an electric probe. The well will then be checked for the presence of a free oil phase using a borosilicate glass bailer by lowering the bailer slowly into the well until the water level is about half way up the barrel of the bailer. The bailer is then withdrawn and the contents inspected visually for any oil phase. If no oil phase is detected, ground water purging and sampling will proceed, whereas if an oil phase is present, a sample of this material will be collected using a glass bailer similar to the first except with a sealed bottom.

A well exhibiting no oil phase will be purged of three to five casing volumes of water using a teflon bailer. Evacuated water will be measured in a bucket. Care will be taken during the purging and subsequent sampling that the bailer and suspension line are not contaminated by contacting the ground or other unclean objects. Disposable over-gloves will be worn during purging and sampling and replaced prior to sampling each new well.

In wells which do exhibit an oil phase, a one-inch diameter PVC drop-pipe will be lowered below the oil layer in a manner which will prevent oil from entering the drop-pipe bore. Purging will be conducted through the drop-pipe using a peristaltic pump and tubing; purging will be done at a rate which will preclude oil from entering the drop-pipe. Sampling will be conducted by lowering a small-diameter glass bailer through the drop-pipe. The purpose of this special methodology at wells with an oil phase is to obtain a water sample for analysis rather than a mixed oil-water sample.

After purging, a sample will be withdrawn and analyzed in the field for pH, specific conductance and temperature. All field instruments will be calibrated in the field according to the manufacturer's instructions prior to each reading. Fresh, commercially prepared buffers and standard solutions will be used. Sample water will then be drawn from the well via the bailer and transferred into the sample bottles. All bottles will be filled to the top allowing no air to remain in the bottle after the cap is secured. Care will be taken that the sample is not aerated during sample collection or transfer to the sample bottles.

All samples will be iced immediately after collection and shipped to the analytical laboratory on the day of collection via overnight courier. Appropriate chain-of-custody documentation will be maintained.

SURFACE WATER SAMPLING

Four surface water sampling stations will be designated for sample collection to evaluate contamination which may be emanating from the refinery. It is assumed that water will be turned into these irrigation ditches by the time this investigation is conducted. These sites will be in the Farmers Mutual Irrigation ditch immediately north of U.S. Highway 550, (an upstream or background sample), in the same ditch immediately west of the refinery area, in the secondary irrigation ditch immediately south of State Route 489 and in the secondary irrigation ditch about one-quarter mile south of State Route 489.

Surface water samples will be collected at the designated sample station at the same time the monitor wells are sampled. Stream flow will be estimated using the cross-sectional area of the channel and a flow meter to determine flow velocity. Specific conductance, pH and temperature will be measured and recorded as during the monitor well sampling. Sample bottles will be filled either by directly immersing the sample bottle in the stream flow or by collecting the sample with a teflon or stainless steel dipper and transferring it to the sample bottle.

SAMPLING EQUIPMENT DECONTAMINATION

All sampling and purging equipment that contacts well or surface water will be thoroughly cleaned between samples. Cleaning will consist of thoroughly scrubbing with non-phosphate detergent followed by a tap water rinse followed by three consecutive rinses of distilled water. If a free oil phase was noted during sampling an additional rinse with hexane will be used after the tap water rinse and followed by three consecutive rinses of distilled water. Where possible, disposable equipment will be used and renewed between sample sites.

QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

Throughout the sampling, steps will be taken to insure that high quality data will result. The analytical laboratory will operate under its own internal QA/QC guidance. Field procedures used to assure high quality data will include at least 15 percent blind field duplicates, equipment blanks and trip blanks. Field duplicates will consist of sample splits shipped to the laboratory as a separate sample. Equipment blanks will consist of distilled water samples taken in the same manner as the actual samples to check for cross contamination caused by the sampling equipment. One trip blank, supplied by the analytical laboratory, will accompany each sample shipment to check for contamination during shipment to the laboratory.

SUMMARY REPORT

Following completion of all site work and receipt of analytical data, a summary report of our findings will be prepared. The report will address the sources, constituents, concentration, depth and areal extent of ground water contamination as well as the velocity and flow direction of ground water in the area. Surface water contamination will also be evaluated. In addition, a qualitative risk evaluation will be made which will assess the significance of observed contamination from the basis of analysis of the toxicity of the contaminants detected, their potential for transport via ground water and surface water pathways, and their impact upon identified targets or receptors.

All original analytical data, field logs, well drilling and well construction information, and details of methodologies employed will be included as appendices to this report.

SCHEDULE

Given the EID proposal review time, the 30 day period for Caribou to make revisions and time for EID to review and approve the final proposal, we anticipate that a May 1, 1987 start-up date is realistic. We expect project initiation activities, obtaining permission from landowners, the preliminary ground water contamination survey, drilling and installation of monitor wells, and the collection of the first round of water samples to consume about 7-8 calendar weeks from start-up or until nearly the end of June. Turnaround time for the laboratory analyses is 3-4 weeks. The second round of sampling would then be conducted in late July with the results available in late August. Inclusion of this data and final preparation of the report would require about two additional calendar weeks resulting in a likely report submittal date of mid- to late-September.

Monthly progress reports will be submitted to Caribou and could be also transmitted to EID. A meeting with EID personnel following receipt of the first round of water quality monitoring results would seem appropriate to review the data and make adjustments, if necessary, in the analyses to be performed during the second sampling round.

EID would be kept informed in advance of when significant field activities would be conducted (e.g., the TRC survey, well drilling, water sampling) should its personnel desire to be present to observe or to obtain split samples.

QUALIFICATIONS

Dames & Moore is well qualified to perform these investigations. The Salt Lake City office (established in 1952 and one of more than 20 in the U.S), from which this project would be staffed, has performed hazardous waste investigations dealing with ground water and subsurface contamination at a significant number of refineries and petroleum-related-facilities over the last six years primarily in response to RCRA, CERCLA and state regulatory requirements. Included among these are the Chevron, Amoco, Phillips, Caribou and Flying J (formerly Husky) refineries in the Salt Lake Valley and the Flying J refineries in Cheyenne and Cody, Wyoming.

In addition to our experience at refineries, we have conducted subsurface and ground water investigations dealing with petroleum product contamination problems at the following: the Chevron Salt Lake Marketing Terminal; the Chevron Hilltop Truck Stop in American Falls, Idaho; a Chevron gasoline station at 3500 South and 4000 West in West Valley City, Utah; the Husky truck stop in Cheyenne, Wyoming; and a leak from a large diesel storage tank for a confidential client in the Salt Lake Valley.

Our experience dealing with non-petroleum-related ground water and subsurface contamination is also very significant and has provided us with further insight and experience in conducting such investigations. Among such experience is the following: Mountain Fuel Supply Company's former coal gasification site in Salt Lake City; Lone Star Industries (Portland Cement Company of Utah) cement kiln dust disposal sites in Salt Lake City; Utah Power and Light Company's pole treating plant in Idaho Falls, Idaho; Kennecott's mining, milling, and tailings disposal sites in the western part of Salt Lake Valley; the Park City Prospector Square and Midvale tailings Superfund sites; and the Hercules Bacchus Works facility near Magna, Utah.

Services provided by the Salt Lake City office at hazardous waste management facilities have included the entire spectrum of regulatory requirements: preparation of basic RCRA operating documents; installation of monitor wells and collection and interpretation of water quality data; definition of site geohydrology; development and implementation of ground water quality assessment plans; development and implementation of remedial action plans; waste sampling and characterization; development and implementation of closure plans; certification of closure; design of surface impoundments and landfills to regulatory standards; preparation of support documents for petitions to establish alternate concentration limits and exclusion of ground water monitoring; risk assessment of threats to human health and the environment from contaminant releases; preparation of Part B permit applications and applications for post-closure permits; and conduct of remedial investigations/feasibility studies at Superfund sites.

Dames & Moore will assign to this project personnel who have demonstrated capabilities and experience in the area of hydrogeology and hazardous waste investigations. The project director will be Dr. Peter F. Olsen who will be ultimately responsible for the overall conduct of the project. Dr. Olsen has served in this function for virtually all of the hazardous waste projects conducted by the Salt Lake City office over the last six years. The project manager and principal ground water hydrology investigator will be Mr. Louis Schipper. Mr. Schipper is a highly experienced ground water geologist, has conducted ground water contamination studies at several refineries, is the office's Health and Safety Officer, and made the site visit to the Kirtland refinery during preparation of this proposal. They will be assisted, as needed, by other members of the 35-person Salt Lake City office staff, which includes 10 hydrogeologists, 10 geotechnical/civil/soils engineers, field and laboratory technicians, and clerical/secretarial/drafting personnel.

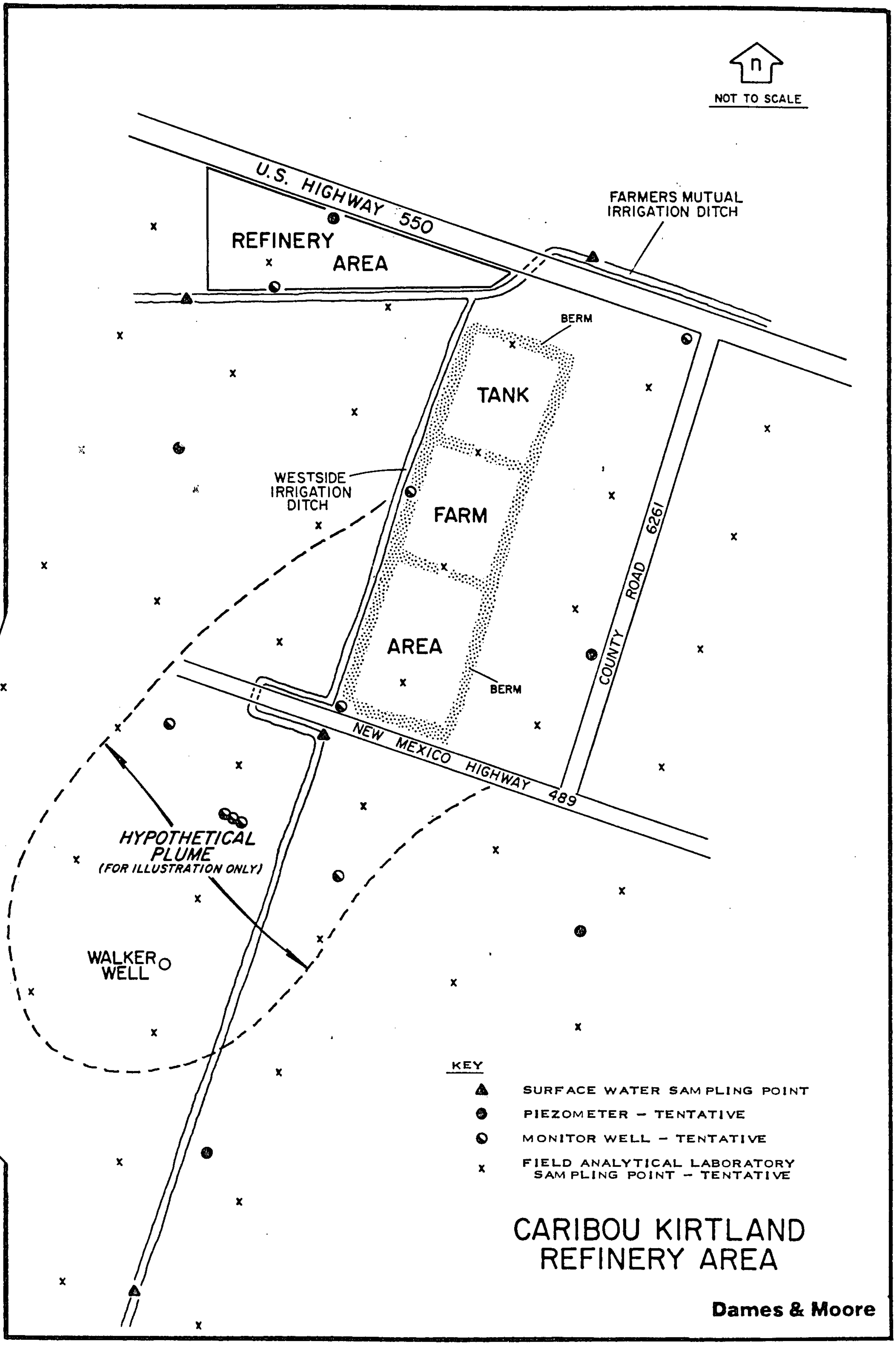


PLATE I

FILE ____ BY ____ DATE ____ CHECKED BY ____ DATE ____

Tracer Research Corporation

3855 North Business Center Drive Tucson, Arizona 85705 (602) 888-9400

SOIL GAS CONTAMINANT

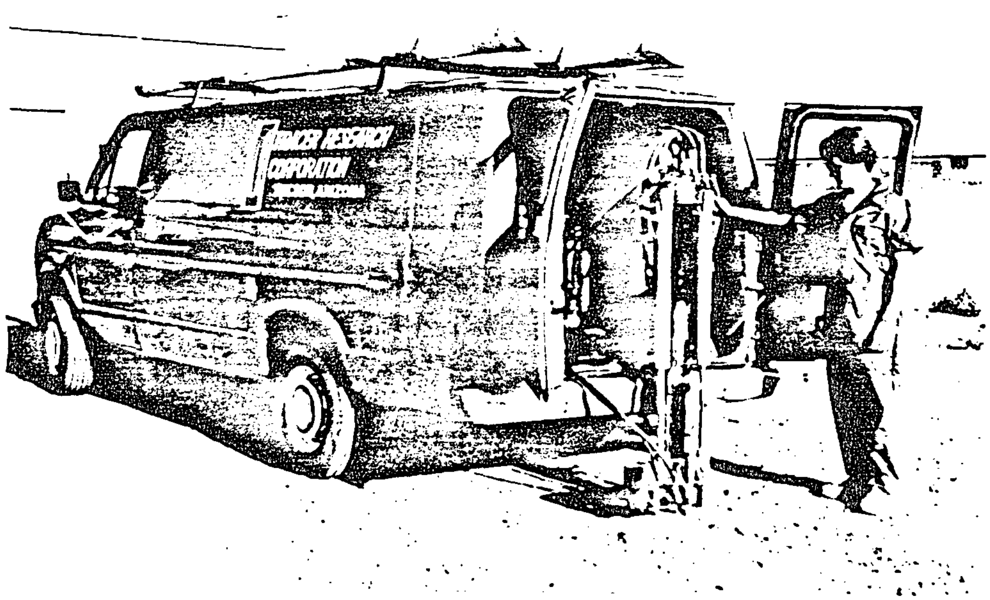
INVESTIGATION SERVICES

TRACER RESEARCH CORPORATION

Soil Gas Contaminant Investigation Services

Soil gas contaminant investigation refers to a cost-effective method developed by Tracer Research Corporation for investigating underground contamination from volatile chemicals such as industrial solvents, cleaning fluids and petroleum products by looking for their vapors in the shallow soil gas. The method involves pumping a small amount of soil gas out of the ground through a hollow probe driven a few feet into the ground and analyzing the gas for the presence of volatile contaminants. The presence of contaminants in the soil gas usually means that there is contamination from the observed compound either in the soil near the probe or in the groundwater below the probe. The soil gas analysis is performed in the field using proprietory analytical technology developed by TRC. Samples do not have to be packed or shipped, and analytical results are available immediately and can be used to direct the investigation.

Soil gas contaminant mapping saves costs in a contamination investigation by providing a rapid means of detecting and delineating the contaminant distribution in groundwater. Standard drilling and sampling methods are cumbersome, costly, much slower, and require more effort to obtain data points. By contrast, the TRC method allows for collection and analysis of 15 to 30 soil gas samples per day. Thus, more can be learned about the contaminant distribution at a site in one day from the soil gas method then conventional drilling and sampling techniques could provide in several days of work. The method becomes even more cost-effective relative to conventional methods as the depth to water increases.



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Specialization in Tracer Technology and Studies of Subsurface Halocarbon Distribution

WHAT IS A SOIL GAS INVESTIGATION?

Soil gas contaminant investigation refers to a method developed by Tracer Research Corporation (TRC) for investigating underground contamination from volatile organic chemicals (VOCs) such as industrial solvents, cleaning fluids and petroleum products by looking for their vapors in the shallow soil gas. The method involves pumping a small amount of soil gas out of the ground through a hollow probe driven a few feet into the ground and analyzing the gas for the presence of volatile contaminants. The presence of contaminants in the soil gas usually means that there is contamination from the observed compound either in the soil or in the groundwater below the probe. The soil gas technology is most effective in mapping low molecular weight halogenated solvent chemicals and petroleum hydrocarbons possessing high vapor pressures and low aqueous solubilities. These compounds readily evaporate out of the groundwater and diffuse into the soil gas as a result of their high gas/liquid partition coefficients. Once in the soil gas, VOCs diffuse vertically and horizontally through the soil to the ground surface where they dissipate into the atmosphere. The groundwater acts as a source and the above ground atmosphere acts as a sink and typically a concentration gradient develops between the two. The concentration gradient in soil gas between the water table and ground surface may be locally distorted by hydrologic and geologic anomalies (e.g. clays, perched water); however, soil gas mapping generally remains effective because the areal distribution of the observed compound is usually much larger in scale than the local anomalies and is defined using a large data base.

TIME AND COST SAVINGS BENEFITS

Soil gas contaminant mapping saves costs in a contamination investigation by providing a rapid means of detecting and delineating the contaminant distribution in groundwater. Standard drilling and sampling methods are cumbersome, costly, much slower and require more effort to obtain data points. By contrast, 15-25 soil gas samples can be collected per day. Usually more can be learned about the contaminant distribution at a site in one day from the soil gas method then conventional drilling and sampling techniques could provide in several days of work. The method becomes even more cost-effective relative to conventional methods as the depth to water increases. In areas where the depth to water is 100 feet or greater, the cost savings increases expotentially because square miles of the field area can be mapped using soil gas for the cost of two or three monitoring wells.

SOURCE AREA IDENTIFICATION

A major application of the soil gas technology is as a tool for locating contaminant source areas. The simple fact that numerous samples can be economically collected on a grid over a large area increases the possibility of uncovering or detecting contributors that otherwise go unnoticed. The sampling operation is quick, nonobtrusive and produces only a very small hole in the soil that quickly disappears. The samples can easily be collected along city streets, sidewalks and residential neighborhoods without creating obstructions or attracting a great deal of attention.

Generally, a source capable of causing groundwater contamination will create above background readings for a radius of 170 meters (500 feet) around it. Typically, the vapor concentrations at the center of the source are hundreds or thousands of times higher than background levels and remain so for tens of years after the contamination occurs. Broad areal coverage can be achieved rapidly using transects with samples collected on 300 to 500 foot centers. A case study of the soil gas technology used to locate a source area follows.

EQUIPMENT

TRC has designed and built a fleet of analytical field vans which are capable of hydraulically driving and pulling soil gas or groundwater probes and performing all chemical analyses on-site. The TRC analytical field vans are each operated by a two-person crew consisting of an analytical chemist and a hydrogeologist. A list of equipment used by TRC in a soil gas investigation is given below.

(A) General Equipment

- One ton Ford E350 chassis, 4 wheel drive
- Two built-in gasoline powered generators (110 volts/AC) for maximum reliability
- Hydraulic probe driving and removal equipment designed especially for soil gas probing
- 42 soil gas probes fabricated from a steel pipe
- Safety Equipment: first aid, fire, hazardous chemical protection
- Two vacuum pumps
- An electric hammer/drill capable of drilling through asphalt and concrete
- A peristaltic pump and polethylene tubing used for groundwater sampling

(B) Gas Chromatographic Equipment in Each Van

- Two gas chromatographs per van (Either Varian 6000, Tracor 540, or Varian 3000 gas chromatographs)
- Two Spectra-Physics model SP4270 computing integrators
- Electron capture, flame ionization, photo ionization and thermo conductivity detectors on the various GCs.
- Analytical standards for purgable priority pollutants, pure compounds obtained from Chem Service, Inc. of West Chester, Pennsylvania

- Glass syringes ranging from 10 ul to 10 ml in volume
- Various packed and capillary gas chromatographic columns
- Gas cylinders containing compressed nitrogen, air and hydrogen
- 40 ml glass sampling vials in which the chemical standards are prepared and groundwater samples are collected
- Various fittings and tools required for normal operation

TRC has developed special analytical technology (patent pending) that enables very rapid measurement of contaminants in either soil gas or water. Both are injected directly into the instrument without the use of purge and trap or preconcentrating technique. Using the TRC method, a typical measurement for most of the priority pollutant purgables requires approximately five minutes. An example is shown in Figure 1. The sensitivity and precision are typically as good as conventional methods, but analysis is about a factor of 10 faster. The rapid analysis is extremely beneficial to the TRC soil gas operation. It allows the analysis to be performed in about the same period of time required to drive, sample and pull the probe. Thus, the soil gas sampling operating proceeds with maximum efficiency.

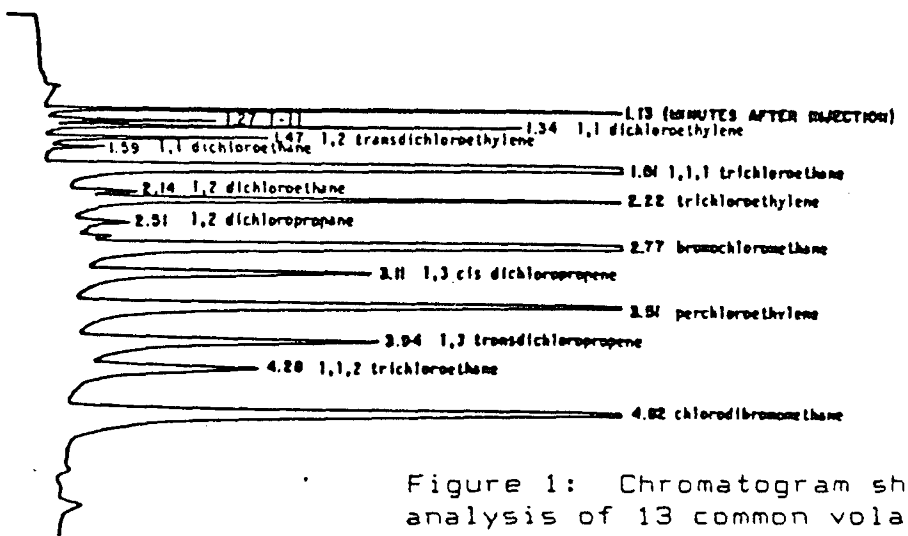


Figure 1: Chromatogram showing the analysis of 13 common volatile contaminants. Analyses of soil gas or water are identical by TRC method and require 5 minutes or less to perform.

QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

TRC has developed a QA/QC program that has been accepted by EPA for use on Superfund sites. This program is followed on all TRC jobs.

CASE STUDIES

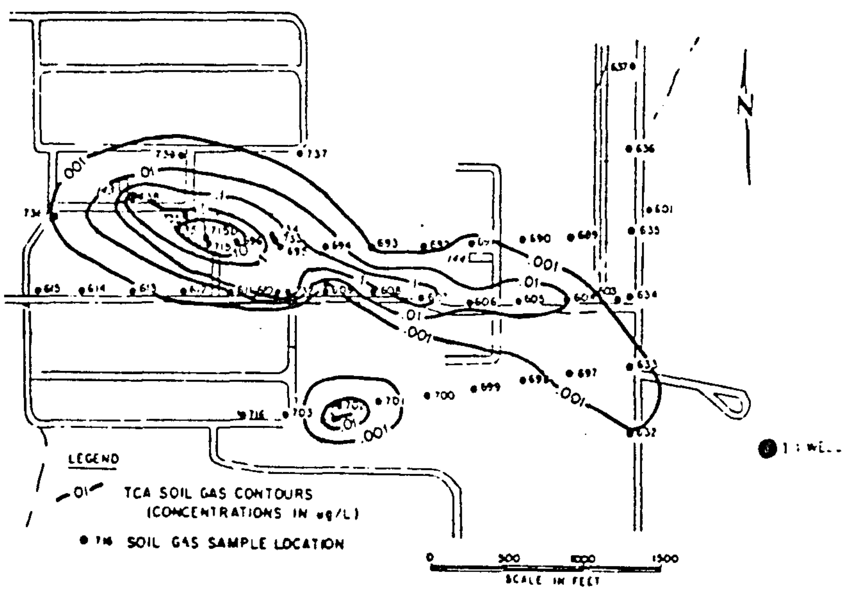
TRC has been involved in over 200 contaminant investigations using the soil gas technology. Several examples are provided to illustrate the results that have been obtained at typical sites.

Case Study #1

Figure 2 shows an example where soil gas technology was used to locate a contamination source in the midwestern U.S. The depth to water was 120 feet. The soil materials were silty clays. The irrigation well I-1 in the southeast corner of the figure was contaminated with TCA. A large industrial complex existed on the west side of the road extending over a mile north and south of the well. The soil gas sampling was initiated along a north-south road between the well and the complex. The transect extended several thousand feet north and south of the contaminated well. One soil gas sample on the first transect detected TCA slightly above background (Point 633, Figure 1). A second east-west transect was initiated along a convenient road into the complex a short distance north of Point 633. The samples along the second transect detected increasingly higher TCA concentrations. Because the soil gas analyses were performed in the field, the sampling plan could be easily directed to "zero in" on the source area. In this case the source was a business with a leaking TCA tank. The long axis of the detectable soil gas plume extended over 3000 feet from the source toward the contaminated well which was about one mile away. The investigation left very little doubt about the source of TCA contamination in the I-1 well.

This investigation represents a classical example of the utility of the soil gas. The general distribution of the contaminant can be defined quickly and easily and at minimal cost (approximately $180.00 per probe). After the soil gas investigation, verification drilling and soil sampling can proceed very efficiently.

Figure 2: TCA SOIL GAS CONCENTRATION CONTOURS



HYDROCARBON BEHAVIOR VS HALOCARBON

Hydrocarbons (fuels, paint solvents) behave differently than halocarbons (chlorinated solvents) in the subsurface because they are particularly susceptible to degradation in the upper portion of the soil profile where oxygen is present. As a result, soil gas measurements most effectively detect hydrocarbon product vapors when the soil gas samples are collected at depths below 10 feet. Table 1 shows a vertical profile in a sandy soil over groundwater contaminated with a halocarbon, perchloroethylene (PCE) and hydrocarbons including benzene and toluene. The depth to groundwater is approximately 20 feet. The PCE concentrations increase incrementally with depth, but the hydrocarbon components characteristically appear in significant concentrations only below a certain critical depth. This depth varies depending on the amount of product underground, the soil porosity and moisture content. In most cases, however, it occurs deeper than five (5) feet.

Table 1. Hydrocarbon Variation With Depth

Depth	PCE	Benzene	Toluene
5 feet	.006[1]	<.1	<.1
10 feet	.01	<.1	<.1
15 feet	.03	200	30

[1]All samples expressed in ug/l.

Case Study #2

Figure 3 shows the concentration contours of **TOTAL HYDROCARBONS** in shallow groundwater (12 feet deep) underlying a gasoline service station in the Southwestern U.S. Total hydrocarbons are defined as benzene, toluene, xylenes and C_5-C_{10} aliphatic and alicyclic compounds. Concentration contours indicate that the groundwater plume probably originates near the pump island and the underground storage tanks. Radial spreading of gasoline in groundwater from the two sources produced a single plume underlying the service station.

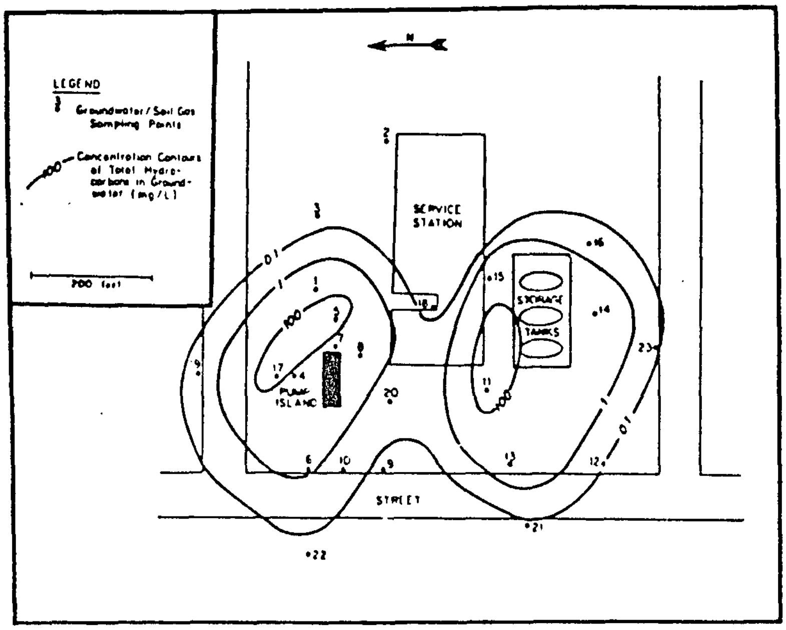


Figure 3: Distribution of total hydrocarbons in shallow groundwater underlying a gasoline service station.

SUMMARY

The examples discussed here illustrate that soil gas technology is a viable tool for mapping underground contamination. At sites where it is applicable, soil gas mapping can provide a rapid and cost effective means of investigating contamination over very large areas. In most instances a preliminary soil gas investigation will result in a cost savings over the same job by conventional boring and sampling. In addition, the distribution of the contaminant can be mapped in greater detail using soil gas technology because more samples are collected per unit area than with conventional methods. Most industrial sites, landfill areas or other property of ten acres or less can be evaluated in two or three days and subsequent on-site work can be completed in a rapid and cost effective manner.

FACTS ABOUT TRACER RESEARCH CORPORATION & SOIL GAS TECHNOLOGY

. TRC chemists and hydrogelogists developed the concept of soil gas detection of volatile groundwater contamination, developed the technology for commercial use and have been the largest supplier of the service, having performed over 200 soil gas investigations at different locations thoroughout the U.S. and Canada.

. All personnel are specially trained in soil gas sampling and analysis and are dedicated full time to this service. Their experience enables them to provide the most efficient possible field data collection and analysis effort.

. TRC has set the industry standard for QA/QC in soil gas sampling and analytical technology. EPA has accepted TRC soil gas procedures for use at Superfund sites where legal action is expected.

. TRC provides only specialty services such as soil gas sampling and tracer leak detection, and thus is noncompetitive with full service geotechnical consulting firms.

. TRC hydraulic sampling equipment has been uniquely designed to perform the most efficient shallow soil gas and shallow groundwater sampling possible. It is compact, highly portable, and has no tall masts or derricks so work can be performed safely under overhead obstacles and lines.

. TRC vans contain all equipment required for collection and analysis of soil gas sampling. TRC offers the fastest and most sensitive analytical capability in the industry for volatile organic chemicals in soil gas. TRC equipment is readily dispatched to all parts of the U.S. with very minimal mobilization costs.

GEOGRAPHICAL DISTRIBUTION OF TRACER RESEARCH CORPORATION CLIENTS

Other Locations:

Alaska
Ottawa, Ontario

BACKGROUND OF KEY PERSONNEL OF TRC

Dr. Glenn Thompson received his B.S. (1970) and M.S. (1973) degrees in Geology from the University of Rhode Island and Memphis State University, respectively. He earned his Ph.D. in Geology at Indiana University in 1976. His dissertation centered on the development and testing of analytical and field methods needed to date groundwater by means of man-made atmospheric contaminants, primarily fluorocarbons, that have entered the ground only in the last 60 years. He served as an Assistant Professor of Hydrology at the University of Arizona from 1977 to 1983. While at the University, he was principal investigator on 10 major research grants that resulted in publications on tracer technology, subsurface gas diffusion, behavior of organic compounds in the environment, solute transport in groundwater and tracer monitoring of hazardous waste burial sites.

He has had a great deal of experience using volatile chemicals as groundwater tracers and eventually observed that the tracers evaporate from the water table surface and diffuse tens of feet upward into the soil gas of the unsaturated zone. These experiments with tracers led to the practical technology that is presented here. He founded and is currently President of Tracer Research Corporation.

OTHER TRACER RESEARCH CORPPORATION SERVICES

- Underground Storage Tank Leak Testing (specializing in LARGE tanks).

- Above-Ground Storage Tank Integrity Testing

- On-Site Field Analytical Support

- Tracer Technology

STANDARD FORM (SF) 254

Architect-Engineer and Related Services Questionnaire

Tracer Research Corporation
3855 North Business Center Drive
Tucson, Arizona 85705

1a. Submittal is for ☒ Parent Company ☐ Branch or Subsidiary Office

Established: 1983

Date Prepared: 6-25-86

4. Specify type of ownership *and* check below, if applicable.

- x A. Small Business
- B. Small Disadvantaged Business
- C. Woman-owned Business

5. Name of Parent Company, if any:

5a. Former Parent Company Name(s), if any, and Year(s) Established:

Dr. Glenn M. Thompson, Private Consultant, 1977

6. Names of not more than Two Principals to Contact: Title / Telephone
1) Glenn M. Thompson, President (602) 623-0200
2) Shannan K. Marty, Secretary/Treasurer (602) 623-0200

7. Present Offices: City / State / Telephone / No. Personnel Each Office

7a. Total Personnel 12

1) Tucson, Arizona (602) 623-0200

8. Personnel by Discipline: *(List each person only once, by primary function.)*

2	Administrative		Electrical Engineers		Oceanographers	3	Analytical Chemists
	Architects		Estimators		Planners: Urban/Regional	1	Fabrication Specialist
	Chemical Engineers	4	Geologists		Sanitary Engineers	1	Technician
	Civil Engineers	1	Hydrologists		Soils Engineers		
	Construction Inspectors		Interior Designers		Specification Writers		
	Draftsmen		Landscape Architects		Structural Engineers		
	Ecologists		Mechanical Engineers		Surveyors		
	Economists		Mining Engineers		Transportation Engineers		

9. Summary of Professional Services Fees Received: (Insert index number)

Last 5 Years (most recent year first)	19 85	19 84	19 83	19	19
Direct Federal contract work, including overseas	1	1	1		
All other domestic work	4	2	1		
All other foreign work*					

*Firms interested in foreign work, but without such experience, check here: ☒.

Ranges of Professional Services Fees

INDEX
1. Less than $100,000
2. $100,000 to $250,000
3. $250,000 to $500,000
4. $500,000 to $1 million
5. $1 million to $2 million
6. $2 million to $5 million
7. $5 million to $10 million
8. $10 million or greater

10. Profile of Firm's Project Experience, Last 5 Years

Profile Code	Number of Projects	Total Gross Fees (in thousands)	Profile Code	Number of Projects	Total Gross Fees (in thousands)	Profile Code	Number of Projects	Total Gross Fees (in thousands)
1) 114		1,757	11)			21)		
2) 201		1,410	12)			22)		
3) 202		15	13)			23)		
4)			14)			24)		
5)			15)			25)		
6)			16)			26)		
7)			17)			27)		
8)			18)			28)		
9)			19)			29)		
10)			20)			30)		

201- Soil Gas Contaminant Plume Mapping

202- Underground Tank Leak Detection

11. Project Examples, Last 5 Years

Profile Code	"P", "C", "JV", or "IE"	Project Name and Location	Owner Name and Address	Cost of Work (in thousands)	Completion Date (Actual or Estimated)
114	IE	1 Research Project on Groundwater Tracers University of Arizona-Tucson, AZ Oak Ridge, TN	Union Carbide Oak Ridge, TN Ms. Tammy Tanura (615) 574-7299	75	1980
114	IE	2 Laboratory Investigation of Tracers for Measurement of Matrix Diffusion Tucson, AZ	Los Alamos Scientific Laboratory Los Alamos, New Mexico Mr. Bruce Evdal (505) 667-5338	165	1982
114	IE	3 Shallow Trench Burial Project Tucson, AZ	Nuclear Regulatory Commission Washington, DC Mr. Ed O'Donell (301) 427-4639	134	1983
114	IE	4 Sheffield Low Level Waste Burial Ground Tracer Studies Sheffield, IL	Nuclear Regulatory Commission Washington, DC Ms. Maxine Dunkleman (301)427-4569	67	1983
114	IE	5 Studies of Proposed Nuclear Waste Burial Ground in Fractured Rock Tucson, AZ	Nuclear Regulatory Commission Washington, DC Mr. Larry Doyle (301) 427-4586	1,128	1983
114	IE	6 Greater Confinement Test Facility Nevada Test Site Tracer Tests	Reynolds Electrical Engineering Las Vegas, Nevada Mr. Paul Dickman (702) 734-3671	30	1984
114	IE	7 Tracer studies for measurement of aquifer parameters in deep basalt Hanford, WA	Rockwell International Hanford, Washington Dr. Leo Lynhart	40	On-going

201	C	8 Soil gas plume mapping halogenated compounds San Jose, CA	Confidential	2	2/84
201	C	9 Soil gas plume mapping halogenated compounds Livermore, CA	Sandia & Lawrence Livermore Laboratories Livermore, CA	4	2/84
201	C	10 Soil gas plume mapping halogenated compounds Sunnyvale, CA	Confidential	4	2/84
201	C	11 Soil gas plume mapping halogenated compounds Los Angeles, CA	Confidential	11	3/84
201	C	12 Soil gas plume mapping halogenated compounds Sacramento, CA	Confidential	7	5/84
201	C	13 Soil gas plume mapping halogenated compounds Coalinga, CA	Confidential	8	5/84
201	C	14 Soil gas plume mapping halogenated & hydrocarbon compounds Albuquerque, NM	CH2M Hill Albuquerque Superfund Site	19	5/84
201	C	15 Soil gas plume mapping halogenated compounds Albuquerque, NM	Confidential	10	5/84
114	1E	16 Department of Energy Underground Coal Gasification Site Hanna, WY	Departmentof Energy Laramie, Wyoming Mr. Urban Sherum (307)721-2258	75	6/84
114	C	17 Tracer air drilling fluid in deep bore hole at Nevada test site	Edwin D. Weeks USGS - WRD Denver, CO	3	On-going
114	C	18 Tracer leak testing of deep bore hole plugs	Jack Daeman Dept. of Mining Engineering University of AZ- Tucson, AZ	8	1984
202	C	19 Leak detection in subsurface gasoline tanks	Major Oil Company	7	7/84

201	C	20 Soil gas plume mapping halogenated compounds Mountain View, CA	Confidential	6	8/84
201	C	21 TCE Contamination Site Tucson, Arizona	U.S. EPA Ada, OK Dr. William Dunlap (405) 332-8000	15	9/84
201	C	22 Soil gas plume mapping hydrocarbon compounds Novato, CA	Major Oil Company	12	9/84
201	C	23 Soil gas plume mapping halogenated compounds	IBM	200	On-going
201	C	24 Soil gas plume mapping hydrocarbon compounds Point Molate, CA	U.S. Navy	6	9/84
201	C	25 Soil gas plume mapping halogenated compounds Menlo Park, CA	Confidential	8	9/84
201	C	26 Soil gas plume mapping halogenated & hydrocarbon compounds Maryland	U.S. Army	4	10/84
201	C	27 Soil gas plume mapping halogenated & hydrocarbon compounds Sunnyvale, CA	Confidential	6	11/84
201	C	28 Soil gas plume mapping halogenated compounds Phoenix, AZ	Confidential	6	11/84
201	C	29 Soil gas plume mapping hydrocarbon compounds Albuquerque, NM	Confidential	5	11/84
201	C	30 Soil gas plume mapping halogenated compounds San Jose, California	Confidential	5	11/84
201	C	31 Soil gas plume mapping halogenated & hydrocarbon compounds San Jose, California	Confidential	10	12/84

201	C	32 Soil gas plume mapping halogenated compounds Sunnyvale, California	Confidential	28	12/84
201	C	33 Soil gas plume mapping halogenated compounds Phoenix, Arizona	Confidential	14	2/85
114	1E	34 Measurement of gases from deep bore hole brines, provide tracer service for deep drilling program Amarillo, Texas	Stone & Webster Engineering Boston, MA Al Foster (617) 589-2098	85	1985
201	C	35 Soil gas plume mapping halogenated & hydrocarbon compounds Newark, CA	Confidential	14	2/85
201	C	36 Soil gas plume mapping halogenated & hydrocarbon compounds San Jose, California	Confidential	6	2/85
201	C	37 Soil gas plume mapping halogenated compounds Moutain View, California	Confidential	27	2/85
201	C	38 Soil gas plume mapping halogenated compounds Phoenix, Arizona	Confidential	51	2/85
201	C	39 Soil gas plume mapping services; CH_4 and halogenated compounds Landfills, Pima County, Arizona	Board of Supervisors Pima County Tucson, AZ	15	4/85
201	C	40 Soil gas plume mapping hydrocarbon compounds Tucson, Arizona	Confidential	1	4/85
114	1E	41 City of Tucson Water Department	City of Tucson Water Department Tucson, Arizona	5	4/85
201	C	42 Soil gas plume mapping halogenated compounds Mountain View, California	Confidential	30	3/85
201	C	43 Soil gas plume mapping halogenated & hydrocarbon compounds Fremont, California	Confidential	11	4/85

201	C	44 Stringfellow Acid Pits Site Riverside, California	California State Dept. of Health	34	4/85
201	C	45 Soil gas plume mapping halogenated compounds Santa Fe Springs, California	Confidential	15	5/85
201	C	46 Soil gas plume mapping halogenated compounds Los Angeles, California	Confidential	10	5/85
201	C	47 Soil gas plume mapping of halocarbon and hydrocarbon compounds San Jose, California	Confidential	10	5/85
201	C	48 Soil gas plume mapping of halocarbon compounds Albuquerque, New Mexico	Confidential	14	6/85
202	C	49 Underground tank leak detection Phoenix, Arizona	Confidential	1	6/85
201	C	50 Soil gas plume mapping of halocarbon compounds Alamagardo, New Mexico	Confidential	10	6/85
202	C	51 Underground tank leak detection Los Angeles, California	Confidential	3	7/85
201	C	52 Soil gas plume mapping of halocarbon compounds San Jose, California	Confidential	3	7/85
201	C	53 Soil gas plume mapping of halocarbon and hydrocarbon compounds Fremont, California	Confidential	11	7/85
201	C	54 Soil gas plume mapping of hydrocarbon and halocarbon compounds Alamagardo, New Mexico	Lockheed Engineering & Mgmt. Services Las Vegas, Nevada	21	8/85
201	C	55 Soil gas plume mapping of halocarbon compounds Nogales, Arizona	Confidential	16	5/86

201	C	56 Soil gas plume mapping of hydrocarbon compounds Saugas, California	Confidential	16	9/85
201	C	57 Soil gas plume mapping of halocarbon compounds San Francisco, California	Confidential	9	9/85
201	C	58 Soil gas plume mapping of halocarbon compounds Rockaway, New Jersey	Confidential	11	10/85
201	C	59 Soil gas plume mapping of halocarbon compounds Hastings, Nebraska	EPA Region VII	82	4/86
201	C	60 Investigation of contaminant leakage from landfill Spokane, Washington	Lockheed Engineering & Mgmt. Services Las Vegas, Nevada	23	10/85
201	C	61 Soil gas plume mapping of halocarbon and hydrocarbon compounds Alpena, Michigan	Lockheed Engineering & Mgmt. Services Las Vegas, Nevada	22	10/85
201	C	62 Soil gas investigation of landfill Wright City, Missouri	Confidential	5	10/85
201	C	63 Soil gas plume mapping of halocarbon compounds Merced, California	Confidential	10	10/85
201	C	64 Soil gas plume mapping of halocarbon compounds Phoenix, Arizona	Confidential	34	11/85
201	C	65 Soil gas plume mapping of halocarbon compounds Fort Ord, California	Confidential	21	11/85
114	1E	66 SCN^- Analyses	Texas Bureau of Economic Geology Austin, Texas	.5	11/85
201	C	67 Soil gas plume mapping halocarbon compounds Denver, Colorado	Confidential	16	12/85

201	C	68 Soil gas plume mapping of hydrocarbon and halocarbon compounds Salt Lake City, Utah	Confidential	27	11/85
201	C	69 Soil gas plume mapping of halocarbon compounds Tracy, California	Confidential	16	11/85
201	C	70 Soil gas plume mapping of hydrocarbon compounds South San Francisco, California	Confidential	10	1/86
114	1E	71 Evaluation of tracer materials Hanford, Washington	Rockwell International Hanford Operations Group	5	On-going
201	C	72 Soil gas investigation of landfill Salinas, California	Confidential	15	1/86
201	C	73 Soil gas plume mapping of halogenated compounds Palo Alto, California	Confidential	3	1/86
201	C	74 Soil gas plume mapping of halogenated and hydrocarbon compounds Fremont, California	Confidential	6	2/86
201	C	75 Soil gas plume mapping of halogenated compounds Waverly, Nebraska	EPA Region VII	45	2/86
201	C	76 Soil gas investigation of landfills Phoenix, Arizona	Salt River Project Phoenix, Arizona	62	2/86
114	1E	77 Drill rig analytical support services Rockaway, New Jersey	Confidential	22	2/86
201	C	78 Soil gas plume mapping of halogenated and hydrocarbon compounds Fort Worth, Texas	Confidential	10	3/86
201	C	79 Soil gas plume mapping of halogenated compounds City of Industry, California	Confidential	16	3/86

201	C	80	Soil gas plume mapping of halogenated compounds San Bernardino, California	Confidential	13	3/86
202	C	81	Underground storage tank leak investigation Camp Pendleton, California	United States Marine Corps	15	3/86
201	C	82	Soil gas plume mapping of halogenated compounds Denver, Colorado	Confidential	46	4/86
201	C	83	Soil gas plume mapping of landfill Pima County, Arizona	Confidential	4	3/86
201	C	84	Soil gas plume mapping of halogenated compounds Denver, Colorado	Dept. of Energy Facility Denver, Colorado	14	4/86
201	C	85	Soil gas plume mapping of landfill Phoenix, Arizona	City of Phoenix	22	4/86
201	C	86	Soil gas plume mapping of halogenated and hydrocarbon compounds Layton, Utah	Confidential	14	On-Going
201	C	87	Soil gas plume mapping of halogenated compounds Palo Alto, California	Confidential	18	5/86
201	C	88	Soil gas plume mapping of halogenated compounds Aiken, South Carolina	Savannah River Plant Aiken, South Carolina	18	5/86
201	C	89	Soil gas plume mapping of halogenated compounds Riverside, California	Confidential	6	5/86
201	C	90	Soil gas plume mapping of halogenated compounds Lake Charles, Louisiana	Confidential	17	5/86
201	C	91	Soil gas plume mapping of halogenated compounds Sunnyvale, California	Confidential	12	6/86

201	C	92 Soil gas plume mapping of halogenated compounds Collegeville, Pennsylvania	Confidential	15	6/86
201	C	93 Soil gas plume mapping of halogenated compounds Texas City, Texas	Confidential	15	6/86
201	C	94 Soil gas plume mapping of halogenated compounds	Confidential	18	6/86
201	C	95 Soil gas investigation of landfill San Jose, California	Confidential	4	6/86
201	C	96 Soil gas investigation of a landfill Tucson, Arizona	Confidential	5	6/86
201	C	97 Soil gas plume mapping of halogenated compounds St. Louis, Missouri	Confidential	5	6/86

12. The foregoing is a statement of facts

Date:

Signature: ______________ Typed Name and Title: Shannan K. Marty-Project Coordinator

STANDARD FORM

R4

Caribou Four Corners, Inc. Phone (307) 886-3861 - P. O. Box 457 - Afton, Wyoming 83110

February 2, 1987

RECEIVED

FEB 06 1987

EID: LEGAL BUREAU

Mr. Richard Young
Division Attorney
State of New Mexico
Environmental Improvement Division
P. O. Box 968
Santa Fe, NM 87504-0968

Dear Mr. Young:

In response to your letter of 31 December, 1986, I want to assure you that Caribou is committed to resolving any environmental problems existing at the refinery site. Caribou will consider your requests and will make the appropriate response. However, it is important to understand that Mr. Memmott did not agree that Caribou would commit to any specific action during the meeting on 14 June, 1986. He merely agreed to present the data obtained in the meeting to Caribou for its consideration. At my instruction he later requested that the Environmental Improvement Division (EID) present any request for action from Caribou in writing to me.

EID has made a number of assumptions concerning contamination at the site. Caribou hereby makes the following comments in response to your letter. The letters heading each response corresponds to the letters heading each comment in your letter.

A. Caribou agrees with this statement.

B. Caribou concedes that volatile hydrocarbons including benzene, toluene, xylene and ethylbenzene are common constituents of gasoline. Caribou does not, however, concede that 1,2-dichloroethane was a constituent of gasoline produced at the refinery. Caribou does not deny that gasoline may have leaked into the Brimhall ditch, however, Caribou has not observed such a spill and does not have first hand knowledge of the alleged ground water contamination. Caribou also recognizes the difficulty in analyzing for constituents in the part per billion range with a high level of confidence. Even with the most careful laboratory procedure and with the most rigorous quality assurance and quality control procedures, an accurate determination of concentrations below 100 parts per billion is difficult. 1,2-dichloroethane may even be used as a solvent at some other part of the laboratory where the test was performed. Vapors permeating other rooms in the laboratory could easily cause a response in the tens of parts per billion range.

February 2, 1987

Richard Young, Division Attorney
New Mexico Environmental Improvement Division

Several techiniques have been developed in an attempt to reduce the occurrance of false positive indications when analyzing near the detection limit of a constituent. One such method is the use of limits of quantitation. A copy of a paper entitled "Principles of Environmental Analysis" published by the American Chemical Society describing this method is enclosed for your information. Caribou proposed that this or an alternate method, equally documented and supported by an organization with the stature of the American Chemical Society be used to determine background concentration levels and concentrations of constituents that may be present near their detection limits.

Without further information concerning the laboratory techniques and the laboratory quality control and quality assurance procedures, Caribou can not assume that 1,2-dichloroethane detected in the groundwater is greater than background levels or that the refinery was the origin of 1,2-dichloroethane contamination.

You state that ground water located upgradient of the refinery was tested and was found to contain no volatile hydrocarbons. You do not comment on the concentration of 1,2-dichloroethane in the upgradient wells or the concentration of volatile hydrocarbons in the downgradient wells.

C. Based on the previous discussion, Caribou does not currently accept your conclusion that the refinery is the source of 1,2-dichloroethane contamination or that such 1,2-dichloroethane contamination is high enough to be a threat to the health of persons or livestock in the vicinity, or that it qualifies as a public nuisance.

D.1. Should it be determined that 1,2-dichloroethane contamination is in fact a threat to the health of persons or livestock in the vicinity and that the refinery was the source of the contamination, Caribou will agree to implement item D.1.

D.2. Caribou will begin immediately to prepare a proposal to investigate the nature and extent of groundwater contamination at the site. Since Caribou does not have in house capability to perform such a study, this will be subcontracted to a company with such capability. The proposal will be prepared as soon as possible but it may take longer than 30 days.

February 2, 1987

Richard Young, Division Attorney
New Mexico Environmental Improvement Division

D.3. Following the investigation, Caribou will prepare an appropriate remedial action plan for EID's review.

D.4. Caribou needs additional time to review the statutory regulations in regard to payment of response costs. We would appreciate your indication of the amounts you believe would be needed to cover these costs and the approximate dates that they would be due.

Please contact me or Mr. Memmott if you have any further questions.

Sincerely,

CARIBOU FOUR CORNERS, INC.

William Call

William A. Call
President

WAC/knh

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

January 29, 1987

Mr. Bill Call
Caribou - Four Corners, Inc.
Highway 89, Route 1
Afton, Wyoming 83110

Re: My Letter of December 31, 1986

Dear Mr. Call:

On page four of my letter to you dated December 31, 1986, I requested that you respond within ten days, either expressing agreement with the substance of my letter or informing me when I might expect a detailed response as to any areas of disagreement. The certified letter was received on your behalf on January 8, 1987, but thus far I have heard nothing from you. I would appreciate your responding immediately, as to your intentions in this matter. Lacking such a response, I would have no alternative to initiating some enforcement action against your company. I trust that you will act to obviate that necessity.

Sincerely,

Richard Young

RICHARD YOUNG
Division Attorney

RY:dcb

cc: Dennis McQuillan
Richard Perkins

TONEY ANAYA
GOVERNOR

DENISE D. FORT
DIRECTOR

HEALTH ENVIRONMENT department

STATE OF NEW MEXICO

ENVIRONMENTAL IMPROVEMENT DIVISION
P.O. Box 968, Santa Fe, New Mexico 87504-0968
(505) 827-2990

RECEIVED
JAN 2 1987
LIQUID WASTE/GROUND WATER
SURVEILLANCE

December 31, 1986

Mr. Bill Call
Caribou - Four Corners, Inc.
Highway 89, Route 1
Afton, Wyoming 83110

Dear Mr. Call:

The purpose of this letter is to resume cooperative efforts of your company and this agency, concerning site characterization and remedial measures needed to deal with ground water contamination at your refinery in Kirtland, New Mexico. Because of staff reassignments and competing priorities within the agency, not a great deal of progress has been made since Steve Cary was in touch with your people last summer. As you may be aware, your case has been reassigned to Dennis McQuillan, who has reviewed the matter and is generally in agreement with the direction taken by Steve and your representatives, including Vince Memmott, consultant for Caribou. Thus, while we regret not having moved this matter along more rapidly, we hope that you will continue to show the kind of cooperation that we have come to expect of you.

At this juncture, it may be well to reiterate our understanding of what came out of a June 4, 1986, meeting with your company, as well as subsequent telephone conversations between EID technical staff and Mr. Memmott. If you have any disagreement with the following account of our tentative agreement with your company, by all means let me know promptly as to any misstatements or misunderstandings on my part. My understanding of where we left matters with your company last July is as follows:

A. Your company, Caribou -Four Corners, Inc., owns the Caribou - Four Corners Refinery in Kirtland, New Mexico. This facility consists of refinery apparatus and a tank farm, both now idle. During its operation of this facility, your company refined locally produced crude oil into gasoline, diesel, burner fuel, and other products. Leaded gasoline was blended and stored at the site.

B. On the refinery property, contaminated ground water containing volatile hydrocarbons, including benzene, toluene, xylenes, ethylbenzene, and 1,2-dichloroethane (EDC), was observed to be entering the so-called Brimhall Ditch. Lab analysis has detected up to 60 ppb of EDC in this water; the New Mexico ground water standard is 10 ppb. The Brimhall Ditch directs irrigation water to the south and west where it is applied to alfalfa and hay. Also south of the refinery property, in the apparent direction of ground water flow, is a rural residential subdivision where several private wells are in use. Three such wells were sampled and were found to contain up to 9 ppb of EDC. The Maximum Concentration Limit (MCL) proposed for drinking water by the U.S. Environmental Protection Agency (EPA) for public water supplies is 5 ppb. Ground water located up-gradient of the refinery was tested and was found to contain no volatile hydrocarbons.

C. Based upon the foregoing information, this agency (EID) has concluded that your company's refinery is the source of ground water contamination by volatile hydrocarbons including EDC, both on the refinery property itself and extending some presently unknown distance to the south and southwest beyond your property boundaries. This contamination constitutes a threat to the health of persons and livestock in the vicinity, and therefore not only violates our state ground water statutes and regulations but also is a public nuisance under New Mexico law. Further, such ground water contamination appears to be an unlawful "release" under the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. Sections 9601 et seq. Under the provisions of CERCLA, such a release makes your facility a potential Superfund site, and also makes your company potentially liabile to the State in an action in federal court under 42 U.S.C. Section 9607, for the recovery of response costs and damages to natural resources, of which the ground water is one such natural resource of the State.

D. In consideration of the foregoing factual findings and legal conclusions, your company has expressed its willingness voluntarily to do the following things:

1. Immediately provide a safe water supply to residents whose private drinking water wells are threatened by contamination from your refinery. In this regard, your company is committed to:

   a. identify users of private wells in the area south of State Road 489, between Coolidge Arroyo and the east boundary of Section 17;

   b. advise the well users of the contamination problem in the area;

c. offer to hook up all private well owners in that area to the public water supply system, at no cost to the well owners;

d. reimburse those well owners in that area who have already hooked up at their own expense, because of contamination from the refinery;

e. obtain water samples from each private well and have the samples tested for volatile organics by a laboratory approved by the EID;

f. advise EID in advance of sampling, so that we can split samples; and

g. advise EID and the well owners of your lab results.

EID will assist Caribou by sharing information in our possession concerning private well owners. Each private well owner in the above-described area should be given the opportunity to hook into the public water system without further delay and regardless of the level of contamination observed in the owner's well.

2. Within 30 days (or such longer period as you may reasonably need) after your receipt of this letter, your company will submit a proposal as to how you intend to investigate the nature and extent of ground water contamination emanating from your refinery. This proposal will be reviewed by EID and comments will be provided to Caribou within 20 days of receipt of your proposal. Thereafter, within 30 days of Caribou's receipt of EID's comments, Caribou will submit a final proposal addressing EID's comments and either adopting EID's suggestions or justifying why such adoption is impossible or unnecessary. The final, acceptable proposal by Caribou will describe in sufficient detail an investigation which outlines the vertical depth and lateral extent of contaminated ground water, identify and quantify all contaminants present; identify all contaminant sources known or suspected, and determine ground water flow direction(s), velocities, etc. Caribou will include in its proposal a schedule of activities and periodic progress reports. Promptly after EID accepts Caribou's proposal, Caribou will perform the site investigation in accordance with the proposal.

3. As soon as the requisite data is available from the site investigation, Caribou will design and submit to EID for approval a proposed remedial action plan. Both parties will act in good faith to arrive at a mutually acceptable plan, to the end that adequate protection of the public health, safety and the environment is achieved at minimal cost to Caribou.

4. Caribou agrees in principle to reimburse the State for past and future response costs incurred by the State, provided that such costs are direct costs (not general administrative or overhead costs), are limited to documented time by technical staff or documented lab expenses, and are demonstrably reasonable in light of EID's responsibilities to ensure that the site is properly investigated and remediated.

5. The issue of compensation by Caribou to the State for any damage to ground water or other natural resources of the State is expressly reserved, there being no necessity for Caribou to take any position on this issue at this juncture.

With the exception of the latter point, I believe that all of the above matters were discussed by Mr. Memmott and Steve Cary last summer. It is my understanding that the possibility of adding your refinery to the federal Superfund list was mentioned by Mr. Cary. My feeling is that if we can work together voluntarily to accomplish a satisfactory site investigation and remedial action, there will be no need for the State to press EPA for Superfund listing of your company's facility.

I would ask that promptly after your receipt of this letter, you either indicate in writing your agreement with the substance of this letter, or else inform me when I may expect to receive a more detailed, point-by-point response (in the event that you disagree with what I have outlined). By "promptly," I mean a week or ten days from your receipt of this certified letter.

Thank you for your kind cooperation in this matter. If you have any questions, please feel free to contact Dennis McQuillan, Richard Perkins or myself at any time. For your information, I am enclosing an exemplary settlement agreement which EID negotiated with another company covering site characterization and remedial action regarding ground water contamination.

Sincerely,

Richard L. Young/dcb

RICHARD L. YOUNG
Division Attorney

RLY:dcb

Enclosure

cc: Dennis McQuillan
Richard Perkins

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

December 23, 1986

TONEY ANAYA
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Spero Bavelas
B & M Associates
1919 West North Temple
Salt Lake City, Utah 84116

Dear Mr. Bavelas:

Enclosed as you requested are copies of the New Mexico Water Quality Control Commission Regulations, discharge plan guidelines for natural gas plants, guidelines for lined ponds and below-grade tanks (non-UST), and copies of water and soil analyses taken at Caribou and at nearby domestic wells.

A discharge plan as defined in WQCC Section 1-101.P, will be necessary for operation of the refinery, and will be requested of the new owners when we are notified who they are and of their intention to operate the refinery. Review of a discharge plan (i.e., permit) requires a minimum of 60 days including public notice. If all that remains at the end of the 60-day review period are a few minor items to be addressed, the plan can be approved conditionally. In preparing a refinery discharge plan application, use of the guidelines for natural gas plant discharge plan will be most helpful since many of the effluents and operations will be similar.

