GW - 28

REPORTS

YEAR(S):

1986 - 1997

TELEPHONE
(505) 748-3311

EASYLINK
62905278

NAVAJO REFINING COMPANY

501 EAST MAIN STREET ◦ P. O. BOX 159
ARTESIA, NEW MEXICO 88211-0159

FAX
(505) 746-6410 ACCTG
(505) 746-6155 EXEC
(505) 748-9077 ENGR
(505) 746-4438 P / L

January 13, 1998

Mr. Roger Anderson
NM Oil Conservation Division
Environmental Bureau
Oil Conservation Division
2040 S. Pacheco St.
Santa Fe, NM 87505-5472

RE: FALL 1997 REPORT GROUND WATER SAMPLING AROUND EVAPORATION PONDS

Dear Roger:

Enclosed are results from our Fall 1997 sampling of the monitor wells around the evaporation ponds. This is on a staggered schedule per your letter of October 21, 1991. The following is a summary of field observations:

Several of these wells have been paired with deep wells. Therefore, you will notice that OCD-2 has become OCD-2A and MW-2 has become MW-2A and so on as needed. The deep wells are labeled as OCD-2B and so on. Also, the day these wells were sampled, our ph-Temperature Meter was not working. We have ordered a new one and will get those parameters on the next sampling event. Finally, the conductivities that were recorded were well below the historic numbers. We are checking this meter to see if it is correct.

Well #	Ground water ft amsL	pH	EC umhos	Deg. C	Description
MW-1	3301.72	NA	12700	NA	Slight Odor
MW-2A	3301.18	NA	6530	NA	Odor
MW-3	3299.93	NA	5150	NA	Moderate odor, Brown
MW-4	3299.73	NA	3830	NA	Mod. Odor
MW-5A	3298.77	NA	7120	NA	Odor, Silty
OCD-2A	3300.13	NA	6630	NA	Odor
OCD-4	3299.00	NA	7960	NA	Murky, odor
OCD-6	3298.37	NA	7140	NA	Brown, Mild odor
OCD-8A	3298.81	NA	6220	NA	Brown

If you have any questions, please contact me at 748-3311, extension 281.

Respectfully yours,
NAVAJO REFINING CO.

Darrell Moore

Darrell Moore
Environmental Mgr. for Watre and Waste

Encl.

TRACE ANALYSIS, INC.

6701 Aberdeen Avenue, Suite 9 Lubbock, Texas 79424 800•378•1296 806•794•1296 FAX 806•794•1298
4725 Ripley Avenue, Suite A El Paso, Texas 79922 888•588•3443 915•585•3443 FAX 915•585•4944
E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
NAVAJO REFINING
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

December 19, 1997
Receiving Date: 11/29/97
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Extraction Date: 12/05/97
Analysis Date: 12/08/97
Sampling Date: 11/25/97
Sample Condition: Intact & Cool
Sample Received by: RW
Project Name: Semi-Annual Evap. Ponds

TCLP Semi-Volatiles (mg/L)	Reporting Limit	Method Blank	T86283 MW-4	QC	RPD	%EA	%IA
1-methyl-napthalene	0.001	ND	ND	—	—	—	—
Naphthalene	0.001	ND	ND	—	—	—	—

Surrogates	% RECOVERY
2-Fluorophenol	16*
Phenol-d6	10
Nitrobenzene-d5	74
2-Fluorobiphenyl	86
2,4,6-Tribromophenol	80
Terphenyl-d14	88

*Surrogate recovery out of standard range due to matrix effect.
ND - Not Detected

Methods: EPA SW 846-3510, 8270.
CHEMIST: RP/HW

Director, Dr. Blair Leftwich

12-19-97
DATE

TRACE ANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
Navajo Refining
Attention Darrell Moore
501 E. Main
Artesia NM 88210

Lab Receiving # : 9711000448
Date Rec: 11/29/97
Sampling Date: 11/25/9 - 11/26/97
Sample Condition: Intact and Cool
Sample Received By: RW

Date: Dec 04, 1997
Project: N/A
Proj Name: Evaporation Ponds
Proj Loc: Artesia

TA#	Field Code	MATRIX	MTBE (mg/L)	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL-BENZENE (mg/L)	M,P,O XYLENE (mg/L)	TOTAL BTEX (mg/L)
T86281	MW-3	Water	<0.001	0.002	0.005	0.006	0.011	0.024
T86282	MW-1	Water	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
T86283	MW-4	Water	0.002	0.017	0.010	0.026	0.042	0.095
T86284	MW-5A	Water	0.003	0.006	0.017	0.002	0.015	0.040
T86285	OCD-8A	Water	0.005	<0.001	<0.001	<0.001	<0.001	<0.001
T86286	OCD-2A	Water	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
T86287	OCD-4	Water	0.003	<0.001	<0.001	<0.001	<0.001	<0.001
T86288	MW-2A	Water	0.003	<0.001	<0.001	<0.001	<0.001	<0.001
T86289	OCD-6	Water	<0.001	<0.001	<0.001	<0.001	0.002	0.002
Method Blank			<0.001	<0.001	<0.001	<0.001	<0.001	
Reporting Limit			0.001	0.001	0.001	0.001	0.001	
QC			0.089	0.093	0.090	0.099	0.300	
RPD			0	3	2	2	4	
% Extraction Accuracy			95	103	100	107	111	
% Instrument Accuracy			89	93	90	99	100	

TEST	PREP METHOD	PREP DATE	ANALYSIS METHOD	ANALYSIS COMPLETED	CHEMIST	QC: (mg/L)	SPIKE: (mg/L)
BTEX	EPA 5030	11/29/97	EPA 8020	11/29/97	AG	0.100 ea	0.1 ea

Director, Dr. Blair Leftwich

12-4-97
Date

TRACE ANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING

December 19, 1997
Receiving Date: 11/29/97
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

Prep Date: 12/02/97
Analysis Date: 12/02/97
Sampling Date: 11/25-26/97
Sample Condition: Intact & Cool
Sample Received by: RW
Project Name: Semi-Annual Evap. Ponds

TA#	FIELD CODE		CHLORIDE (mg/L)	FLUORIDE (mg/L)	SULFATE (mg/L)	ALKALINITY (mg/L as CaCo3) HC03	C03
T86281	MW-3		1,600	7.4	2,700	280	<1.0
T86282	MW-1		3,000	<5.0	2,700	300	<1.0
T86283	MW-4		1,600	<5.0	1,800	230	<1.0
T86284	MW-5A		4,600	<5.0	7,700	410	<1.0
T86285	OCD-8A		3,100	<5.0	3,700	430	<1.0
T86286	OCD-2A		3,600	<5.0	3,800	510	<1.0
T86287	OCD-4		5,100	<5.0	3,000	190	<1.0
T86288	MW-2A		2,300	14	2,900	610	<1.0
T86289	OCD-6		2,800	<5.0	3,800	600	<1.0
QC	Quality Control		25	5.2	25	---	---
RPD			3	4	2	2	2
% Extraction Accuracy			101	107	101	---	---
% Instrument Accuracy			99	105	100	---	---
REPORTING LIMIT		2.0	10	5.0	10	1.0	1.0

METHODS: EPA 300.0, 310.1.
CHEMIST: CHLORIDE/SULFATE/FLUORIDE: RC ALKALINITY: JS
SPIKE: 25 mg/L CHLORIDE; 5.0 mg/L FLUORIDE; 25 mg/L SULFATE.
QC: 25 mg/L CHLORIDE; 5.2 mg/L FLUORIDE; 25 mg/L SULFATE.

Director, Dr. Blair Leftwich

12-15-97
Date

TRACE ANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

December 22, 1997
Receiving Date: 11/29/97
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Prep Date: 12/05/97
Analysis Date: 12/17/97
Sampling Date: 11/25-26/97
Sample Condition: Intact & Cool
Sample Received by: RW
Project Name: Semi-Annual Evap. Ponds

TA#	Field Code	POTASSIUM (mg/L)	MAGNESIUM (mg/L)	CALCIUM (mg/L)	SODIUM (mg/L)
T86281	MW-3	12.4	190	670	870
T86282	MW-1	9.6	380	1,030	1,180
T86283	MW-4	4.5	150	525	950
T86284	MW-5A	17.3	1,040	655	2,160
T86285	OCD-8A	15.6	410	850	1,500
T86286	OCD-2A	14.4	330	840	1,650
T86287	OCD-4	78.2	260	1,140	1,740
T86288	MW-2A	14.4	88	660	1,470
T86289	OCD-6	24.7	160	650	1,600
QC	Quality Control	51	50	49	;52
Reporting Limit		0.10	0.10	0.10	0.40
RPD		1	2	2	8
% Extraction Accuracy		96	108	108	104
% Instrument Accuracy		102	100	98	104

METHODS: EPA 200.7.
CHEMIST: RR
SPIKE: 100 mg/L POTASSIUM, MAGNESIUM, CALCIUM, SODIUM.
QC: 50 mg/L POTASSIUM, MAGNESIUM, CALCIUM, SODIUM.

Director, Dr. Blair Leftwich

12-22-97
Date

86281-89

Star Enterprise

TraceAnalysis, Inc.

6701 Aberdeen Avenue, Ste. 9 Lubbock, Texas 79424
Tel (806) 794 1296 Fax (806) 794 1298
1 (800) 378 1296

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

LAB Order ID # 448

Consulting Company Name:
Address: Navajo

Phone #:
Fax #: 505 748 3311

Consulting Contact: Darrell Moore

Star Contract:

Location Code: Semi-Annual Evap. Ponds

Casuality Loss #:

Star Job #

Consultant Job #

Location Address: Artesia NM

Sampler Signature: Laurie McDaniel

ANALYSIS REQUEST
(Circle or Specify Method No.)

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	SAMPLING: DATE	TIME	MTBE 8020/602	BTEX 8020/602	TPH	PAH 8270	Total Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC.MS Vol. 8240/8260/624	GC/MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 8080/608	BOD, TSS, PH	Turn Around Time if different from standard	Hold
86281	MW-3	4		X				X	X	X	X	11/25/97	11:50			See list													
82	MW-1	4		X				X	X	X	X	"	13:30			See list													
83	MW-4	5		X				X	X	X	X	"	14:10			See list													
84	MW-5A	4		X				X	X	X	X	"	14:40			See list													
85	OCD-8A	4		X				X	X	X	X	"	15:15			See list													
86	OCD-2A	4		X				X	X	X	X	11/26/97	11:00			See list													
87	OCD-4	4			X			X	X	X	X	"	11:35			See list													
88	MW-2A	4		X				X	X	X	X	"	12:15			See list													
89	OCD-6	4		X				X	X	X	X	"	12:45			See list													

Relinquished by: Laurie McDaniel Date: 11/28/97 Time: 14:00
Received by: Date: Time:

Relinquished by: Date: Time:
Received by: Date: Time:

Relinquished by: Date: Time:
Received at Laboratory by: Chris West Date: 11/29/97 Time: 10:30 AM

LAB USE ONLY
Intact (Y) N
Headspace Y (N)
Temp 0 °
Log-In Review

REMARKS:
00 Temp

Carrier # 321 1778 824 FedX AA 333

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C.O.C.

ORIGINAL COPY

TELEPHONE
(505) 748-3311

EASYLINK
62905278

NAVAJO REFINING COMPANY

501 EAST MAIN STREET ◦ P. O. BOX 159
ARTESIA, NEW MEXICO 88211-0159

FAX
(505) 746-6410 ACCTG
(505) 746-6155 EXEC
(505) 748-9077 ENGR
(505) 746-4438 P / L

June 27, 1997

Mr. Roger Anderson
NM Oil Conservation Division
Environmental Bureau
Oil Conservation Division
2040 S. Pacheco St.
Santa Fe, NM 87501

RE: SPRING 1997 REPORT GROUND WATER SAMPLING AROUND EVAPORATION PONDS

Dear Roger:

Enclosed are results from our Spring 1997 sampling of the monitor wells around the evaporation ponds. This is on a staggered schedule per your letter of October 21, 1991.

Several of these wells have been paired with deep wells. Therefore, you will notice that OCD-2 has become OCD-2A and MW-2 has become MW-2A and so on as needed. The deep wells are labeled as OCD-2B and so on. The following is a summary of field data:

Well #	Ground water ft amsL	pH	EC umhos	Deg. C	Description
MW-6A	3298.87	7.6	8,190	20	Mod. Odor
OCD-1	3301.76	7.4	9,820	20	Mod. Odor
OCD-3	3298.67	7.6	9,790	21	Mod. Odor
OCD-5	3297.08	7.5	10,250	21	Odor
OCD-7AR	3299.57	7.6	10,300	21	Murky, odor
MW-5A	3297.82	7.4	13,500	21	Lt Brown, odor
MW-3	3298.51	7.5	9,890	21	Odor
MW-7A	3297.48	7.4	9,250	21	Mod. Odor
MW-4	3298.33	7.5	8,200	21	Mod. Odor

If you have any questions, please contact me at 748-3311, extension 362.

Regards,
NAVAJO REFINING COMPANY

Bryan Madrid
Environmental Specialist

Encl.
cc: USEPA

TRACE ANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
Navajo Refining
Attention Darrell Moore
501 E. Main
Artesia NM 88210

Lab Receiving # : 9705000419
Date Rec: 5/23/97
Sampling Date: 5/19/97 - 5/21/97
Sample Condition: Intact and Cool
Sample Received By: JH

Date: May 28, 1997
Project: N/A
Proj Name: Evaporation Ponds
Proj Loc: Artesia

TA#	Field Code	MATRIX	MTBE (mg/L)	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL-BENZENE (mg/L)	M,P,O XYLENE (mg/L)	TOTAL BTEX (mg/L)
T74242	MW-3	Water	<0.001	<0.001	0.002	0.002	0.004	0.008
T74243	MW-5A	Water	0.004	<0.001	<0.001	<0.001	0.002	0.002
T74244	MW-6A	Water	<0.001	<0.001	0.004	0.005	0.010	0.019
T74245	MW-4	Water	0.002	0.017	0.007	0.022	0.033	0.079
T74246	MW-7A	Water	0.005	<0.001	<0.001	<0.001	<0.001	<0.001
T74247	OCD-1	Water	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
T74248	OCD-3	Water	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
T74249	OCD-5	Water	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
T74250	OCD-7AR	Water	0.003	<0.001	<0.001	<0.001	<0.001	<0.001
QC			0.102	0.107	0.107	0.106	0.325	
RPD			2	4	3	3	3	
% Extraction Accuracy			106	110	111	110	112	
% Instrument Accuracy			102	107	107	106	108	

Reporting Limit:			0.001	0.001	0.001	0.001	0.001	

TEST	PREP METHOD	PREP DATE	ANALYSIS METHOD	ANALYSIS COMPLETED	CHEMIST	QC: (mg/L)	SPIKE: (mg/L)
MTBE/BTEX	EPA 5030	5/24/97	EPA 8020	5/24/97	RW	0.100 ea	0.1 ea

Director, Dr. Blair Leftwich

5-28-97
Date

TRACE ANALYSIS, INC.

5701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

June 23 1997
Receiving Date: 05/23/97
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

ANALYTICAL RESULTS FOR
NAVAJO REFINING
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

Prep Date: 05/28/97
Analysis Date: 05/28/97
Sampling Date: 05/19,21/97
Sample Condition: Intact & Cool
Sample Received by: JH
Project Name: Semi-Anrual Evaporation Ponds

TOTAL METALS

TA#	FIELD CODE	As (mg/L)	Se (mg/L)	Cd (mg/L)	Cr (mg/L)	Pb (mg/L)	Ag (mg/L)	Ba (mg/L)	Al (mg/L)	Be (mg/L)	B (mg/L)	U (mg/L)
T74242	MW-3	0.012	<0.006	<0.02	<0.006	<0.010	<0.005	<0.20	1.0	<0.01	<1.0	1.4
T74243	MW-5A	0.032	<0.006	0.02	0.017	0.019	<0.005	<0.20	3.3	<0.01	1.3	5.6
T74244	MW-6A	<0.005	0.024	<0.02	0.016	0.012	<0.005	<0.20	0.40	<0.01	<1.0	<1.0
T74245	MW-4	0.018	<0.006	<0.02	0.012	0.014	<0.005	<0.20	0.27	<0.01	<1.0	2.2
T74246	MW-7A	0.014	<0.006	<0.02	0.007	<0.010	<0.005	<0.20	0.17	<0.01	1.1	<1.0
QC	Quality Control	5.0	4.7	5.1	5.0	4.8	0.24	4.6	4.6	5.3	4.9	5.2
REPORTING LIMIT		0.005	0.006	0.02	0.006	0.010	0.005	0.20	0.025	0.01	1.0	1.0
RPD		4	6	3	4	6	3	4	9	6	4	1
% Extraction Accuracy		92	90	111	106	98	80	96	86	99	108	100
% Instrument Accuracy		101	95	102	101	96	96	92	93	105	98	103

TA#	FIELD CODE	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	V (mg/L)	Zn (mg/L)	Hg (mg/L)
T74242	MW-3	<0.03	0.49	1.8	1.8	<0.10	0.014	<0.05	<0.02	<0.001
T74243	MW-5A	<0.03	0.82	11	1.6	<0.10	0.024	<0.05	0.09	<0.001
T74244	MW-6A	<0.03	0.88	1.1	0.56	<0.10	0.012	<0.05	<0.02	<0.001
T74245	MW-4	<0.03	0.87	3.9	2.4	<0.10	0.036	<0.05	0.02	<0.001
T74246	MW-7A	<0.03	0.69	8.8	0.47	<0.10	0.022	<0.05	0.04	<0.001
QC	Quality Control	4.9	4.3	4.9	5.0	5.0	5.0	4.8	4.9	0.0058
REPORTING LIMIT		0.03	0.02	0.03	0.01	0.10	0.01	0.05	0.02	0.001
RPD		4	4	7	3	4	4	7	4	6
% Extraction Accuracy		102	104	80	94	105	106	100	99	95
% Instrument Accuracy		97	85	99	100	99	100	97	97	116

METHODS: EPA 200.7, 245.1.
CHEMIST: As, Cd, Cr, Ba, Al, Be, Co, Cu, Fe, Mn, Mo, Ni, V, Zn, Se, Pb Ag, B, U: RR Hg: DM
TOTAL METALS SPIKE: 2.0 mg/L As, Se, Cd, Cr, Pb, Ba, Al, Be, B, U, Co, Cu, Fe, Mn, Mo, Ni, V, Zn; 0.15 mg/L Ag; 0.005 mg/L Hg.
TOTAL METALS QC: 5.0 mg/L As, Se, Cd, Cr, Pb, Ba, Al, Be, B, U, Co, Cu, Fe, Mn, Mo, Ni, V, Zn 0.25 mg/L Ag; 0.005 mg/L Hg.

Director, Dr. Blair Leftwich

6-23-97
DATE

TRACEANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

June 23, 1997
Receiving Date: 05/23/97
Sample Type: Water
Project No: NA
Project Location Artesia, NM

Prep Date: 06/02/97
Analysis Date: 06/02/97
Sampling Date: 05/19,21/97
Sample Condition: Intact & Cool
Sample Received by: JH
Project Name: Semi-Annua
Evaporation Ponds

TA#	Field Code	POTASSIUM (mg/L)	MAGNESIUM (mg/L)	CALCIUM (mg/L)	SODIUM (mg/L)
T74242	MW-3	3.7	310	870	1,600
T74243	MW-5A	9.8	1,700	830	6,400
T74244	MW-6A	1.9	200	780	1,100
T74245	MW-4	2.8	260	840	1,900
T74246	MW-7A	6.2	630	840	4,100
QC	Quality Control	26	25	26	25
Reporting Limit		0.10	0.01	0.01	0.40
RPD		8	1	4	3
% Extraction Accuracy		113	103	99	106
% Instrument Accuracy		105	98	103	100

METHODS: EPA 200.7.
CHEMIST: RR
SPIKE: 100 mg/L POTASSIUM, MAGNESIUM, CALCIUM, SODIUM.
QC: 25 mg/L POTASSIUM MAGNESIUM, CALCIUM SODIUM.

Director, Dr. Blair Leftwich

6-23-97
Date

TRACE ANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

June 23, 1997
Receiving Date: 05/23/97
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Prep Date: 06/02/97
Analysis Date: 06/02/97
Sampling Date: 05/21/97
Sample Condition: Intact & Cool
Sample Received by: JH
Project Name: Semi-Annua Evaporation Ponds

TA#	Field Code	POTASSIUM (mg/L)	MAGNESIUM (mg/L)	CALCIUM (mg/L)	SODIUM (mg/L)
T74247	OCD-1	6.0	290	1,100	4,100
T74248	OCD-3	23	260	840	2,900
T74249	OCD-5	45	400	1,300	4,700
T74250	OCD-7AR	6.3	380	1,100	3,400
QC	Quality Control	26	25	25	25
Reporting Limit		0.10	0.01	0.01	0.40
RPD		8	1	4	3
% Extraction Accuracy		113	103	99	106
% Instrument Accuracy		105	98	103	100

METHODS: EPA 200.7.
CHEMIST: RR
SPIKE: 100 mg/L POTASSIUM, MAGNESIUM, CALCIUM, SODIUM.
QC: 25 mg/L POTASSIUM, MAGNESIUM, CALCIUM SODIUM.

Director, Dr. Blair Leftwich

6-23-97
Date

TRACE ANALYSIS, INC.
6701 Aberdeer Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

June 23, 1997
Receiving Date: 05/23/97
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

ANALYTICAL RESULTS FOR
NAVAJO REFINING
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

Prep Date: 05/28/97
Analysis Date: 05/28/97
Sampling Date: 05/21/97
Sample Condition: Intact & Cool
Sample Received by: JH
Project Name: Semi-Annual Evaporation Ponds

TOTAL METALS

TA#	FIELD CODE	As (mg/L)	Se (mg/L)	Cd (mg/L)	Cr (mg/L)	Pb (mg/L)	Ag (mg/L)	Ba (mg/L)	Al (mg/L)	Be (mg/L)	B (mg/L)	U (mg/L)
T74247	OCD-1	0.027	<0.006	<0.02	0.013	0.022	<0.005	<0.20	1.1	<0.01	<1.0	5.3
T74248	OCD-3	0.008	<0.001	<0.02	0.013	<0.010	<0.005	<0.20	0.065	<0.01	1.0	1.6
T74249	OCD-5	0.012	0.010	<0.02	0.035	0.019	<0.005	<0.20	0.048	<0.01	1.1	2.1
T74250	OCD-7AR	0.019	<0.006	<0.02	0.021	0.011	<0.005	<0.20	7.5	<0.01	<1.0	3.4
QC	Quality Control	5.0	4.7	5.1	5.0	4.8	0.24	4.6	4.6	5.3	4.9	5.2
REPORTING LIMIT		0.005	0.006	0.02	0.006	0.010	0.005	0.20	0.025	0.01	1.0	1.0
RPD		4	6	3	4	6	3	4	9	6	4	1
% Extraction Accuracy		92	90	111	106	98	80	96	86	99	108	100
% Instrument Accuracy		101	95	102	101	96	96	92	93	105	98	103

TA#	FIELD CODE	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	V (mg/L)	Zn (mg/L)	Hg (mg/L)
T74247	OCD-1	<0.03	0.72	9.3	2.6	<0.10	0.059	<0.05	0.05	<0.001
T74248	OCD-3	<0.03	0.64	2.8	0.25	<0.10	<0.010	<0.05	0.03	<0.001
T74249	OCD-5	<0.03	0.43	4.0	0.23	<0.10	0.024	<0.05	0.06	<0.001
T74250	OCD-7AR	<0.03	0.50	6.0	4.6	<0.10	0.097	<0.05	0.05	<0.001
QC	Quality Control	4.9	4.3	4.9	5.0	5.0	5.0	4.8	4.9	0.0058
REPORTING LIMIT		0.03	0.02	0.03	0.01	0.10	0.01	0.05	0.02	0.001
RPD		4	4	7	3	4	4	7	4	6
% Extraction Accuracy		102	104	80	94	105	106	100	99	95
% Instrument Accuracy		97	95	99	100	99	100	97	97	116

METHODS: EPA 200.7, 245.1.
CHEMIST: As, Cd, Cr, Ba, Al, Be, Co, Cu, Fe, Mn, Mo, Ni, V, Zn, Se, Pb, Ag, B, U: RR Hg: DM
TOTAL METALS SPIKE: 2.0 mg/L As, Se, Cd, Cr, Pb, Ba, Al, Be, B, U, Co, Cu, Fe, Mn, Mo, Ni, V, Zn; 0.15 mg/L Ag; 0.005 mg/L Hg.
TOTAL METALS CC: 5.0 mg/L As Se, Cd, Cr, Pb, Ba, Al, Be, B, U, Co, Cu, Fe, Mn, Mo, Ni, V, Zn; 0.25 mg/L Ag; 0.005 mg/L Hg.

Director, Dr. Blair Leftwich

6-23-97
DATE

TRACEANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING

June 24, 1997
Receiving Date: 05/23/97
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

Prep Date: 06/02/97
Analysis Date: 06/02/97
Sampling Date: 05/19,21/97
Sample Condition: Intact & Cool
Sample Received by: JH
Project Name: Semi-Annual Evaporation Ponds

TA#	FIELD CODE	CHLORIDE (mg/L)	FLUORIDE (mg/L)	SULFATE (mg/L)	ALKALINITY (mg/L as CaCo3) HC03	C03
T74242	MW-3	1,100	2.6	2,700	280	<1.00
T74243	MW-5A	5,300	5.0	8,300	440	<1.00
T74244	MW-6A	600	2.7	2,000	120	<1.00
T74245	MW-4	1,200	2.1	2,100	260	<1.00
T74246	MW-7A	2,300	1.7	3,900	270	<1.00
QC	Quality Control	24	1.0	25	---	---
RPD		2	3	1	0	0
% Extraction Accuracy		97	88	99	---	---
% Instrument Accuracy		98	97	99	---	---
REPORTING LIMIT		1.0	0.1	1.0	1.00	1.00

METHODS: EPA 300.0, 310.1, 340.2.
CHEMIST CHLORIDE/SULFATE: RC FLUORIDE/ALKALINITY: JS
SPIKE: 25 mg/L CHLORIDE; 5.0 mg/L FLUORIDE; 25 mg/L SULFATE.
QC: 25 mg/L CHLORIDE; 1.0 mg/L FLUORIDE; 24 mg/L SULFATE.

Director, Dr. Blair Leftwich

6-24-97
Date

TRACE ANALYSIS, INC.
6701 Aberdeen Avenue Lubbock Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING

June 24, 1997
Receiving Date: 05/23/97
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

Prep Date: 06/02/97
Analysis Date: 06/02/97
Sampling Date: 05/21/97
Sample Condition: Intact & Cool
Sample Received by: JH
Project Name: Semi-Annual Evaporation Ponds

TA#	FIELD CODE	CHLORIDE (mg/L)	FLUORIDE (mg/L)	SULFATE (mg/L)	ALKALINITY (mg/L as CaCo3) HC03	C03
T74247	OCD-1	3,200	8.9	3,900	640	<1.00
T74248	OCD-3	1,800	1.3	3,100	310	<1.00
T74249	OCD-5	5,100	1.1	3,400	210	<1.00
T74250	OCD-7AR	1,100	3.3	380	590	<1.00
QC	Quality Control	24	0.99	25	---	---
RPD		2	2	1	0	0
% Extraction Accuracy		97	92	99	---	---
% Instrument Accuracy		98	98	99	---	---
REPORTING LIMIT		1.0	0.1	1.0	1.00	1.00

METHODS: EPA 300.0, 310.1, 340.2.
CHEMIST: CHLORIDE/SULFATE: RC FLUORIDE/ALKALINITY: JS
SPIKE: 25 mg/L CHLORIDE; 5.0 mg/L FLUORIDE; 25 mg/L SULFATE.
QC: 25 mg/L CHLORIDE; 1.0 mg/L FLUORIDE; 24 mg/L SULFATE.

Director, Dr. Blair Leftwich

6-24-97
Date

6701 Aberdeen Avenue
Lubbock, Texas 79424
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ANALYTICAL RESULTS FOR
NAVAJO REFINING COMPANY
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

June 24, 1997
Receiving Date: 05/23/97
Sample Type: Water
Sampling Date: 05/19/97
Sample Condition: I & C
Sample Received by: JH
Project Location: Artesia, NM
Project Name: Semi-Annual Evaporation Ponds
Extraction Date: 05/26/97
Analysis Date: 05/28/97

PAH

8270 Compounds (mg/L)	Reporting Limit	T/4245 MW-4	QC	RPD	%EA	%TA
Naphthalene	0.01	ND	75	14	67	94
2-methylnaphthalene	0.01	ND	---	---	---	---
1-methylnaphthalene	0.01	ND	---	---	---	---

ND = Not Detected

	% RECOVERY
Nitrobenzene-d5 SURR	94
2-Fluorobiphenyl SURR	94
Terphenyl-d14 SURR	100

*NOTE: Elevated reporting limit due to sample matrix interference.

METHODS: EPA SW 846-8270, 3510.
CHEMIST: HC/CC

Director, Dr. Blair Leftwich

6-24-97
DATE

6701 Aberdeen Avenue
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ANALYTICAL RESULTS FOR
NAVAJO REFINING COMPANY
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

June 24, 1997
Receiving Date: 05/23/97
Sample Type: Water
Sampling Date: 05/19/97
Sample Condition: I & C
Sample Received by: JH
Project Location: Artesia, NM
Project Name: Semi-Annual Evaporation Ponds
Extraction Date: 05/26/97
Analysis Date: 05/28/97

PAH 8270 Compounds (mg/L)	Reporting Limit	T74244 MW-6A	QC	RPD	%EA	%IA
Naphthalene	0.01	ND	75	14	67	94
2-methylnaphthalene	0.01	ND	---	---	---	---
1-methylnaphthalene	0.01	ND	---	---	---	---

ND = Not Detected

	% RECOVERY
Nitrobenzene-d5 SURR	96
2-Fluorobiphenyl SURR	94
Terphenyl-d14 SURR	102

*NOTE: Elevated reporting limit due to sample matrix

METHODS: EPA SW 846-8270, 3510.
CHEMIST: HC/CC

Director, Dr. Blair Leftwich

6-24-97
DATE

TRACE ANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

June 24, 1997
Receiving Date: 06/03/97
Sample Type: Catalyst
Project No: NA
Project Location: Artesia, NM

Prep Date: 06/06/97
Analysis Date: 06/06/97
Sampling Date: 06/02/97
Sample Condition: Intact & Cool
Sample Received by: JH
Project Name: NA

TA#	Field Code	REACTIVITY	SULFIDES (ppm)	CYANIDES (ppm)	CORROSIVITY	pH (s.u.)	IGNITABILITY
	EPA LIMIT =	---	500	250	---	<2 >12.5	---
T74833	Sulfur Guard	Non-reactive	<10	<2.5	Non-corrosive	7.6	Nonignitable
QC	Quality Control	---	---	---	---	7.0	---
RPD		0	0	0	0	0	0
% Extraction Accuracy		---	---	---	---	---	---
% Instrument Accuracy		---	---	---	---	100	---

METHODS: EPA SW 846-2.1.3, 2.1.2, 2.1.1.
CHEMIST: JT

Director, Dr. Blair Leftwich

6-25-97
DATE

TRACE ANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

June 24, 1997
Receiving Date: 06/03/97
Sample Type: Catalyst
Project No: NA
Project Location: Artesia, NM

Extraction Date: 06/05/97
Analysis Date: 06/05/97
Sampling Date: 06/02/97
Sample Condition Intact & Cool
Sample Received by: JH
Project Name: NA

TCLP METALS (mg/L)

TA#	Field Code	As	Se	Cd	Cr	Pb	Ag	Ba	Hg
	EPA LIMIT =	5.0	1.0	1.0	5.0	5.0	5.0	100.0	0.20
T74833	Sulfur Guard	<0.10	<0.10	<0.02	<0.05	0.35	<0.05	<0.20	<0.0
QC	Quality Control	4.9	5.1	5.2	5.1	5.1	1.0	5.1	0.053
Reporting Limit		0.10	0.10	0.02	0.05	0.10	0.05	0.20	0.01
RPD		4	1	1	2	1	19	2	2
% Extraction Accuracy		87	94	94	87	87	90	87	103
% Instrument Accuracy		99	102	104	103	102	104	102	106

CHEMIST: As, Se, Cd, Cr, Pb, Ag, Ba: RR Hg: DM
METHODS: EPA SW846-1311, 6010, 7470.
TCLP METALS SPIKE: 1.5 mg/L As, Se, Ba, Cd, Cr; Pb; 2.0 mg/L Ag; 0.05 mg/L Hg.
TCLP METALS QC: 5.0 mg/L As, Se, Cd, Cr, Pb, Ba; 1.0 mg/L Ag; 0.05 mg/L Hg.