Regarding cleanup of contamination from past operations, this agency will not supervise such work unless additional staff assistance is made available for technical review. Therefore, EID's Superfund group will likely do the review. However, no definite decision has yet been made. I strongly urge you to contact an environmental consultant or attorney prior to purchase regarding possible financial liabilities due to ground water contamination at the site. Some preliminary work on the site may have been done by Camp, Dresser, and McKee consultants in Dallas (contact Jim McNutt or Richard Petrus, (214) 987-1900).

If you require further information, please contact me at 827-5812, or Roger Anderson, Environmental Engineer, at 827-5885, for questions on specific engineering requirements for the discharge plan.

Sincerely,

DAVID G. BOYER
Hydrogeologist/Environmental Bureau Chief

DGB:dp

Enc.

cc: Roger Anderson, NMOCD
Steve Cary, NMEID

P 612 458 023

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL

(See Reverse)

★ U.S.G.P.O. 1983-403-517

Sent to MR. SPERO BAVELAS	
Street and No. 1919 W. North Temple	
P.O., State and ZIP Code Salt Lake City, Utah 84116	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to whom and Date Delivered	
Return receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	$
Postmark or Date	

PS Form 3800, Feb. 1982

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 3:30pm	Date 12/17/86

Originating Party	Other Parties
Spero Bavelus B&M Assoc., Salt Lake City	Dave Boyer - OCD (801) 531-8866

Subject

Reopening of Caribou Refinery

Discussion Called to inquire about permitting. I told him it was fairly straight forward if no discharges to ground or surface water. Complex if discharges to ground water & NPDES if surface water. New operator must be aware of possible liabilities if site is listed or being considered for superfund. Suggested (strongly) that he contact environmental consultants or attorney before purchase.

Conclusions or Agreements

Send copy of regs, analyses, other information

Distribution

Caribou file

Signed D. G. Boyer

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501-2088
(505) 827-5800

September 11, 1986

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Richard Petrus
Camp, Dresser & McKee
8800 North Central Expressway
Suite 400
Dallas, Texas 75231

Dear Mr. Petrus:

Enclosed as you requested are copies of the New Mexico WQCC Regulations, discharge plan guidelines for natural gas plants, guidelines for lined ponds and below-grade tanks (non-UST), and copies of water and soil analyses taken at Caribou and at nearby domestic wells.

A discharge plan as defined in WQCC Section 1-101.P, will be necessary for operation of the refinery, and will be requested of the new owners when we are notified who they are and of their intention to operate the refinery. Review of a discharge plan (i.e., permit) requires a minimum of 60 days including public notice. If all that remains at the end of the 60-day review period are a few minor items to be addressed, the plan can be approved conditionally. Another approach is that for good cause shown temporary approval for non-UIC operations can be given by OCD for a one-time maximum period of 120 days (WQCC Section 3-106.B.). This time can be used to finish plan review. In preparing a refinery discharge plan application, use of the guidelines for natural gas plant discharge plans will be most helpful since many of the effluents wil be similar.

Regarding clean up of contamination from past operations, I cannot take it on unless I have additional staff assistance for technical review. Therefore, EID's Super-fund group will likely do the review. However, no definite decision has yet been made.

If you require further information, please contact me at 827-5815 or Roger Anderson, Environmental Engineer, at 827-5885.

Sincerely,

David G. Boyer

DAVID G. BOYER
Hydrogeologist/Environmental Bureau Chief

Enc.

cc: Roger Anderson, NMOCD
Steve Cary, NMEID

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 3:30 PM	Date 9/5/86

Originating Party	Other Parties
Jim McNutt - CDM Dallas Richard Petrus - " "	David Boyer - OCD Phone: (214) 987-1900

Subject Caribou Refining - Clean Up & Reopening

Discussion McNutt called to say their was a good possibility Joel Burr (Lawyer) & Rod Weatherford (oil man?) of Farmington would buy and operate Caribou. CDM wanted to know who would do permit review (OCD) and cleanup review (likely OCD). He wanted to know our rules for secondary containment (proper diking, check of base & bottom of tanks for bad leaks, no lining of dikes, no draining of tank water), double lining of underground piping (Told him hydrostatic tests OK) and if we required cathodic protection (unsure). He said worst area for cleanup was pits in fields & GW.

Conclusions or Agreements I sent them WQCC Regs, Gas Plant Guidelines and told them how to apply for a DP. Told them by phone (and letters) that we do permitting but that EID would have to do cleanup review since I am only hydrogeologist.

Distribution
Caribou File

Signed [signature]

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 11 AM	Date 8/13/86

Originating Party 325-1702	Other Parties
Joel Burr Farmington	Dave Boyer - OCD
Burr & Codey Lawyers	

Subject Caribou Refinery

Discussion Burr has a client who wants to purchase Caribou and wanted to know status of cleanup, etc. I told him only in preliminary stage. OCD staffing too limited to deal with cleanup at this time. Since Caribou is willing to do investigation etc. now, they were referred to EID's superfund program. I told Burr of GW problems, refinery Haz. Waste issues and referred him to EID. I said if had evap ponds lined, could get permitted but would need plan

Conclusions or Agreements for spills, other disposal etc. Since remedial action might interfere with operations, need to be aware of magnitude of problem. Suggested they get a consultant to investigate these aspects before purchase

Distribution Caribou file.

Signed D G Boyer

Facility name: Caribou Refinery

Location: Kirtland, New Mexico

EPA Region: VI

Person(s) in charge of the facility: Site operator: none, inactive;

Site owner: Mr. Bill Call
Caribou - Four Corners, Inc.
Hwy 89, Rte 1
Afton, WY 83110

Name of Reviewer: Steven J. Cary Date: August 25, 1986

General description of the facility:

Caribou Refinery is located near the community of Kirtland, in northwestern San Juan County, New Mexico. The site is an air-exchange petroleum refining operation that has been inactive since 1982. In addition to the idle refinery apparatus, on-site structures include an inactive tank farm and an operating convenience store that sells gasoline. While operative the refinery produced diesel, kerosine, burner fuel, and leaded and unleaded gasoline. The facility had a poor housekeeping record; spills and leaks were commonplace, with some resulting in fires and some entering a local irrigation ditch. Crude oil tank bottom wastes were placed into unlined pits, at least one of which was excavated below the seasonal high water table. Contamination has been confirmed in both surface water and shallow ground water at the site. On-site ground water and surface water are contaminated with benzene, toluene, ethylbenzene, xylenes and 1,2-dichloroethane. Three downgradient private wells are contaminated with 1,2-dichloroethane. Surface water is used to irrigate forage crops less than one mile downstream from the extent of contamination. Other hazardous materials identified on-site include heavy metals, such as lead, and dioctylphthalate.

Scores: $S_M =$ 38.12 ($S_{gw} =$ 54.63 $S_{sw} =$ 36.92 $S_a =$ 0)

$S_{FE} =$ not evaluated

$S_{DC} =$ not evaluated

FIGURE 1
HRS COVER SHEET

Ground Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 45	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 3	2	6	6	
Net Precipitation	0 1 2 3	1	1	3	
Permeability of the Unsaturated Zone	0 1 2 3	1	3	3	
Physical State	0 1 2 3	1	3	3	
	Total Route Characteristics Score		13	15	
3 Containment	0 1 2 3	1	3	3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 18	1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	6	8	
	Total Waste Characteristics Score		24	26	
5 Targets					3.5
Ground Water Use	0 1 2 3	3	9	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 / 12 16 18 20 / 24 30 32 35 40	1	20	40	
	Total Targets Score		29	49	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			31320	57,330	
7 Divide line 6 by 57,330 and multiply by 100		S_{gw} =	54.63		

FIGURE 2
GROUND WATER ROUTE WORK SHEET

BRIMHALL DITCH PATHWAY

Surface Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 45	1	45	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	0 1 2 3	1	3	3	
1-yr. 24-hr. Rainfall	0 1 2 3	1	1	3	
Distance to Nearest Surface Water	0 1 2 3	2	6	6	
Physical State	0 1 2 3	1	3	3	
	Total Route Characteristics Score		13	15	
3 Containment	0 1 2 3	1	3	3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 18	1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	6	8	
	Total Waste Characteristics Score		24	26	
5 Targets					4.5
Surface Water Use	0 1 2 3	3	6	9	
Distance to a Sensitive Environment	0 1 2 3	2	0	6	
Population Served/Distance to Water Intake Downstream	0 4 6 8 10 12 16 18 20 24 30 32 35 40	1	16	40	
	Total Targets Score		22	55	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			23760	64,350	
7 Divide line 6 by 64,350 and multiply by 100		S_{sw} =	36.92		

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

FARMERS MUTUAL IRRIGATION DITCH

Surface Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 45	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	0 1 2 3	1	3	3	
1-yr. 24-hr. Rainfall	0 1 2 3	1	1	3	
Distance to Nearest Surface Water	0 1 2 3	2	6	6	
Physical State	0 1 2 3	1	3	3	
	Total Route Characteristics Score		13	15	
3 Containment	0 1 2 3	1	3	3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 18	1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	2	8	
	Total Waste Characteristics Score		20	26	
5 Targets					4.5
Surface Water Use	0 1 2 3	3	6	9	
Distance to a Sensitive Environment	0 1 2 3	2	0	6	
Population Served/Distance to Water Intake Downstream	0 4 6 8 10 12 16 18 20 24 30 32 35 40	1	10	40	
	Total Targets Score		16	55	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			12480	64,350	
7 Divide line 6 by 64,350 and multiply by 100		S_{SW} =	19.39		

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
$\boxed{1}$ Observed Release	0 45	1		45	5.1
Date and Location:					
Sampling Protocol:					
If line $\boxed{1}$ is 0, the S_a = 0. Enter on line $\boxed{5}$. If line $\boxed{1}$ is 45, then proceed to line $\boxed{2}$.					
$\boxed{2}$ Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			20	
$\boxed{3}$ Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
	Total Targets Score			39	
$\boxed{4}$ Multiply $\boxed{1}$ x $\boxed{2}$ x $\boxed{3}$				35,100	
$\boxed{5}$ Divide line $\boxed{4}$ by 35,100 and multiply by 100	S_a =				

FIGURE 9
AIR ROUTE WORK SHEET

	S	S^2
Groundwater Route Score (S_{gw})	54.63	2984.44
Surface Water Route Score (S_{sw})	36.92	1363.82
Air Route Score (S_a)	------	-------
$S^2_{gw} + S^2_{sw} + S^2_a$		4348.26
$\sqrt{S^2_{gw} + S^2_{sw} + S^2_a}$		65.94
$\sqrt{S^2_{gw} + S^2_{sw} + S^2_a} / 1.73 = S_M =$		38.12

FIGURE 10
WORKSHEET FOR COMPUTING S_M

Fire and Explosion Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Containment	1 3	1		3	7.1
2 Waste Characteristics					7.2
Direct Evidence	0 3	1		3	
Ignitability	0 1 2 3	1		3	
Reactivity	0 1 2 3	1		3	
Incompatibility	0 1 2 3	1		3	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			20	
3 Targets					7.3
Distance to Nearest Population	0 1 2 3 4 5	1		5	
Distance to Nearest Building	0 1 2 3	1		3	
Distance to Sensitive Environment	0 1 2 3	1		3	
Land Use	0 1 2 3	1		3	
Population Within 2-Mile Radius	0 1 2 3 4 5	1		5	
Buildings Within 2-Mile Radius	0 1 2 3 4 5	1		5	
	Total Targets Score			24	
4 Multiply 1 x 2 x 3				1,440	
5 Divide line 4 by 1,440 and multiply by 100		S_{FE} =			

FIGURE 11
FIRE AND EXPLOSION WORK SHEET

Direct Contact Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Incident	0 45	1		45	8.1
If line 1 is 45, proceed to line 4 If line 1 is 0, proceed to line 2					
2 Accessibility	0 1 2 3	1		3	8.2
3 Containment	0 15	1		15	8.3
4 Waste Characteristics Toxicity	0 1 2 3	5		15	8.4
5 Targets					8.5
Population Within a 1-Mile Radius	0 1 2 3 4 5	4		20	
Distance to a Critical Habitat	0 1 2 3	4		12	
	Total Targets Score			32	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5				21,600	
7 Divide line 6 by 21,600 and multiply by 100	S_{DC} =				

FIGURE 12
DIRECT CONTACT WORK SHEET

86 1466 C

DAVID BOYER
OIL CONSERVATION DIV
PO BOX 2088 STATE LAND OFFICE
SANTA FE, NM 87504-2088

LABORATORY 2/14/86
LAB NUMBER OR 166A,B.
82235
SLD Users Code No.

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ______

Water Supply and/or Code No. ______

City & County KIRTLAND, SAN JUAN COUNTY

Collected (date & time) 860213 ~~1510~~ 1515 By (name) BAILEY/BOYER

pH= ______; Conductivity= ______ umho/cm at ______ °C; Chlorine Residual= ______

Dissolved Oxygen= ______ mg/l; Alkalinity= ______; Flow Rate= ______

Sampling Location, Methods & Remarks (i.e. odors etc.)

SEEP BEHIND CARIBOU; ON ROAD RIGHT of WAY

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed J. Bailey

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed ______

Method of Shipment to Laboratory Hand-carried.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen 8602131515; duplicate ______; triplicate ______; blank(s) ______,
and ______ amber glass jug(s) with teflon-lined cap(s) identified as ______,
and ______ other container(s) (describe) ______ identified as ______.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on (date & time) ______ and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ______ ______

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on (date & time) ______ and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ______ ______

ANALYSES REQUESTED LAB. No.: ORG- 166

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
X	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
X	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
√	√	SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
		EDC			

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
benzene	possible trace <10 ppb		
toluene	possible trace <10		
ethylbenzene	possible trace <10		
p-xylene	possible trace <10		
m-xylene	possible trace <10		
o-xylene	possible trace <10		
1,2-dichloroethane	possible trace <10		
		* DETECTION LIMIT	10 ugm/l

REMARKS: This sample was foamy.

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes__ NO X. Seal(s) broken by:________ date:____

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 5 March 86; 7 April 86 Analyst's signature: [signature] Tinney

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: [signature] Meyerhein

86 1461 C

2/14/86

REPORT TO: DAVID BOYER
OIL CONSERVATION DIV.
P.O. BOX 2088 STATE LAND OFFICE
SANTA FE, NM 87504-2088

LABORATORY OR 161 A, B.

LAB NUMBER

82235

SLD Users Code No.

ENVIRONMENT

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other

Water Supply and/or Code No.

City & County KIRTLAND, SAN JUAN COUNTY

Collected (date & time) 86 02 13 1510 By (name) BAILEY / BOYER

pH= 6.6 ; Conductivity= 1100 umho/cm at 8 °C; Chlorine Residual=

Dissolved Oxygen= mg/l; Alkalinity= ; Flow Rate=

Sampling Location, Methods & Remarks (i.e. odors etc.)

DITCH OFF SW CORNER CARIBOU REFINERY

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed G. Bailey

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed

Method of Shipment to Laboratory HAND CARRIED.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as: specimen 860213 1510; duplicate ; triplicate ; blank(s) , and amber glass jug(s) with teflon-lined cap(s) identified as , and other container(s) (describe) identified as .

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from to at (location) on (date & time) and that the statements in this block are correct.

Disposition of Sample . Seal(s) Intact: Yes ☐ No ☐ .

Signature(s)

I (we) certify that this sample was transferred from to at (location) on (date & time) and that the statements in this block are correct.

Disposition of Sample . Seal(s) Intact: Yes ☐ No ☐ .

Signature(s)

ANALYSES REQUESTED — LAB. No.: ORG- 161

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
~~X~~	~~X~~	ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
X	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
X	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
✓	✓	EDC			

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
arom. purg. screen*	none detected		
1,2-dichloroethane	3 ugm/l		
		* DETECTION LIMIT	1 ppb

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes ___ NO X. Seal(s) broken by: ______________ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 3 March & 12 March 86 Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: K Meyerhein

NF.

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED 2 14 86	LAB NO. WC 674	USER CODE ☐ 59300 ☐ 59600 ☒ OTHER: 82235	
Collection DATE 86 02 13	SITE INFORMATION ►	Sample location Caribou Four Corners Refinery	
Collection TIME 1510		Collection site description Drainage Ditch at SW corner of refinery on road ROW	
Collected by — Person/Agency Boyer/Bailey/Anderson (OCD)			

SEND FINAL REPORT TO ►

ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87501

Attn: David Boyer

Station/well code

Owner

SAMPLING CONDITIONS

☐ Bailed ☐ Pump ☒ Dipped ☐ Tap	Water level —	Discharge ~5 gpm	Sample type Grab
pH (00400) 6.6	Conductivity (Uncorrected) 1100 µmho	Water Temp. (00010) 8 °C	Conductivity at 25°C (00094) µmho

Field comments Smells like gasoline

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted 1 | ☐ NF: Whole sample (Non-filtered) | ☒ F: Filtered in field with 0.45 µmembrane filter | ☐ A: 2 ml H_2SO_4/L added

☒ NA: No acid added ☐ Other-*specify*:

ANALYTICAL RESULTS from SAMPLES

NF, NA		Units	Date analyzed
☐ Conductivity (Corrected) 25°C (00095)		µmho	
☐ Total non-filterable residue (suspended) (00530)		mg/l	
☐ Other:			
☐ Other:			
☐ Other:			

F, NA		Units	Date analyzed
☒ Calcium (00915)	250.7	mg/l	2/19
☒ Magnesium (00925)	10.9	mg/l	"
☒ Sodium (00930)	182.4	mg/l	"
☒ Potassium (00935)	35.1	mg/l	"
☒ Bicarbonate (00440)	363	mg/l	2/18
☒ Chloride (00940)	77	mg/l	3/11
☒ Sulfate (00945)	677	mg/l	3/10
☒ Total filterable residue (dissolved) (70300)	1353	mg/l	3/19
☐ Other:			

NF, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

F, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst	Date Reported	Reviewed by
	3 26 86	CJ

Laboratory remarks

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

PF · Heavy Metal ~~GENERAL WATER CHEMISTRY and NITROGEN~~ ANALYSIS

DATE RECEIVED 2/14/86 LAB NO. HM 304 USER CODE ☐ 59300 ☐ 59600 ☒ OTHER: 82235

Collection DATE 86/02/13
Collection TIME 1310
SITE INFORMATION ►
Sample location: Caribou Four Corners Refinery
Collection site description: Drainage Ditch at SW corner of refinery on road ROW
Collected by — Person/Agency: Boyer/Bailey/Anderson (OCD)

SEND FINAL REPORT TO ►
ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87501
Attn: David Boyer

RECEIVED APR 28 1986 OIL CONSERVATION DIVISION SANTA FE

Station/well code
Owner

SAMPLING CONDITIONS

☐ Bailed ☐ Pump ☒ Dipped ☐ Tap	Water level —	Discharge ~5 GPM	Sample type Grab
pH (00400) 6.6	Conductivity (Uncorrected) 1100 μmho	Water Temp. (00010) 8 °C	Conductivity at 25 °C (00094) μmho

Field comments: Smells like gasoline.

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted: 1 | ☐ NF: Whole sample (Non-filtered) | ☒ F: Filtered in field with 0.45 μmembrane filter | ☒ A: ~~2 ml H_2SO_4/L~~ added 4 ml CONC HNO_3

☐ NA: No acid added ☐ Other-*specify*:

ANALYTICAL RESULTS from SAMPLES

NF, NA — Units / Date analyzed

		Units	Date analyzed
☐ Conductivity (Corrected) 25 °C (00095)		μmho	
☒ ~~Total non-filterable residue (suspended) (00530)~~ ICAP		mg/l	
☒ Other: As	<0.005		4/7/86
☒ Other: Se	<0.005		3/18/86
☒ Other: Hg	<0.0005		3/18/86

F, NA

		Units	Date analyzed
☐ Calcium (00915)		mg/l	
☐ Magnesium (00925)		mg/l	
☐ Sodium (00930)		mg/l	
☐ Potassium (00935)		mg/l	
☐ Bicarbonate (00440)		mg/l	
☐ Chloride (00940)		mg/l	
☐ Sulfate (00945)		mg/l	
☐ Total filterable residue (dissolved) (70300)		mg/l	
☐ Other:			

NF, A-H_2SO_4

☐ Nitrate-N +, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)	/	mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

F, A-H_2SO_4

☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst | Date Reported 4/18/86 | Reviewed by JFA

Laboratory remarks

SLD 726 (12/84) *DISTRIBUTION:* **WHITE** — EID, GW&HW Bureau **CANARY** — WS System **PINK** — EID Local Office **GOLDENROD** — SLD

cc. Farmington EID
724 W. Animas 87401

86 148-C

REPORT TO: Steven Cary
Ground Water Section
Environmental Improvement Div.
P.O. Box 968
Santa Fe, NM 87504-0968

LABORATORY 2/11/86.

LAB NUMBER OR148 A, B.

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ______

Water Supply and/or Code No. ______

City & County Kirtland, San Juan

Collected (date & time) 2-10-86, 1050 hrs By (name) Len Murray

pH= ______; Conductivity= ______ umho/cm at ______ °C; Chlorine Residual= ______

Dissolved Oxygen= ______ mg/l; Alkalinity= ______; Flow Rate= ______

Sampling Location, Methods & Remarks (i.e. odors etc.)

San Juan River, 300 ft. downstream from drainage ditch.

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed ______

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed ______

Method of Shipment to Laboratory Purolator.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen SJR 2a; duplicate SJR 2b; triplicate ______; blank(s) ______,
and ______ amber glass jug(s) with teflon-lined cap(s) identified as ______,
and ______ other container(s) (describe) ______ identified as ______.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on (date & time) ______ and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☐ No ☐ .

Signature(s) ______ ______

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on (date & time) ______ and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☐ No ☐ .

Signature(s) ______ ______

RECEIVED
FEB 21 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

ANALYSES REQUESTED   LAB. NO.: ORG-148

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
X	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
X	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
X	X	1,2-Dichloroethene			

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
Aromatic Purgeables	None Detected *		
Halogenated Purgeables	None Detected *		
		* DETECTION LIMIT	2 ug/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes___ NO X. Seal(s) broken by:______________ date:________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 2/13/86. Analyst's signature: Richard Meyerhans

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature:______________

C.C. Farmington EID
724 W. Animas 87401

86/145 C

REPORT TO:

Steven Cary
Ground Water Section
Environmental Improvement Div.
P.O. Box 968
Santa Fe, NM 87504-0968

LABORATORY 2/11/86

LAB NUMBER OR 145 A, B.

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ____

Water Supply and/or Code No. ____

City & County Kirtland, San Juan

Collected (date & time) 2-10-86, 1045 hrs By (name) Len Murray

pH=____; Conductivity=____umho/cm at____°C; Chlorine Residual=____

Dissolved Oxygen=____mg/l; Alkalinity=____; Flow Rate=____

Sampling Location, Methods & Remarks (i.e. odors etc.)

Drainage Ditch 1 mile Southwest of Caribou refinery

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed ____

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed ____

Method of Shipment to Laboratory Purolator.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen 3-A; duplicate 3-B; triplicate ____; blank(s) ____,
and ____ amber glass jug(s) with teflon-lined cap(s) identified as ____,
and ____ other container(s) (describe) ____ identified as ____.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).
P-ICE: Sample stored in an ice bath.
P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from ____ to ____ at (location) ____ on (date & time) ____ and that the statements in this block are correct.

Disposition of Sample ____. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ____ ____

I (we) certify that this sample was transferred from ____ to ____ at (location) ____ on (date & time) ____ and that the statements in this block are correct.

Disposition of Sample ____. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ____ ____

RECEIVED
FEB 21 1986
LIQUID WASTE/GROUNDWATER SURVEILLANCE

ANALYSES REQUESTED LAB. NO.: ORG- 145

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
X	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
X	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
X	X	1,2-Dichloroethane			

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
GC/MS Purgeables			
Thiobis methane	[~ 25]		
Carbon disulfide	[~ 5]		
Toluene	3		
1,2-Dichloroethane	None Detected*		
No other purgeables Detected *			
		* DETECTION LIMIT	2 ug/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes ___ NO X . Seal(s) broken by: ______ date: ______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 2/13/86 . Analyst's signature: Richard Meyerhen

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: ______

C.C. Farmington EID
724 W. Animas 87401

86 143 C

2/11/86

Steven Cary

REPORT TO:
Ground Water Section
Environmental Improvement Div.
P.O. Box 968
Santa Fe, NM 87504-0968

LABORATORY CR 143 A,B.

LAB NUMBER

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other

Water Supply and/or Code No.

City & County Kirtland, San Juan

Collected (date & time) 2-10-86, 1010 hrs By (name) Len Murray

pH= ; Conductivity= umho/cm at °C; Chlorine Residual=

Dissolved Oxygen= mg/l; Alkalinity= ; Flow Rate=

Sampling Location, Methods & Remarks (i.e. odors etc.)

San Juan River, at Lions Club Park, Kirtland, NM.

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed

Method of Shipment to Laboratory Purolator.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen SJR1-A; duplicate SJR-1-B; triplicate ; blank(s) ,
and amber glass jug(s) with teflon-lined cap(s) identified as ,
and other container(s) (describe) identified as .

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

$P-Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from to at (location) on (date & time) and that the statements in this block are correct.

Disposition of Sample . Seal(s) Intact: Yes ☐ No ☐ .

Signature(s)

RECEIVED
FEB 21 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

I (we) certify that this sample was transferred from to at (location) on (date & time) and that the statements in this block are correct.

Disposition of Sample . Seal(s) Intact: Yes ☐ No ☐ .

Signature(s)

ANALYSES REQUESTED LAB. NO.: ORG- 143

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
X	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
X	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
X	X	1,2-Dichloroethane			

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
Aromatic Purgeables	None Detected*		
Halogenated Purgeables	None Detected*		
		* DETECTION LIMIT	2ug/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes___ NO X. Seal(s) broken by:__________________ date:________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 2/13/86. Analyst's signature: Richard Meyerhen

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature:__________________

cc. Farmington EID
724 W. Animas 87401

86 446 C

Steven Cary

REPORT TO: Ground Water Section
Environmental Improvement Div.
P.O. Box 968
Santa Fe, NM 87504-0968

LABORATORY 2/11/86.

LAB NUMBER OR 146 A, B.

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ______

Water Supply and/or Code No. ______

City & County Kirtland, San Juan

Collected (date & time) 2-10-86, 1000 By (name) Len Murray

pH= ____; Conductivity= ____ umho/cm at ____ °C; Chlorine Residual= ____

Dissolved Oxygen= ____ mg/l; Alkalinity= ____; Flow Rate= ____

Sampling Location, Methods & Remarks (i.e. odors etc.)

Drainage Ditch ½ mile South of Caribou refinery

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed ______

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed ______

Method of Shipment to Laboratory Purolator.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as: specimen 2-A; duplicate 2-B; triplicate ____; blank(s) ____, and ____ amber glass jug(s) with teflon-lined cap(s) identified as ____, and ____ other container(s) (describe) ____ identified as ____.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on (date & time) ______ and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ______ ______

RECEIVED
FEB 21 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on (date & time) ______ and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ______ ______

ANALYSES REQUESTED LAB. NO.: ORG- 146

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
X	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
X	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
X	X	1,2-Dichloroethane			

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
Aromatic Purgeables	None Detected		
Halogenated Purgeables			
1,2-Dichloroethane	1ug/l		
		* DETECTION LIMIT	1ug/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes___ NO X . Seal(s) broken by:____________ date:________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 2/23/86 . Analyst's signature: Richard Meyahei

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature:____________

.C.C. Farmington EID
724 W. Animas 87401

86 147 C

REPORT TO:

Steven Cary
Ground Water Section
Environmental Improvent Div
P.O. Box 968
Santa Fe, NM 87504-0968

LABORATORY 2/11/86.

LAB NUMBER OR 147A, B.

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other

Water Supply and/or Code No.

City & County Kirtland, San Juan

Collected (date & time) 2-10-86, 0845 hrs By (name) Len Murray

pH=_____; Conductivity=_____ umho/cm at _____ °C; Chlorine Residual=

Dissolved Oxygen=_____ mg/l; Alkalinity=_____; Flow Rate=

Sampling Location, Methods & Remarks (i.e. odors etc.)

Farmington office, 724 W. Animas, Distilled Water jug

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed

Method of Shipment to Laboratory Purolator.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as: specimen Dist. H_2O Blank a duplicate Dist H_2O Blank b; triplicate _____; blank(s) _____, and _____ amber glass jug(s) with teflon-lined cap(s) identified as _____, and _____ other container(s) (describe) _____ identified as _____.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

$P\text{-}Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from _____ to _____ at (location) _____ on (date & time) _____ and that the statements in this block are correct.

Disposition of Sample _____. Seal(s) Intact: Yes ☐ No ☐ .

Signature(s)

I (we) certify that this sample was transferred from _____ to _____ at (location) _____ on (date & time) _____ and that the statements in this block are correct.

Disposition of Sample _____. Seal(s) Intact: Yes ☐ No ☐ .

Signature(s)

RECEIVED
FEB 21 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

ANALYSES REQUESTED LAB. No.: ORG- 147

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
X	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
X	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
X	X	1,2-Dichloroethane			

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
Aromatic Purgeables	None Detected *		
Halogenated Purgeables	None Detected *		
		* DETECTION LIMIT	2ug/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes___ NO X . Seal(s) broken by:_______________ date:_______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 2/13/86 . Analyst's signature: Richard Meyer Lee

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature:_______________

c.c. Farmington EID
724 W. Animas 87401

86 144 C

2/11/86.

Steven Cary

REPORT TO: Ground Water Section
Environmental Improvement Div.
P.O. Box 968
Santa Fe, NM 87504-0968

LABORATORY

LAB NUMBER OR 144 A, B.

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other

Water Supply and/or Code No.

City & County Kirtland, San Juan

Collected (date & time) 2-10-86, 0950 hrs By (name) Len Murray

pH= ; Conductivity= umho/cm at °C; Chlorine Residual=

Dissolved Oxygen= mg/l; Alkalinity= ; Flow Rate=

Sampling Location, Methods & Remarks (i.e. odors etc.)

Bill Walker Well, from Kitchen sink - Priority 1

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed

Method of Shipment to Laboratory Purolator.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen 1-A ; duplicate 1-B ; triplicate ; blank(s) ,
and amber glass jug(s) with teflon-lined cap(s) identified as ,
and other container(s) (describe) identified as .

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from to at (location) on (date & time) and that the statements in this block are correct.

Disposition of Sample . Seal(s) Intact: Yes ☐ No ☐ .

Signature(s)

RECEIVED
FEB 21 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

I (we) certify that this sample was transferred from to at (location) on (date & time) and that the statements in this block are correct.

Disposition of Sample . Seal(s) Intact: Yes ☐ No ☐ .

Signature(s)

ANALYSES REQUESTED LAB. NO.: ORG- 144

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
		AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
		HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
		1,2-Dichloroethane			

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
GC/MS Purgeable Scan			
1,2-Dichloroethane	2 ug/l		
No other Purgeables Detected *			
		* DETECTION LIMIT	1ug/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes___ NO x. Seal(s) broken by:________ date:________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 2/12/86. Analyst's signature: Richard Meyerhein

I certify that I have reviewed and concur with the statements in this block and the analytical results for this sample and with the statements in this block. Reviewers signature:________

TONEY ANAYA
GOVERNOR

DENISE D. FORT
DIRECTOR

HEALTH ENVIRONMENT department

STATE OF NEW MEXICO

ENVIRONMENTAL IMPROVEMENT DIVISION
P.O. Box 968, Santa Fe, New Mexico 87504-0968
(505) 984-0020

February 10, 1986

M E M O R A N D U M

TO: David G. Boyer
Oil Conservation Division

FROM: Steven J. Cary, WRS III
GW/HWB CERCLA Program

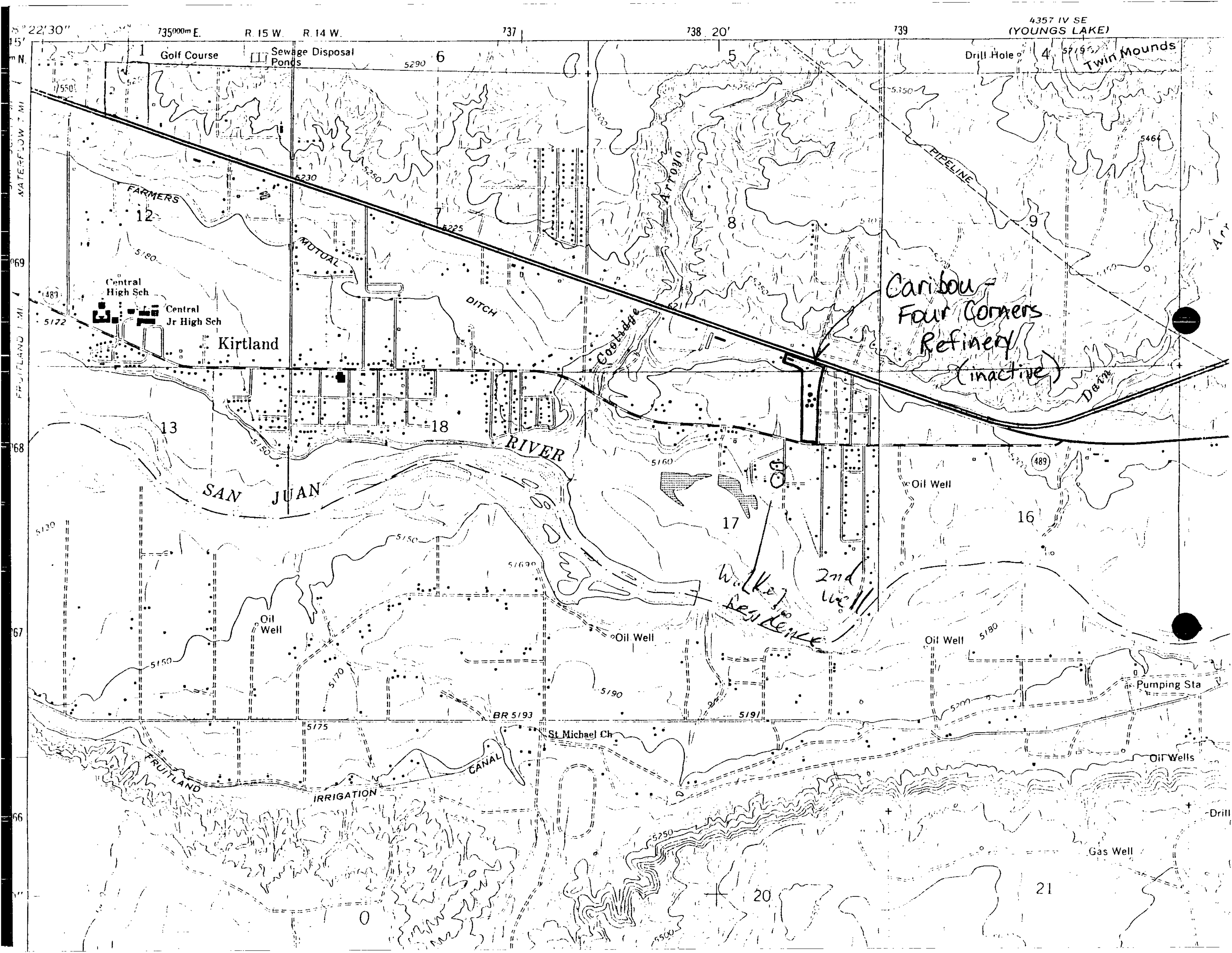
SUBJECT: **CARIBOU - FOUR CORNERS RERFINERY, KIRTLAND**

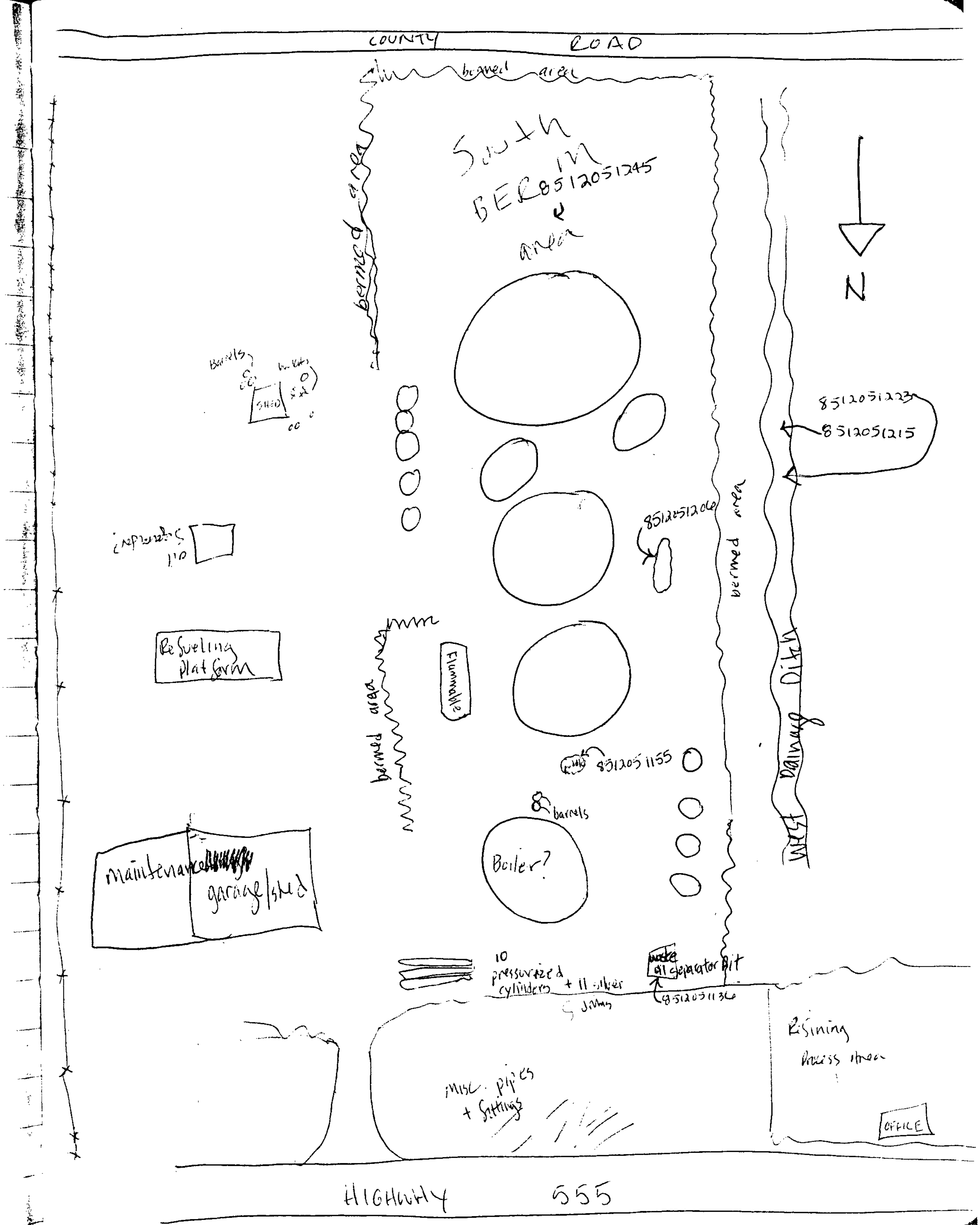
The attached information should apprise you of our recent activity at the above site. Outstanding sample results will be forwarded to you as they become available.

SJC:dlr

Attachment

EQUAL OPPORTUNITY EMPLOYER


4357 IV SE
(YOUNGS LAKE)
Golf Course
Sewage Disposal Ponds
R. 15 W.
R. 14 W.
Drill Hole
Twin Mounds
PIPELINE
Arroyo
Coolidge
Caribou-Four Corners Refinery (inactive)
Dam
FARMERS
MUTUAL
DITCH
Central High Sch
Central Jr High Sch
Kirtland
SAN JUAN RIVER
Oil Well
2nd Well
Walker Residence
Pumping Sta
Oil Wells
St Michael Ch
FRUITLAND
IRRIGATION
CANAL
Gas Well
Drill
FRUITLAND 1 MI.
WATERFLOW 7 MI.



COUNTY ROAD
bermed area
South BERM area
8512051245
N
8512051223
8512051215
bermed area
8512051206
West Drainage Ditch
Barrels
SHED
Refueling platform
Flammable
bermed area
8512051155
8 barrels
Boiler?
maintenance
garage/shed
10 pressurized cylinders
oil separator pit
8512051136
Refining Process Area
OFFICE
misc. pipes + fittings
HIGHWAY 555

HEALTH ENVIRONMENT department

STATE OF NEW MEXICO

ENVIRONMENTAL IMPROVEMENT DIVISION

P.O. Box 968, Santa Fe, New Mexico 87504-0968
(505) 984-0020

TONEY ANAYA
GOVERNOR

DENISE D. FORT
DIRECTOR

January 31, 1986

Mr. and Mrs. Bill Walker
P.O. Box 252
Kirtland, NM 87417

Dear Mr. and Mrs. Walker:

On December 5, 1985, the New Mexico Environmental Improvement Division (EID) collected a water sample from your private well. In the past, this well had been sampled for bacteria only. This time, however, we requested analyses for heavy metals and several organic chemicals. Results of these tests are attached.

The results show that your well water contains acceptable concentrations of most metals. Manganese is slightly elevated above the state ground water standard of 0.2 parts per million (ppm), but this is natural for the ground water in your area. In addition, the standard is only for aesthetic purposes; the excess manganese may stain porcelain appliances, but it does not present a health threat.

The lab also detected no organochlorine pesticides, such as DDT, and no polychlorinated biphenyls (PCBs).

Your well water does contain a small amount of 1,2-dichloroethane. This is an organic chemical often associated with leaded gasoline. The sample from your well contained 9 parts per billion (ppb) of this chemical; this is below the state ground water standard of 10 ppb. The presence of 1,2-dichloroethane in your well water suggests low-level contamination of shallow ground water by petroleum products in your area, but the amount of contaminant present at this time is too small to be a threat to human health.

An EID representative may call on you again in the near future for the purpose resampling your well and confirming these results. Eventually the EID will conduct a more detailed survey of other wells in your neighborhood and determine the source of the ground water contamination. We regret, however, that an already full schedule, as well as inadequate staffing and funding, will probably delay this work until sometime in 1987.

EQUAL OPPORTUNITY EMPLOYER

Please telephone me at 827-2898, or contact the EID office in Farmington, if you have any questions.

Sincerely,

Steven J. Cary
Water Resource Specialist
Ground Water & Hazardous Waste Bureau

SJC:dlr

Enclosures

cc: David Tomko, EID Field Office, Farmington
Dr. Millicent Eidson, Environmental Epidemiologist, Santa Fe
David G. Boyer, Oil Conservation Division, Santa Fe
Stuart Castle, EID Water Supply Section, Santa Fe

REPORT TO: CARY/RAWLINGS -- NMEID
GW/HW Bureau -- CERCLA Section
P.O.Box 968
Santa Fe, NM 87504-0968

LABORATORY ____________

LAB NUMBER

85-1196-C

Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ____________

~~Water Supply and/or Code No.~~ Sample # 851205 1345 - Walker Well

City & County Carbon Refinery Site, Farmington NM

Collected (date & time) 12/5/85 @ 1345 By (name) S. Cary / R. Rawlings

pH= —; Conductivity= — umho/cm at — °C; Chlorine Residual= —

Dissolved Oxygen= — mg/l; Alkalinity= —; Flow Rate= —

Sampling Location, Methods & Remarks (i.e. odors etc.)

From Walker Well (private) approx ½ mile down gradient from Refinery.

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed Richard H Rawlings

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed Steven J. Cary

Method of Shipment to Laboratory By Hand.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen 1; duplicate 1; triplicate ____; blank(s) ____,
and ____ amber glass jug(s) with teflon-lined cap(s) identified as ____,
and ____ other container(s) (describe) ____ identified as ____.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).
P-ICE: Sample stored in an ice bath.
P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from STEVEN J. CARY to R Meyerhein at (location) SLD on (date & time) 12/10/85 11:02a and that the statements in this block are correct.

Disposition of Sample ____________. Seal(s) Intact: Yes ☒ No ☐.

Signature(s) Steven J. Cary R Meyerhein

I (we) certify that this sample was transferred from ____________ to ____________ at (location) ____________ on (date & time) ____________ and that the statements in this block are correct.

Disposition of Sample ____________. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ____________ ____________

RECEIVED
JAN 27 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

ANALYSES REQUESTED | LAB. No.: ORG- 1196

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
arom. purg. screen*	none detected		
1,2-dichloroethane ⊕	9 ppb		
		⊕ DETECTION LIMIT	1 ugm/l
		* DETECTION LIMIT	2 ugm/l

REMARKS: A trace amount of one compound was detected by the halogenated screen that was not identified (it eluted early on both columns).

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO ___. Seal(s) broken by: [signature] date: 12-12-85 1-6-86

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis 12-12-85 (1-6-86) Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: K Meyerhon

REPORT TO: CARY/RAWLINGS NMEID
GW/HW Bureau -- CERCLA Section
P.O.Box 968
Santa Fe, NM 87504-0968

LABORATORY

LAB NUMBER 85- 1216 -B

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other

~~Water Supply and/or Code No.~~ Sample # 8512051345

City & County Down Gradient Well (½ mile) Caribou Fed Site, Farmington

Collected (date & time) 12/5/85 1345 By (name) R. Rawlings / S. Cary

pH= — ; Conductivity= — umho/cm at — °C; Chlorine Residual= —

Dissolved Oxygen= — mg/l; Alkalinity= — ; Flow Rate= —

Sampling Location, Methods & Remarks (i.e. odors etc.)

From Walker Resident Kitchen faucet.

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed Richard A Rawlings

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed Steven J. Cary

Method of Shipment to Laboratory By Hand.

THIS FORM ACCOMPANIES ____ septum vials with teflon-lined discs identified as:

specimen ____; duplicate ____; triplicate ____; blank(s) ____,

and 1 amber glass jug(s) with teflon-lined cap(s) identified as 8512051345,

and ____ other container(s) (describe) ____ identified as ____.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from STEVEN J. CARY to R Meyerhein at (location) SLD on (date & time) 12/10/85 11:20am and that the statements in this block are correct.

Disposition of Sample ____. Seal(s) Intact: Yes ☒ No ☐.

Signature(s) Steven J. Cary   R Meyerhein

I (we) certify that this sample was transferred from ____ to ____ at (location) ____ on (date & time) ____ and that the statements in this block are correct.

Disposition of Sample ____. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ____

RECEIVED
JAN 17 1986
LIQUID WASTE/GROUND WATER
SURVEILLANCE

ANALYSES REQUESTED LAB. No.: ORG- 85-1246

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
		AROMATIC HYDROCARBON SCREEN		X	CHLORINATED HYDROCARBON PESTICIDES
		HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
				X	POLYCHLORINATED BIPHENYLS (PCB's)
				~~X~~	POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
Organochlorine Pesticides:	None Detected		
Minimum Detection Limit:	0.27 ppb against DDT		
PCBs: None Detected			
Minimum Detection Limit:	0.13 ppb against Aroclor 1254		
		* DETECTION LIMIT	

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes ✓ NO ___. Seal(s) broken by: K. Shewell date: 12/19/85

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 1/14/86. Analyst's signature: K. Shewell

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: [illegible]

REPORT TO: STEVEN J. CARY
Ground Water & Hazardous Waste Bureau
Environmental Improvement Division
Health & Environment Department
P.O. Box 968 - Crown Building
Santa Fe, NM 87504-0968

PN

LAB NUMBER HM-2022
DATE RECEIVED 12/10/85
DATE REPORTED 12/31/85 JA Initials
SLD USER CODE NUMBER 53400

Sample # 85I205 1345

Well Location Address Walker Well ½ mile downgradient from Caribou Ref.

Point of Collection Kitchen Faucet.

Well Owner/User Mrs. Walker

Number of People Drinking Water from Well 2-3

Collected 85/12/05 (Date) 1345 (Time) By S. Cary/K. Rawlings (Name) EID (Agency)

Well Depth ____________ pH —

Water Level ____________ Conductivity (Uncorrected) — umho/cm

Taste? Odor? Color? Collectors Remarks ____________ Temperature — °C

Conductivity at 25°C — umho/cm

PROJECT:

From ____, A-H_2SO_4 Sample:

- ☐ Nitrate-N+ Nitrite-N ______ mg/l ______
- ☐ Ammonia-N ______ mg/l ______
- ☐ Chemical oxygen demand ______ mg/l ______
- ☐ ______ ______ ______

From NF, A-HNO_3 Sample:

- ☒ ICAP Scan
- ☒ Metals by AA (Specify) As, Se, Hg.

From ____, NA Sample: Date Analyzed

- ☐ Calcium ______ mg/l ______
- ☐ Potassium ______ mg/l ______
- ☐ Magnesium ______ mg/l ______
- ☐ Sodium ______ mg/l ______
- ☐ Bicarbonate ______ mg/l ______
- ☐ Chloride ______ mg/l ______
- ☐ Sulfate ______ mg/l ______
- ☐ Total Solids ______ mg/l ______
- ☐ ______

RECEIVED
JAN 8 1985
LIQUID WASTE/GROUND WATER SURVEILLANCE

This form accompanies 1 sample(s) marked as follows to indicate field treatment:

NF: Whole sample (no filtration)
F: Filtered in field with 0.45u membrane filter
A-H_2SO_4: Acidified with 2 ml conc H_2SO_4/l
A-HNO_3: Acidified with 5ml conc HNO_3/l
NA: No acid added

Sample acidified in lab - 12-12-85 JK

Lab Number: HM 2022

Sample Code: Walker Well

Date Submitted: 12/10/85

Date Analyzed: 12/16/85

By: Cary

Reviewed By: Jim Ashby

Date Reported: 12/31/85

Element	ICAP VALUE (MG/L)	AA VALUE (MG/L)
Aluminum	<0.1	
Barium	<0.1	
Berylium	<0.1	
Boron	<0.1	
Cadmium	<0.1	
Calcium	100.	
Chromium	<0.1	
Cobalt	<0.1	
Copper	<0.1	
Iron	<0.1	
Lead	<0.1	
Magnesium	17.	
Manganese	0.37	
Molybdenum	<0.1	
Nickel	<0.1	
Silicon	9.9	
Silver	<0.1	
Strontium	1.3	
Tin	<0.1	
Vanadium	<0.1	
Zinc	<0.1	
Arsenic		<0.005
Selenium		<0.005
Mercury		<0.0005

HM 2022

ENVIRONMENTAL IMPROVEMENT DIVISION

LOCATION Caribou Refinery

SAMPLE NO. 1345 H DATE 5/2 85

SIGNATURE Steven J. Cary

PRINT NAME AND TITLE (Inspector, Analyst or Technician) STEVEN J. CARY INSPECTOR

ENTRY

SEAL

HEALTH ENVIRONMENT department

STATE OF NEW MEXICO

ENVIRONMENTAL IMPROVEMENT DIVISION
P.O. Box 968, Santa Fe, New Mexico 87504-0968
(505) 984-0020

TONEY ANAYA
GOVERNOR

DENISE D. FORT
DIRECTOR

MAR 20 198[illegible]

March 17, 1986

Mr. and Mrs. Bill Walker
P.O. Box 252
Kirtland, NM 87417

Dear Mr. and Mrs. Walker:

In my letter of January 31, 1986, I reported to you the results of laboratory analysis of your well water. The sample obtained on December 5, 1985, contained 9 parts per billion (ppb) of 1,2-dichloroethane. Your well was resampled by Mr. Len Murray, of EID's Farmington Field Office, on February 10, 1986. This sample contained 2 ppb of 1,2-dichloroethane; a copy of the analysis is enclosed. The results confirm the presence of 1,2-dichloroethane in your well water, but only at low levels.

The results are cause for concern, but not alarm. The New Mexico Water Quality Control Commission has adopted a state ground water standard of 10 ppb 1,2-dichloroethane. The USEPA, however, recommends a maximum concentration of zero in public water supplies that serve 15 or more people. This recommendation is made because 1,2-dichloroethane has been shown to cause cancer in laboratory animals, but there is not sufficient evidence of carcinogenicity in humans. At the low levels observed in your well water, 1,2-dichloroethane probably does not present an immediate threat to human health. Nevertheless, prolonged exposure to this chemical should be avoided, at least until laboratory research identifies a safe level for human consumption.

To be on the safe side, you should consider finding another source of water for your household. If it is possible to do so, I recommend that you tie into the public water supply provided by the Lower Valley Water Users Association. Alternatively you may wish to purchase an activated carbon filter system to remove 1,2-dichloroethane from your well water. Such a system would require careful maintenance. Bottled water is another option.

The source of the apparent ground water contamination is still under investigation by the EID. If you decide to stop using your well, please do not take any steps to plug or seal it. If it is left serviceable it can be useful for monitoring purposes.

EQUAL OPPORTUNITY EMPLOYER

I would be happy to discuss this matter with you. If you have any questions at all, please feel free to telephone me at 827-2898, or the Farmington EID office at 327-9851.

Sincerely,

Steven J. Cary

Steven J. Cary
Water Resource Specialist
Ground Water/Hazardous Waste Bureau

SJC/ps

cc: David Tomko, EID Farmington
Dr. Millicent Eidson, Environmental Epidemiologist, Santa Fe
David G. Boyer, Oil Conservation Division, Santa Fe
Stuart Castle, EID Water Supply Section, Santa Fe
Gerald Fontenot, Field Response Section, USEPA, Dallas
Len Pardee, Public Water Supply Section, USEPA, Dallas

CC. Farmington EID
724 W. Animas 87401

86 144 C

2/11/86.

Steven Cary

REPORT TO:

Ground Water Section
Environmental Improvement Div.
P.O. Box 968
Santa Fe, NM 87504-0968

LABORATORY ______

LAB NUMBER OR 144 A, B.

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ______

Water Supply and/or Code No. ______

City & County Kirtland, San Juan

Collected (date & time) 2-10-86, 0950 hrs By (name) Len Murray

pH= ____; Conductivity= ____ umho/cm at ____ °C; Chlorine Residual= ____

Dissolved Oxygen= ____ mg/l; Alkalinity= ____; Flow Rate= ____

Sampling Location, Methods & Remarks (i.e. odors etc.)

Bill Walker Well, from kitchen sink - Priority 1

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed ______

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed ______

Method of Shipment to Laboratory Purolator.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen 1-A; duplicate 1-B; triplicate ____; blank(s) ____,
and ____ amber glass jug(s) with teflon-lined cap(s) identified as ____,
and ____ other container(s) (describe) ____ identified as ____.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on (date & time) ______ and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ______ ______

RECEIVED
FEB 21 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on (date & time) ______ and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ______ ______

ANALYSES REQUESTED LAB. No.: ORG- 144

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
		AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
		HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
		1,2 - Dichloroethane			

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
GC/MS Purgeable Scan			
1,2-Dichloroethane	2 ug/l		
No other Purgeables Detected *			
		* DETECTION LIMIT	1ug/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes___ NO x . Seal(s) broken by:____________ date:______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 2/12/86 . Analyst's signature: Richard Meyerhein

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature:____________

Lab Number: [redacted] 304

Date Submitted: 2/14/86

By: Bailey / Anderson

Sample [redacted]de: Four Corners Refinery

Date Analyzed: 2/17/86

Reviewed By: Jim Ashley

Date Reported: 4/18/86

Element	ICAP VALUE (MG/L)	AA VALUE (MG/L)
Aluminum	<0.1	
Barium	<0.1	
Berylium	<0.1	
Boron	<0.1	
Cadmium	<0.1	
Calcium	170.	
Chromium	<0.1	
Cobalt	<0.1	
Copper	<0.1	
Iron	<0.1	
Lead	<0.1	
Magnesium	28.	
Manganese	0.48	
Molybdenum	<0.1	
Nickel	<0.1	
Silicon	6.1	
Silver	<0.1	
Strontium	1.9	
Tin	<0.1	
Vanadium	<0.1	
Zinc	<0.1	
Arsenic		<0.005
Selenium		<0.005
Mercury		< 0.0005

REPORT TO:

CARY/RAWLINGS -- NMEID
GW/HW Bureau - CERCLA Section
P.O.Box 968
Santa Fe, NM 87504-0968

85-1211-C

LABORATORY

LAB NUMBER

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☐ Soil ☒ Other

~~Water Supply and/or Code No.~~ Sample # 851205 1136

City & County Caribou Refinery, Farmington, NM

Collected (date & time) 12/5/85 11:36 By (name) R Rawlings / S. Cary

pH= ; Conductivity= umho/cm at °C; Chlorine Residual=

Dissolved Oxygen= mg/l; Alkalinity= ; Flow Rate=

Sampling Location, Methods & Remarks (i.e. odors etc.)

Stained area beside concrete tank separator pit at north end of site

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed Richard A Rawlings

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed

Method of Shipment to Laboratory By Hand.

THIS FORM ACCOMPANIES ____ septum vials with teflon-lined discs identified as:
specimen ____; duplicate ____; triplicate ____; blank(s) ____,
and ____ amber glass jug(s) with teflon-lined cap(s) identified as ____,
and 2 other container(s) (describe) Soy jars identified as 851205 1136.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from STEVEN J. CARY to R Meyerhein at (location) SLD on (date & time) 12/10/85 1107 and that the statements in this block are correct.

Disposition of Sample ____. Seal(s) Intact: Yes ☒ No ☐.

Signature(s) Steven J. Cary R Meyerhein

I (we) certify that this sample was transferred from ____ to ____ at (location) ____ on (date & time) ____ and that the statements in this block are correct.

Disposition of Sample ____. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ____

RECEIVED
FEB 7 - 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

ANALYSES REQUESTED LAB No.: ORG- 1211

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN		X	CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
	X	GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
				X	POLYCHLORINATED BIPHENYLS (PCB's)
				X	POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND		COMPOUND	[PPB]
Methylene chloride extract	4.6 %		
PAH	see remarks		
arom. purg. screen *	none detected		
halo. purg. screen ⊕	none detected		
Organochlorine Pesticides:	None Detected		
Minimum Detection Limit:	1.4 ppm against DDT		
PCBs: None Detected		⊕ DETECTION LIMIT	80 ugm/l
Minimum Detection Limit:	20 ppb against A1254	* DETECTION LIMIT	200 ugm/l

REMARKS:

Unable to determine polynuclear aromatic hydrocarbons in an oil or grease matrix. The bulk of the extract is composed of C_{14} thru C_{34} hydrocarbons which is consistent with those compounds in Pet. Crude.

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes ✓ NO___. Seal(s) broken by: C. Burns / ~~EDS~~ see below date: 1/7/86 see below

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 1/8/86 1/10/86 1/1985 Analyst's signature: C. Burns, Mary Ellen / [illegible]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: [illegible]

1211 A seal Not Intact (No seal) EDS Date of ~~[illegible]~~ bottle opening 1/7/86

HEALTH
ENVIRONMENT department

STATE OF NEW MEXICO

ENVIRONMENTAL IMPROVEMENT DIVISION
P.O. Box 968, Santa Fe, New Mexico 87504-0968
(505) 984-0020

TONEY ANAYA
GOVERNOR

DENISE D. FORT
DIRECTOR

February 10, 1986

M E M O R A N D U M

TO: David G. Boyer
Oil Conservation Division

FROM: Steven J. Cary, WRS III SC
GW/HWB CERCLA Program

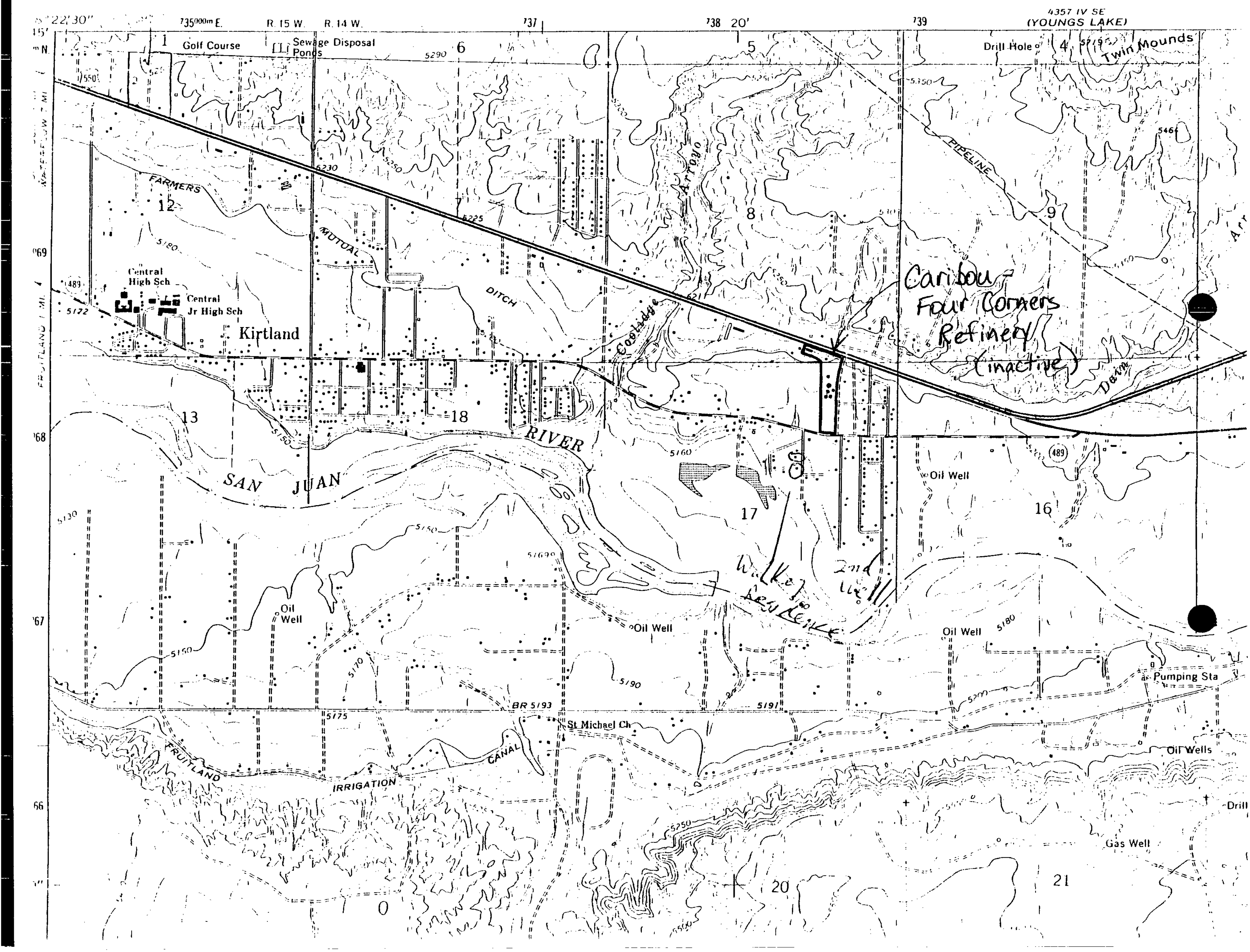
SUBJECT: **CARIBOU - FOUR CORNERS RERFINERY, KIRTLAND**

The attached information should apprise you of our recent activity at the above site. Outstanding sample results will be forwarded to you as they become available.

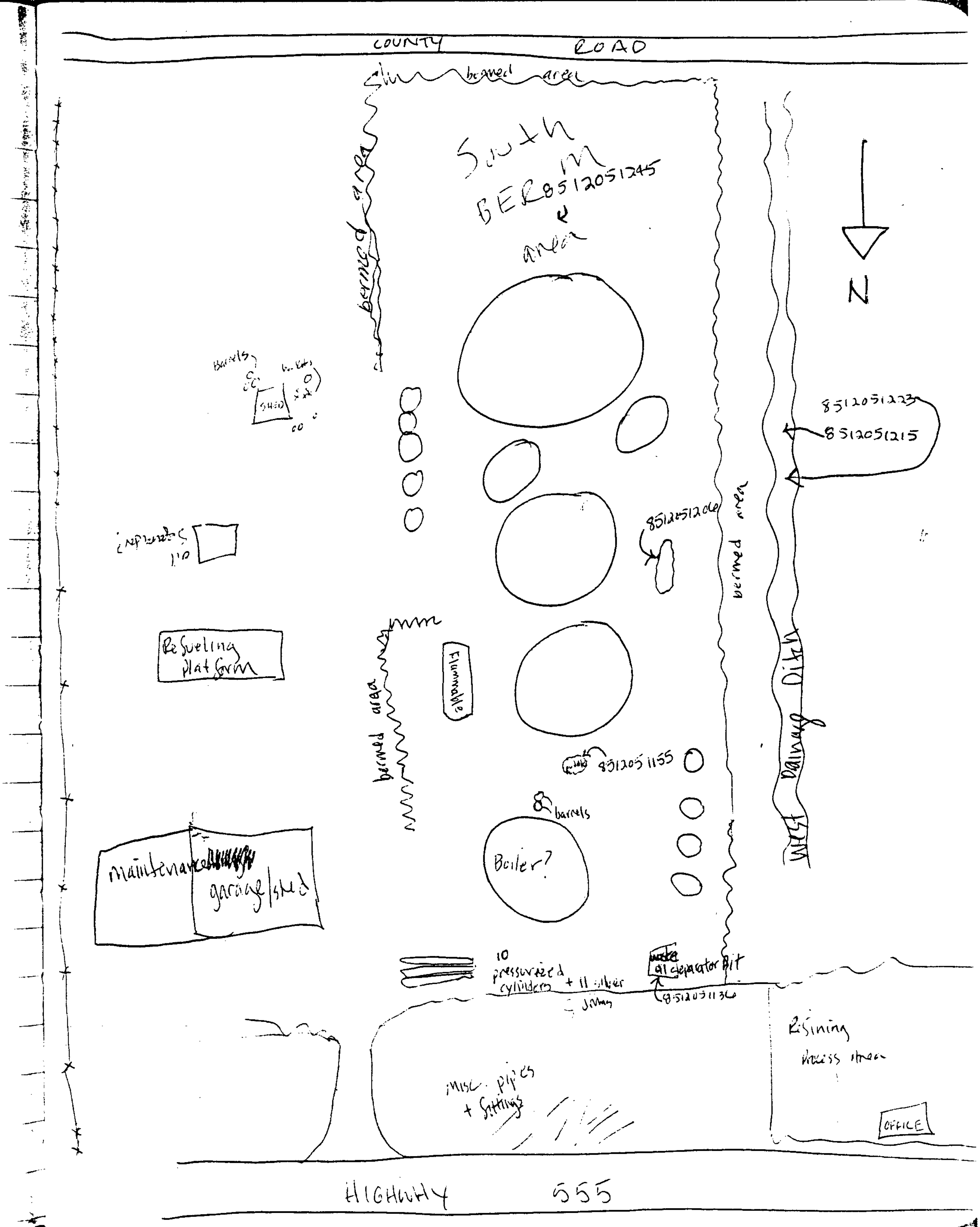
SJC:dlr

Attachment (See 12/85 sample results)

EQUAL OPPORTUNITY EMPLOYER



4357 IV SE (YOUNGS LAKE)
Golf Course
Sewage Disposal Ponds
R. 15 W.
R. 14 W.
Drill Hole
Twin Mounds
PIPELINE
Caribou - Four Corners Refinery (inactive)
Berm
Arroyo
Coolidge
FARMERS
MUTUAL
DITCH
Central High Sch
Central Jr High Sch
Kirtland
SAN JUAN
RIVER
Oil Well
Pumping Sta
Oil Wells
Gas Well
St Michael Ch
FRUITLAND
IRRIGATION
CANAL


COUNTY ROAD
bermed area
South BERM area
8512051245
N
barrels
SHED
8512051223
8512051215
8512051206
bermed area
Refueling platform
Flammable
bermed area
8512051155
barrels
Boiler?
maintenance
garage/shed
West Drainage Ditch
10 pressurized cylinders
oil separator pit
8512051136
Refining
process area
misc. pipes + fittings
OFFICE
HIGHWAY 555

REPORT TO: CARY/RAWLINGS -- NMEID
GW/HW Bureau - CERCLA Section
P.O.Box 968
Santa Fe, NM 87504-0968

LABORATORY ____________

LAB NUMBER

85- 1215 -B-

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ____________

~~Water Supply and/or Code No.~~ Sample # 8512051310

City & County Caribou Ref. Site, Farmington, NM

Collected (date & time) 12/5/85 1310 By (name) S. Cary / R. Rawlings

pH= — ; Conductivity= — umho/cm at — °C; Chlorine Residual= —

Dissolved Oxygen= — mg/l; Alkalinity= — ; Flow Rate= —

Sampling Location, Methods & Remarks (i.e. odors etc.)

From faucet at refueling platform. Unable to detach hose.

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed Richard H. Rawlings

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed Steven J. Cary

Method of Shipment to Laboratory ____________.

THIS FORM ACCOMPANIES ____ septum vials with teflon-lined discs identified as:
specimen ______; duplicate ______; triplicate ______; blank(s) ______,
and 1 amber glass jug(s) with teflon-lined cap(s) identified as 8512051310,
and ____ other container(s) (describe) ____________ identified as ____________.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).
P-ICE: Sample stored in an ice bath.
$P\text{-}Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from STEVEN J. CARY to R meyerhein at (location) SLD on (date & time) 12/10/85 1112 and that the statements in this block are correct.

Disposition of Sample ____________. Seal(s) Intact: Yes ☒ No ☐ .

Signature(s) Steven J. Cary R meyerhein

I (we) certify that this sample was transferred from ____________ to ____________ at (location) ____________ on (date & time) ____________ and that the statements in this block are correct.

Disposition of Sample ____________. Seal(s) Intact: Yes ☐ No ☐ .

Signature(s) ____________ ____________

RECEIVED
JAN 17 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

ANALYSES REQUESTED LAB. No.: ORG- 85-1215

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
		AROMATIC HYDROCARBON SCREEN		X	CHLORINATED HYDROCARBON PESTICIDES
		HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
				X	POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
Organochlorine Pesticides:	None Detected		
Minimum Detection Limit:	0.27 ppb against DDT		
PCBs: None Detected			
Minimum Detection Limit:	0.13 ppb against Aroclor 1254		
		* DETECTION LIMIT	

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes ✓ NO___. Seal(s) broken by: K. Sherrell date: 12/9/85

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 1/14/86. Analyst's signature: K. Sherrell

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: K. Meyerhein

REPORT TO: CARY/RAWLINGS -- NMEID
GW/HW Bureau -- CERCLA Section
P.O.Box 968
Santa Fe, NM 87504-0968

85- 1202 C

LABORATORY ______
LAB NUMBER ______

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other

~~Water Supply and/or Code~~ No. Sample # 851205 1155

City & County Caribou Refinery, Farmington, NM

Collected (date & time) 12/5/85 1155 By (name) S Cary / R Rawlings

pH= ——; Conductivity= —— umho/cm at —— °C; Chlorine Residual= ——

Dissolved Oxygen= —— mg/l; Alkalinity= ——; Flow Rate= ——

Sampling Location, Methods & Remarks (i.e. odors etc.)

From standing water in stained area in north tank berm.

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed Richard A Rawlings

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed Steven J. Cary

Method of Shipment to Laboratory By Hand

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen 1; duplicate 1; triplicate ______; blank(s) ______,
and ______ amber glass jug(s) with teflon-lined cap(s) identified as ______,
and ______ other container(s) (describe) ______ identified as ______.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).
P-ICE: Sample stored in an ice bath.
P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from STEVEN J. CARY to R Meyerhein at (location) SLD on (date & time) 12/10/85 11:04 and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☒ No ☐.

Signature(s) Steven J. Cary R Meyerhein

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on (date & time) ______ and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ______ ______

RECEIVED
DEC 27 1985
LIQUID WASTE/GROUND WATER SURVEILLANCE

ANALYSES REQUESTED LAB. No.: ORG- 1202

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
	~~X~~	GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
arom. purg. screen *	none detected		
halo. purg. screen ⊛	none detected		
		⊛ DETECTION LIMIT	15 ugm/l
		* DETECTION LIMIT	50 ugm/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO___. Seal(s) broken by: J Tinney date: 12-12-85

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 12-12-85. Analyst's signature: J Tinney

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: R Meyerhan

REPORT TO: CARY/RAWLINGS -- NMEID
GW/HW Bureau - CERCLA Section
P.O.Box 968
Santa Fe, NM 87504-0968

85- 1212 -C

LABORATORY ______

LAB NUMBER ______

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☐ Soil ☒ Other ______

~~Water Supply and/or Code No.~~ Sample # 851205 1155

City & County Cariboo Refinery, Farmington, NM

Collected (date & time) 12/5/85 1155 By (name) S. Cary / R. Rawlings

pH= — ; Conductivity= — umho/cm at — °C; Chlorine Residual= —

Dissolved Oxygen= — mg/l; Alkalinity= — ; Flow Rate= —

Sampling Location, Methods & Remarks (i.e. odors etc.)

Stained area in North Tank Berm area

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed Richard A Rawlings

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed Steven J. Cary

Method of Shipment to Laboratory By Hand.

THIS FORM ACCOMPANIES ____ septum vials with teflon-lined discs identified as:
specimen ______; duplicate ______; triplicate ______; blank(s) ______,
and ____ amber glass jug(s) with teflon-lined cap(s) identified as ______,
and 2 other container(s) (describe) 2 x 8oz jars identified as 851205 1155.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from STEVEN J. CARY to R Meyerhein at (location) SLD on (date & time) 12/10/85 1113 and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☒ No ☐.

Signature(s) Steven J. Cary R Meyerhein

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on (date & time) ______ and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ______

RECEIVED
FEB 7 - 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

ANALYSES REQUESTED LAB No.: ORG- 1212

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN		X	CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
	X	GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
				X	POLYCHLORINATED BIPHENYLS (PCB's)
				X	POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND		COMPOUND	[PPB]
METHYLENE CHLORIDE EXTRACT	5.4 %	Organochlorine Pesticides: None Detected	
PAH	see remarks	Minimum Detection Limit: 0.1 ppm against DDT	
		PCBs: None Detected	
Aromatic hydrocarbon screen	none detected *	Minimum Detection Limit 20 ppb Against	
halogenated hydrocarbon screen	none detected (*)		Arochlor 1254
		(*)	80 ug/L
		* DETECTION LIMIT	200 ug/L

REMARKS:

Unable to determine PAH in an oil or grease matrix. The bulk of the extract appears to be hydrocarbons. The chromatographic fingerprint is composed of C14 thru C34 hydrocarbons which is consistent with Petroleum Crude

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes ✓ NO ___. Seal(s) broken by: K. Sherrell date: 1/7/86

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 1/8/86 1/10/86 1/14/86 Analyst's signature: A S Burney Gary Ellen K. Sherrell

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: K Meyerhein

REPORT TO: CARY/RAWLINGS -- NMEID
GW/HW Bureau - CERCLA Section
P.O.Box 968
Santa Fe, NM 87504-0968

85- 1203 C

LABORATORY ____________

LAB NUMBER ____________

Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ____________

~~Water Supply and/or Code No.~~ Sample # 851205 1206

City & County Caribou Refinery Site Farmington, NM

Collected (date & time) 12/5/85 1206 By (name) R. Rawlings/S. Cary

pH= — ; Conductivity= — umho/cm at — °C; Chlorine Residual= ✓

Dissolved Oxygen= — mg/l; Alkalinity= — ; Flow Rate= —

Sampling Location, Methods & Remarks (i.e. odors etc.)

From standing water in middle Tank berm (Stained area).

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed Richard A Rawlings

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed Steven J. Cary

Method of Shipment to Laboratory By Hand.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen 1 ; duplicate 1 ; triplicate ____ ; blank(s) ____ ,
and ____ amber glass jug(s) with teflon-lined cap(s) identified as ____ ,
and ____ other container(s) (describe) ____ identified as ____ .

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from STEVEN J. CARY to R Meyerhein at (location) SLD on (date & time) 12/10/85 1105 and that the statements in this block are correct.

Disposition of Sample ____________ . Seal(s) Intact: Yes ☒ No ☐ .

Signature(s) Steven J. Cary R Meyerhein

I (we) certify that this sample was transferred from ____________ to ____________ at (location) ____________ on (date & time) ____________ and that the statements in this block are correct.

Disposition of Sample ____________ . Seal(s) Intact: Yes ☐ No ☐ .

Signature(s) ____________ ____________

RECEIVED
DEC 17 1985
LIQUID WASTE/GROUND WATER
SURVEILLANCE

ANALYSES REQUESTED LAB. No.: ORG-1203

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
arom. purg. screen*	none detected		
halo. purg. screen(*)	none detected		
		(*) DETECTION LIMIT	15 ugm/l
		* DETECTION LIMIT	50 ugm/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO___. Seal(s) broken by: J. Finney date: 12-12-85

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 12-12-85. Analyst's signature: J. Finney

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: K Meyerhew

REPORT TO: CARY/RAWLINGS -- NMEID
GW/HW Bureau - CERCLA Section
P.O.Box 968
Santa Fe, NM 87504-0968

LABORATORY ____________

LAB NUMBER

85- 1199 -C

Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☐ Soil ☒ Other ____________

~~Water Supply and/or Code No.~~ 851205 1215 – Sample #

City & County Caribou Refinery Site, Farmington, NM

Collected (date & time) 12/5/85 1215 By (name) S. Cary / R. Rawlings

pH= — ; Conductivity= — umho/cm at — °C; Chlorine Residual= —

Dissolved Oxygen= — mg/l; Alkalinity= — ; Flow Rate= —

Sampling Location, Methods & Remarks (i.e. odors etc.)

From drainage ditch on west boundary of site. Water in ditch was heavily contaminated with a strong odour.

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed Richard A Rawlings

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed Steven J. Cary

Method of Shipment to Laboratory By Hand.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen 1 ; duplicate 1 ; triplicate ______ ; blank(s) ______ ,
and ______ amber glass jug(s) with teflon-lined cap(s) identified as ______ ,
and ______ other container(s) (describe) ______ identified as ______ .

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from STEVEN J. CARY to R Meyerhein at (location) SLD on (date & time) 12/10/85 11:04 Am and that the statements in this block are correct.

Disposition of Sample ____________ . Seal(s) Intact: Yes ☒ No ☐ .

Signature(s) Steven J. Cary R Meyerhein

I (we) certify that this sample was transferred from ____________ to ____________ at (location) ____________ on (date & time) ____________ and that the statements in this block are correct.

Disposition of Sample ____________ . Seal(s) Intact: Yes ☐ No ☐ .

Signature(s) ____________ ____________

RECEIVED
JAN 27 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

ANALYSES REQUESTED   LAB. No.: ORG- 1199

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
benzene *	290		
toluene *	1500		
ethylbenzene *	280		
p-xylene *	610		
m-xylene *	1850		
o-xylene *	1030	© DETECTION LIMIT	5 ugm/l
1,2-dichloroethane ©	15	⊛ DETECTION LIMIT	50 ugm/l
		* DETECTION LIMIT	150 ugm/l

REMARKS: Sample form says this sample is a soil, it is not soil, it is water, with a small amount of free floating oil.

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO___. Seal(s) broken by: [signature] date: 1-6-86 12-12-85

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 12-12-85 (6 Jan 86) Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: [signature]

REPORT TO: CARY/RAWLINGS -- NMEID
GW/HW Bureau - CERCLA Section
P.O.Box 968
Santa Fe, NM 87504-0968

85- 1191 -C

LABORATORY ______

LAB NUMBER ______

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ______

~~Water Supply and/or Code No.~~ Sample # 851203 0820

City & County SLD Blank.

Collected (date & time) 12/3/85 0820 By (name)s S. Cary / R. Rawlings

pH= ______; Conductivity= ______ umho/cm at ______ °C; Chlorine Residual= ______

Dissolved Oxygen= ______ mg/l; Alkalinity= ______; Flow Rate= ______

Sampling Location, Methods & Remarks (i.e. odors etc.)

SLD lab blank collected at start of trip.

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed Richard A Rawlings

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed Steven J. Cary

Method of Shipment to Laboratory By Hand.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen 1; duplicate 1; triplicate ______; blank(s) ______,
and ______ amber glass jug(s) with teflon-lined cap(s) identified as ______,
and ______ other container(s) (describe) ______ identified as ______.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from STEVEN J. CARY to R meyerhein at (location) SLD on (date & time) 12/10/85 11:59 and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☒ No ☐.

Signature(s) Steven J. Cary   R Meyerhein

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on (date & time) ______ and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ______ ______

RECEIVED
DEC 27 1985
LIQUID WASTE/GROUND WATER SURVEILLANCE

ANALYSES REQUESTED LAB No.: ORG- 1191

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDE
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
	~~X~~	GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
	X	Methylene Chloride			
	X	Chloroform			
	X	Carbon Tetrachloride			

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
arom. purg. screen ⊛	none detected		
halo. purg. screen *	none detected		
		⊛ Detection Limit	3 ugm/l
		* DETECTION LIMIT	1 ugm/l

REMARKS: This blank sample was received with approx 1ml of headspace before analysis.

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO ___. Seal(s) broken by: JP Finney date: 12-11-85

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 11 Dec 85. Analyst's signature: JP Finney

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: K Meyerhee

REPORT TO:

CARY/RAWLINGS -- NMEID
GW/HW Bureau - CERCLA Section
P.O.Box 968
Santa Fe, NM 87504-0968

85- 1200 -C

LABORATORY ____________

LAB NUMBER ____________

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ____________

~~Water Supply and/or Code No.~~ Sample # 851205 1136

City & County Caribou Refinery, Farmington, NM

Collected (date & time) 12/5/85 1136 By (name) S. Cary / R. Rawlings

pH= — ; Conductivity= — umho/cm at — °C; Chlorine Residual= —

Dissolved Oxygen= — mg/l; Alkalinity= — ; Flow Rate= —

Sampling Location, Methods & Remarks (i.e. odors etc.)

From standing water beside concrete tank separator pit at north end of site

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed Richard A Rawlings

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed Steven J. Cary

Method of Shipment to Laboratory By Hand

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as: specimen 1 ; duplicate 1 ; triplicate ____ ; blank(s) ____ , and ____ amber glass jug(s) with teflon-lined cap(s) identified as ____ , and ____ other container(s) (describe) ____ identified as ____ .

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from STEVEN J. CARY to R Meyerhein at (location) SLD on (date & time) 12/10/85 1105 and that the statements in this block are correct.

Disposition of Sample ____________ . Seal(s) Intact: Yes ☒ No ☐ .

Signature(s) Steven J. Cary R Meyerhein

I (we) certify that this sample was transferred from ____________ to ____________ at (location) ____________ on (date & time) ____________ and that the statements in this block are correct.

Disposition of Sample ____________ . Seal(s) Intact: Yes ☐ No ☐ .

Signature(s) ____________

RECEIVED
DEC 27 1985
LIQUID WASTE/GROUND WATER SURVEILLANCE

ANALYSES REQUESTED — LAB. No.: ORG- 1200

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
arom. purg. screen *	none detected		
halo. purg. screen ⊛	none detected		
		⊛ DETECTION LIMIT	10 ugm/l
		* DETECTION LIMIT	30 ugm/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO ___. Seal(s) broken by: [signature] date: 12-12-85

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 12-12-85. Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: [signature]

REPORT TO: CARY/RAWLINGS -- NMEID
GW/HW Bureau – CERCLA Section
P.O.Box 968
Santa Fe, NM 87504-09 85- 1210 -B

LABORATORY
LAB NUMBER

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other

~~Water Supply and/or Code No.~~ Sample # 551205 1136

City & County Caribou Refinery Site, Farmington NM

Collected (date & time) 12/5/85 1136 By (name) S. Cary / R. Rawlings

pH= — ; Conductivity= — umho/cm at — °C; Chlorine Residual= —

Dissolved Oxygen= — mg/l; Alkalinity= — ; Flow Rate= —

Sampling Location, Methods & Remarks (i.e. odors etc.)

From standing water (which was at same level as water in the concrete separator pit) beside pit.

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed Richard A Rawlings

I certify that I witnessed these field analyses/observations and activities and concur with the statements in this block. Signed Steven J. Cary

Method of Shipment to Laboratory By Hand.

THIS FORM ACCOMPANIES ___ septum vials with teflon-lined discs identified as:
specimen ___; duplicate ___; triplicate ___; blank(s) ___,
and 1 amber glass jug(s) with teflon-lined cap(s) identified as 551205 1136,
and ___ other container(s) (describe) ___ identified as ___.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).
P-ICE: Sample stored in an ice bath.
$P-Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from STEVEN J. CARY to R Meyerhein at (location) SLD on (date & time) 12/10/85 1106 and that the statements in this block are correct.

Disposition of Sample ___. Seal(s) Intact: Yes ☒ No ☐.

Signature(s) Steven J. Cary R Meyerhein

I (we) certify that this sample was transferred from ___ to ___ at (location) ___ on (date & time) ___ and that the statements in this block are correct.

Disposition of Sample ___. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ___ ___

RECEIVED
JAN 17 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

ANALYSES REQUESTED LAB. No.: ORG- 85-1210

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
		AROMATIC HYDROCARBON SCREEN		X	CHLORINATED HYDROCARBON PESTICIDES
		HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
				X	POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
Organochlorine Pesticides:	None Detected		
Minimum Detection Limit:	5.2ppb against DDT		
PCBs : None Detected			
Minimum Detection Limit:	5.2ppb against Arochlor 1254		
Arochlor 1254			
		* DETECTION LIMIT	

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes ✓ NO ___. Seal(s) broken by: K. Sherrell date: 12/19/85

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 1/14/85. Analyst's signature: K. Sherrell

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: K. [illegible]

REPORT TO: CARY/RAWLINGS -- NMEID
GW/HW Bureau - CERCLA Section
P.O.Box 968
Santa Fe, NM 87504-0968

LABORATORY ______

LAB NUMBER

85-1209-B

D Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ______

~~Water Supply~~ ~~and/or Code No.~~ Sample # 851205 1215

City & County Caribou Refinery Site, Farmington NM

Collected (date & time) 12/5/85 1215 By (name) S. Cary/R. Rawlings

pH= — ; Conductivity= — umho/cm at — °C; Chlorine Residual= —

Dissolved Oxygen= — mg/l; Alkalinity= — ; Flow Rate= —

Sampling Location, Methods & Remarks (i.e. odors etc.)

From west drainage ditch on west boundary of site at area of obvious contamination - Strong gasoline

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed Richard A Rawlings

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed Steven J. Cary

Method of Shipment to Laboratory By Hand.

THIS FORM ACCOMPANIES ____ septum vials with teflon-lined discs identified as:
specimen ______; duplicate ______; triplicate ______; blank(s) ______,
and 1 amber glass jug(s) with teflon-lined cap(s) identified as 851205 1215,
and ____ other container(s) (describe) ______ identified as ______.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).
P-ICE: Sample stored in an ice bath.
P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from STEVEN J. CARY to R Meyerhein at (location) SLD on (date & time) 12/10/85 1106 and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☒ No ☐ .

Signature(s) Steven J. Cary R Meyerhein

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on (date & time) ______ and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☐ No ☐ .

Signature(s) ______ ______

RECEIVED
JAN 17 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

ANALYSES REQUESTED LAB. No.: ORG- 85-1209

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
		AROMATIC HYDROCARBON SCREEN		X	CHLORINATED HYDROCARBON PESTICIDES
		HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
				X	POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
PCB's : None Detected			
Minimum Detection Limit:	1 ppm against	Aroclor 1254	
Pesticides: see below			
		* DETECTION LIMIT	

REMARKS: Sample consisted of mixture of oil and water. PCB result above based on extraction of oil layer (approximately 8ml of total sample) in which most organics would concentrate. Pesticides not analyzable in such matrices at this laboratory.

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes ✓ NO___. Seal(s) broken by: K. Sherrell date: 6/19/85

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 6/19/85. Analyst's signature: K. Sherrell

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: [illegible]

REPORT TO:

CARY/RAWLINGS -- NMEID
GW/HW Bureau - CERCLA Section
P.O.Box 968
Santa Fe, NM 87504-0968

LABORATORY ____

LAB NUMBER 85-1197-C

Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ____

~~Water Supply and/or Code No.~~ Sample # 8512051223

City & County Carribou Refinery, Farmington, NM

Collected (date & time) 12/5/85 1223 By (name) S. Cary / R. Rawlings

pH= — ; Conductivity= — umho/cm at — °C; Chlorine Residual= —

Dissolved Oxygen= — mg/l; Alkalinity= — ; Flow Rate= —

Sampling Location, Methods & Remarks (i.e. odors etc.)

From West Drainage Ditch above contaminated section. H_2O appeared uncontaminated.

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed Richard H Rawlings

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed Steven J. Cary

Method of Shipment to Laboratory By Hand.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen / ; duplicate / ; triplicate ____ ; blank(s) ____ ,
and ____ amber glass jug(s) with teflon-lined cap(s) identified as ____ ,
and ____ other container(s) (describe) ____ identified as ____ .

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from STEVEN J. CARY to R Meyerhein at (location) SLD on (date & time) 12/10/85 11:03a and that the statements in this block are correct.

Disposition of Sample ____ . Seal(s) Intact: Yes ☒ No ☐ .

Signature(s) Steven J. Cary R Meyerhein

I (we) certify that this sample was transferred from ____ to ____ at (location) ____ on (date & time) ____ and that the statements in this block are correct.

Disposition of Sample ____ . Seal(s) Intact: Yes ☐ No ☐ .

Signature(s) ____ ____

RECEIVED

DEC 27 1985

LIQUID WASTE/GROUND WATER SURVEILLANCE

ANALYSES REQUESTED LAB. No.: ORG- 1197

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
	~~X~~	GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
arom. purg. screen *	none detected		
halo. purg. screen ⊛	none detected		
		⊛ DETECTION LIMIT	1 ugm/l
		* DETECTION LIMIT	3 ugm/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO___. Seal(s) broken by: [signature] date ~~12-12-85~~ 12-12-85

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 12-12-85. Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: K Meyer Lee

REPORT TO:

CARY/RAWLINGS NMEID
GW/HW Bureau -- CERCLA Section
P.O.Box 968
Santa Fe, NM 87504-0968

85-1213-C

LABORATORY
LAB NUMBER

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☐ Soil ☒ Other

Water Supply and/or Code No. Sample #851205 1245

City & County Caribou Refinery, Farmington NM

Collected (date & time) 12/5/85 1245 By (name) S. Cary / R. Rawlings

pH=____; Conductivity=____ umho/cm at ____ °C; Chlorine Residual=____

Dissolved Oxygen=____ mg/l; Alkalinity=____; Flow Rate=____

Sampling Location, Methods & Remarks (i.e. odors etc.)

South Bermed Area. - 2 x 8oz jars

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed Richard A. Rawlings

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed Steven J. Cary

Method of Shipment to Laboratory By Hand.

THIS FORM ACCOMPANIES ____ septum vials with teflon-lined discs identified as:
specimen ____; duplicate ____; triplicate ____; blank(s) ____,
and ____ amber glass jug(s) with teflon-lined cap(s) identified as ____,
and 2 other container(s) (describe) 8oz jars identified as 851205 1245.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from STEVEN J CARY to R Meyerhein at (location) SLD on (date & time) 12/10/85 1113 and that the statements in this block are correct.

Disposition of Sample ____. Seal(s) Intact: Yes ☒ No ☐ .

Signature(s) Steven J. Cary R Meyerhein

I (we) certify that this sample was transferred from ____ to ____ at (location) ____ on (date & time) ____ and that the statements in this block are correct.

Disposition of Sample ____. Seal(s) Intact: Yes ☐ No ☐ .

Signature(s) ____ ____

RECEIVED
FEB 7 - 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

ANALYSES REQUESTED **LAB. No.: ORG- 1213**

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
		AROMATIC HYDROCARBON SCREEN		X	CHLORINATED HYDROCARBON PESTICIDES
		HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
	X	GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
				X	POLYCHLORINATED BIPHENYLS (PCB's)
				X	POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
GC/MS Purgeable screen	none detected	PAH Compounds -	See attached
Organochlorine Pesticides:	None Detected	DIBUTYLPHTHALATE	14 ug/l
Minimum Detection Limit	50ppb DDT	DIOCTYLPHTHALATE	45 ug/l
PCB's : None Detected			
Minimum Detection Limit	20ppb against Arochlor 1254		
		* DETECTION LIMIT	

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes ✓ NO___. Seal(s) broken by: K Sherrell date: 1/7/86

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 1/10/86 1/14/86 1/28/86 Analyst's signature: Harry Eden K Sherrell CS Bueno

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: K Meyer Lee

	SP-1000	D-300
NAPHTHALENE	ND	ND
METHYLNAPHTH.	ND	ND
ACENAPHTHALENE	ND	ND
ACENAPHTHENE	ND	ND
FLUORENE	ND	ND
PHENANTHRENE	ND ~~[illegible]~~	D < 5
FLUOTAMTHENE	INT	INT
PYRENE	ND ~~[illegible]~~	D < 5
BENZO(a) ANTHRACENE	—	D < 5
BENZO(a) PYRENE	—	D < 5
DIBENZ(a,h)ANTHRACENE	—	D < 5
DIBUTYLPHTHALATE	~~[illegible]~~ 14 ~~[illegible]~~	—
DIOCTYLPHTHALATE	150 ug/ml 415 ug/l	—

D < 5 = ~~[illegible]~~ detected but less than 5 ppb
INT = matrix interference

REPORT TO: CARY/RAWLINGS -- NMEID
GW/HW Bureau -CERCLA Section
P.O.Box 968
Santa Fe, NM 87504-0968

LABORATORY ____________

LAB NUMBER

85-1198-C

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ____________

~~Water Supply and/or Code No.~~ Sample # 851205 1310

City & County Caribou Refinery Site, Farmington, NM

Collected (date & time) 12/5/85 1310 By (name) S. Cary / R. Rawlings

pH= —; Conductivity= — umho/cm at — °C; Chlorine Residual= —

Dissolved Oxygen= — mg/l; Alkalinity= — ; Flow Rate= —

Sampling Location, Methods & Remarks (i.e. odors etc.)
From pump (faucet with hose) at refueling platform.
May be city water.

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed Richard A Rawlings

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed Steven J. Cary

Method of Shipment to Laboratory By Hand.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen 1 ; duplicate 1 ; triplicate ____ ; blank(s) ____ ,
and ____ amber glass jug(s) with teflon-lined cap(s) identified as ____ ,
and ____ other container(s) (describe) ____ identified as ____ .

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).
P-ICE: Sample stored in an ice bath.
P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from STEVEN J. CARY to R Meyerhein at (location) SLD on (date & time) 12/10/85 11:02 and that the statements in this block are correct.

Disposition of Sample ____________. Seal(s) Intact: Yes ☒ No ☐ .

Signature(s) Steven J. Cary R Meyerhein

I (we) certify that this sample was transferred from ____________ to ____________ at (location) ____________ on (date & time) ____________ and that the statements in this block are correct.

Disposition of Sample ____________. Seal(s) Intact: Yes ☐ No ☐ .

Signature(s) ____________ ____________

RECEIVED

DEC 27 1985

LIQUID WASTE/GROUND WATER
SURVEILLANCE

ANALYSES REQUESTED LAB No.: ORG- 1198

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
	~~X~~	GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
arom. purg. screen*	none detected		
$CHCl_3$ ⊛	45		
$CHCl_2Br$ ⊛	10		
$CHClBr_2$ ⊛	3		
$CHBr_3$ ⊛	none detected		
		⊛ DETECTION LIMIT	1 ugm/l
		* DETECTION LIMIT	3 ugm/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO___. Seal(s) broken by: [signature] date: 12-12-85

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 12-12-85. Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: [signature]

REPORT TO: STEVEN J. CARY
Ground Water & Hazardous Waste Bureau
Environmental Improvement Division
Health & Environment Department
P.O. Box 968 - Crown Building
Santa Fe, NM 87504-0968

PN

LAB NUMBER HM-2023
DATE RECEIVED 12/10/85
DATE REPORTED 12/31/85 GTA
Initials
SLD USER CODE NUMBER 53400

8512051310

Well Location Address On-site pump at refueling platform

Point of Collection At end of hose attached to pump.

Well Owner/User Caribou Refinery (May be city supply)

Number of People Drinking Water from Well Unknown

Collected 12/5/85 (Date) 1310 (Time) By S. Cary / R. Rawlings (Name) EID (Agency)

Well Depth Unknown

pH —

Water Level Unknown

Conductivity (Uncorrected) — umho/cm

Taste? Odor? Color? Collectors Remarks

Initially smelled a little like paint thinners

Temperature — °C

Conductivity at 25°C — umho/cm

PROJECT:

From _____, A-H_2SO_4 Sample:

- ☐ Nitrate-N+ Nitrite-N _____ mg/l _____
- ☐ Ammonia-N _____ mg/l _____
- ☐ Chemical oxygen demand _____ mg/l _____
- ☐ _____ _____ _____

From NF, A-HNO_3 Sample:

- ☒ ICAP Scan
- ☒ Metals by AA (Specify) As, Se, Hg

From _____, NA Sample: Date Analyzed

- ☐ Calcium _____ mg/l _____
- ☐ Potassium _____ mg/l _____
- ☐ Magnesium _____ mg/l _____
- ☐ Sodium _____ mg/l _____
- ☐ Bicarbonate _____ mg/l _____
- ☐ Chloride _____ mg/l _____
- ☐ Sulfate _____ mg/l _____
- ☐ Total Solids _____ mg/l _____
- ☐ _____ _____

RECEIVED
JAN 8 1985
LIQUID WASTE/GROUND WATER
SURVEILLANCE

This form accompanies 1x liter sample(s) marked as follows to indicate field treatment:

NF: Whole sample (no filtration)
F: Filtered in field with 0.45u membrane filter
A-H_2SO_4: Acidified with 2 ml conc H_2SO_4/l
A-HNO_3: Acidified with 5ml conc HNO_3/l
NA: No acid added

Lab Number: #M 2023

Sample Code: On-Site Pump

Date Submitted: 12/10/85

Date Analyzed: 12/16/85

By: Cary

Reviewed By: Jim Ashby

Date Reported: 12/31/85

Element	ICAP VALUE (MG/L)	AA VALUE (MG/L)
Aluminum	<0.1	
Barium	<0.1	
Beryllium	<0.1	
Boron	<0.1	
Cadmium	<0.1	
Calcium	61.	
Chromium	<0.1	
Cobalt	<0.1	
Copper	<0.1	
Iron	0.3	
Lead	<0.1	
Magnesium	8.4	
Manganese	<0.05	
Molybdenum	<0.1	
Nickel	<0.1	
Silicon	47	
Silver	<0.1	
Strontium	0.7	
Tin	<0.1	
Vanadium	<0.1	
Zinc	0.1	
Arsenic		<0.005
Selenium		<0.005
Mercury		<0.0005

REPORT TO: CARY/RAWLINGS -- NMEID
GW/HW Bureau - ERCLA Section
P.O.Box 968
Santa Fe, NM 87504-0968

LABORATORY ______
LAB UMBER
85- 1196 -C
ers Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ______

~~Water Supply and/or Code No.~~ Sample # 851205 1745 - Walker Well

City & County Carbon Refinery Site, Farmington NM

Collected (date & time) 12/5/85 1745 By (name) S. Cary / R. Rawlings

pH= —; Conductivity= — umho/cm at — °C; Chlorine Residual= —

Dissolved Oxygen= — mg/l; Alkalinity= — ; Flow Rate= —

Sampling Location, Methods & Remarks (i.e. odors etc.)

From Walker Well (private) approx ½ mile down gradient from Refinery.

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed Richard A Rawlings

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed Steven J. Cary

Method of Shipment to Laboratory By Hand.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen 1 ; duplicate 1 ; triplicate ______; blank(s) ______,
and ______ amber glass jug(s) with teflon-lined cap(s) identified as ______,
and ______ other container(s) (describe) ______ identified as ______.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).
P-ICE: Sample stored in an ice bath.
P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from STEVEN J. CARY to R Meyerhein at (location) SLD on (date & time) 12/10/85 11:02am and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☒ No ☐ .

Signature(s) Steven J. Cary ______ R Meyerhein

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on (date & time) ______ and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☐ No ☐ .

Signature(s) ______ ______

RECEIVED
JAN 27 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

ANALYSES REQUESTED LAB. No.: ORG- 1196

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
arom. purg. screen*	none detected		
1,2-dichloroethane	⊕ 9 ppb		
		⊕ DETECTION LIMIT	1 ugm/l
		* DETECTION LIMIT	2 ugm/l

REMARKS: A trace amount of one compound was detected by the halogenated screen that was not identified (it eluted early on both columns).

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO __. Seal(s) broken by: [signature] date: 12-12-85 1-6-86

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis 12-12-85 1-6-86 Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: R Meyer[signature]

REPORT TO:

CARY/RAWLINGS NMEID
GW/HW Bureau -- CERCLA Section
P.O.Box 968
Santa Fe, NM 87504-0968

LABORATORY ____________

LAB NUMBER

85- 1216 -B

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ____________

~~Water Supply and/or Code No.~~ Sample # 8512051345

City & County Down Gradient Well (½ mile) Caribou Ref Site, Farmington NM

Collected (date & time) 12/5/85 1345 By (name) R. Rawlings/S. Cary

pH= — ; Conductivity= — umho/cm at — °C; Chlorine Residual= —

Dissolved Oxygen= — mg/l; Alkalinity= — ; Flow Rate= —

Sampling Location, Methods & Remarks (i.e. odors etc.)

From Walker Resident Kitchen faucet.

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed Richard A Rawlings

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed Steven J. Cary

Method of Shipment to Laboratory By Hand.

THIS FORM ACCOMPANIES ____ septum vials with teflon-lined discs identified as:

specimen ________; duplicate ________; triplicate ________; blank(s) ________,

and 1 amber glass jug(s) with teflon-lined cap(s) identified as 8512051345,

and ____ other container(s) (describe) ____________ identified as ________.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from STEVEN J. CARY to R Meyerhein at (location) SLD on (date & time) 12/10/85 11:20am and that the statements in this block are correct.

Disposition of Sample ____________. Seal(s) Intact: Yes ☒ No ☐ .

Signature(s) Steven J. Cary R Meyerhein

I (we) certify that this sample was transferred from ____________ to ____________ at (location) ____________ on (date & time) ____________ and that the statements in this block are correct.

Disposition of Sample ____________. Seal(s) Intact: Yes ☐ No ☐ .

Signature(s) ____________ ____________

RECEIVED
JAN 17 1986
LIQUID WASTE/GROUND WATER
SURVEILLANCE

ANALYSES REQUESTE[redacted] LAB.[redacted]o.: ORG- 85-12[illegible]

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
		AROMATIC HYDROCARBON SCREEN		X	CHLORINATED HYDROCARBON PESTICIDES
		HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
				X	POLYCHLORINATED BIPHENYLS (PCB's)
				X	POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
Organochlorine Pesticides: None Detected			
Minimum Detection Limit: 0.27 ppb against DDT			
PCBs: None Detected			
Minimum Detection Limit: 0.13 ppb against Aroclor 1254			
		* DETECTION LIMIT	

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes ✓ NO___. Seal(s) broken by: K. Shewell date: 12/9/85

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 1/14/86. Analyst's signature: G. Shewell

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: K. Meyer

REPORT TO: Steven J. Cary
Ground Water & Hazardous Waste Bureau
Environmental Improvement Division
Health & Environment Department
P.O. Box 968 - Crown Building
Santa Fe, NM 87504-0968

PN

Sample # 85R05 1345

LAB NUMBER HM-2022
DATE RECEIVED 12/10/85
DATE REPORTED 12/31/85 JA
Initials
SLD USER CODE NUMBER 53400

Well Location Address Walker Well, ½ mile downgradient from Caribou Ref.

Point of Collection Kitchen Faucet.

Well Owner/User Mrs. Walker

Number of People Drinking Water from Well 2-3

Collected 85/12/05 1345 By S. Cary/R. Rawlings EID
Date Time Name Agency

Well Depth ______ pH —

Water Level ______ Conductivity (Uncorrected) — umho/cm

Taste? Odor? Color? Collectors Remarks Temperature — °C

Conductivity at 25°C — umho/cm

PROJECT:

From ____, A-H_2SO_4 Sample:

☐ Nitrate-N+ Nitrite-N ____ mg/l ____

☐ Ammonia-N ____ mg/l ____

☐ Chemical oxygen demand ____ mg/l ____

☐ ____ ____ ____

From NF, A-HNO_3 Sample:

☒ ICAP Scan

☒ Metals by AA (Specify) As, Se, Hg.

From ____, NA Sample: Date Analyzed

☐ Calcium ____ mg/l ____

☐ Potassium ____ mg/l ____

☐ Magnesium ____ mg/l ____

☐ Sodium ____ mg/l ____

☐ Bicarbonate ____ mg/l ____

☐ Chloride ____ mg/l ____

☐ Sulfate ____ mg/l ____

☐ Total Solids ____ mg/l ____

☐ ____ ____

RECEIVED
JAN 8 1985
LIQUID WASTE/GROUND WATER SURVEILLANCE

This form accompanies 1 sample(s) marked as follows to indicate field treatment:
NF: Whole sample (no filtration)
F: Filtered in field with 0.45u membrane filter
A-H_2SO_4: Acidified with 2 ml conc H_2SO_4/l
A-HNO_3: Acidified with 5ml conc HNO_3/l
NA: No acid added

Sample acidified in lab 12-12-85 JK

Lab Number: HM 2022

Sample Code: Walker Well

Date Submitted: 12/10/85

Date Analyzed: 12/16/85

By: Cary

Reviewed By: Jim Ashby

Date Reported: 12/31/85

Element	ICAP VALUE(MG/L)	AA VALUE(MG/L)
Aluminum	<0.1	
Barium	<0.1	
Berylium	<0.1	
Boron	<0.1	
Cadmium	<0.1	
Calcium	100.	
Chromium	<0.1	
Cobalt	<0.1	
Copper	<0.1	
Iron	<0.1	
Lead	<0.1	
Magnesium	17.	
Manganese	0.37	
Molybdenum	<0.1	
Nickel	<0.1	
Silicon	9.9	
Silver	<0.1	
Strontium	1.3	
Tin	<0.1	
Vanadium	<0.1	
Zinc	<0.1	
Arsenic		<0.005
Selenium		<0.005
Mercury		<0.0005

HM 2022

ENVIRONMENTAL IMPROVEMENT DIVISION	SAMPLE NO. 1345 H DATE 8/5/12 85
	SIGNATURE Steven J. Cary
LOCATION Caribou Refinery	PRINT NAME AND TITLE (Inspector, Analyst or Technician) STEVEN J. CARY INSPECTOR
	ENTRY
	SEAL

REPORT TO: CARY/RAWLINGS -- NMEID
GW/HW Bureau - CERCLA Section
P.O.Box 968
Santa Fe, NM 87504-0968

85- 1195 -C

LABORATORY ______
LAB NUMBER ______

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ______

~~Water Supply and/or Code No.~~ Sample # 851205 1357

City & County Caribou Refinery Site, Farmington, NM

Collected (date & time) 12/5/85 1357 By (name) S. Cary / R. Rawlings

pH= — ; Conductivity= — umho/cm at — °C; Chlorine Residual= —

Dissolved Oxygen= — mg/l; Alkalinity= — ; Flow Rate= —

Sampling Location, Methods & Remarks (i.e. odors etc.)

From West drainage ditch 1 mile downstream from site and ½ mile from San Juan River.

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed Richard A Rawlings

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed Steven J. Cary

Method of Shipment to Laboratory By Hand.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen 1 ; duplicate 1 ; triplicate ______ ; blank(s) ______,
and ______ amber glass jug(s) with teflon-lined cap(s) identified as ______,
and ______ other container(s) (describe) ______ identified as ______.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from STEVEN J. CARY to R Meyerhein at (location) SLD on (date & time) 12/10/85 11:02am and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☒ No ☐.

Signature(s) Steven J. Cary R Meyerhein

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on (date & time) ______ and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ______ ______

RECEIVED
JAN 27 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

ANALYSES REQUESTED LAB. No.: ORG- 1195

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
	~~X~~	GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
arom. purg. screen*	none detected		
1,2-dichloroethane⊛	1 ppb		
		⊛ DETECTION LIMIT	1 ugm/l
		* DETECTION LIMIT	2 ugm/l

REMARKS: a trace amount of one compound was detected by the halogenated screen that was not identified (it eluted early on both columns).

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO___. Seal(s) broken by: [signature] date: 12-12-85 1-6-86

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 12-12-85 (6 Jan 86) Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: R. Meyer[signature]

REPORT TO: CARY/RAWLINGS — NMEID
GW/HW Bureau — CERCLA Section
P.O.Box 968
Santa Fe, NM 87504-0968

LABORATORY

LAB NUMBER

85- 1214 -B

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other

~~Water Supply and/or Code No.~~ Sample #85120S1357

City & County Caribou Refinery Site, Farmington NM

Collected (date & time) 12/5/85 1357 By (name) S. Cary / R. Rawlings

pH= —; Conductivity= — umho/cm at — °C; Chlorine Residual= —

Dissolved Oxygen= — mg/l; Alkalinity= —; Flow Rate= —

Sampling Location, Methods & Remarks (i.e. odors etc.)

From West Drainage ditch, down stream from site and ½ mile from river (San Juan).

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed Richard A. Rawlings

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed Steven J. Cary

Method of Shipment to Laboratory By Hand.

THIS FORM ACCOMPANIES ____ septum vials with teflon-lined discs identified as:
specimen ____; duplicate ____; triplicate ____; blank(s) ____,
and 1 amber glass jug(s) with teflon-lined cap(s) identified as 85120S1357,
and ____ other container(s) (describe) ____ identified as ____.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from STEVEN J. CARY to R Meyerhein at (location) SLD on (date & time) 12/10/85 1112 and that the statements in this block are correct.

Disposition of Sample ____. Seal(s) Intact: Yes ☒ No ☐.

Signature(s) Steven J. Cary R Meyerhein

I (we) certify that this sample was transferred from ____ to ____ at (location) ____ on (date & time) ____ and that the statements in this block are correct.

Disposition of Sample ____. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ____

RECEIVED
JAN 17 1986
LIQUID WASTE/GROUND WATER
SURVEILLANCE

ANALYSES REQUESTED LAB No.: ORG- 85-1244

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
		AROMATIC HYDROCARBON SCREEN		X	CHLORINATED HYDROCARBON PESTICIDES
		HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
				X	POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
Organochlorine Pesticides:	None Detected		
Minimum Detection Limit:	0.27 ppb against DDT		
PCB's: None Detected			
Minimum Detection Limit:	0.13 ppb against Arochlor 1254		
		* DETECTION LIMIT	

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes ✓ NO ___. Seal(s) broken by: K. Sherrell date: 12/19/85

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 1/14/86 . Analyst's signature: K. Sherrell

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: [illegible signature]

REPORT TO: CARY/RAWLINGS -- NMEID
GW/HW Bureau -- CERCLA Section
P.O.Box 968
Santa Fe, NM 87504-0968

LABORATORY

LAB NUMBER

85- 1201 -C

_D Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other

Water Supply and/or Code No. ~~Eloot~~ Field Blank, CARIBOU REFINERY

City & County Santa Fe, NM (Kirtland, San Juan Co.)

Collected (date & time) 8512100805 By (name)s S.C.

pH=____; Conductivity=______ umho/cm at ______ °C; Chlorine Residual=

Dissolved Oxygen=______ mg/l; Alkalinity=______; Flow Rate=

Sampling Location, Methods & Remarks (i.e. odors etc.)

Blank of EID lab distilled water

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed Steven J. Cary

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed R. Rawlings

Method of Shipment to Laboratory By Hand.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen 1; duplicate 1; triplicate ______; blank(s) ______,
and ____ amber glass jug(s) with teflon-lined cap(s) identified as ______,
and ____ other container(s) (describe) ______ identified as ______.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

$P-Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from STEVEN J. CARY to R Meyerhein at (location) SLD on (date & time) 12/10/85 1105 and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☒ No ☐.

Signature(s) Steven J. Cary R Meyerhein

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on (date & time) ______ and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☐ No ☐.

Signature(s)

RECEIVED
DEC 27 1985
LIQUID WASTE/GROUND WATER SURVEILLANCE

ANALYSES REQUESTED LAB No.: ORG- 1201

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
	X	GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
arom. purg. screen *	none detected		
$CHCl_3$ ⊛	8		
$CHCl_2Br$ ⊛	2		
$CHClBr_2$ ⊛	2		
$CHBr_3$ ⊛	1		
		⊛ DETECTION LIMIT	1 ugm/l
		* DETECTION LIMIT	3 ugm/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO ___. Seal(s) broken by: J. Finney date: 12-12-85

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 12-12-85. Analyst's signature: J. Finney

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: R. Meyerhe

NM ENVIRONMENTAL IMPROVEMENT DIVISION, HAZARDOUS WASTE SECTION

Page 1 of 2

CHAIN OF CUSTODY RECORD

PROJ. NO.:

PROJECT NAME: CARIBou REFINERY

SAMPLERS: (Signature) [illegible]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	WATER	SOIL	GC/HE	[illegible]	PAH	Heavy Metals	REMARKS
1.	[illegible]	1136		X	[illegible] Pit	1L Amb.	X			X	X		
	"	"		X	" " "	2-40ml	X		X				
	"	"		X	" " "	2x8oz		X	X	X	X		1 not valid
2.	"	1155		X	North Tank Berm Area	2-40ml	X		X				
	"	"		X	" " " "	2x8oz		X	X	X	X		1 not valid
3.	"	1216		X	Middle Tank Berm Area	2-40ml	X		X				
4.	"	1215		X	W. Drainage Ditch-[illegible]	1L Amb.	X			X	X		
	"	"		X	" " " "	2-40ml	X		X				
5.	"	1223		X	West Drainage Ditch-Upstream	2-40ml	X		X				
6.	"	1245		X	South Berm Area	2x8oz		X	X	X	X		
7.	"	1310		X	Refueling Pl[illegible]	1L Amb.	X			X	X		
	"	"		X	" " "	1L Plast.	X					X	not valid
	"	"		X	" " "	2-40ml	X		X				

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[illegible]	12/10/85 1053	[illegible]			

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

NM ENVIRONMENTAL IMPROVEMENT DIVISION, HAZARDOUS WASTE SECTION

Page 2 of 2

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
	Gibson Refinery

SAMPLERS: (Signature) Richard A Rawling

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	WATER	SOIL	GC/MS	PCB-Pesticides	PAH	Heavy Metals	REMARKS
8	2/5/85	1345		X	Walker Well	1 l Amber	X			X	X		
	"	"		X	" "	1 l Plastic	X					X	
	"	"		X	" "	[illegible]	X		X				
9	"	1357		X	West Drainage Ditch Downstream	1 l Amber	X			X	X		
	"	"		X	" " "	2-40ml	X		X				
10	2/10	0805		X	[illegible] H₂O	[illegible]	X						

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[illegible]	2/10/85 1053	[illegible]			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

SITE INSPECTION FOLLOW-UP REPORT

CARIBOU REFINERY SITE

KIRTLAND, NEW MEXICO

CONCLUSIONS

Based on work conducted under this Site Inspection Follow-up investigation, the following conclusions are drawn:

1. 1,2-dichloroethane in shallow ground water at the site is originating at the Caribou facility; there are no alternate sources.
2. Shallow ground water is used in the area for private and public/community drinking purposes.
3. The alluvial aquifer along the San Juan River is not transected by Coolidge Arroyo.
4. Water from the Brimhall Ditch is used to irrigate 75 acres of forage crops within 0.5 miles of the extended site boundary.
5. A waste disposal pit on-site holds 689 cubic yards of non-exempt sludge containing up to 140 ppm lead; this waste is available to ground water and surface water.

INTRODUCTION

A Site Inspection (SI) was performed at the Caribou Refinery site (NM01902) by the New Mexico Environmental Improvement Division's (EID) CERCLA PA/SI staff in December 1985. Data obtained during the SI indicated that volatile organics from the site were entering surface water and ground water. On the refinery property, ground water was observed seeping into the Brimhall Ditch. This ground water contained benzene, toluene, ethylbenzene, xylenes, and EDC. The Walker private well, located downgradient from the site, produced water containing 9 ppb of 1,2-dichloroethane. Due to the seriousness of contamination at the site, EID PA/SI staff proposed to perform SIF work in order to document an HRS package and nominate the site for the NPL.

WORK PLAN OVERVIEW

Further study was recommended on both the ground water and surface water routes at the Caribou site. To properly evaluate the ground water route, it was necessary to sample upgradient ground water, perform a well inventory and quantify the population at risk, and quantify waste volume, toxicity, and persistence at the site. The surface water route was more complex because there are two distinct pathways. Both pathways were evaluated to determine which produced the highest HRS score. For one there was clearly a release, but no documented use. For the other there was a use, but no documented release. The amount and nature of wastes available to each pathway was also determined.

RESULTS

Field notes from the two site visits made by PA/SI staff for this SIF are given in Appendix II. Raw data from these visits, as well as from relevant site visits made by the Oil Conservation Division and the EID Farmington Field Office, are given in Appendix III.

GROUND WATER ROUTE

Water Well Inventory

In order to determine the population potentially at risk from contaminated shallow ground water, attempts were made to identify and locate all water supply wells tapping the shallow alluvial aquifer within three miles of the site. Information was obtained by perusing the files of the New Mexico State Engineer Office (SEO) and the EID Water Supply Section (WSS). EID staff stationed at the Farmington Field Office (FFO) assisted by conducting a survey of houses in the neighborhood south of the site.

This part of the SIF also produced valuable data such as well depth, construction, and use. Using drillers' logs, staff identified which water supply wells tap the shallow alluvial aquifer along the San Juan River. Information on alluvial wells in the area is summarized in the table below. Appendix I contains available well records for alluvial wells within three miles of the site. Locations of these wells are given on Figure 1.

CARIBOU AREA WELL DATA

owner	location	depth (ft)	aquifer	use	source
Hastings (Miller)	17,29N,14W	38	alluvium	dom/stk	SEO
Hastings (Jackson)	17,29N,14W	35	alluvium	dom/stk	SEO
Harris	7,29N,14W	39	alluvium	dom/stk	SEO
Urbach	18,29N,14W	28	alluvium	dom	SEO
Blaylock	13,29N,15W	30	alluvium	dom/stk	SEO
Sweek	17,29N,14W	31	alluvium	dom/stk	SEO
Fergie's Tr. Pk.	7,29N,14W	50	alluvium	public	EID-WSS
Walker	17,29N,14W	26	alluvium	dom	EID-FFO
Grubbs	17,29N,14W	unk.	alluvium	dom	EID-FFO

While all the above wells are finished in the alluvial aquifer, three are on the other side of Coolidge Arroyo from the refinery (see Figure 1). In order to be able to use these wells for HRS purposes it is necessary to show that the alluvial aquifer is continuous beneath Coolidge Arroyo. This can be done by comparing the elevation of the bottom of Coolidge Arroyo with the elevation of the top of the bedrock as identified in area drillers' logs. Drillers' logs are available for most of the above wells (Appendix I). None of the wells having drillers' logs encounters bedrock; all are completed in alluvium. By subtracting the known well depths from land surface elevations estimated from Figure 1 it is possible to estimate minimum thicknesses of the alluvium and upper limits for the top of the bedrock beneath the alluvium (see Table below).