Director, Dr. Blair Leftwich

6-24-97
Date

6701 Aberdeen Avenue
Lubbock, Texas 79424
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FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

June 24, 1997
Receiving Date: 06/03/97
Sample Type: Catalyst
Project No: NA
Project Location: Artesia, NM

Extraction Date: 06/03/97
Analysis Date: 06/06/97
Sampling Date: 06/02/97
Sample Condition: I & C
Sample Received by: JH
Project Name: NA

TCLP Semi-Volatiles (mg/L)	EPA Limit	Reporting Limit	T74833 Sulfur Guard	QC	RPD	%EA	%IA
Pyridine	5.0	0.05	ND	87	1	37	109
1,4-Dichlorobenzene	7.5	0.05	ND	78	12	47	98
o-Cresol	200.0	0.05	ND	78	13	55	98
m,p-Cresol	200.0	0.05	ND	73	14	53	91
Total Cresol	200.0	0.05	ND	---	---	---	---
Hexachloroethane	3.0	0.05	ND	78	14	51	98
Nitrobenzene	2.0	0.05	ND	75	14	57	94
Hexachlorobutadiene	0.5	0.05	ND	79	13	57	99
2,4,6-Trichlorophenol	2.0	0.05	ND	73	14	61	91
2,4,5-Trichlorophenol	400.0	0.05	ND	74	15	62	93
2,4-Dinitrotoluene	0.13	0.05	ND	79	8	69	99
2,4-D	10.0	0.05	ND	78	3	49	98
Hexachlorobenzene	0.13	0.05	ND	78	4	81	98
2,4,5-TP	1.0	0.05	ND	74	0	51	93
Pentachlorophenol	100.0	0.05	ND	70	6	77	88
Chlordane	0.03	0.001	ND	0.052	5	93	104
Toxaphene	0.5	0.05	ND	2.11	25	139	106
Lindane	0.4	0.001	ND	0.027	5	97	108
Heptachlor	0.008	0.001	ND	0.026	5	90	104
Heptachlor epoxide	0.008	0.001	ND	0.027	5	93	108
Total Heptachlor	0.008	0.001	ND	---	---	---	---
Endrin	0.02	0.001	ND	0.0535	3	122	107
Methoxychlor	10.0	0.1	ND	0.29	5	100	116

Surrogates	% RECOVERY
2-Fluorophenol	53
Phenol-d6	43
Nitrobenzene-d5	84
2-Fluorobiphenyl	88
2,4,6-Tribromophenol	88
Terphenyl-d14	103

Methods: EPA SW 846-1311, 8270, 8080.
CHEMIST: HC/CC
ND - Not Detected

Director, Dr. Blair Leftwich

6-27-97
DATE

6701 Aberdeen Avenue
Lubbock, Texas 79424
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FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

June 24, 1997
Receiving Date: 06/03/97
Sample Type: Catalyst
Project No: NA
Project Location: Artesia, NM

Extraction Date: 06/08/97
Analysis Date: 06/14/97
Sampling Date: 06/02/97
Sample Condition: I & C
Sample Received by: JH
Project Name: NA

TCLP VOLATILES (mg/L)	EPA LIMIT	Reporting Limit	T74833 Sulfur Guard	QC	RPD	%EA	%IA
Vinyl chloride	0.20	0.1	ND	0.095	1	114	95
1,1-Dichloroethene	0.70	0.1	ND	0.098	2	112	98
Methyl Ethyl Ketone	200.0	1.0	ND	0.098	2	109	98
Chloroform	6.00	0.1	ND	0.096	1	118	96
1,2-Dichloroethane	0.50	0.1	ND	0.097	2	116	97
Benzene	0.50	0.1	8.0	0.097	1	116	97
Carbon Tetrachloride	0.50	0.1	ND	0.097	4	117	97
Trichloroethene	0.50	0.1	ND	0.096	2	116	96
Tetrachloroethene	0.70	0.1	ND	0.093	2	112	93
Chlorobenzene	100.00	0.1	ND	0.097	3	107	97
1,4-Dichlorobenzene	7.50	0.1	ND	0.092	1	108	92

SURROGATES	% Recovery
Dibromofluoromethane	104
Toluene-d8	103
4-Bromofluorobenzene	102

ND = Not Detected

METHODS. EPA SW 846-1311, 8260.
CHEMIST: RP

Director, Dr. Blair Leftwich

6-25-97
DATE

TELEPHONE
(505) 748-3311

EASYLINK
62905278

NAVAJO REFINING COMPANY

501 EAST MAIN STREET ◦ P. O. BOX 159
ARTESIA, NEW MEXICO 88211-0159

FAX
(505) 746-6410 ACCTG
(505) 746-6155 EXEC
(505) 748-9077 ENGR
(505) 746-4438 P / L

February 3, 1997

Mr. Roger Anderson
NM Oil Conservation Division
Environmental Bureau
Oil Conservation Division
2040 S. Pacheco St.
Santa Fe, NM 87501

CERTIFIED MAIL/RETURN RECEIPT
P 355 936 392

RE: FALL 1996 REPORT GROUND WATER SAMPLING AROUND EVAPORATION PONDS

Dear Roger:

Enclosed are results from our Fall 1996 sampling of the monitor wells around the evaporation ponds. This is on a staggered schedule per your letter of October 21, 1991.

Several of these wells have been paired with deep wells. Therefore, you will notice that OCD-2 has become OCD-2A and MW-2 has become MW-2A and so on as needed. The deep wells are labeled as OCD-2B and so on. The following is a summary of field data:

Well #	Ground water ft amsL	pH	EC umhos	Deg. C	Description
MW-1	3301.40	8.9	11,680	20	Slt Odor
MW-2A	3299.97	7.8	11,400	20	Mod. Odor,
MW-3	3298.45	6.9	7,500	20	Mod. Odor,
MW-5A	3297.62	7.6	9,260	20	Hvy Odor
OCD-2A	3298.82	7.0	11,650	20	Odor
OCD-4	3298.07	7.1	12,450	20	Odor
OCD-6	3297.47	6.9	10, 050	20	Odor
OCD-8	3297.43	6.8	8,880	20	Mod. Odor
MW-4A	3300.57	7.4	5,980	20	Slt. Odor

If you have any questions, please contact me at 748-3311, extension 281.

Regards,
NAVAJO REFINING COMPANY

Darrell Moore

Darrell Moore
Sr. Environmental Specialist

Encl.
cc: USEPA- P 355 936 391

TRACE ANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

January 17, 1997
Receiving Date: 12/27/96
Sample Type: Water
Project No: NA
Project Location: Evaporation Ponds

Prep Date: 12/30/96
Analysis Date: 12/30/96
Sampling Date: 12/26/96
Sample Condition: Intact & Cool
Sample Received by: SH
Project Name: NA

TA#	FIELD CODE	CHLORIDE (mg/L)	FLUORIDE (mg/L)	SULFATE (mg/L)	ALKALINITY (mg/L as CaCo3) HCO3	CO3
T65094	MW-1	3,300	1.6	3,000	380	0
T65095	MW-2A	2,400	9.8	2,400	560	0
T65096	MW-3	1,200	2.7	2,200	260	0
T65097	MW-5A	2,900	3.5	3,500	380	0
T65098	OCD-2A	3,500	1.6	3,200	520	0
T65099	OCD-4	5,100	1.1	2,400	210	0
T65100	OCD-6	2,500	4.2	3,100	590	0
T65101	OCD-8A	2,300	3.7	2,800	410	0
T65102	MW-4A	1,400	2.2	1,600	230	0
QC	Quality Control	24	1.1	25	---	---
RPD		5	0	0	1	1
% Extraction Accuracy		93	90	104	---	---
% Instrument Accuracy		96	110	100	---	---
REPORTING LIMIT		2.0	0.1	2.0	10	10

METHODS: EPA 300.0, 310.1, 340.2.
CHEMIST: Chloride/Fluoride/Sulfate: MS Alkalinity: RCD
SPIKE: 1,000 mg/L CHLORIDE, SULFATE; 2.0 mg/L FLUORIDE.
QC: 25 mg/L CHLORIDE, SULFATE; 1.0 mg/L FLUORIDE.

BB

Director, Dr. Blair Leftwich
Director, Dr. Bruce McDonell

1-17-97
Date

6701 Aberdeen Avenue
Lubbock, Texas 79424
806•794•1296
FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

January 17, 1997
Receiving Date: 12/27/96
Sample Type: Water
Sampling Date: 12/26/96
Sample Condition: I & C
Sample Received by: SH
Proj. Loc: Evaporation Ponds
Extraction Date: 01/06/97
Analysis Date: 01/06/97

PAH Reporting T65102

8270 Compounds (mg/L)	Limit	MW-4A	QC	RPD	%EA	%IA
Naphthalene	0.001	ND	75	4	72	94
1-methylnaphthalene	0.001	0.001	---	---	---	---
2-methylnaphthalene	0.001	ND	---	---	---	---

ND = Not Detected

% RECOVERY

Nitrobenzene-d5 SURR	77
2-Fluorobiphenyl SURR	81
Terphenyl-d14 SURR	113

METHODS: EPA SW 846-8270, 3510.
CHEMIST: RD/CC

1-17-97

Director, Dr. Blair Leftwich **DATE**
Director, Dr. Bruce McDonell

TRACE ANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

January 28, 1997
Receiving Date: 12/27/96
Sample Type: Water
Project No: NA
Project Location: Evaporation Ponds

Prep Date: 12/31/96
Analysis Date: 01/27/97
Sampling Date: 12/26/96
Sample Condition: Intact & Cool
Sample Received by: SH
Project Name: NA

TA#	Field Code	POTASSIUM (mg/L)	MAGNESIUM (mg/L)	CALCIUM (mg/L)	SODIUM (mg/L)
T65094	MW-1	9.6	640	910	2,700
T65095	MW-2A	10	150	560	2,800
T65096	MW-3	7.9	210	550	1,300
T65097	MW-5A	12	510	550	3,700
T65098	OCD-2A	12	370	760	4,500
T65099	OCD-4	90	370	1,200	5,900
T65100	OCD-6	18	180	540	3,700
T65101	OCD-8A	15	400	810	3,600
T65102	MW-4A	4.7	160	450	1,500
QC	Quality Control	24.35	24.65	24.6	24
Reporting Limit		3.0	1.0	1.0	4.0
RPD		2	2	2	1
% Extraction Accuracy		109	119	122	108
% Instrument Accuracy		97	99	98	96

METHODS: EPA 200.7.
CHEMIST: RR
SPIKE: 100.0 mg/L POTASSIUM, MAGNESIUM, CALCIUM, SODIUM.
QC: 25.0 mg/L POTASSIUM, MAGNESIUM, CALCIUM, SODIUM.

Director, Dr. Blair Leftwich
Director, Dr. Bruce McDonell

1-28-97
Date

TRACE ANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
Navajo Refining
Attention Darrell Moore
501 E. Main
Artesia NM 88210

Date: Jan 03, 1997
Date Rec: 12/27/96
Project: Evaporation Ponds
Proj Name: Evaporation Ponds
Proj Loc:

Lab Receiving # : 9612000367
Sampling Date: 12/26/96
Sample Condition: Intact and Cool
Sample Received By: SH

TA#	Field Code	MATRIX	MTBE (mg/L)	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL-BENZENE (mg/L)	M,P,O XYLENE (mg/L)	TOTAL BTEX (mg/L)
T 65094	MW-1	Water	0.005	0.004	<0.001	0.002	0.013	0.019
T 65095	MW-2A	Water	0.007	0.001	<0.001	<0.001	0.003	0.004
T 65096	MW-3	Water	0.013	0.001	0.002	<0.001	0.006	0.009
T 65097	MW-5A	Water	0.027	0.014	0.006	<0.005	0.045	0.065
T 65098	OCD-2A	Water	0.020	<0.001	<0.001	<0.001	0.003	0.003
T 65099	OCD-4	Water	<0.001	<0.001	<0.001	<0.001	0.004	0.004
T 65100	OCD-6	Water	0.009	<0.001	<0.001	<0.001	0.003	0.003
T 65101	OCD-8A	Water	0.012	<0.001	<0.001	<0.001	0.001	0.001
T 65102	MW-4A	Water	0.013	0.016	0.008	0.014	0.037	0.075
QC			0.098	0.098	0.098	0.099	0.308	
RPD			1	1	2	1	1	
% Extraction Accuracy			101	98	100	104	107	
% Instrument Accuracy			98	98	98	99	103	
Reporting Limit:			0.001	0.001	0.001	0.001	0.001	

TEST	PREP METHOD	PREP DATE	ANALYSIS METHOD	ANALYSIS COMPLETED	CHEMIST	QC: (mg/L)	SPIKE: (mg/L)
MTBE/BTEX	EPA 5030	12/31/96	EPA 8020	1/2/97	RW	0.100 ea	0.1 ea

Director, Dr. Blair Leftwich
Director, Dr. Bruce McDonell

1-3-97
Date

(367)

TraceAnalysis, Inc.

6701 Aberdeen Avenue Lubbock, Texas 79424
Tel (806) 794 1296 Fax (806) 794 1298
1 (800) 378 1296

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Darrell Moore
Phone #:
FAX #:
Company Name & Address: Navajo Refining
Project #:
Project Name :
Project Location: Evaporation Ponds
Sampler Signature:

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	SAMPLING: DATE	TIME	BTEX, MTBE	TPH	Total Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	8240 / 8260	8270
65094	MW-1	4		X				2	1	4	1	12/26/96	9:00	✓		See List						
95	MW-2A	"		"				"	"	"	"	"	9:20	✓		"			"			
96	MW-3	"		"				"	"	"	"	"	9:40	✓		"			"			
97	MW-5A	"		"				"	"	"	"	"	10:00	✓		"			"			
98	OCD-2A	"		"				"	"	"	"	"	10:20	✓		"			"			
99	OCD-4	"		"				"	"	"	"	"	10:40	✓		"			"			
100	OCD-6	"		"				"	"	"	"	"	11:00	✓		"			"			
01	OCD-8A *	"		"				"	"	"	"	"	11:20	✓		"			"			
02	MW-4A **	5		"				2	1	5	2	"	11:40	✓		"			"			

SPECIAL HANDLING
Turn around # of days
Fax ASAP
Hold

Relinquished by: Darrell Moore **Date:** 12/26/96 **Time:** 16:15
Received by: **Date:** **Time:**
Relinquished by: **Date:** **Time:**
Received by: **Date:** **Time:**
Relinquished by: **Date:** **Time:**
Received at Laboratory by: **Date:** 12/27/96 **Time:** 12:00

LE

REMARKS

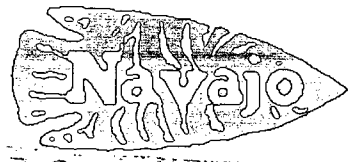
* OCD-8 on Containers QT & 500 mL VOA = 8A
** Napthalene 4A only for MW-4A DM 12-27-96

No metals Cations Anions only per DM 12-27-96

262AE

TELEPHONE
(505) 748-3311

EASYLINK
62905278



REFINING COMPANY

501 EAST MAIN STREET ◦ P. O. BOX 159
ARTESIA, NEW MEXICO 88211-0159

FAX
(505) 746-6410 ACCTG
(505) 746-6155 EXEC
(505) 748-9077 ENGR
(505) 746-4438 P / L

July 23, 1996

Mr. Roger Anderson
NM Oil Conservation Division
Environmental Bureau
Oil Conservation Division
2040 S. Pacheco St.
Santa Fe, NM 87501

CERTIFIED MAIL/RETURN RECEIPT
P 274 899 424

RE: SPRING 1996 REPORT GROUND WATER SAMPLING AROUND EVAPORATION PONDS

Dear Roger:

Enclosed are results from our Spring 1996 sampling of the monitor wells around the evaporation ponds. This is on a staggered schedule per your letter of October 21, 1991.

Several of these wells have been paired with deep wells. Therefore, you will notice that OCD-2 has become OCD-2A and MW-2 has become MW-2A and so on as needed. The deep wells are labeled as OCD-2B and so on. The following is a summary of field data:

Well #	Ground water ft amsL	pH	EC umhos	Deg. C	Description
MW-6	3298.32	8.8	3,680	20	Mod. Odor
OCD-1	3301.75	7.6	7,950	20	Mod. Odor,
OCD-3	3298.48	7.6	9,650	21	Mod. Odor,
OCD-5	3297.66	7.8	10,050	21	Odor
OCD-7	3298.82	8.2	4,630	21	Murky, odor
MW-5	3297.32	7.5	11,500	21	Lt Brown, odor
MW-3	3297.99	7.6	5,500	21	Odor
MW-7	3297-15	7.6	8,000	21	Mod. Odor

If you have any questions, please contact me at 748-3311, extension 281.

Regards,
NAVAJO REFINING COMPANY

Darrell Moore

Darrell Moore
Sr. Environmental Specialist

Encl.
cc: USEPA CERTIFIED MAIL/RETURN RECEIPT P 274 899 425

TRACE ANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING COMPANY
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

June 6, 1996
Receiving Date: 06/05/96
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Prep Date: 06/05/96
Analysis Date: 06/06/96
Sampling Date: 06/03/96
Sample Condition: Intact & Cool
Sample Received by: SH
Project Name: Semi-Annual Evap. Ponds

TA#	Field Code	MTBE (ug/L)	BENZENE (ug/L)	TOLUENE (ug/L)	ETHYL-BENZENE (ug/L)	M,P,O XYLENE (ug/L)	TOTAL BTEX (ug/L)
T53576	MW-6	<2	9	8	6	9	32
T53577	OCD-1	<1	<1	<1	<1	1	1
T53578	OCD-3	<1	<1	<1	<1	<1	<1
T53579	OCD-5	<1	<1	<1	<1	<1	<1
T53580	OCD-7	<1	<1	<1	<1	<1	<1
T53581	MW-5	<2	10	14	3	36	63
T53582	MW-3	<2	4	4	4	10	22
T53583	MW-7	<2	4	3	2	3	12
QC	Quality Control	109	103	103	103	205	
Reporting Limit		1	1	1	1	1	
RPD		0	1	1	1	1	
% Extraction Accuracy		109	104	105	105	105	
% Instrument Accuracy		109	103	103	103	102	

METHODS: EPA SW 846-8020, 5030.
MTBE/BTEX SPIKE AND QC: 100 ug/L MTBE/BTEX.
CHEMIST: MTBE/BTEX: McD

Director, Dr. Blair Leftwich
Director, Dr. Bruce McDonell

6-6-96
Date

TRACE ANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

July 5, 1996
Receiving Date: 06/05/96
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Prep Date: 06/07/96
Analysis Date: 06/07/96
Sampling Date: 06/03/96
Sample Condition: Intact & Cool
Sample Received by: SH
Project Name: Semi-Annual Evap. Ponds

TA#	FIELD CODE	CHLORIDE (mg/L)	FLUORIDE (mg/L)	SULFATE (mg/L)	ALKALINITY (mg/L as CaCo3) HCO3	CO3
T53576	MW-6	578	2.6	2,030	167	<3
T53577	OCD-1	2,620	7.9	3,370	581	<3
T53578	OCD-3	4,560	1.4	3,540	325	<3
T53579	OCD-5	4,850	0.9	3,150	208	<3
T53580	OCD-7	1,070	1.2	2,540	79	<3
T53581	MW-5	4,610	3.5	8,270	394	<3
T53582	MW-3	1,260	2.3	2,700	262	<3
T53583	MW-7	2,570	1.5	3,990	263	<3
QC	Quality Control	505	0.93	11.99	---	---
RPD		0	0	7	3	3
% Extraction Accuracy		99	96	114	---	---
% Instrument Accuracy		100	94	108	---	---
REPORTING LIMIT		0.5	0.1	1	10	10

METHODS: EPA 375.4, 310.1, 340.2; 4500 Cl-B.
CHEMIST: Chloride: JT Fluoride: MB/MS Sulfate: MS Alkalinity: RCD
SPIKE: 5,000 mg/L CHLORIDE; 5.0 mg/L FLUORIDE; 5,000 mg/L SULFATE.
QC: 500 mg/L CHLORIDE; 1.0 mg/L FLUORIDE; 10 mg/L SULFATE.

Director, Dr. Blair Leftwich
Director, Dr. Bruce McDonell

7-9-96
Date

TRACE ANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING COMPANY
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

June 18, 1996
Receiving Date: 06/05/96
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Prep Date: 06/06/96
Analysis Date: 06/12/96
Sampling Date: 06/03/96
Sample Condition: Intact & Cool
Sample Received by: SH
Project Name: Semi-Annual Evap. Ponds

TA#	Field Code	POTASSIUM (mg/L)	MAGNESIUM (mg/L)	CALCIUM (mg/L)	SODIUM (mg/L)
T53576	MW-6	2.7	120	422	623
T53577	OCD-1	10.2	139	589	2,010
T53578	OCD-3	28.4	270	739	2,520
T53579	OCD-5	39.5	233	749	2,520
T53580	OCD-7	13.4	122	559	725
T53581	MW-5	13.3	740	675	3,100
T53582	MW-3	8.0	183	550	1,020
T53583	MW-7	7.7	325	426	1,970
QC	Quality Control	5.6	5.2	5.4	6.33
Reporting Limit		0.3	0.01	0.01	0.4
RPD		3	4	6	5
% Extraction Accuracy		99	85	125	94
% Instrument Accuracy		113	104	108	106

METHODS: EPA 200.7.
CHEMIST: RR
SPIKE: 100.0 mg/L POTASSIUM, MAGNESIUM, CALCIUM, SODIUM.
QC: 5 mg/L POTASSIUM, MAGNESIUM, CALCIUM; 6 mg/L SODIUM.

BS

Director, Dr. Blair Leftwich
Director, Dr. Bruce McDonell

6-18-96
Date

6701 Aberdeen Avenue
Lubbock, Texas 79424
806•794•1296
FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING COMPANY
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

June 18, 1996
Receiving Date: 06/05/96
Sample Type: Water
Sampling Date: 06/03/96
Sample Condition: I & C
Sample Received by: SH
Project Location: Artesia, NM
Project Name: Semi-Annual Evap. Ponds

FIELD CODE: MW-6
TA #: T53576

Extraction Date: 06/06/96
Analysis Date: 06/07/96

8270 Compounds	Reporting Limit	Concentration (mg/L)	QC	RPD	%EA	%IA
Naphthalene	0.001	ND				
2-Methylnaphthalene	0.001	ND				

	% RECOVERY
2-Fluorophenol SURR	71
Phenol-d6 SURR	55
Nitrobenzene-d5 SURR	100
2-Fluorobiphenyl SURR	102
2,4,6-Tribromophenol SURR	93
Terphenyl-d14 SURR	72*

*NOTE: Surrogate Recovery out of range.

ND= NOT DETECTED

METHOD: EPA SW 846-8270, 3510.
CHEMIST: RD/CC

6-18-96

Director, Dr. Blair Leftwich
Director, Dr. Bruce McDonell

Date

6701 Aberdeen Avenue
Lubbock, Texas 79424
806•794•1296
FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING COMPANY
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

June 18, 1996
Receiving Date: 06/05/96
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Prep Date: 06/11/96
Analysis Date: 06/11/96
Sampling Date: 06/03/96
Sample Condition: Intact & Cool
Sample Received by: SH
Project Name: Semi-Annual Evap. Ponds

FIELD CODE: MW-6
TA#: T53576

8260 Compounds	Concentration (ug/L)	Reporting Limit
Benzene	ND	1
Toluene	4	1
Ethylbenzene	5	1
m & p-Xylene	2	1
o-Xylene	9	1
MTBE	ND	1

SURROGATES	**RECOVERY**
Dibromofluoromethane	100
Toluene-d8	99
4-Bromofluorobenzene	101

ND = Not Detected

METHODS: EPA SW 846-5030; EPA 8260.
CHEMIST: RP

6-18-96

Director, Dr. Blair Leftwich
Director, Dr. Bruce McDonell

Date

6701 Aberdeen Avenue
Lubbock, Texas 79424
806•794•1296
FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING COMPANY
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

June 18, 1996
Receiving Date: 06/05/96
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Prep Date: 06/11/96
Analysis Date: 06/11/96
Sampling Date: 06/03/96
Sample Condition: Intact & Cool
Sample Received by: SH
Project Name: Semi-Annual Evap. Ponds

FIELD CODE: MW-5
TA#: T53581

8260 Compounds	Concentration (ug/L)	Reporting Limit
Benzene	8	1
Toluene	15	1
Ethylbenzene	2	1
m & p-Xylene	32	1
o-Xylene	2	1
MTBE	ND	1

SURROGATES	**RECOVERY**
Dibromofluoromethane	101
Toluene-d8	98
4-Bromofluorobenzene	107

ND = Not Detected

METHODS: EPA SW 846-5030; EPA 8260.
CHEMIST: RP

6-18-96

Director, Dr. Blair Leftwich
Director, Dr. Bruce McDonell

Date

6701 Aberdeen Avenue
Lubbock, Texas 79424
806•794•1296
FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING COMPANY
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

June 18, 1996
Receiving Date: 06/05/96
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Prep Date: 06/11/96
Analysis Date: 06/11/96
Sampling Date: 06/03/96
Sample Condition: Intact & Cool
Sample Received by: SH
Project Name: Semi-Annual Evap. Ponds

FIELD CODE: MW-3
TA#: T53582

8260 Compounds	Concentration (ug/L)	Reporting Limit
Benzene	3	1
Toluene	2	1
Ethylbenzene	5	1
m & p-Xylene	2	1
o-Xylene	6	1
MTBE	ND	1

SURROGATES	**RECOVERY**
Dibromofluoromethane	98
Toluene-d8	100
4-Bromofluorobenzene	101

ND = Not Detected

METHODS: EPA SW 846-5030; EPA 8260.
CHEMIST: RP

Director, Dr. Blair Leftwich
Director, Dr. Bruce McDonell

6-18-96
Date

6701 Aberdeen Avenue
Lubbock, Texas 79424
806•794•1296
FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING COMPANY
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

June 18, 1996
Receiving Date: 06/05/96
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Prep Date: 06/11/96
Analysis Date: 06/11/96
Sampling Date: 06/03/96
Sample Condition: Intact & Cool
Sample Received by: SH
Project Name: Semi-Annual Evap. Ponds

FIELD CODE: MW-7
TA#: T53583

8260 Compounds	Concentration (ug/L)	Reporting Limit
Benzene	2	1
Toluene	ND	1
Ethylbenzene	ND	1
m & p-Xylene	ND	1
o-Xylene	ND	1
MTBE	ND	1

SURROGATES	**RECOVERY**
Dibromofluoromethane	97
Toluene-d8	100
4-Bromofluorobenzene	99

ND = Not Detected

METHODS: EPA SW 846-5030; EPA 8260.
CHEMIST: RP

Director, Dr. Blair Leftwich
Director, Dr. Bruce McDonell

6-18-96
Date

53576-83

TraceAnalysis, Inc.

6701 Aberdeen Avenue Lubbock, Texas 79424
Tel (806) 794 1296 Fax (806) 794 1298
1 (800) 378 1296

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Darrell Moore **Phone #:** **FAX #:**

Company Name & Address: Navajo

Project #: **Project Name :**

Project Location: Artesia **Sampler Signature:** Darrell Moore

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	WATER	SOIL	AIR	SLUDGE	HCL	HNO3	ICE	NONE	DATE	TIME
53576	MW-6	5		X				2	1		2	6/3/96	14:00
77	OCD-1	5		"				"	"		"	" "	14:30
78	OCD-3	"		"				"	"		"	" "	14:45
79	OCD-5	"		"				"	"		"	" "	15:00
80	OCD-7	"		"				"	"		"	" "	15:15
81	MW-5	"		"				"	"		"	" "	15:30
82	MW-3	"		"				"	"		"	" "	15:45
83	MW-7	"		"				"	"		"	" "	16:00

ANALYSIS REQUEST: BTEX, MTBE; TPH; Total Metals Ag As Ba Cd Cr Pb Hg Se; TCLP Metals Ag As Ba Cd Cr Pb Hg Se; TCLP Volatiles; TCLP Semi Volatiles; RCI; 8240 / 8260; 8270

See List for Semi-Annual Evap Ponds.
*One change - no longer need metals

SPECIAL HANDLING: Turn around # of days; Fax ASAP; Hold

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Darrell Moore	6/4/96	16:15			
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received at Laboratory by:	Date:	Time:
			[signature]	6-5-96	11:10A

REMARKS

Run MW 6, 5, 3, 7 MTBE + BTEX by 8260 per Darrell 6/7/96 F 6-7-96
F 6/20 7-10-96
NAUBT ~~X~~ 96

LI 15741 (358)

TELEPHONE
(505) 748-3311

EASYLINK
62905278

NAVAJO REFINING COMPANY

501 EAST MAIN STREET • P. O. BOX 159
ARTESIA, NEW MEXICO 88211-0159

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(505) 748-9077 ENGR
(505) 746-4438 P / L

July 31, 1995

Mr. Roger Anderson
NM Oil Conservation Division
Environmental Bureau
Oil Conservation Division
2040 S. Pacheco St.
Santa Fe, NM 87501

RE: SPRING 1995 REPORT GROUND WATER SAMPLING AROUND EVAPORATION PONDS

Dear Roger:

Enclosed are results from our Spring 1995 sampling of the monitor wells around the evaporation ponds. This is on a staggered schedule per your letter of October 21, 1991. The following is a summary of field observations:

Several of these wells have been paired with deep wells. Therefore, you will notice that OCD-2 has become OCD-2A and MW-2 has become MW-2A and so on as needed. The deep wells are labeled as OCD-2B and so on.

Well #	Ground water ft amsL	pH	EC umhos	Deg. C	Description
MW-3	3301.08	7.2	6660	22	Moderate odor
MW-4A	3300.27	7.3	7520	21	Mod. Odor, , Turbid
MW-5A	3299.54	7.2	15400	21	Odor, Silty, Turbid
MW-6A	3302.09	7.6	4280	22	Odor,Murky
MW-7A	3300.83	7.2	12000	22	Murky, odor
OCD-1	3300.97	7.4	11200	22	Brown, Mild odor
OCD-3	3299.98	7.7	17800	21	Brown,Turbid
OCD-5	3300.34	7.7	16900	22	Odor
OCD-7AR	3301.01	7.4	10700	22	Strong odor,

If you have any questions, please contact me at 748-3311, extension 281.

Regards,
NAVAJO REFINING COMPANY

Darrell Moore

Darrell Moore
Sr. Environmental Specialist

Encl.

imL

Inter-Mountain Laboratories, Inc.

Inorganics Laboratory
11183 SH 30 College Station, Texas 77845
Phone (409) 776-8945 FAX (409) 774-4705

Organics Laboratory
3304 Longmire Drive College Station, Texas 77845
Phone (409) 774-4999 Fax (409) 696-0692

BTEX
AROMATIC VOLATILE ORGANICS

Client:	**NAVAJO REFINING COMPANY**		
Project Name:	RFI-Phase III / Artesia, NM	Report Date:	07/05/95
Sample ID:	MW - 3	Date Sampled:	06/21/95
Sample Number:	0695G00957	Date Received:	06/24/95
Sample Matrix:	Water	Date Extracted:	07/05/95
Preservative:	Cool, HCl	Date Analyzed:	07/05/95
Condition:	Intact, pH < 2	Time Analyzed:	3:02 PM

Analyte	Concentration (ug/L)	Detection Limit (ug/L)
Benzene	ND	17
Toluene	ND	17
Ethylbenzene	18	17
p,m-Xylene	ND	17
o-Xylene	30	17

ND - Analyte not detected at stated detection limit.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	131%	75 - 125%
Bromofluorobenzene	99%	70 - 120%

Reference:

Method 5030, Purge and Trap.
Method 8020, Aromatic Volatile Organics.
SW-846, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, Final Update I, July 1992.

Comments: Matrix Interference resulted in high recovery of a,a,a- Trifluorotoluene.

Analyst

Review

imi

Inter-Mountain Laboratories, Inc.

Inorganics Laboratory
11183 SH 30 College Station, Texas 77845
Phone (409) 776-8945 FAX (409) 774-4705

Organics Laboratory
3304 Longmire Drive College Station, Texas 77845
Phone (409) 774-4999 Fax (409) 696-0692

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM
Sample ID: MW - 3
Lab ID: 0495W05650/0695G00957
Matrix: Water
Condition: Intact

Report Date: 07/11/95
Receipt Date: 06/26/95
Sample Date: 06/21/95

Parameter	Concentration	PQL	Method
pH (Lab)	7.2 s.u.	0.1	SW-846 9040
Conductivity (Lab)	6660 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180° C)	5250 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	317 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	1860 mg/L	1	Calculation
Fluoride	3.0 mg/L	0.1	EPA 340.2

Calcium	499 mg/L	24.90 meq/L	1 mg/L	SW-846 6010A
Magnesium	148 mg/L	12.21 meq/L	1 mg/L	SW-846 6010A
Potassium	10 mg/L	0.26 meq/L	1 mg/L	SW-846 6010A
Sodium	935 mg/L	40.67 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	387 mg/L	6.34 meq/L	1 mg/L	EPA 310.1
Carbonate	ND*	0.00	1 mg/L	EPA 310.1
Chloride	1090 mg/L	30.72 meq/L	1 mg/L	SW-846 9251
Sulfate	2060 mg/L	42.87 meq/L	5 mg/L	SW-846 9036
Major Cation Sum	78.04 meq/L		N/A	Calculation
Major Anion Sum	79.93 meq/L		N/A	Calculation
Cation/Anion Balance	-1.20 % Diff		N/A	Calculation

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

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EPA Method 8240
VOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project :	Artesia, NM	Report Date:	07/18/95
Sample ID:	MW-4A	Date Sampled:	06/28/95
Laboratory ID:	0695G00981	Date Received:	06/30/95
Sample Matrix:	Water	Date Extracted:	07/11/95
Preservative:	Cool, HCl	Date Analyzed:	07/11/95
Condition:	Intact, pH<2	Time Analyzed:	11:07 PM

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Benzene	0.015	0.005
Toluene	0.008	0.005
Ethylbenzene	0.019	0.005
m,p-Xylene	0.008	0.005
o-Xylene	0.028	0.005
Methyl ethyl ketone	0.012	0.020
Carbon disulfide	ND	0.005

ND - Analyte not detected at stated limit of detection

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
1,2-Dichloroethane-d4	99%	86 - 118%
Toluene-d8	103%	88 - 110%
Bromofluorobenzene	**1418%**	86 - 115%

Reference: Method 8240A: Gas Chromatography / Mass Spectrometry for Volatile Organics Test Methods for Evaluating Solid Waste, SW - 846, Final Update II, United States Environmental Protection Agency, September 1994.

Comments: A capillary column is used instead of a packed column as in the reference above. One surrogate recovery is out of acceptance limit due to matrix interference.

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EPA Method 8270
SEMIVOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project:	Artesia, NM	Report Date:	07/03/95
Sample ID:	MW-4A	Date Sampled:	06/28/95
Laboratory ID:	0695G00981	Date Received:	06/30/95
Sample Matrix:	Water	Date Extracted:	06/30/95
Condition:	Intact	Date Analyzed:	07/03/95
Preservative:	Cool	Time Analyzed:	11:34 AM

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Acenaphthene	ND	0.050
Acenaphthylene	ND	0.050
Anthracene	ND	0.050
Benzo(a)anthracene	ND	0.050
Benzo(b)fluoranthene	ND	0.050
Benzo(k)fluoranthene	ND	0.050
Benzo(g,h,i)perylene	ND	0.050
Benzo(a)pyrene	ND	0.050
Benzoic acid	ND	0.050
Benzyl alcohol	ND	0.050
Bis(2-chloroethoxy)methane	ND	0.050
Bis(2-chloroethyl)ether	ND	0.050
Bis(2-chloroisopropyl)ether	ND	0.125
Bis(2-ethylhexyl)phthalate	ND	0.125
4-Bromophenyl phenyl ether	ND	0.050
Butyl benzyl phthalate	ND	0.050
p - Chloroaniline	ND	0.050
p - Chloro - m - cresol	ND	0.050
2 - Chloronaphthalene	ND	0.050
2 - Chlorophenol	ND	0.050
4-Chlorophenyl phenyl ether	ND	0.050
Chrysene	ND	0.050
o - Cresol	ND	0.050
m,p - Cresol	ND	0.050
Di - n - butylphthalate	ND	0.125
Dibenz(a,h)anthracene	ND	0.050
o - Dichlorobenzene	ND	0.050
m - Dichlorobenzene	ND	0.050
p - Dichlorobenzene	ND	0.050
3,3 - Dichlorobenzidine	ND	0.050
2,4 - Dichlorophenol	ND	0.050
Diethyl phthalate	ND	0.050
2,4 - Dimethylphenol	ND	0.050
Dimethyl phthalate	ND	0.050

ND - Analyte not detected at stated limit of detection

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EPA Method 8270
SEMIVOLATILE ORGANIC COMPOUNDS

Client: **NAVAJO REFINING COMPANY**
Project: Artesia, NM
Sample ID: MW-4A
Laboratory ID: 0695G00981

Report Date: 07/03/95
Date Sampled: 06/28/95
Date Analyzed: 07/03/95

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
4,6 - Dinitro -2- methylphenol	ND	0.125
2,4 - Dinitrophenol	ND	0.125
2,4 - Dinitrotoluene	ND	0.050
2,6 - Dinitrotoluene	ND	0.050
Di-n-octyl phthalate	ND	0.125
Fluoranthene	ND	0.050
Fluorene	ND	0.050
Hexachlorobenzene	ND	0.050
Hexachlorocyclopentadiene	ND	0.125
Hexachloroethane	ND	0.050
Hexachlorobutadiene	ND	0.050
Ideno(1,2,3-cd)pyrene	ND	0.050
Isophorone	ND	0.050
2 - Methylnaphthalene	ND	0.050
Naphthalene	ND	0.050
Mono-Naphthalene	ND	0.050
o - Nitroaniline	ND	0.050
m - Nitroaniline	ND	0.050
p - Nitroaniline	ND	0.050
Nitrobenzene	ND	0.050
o - Nitrophenol	ND	0.050
p - Nitrophenol	ND	0.050
n - Nitrosodimethylamine	ND	0.050
n - Nitrosodiphenylamine	ND	0.050
n-Nitroso-di-n-propylamine	ND	0.050
Pentachlorophenol	ND	0.125
Phenanthrene	ND	0.050
Phenol	ND	0.050
Pyrene	ND	0.050
1,2,4 - Trichlorobenzene	ND	0.050
2,4,5 - Trichlorophenol	ND	0.050
2,4,6 - Trichlorophenol	ND	0.050

ND - Analyte not detected at stated limit of detection

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EPA Method 8270
SEMIVOLATILE HYDROCARBONS
ADDITIONAL DETECTED COMPOUNDS

Client: **NAVAJO REFINING COMPANY**
Project: Artesia, NM
Sample ID: MW-4A
Laboratory ID: 0695G00981

Report Date: 07/03/95
Date Sampled: 06/28/95
Date Analyzed: 07/03/95

Tentative Identification	Retention Time (Minutes)	Concentration (mg/L)
Unknown hydrocarbon	8.65	0.29
Hydrocarbon envelope	7 - 29	-

* - Concentration calculated using assumed Relative Response Factor = 1

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
2 - Fluorophenol	64%	21 - 110%
Phenol - d5	68%	10 - 110%
Nitrobenzene - d5	91%	35 - 114%
2 - Fluorobiphenyl	**124%**	43 - 116%
2,4,6 - Tribromophenol	95%	10 - 123%
Terphenyl - d14	140%	33 - 141%

References:

Method 3510: Separatory Funnel Liquid-Liquid Extraction.
Method 8270: Gas Chromatography / Mass Spectrometry for Semivolatile Organics Test Methods for Evaluating Solid Wastes, SW - 846, Final Update II, United States Environmental Protection Agency, September 1994.

Comments:

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WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM
Sample ID: MW - 4A
Lab ID: 0495W05736/0695G00981
Matrix: Water
Condition: Intact

Report Date: 07/13/95
Receipt Date: 06/30/95
Sample Date: 06/28/95

Parameter	Concentration	PQL	Method
pH (Lab)	7.3 s.u.	0.1	SW-846 9040
Conductivity (Lab)	7520 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180° C)	5750 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	247 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	1820 mg/L	1	Calculation
Fluoride	1.9 mg/L	0.1	EPA 340.2

Calcium	472 mg/L	23.55 meq/L	1 mg/L	SW-846 6010A
Magnesium	157 mg/L	12.92 meq/L	1 mg/L	SW-846 6010A
Potassium	2 mg/L	0.06 meq/L	1 mg/L	SW-846 6010A
Sodium	1250 mg/L	54.50 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	301 mg/L	4.93 meq/L	1 mg/L	EPA 310.1
Carbonate	ND*	0.00	1 mg/L	EPA 310.1
Chloride	1630 mg/L	46.07 meq/L	1 mg/L	SW-846 9251
Sulfate	1820 mg/L	37.91 meq/L	5 mg/L	SW-846 9036
Major Cation Sum	91.03 meq/L		N/A	Calculation
Major Anion Sum	88.90 meq/L		N/A	Calculation
Cation/Anion Balance	1.18 % Diff		N/A	Calculation

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

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BTEX
AROMATIC VOLATILE ORGANICS

Client:	**NAVAJO REFINING COMPANY**		
Project Name:	RFI-Phase III / Artesia, NM	Report Date:	07/05/95
Sample ID:	MW - 5A	Date Sampled:	06/21/95
Sample Number:	0695G00956	Date Received:	06/24/95
Sample Matrix:	Water	Date Extracted:	07/05/95
Preservative:	Cool, HCl	Date Analyzed:	07/05/95
Condition:	Intact, pH < 2	Time Analyzed:	12:04 PM

Analyte	Concentration (ug/L)	Detection Limit (ug/L)
Benzene	ND	5.0
Toluene	34	5.0
Ethylbenzene	6.0	5.0
p,m-Xylene	50	5.0
o-Xylene	ND	5.0

ND - Analyte not detected at stated detection limit.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	118%	75 - 125%
Bromofluorobenzene	115%	70 - 120%

Reference:

Method 5030, Purge and Trap.
Method 8020, Aromatic Volatile Organics.
SW-846, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, Final Update I, July 1992.

Comments: Elevated detection limit due to dilution required to reduce matrix effects.

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WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM
Sample ID: MW - 5A
Lab ID: 0495W05649/0695G00956
Matrix: Water
Condition: Intact

Report Date: 07/11/95
Receipt Date: 06/26/95
Sample Date: 06/21/95

Parameter	Concentration	PQL	Method
pH (Lab)	7.2 s.u.	0.1	SW-846 9040
Conductivity (Lab)	15400 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180° C)	13100 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	383 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	3730 mg/L	1	Calculation
Fluoride	2.9 mg/L	0.1	EPA 340.2

Calcium	546 mg/L	27.25 meq/L	1 mg/L	SW-846 6010A
Magnesium	575 mg/L	47.33 meq/L	1 mg/L	SW-846 6010A
Potassium	7 mg/L	0.19 meq/L	1 mg/L	SW-846 6010A
Sodium	2990 mg/L	129.93 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	467 mg/L	7.66 meq/L	1 mg/L	EPA 310.1
Carbonate	ND*	0.00	1 mg/L	EPA 310.1
Chloride	3050 mg/L	85.92 meq/L	1 mg/L	SW-846 9251
Sulfate	5100 mg/L	106.18 meq/L	5 mg/L	SW-846 9036
Major Cation Sum	204.70 meq/L		N/A	Calculation
Major Anion Sum	199.76 meq/L		N/A	Calculation
Cation/Anion Balance	1.22 % Diff		N/A	Calculation

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

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BTEX
AROMATIC VOLATILE ORGANICS

Client:	**NAVAJO REFINING COMPANY**		
Project Name:	RFI-Phase III / Artesia, NM	Report Date:	07/05/95
Sample ID:	MW - 6A	Date Sampled:	06/22/95
Sample Number:	0695G00958	Date Received:	06/24/95
Sample Matrix:	Water	Date Extracted:	07/05/95
Preservative:	Cool, HCl	Date Analyzed:	07/05/95
Condition:	Intact, pH < 2	Time Analyzed:	3:38 PM

Analyte	Concentration (ug/L)	Detection Limit (ug/L)
Benzene	ND	5.0
Toluene	ND	5.0
Ethylbenzene	5.9	5.0
p,m-Xylene	ND	5.0
o-Xylene	11	5.0

ND - Analyte not detected at stated detection limit.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	96%	75 - 125%
Bromofluorobenzene	97%	70 - 120%

Reference:

Method 5030, Purge and Trap.
Method 8020, Aromatic Volatile Organics.
SW-846, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, Final Update I, July 1992.

Comments: Elevated detection limit due to dilution required to reduce matrix effects.

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EPA Method 8270
SEMIVOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project:	RFI Phase III/Artesia, NM	Report Date:	06/26/95
Sample ID:	MW-6A	Date Sampled:	06/22/95
Laboratory ID:	0695G00958	Date Received:	06/24/95
Sample Matrix:	Water	Date Extracted:	06/26/95
Condition:	Intact	Date Analyzed:	06/26/95
Preservative:	Cool	Time Analyzed:	3:43 PM

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Acenaphthene	ND	0.020
Acenaphthylene	ND	0.020
Anthracene	ND	0.020
Benzo(a)anthracene	ND	0.020
Benzo(b)fluoranthene	ND	0.020
Benzo(k)fluoranthene	ND	0.020
Benzo(g,h,i)perylene	ND	0.020
Benzo(a)pyrene	ND	0.020
Benzoic acid	ND	0.020
Benzyl alcohol	ND	0.020
Bis(2-chloroethoxy)methane	ND	0.020
Bis(2-chloroethyl)ether	ND	0.020
Bis(2-chloroisopropyl)ether	ND	0.050
Bis(2-ethylhexyl)phthalate	ND	0.050
4-Bromophenyl phenyl ether	ND	0.020
Butyl benzyl phthalate	ND	0.020
p - Chloroaniline	ND	0.020
p - Chloro - m - cresol	ND	0.020
2 - Chloronaphthalene	ND	0.020
2 - Chlorophenol	ND	0.020
4-Chlorophenyl phenyl ether	ND	0.020
Chrysene	ND	0.020
o - Cresol	ND	0.020
m,p - Cresol	ND	0.020
Di - n - butylphthalate	ND	0.050
Dibenz(a,h)anthracene	ND	0.020
o - Dichlorobenzene	ND	0.020
m - Dichlorobenzene	ND	0.020
p - Dichlorobenzene	ND	0.020
3,3 - Dichlorobenzidine	ND	0.020
2,4 - Dichlorophenol	ND	0.020
Diethyl phthalate	ND	0.020
2,4 - Dimethylphenol	ND	0.020
Dimethyl phthalate	ND	0.020

ND - Analyte not detected at stated limit of detection

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EPA Method 8270
SEMIVOLATILE ORGANIC COMPOUNDS

Client: **NAVAJO REFINING COMPANY**
Project: RFI Phase III/Artesia, NM
Sample ID: MW-6A
Laboratory ID: 0695G00958

Report Date: 06/26/95
Date Sampled: 06/22/95
Date Analyzed: 06/26/95

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
4,6 - Dinitro -2- methylphenol	ND	0.050
2,4 - Dinitrophenol	ND	0.050
2,4 - Dinitrotoluene	ND	0.020
2,6 - Dinitrotoluene	ND	0.020
Di-n-octyl phthalate	ND	0.050
Fluoranthene	ND	0.020
Fluorene	ND	0.020
Hexachlorobenzene	ND	0.020
Hexachlorocyclopentadiene	ND	0.050
Hexachloroethane	ND	0.020
Hexachlorobutadiene	ND	0.020
Ideno(1,2,3-cd)pyrene	ND	0.020
Isophorone	ND	0.020
2 - Methylnaphthalene	ND	0.020
Naphthalene	ND	0.020
Mono-Naphthalene	ND	0.020
o - Nitroaniline	ND	0.020
m - Nitroaniline	ND	0.020
p - Nitroaniline	ND	0.020
Nitrobenzene	ND	0.020
o - Nitrophenol	ND	0.020
p - Nitrophenol	ND	0.020
n - Nitrosodimethylamine	ND	0.020
n - Nitrosodiphenylamine	ND	0.020
n-Nitroso-di-n-propylamine	ND	0.020
Pentachlorophenol	ND	0.050
Phenanthrene	ND	0.020
Phenol	ND	0.020
Pyrene	ND	0.020
1,2,4 - Trichlorobenzene	ND	0.020
2,4,5 - Trichlorophenol	ND	0.020
2,4,6 - Trichlorophenol	ND	0.020

ND - Analyte not detected at stated limit of detection

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EPA Method 8270
SEMIVOLATILE HYDROCARBONS
ADDITIONAL DETECTED COMPOUNDS

Client: **NAVAJO REFINING COMPANY**
Project: RFI Phase III/Artesia, NM
Sample ID: MW-6A
Laboratory ID: 0695G00958

Report Date: 06/26/95
Date Sampled: 06/22/95
Date Analyzed: 06/26/95

Tentative Identification	Retention Time (Minutes)	Concentration* (mg/L)
Unknown hydrocarbon	8.6	0.08
Hydrocarbon envelope	8 - 32	-

* - Concentration calculated using assumed Relative Response Factor = 1

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
2 - Fluorophenol	43%	21 - 110%
Phenol - d5	45%	10 - 110%
Nitrobenzene - d5	57%	35 - 114%
2 - Fluorobiphenyl	81%	43 - 116%
2,4,6 - Tribromophenol	74%	10 - 123%
Terphenyl - d14	95%	33 - 141%

References:

Method 3510: Separatory Funnel Liquid-Liquid Extraction.
Method 8270: Gas Chromatography / Mass Spectrometry for Semivolatile Organics Test Methods for Evaluating Solid Wastes, SW - 846, Final Update II, United States Environmental Protection Agency, September 1994.

Comments:

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WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM
Sample ID: MW - 6A
Lab ID: 0495W05651/0695G00958
Matrix: Water
Condition: Intact

Report Date: 07/11/95
Receipt Date: 06/26/95
Sample Date: 06/22/95

Parameter	Concentration	PQL	Method
pH (Lab)	7.6 s.u.	0.1	SW-846 9040
Conductivity (Lab)	4280 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180° C)	3340 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	148 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	1030 mg/L	1	Calculation
Fluoride	2.8 mg/L	0.1	EPA 340.2

Calcium	274 mg/L	13.67 meq/L	1 mg/L	SW-846 6010A
Magnesium	84 mg/L	6.91 meq/L	1 mg/L	SW-846 6010A
Potassium	1 mg/L	0.03 meq/L	1 mg/L	SW-846 6010A
Sodium	632 mg/L	27.49 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	181 mg/L	2.97 meq/L	1 mg/L	EPA 310.1
Carbonate	ND*	0.00	1 mg/L	EPA 310.1
Chloride	647 mg/L	18.25 meq/L	1 mg/L	SW-846 9251
Sulfate	1290 mg/L	26.86 meq/L	5 mg/L	SW-846 9036
Major Cation Sum	48.10 meq/L		N/A	Calculation
Major Anion Sum	48.07 meq/L		N/A	Calculation
Cation/Anion Balance	0.03 % Diff		N/A	Calculation

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

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Robert Alford
Supervisor, Water Laboratory

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EPA Method 8240
VOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project :	Artesia, NM	Report Date:	07/18/95
Sample ID:	MW-7A	Date Sampled:	06/28/95
Laboratory ID:	0695G00985	Date Received:	06/30/95
Sample Matrix:	Water	Date Extracted:	07/12/95
Preservative:	Cool, HCl	Date Analyzed:	07/12/95
Condition:	Intact, pH<2	Time Analyzed:	1:01 AM

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Benzene	ND	0.005
Toluene	ND	0.005
Ethylbenzene	ND	0.005
m,p-Xylene	ND	0.005
o-Xylene	ND	0.005
Methyl ethyl ketone	ND	0.020
Carbon disulfide	ND	0.005

ND - Analyte not detected at stated limit of detection

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
1,2-Dichloroethane-d4	94%	86 - 118%
Toluene-d8	103%	88 - 110%
Bromofluorobenzene	779%	86 - 115%

Reference: Method 8240A: Gas Chromatography / Mass Spectrometry for Volatile Organics Test Methods for Evaluating Solid Waste, SW - 846, Final Update II, United States Environmental Protection Agency, September 1994.

Comments: A capillary column is used instead of a packed column as in the reference above. One surrogate recovery is out of acceptance limit due to matrix interference.

Analyst

Review

jml

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WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM
Sample ID: MW - 7A
Lab ID: 0495W05740/0695G00985
Matrix: Water
Condition: Intact

Report Date: 07/13/95
Receipt Date: 06/30/95
Sample Date: 06/28/95

Parameter	Concentration	PQL	Method
pH (Lab)	7.2 s.u.	0.1	SW-846 9040
Conductivity (Lab)	12000 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180° C)	8960 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	287 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	2310 mg/L	1	Calculation
Fluoride	1.5 mg/L	0.1	EPA 340.2

Calcium	383 mg/L	19.11 meq/L	1 mg/L	SW-846 6010A
Magnesium	330 mg/L	27.16 meq/L	1 mg/L	SW-846 6010A
Potassium	6 mg/L	0.15 meq/L	1 mg/L	SW-846 6010A
Sodium	2290 mg/L	99.61 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	350 mg/L	5.74 meq/L	1 mg/L	EPA 310.1
Carbonate	ND*	0.00	1 mg/L	EPA 310.1
Chloride	2500 mg/L	70.41 meq/L	1 mg/L	SW-846 9251
Sulfate	3410 mg/L	71.02 meq/L	5 mg/L	SW-846 9036
Major Cation Sum	146.03 meq/L		N/A	Calculation
Major Anion Sum	147.17 meq/L		N/A	Calculation
Cation/Anion Balance	-0.39 % Diff		N/A	Calculation

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

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BTEX
AROMATIC VOLATILE ORGANICS

Client:	**NAVAJO REFINING COMPANY**		
Project Name:	RFI-Phase III / Artesia, NM	Report Date:	07/05/95
Sample ID:	OCD - 1	Date Sampled:	06/22/95
Sample Number:	0695G00960	Date Received:	06/24/95
Sample Matrix:	Water	Date Extracted:	07/05/95
Preservative:	Cool, HCl	Date Analyzed:	07/05/95
Condition:	Intact, pH < 2	Time Analyzed:	7:30 PM

Analyte	Concentration (ug/L)	Detection Limit (ug/L)
Benzene	ND	5.0
Toluene	ND	5.0
Ethylbenzene	ND	5.0
p,m-Xylene	ND	5.0
o-Xylene	ND	5.0

ND - Analyte not detected at stated detection limit.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	100%	75 - 125%
Bromofluorobenzene	104%	70 - 120%

Reference:

Method 5030, Purge and Trap.
Method 8020, Aromatic Volatile Organics.
SW-846, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, Final Update I, July 1992.

Comments: Elevated detection limit due to dilution required to reduce matrix effects.

Analyst

Review

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WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM
Sample ID: OCD - 1
Lab ID: 0495W05653/0695G00960
Matrix: Water
Condition: Intact

Report Date: 07/11/95
Receipt Date: 06/26/95
Sample Date: 06/22/95

Parameter	Concentration	PQL	Method
pH (Lab)	7.4 s.u.	0.1	SW-846 9040
Conductivity (Lab)	11200 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180° C)	8660 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	591 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	1920 mg/L	1	Calculation
Fluoride	7.7 mg/L	0.1	EPA 340.2

Calcium	558 mg/L	27.84 meq/L	1 mg/L	SW-846 6010A
Magnesium	127 mg/L	10.45 meq/L	1 mg/L	SW-846 6010A
Potassium	8 mg/L	0.20 meq/L	1 mg/L	SW-846 6010A
Sodium	2150 mg/L	93.52 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	721 mg/L	11.82 meq/L	1 mg/L	EPA 310.1
Carbonate	ND*	0.00	1 mg/L	EPA 310.1
Chloride	2150 mg/L	60.56 meq/L	1 mg/L	SW-846 9251
Sulfate	2880 mg/L	59.90 meq/L	5 mg/L	SW-846 9036
Major Cation Sum	132.01 meq/L		N/A	Calculation
Major Anion Sum	132.28 meq/L		N/A	Calculation
Cation/Anion Balance	-0.10 % Diff		N/A	Calculation

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

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BTEX
AROMATIC VOLATILE ORGANICS

Client:	**NAVAJO REFINING COMPANY**		
Project Name:	RFI-Phase III / Artesia, NM	Report Date:	07/06/95
Sample ID:	OCD - 3	Date Sampled:	06/22/95
Sample Number:	0695G00962	Date Received:	06/24/95
Sample Matrix:	Water	Date Extracted:	07/06/95
Preservative:	Cool, HCl	Date Analyzed:	07/06/95
Condition:	Intact, pH < 2	Time Analyzed:	6:27 PM

Analyte	Concentration (ug/L)	Detection Limit (ug/L)
Benzene	ND	1.0
Toluene	ND	1.0
Ethylbenzene	ND	1.0
p,m-Xylene	ND	1.0
o-Xylene	ND	1.0

ND - Analyte not detected at stated detection limit.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	97%	75 - 125%
Bromofluorobenzene	91%	70 - 120%

Reference:

Method 5030, Purge and Trap.
Method 8020, Aromatic Volatile Organics.
SW-846, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, Final Update I, July 1992.

Comments: Elevated detection limit due to dilution required to reduce matrix effects.

Analyst

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WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM
Sample ID: OCD - 3
Lab ID: 0495W05655/0695G00962
Matrix: Water
Condition: Intact

Report Date: 07/11/95
Receipt Date: 06/26/95
Sample Date: 06/22/95

Parameter	Concentration	PQL	Method
pH (Lab)	7.7 s.u.	0.1	SW-846 9040
Conductivity (Lab)	17800 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180° C)	13500 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	239 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	3610 mg/L	1	Calculation
Fluoride	1.0 mg/L	0.1	EPA 340.2

Calcium	975 mg/L	48.65 meq/L	1 mg/L	SW-846 6010A
Magnesium	285 mg/L	23.46 meq/L	1 mg/L	SW-846 6010A
Potassium	39 mg/L	1.00 meq/L	1 mg/L	SW-846 6010A
Sodium	2990 mg/L	129.84 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	291 mg/L	4.77 meq/L	1 mg/L	EPA 310.1
Carbonate	ND*	0.00	1 mg/L	EPA 310.1
Chloride	5290 mg/L	149.20 meq/L	1 mg/L	SW-846 9251
Sulfate	2460 mg/L	51.18 meq/L	5 mg/L	SW-846 9036
Major Cation Sum	202.95 meq/L		N/A	Calculation
Major Anion Sum	205.15 meq/L		N/A	Calculation
Cation/Anion Balance	-0.54 % Diff		N/A	Calculation

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

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BTEX
AROMATIC VOLATILE ORGANICS

Client:	**NAVAJO REFINING COMPANY**		
Project Name:	RFI-Phase III / Artesia, NM	Report Date:	07/06/95
Sample ID:	OCD - 5	Date Sampled:	06/22/95
Sample Number:	0695G00963	Date Received:	06/24/95
Sample Matrix:	Water	Date Extracted:	07/06/95
Preservative:	Cool, HCl	Date Analyzed:	07/06/95
Condition:	Intact, pH < 2	Time Analyzed:	7:32 PM

Analyte	Concentration (ug/L)	Detection Limit (ug/L)
Benzene	ND	5.0
Toluene	ND	5.0
Ethylbenzene	ND	5.0
p,m-Xylene	ND	5.0
o-Xylene	ND	5.0

ND - Analyte not detected at stated detection limit.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	98%	75 - 125%
Bromofluorobenzene	92%	70 - 120%

Reference:

Method 5030, Purge and Trap.
Method 8020, Aromatic Volatile Organics.
SW-846, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, Final Update I, July 1992.

Comments: Elevated detection limit due to dilution required to reduce matrix effects.

Analyst

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WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM
Sample ID: OCD - 5
Lab ID: 0495W05656/0695G00963
Matrix: Water
Condition: Intact

Report Date: 07/11/95
Receipt Date: 06/26/95
Sample Date: 06/22/95

Parameter	Concentration	PQL	Method
pH (Lab)	7.7 s.u.	0.1	SW-846 9040
Conductivity (Lab)	16900 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180° C)	12500 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	190 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	2810 mg/L	1	Calculation
Fluoride	1.1 mg/L	0.1	EPA 340.2

Calcium	757 mg/L	37.77 meq/L	1 mg/L	SW-846 6010A
Magnesium	223 mg/L	18.35 meq/L	1 mg/L	SW-846 6010A
Potassium	40 mg/L	1.02 meq/L	1 mg/L	SW-846 6010A
Sodium	3180 mg/L	138.41 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	231 mg/L	3.79 meq/L	1 mg/L	EPA 310.1
Carbonate	ND*	0.00	1 mg/L	EPA 310.1
Chloride	4700 mg/L	132.64 meq/L	1 mg/L	SW-846 9251
Sulfate	2760 mg/L	57.42 meq/L	5 mg/L	SW-846 9036
Major Cation Sum	195.55 meq/L		N/A	Calculation
Major Anion Sum	193.85 meq/L		N/A	Calculation
Cation/Anion Balance	0.44 % Diff		N/A	Calculation

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

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EPA Method 8240
VOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project :	RFI Phase III	Report Date:	07/06/95
Sample ID:	OCD 7AR	Date Sampled:	06/26/95
Laboratory ID:	0695G00974	Date Received:	06/29/95
Sample Matrix:	Water	Date Extracted:	07/02/95
Preservative:	Cool, HCl	Date Analyzed:	07/02/95
Condition:	Intact, pH <2	Time Analyzed:	10:58 PM

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Benzene	ND	0.005
Ethylbenzene	ND	0.005
Toluene	ND	0.005
Xylenes (total)	ND	0.005

ND - Analyte not detected at stated limit of detection

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
Dibromofluoromethane	113%	86 - 118%
Toluene-d8	94%	88 - 110%
Bromofluorobenzene	113%	86 - 115%

Reference: Method 8240A: Gas Chromatography / Mass Spectrometry for Volatile Organics Test Methods for Evaluating Solid Waste, SW - 846, Update II, United States Environmental Protection Agency, September 1994.