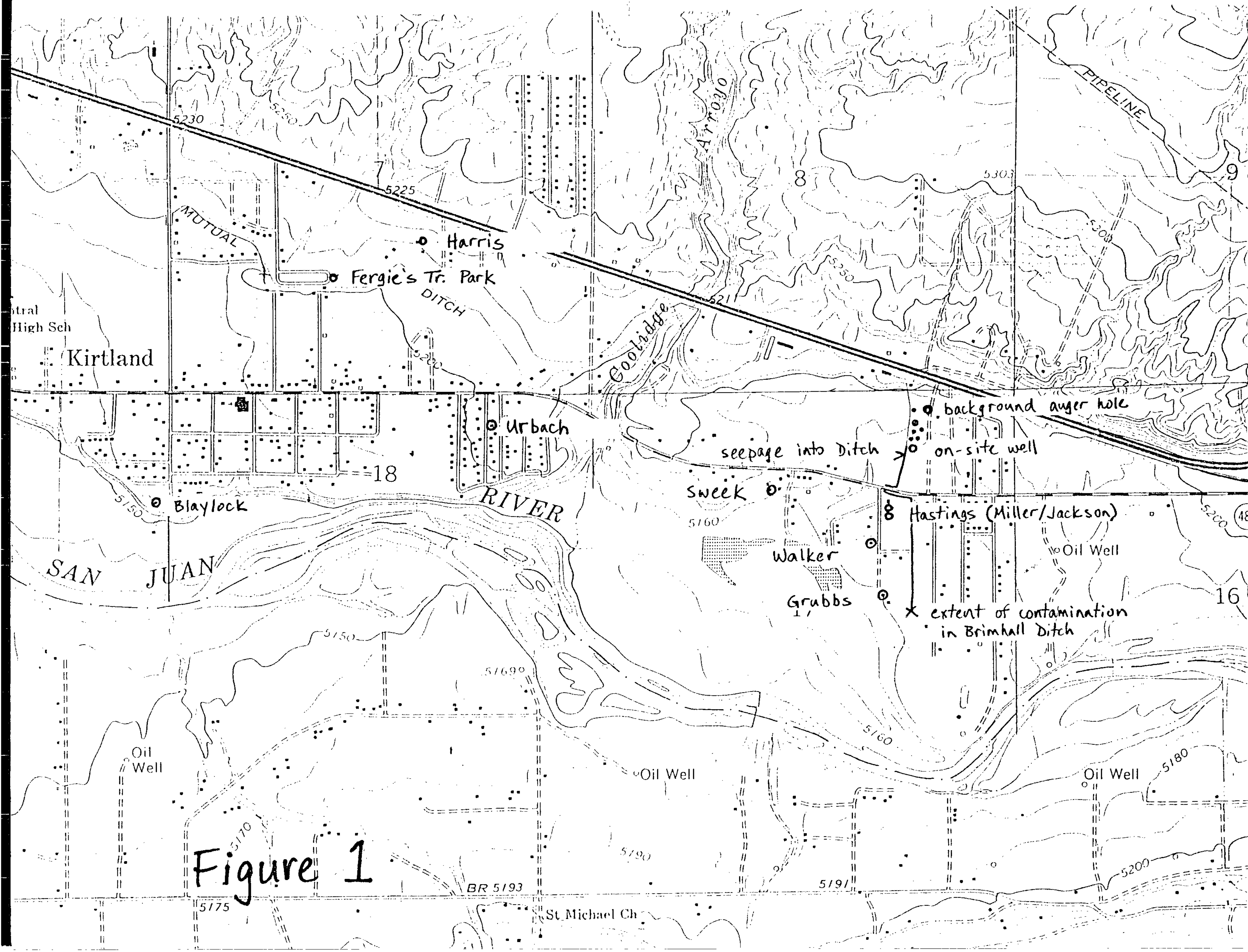

PIPELINE
Arroyo
Coolidge
MUTUAL
DITCH
Harris
Fergie's Tr. Park
Kirtland
High Sch
Urbach
Blaylock
SAN JUAN RIVER
background auger hole
on-site well
seepage into Ditch
Sweek
Hastings (Miller/Jackson)
Walker
Grubbs
extent of contamination
in Brimhall Ditch
Oil Well
Oil Well
Oil Well
Oil Well
St Michael Ch
BR 5193
7
8
9
16
18
5230
5225
5250
5303
5200
5160
5150
5169
5170
5175
5180
5190
5191

Figure 1

ALLUVIAL AQUIFER THICKNESS

owner	land surf. elev. (ft)	well depth (ft)	top of bedrock elev. (ft)
Hastings (Miller)	5167	38	<5129
Hastings (Jackson)	5167	35	<5132
Harris	5210	39	<5171
Urbach	5204	28	<5176
Blaylock	5145	30	<5115
Sweek	5170	31	<5139
Fergie's Tr. Pk.	5204	50	unknown
Walker	5165	26	unknown
Grubbs	5160	unknown	unknown

From Figure 1 the minimum elevation of Coolidge Arroyo near the San Juan River is seen to be 5150 feet. The bottom of the Arroyo rises to the northeast. Data in the above table show that sand and gravel extends down to an elevation of 5115 feet near the San Juan River. Four of the six wells for which data are available show alluvium down at least to an elevation of 5139 feet. This is more than 10 feet lower than the bottom of Coolidge Arroyo. It is therefore concluded that Coolidge Arroyo does not transect the alluvial aquifer.

Ground Water Sampling

Additional ground water sampling was conducted during the SIF. The results of this effort were confirmation of earlier lab results, better description of the extent of contamination, and conclusive determination that Caribou Refinery was the source of ground water contamination.

The Walker private well was sampled during the SI; that sample contained 9 ppb of 1,2-dichloroethane (EDC). During the SIF, the Walker well was resampled to verify the earlier findings. Three other private domestic wells in the area, those owned by Miller, Jackson, and Grubbs, also were sampled. These wells were sampled at spigots nearest the well heads. Samples were placed in duplicate 40-ml teflon-capped glass vials and stored on ice for shipment to the laboratory, where they were tested for volatile organics, including EDC.

Resampling of the Walker well confirmed the presence of EDC. Of the three additional wells sampled, one was found to be uncontaminated; the other two wells contained amounts of EDC comparable to the Walker well. No other volatile organic contaminants were found in shallow ground water in the area. All of the private domestic wells tested are located within one mile to the south or southwest of the refinery in the presumed direction of ground water flow, obliquely down valley.

To demonstrate that EDC found in down-gradient private wells originated at the Caribou refinery site it was necessary to confirm that upgradient ground water does not contain EDC. Near the northeast boundary of the site a hole was bored approximately 6 feet to the water table with a 3-inch diameter hand-operated soil auger. A sample was bailed using a 1-inch PVC bailer. The sample was placed in duplicate 40-ml teflon-capped glass vials and stored on ice for shipment to the laboratory, where it was tested for volatile organics, including EDC. This sample contained no contamination with volatile organics of any kind. Therefore it is concluded that the EDC in shallow ground water south of the Caribou Refinery is originating at the refinery.

The results of all ground water sampling performed at this site to date are summarized in the table below. Raw data for these samples are given in Appendix II.

GROUND WATER SAMPLING RESULTS

sample location	date	EDC (ppb)	other VOCs (ppb)
background	2/18/86	<1	<1
on-site well	2/17/86	<1	<1
seep into ditch	2/17/86	60	BTEXs
Miller-Jackson #1	4/1/86	6	<1
Miller-Jackson #2	4/1/86	8	<1
Walker well	12/5/85	9	<2
Walker well	2/10/86	2	<1
Grubbs well	4/1/86	<1	<1

Quality control (QC) samples collected during the SIF indicate that no artificial contamination of samples occurred and that the concentrations presented above represent actual concentrations in ground water. Three QC procedures were employed in the ground water portion of this SIF. The state's Scientific Laboratory Division (SLD) and the Farmington Field Office (FFO) each supplied distilled water travel blanks. In the field, PA/SI staff used de-ionized water to rinse the soil auger and bailing equipment; these rinse waters were collected in 40-ml teflon-capped glass vials and stored on ice for shipment to the laboratory, where they were tested for volatile organics, including EDC. As the third QC measure, all samples for VOC analysis, incuding blanks, were collected and submitted in duplicate. The results of QC sampling and analyses are presented in the table below.

QUALITY CONTROL SAMPLES - GROUND WATER

sample type	date	EDC (ppb)	other VOCs (ppb)
travel blank (FFO)	2/10/86	<2	<2
travel blank (SLD)	2/13/86	<1	<1
field blank #1 bailer rinse	2/17/86	<1	<1
field blank #2 soil auger rinse	2/18/86	<1	<1
field blank #3 siol auger rinse	2/18/86	<1	<1
field blank #4 bailer rinse	2/18/86	<1	<1
travel blank (FFO)	4/1/86	<1	<1

SURFACE WATER ROUTE

Investigations into the surface water route were necessary to sort out the confusing array of irrigation ditches and diversions in the immediate vicinity of the site. The Farmers Mutual Irrigation Ditch potentially affects a large target population, but there is no documented release and characteristics of available wastes and the overland flow route are extremely problematic. A release to the Brimhall Ditch was documented and a target population was identified through irrigation of forage crops. Volume of waste available to this pathway is sufficient to make this route useful for HRS purposes.

Surface water at the site consists of the Farmers' Mutual Irrigation Ditch (FMID) and diversions therefrom, which flow eventually to the San Juan River. The main ditch (FMID) obtains water from the Animas River several miles east of the site and transports it westward along the north side of the San Juan River valley. The

FMID splits the refinery property; the refining apparatus and the former tank farm are to the north of the FMID and the present tank farm, lead mixing area and loading area are to the south of the FMID.

Along its route the FMID is tapped for irrigation purposes. At the refinery property a headgate is used to divert water from the FMID into the so-called Brimhall Ditch. The Brimhall Ditch (BD) carries water south and west to irrigate fields along the San Juan River. The BD exits the FMID at the refinery apparatus and flows along the west boundary of the present tank farm. Numerous other headgates draw water from the FMID after it traverses the refinery property and continues downvalley. These diversions are used by local property owners to water private gardens, to grow small amounts of cash crops, such as melons and sweet corn, and to irrigate alfalfa, hay, and field corn for livestock consumption. Tailwater from the BD and other diversions flows to the San Juan River. A schematic diagram of the ditch configuration is shown in Figure 2.

Approximately 5 miles west of the refinery the FMID supplies water for community drinking purposes. The San Juan River, which receives the tailwater from the FMID, is also used for drinking water purposes about 5 miles downstream from the refinery.

Wastes at the site may enter surface water through two distinct pathways. One pathway of concern is the FMID, which may have received wastes from the refinery apparatus or from the former tank farm. From the FMID the wastes could have been diverted into the BD or into other diversions to the west. Through the second pathway, wastes from the present tank farm area could enter the Brimhall Ditch directly, with potential risks to users of water from that single lateral or from the San Juan River.

As a part of this investigation, PA/SI staff researched historical records and interviewed officials to determine the nature of past spills or leaks. According to Don McGonigle, San Juan County Fire Marshal, there was poor housekeeping at the old tank farm near the refinery proper (see Appendix II, p. 26). Spills and leaks, some resulting in fires, were apparently commonplace. Correspondence between the New Mexico Oil Conservation Division (OCD) and the NMEID in 1973 (Appendix IV) indicates that spills, leaks, and seepage of hydrocarbons into the FMID were serious enough to warrant construction of a concrete retaining wall and a concrete pipe to completely enclose the FMID as it traversed the refinery property. These concrete structures are still in place and, upon inspection, were found to be capable of preventing spills or leaks from flowing overland and entering the FMID.

PA/SI staff also tried to document a release to the FMID by sampling the ditch-bottom sediments upstream and downstream of the refinery. The samples were collected in February, when the FMID was not running. The upper two inches of sediment were collected with spoons, placed into 8-ounce glass jars, and submitted for metals and Volatile Organic Carbons (VOC) analysis. The results are summarized in the table below.

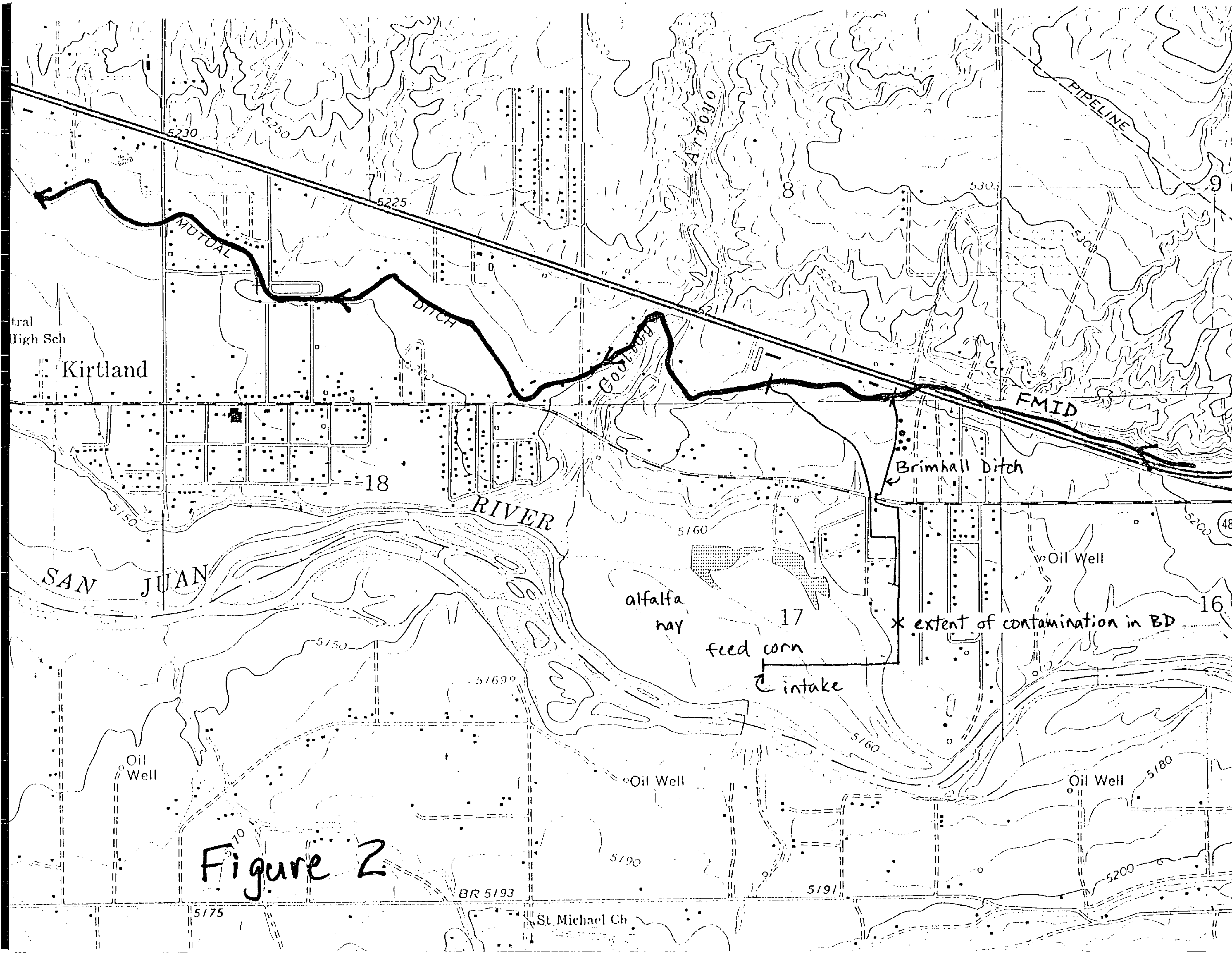

PIPELINE
FMID
Brimhall Ditch
extent of contamination in BD
intake
feed corn
alfalfa
hay
Arroyo
MUTUAL
DITCH
Kirtland
High Sch
SAN JUAN
RIVER
Oil Well
St Michael Ch
BR 5193
5230
5225
5250
5150
5160
5180
5200
5190
5191
5175
7
8
9
16
17
18

Figure 2

FMID SEDIMENT SAMPLING RESULTS (ug/g)

constituent	upstream	downstream
As	1.0	1.7
B	<5	10
Co	<5	5
Cu	10	15
Pb	25	55
Mn	500	800
Ni	<5	5
V	5	<5
Zn	140	225
VOCs	<500	<500

Results for lead are suggestive, with the downstream sample having 55 ppm in comparison to only 25 ppm upstream, but these values are not sufficiently different to be convincing. Results fail to indicate any likely refinery contaminant that is significantly elevated in the downstream sample.

It is therefore clear that hydrocarbons were released from the facility to the FMID in the past. However, these materials most likely qualify for the CERCLA petroleum exemption. PA/SI staff were unsuccessful in ascertaining the exact nature of materials spilled, leaked and seeped into the FMID. Without knowing exactly what wastes were lost to the FMID, the petroleum exemption cannot be evaluated. Accordingly, a release of non-exempt waste to the FMID cannot be documented.

Because staff was unable to document a release to the FMID and because of potential problems with waste characteristics on that pathway, further SIF effort was focussed on the Brimhall Ditch pathway. A release of EDC to the BD can be documented with data from the SI. SI data also allowed extension of the site boundary along the Brimhall Ditch 0.3 miles south of the refinery.

During the SIF, PA/SI staff attempted to determine the location and size of the target population for this pathway. PA/SI staff walked the Brimhall Ditch on July 8, 1986. The only diversions from the BD were located 0.45 miles (2376 ft) downstream from the hazardous substance (Appendix II, p. 27). At that location a gate diverts BD water into 75 acres of fields owned by Mr. Brimhall and Mr. Walker and used to grow hay, feed corn, and alfalfa for livestock consumption (Appendix V). No irrigation was observed downstream from these properties. Tailwater goes to the San Juan River (Appendix V).

A 3-acre plot of sweet corn and melons was identified immediately adjacent to the BD right at the hazardous substance (site) boundary. However, this field, which is owned by Mr. Grubbs and leased to Mr. Kinlichee, is irrigated from a lateral that exits the FMID about 1000 ft west of the BD headgate, and so is not vulnerable to contamination in the BD.

WASTE CHARACTERISTICS

PA/SI staff ascertained that 689 cubic yards of non-exempt, lead-containing wastes had been deposited of at the site in a manner that left the wastes available to both surface water and ground water routes.

On February 17, 1986, two waste disposal areas were identifed at the site. Mr. Omer Morrison, a former refinery employee, stated that tank bottoms from the 50,000-barrel crude oil tank had been removed and placed in these two disposal pits. This material is considered non-exempt under CERCLA because it is a waste product of the refining process. The sludge is not petroleum, crude oil, or any fraction thereof.

The largest of the two waste pits is located just south of the refueling platform. Mr. Morrison stated that it was 10 to 15 feet deep. Using a steel measuring tape, PA/SI staff measured the horizontal dimensions to be 62 x 30 feet. Therefore, the volume of waste in this pit is conservatively estimated to be 10 x 62 x 30 = 18,600 cubic feet, or 689 cubic yards. The second pit is located adjacent to the 50,000-barrel tank. Mr. Morrison gave its depth as 5 to 6 feet. The pit has been filled in with earth material and covered over and only seeps are visible at the surface; the horizontal dimensions, and therefore the waste volume, are unknown.

Both these pits were excavated in sand and gravel alluvium, are unlined, have inadequate freeboard and unsound runon diversion structures. Both are available to the ground water route. Although Mr. Morrison indicated that the large pit was dry when it was excavated, the seasonal high water table probably rises into the waste material in this pit.

Surface runoff from the pits cannot leave the site because of a berm at the south end of the refinery property, nor can it flow overland to the BD because of a berm along the BD. However, shallow ground water flows southwest from the pits toward the BD which is less than 100 yards away. Therefore both pits are available to the BD surface water pathway by way of shallow ground water.

In addition to the two waste disposal pits, Mr. Morrison identified the area in which gasoline was blended with tetra-ethyl lead to make leaded gasoline. This area is in the middle of the new tank farm. It is bermed so that surface runon/runoff is not a factor, but the area is unlined and movement to ground water is not prevented.

Chemical characteristics of wastes in these areas can be assessed from samples collected on February 17 - 18, 1986. From the large disposal pit staff obtained two 8-oz. glass jars of sludge and two 40-ml teflon-capped glass vials of fluid ponded at the surface of the pit. From the small pit staff collected two 8-oz. glass jars of cover soil. From the area near the lead blending pump, staff collected two 8-oz. glass jars of surface soil.

Results of all sampling for waste characteristics are summarized in the table below. The results indicate that the sludge in the waste pit and the soil in the lead blending area contain elevated levels of lead, chromium, and arsenic. Lead, for example, occurs at about 11 ppm in native soils, but is elevated to more than 10 times that level in on-site wastes.

WASTE SAMPLING RESULTS

sample location	date	VOCs	lead	chromium	arsenic
bkgd surface soil	2/18/86		11 ppm	2.6 ppm	1.9 ppm
bkgd. soil @ 24" dpth.	2/18/86		10	2.6	1.7
sm. waste pit (soil)	2/17/86		20	2.6	2.8
lg. waste pit (liquid)	2/17/86	<3 ppb			
lg. waste pit (sludge)	2/17/86		140	31	23
lead mixing area (soil)	2/17/86		260	15	5

All of the above wastes are in or near the present tank farm. No official waste disposal was indicated in the area near the actual refinery apparatus and former tank farm north of the FMID. The lead storage shed was in that area and there is historical documentation that the old tank farm was a source of spills and leaks that saturated the underlying soil and contaminated the FMID, but there is no identifiable or measurable volume of non-exempt CERCLA hazardous waste in that area.

SUMMARY AND APPLICATION

The SIF confirmed that benzene, toluene, xylenes and 1,2-dichloroethane had been released from the site to shallow ground water and surface water and that there were no alternate sources for this contamination. The SIF showed that ground water is used extensively for drinking purposes in proximity to the site and that surface water is used for irrigation of forage crops in the vicinity of the site. Waste characteristics were also quantified as a result of data collected for this SIF. The site holds 689 cubic yards of waste that contains elevated levels of lead. This material is a refinery waste product and is deemed not exempt from CERCLA law. The waste materials are available to both surface water and ground water.

Information obtained through this SIF will be used to document an HRS package for the Caribou Refinery site. Data are sufficient to support a Ground Water Route score that will stand on its own and a Surface Water Route score that will also be of value.

APPENDIX I

Well Records and Drillers' Logs

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

'77 AUG 10 AM 11 48

STATE ENGINEER OFFICE
SANTA FE, N.M. 87501

Section 1. GENERAL INFORMATION

(A) Owner of well ~~Joseph Hastings~~ Owner's Well No. ______
Street or Post Office Address ~~P.O. Box 633~~
City and State ~~Kirtland, New Mexico~~

Well was drilled under Permit No. ~~SJ-417~~ and is located in the:

a. ______ ¼ NW ¼ SW ¼ NE ¼ of Section 17 Township 29 Range 14W N.M.P.M.

b. Tract No. ______ of Map No. ______ of the ______

c. Lot No. ______ of Block No. ______ of the ______
Subdivision, recorded in San Juan County.

d. X= ______ feet, Y= ______ feet, N.M. Coordinate System ______ Zone in the ______ Grant.

(B) Drilling Contractor William J. Hood License No. Wd-717

Address Rt. 3, Box 234, Flora Vista, N. Mex.

Drilling Began 8/2/77 Completed 8/4/77 Type tools cable Size of hole 7 in.

Elevation of land surface or ______ at well is 5200 ft. Total depth of well 38 ft.

Completed well is [X] shallow [ ] artesian. Depth to water upon completion of well 7 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet		Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
From	To			
25 Ø	38	13	Blue water sand	10

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet		Length (feet)	Type of Shoe	Perforations	
			Top	Bottom			From	To
7	.256		0	19	19	none	none	
5.5	plastic cl-200		17	38	21	none	25	38

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet		Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement
From	To				

Section 5. PLUGGING RECORD

Plugging Contractor ______
Address ______
Plugging Method ______
Date Well Plugged ______
Plugging approved by:

______
State Engineer Representative

No.	Depth in Feet		Cubic Feet of Cement
	Top	Bottom	
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received 8/10/77

Quad ______ FWL ______ FSL ______

File No. SJ-417 Use Dom. Location No. 29.14.17 ...
San Juan Co. 231

Section 6. LOG OF HOLE

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color and Type of Material Encountered
0	25	25	Over burden & boulders
25	38	13	Blue water sand

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Driller

[redacted]

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well ~~Joseph M. Hastings~~ Owner's Well No. ___

Street or Post Office Address ~~Box 633~~

City and State ~~Kirtland New Mexico~~

Well was drilled under Permit No. ~~SJ-418~~ and is located in the:

a. ___ ¼ ~~NW~~ ¼ ~~SW~~ ¼ ~~NE~~ ¼ of Section ~~17~~ Township ~~29~~ Range ~~14 West~~ N.M.P.M.

b. Tract No. ___ of Map No. ___ of the ___

c. Lot No. ___ of Block No. ___ of the ___
Subdivision, recorded in ~~San Jaun~~ County.

d. X= ___ feet, Y= ___ feet, N.M. Coordinate System ___ Zone in the ___ Grant.

(B) Drilling Contractor ~~W.J. Hood~~ License No. ~~WD 717~~

Address ___

Drilling Began ~~8/9/77~~ Completed ~~8/11/77~~ Type tools ~~Cable~~ Size of hole ~~7~~ in.

Elevation of land surface or ___ at well is 5200 ft. Total depth of well 35 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 7 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
23	35	12	Blue Water Sand	10

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
7	¼ Wall		0	14	14	None		
XXX	XXX							
5.3	Plastic		12	35	23	None	22	35

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement

Section 5. PLUGGING RECORD

Plugging Contractor ___
Address ___
Plugging Method ___
Date Well Plugged ___
Plugging approved by:

___
State Engineer Representative

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received Aug. 18, 1977

SJ-418

Section 6. LOG OF HOLE

Depth in Feet		Thickness in Feet	Color and Type of Material Encountered
From	To		
0	22		Over Burden & Boulders
22	35	13	Blue Water Sand

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Driller

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Lowell Harris Owner's Well No. SJ 451
Street or Post Office Address 725 W. Animas
City and State Farmington, N.M. 87401

Well was drilled under Permit No. SJ 451 and is located in the:

STATE ENGINEER OFFIC
SANTA FE, N.M. 87501

a. SW ¼ ____ ¼ NW ¼ SE ¼ of Section 7 Township 29N Range 14W N.M.P.M.

b. Tract No. ____ of Map No. ____ of the ____

c. Lot No. ____ of Block No. ____ of the ____
Subdivision, recorded in San Jaun County.

d. X= ____ feet, Y= ____ feet, N.M. Coordinate System ____ Zone in the ____ Grant.

(B) Drilling Contractor Leon(Shorty) Thompson License No. WD 527

Address P.O.Box 1651 Farmington, N.M. 87401

Drilling Began 9/5/77 Completed 9/7/77 Type tools Cable Tool Size of hole 6 in.

Elevation of land surface or ____ at well is ____ ft. Total depth of well 6 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 24 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet		Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
From	To			
32	39	7	Gravel	40

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet		Length (feet)	Type of Shoe	Perforations	
			Top	Bottom			From	To
6	19	Welded			32	None	None	

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet		Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement
From	To				

Section 5. PLUGGING RECORD

Plugging Contractor ____
Address ____
Plugging Method ____
Date Well Plugged ____
Plugging approved by:

____
State Engineer Representative

No.	Depth in Feet		Cubic Feet of Cement
	Top	Bottom	
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received 9/15/77

SJ-451

San Juan Co.

Section 6. LOG OF HOLE

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color and Type of Material Encountered
0	23	23	Sand
23	35	12	Boulders
35	[illegible]	7	Gravel

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Driller

[redacted]

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Eugen Urbach Owner's Well No. SJ 1034
Street or Post Office Address P.O. Box 265
City and State Kirkland, N.M.

Well was drilled under Permit No. SJ 1034 and is located in the:

a. NW ¼ NE ¼ NE ¼ ______ ¼ of Section 18 Township 29N Range 14W N.M.P.M.

b. Tract No. ______ of Map No. ______ of the ______

c. Lot No. 14 of Block No. 1 of the Brandt # 2
Subdivision, recorded in San Juan County.

d. X= ______ feet, Y= ______ feet, N.M. Coordinate System ______ Zone in the ______ Grant.

(B) Drilling Contractor Bob Sayre License No. WD 847

Address P.O. Box 2434 Farmington, N.M.

Drilling Began 11-9-79 Completed 11-12-79 Type tools Cable tool Size of hole 6 in.

Elevation of land surface or ______ at well is ______ ft. Total depth of well 28 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 16 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet		Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
From	To			
26	28	2	Gravel	10

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet		Length (feet)	Type of Shoe	Perforations	
			Top	Bottom			From	To
6	20	Welded			27	Heavy [illegible]		

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet		Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement
From	To				

Section 5. PLUGGING RECORD

Plugging Contractor ______
Address ______
Plugging Method ______
Date Well Plugged ______
Plugging approved by:

______
State Engineer Representative

No.	Depth in Feet		Cubic Feet of Cement
	Top	Bottom	
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received 11/14/79

Quad ______ FWL ______ FSL ______

File No. SJ-1034 ______ Use Dom. ______ Location No. 29N.14W.18.[illegible]

[redacted]

Section 6. LOG OF HOLE

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color and Type of Material Encountered
0	20	20	[illegible]
20	26	6	Sand
26	28	2	Gravel

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

[illegible]
Driller

[redacted]

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Louis Blaylock Owner's Well No. ______
Street or Post Office Address Box 536
City and State Kirtland, N.M.

Well was drilled under Permit No. SJ 1223 and is located in the:

a. ____ ¼ ____ ¼ SE ¼ NE ¼ of Section 13 Township 29N Range 15W N.M.P.M.

b. Tract No. ______ of Map No. ______ of the ______

c. Lot No. ______ of Block No. ______ of the ______
Subdivision, recorded in ______ County.

d. X= ______ feet, Y= ______ feet, N.M. Coordinate System ______ Zone in the ______ Grant.

(B) Drilling Contractor Terry G Hood License No. WD 717

Address Rt 3 Box 234 Flora Vista N.M.

Drilling Began 7/19/ 80 Completed 7/ 21 / 80 Type tools CableTool Size of hole 6 in.

Elevation of land surface or ______ at well is 5300 ft. Total depth of well 30 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 12 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet		Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
From	To			
18	30	12	Water Bearing Sand & Gravel	20

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet		Length (feet)	Type of Shoe	Perforations	
			Top	Bottom			From	To
6	.219		0	30	30	Drive Shoe	18	30

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet		Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement
From	To				

'80 JUL 24 PM 12 18
STATE ENGINEER
SANTA FE, N.M.

Section 5. PLUGGING RECORD

Plugging Contractor ______
Address ______
Plugging Method ______
Date Well Plugged ______
Plugging approved by:

______
State Engineer Representative

No.	Depth in Feet		Cubic Feet of Cement
	Top	Bottom	
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received 7/24/80

Quad ______ FWL ______ FSL ______

File No. SJ-1223

[redacted]

Section 6. LOG OF HOLE

Depth in Feet		Thickness in Feet	Color and Type of Material Encountered
From	To		
0	18	18	Over Burden & Boulders
18	30	12	Water Bearing Sand & Gravel

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Tony J. Steel
Driller

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Kenneth Sreek Owner's Well No. ______

Street or Post Office Address Rt 1 Box 363

City and State Farmington , N.M. 87401

Well was drilled under Permit No. SJ 1259 and is located in the:

a. ______ ¼ ______ ¼ E ½ ¼ NW ¼ of Section 17 Township 29N Range 14W N.M.P.M.

b. Tract No. ______ of Map No. ______ of the ______

c. Lot No. ______ of Block No. ______ of the ______ Subdivision, recorded in ______ County.

d. X= ______ feet, Y= ______ feet, N.M. Coordinate System ______ Zone in the ______ Grant.

(B) Drilling Contractor Terry G Hood License No. WD 717

Address Rt 3 Box 234 Flora Vista, NM

Drilling Began 9/5/80 Completed 9/9/80 Type tools Cable Tool Size of hole 6 in.

Elevation of land surface or ______ at well is 5300 ft. Total depth of well 31 ft.

[illegible] is ☒ shallow ☐ artesian. Depth to water upon completion of well 3 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet		Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
From	To			
10	31	21	Water Bearing Sand & Gravel	10

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet		Length (feet)	Type of Shoe	Perforations	
			Top	Bottom			From	To
6	.219		0	31	31	Drive Shoe	12	31

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet		Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement
From	To				

STATE ENGINEER
SANTA FE, N.M.
SEP 17 PM 1 21

Section 5. PLUGGING RECORD

Plugging Contractor ______

Address ______

Plugging Method ______

Date Well Plugged ______

Plugging approved by:

______

State Engineer Representative

No.	Depth in Feet		Cubic Feet of Cement
	Top	Bottom	
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received 9/17/80

Quad ______ FWL ______ FSL ______

File No. SJ-1259

Section 6. LOG OF HOLE

Depth in Feet		Thickness in Feet	Color and Type of Material Encountered
From	To		
0	10	10	Over Burden & Boulders
10	31	21	Water Bearing Sand Gravel

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Driller

APPENDIX II

Field Notes

Feb 17, 1986

1400 Hrs. Arrived on site - Steven Cary
Richard Abramburg

Purpose of Visit:
- Sample Farmer's Mutual Irrig. Ditch above & below site

- Identify property boundaries
- Identify tetraethyl lead storage tank and mixing area.
- Sample soil near lead tank

- Sample drainage ditch on site.
- Sample upgradient groundwater
- Get a waste quantity estimate if possible
- Air monitoring upwind and downwind of drainage ditch.

Personnel On-Site
Site representative Jim Cahoon.
OCD representative - Ernie Busch
EID Field Office rep. - Len Murray RA

(12)

Caribou - Commenced 1965
Refined local crude &
transmix (line washing)

Dichloroethane added during
refining but is burned off before
final product comes off.
Lead shed is behind
Maverick store

- Fire dep't required tanks to be
emptied when closed down

- No EDB used
on site
- Sold refined product to Maverick Stores
and Direct Sales Co.

-

Inspect steel shed (boiler room) Some
caustic soda & soda ash for H_2O
softening. 100' x 50'

[initials]

(12)

(13)

Storage
- Lead, shed. - behind Maverick Store
Boraxyl + H_2O was added to lead tank to deactivate lead.
Tank - 51,800 lb max wt.
Final destruct" is by burning.

- Lead trucked in and sucked in by vacuum.
- 1 drum of "Oil Soluble Dye" for regular gasoline

"Ethyl" Red 105

mixture of Azo Benzene - 4 - azo - 2 naphthol and benzene - azo - 2 - naphthol
2 drums - part full
1 5 gal bucket

- Work shop attached to lead shed. - [illegible]

Lead Shed + Work Shop - Approx 50' x 120'
- Lead solution was piped to tank farm under vacuum for mixing

RHK

1x 55 gall drum - of "Emulsifier"
on site.

1445 Drove down to Tank Farm

Starting at southern end of farm

- 50,000 gall tank. - Stored
leaded gasoline - Earth bermed.

- Final pumped out 1983-84 after
blending activity by Peter/Soura.
- Well located in bermed area
to north of 50K tank.

1500 Collected sample from on-site well
DTW ~ 6' measured w/ 2x4
sample bailed with nylon ~~[illegible]~~ wire
wound around neck of 40 ml vial
(2 x 40 ml vials)

1522 distilled water blank collected from wire of
sampling device
(2 x 40 ml vials)

RAR

1525 collected water sample from drainage ditch on west side of tank farm (2 x 40 ml vials) smelled ~~like~~ hydrocarbons, color was yellow-orange scum; Ernie Busch said it smelled like refined product.

FR

Ernie Busch

Petro Source blended gas at site; blended bad w/ product & crude (light natural) & selling it as product

1983-1984; used lead plant & blenders & tank farm

Owner Morrison was in charge;

check w/ Fire Dept. to see if tanks were pumped out before or after Petro Source; also see if ~~[illegible]~~ ~~[illegible]~~ Petro Source used remaining stock left from Caribou

contact

Gene Allen, Supt., Texline Plant

598-9518

perhaps more reliable than Morrison

former chemist for Caribou

RH

1545 joined by Vince Morrison

says well was ≈ 20' deep

may have theory for gasoline in ditch;

disconnected (rusted) pipe just W of south tank

may indicate that some gasoline was drained out of

lines

fire in 1978 burned most of tank

lead pumped down from storage shed to lead

pump just N of E-W row of 5 tanks (#s 517,

715, 574, 2712 & 2571); ~~to~~ mixed lead w/ premium in

tank 574, regular in 2712;

sample soil near pump for lead.

5000 bbl tank was cleaned; tank bottoms

were dug out and placed in pit south of loading

rack; hole was dry when filled; estimated

10-15' deep; tank held crude oil; also

a similar pit 5-6' deep at that tank;

came out as light grease

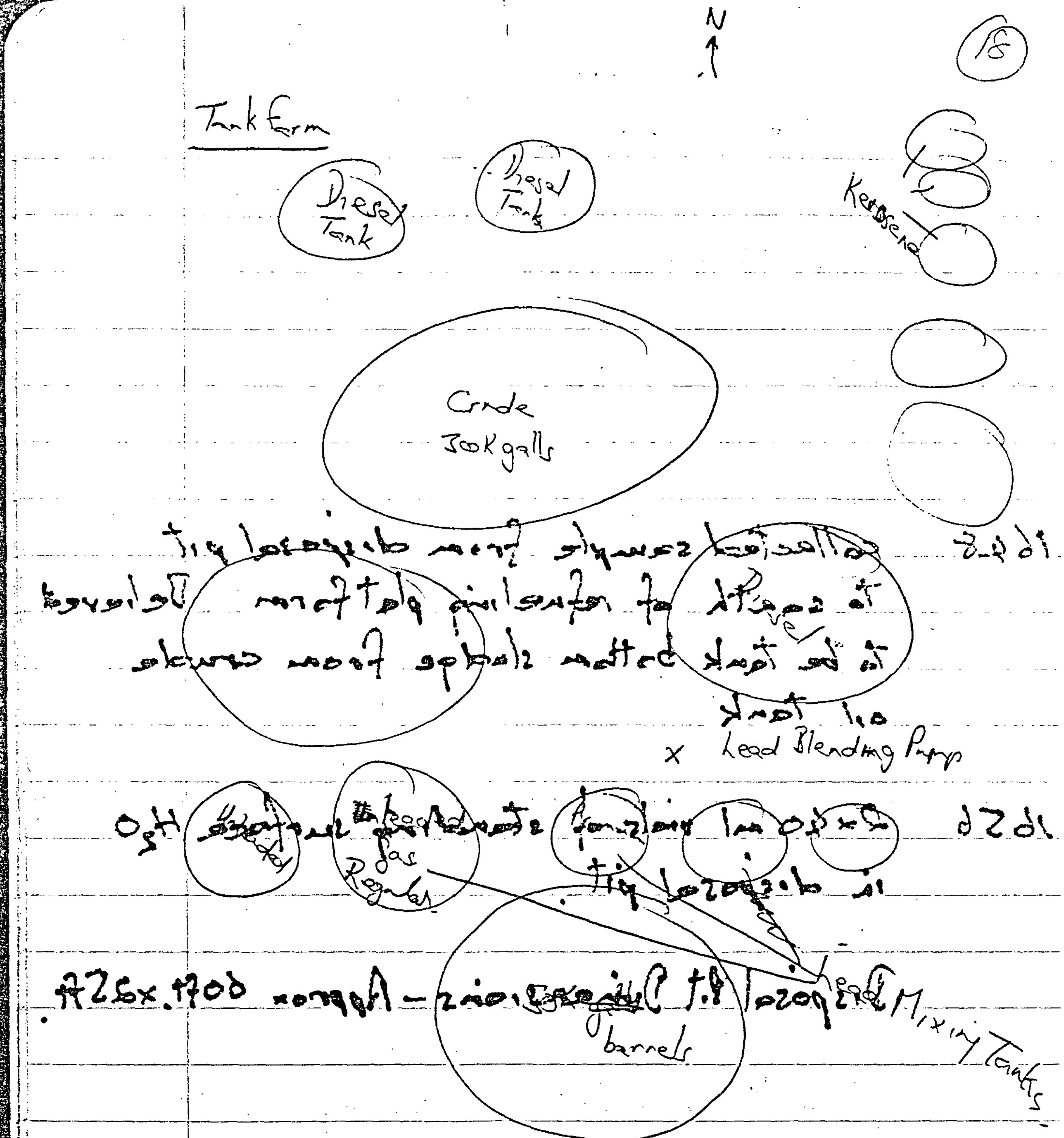
1631 Collected soil sample from near lead blending pump. (2x 8oz jars)

1639 collected soil sample from south of tank with floating roof, suspected area of tank bottom disposal (2x 8oz jars)

1648 collected sample from disposal pit to south of refueling platform. Believe to be tank bottom sludge from crude oil tank

1656 2x40 ml vials of standing surface H_2O in disposal pit.

Disposal Pit Dimensions – Approx 60ft. x 25ft



1645 Collected sample from disposal pit to depth of refueling platform. Delivered to the tank bottom sludge from crude oil tank

1650 2x40 ml ... standing surface H_2O in disposal pit.

Disposal pit dimensions - Approx 60ft. x 25ft.

RAK

(18) (19)

2021 Notes, evening of 2/17/86

— still need to get background water quality and background soil; bkgd soil is no problem, can ge it almost anywhere, preferably close to the hip (US 550) so that highway lead and other contaminant are accounted for.

bkgd ground water may be difficult; on-si well was sampled today, but it's hard to say what i in sample; presence of mosquito larvae in well wat suggests it may be clean, but can't say for sure; besides, well construction is unknown, but there may b a well record at SEO for it;

north boundary of site is on south face of hi river terrace, apparently composed largely of gravel, & will make augering difficult; should pick a spot away from that terrace; one good thing is that we don't have to case the hole; because it is for bk quality, any artificial contamination from slump soil won't affect the argument for a release, as long as the bkgd sample is still well below on-site levels; test sample for EDC

20

all this assumes g.w. flow is to south and west; land slope is to south; river flows down valley to west; under natural conditions, g.w. flow was probably to west, with a slight riverward component; however, Farmers Mutual Irrigation Ditch runs along north boundary of site; although ditch is made of concrete sections, there appears to be ample opportunity for water to seep out of ditch via cracks and spaces; ~~#~~ if correct, this will cause g.w. mound beneath FMI Ditch while it flows; this will distort flow of shallow g.w. more toward south, during March – October, when FMI Ditch flows; g.w. levels seem to be dependent on flow in the ditch; during our site visit in December the FMI Ditch was flowing and water was flowing in the lateral west of the site (west drainage ditch) after entering the lateral via ground water inflow; today there was only stagnant contaminated water and no flow, while FMI Ditch was dry. ~~[illegible]~~ Evidence indicates that the FMI Ditch strongly influences g.w. beneath the site; will try to get bkgd g.w. sample off NE corner of property in county road ~~[illegible]~~ R.O.W.;

- for surface water we need to ~~get~~ identify a water use and an affected population; ditch on west s of property is on property according to Cahoon; ditch i bermed so that runoff from site cannot enter it unde normal circumstances; this ditch is actually a lateral fr Fall Ditch, with a headgate, according to Morrison; condition of ditch does not suggest recent use; however, maybe it was in use last growing season; need to look along that lateral for irrigation uses – food crops;
- since lateral hooks up with San Juan, we shou look for surface water withdrawals from the San Juan, too; ~~[illegible]~~ the point of farthest contamination can be considered the lateral sample ne the San Juan; so look for diversions, withdrawals, us anywhere along lateral from refinery to three miles dow San Juan;
- inspect Coolidge Arroyo, see if it cuts into bedrock or alluvium; if the former, we may not be able to count the trailer parks in Kirtland in same aquifer as Walker well + on-site contamination;

(22)

- attempt to contact officials of the FM1 Ditch association to determine uses & diversions of water from that lateral; also from main ditch;

- second surface water route to evaluate is via the main FM1 Ditch; spills have occurred there in the past, but constituents may all be exempt; nevertheless, non-exempt substances were used at the refinery (EDC, lead); may be able to score it with route characteristics; according to topo maps there are orchards (irrigation of food crops) within 2 miles downstream of ditch; must be diversions from FM1 Ditch, or else g.w.; odds are strongly in favor of diversion, just need to confirm;

860218

called Ernie Brioch

Jim Dunlap in charge of Ditch

~~[illegible]~~

in Waterflow

or try at LVWUA (598-5585)

called Jim Dunlap

not in, will call me @ 327-9851

office at 6 miles on N side of 550

across from ~~Don's~~ Alignment

he may be in the office w/in 1/2-3/4 h

0908 Collected EID distilled H_2O blank washings of auger bit

Blank #2

0915 ~~0930~~ RAK Augered hole on NE corner of site 3 yds from property boundary + 7 yds from NS county Rd. 80 yds south from intersection of State Rte 550 and N-S county road. Lithologic Log #1 Auger Hole.

0-1' Gravelly loam

1-5' ~~4'~~ Sandy loam

5'-7 Gravelly loam

No odors

Could not penetrate

RAK

0921 Background soil samples taken one at 4" (8oz jar) and one at 24" (8oz) (0923)

0950 Jim Dunlap, Manager, Lower Valley Water User's Assoc. stopped by site to discuss the distribution system and the Farmer's Mutual Irrigation Ditch.

Will go to office to look at maps and records of use.

Dunlap stated that it was his experience that ground water flow in this area was to the southwest. His experience was based on installation of the water mains for the LVWUA. Ground water is very shallow in the area, ~~[illegible]~~ and may surface in certain locations at certain times of year.

1012 Blank #3 Collected EM distilled water blank run across auger bit.

1020 Commenced new auger hole 350 yds to sw 14 yds south and to the east of ~~the~~ refueling platform RAR

Lithologic Log - Auger Hole #2

0-1' Sandy Loam
1'-1½' Gravel
1½-5' Sandy Loam - Soil damp, hole cavin
Depth to Water 6.5 ft.

1047 ~~Blank~~ Blank #4 EID distilled water
blank run across bailer.

1115 ~~1127~~ Finished augering and bailed sample
from hole. Only 1-2 inches of water in
hole. Sample contained a lot of sediment.
2×40 ml vials 850218 1058

1120 Steven Cary visited Lower Valley Water Users Assoc. to check

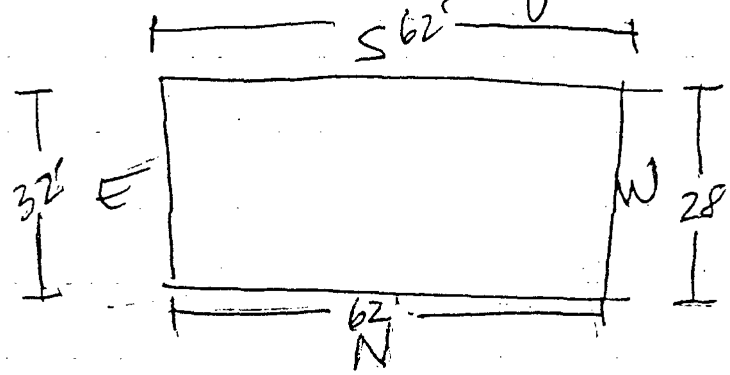
1123 R. Rawlings & E. Busch Collected sample from Farmers Mutual
Irrigation Ditch, across H'way 555 upstream
from the site. Water only flows March
through December. Collected sediment
sample 2×8oz.

1131 Collected sediment sample from Farmers
Mutual Irrigation $ at refinery (at head of
commencement of concrete culvert, 2×8oz sediment samp

1200 Departed for Albuquerque to deliver samp

8607081600
Rawlings / Cary

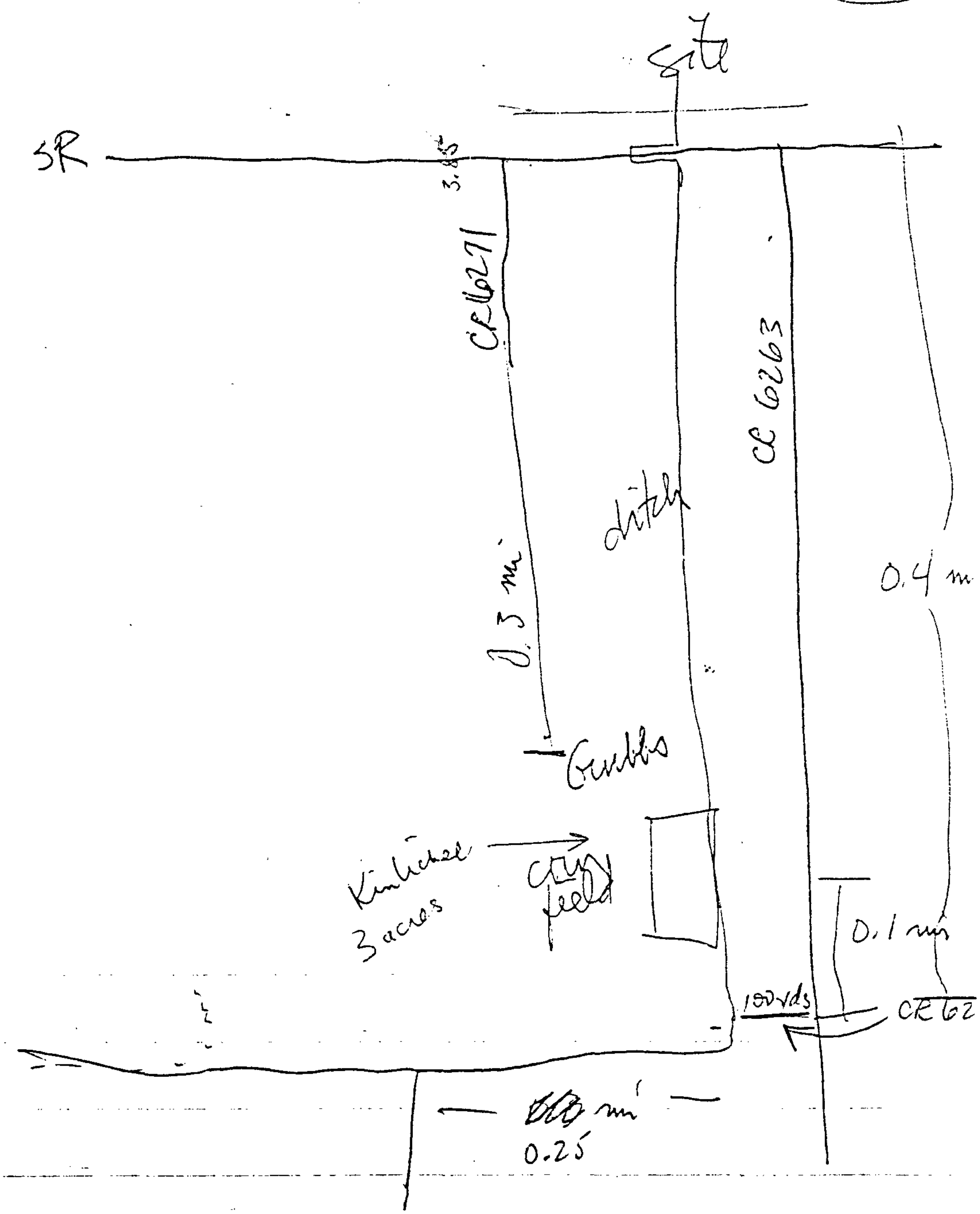
measure dimensions of waste pit



62
30
1860 ft^3
68.9
27) 1860.0 yds^3
162
240
216
24

found patch of corn (1-2 acres) on west side of lower ditch, just north of where we sampled in December; field clearly set up for irrigation via furrows, although furrows ~~was~~ presently dry

2.4
2.6 ditch was receiving water from FMI Ditch
headgate open


site
SR
CR 6271
CR 6263
ditch
0.3 mi
0.4 mi
Grubbs
3 acres
0.1 mi
100 yds
CR 62
mi
0.25

860709

9:30 – 10:45 AM

talked to Mr Don McGonigle, San Juan Co. Fire Marshal, Aztec, NM

he said we could get copy of the Caribou file if we gave him a written request; I said we would do it;

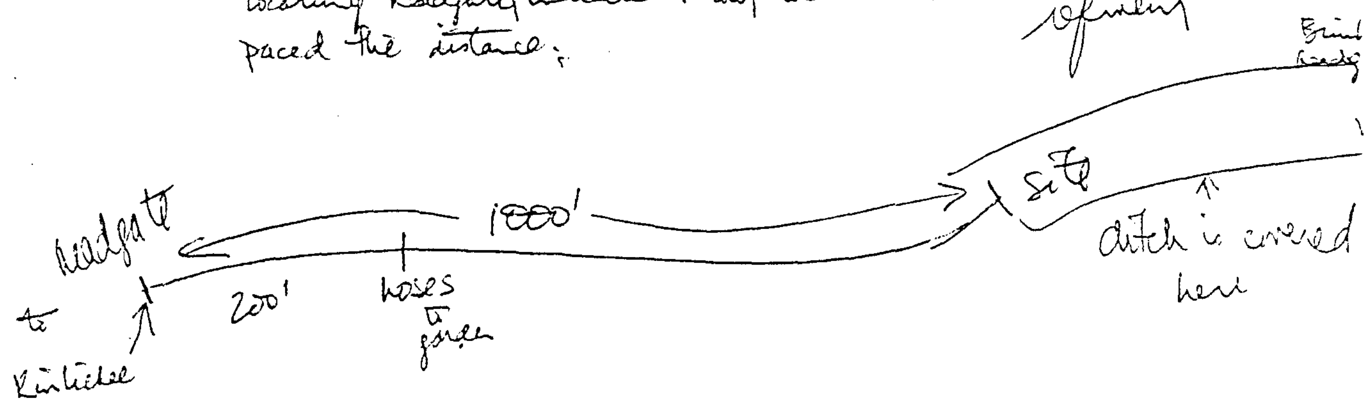
~~He~~ we looked thru the file, found nothing too helpful, but closer examination may be worthwhile;

lots of stories about fires; they don't respond to spills unless there is a fire!

he said he couldn't give out fire reports, but claimed there was nothing of value in them anyway; he said info, like what was burning + how much, was not recorded

apparently the present tank farm dates back to ~1978; before then there were small tanks up at the refinery, to west of refinery operation; these tanks now gone; lots of leaks, spills, poor housekeeping under old set-up; new tank farm relatively clean;

said ~~State~~ Fire Marshal may have some copies of these reports talked to Mrs. Grubbs + Mr. Phillip Kinlichee, who leases land from Grubbs; Kinlichee says he has ~3 acres in sweet corn + melons which he waters from FMI Ditch; he described location of headgates indicated below; we located + paced the distance;



apparently no use of Brimhall Ditch, the one ~~???~~ above headgate is behind opening; actually it is used, but only after it takes the right turn near the river, used for alfalfa

1:30 → talked to Mrs Walker about Brimhall Ditch; she said that they (Walkers) + Brimhall used the water at the end of the ditch to irrigate hay + alfalfa; Mrs. Walker's son said that Brimhall had just planted corn, but he thought it was feed corn for livestock, he also said tailwater from the Brimhall and other laterals goes into ponds; these ponds are also used for irrigation, livestock water + fishing (bass); Mrs. Walker offered to be of service; Walkers now on city water!

found Mr Adair who grows field corn, alfalfa, garden; water from FMI Ditch, headgates (3) just N. of his property; said lots of folks have gardens watered w/ FMI Ditch, but no major plots of food crops such as sweet corn;

found Mrs. Brimhall whose husband has rights to Brimhall Ditch; she said 70 acres of alfalfa w/ some field corn; she hoped to have a good crop so she could use some for corn meal, etc., for household use; she also said there were probably "poachers" along the ditch who stole water for gardens;

we went to look but didn't see any obvious ones

APPENDIX III

Laboratory Results

C.C. Farmington EID
724 W. Animas 87401

86 143-C

2/11/86

Steven Cary

REPORT TO: Ground Water Section
Environmental Improvement Div.
P.O. Box 968
Santa Fe, NM 87504-0968

LABORATORY CR 143 A,B.

LAB NUMBER

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other

Water Supply and/or Code No.

City & County Kirtland, San Juan

Collected (date & time) 2-10-86, 1010 hrs By (name) Len Murray

pH= ; Conductivity= umho/cm at °C; Chlorine Residual=

Dissolved Oxygen= mg/l; Alkalinity= ; Flow Rate=

Sampling Location, Methods & Remarks (i.e. odors etc.)

San Juan River, at Lions Club Park, Kirtland, NM.

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed

Method of Shipment to Laboratory Purolator.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as: specimen SJR1-A; duplicate SJR-1-B; triplicate ; blank(s) ,
and amber glass jug(s) with teflon-lined cap(s) identified as ,
and other container(s) (describe) identified as .

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

$P\text{-}Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from to at (location) on (date & time) and that the statements in this block are correct.

Disposition of Sample . Seal(s) Intact: Yes No ☐ .

Signature(s)

RECEIVED
FEB 21 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

I (we) certify that this sample was transferred from to at (location) on (date & time) and that the statements in this block are correct.

Disposition of Sample . Seal(s) Intact: Yes ☐ No ☐ .

Signature(s)

ANALYSES REQUESTED LAB. No.: ORG- 143

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
X	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
X	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
X	X	1,2-Dichloroethane			

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
Aromatic Purgeables	None Detected*		
Halogenated Purgeables	None Detected*		
		* DETECTION LIMIT	2µg/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes___ NO X. Seal(s) broken by:________________ date:________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 2/13/86. Analyst's signature: Richard Meyerhein

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature:________________

C.C. Farmington EID
724 W. Animas 87401

86-1444-C

2/11/86

Steven Cary

REPORT TO: Ground Water Section
Environmental Improvement Div.
P.O. Box 968
Santa Fe, NM 87504-0968

LABORATORY ____

LAB NUMBER CR 144 A,B

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ____

Water Supply and/or Code No. ____

City & County Kirtland, San Juan

Collected (date & time) 2-10-86, 0950 hrs By (name) Len Murray

pH= ____; Conductivity= ____ umho/cm at ____ °C; Chlorine Residual= ____

Dissolved Oxygen= ____ mg/l; Alkalinity= ____; Flow Rate= ____

Sampling Location, Methods & Remarks (i.e. odors etc.)

Bill Walker Well, from kitchen sink - Priority 1

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed ____

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed ____

Method of Shipment to Laboratory Purolator.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen 1-A; duplicate 1-B; triplicate ____; blank(s) ____,
and ____ amber glass jug(s) with teflon-lined cap(s) identified as ____,
and ____ other container(s) (describe) ____ identified as ____.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from ____ to ____ at (location) ____ on (date & time) ____ and that the statements in this block are correct.

Disposition of Sample ____. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ____ ____

RECEIVED
FEB 21 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

I (we) certify that this sample was transferred from ____ to ____ at (location) ____ on (date & time) ____ and that the statements in this block are correct.

Disposition of Sample ____. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ____ ____

ANALYSES REQUESTED

LAB. No.: ORG- 144

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
		AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
		HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
		1,2 - Dichloroethane			

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
GC/MS Purgeable Scan			
1,2-Dichloroethane	2 ug/l		
No other Purgeables Detected *			
		* DETECTION LIMIT	1ug/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes___ NO x. Seal(s) broken by:________________ date:________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 2/12/86. Analyst's signature: Richard Meyerhein

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature:________________

C.C. Farmington EID
724 W. Animas 87401

86/145 -C

REPORT TO: Steven Cary
Ground Water Section
Environmental Improvement Div.
P.O. Box 968
Santa Fe, NM 87504-0968

LABORATORY 2/11/86

LAB NUMBER OR 145 A, B.

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ____

Water Supply and/or Code No. ____

City & County Kirtland, San Juan

Collected (date & time) 2-10-86, 1045 hrs By (name) Len Murray

pH= ____; Conductivity= ____ umho/cm at ____ °C; Chlorine Residual= ____

Dissolved Oxygen= ____ mg/l; Alkalinity= ____; Flow Rate= ____

Sampling Location, Methods & Remarks (i.e. odors etc.)

Drainage Ditch 1 mile Southwest of Caribou refinery

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed ____

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed ____

Method of Shipment to Laboratory Purolator.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as: specimen 3-A; duplicate 3-B; triplicate ____; blank(s) ____, and ____ amber glass jug(s) with teflon-lined cap(s) identified as ____, and ____ other container(s) (describe) ____ identified as ____.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

$P-Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from ____ to ____ at (location) ____ on (date & time) ____ and that the statements in this block are correct.

Disposition of Sample ____. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ____ ____

I (we) certify that this sample was transferred from ____ to ____ at (location) ____ on (date & time) ____ and that the statements in this block are correct.