Comments: A capillary column is used instead of a packed column as in the reference above.

Analyst

Review

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WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM
Sample ID: OCD - 7AR
Lab ID: 0495W05728/0695G00974
Matrix: Water
Condition: Intact

Report Date: 07/12/95
Receipt Date: 06/29/95
Sample Date: 06/26/95

Parameter	Concentration	PQL	Method
pH (Lab)	7.4 s.u.	0.1	SW-846 9040
Conductivity (Lab)	10700 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180° C)	8110 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	490 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	2040 mg/L	1	Calculation
Fluoride	7.6 mg/L	0.1	EPA 340.2

Calcium	593 mg/L	29.59 meq/L	1 mg/L	SW-846 6010A
Magnesium	135 mg/L	11.11 meq/L	1 mg/L	SW-846 6010A
Potassium	11 mg/L	0.28 meq/L	1 mg/L	SW-846 6010A
Sodium	1860 mg/L	80.90 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	598 mg/L	9.80 meq/L	1 mg/L	EPA 310.1
Carbonate	ND*	0.00	1 mg/L	EPA 310.1
Chloride	1990 mg/L	56.16 meq/L	1 mg/L	SW-846 9251
Sulfate	2800 mg/L	58.19 meq/L	5 mg/L	SW-846 9036
Major Cation Sum	121.88 meq/L		N/A	Calculation
Major Anion Sum	124.15 meq/L		N/A	Calculation
Cation/Anion Balance	-0.92 % Diff		N/A	Calculation

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

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January 23, 1995

Mr. Roger Anderson
NM Oil Conservation Division
Land Office Building
P.O. Box 2088
Santa Fe, NM 87501

RE: FALL 1994 REPORT GROUND WATER SAMPLING AROUND EVAPORATION PONDS

Dear Roger:

Enclosed are results from our Fall 1994 sampling of the monitor wells around the evaporation ponds. This is on a staggered schedule per your letter of October 21, 1991. The following is a summary of field observations:

Several of these wells have been paired with deep wells. Therefore, you will notice that OCD-2 has become OCD-2A and MW-2 has become MW-2A and so on as needed. The deep wells are labeled as OCD-2B and so on.

Well #	Ground water ft amsL	pH	EC umhos	Deg. C	Description
MW-1	3301.11	7.5	16500	19	Slight Odor, Silty,
MW-2A	3301.77	7.5	13000	20	Odor
MW-3	3299.28	7.5	6150	20	Moderate odor
MW-4	3299.07	7.0	7900	19	Mod. Odor, , Turbid
MW-5A	3298.37	7.5	19500	19	Odor, Silty, Turbid
OCD-2A	3300.91	7.5	17000	20	Odor,Murky
OCD-4	3299.51	7.5	20500	20	Murky, odor
OCD-6	3299.46	7.5	15000	20	Brown, Mild odor
OCD-8A	3298.73	7.5	11400	19	Brown,Turbid

If you have any questions, please contact me at 748-3311, extension 281.

Respectfully yours,

Darrell Moore

Darrell Moore
Environmental Specialist

ENCL.

Inter-Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

EPA Method 8240
VOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project :	RFI Phase III / Artesia, NM	Report Date:	11/11/94
Sample ID:	MW-1	Date Sampled:	11/05/94
Laboratory ID:	0694G02080	Date Received:	11/08/94
Sample Matrix:	Water	Date Extracted:	11/11/94
Preservative:	Cool, HCl	Date Analyzed:	11/11/94
Condition:	Intact, pH<2		

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Benzene	ND	0.005
Toluene	ND	0.005
Ethylbenzene	ND	0.005
m,p-Xylene	ND	0.005
o-Xylene	ND	0.005
Methyl ethyl ketone	ND	0.005
Carbon disulfide	ND	0.005

ND - Analyte not detected at stated limit of detection

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
Dibromofluoromethane	100%	86 - 118%
Toluene - d8	100%	88 - 110%
Bromofluorobenzene	101%	86 - 115%

Reference: Method 8240A: Gas Chromatography / Mass Spectrometry for Volatile Organics Test Methods for Evaluating Solid Waste, SW - 846, Final Update I, United States Environmental Protection Agency, July 1992.

Comments: A capillary column is used instead of a packed column as in the reference above.

Analyst

Review

Inter-Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

EPA Method 8270
SEMIVOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project:	RFI Phase III / Artesia, NM	Report Date:	11/13/94
Sample ID:	MW - 1	Date Sampled:	11/05/94
Laboratory ID:	0694G02080	Date Received:	11/08/94
Sample Matrix:	Water	Date Extracted:	11/10/94
Condition:	Intact	Date Analyzed:	11/11/94
Preservative:	Cool		

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Acenaphthene	ND	0.010
Acenaphthylene	ND	0.010
Anthracene	ND	0.010
Benzo(a)anthracene	ND	0.010
Benzo(b)fluoranthene	ND	0.010
Benzo(k)fluoranthene	ND	0.010
Benzo(g,h,i)perylene	ND	0.010
Benzo(a)pyrene	ND	0.010
Chrysene	ND	0.010
Dibenz(a,h)anthracene	ND	0.010
Fluoranthene	ND	0.010
Fluorene	ND	0.010
Ideno(1,2,3-cd)pyrene	ND	0.010
Naphthalene	ND	0.010
Phenanthrene	ND	0.010
Pyrene	ND	0.010

ND - Analyte not detected at stated limit of detection

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
2 - Fluorophenol	58%	21 - 110%
Phenol - d5	59%	10 - 110%
Nitrobenzene - d5	62%	35 - 114%
2 - Fluorobiphenyl	53%	43 - 116%
2,4,6 - Tribromophenol	81%	10 - 123%
Terphenyl - d14	85%	33 - 141%

References: Method 3510: Separatory Funnel Liquid-Liquid Extraction.
Method 8270: Gas Chromatography / Mass Spectrometry for Semivolatile Organics
Test Methods for Evaluating Solid Wastes, SW - 846, Final Update I, United States Environmental Protection Agency, July 1992.

Comments:

Ramona R. Dennis
Analyst

Review

Inter-Mountain Laboratories, Inc.

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College Station, Texas 77845

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM *
Sample ID: MW-1
Lab ID: 0494W10190/0694G02080
Matrix: Water
Condition: Intact

Report Date: 12/13/94
Receipt Date: 11/10/94
Sample Date: 11/05/94

Parameter	Concentration				PQL	Method
pH (Lab)	7.7	s.u.			0.1	SW-846 9040
Conductivity (Lab)	14500	µmhos/cm			1	SW-846 9050
Total Dissolved Solids (180° C)	10200	mg/L			10	EPA 160.1
Total Alkalinity (as CaCO3)	387	mg/L			1	EPA 310.1
Total Hardness (as CaCO3)	4040	mg/L			1	Calculation
Fluoride	1.2	mg/L			0.1	EPA 340.2
Calcium	862	mg/L	43.03	meq/L	1 mg/L	SW-846 6010A
Magnesium	459	mg/L	37.75	meq/L	1 mg/L	SW-846 6010A
Potassium	8	mg/L	0.20	meq/L	1 mg/L	SW-846 6010A
Sodium	2130	mg/L	92.45	meq/L	1 mg/L	SW-846 6010A
Bicarbonate	472	mg/L	7.74	meq/L	1 mg/L	EPA 310.1
Carbonate	ND*		0.00		1 mg/L	EPA 310.1
Chloride	3590	mg/L	179.33	meq/L	1 mg/L	SW-846 9251
Sulfate	2800	mg/L	58.29	meq/L	5 mg/L	SW-846 9036
Major Cation Sum	173.42	meq/L			N/A	Calculation
Major Anion Sum	167.46	meq/L			N/A	Calculation
Cation/Anion Balance	1.75	% Diff			N/A	Calculation
Total Metals						
Total Arsenic	0.013	mg/L			0.005	SW-846 7061A
Total Chromium	0.22	mg/L			0.02	SW-846 6010A
Total Lead	ND*				0.01 mg/L	SW-846 7421
Total Nickel	0.06	mg/L			0.01	SW-846 6010A

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

David N. Poelstra
Laboratory Manager

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM *
Sample ID: MW-1
Lab ID: 0494W10190/0694G02080
Matrix: Water
Condition: Intact

Report Date: 12/13/94
Receipt Date: 11/10/94
Sample Date: 11/05/94

Parameter	Concentration	PQL	Method
Dissolved Aluminum	ND*	0.1 mg/L	SW-846 6010A
Dissolved Antimony	0.1 mg/L	0.1	SW-846 6010A
Dissolved Arsenic	ND*	0.2 mg/L	SW-846 6010A
Dissolved Barium	ND*	0.05 mg/L	SW-846 6010A
Dissolved Beryllium	ND*	0.01 mg/L	SW-846 6010A
Dissolved Boron	0.40 mg/L	0.05	SW-846 6010A
Dissolved Cadmium	0.07 mg/L	0.02	SW-846 6010A
Dissolved Chromium	ND*	0.02 mg/L	SW-846 6010A
Dissolved Cobalt	ND*	0.02 mg/L	SW-846 6010A
Dissolved Copper	ND*	0.01 mg/L	SW-846 6010A
Dissolved Iron	0.99 mg/L	0.05	SW-846 6010A
Dissolved Lead	ND*	0.1 mg/L	SW-846 6010A
Dissolved Manganese	2.43 mg/L	0.02	SW-846 6010A
Dissolved Nickel	0.06 mg/L	0.01	SW-846 6010A
Dissolved Molybdenum	ND*	0.05 mg/L	SW-846 6010A
Dissolved Selenium	ND*	0.2 mg/L	SW-846 6010A
Dissolved Silica	12.63 mg/L	0.05	SW-846 6010A
Dissolved Silver	ND*	0.01 mg/L	SW-846 6010A
Dissolved Thallium	ND*	0.2 mg/L	SW-846 6010A
Dissolved Vanadium	0.01 mg/L	0.01	SW-846 6010A
Dissolved Zinc	0.04 mg/L	0.01	SW-846 6010A

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

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EPA Method 8240
VOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project :	RFI Phase III / Artesia, NM	Report Date:	11/11/94
Sample ID:	MW-2A	Date Sampled:	11/05/94
Laboratory ID:	0694G02081	Date Received:	11/08/94
Sample Matrix:	Water	Date Extracted:	11/11/94
Preservative:	Cool, HCl	Date Analyzed:	11/11/94
Condition:	Intact, pH<2		

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Benzene	ND	0.005
Toluene	ND	0.005
Ethylbenzene	ND	0.005
m,p-Xylene	ND	0.005
o-Xylene	ND	0.005
Methyl ethyl ketone	ND	0.005
Carbon disulfide	ND	0.005

ND - Analyte not detected at stated limit of detection

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
Dibromofluoromethane	98%	86 - 118%
Toluene - d8	95%	88 - 110%
Bromofluorobenzene	95%	86 - 115%

Reference: Method 8240A: Gas Chromatography / Mass Spectrometry for Volatile Organics Test Methods for Evaluating Solid Waste, SW - 846, Final Update I, United States Environmental Protection Agency, July 1992.

Comments: A capillary column is used instead of a packed column as in the reference above.

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

EPA Method 8270
SEMIVOLATILE ORGANIC COMPOUNDS

Client: **NAVAJO REFINING COMPANY**
Project: RFI Phase III / Artesia, NM
Sample ID: MW - 2A
Laboratory ID: 0694G02081
Sample Matrix: Water
Condition: Intact
Preservative: Cool

Report Date: 11/13/94
Date Sampled: 11/05/94
Date Received: 11/08/94
Date Extracted: 11/10/94
Date Analyzed: 11/11/94

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Acenaphthene	ND	0.010
Acenaphthylene	ND	0.010
Anthracene	ND	0.010
Benzo(a)anthracene	ND	0.010
Benzo(b)fluoranthene	ND	0.010
Benzo(k)fluoranthene	ND	0.010
Benzo(g,h,i)perylene	ND	0.010
Benzo(a)pyrene	ND	0.010
Chrysene	ND	0.010
Dibenz(a,h)anthracene	ND	0.010
Fluoranthene	ND	0.010
Fluorene	ND	0.010
Ideno(1,2,3-cd)pyrene	ND	0.010
Naphthalene	ND	0.010
Phenanthrene	ND	0.010
Pyrene	ND	0.010

ND - Analyte not detected at stated limit of detection

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
2 - Fluorophenol	70%	21 - 110%
Phenol - d5	78%	10 - 110%
Nitrobenzene - d5	71%	35 - 114%
2 - Fluorobiphenyl	80%	43 - 116%
2,4,6 - Tribromophenol	102%	10 - 123%
Terphenyl - d14	90%	33 - 141%

References: Method 3510: Separatory Funnel Liquid-Liquid Extraction.
Method 8270: Gas Chromatography / Mass Spectrometry for Semivolatile Organics Test Methods for Evaluating Solid Wastes, SW - 846, Final Update I, United States Environmental Protection Agency, July 1992.

Comments:

Ramona B. Dennis
Analyst

Review

Inter-Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM *
Sample ID: MW-2A
Lab ID: 0494W10191/0694G02081
Matrix: Water
Condition: Intact

Report Date: 12/13/94
Receipt Date: 11/10/94
Sample Date: 11/05/94

Parameter	Concentration				PQL	Method
pH (Lab)	7.1	s.u.			0.1	SW-846 9040
Conductivity (Lab)	10600	µmhos/cm			1	SW-846 9050
Total Dissolved Solids (180° C)	7620	mg/L			10	EPA 160.1
Total Alkalinity (as CaCO3)	575	mg/L			1	EPA 310.1
Total Hardness (as CaCO3)	1730	mg/L			1	Calculation
Fluoride	14.3	mg/L			0.1	EPA 340.2
Calcium	542	mg/L	27.05	meq/L	1 mg/L	SW-846 6010A
Magnesium	91	mg/L	7.47	meq/L	1 mg/L	SW-846 6010A
Potassium	10	mg/L	0.26	meq/L	1 mg/L	SW-846 6010A
Sodium	2100	mg/L	91.47	meq/L	1 mg/L	SW-846 6010A
Bicarbonate	701	mg/L	11.50	meq/L	1 mg/L	EPA 310.1
Carbonate	ND*		0.00		1 mg/L	EPA 310.1
Chloride	1910	mg/L	95.08	meq/L	1 mg/L	SW-846 9251
Sulfate	2610	mg/L	54.24	meq/L	5 mg/L	SW-846 9036
Major Cation Sum	126.27	meq/L			N/A	Calculation
Major Anion Sum	119.53	meq/L			N/A	Calculation
Cation/Anion Balance	2.74	% Diff			N/A	Calculation
Total Metals						
Total Arsenic	0.156	mg/L			0.005	SW-846 7061A
Total Chromium	0.02	mg/L			0.02	SW-846 6010A
Total Lead	ND*				0.01 mg/L	SW-846 7421
Total Nickel	0.03	mg/L			0.01	SW-846 6010A

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

David N. Poelstra
Laboratory Manager

Inter-Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM *
Sample ID: MW-2A
Lab ID: 0494W10191/0694G02081
Matrix: Water
Condition: Intact

Report Date: 12/13/94
Receipt Date: 11/10/94
Sample Date: 11/05/94

Parameter	Concentration	PQL	Method
Dissolved Aluminum	ND*	0.1 mg/L	SW-846 6010A
Dissolved Antimony	ND*	0.1 mg/L	SW-846 6010A
Dissolved Arsenic	0.2 mg/L	0.2	SW-846 6010A
Dissolved Barium	ND*	0.05 mg/L	SW-846 6010A
Dissolved Beryllium	ND*	0.01 mg/L	SW-846 6010A
Dissolved Boron	0.37 mg/L	0.05	SW-846 6010A
Dissolved Cadmium	ND*	0.02 mg/L	SW-846 6010A
Dissolved Chromium	ND*	0.02 mg/L	SW-846 6010A
Dissolved Cobalt	ND*	0.02 mg/L	SW-846 6010A
Dissolved Copper	ND*	0.01 mg/L	SW-846 6010A
Dissolved Iron	4.72 mg/L	0.05	SW-846 6010A
Dissolved Lead	ND*	0.1 mg/L	SW-846 6010A
Dissolved Manganese	2.50 mg/L	0.02	SW-846 6010A
Dissolved Nickel	0.02 mg/L	0.01	SW-846 6010A
Dissolved Molybdenum	ND*	0.05 mg/L	SW-846 6010A
Dissolved Selenium	ND*	0.2 mg/L	SW-846 6010A
Dissolved Silica	20.97 mg/L	0.05	SW-846 6010A
Dissolved Silver	ND*	0.01 mg/L	SW-846 6010A
Dissolved Thallium	ND*	0.2 mg/L	SW-846 6010A
Dissolved Vanadium	ND*	0.01 mg/L	SW-846 6010A
Dissolved Zinc	ND*	0.01 mg/L	SW-846 6010A

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

David N. Poelstra
Laboratory Manager

Inter·Mountain Laboratories, Inc.

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EPA Method 8240
VOLATILE ORGANIC COMPOUNDS

Client: **NAVAJO REFINING COMPANY**
Project : RFI Phase III / Artesia, NM
Sample ID: MW-3
Laboratory ID: 0694G02096
Sample Matrix: Water
Preservative: Cool, HCl
Condition: Intact, pH<2

Report Date: 11/15/94
Date Sampled: 11/08/94
Date Received: 11/09/94
Date Extracted: 11/15/94
Date Analyzed: 11/15/94

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Benzene	ND	0.005
Toluene	ND	0.005
Ethylbenzene	ND	0.005
m,p-Xylene	ND	0.005
o-Xylene	0.006	0.005
Methyl ethyl ketone	ND	0.005
Carbon disulfide	ND	0.005

ND - Analyte not detected at stated limit of detection

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
Dibromofluoromethane	99%	86 - 118%
Toluene - d8	101%	88 - 110%
Bromofluorobenzene	97%	86 - 115%

Reference: Method 8240A: Gas Chromatography / Mass Spectrometry for Volatile Organics Test Methods for Evaluating Solid Waste, SW - 846, Final Update I, United States Environmental Protection Agency, July 1992.

Comments: A capillary column is used instead of a packed column as in the reference above.

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

EPA Method 8270
SEMIVOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project:	RFI Phase III / Artesia, NM	Report Date:	11/20/94
Sample ID:	MW - 3	Date Sampled:	11/08/94
Laboratory ID:	0694G02096	Date Received:	11/09/94
Sample Matrix:	Water	Date Extracted:	11/15/94
Condition:	Intact	Date Analyzed:	11/19/94
Preservative:	Cool		

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Acenaphthene	ND	0.40
Acenaphthylene	ND	0.40
Anthracene	ND	0.40
Benzo(a)anthracene	ND	0.40
Benzo(b)fluoranthene	ND	0.40
Benzo(k)fluoranthene	ND	0.40
Benzo(g,h,i)perylene	ND	0.40
Benzo(a)pyrene	ND	0.40
Chrysene	ND	0.40
Dibenz(a,h)anthracene	ND	0.40
Fluoranthene	ND	0.40
Fluorene	ND	0.40
Ideno(1,2,3-cd)pyrene	ND	0.40
Naphthalene	ND	0.40
Phenanthrene	ND	0.40
Pyrene	ND	0.40

ND - Analyte not detected at stated limit of detection

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
2 - Fluorophenol	48%	21 - 110%
Phenol - d5	40%	10 - 110%
Nitrobenzene - d5	68%	35 - 114%
2 - Fluorobiphenyl	102%	43 - 116%
2,4,6 - Tribromophenol	63%	10 - 123%
Terphenyl - d14	101%	33 - 141%

References: Method 3510: Separatory Funnel Liquid-Liquid Extraction.
Method 8270: Gas Chromatography / Mass Spectrometry for Semivolatile Organics Test Methods for Evaluating Solid Wastes, SW - 846, Final Update I, United States Environmental Protection Agency, July 1992.

Comments:

Ramona R. Dennis
Analyst

Wendi M Key
Review

Inter-Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM *
Sample ID: MW-3
Lab ID: 0494W10192/0694G02096
Matrix: Water
Condition: Intact

Report Date: 12/13/94
Receipt Date: 11/10/94
Sample Date: 11/05/94

Parameter	Concentration				PQL	Method
pH (Lab)	7.1	s.u.			0.1	SW-846 9040
Conductivity (Lab)	7500	µmhos/cm			1	SW-846 9050
Total Dissolved Solids (180° C)	5970	mg/L			10	EPA 160.1
Total Alkalinity (as CaCO3)	293	mg/L			1	EPA 310.1
Total Hardness (as CaCO3)	2360	mg/L			1	Calculation
Fluoride	2.6	mg/L			0.1	EPA 340.2
Calcium	608	mg/L	30.34	meq/L	1 mg/L	SW-846 6010A
Magnesium	204	mg/L	16.77	meq/L	1 mg/L	SW-846 6010A
Potassium	6	mg/L	0.17	meq/L	1 mg/L	SW-846 6010A
Sodium	983	mg/L	42.76	meq/L	1 mg/L	SW-846 6010A
Bicarbonate	357	mg/L	5.85	meq/L	1 mg/L	EPA 310.1
Carbonate	ND*		0.00		1 mg/L	EPA 310.1
Chloride	1120	mg/L	56.07	meq/L	1 mg/L	SW-846 9251
Sulfate	2290	mg/L	47.54	meq/L	5 mg/L	SW-846 9036
Major Cation Sum	90.04	meq/L			N/A	Calculation
Major Anion Sum	85.16	meq/L			N/A	Calculation
Cation/Anion Balance	2.79	% Diff			N/A	Calculation
Total Metals						
Total Arsenic	0.045	mg/L			0.005	SW-846 7061A
Total Chromium	0.04	mg/L			0.02	SW-846 6010A
Total Lead	ND*				0.01 mg/L	SW-846 7421
Total Nickel	0.04	mg/L			0.01	SW-846 6010A

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

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Laboratory Manager

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College Station, Texas 77845

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM *
Sample ID: MW-3
Lab ID: 0494W10192/0694G02096
Matrix: Water
Condition: Intact

Report Date: 12/13/94
Receipt Date: 11/10/94
Sample Date: 11/05/94

Parameter	Concentration	PQL	Method
Dissolved Aluminum	ND*	0.1 mg/L	SW-846 6010A
Dissolved Antimony	ND*	0.1 mg/L	SW-846 6010A
Dissolved Arsenic	ND*	0.2 mg/L	SW-846 6010A
Dissolved Barium	ND*	0.05 mg/L	SW-846 6010A
Dissolved Beryllium	ND*	0.01 mg/L	SW-846 6010A
Dissolved Boron	0.93 mg/L	0.05	SW-846 6010A
Dissolved Cadmium	0.07 mg/L	0.02	SW-846 6010A
Dissolved Chromium	0.02 mg/L	0.02	SW-846 6010A
Dissolved Cobalt	ND*	0.02 mg/L	SW-846 6010A
Dissolved Copper	ND*	0.01 mg/L	SW-846 6010A
Dissolved Iron	1.70 mg/L	0.05	SW-846 6010A
Dissolved Lead	0.1 mg/L	0.1	SW-846 6010A
Dissolved Manganese	2.68 mg/L	0.02	SW-846 6010A
Dissolved Nickel	0.11 mg/L	0.01	SW-846 6010A
Dissolved Molybdenum	ND*	0.05 mg/L	SW-846 6010A
Dissolved Selenium	ND*	0.2 mg/L	SW-846 6010A
Dissolved Silica	15.16 mg/L	0.05	SW-846 6010A
Dissolved Silver	ND*	0.01 mg/L	SW-846 6010A
Dissolved Thallium	ND*	0.2 mg/L	SW-846 6010A
Dissolved Vanadium	0.02 mg/L	0.01	SW-846 6010A
Dissolved Zinc	ND*	0.01 mg/L	SW-846 6010A

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

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Inter-Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

EPA Method 8141
ORGANOPHOSPHORUS COMPOUNDS

Client: **NAVAJO REFINING COMPANY**
Project : RFI Phase III / Artesia, NM
Sample ID: MW-3
Laboratory ID: 0694G02096
Sample Matrix: Water
Preservative: Cool
Condition: Intact

Report Date: 12/12/94
Date Sampled: 11/08/94
Date Received: 11/09/94
Date Extracted: 11/14/94
Date Analyzed: 12/08/94

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Azinphos Methyl	ND	0.0002
Bolstar	ND	0.0002
Chlorpyrifos	ND	0.0002
Coumaphos	ND	0.0004
Demeton	ND	0.0002
Diazinon	ND	0.0002
Dichlorvos	ND	0.0002
Dimethoate	ND	0.001
Disulfoton	ND	0.0002
EPN	ND	0.0002
Ethoprop	ND	0.0002
Fensulfothion	ND	0.001
Fenthion	ND	0.0002
Malathion	ND	0.0002
Merphos	ND	0.0002
Mevinphos	ND	0.001
Monocrotophos	ND	0.001
Naled	ND	0.002
Ethyl Parathion	ND	0.0002
Methyl Parathion	ND	0.0002
Phorate	ND	0.0002
Ronnel	ND	0.0002
Sulfotep	ND	0.0002
Tetrachlorovinphos	ND	0.0002
TEPP	ND	0.0002
Tokuthion	ND	0.0002
Trichloronate	ND	0.0002

ND - Analyte not detected at stated limit of detection

Reference: Method 8141: Organophosphorus Compounds by Gas Chromatography: Capillary Column Technique. Test Methods for Evaluating Solid Waste, SW - 846, Final Update I, United States Environmental Protection Agency, July 1992.

Comments:

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

EPA Method 8151
CHLORINATED HERBICIDES

Client:	NAVAJO REFINING COMPANY		
Project Name:	RFI Phase III / Artesia, NM	Report Date:	12/09/94
Sample ID:	MW - 3	Date Sampled:	11/08/94
Sample Number:	0694G02096	Date Received:	11/09/94
Sample Matrix:	Water	Date Extracted:	11/14/94
Preservative:	Cool	Date Analyzed:	12/06/94
Condition:	Intact		

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Dalapon	ND	0.01
3,5-Dichlorobenzoic acid	ND	0.01
4-Nitrophenol	ND	0.01
Dicamba	ND	0.01
MCPP	ND	1
MCPA	ND	1
Dichlorprop	ND	0.01
2,4-D	ND	0.01
Pentachlorophenol	ND	0.01
Chloramben	ND	0.01
2.4.5 - TP	ND	0.01
2,4,5 - T (Silvex)	ND	0.01
2,4 - DB	ND	0.01
Dinoseb	ND	0.01
Bentazon	ND	0.01
Picloram	ND	0.01
DCPA	ND	0.01
Acifluorfen	ND	0.01

ND - Analyte not detected at stated detection limit

Reference: *Method 8151: Chlorinated Herbicides*
Test Methods for Evaluating Solid Wastes, SW-846, United States Environmental Protection Agency, Final Update I, July 1992.

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

EPA Method 8270
SEMIVOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project:	RFI Phase III / Artesia, NM	Report Date:	11/22/94
Sample ID:	MW - 4	Date Sampled:	11/10/94
Laboratory ID:	0694G02156	Date Received:	11/14/94
Sample Matrix:	Water	Date Extracted:	11/17/94
Condition:	Intact	Date Analyzed:	11/21/94
Preservative:	Cool		

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Acenaphthene	ND	0.10
Acenaphthylene	ND	0.10
Anthracene	ND	0.10
Benzo(a)anthracene	ND	0.10
Benzo(b)fluoranthene	ND	0.10
Benzo(k)fluoranthene	ND	0.10
Benzo(g,h,i)perylene	ND	0.10
Benzo(a)pyrene	ND	0.10
Chrysene	ND	0.10
Dibenz(a,h)anthracene	ND	0.10
Fluoranthene	ND	0.10
Fluorene	ND	0.10
Ideno(1,2,3-cd)pyrene	ND	0.10
Naphthalene	ND	0.10
Phenanthrene	ND	0.10
Pyrene	ND	0.10

ND - Analyte not detected at stated limit of detection

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
2 - Fluorophenol	54%	21 - 110%
Phenol - d5	67%	10 - 110%
Nitrobenzene - d5	52%	35 - 114%
2 - Fluorobiphenyl	77%	43 - 116%
2,4,6 - Tribromophenol	57%	10 - 123%
Terphenyl - d14	77%	33 - 141%

References: Method 3510: Separatory Funnel Liquid-Liquid Extraction.
Method 8270: Gas Chromatography / Mass Spectrometry for Semivolatile Organics Test Methods for Evaluating Solid Wastes, SW - 846, Final Update I, United States Environmental Protection Agency, July 1992.

Comments:

Ramona R. Dennis
Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM *
Sample ID: MW-4
Lab ID: 0494W10214/0694G02156
Matrix: Water
Condition: Intact

Report Date: 12/13/94
Receipt Date: 11/15/94
Sample Date: 11/10/94

Parameter	Concentration	PQL	Method
pH (Lab)	7.4 s.u.	0.1	SW-846 9040
Conductivity (Lab)	7480 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180° C)	5410 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	255 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	1810 mg/L	1	Calculation
Fluoride	1.9 mg/L	0.1	EPA 340.2

Calcium	495 mg/L	24.72 meq/L	1 mg/L	SW-846 6010A
Magnesium	139 mg/L	11.47 meq/L	1 mg/L	SW-846 6010A
Potassium	3 mg/L	0.07 meq/L	1 mg/L	SW-846 6010A
Sodium	1230 mg/L	53.57 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	311 mg/L	5.10 meq/L	1 mg/L	EPA 310.1
Carbonate	ND*	0.00	1 mg/L	EPA 310.1
Chloride	1310 mg/L	65.23 meq/L	1 mg/L	SW-846 9251
Sulfate	2360 mg/L	49.18 meq/L	5 mg/L	SW-846 9036
Major Cation Sum	89.77 meq/L		N/A	Calculation
Major Anion Sum	91.21 meq/L		N/A	Calculation
Cation/Anion Balance	-0.80 % Diff		N/A	Calculation

Total Metals			
Total Arsenic	0.156 mg/L	0.005	SW-846 7061A
Total Chromium	0.13 mg/L	0.02	SW-846 6010A
Total Lead	0.07 mg/L	0.01	SW-846 7421
Total Nickel	0.10 mg/L	0.01	SW-846 6010A

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

David N Poelstra

David N. Poelstra
Laboratory Manager

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM *
Sample ID: MW-4
Lab ID: 0494W10214/0694G02156
Matrix: Water
Condition: Intact

Report Date: 12/13/94
Receipt Date: 11/15/94
Sample Date: 11/10/94

Parameter	Concentration	PQL	Method
Dissolved Aluminum	ND*	0.1 mg/L	SW-846 6010A
Dissolved Antimony	ND*	0.1 mg/L	SW-846 6010A
Dissolved Arsenic	0.2 mg/L	0.2	SW-846 6010A
Dissolved Barium	ND*	0.05 mg/L	SW-846 6010A
Dissolved Beryllium	ND*	0.01 mg/L	SW-846 6010A
Dissolved Boron	0.74 mg/L	0.05	SW-846 6010A
Dissolved Cadmium	0.04 mg/L	0.02	SW-846 6010A
Dissolved Chromium	ND*	0.02 mg/L	SW-846 6010A
Dissolved Cobalt	ND*	0.02 mg/L	SW-846 6010A
Dissolved Copper	ND*	0.01 mg/L	SW-846 6010A
Dissolved Iron	2.40 mg/L	0.05	SW-846 6010A
Dissolved Lead	ND*	0.1 mg/L	SW-846 6010A
Dissolved Manganese	2.61 mg/L	0.02	SW-846 6010A
Dissolved Nickel	0.05 mg/L	0.01	SW-846 6010A
Dissolved Molybdenum	ND*	0.05 mg/L	SW-846 6010A
Dissolved Selenium	ND*	0.2 mg/L	SW-846 6010A
Dissolved Silica	30.72 mg/L	0.05	SW-846 6010A
Dissolved Silver	ND*	0.01 mg/L	SW-846 6010A
Dissolved Thallium	ND*	0.2 mg/L	SW-846 6010A
Dissolved Vanadium	ND*	0.01 mg/L	SW-846 6010A
Dissolved Zinc	ND*	0.01 mg/L	SW-846 6010A

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

David N. Poelstra
Laboratory Manager

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

EPA Method 8141
ORGANOPHOSPHORUS COMPOUNDS

Client: **NAVAJO REFINING COMPANY**
Project : RFI Phase III / Artesia, NM
Sample ID: MW-4
Laboratory ID: 0694G02156
Sample Matrix: Water
Preservative: Cool
Condition: Intact

Report Date: 12/12/94
Date Sampled: 11/10/94
Date Received: 11/14/94
Date Extracted: 11/17/94
Date Analyzed: 12/08/94

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Azinphos Methyl	ND	0.0002
Bolstar	ND	0.0002
Chlorpyrifos	ND	0.0002
Coumaphos	ND	0.0004
Demeton	ND	0.0002
Diazinon	ND	0.0002
Dichlorvos	ND	0.0002
Dimethoate	ND	0.001
Disulfoton	ND	0.0002
EPN	ND	0.0002
Ethoprop	ND	0.0002
Fensulfothion	ND	0.001
Fenthion	ND	0.0002
Malathion	ND	0.0002
Merphos	ND	0.0002
Mevinphos	ND	0.001
Monocrotophos	ND	0.001
Naled	ND	0.002
Ethyl Parathion	ND	0.0002
Methyl Parathion	ND	0.0002
Phorate	ND	0.0002
Ronnel	ND	0.0002
Sulfotep	ND	0.0002
Tetrachlorovinphos	ND	0.0002
TEPP	ND	0.0002
Tokuthion	ND	0.0002
Trichloronate	ND	0.0002

ND - Analyte not detected at stated limit of detection

Reference: Method 8141: Organophosphorus Compounds by Gas Chromatography: Capillary Column Technique. Test Methods for Evaluating Solid Waste, SW - 846, Final Update I, United States Environmental Protection Agency, July 1992.

Comments:

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

EPA Method 8151
CHLORINATED HERBICIDES

Client: **NAVAJO REFINING COMPANY**
Project Name: RFI Phase III / Artesia, NM
Sample ID: MW - 4
Sample Number: 0694G02156
Sample Matrix: Water
Preservative: Cool
Condition: Intact

Report Date: 12/09/94
Date Sampled: 11/10/94
Date Received: 11/14/94
Date Extracted: 11/17/94
Date Analyzed: 12/07/94

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Dalapon	ND	0.01
3,5-Dichlorobenzoic acid	ND	0.01
4-Nitrophenol	ND	0.01
Dicamba	ND	0.01
MCPP	ND	1
MCPA	ND	1
Dichlorprop	ND	0.01
2,4-D	ND	0.01
Pentachlorophenol	ND	0.01
Chloramben	ND	0.01
2.4.5 - TP	ND	0.01
2,4,5 - T (Silvex)	ND	0.01
2,4 - DB	ND	0.01
Dinoseb	ND	0.01
Bentazon	ND	0.01
Picloram	ND	0.01
DCPA	ND	0.01
Acifluorfen	ND	0.01

ND - Analyte not detected at stated detection limit

Reference: Method 8151: Chlorinated Herbicides
Test Methods for Evaluating Solid Wastes, SW-846, United States Environmental Protection Agency, Final Update I, July 1992.

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

EPA Method 8240
VOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project :	RFI Phase III / Artesia, NM	Report Date:	11/15/94
Sample ID:	MW-5A	Date Sampled:	11/08/94
Laboratory ID:	0694G02095	Date Received:	11/09/94
Sample Matrix:	Water	Date Extracted:	11/15/94
Preservative:	Cool, HCl	Date Analyzed:	11/15/94
Condition:	Intact, pH<2		

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Benzene	ND	0.005
Toluene	ND	0.005
Ethylbenzene	ND	0.005
m,p-Xylene	0.021	0.005
o-Xylene	ND	0.005
Methyl ethyl ketone	ND	0.005
Carbon disulfide	ND	0.005

ND - Analyte not detected at stated limit of detection

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
Dibromofluoromethane	98%	86 - 118%
Toluene - d8	99%	88 - 110%
Bromofluorobenzene	100%	86 - 115%

Reference: Method 8240A: Gas Chromatography / Mass Spectrometry for Volatile Organics Test Methods for Evaluating Solid Waste, SW - 846, Final Update I, United States Environmental Protection Agency, July 1992.

Comments: A capillary column is used instead of a packed column as in the reference above.

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

EPA Method 8270
SEMIVOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project:	RFI Phase III / Artesia, NM	Report Date:	11/20/94
Sample ID:	MW - 5A	Date Sampled:	11/08/94
Laboratory ID:	0694G02095	Date Received:	11/09/94
Sample Matrix:	Water	Date Extracted:	11/15/94
Condition:	Intact	Date Analyzed:	11/19/94
Preservative:	Cool		

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Acenaphthene	ND	0.20
Acenaphthylene	ND	0.20
Anthracene	ND	0.20
Benzo(a)anthracene	ND	0.20
Benzo(b)fluoranthene	ND	0.20
Benzo(k)fluoranthene	ND	0.20
Benzo(g,h,i)perylene	ND	0.20
Benzo(a)pyrene	ND	0.20
Chrysene	ND	0.20
Dibenz(a,h)anthracene	ND	0.20
Fluoranthene	ND	0.20
Fluorene	ND	0.20
Ideno(1,2,3-cd)pyrene	ND	0.20
Naphthalene	ND	0.20
Phenanthrene	ND	0.20
Pyrene	ND	0.20

ND - Analyte not detected at stated limit of detection

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
2 - Fluorophenol	42%	21 - 110%
Phenol - d5	54%	10 - 110%
Nitrobenzene - d5	70%	35 - 114%
2 - Fluorobiphenyl	98%	43 - 116%
2,4,6 - Tribromophenol	61%	10 - 123%
Terphenyl - d14	95%	33 - 141%

References: Method 3510: Separatory Funnel Liquid-Liquid Extraction.
Method 8270: Gas Chromatography / Mass Spectrometry for Semivolatile Organics
Test Methods for Evaluating Solid Wastes, SW - 846, Final Update I, United States
Environmental Protection Agency, July 1992.

Comments:

Ramona R. Dennis
Analyst

Review

Inter-Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM *
Sample ID: MW-5A
Lab ID: 0494W10186/0694G02095
Matrix: Water
Condition: Intact

Report Date: 12/13/94
Receipt Date: 11/10/94
Sample Date: 11/08/94

Parameter	Concentration				PQL	Method
pH (Lab)	7.0	s.u.			0.1	SW-846 9040
Conductivity (Lab)	17500	µmhos/cm			1	SW-846 9050
Total Dissolved Solids (180° C)	14600	mg/L			10	EPA 160.1
Total Alkalinity (as CaCO3)	390	mg/L			1	EPA 310.1
Total Hardness (as CaCO3)	3750	mg/L			1	Calculation
Fluoride	2.9	mg/L			0.1	EPA 340.2
Calcium	536	mg/L	26.73	meq/L	1 mg/L	SW-846 6010A
Magnesium	587	mg/L	48.29	meq/L	1 mg/L	SW-846 6010A
Potassium	8	mg/L	0.20	meq/L	1 mg/L	SW-846 6010A
Sodium	3370	mg/L	146.54	meq/L	1 mg/L	SW-846 6010A
Bicarbonate	475	mg/L	7.79	meq/L	1 mg/L	EPA 310.1
Carbonate	ND*		0.00		1 mg/L	EPA 310.1
Chloride	3320	mg/L	165.83	meq/L	1 mg/L	SW-846 9251
Sulfate	5350	mg/L	111.25	meq/L	5 mg/L	SW-846 9036
Major Cation Sum	221.80	meq/L			N/A	Calculation
Major Anion Sum	212.88	meq/L			N/A	Calculation
Cation/Anion Balance	2.05	% Diff			N/A	Calculation
Total Metals						
Total Arsenic	0.127	mg/L			0.005	SW-846 7061A
Total Chromium	0.12	mg/L			0.02	SW-846 6010A
Total Lead	0.02	mg/L			0.01	SW-846 7421
Total Nickel	0.10	mg/L			0.01	SW-846 6010A

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

David N. Poelstra
Laboratory Manager

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM *
Sample ID: MW-5A
Lab ID: 0494W10186/0694G02095
Matrix: Water
Condition: Intact

Report Date: 12/13/94
Receipt Date: 11/10/94
Sample Date: 11/08/94

Parameter	Concentration	PQL	Method
Dissolved Aluminum	ND*	0.1 mg/L	SW-846 6010A
Dissolved Antimony	ND*	0.1 mg/L	SW-846 6010A
Dissolved Arsenic	0.2 mg/L	0.2	SW-846 6010A
Dissolved Barium	ND*	0.05 mg/L	SW-846 6010A
Dissolved Beryllium	ND*	0.01 mg/L	SW-846 6010A
Dissolved Boron	1.00 mg/L	0.05	SW-846 6010A
Dissolved Cadmium	ND*	0.02 mg/L	SW-846 6010A
Dissolved Chromium	ND*	0.02 mg/L	SW-846 6010A
Dissolved Cobalt	ND*	0.02 mg/L	SW-846 6010A
Dissolved Copper	ND*	0.01 mg/L	SW-846 6010A
Dissolved Iron	3.73 mg/L	0.05	SW-846 6010A
Dissolved Lead	ND*	0.1 mg/L	SW-846 6010A
Dissolved Manganese	1.16 mg/L	0.02	SW-846 6010A
Dissolved Nickel	0.05 mg/L	0.01	SW-846 6010A
Dissolved Molybdenum	ND*	0.05 mg/L	SW-846 6010A
Dissolved Selenium	ND*	0.2 mg/L	SW-846 6010A
Dissolved Silica	23.14 mg/L	0.05	SW-846 6010A
Dissolved Silver	ND*	0.01 mg/L	SW-846 6010A
Dissolved Thallium	ND*	0.2 mg/L	SW-846 6010A
Dissolved Vanadium	ND*	0.01 mg/L	SW-846 6010A
Dissolved Zinc	ND*	0.01 mg/L	SW-846 6010A

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

David N. Poelstra
Laboratory Manager

Inter-Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

EPA Method 8141
ORGANOPHOSPHORUS COMPOUNDS

Client: **NAVAJO REFINING COMPANY**
Project : RFI Phase III / Artesia, NM
Sample ID: MW-5A
Laboratory ID: 0694G02095
Sample Matrix: Water
Preservative: Cool
Condition: Intact

Report Date: 12/12/94
Date Sampled: 11/08/94
Date Received: 11/09/94
Date Extracted: 11/14/94
Date Analyzed: 12/08/94

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Azinphos Methyl	ND	0.0002
Bolstar	ND	0.0002
Chlorpyrifos	ND	0.0002
Coumaphos	ND	0.0004
Demeton	ND	0.0002
Diazinon	ND	0.0002
Dichlorvos	ND	0.0002
Dimethoate	ND	0.001
Disulfoton	ND	0.0002
EPN	ND	0.0002
Ethoprop	ND	0.0002
Fensulfothion	ND	0.001
Fenthion	ND	0.0002
Malathion	ND	0.0002
Merphos	ND	0.0002
Mevinphos	ND	0.001
Monocrotophos	ND	0.001
Naled	ND	0.002
Ethyl Parathion	ND	0.0002
Methyl Parathion	ND	0.0002
Phorate	ND	0.0002
Ronnel	ND	0.0002
Sulfotep	ND	0.0002
Tetrachlorovinphos	ND	0.0002
TEPP	ND	0.0002
Tokuthion	ND	0.0002
Trichloronate	ND	0.0002

ND - Analyte not detected at stated limit of detection

Reference: Method 8141: Organophosphorus Compounds by Gas Chromatography: Capillary Column Technique. Test Methods for Evaluating Solid Waste, SW - 846, Final Update I, United States Environmental Protection Agency, July 1992.

Comments:

Inter-Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

EPA Method 8151
CHLORINATED HERBICIDES

Client: **NAVAJO REFINING COMPANY**
Project Name: RFI Phase III / Artesia, NM
Sample ID: MW - 5A
Sample Number: 0694G02095
Sample Matrix: Water
Preservative: Cool
Condition: Intact

Report Date: 12/09/94
Date Sampled: 11/08/94
Date Received: 11/09/94
Date Extracted: 11/14/94
Date Analyzed: 12/06/94

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Dalapon	ND	0.01
3,5-Dichlorobenzoic acid	ND	0.01
4-Nitrophenol	ND	0.01
Dicamba	ND	0.01
MCPP	ND	1
MCPA	ND	1
Dichlorprop	ND	0.01
2,4-D	ND	0.01
Pentachlorophenol	ND	0.01
Chloramben	ND	0.01
2.4.5 - TP	ND	0.01
2,4,5 - T (Silvex)	ND	0.01
2,4 - DB	ND	0.01
Dinoseb	ND	0.01
Bentazon	ND	0.01
Picloram	ND	0.01
DCPA	ND	0.01
Acifluorfen	ND	0.01

ND - Analyte not detected at stated detection limit

Reference: Method 8151: Chlorinated Herbicides
Test Methods for Evaluating Solid Wastes, SW-846, United States Environmental Protection Agency, Final Update I, July 1992.

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

EPA Method 8240
VOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project :	RFI Phase III / Artesia, NM	Report Date:	11/11/94
Sample ID:	OCD-2A	Date Sampled:	11/05/94
Laboratory ID:	0694G02077	Date Received:	11/08/94
Sample Matrix:	Water	Date Extracted:	11/11/94
Preservative:	Cool, HCl	Date Analyzed:	11/11/94
Condition:	Intact, pH<2		

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Benzene	ND	0.005
Toluene	ND	0.005
Ethylbenzene	ND	0.005
m,p-Xylene	ND	0.005
o-Xylene	ND	0.005
Methyl ethyl ketone	ND	0.005
Carbon disulfide	ND	0.005

ND - Analyte not detected at stated limit of detection

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
Dibromofluoromethane	101%	86 - 118%
Toluene - d8	97%	88 - 110%
Bromofluorobenzene	102%	86 - 115%

Reference: Method 8240A: Gas Chromatography / Mass Spectrometry for Volatile Organics Test Methods for Evaluating Solid Waste, SW - 846, Final Update I, United States Environmental Protection Agency, July 1992.

Comments: A capillary column is used instead of a packed column as in the reference above.

Analyst

Review

Inter-Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

EPA Method 8270
SEMIVOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project:	RFI Phase III / Artesia, NM	Report Date:	11/13/94
Sample ID:	OCD - 2A	Date Sampled:	11/05/94
Laboratory ID:	0694G02077	Date Received:	11/08/94
Sample Matrix:	Water	Date Extracted:	11/10/94
Condition:	Intact	Date Analyzed:	11/11/94
Preservative:	Cool		

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Acenaphthene	ND	0.010
Acenaphthylene	ND	0.010
Anthracene	ND	0.010
Benzo(a)anthracene	ND	0.010
Benzo(b)fluoranthene	ND	0.010
Benzo(k)fluoranthene	ND	0.010
Benzo(g,h,i)perylene	ND	0.010
Benzo(a)pyrene	ND	0.010
Chrysene	ND	0.010
Dibenz(a,h)anthracene	ND	0.010
Fluoranthene	ND	0.010
Fluorene	ND	0.010
Ideno(1,2,3-cd)pyrene	ND	0.010
Naphthalene	ND	0.010
Phenanthrene	ND	0.010
Pyrene	ND	0.010

ND - Analyte not detected at stated limit of detection

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
2 - Fluorophenol	75%	21 - 110%
Phenol - d5	74%	10 - 110%
Nitrobenzene - d5	69%	35 - 114%
2 - Fluorobiphenyl	64%	43 - 116%
2,4,6 - Tribromophenol	104%	10 - 123%
Terphenyl - d14	85%	33 - 141%

References: Method 3510: Separatory Funnel Liquid-Liquid Extraction.
Method 8270: Gas Chromatography / Mass Spectrometry for Semivolatile Organics Test Methods for Evaluating Solid Wastes, SW - 846, Final Update I, United States Environmental Protection Agency, July 1992.

Comments:

Analyst

Wendi M Log
Review

Inter-Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM *
Sample ID: OCD-2A
Lab ID: 0494W10185/0694G02077
Matrix: Water
Condition: Intact

Report Date: 12/13/94
Receipt Date: 11/10/94
Sample Date: 11/15/94

Parameter	Concentration	PQL	Method
pH (Lab)	7.1 s.u.	0.1	SW-846 9040
Conductivity (Lab)	14400 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180° C)	11000 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	504 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	2430 mg/L	1	Calculation
Fluoride	1.2 mg/L	0.1	EPA 340.2

Calcium	581 mg/L	28.99 meq/L	1 mg/L	SW-846 6010A
Magnesium	238 mg/L	19.56 meq/L	1 mg/L	SW-846 6010A
Potassium	11 mg/L	0.28 meq/L	1 mg/L	SW-846 6010A
Sodium	2830 mg/L	123.01 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	615 mg/L	10.09 meq/L	1 mg/L	EPA 310.1
Carbonate	ND*	0.00	1 mg/L	EPA 310.1
Chloride	2800 mg/L	139.86 meq/L	1 mg/L	SW-846 9251
Sulfate	3510 mg/L	73.10 meq/L	5 mg/L	SW-846 9036
Major Cation Sum	171.87 meq/L		N/A	Calculation
Major Anion Sum	162.31 meq/L		N/A	Calculation
Cation/Anion Balance	2.86 % Diff		N/A	Calculation

Total Metals			
Total Arsenic	0.048 mg/L	0.005	SW-846 7061A
Total Chromium	0.10 mg/L	0.02	SW-846 6010A
Total Lead	0.03 mg/L	0.01	SW-846 7421
Total Nickel	0.07 mg/L	0.01	SW-846 6010A

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

David N. Poelstra
Laboratory Manager

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM *
Sample ID: OCD-2A
Lab ID: 0494W10185/0694G02077
Matrix: Water
Condition: Intact

Report Date: 12/13/94
Receipt Date: 11/10/94
Sample Date: 11/15/94

Parameter	Concentration	PQL	Method
Dissolved Aluminum	ND*	0.1 mg/L	SW-846 6010A
Dissolved Antimony	ND*	0.1 mg/L	SW-846 6010A
Dissolved Arsenic	ND*	0.2 mg/L	SW-846 6010A
Dissolved Barium	ND*	0.05 mg/L	SW-846 6010A
Dissolved Beryllium	ND*	0.01 mg/L	SW-846 6010A
Dissolved Boron	0.47 mg/L	0.05	SW-846 6010A
Dissolved Cadmium	ND*	0.02 mg/L	SW-846 6010A
Dissolved Chromium	ND*	0.02 mg/L	SW-846 6010A
Dissolved Cobalt	ND*	0.02 mg/L	SW-846 6010A
Dissolved Copper	ND*	0.01 mg/L	SW-846 6010A
Dissolved Iron	5.34 mg/L	0.05	SW-846 6010A
Dissolved Lead	ND*	0.1 mg/L	SW-846 6010A
Dissolved Manganese	1.38 mg/L	0.02	SW-846 6010A
Dissolved Nickel	ND*	0.01 mg/L	SW-846 6010A
Dissolved Molybdenum	ND*	0.05 mg/L	SW-846 6010A
Dissolved Selenium	ND*	0.2 mg/L	SW-846 6010A
Dissolved Silica	15.37 mg/L	0.05	SW-846 6010A
Dissolved Silver	ND*	0.01 mg/L	SW-846 6010A
Dissolved Thallium	ND*	0.2 mg/L	SW-846 6010A
Dissolved Vanadium	0.01 mg/L	0.01	SW-846 6010A
Dissolved Zinc	ND*	0.01 mg/L	SW-846 6010A

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

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EPA Method 8240
VOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project :	RFI Phase III / Artesia, NM	Report Date:	11/14/94
Sample ID:	OCD-4	Date Sampled:	11/06/94
Laboratory ID:	0694G02086	Date Received:	11/09/94
Sample Matrix:	Water	Date Extracted:	11/14/94
Preservative:	Cool, HCl	Date Analyzed:	11/14/94
Condition:	Intact, pH<2		

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Benzene	ND	0.005
Toluene	ND	0.005
Ethylbenzene	ND	0.005
m,p-Xylene	ND	0.005
o-Xylene	ND	0.005
Methyl ethyl ketone	ND	0.005
Carbon disulfide	ND	0.005

ND - Analyte not detected at stated limit of detection

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
Dibromofluoromethane	109%	86 - 118%
Toluene - d8	92%	88 - 110%
Bromofluorobenzene	98%	86 - 115%

Reference: Method 8240A: Gas Chromatography / Mass Spectrometry for Volatile Organics Test Methods for Evaluating Solid Waste, SW - 846, Final Update I, United States Environmental Protection Agency, July 1992.

Comments: A capillary column is used instead of a packed column as in the reference above.

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

EPA Method 8270
SEMIVOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project:	RFI Phase III / Artesia, NM	Report Date:	11/14/94
Sample ID:	OCD - 4	Date Sampled:	11/06/94
Laboratory ID:	0694G02086	Date Received:	11/09/94
Sample Matrix:	Water	Date Extracted:	11/12/94
Condition:	Intact	Date Analyzed:	11/13/94
Preservative:	Cool		

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Acenaphthene	ND	0.010
Acenaphthylene	ND	0.010
Anthracene	ND	0.010
Benzo(a)anthracene	ND	0.010
Benzo(b)fluoranthene	ND	0.010
Benzo(k)fluoranthene	ND	0.010
Benzo(g,h,i)perylene	ND	0.010
Benzo(a)pyrene	ND	0.010
Chrysene	ND	0.010
Dibenz(a,h)anthracene	ND	0.010
Fluoranthene	ND	0.010
Fluorene	ND	0.010
Ideno(1,2,3-cd)pyrene	ND	0.010
Naphthalene	ND	0.010
Phenanthrene	ND	0.010
Pyrene	ND	0.010

ND - Analyte not detected at stated limit of detection

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
2 - Fluorophenol	51%	21 - 110%
Phenol - d5	59%	10 - 110%
Nitrobenzene - d5	62%	35 - 114%
2 - Fluorobiphenyl	71%	43 - 116%
2,4,6 - Tribromophenol	87%	10 - 123%
Terphenyl - d14	84%	33 - 141%

References: Method 3510: Separatory Funnel Liquid-Liquid Extraction.
Method 8270: Gas Chromatography / Mass Spectrometry for Semivolatile Organics
Test Methods for Evaluating Solid Wastes, SW - 846, Final Update I, United States
Environmental Protection Agency, July 1992.

Comments:

Ramona R. Dennis
Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM *
Sample ID: OCD-4
Lab ID: 0494W10187/0694G02086
Matrix: Water
Condition: Intact

Report Date: 12/13/94
Receipt Date: 11/10/94
Sample Date: 11/06/94

Parameter	Concentration	PQL	Method
pH (Lab)	7.2 s.u.	0.1	SW-846 9040
Conductivity (Lab)	18000 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180° C)	12400 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	192 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	3000 mg/L	1	Calculation
Fluoride	1.0 mg/L	0.1	EPA 340.2

Calcium	795 mg/L	39.67 meq/L	1 mg/L	SW-846 6010A
Magnesium	248 mg/L	20.41 meq/L	1 mg/L	SW-846 6010A
Potassium	62 mg/L	1.58 meq/L	1 mg/L	SW-846 6010A
Sodium	3270 mg/L	142.14 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	234 mg/L	3.84 meq/L	1 mg/L	EPA 310.1
Carbonate	ND*	0.00	1 mg/L	EPA 310.1
Chloride	4820 mg/L	240.31 meq/L	1 mg/L	SW-846 9251
Sulfate	2690 mg/L	56.03 meq/L	5 mg/L	SW-846 9036
Major Cation Sum	203.82 meq/L		N/A	Calculation
Major Anion Sum	195.77 meq/L		N/A	Calculation
Cation/Anion Balance	2.01 % Diff		N/A	Calculation

Total Metals			
Total Arsenic	0.024 mg/L	0.005	SW-846 7061A
Total Chromium	0.06 mg/L	0.02	SW-846 6010A
Total Lead	0.02 mg/L	0.01	SW-846 7421
Total Nickel	ND*	0.01 mg/L	SW-846 6010A

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

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Laboratory Manager

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM *
Sample ID: OCD-4
Lab ID: 0494W10187/0694G02086
Matrix: Water
Condition: Intact

Report Date: 12/13/94
Receipt Date: 11/10/94
Sample Date: 11/06/94

Parameter	Concentration	PQL	Method
Dissolved Aluminum	ND*	0.1 mg/L	SW-846 6010A
Dissolved Antimony	ND*	0.1 mg/L	SW-846 6010A
Dissolved Arsenic	ND*	0.2 mg/L	SW-846 6010A
Dissolved Barium	ND*	0.05 mg/L	SW-846 6010A
Dissolved Beryllium	ND*	0.01 mg/L	SW-846 6010A
Dissolved Boron	1.38 mg/L	0.05	SW-846 6010A
Dissolved Cadmium	0.02 mg/L	0.02	SW-846 6010A
Dissolved Chromium	ND*	0.02 mg/L	SW-846 6010A
Dissolved Cobalt	ND*	0.02 mg/L	SW-846 6010A
Dissolved Copper	ND*	0.01 mg/L	SW-846 6010A
Dissolved Iron	2.99 mg/L	0.05	SW-846 6010A
Dissolved Lead	ND*	0.1 mg/L	SW-846 6010A
Dissolved Manganese	0.30 mg/L	0.02	SW-846 6010A
Dissolved Nickel	ND*	0.01 mg/L	SW-846 6010A
Dissolved Molybdenum	ND*	0.05 mg/L	SW-846 6010A
Dissolved Selenium	ND*	0.2 mg/L	SW-846 6010A
Dissolved Silica	12.37 mg/L	0.05	SW-846 6010A
Dissolved Silver	ND*	0.01 mg/L	SW-846 6010A
Dissolved Thallium	ND*	0.2 mg/L	SW-846 6010A
Dissolved Vanadium	ND*	0.01 mg/L	SW-846 6010A
Dissolved Zinc	ND*	0.01 mg/L	SW-846 6010A

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

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3304 Longmire
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EPA Method 8240
VOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project :	RFI Phase III / Artesia, NM	Report Date:	11/14/94
Sample ID:	OCD-6	Date Sampled:	11/06/94
Laboratory ID:	0694G02088	Date Received:	11/09/94
Sample Matrix:	Water	Date Extracted:	11/14/94
Preservative:	Cool, HCl	Date Analyzed:	11/14/94
Condition:	Intact, pH<2		

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Benzene	ND	0.005
Toluene	ND	0.005
Ethylbenzene	ND	0.005
m,p-Xylene	ND	0.005
o-Xylene	ND	0.005
Methyl ethyl ketone	ND	0.005
Carbon disulfide	ND	0.005

ND - Analyte not detected at stated limit of detection

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
Dibromofluoromethane	102%	86 - 118%
Toluene - d8	96%	88 - 110%
Bromofluorobenzene	98%	86 - 115%

Reference: Method 8240A: Gas Chromatography / Mass Spectrometry for Volatile Organics Test Methods for Evaluating Solid Waste, SW - 846, Final Update I, United States Environmental Protection Agency, July 1992.

Comments: A capillary column is used instead of a packed column as in the reference above.

Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

EPA Method 8270
SEMIVOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project:	RFI Phase III / Artesia, NM	Report Date:	11/14/94
Sample ID:	OCD - 6	Date Sampled:	11/06/94
Laboratory ID:	0694G02088	Date Received:	11/09/94
Sample Matrix:	Water	Date Extracted:	11/12/94
Condition:	Intact	Date Analyzed:	11/13/94
Preservative:	Cool		

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Acenaphthene	ND	0.010
Acenaphthylene	ND	0.010
Anthracene	ND	0.010
Benzo(a)anthracene	ND	0.010
Benzo(b)fluoranthene	ND	0.010
Benzo(k)fluoranthene	ND	0.010
Benzo(g,h,i)perylene	ND	0.010
Benzo(a)pyrene	ND	0.010
Chrysene	ND	0.010
Dibenz(a,h)anthracene	ND	0.010
Fluoranthene	ND	0.010
Fluorene	ND	0.010
Ideno(1,2,3-cd)pyrene	ND	0.010
Naphthalene	ND	0.010
Phenanthrene	ND	0.010
Pyrene	ND	0.010

ND - Analyte not detected at stated limit of detection

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
2 - Fluorophenol	64%	21 - 110%
Phenol - d5	72%	10 - 110%
Nitrobenzene - d5	75%	35 - 114%
2 - Fluorobiphenyl	77%	43 - 116%
2,4,6 - Tribromophenol	94%	10 - 123%
Terphenyl - d14	81%	33 - 141%

References: Method 3510: Separatory Funnel Liquid-Liquid Extraction.
Method 8270: Gas Chromatography / Mass Spectrometry for Semivolatile Organics
Test Methods for Evaluating Solid Wastes, SW - 846, Final Update I, United States
Environmental Protection Agency, July 1992.

Comments:

Ramona R. Dennis
Analyst

Review

Inter·Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM *
Sample ID: OCD-6
Lab ID: 0494W10188/0694G02088
Matrix: Water
Condition: Intact

Report Date: 12/13/94
Receipt Date: 11/10/94
Sample Date: 11/06/94

Parameter	Concentration				PQL	Method
pH (Lab)	7.7	s.u.			0.1	SW-846 9040
Conductivity (Lab)	12800	µmhos/cm			1	SW-846 9050
Total Dissolved Solids (180° C)	9500	mg/L			10	EPA 160.1
Total Alkalinity (as CaCO3)	618	mg/L			1	EPA 310.1
Total Hardness (as CaCO3)	1990	mg/L			1	Calculation
Fluoride	3.7	mg/L			0.1	EPA 340.2
Calcium	527	mg/L	26.32	meq/L	1 mg/L	SW-846 6010A
Magnesium	164	mg/L	13.51	meq/L	1 mg/L	SW-846 6010A
Potassium	13	mg/L	0.35	meq/L	1 mg/L	SW-846 6010A
Sodium	2590	mg/L	112.84	meq/L	1 mg/L	SW-846 6010A
Bicarbonate	754	mg/L	12.37	meq/L	1 mg/L	EPA 310.1
Carbonate	ND*		0.00		1 mg/L	EPA 310.1
Chloride	2210	mg/L	110.24	meq/L	1 mg/L	SW-846 9251
Sulfate	3510	mg/L	73.10	meq/L	5 mg/L	SW-846 9036
Major Cation Sum	152.96	meq/L			N/A	Calculation
Major Anion Sum	147.83	meq/L			N/A	Calculation
Cation/Anion Balance	1.71	% Diff			N/A	Calculation
Total Metals						
Total Arsenic	0.039	mg/L			0.005	SW-846 7061A
Total Chromium	0.09	mg/L			0.02	SW-846 6010A
Total Lead	0.03	mg/L			0.01	SW-846 7421
Total Nickel	0.04	mg/L			0.01	SW-846 6010A

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

David N. Poelstra
Laboratory Manager

Inter·Mountain Laboratories, Inc.