Disposition of Sample ____. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ____ ____

RECEIVED
FEB 21 1986
LIQUID WASTE/GROUNDWATER SURVEILLANCE

ANALYSES REQUESTED

LAB. No.: ORG- 145

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
X	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
X	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
X	X	1,2-Dichloroethane			

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
GC/MS Purgeables			
Thiobis methane	[~ 25]		
Carbon disulfide	[~ 5]		
Toluene	3		
1,2-Dichloroethane	None Detected*		-
No other purgeables Detected *			
		* DETECTION LIMIT	2 ug/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes___ NO X. Seal(s) broken by:______________ date:________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 2/13/86. Analyst's signature: Richard Meyerhein

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature:______________

C.C. Farmington EID
724 W. Animas 87401

86-146-C

REPORT TO:

Steven Cary
Ground Water Section
Environmental Improvement Div.
P.O. Box 968
Santa Fe, NM 87504-0968

LABORATORY 2/11/86.

LAB NUMBER OR 146 A, B.

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ______

Water Supply and/or Code No. ______

City & County Kirtland, San Juan

Collected (date & time) 2-10-86, 1000 By (name) Len Murray

pH= ______; Conductivity= ______ umho/cm at ______ °C; Chlorine Residual= ______

Dissolved Oxygen= ______ mg/l; Alkalinity= ______; Flow Rate= ______

Sampling Location, Methods & Remarks (i.e. odors etc.)

Drainage Ditch ½ mile South of Caribou refinery

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed ______

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed ______

Method of Shipment to Laboratory Purolator.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen 2-A; duplicate 2-B; triplicate ______; blank(s) ______,
and ______ amber glass jug(s) with teflon-lined cap(s) identified as ______,
and ______ other container(s) (describe) ______ identified as ______.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).
P-ICE: Sample stored in an ice bath.
P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on (date & time) ______ and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ______ ______

RECEIVED
FEB 21 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on (date & time) ______ and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ______ ______

ANALYSES REQUESTED LAB. No.: ORG- 146

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
X	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
X	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
X	X	1,2-Dichloroethane			

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
Aromatic Purgeables	None Detected		
Halogenated Purgeables			
1,2-Dichloroethane	1ug/l		
		* DETECTION LIMIT	1ug/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes___ NO X. Seal(s) broken by:________ date:________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 2/23/86. Analyst's signature: Richard Meyahein

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature:________

C.C. Farmington EID
724 W. Animas 87401

86/447-C

REPORT TO:
Steven Cary
Ground Water Section
Environmental Improvement Div
P.O. Box 968
Santa Fe, NM 87504-0968

LABORATORY 2/11/86.
LAB NUMBER OR 147A, B.

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other

Water Supply and/or Code No.

City & County Kirtland, San Juan

Collected (date & time) 2-10-86, 0845 hrs By (name) Len Murray

pH= ; Conductivity= umho/cm at °C; Chlorine Residual=

Dissolved Oxygen= mg/l; Alkalinity= ; Flow Rate=

Sampling Location, Methods & Remarks (i.e. odors etc.)

Farmington office, 724 W. Animas, Distilled Water jug

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed

Method of Shipment to Laboratory Purolator.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as: specimen Dist. H_2O Blank a duplicate Dist H_2O Blank b; triplicate ; blank(s) ,
and amber glass jug(s) with teflon-lined cap(s) identified as ,
and other container(s) (describe) identified as .

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from to at (location) on (date & time) and that the statements in this block are correct.

Disposition of Sample . Seal(s) Intact: Yes ☐ No ☐ .

Signature(s)

I (we) certify that this sample was transferred from to at (location) on (date & time) and that the statements in this block are correct.

Disposition of Sample . Seal(s) Intact: Yes ☐ No ☐ .

Signature(s)

RECEIVED
FEB 21 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

ANALYSES REQUESTED — LAB. No.: ORG- 147

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
X	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
X	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
X	X	1,2-Dichloroethane			

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
Aromatic Purgeables	None Detected *		
Halogenated Purgeables	None Detected *		
		* DETECTION LIMIT	1 ug/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes__ NO X. Seal(s) broken by:____ date:____

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 2/13/86. Analyst's signature: Richard Meyerhen

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature:____

CC. Farmington EID
724 W. Animas 87401

86 448 -C

Steven Cary

REPORT TO: Ground Water Section
Environmental Improvement Div.
P.O. Box 968
Santa Fe, NM 87504-0968

LABORATORY 2/11/86.

LAB NUMBER CR148 A, B.

SLD Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ____

Water Supply and/or Code No. ____

City & County Kirtland, San Juan

Collected (date & time) 2-10-86, 1050 hrs By (name) Lew Murray

pH= ____; Conductivity= ____ umho/cm at ____ °C; Chlorine Residual= ____

Dissolved Oxygen= ____ mg/l; Alkalinity= ____; Flow Rate= ____

Sampling Location, Methods & Remarks (i.e. odors etc.)

San Juan River, 300 ft. downstream from drainage ditch.

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed ____

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed ____

Method of Shipment to Laboratory Purolator.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen SJR 2a; duplicate SJR 2b; triplicate ____; blank(s) ____,
and ____ amber glass jug(s) with teflon-lined cap(s) identified as ____,
and ____ other container(s) (describe) ____ identified as ____.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

$P\text{-}Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from ____ to ____ at (location) ____ on (date & time) ____ and that the statements in this block are correct.

Disposition of Sample ____. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ____ ____

RECEIVED

I (we) certify that this sample was transferred from ____ to ____ at (location) ____ on

FEB 2? 1986

LIQUID WASTE/GROUND WATER SURVEILLANCE

(date & time) ____ and that the statements in this block are correct.

Disposition of Sample ____. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ____ ____

ANALYSES REQUESTED LAB. No.: ORG-148

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
X	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
X	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
X	X	1,2-Dichloroethane			

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
Aromatic Purgeables	None Detected *		
Halogenated Purgeables	None Detected *		
		* DETECTION LIMIT	2ug/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes___ NO X. Seal(s) broken by:________ date:________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 2/13/86. Analyst's signature: Richard Meyerhan

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature:________

8D 1461 -C

2/14/86

REPORT TO: DAVID BOYER
OIL CONSERVATION DIV.
P.O. BOX 2088 STATE LAND OFFICE
SANTA FE NM 87504-2088

LABORATORY OR 161 A, B.

LAB NUMBER

82235

SLD Users Code No.

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ______

Water Supply and/or Code No. ______

City & County KIRTLAND, SAN JUAN COUNTY

Collected (date & time) 86 02 13 1510 By (name) BAILEY / BOYER

pH= 6.6 ; Conductivity= 1100 umho/cm at 8 °C; Chlorine Residual= ______

Dissolved Oxygen= ______ mg/l; Alkalinity= ______ ; Flow Rate= ______

Sampling Location, Methods & Remarks (i.e. odors etc.)

DITCH OFF SW CORNER CARIBOU REFINERY

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed G. Bailey

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed ______

Method of Shipment to Laboratory HAND CARRIED.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as: specimen 860213 1510; duplicate ______; triplicate ______; blank(s) ______, and ______ amber glass jug(s) with teflon-lined cap(s) identified as ______, and ______ other container(s) (describe) ______ identified as ______.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on (date & time) ______ and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ______ ______

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on (date & time) ______ and that the statements in this block are correct.

Disposition of Sample ______. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ______ ______

ANALYSES REQUESTED LAB. No.: ORG- 161

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
X	X	ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
X	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
X	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
✓	✓	EDC			

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
arom. purg. screen*	none detected		
1,2-dichloroethane	3 ugm/l		
		* DETECTION LIMIT	1 ppb

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes__ NO X. Seal(s) broken by:___ date:___

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 3 March & 12 March 86 Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: K Meyerhen

85 166-C

DAVID BOYER
OIL CONSERVATION DIV
PO BOX 2088 STATE LAND OFFICE
SANTA FE NM 87504-2088

LABORATORY 2/14/86.
LAB NUMBER OR 166 A, B.
82235
SLD Users Code No.

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other ____

Water Supply and/or Code No. ____

City & County KIRTLAND SAN JUAN COUNTY

Collected (date & time) 860213 ~~0~~ 1515 By (name) BAILEY/ BOYER

pH=____; Conductivity=____ umho/cm at ____ °C; Chlorine Residual=____

Dissolved Oxygen=____ mg/l; Alkalinity=____; Flow Rate=____

Sampling Location, Methods & Remarks (i.e. odors etc.)

SEEP BEHIND CARIBOU; ON ROAD RIGHT of WAY

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed G. Bailey

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed ____

Method of Shipment to Laboratory Hand carried.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as: specimen 8602131515; duplicate ____; triplicate ____; blank(s) ____, and ____ amber glass jug(s) with teflon-lined cap(s) identified as ____, and ____ other container(s) (describe) ____ identified as ____.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from ____ to ____ at (location) ____ on (date & time) ____ and that the statements in this block are correct.

Disposition of Sample ____. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ____ ____

I (we) certify that this sample was transferred from ____ to ____ at (location) ____ on (date & time) ____ and that the statements in this block are correct.

Disposition of Sample ____. Seal(s) Intact: Yes ☐ No ☐.

Signature(s) ____ ____

ANALYSES REQUESTED — LAB. No.: ORG- 166

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN
X	X	AROMATIC HYDROCARBON SCREEN
X	X	HALOGENATED HYDROCARBON SCREEN
		GAS CHROMATOGRAPH/MASS SPECTROMETER
		SPECIFIC COMPOUNDS
✓	✓	EDC

QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBONS
		CHLORINATED HYDROCARBON PESTICIDES
		CHLOROPHENOXY ACID HERBICIDES
		HYDROCARBON FUEL SCREEN
		ORGANOPHOSPHATE PESTICIDES
		POLYCHLORINATED BIPHENYLS (PCB's)
		POLYNUCLEAR AROMATIC HYDROCARBONS
		TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
benzene	possible trace <10 ppb		
toluene	possible trace <10		
ethylbenzene	possible trace <10		
o-xylene	possible trace <10		
m-xylene	possible trace <10		
p-xylene	possible trace <10		
1,2-dichloroethane	possible trace <10		
		* DETECTION LIMIT	10 ugm/l

REMARKS: This sample was foamy.

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes___ NO X. Seal(s) broken by:________________ date:________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 5 March 86; 7 April 86 Analyst's signature: [illegible]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: [illegible]

NF.

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED 2/14/86	LAB NO. WC 674	USER CODE ☐ 59300 ☐ 59600 ☒ OTHER: 82235	
Collection DATE 86/02/13	SITE INFORMATION ►	Sample location: Caribou Four Corners Refinery	
Collection TIME 1510		Collection site description: Drainage Ditch at SW corner of refinery on road ROW	
Collected by — Person/Agency: Boyer/Bailey/Anderson (OCD)			

SEND FINAL REPORT TO ►

ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87501

Attn: David Boyer

Station/ well code:

Owner:

SAMPLING CONDITIONS

☐ Bailed ☒ Dipped ☐ Pump ☐ Tap	Water level: –	Discharge: ~5 gpm	Sample type: Grab
pH (00400): 6.6	Conductivity (Uncorrected): 1100 µmho	Water Temp. (00010): 8 °C	Conductivity at 25°C (00094): µmho

Field comments: Smells like gasoline

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted: 1

☐ NF: Whole sample (Non-filtered) ☒ F: Filtered in field with 0.45 µmembrane filter ☐ A: 2 ml H_2SO_4/L added

☒ NA: No acid added ☐ Other-*specify*:

ANALYTICAL RESULTS from SAMPLES

NF, NA		Units	Date analyzed
☐ Conductivity (Corrected) 25°C (00095)		µmho	
☐ Total non-filterable residue (suspended) (00530)		mg/l	
☐ Other:			
☐ Other:			
☐ Other:			

F, NA		Units	Date analyzed
☒ Calcium (00915)	250.7	mg/l	2/17
☒ Magnesium (00925)	10.9	mg/l	"
☒ Sodium (00930)	182.4	mg/l	"
☒ Potassium (00935)	35.1	mg/l	"
☒ Bicarbonate (00440)	363	mg/l	2/18
☒ Chloride (00940)	77	mg/l	3/11
☒ Sulfate (00945)	677	mg/l	3/10
☒ Total filterable residue (dissolved) (70300)	1353	mg/l	3/19
☐ Other:			

NF, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N⁺, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

F, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N⁺, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst	Date Reported	Reviewed by
	3/26/86	CJ

Laboratory remarks

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

PF · Heavy Metal ~~GENERAL WATER CHEMISTRY~~ and ~~NITROGEN~~ ANALYSIS

DATE RECEIVED	2/14/86
LAB NO.	HM 304
USER CODE	☐ 59300 ☐ 59600 ☒ OTHER: 82235
Collection DATE	86/02/13
Collection TIME	1310
Collected by — Person/Agency	Boyer/Bailey/Anderson (OCD)

SITE INFORMATION
Sample location: Caribou Four Corners Refinery
Collection site description: Drainage ditch at SW corner of refinery on road ROW

SEND FINAL REPORT TO
ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87501
Attn: David Boyer

Station/ well code
Owner

SAMPLING CONDITIONS

☐ Bailed ☒ Dipped ☐ Pump ☐ Tap	Water level —	Discharge ~5 GPM	Sample type Grab
pH (00400) 6.6	Conductivity (Uncorrected) 1100 µmho	Water Temp. (00010) 8 °C	Conductivity at 25°C (00094) µmho

Field comments: Smells like gasoline.

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted: 1
☐ NF: Whole sample (Non-filtered)
☒ F: Filtered in field with 0.45 µmembrane filter
☒ A: ~~2 ml H_2SO_4/L~~ added 4 ml Conc HNO3
☐ NA: No acid added ☐ Other-*specify:*

ANALYTICAL RESULTS from SAMPLES

NF, NA		Units	Date analyzed
☐ Conductivity (Corrected) 25°C (00095)		µmho	
☒ ~~Total non-filterable residue (suspended) (00530)~~ ICAP		mg/l	
☒ Other: As	<0.005		4/7/86
☒ Other: Se	<0.005		3/19/86
☒ Other: Hg.	<0.005		3/19/86

F, NA		Units	Date analyzed
☐ Calcium (00915)		mg/l	
☐ Magnesium (00925)		mg/l	
☐ Sodium (00930)		mg/l	
☐ Potassium (00935)		mg/l	
☐ Bicarbonate (00440)		mg/l	
☐ Chloride (00940)		mg/l	
☐ Sulfate (00945)		mg/l	
☐ Total filterable residue (dissolved) (70300)		mg/l	
☐ Other:			

NF, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

F, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst	Date Reported	Reviewed by
	4/18/86	DTA

Laboratory remarks

SLD 726 (12/84) *DISTRIBUTION:* WHITE — EID. GW&HW Bureau CANARY — WS System PINK — EID Local Office GOLDENROD — SLD

Lab Number: HM 304

Date Submitted: 2/14/86

By: Bailey / Anderson

Sample Code: Four Corners Refinery

Date Analyzed: 2/17/86

Reviewed By: Jim Ashley

Date Reported: 4/18/86

Element	ICAP VALUE(MG/L)	AA VALUE(MG/L)
Aluminum	<0.1	
Barium	<0.1	
Berylium	<0.1	
Boron	<0.1	
Cadmium	<0.1	
Calcium	170.	
Chromium	<0.1	
Cobalt	<0.1	
Copper	<0.1	
Iron	<0.1	
Lead	<0.1	
Magnesium	28.	
Manganese	0.48	
Molybdenum	<0.1	
Nickel	<0.1	
Silicon	6.1	
Silver	<0.1	
Strontium	1.9	
Tin	<0.1	
Vanadium	<0.1	
Zinc	<0.1	
Arsenic		<0.005
Selenium		<0.005
Mercury		< 0.0005

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

REGION 6
First International Bldg., 1201 Elm St.
Dallas, Texas 75270

CHAIN OF CUSTODY RECORD

PROJ. NO.: [illegible]

PROJECT NAME: Caribou 4 Corners Refinery

SAMPLERS: *(Signature)* [illegible] [illegible]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CON-TAINERS	[illegible]	[illegible]			[illegible]	[illegible]	REMARKS
1	2/17/86	1522		X	distilled water blank	2×40ml	X	X			X		
2	2/17/86	1500		X	on-site well	"	X	X			X		
3	2/17/86	1525		X	west drainage ditch	"	X	X			X		
4	2/17/86	1656		X	disposal pit (large)	"	X	X			X		
5	2/18/86	0908		X	distilled water blank #2	"	X	X			X		
6	2/18/86	1012		X	" #3	"	X	X			X		
7	2/18/86	1047		X	" #4	"	X	X			X		
8	2/18/86	1115		X	auger hole	"	X	X			X		
9	2/18/86	1123		X	FMI Ditch upstream	1-8oz	X	X				X	
10	2/18/86	1131		X	FMI Ditch downstream	"	X	X				X	
11	2/13/86	1509		X	SLD-travel blank	2×40ml	X	X			X		

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
[illegible]	2/18/86 1615	[illegible]			
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

6—2001

ENVIRONMENT

STATE OF NEW MEXICO

SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

85-1482 -C

REPORT TO: Steven Cary
GW/HW Bureau - EID
P.O. Box 968
Santa Fe, NM 87504-0968

S.L.D. No.: OR- 182-17B
DATE REC.: 2/18/86
PHONE 827-2898
USER CODE: 5 3 4 0 0

CONTAINERS WHICH ACCOMPANY THIS FORM ARE COLLECTIVELY REFERED TO AS SAMPLE.

SUBMITTER: Steven Cary CODE:

SAMPLE TYPE: WATER ☒, SOIL ☐, OTHER ______ CODE:

COLLECTED: 02/17/86 - 15:00 BY S. Cary CODE: Y Y M M D D H H M M I I I
DATE AND TIME

SOURCE: On-Site Well CODE: AQUIFER DEPTH

NEAREST CITY: Kirtland CODE:

LOCATION: Caribou Refinery CODE: TOWNSHIP RANGE SECTION TRACTS

pH= — ; Conductivity= — umho/cm at — °C; Chlorine Residual= —

Dissolved Oxygen= — mg/l; Alkalinity= — ; Flow Rate= —

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Some debris in well - paper cup, aluminium cans etc
Well not bailed.
Well depth approx 20ft. Depth to water 6ft. Used wire around vial to reach water

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Steven J. Cary

Method of shipment to the Laboratory automobile OF-32961

This form accompanies 2 Septum Vials, ___ Glass Jugs, ___ ______

Containers are marked as follows to indicate preservation:

- ☐ NP: No preservation; sample stored at room temperature.
- ☒ P-Ice Sample stored in an ice bath (not frozen).
- ☐ P-$Na_2S_2O_3$: Sample preserved with $Na_2S_2O_3$ to remove chlorine residual.

I (we) certify that this sample was transferred from STEVEN J. CARY to J.A. Finney at (location) SLD on 2/18/86 - 16:15 and that the statements in this block are correct.
DATE AND TIME

Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☒ No ☐

Signatures Steven J. Cary J.A. Finney

(we) certify that this sample was transferred from ______ to ______ at (location) ______ on ___/___/___ - ___:___ and that the statements in this block are correct.
DATE AND TIME

Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐

Signatures ______ ______

ANALYSES REQUESTED LAB. No.: ORG- 182

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
	X	1,2 Dichloroethane			

RECEIVED APR 11 1986 LIQUID WASTE/GROUND WATER SURVEILLANCE

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
aromatic hydrocarbons	** none detected		
halogenated hydrocarbons	* none detected		
	RECEIVED		
	APR 11 1986		
	LIQUID WASTE/GROUND WATER SURVEILLANCE	** Detection Limit	1
		* DETECTION LIMIT	1

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO___. Seal(s) broken by: Harry C. Eden date: 3/11/86

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 3/11/86. Analyst's signature: Harry C. Eden

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: R Meyer

STATE OF NEW MEXICO

ENVIRONMENT

SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

85-1434 -C

REPORT TO: Steven Cary
EID - GW/HW Bureau
P.O. Box 968
Santa Fe, NM 87504-0968

S.L.D. No.: OR- 174-AB
DATE REC.: 2/18/86
PHONE (505) 827-2848
USER CODE: 5|3|4|0|0|1

CONTAINERS WHICH ACCOMPANY THIS FORM ARE COLLECTIVELY REFERED TO AS SAMPLE.

SUBMITTER: S. Cary CODE:

SAMPLE TYPE: WATER ☒, SOIL ☐, OTHER ______ CODE:

COLLECTED: 02/17/86-15:22 BY R. Rawlings CODE:
DATE AND TIME — Y Y M M D D H H M M I I I

SOURCE: EID distilled water blank from wire used in sampling on-site well CODE:
AQUIFER DEPTH

NEAREST CITY: Kirtland CODE:

LOCATION: Caribou Refinery CODE:
TOWNSHIP RANGE SECTION TRACTS

pH= — ; Conductivity= — umho/cm at — °C; Chlorine Residual= —

Dissolved Oxygen= — mg/l; Alkalinity= — ; Flow Rate= —

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Wire rinsed off with EID distilled water;
~~[illegible]~~

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Steven J. Cary

Method of shipment to the Laboratory automobile OF-3296

This form accompanies 2 Septum Vials, ___ Glass Jugs, ___ ______
Containers are marked as follows to indicate preservation:

- ☐ NP: No preservation; sample stored at room temperature.
- ☒ P-Ice Sample stored in an ice bath (not frozen).
- ☐ P-$Na_2S_2O_3$; Sample preserved with $Na_2S_2O_3$ to remove chlorine residual.

I (we) certify that this sample was transferred from STEVEN J. CARY
to J.A. Finney at (location) SLD on
2/18/86-16:15 and that the statements in this block are correct.
DATE AND TIME
Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☒ No ☐
Signatures Steven J. Cary J.A. Finney

(we) certify that this sample was transferred from ______
to ______ at (location) ______ on
___/___/___-___:___ and that the statements in this block are correct.
DATE AND TIME
Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐
Signatures ______ ______

ANALYSES REQUESTED LAB. No.: ORG- 184

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
	x	1,2 Dichloroethane			

RECEIVED
APR 17 1986
LIQUID WASTE SURVEILLANCE CENTER

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
aromatic hydrocarbons	** none detected		
halogenated hydrocarbons	none detected		
		** Detection Limit	1
		* DETECTION LIMIT	1

RECEIVED
APR 17 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO ___. Seal(s) broken by: Gary C. Eden date: 3/11/86

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 3/12/86 . Analyst's signature: Gary C. Eden

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: R Meyerhen

STATE OF NEW MEXICO
ENVIRONMENT

SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

85-1483-C

REPORT TO: Steven Cary
GW/HW Bureau - EID
P.O. Box 968
Santa Fe, NM 87504-0968

S.L.D. No.: OR- 173.H.B
DATE REC.: 2/18/86
PHONE 827-2898
USER CODE: 5 3 4 0 0

CONTAINERS WHICH ACCOMPANY THIS FORM ARE COLLECTIVELY REFERED TO AS SAMPLE.

SUBMITTER: Steven Cary CODE:

SAMPLE TYPE: WATER ☒, SOIL ☐, OTHER ______ CODE:

COLLECTED: 02/13/86 - 15:09 BY R. Meyerheim CODE: Y Y M M D D H H M M I I I
DATE AND TIME

SOURCE: SLD Blank - Travel CODE: AQUIFER DEPTH

NEAREST CITY: Albuquerque CODE:

LOCATION: ______ CODE: TOWNSHIP RANGE SECTION TRACTS

pH= — ; Conductivity= — umho/cm at — °C; Chlorine Residual= —

Dissolved Oxygen= — mg/l; Alkalinity= — ; Flow Rate= —

Sampling Location, Methods and Remarks (i.e. odors, etc.)

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Steven J. Cary

Method of shipment to the Laboratory automobile OF-3296

This form accompanies 2 Septum Vials, ___ Glass Jugs, ___ ______

Containers are marked as follows to indicate preservation:

☐ NP: No preservation; sample stored at room temperature.

☒ P-Ice Sample stored in an ice bath (not frozen).

☐ P-$Na_2S_2O_3$; Sample preserved with $Na_2S_2O_3$ to remove chlorine residual.

I (we) certify that this sample was transferred from STEVEN J. CARY to J.A. Finney at (location) SLD on 2/18/86 - 16:15 and that the statements in this block are correct.
DATE AND TIME

Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☒ No ☐

Signatures Steven J. Cary J. Finney

(we) certify that this sample was transferred from ______ to ______ at (location) ______ on ___/___/___ - ___:___ and that the statements in this block are correct.
DATE AND TIME

Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐

Signatures ______ ______

ANALYSES REQUESTED

LAB. No.: ORG- 183

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	√	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	√	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

RECEIVED
APR 11 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
aromatic hydrocarbons	** none detected		
halogenated hydrocarbons	none detected		
		** Detection limit	1
		* DETECTION LIMIT	1

RECEIVED
APR 11 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO ___. Seal(s) broken by: Gary C. Eden date: 3/12/86

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 3/12/86 . Analyst's signature: Gary C. Eden

I certify that I have reviewed and concur with the statements in this block. Reviewers signature: R Meyerhoff

STATE OF NEW MEXICO
ENVIRONMENT

SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

85-1481-C

REPORT TO: Steven Cary
EID - GW/HW Bureau
P.O. Box 968
Santa Fe, NM 87504-0968

S.L.D. No.: OR- 171-A,B
DATE REC.: 2/18/86
PHONE 827-2848
USER CODE: 51340

CONTAINERS WHICH ACCOMPANY THIS FORM ARE COLLECTIVELY REFERED TO AS SAMPLE.

SUBMITTER: Steven Cary CODE:

SAMPLE TYPE: WATER ☒, SOIL ☐, OTHER ______ CODE:

COLLECTED: 02/17/86-15:25 BY S. Cary CODE: Y Y M M D D H H M M I I I
DATE AND TIME

SOURCE: West side drainage ditch CODE: AQUIFER DEPTH

NEAREST CITY: Kirtland CODE:

LOCATION: Caribou Refinery CODE: TOWNSHIP RANGE SECTION TRACTS

pH= ——; Conductivity= —— umho/cm at —— °C; Chlorine Residual= ——

Dissolved Oxygen= —— mg/l; Alkalinity= ——; Flow Rate= ——

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Smelled like refined gasoline. Yellow color.
yellow-orange scum on surface

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Steven J. Cary

Method of shipment to the Laboratory automobile OF-3296

This form accompanies 2X Septum Vials, ___ Glass Jugs, ___ ______

Containers are marked as follows to indicate preservation:

- ☐ NP: No preservation; sample stored at room temperature.
- ☒ P-Ice Sample stored in an ice bath (not frozen).
- ☐ P-$Na_2S_2O_3$: Sample preserved with $Na_2S_2O_3$ to remove chlorine residual.

I (we) certify that this sample was transferred from STEVEN J. CARY to JA Finney at (location) SLD on 2/18/86-16:15 and that the statements in this block are correct.
DATE AND TIME

Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☒ No ☐

Signatures Steven J. Cary JA Finney

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on ___/___/___-___:___ and that the statements in this block are correct.
DATE AND TIME

Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐

Signatures ______ ______

ANALYSES REQUESTED | LAB. No.: ORG- 181

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
	X	1,2 Dichloroethane			
	X	~~1,2~~ Dibromoethane			

RECEIVED APR 11 1986 LIQUID WASTE/GROUND WATER SURVEILLANCE

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
~~aromatic hydrocarbons~~		Benzene	1275
1,2 Dichloroethane	* 60	Toluene	295
1,2 Dibromoethane	* none detected	Ethylbenzene	4
		p-xylene	9
		m-xylene	28
		o-xylene	11
		** Detection Limit	1
		* DETECTION LIMIT	1

REMARKS:

RECEIVED APR 11 1986 LIQUID WASTE/GROUND WATER SURVEILLANCE

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO ___. Seal(s) broken by: Gary E. Elen date: 3/11/86

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 3/11/86. Analyst's signature: Gary E. Elen

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: L Meyer[illegible]

STATE OF NEW MEXICO ENVIRONMENT

83-4480-C

SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

REPORT TO: Steven Cary
EID - GW/HW Bureau
P.O. Box 968
Santa Fe NM 87504-0968

S.L.D. No.: OR- 180-HB
DATE REC.: 2/18/86
PHONE 827-2898
USER CODE: 5 3 4 0 0

CONTAINERS WHICH ACCOMPANY THIS FORM ARE COLLECTIVELY REFERED TO AS SAMPLE.

SUBMITTER: Steven Cary CODE:

SAMPLE TYPE: WATER ☒, SOIL ☐, OTHER ______ CODE:

COLLECTED: 02/17/86 - 16:56 BY R. Rawlings CODE: Y Y M M D D H H M M I I I
DATE AND TIME

SOURCE: Surface water from disposal pit CODE: AQUIFER DEPTH

NEAREST CITY: Kirtland, NM CODE:

LOCATION: Caribou Refinery CODE: TOWNSHIP RANGE SECTION TRACTS

pH= — ; Conductivity= — umho/cm at — °C; Chlorine Residual= —

Dissolved Oxygen= — mg/l; Alkalinity= — ; Flow Rate= —

Sampling Location, Methods and Remarks (i.e. odors, etc.)

hydrocarbon sheen on water surface

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Steven J. Cary

Method of shipment to the Laboratory automobile OF-3296

This form accompanies 2 Septum Vials, ___ Glass Jugs, ___ ______

Containers are marked as follows to indicate preservation:

☒ NP: No preservation; sample stored at room temperature.

☒ P-Ice Sample stored in an ice bath (not frozen).

☐ P-$Na_2S_2O_3$; Sample preserved with $Na_2S_2O_3$ to remove chlorine residual.

I (we) certify that this sample was transferred from STEVEN J. CARY to J.A. Finney at (location) SLD on 2/18/86 - 16:15 and that the statements in this block are correct.
DATE AND TIME

Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☒ No ☐

Signatures Steven J. Cary J. Finney

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on ___/___/___ - ___:___ and that the statements in this block are correct.
DATE AND TIME

Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐

Signatures ______ ______

ANALYSES REQUESTED

LAB. No.: ORG- 180

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
	X	1,2 Dichloroethane			

RECEIVED APR 17 1986 LIQUID WASTE/GROUND WATER SURVEILLANCE

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
aromatic hydrocarbons	none detected		
halogenated hydrocarbons	none detected		
		* DETECTION LIMIT	3 ugm/l

RECEIVED

APR 11 1986

LIQUID WASTE/GROUND WATER SURVEILLANCE

REMARKS: sample was slightly foamy during purgeable run.

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO ___. Seal(s) broken by: ~~[illegible]~~ [illegible] date: 3-11-86

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 3-11-86, 3/11/86. Analyst's signature: [signatures]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: [signature]

STATE OF NEW MEXICO

ENVIRONMENT

86-A79-C

SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

REPORT TO: Steven Cary
EID – GW/HW Bureau
P.O. Box 968
Santa Fe, NM 87504-0968

S.L.D. No.: OR- 179-11.B
DATE REC.: 2/19/86
PHONE 827-2848
USER CODE: 5 B 4 0 0 1

CONTAINERS WHICH ACCOMPANY THIS FORM ARE COLLECTIVELY REFERED TO AS SAMPLE.

SUBMITTER: S. Cary CODE:

SAMPLE TYPE: WATER ☒, SOIL ☐, OTHER ______ CODE:

COLLECTED: 02/18/86-09:08 (DATE AND TIME) BY S. Cary CODE: Y Y M M D D H H M M I I I

SOURCE: Blank #2 CODE: AQUIFER DEPTH

NEAREST CITY: Kirtland CODE:

LOCATION: Caribou-Four Corners Refinery CODE: TOWNSHIP RANGE SECTION TRACTS

pH= — ; Conductivity= — umho/cm at — °C; Chlorine Residual= —

Dissolved Oxygen= — mg/l; Alkalinity= — ; Flow Rate= —

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Distilled water rinse from soil auger bit.

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Steven J. Cary

Method of shipment to the Laboratory automobile OF-13296

This form accompanies 2 Septum Vials, ___ Glass Jugs, ___

Containers are marked as follows to indicate preservation:

- ☐ NP: No preservation; sample stored at room temperature.
- ☒ P-Ice Sample stored in an ice bath (not frozen).
- ☐ P-$Na_2S_2O_3$; Sample preserved with $Na_2S_2O_3$ to remove chlorine residual.

I (we) certify that this sample was transferred from STEVEN J. CARY to JA Finney at (location) SLD on 2/18/86-16:15 (DATE AND TIME) and that the statements in this block are correct.

Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☒ No ☐

Signatures Steven J. Cary JA Finney

(we) certify that this sample was transferred from ______ to ______ at (location) ______ on ___/___/___-___:___ (DATE AND TIME) and that the statements in this block are correct.

Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐

Signatures ______ ______

ANALYSES REQUESTED | LAB. No.: ORG- 179

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED.* WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
	X	EDC			
	X	EDB			

RECEIVED APR 11 1986 LIQUID WASTE/GROUND WATER SURVEILLANCE

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
aromatic hydrocarbons	** none detected		
halogenated hydrocarbons	* none detected		
		** Detection Limit	1
		* DETECTION LIMIT	1

RECEIVED APR 11 1986 LIQUID WASTE/GROUND WATER SURVEILLANCE

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO __. Seal(s) broken by: Gary C. Eden date: 3/11/86

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 3/11/86. Analyst's signature: Gary Eden

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: R Meyerhein

ENVIRONMENT

STATE OF NEW MEXICO

SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

86-4477-C

REPORT TO: Steven Cary
EID - GW/HW Bureau
P.O. Box 968
Santa Fe, NM 87504-0968

S.L.D. No.: OR- 177-17.13
DATE REC. : 2/18/86
PHONE 827-2898
USER CODE: 5 3 6 0 0 0

CONTAINERS WHICH ACCOMPANY THIS FORM ARE COLLECTIVELY REFERED TO AS SAMPLE.

SUBMITTER: S. Cary CODE: ☐☐☐☐☐

SAMPLE TYPE: WATER ☒, SOIL ☐, OTHER ______ CODE: ☐☐

COLLECTED: 02/18/86-10:12 BY S. Cary CODE: Y Y M M D D H H M M I I I
DATE AND TIME

SOURCE: Water blank #3 CODE: AQUIFER DEPTH

NEAREST CITY: Kirtland CODE:

LOCATION: Caribou Four Corners Refinery CODE: TOWNSHIP RANGE SECTION TRACTS

pH=______; Conductivity=______umho/cm at ______°C; Chlorine Residual=______

Dissolved Oxygen=______mg/l; Alkalinity=__________; Flow Rate=__________

Sampling Location, Methods and Remarks (i.e. odors, etc.)

EID distilled water rinse of soil auger bit after hole #1, before hole #2

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Steven J. Cary

Method of shipment to the Laboratory automobile OF-3296

This form accompanies 2 Septum Vials, ___Glass Jugs, ___ ________

Containers are marked as follows to indicate preservation:

☐ NP: No preservation; sample stored at room temperature.

☒ P-Ice Sample stored in an ice bath (not frozen).

☐ P-$Na_2S_2O_3$; Sample preserved with $Na_2S_2O_3$ to remove chlorine residual.

I (we) certify that this sample was transferred from STEVEN J. CARY to J.A. Finney at (location) SLD on 2/18/86-16:15 and that the statements in this block are correct.
DATE AND TIME

Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☒ No ☐

Signatures Steven J. Cary J.A. Finney

(we) certify that this sample was transferred from ______________ to ______________ at (location) ______________ on ___/___/___-___:___ and that the statements in this block are correct.
DATE AND TIME

Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐

Signatures ______________ ______________

ANALYSES REQUESTED

LAB. No.: ORG- 177

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
	X	EDC			
	X	EDB			

RECEIVED APR 11 1986 LIQUID WASTE/GROUND WATER SURVEILLANCE

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
aromatic hydrocarbon screen	** none detected		
halogenated hydrocarbons	* none detected		
		** Detection Limit	1
		* DETECTION LIMIT	1

RECEIVED APR 11 1986 LIQUID WASTE/GROUND WATER SURVEILLANCE

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO ___. Seal(s) broken by: Gary C. Eden date: 3/11/86

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 3/11/86. Analyst's signature: Gary C. Eden

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: R Meyerhe[illegible]

ENVIRONMENT

STATE OF NEW MEXICO

SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

85-1478 -C

REPORT TO: Steven Cary EID - GW/HW Bureau P.O. Box 968 Santa Fe, NM 87504-0968	S.L.D. No.: OR- 177-K B DATE REC.: 2/18/86 PHONE 827-2898 USER CODE: 5 3 4 1 0 0 1

CONTAINERS WHICH ACCOMPANY THIS FORM ARE COLLECTIVELY REFERED TO AS SAMPLE.

SUBMITTER: S. Cary CODE:

SAMPLE TYPE: WATER ☒, SOIL ☐, OTHER ______ CODE:

COLLECTED: 02/18/86-10:47 BY S. Cary CODE: Y Y M M D D H H M M I I I
DATE AND TIME

SOURCE: Water blank #4 CODE: AQUIFER DEPTH

NEAREST CITY: Kirtland CODE:

LOCATION: Caribou Four Corners Refinery CODE: TOWNSHIP RANGE SECTION TRACTS

pH=______; Conductivity=______umho/cm at ______°C; Chlorine Residual=______

Dissolved Oxygen=______mg/l; Alkalinity=______; Flow Rate=______

Sampling Location, Methods and Remarks (i.e. odors, etc.)

EID distilled water rinse of bailer prior to use.

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Steven J. Cary

Method of shipment to the Laboratory automobile OF-3296

This form accompanies 2 Septum Vials, ___Glass Jugs, ___ ______

Containers are marked as follows to indicate preservation:

☐ NP: No preservation; sample stored at room temperature.

☒ P-Ice Sample stored in an ice bath (not frozen).

☐ P-$Na_2S_2O_3$; Sample preserved with $Na_2S_2O_3$ to remove chlorine residual.

I (we) certify that this sample was transferred from STEVEN J. CARY to J.A. Finney at (location) SLD on 2/18/86-16:15 and that the statements in this block are correct.
DATE AND TIME

Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☒ No ☐

Signatures Steven J. Cary J.A. Finney

I (we) certify that this sample was transferred from ______ to ______ at (location) ______ on ___/___/___-___:___ and that the statements in this block are correct.
DATE AND TIME

Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐

Signatures ______ ______

ANALYSES REQUESTED LAB. No.: ORG- 178

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
	X	EDB			
	X	EDC			

RECEIVED APR 11 1986 LIQUID WASTE/GROUND WATER SURVEILLANCE

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
aromatic hydrocarbons	** none detected		
halogenated hydrocarbons	* none detected		
		** Detection Limit	1
		* DETECTION LIMIT	1

RECEIVED APR 11 1986 LIQUID WAS... SURV...

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO ___. Seal(s) broken by: Gary C. Eden date: 3/11/86

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 3/11/86. Analyst's signature: Gary C. Eden

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: K Meyerhein

STATE OF NEW MEXICO ENVIRONMENT

85-1485-C

SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

REPORT TO: Steven Cary
EID- GW/HW Bureau
P.O. Box 968
Santa Fe NM 87506-0968

S.L.D. No.: OR- 195-H8
DATE REC.: 2/18/86
PHONE 827-2898
USER CODE: 5 3 4 0 0

CONTAINERS WHICH ACCOMPANY THIS FORM ARE COLLECTIVELY REFERED TO AS SAMPLE.

SUBMITTER: S. Cary CODE:

SAMPLE TYPE: WATER ☒, SOIL ☐, OTHER ______ CODE:

COLLECTED: 02/18/86-11:15 BY S. Cary CODE: Y Y M M D D H H M M I I I
DATE AND TIME

SOURCE: shallow ground water CODE: AQUIFER DEPTH

NEAREST CITY: Kirtland CODE:

LOCATION: Caribou Four Corners Refinery CODE: TOWNSHIP RANGE SECTION TRACTS

pH=______; Conductivity=______umho/cm at ______°C; Chlorine Residual=______

Dissolved Oxygen=______mg/l; Alkalinity=______; Flow Rate=______

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Sample bailed from 3" hole augered in county road right of way along east boundary of Caribou site; no unusual odors or colors;

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Steven J. Cary

Method of shipment to the Laboratory automobile OF-3296

This form accompanies 2 Septum Vials, ___ Glass Jugs, ___ ______

Containers are marked as follows to indicate preservation:

☐ NP: No preservation; sample stored at room temperature.

☒ P-Ice Sample stored in an ice bath (not frozen).

☐ P-$Na_2S_2O_3$; Sample preserved with $Na_2S_2O_3$ to remove chlorine residual.

I (we) certify that this sample was transferred from STEVEN J. CARY to JA Finney at (location) SLD on 2/18/86-16:15 and that the statements in this block are correct.
DATE AND TIME

Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☒ No ☐

Signatures Steven J. Cary JA Finney

(we) certify that this sample was transferred from ______ to ______ at (location) ______ on ___/___/___-___:___ and that the statements in this block are correct.
DATE AND TIME

Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐

Signatures ______ ______

ANALYSES REQUESTED LAB. No.: ORG- 185

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
	X	EDC			
	X	EDB			

RECEIVED
APR 11 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
aromatic hydrocarbons	* none detected		
halogenated hydrocarbons	none detected		
		** Detection Limit	1
		* DETECTION LIMIT	1

RECEIVED
APR 11 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO ___. Seal(s) broken by: Henry C. Eden date: 3/11/86

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 3/11/86. Analyst's signature: Henry C. Eden

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: K Meyerhein

STATE OF NEW MEXICO

ENVIRONMENT

RECEIVED

86-1476-B

SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

REPORT TO: Steven J. Cary
MAR 14 1986 PO Box 968
Santa Fe, NM 87504-0968
GROUND WATER/HAZARDOUS WASTE BUREAU

S.L.D. No.: OR- 176-A
DATE REC. : 2/18/86
PHONE 827-2898
USER CODE: 5|3|4|0|0|

CONTAINERS WHICH ACCOMPANY THIS FORM ARE COLLECTIVELY REFERED TO AS SAMPLE.

SUBMITTER: S Cary CODE: ☐☐☐☐☐

SAMPLE TYPE: WATER ☐, SOIL ☒, OTHER ______ CODE: ☐☐

COLLECTED: 02/18/86 - 11:23 BY R. Rawlings CODE: Y Y M M D D H H M M I I I
DATE AND TIME

SOURCE: Farmers Mutual Irrigation Ditch CODE: AQUIFER DEPTH

NEAREST CITY: Kirtland CODE:

LOCATION: above Caribou 4 Corners Refinery CODE: TOWNSHIP RANGE SECTION TRACTS

pH=______; Conductivity=______umho/cm at ______°C; Chlorine Residual=______

Dissolved Oxygen=______mg/l; Alkalinity=__________; Flow Rate=__________

Sampling Location, Methods and Remarks (i.e. odors, etc.)

surface sediment from now-dry ditch

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Steven J. Cary

Method of shipment to the Laboratory automobile OF-13294

This form accompanies ___Septum Vials, ___Glass Jugs, 1 8oz jar

Containers are marked as follows to indicate preservation:

☒ NP: No preservation; sample stored at room temperature.

☐ P-Ice Sample stored in an ice bath (not frozen).

☐ P-$Na_2S_2O_3$: Sample preserved with $Na_2S_2O_3$ to remove chlorine residual.

I (we) certify that this sample was transferred from STEVEN J. CARY to JA Finney at (location) SLD on 2/18/86-16:15 and that the statements in this block are correct.
DATE AND TIME

Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☒ No ☐

Signatures Steven J. Cary JA Finney

I (we) certify that this sample was transferred from ______________ to ______________ at (location) ______________ on ___/___/___-___:___ and that the statements in this block are correct.
DATE AND TIME

Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐

Signatures ______________ ______________

ANALYSES REQUESTED | LAB. No.: ORG- 176

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
aromatic hydrocarbon screen	none detected		
halogenated hydrocarbon screen	none detected		
		* DETECTION LIMIT	500

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO___. Seal(s) broken by: Mary C. Eden date: 3/4/86

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 3/4/86. Analyst's signature: Mary C. Eden

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: R Meyerhein

STATE OF NEW MEXICO

ENVIRONMENT

RECEIVED

MAR 4 1986

GROUND WATER/HAZARDOUS WASTE BUREAU

SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

85-1475 -B

REPORT TO: Steven J. Cary
PO Box 968
Santa Fe, NM 87504-0968

S.L.D. No.: OR- 175-A
DATE REC. : 2/18/86
PHONE 827-2898
USER CODE: 5 3 4 0 0

CONTAINERS WHICH ACCOMPANY THIS FORM ARE COLLECTIVELY REFERED TO AS SAMPLE.

SUBMITTER: S. Cary CODE:

SAMPLE TYPE: WATER ☐, SOIL ☒, OTHER ______ CODE:

COLLECTED: 02/18/86 - 11:31 BY R. Rawlings CODE: Y Y M M D D H H M M I I I
DATE AND TIME

SOURCE: Farmers Mutual Irrigation Ditch CODE: AQUIFER DEPTH

NEAREST CITY: Kirtland CODE:

LOCATION: Caribou Four Corners Refinery CODE: TOWNSHIP RANGE SECTION TRACTS

pH=______; Conductivity=______umho/cm at ______°C; Chlorine Residual=______

Dissolved Oxygen=______mg/l; Alkalinity=__________; Flow Rate=__________

Sampling Location, Methods and Remarks (i.e. odors, etc.)

surface sediment from now dry ditch, within area influenced by refinery

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Steven J. Cary

Method of shipment to the Laboratory automobile OF-3296

This form accompanies ___Septum Vials, ___Glass Jugs, 1 8 oz jar

Containers are marked as follows to indicate preservation:

☒ NP: No preservation; sample stored at room temperature.

☐ P-Ice Sample stored in an ice bath (not frozen).

☐ P-$Na_2S_2O_3$; Sample preserved with $Na_2S_2O_3$ to remove chlorine residual.

I (we) certify that this sample was transferred from STEVEN J. CARY to JA. Finney at (location) SLD on 2/18/86 - 16:15 and that the statements in this block are correct.
DATE AND TIME

Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☒ No ☐

Signatures Steven J. Cary JA Finney

I (we) certify that this sample was transferred from ______________ to ______________ at (location) ______________ on ___/___/___-___:___ and that the statements in this block are correct.
DATE AND TIME

Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐

Signatures ______________ ______________

ANALYSES REQUESTED LAB. No.: ORG- 175

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
no purgeables detected	—		
		* DETECTION LIMIT	500

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes X NO___. Seal(s) broken by: Harry C. Eden date: 3/4/86

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 3/4/86. Analyst's signature: Harry C. Eden

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: K Meyerheen

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

REGION 6
First International Bldg., 1201 Elm St.
Dallas, Texas 75270

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
PA/SI	Caribou 4 Corners Refining

SAMPLERS: (Signature) Steven J. Carey   Richard A Rawlings

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CON-TAINERS	ICAP	AA			Water	Soil	REMARKS
1	2/17/86	1648		X	large disposal pit	2-8oz		X				X	Pb, Cr, As HM-326
2.	2/17/86	1639		X	small disposal pit	"		X				X	" " " HM-324
3	2/17/86	1631		X	lead blending pump	"		X				X	" " " HM-325
4.	2/18/86	0921		X	road right-of-way: B'ground -4"	1x8oz		X				X	" " " HM-328
5.	2/18/86	0923		X	" " " " " 24"	1x8oz		X				X	" " " HM-329
6.	2/18/86	1123		X	Mutual Irrig. Ditch-Above refinery	1 8oz	X	X				X	As Se Hg HM-327
7.	2/18/86	1131		X	" " " -Below "	1 8oz	X	X				X	" " " HM-330

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Steven J. Carey	2/18/86 4:28	[signature]			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

6—8010

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

REGION 6
First International Bldg., 1201 Elm St.
Dallas, Texas 75270

CHAIN OF CUSTODY RECORD

PROJ. NO. [illegible]

PROJECT NAME Caribou 4 Corners Refining

SAMPLERS: *(Signature)* [illegible]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS							REMARKS
1	2/11/80	1048		X	large disposal pit	2-8 oz.		X				X	Pb, Cr, As
2	2/11/80	1039		X	small disposal pit	"		X				X	" " "
3	2/11/80	1631		X	[illegible]	"		X				X	" " "
4	2/11/80	[illegible]		X	road right-of-way [illegible]	[illegible]		X				X	" " "
5	2/11/80	[illegible]		X	" " " " "	[illegible]		X				X	" " "
6	2/11/80	[illegible]		X	Mutual Irrig. Ditch - Above refinery	1-8 oz	X	X				X	As Se Hg
7	2/11/80	1131		X	" " " - Below "	1 8 oz	X	X				X	" " "

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
[illegible]	2/18/80 4:28	[illegible]			

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*

Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

6 — 8010

REPORT TO: STEVEN J. CARY
Ground Water & Hazardous Waste Bureau
Environmental Improvement Division
Health & Environment Department
P.O. Box 968 - Crown Building
Santa Fe, NM 87504-0968

LAB NUMBER [illegible]
DATE RECEIVED 2/18/86
DATE REPORTED 6/10/86 [illegible] Initials
SLD USER CODE NUMBER 53400

~~Well Location~~ Address Farmers Mutual Irrigation Ditch

Point of Collection ~~[illegible]~~ Caribou Four Corners Refinery

Well Owner/User

Number of People Drinking Water from Well

Collected 860218 (Date) 1131 (Time) By R. Rawlings (Name) EID (Agency)

~~Well Depth~~ pH

~~Water Level~~ Conductivity (Uncorrected) umho/cm

Taste? Odor? Color? Collectors Remarks Temperature °C

nothing unusual

Conductivity at 25°C umho/cm

RECEIVED

PROJECT: JUN 18 1986

LIQUID WASTE/GROUND WATER SURVEILLANCE

From ____, A-H_2SO_4 Sample: From ____, NA Sample: Date Analyzed

☐ Nitrate-N+ Nitrite-N	mg/l	
☐ Ammonia-N	mg/l	
☐ Chemical oxygen demand	mg/l	
☐		

☐ Calcium	mg/l	
☐ Potassium	mg/l	
☐ Magnesium	mg/l	-
☐ Sodium	mg/l	
☐ Bicarbonate	mg/l	
☐ Chloride	mg/l	
☐ Sulfate	mg/l	
☐ Total Solids	mg/l	
☐		

From ____, A-HNO_3 Sample:

☒ ICAP Scan

☒ Metals by AA (Specify) As, Se, Hg

Digested

As = 1.7 μg/g
Se = <0.25 μg/g
Hg = <0.03 μg/g

This form accompanies 1 8oz sample(s) marked as follows to indicate field treatment:

NF: Whole sample (no filtration)
F: Filtered in field with 0.45u membrane filter
A-H_2SO_4: Acidified with 2 ml conc H_2SO_4/l
A-HNO_3: Acidified with 5ml conc HNO_3/l
NA: No acid added

Seal broken by JK on 3/17/86.

Lab Number: HM 330

Date Submitted: 2/18/86

By: Steven J. Cary / Rawlings

Sample Code: Farmers Mutual Irr. Ditch

Date Analyzed: 5/20/86

Reviewed By: Jim Ashby

Date Reported: 6/10/86

Element	ICAP VALUE (mg/l) × 50 =	(ug/g)	AA VALUE (mg/l)	(ug/g)
Aluminum	92.	4600.		
Barium	2.2	110.		
Berylium	<0.1	<5.		
Boron	0.2	10.		
Cadmium	<0.1	<5.		
Calcium	105.	5250.		
Chromium	<0.1	<5.		
Cobalt	0.1	5.		
Copper	0.3	15.		
Iron	170.	8500.		
Lead	1.1	55.		
Magnesium	33.	1650.		
Manganese	16.	800.		
Molybdenum	<0.1	<5.		
Nickel	0.1	5.		
Silicon	2.9	145.		
Silver	<0.1	<5.		
Strontium	0.8	40.		
Tin	<0.1	<5.		
Vanadium	0.2	10.		
Zinc	4.5	225.		
Arsenic			0.034	1.7
Selenium			<0.005	~~<0.025~~ <0.25
Mercury			–	<0.03

Note: mg/l value is the "digested solution" concentration. The ug/g is the final concentration on the "as received" basis.

$$ug/ml \times \frac{50\ ml}{1.0\ g} = 50\ ug/g$$

REPORT TO: STEVEN J. CARY
Ground Water & Hazardous Waste Bureau
Environmental Improvement Division
Health & Environment Department
P.O. Box 968 - Crown Building
Santa Fe, NM 87504-0968

LAB NUMBER 7/7/ 321
DATE RECEIVED 2/13/86
DATE REPORTED 6/10/86 JTA
Initials
SLD USER CODE NUMBER 53400

~~Well Location~~ Address Farmers Mutual Irrigation Ditch

Point of Collection above Caribou Four Corners Refinery

Well Owner/User

Number of People Drinking Water from Well

Collected 860218 1123 By R. Rawlings EID
Date Time Name Agency

~~Well Depth~~ pH

~~Water Level~~ Conductivity (Uncorrected) umho/cm

Taste? Odor? Color? Collectors Remarks Temperature ^{0}C

nothing unusual

Conductivity at $25^{0}C$ umho/cm

RECEIVED

PROJECT: JUN 18 1986

From _____, A-H_2SO_4 Sample:

☐ Nitrate-N+ Nitrite-N		mg/l	
☐ Ammonia-N		mg/l	
☐ Chemical oxygen demand		mg/l	
☐			

From LIQUID WASTE/GROUND ~~WATER~~ SURVEILLANCE, NA Sample:

			Date Analyzed
☐ Calcium		mg/l	
☐ Potassium		mg/l	
☐ Magnesium		mg/l	
☐ Sodium		mg/l	
☐ Bicarbonate		mg/l	
☐ Chloride		mg/l	
☐ Sulfate		mg/l	
☐ Total Solids		mg/l	
☐			

From _____, A-HNO_3 Sample:
☒ ICAP Scan
☒ Metals by AA (Specify) As, Se, Hg

digested

As = 1.0 µg/g
Hg = <0.03 µg/g

This form accompanies 1 802 sample(s) marked as follows to indicate field treatment:

NF: Whole sample (no filtration)
F: Filtered in field with 0.45u membrane filter
A-H_2SO_4: Acidified with 2 ml conc H_2SO_4/l
A-HNO_3: Acidified with 5ml conc HNO_3/l
NA: No acid added

Se = <0.25 µg/g

Seal broken by JK on 3/17/86

Lab Number: HM 327

Date Submitted: 2/18/86

By: Steven J. Cary / Rawlings

Sample Code: Farmers Mutual Ins. Ditz

Date Analyzed: 5/20/86

Reviewed By: Jim Ashley

Date Reported: 6/10/86

Element	ICAP VALUE (mg/l)	x 50 = (ug/g)	AA VALUE (mg/l)	(ug/g)
Aluminum	55.	2750.		
Barium	1.6	80.		
Berylium	<0.1	<5.		
Boron	<0.1	<5.		
Cadmium	<0.1	<5.		
Calcium	59.	2950.		
Chromium	<0.1	<5.		
Cobalt	<0.1	<5.		
Copper	0.2	10.		
Iron	102.	5100.		
Lead	0.5 ~~<0.1~~	~~<5.~~ 25	SR	
Magnesium	20.	1000.		
Manganese	10.	500.		
Molybdenum	<0.1	<5.		
Nickel	<0.1	<5.		
Silicon	2.0	100.		
Silver	<0.1	<5.		
Strontium	0.5	25.		
Tin	<0.1	<5.		
Vanadium	0.1	5.		
Zinc	2.8	140.		
Arsenic			0.020	1.0
Selenium			<0.005	<0.25
Mercury			<0.0005	<0.03

Note: mg/l value is the "digested solution" concentration. The ug/g is the final concentration on the "as received" basis.

$$ug/ml \times \frac{50\ ml}{1.0\ g} = 50\ ug/g$$

REPORT TO: STEVEN J. CARY
Ground Water & Hazardous Waste Bureau
Environmental Improvement Division
Health & Environment Department
P.O. Box 968 - Crown Building
Santa Fe, NM 87504-0968

RECEIVED
JUN 18 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

LAB NUMBER M-I 524
DATE RECEIVED 2/18/86.
DATE REPORTED 6/10/86 JTA
Initials
SLD USER CODE NUMBER 53400

~~Well~~ Location Address Caribou Refinery, Kirtland, NM

Point of Collection Disposal area south of 30,000 barrel tank

Well Owner/User ——

Number of People Drinking Water from Well ——

Collected 02/17/86 (Date) 1639 (Time) By Steven Cary (Name) EID (Agency)

Well Depth ——

Water Level ——

pH ____

Conductivity (Uncorrected) ____ umho/cm

Temperature ____ ^oC

Conductivity at 25^oC ____ umho/cm

Taste? Odor? Color? Collectors Remarks

Contaminated with "oil"
Soil sample

PROJECT:

From ____, $A-H_2SO_4$ Sample:

- [ ] Nitrate-N + Nitrite-N ____ mg/l ____
- [ ] Ammonia-N ____ mg/l ____
- [ ] Chemical oxygen demand ____ mg/l ____
- [ ] ____ ____ ____

From ____, NA Sample: Date Analyzed

- [ ] Calcium ____ mg/l ____
- [ ] Potassium ____ mg/l ____
- [ ] Magnesium ____ mg/l -
- [ ] Sodium ____ mg/l ____
- [ ] Bicarbonate ____ mg/l ____
- [ ] Chloride ____ mg/l ____
- [ ] Sulfate ____ mg/l ____
- [ ] Total Solids ____ mg/l ____
- [ ] ____ ____

From ____, $A-HNO_3$ Sample:

- [ ] ~~ICAP Scan~~
- [x] Metals by AA (Specify) Pb, Cr, As

digested

This form accompanies 2x8oz sample(s) marked as follows to indicate field treatment:

NF: Whole sample (no filtration)
F: Filtered in field with 0.45u membrane filter
$A-H_2SO_4$: Acidified with 2 ml conc $H_2SO_4/1$
$A-HNO_3$: Acidified with 5ml conc $HNO_3/1$
NA: No acid added

As = 2.8 µg/g
Cr = 2.6 µg/g
Pb = 20. µg/g
As received Basis.

Seal intact. Seal broken 5/20/86 by JTA

REPORT TO: STEVEN J. CARY
Ground Water & Hazardous Waste Bureau
Environmental Improvement Division
Health & Environment Department
P.O. Box 968 - Crown Building
Santa Fe, NM 87504-0968

LAB NUMBER AM 525
DATE RECEIVED 2/18/86
DATE REPORTED 6/10/86 JMA
Initials
SLD USER CODE NUMBER 53400

~~Well~~ Location Address Caribou Refinery, Kirtland, NM

Point of Collection Nr. lead blending pump

Well Owner/User —

Number of People Drinking Water from Well —

Collected 02/17/86 1631 By Richard A. Rawlings EID
Date Time Name Agency

Well Depth — pH —

Water Level — Conductivity (Uncorrected) — umho/cm

Taste? Odor? Color? Collectors Remarks Temperature — °C

Contaminated with "oil" Conductivity at 25°C — umho/cm

Soil sample

RECEIVED
JUN 18 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

PROJECT:

From ____, A-H_2SO_4 Sample:

- ☐ Nitrate-N+ Nitrite-N ____ mg/l ____
- ☐ Ammonia-N ____ mg/l ____
- ☐ Chemical oxygen demand ____ mg/l ____
- ☐ ____ ____ ____

From ____, NA Sample: Date Analyzed

- ☐ Calcium ____ mg/l ____
- ☐ Potassium ____ mg/l ____
- ☐ Magnesium ____ mg/l -
- ☐ Sodium ____ mg/l ____
- ☐ Bicarbonate ____ mg/l ____
- ☐ Chloride ____ mg/l ____
- ☐ Sulfate ____ mg/l ____
- ☐ Total Solids ____ mg/l ____
- ☐ ____ ____

From ____, A-HNO_3 Sample:

- ☐ ICAP Scan
- ☒ Metals by AA (Specify) Pb, Cr, As

digestion

This form accompanies 2x 4oz sample(s) marked as follows to indicate field treatment:

NF: Whole sample (no filtration)
F: Filtered in field with 0.45u membrane filter
A-H_2SO_4: Acidified with 2 ml conc H_2SO_4/l
A-HNO_3: Acidified with 5ml conc HNO_3/l
NA: No acid added

As = 5.0 µg/g
Cr = 15. µg/g
Pb = 260 µg/g

Seal intact. Broken by JMA 5/20/86. As received basis.

REPORT TO: STEVEN J. CARY
Ground Water & Hazardous Waste Bureau
Environmental Improvement Division
Health & Environment Department
P.O. Box 968 - Crown Building
Santa Fe, NM 87504-0968

LAB NUMBER HM 346
DATE RECEIVED 2/18/86
DATE REPORTED 6/10/86 JJA
Initials
SLD USER CODE NUMBER 53400

~~Well~~ Location Address Caribou Refinery, Kirtland, NM
Point of Collection Disposal pit south of refueling platform
Well Owner/User —
Number of People Drinking Water from Well —
Collected 02/17/86 1648
Date Time
By Steven Cary EID
Name Agency
Well Depth —
Water Level —
pH
Conductivity (Uncorrected) umho/cm
Temperature °C
Conductivity at 25°C umho/cm

RECEIVED
JUN 18 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

Taste? Odor? Color? Collectors Remarks
Believed to be Tank bottom sludge from crude Tank

PROJECT:

From ____, A-H_2SO_4 Sample:

- ☐ Nitrate-N+ Nitrite-N ____ mg/l ____
- ☐ Ammonia-N ____ mg/l ____
- ☐ Chemical oxygen demand ____ mg/l ____
- ☐ ____ ____ ____

From ____, NA Sample: Date Analyzed

- ☐ Calcium ____ mg/l ____
- ☐ Potassium ____ mg/l ____
- ☐ Magnesium ____ mg/l ____
- ☐ Sodium ____ mg/l ____
- ☐ Bicarbonate ____ mg/l ____
- ☐ Chloride ____ mg/l ____
- ☐ Sulfate ____ mg/l ____
- ☐ Total Solids ____ mg/l ____
- ☐ ____ ____

From ____, A-HNO_3 Sample:

- ☐ ~~ICAP Scan~~
- ☒ Metals by AA (Specify) Pb, Cr, As

digested

This form accompanies 2-8oz sample(s) marked as follows to indicate field treatment:

NF: Whole sample (no filtration)
F: Filtered in field with 0.45u membrane filter
A-H_2SO_4: Acidified with 2 ml conc H_2SO_4/l
A-HNO_3: Acidified with 5ml conc HNO_3/l
NA: No acid added

As = 23.
Cr = 31. µg/g
Pb = 140 µg/g
As received Basis.

Seal intact. Broken 5/20/86 by JJA.

REPORT TO: Steven J. Cary
Ground Water & Hazardous Waste Bureau
Environmental Improvement Division
Health & Environment Department
P.O. Box 968 - Crown Building
Santa Fe, NM 87504-0968

LAB NUMBER AM 328
DATE RECEIVED 2/18/86
DATE REPORTED 6/10/86 JFA
Initials
SLD USER CODE NUMBER 53400

Well Location Address surface soil sample

Point of Collection road right of way

~~Well Owner/User~~ Caribou Four Corners Refinery

Number of People Drinking Water from Well

Collected 860218 0921 By R. Rawlings EID
Date Time Name Agency

~~Well~~ Depth top 4 inches

pH

~~Water~~ Level

Conductivity (Uncorrected) umho/cm

Taste? Odor? Color? Collectors Remarks
no unusual characteristics

Temperature °C

Conductivity at 25°C umho/cm

PROJECT: LIQUID WASTE/GROUND WATER SURVEILLANCE

From ____, A-H_2SO_4 Sample:

JUN 18 1986

RECEIVED

From ____, NA Sample:

Date Analyzed

☐ Nitrate-N+ Nitrite-N	mg/l		☐ Calcium	mg/l	
☐ Ammonia-N	mg/l		☐ Potassium	mg/l	
☐ Chemical oxygen demand	mg/l		☐ Magnesium	mg/l	-
☐			☐ Sodium	mg/l	
			☐ Bicarbonate	mg/l	
			☐ Chloride	mg/l	
			☐ Sulfate	mg/l	
			☐ Total Solids	mg/l	
			☐		

From ____, A-HNO_3 Sample:

☐ ICAP Scan

☒ Metals by AA (Specify) Pb, Cr, As digested

As = 1.9 µg/g
Cr = 2.6 µg/g
Pb = 11. µg/g

This form accompanies 1 8oz sample(s) marked as follows to indicate field treatment:

NF: Whole sample ✓(no filtration)
F: Filtered in field with 0.45u membrane filter
A-H_2SO_4: Acidified with 2 ml conc H_2SO_4/l
A-HNO_3: Acidified with 5ml conc HNO_3/l
NA: No acid added

Seal broken by JFA on 5/20/86.

REPORT TO: STEVEN J. CARY
Ground Water & Hazardous Waste Bureau
Environmental Improvement Division
Health & Environment Department
P.O. Box 968 - Crown Building
Santa Fe, NM 87504-0968

LAB NUMBER M-1327
DATE RECEIVED 2/13/86
DATE REPORTED 6/10/86 JTA
Initials
SLD USER CODE NUMBER 53400

Well Location Address Caribou - Four Corners Refinery
Point of Collection county highway right of way
Well Owner/User
Number of People Drinking Water from Well
Collected 860218 0923 By R. Rawlings EID
Date Time Name Agency

~~Well~~ Depth 24"
~~Water Level~~

pH
Conductivity (Uncorrected) umho/cm
Temperature °C
Conductivity at 25°C umho/cm

Taste? Odor? Color? Collectors Remarks
no unusual characteristics

RECEIVED
JUN 18 1986
LIQUID WASTE/GROUND WATER SURVEILLANCE

PROJECT:

From ____, A-H_2SO_4 Sample:

- [ ] Nitrate-N+ Nitrite-N ____ mg/l ____
- [ ] Ammonia-N ____ mg/l ____
- [ ] Chemical oxygen demand ____ mg/l ____
- [ ] ____ ____ ____

From ____, NA Sample: Date Analyzed

- [ ] Calcium ____ mg/l ____
- [ ] Potassium ____ mg/l ____
- [ ] Magnesium ____ mg/l -
- [ ] Sodium ____ mg/l ____
- [ ] Bicarbonate ____ mg/l ____
- [ ] Chloride ____ mg/l ____
- [ ] Sulfate ____ mg/l ____
- [ ] Total Solids ____ mg/l ____
- [ ] ____ ____

From ____, A-HNO_3 Sample:

- [ ] ICAP Scan
- [x] Metals by AA (Specify) Pb, Cr, As digested

As = 1.7 µg/g
Cr = 2.5 µg/g
Pb = 10 µg/g

This form accompanies 1 8-oz sample(s) marked as follows to indicate field treatment:

NF: Whole sample (no filtration)
F: Filtered in field with 0.45u membrane filter
A-H_2SO_4: Acidified with 2 ml conc H_2SO_4/l
A-HNO_3: Acidified with 5ml conc HNO_3/l
NA: No acid added

Seal broken by JTA on 5/20/86.

cc. Farmington EID
724 W. Animas 87401

86- 0392-C

REPORT TO: Steven Cary
Ground Water Section
Environmental Improvement Div.
P.O. Box 968
Santa Fe, NM 87504-0968

RECEIVED APR 23 1986

LABORATORY
LAB NUMBER ORG-392-F,B 4/03/86

Users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

LIQUID WASTE/GROUND WATER SURVEILLANCE

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other

Water Supply and/or Code No.

City & County Kirtland, San Juan

Collected (date & time) 4-1-86, 1040 hrs By (name) Len Murray

pH=____; Conductivity=____ umho/cm at ____ °C; Chlorine Residual=

Dissolved Oxygen=____ mg/l; Alkalinity=____; Flow Rate=

Sampling Location, Methods & Remarks (i.e. odors etc.)

Well House faucet of Pat and Charles Grubbs. Priority 1
Approx. ½ mile SW of Caribou Refinery.

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed

Method of Shipment to Laboratory Purolator.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen PG-A; duplicate PG-B; triplicate ____; blank(s) ____,
and ____ amber glass jug(s) with teflon-lined cap(s) identified as ____,
and ____ other container(s) (describe) ____ identified as ____.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).
P-ICE: Sample stored in an ice bath.
P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from ____ to ____ at (location) ____ on (date & time) ____ and that the statements in this block are correct.
Disposition of Sample ____. Seal(s) Intact: Yes ☐ No ☐ .
Signature(s)

I (we) certify that this sample was transferred from ____ to ____ at (location) ____ on (date & time) ____ and that the statements in this block are correct.
Disposition of Sample ____. Seal(s) Intact: Yes ☐ No ☐ .
Signature(s)

ANALYSES REQUESTED **LAB. No.: ORG- 392**

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
X	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
X	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
X	X	1,2- Dichloroethane			

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
arom. purg. screen	none detected		
halo. purg. screen	none detected		
		* DETECTION LIMIT	1 ugm/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes___ NO X. Seal(s) broken by:__________ date:_____

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 3 April 86. Analyst's signature: R. Dinney

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: L. Meyerhe

cc. Farmington EID
724 W. Animas 87401

REPORT TO:

Steven Cary
Ground Water Section
~~Environmental Improvement Div.~~
P.O. Box 968
Santa Fe, NM 87504-0968

LABORATORY

RECEIVED
LAB NUMBER ORG-393-F.B
4/03/86

86-0393-C

Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other

Water Supply and/or Code No.

City & County Kirtland, San Juan

Collected (date & time) 4-1-86, 1100 hrs. By (name) Len Murray

pH=____; Conductivity=____umho/cm at____°C; Chlorine Residual=____

Dissolved Oxygen=____mg/l; Alkalinity=____; Flow Rate=____

Sampling Location, Methods & Remarks (i.e. odors etc.)

#1 Well House faucet of the Miller-Jackson property, approx. 70 yds North of Bill Walker Well. Priority 1

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed

Method of Shipment to Laboratory Purolator.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as: specimen MJ-1-a; duplicate MJ-1-b; triplicate____; blank(s)____, and____ amber glass jug(s) with teflon-lined cap(s) identified as____, and____ other container(s) (describe)____ identified as____.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

$P\text{-}Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from____ to____ at (location)____ on (date & time)____ and that the statements in this block are correct.

Disposition of Sample____. Seal(s) Intact: Yes ☐ No ☐.

Signature(s)____ ____

I (we) certify that this sample was transferred from____ to____ at (location)____ on (date & time)____ and that the statements in this block are correct.

Disposition of Sample____. Seal(s) Intact: Yes ☐ No ☐.

Signature(s)____ ____

ANALYSES REQUESTED LAB. No.: ORG- 393

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
X	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
X	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
X	X	1,2-Dichlorethane			

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
arom. purg. screen	none detected		
1,2-dichloroethane	6		
		* DETECTION LIMIT	1 µg/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes___ NO X. Seal(s) broken by:________________ date:________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 3 April 86. Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: [signature]

C.C. Farmington EID
724 W. Animas 87401

REPORT TO: Steven Cary
Ground Water Section
Environmental Improvement Div.
P.O. Box 968
Santa Fe, NM 87504-0968

LABORATORY

RECEIVED

LAB NUMBER ORG-394-F.B
4/03/86

86-0394-C

SLD users Code No. 53400

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

GROUND WATER SURVEILLANCE

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other

Water Supply and/or Code No.

City & County Kirtland, San Juan

Collected (date & time) 4-1-86, 1120 hrs. By (name) Len Murray

pH=____; Conductivity=____ umho/cm at ____ °C; Chlorine Residual=____

Dissolved Oxygen=____ mg/l; Alkalinity=____; Flow Rate=____

Sampling Location, Methods & Remarks (i.e. odors etc.)

Well House #2, approx. 100 yds west of Well #1. Sample collected from faucet on side of trailer, approx. 35 yds. west of well House #2. Miller-Jackson property. Priority 1

I certify that the statements ~~in this~~ block accurately reflect the results of my field analyses, observations and activities. Signed

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed

Method of Shipment to Laboratory Purolator.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as: specimen MJ-2-a; duplicate MJ-2-b; triplicate ____; blank(s) ____, and ____ amber glass jug(s) with teflon-lined cap(s) identified as ____, and ____ other container(s) (describe) ____ identified as ____.

Containers are marked as follows to indicate preservation (circle):

NP: No preservation; sample stored at room temperature (~20°C).

P-ICE: Sample stored in an ice bath.

$P\text{-}Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from ____ to ____ at (location) ____ on (date & time) ____ and that the statements in this block are correct.

Disposition of Sample ____. Seal(s) Intact: Yes ☐ No ☐ .

Signature(s)

I (we) certify that this sample was transferred from ____ to ____ at (location) ____ on (date & time) ____ and that the statements in this block are correct.

Disposition of Sample ____. Seal(s) Intact: Yes ☐ No ☐ .

Signature(s)

ANALYSES REQUESTED **LAB. No.: ORG- 394**

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
X	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
X	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
X	X	1,2-Dichloroethane			

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
arom purg screen	none detected		
1,2-dichloroethane	8		
		* DETECTION LIMIT	1 ugm/l

REMARKS:

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes___ NO X. Seal(s) broken by:________ date:______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 3 April 86. Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: [signature]

STATE OF NEW MEXICO

ENVIRONMENT

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

86-0395-C

REPORT TO: Steven Cary
Ground Water Section
EID
PO Box 968
Santa Fe, NM 87504-0968

S.L.D. No.: OR- 345 A B
DATE REC. : 4/03/86
PHONE
USER CODE: 5 3 4 0 0

CONTAINERS WHICH ACCOMPANY THIS FORM ARE COLLECTIVELY REFERED TO AS SAMPLE.

SUBMITTER: Len Murray CODE:

SAMPLE TYPE: WATER ☑, SOIL ☐, OTHER ____ CODE:

COLLECTED: 86 / 04 / 01 - 0957 : ____ BY Murray CODE: Y Y M M D D H H M M I I I
DATE AND TIME

SOURCE: Clinic 1+2 (Dist. H2O) Office CODE: AQUIFER DEPTH

NEAREST CITY: ____ CODE:

RECEIVED

LOCATION: ____ CODE: TOWNSHIP RANGE SECTION TRACTS

APR 23 1986

HEALTH SURVEILLANCE WATER

pH= ____; Conductivity= ____ umho/cm at ____; Chlorine Residual= ____

Dissolved Oxygen= ____ mg/l; Alkalinity= ____; Flow Rate= ____

Sampling Location, Methods and Remarks (i.e. odors, etc.)

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. ____

Method of shipment to the Laboratory ____

This form accompanies ___Septum Vials, ___Glass Jugs, ___ ____

Containers are marked as follows to indicate preservation:

☐ NP: No preservation; sample stored at room temperature.
☐ P-Ice Sample stored in an ice bath (not frozen).
☐ P-$Na_2S_2O_3$; Sample preserved with $Na_2S_2O_3$ to remove chlorine residual.

I (we) certify that this sample was transferred from ____
to ____ at (location) ____ on
___/___/___-___:___ and that the statements in this block are correct.
DATE AND TIME
Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐
Signatures ____ ____

(we) certify that this sample was transferred from ____
to ____ at (location) ____ on
___/___/___-___:___ and that the statements in this block are correct.
DATE AND TIME
Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐
Signatures ____ ____

ANALYSES REQUESTED LAB. No.: ORG- 395

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
		AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
		HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
arom. purg. screen*	none detected		
halo. purg. screen	none detected		
		* DETECTION LIMIT	1 ugm/l

REMARKS: * One compound was detected by the aromatic screen that is possible acetone at less than 1 ppm.

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes___ NO X. Seal(s) broken by:________________ date:________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 3 April 86. Analyst's signature: [signature]

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: [signature]

APPENDIX IV

File Correspondence on Spills and Leaks

Spills

Caribou FOUR CORNERS INC.

HOME OFFICE - PHONE (307) 886-3124 - P. O. BOX 457 - AFTON, WYOMING 83110
PHONE (801) 295-5557 - 1431 SO. 1800 W. - WOODS CROSS, UTAH 84087

Caribou Four Corners, Inc.
P.O. Box 175
Kirtland, N.M. 87417

Subject- #5 oil spill

Date- 8-16-78

To- New Mexico Oil Conservation Commission,
New Mexico E.I.A., Federal E.I.A.

Approximately 7:30 P.M. 8-3-78, the plant operators switched the #5 fuel oil from one tank to another.

At approximately 8:30 P.M. the operators noticed vapors coming up from the ground. They found #5 fuel oil coming to the ground surface and going to the Farmers Mutual Ditch Co. irrigation ditch. They immediately began correction and containment action.

As soon as possible the plant operators called me, L.W. Hollimon, Refinery Superintendent. Immediately I went to the refinery and determined that the most oil that could have entered the ditch to be 10 bbls. A crew was called in at this time to begin clean up.

At this time all of the proper authorities were notified of the spill and to the amount of the spill.

The oil was contained in the ditch, recovered and removed. It was determined that no oil was allowed to enter the San Juan River, nor will there be any natural resources or irrigated land damaged..

The cause of the spill was determined to be caused by a 3" 90 degree ell manufactured by Ladish Corp. The 90 degree ell had ruptured 180 degrees around its circumference. The manufactuers are trying to determine the cause of this failure.

RECEIVED
SEP 28 1978
OIL CON. COM.
DIST. 3

Sincerely,

L. W. Holl

L. W. Hollimon
Refinery Superintendent

NEW MEXICO OIL CONSERVATION COMMISSION

NOTIFICATION OF FIRE, BREAKS, SPILLS, LEAKS, AND BLOWOUTS

NAME OF OPERATOR Caribou Four Corners Inc				ADDRESS P.O. Box 175 Kirtland N. Mex			
REPORT OF	FIRE ✓	BREAK	SPILL	LEAK	BLOWOUT	OTHER*	
TYPE OF FACILITY	DRLG WELL	PROD WELL	TANK BTTY	PIPE LINE	GASO PLNT	OIL RFY ✓	OTHER*
NAME OF FACILITY Caribou Four Corners Inc Refinery							
LOCATION OF FACILITY (QUARTER/QUARTER SECTION OR FOOTAGE DESCRIPTION)				SEC.	TWP.	RGE.	COUNTY
DISTANCE AND DIRECTION FROM NEAREST TOWN OR PROMINENT LANDMARK 2.8 miles West of Farmington & limits Hiway 550							
DATE AND HOUR OF OCCURENCE 2-20-77 10:30-11:30 P.M.				DATE AND HOUR OF DISCOVERY 2-20-77 10:30-11:30 P.M.			
WAS IMMEDIATE NOTICE GIVEN?	YES	NO ✓	NOT REQUIRED	IF YES, TO WHOM			
BY WHOM				DATE AND HOUR			
TYPE OF FLUID LOST Gasoline				QUANTITY OF LOSS 9354 gallons		VOLUME RECOVERED	
DID ANY FLUIDS REACH A WATERCOURSE?	YES	NO ✓	QUANTITY				

IF YES, DESCRIBE FULLY**

DESCRIBE CAUSE OF PROBLEM AND REMEDIAL ACTION TAKEN** Light ends from storage tank settled and traveled to furnace. Ignition and flash back ignited tank vapors and at fullest extent of fire six tanks were burning at vents.

DESCRIBE AREA AFFECTED AND CLEANUP ACTION TAKEN** Area cleaned up all lines checked with pressure and system put back in service.

DESCRIPTION OF AREA	FARMING	GRAZING ✓	URBAN	OTHER*			
SURFACE CONDITIONS	SANDY	SANDY LOAM	CLAY	ROCKY ✓	WET	DRY	SNOW

DESCRIBE GENERAL CONDITIONS PREVAILING (TEMPERATURE, PRECIPITATION, ETC.)**
Temp 20-25°
Wind - None
Precip. - None

I HEREBY CERTIFY THAT THE INFORMATION ABOVE IS TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF

SIGNED [signature] TITLE Ref Supt DATE 3-3-77

*SPECIFY **ATTACH ADDITIONAL SHEETS IF NECESSARY

MAR 8 1977
OIL CON. COM.
DIST. 3

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO
1000 RIO BRAZOS ROAD - AZTEC
87410

GOVERNOR
BRUCE KING
CHAIRMAN

LAND COMMISSIONER
ALEX J. ARMIJO
MEMBER

STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY – DIRECTOR

February 21, 1973

Mr. Richard Mitzelfelt
Environmental Improvement Agency
Regional Office I & III
2929 Monte Vista N. E.
Albuquerque, New Mexico 87106

Re: Caribou Four Corners Refinery, Kirtland, New Mexico

Dear Mr. Mitzelfelt:

Since receiving your letter of February 5, 1973, I have investigated the oil seepage problem at the above mentioned refinery.

Several years ago our office in conjunction with the State Fire Marshall and representatives from the Farmers Mutual Ditch Company required the Four Corners Caribou Company to install certain safety features at the plant. These included fire walls at all storage tanks as well as a concrete retaining wall along the irrigation canal to prevent accidental spills from entering the ditch. So far as I know there has not been contamination of the ditch since that time. The company did have one tank which accidently ruptured and the oil was contained in the fire walls around the tank. However, I am sure that oil from this spill did seep into the gravel bar underneath the tank and probably flowed through the bar underneath the ditch. However, there was no evidence at that time the oil entered the ditch; or if there was evidence, it was not brought to our attention. The ditch company recently cleaned out the ditch which is now empty and dug it a couple of feet below grade and at that time dug into oil residue and I believe that was probably when report of seepage into the ditch was made to your office. We did not receive any complaints at this office so I was unaware of the situation prior to receiving your letter.

Mr. Larry Holliman, the plant superintendent, has informed me that concrete pipe has been ordered from Hydro-Conduit Corporation in Albuquerque and that the delivery date is supposed to be about March 1. They intend to install about 350 feet of pipe and this should take care of the pollution hazard so far as the ditch is concerned. The ditch company indicates they will turn water in the ditch about March 15 so there should be time enough to get the pipe installed.

I presume that Mr. Hulls letter of January 30, 1973, to Mr. Holliman may have inspired the company to institute corrective action. Whatever inspired the action, I am happy it is being taken as I believe piping the ditch past the refinery is the only way to completely remove the hazard of getting oil in the ditch.

Mr. Richard Mitzelfelt
Environmental Improvement Agency
February 21, 1973

Page 2

You have asked whether I consider Mr. Hulls letter to Caribou Four Corners Refinery to be out of order in any way. Please be advised that we are extremely anxious to prevent any pollution arising from oil and gas operations and we welcome whatever assistance we might get from you or any other agency in accomplishing this. We will be happy to cooperate with you in any way possible in correcting future problems which may arise.

Yours very truly,

Emery C Arnold

Emery C. Arnold
Supervisor, District #3

ECA:mc

cc: Mr. A. L. Porter, Jr.
Oil Conservation Commission
Santa Fe, New Mexico

Mr. John Wright
Water Quality Section, EIA

Mr. Howard J. Hull
Environmentalist II
620 Lake Street
Farmington, New Mexico

Regional Office I and III
2929 Monte Vista NE
Albuquerque, New Mexico 87106

February 5, 1973

Oil Conservation Commission
District Office
Aztec, New Mexico

Gentlemen:

RE: Caribou Four Corners Inc. Refinery Plant, Kirtland, New Mexico

Complaints have been received by our Farmington office regarding seepage of petroleum products into an adjacent canal from the above-mentioned refinery.

As this type of operation is under your jurisdiction, we are bringing it to your attention for investigation. Enclosed is a letter our agency sent to the owner of this plant. If the letter was out of order in any way, please let me know.

Sincerely,

Richard Mitzelfelt, Environmental Specialist

RM:jt

cc: Jeff Hull, Environmentalist
John Wright, Water Quality Section, EIA
File

620 South Lake Street
Farmington, New Mexico 87401

January 30, 1973

Mr. Larry Holliman
Caribou Four Corners, Inc.
Box 175
Kirtland, New Mexico 87417

Dear Mr. Holliman:

This is to confirm our discussion regarding the problem of petroleum products and sewage leaking into the Farmers Mutual Irrigation Ditch. This is a violation of the New Mexico Water Pollution Regulations.

The best solution to the oil problem appears to be lining the ditch or installing a concrete pipe past the refinery.

The new sewage system will be required for the grocery store and office. The system will be subject to approval by this agency, since the grocery store is governed by the Restaurant Law and by the State Regulations, which pertain to food service establishments.

Since this is a serious matter, we would appreciate your cooperation in correcting the oil and sewage problems before the water is turned back into the irrigation ditch, which is usually around the first of March each year. Failure to correct the problems will leave us no alternative than to pursue appropriate legal action.

If you have any questions concerning the above please call us.

Sincerely,

Howard J. Hull

Howard J. Hull
Environmentalist II

HJH:cms

cc Thomas E. Baca, Regional Manager
Farmers Mutual Irrigation Ditch

…k Items
Analysis

Public Health Laboratory

New Mexico Health and Social Services Department
305 Terrace Avenue N. E., Albuquerque, New Mexico 87106
CHEMICAL AND PHYSICAL ANALYSIS FOR WATER SAMPLES

Date Received: 2/2
Lab. No.: C-2509

…llection Date: 1-26-73
…llected by: Howard J. Hull
…ner: Caribour Refinery
…ort to: Howard J. Hull
…dress: 620 South Lake Street
Farmington, New Mexico 87401
…her Information:

CITY OR LOCATION: Kirtland
County: San Juan
Elev.: 5200
Station:

Source: [ ] Well Depth: ____ [ ] Spring [x] Stream [ ] Sewer [ ] Drain [ ] Lake [ ] Pool

River Basin: [ ] Rio Grande [ ] Canadian [ ] Pecos [x] San Juan [ ] Gila [ ] Little Colorado [ ] Other

WATER SUPPLIES: [ ] MUNICIPAL [ ] MDWCA [ ] PRIVATE [ ] INDUSTRIAL [ ] COMMERCIAL

WASTE WATERS: [ ] MUNICIPAL [ ] MDWCA [ ] PRIVATE [ ] INDUSTRIAL [ ] COMMERCIAL

Lat. 36° 44 00 Long. 108° 19 50

Cations	mg/l	me/l	Anions	mg/l	me/l	Physical and Chemical Parameters	mg/l	Other Parameters		Other Parameters		Other Parameters Not Listed	
Sodium (as Na)			Chloride (as Cl)			Total Hardness (as CaCO₃)		Surfactants (as LAS)		pH			
Potassium (as K)			Fluoride (as F)			Alkalinity (as CaCO₃)		BOD-5 day 20°C mg/l		Water Temperature °C			
Calcium (as Ca)			Nitrate (as NO₃)			Dissolved Residue		COD mg/l		Color Units			
Magnesium (as Mg)			Bicarbonate (as HCO₃)			Suspended Residue		Chlorine demand mg/l		Turbidity Jackson Units Supernatant			
Iron - Total (as Fe)			Carbonate (as CO₃)			Total Residue		Dissolved Oxygen mg/l		Turbidity Jackson Units Total			
Manganese (as Mn)			Sulfate (as SO₄)			Total Fixed Solids		Oxygen Saturation Concentration		Settleable Solids ml/l			
			Phosphate (as PO₄)			Total Volatile Solids		Conductance Micromhos 25°C		Odor Nature			
Total			Total							% Hydrocarbons = <0.001%			

Remarks: Petroleum products is believed to be seeping into irrigation ditch which runs beside the refinery. Please check sample for petroleum products.
(Sandy Material)

Date: 2/5/73
Analyst: BB
Reviewed by: BB
Date Reported: 2/5/73

Public Health Laboratory

New Mexico Health and Social Services Department
305 Terrace Avenue N. E., Albuquerque, New Mexico 87106
CHEMICAL AND PHYSICAL ANALYSIS FOR WATER SAMPLES

...k Items Analysis

2/2 Date Received   C-2508 Lab. No.

...tion Date 1-26-73
...llected by J. Hull
...ner Caribou Oil Refinery
...port to Jeff Hull
...dress 620 South Lake Street
Farmington, New Mexico
...her Information:

CITY OR LOCATION Kirtland   County San Juan   Elev. 5200

Station

Source: ☐ Well Depth ☐ Spring ☒ Stream ☐ Sewer ☐ Drain ☐ Lake ☐ Pool

River Basin: ☐ Rio Grande ☐ Canadian ☐ Pecos ☒ San Juan ☐ Gila ☐ Little Colorado ☐ Other

WATER SUPPLIES: ☐ MUNICIPAL ☐ MDWCA ☐ PRIVATE ☐ INDUSTRIAL ☐ COMMERCIAL

WASTE WATERS: ☐ MUNICIPAL ☐ MDWCA ☐ PRIVATE ☐ INDUSTRIAL ☐ COMMERCIAL

Lat. 36° 44 010   Long. 108° 19 510

Cations	mg/l	me/l	Anions	mg/l	me/l	Physical and Chemical Parameters	mg/l	Other Parameters		Other Parameters		Other Parameters Not Listed	
Sodium (as Na)			Chloride (as Cl)			Total Hardness (as $CaCO_3$)		Surfactants (as LAS)		pH			
Potassium (as K)			Fluoride (as F)			Alkalinity (as $CaCO_3$)		BOD-5 day 20°C mg/l		Water Temperature °C			
Calcium (as Ca)			Nitrate (as NO_3)			Dissolved Residue		COD mg/l		Color Units			
Magnesium (as Mg)			Bicarbonate (as HCO_3)			Suspended Residue		Chlorine demand mg/l		Turbidity Jackson Units Supernatant			
Iron - Total (as Fe)			Carbonate (as CO_3)			Total Residue		Dissolved Oxygen mg/l		Turbidity Jackson Units Total			
Manganese (as Mn)			Sulfate (as SO_4)			Total Fixed Solids		Oxygen Saturation Concentration		Settleable Solids ml/l			
			Phosphate (as PO_4)			Total Volatile Solids		Conductance Micromhos 25°C		Odor Nature			
Total			Total							% Hydrocarbons = 0.08%			

Remarks: Petroleum products are believed to be seeping into irrigation ditch which runs beside the refinery.
Please check sample for petroleum residues.
(Soil)

Date: 2/5/73
Analyst: BS
Reviewed by: BS
Date Reported: 2/5/73

APPENDIX V

Records of Conversations

STATE OF NEW MEXICO
ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

] Telephone ☐ Personal	Time 0915	Date 8/15/86

Originating Party	Other Parties
Steven J. Cary	Mrs. Bill Walker
NMEID, CERCLA Program	Kirtland, NewMexico

ubject

Caribou Refinery site

iscussion

I asked Mrs. Walker exactly how many acres she was irrigating off the Brimhall Ditch. She said approximately 25 acres. I asked what crops she was growing. She said hay and alfalfa for their livestock.

I asked if she knew the depth of their private well. She said that it was 26 ft. deep, plus or minus 2 feet.

Mrs. Walker asked if she could have a copy of my report, because they were retaining an attorney for this case. I said I would send her a copy of my report.

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Send Walkers a copy of report.

istribution

SIF report and HRS package for Caribou site.

Signed Steven J. Cary

STATE OF NEW MEXICO
ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

Telephone	Personal	Time 0920	Date 8/15/86

Originating Party	Other Parties
Steven J. Cary	Mrs. Evan D. Brimhall (598-5193)
NMEID, CERCLA Program	Kirtland, NM

Subject Caribou Refinery site

Discussion

I asked Mrs. Brimhall exactly how many acres they were irrigating off the Brimhall Ditch. She said that they and the Walkers had about 75 acres together. I said that I had just spoken with Mrs. Walker who said they irrigated about 25 acres. Mrs. Brimhall then stated that they (the Brimhalls) must have about 50. I asked what crops they were growing this year. She said alfalfa and feed corn. In past years they have grown oats and pasture. All of these crops were for livestock consumption. I asked what happened to their tailwater. She said it went to the San Juan River.

Conclusions or Agreements

Distribution

SIF report and HRS package for Caribou site

Signed Steven J. Cary

APPENDIX IV

File Correspondence on Spills and Leaks

Fields 7 Spills

Caribou FOUR

CORNERS INC.

HOME OFFICE - PHONE (307) 886-3124 - P. O. BOX 457 - AFTON, WYOMING 83110
PHONE (801) 295-5557 - 1431 SO. 1800 W. - WOODS CROSS, UTAH 84087

Caribou Four Corners, Inc.
P.O. Box 175
Kirtland, N.M. 87417

Subject- #5 oil spill

Date- 8-16-78

To- New Mexico Oil Conservation Commission,
New Mexico E.I.A., Federal E.I.A.

Approximately 7:30 P.M. 8-3-78, the plant operators switched the #5 fuel oil from one tank to another.

At approximately 8:30 P.M. the operators noticed va pors coming up from the ground. They found #5 fuel oil coming to the ground surface and going to the Farmers Mutual Ditch Co. irrigation ditch. They immediately began correction and containment action.

As soon as possible the plant operators called me, L.W. Hollimon, Refinery Superintendent. Immediately I went to the refinery and determined that the most oil that could have entered the ditch to be 10 bbls. A crew was called in at this time to begin clean up.

At this time all of the proper authorities were notified of the spill and to the amount of the spill.

The oil was contained in the ditch, recovered and removed. It was determined that no oil was allowed to enter the San Juan River, nor will there be any natural resources or irrigated land damaged..

The cause of the spill was determined to be caused by a 3" 90 degree ell manufactured by Ladish Corp. The 90 degree ell had ruptured 180 degrees around its circumference. The manufactuers are trying to determine the cause of this failure.

RECEIVED
SEP 28 1978
OIL CON. COM.
DIST. 3

Sincerely,

L. W. Hollimon

L. W. Hollimon
Refinery Superintendent

NEW MEXICO OIL CONSERVATION COMMISSION

NOTIFICATION OF FIRE, BREAKS, SPILLS, LEAKS, AND BLOWOUTS

NAME OF OPERATOR Caribou Four Corners Inc	ADDRESS P.O. Box 175 Kirtland N. Mex.

REPORT OF	FIRE ✓	BREAK	SPILL	LEAK	BLOWOUT	OTHER*

TYPE OF FACILITY	DRLG WELL	PROD WELL	TANK BTTY	PIPE LINE	GASO PLNT	OIL RFY ✓	OTHER*

NAME OF FACILITY Caribou Four Corners Inc. Refinery

LOCATION OF FACILITY (QUARTER/QUARTER SECTION OR FOOTAGE DESCRIPTION)	SEC.	TWP.	RGE.	COUNTY

DISTANCE AND DIRECTION FROM NEAREST TOWN OR PROMINENT LANDMARK 2.8 miles West of Farmington City limits Hiway 550.

DATE AND HOUR OF OCCURENCE 2-20-77 10:30-11:30 P.M.	DATE AND HOUR OF DISCOVERY 2-20-77 10:30-11:30 P.M.

WAS IMMEDIATE NOTICE GIVEN?	YES	NO ✓	NOT REQUIRED	IF YES, TO WHOM

BY WHOM	DATE AND HOUR

TYPE OF FLUID LOST Gasoline	QUANTITY OF LOSS 935 gallons	VOLUME RECOVERED

DID ANY FLUIDS REACH A WATERCOURSE?	YES	NO ✓	QUANTITY

IF YES, DESCRIBE FULLY**

DESCRIBE CAUSE OF PROBLEM AND REMEDIAL ACTION TAKEN** settled and traveled to
Light Ends from Storage Tank
Furnace. Ignition and Flash back Ignited Tank Vapors and
at Fullest extent of Fire Six tanks were burning at Vents.

DESCRIBE AREA AFFECTED AND CLEANUP ACTION TAKEN**
Area cleaned up all lines checked with pressure and
system put back in service.

DESCRIPTION OF AREA	FARMING	GRAZING ✓	URBAN	OTHER*

SURFACE CONDITIONS	SANDY	SANDY LOAM	CLAY	ROCKY ✓	WET	DRY	SNOW

DESCRIBE GENERAL CONDITIONS PREVAILING (TEMPERATURE, PRECIPITATION, ETC.)**
Temp 20-25°
Wind - None
Precip. - None

I HEREBY CERTIFY THAT THE INFORMATION ABOVE IS TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF

SIGNED T. W. Hall[illegible] TITLE Ref. Supt. DATE 3-3-77

*SPECIFY **ATTACH ADDITIONAL SHEETS IF NECESSARY

MAR 8 1977
OIL CON. COM.
DIST. 3

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO
1000 RIO BRAZOS ROAD - AZTEC
87410

GOVERNOR
BRUCE KING
CHAIRMAN

LAND COMMISSIONER
ALEX J. ARMIJO
MEMBER

STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY - DIRECTOR

February 21, 1973

Mr. Richard Mitzelfelt
Environmental Improvement Agency
Regional Office I & III
2929 Monte Vista N. E.
Albuquerque, New Mexico 87106

Re: Caribou Four Corners Refinery, Kirtland, New Mexico

Dear Mr. Mitzelfelt:

Since receiving your letter of February 5, 1973, I have investigated the oil seepage problem at the above mentioned refinery.

Several years ago our office in conjunction with the State Fire Marshall and representatives from the Farmers Mutual Ditch Company required the Four Corners Caribou Company to install certain safety features at the plant. These included fire walls at all storage tanks as well as a concrete retaining wall along the irrigation canal to prevent accidental spills from entering the ditch. So far as I know there has not been contamination of the ditch since that time. The company did have one tank which accidently ruptured and the oil was contained in the fire walls around the tank. However, I am sure that oil from this spill did seep into the gravel bar underneath the tank and probably flowed through the bar underneath the ditch. However, there was no evidence at that time the oil entered the ditch; or if there was evidence, it was not brought to our attention. The ditch company recently cleaned out the ditch which is now empty and dug it a couple of feet below grade and at that time dug into oil residue and I believe that was probably when report of seepage into the ditch was made to your office. We did not receive any complaints at this office so I was unaware of the situation prior to receiving your letter.

Mr. Larry Holliman, the plant superintendent, has informed me that concrete pipe has been ordered from Hydro-Conduit Corporation in Albuquerque and that the delivery date is supposed to be about March 1. They intend to install about 350 feet of pipe and this should take care of the pollution hazard so far as the ditch is concerned. The ditch company indicates they will turn water in the ditch about March 15 so there should be time enough to get the pipe installed.

I presume that Mr. Hulls letter of January 30, 1973, to Mr. Holliman may have inspired the company to institute corrective action. Whatever inspired the action, I am happy it is being taken as I believe piping the ditch past the refinery is the only way to completely remove the hazard of getting oil in the ditch.

Mr. Richard Mitzelfelt
Environmental Improvement Agency
February 21, 1973

You have asked whether I consider Mr. Hulls letter to Caribou Four Corners Refinery to be out of order in any way. Please be advised that we are extremely anxious to prevent any pollution arising from oil and gas operations and we welcome whatever assistance we might get from you or any other agency in accomplishing this. We will be happy to cooperate with you in any way possible in correcting future problems which may arise.

Yours very truly,

Emery C Arnold

Emery C. Arnold
Supervisor, District #3

ECA:mc

cc: Mr. A. L. Porter, Jr.
Oil Conservation Commission
Santa Fe, New Mexico

Mr. John Wright
Water Quality Section, EIA

Mr. Howard J. Hull
Environmentalist II
620 Lake Street
Farmington, New Mexico

Regional Office I and III
2929 Monte Vista NE
Albuquerque, New Mexico 87106

February 5, 1973

Oil Conservation Commission
District Office
Aztec, New Mexico

Gentlemen:

RE: Caribou Four Corners Inc. Refinery Plant, Kirtland, New Mexico

Complaints have been received by our Farmington office regarding seepage of petroleum products into an adjacent canal from the above-mentioned refinery.

As this type of operation is under your jurisdiction, we are bringing it to your attention for investigation. Enclosed is a letter our agency sent to the owner of this plant. If the letter was out of order in any way, please let me know.

Sincerely,

Richard Mitzelfelt, Environmental Specialist

RM:jt

cc: ✓ Jeff Hull, Environmentalist
John Wright, Water Quality Section, EIA
File

620 South Lake Street
Farmington, New Mexico 87401

January 30, 1973

Mr. Larry Holliman
Caribou Four Corners, Inc.
Box 175
Kirtland, New Mexico 87417

Dear Mr. Holliman:

This is to confirm our discussion regarding the problem of petroleum products and sewage leaking into the Farmers Mutual Irrigation Ditch. This is a violation of the New Mexico Water Pollution Regulations.

The best solution to the oil problem appears to be lining the ditch or installing a concrete pipe past the refinery.

The new sewage system will be required for the grocery store and office. The system will be subject to approval by this agency, since the grocery store is governed by the Restaurant Law and by the State Regulations, which pertain to food service establishments.

Since this is a serious matter, we would appreciate your cooperation in correcting the oil and sewage problems before the water is turned back into the irrigation ditch, which is usually around the first of March each year. Failure to correct the problems will leave us no alternative than to pursue appropriate legal action.

If you have any questions concerning the above please call us.

Sincerely,

Howard J. Hall

Howard J. Hall
Environmentalist II

HJH:cms

cc Thomas E. Baca, Regional Manager
Farmers Mutual Irrigation Ditch

…k Items
Analysis

Public Health Laboratory

New Mexico Health and Social Services Department
305 Terrace Avenue N. E., Albuquerque, New Mexico 87106
CHEMICAL AND PHYSICAL ANALYSIS FOR WATER SAMPLES

Date Received: 2/2   Lab. No.: C-2509

…llection Date: 1-26-73
…llected by: Howard J. Hull
…ner: Caribour Refinery
…port to: Howard J. Hull
…dress: 620 South Lake Street
Farmington, New Mexico 87401
…her Information:

CITY OR LOCATION: Kirtland   County: San Juan   Elev.: 5200

Station:

Source: [ ] Well Depth: ___ [ ] Spring [X] Stream [ ] Sewer [ ] Drain [ ] Lake [ ] Pool

River Basin: [ ] Rio Grande [ ] Canadian [ ] Pecos [X] San Juan [ ] Gila [ ] Little Colorado [ ] Other

WATER SUPPLIES: [ ] MUNICIPAL [ ] MDWCA [ ] PRIVATE [ ] INDUSTRIAL [ ] COMMERCIAL

WASTE WATERS: [ ] MUNICIPAL [ ] MDWCA [ ] PRIVATE [ ] INDUSTRIAL [ ] COMMERCIAL

Lat. 36° 44 010   Long. 108° 19 510

Cations	mg/l	me/l	Anions	mg/l	me/l	Physical and Chemical Parameters	mg/l	Other Parameters		Other Parameters		Other Parameters Not Listed	
Sodium (as Na)			Chloride (as Cl)			Total Hardness (as $CaCO_3$)		Surfactants (as LAS)		pH			
Potassium (as K)			Fluoride (as F)			Alkalinity (as $CaCO_3$)		BOD-5 day 20°C mg/l		Water Temperature °C			
Calcium (as Ca)			Nitrate (as NO_3)			Dissolved Residue		COD mg/l		Color Units			
Magnesium (as Mg)			Bicarbonate (as HCO_3)			Suspended Residue		Chlorine demand mg/l		Turbidity Jackson Units Supernatant			
Iron - Total (as Fe)			Carbonate (as CO_3)			Total Residue		Dissolved Oxygen mg/l		Turbidity Jackson Units Total			
Manganese (as Mn)			Sulfate (as SO_4)			Total Fixed Solids		Oxygen Saturation Concentration		Settleable Solids ml/l			
			Phosphate (as PO_4)			Total Volatile Solids		Conductance Micromhos 25°C		Odor Nature			
Total			Total							% Hydrocarbons = <0.001%			

Remarks: Petroleum products is believed to be seeping into irrigation ditch which runs beside the refinery.
Please check sample for petroleum products.
(Sandy Material)

Date: 2/5/73
Analyst: BB
Reviewed by: BB
Date Reported: 2/5/73

PHL-Ch 27(Rev. 4/1/68) Replaces Rev. 9/24/66 which is obsolete

Public Health Laboratory

New Mexico Health and Social Services Department
305 Terrace Avenue N. E., Albuquerque, New Mexico 87106
CHEMICAL AND PHYSICAL ANALYSIS FOR WATER SAMPLES

...le Items Analysis

2/2 Date Received — C-2508 Lab. No.

...ction Date 1-26-73

...llected by J. Hull

...ner Caribou Oil Refinery

...port to Jeff Hull

...dress 620 South Lake Street
Farmington, New Mexico

...her Information:

CITY OR LOCATION Kirtland — County San Juan — Elev. 5200

Station

Source: ☐ Well Depth ☐ Spring ☒ Stream ☐ Sewer ☐ Drain ☐ Lake ☐ Pool

River Basin: ☐ Rio Grande ☐ Canadian ☐ Pecos ☒ San Juan ☐ Gila ☐ Little Colorado ☐ Other

WATER SUPPLIES: ☐ MUNICIPAL ☐ MDWCA ☐ PRIVATE ☐ INDUSTRIAL ☐ COMMERCIAL

WASTE WATERS: ☐ MUNICIPAL ☐ MDWCA ☐ PRIVATE ☐ INDUSTRIAL ☐ COMMERCIAL

Lat. 36° 41 4010" Long. 108° 19 510"

Cations	mg/l	me/l	Anions	mg/l	me/l	Physical and Chemical Parameters	mg/l	Other Parameters		Other Parameters		Other Parameters Not Listed	
Sodium (as Na)			Chloride (as Cl)			Total Hardness (as $CaCO_3$)		Surfactants (as LAS)		pH			
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			Phosphate (as PO_4)			Total Volatile Solids		Conductance Micromhos 25°C		Odor Nature			
Total			Total							% Hydrocarbons = 0.08%			

Remarks: Petroleum products are believed to be seeping into irrigation ditch which runs beside the refinery.
Please check sample for petroleum residues.
(Soil)

Date: 2/5/73
Analyst: BB
Reviewed by: BB
Date Reported: 2/5/73

PHL-Ch 27(Rev. 4/1/68). Replaces Rev. 9/24/66 which is obsolete

APPENDIX V

Records of Conversations

STATE OF NEW MEXICO
ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

☐ Telephone ☐ Personal	Time 0915	Date 8/15/86

Originating Party	Other Parties
Steven J. Cary	Mrs. Bill Walker
NMEID, CERCLA Program	Kirtland, NewMexico

ubject

Caribou Refinery site

iscussion

I asked Mrs. Walker exactly how many acres she was irrigating off the Brimhall Ditch. She said approximately 25 acres. I asked what crops she was growing. She said hay and alfalfa for their livestock.

I asked if she knew the depth of their private well. She said that it was 26 ft. deep, plus or minus 2 feet.

Mrs. Walker asked if she could have a copy of my report, because they were retaining an attorney for this case. I said I would send her a copy of my report.

cnclusions or Agreements

Send Walkers a copy of report.

istribution

SIF report and HRS package for Caribou site.

Signed Steven J. Cary

[redacted]

STATE OF NEW MEXICO
ENVIRONMENT

MEMORANDUM OF MEETING OR CONVERSATION

Telephone ☐ Personal	Time 0920	Date 8/15/86

Originating Party	Other Parties
Steven J. Cary	Mrs. Evan D. Brimhall (598-5193)
NMEID, CERCLA Program	Kirtland, NM

Subject Caribou Refinery site

Discussion

I asked Mrs. Brimhall exactly how many acres they were irrigating off the Brimhall Ditch. She said that they and the Walkers had about 75 acres together. I said that I had just spoken with Mrs. Walker who said they irrigated about 25 acres. Mrs. Brimhall then stated that they (the Brimhalls) must have about 50. I asked what crops they were growing this year. She said alfalfa and feed corn. In past years they have grown oats and pasture. All of these crops were for livestock consumption. I asked what happened to their tailwater. She said it went to the San Juan River.

Conclusions or Agreements

Distribution

SIF report and HRS package for Caribou site

Signed Steven J. Cary

Caribou FOUR KIRTLAND REFINERY
CORNERS INC.
HOME OFFICE - PHONE (307) 886-3124 - P. O. BOX 457 - AFTON, WYOMING 83110
PHONE (801) 295-5557 - 1431 SO. 1800 W. - WOODS CROSS, UTAH 84087
PHONE (505) 598-5332 - P. O. BOX 175 - KIRTLAND, NEW MEXICO 87417

April 19, 1979

Oil Conservation Division
P.O. Box 1980
Hobbs, N.M. 88240

Attn; Mr. Seay

Dear Mr. Seay,

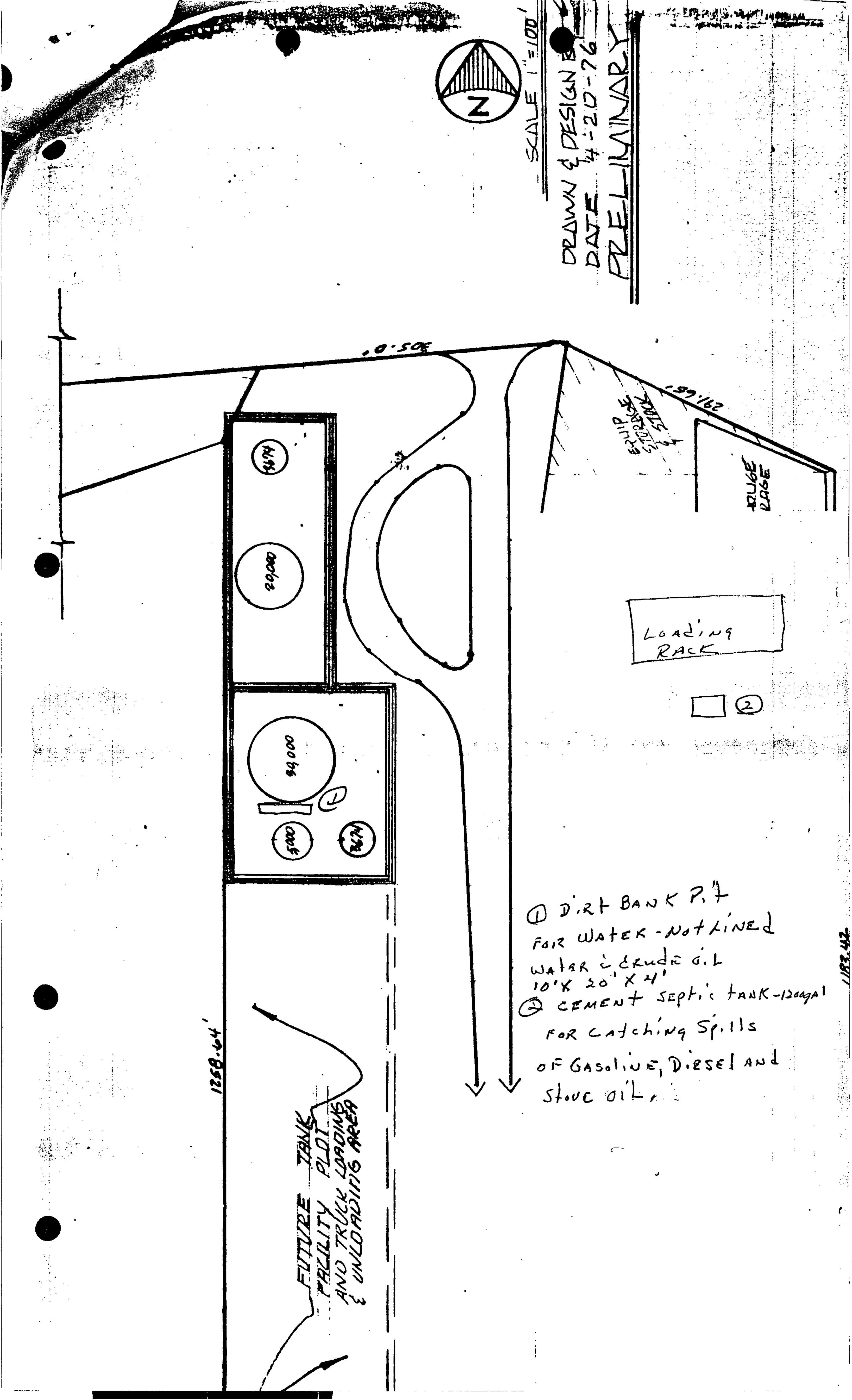
Enclosed is a copy of tank field and pits that are in service. If you need further information please contact Mr. Russell Haines as he will be the Superintendent of the refinery effective 4-20-79.

Sincerely

J.W. Holl

J.W. Hollimon
Refinery Superintendent

Posted
4/27/79



① Dirt Bank Pit
For Water - Not Lined
water & crude oil
10' x 20' x 4'
② Cement Septic tank - 1200gal
for catching spills
of Gasoline, Diesel and
stove oil.

CARIBOU REFINERY

KIRTLAND, NEW MEXICO

These records provide an auditable record of the data and documentation used to apply the Hazard Ranking System to this facility. The information used to assign the score for each factor is summarized. The source of information for each entry is provided as a bibliographic-type reference. Copies of the relevant pages have been appended for ease in review.

GROUND WATER ROUTE

1. OBSERVED RELEASE

Contaminants detected (5 maximum):

Water samples collected from ground water seeping into the Brimhall Ditch (BD) on refinery property contained several volatile organic contaminants in large concentrations. The table below summarizes these data from References 2 and 3:

1,2-dichloroethane	60 ppb	(Ref. 3, p. 5)
benzene	1275 ppb	(Ref. 3, App. III)
toluene	1500 ppb	(Ref. 2)
ethylbenzene	280 ppb	(Ref. 2)
total xylenes	3490 ppb	(Ref. 2).

1,2-dichloroethane (also known as ethylene dichloride or EDC) was detected at concentrations of up to 60 ppb (Ref. 2; Ref. 3, p. 5). The same compound was detected in water samples produced by three private shallow wells downgradient from the refinery; concentrations varied from 2 to 9 ppb (Ref. 2; Ref. 3, p. 5).

Rationale for attributing the contaminants to the facility:

Seepage into the Brimhall Ditch represents ground water inflow. During the winter months the Brimhall Ditch (BD) does not receive water from the main irrigation ditch; the headgate is closed and the BD is dry at its point of origin. While still on refinery property, however, the BD intercepts shallow ground water. This was observed in December, 1985 (Ref. 2), and in February, 1986 (Ref. 3).

Water in the BD was sampled at several locations. A sample collected near the beginning of ground water inflow proved to contain no hydrocarbons (Ref. 2). Farther downstream, however, but still on refinery property and on the same day, the seepage smelled like gasoline and an orange scum covered the surface (Ref. 2). When sampled and tested, this fluid contained benzene, toluene, ethylbenzene, xylenes, and EDC (Ref. 2). These data indicate that the contamination begins on site. Subsequent sampling confirmed that upgradient ground water was free of organics (Ref. 3, pp. 4-5).

Quality control procedures indicate that contamination of water samples did not occur during collection, preservation, storage, or analysis (Refs. 2, 3). A variety of QC samples were utilized to guard against incorrect results. Distilled water travel blanks all tested negative for volatile organics (Refs. 2, 3). Distilled water rinses of augering and sampling equipment also tested negative (Refs. 2, 3). Therefore, contamination observed in ground water samples represents actual conditions.

The refinery is the only plausible source of this contamination. The contaminants observed are water-soluble components of gasoline, a product which was generated and handled at the site. EDC is added to commercial leaded gasoline as a lead scavenger (Ref. 10, p. 665). Leaded gasoline was prepared, handled, and stored at the site (Refs. 2, 3). There are no other plausible sources in the area.

The contamination is attributed to the facility because contamination was observed on-site, because upgradient ground water is uncontaminated with observed compounds, and because the facility is the only one in the area that handled the substances in question.

* * *

2. ROUTE CHARACTERISTICS

Depth to Aquifer of Concern

Name and description of aquifer(s) of concern:

The aquifer of concern is the valley fill along the San Juan River. This aquifer has been widely used for domestic purposes, but it has not been intensively developed to produce large volumes of water (Ref. 5, p. A51). It has therefore not been seriously studied.

River deposits along the San Juan River are Pleistocene in age (Ref. 5, p. A7). They consist of sand, gravel, and boulders (Ref. 5, p. A7; also see drillers' logs in Ref. 3, Appendix I) deposited as glacial outwash. The alluvium is generally less than 50 feet thick in the San Juan valley (Ref. 4, p. 16). Transmissivity may exceed 40,000 ft^2/day, however (Ref. 4, p. 16).

Depth(s) from the ground surface to the highest seasonal level of the saturated zone (water table(s)) of the aquifer of concern:

The water table is at the land surface where it seeps into the Brimhall Ditch (Refs. 2, 3). Widespread occurrence at the site of white evaporation/salt deposits on surfaces of the soil and low growing vegetation is further evidence that the capillary fringe of the water table is very near the land surface. In addition, depth to ground water was determined to be 6.5 feet in an auger hole on the northeast site boundary (Ref. 3, Appendix II, p. 25) and 6 feet in the on-site well (Ref. 3, Appendix II, p. 14).

Depth from the ground surface to the lowest point of waste contamination:

The lowest point of waste contamination is inferred to be 25 feet below the land surface. The Hastings (Miller) well produced water contaminated with 6 ppb of EDC (Ref. 3, p. 5). The perforations in this well begin at a depth of 25 feet (Ref. 3, Appendix I). As corroboration, the Hastings (Jackson) well produced water contaminated with 8 ppb of EDC (Ref. 3, p. 5). The top of the perforations in this well is at a depth of 22 feet (Ref. 3, Appendix I). Alternatively, wastes containing up to 140 ppm of lead (Ref. 3, p. 9) were placed in an unlined excavation at least 10 feet deep (Ref. 3, p. 9).

The score for this factor is 3, based either on the documented release to ground water or on the fact that waste occurs below the seasonal high water table (Ref. 1, p. 12).

Net Precipitation

Mean annual or seasonal precipitation (list months for seasonal):

Mean winter (December - February) precipitation at Farmington, less than 10 miles east of the site at a similar elevation, is 1.80 inches (Ref. 6, p. 72).

Mean annual lake or seasonal evaporation (list months for seasonal):

Mean winter (December - February) land pan evaporation is 3.50 inches (Ref. 7, p. 261). Using the factor of 0.7 to convert land pan evaporation to lake evaporation (Ref. 7, p. 8) gives 2.45 inches.

Net precipitation (subtract the above figures):

Net winter (December - February) precipitation is calculated to be:

1.80 - 2.45 = -0.65 inches.

The appropriate assigned value is 1 (Ref. 1, p. 12).

Permeability of the Unsaturated Zone

Soil type in unsaturated zone:

The unsaturated zone above the water table at the site consists entirely of alluvial sands, gravels, and boulders. Lithologic logs from holes augered at the northeast boundary of the site encountered only sand and gravel (Ref. 3, Appendix II, pp. 23-25). Similar materials are recorded in area drillers' logs (Ref. 3, Appendix I).

Permeability associated with soil type:

Permeability of this material is estimated to be greater than 10^{-3} cm/sec (Ref. 1, p. 15). This justifies a score of 3.

Physical State

Physical state of substances at time of disposal (or at present time for generated gases):

At the time of their disposal, and at present, wastes placed in the sludge pits were in the form of sludges (Ref. 3, pp. 8-9). Spills and leaks of liquids, such as leaded gasoline and the tetraethyllead additive, also ocurred (Ref. 3). The appropriate score is 3 (Ref. 1, p. 16).

* * *

3. CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

The large sludge pit on the site was evaluated as a landfill. The sludge pit is unlined and excavated from native sandy earth material that is highly permeable; ponding of fluids occurs on the surface; and the unengineered piles of native earth material that partially surround the pit do not constitute a sound runon diversion system (Ref. 3, p. 9 and App. II).

Method with highest score:

Landfill: the resultant containment score is 3 (Ref. 1, p. 17).

* * *

4. WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

The following toxic substances are present at the site in the stated concentrations:

lead	260 ppm	(Ref. 3, p. 9)
EDC	60 ppb	(Ref. 3, p. 5).

Compound with highest score:

Lead scores 3 for toxicity and 3 for persistence (Ref. 8, p. 1688-1689). This supports a factor score of 18 (Ref. 1, p. 18).

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0:

The total amount of hazardous substances having a containment score greater than zero at the site is estimated to be 689 cubic yards (Ref. 3, pp. 8-9). This justifies a factor score of 6 (Ref. 1, p. 19).