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College Station, Texas 77845

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM *
Sample ID: OCD-6
Lab ID: 0494W10188/0694G02088
Matrix: Water
Condition: Intact

Report Date: 12/13/94
Receipt Date: 11/10/94
Sample Date: 11/06/94

Parameter	Concentration	PQL	Method
Dissolved Aluminum	ND*	0.1 mg/L	SW-846 6010A
Dissolved Antimony	ND*	0.1 mg/L	SW-846 6010A
Dissolved Arsenic	ND*	0.2 mg/L	SW-846 6010A
Dissolved Barium	ND*	0.05 mg/L	SW-846 6010A
Dissolved Beryllium	ND*	0.01 mg/L	SW-846 6010A
Dissolved Boron	0.55 mg/L	0.05	SW-846 6010A
Dissolved Cadmium	ND*	0.02 mg/L	SW-846 6010A
Dissolved Chromium	ND*	0.02 mg/L	SW-846 6010A
Dissolved Cobalt	ND*	0.02 mg/L	SW-846 6010A
Dissolved Copper	ND*	0.01 mg/L	SW-846 6010A
Dissolved Iron	7.95 mg/L	0.05	SW-846 6010A
Dissolved Lead	ND*	0.1 mg/L	SW-846 6010A
Dissolved Manganese	1.88 mg/L	0.02	SW-846 6010A
Dissolved Nickel	0.01 mg/L	0.01	SW-846 6010A
Dissolved Molybdenum	ND*	0.05 mg/L	SW-846 6010A
Dissolved Selenium	ND*	0.2 mg/L	SW-846 6010A
Dissolved Silica	14.94 mg/L	0.05	SW-846 6010A
Dissolved Silver	ND*	0.01 mg/L	SW-846 6010A
Dissolved Thallium	ND*	0.2 mg/L	SW-846 6010A
Dissolved Vanadium	ND*	0.01 mg/L	SW-846 6010A
Dissolved Zinc	ND*	0.01 mg/L	SW-846 6010A

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

David N. Poelstra
Laboratory Manager

Inter-Mountain Laboratories, Inc.

3304 Longmire
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EPA Method 8240
VOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project :	RFI Phase III / Artesia, NM	Report Date:	11/14/94
Sample ID:	OCD-8A	Date Sampled:	11/06/94
Laboratory ID:	0694G02092	Date Received:	11/09/94
Sample Matrix:	Water	Date Extracted:	11/14/94
Preservative:	Cool, HCl	Date Analyzed:	11/14/94
Condition:	Intact, pH<2		

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Benzene	ND	0.005
Toluene	ND	0.005
Ethylbenzene	ND	0.005
m,p-Xylene	ND	0.005
o-Xylene	ND	0.005
Methyl ethyl ketone	ND	0.005
Carbon disulfide	ND	0.005

ND - Analyte not detected at stated limit of detection

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
Dibromofluoromethane	100%	86 - 118%
Toluene - d8	99%	88 - 110%
Bromofluorobenzene	101%	86 - 115%

Reference: Method 8240A: Gas Chromatography / Mass Spectrometry for Volatile Organics Test Methods for Evaluating Solid Waste, SW - 846, Final Update I, United States Environmental Protection Agency, July 1992.

Comments: A capillary column is used instead of a packed column as in the reference above.

Analyst

Review

Inter-Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

EPA Method 8270
SEMIVOLATILE ORGANIC COMPOUNDS

Client: **NAVAJO REFINING COMPANY**
Project: RFI Phase III / Artesia, NM
Sample ID: OCD - 8A
Laboratory ID: 0694G02092
Sample Matrix: Water
Condition: Intact
Preservative: Cool

Report Date: 11/14/94
Date Sampled: 11/06/94
Date Received: 11/09/94
Date Extracted: 11/12/94
Date Analyzed: 11/13/94

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Acenaphthene	ND	0.010
Acenaphthylene	ND	0.010
Anthracene	ND	0.010
Benzo(a)anthracene	ND	0.010
Benzo(b)fluoranthene	ND	0.010
Benzo(k)fluoranthene	ND	0.010
Benzo(g,h,i)perylene	ND	0.010
Benzo(a)pyrene	ND	0.010
Chrysene	ND	0.010
Dibenz(a,h)anthracene	ND	0.010
Fluoranthene	ND	0.010
Fluorene	ND	0.010
Ideno(1,2,3-cd)pyrene	ND	0.010
Naphthalene	ND	0.010
Phenanthrene	ND	0.010
Pyrene	ND	0.010

ND - Analyte not detected at stated limit of detection

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
2 - Fluorophenol	61%	21 - 110%
Phenol - d5	75%	10 - 110%
Nitrobenzene - d5	67%	35 - 114%
2 - Fluorobiphenyl	75%	43 - 116%
2,4,6 - Tribromophenol	83%	10 - 123%
Terphenyl - d14	77%	33 - 141%

References: Method 3510: Separatory Funnel Liquid-Liquid Extraction.
Method 8270: Gas Chromatography / Mass Spectrometry for Semivolatile Organics Test Methods for Evaluating Solid Wastes, SW - 846, Final Update I, United States Environmental Protection Agency, July 1992.

Comments:

Ramona R. Dennis
Analyst

Wendell M Rogers
Review

Inter-Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM *
Sample ID: OCD-8A
Lab ID: 0494W10189/0694G02092
Matrix: Water
Condition: Intact

Report Date: 12/13/94
Receipt Date: 11/10/94
Sample Date: 11/06/94

Parameter	Concentration	PQL	Method
pH (Lab)	7.4 s.u.	0.1	SW-846 9040
Conductivity (Lab)	12200 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180° C)	9560 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	407 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	3000 mg/L	1	Calculation
Fluoride	2.7 mg/L	0.1	EPA 340.2

Calcium	634 mg/L	31.64 meq/L	1 mg/L	SW-846 6010A
Magnesium	345 mg/L	28.34 meq/L	1 mg/L	SW-846 6010A
Potassium	9 mg/L	0.24 meq/L	1 mg/L	SW-846 6010A
Sodium	2140 mg/L	93.08 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	497 mg/L	8.15 meq/L	1 mg/L	EPA 310.1
Carbonate	ND*	0.00	1 mg/L	EPA 310.1
Chloride	2340 mg/L	116.66 meq/L	1 mg/L	SW-846 9251
Sulfate	3480 mg/L	72.31 meq/L	5 mg/L	SW-846 9036
Major Cation Sum	153.35 meq/L		N/A	Calculation
Major Anion Sum	146.46 meq/L		N/A	Calculation
Cation/Anion Balance	2.30 % Diff		N/A	Calculation

Total Metals			
Total Arsenic	0.022 mg/L	0.005	SW-846 7061A
Total Chromium	0.09 mg/L	0.02	SW-846 6010A
Total Lead	0.02 mg/L	0.01	SW-846 7421
Total Nickel	0.06 mg/L	0.01	SW-846 6010A

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

David N. Poelstra
Laboratory Manager

Inter-Mountain Laboratories, Inc.

3304 Longmire
College Station, Texas 77845

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM *
Sample ID: OCD-8A
Lab ID: 0494W10189/0694G02092
Matrix: Water
Condition: Intact

Report Date: 12/13/94
Receipt Date: 11/10/94
Sample Date: 11/06/94

Parameter	Concentration	PQL	Method
Dissolved Aluminum	ND*	0.1 mg/L	SW-846 6010A
Dissolved Antimony	ND*	0.1 mg/L	SW-846 6010A
Dissolved Arsenic	ND*	0.2 mg/L	SW-846 6010A
Dissolved Barium	ND*	0.05 mg/L	SW-846 6010A
Dissolved Beryllium	ND*	0.01 mg/L	SW-846 6010A
Dissolved Boron	0.87 mg/L	0.05	SW-846 6010A
Dissolved Cadmium	0.04 mg/L	0.02	SW-846 6010A
Dissolved Chromium	ND*	0.02 mg/L	SW-846 6010A
Dissolved Cobalt	ND*	0.02 mg/L	SW-846 6010A
Dissolved Copper	ND*	0.01 mg/L	SW-846 6010A
Dissolved Iron	0.50 mg/L	0.05	SW-846 6010A
Dissolved Lead	ND*	0.1 mg/L	SW-846 6010A
Dissolved Manganese	4.55 mg/L	0.02	SW-846 6010A
Dissolved Nickel	0.06 mg/L	0.01	SW-846 6010A
Dissolved Molybdenum	ND*	0.05 mg/L	SW-846 6010A
Dissolved Selenium	ND*	0.2 mg/L	SW-846 6010A
Dissolved Silica	10.92 mg/L	0.05	SW-846 6010A
Dissolved Silver	ND*	0.01 mg/L	SW-846 6010A
Dissolved Thallium	ND*	0.2 mg/L	SW-846 6010A
Dissolved Vanadium	0.01 mg/L	0.01	SW-846 6010A
Dissolved Zinc	ND*	0.01 mg/L	SW-846 6010A

*ND - Parameter not detected at stated Practical Quantitation Limit.

Reference: SW-846 - "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", United States Environmental Protection Agency, Final Update 1, July 1992.

EPA - "Methods for Chemical Analysis of Water and Wastes", United States Environmental Protection Agency, EPA 600/4-79-020, Revised March, 1983.

Reviewed By:

David N. Poelstra
Laboratory Manager

TELEPHONE
(505) 748-3311

EASYLINK
62905278

Navajo
REFINING COMPANY

501 EAST MAIN STREET ◦ P. O. BOX 159
ARTESIA, NEW MEXICO 88211-0159

FAX
(505) 746-6410 ACCTG
(505) 746-6155 EXEC
(505) 748-9077 ENGR
(505) 746-4438 P / L

January 19, 1995

Mr. Roger Anderson
Oil Conservation Division-Environmental Bureau
State Land Office Bldg.
P.O. Box 2088
Santa Fe, NM 87501

Dear Roger,

Enclosed are the results of Navajo Refining Company's annual sampling of the effluent into our evaporation ponds. In Navajo's letter of December 21, 1991, (response to NOV NMD048918817), Navajo agreed to send a copy of these results to ED.

If you have any questions concerning these results, please call me at 505-748-3311. Thank you for your time in this matter.

Sincerely,

Darrell Moore

Darrell Moore
Environmental Specialist

encl.
cc: NM Environment Dept.

TRACE ANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING COMPANY
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

December 13, 1994
Receiving Date: 12/10/94
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Analysis Date: 12/12/94
Sampling Date: 12/09/94
Sample Condition: Intact & Cool
Sample Received by: BL
Project Name: NA

TA#	Field Code	MTBE (ppb)	BENZENE (ppb)	TOLUENE (ppb)	ETHYL-BENZENE (ppb)	M,P,O XYLENE (ppb)	TOTAL BTEX (ppb)
T29583	Effluent to Evap. Ponds (Yrly)	<10	278	284	63	456	1,081
QC	Quality Control	186	185	183	183	550	
Detection Limit		1	1	1	1	1	
% Precision		92	99	99	98	98	
% Extraction Accuracy		102	102	101	102	102	
% Instrument Accuracy		93	93	92	92	92	

METHODS: EPA SW 846-8020.
BTEX SPIKE AND QC: Sample and Blank Spiked with 200 ppb EACH VOLATILE ORGANICS.

12-13-94

Director, Dr. Blair Leftwich
Director, Dr. Bruce McDonell

Date

TRACE ANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING

December 21, 1994
Receiving Date: 12/10/94
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

Analysis Date: 12/10/94
Sampling Date: 12/09/94
Sample Condition: Intact & Cool
Sample Received by: BL
Project Name: NA

TA#	FIELD CODE	CHLORIDE (mg/L)	FLUORIDE (mg/L)	SULFATE (mg/L)	ALKALINITY (mg/L as CaCo3) HC03	C03	
T29583	Effluent to Evap. Ponds (Yrly)	475	153	487	357	0	
QC	Quality Control	499	1.0	9	---	---	
% Precision		100	99	103	102	102	
% Extraction Accuracy		97	97	101	---	---	
% Instrument Accuracy		99	100	97	---	---	
DETECTION LIMIT		1	0.1	1	10	10	10

METHODS: EPA 375.4, 310.1, 340.2; 4500 Cl-B.
QC: Blank Spiked with 500 mg/L CHLORIDE; 1.0 mg/L FLUORIDE; 10.0 mg/L SULFATE.

Director, Dr. Blair Leftwich
Director, Dr. Bruce McDonell

12-21-94
Date

TRACE ANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING

January 13, 1995
Receiving Date: 12/10/94
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

Analysis Date: 12/20/94
Sampling Date: 12/09/94
Sample Condition: Intact & Cool
Sample Received by: BL
Project Name: NA

TA#	Field Code	POTASSIUM (mg/L)	MAGNESIUM (mg/L)	CALCIUM (mg/L)	SODIUM (mg/L)
T29583	Effluent to Evap. Ponds (Yrly)	21.8	69.8	63.7	772
QC	Quality Control	11.0	21.8	20.6	20.3
Detection Limit		0.1	0.1	0.05	0.1
% Precision		101	99	99	95
% Extraction Accuracy		112	104	98	102
% Instrument Accuracy		110	109	103	102

METHODS: EPA 200.7.
QC: Blank Spiked with 10.0 mg/L POTASSIUM; 20.0 mg/L MAGNESIUM, CALCIUM, SODIUM.

Director, Dr. Blair Leftwich
Director, Dr. Bruce McDonell

1-13-95
Date

TRACE ANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

January 13, 1995
Receiving Date: 12/10/94
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Analysis Date: 12/20/94
Sampling Date: 12/09/94
Sample Condition: Intact & Cool
Sample Received by: BL
Project Name: NA

TOTAL METALS

TA#	FIELD CODE	As (ppm)	Mo (ppm)	Cr (ppm)	Zn (ppm)	Cd (ppm)	Ni (ppm)	Be (ppm)	Fe (ppm)	Mn (ppm)	V (ppm)	Cu (ppm)
T29583	Effluent to Evap. Ponds (Yrly)	0.6	<0.05	<0.01	0.06	<0.01	<0.05	<0.01	0.85	0.15	<0.05	<0.05
QC	Quality Control	9.9	5.44	10.0	5.48	2.01	5.34	5.37	5.38	5.31	5.27	5.31
DETECTION LIMIT		0.1	0.05	0.01	0.01	0.01	0.01	0.01	0.05	0.05	0.05	0.05
% Precision		102	100	100	99	99	100	101	100	99	100	100
% Extraction Accuracy		89	99	90	104	90	101	100	102	101	104	101
% Instrument Accuracy		99	109	100	110	100	107	107	108	106	105	106

TA#	FIELD CODE	Al (ppm)	B (ppm)	Co (ppm)	Ba (ppm)	U (ppm)	Hg (ppm)	Se (ppm)	Pb (ppm)	Ag (ppm)
T29583	Effluent to Evap. Ponds (Yrly)	0.35	0.54	<0.05	<0.05	<0.5	<0.001	0.001	<0.001	<0.001
QC	Quality Control	5.22	5.14	5.40	192	10.7	0.022	0.046	0.051	0.096
DETECTION LIMIT		0.08	0.05	0.05	0.05	0.5	0.001	0.001	0.001	0.001
% Precision		98	100	100	99	99	102	100	98	100
% Extraction Accuracy		104	101	100	89	100	100	100	98	110
% Instrument Accuracy		104	103	108	96	109	100	92	102	96

METHODS: EPA 200.7, 239.2, 270.2, 272.2.
QC: Blank Spiked with 0.050 ppm Se, Pb; 0.100 ppm Ag; 10.0 ppm As, Cr; 5.00 ppm Mo, Cd, Ni, Fe, Mn, V, Cu, Al, B, Co; 2.00 ppm Cd; 200 ppm Ba; 9.8 ppm U; 0.022 ppm Hg.

BS

Director, Dr. Blair Leftwich
Director, Dr. Bruce McDonell

1-13-95
DATE

6701 Aberdeen Avenue
Lubbock, Texas 79424
806•794•1296
FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING CO.
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

December 23, 1994
Receiving Date: 12/10/94
Sample Type: Water
Sample Condition: I & C
Sample Received by: BL
Analysis Date: 12/12/94

T29583
Evap. Pond

PAH's

EPA 8270 (ppm)	DL	Effluent	QC	%P	%EA	%IA
Naphthalene	0.001	0.096	3.97			79
Acenaphthylene	0.001	ND	4.47			89
Acenaphthene	0.001	0.007	4.66	100	87	93
Fluorene	0.001	ND	3.48			70
Phenanthrene	0.001	ND	5.31			106
Anthracene	0.001	0.231	4.96			95
Fluoranthene	0.001	0.016	4.69			94
Pyrene	0.001	0.092	4.52	112	130	90
Benz[a]anthracene	0.001	0.048	4.01			80
Chyrsene	0.001	ND	4.17			83
Benzo[b]fluoranthene	0.001	ND	3.97			79
Benzo[k]fluoranthene	0.001	ND	3.75			75
Benzo[a]pyrene	0.001	ND	4.83			97
Indeno[1,2,3-cd]pyrene	0.001	ND	3.03			61
Dibenz[a,h]anthracene	0.001	ND	3.67			73
Benzo[g,h,i]perylene	0.001	ND	3.66			73

*ND = Not Detected

	% RECOVERY
2-Fluorophenol SURR	83
Phenol-d5 SURR	87
Nitrobenzene-d5 SURR	84
2-Fluorobiphenyl SURR	84
2,4,6-Tribromophenol SURR	78
Terphenyl-d14 SURR	102

METHODS: EPA 8270.

Director, Dr. Blair Leftwich

12-23-94
DATE

Director, Dr. Bruce McDonell

TraceAnalysis, Inc.

6701 Aberdeen Avenue Lubbock, Texas 79424
Tel (806) 794 1296 Fax (806) 794 1298

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Darrell Moore
Phone #: 505-748-3311
FAX #: 505-748-9077

Company Name & Address: Navajo Refining 501 E. Main Artesia NM

Project #:

Project Name :

Project Location: Artesia

Sampler Signature: Darrell Moore

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	OTHER	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	OTHER	SAMPLING: DATE	TIME	BTEX, MTBE	TPH	TCLP Metals Ag As Ba Cd Cr Pb Hg Se	Total Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Volatiles	TCLP Semi Volatiles	TDS	RCI
29579	Outside Pipe Run	1			X						X	X		12/8/94	14:00		X						
80	Under Pipe Run	1			X						X	X		" "	14:10		X						
81	RA-2723	2		X							X	X		12/9/94	13:30	X							
82	Reverse Osmosis Qtrly	14		X						(5) X	All X	(6) X	(3) X	" "	14:00				See	List			
83	Effluent to Evap Ponds (Yrly)	5		X						(5) X	All X	(4) X		" "	14:30				See	List			

SPECIAL HANDLING: Turn around # of days; Fax ASAP; Report TWC direct; Hold

Relinquished by:	Date:	Times:	Received by:
Darrell Moore	12/9/94	16:30	
	12-10-94	FIC	

Received by Laboratory:

REMARKS

TELEPHONE
(505) 748-3311

EASYLINK
62905278

NAVAJO REFINING COMPANY

FAX
(505) 746-6410 ACCTG
(505) 746-6155 EXEC
(505) 748-9077 ENGR
(505) 746-4438 P / L

501 EAST MAIN STREET ◦ P. O. BOX 159
ARTESIA, NEW MEXICO 88211-0159

January 13, 1995

Mr. Roger Anderson
Oil Conservation Division-Environmental Bureau
State Land Office Bldg.
P.O. Box 2088
Santa Fe, NM 87501

Dear Roger,

Enclosed are the results of Navajo Refining Company's annual sampling of the effluent into our evaporation ponds. In Navajo's letter of December 21, 1991, (response to NOV NMD048918817), Navajo agreed to send a copy of these results to ED.

If you have any questions concerning these results, please call me at 505-748-3311. Thank you for your time in this matter.

Sincerely,

Darrell Moore

Darrell Moore
Environmental Specialist

encl.
cc: NM Environment Dept.

TRACEANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING COMPANY
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

December 13, 1994
Receiving Date: 12/10/94
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Analysis Date: 12/12/94
Sampling Date: 12/09/94
Sample Condition: Intact & Cool
Sample Received by: BL
Project Name: NA

TA#	Field Code	MTBE (ppb)	BENZENE (ppb)	TOLUENE (ppb)	ETHYL-BENZENE (ppb)	M,P,O XYLENE (ppb)	TOTAL BTEX (ppb)
T29583	Effluent to Evap. Ponds (Yrly)	<10	278	284	63	456	1,081
QC	Quality Control	186	185	183	183	550	
Detection Limit		1	1	1	1	1	
% Precision		92	99	99	98	98	
% Extraction Accuracy		102	102	101	102	102	
% Instrument Accuracy		93	93	92	92	92	

METHODS: EPA SW 846-8020.
BTEX SPIKE AND QC: Sample and Blank Spiked with 200 ppb EACH VOLATILE ORGANICS.

12-13-94

Director, Dr. Blair Leftwich
Director, Dr. Bruce McDonell

Date

TRACEANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING

December 21, 1994
Receiving Date: 12/10/94
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

Analysis Date: 12/10/94
Sampling Date: 12/09/94
Sample Condition: Intact & Cool
Sample Received by: BL
Project Name: NA

TA#	FIELD CODE	CHLORIDE (mg/L)	FLUORIDE (mg/L)	SULFATE (mg/L)	ALKALINITY (mg/L as CaCo3) HCO3	CO3	
T29583	Effluent to Evap. Ponds (Yrly)	475	153	487	357	0	
QC	Quality Control	499	1.0	9	---	---	
% Precision		100	99	103	102	102	
% Extraction Accuracy		97	97	101	---	---	
% Instrument Accuracy		99	100	97	---	---	
DETECTION LIMIT		1	0.1	1	10	10	10

METHODS: EPA 375.4, 310.1, 340.2; 4500 Cl-B.
QC: Blank Spiked with 500 mg/L CHLORIDE; 1.0 mg/L FLUORIDE; 10.0 mg/L SULFATE.

Director, Dr. Blair Leftwich
Director, Dr. Bruce McDonell

12-21-94
Date

6701 Aberdeen Avenue
Lubbock, Texas 79424
806•794•1296
FAX 806•794•1298

ANALYTICAL RESULTS FOR
NAVAJO REFINING CO.
Attention: Darrell Moore
501 E. Main
Artesia, NM 88210

December 23, 1994
Receiving Date: 12/10/94
Sample Type: Water
Sample Condition: I & C
Sample Received by: BL
Analysis Date: 12/12/94

T29583
Evap. Pond

PAH's

EPA 8270 (ppm)	DL	Effluent	QC	%P	%EA	%IA
Naphthalene	0.001	0.096	3.97			79
Acenaphthylene	0.001	ND	4.47			89
Acenaphthene	0.001	0.007	4.66	100	87	93
Fluorene	0.001	ND	3.48			70
Phenanthrene	0.001	ND	5.31			106
Anthracene	0.001	0.231	4.96			95
Fluoranthene	0.001	0.016	4.69			94
Pyrene	0.001	0.092	4.52	112	130	90
Benz[a]anthracene	0.001	0.048	4.01			80
Chyrsene	0.001	ND	4.17			83
Benzo[b]fluoranthene	0.001	ND	3.97			79
Benzo[k]fluoranthene	0.001	ND	3.75			75
Benzo[a]pyrene	0.001	ND	4.83			97
Indeno[1,2,3-cd]pyrene	0.001	ND	3.03			61
Dibenz[a,h]anthracene	0.001	ND	3.67			73
Benzo[g,h,i]perylene	0.001	ND	3.66			73

*ND = Not Detected

	% RECOVERY
2-Fluorophenol SURR	83
Phenol-d5 SURR	87
Nitrobenzene-d5 SURR	84
2-Fluorobiphenyl SURR	84
2,4,6-Tribromophenol SURR	78
Terphenyl-d14 SURR	102

METHODS: EPA 8270.

Director, Dr. Blair Leftwich

12-23-94
DATE

Director, Dr. Bruce McDonell

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.: Place Form ID Sticker Here

4 Priority Code #: _____ (If "1" or "2", call EID-SLD Coordinator)

5 Facility Name: Navajo Refinery

6 County: Eddy

7 City: Artesia

8 State: NM

9 Sample Location: Pond Effluent

10 Collected By: Kathy Brown (First / Last) On: 93/05/13 (Date: YY/MM/DD) At: 0900 (Time: 24 hr. clock, 3:00 pm = 1500 hrs.) hrs.

11 Codes: Submitter _____ WSS # _____ Organization _____

12 Latitude (DDMMSS) _____ ° _____ ' _____ "
Longitude (DDDMMSS) _____ ° _____ ' _____ "
2 Digit ID (If needed) _____

13 Report To: 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: _____, Conductivity: 950 umhos @ _____ °C, Temperature: 28.5 °C, Chlorine Residual: _____ mg/l, Flow: _____

17 Sample Source:
- ☐ Stream
- ☐ Lake
- ☐ Drain
- ☐ Pool
- ☐ WWTP
- ☐ Well; Depth: _____
- ☐ Spring
- ☐ Distribution
- ☒ Point-of-Entry
- ☐ Other: Pond

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 each)
_____ - 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:

This Form Will NOT Be Returned With Your Results. Please RETAIN A COPY!

WATER CHEMISTRY ANALYTICAL REQUEST FORM

SCIENTIFIC LABORATORY DIVISION
700 CAMINO DE SALUD, ALBUQUERQUE, NM 87106
Water Chemistry Section - Telephone: (505) 841-2555

SLD No. 1 •

Date Received: _____

2 User Code #: 7 0 3 2 0	3 Request ID No.: Place Form ID Sticker Here	4 Priority Code #:	
5 Facility Name: Navajo Refinery	6 County: Eddy	7 City: Artesia	8 State: NM
9 Sample Location: Pond 1 Effluent			
10 Collected By: Kathy Brown (First / Last)	On: 93/05/13 (Date: YY/MM/DD)	At: 0910 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. 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: _____, Conductivity: 9500 umhos @ _____ °C, Temperature: 28.5 °C, Chlorine Residual: _____ mg/l, Flow: _____

17 Sample Source:
- ☐ Stream
- ☐ Lake
- ☐ Drain
- ☐ Pool
- ☐ WWTP
- ☐ Well; Depth: _____
- ☐ Spring
- ☐ Distribution
- ☒ Point-of-Entry
- ☐ Other: Pond

18 Field Notes/ Sample #:

19 Sample Type: ☒ Water, ☐ Soil, ☐ Food, ☐ Wastewater, ☐ Other _____

This form accompanies a single sample consisting of:
- ____ 1 liter cubitainers (1 quart)
- ____ 4 liter cubitainers (1 gallon)
- ____ _____

20 Preservation:
- ☐ WNF Water Not Preserved; Filtered
- ☒ WNN Water Not Preserved; Not Filtered
- ☐ WPF Water Preserved with Sulfuric Acid (H2SO4); Filtered
- ☐ WPN Water Preserved with Sulfuric Acid; Not Filtered
- ☐ WNL Water Not Preserved in Field; Please Add H2SO4 at Lab
- ☒ ICE Water Iced
- ☐ Other _____

21 Analyses Requested: Please check the appropriate box(es) below to indicate the type of analyses required.

Group Analyses:
- ☐ (854) SDWA Group II (Nitrate as N)
- ☐ (861) SDWA Group III (Fluoride)
- ☐ (860) SDWA Complete Secondary
- ☐ (859) SWQB SS Anion - Cation Group +
- ☐ (868) SWQB NPS Anion, Cation, Physical + TSS
- ☐ (869) SWQB Nutrient Analysis Group +
- ☒ (867) Major Anions & Cations

Cations:		Physical Parameters:		Surface and Waste Water:	
☐ Calcium (as Ca)		☐ Color		☐ Biological Oxygen Demand	
☐ Magnesium (as Mg)		☐ Conductance (Micromhos @ 25 C)		☐ Total Suspended Solids	
☐ Potassium (as K)		☐ Odor		☐ Chemical Oxygen Demand	
☐ Sodium (as Na)		☐ pH		☐ Total Organic Carbon	
☐ Total Hardness (as CaCO3)		☐ Surfactants		☐ Cyanide	
Anions:		☐ Total Dissolved Solids		**Nutrients:**	
☐ Alkalinity (as CaCO3)		☐ Turbidity		☐ Nitrate + Nitrite (as N)	
☐ Bicarbonate (as HCO3)		**Other:**		☐ Ammonia (as N)	
☐ Carbonate (as CO3)		☐ _____		☐ Total Kjeldahl (as N)	
☐ Chloride (as Cl)		☐ _____		☐ Nitrite (as N)	
☐ Fluoride (as F)		☐ _____		☐ Orthophosphate (as P)	
☐ Sulfate (as SO4)		☐ _____		☐ Total Phosphorus (as P)	
☐ Ion Charge Balance					

Remarks:

SLD 8912-WC Form New 12/89 This Form Will NOT Be Returned With Your Results. Please RETAIN A COPY!

AIR & HEAVY METALS ANALYTICAL REQUEST FORM

SCIENTIFIC LABORATORY DIVISION
700 CAMINO DE SALUD N.E., ALBUQUERQUE, NM 87106
Air & Heavy Metals Section - Telephone: (505) 841-2553

SLD No. 1

Date Received:

2 User Code #: 7 0 3 2 0

3 Request ID No.: Place Form ID Sticker Here

4 Priority Code #: [If "1" or "2", call EID-SLD Coordinator]

5 Facility Name: Navajo Refinery

6 County: Eddy

7 City: Artesia

8 State: NM

9 Sample Location: POND EFFLUENT

10 Collected By: Kathy Brown (First / Last) On: 93/05/13 (Date: YY/MM/DD) At: 0900 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: 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 ☒ Monitoring ☐ Special
☒ Grab ☐ Composite _____ (Composite Time Period)
☐ Flow Proportioned ☐ Equal Aliquot ☐ Sample Split w/Permittee ☐ Chain of Custody

16 Field Data: pH: _____, Conductivity: 9500 umhos @ _____ °C, Temperature: 28.5 °C, Chlorine Residual: _____ mg/l, Flow: _____

17 Sample Source:
☐ -Stream ☐ -Well; Depth: _____
☐ -Lake ☐ -Spring
☐ -Drain ☐ -Distribution
☐ -Pool ☒ -Point-of-Entry
☐ -WWTP ☐ -Other: Pond

18 Field Notes/ Sample #:

19 Sample Type: ☒ -Water, ☐ -Soil, ☐ -Food, ☐ -Wastewater, ☐ -Other _____
This form accompanies a **single sample** consisting of:
1 - 1 liter cubitainers (1 quart)
_____ - 4 liter cubitainers (1 gallon)
_____ - _____

20 Preservation:
☐ - WNF Water Not Preserved; Filtered
☒ - WNN Water Not Preserved; Not Filtered
☐ - WPF Water Preserved with Nitric Acid (HNO3); Filtered
☐ - WPN Water Preserved with Nitric Acid; Not Filtered
☐ - WNL Water Not Preserved in Field; Please Add HNO3 at Lab
☒ - ICE Water Iced
☐ - Other _____

21 Analyses Requested: Please check the appropriate box(es) below to indicate the type of analyses required.

☒ - (704) ICAP Scan
☐ - (720) SDWA Group I Only
☐ - (721) SDWA Group I + other parameter(s) marked below

☐ - Aluminum	☐ - Lead	☐ - Vanadium
☐ - Arsenic	☐ - Manganese	☐ - Zinc
☐ - Barium	☐ - Mercury	☐ - _____
☐ - Cadmium	☐ - Molybdenum	☐ - _____
☐ - Chromium	☐ - Nickel	☐ - _____
☐ - Cobalt	☐ - Selenium	☐ - _____
☐ - Copper	☐ - Silver	☐ - _____
☐ - Iron	☐ - Uranium	☐ - _____

Remarks:

SLD 8912-HM Form New 12/89 This Form Will NOT Be Returned With Your Results. Please RETAIN A COPY!