Basis of estimating and/or computing waste quantity:

This quantity constitutes the estimated contents of the large sludge pit at the site (Ref. 3, pp. 8-9). This volume was computed as the product of surface area, measured with a steel measuring tape, and a conservative estimate of depth, provided by former site employee (Ref. 3, Appendix II).

* * *

5. TARGETS

Ground Water Use

Use(s) of aquifer(s) of concern within a 3-mile radius of the facility:

Within 3 miles, the aquifer of concern is presently used for public community water supply, private domestic water supply, and livestock water supply (Refs. 2, 3). The resulting score for this factor is 3 (Ref. 1, p. 24).

Distance to Nearest Well

Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply:

The nearest wells drawing from the aquifer of concern are the private wells owned by Walker, Miller and Jackson (Ref. 3, p. 3). These wells are located south across State Road 489 in the NE1/4 of Section 17.

Distance to above well or building:

These wells are just a few hundred feet from the refinery property. However, because these wells have been contaminated (Ref. 3, p. 5), the site boundary for the ground water route is extended to them. The distance to these wells is therefore zero feet. This leads to a score of 4 (Ref. 1, p. 25).

Population Served by Ground Water Wells Within a 3-Mile Radius

Identified water-supply wells drawing from aquifer of concern within a 3-mile radius and populations served by each:

The table below displays information from Reference 3. This table specifies those water supply wells known to be drawing from the aquifer of concern within a 3-mile radius of the site and the population using each well. The total population served by ground water is 201.4.

GROUND WATER ROUTE TARGET POPULATION

well owner	location	depth (ft)	aquifer	use	# users
Hastings (Miller)	17,29N,14W	38	alluvium	dom/stk	3.8
Hastings (Jackson)	17,29N,14W	35	alluvium	dom/stk	3.8
Harris	7,29N,14W	39	alluvium	dom/stk	3.8
Urbach	18,29N,14W	28	alluvium	dom	3.8
Blaylock	13,29N,15W	30	alluvium	dom/stk	3.8
Sweek	17,29N,14W	31	alluvium	dom/stk	3.8
Fergie's Tr. Pk.	7,29N,14W	50	alluvium	public	171.0
Walker	17,29N,14W	26	alluvium	dom	3.8
Grubbs	17,29N,14W	unk.	alluvium	dom	3.8
total					201.4

Computation of land area irrigated by supply well(s) drawing from the aquifer(s) of concern within a 3-mile radius, and conversion to population (1.5 people per acre):

NA

Total population served by ground water within a 3-mile radius:

The number of people served by wells within a 3-mile radius of the site is specified in the above table. The population assigned to the public water supply well is documented in Reference 9. Individual private wells are assigned 3.8 people each (Ref. 1, p. 27). The total population served by ground water is estimated to be 201.4 people, which warrants a score of 2 in that portion of the matrix (Ref. 1, p. 27).

The overall score for targets, based on the distance/population matrix, is 20 (Ref. 1, p. 25).

* * *

SURFACE WATER ROUTE
Brimhall Ditch Pathway

1. OBSERVED RELEASE

Contaminants detected in surface water at the facility or downhill from it (5 maximum):

Water samples collected from the Brimhall Ditch (BD) on refinery property contained several volatile organic contaminants in large concentrations. The table below summarizes these data from References 2 and 3:

1,2-dichloroethane	60 ppb	(Ref. 3, p. 5)
benzene	1275 ppb	(Ref. 3, App. III)
toluene	1500 ppb	(Ref. 2)
ethylbenzene	280 ppb	(Ref. 2)
total xylenes	3490 ppb	(Ref. 2).

Rationale for attributing the contaminants to the facility:

Water in the BD was sampled at several locations. A sample collected near the upstream extent of flow proved to contain no hydrocarbons (Ref. 2). Farther downstream, however, but still on refinery property and on the same day, the BD smelled like hydrocarbons and an orange scum covered the surface (Ref. 2, Field Notes). When sampled and tested, this fluid contained benzene, toluene, ethylbenzene, xylenes, and EDC (see above; also see Ref. 2 and Ref. 3, Appendix III).

Quality control procedures indicate that contamination of water samples did not occur during collection, preservation, storage, or analysis (Ref. 2). Distilled water blanks all tested negative for volatile organics (Ref. 2). Therefore, it is concluded that contamination observed in samples from the Brimhall Ditch represents actual conditions.

The refinery is the only plausible source of this contamination. The contaminants observed are water-soluble components of leaded gasoline, a product which was generated, stored and handled at the site. 1,2-dichoroethane (EDC) is added to commercial leaded gasoline as a lead scavenger (Ref. 10, p. 665). Leaded gasoline was prepared, handled, and stored at the site (Refs. 2, 3). There are no other plausible sources in the area.

* * *

2. ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

Average slope of facility in percent:
A 7.5' USGS topographic map was used to measure the average slope of the facility. Vertical change in elevation is 35 feet over a north-south horizontal distance of 1650 feet. Average facility slope is: 35/1650 = 0.0212 = 2.12%.

Name/description of nearest downslope surface water:
The nearest downslope surface waters are the Farmers Mutual Irrigation Ditch (FMID) and the Brimhall Ditch (BD) (Ref. 3, pp. 6-8). The FMID flows westward across the refinery property, separating the present tank farm on the south from the refinery apparatus, convenience store, and the former tank farm location to the north. At the refinery apparatus is located the headgate for the BD, which carries water southward along the west side of the present tank farm, departs the refinery property at its south edge, continues south for about 0.4 miles, then turns west toward fields of forage crops which it is used to irrigate. The BD receives water from the FMID during the growing season. During winter, however, the headgate is closed and no water enters the BD from the FMID. Under these conditions the BD is dry at its origin, but it intercepts the water table while still on-site.

Average slope of terrain between facility and above-cited surface water body in percent:
See below.

Is the facility located either totally or partially in surface water?
Yes. The BD originates on and flows across the facility property. Pipelines cross over the FMID, carrying products from the refinery and the lead storage area to the tank farm and lead blending area. The BD is part of the facility because it harbors contamination from on-site (Ref 2; Ref. 3, p. 5). The appropriate score for this factor is 3 (Ref. 1, p. 31).

Is the facility completely surrounded by areas of higher elevation?
No (Ref. 3, p. 6).

1-Year 24-Hour Rainfall in Inches

This quantity is 1.20 inches (Ref. 1, p. 33), giving a score of 1 (Ref. 1, p. 32).

Distance to Nearest Downslope Surface Water

Surface water is on-site (Refs. 2, 3), so the distance is zero feet and the appropriate score is 3 (Ref. 1, p. 32).

Physical State of Waste

At the time of their disposal, and at present, wastes placed in the sludge pits were in the form of sludges (Ref. 3, pp. 8-9). Spills and leaks of liquids, such as leaded gasoline and the tetraethyllead additive, also ocurred (Ref. 3). The appropriate score is 3 (Ref. 1, p. 16).

* * *

3. CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

The large sludge pit on site was evaluated as a landfill. The pit is not covered and the unengineered piles of native sandy earth material that partially surround the pit do not constitute a sound runon diversion system, as fluid was observed ponded on top of the sludge (Ref. 3, p. 9 and App. II).

Method with highest score:

Landfill; the resultant containment score is 3 (Ref. 1, p. 35).

* * *

4. WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

The following toxic substances in the stated concentrations are present in, or available to, surface water at the site:

lead	260 ppm	(Ref. 3, p. 9)
EDC	60 ppb	(Ref. 3, p. 5).

Compound with highest score:

Lead scores 3 for toxicity and 3 for persistence (Ref. 8, p. 1688-1689). This supports a factor score of 18 (Ref. 1, p. 18).

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0:

The total amount of hazardous substances having a containment score greater than zero at the site is estimated to be 689 cubic yards (Ref. 3, pp. 8-9). This justifies a factor score of 6 (Ref. 1, p. 19).

Basis of estimating and/or computing waste quantity:

This quantity constitutes the estimated contents of the large sludge pit at the site (Ref. 3, pp. 8-9). This volume was computed as the product of its surface area (measured with a steel measuring tape) and a conservative estimate of depth (provided by a former site employee) (Ref. 3, Appendix II).

This waste is available to the Brimhall Ditch via infiltration to shallow ground water, movement of shallow ground water less than 100 yards downgradient to the southwest toward the Ditch, and inflow into the Ditch. Surface runoff from the waste pit is not available to the Brimhall Ditch due to intact berms.

* * *

5. TARGETS

Surface Water Use

Use(s) of surface water within 3 miles downstream of the hazardous substance:
Water from the Brimhall Ditch is used to irrigate forage crops such as hay, alfalfa, and feed corn (Ref. 3, App. V). The appropriate factor score is 2 (Ref. 1, p. 34).

Is there tidal influence?
No.

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:
NA

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:
NA

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:
NA. The score for this factor is zero (Ref. 1, p. 37).

Population Served by Surface Water

Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:
The site boundary can be extended 0.3 miles south of the facility boundary along the Brimhall Ditch, based on EDC concentrations summarized in the table below:

EDC (ppb) IN THE BRIMHALL DITCH

sample location	lab number	date	EDC
background (upstream)	85-1197-C	12/5/85	<1 ppb
on-site, near tank farm	85-1199-C	12/5/85	15
	86-181-C	2/17/86	60
at State Road 489	86-161-C	2/13/86	3
0.3 miles S. SR 489	85-1195-C	12/5/85	1
	86-146-C	2/10/86	1

The gate which transmits water from the Brimhall Ditch to the alfalfa fields is located at the fields themselves, 0.45 miles from the downstreammost extent of contamination (Ref. 3, pp. 5-7). This distance was measured at the site with an automobile odometer. No other intakes were identified.

Computation of land area irrigated by above-cited intake and conversion to population (1.5 people per acre):

This intake is used to irrigate 75 acres of forage crops (Ref. 3, App. V). Applying the conversion factor of 1.5 people for each irrigated acre (Ref. 1, p. 36) results in a target population of

$$75 \times 1.5 = 112.5 \text{ people.}$$

No other targets were identified.

Total population served:

112.5 people.

Name/description of nearest of above surface water bodies:

The nearest surface water body is the Brimhall Ditch (BD) (Ref. 3, pp. 5-7). The BD branches off the Farmers Mutual Irrigation Ditch at the Caribou refinery apparatus. The BD carries water southward along the west side of the present tank farm, departs the refinery property at its south edge, continues south for about 0.4 miles, then turns west toward fields of forage crops which it is used to irrigate. The BD receives water from the FMID during the growing season. During winter, however, the headgate is closed and the BD is dry except where it intercepts the water table. In December, 1985, and February, 1986, the BD intercepted ground water while still on the refinery property.

Distance to above-cited intake, measured in stream miles:

The distance between the downstreammost extent of waste and the gate that diverts water into the fields was measured by automobile odometer to be 0.45 miles (2376 feet) (Ref. 3, pp. 5-7).

The appropriate score for this factor is 16 (Ref. 1, p. 38).

* * *

SURFACE WATER ROUTE
Farmers Mutual Irrigation Ditch Pathway

1. OBSERVED RELEASE

Contaminants detected in surface water at the facility or downhill from it (5 maximum):
NA

Rationale for attributing the contaminants to the facility:
NA

* * *

2. ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

Average slope of facility in percent:
A 7.5' USGS topographic map was used to measure the average slope of the facility. Vertical change in elevation is 35 feet over a north-south horizontal distance of 1650 feet. Average facility slope is: 35/1650 = 0.0212 = 2.12%.

Name/description of nearest downslope surface water:
The nearest downslope surface waters are the Farmers Mutual Irrigation Ditch (FMID) and the Brimhall Ditch (BD) (Ref. 3, pp. 6-8). The FMID flows westward across the refinery property, separating the present tank farm on the south from the refinery apparatus, convenience store, and the former tank farm location to the north. The FMID was an open ditch until the 1970s, when repeated spills and leaks from the refinery into the FMID led the Ditch association to request that the FMID be protected. Caribou responded by lining and covering the FMID with concrete at the refinery location and grading the property so that runoff did not go to the FMID. The FMID carries water during the growing season for use by downstream irrigators and a public water supply, but it is dry during at least part of the winter.

Average slope of terrain between facility and above-cited surface water body in percent:
See below.

Is the facility located either totally or partially in surface water?
Yes. The FMID flows across the facility property, within 10 feet of the refinery apparatus and beneath pipelines that carried refinery products to the tank farm and tetraethyllead to the lead mixing area. The appropriate score for this factor is 3 (Ref. 1, p. 31).

Is the facility completely surrounded by areas of higher elevation?
No.

1-Year 24-Hour Rainfall in Inches
This quantity is 1.20 inches (Ref. 1, p. 33), giving a score of 1 (Ref. 1, p. 32).

Distance to Nearest Downslope Surface Water
Surface water is on-site (Refs. 2, 3), so the distance is zero feet and the appropriate score is 3 (Ref. 1, p. 32).

Physical State of Waste
The nature of wastes available to the FMID is uncertain. Based on the history of spills and leaks, it is clear that there were liquid materials wasted at the site and available to this pathway. It is unclear, however, whether these materials qualify for the petroleum exemption under EPA's interpretation of CERCLA law.

* * *

3. CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:
Tanks and vessels on the refinery property were evaluated as containers. Historical documentation indicates that containers leaked and that diversion or containment structures were inadequate to prevent spills from reaching the FMID.

Method with highest score:
Containers; the resultant containment score is 3 (Ref. 1, p. 35).

* * *

4. WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:
It is unclear from the records exactly what nonexempt materials were available to the FMID. However, tetraethyllead was onsite with a nonzero containment score.

Compound with highest score:

Lead scores 3 for toxicity and 3 for persistence (Ref. 8, p. 1688-1689). This supports a factor score of 18 (Ref. 1, p. 18).

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0:

The total amount of hazardous substances having a containment score greater than zero at the site is estimated to be 13 cubic yards (Ref. 3, pp. 8-9). This justifies a factor score of 2 (Ref. 1, p. 19).

Basis of estimating and/or computing waste quantity:

This quantity constitutes the half-full volume of the lead storage tank at the site. The maximum capacity of the lead tank is 51,800 lbs, or 25.9 tons. Half of 25.9 is 13 tons. In the HRS scoring system, 1 ton = 1 cubic yard (Ref. 1, p. 19), so the half-full volume of the tank is 13 cubic yards.

The containment value for this material is 1 (Ref. 1, p. 17), because there is no liner beneath the tank.

* * *

5. TARGETS

Surface Water Use

Use(s) of surface water within 3 miles downstream of the hazardous substance:

Water from the FMID is used to irrigate food forage crops such as sweet corn, melons,hay, alfalfa, and feed corn. The appropriate factor score is 2 (Ref. 1, p. 34).

Is there tidal influence?

No.

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

NA

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

NA

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:

NA. The score for this factor is zero (Ref. 1, p. 37).

Population Served by Surface Water

Location(s) of water-supply intake(s) withi ı 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:

The gate which transmits water from the Brimhall Ditch to the sweet corn and melon fields is located 1000 feet from the lead storage facility. This distance was measured and double-checked at the site by pacing. Several other gates occur along the FMID as it moves downvalley. Each gate transmits water to a variety of small fields owned by private landowners. Probably no individual's irrigated acreage exceeds 10 acres.

Computation of land area irrigated by above-cited intake and conversion to population (1.5 people per acre):

Fewer than 100 people can be affected because less than 64 acres if crops were identified.

Total population served:

< 100 people.

Name/description of nearest of above surface water bodies:

The nearest surface water body is the Farmers Mutual Irrigation Ditch. See earlier description.

Distance to above-cited intake, measured in stream miles:

See above; 1000 ft.

The appropriate score for this factor is 10 (Ref. 1, p. 38).

* * *

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REFERENCE 4

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GROUND WATER IN THE SAN JUAN BASIN, NEW MEXICO AND COLORADO

WATER-RESOURCES INVESTIGATIONS 79-73

PREPARED IN COOPERATION WITH THE NEW MEXICO BUREAU OF MINES AND MINERAL RESOURCES, THE NEW MEXICO STATE ENGINEER, AND THE BUREAU OF INDIAN AFFAIRS' SAN JUAN REGIONAL URANIUM STUDY

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16. Abstracts

Principal aquifers in the San Juan Basin of New Mexico and Colorado are the Entrada Sandstone, Westwater Canyon Member of the Morrison Formation, Gallup Sandstone, several sandstones in the Mesaverde Group above the Gallup (Dalton Sandstone, Point Lookout Sandstone, Menefee Formation, Cliffhouse Sandstone), and sandstones of tertiary.

Most ground water flows from topographically high outcrop areas toward the San Juan River and Rio Grande Valley. Much of the water may move through confining layers to other aquifers or to the land surface rather than discharging directly to the streams.

Transmissivities of the sandstones range from 50 to 300 squared feet per day. Lowest dissolved-solids concentrations occur in or near outcrops of the sandstones and increase in the direction of ground-water flow. Concentrations range from less than 500 milligrams per liter to more than 30,000 milligrams per liter.

17. Key Words and Document Analysis. 17a. Descriptors

*ground water, *hydrogeology, *Aquifers, *Aquifer characteristics, *geohydrologic units, geologic formations, transmissivity, water quality, water resources.

17b. Identifiers/Open-Ended Terms

San Juan Basin, Northwestern New Mexico

17c. COSATI Field/Group

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MAY 1979

UNITED STATES DEPARTMENT OF THE INTERIOR

Cecil D. Andrus, Secretary

GEOLOGICAL SURVEY

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prepared at the request of the Bureau of Indian Affairs' San Juan Basin Regional Uranium Study Task Force, summarizes the ground-water environment in 1978, based on results that were obtained as a part of the cooperative study. The data used for this summary are on file in the U.S. Geological Survey office in Albuquerque, N. Mex. A data report is in preparation.

Study area

The study area coincides approximately with the San Juan structural basin as defined by Kelley (1951). The boundaries of the study area include the San Juan and La Plata Mountains of Colorado on the north side, the Defiance uplift and New Mexico-Arizona State line on the west side, the Zuni Mountains and Interstate 40 on the south side, and the Nacimiento uplift and Rio Grande rift on the east side (fig. 1). This area covers about 18,000 square miles. Population centers include Durango and Cortez, Colorado and Farmington, Gallup, and Grants, N. Mex.

Mean annual rainfall in the basin varies from about 6 inches at lower elevations to more than 20 inches in mountains.

The San Juan Basin is rich in energy resources. Oil production began near Shiprock in the early 1900's and continues in several fields (fig. 2). Since the 1950's, natural gas produced from a large area near the center of the basin has been the principal hydrocarbon product. Surface coal mining and mine-mouth power generation began in 1962 near Farmington. Surface mining has also produced coal near Gallup since 1961 (Shomaker and others, 1971). Uranium production in the Grants mineral belt on the south end of the basin (fig. 2) has been one of New Mexico's principal industries since the 1950's.

Proposed energy-resource developments include several surface coal-mining operations in the Fruitland coal area, underground mining of coal seams in the Menefee Formation near Cuba, and surface mining of coal seams in the Menefee near Crownpoint. The feasibility of installing at least one additional power plant is being studied. Numerous underground uranium mines have either been started or are in the planning stage throughout most of the Grants mineral belt.

An industry of considerable importance is the Navajo Indian Irrigation project south of Farmington, which will add 110,000 acres of irrigated land by 1986. Irrigation began on the first 10,000-acre tract in 1976.

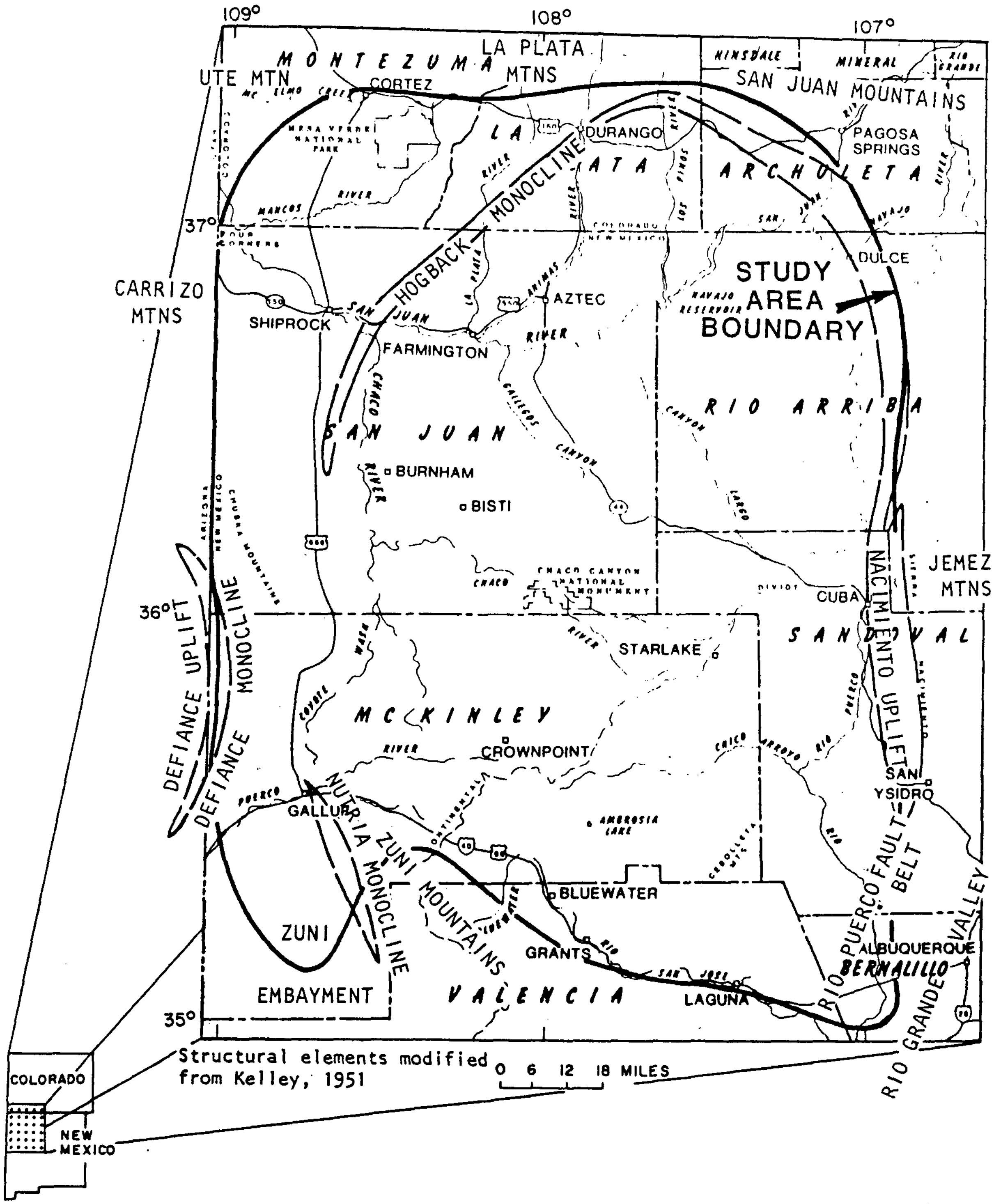

Figure 1.--Structural elements of the San Juan Basin and location of the study area.

Rapid population increases are occurring in the larger cities--Farmington, Gallup, and Grants. Expansion and economic growth may soon take place in smaller towns near areas of major industrial development.

Sources of ground-water data

Parts of the San Juan Basin have been studied in varying degrees of intensity starting with Gregory's reconnaissance of the Navajo Country during the early 1900's (Gregory, 1916). Later investigations include those by Baltz and West (1967) of part of the Jicarilla Reservation; Cooper and John (1968) of southeastern McKinley County; and Cooley, Harshbarger, and others (1969) of the Navajo Reservation. Other important sources of data are given in the list of selected references. The Navajo Tribe has kindly supplied data for many water wells drilled since the 1950's. Various coal, uranium, and petroleum companies working in the area have also supplied extremely useful hydrologic data.

Geologic setting

Geologic units in the San Juan Basin range in age from Cambrian to Quaternary. With the exception of the Permian San Andres Limestone and Glorieta Sandstone near Grants, the better aquifers are found in sandstones of Jurassic, Cretaceous, and Tertiary age. Quaternary deposits filling stream channels are capable of yielding sufficient quantities of water for stock and domestic use in many areas.

Aquifers discussed in this report are Jurassic age or younger. These include, in ascending order, the Entrada Sandstone, the Morrison Formation (principally the Westwater Canyon Member), the Gallup Sandstone of the Mesaverde Group, younger sandstones of the Mesaverde Group (Dalton Sandstone Member of the Crevasse Canyon Formation, Point Lookout Sandstone, Menefee Formation, and Cliff House Sandstone), and the Tertiary section (the Ojo Alamo Sandstone, Nacimiento Formation, San Jose Formation, and Chuska Sandstone). All aquifers are separated by shale units. The oldest rocks crop out on the edge of the basin and dip under younger rocks toward the deepest part of the basin near Navajo Reservoir. Figure 3 shows the major aquifers in a highly generalized section through the deepest part of the basin. Detailed descriptions of some of the sandstone aquifers are given by Shomaker and Stone (1976). General descriptions of most geologic units in the San Juan Basin are given by Ridgley and others (1978).

Many discontinuous faults of small displacement exist throughout the basin. These faults may be significant conduits for the inter-aquifer transfer of ground water. Two major structural features--the Hogback Monocline in the northwest and the Rio Puerco fault belt at the edge of the Rio Grande valley (fig. 1)--strongly affect the ground-water flow regime in these localities because of water movement along vertical fractures.

Principal aquifers

Entrada Sandstone

Recharge to the Entrada Sandstone occurs mainly in or near topographically high outcrop areas on the edge of the basin (fig. 3) either by direct infiltration or by leakage from overlying and underlying aquifers. Most ground water moves toward outcrops in Utah near Four Corners and in the Rio Grande rift. Some of the water may be discharged by leaking to other aquifers or to the land surface before reaching the outcrops.

Transmissivity is "the rate at which water of the prevailing kinematic viscosity is transmitted through a unit width of the aquifer under a unit hydraulic gradient" (Lohman, 1972, p. 6). Limited data for the Entrada Sandstone indicate that transmissivities toward the center of the basin are higher than near the edge of the basin. Measured values of transmissivity near Chaco Canyon National Monument range from 100 to 300 ft^2/d (J. W. Shomaker, oral commun., 1978) in contrast to values of less than 50 ft^2/d near outcrop areas on the south and west sides of the basin. Insufficient data are available for construction of a map showing transmissivity and flow directions.

Water quality in the Entrada Sandstone deteriorates toward the center of the basin. Dissolved-solids concentrations normally increase in the direction of flow. Dissolved-solids concentrations of 1,000 mg/L or less occur in or near recharge areas south of Crownpoint and in the Chuska Mountains. Concentrations of 10,000 mg/L or more toward the center of the basin may be partly attributed to the dissolution of soluble minerals in the Entrada. Also of importance may be the dissolution of evaporites in the overlying Todilto Limestone. Insufficient data are available for construction of a map showing water quality.

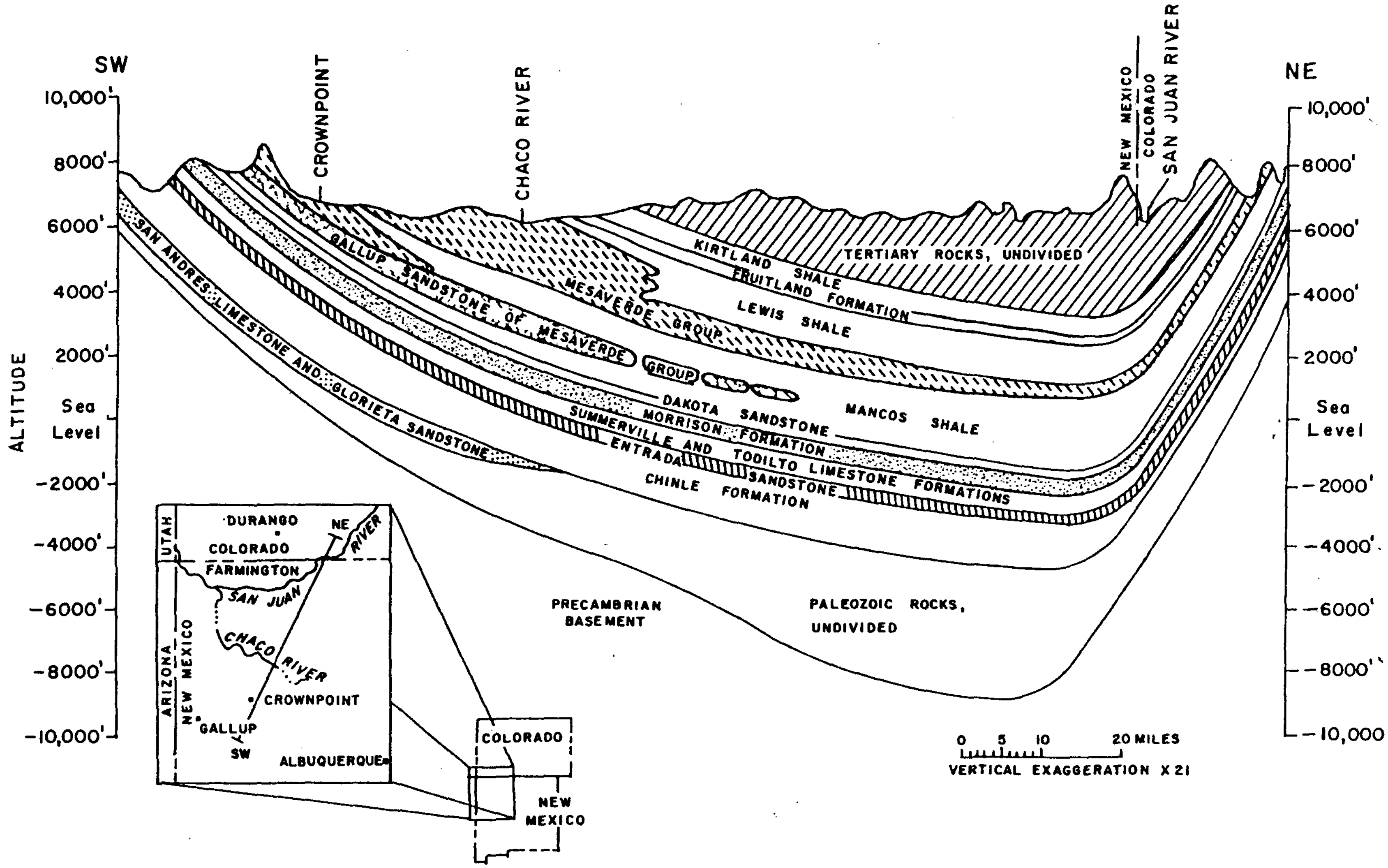

Figure 3.--Generalized geologic section showing major aquifers (patterns) in the San Juan Basin.

Recharge to the Tertiary sandstones near the center of the basin occurs mostly in outcrop areas. The general direction of flow is toward the San Juan River and lower reaches of major tributaries (fig. 10).

Water recharged to the Chuska Sandstone moves toward springs on the east and west sides of the Chuska Mountains (Harshbarger and Repenning, 1954, p. 6). Water in the Chuska Sandstone also recharges the underlying Jurassic and Cretaceous sandstones.

The transmissivity of some of the thicker sandstones such as the Ojo Alamo Sandstone may exceed 150 ft^2/d in some places (Brimhall, 1973, p. 20) but generally does not exceed 100 ft^2/d. Baltz and West (1967, p. 65) indicated that yields of 1,000 gal/min or more may be expected in wells penetrating the full thickness of Tertiary sandstones near the thickest part of the section. The available data is too limited for construction of a transmissivity map.

In general, dissolved-solids concentrations in Tertiary sandstones in the northeast part of the study area exceed 1,000 mg/L and increase in the direction of ground-water flow (fig. 10). Near the San Juan River, concentrations exceeding 4,000 mg/L may be partly attributed to saline water leaking upward from underlying Cretaceous rocks. Generally, concentrations are higher in the finer-grained sediments than in the coarser-grained sediments. Dissolved-solids concentrations in the Chuska Sandstone are less than 500 mg/L (Harshbarger and Repenning, 1954, p. 15).

Valley fill

Saturated valley fill occurs in most of the perennial and ephemeral stream channels. Total thicknesses of valley fill in most areas are less than 50 feet. In parts of the Chaco River, Puerco River, and Rio Puerco channels, however, thicknesses exceeding 100 feet have been reported (David Love, oral commun., 1977; Shomaker, 1971, p. 85; and A. E. Saucier, written commun., 1974).

The transmissivity of valley fill is highest in the coarse gravels along the San Juan, Animas, and La Plata Rivers. Although thicknesses are generally less than 50 feet, the transmissivity may exceed 40,000 ft^2/d in places (T. E. Kelly, written commun., 1977). Transmissivities along ephemeral streams probably do not exceed 1,000 ft^2/d (Shomaker, 1971, p. 87-90 and F. P. Lyford, written commun., 1978).

Recharge to valley fill along irrigated portions of the San Juan, Animas, and La Plata Valleys results largely from the percolation of irrigation water and from leaking ditches. Smaller quantities are contributed from bedrock sources. Much of this water is evapotranspired, but some is discharged into the river or drainage ditches.

Recharge to valley fill along ephemeral streams results largely from infiltration of storm flows and snowmelt runoff. In addition, bedrock units contribute water to the valley fill, particularly in lower reaches of the stream. Discharge is by evapotranspiration, infiltration to underlying bedrock units in recharge areas, and movement downstream through the alluvium.

Dissolved solids in valley fill normally increase from less than 1,000 mg/L in headwater areas to more than 2,000 mg/L in lower reaches where water seeping from bedrock units adds dissolved solids (fig. 11). Percolation of applied irrigation water with low dissolved solids (less than 500 mg/L) may improve ground-water quality in parts of the San Juan, Animas, and La Plata River Valleys.

Summary

Principal aquifers in the San Juan Basin of New Mexico and Colorado occur in the coarser-grained sandstones of Jurassic, Cretaceous and Tertiary age. These include the Entrada Sandstone, Westwater Canyon Member of the Morrison Formation, Gallup Sandstone of the Mesaverde Group, several sandstones in the Mesaverde Group above the Gallup (Dalton Sandstone Member of the Crevasse Canyon Formation, Point Lookout Sandstone, Cliff House Sandstone), and sandstones of Tertiary age.

Most ground water flows from recharge areas on topographically high outcrops toward the San Juan River or the Rio Grande rift. Much of the water may move through confining layers to other aquifers, to the land surface, or to alluvium-filled channels.

Transmissivities of the more productive aquifers in the San Juan Basin range from 50 to 300 ft^2/d. Dissolved-solids concentrations range from less than 500 mg/L near recharge areas to more than 10,000 mg/L near discharge areas.

Valley fill near perennial streams and major ephemeral streams normally does not exceed a thickness of 50 feet. Transmissivities range from less than 1,000 ft^2/d in ephemeral channels to more than 40,000 ft^2/d in gravel-filled perennial stream channels.

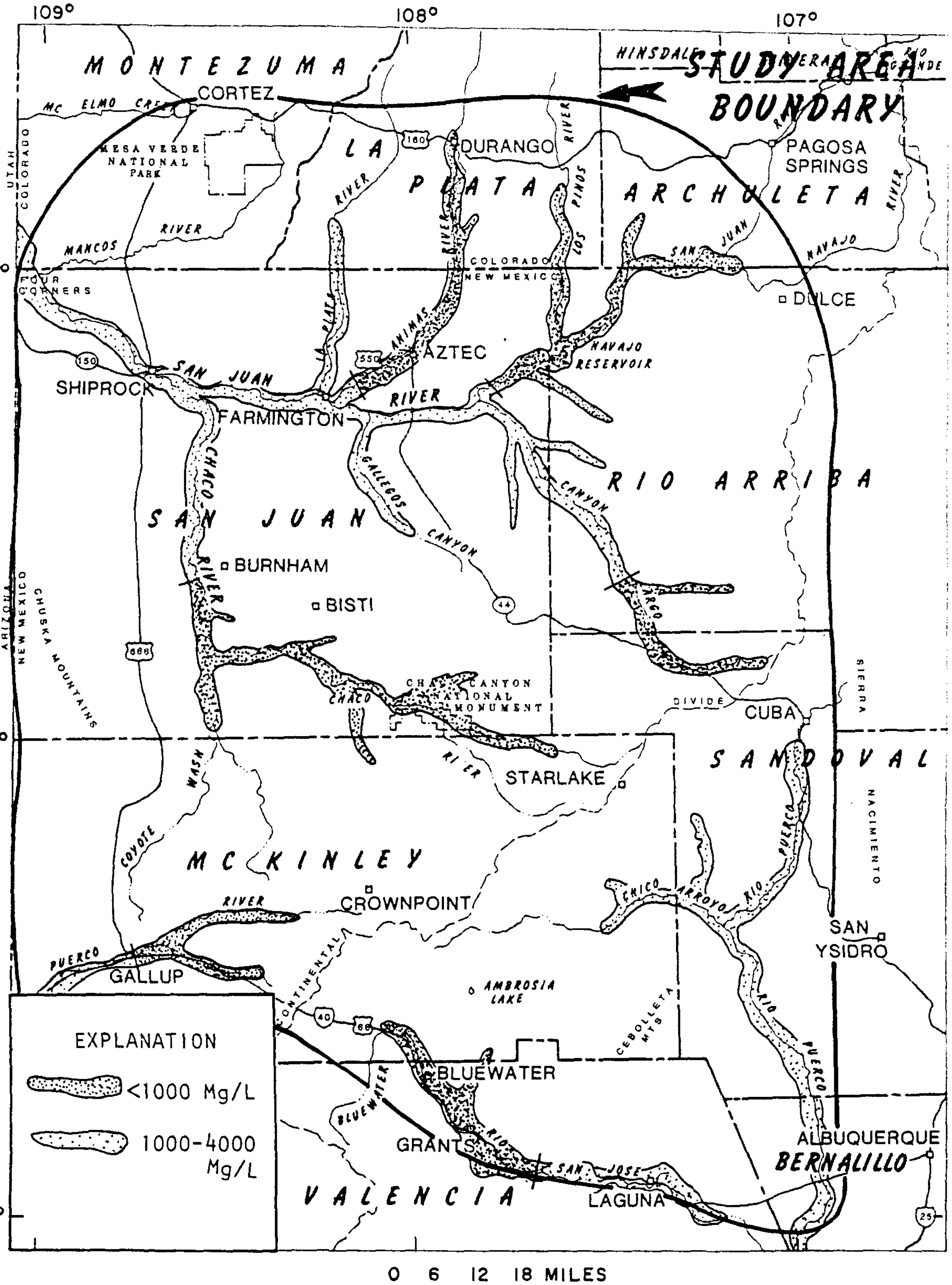

Figure 11.--Dissolved-solids concentration in valley-fill aquifers.

Dissolved-solids concentrations in water from the valley-fill deposits range from less than 1,000 mg/L in headwater areas to more than 4,000 mg/L in some localities where contributions from bedrock sources are significant.

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REFERENCE 5

Regional Hydrogeology of the Navajo and Hopi Indian Reservations, Arizona New Mexico, and Utah

By M. E. COOLEY, J. W. HARSHBARGER, J. P. AKERS, *and* W. F. HARDT

With a section on Vegetation

By O. N. HICKS

HYDROGEOLOGY OF THE NAVAJO AND HOPI INDIAN RESERVATIONS ARIZONA, NEW MEXICO, AND UTAH

GEOLOGICAL SURVEY PROFESSIONAL PAPER 521-A

Prepared in cooperation with the Bureau of Indian Affairs and the Navajo Tribe

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1969

The crossbeds, as shown in the following tabulation, are classified as to shape, angle of dip, size, and thickness:

Shape	Concave or convex (upward).
Angle of dip:	
High	>20°.
Medium	10°–20°.
Low	<10°.
Size or scale:	
Large	>20 ft.
Medium	1–20 ft.
Small	<1 ft.
Thickness	Same as classification for bedding.

Pseudocrossbedding, formed by a progressive advance of ripples upon each other, is common in silty fine-grained sandstone and siltstone beds. Commonly, the upper part of the ripple mark has been removed and only the lower part is preserved. Well-formed ripple marks are not common within a pseudocrossbedded unit, although they may occur at the top of the unit.

The other features of the sedimentary rocks relate to weathering and topographic expression, such as slopes, ledges, cliffs, and the size of blocks and particles produced by weathering. For the most part, the terms are self-explanatory. Platy weathering generally is associated with very thin bedded units and flaggy weathering with thin- to thick-bedded sediments, especially those consisting of alternating sandstone and siltstone layers. Hoodoo weathering pertains to rounded, irregular, or pillarlike forms, which often have been described as "rock babies."

GEOLOGY AND OCCURRENCE OF GROUND WATER

Practically all the ground water in the reservations occurs in sedimentary rocks that overlie relatively impermeable granitic and metamorphic basement rocks. The water-bearing sedimentary rocks consist of sandstone, conglomerate, and limestone. Those that do not bear water consist of mudstone, siltstone, and silty sandstone. The thickness, lithology, and water-bearing characteristics of the sedimentary rocks are summarized in table 3.

Most of the rocks of the Navajo country contain some water, but only a few formations yield water readily to wells. The major water-yielding units are the Navajo and Coconino Sandstones, which form multiple-aquifer systems with the adjacent strata, and the alluvium, which receives considerable water as discharge from the sedimentary rocks. Minor water-yielding units, in ascending stratigraphic order, are the Shinarump Member of the Chinle Formation, Lukachukai Member of the Wingate Sandstone, Entrada Sandstone, Cow Springs Sandstone, Morrison Formation, Dakota Sandstone, Toreva Formation, Gallup Sandstone, Crevasse Canyon Formation, Point Lookout Sandstone, Menefee Formation, Cliff House Sandstone, Chuska Sandstone, and volcanic rocks. Other units that yield water in adjoining regions but only small amounts on the reservations are the Supai Formation, Sonsela Sandstone Bed of the Chinle Formation, Ojo Alamo Sandstone, and the Bidahochi Formation.

TABLE 3.—*Water-bearing characteristics of sedimentary rocks in the Navajo and Hopi Indian Reservations, Arizona, New Mexico, and Utah*

[Data are through 1956]

System	Series	Group	Stratigraphic unit	Lithology and thickness (feet)	Water-bearing characteristics: General hydrology	Depth of wells (feet)	Depth to water (feet)
			Navajo country				
Quaternary	Pleistocene and Recent		Alluvium and terrace deposits.	Chiefly sand, silt, and gravel, 200.	Alluvium: yields generally small amounts of water to wells along the Little Colorado River, San Juan River, and larger tributaries; <225. Terrace deposits: yield a small amount of water to a few springs.	50->300	10->200
			Dune deposits	Chiefly sand; <100.	Yield small amounts of water to a few springs.		
	Pleistocene		Landslide and talus	Large slump blocks and slide rubble.	Yield small amounts of water in the Hopi country and in the Chuska Mountains.		
Tertiary	Pliocene		Bidahochi Formation	Upper and lower members: siltstone, sandy siltstone, and sandstone; <800. Middle volcanic member: tuff and basalt flows.	Yields small amounts of water to a few wells in central Navajo and Apache Counties; small springs issue from tuff in the Hopi Buttes.	<700	100–600
	Pliocene (?)		Chuska Sandstone	Chiefly sandstone; 1,000.	Yields water to springs in the Chuska Mountains; it is the source of water in the perennial reaches of Tsaile, Wheatfields, and Whiskey Creeks; no wells penetrate the formation.		
	Paleocene		Nacimiento Formation	Alternating shaly units 200–400 feet thick with sandstone beds 50–100 feet thick; >1,000.	Not water bearing within the Navajo Indian Reservation.		

that has been tapped by numerous wells. Only a few springs issue from the Ojo Alamo Sandstone on Mount Cisco Mesa, and a few wells withdraw a small amount of water from the unit east of the reservations.

TERTIARY ROCKS

Erosion after regional uplift was the dominant geologic process during Tertiary time; however, sedimentary rocks of Tertiary age are present in three areas of the reservations (pl. 1). The Nacimiento Formation of Paleocene age crops out in the San Juan basin, the Chuska Sandstone of Pliocene(?) age forms the thick capping layer on the Chuska and Lukachukai Mountains, and the Bidahochi Formation of Pliocene age is exposed in the valley of the Little Colorado River. The Chuska Sandstone and the Bidahochi Formation overlie prominent erosion surfaces, which bevel the pre-Tertiary rocks. The Nacimiento Formation was deposited during the late part of the structural episode that formed the San Juan and other basins of the Colorado Plateaus. The Chuska Sandstone contains beds of eolian and fluvial origin and presumably is a remnant of a widespread deposit. A remnant of a deposit similar in lithology to the Chuska Sandstone in the Chuska-Lukachukai Mountains is present beneath lavas at the Mount Powell Lookout near Thoreau, N. Mex. It was laid down after the formation of the basins and other fold structures and before the development of the Colorado River system in late Tertiary time. The Bidahochi Formation was laid down as basin fill in the ancestral valley of the Little Colorado River.

The Tertiary formations, because of their small areal extent, yield only a limited amount of water. One of the main spring horizons in the Navajo country (Gregory, 1916, p. 138, fig. 14), however, is along the lower contact of the Chuska Sandstone. The Bidahochi Formation contains little water within the reservations, but southward it yields considerable water to wells. The Nacimiento Formation bears virtually no water.

QUATERNARY DEPOSITS

Unconsolidated sediments, mainly of Quaternary age, in order of hydrologic importance are the alluvial, terrace, landslide, and eolian deposits (pl. 2); the Quaternary deposits mostly are less than 30 feet thick but are as much as 225 feet thick in a few places. They form a discontinuous, rather permeable mantle over large parts of the reservations. The alluvium is the chief source of water in dug wells; it is also the source of water in springs and drilled wells in several parts of the reservations, especially where water discharges from the bedrock aquifers into the alluvium (pl. 2). Depth to water in wells drilled in the alluvium is shallow—the depth ranges from a few feet to about 100 feet below the land surface. Few wells or springs are developed in the other Quaternary deposits.

VOLCANIC ROCKS

The eruptive rocks are composed of basalt, monchiquite, or minette, and they occur in flows, dikes, breccia pipes, diatremes, cinder cones, and tuff deposits in widely separated volcanic fields. Ground water is yielded from material filling the diatremes in the Hopi Buttes and the Defiance Plateau (Callahan and others, 1959; Akers, McClymonds, and Harshbarger, 1962), and discharges as springs from flows and tuff beds.

The volcanic rocks are divided by composition into three provinces; the monchiquite and minette provinces (Shoemaker, 1956) cover most of the southwestern and northeastern parts of the reservations, respectively, and the basalt province, a part of the San Francisco volcanic field, is along the southwestern border (pl. 2). There are about 200 volcanic vents in the Hopi Buttes in an area of 1,400 square miles. Another 100 vents are in small scattered groups in other parts of the Navajo country. Impure travertine deposits at springs are associated with the volcanic rocks in the Hopi Buttes (pl. 1), and many of the diatremes show evidence of past spring activity. The upper parts of some diatremes are filled with bedded tuff and limestone and some thinly laminated claystone and siltstone (Shoemaker, 1956, p. 179–185).

The volcanic rocks are late Cenozoic in age, as indicated by relations of the volcanic rocks to erosional stages in the Colorado River system and to Tertiary formations. Dikes and sills intruded the Chuska Sandstone of Pliocene(?) age, and flows, where preserved, filled valleys as deep as 300 feet in the Chuska. The volcanic rocks of the Hopi Buttes volcanic field were assigned by Repenning and Irwin (1954, p. 1823) to the volcanic member of the Bidahochi Formation, which occurs between the upper and lower sedimentary members of the Bidahochi of Pliocene age. All the volcanic rocks of the monchiquite and minette provinces were emplaced during the early stages of entrenchment of the Colorado River system in late Tertiary time. (See "Entrenchment of the Colorado River System," p. A34.) Basalt of the San Francisco volcanic field caps terraces that are in the valley of the Little Colorado River and ranges in age from late Pliocene to early Recent (Cooley, 1963).

STRUCTURE

The reservations are in the south-central part of the Colorado Plateaus province, which is characterized by the absence of the severe deformation that took place nearly everywhere along the plateaus boundary. This in the valley of the Little Colorado River, in Chinle Valley, San Juan basin, and elsewhere. Grass grows extensively on the alluvial and eolian deposits that cover the gentle slopes of Mount Cisco Mesa and overlie the shaly Kirtland and Fruitland Formations, which without this cover would sustain little vegetation (pl. 3). Surficial deposits containing relatively heavy vegetation are also on much of the outcrops of the Chinle, Moenave, and Carmel Formations and on the Wingate and Navajo Sandstones in other parts of the reservations.

DRAINAGE PATTERNS

All runoff in the reservations is to the Colorado River, the master stream of the Colorado Plateaus. Most of the reservations are drained by two principal tributary streams, the San Juan and the Little Colorado Rivers. The Colorado and San Juan Rivers are perennial, but all other streams are either ephemeral or intermittent.

ENTRENCHMENT OF THE COLORADO RIVER SYSTEM

Continuous adjustment, modification, and entrenchment throughout late Cenozoic time of the drainage systems of the Colorado Plateaus resulted in the development of the Colorado River system. Early studies in the southern part of the Colorado Plateaus by Dutton (1882), Davis (1901), Robinson (1907, 1910), and Gregory (1947) led them to postulate the general erosional development and the entrenchment of the Colorado River system from a widespread erosion surface formed in middle and late Tertiary time. The period of erosion represented by this surface has been named the "Great Denudation" by Dutton (1882) or the "Plateau Cycle" by Davis (1901). The succeeding period, during which the Colorado River system was entrenched in canyons and valleys, was called the "Canyon Cycle." Recent geomorphic studies in the Navajo country and surrounding parts of the Colorado Plateaus summarized in this report (p. A36) have substantiated generally the hypotheses presented by these early investigators.

The erosional development stage of the Colorado River system is subdivided into four general cycles (table 5): the Valencia cycle, of probable Miocene age, named from the Valencia surface (Cooley and Akers, 1961a, p. 244); the Hopi Buttes-Zuni cycle, undifferentiated, of Pliocene age, named from the Hopi Buttes surface (Gregory, 1917, p. 121–122) and the Zuni surface (McCann, 1938, p. 260–278); the Black Point cycle, of late Pliocene and early Pleistocene age, named from the Black Point surface (Gregory, 1917, p. 120); and the Wupatki cycle, of middle and late Pleistocene age, named from the Wupatki surface (Childs, 1948, p. 379–381). An older surface, the Tsaile surface of middle Tertiary age (Cooley, 1958, p. 147–148), underlies the Chuska Sandstone. Crossbed and imbrication study shows that the streams on this surface that deposited the fluvial part of the Chuska Sandstone were not related to the present physiography and to the development of the Colorado River system. The late Tertiary and the Quaternary erosion cycles of the Navajo country are shown on plate 3.

The streams that flowed on the Valencia surface began the Colorado River system. The Valencia surface is usually higher than 7,500 feet and predates the cutting of the Grand Canyon. It is preserved below basalt caprocks on Red Butte on the Coconino Plateau, perhaps below some of the lava flows in the Chuska Mountains, and in several places south of the reservations. The summits on Black Mesa and the Kaiparowits Plateau probably represent dissected segments of the Valencia surface.

Accelerated downcutting during the early part of the Hopi Buttes-Zuni cycle entrenched the ancestral Colorado and Little Colorado River systems 1,000–1,500 feet below the level of the Valencia surface. The amount of downcutting was determined from the contouring of the Hopi Buttes and Zuni surfaces near the Little Colorado River (Cooley and Akers, 1961a, fig. 237.3) and by reconstruction of the old valley profiles preserved in other parts of the Navajo country. The ancestral Colorado River during the Hopi Buttes-Zuni cycle flowed in an open valley south of Navajo Mountain, and its confluence with the ancestral Little Colorado River probably was in the western part of the Navajo country (pl. 2). The fluvial and lacustrine Bidahochi Formation was deposited on the Hopi Buttes and Zuni surfaces in the ancestral valley of the Little Colorado River.

Vigorous downcutting caused by uplift of the Colorado Plateaus during late Cenozoic time ended the Hopi Buttes-Zuni cycle, and, during the following Black Point and Wupatki cycles, the present Colorado River drainage system was outlined and entrenched (pl. 3). Excavation of the major valleys of the Navajo country and Glen, San Juan, and Navajo Canyons and Canyon de Chelly probably began during the Black Point cycle (table 5). Regional downcutting continued intermittently throughout the Wupatki cycle and is recorded by the several levels of terraces preserved along the large streams.

The deposits capping terraces of the Wupatki cycle along the Colorado, Little Colorado, and San Juan Rivers and the lower reaches of their tributaries are contemporaneous with the alluvial deposits of Pleistocene age laid down in the upper reaches of streams in

TABLE 5.—*Late Cenozoic erosional and depositional events in the Navajo and Hopi Indian Reservations*

Age			Cycle	Erosional and depositional events	Height of terraces above river level (feet): Confluence of the Colorado and San Juan Rivers	Height of terraces above river level (feet): Little Colorado River in the Cameron-Winslow area	Approximate age of cutting of principal canyons
Quaternary	Pleistocene	Middle and late	Wupatki	Downcutting and terracing.	Five terraces at 30–50, 50–100, 100–200, 200–300, and 400–500.	Five terraces at 30, 50, 75–100, 150–200, and 200–300.	Eastern Grand Canyon, Marble Canyon, Glen Canyon, San Juan Canyon, Canyon de Chelly
Quaternary	Pleistocene	Early	Black Point	Downcutting and terracing.	Two prominent terraces at 800–1,200 and 1,400–1,800.	Two prominent terraces at 400–500 and 600–800.	Eastern Grand Canyon, Marble Canyon, Glen Canyon, San Juan Canyon, Canyon de Chelly
Tertiary	Pliocene	Late					Eastern Grand Canyon, Marble Canyon, Glen Canyon, San Juan Canyon
Tertiary	Pliocene	Middle	Hopi Buttes-Zuni	Formation of Zuni surface and deposition of the upper member of the Bidahochi Formation in valley of the Little Colorado River.	About 2,500.	1,000–1,500.	Eastern Grand Canyon, Marble Canyon
Tertiary	Pliocene	Early		Formation of Hopi Buttes surface and deposition of the lower member of the Bidahochi Formation and equivalents.			Eastern Grand Canyon
Tertiary			Valencia	Few deposits(?)	About 4,000.	2,000–2,500.	
Tertiary	Miocene						

the Navajo country and with glacial-outwash deposits in some of the nearby mountainous areas. Terrace deposits along the Little Colorado River are contiguous with alluvium referred to as the Jeddito Formation by Hack (1942, p. 48–50), along Jeddito, Polacca, and Oraibi Washes, and with the Gamerco Formation (Leopold and Snyder, 1951, p. 6–9) in the Gallup area. Similarly, the alluvium in the upper part of Chinle Wash and the Chaco River drainages is a lateral equivalent of the terrace deposits along the San Juan River.

Deposits of the three lowest terraces in the Shiprock-Farmington area, 30–200 feet above the San Juan River, are continuous upstream along the Animas River to Durango, Colo. The highest of these deposits merges with the outwash sediments of the Durango glaciation. The deposits of the two remaining terraces are correlative with the younger outwash sediments of the Wisconsin glaciation of Atwood and Mather (1932). Field mapping and lithologic studies (Cooley, 1962a, p. 102-113) indicate that the deposits of the three lowermost Wupatki surfaces along the Little Colorado River downstream from Grand Falls are lateral equivalents of the outwash of the three glaciations on San Francisco Mountain described by Sharp (1942). The relations of the terrace deposits in the Navajo country to the outwash in the San Juan Mountains and San Francisco Mountain suggest that deposition occurred during the glaciations when the streams were overloaded and that the intervening periods of downcutting and formation of the terraces are correlative with the drier interglaciations.

Maximum entrenchment during the Black Point and Wupatki cycles in the Colorado River system occurred in Marble and Grand Canyons—as much as 2,500 feet. Upstream from the Grand Canyon, the depth of cutting decreased progressively and was 1,800 feet at the confluence of the Colorado and San Juan Rivers, about 1,000 feet along the Little Colorado River between Cameron and Winslow, and generally less than 600 feet in the upper reaches of Chinle Wash, the Chaco River, and the south-flowing tributaries of the Little Colorado River.

TABLE 7.—*Range of the hydraulic properties of aquifers in the Navajo and Hopi Indian Reservations*

[Well data as of 1956]

Geologic source	Sedimentary laboratory analyses: Samples	Solubles (percent): Range	Solubles (percent): Weighted average	Median diameter (mm): Range	Median diameter (mm): Weighted average	Coefficient of sorting: Range	Coefficient of sorting: Weighted average	Hydrologic laboratory tests: Number of cores	Porosity (percent)	Specific retention (percent)	Specific yield (percent)	Coefficient of permeability (gpd per sq ft)	Pumping tests: Number of tests	Coefficient of transmissibility (gpd per ft)	Coefficient of storage	Specific capacity (gpm per ft of drawdown)	Yield (gpm)	Bailing tests: Number of tests	Specific capacity (gpm per ft): Range	Specific capacity (gpm per ft): Average	Yield (gpm): Range	Yield (gpm): Average	Pressure tests: Number of tests	Specific capacity (gpm per ft)	Flow (gpm)	Remarks
Alluvium	0												12	325–63,800	5×10^{-4}–0.25	0.80–68.86	10–241	48	0.12–75		5-275	45				Specific capacity usually is 0.5–3.0 gpm per ft.
Bidahochi Formation	14	1.0–82.1		Clay–0.18		2.81–1.09							1	60		.12	4	6	.04–26.9		12–250					Upper and lower members.
Chuska Sandstone	12	.7–17.7	5.3	.11–.35	0.20	1.80–1.12	1.43																			
Pictured Cliffs Sandstone.	0																	3	.02–.07		8–12					
Cliff House Sandstone.	0																	3	.05–.12		5–40		1	0.04	0.7	
Menefee Formation	0																	27	.03–1.38	0.34	6–90	26	6	.11–.41	1.5–11	
Point Lookout Sandstone.	4		8.2		.19		1.23											6	.07–1.12		7–53		2	.42–1.87	11–15	
Yale Point Sandstone.	5	.7–1.5	.9	.16–.27	.21	1.36–1.14	1.23																			
Crevasse Canyon Formation.	0																	7	.03–.64	.20	2–45	19	2	1.02–1.7	6–15	
Wepo Formation	6	1.0–2.9	1.3	.21–.35	.27	1.63–1.23	1.44	2	1–2	1.2	0	0.0009–.02						1	.37		15					
Gallup Sandstone	2		.6		.21		1.36	2	23	7	16–17	.4–2	9			.03–4.78	13–264	20	.02–4.84	.55	4–150	38	2	.04–.28	7–11	Specific capacity average does not include highest figure.
Toreva Formation	0							4	29–34	4–7	22–30	0–534	1	18		.12	15	27	.05–1.20	.32	4–60	18				Upper and lower members.
Dakota Sandstone	29	0–10.0	1.5	.10–1.38	.24	5.88–1.12	1.24	4	23–28	4.10	17–19	0.7–25						20	.02–.40	.13	3–36	16	2	.16–.06	3–8	
Morrison Formation:																										
Westwater Canyon Member.	23	0–21.7	3.7	.13–.58	.26	3.76–1.14	1.56	2	20–21	10	10–11	.1–15														
Recapture Member.	24	0–81.8	7.4	Silt–.28	.15	1.85–1.12	1.32						5	677		0.45–0.92	13–350	10	.02–2.20	.43	6–19	11	1	0–44	15	Coefficient of transmissibility computed from one test.
Salt Wash Member.	1		27.6		.17		1.20																			
Cow Springs Sandstone.	31	.02–33.8	6.9	.11–.23	.17	1.47–1.01	1.21	4	19–25	10–20	4–10	.4–2	2	20.7		.07–.16	9–16	3	.07–.27		8–40					Coefficient of transmissibility computed from one test.

yield" may be defined as the ratio, expressed as percentage, of the volume of water drained by gravity from a saturated rock to the volume of the rock. The remaining fraction of water held in the minute pore spaces of the rock by molecular attraction against the pull of gravity is termed "specific retention," which is the ratio, expressed in percentage, of the volume of water retained to the volume of the rock.