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.: Place Form ID Sticker Here

4 Priority Code #: (If "1" or "2" call EID-SLD Coordinator)

5 Facility Name: Navajo Refinery

6 County: Eddy

7 City: Artesia

8 State: NM

9 Sample Location: NE POND EFFLUENT

10 Collected By: Kathy (First) Brown (Last) On: 93/05/13 (Date: YY/MM/DD) At: 0930 (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:
- [x] Compliance
- [ ] Check
- [x] Monitoring
- [ ] Special

Sampling Information:
- [x] Grab
- [ ] Composite _____ (Composite Time Period)
  - [ ] Flow Proportioned
  - [ ] Equal Aliquot
- [ ] Sample Split w/Permittee
- [ ] Chain of Custody

16 Field Data: pH: _____, Conductivity: 10900 umhos @ _____ °C, Temperature: 23 °C, Chlorine Residual: _____ mg/l, Flow: _____

17 Sample Source:
- [ ] Stream
- [ ] Lake
- [ ] Drain
- [ ] Pool
- [ ] WWTP
- [ ] Well; Depth: _____
- [ ] Spring
- [ ] Distribution
- [x] Point-of-Entry
- [ ] Other: Pond

18 Field Notes/ Sample #:

19 Sample Type: [ ] Water, [ ] Soil, [ ] Food, [x] Wastewater, [ ] Other _____
This form accompanies a single sample consisting of:
2 - septum vial(s) (volume = 40 ml each)
_____ - 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)
- [x] 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)
- [x] (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!

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.: (Place Form ID Sticker Here)

4 Priority Code #: _____ (If "1" or "2", call EID-SLD Coordinator)

5 Facility Name: Navajo Refinery

6 County: Eddy

7 City: Artesia

8 State: NM

9 Sample Location: MONITOR WELL NO. 46

10 Collected By: Kathy (First) Brown (Last.....) On: 93/05/13 (Date: YY/MM/DD) At: 1140 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: 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:
- [x] Compliance
- [ ] Check
- [x] 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: 4600 umhos @ _____ °C, Temperature: 19 °C, Chlorine Residual: _____ mg/l, Flow: _____

17 Sample Source:
- [ ] Stream
- [ ] Lake
- [ ] Drain
- [ ] Pool
- [ ] WWTP
- [x] Well; Depth: TD 19.77' DTW 10.52'
- [ ] 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:
2 - septum vial(s) (volume = 40 ml each)
_____ - 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)
- [x] 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)
- [x] (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!

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.: (Place Form ID Sticker Here) | 4 Priority Code #: _____ (If "1" or "2", call EID-SLD Coordinator)

5 Facility Name: Navajo Refinery | 6 County: Eddy | 7 City: Artesia | 8 State: NM

9 Sample Location: Monitor Well No. 18

10 Collected By: Kathy (First) Brown (Last) On: 93/05/13 (Date: YY/MM/DD) At: 1345 (Time: 24 hr. clock, 3:00 pm = 1500 hrs.) hrs.

11 Codes: Submitter _____ WSS # _____ Organization _____

12 Latitude (DDMMSS) _____ ° _____ ' _____ "
Longitude (DDDMMSS) _____ ° _____ ' _____ "
2 Digit ID (If needed) _____

13 Report To: 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: [X] Compliance [ ] Check [X] 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 [X] Well; Depth: TD 22.67' DTW 16.55'
[ ] Lake [ ] Spring
[ ] Drain [ ] Distribution
[ ] Pool [ ] Point-of-Entry
[ ] WWTP [ ] 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 each)
_____ - 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)
[X] Other HgCl2

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)
[X] - (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

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

ANALYSIS REQUEST FORM

Contract Lab Westech Lab Contract No. 93-521.07-034A

OCD Sample No. 9305131000

Collection Date	Collection Time	Collected by—Person/Agency
5/13/93	1000	Brown/Olsen OCD

SITE INFORMATION

Sample location: Navajo Refinery - Artesia

Collection Site Description: ~~Plant~~ RO Reject Water from outlet pipe

Township, Range, Section, Tract: | | | + | | + | − | |

SEND FINAL REPORT TO ▸
ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
PO Box 2088
Santa Fe, NM 87504-2088

SAMPLING CONDITIONS

☐ Bailed ☐ Pump
☒ Dipped ☐ Tap

Water level	
Discharge	
Sample type	
pH(00400)	
Conductivity (Uncorrected)	34100 μmho
Water Temp. (00010)	25.5°C
Conductivity at 25° C	μmho

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted: 2

- ☒ **NF:** Whole sample (Non-filtered)
- ☐ **F:** Filtered in field with 0.45 μ membrane filter
- ☐ **PF:** Pre-filtered w/45 μ membrane filter

- ☒ **NA:** No acid added
- ☐ **A:** HCL
- ☐ **A:** 2ml H_2SO_4/L added
- ☐ **A:** 5ml conc. HNO_3 added
- ☐ **A:** 4ml fuming HNO_3 added

FIELD COMMENTS:

LAB ANALYSIS REQUESTED:

ITEM	DESC	METHOD	ITEM	DESC	METHOD	ITEM	DESC	METH
☐ 001	VOA	8020	☐ 013	PHENOL	604	☐ 026	Cd	7
☐ 002	VOA	602	☐ 014	VOC	8240	☐ 027	Pb	7
☐ 003	VOH	8010	☐ 015	VOC	624	☐ 028	Hg(L)	7
☐ 004	VOH	601	☐ 016	SVOC	8250	☐ 031	Se	7
☐ 005	SUITE	8010-8020	☐ 017	SVOC	625	☐ 032	ICAP	6
☐ 006	SUITE	601-602	☐ 018	VOC	8260	☐ 033	CATIONS/ANIONS	
☐ 007	HEADSPACE		☐ 019	SVOC	8270	☐ 034	N SUITE	
☐ 008	PAH	8100	☐ 020	O&G	9070	☐ 035	NITRATE	
☐ 009	PAH	610	☐ 022	AS	7060	☐ 036	NITRITE	
☐ 010	PCB	8080	☐ 023	Ba	7080	☐ 037	AMMONIA	
☐ 011	PCB	608	☐ 024	Cr	7190	☐ 038	TKN	
☐ 012	PHENOL	8040	☐ 025	Cr6	7198	☐	OTHER	

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

ANALYSIS REQUEST FORM

Contract Lab Westech Contract No. 93-521.07-034-A

OCD Sample No. 9305131140

Collection Date	Collection Time	Collected by —Person/Agency
5/13/93	1140	Brown/Olsen OCD

SITE INFORMATION

Sample location: Navajo Refinery - Artesia

Collection Site Description: Monitor Well No. 46

Township, Range, Section, Tract:

SEND FINAL REPORT TO: ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
PO Box 2088
Santa Fe, NM 87504-2088

SAMPLING CONDITIONS

- ☒ Bailed ☐ Pump
- ☐ Dipped ☐ Tap

Water level: 10.52'

Discharge:

Sample type:

pH(00400):

Conductivity (Uncorrected): 4600 μmho

Water Temp. (00010): 19°C

Conductivity at 25° C: μmho

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted:

- ☒ NF: Whole sample (Non-filtered)
- ☐ F: Filtered in field with 0.45 μ membrane filter
- ☐ PF: Pre-filtered w/45 μ membrane filter

- ☒ NA: No acid added
- ☐ A: HCL
- ☐ A: 2ml H_2SO_4/L added
- ☐ A: 5ml conc. HNO_3 added
- ☐ A: 4ml fuming HNO_3 added

FIELD COMMENTS:

$HgCl_2$ added to 40 ml Vial

LAB ANALYSIS REQUESTED:

ITEM	DESC	METHOD	ITEM	DESC	METHOD	ITEM	DESC	METH
☐ 001	VOA	8020	☐ 013	PHENOL	604	☐ 026	Cd	7
☐ 002	VOA	602	☐ 014	VOC	8240	☐ 027	Pb	7
☐ 003	VOH	8010	☐ 015	VOC	624	☐ 028	Hg(L)	7
☐ 004	VOH	601	☐ 016	SVOC	8250	☐ 031	Se	7
☐ 005	SUITE	8010-8020	☐ 017	SVOC	625	☒ 032	ICAP	6
☒ 006	SUITE	601-602	☐ 018	VOC	8260	☒ 033	CATIONS/ANIONS	
☐ 007	HEADSPACE		☐ 019	SVOC	8270	☐ 034	N SUITE	
☐ 008	PAH	8100	☐ 020	O&G	9070	☐ 035	NITRATE	
☐ 009	PAH	610	☐ 022	AS	7060	☐ 036	NITRITE	
☐ 010	PCB	8080	☐ 023	Ba	7080	☐ 037	AMMONIA	
☐ 011	PCB	608	☐ 024	Cr	7190	☐ 038	TKN	
☐ 012	PHENOL	8040	☐ 025	Cr6	7198	☐	OTHER	

Westech Laboratories Inc.
The Quality People
Since 1955

Phoenix • 3737 E. Broadway Rd. • AZ 85040 • 602-437-1080 • fax 437-8706
Flagstaff • 2400 E. Huntington Dr. • AZ 86004 • 602-774-2312 • fax 774-6469
El Paso • 10737 Gateway West #100 • TX 79935 • 915-592-3591 • fax 592-3594

CHAIN OF CUSTODY RECORD

CLIENT	ADDRESS	
[illegible]	P. O. Box 2088	
[illegible]	Santa Fe, N.M. 87504-2088	
TELEPHONE	PROJECT	JOB/P.O. NO.
505 827 5884	[illegible]	

• REFER TO FEE SCHEDULE FOR ANALYSES SELECTION •

SAMPLER (SIGNATURE): [signature]
SAMPLER (PLEASE PRINT): [illegible]

SAMPLE TYPE CODES
S – SOIL O – OIL T – TRAVEL BLANK
W – WATER G – SLUDGE F – FIELD BLANK
X – OTHER (SPECIFY) _____

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE LOCATION	COMPOSITE	GRAB	SAMPLE TYPE	NUMBER OF CONTAINERS	HOLD	REQUESTED ANALYSES	COMMENTS	LABORATORY IDENTIFICATION
930513 0900	5/13/93	0900	Pond Influent			W	3				
930513 0930	5/13/93	0930	NE Corner Pond Influent			W	3				
930513 1000	5/13/93	1000	R.O. Reject Effluent			W	3				
930513 1110	5/13/93	1110	Monitor Well No. 16			W	3				
930513 1345	5/13/93	1345	Monitor Well No. 13			W	3				
930513 1430	5/13/93	1430	Monitor Well No. 14			W	3				

RELINQUISHED BY (SIGNATURE)	PRINT NAME	DATE/TIME	RECEIVED BY (SIGNATURE)	PRINT NAME	REMARKS
[signature]	[illegible]	5/14/93 9:45			
RELINQUISHED BY (SIGNATURE)	PRINT NAME	DATE/TIME	RECEIVED BY (SIGNATURE)	PRINT NAME	
RELINQUISHED BY (SIGNATURE)	PRINT NAME	DATE/TIME	RECEIVED BY (SIGNATURE)	PRINT NAME	SAMPLE PROCESS TURNAROUND TIME: ☐ 10 BUSINESS DAYS ☐ OTHER (SPECIFY)

Westech Laboratories Inc.
The Quality People
Since 1955

Phoenix • 3737 E. Broadway Rd. • AZ 85040 • 602-437-1080 • fax 437-8706
Flagstaff • 2400 E. Huntington Dr. • AZ 86004 • 602-774-2312 • fax 774-6469
El Paso • 10737 Gateway West #100 • TX 79935 • 915-592-3591 • fax 592-3594

CHAIN OF CUSTODY RECORD

CLIENT	ADDRESS	
New Mexico Oil Conservation Division	P.O. Box 2088 Santa Fe, NM 87504-2088	
TELEPHONE	PROJECT	JOB / P.O. NO.
505-827-5884	Navajo Refinery	

• REFER TO FEE SCHEDULE FOR ANALYSES SELECTION •

SAMPLER (SIGNATURE): Kathy Brown

SAMPLER (PLEASE PRINT): Kathy Brown, Bill Olsen

SAMPLE TYPE CODES: S – SOIL; O – OIL; T – TRAVEL BLANK; W – WATER; G – SLUDGE; F – FIELD BLANK; X – OTHER (SPECIFY)

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE LOCATION	COMPOSITE	GRAB	SAMPLE TYPE	NUMBER OF CONTAINERS	HOLD	REQUESTED ANALYSES: 601/602	ICAP metals 6010	Cation/Anions 13.3	COMMENTS	LABORATORY IDENTIFICATION
9305130900	5/13/93	0900	Pond Effluent			W	2 cubi 2 40 ml		1	1	1		
9305130930	5/13/93	0930	NE Corner Pond Effluent			W	2 cubi 2 40 ml		1	1	1		
9305131000	5/13/93	1000	R.O. Reject Effluent			W	2 cubi			1	1		
9305131140	5/13/93	1140	Monitor Well No. 46			W	2 cubi 2 40 ml		1	1	1		
9305131345	5/13/93	1345	Monitor Well No. 18			W	2 cubi 2 40 ml		1	1	1		
9305131430	5/13/93	1430	Monitor Well No. AE			W	2 cubi 2 40 ml		1	1	1		

RELINQUISHED BY (SIGNATURE)	PRINT NAME	DATE / TIME	RECEIVED BY (SIGNATURE)	PRINT NAME	REMARKS
Kathy Brown	Kathy Brown	5/14/93 10:30			
RELINQUISHED BY (SIGNATURE)	PRINT NAME	DATE / TIME	RECEIVED BY (SIGNATURE)	PRINT NAME	
RELINQUISHED BY (SIGNATURE)	PRINT NAME	DATE / TIME	RECEIVED BY (SIGNATURE)	PRINT NAME	SAMPLE PROCESS TURNAROUND TIME: ☐ 10 BUSINESS DAYS ☐ OTHER (SPECIFY)

623 (8/92) White - Testing Laboratory; Yellow - Department Job File; Pink - Client

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

ANALYSIS REQUEST FORM

Contract Lab Westech Lab Contract No. 93-521-07-034-A

OCD Sample No. 9305130900

Collection Date	Collection Time	Collected by —Person/Agency
5/13/93	0900	Brown/Olsen /OCD

SITE INFORMATION

Sample location: Navajo Refinery Artesia

Collection Site Description: Pond Effluent @ inlet point

Township, Range, Section, Tract: | | | + | | + | + | |

SEND FINAL REPORT TO

ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
PO Box 2088
Santa Fe, NM 87504-2088

SAMPLING CONDITIONS

☐ Bailed ☐ Pump
☒ Dipped ☐ Tap

Water level:

Discharge:

Sample type:

pH(00400):

Conductivity (Uncorrected): 9500 µmho

Water Temp. (00010): 20.5°C

Conductivity at 25° C: µmho

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted: 4

☒ **NF:** Whole sample (Non-filtered)
☐ **F:** Filtered in field with 0.45 µ membrane filter
☐ **PF:** Pre-filtered w/45 µ membrane filter

☒ **NA:** No acid added
☐ **A:** HCL
☐ **A:** 2ml H_2SO_4/L added
☐ **A:** 5ml conc. HNO_3 added
☐ **A:** 4ml fuming HNO_3 added

FIELD COMMENTS: $HgCl_2$ added to 40 ml vials

LAB ANALYSIS REQUESTED:

ITEM	DESC	METHOD	ITEM	DESC	METHOD	ITEM	DESC	METHO
☐ 001	VOA	8020	☐ 013	PHENOL	604	☐ 026	Cd	713
☐ 002	VOA	602	☐ 014	VOC	8240	☐ 027	Pb	742
☐ 003	VOH	8010	☐ 015	VOC	624	☐ 028	Hg(L)	747
☐ 004	VOH	601	☐ 016	SVOC	8250	☐ 031	Se	774
☐ 005	SUITE	8010-8020	☐ 017	SVOC	625	☒ 032	ICAP	601
☒ 006	SUITE	601-602	☐ 018	VOC	8260	☒ 033	CATIONS/ANIONS	
☐ 007	HEADSPACE		☐ 019	SVOC	8270	☐ 034	N SUITE	
☐ 008	PAH	8100	☐ 020	O&G	9070	☐ 035	NITRATE	
☐ 009	PAH	610	☐ 022	AS	7060	☐ 036	NITRITE	
☐ 010	PCB	8080	☐ 023	Ba	7080	☐ 037	AMMONIA	
☐ 011	PCB	608	☐ 024	Cr	7190	☐ 038	TKN	
☐ 012	PHENOL	8040	☐ 025	Cr6	7198	☐	OTHER	

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

ANALYSIS REQUEST FORM

Contract Lab Westech Lab Contract No. 93-521.07-034-A

OCD Sample No. 9305130930

Collection Date	Collection Time	Collected by —Person/Agency
5 | 13 | 93	0930	Brown/Olsen /OCD

SITE INFORMATION

Sample location: Navajo Refinery - Artesia

Collection Site Description: NE Corner of Pond - Effluent

Township, Range, Section, Tract: | | | + | | + | + | |

SEND FINAL REPORT TO ▸ ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
PO Box 2088
Santa Fe, NM 87504-2088

SAMPLING CONDITIONS

☐ Bailed ☐ Pump
☒ Dipped ☐ Tap

Water level:

Discharge:

Sample type:

pH(00400):

Conductivity (Uncorrected): 10,900 μmho

Water Temp. (00010): 23°C

Conductivity at 25° C: μmho

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted: 4

☒ **NF:** Whole sample (Non-filtered)
☐ **F:** Filtered in field with 0.45 μ membrane filter
☐ **PF:** Pre-filtered w/45 μ membrane filter

☒ **NA:** No acid added
☐ **A:** HCL
☐ **A:** 2ml H_2SO_4/L added
☐ **A:** 5ml conc. HNO_3 added
☐ **A:** 4ml fuming HNO_3 added

FIELD COMMENTS:

HgCl2 added to 40 ml vials

LAB ANALYSIS REQUESTED:

ITEM	DESC	METHOD	ITEM	DESC	METHOD	ITEM	DESC	METHOD
☐ 001	VOA	8020	☐ 013	PHENOL	604	☐ 026	Cd	713(
☐ 002	VOA	602	☐ 014	VOC	8240	☐ 027	Pb	742
☐ 003	VOH	8010	☐ 015	VOC	624	☐ 028	Hg(L)	747(
☐ 004	VOH	601	☐ 016	SVOC	8250	☐ 031	Se	774
☐ 005	SUITE	8010-8020	☐ 017	SVOC	625	☒ 032	ICAP	601
☒ 006	SUITE	601-602	☐ 018	VOC	8260	☒ 033	CATIONS/ANIONS	
☐ 007	HEADSPACE		☐ 019	SVOC	8270	☐ 034	N SUITE	
☐ 008	PAH	8100	☐ 020	O&G	9070	☐ 035	NITRATE	
☐ 009	PAH	610	☐ 022	AS	7060	☐ 036	NITRITE	
☐ 010	PCB	8080	☐ 023	Ba	7080	☐ 037	AMMONIA	
☐ 011	PCB	608	☐ 024	Cr	7190	☐ 038	TKN	
☐ 012	PHENOL	8040	☐ 025	Cr6	7198	☐	OTHER	

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

ANALYSIS REQUEST FORM

Contract Lab Westech Lab Contract No. 93-521.07-034-A

OCD Sample No. 9305131345

Collection Date	Collection Time	Collected by —Person/Agency
5/13/93	1345	Brown/Olsen OCD

SITE INFORMATION

Sample location Navajo Refinery - Artesia

Collection Site Description

Monitor Well No. 13

Township, Range, Section, Tract: | | | + | | + | + | |

SEND FINAL REPORT TO

ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
PO Box 2088
Santa Fe, NM 87504-2088

SAMPLING CONDITIONS

☒ Bailed ☐ Pump ☐ Dipped ☐ Tap

Water level 16.55'

Discharge

Sample type

pH(00400)

Conductivity (Uncorrected) 2450 µmho

Water Temp. (00010) 20°C

Conductivity at 25° C 0 µmho

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted:

☒ **NF:** Whole sample (Non-filtered)
☐ **F:** Filtered in field with 0.45 µ membrane filter
☐ **PF:** Pre-filtered w/45 µ membrane filter

☒ **NA:** No acid added
☐ **A:** HCL
☐ **A:** 2ml H_2SO_4/L added
☐ **A:** 5ml conc. HNO_3 added
☐ **A:** 4ml fuming HNO_3 added

FIELD COMMENTS:

$HgCl_2$ added to 40 ml vials

LAB ANALYSIS REQUESTED:

ITEM	DESC	METHOD	ITEM	DESC	METHOD	ITEM	DESC	METH
☐ 001	VOA	8020	☐ 013	PHENOL	604	☐ 026	Cd	7
☐ 002	VOA	602	☐ 014	VOC	8240	☐ 027	Pb	7
☐ 003	VOH	8010	☐ 015	VOC	624	☐ 028	Hg(L)	7
☐ 004	VOH	601	☐ 016	SVOC	8250	☐ 031	Se	7
☐ 005	SUITE	8010-8020	☐ 017	SVOC	625	☒ 032	ICAP	6
☒ 006	SUITE	601-602	☐ 018	VOC	8260	☒ 033	CATIONS/ANIONS	
☐ 007	HEADSPACE		☐ 019	SVOC	8270	☐ 034	N SUITE	
☐ 008	PAH	8100	☐ 020	O&G	9070	☐ 035	NITRATE	
☐ 009	PAH	610	☐ 022	AS	7060	☐ 036	NITRITE	
☐ 010	PCB	8080	☐ 023	Ba	7080	☐ 037	AMMONIA	
☐ 011	PCB	608	☐ 024	Cr	7190	☐ 038	TKN	
☐ 012	PHENOL	8040	☐ 025	Cr6	7198	☐	OTHER	

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

ANALYSIS REQUEST FORM

Contract Lab Westech Lab. Contract No. 93-521.07-034-A

OCD Sample No. 9305131430

Collection Date	Collection Time	Collected by —Person/Agency
5/13/93	1430	Braun/Olsen

SITE INFORMATION

Sample location: Navajo Refinery - Artesia

Collection Site Description: Monitor Well No. AE

Township, Range, Section, Tract: | | | + | | + | | + | |

SEND FINAL REPORT TO ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
PO Box 2088
Santa Fe, NM 87504-2088

SAMPLING CONDITIONS

☒ Bailed ☐ Pump
☐ Dipped ☐ Tap

Water level: 17.05'

Discharge:

Sample type:

pH(00400):

Conductivity (Uncorrected): 4050 μmho

Water Temp. (00010): 23°C

Conductivity at 25° C: μmho

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted:

☒ **NF:** Whole sample (Non-filtered)
☐ **F:** Filtered in field with 0.45 μ membrane filter
☐ **PF:** Pre-filtered w/45 μ membrane filter

☒ **NA:** No acid added
☐ **A:** HCL
☐ **A:** 2ml H_2SO_4/L added
☐ **A:** 5ml conc. HNO_3 added
☐ **A:** 4ml fuming HNO_3 added

FIELD COMMENTS:

$HgCl_2$ added to 40 ml vials

LAB ANALYSIS REQUESTED:

ITEM	DESC	METHOD	ITEM	DESC	METHOD	ITEM	DESC	METH
☐ 001	VOA	8020	☐ 013	PHENOL	604	☐ 026	Cd	7
☐ 002	VOA	602	☐ 014	VOC	8240	☐ 027	Pb	7
☐ 003	VOH	8010	☐ 015	VOC	624	☐ 028	Hg(L)	7
☐ 004	VOH	601	☐ 016	SVOC	8250	☐ 031	Se	7
☐ 005	SUITE	8010-8020	☐ 017	SVOC	625	☒ 032	ICAP	6
☒ 006	SUITE	601-602	☐ 018	VOC	8260	☒ 033	CATIONS/ANIONS	
☐ 007	HEADSPACE		☐ 019	SVOC	8270	☐ 034	N SUITE	
☐ 008	PAH	8100	☐ 020	O&G	9070	☐ 035	NITRATE	
☐ 009	PAH	610	☐ 022	AS	7060	☐ 036	NITRITE	
☐ 010	PCB	8080	☐ 023	Ba	7080	☐ 037	AMMONIA	
☐ 011	PCB	608	☐ 024	Cr	7190	☐ 038	TKN	
☐ 012	PHENOL	8040	☐ 025	Cr6	7198	☐	OTHER	

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

LABORATORY SAMPLE RECORD

PROJ. NO.	PROJECT NAME: Navajo Refinery	NO. OF CONTAINERS	Major Cations Anions	TCAP metals	601/602				REMARKS
SAMPLERS: (Signature) Kathy Brown									
DATE TIME	STATION LOCATION								
9305130900	Pond Effluent	2 Cub. 2 40 mil	1	1	1				
9305130930	NE Corner Pond Effluent	2 40 mil			1				
~~9305131000~~	~~RO Reject Effluent~~	~~2 40 mil~~			1				
9305131140	Monitor Well No. 46	2 40 mil			1				
9305131345	Monitor Well No. 18	2 40 mil			1				

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)

SEALS INTACT ☐ YES ☐ NO

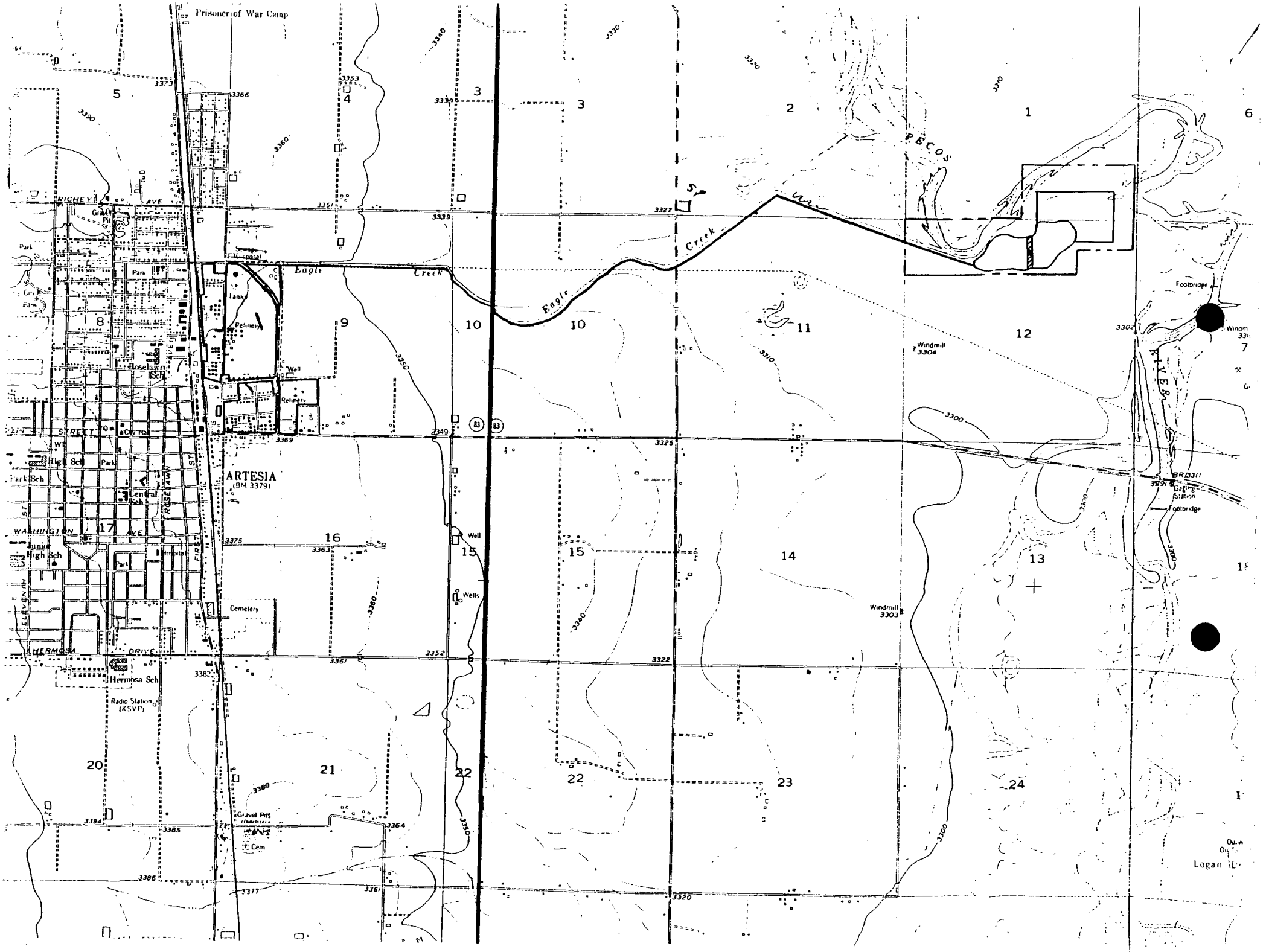
: (Signature)

: (Signature)

Date / Time

Remarks

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files


Prisoner of War Camp
PECOS
Eagle Creek
Eagle Creek
ARTESIA
(BM 3379)
Roselawn Sch
Central Sch
High Sch
Junior High Sch
Hermosa Sch
Radio Station (KSVP)
Cemetery
Gravel Pits
Refinery
Refinery
Tanks
Well
Wells
Windmill 3304
Windmill 3303
Footbridge
Footbridge
Logan
RICHEY AVE
WASHINGTON AVE
ROSELAWN ST
FIRST ST
HERMOSA DRIVE
ELEVATION

SUMMARY OF 1987
OCD MONITORING AT DISPOSAL POND AREA

SAMPLE INFORMATION		ORGANIC STANDARDS AND VALUES IN ug/1 (ppb)						INORGANIC STANDARDS AND VALUES IN mg/1 (ppm)				
Place	Date+	Benzene	Toluene	E-Ben	Total Xylene	PAH	Detection Limit	Date	TDS	CL	SO4	Fluoride
Standard	-	10	750	750	620	30	—	—	1000	250	600	1.6
Ditch	8/12	117	418	208	486	—	25					
New Pond	8/12	ND	TR	ND	37	ND 10	10	4/29	5454	1517	1127	32.8
Pipeline Exit	11/12	4400	140000	1780	7060	—	200	11/12	3060	680	630	26.6
MW #1	8/12	ND	6	ND	19*	ND 5	1	4/30	11450	4753	3146	0.88
MW #2	8/12	ND	132	46	993*	ND 5	10	4/30	10064	2842	3457	5.48
MW #3	—	—	—	—	—	—	—	4/28	6844	1316	2654	2.15
MW #4	8/12	45	280	130	992*	98	1	4/30	4730	1225	1520	1.63
	11/12	51	ND	156	1767*	—	10	11/12	4756	1100	1770	1.94
MW #5	8/12	TR	TR	56	830*	ND 5	10	4/29	27428	6939	10610	2.62
	11/12	ND	ND	52	755*	—	10	11/12	24104	5300	9150	3.48
MW #6	8/12	ND	135	61	750*	TR 10	10	4/28	4324	1044	1466	4.04
MW #7	8/12	ND	ND	ND	ND	ND 5	10	4/29	8220	2294	2366	1.15
Pond Windmill	4/28	ND	ND	ND	ND	—	1	4/28	6036	1707	1734	1.06
	8/12	ND	ND	ND	ND	ND 5	1	11/12	6054	1475	2230	1.4
	11/12	2	ND	ND	TR	—	1					

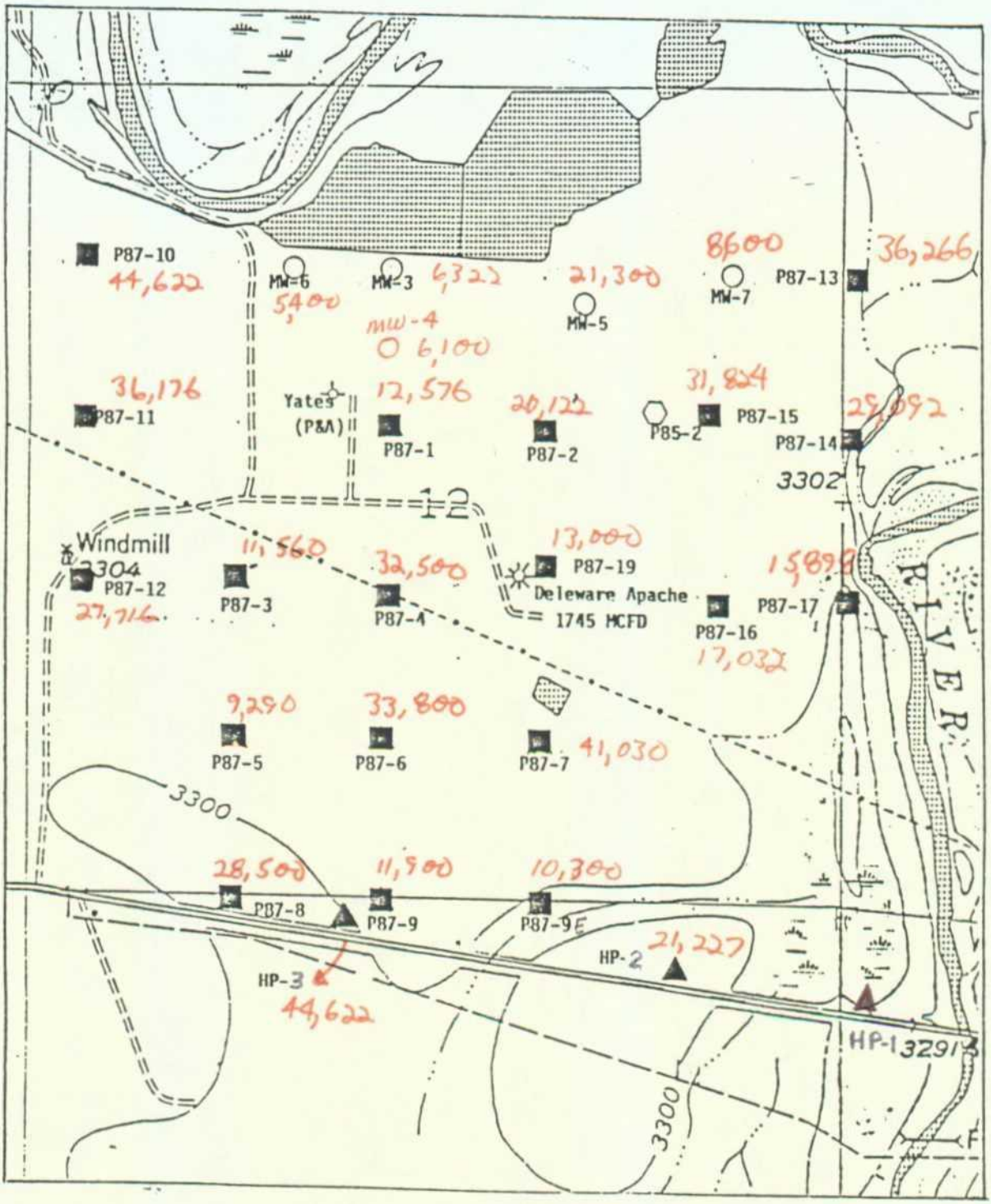
All monitor wells, the ditch and new pond had unidentified aromatic (benzene-ring) hydrocarbons in addition to above. MW-6 also had floating oil during 8/12 sampling.