PUMPING, BAILING, AND PRESSURE-TEST DATA

Test data indicate that the productivity of all the water-bearing units is low and that few wells yield more than 250 gpm. Well yields in much of the reservations are less than 20 gpm and in some areas less than 5 gpm. Most of the wells supply water for stock and are equipped with windmills, which pump 1–5 gpm from depths as great as 1,100 feet. Most municipal and institutional wells yield 5–100 gpm. The few industrial wells generally yield less than 200 gpm. Because of the low productivity of the aquifers, few wells are used for irrigation. However, a well in the flood-plain alluvium along Chinle Wash is reported to have been pumped at more than 500 gpm.

Flowing wells are common only in the San Juan basin (fig. 9). Most flow 15 gpm or less; the highest reported is 1,000 gpm from a wildcat oil-test well near Tohatchi. The driller reported this large flow from a depth between 2,000 and 2,400 feet, the stratigraphic interval occupied by the Morrison Formation and the Cow Springs Sandstone.

The specific capacity is used generally to make a comparison of productivity between wells and, thus, between different aquifers. It is especially useful where only short-duration bailing or pumping tests are available and test data are inadequate to compute the coefficient of transmissibility. "Specific capacity" is defined as the yield, in gallons per minute, divided by the drawdown, in feet. It is related directly to the coefficient of transmissibility of the aquifer. The specific capacity of a well, however, is not an exact measure of the hydrologic characteristics of an aquifer because specific capacity does not take into account differences in the depth of aquifer penetrated, fracturing and lithologic variation of the aquifer, type of well construction, duration and rate of pumping, and well efficiency.

Computed specific capacities generally range from 0.3 to 5 gpm per ft of drawdown, although most are less than 1 gpm. Some wells in the Coconino Sandstone, Bidahochi Formation, and the alluvium have specific capacities greater than 15 gpm per ft of drawdown (table 7). Other wells completed in the Supai Formation, Glorieta Sandstone, Lukachukai Member of the Wingate Sandstone, Cow Springs Sandstone, Dakota Sandstone, Wepo Formation, Crevasse Canyon Formation, Cliff House Sandstone, and Pictured Cliffs Sandstone generally have specific capacities of less than 1 gpm per ft of drawdown.

The coefficients of transmissibility computed for the aquifers in sandstone of the Navajo country, excepting those in the Coconino Sandstone, are low, fairly consistent, and with few exceptions, are less than 1,200 gpd per ft. Most coefficients of transmissibility of the sandstone aquifers in about 80 percent of the reservations—roughly, that area northeast of the Little Colorado River—range from 500 to 1,000 gpd per ft. In contrast, coefficients of transmissibility in the Coconino Sandstone range from 15,000 to 35,000 gpd per ft in the southwestern part of the reservations and in the valley of the Little Colorado River south of the reservations.

Coefficients of permeability of the consolidated sedimentary rocks, computed from pumping-test data, are extremely low. Some are less than 1 gpd per sq ft. Most range from 1 to 3 gpd per sq ft, and those of only part of the Navajo and Coconino Sandstones in the western part of the reservations are more than 5 gpd per sq ft (pl. 5). The coefficients of permeability of the Coconino Sandstone are as much as 70 gpd per sq ft in a well south of the reservations—the highest permeability of any rock unit in the southern part of the Colorado Plateaus.

Coefficients of transmissibility and permeability of the sand and gravel deposits in the flood-plain alluvium along the main washes are the highest in the Navajo country and reflect the diverse lithology of those deposits. Locally, coefficients of transmissibility may be more than 60,000 gpd per ft. Coefficients of 1,500–5,000 gpd per ft are common in many areas, but those less than 300 gpd per ft are rather uncommon. Coefficients of permeability for the water-yielding beds in the alluvium may exceed 100 gpd per sq ft. The most permeable alluvium, on the basis of well-test data and on subsurface information obtained from well logs, is along reaches of Chinle Wash, Black Creek, Pueblo Colorado Wash, Puerco River, and the Little Colorado River.

DRILL-CORE TEST DATA

Cores were taken from sandstone beds in 11 water-bearing units in widely spaced parts of the reservations, but only the Navajo Sandstone was cored extensively (table 7). At each locality two cores were taken, one parallel and one perpendicular to the bedding. All the cores were taken from exposures except one taken from a chunk brought up by a bailer from a fractured zone in the Coconino Sandstone south of the reservations at Joseph City, Ariz.

and thus increases permeability. Rocks in the subsurface have a lower permeability as indicated by pumping tests, however, and probably are unaffected by weathering and are little affected by leaching.

CONCLUSIONS

Several geologic factors influence the permeability and transmissibility of the bedrock sandstone aquifers of the Navajo country. The grain size, generally in the very fine to medium range, causes a slow rate of water movement through the rocks. Cementation, both by the generally insoluble siliceous materials and the more soluble carbonate materials, decreases permeability and transmissibility. Fractures increase overall permeability and transmissibility. Effects of both fractures and cement are noted in the variability of the hydraulic properties computed from pumping tests, but only the effects of cementation are noted in the hydraulic properties determined from drill cores.

Regional geologic factors that directly influence transmissibility and more indirectly permeability are the broad lateral lithologic changes, trends in thickness, intertonguing, and wedging out of aquifers. In most sandstone units, where silt- and clay-size particles increase, permeability and transmissibility decrease. This relation is especially apparent in the Wingate, Navajo, and Cow Springs Sandstones (Jobin, 1962, p. 35–36, 42, 52).

The hydraulic properties computed from the tests are relatively uniform and indicate only slight differences in the aquifers, except for the Coconino Sandstone and the alluvium. In general, the coefficient of permeability is less than 10 gpd per sq ft, the coefficient of transmissibility is less than 1,000 gpd per ft, and the specific capacity is less than 1.0 gpd per ft of drawdown. Contrasting with that of other bedrock aquifers, the coefficient of transmissibility of the Coconino Sandstone in the southwestern part of the reservations and nearby areas is more than 30,000 gpd per ft. The Coconino Sandstone is the principal aquifer in northeastern Arizona, but unfortunately in most of the reservations it contains water too highly mineralized for use or it has been drained by deep canyons carved by the Colorado and Little Colorado Rivers. The Navajo Sandstone yields moderate amounts of water to wells in nearly half of the reservations, but where it has a thick saturated zone this sandstone yields large quantities of water to wells even though its permeability is generally low.

The alluvium generally has much higher coefficients of permeability and transmissibility than the consolidated aquifers, except for the Coconino Sandstone. The alluvium has not been developed as much as the other aquifers, and its water-bearing potential is not fully known; however, its hydraulic properties differ considerably in the Navajo country. The alluvium probably will yield more than 500 gpm to wells in parts of Black Creek and Chinle and Pueblo Colorado Washes.

CHEMICAL QUALITY OF THE GROUND WATER

Chemical analyses of more than 1,300 samples of ground water from the reservations indicate that the water is slightly to highly mineralized, usually hard to very hard, and chiefly of a bicarbonate type. Representative analyses are given by Kister and Hatchett (1963). The general characteristics of the chemical quality of the water are indicated in table 8, which gives the ranges of the chemical constituents of the main aquifers, and by maps, which show the distribution of dissolved solids (fig. 17), fluoride (fig. 19), and hardness (fig. 20).

The dissolved-solids content of the ground water generally ranges from 100 to 47,000 ppm. Dissolved solids usually are less than 500 ppm in water from aquifers in the Navajo Uplands and Defiance Plateau-Chuska Mountains areas (fig. 17). In contrast, concentrations of 2,000 to more than 10,000 ppm are common in water from aquifers in Cretaceous rocks at shallow depths in the San Juan basin and in aquifers in Permian, Triassic, and Jurassic rocks in the Black Mesa basin area north of the Little Colorado River. High dissolved-solids contents were reported from deep water wells and gas-test wells penetrating the Coconino Sandstone in the southern part of the Navajo country. Ground water containing considerably more than 25,000 ppm dissolved solids occurs in oil and gas wells penetrating aquifers in Mesozoic rocks deeply buried in the center of the San Juan basin (Berry, 1959).

The principal chemical constituents of the ground water are calcium and sodium, and bicarbonate, sulfate, and chloride ions. Combinations of these ions form four general chemical types of ground water—calcium bicarbonate, sodium bicarbonate, sodium sulfate, and sodium chloride. Most ground water having less than 700 ppm dissolved solids is either calcium bicarbonate or sodium bicarbonate, and that containing more than 700 ppm is sodium sulfate, calcium sulfate, or sodium chloride. Gradations between these types are common, and much of the highly mineralized water is a bicarbonate sulfate type.

The minor chemical constituents are fluoride, nitrate, magnesium, silica, and iron (table 8). The concentrations of these ions differ considerably in different aqui-

REFERENCE 6

TEMPERATURE AND PRECIPITATION SUMMARIES FOR SELECTED NEW MEXICO LOCATIONS

DECEMBER 1984

Cover Photo: Dr. Kenneth E. Kunkel
Editorial Assistant: Ms. Darlene M. Joyce

FARMINGTON 4 NE : 1931-1978

ANNUAL SUMMARY - TEMPERATURE

	Averages			Daily Extremes				Mean Extremes				#Days-Max		#Days-Min	
	Max	Min	Mean	High	---Date	Low	----Date	High	--Yr	Low	--Yr	=>90°	<=32°	<=32°	<=0°
Ja	41.8	13.7	27.9	68	6/1956	-22	7/1971	36.5	56	17.3	62	0	5	29	3
Fe	49.7	19.4	34.6	70*	29/1976	-7	13/1965	42.5	57	27.4	55	0	1	26	1
Ma	58.4	24.3	41.4	82	26/1971	4*	1/1971	47.5	72	34.6	62	0	0	26	0
Ap	67.8	31.0	49.4	87	22/1965	14	4/1955	55.9	54	45.1	70	0	0	17	0
Ma	78.4	39.8	59.1	95*	31/1977	16	1/1962	62.9	63	56.2*	75	1	0	4	0
Jn	88.8	48.4	68.6	104	22/1954	31	15/1976	72.8	74	63.8	65	15	0	0	0
Jl	93.4	57.3	75.4	105	13/1971	40	1/1968	77.6	66	72.5	56	26	0	0	0
Au	90.3	54.8	72.6	103	9/1969	35	24/1968	76.6	70	68.5	56	18	0	0	0
Se	83.1	45.9	64.5	97*	8/1977	24	25/1961	67.4	56	58.6	61	5	0	1	0
Oc	71.0	34.4	52.7	92	12/1965	16*	20/1976	56.8	63	48.4	70	0	0	13	0
No	55.7	23.4	39.5	76*	4/1977	-3	28/1976	44.5	65	32.7	56	0	0	25	0
De	43.7	15.7	29.7	66	1/1973	-34	12/1961	34.8	58	14.1	61	0	4	29	2
An	68.5	34.0	51.3	105	7/13/71	-34	12/12/61	52.7	57	47.9	61	66	9	169	6
Wi	45.0	16.3	30.7	70	2/29/76	-34	12/12/61	35.3	57	21.3	62	0	9	83	5
Sp	68.2	31.7	50.0	95	5/31/77	4	3/ 1/71	52.8	72	47.2*	65	1	0	46	0
Su	90.8	53.5	72.2	105	7/13/71	31	6/15/76	74.5	77	69.8	65	59	0	0	0
Fa	69.9	34.5	52.2	97	9/ 8/77	-3	11/28/76	54.6	62	47.5	61	6	0	40	0
#Y	27	27	27	27		27		22		22		28	28	28	28

ANNUAL SUMMARY - PRECIPITATION

	Total Precipitation								Snow			#Days		
	Mean	High	--Yr	Low	--Yr	24 Hr Max			Mean	High	--Yr	=>.10	=>.50	=>1.00
Ja	0.56	1.44	78	0.00	72	0.61	27/1961		3.4	9.5	44	2	0	0
Fe	0.58	2.90	78	0.00*	72	1.10	7/1978		2.0	7.0	34	2	0	0
Ma	0.55	2.39	78	0.00*	66	0.69	10/1978		0.6	4.2	38	2	0	0
Ap	0.54	2.81	41	0.00*	67	0.83	28/1952		0.1	2.0	34	2	0	0
Ma	0.49	2.25	41	0.00*	72	0.98	10/1947		0.0	0.0	0	2	0	0
Jn	0.37	1.63	48	0.00*	71	0.80	18/1949		0.0	0.0	0	1	0	0
Jl	0.75	2.81	54	0.05	51	1.62	23/1954		0.0	0.0	0	3	0	0
Au	1.06	3.65	61	0.00	62	1.10	8/1967		0.0	0.0	0	3	1	0
Se	0.94	2.93	41	0.00	53	1.30	10/1973		0.0	0.0	0	2	0	0
Oc	1.03	4.93	72	0.00*	64	1.82	21/1969		0.1	2.0	35	3	1	0
No	0.44	1.44	57	0.00*	48	0.67	1/1968		0.4	3.3	57	2	0	0
De	0.66	2.52	40	0.02	76	0.78	11/1954		3.8	18.0	60	2	0	0
An	7.99	18.44	41	4.07	50	1.82	10/21/69		10.5	34.0	60	26	3	0
Wi	1.80	4.71	41	0.40	64	1.10	2/ 7/78		9.3	24.2	44	6	0	0
Sp	1.59	5.86	41	0.08	72	0.98	5/10/47		0.8	5.4	38	5	0	0
Su	2.18	5.70	65	0.15	62	1.62	7/23/54		0.0	0.0	0	8	1	0
Fa	2.41	7.08	41	0.65	34	1.82	10/21/69		0.4	3.3	57	7	1	0
#Y	48	42		42		32			47	10		25	28	32

Station Coordinates: 36°45' N 108°10' W 5395 ft
* - also in earlier years; #Y - number of years of data
=> - equal to or greater than; <= - less than or equal to

Office of State Climatologist, NM Dept of Agriculture, Las Cruces, NM

REFERENCE 7

Technical Report Number 5

State of New Mexico
State Engineer Office

S. E. Reynolds
State Engineer

CLIMATOLOGICAL SUMMARY
NEW MEXICO

Temperature	1850 - 1954
Frost	1850 - 1954
Evaporation	1912 - 1954

Prepared in cooperation with
the New Mexico Interstate Stream
Commission and the Weather Bureau,
U. S. Department of Commerce

1956

EXHIBIT 3

MEAN MONTHLY PAN EVAPORATION AT SELECTED STATIONS

Water losses by evaporation under natural conditions are extremely difficult to measure. Evaporation occurs in two ways, i.e., from moisture held by vegetation during rains; and by evaporation from free water surfaces such as lakes, rivers, reservoirs, and from land surfaces.

Measurement of evaporation from land surfaces has persistently resisted methods of measurement, but evaporation from water surfaces is considerably easier to define. Evaporation from water surfaces in pans from which water losses can be accurately determined are the measurements which were used in preparation of the exhibit and the records contained in this report. The rate of evaporation from water surfaces depends upon the air and water temperatures, relative humidity, wind movement, exposure, size and configuration of the water body, and other factors.

The prevailing winds in New Mexico are from the west and the southwest for nearly all localities, the few variations being caused by local conditions. The wind movement, in all except sheltered localities, is fairly strong with winds sometimes reaching a velocity of 60 miles per hour. Because of high temperatures, fairly constant winds, and low humidity the evaporation is of considerable magnitude, ranging up to more than 100 inches in the lower river valleys.

Where freezing winter temperatures prevail, evaporation data are not recorded because of ice that forms in the evaporation pans. This accounts for the lack of data for the winter months for such stations as El Vado Dam, Eagle Nest and Tucumcari Field Station.

The data shown in the exhibit are the amounts of pan evaporation and do not reflect the actual evaporation that would occur from large free water surfaces. To convert the data to actual evaporation from natural water surfaces it will be necessary to multiply by an appropriate "pan factor" or employ some more elaborate conversion method. For the U. S. Weather Bureau Class A land pan, a coefficient of 0.7 can be used for approximate computations and for the U. S. G. S. Floating Pan a coefficient of 0.8 can be used.

Units Inches
By MBC
Date 2-53
Checked BE
Date 6-55

EVAPORATION: FARMINGTON 3 NE - SAN JUAN COUNTY

Elevation 5,395 Ft.

Class A Land Pan*

Lat. 36°45' Long. 108°10'

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL	
1914	-	-	-	-	-	-	-	5.425	3.890	-	-	-	-	USWB Compilation
1915	-	-	3.050	-	-	-	-	-	-	4.180	-	-	-	" "
1916	-	-	-	-	6.850	7.210	6.880	5.960	4.640	3.200	-	-	-	" "
1917	-	-	2.800	5.550	6.795	7.255	6.460	6.010	4.780	4.220	2.860	1.690	-	" "
1918	-	1.870	3.225	5.930	7.365	6.840	6.680	6.140	4.590	3.670	1.470	0.780	-	" "
1919	-	-	4.000	7.040	6.670	9.140	6.000	6.430	4.940	4.370	2.770	-	-	" "
1920	-	-	-	-	-	6.990	8.350	5.760	-	-	-	-	-	" "
1921	1.030	1.520	3.260	5.250	6.330	6.730	-	5.530	5.535	3.395	1.830	-	-	" "
1922	-	-	3.650	4.670	7.250	8.240	8.420	7.050	6.070	4.180	-	1.010	-	" "
1923	1.210	1.760	2.910	4.700	7.810	8.990	8.130	5.790	4.280	3.440	1.460	0.780	51.260	" "
1924	0.670	1.220	2.800	5.370	7.970	9.810	9.240	7.815	5.710	3.535	2.010	0.750	56.900	" "
1925	-	2.160	3.850	6.185	7.505	7.750	12.200	6.030	5.490	2.930	1.585	0.995	-	" "
1926	1.520	2.065	4.235	4.210	5.940	-	-	-	5.470	3.300	2.180	1.150	-	" "
1927	0.690	1.730	3.590	5.730	8.410	6.990	7.110	-	3.900	4.445	2.715	0.790	-	" "
1928	-	1.690	3.960	6.340	6.715	9.565	9.860	6.670	5.650	3.710	-	1.125	-	" "
1929	0.640	1.405	4.060	6.230	7.135	7.715	7.400	5.610	4.175	3.805	1.890	0.877	50.942	" "
1930	-	-	4.185	6.000	6.835	7.910	7.715	5.625	4.660	3.505	1.670	-	-	" "
1931	-	1.520	4.160	-	-	-	-	-	-	-	-	-	-	" "
1932	-	-	-	-	-	-	8.030	7.690	6.505	4.700	3.215	-	-	" "
1933	-	-	4.310	6.620	7.710	6.030	7.680	7.650	5.610	4.280	2.730	1.320	-	" "
1934	1.580	2.400	6.180	7.410	7.960	9.040	8.050	7.530	5.790	5.150	2.190	-	-	" "
1935	0.880	1.840	3.750	6.210	7.080	10.030	8.860	6.850	5.150	4.440	2.230	1.180	58.500	" "
1936	1.460	1.580	4.790	6.460	7.980	8.320	6.680	4.740	4.560	2.950	1.760	0.970	52.250	" "
1937	-	-	3.370	7.370	6.610	7.420	5.040	5.210	4.080	3.260	2.600	1.380	-	" "
1938	1.030	0.130	2.940	5.750	6.750	6.030	5.430	5.280	3.450	3.300	1.840	0.950	43.680	" "
1939	1.020	0.470	3.140	6.620	7.300	7.520	6.680	5.230	3.640	3.620	1.840	1.339	48.419	" "
1940	-	0.810	4.250	5.900	6.220	6.240	5.850	5.450	3.720	3.050	1.640	0.380	-	" "
1941	0.750	1.420	3.530	3.440	6.550	6.860	7.160	5.620	4.140	2.397	1.872	-	-	USWB Compilation
1942	-	1.280	3.100	5.370	7.990	7.350	6.280	5.300	6.690	3.290	1.950	0.739	-	" "
1943	0.770	1.540	3.330	7.160	7.590	6.890	6.770	6.020	5.510	3.520	1.900	0.540	51.540	" "
1944	-	1.508	3.920	5.620	6.800	7.190	6.580	6.280	4.460	3.180	1.450	0.692	-	" "
1945	0.240	1.890	3.100	5.690	8.020	8.110	7.220	6.264	5.760	3.170	2.470	-	-	" "
1946	-	1.930	4.100	6.290	7.700	6.760	7.070	5.900	4.860	3.700	1.600	1.580	-	" "
1947	-	2.110	4.350	6.070	6.150	6.210	5.850	3.958	3.780	2.560	1.510	-	-	" "
1948	-	-	3.480	6.730	7.771	6.640	7.200	5.350	4.460	3.233	1.903	0.742	-	C.D.A.S. 1948
1949	-	-	3.60	6.26	7.71	8.06	8.70	7.24	5.30	3.78	2.23	-	-	C.D.A.S. 1949
1950	-	-	4.79	8.03	9.39	9.43	8.54	7.56	4.90	4.55	-	-	-	C.D.A.S. 1950
1951	-	-	5.19	6.24	8.44	9.69	9.50	6.61	5.95	3.92	-	-	-	C.D.A.S. 1951
1952	-	-	3.67	6.57	8.36	9.25	8.30	8.23	6.17	5.04	1.36	-	-	C.D.A.S. 1952
1953	-	-	-	6.81	8.42	-	11.16	9.24	8.11	4.39	2.14	-	-	C.D.M.S. 1953
1954	-	-	-	9.42	10.26	12.00	10.42	8.71	6.32	4.56	-	-	-	C.D.M.S. 1954

* Floating Pan prior to June 3, 1948.

REFERENCE 8

Dangerous Properties of Industrial Materials

Sixth Edition

N. IRVING SAX

Assisted by:
Benjamin Feiner/Joseph J. Fitzgerald/Thomas J. Haley/Elizabeth K. Weisburger

VNR VAN NOSTRAND REINHOLD COMPANY
New York

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SYNS:

1-DODECANETHIOL	M-LAURYL MERCAPTAN
M-DODECYL MERCAPTAN	1-MERCAPTODODECANE
1-DODECYL MERCAPTAN	NCI-C60935

TOXICITY DATA:	CODEN:
cyt-rat-ihl 5020 ug/m3/16W	BZARAZ 27,102,74

Reported in EPA TSCA Inventory, 1980.
THR: See mercaptans. MUT data.
Fire Hazard: Low.
To Fight Fire: Alcohol foam.
Disaster Hazard: When heated to decomp it emits tox fumes of SO_x.

LAURYLPYRIDINIUM LAURYLXANTHATE

CAS RN: 14917965 NIOSH #: UU 5775000
mf: $C_{17}H_{30}N \cdot C_{13}H_{25}OS_2$; mw: 509.98

TOXICITY DATA: 2	CODEN:
skn-rbt 500 mg/24H MOD	28ZPAK -,174,72
eye-rbt 20 mg/24H SEV	28ZPAK -,174,72
orl-rat LD50:802 mg/kg	28ZPAK -,174,72

THR: MOD orl. A skn, eye irr.
Disaster Hazard: When heated to decomp it emits very tox fumes of NO_x and SO_x.

LAURYL SULFATE, SODIUM SALT, CONDENSED WITH 3 MOLES OF ETHYLENE OXIDE

NIOSH #: OF 5725000

SYNS:

SODIUM SALT OF SULFATED BROAD-CUT COCONUT ETHOXY(3EO) ALCOHOL	SODIUM SALT OF SULFATED ETHOXYLATE OF BROAD-CUT LAURYL ALCOHOL

TOXICITY DATA: 2	CODEN:
skn-rbt 10 mg MLD	JSCCA5 22,411,71
skn-rbt 230 mg/5W open MLD	JSCCA5 22,411,71
skn-gpg 115 mg/5W open MLD	JSCCA5 22,411,71

THR: A skn irr.
Disaster Hazard: When heated to decomp it emits tox fumes of SO_x.

LAVANDIN OIL

CAS RN: 8022159 NIOSH #: OF 6097500

Main constituent is Linalool; found in plant Lavanoula Hybrida Reverchon; prepared by steam distillation of the flowering stalks of the plant.

SYN: OIL OF LAVANDIN

TOXICITY DATA: 2	CODEN:
skn-rbt 500 mg/24H MLD	FCTXAV 14,443,76

Reported in EPA TSCA Inventory, 1980.
THR: A skn irr.
Disaster Hazard: When heated to decomp it emits acrid smoke and fumes.

LAVATAR

NIOSH #: OF 6097840

Coal tar distillates in a shampoo base.

TOXICITY DATA:	CODEN:
mma-sat 25 ug/plate	TOLED5 3,325,79

THR: MUT data.
Disaster Hazard: When heated to decomp it emits acrid smoke and fumes.

LAVENDER ABSOLUTE

NIOSH #: OF 6100000

Found in the flowers of Lavandula Officinalis chaix. The main constituent is Linalyl Acetate; prepared from alcoholic extract of a residue, which is extracted from plant material using an organic solvent; a dark green liquid.

TOXICITY DATA: 1	CODEN:
skn-rbt 500 mg/24H MLD	FCTXAV 14,443,76
orl-rat LD50:4250 mg/kg	FCTXAV 14(5),443,76

THR: LOW orl; A skn irr.
Disaster Hazard: When heated to decomp it emits acrid smoke and fumes.

LAVENDER OIL

CAS RN: 8000280 NIOSH #: OF 6110000

Main constituent is linalyl acetate. Found in the plant Lavandulaofficinalif choix (Fam. Labiate). Prepared by steam distillation of the flowering stalks of the plant.

SYNS:

LAVENDEL OEL (GERMAN)	OIL OF LAVENDER

TOXICITY DATA: 1	CODEN:
skn-rbt 500 mg/24H MLD	FCTXAV 14,443,76
orl-rat LD50:9040 mg/kg	PHARAT 14,435,59

Reported in EPA TSCA Inventory, 1980.
THR: LOW orl. A skn irr.
Disaster Hazard: When heated to decomp it emits acrid smoke and fumes.

LD-813

CAS RN: 64083052 NIOSH #: OF 6730000

Commercial mixture of aromatic amines containing approx. 40% MOCA

TOXICITY DATA: 3	CODEN:
orl-rat TDLo:37 gm/kg/2Y-C:CARC	TXAPA9 31,159,75

THR: An exper CARC. See also aromatic amines.
Disaster Hazard: When heated to decomp it emits tox fumes of NO_x.

LEAD

CAS RN: 7439921 NIOSH #: OF 7525000
mf: Pb; mw: 207.19

Bluish-gray, soft metal. mp: 327.43°, bp: 1740°, d: 11.34 @ 20°/4°. vap. press: 1 mm @ 973°.

SYNS:

C.I. 77575	LEAD S2
LEAD FLAKE	OLOW (POLISH)

TOXICITY DATA: 3	CODEN:
orl-rat TDLo:790 mg/kg (MGN)	AEHLAU 23,102,71
orl-rat TDLo:1140 mg/kg (14D pre-21D post)	PHMCAA 20,201,78
orl-mus TDLo:1120 mg/kg (MGN)	AEHLAU 23,102,71
orl-mus TDLo:6300 mg/kg (1-21D preg)	EXPEAM 31,1312,75
orl-mus TDLo:12600 mg/kg (1-21D preg)	EXPEAM 31,1312,75
orl-mus TDLo:4800 mg/kg (1-16D preg)	BECTA6 18,271,77
ivn-ham TDLo:50 mg/kg/(8D preg):TER	EXPEAM 25,56,69
orl-dom TDLo:662 mg/kg (1-21W preg)	TXAPA9 25,466,73
ivn-ham TDLo:50 mg/kg/(8D preg):TER	EXPEAM 25,56,69
orl-wmn TDLo:450 mg/kg/6Y:CNS	JAMAAP 237,2627,77
ipr-rat LDLo:1000 mg/kg	EQSSDX 1,1,75
orl-pgn LDLo:160 mg/kg	HBAMAK 4,1289,35

Carcinogenic Determination: Indefinite IARC** 23,325,80.

TLV: AIR: 0.15 mg/m3 DTLVS* 4,243,80; *Toxicology Review:* TRBMAV 33(1),85,75; PGMJAO 51(601),783,75; JDSCAE 58(12),1767,75; IRXPAT 12,1,73; CTPHBG 55,147,71; CTOXAO 6(3),377,73; QURBAW 7(1),75,74; RREVAH 54,55,75; JAVMA4 164(3),277,74; AEMBAP 40,239,73; CTOXAO 5(2),151,72; FOREAE 7,313,42; KOTTAM 11(11),1300,75; GEIGAI 20(3),291,73; STEVA8 2(4),341,74; CLCHAU 19,361,73; AJMEAZ 38,409,65; 85DHAX PB,254,72; PDTNBH 6,204,77; AMTODM 3,209,77. OSHA Standard: Air: TWA 200 ug/m3 (SCP-O) FEREAC 39,23540,74. Occupational Exposure to Inorganic Lead recm std: Air: TWA 0.10 mg(Pb)/m3 NTIS**. "NIOSH Manual of Analytical Methods" VOL 1 102,191,195,200,208,214,262, VOL 3 S341. Reported in EPA TSCA Inventory, 1980.

THR: See lead compounds. A hmn CNS. HIGH orl; MOD irr. A common air contaminant. It is a ± CAR of the lungs and kidney and an exper TER.

Fire Hazard: Mod, in the form of dust when exposed to heat or flame. See also powdered metals.

Explosion Hazard: Mod, in the form of dust when exposed to heat or flame.

Incomp: NH_4NO_3, ClF_3, H_2O_2, NaN_3, Na_2C_2, Zr. disodium acetylide; oxidants.

Disaster Hazard: Dangerous; when heated, emits highly tox fumes; can react vigorously with oxidizing materials.

For further information see Vol. 1, No. 1 of *DPIM Report.*

LEAD ACETATE

CAS RN: 301042 NIOSH #: AI 5250000

mf: $C_4H_6O_4 \cdot Pb$; mw: 325.29

Trihydrate, colorless crystals or white granules or powder. Slightly acetic odor; slowly effloresces; d: 2.55; mp: 75° when rapidly heated. Decomp above 200°; very sol in glycerol. Keep well closed.

SYNS:

ACETIC ACID LEAD (2+) SALT	LEAD DIBASIC ACETATE
ACETATE DE PLOMB (FRENCH)	NORMAL LEAD ACETATE
BLEIACETAT (GERMAN)	PLUMBOUS ACETATE
LEAD (2+) ACETATE	SALT OF SATURN
LEAD(II) ACETATE	SUGAR OF LEAD
LEAD DIACETATE	

TOXICITY DATA: 3	CODEN:
dns-rat-ipr 50 ug/kg	PSEBAA 143,446,73
spm-mus-par 1 gm/kg	ARTODN 46,159,80
orl-rat TDLo:7854 mg/kg (6-16D preg)	FCTXAV 13,629,75
orl-rat TDLo:1800 mg/kg (1-22D preg/14D post)	TOLED5 7,373,80
orl-rat TDLo:113 gm/kg (70D pre-21D post)	PBBHAU 8,347,78
orl-mus TDLo:3150 mg/kg (1-21D preg)	CRSBAW 170,1319,76
orl-mus TDLo:4800 mg/kg (1-8D preg)	CRSBAW 172,1037,78
orl-mus TDLo:9 gm/kg (7-21D preg)	CRSBAW 170,1319,76
ipr-mus TDLo:35 mg/kg (8D preg)	BIMDB3 30,223,79
ivn-ham TDLo:50 mg/kg/(8D preg):TER	EXMPA6 7,208,67
ivn-ham TDLo:50 mg/kg (8D preg)	EXPEAM 25,56,69
ipr-pgn LDLo:150 mg/kg	ARTODN 46,265,80
cyt-hmn:lym 1 mmol/L/24H	TXCYAC 10,67,78
cyt-mus-orl 16800 mg/kg/4W	JTEHD6 2,619,77
cyt-mky-orl 5760 mg/kg/64W	MUREAV 45,77,77
ipr-mus TDLo:15 mg/kg/(8D preg):TER	BIMDB3 30,223,79
ivn-ham TDLo:50 mg/kg/(8D preg):TER	EXMPA6 7,208,67
orl-rat TDLo:250 gm/kg/47W-C:ETA	BJCAAI 16,283,62
ipr-rat LDLo:204 mg/kg	JPETAB 38,161,30
ipr-mus LD50:120 mg/kg	COREAF 256,1043,63
orl-dog LDLo:300 mg/kg	HBAMAK 4,1289,35
scu-dog LDLo:80 mg/kg	HBAMAK 4,1289,35
ivn-dog LDLo:300 mg/kg	EQSSDX 1,1,75
scu-cat LDLo:100 mg/kg	HBAMAK 4,1289,35
scu-rbt LDLo:300 mg/kg	HBAMAK 4,1289,35
ivn-rbt LDLo:50 mg/kg	EQSSDX 1,1,75
scu-frg LDLo:1600 mg/kg	HBAMAK 4,1289,35

Carcinogenic Determination: Animal Positive IARC** 23,325,80; Human Suspected IARC** 23,325,80. *Toxicology Review:* ADTEAS 5,51,72; ENVRAL 13,36,77; 85DHAX Pb,256,72. OSHA Standard: Air: TWA 200 ug(Pb)/m3 (SCP-O) FEREAC 29,23540,74. Occupational Exposure to Inorganic Lead recm std: Air: TWA 0.10 mg(Pb)/m3 NTIS**. Reported in EPA TSCA Inventory, 1980.

THR: MUT data. An exper + CARC, TER, ETA. A susp hmn CARC; HIGH ipr, orl, scu, ivn. See also lead compounds. A poison. An insecticide.

Disaster Hazard: When heated to decomp it emits tox fumes of Pb.

Incomp: $KBrO_3$; acids, sol sulfates, citrates, tartrates, chlorides, carbonates, alkalies, tannin phosphates, resorcinol, salicylic acid, phenol, chloral hydrate, sulfites, vegetable infusions, tinctures.

For further information see Vol. 1, No. 4 of *DPIM Report.*

LEAD ACETATE, BASIC

CAS RN: 1335326 NIOSH #: OF 8750000

mf: $C_4H_{10}O_8Pb_3$; mw: 807.71

REFERENCE 9

678-24

HEALTH ENVIRONMENT department
Telephone #(505)327-9851

STATE OF NEW MEXICO
ENVIRONMENTAL IMPROVEMENT DIVISION
DISTRICT I FIELD OFFICE/724 W. ANIMAS
FARMINGTON, NEW MEXICO 87401
Steven Asher, Director

TONEY ANAYA
GOVERNOR

JOSEPH GOLDBERG,
SECRETARY

JOSEPH F. JOHNSON
DEPUTY SECRETARY

July 9, 1984

Mr. John Phillipi
Fergie's Trailer Park
c/o Clinton Williams Real Estate
210 E. Broadway
Farmington, New Mexico 87401

Dear Mr. Phillipi:

An environmental survey of Fergie's Trailer Park water supply (#678-24) was conducted June 14, 1984 with your assistance. A copy of the report is enclosed for your use.

The trailer park has 58 trailer spaces with 13 vacancies at the time of the inspection. The water source is a 50' deep well with a 1½ horsepower submersible pump. Distribution to the trailers is by pressure from a 300 gallon pressure tank. Improvements made since last survey were the installation of a spare pump in the well casing. This should result in little disruption of service to the tenants in case of pump failure. No deficiencies were observed.

As stated on the last inspection report, the environmental surveys will be conducted every other year. If any significant modifications are made to the system, or if any problems occur, please notify this office. I wish to thank you for your time and cooperation in conducting this survey. If you have any questions, please don't hesitate to contact me.

Sincerely,

David A. Tomko

David A. Tomko
Environmentalist

RECEIVED
JUL 24 1984
WATER SUPPLY
REGULATION SECTION

Enclosure
DAT:lm
cc: Water Supply Section
File

N/A - Not Applicable
N-Av - Not Available
Est. - Estimated

Community Water

Inspection Form

NM Health and Environment Department
Environmental Improvement Division

Section A - GENERAL INFORMATION

Inspection Date: 06-14-84

WSS CODE:	WATER SUPPLY SYSTEM NAME	COUNTY:
678-24	Fergie's Trailer Park	San Juan

System Address/LOCATION: South of U.S. 550 in Kirtland, New Mexico

OWNER:	OWNER ADDRESS (if different than above)	PHONE
John Phillipi Clinton Williams Real Estate	210 E. Broadway, Farmington, NM 87401	327-4466

Population Served	# Connections	# Meters	Max. System Production	Average System Production
Est. 170	58 Connections 13 Vacancies	1 Master	12,000 GPD Poten. ☐ Actual ☒	8,000 GPD

System Source (check Approp. Boxes): Distribution Only ☐ Well(s) ☒ # of Wells 1
Spring(s) ☐ Infiltration Gallery ☐ Surface ☐

Additional or Qualifying Information:

Maximum System Production - Based on master meter readings for 1983.

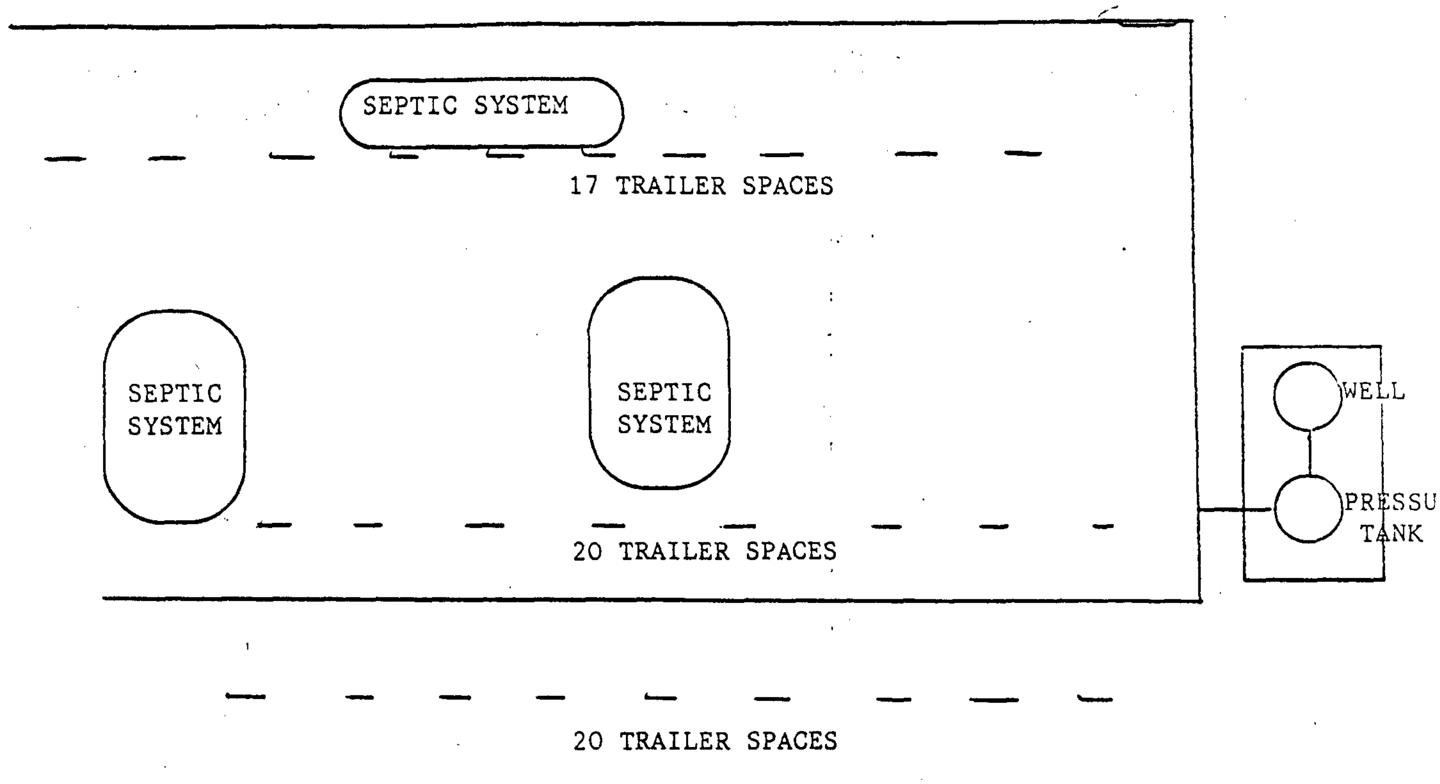
Average System Production - Based on current master meter readings.

System Personnel - Name/Classification	Level of Certification Required	Level of Certification Obtained
John Phillipi & Clinton Williams	None	None

Information furnished by:	Home Phone:	Business Phone:
John Phillipi	325-6888	327-4464

Survey Performed by:	Business Phone:
David A. Tomko DAT	327-9851

SIMPLIFIED FLOW DIAGRAM OR SCHEMATIC OF THE SYSTEM (INDICATE NORTH IF APPROPRIATE)



Section B - Source Information

WELL Identification	Well Depth	Pump Depth	Pump Capacity GPM	Well Drawdown feet	Pump Type	Static Water Level	Age of Pump	Date Well Drilled
#1	50'	42'	33 gpm	1'	Submers. Jacuzy 1½ hp	12'	1 yr.	1946

Remarks, Deficiencies, and Recommendations

Have spare pump set in well casing - Meyer, 3/4 hp, 1 yr. old

Old spare pump (1 hp Meyer) being repaired.

Source	Number (each)	Total Capacity	Remarks, Deficiencies, and Recommendations
Artesian Wells			
Springs			
Infiltration Galleries			

Section F - SURFACE WATER SUPPLY INFORMATION

Source (check one)	Remarks or Deficiencies
Lake ☐	N/A
Stream ☐	

Section G - WATER TREATMENT PLANT INFORMATION

Unit Operations	Remarks or Deficiencies
Plant Intake Structure	
Plant Location (Siting)	
Pretreatment, Raw Water Storage or Presettling Reservoirs	
Coagulation - Sedimentation	
Chemical Addition	
Filtration	
Other Treatment (Ion Exchange, Softening, Reverse Osmosis, etc.)	N/A

Additional Comments or Remarks

REFERENCE 10

Research method but relatively low by the Motor method of laboratory engine testing. Compared with alkylates, they are markedly inferior in actual antiknock performance on the road. Therefore, refiners who have ample isobutane and the required alkylation capacity usually prefer to alkylate rather than polymerize their available olefinic gases.

Isomerization. To date, petroleum-refinery use of isomerization to convert straight-chain hydrocarbons into branched-chain hydrocarbons of the same molecular weight has been confined mainly to the conversion of normal butane to isobutane needed for alkylation feed. Isomerization has been used to a lesser extent to upgrade the antiknock quality of natural gasolines and light straightrun fractions by converting their *n*-pentane and *n*-hexane contents to their higher-octane branched-chain isomers. Such use is growing in countries where cracking is not needed to meet gasoline demand and, therefore, light olefins from cracking are not available to contribute high antiknock quality to the lower-boiling gasoline fractions. Isomerization catalysts include aluminum chloride, antimony chloride, platinum, and other metals and metal compounds. Reaction conditions vary according to the catalyst and the feedstock, ranging from 40–480°C and 0.7–5.0 MPa (100–750 psi). Depending on feedstock composition, isomerized light fractions rate 93–107 octane by the Research method after addition of antiknock compound. Because they are highly branched, they contribute excellent road antiknock quality to finished gasolines.

Hydrogen Treating. As mentioned earlier, foul-smelling, corrosive sulfur compounds in gasoline can either be removed or be converted to less objectionable forms, removal being preferred. Early removal methods included use of strong aqueous solutions of sodium hydroxide, along with other chemicals, to dissolve the sulfur compounds, followed by separation of the aqueous layer. Later processes used clay (bauxite or fuller's earth) as a catalyst for cracking thiols at the carbon–sulfur bond, breaking them down into readily removed gases. Today however, sulfur removal usually is accomplished by hydrogen treating, wherein hydrogen reacts with the sulfur in objectionable compounds, forming easily removable hydrogen sulfide. Hydrogen treating is conducted at moderate temperatures, 250–450°C, and pressures, 2.0–5.5 MPa (300–800 psi), using oxides of cobalt and molybdenum as catalyst. The range of operating conditions is wide, because the purposes vary from mild treatment of reformer feedstock to severe hydrogenation of heavy fractions (see Petroleum).

Antiknock Compounds. The original, and still least expensive, method of increasing gasoline octane number is use of an antiknock compound. Each type of gasoline component has its own response to antiknock fluid, but octane-number increases of 10 to 15 are obtainable when adding 0.8–1.0 g Pb/L (3–4 mL/gal) of tetraethyllead to a quite responsive stock. Although a number of chemical compounds have been found to have antiknock effectiveness, none of the thousands investigated to date are as effective at as little cost as the alkyllead compounds. The original and still most widely used antiknock agent is tetraethyllead (TEL), $Pb(C_2H_5)_4$. However, tetramethyllead (TML), $Pb(CH_3)_4$, its physical mixtures with TEL, and chemically redistributed mixtures consisting of ethyltrimethyllead, diethyldimethyllead, and triethylmethyllead in addition to TEL and TML are also used commercially both in the United States and abroad. Because TML and TEL–TML mixtures are more volatile than TEL, they provide more even distribution of antiknock quality throughout the gasoline boiling range. They are particularly desirable where the lighter components of a gasoline are of relatively low octane number. By distributing their antiknock

action more evenly throughout the vaporizing fuel as it goes to each of an engine's cylinders, TML and TEL–TML mixtures often provide superior antiknock performance in modern automobiles. Because of differing thermal stability, which affects the timing of their release of lead's antiknock action, TML and its mixtures with TEL may also show superior effectiveness per unit lead content in certain fuels under certain engine operating conditions (see Lead compounds).

In addition to the active ingredients (TEL, TML, or both), antiknock fluids contain chemical scavengers to remove the small amount of lead compounds that might remain in the engine after combustion of the fuel. These scavengers contain chlorine and/or bromine to convert the lead compounds to lead chloride and lead bromide, which are gaseous at the temperatures prevailing inside an engine. Ethylene dibromide and ethylene dichloride are the lead scavengers used commercially. A typical motor mix for automotive gasolines consists of about 62% TEL, 18% ethylene dibromide, 18% ethylene dichloride, and 2% of other ingredients, such as dye, petroleum solvent, and stability improver. For overall best performance of aviation piston engines, the scavenger consists entirely of ethylene dibromide, and a typical aviation mix includes about 61–62% TEL, 35–36% ethylene dibromide, and 3% of dye, solvent, inhibitor, etc.

In 1957, Ethyl Corporation announced a new antiknock agent, methylcyclopentadienylmanganese tricarbonyl(MMT), $CH_3C_5H_4Mn(CO)_3$ (see Carbonyls). When used alone, this compound is even more effective than the same amount of TEL or TML in many gasolines. However, MMT also costs somewhat more to manufacture than do the alkyllead additives. Thus, its main economic value originally lay in the powerful promoting effect it exerts on the antiknock action of the alkylleads. Only a tiny amount of the manganese compound added to leaded gasoline gives a marked synergistic effect, raising octane number far more than would be expected from the fuel's response to either antiknock alone. The mechanism of this promoting action still is not completely understood, but the manganese compound is believed to increase the effective catalytic surface area of the lead antiknock particles. Certain organic chemicals (eg, *tert*-butyl acetate) also have been shown to have some promoting effect on the antiknock action of TEL, the effect becoming appreciable at fuel octane-number levels of 100 and above. Thus, the manganese antiknock and organic TEL appreciators offer a route to even higher gasoline octane numbers than can be attained with the alkyllead antiknock compounds alone.

From 1975 to 1978, MMT's main use was as a replacement for lead antiknocks in production of U.S. unleaded gasolines. Since 1975, most passenger cars sold in the United States have required catalytic converters to meet government-imposed standards on exhaust-gas emissions. The catalysts have, in turn, required use of unleaded gasoline, because even a small amount of lead deposited on their active surfaces decreases their emission-controlling effectiveness. Thus, U.S. refiners faced the problem of producing ever increasing quantities of gasoline without the octane help, blending flexibility, and processing economy provided by lead antiknock compounds. To compensate, in part at least, for the loss of lead, they began using MMT in their unleaded grades. This allowed them to reduce somewhat the high energy consumption and yield losses involved in the more severe catalytic reforming required to meet octane-number specifications without lead. In 1978, however, MMT also was banned from use in U.S. unleaded gasolines on suspicion that it may increase exhaust-gas emissions.

To avoid gasoline shortages and minimize the amount of crude oil that the United

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

'77 AUG 10 AM 11 48

Section 1. GENERAL INFORMATION

STATE ENGINEER OFFICE
SANTA FE, N.M. 87501

(A) Owner of well ~~Joseph Hastings~~ Owner's Well No. ______
Street or Post Office Address ~~P. O. Box 633~~
City and State ~~Kirtland, New Mexico~~

Well was drilled under Permit No. ~~SJ-417~~ and is located in the:

a. ______ ¼ NW ¼ SW ¼ NE ¼ of Section 17 Township 29 Range 14W N.M.P.M.

b. Tract No. ______ of Map No. ______ of the ______

c. Lot No. ______ of Block No. ______ of the ______
Subdivision, recorded in San Juan County.

d. X= ______ feet, Y= ______ feet, N.M. Coordinate System ______ Zone in the ______ Grant.

(B) Drilling Contractor William J. Hood License No. Wd-717

Address Rt. 3, Box 234, Flora Vista, N. Mex.

Drilling Began 8/2/77 Completed 8/4/77 Type tools cable Size of hole 7 in.

Elevation of land surface or ______ at well is 5200 ft. Total depth of well 38 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 7 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet		Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
From	To			
25 Ø	38	13	Blue water sand	10

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet		Length (feet)	Type of Shoe	Perforations	
			Top	Bottom			From	To
7	.256		0	19	19	none	none n	
5.5	plastic cl-200		17	38	21	none	25	38

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet		Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement
From	To				

Section 5. PLUGGING RECORD

Plugging Contractor ______
Address ______
Plugging Method ______
Date Well Plugged ______
Plugging approved by:

______
State Engineer Representative

No.	Depth in Feet		Cubic Feet of Cement
	Top	Bottom	
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received 8/10/77

Quad ______ FWL ______ FSL ______

File No. SJ-417 ______ Use Dom. ______ Location No. 29N.14W.17. ______

San Juan Co. 231

Section 6. LOG OF HOLE

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color and Type of Material Encountered
0	25	25	Over burden & boulders
25	38	13	Blue water sand

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Driller

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

ENGINEER OFFIC
N.M. 87501

Section 1. GENERAL INFORMATION

(A) Owner of well Joseph M. Hastings — Owner's Well No.
Street or Post Office Address Box 633
City and State Kirtland New Mexico

Well was drilled under Permit No. SJ 418 and is located in the:

a. ¼ NW ¼ SW ¼ NE ¼ of Section 17 Township 29 Range 14 West N.M.P.M.

b. Tract No. ______ of Map No. ______ of the ______

c. Lot No. ______ of Block No. ______ of the ______
Subdivision, recorded in San Jaun County.

d. X= ______ feet, Y= ______ feet, N.M. Coordinate System ______ Zone in the ______ Grant.

(B) Drilling Contractor W.J. Hood License No. WD 717

Address ______

Drilling Began 8/9/77 Completed 8/11/77 Type tools Cable Size of hole 7 in.

Elevation of land surface or ______ at well is 5200 ft. Total depth of well 35 ft.

☒ shallow ☐ artesian. Depth to water upon completion of well 7 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet		Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
From	To			
23	35	12	Blue Water Sand	10

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet		Length (feet)	Type of Shoe	Perforations	
			Top	Bottom			From	To
7	¼ Wall		0	14	14	None		
~~XXX~~	~~XXX~~							
5.3	Plastic		12	35	23	None	22	35

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet		Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement
From	To				

Section 5. PLUGGING RECORD

Plugging Contractor ______
Address ______
Plugging Method ______
Date Well Plugged ______
Plugging approved by:

______
State Engineer Representative

No.	Depth in Feet		Cubic Feet of Cement
	Top	Bottom	
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received Aug. 18, 1977

Quad ______ FWL ______ FSL ______

[illegible] Dom. 29N.14W.17.231
San Juan Co.

[redacted]

Section 6. LOG OF HOLE

Depth in Feet From	To	Thickness in Feet	Color and Type of Material Encountered
0	22		Over Burden & Boulders
22	35	13	Blue Water Sand

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Driller

[illegible]

[redacted]

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Lowell Harris Owner's Well No. SJ 451
Street or Post Office Address 725 W. Animas
City and State Farmington, N.M. 87401

Well was drilled under Permit No. SJ 451 and is located in the:

STATE ENGINEER OFFICE SANTA FE, N.M. 87501

a. SW ¼ ¼ NW ¼ SE ¼ of Section 7 Township 29N Range 14W N.M.P.M.

b. Tract No. ____ of Map No. ____ of the ____

c. Lot No. ____ of Block No. ____ of the ____
Subdivision, recorded in San Jaun County.

d. X= ____ feet, Y= ____ feet, N.M. Coordinate System ____ Zone in the ____ Grant.

(B) Drilling Contractor Leon(Shorty) Thompson License No. WD 527

Address P.O.Box 1651 Farmington, N.M. 87401

Drilling Began 9/5/77 Completed 9/7/77 Type tools Cable Tool Size of hole 6 in.

Elevation of land surface or ____ at well is ____ ft. Total depth of well 6 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 24 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
32	39	7	Gravel	40

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
6	19	Welded			32	None	None	

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement

Section 5. PLUGGING RECORD

Plugging Contractor ____
Address ____
Plugging Method ____
Date Well Plugged ____
Plugging approved by:

____
State Engineer Representative

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received 9/15/77

Quad ____ FWL ____ FSL ____

File No. ____ Use Dom. Location No. 29N.14W.7 413

[redacted]

San Juan Co.

Section 6. LOG OF HOLE

Depth in Feet		Thickness in Feet	Color and Type of Material Encountered
From	To		
0	20	20	Sand
20	32	12	Boulders
32	39	7	Gravel

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Driller

INSTRUCTIONS: This form should be executed in triplicate [illegible]

[redacted]

Revised June 1972

STATE ENGINEER OFFICE
WELL RECORD

Nov 14 11 50

Section 1. GENERAL INFORMATION

(A) Owner of well Eugene Urbach Owner's Well No. SJ 1034
Street or Post Office Address P.O. Box 265
City and State Kirtland, N.M.

Well was drilled under Permit No. SJ 1034 and is located in the:

a. NW ¼ NE ¼ NE ¼ ____ ¼ of Section 17 Township 29N Range 14W N.M.P.M.

b. Tract No. ____ of Map No. ____ of the ____

c. Lot No. 14 of Block No. 1 of the Beaver's #2
Subdivision, recorded in San Juan County.

d. X= ____ feet, Y= ____ feet, N.M. Coordinate System ____ Zone in the ____ Grant.

(B) Drilling Contractor Bob Savage License No. WD 817

Address P.O. Box 2432 Farmington, N.M.

Drilling Began 11-9-79 Completed 11-12-79 Type tools Cable tool Size of hole 6 in.

Elevation of land surface or ____ at well is ____ ft. Total depth of well 28 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 16 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
26	28	2	Gravel	10

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
6	20	Welded			27	Heavy Pipe...		

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement

Section 5. PLUGGING RECORD

Plugging Contractor ____
Address ____
Plugging Method ____
Date Well Plugged ____
Plugging approved by:

____
State Engineer Representative

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received 11/14/79

Quad ____ FWL ____ FSL ____

File No. SJ-1034 Use Dom. Location No. 29N.14W.17.221

San Juan County

Section 6. LOG OF HOLE

Depth in Feet		Thickness in Feet	Color and Type of Material Encountered
From	To		
0	20	20	Boulders
20	26	6	Sand
26	28	2	Gravel

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

[illegible signature]
Driller

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, [illegible] of the State Engineer. All sections, [illegible] Section 5, shall [illegible] [illegible] well [illegible] When the [illegible] Section [illegible]

[redacted]

Revised June 1972

STATE ENGINEER OFFICE
WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Lodis Blaylock Owner's Well No. ______
Street or Post Office Address Box 536
City and State Kirtland, N.M.

Well was drilled under Permit No. SJ 1223 and is located in the:

a. ____ ¼ ____ ¼ SE ¼ NE ¼ of Section 13 Township 29N Range 15W N.M.P.M.

b. Tract No. ______ of Map No. ______ of the ______

c. Lot No. ______ of Block No. ______ of the ______
Subdivision, recorded in ______ County.

d. X= ______ feet, Y= ______ feet, N.M. Coordinate System ______ Zone in the ______ Grant.

(B) Drilling Contractor Terry G Hood License No. WD 717

Address Rt 3 Box 234 Flora Vista N.M.

Drilling Began 7/19/ 80 Completed 7/ 21 / 80 Type tools CableTool Size of hole 6 in.

Elevation of land surface or ______ at well is 5300 ft. Total depth of well 30 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 12 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet		Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
From	To			
18	30	12	Water Bearing Sand & Gravel	20

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet		Length (feet)	Type of Shoe	Perforations	
			Top	Bottom			From	To
6	.219		0	30	30	Drive Shoe	-18	30

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet		Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement
From	To				

'80 JUL 24 PM 12 08
STATE ENGINEER
SANTA FE, N.M.

Section 5. PLUGGING RECORD

Plugging Contractor ______
Address ______
Plugging Method ______
Date Well Plugged ______
Plugging approved by:

______
State Engineer Representative

No.	Depth in Feet		Cubic Feet of Cement
	Top	Bottom	
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received 7/24/80

Quad ______ FWL ______ FSL ______

SJ-1223 Dom-Stk 29N.15W.13.240
San Juan County

Section 6. LOG OF HOLE

Depth in Feet		Thickness in Feet	Color and Type of Material Encountered
From	To		
0	18	18	Over Burden & Boulders
18	30	12	Water Bearing Sand & Gravel

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

[illegible]
Driller

INSTRUCTIONS: This form should be executed in [illegible], preferably typewritten [illegible] the appropriate [illegible] office of the State Engineer. All sections except Section 5, shall be answered as completely and accurately as [illegible] when any well is drilled, [illegible]. When this form is [illegible] Section 1(a) and Section 5 need be [illegible].

[redacted]

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Kenneth Sweek Owner's Well No. ______

Street or Post Office Address Rt 1 Box 368

City and State Farmington , N.M. 87401

Well was drilled under Permit No. SJ 1259 and is located in the:

a. ____ ¼ ____ ¼ E ½ ¼ NW ¼ of Section 17 Township 29N Range 14W N.M.P.M.

b. Tract No. ______ of Map No. ______ of the ______

c. Lot No. ______ of Block No. ______ of the ______
Subdivision, recorded in ______ County.

d. X= ______ feet, Y= ______ feet, N.M. Coordinate System ______ Zone in the ______ Grant.

(B) Drilling Contractor Terry G Hood License No. WD 717

Address Rt 3 Box 234 Flora Vista, NM

Drilling Began 9/5/80 Completed 9/9/80 Type tools Cable Tool Size of hole 6 in.

Elevation of land surface or ______ at well is 5300 ft. Total depth of well 31 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 3 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet		Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
From	To			
10	31	21	Water Bearing Sand & Gravel	10

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet		Length (feet)	Type of Shoe	Perforations	
			Top	Bottom			From	To
6	.219		0	31	31	Drive Shoe	12	31

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet		Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement
From	To				

80 SEP 17 PM 1 12

STATE ENGINEER

SANTA FE, N.M.

Section 5. PLUGGING RECORD

Plugging Contractor ______

Address ______

Plugging Method ______

Date Well Plugged ______

Plugging approved by:

______
State Engineer Representative

No.	Depth in Feet		Cubic Feet of Cement
	Top	Bottom	
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received 9/17/80

Quad ______ FWL ______ FSL ______

[redacted]

Section 6. LOG OF HOLE

Depth in Feet		Thickness in Feet	Color and Type of Material Encountered
From	To		
0	10	10	Over Burden & Boulders
10	31	21	Water Bearing Sand Gavel

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Tey ? Hand
Driller

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten [illegible] [redacted] [illegible] only Section [illegible] completed