ND - Not detected at indicated detection level.

TR - Trace found at detection level.

+ - Organic values for 4/30 sampling not quantified by lab and not reported here.

* - Value reported by lab likely high due to chemical interference for m-xylene analysis.



LOCATIONS OF WELL POINTS

EVAPORATION POND AREA

- MW-6 Monitor Well
- P87-1 Point installed in this study (1987)
- P85-2 Point installed in earlier study (1985)
- HP-2 Point installed by unknown agency

TDS map (mg/L)

Pond work file

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

March 8, 1988

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Zeke Sherman
Environmental Engineer
Navajo Refining Company
P.O. Drawer 159
Artesia, NM 88210

RE: Discharge Plan for Navajo Refinery, DP-28

Dear Mr. Sherman:

This letter is a follow-up to our discussion by telephone of March 3, 1988. During that conversation we discussed several issues including placement and construction of new monitoring wells. I request that Navajo Refinery use the following guidelines in locating and installing the new monitoring wells:

1. A well is being required by OCD to be located at the southern boundary of the proposed 80-acres to be acquired by Navajo. The east-west location is to be determined after submittal of water levels in several of the well points installed by Navajo in the spring of 1987. These points are not useful for water quality monitoring but are excellent for use as piezometers to determine flow direction from the ponds. If they can be located, stabilized and surveyed they can provide much meaningful data with little additional expense. The points necessary to establish water levels for a location for a new monitor well are:

P 87-1	P 87-14
P 87-2	P 87-15
P 87-3	P 87-16
P 87-4	P 87-17
P 87-13	p 87-19

Provide elevation and water levels for these points. In addition please provide water levels (and elevation and location data if not previously

supplied and/or verified) for MW-3, 4, 5, 6, and 7. All water levels for well points and monitoring wells should be taken the same day if possible.

2. When all ponds and the adjacent monitoring wells have been completed, submit in final tabular form, X-Y coordinate locations and elevation coordinates for all monitor wells and well points used as piezometers; and maximum elevations (less freeboard) for water in the ponds. This information will be computerized by us to map water levels.

3. Attached is a typical monitor well of the design used in the earlier RCRA wells that you can use as a guide. Our only requirements are that you have a minimum of ten (10) feet of saturated thickness but that the maximum saturation does not exceed fifteen (15) feet, that the top of the screen not be submerged, that the filter pack top be placed about 12 inches above the top of the screens (to prevent bentonite migration) and that adequate surface casing and cement be placed to stabilize and seal the well. PVC may be used instead of stainless steel for the well itself.

On February 19, 1988 we sent Navajo a list of discharge plan commitments agreed to at the Navajo-OCD meeting of February 11, 1988. These were prepared from our notes and our understandings of the commitments made by Navajo. Please review these for any serious misinterpretations and notify us so that those points may be discussed further. Unless we hear from you by March 21, we will consider the comments binding.

If you have any questions, please contact me at 827-5812.

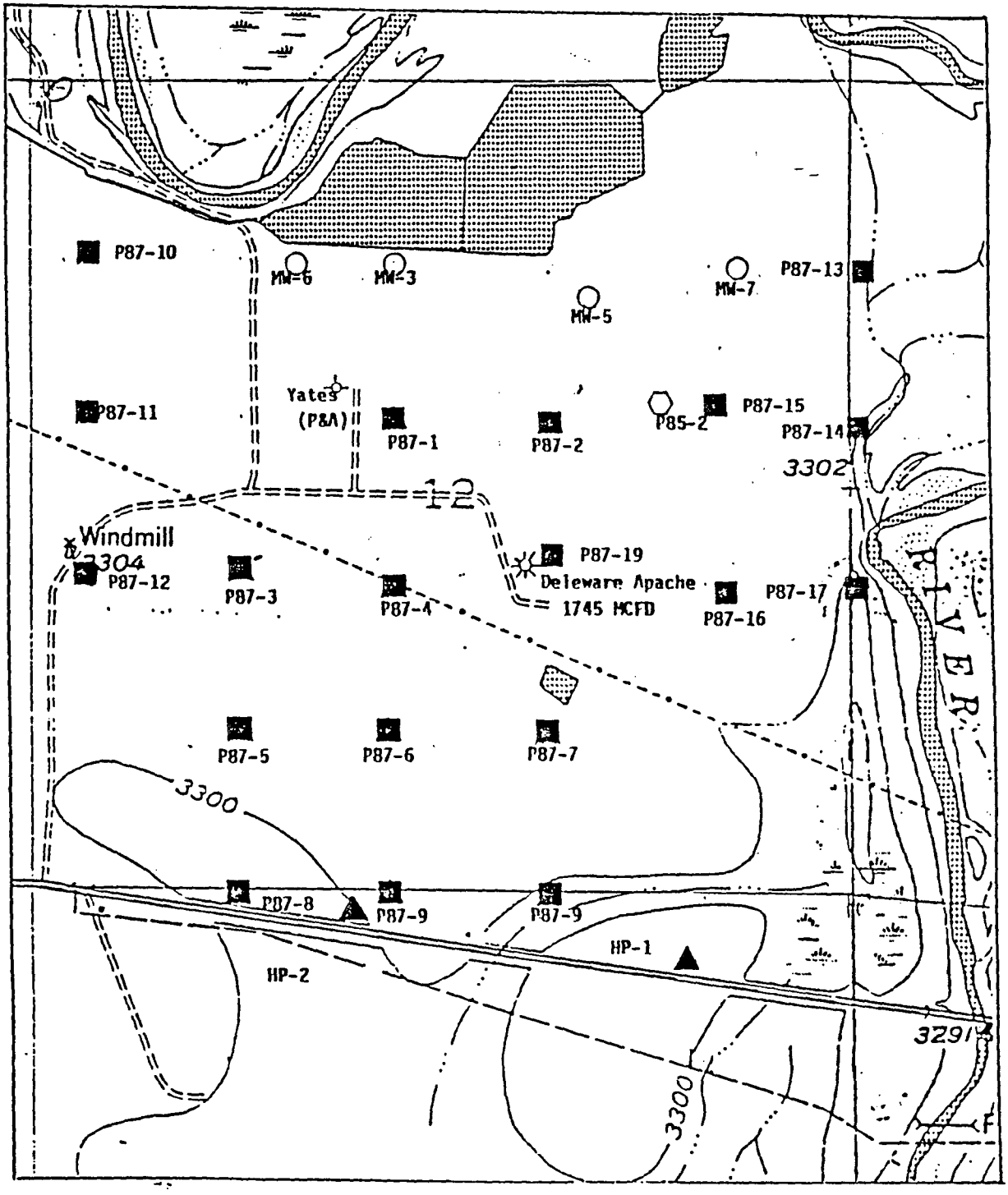
Sincerely,

David G. Boyer
Hydrogeologist
Environmental Bureau Chief

DGB/ag

cc: OCD-Artesia

Attachments



LOCATIONS OF WELL POINTS

EVAPORATION POND AREA

- MW-6 Monitor Well
- P87-1 Point installed in this study (1987)
- P85-2 Point installed in earlier study (1985)
- HP-2 Point installed by unknown agency

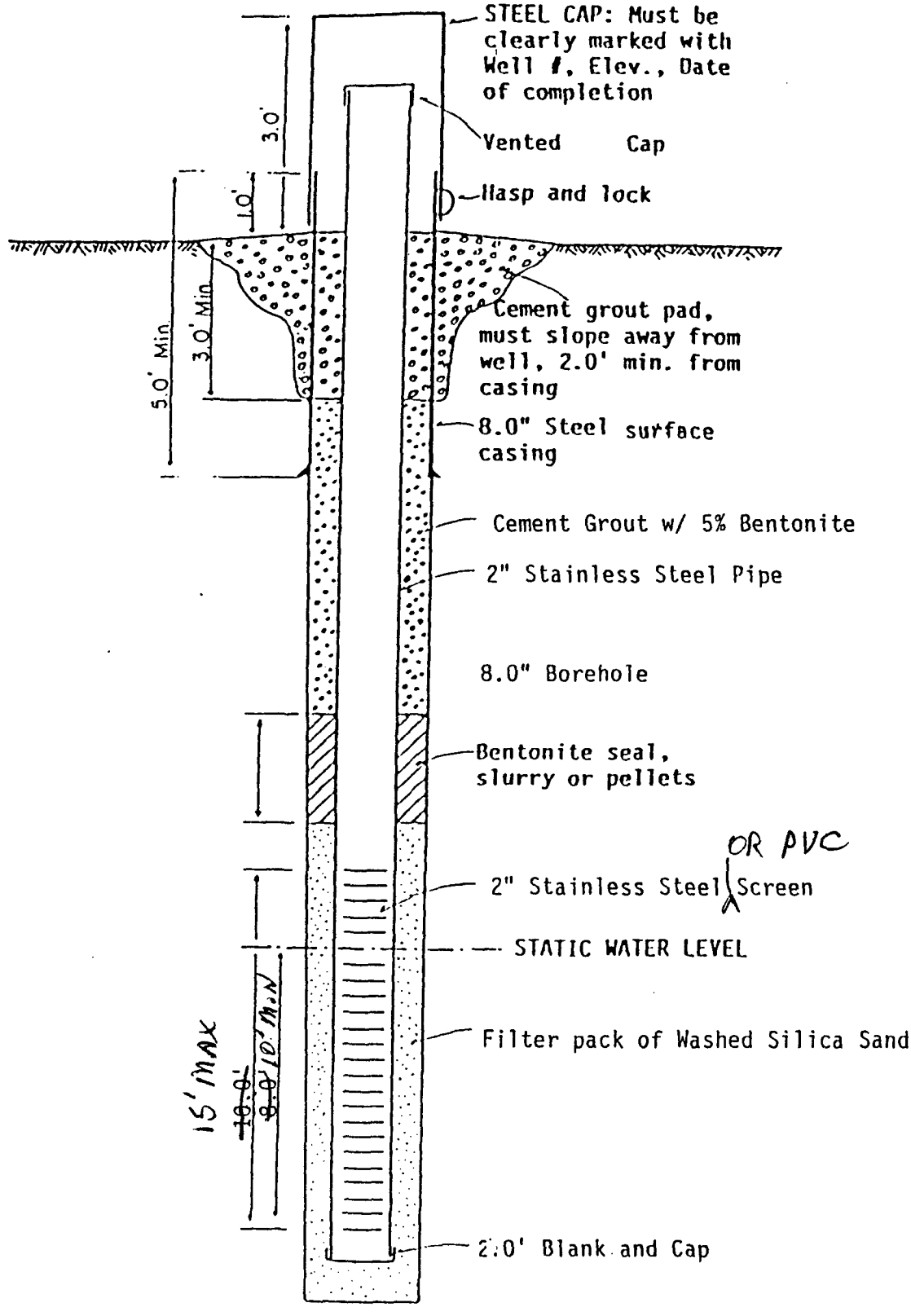


Figure 6-1
TYPICAL MONITOR WELL DESIGN

From Geoscience 5/12/87 Final Report

TELEPHONE
(505) 748-3311

EASYLINK
62905278

Navajo REFINING COMPANY
501 EAST MAIN STREET • P. O. DRAWER 159
ARTESIA, NEW MEXICO 88210

January 11, 1988

Mr. David G. Boyer
Hydrologist/Environmental Bureau Chief
Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87504

Re: Navajo Refinery
Discharge Plan, GW-28

Dear Mr. Boyer:

Navajo is submitting the following information to resolve the issues stated in your August 3, August 27, and December 28, 1987 letters, concerning the refinery and evaporation pond areas.

CONCERNING THE REFINERY

A.1 8/3

Navajo has a Spill Prevention and Countermeasure Plan that addresses major spills and leaks within the refinery. This contingency plan will be revised to include the reporting procedures an actions to be taken if major leaks, spills or upsets of oil, products, chemicals, or wastewater occur outside of curbed or paved areas. Such a revision must take into account a multitude of possible scenarios and responses and will require a great deal of time and planning to provide for the needs of this particular refinery. We would expect to submit a revised contingency plan no later than June 30, 1988. ? to revise?

A.2 & A.3 8/3

Our Maintenance Department has inspected all of the bolted or riveted tanks in operation. Most of these tanks have had their plates welded at the seams as well as around the rivets and in most cases have an exterior surface sealing, asphaltic type coating. Navajo finds no reason to replace tankage that is still serviceable and has no leakage. Clean up in areas within the dikes surrounding these tanks has already commenced, and will continue during the summer of 1988 when additional man power will be available.

but why clean up if no leakage. Identify source of oil that has to be cleaned up.

The following is a schedule of tank repair, replacement and area clean up:

a) Tank #122, which is out of service, is to be dismantled by Fall, 1988.

b) Tank #133 and #135 are scheduled for seam repairs in July and March of 1988.

c) Tank #59's chime has been uncovered and observed for leaks for several months. No leaks have been detected and the surrounding area has been policed.

d) The "...railroad loading tank west of T-837..." is actually a filter, D-105. D-105 is scheduled for removal and the area policed by mid 1988. D-105 is not in service.

Navajo has maintenance procedures for detecting and repairing wastewater and oil drips and leaks at tanks, pumps or any discharge point. It is Navajo's policy to prevent such from occurring and when necessary, provide appropriate containment structures. The following is a schedule of leak clean up and containment:

a) The pumps at Tanks #135, #60 and #61 have received routine preventative maintenance and the immediate areas have been policed. Cement catchment basins under the pumps and associated valve sets will be constructed as part of a project for improvement of area drainage discussed below.

b) Operations at the sump with the open grate, West of Tank #122 have been modified and the area has been policed. To prevent splashing, a length of hose is used to directly unload trucks into the sump.

c) We intend to make drainage improvements to the areas containing Tanks #130, #132, and #135. The plans involve construction of new sumps, sewers and catchment basins, and perhaps additional tankage. The cement catchment basins would be installed to contain potential leaks at the valve and pump sets at the tanks. Because the project scope is larger, but inclusive of OCD's concerns in this area, more time for long range engineering and economic planning is necessary. We expect to have project specifications by late 1988, with project completion by mid 1989. In the meantime, the area will be cleaned by Fall 1988.

d) The CBO truck loading rack area is scheduled to be policed by September 1988 to take advantage of additional man power available during that Summer. We will construct a concrete catchment basin under the loading rack to handle any future spills or leaks. The catchment basin would be installed as part of a project with similar scope as the one mentioned above. We are planning to improve drainage from the area of the railroad loading rack and the adjacent tank farm. Again, we expect to have project specifications by 1988, with project completion by mid 1989.

e) The South Division Cooling Tower has recently been inspected for leakage and none was detected. Navajo currently plans to reconstruct the railroad spur adjacent to the cooling tower. That would involve the construction of a cement gutter to channel drainage from the area of the cooling tower and the spur to an existing plant sewer box. The project should be completed by early 1988. How early? Specific dates + designs

f) A cement catchment basin will be constructed under the salt filtering area adjacent to the North Plant API Separator. The basin will drain directly into the separator. We plan to construct the catchment basin by mid 1989. Specific dates + designs

Attached are schematics of the catchment and drain system of the North Division rail loading facility. Navajo recognizes that there is a need for improvements in drainage facilities in this area, and has begun planning a project to improve them. We plan to commence this project in the first half of 1989, with completion at year's end. Specific dates + designs

A.4 6/3 Navajo will commence initial testing of all underground crude oil and product piping for integrity by March 31, 1988. We expect to have all of the current underground lines tested before the end of 1988. Navajo finds the repetition of testing every six months until replacement by above ground lines to be unnecessarily excessive. Navajo feels that a frequency of every two years would be more appropriate - certainly no more frequently than annually. We are updating our underground lines list, and will forward a testing schedule to you by the end of January, 1988. OK

A.5 6/3 Navajo anticipates ongoing in-plant wastewater piping replacement project. Over the 5 year period of the permit, contractors will perform integrity testing on the replacement wastewater piping immediately after installation. Recently, new wastewater lines were installed from both the South and North Plant API Separators to the Wastewater Treatment Plant. A visual check of connection seals between the concrete sewer boxes and the lines during test flows indicated no leaks. OK

A.6 6/3 Boiler blowdown will be diverted How from the old firewater pond into the new sewer system. The diversion will be complete by March 31, 1988. didn't answer no data or distances to support the requirements. Need more detail

The pit immediately south of Crude Oil Tank #835, contains tank bottom sludge. Navajo intends to recover the sludge for processing and apply any unrecoverable fraction to an existing landfarm.

We are currently studying a method of recovery to remove the sludge for processing or disposal on a landfarm. The remaining contaminated soil can then be removed by backhoe and applied to the landfarm. Once the sludge is removed, the pit will be backfilled. Recovery operations should be complete by November, 1988. when will study be completed + new method implemented? Need updates

Our present method for removing tank bottom sludges involves the use of lugger buckets and a cable powered scrapper. The sludge is loaded from the tank into the luggers, via an access port on the side of the tank for disposal on the appropriate landfarm. We plan to evaluate a more efficient method of dissolving the sludge for reprocessing in the near future. This method might allow us to directly pipe the dissolved tank bottoms back to the Process Units for recovery.

Navajo has a system for preventing the overflow of any of our tankage for obvious reasons. An undetected overflow can quickly add up to thousands of dollars of lost inventory and recovery costs, not forgetting the potential environmental impact.

The first preventative measure is the Inventory and Yields Report generated daily, which indicates the current volume and remaining capacity for all tanks in service. This alerts the division foreman responsible for certain tankage on the individual tank level status.

The second preventative measure is the Operator's Gauging Report. All tanks that are being drawn from or filled are gauged every four hours until shipping or receiving operations are complete. This alerts operators on the tank level status at frequent enough intervals to prevent overflows.

Navajo seldom has tank-overflow, but when it occurs the procedures outlined in the Spill Prevention and Countermeasure Plan are followed, to quickly contain and recover any overflow.

CONCERNING THE EVAPORATION PONDS

Maximum inundation from a 100 year flood in the Pecos River flood plain, is predicted to occur at a discharge rate of 81,700 cubic feet per second as measured at USGS Station #08396500.

Flood guage at this rate is estimated to be approximately 18.9 feet, or 3310.82 ft msl elevation. From the attached plot plan, the present minimum height of the evaporation pond dike is estimated to be 3311.51 ft msl and the present maximum dike height is estimated to be 3314.17 ft msl, with a difference of 0.69 ft to 3.35 ft between flood gauge and dike crown.

To adequately protect the ponds from the effects of a 100 year flood, 3.0 ft of dike crown (3313.82 ft msl) shall be maintained above maximum flood guage. Navajo expects to reinforce the dikes to the average elevation of 3313.82 ft msl, in stages over the 5 year period of the permit. The additional reinforcement should address any potential lateral seepage problems.

Based on an average depth of 3.5 ft, and a wind speed of 50 mph, and a maximum fetch of open water of 2,600 ft, the minimum free board is estimated to be 1.5 ft. With a safety factor of 2, the freeboard necessary to prevent over-topping of the pond dikes under these conditions is 3.0 ft.

1.36 × 2 = 2.72

Navajo is pursuing a covenant restricting use of the effected ground water by the landowners. It is unlikely that we will obtain such by January 15, 1988 and so we request additional time to complete those activities. We will submit a map showing the current property boundaries and names of adjacent landholders at that time. As part of the above mentioned covenant, Navajo will define the down gradient area where standards are not exceeded and monitor the ground water at that point.

The source of the oil/grease detected in Monitor Well #6 remains unknown, although Navajo has begun investigations. Navajo expects to submit the results of these investigations by May 31, 1988.

Sincerely,

Zeke Sherman

Environmental Compliance Engineer

ZRS/pb

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

Pond work file

GARREY CARRUTHERS
GOVERNOR

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

December 28, 1987

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. David G. Griffin, Superintendent
Environmental Affairs
Navajo Refining Company
P. O. Drawer 159
Artesia, New Mexico 88210

RE: OCD Inspection and Sampling November 12, 1987 and Remaining Discharge Plan Issues.

Dear Mr. Griffin:

On November 12, 1987, Jami Bailey and myself met with you and Zeke Sherman to discuss discharge plan progress and to resample several of the monitor wells in the vicinity of the evaporation ponds. The purpose of this letter is to transmit those monitoring results, received December 18, and to discuss several observations made during the visit. It also outlines issues needing resolution prior to a decision being made on discharge plan approval.

On the three previous visits this year (4/28 - 5/1, 5/26, 8/12) OCD had inspected the facility and performed effluent and ground water monitoring. You were previously informed of the results of the inspections and sampling.

During the November 12 trip, we inquired about an oil pit at Tank 835 that OCD was not aware of previously. This pit is apparently a sludge pit used to drain tank bottoms from tank 835. The pit is unlined and has received an unknown volume of waste material from the tank which holds crude oil. As part of the pending discharge plan, Navajo must propose how it plans to clean out the pit, close it, and dispose of the excavated material. Also, Navajo must detail how it plans to handle such wastes in an environmentally sound manner in the future so that ground water contamination can be prevented. Further, it appears that in the past Tank 836, also a crude oil tank, has overflowed. Navajo also needs to submit information on how it proposes to prevent similar overflows at its tanks in the future.

Results of the sampling of the effluent as it discharges from the new pipeline show continued high levels of dissolved aromatic hydrocarbons. These levels are similar to what was found in OCD's 1984 sampling of the ditch at the Eagle Draw road crossing just North of the refinery. However, the turbidity and clarity of the effluent have been much improved with oil particles and emulsions greatly reduced. Because this oil material was deposited in Pond 1, now empty and available for leaching to ground water, I believe that the material was the major cause of the contamination we are seeing in the monitor wells. I expect the removal of the oily material from the waste stream and pond closure will alleviate that problem. The absence of oil will allow the remaining ponds to attenuate the dissolved hydrocarbons by evaporation and volatilization.

Navajo will need to sample and monitor the effluent and ponds to determine the fate of the dissolved hydrocarbons. Although I expect pond levels of aromatic hydrocarbons to be greatly reduced from the end-of-pipe numbers found during the November sampling, this monitoring is necessary to verify the attenuation and prevent high levels of dissolved hydrocarbons from entering the ground water system.

The results of August and November monitoring of the ground water at the ponds show hydrocarbon levels for benzene and PAH's exceeding standards at monitor well 4 (off-property). Non-hydrocarbon water quality at MW-4 is comparable to that at the pond windmill (900 feet west of MW4) currently used for stock watering. The November sample of windmill water had 2 ppb benzene, the first time hydrocarbons have been detected by OCD in that well.

As stated in previous conversations with you, OCD can not approve a ground water discharge plan if the method of discharge currently causes standards to be exceeded, or may cause a standard to be exceeded at a place of present or foreseeable future use of the water. We have discussed with you various regulatory options available, including establishment of a buffer zone by way of water well covenants such that the water can not be used as long as it remains contaminated in excess of standards. As part of such a covenant, Navajo will have to define the downgradient area where standards are not exceeded and monitor the ground water at that point to determine if there is any future violation of ground water standards. Based on OCD analyses performed to date, the pertinent state standards that are or may be violated are benzene, PAHS and fluoride.

Although the work performed by GCL was useful in indicating where high levels of hydrocarbons may be present, it can not be used by itself for a decision on where standards are no longer exceeded. This is because the sampling represented only a small zone (the top two feet) of the water table which is also impacted by evaporation and plant transpiration, and because many of the well points are no longer available for sampling. Permanent monitor wells completed at depths similar to the RCRA wells will be needed.

The issues presented in this letter and our previous letters of August 3 and August 27 constitute the remaining discharge plan's issues yet to be resolved. No further OCD inspections or monitoring will be performed prior to our completing review of the discharge plan. The discharge plan approval decision will be based on the material previously submitted, plus that requested in this and the August letters including any subsequent clarification needed. OCD still intends to prepare a draft summary of refinery commitments and monitoring after we receive responses to our letters.

If you have any questions on ground water issues, please contact me at 827-5812, or Roger Anderson at 827-5885 for engineering issues.

Sincerely,

for Roger C. Anderson

David G. Boyer, Hydrogeologist
Environmental Bureau Chief

DGB:sl

Enc.

cc: OCD - District Office Artesia
EID - Hazardous Waste Bureau

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

Pond work file

GARREY CARRUTHERS
GOVERNOR

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

August 27, 1987

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

J. Sherman 8/27-28/87

Mr. David Griffin
Environmental Affairs Superintendent
Navajo Refining Company
P.O. Drawer 159
Artesia, New Mexico 88210

RE: Navajo Refinery Discharge Plan, GW-28

Dear Mr. Griffin:

On August 3, 1987, correspondence was sent to you listing some major issues that remain to be addressed by the Navajo Refining Company before your discharge plan can be approved. A complete list with specifics was to be provided within 30 days. Based on our research of correspondence, observations during the April, May and August sampling trips and review of the information submitted by your consultants, GCL, the following additional information and schedules must be submitted for review before approval is granted:

A. Refinery Area - Issues in addition to those listed in the August 3 letter:

1. The following tanks showed evidence of leakage. Submit a schedule for repair or replacement and clean-up of surrounding areas.

(a) a. Bolted tank T122 had severe leaks. OK
(b) b. Welded tank T133 had some seam leakage. } scheduled for March & 1988 → July to Long
(b) c. Welded Tank T135 had some seam leakage. } IS STILL LEAKING
(c) d. Tank T59 had severe leakage. OK
(d) e. The railroad loading tank west of T837 had diesel leaking and standing in the open base. mid 88 proposed — not specific enough

2. The pump from tank T135 and the pump west of tanks T60 and T61 showed evidence of severe leakage. Submit a schedule for
(a) clean-up and a proposal and schedule for repair and a method of containment of future leaks. cement catchment basins proposed w/ specific by late 88 + complete by mid 89. Not a specific enough time table. Time frames to Long.

3. Submit for approval a schedule for clean-up of surface contamination and a proposed method of containment/cleanup for future spills (with containment specifications and a schedule for construction) for the following ground areas that show evidence of past leaks and/or spills:

   a. The area east of T130 and T132 (former site of T121) contains oil leakage from either tanks, valves or piping.
   b. The sump with the open grate west of T122 has been used by trucks to dump their loads. There is no containment present, and oil has overflowed and run off the dump pad.
   c. The carbon black truck loading area in the North Division has evidence of continued spills and leaks.
   d. Leakage from the South Division cooling tower is flowing through an unlined ditch adjacent and parallel to the rail line. proposed reconstruction of rail line w/gutters by early 88 How early?

4. The salt filtering area at the North API separator is approximately fifteen feet from Eagle Draw. Submit a proposed method for containment of any spills or leaks and a schedule for construction. cement catchment proposed by mid 89. need schedule for design & construction

5. The catchment area at the rail loading facility west of the North Division had little evidence of spills or leaks. However, the drains between the rail lines appeared to have curbs that were too high to drain the surrounding area in the event of spills. Please submit the schematic of the catchment and drain system for the rail loading area. Is there concrete in the area between the drains? Improvement project planned for 1st & 89 completed by end of 89. need plans & schedule

6. During the August 12 sampling trip the overflow asphalt storage area (Pond) within the diked area of Tank T433 came to our attention. In the future, notification and approval from the OCD will be required prior the use of any unlined or diked areas for asphalt storage. Did not answer

B. Pond Area - Issues in addition to those listed in the August 3 letter:

1. After OCD receives and evaluates the results of the August 12 ground water resampling at the pond, we will propose a schedule of minimal acceptable monitoring for discussion with Navajo. If some seepage water off Navajo's property exceeds ground water standards (either the numerical standard or background), it may be necessary for Navajo to obtain and submit to OCD covenants restricting use of that water until such time as concentrations drop below standards.

2. Oil/grease was detected in Monitor Well #6 during the August 12 sampling. Navajo must provide a schedule to investigate the source of the contamination, and provide OCD with information showing that such source has been eliminated.

3. Noticeable seepage was observed on the South and East dikes of the new pond. Lateral seepage can weaken them enough to cause failure. Submit a plan, with schedule, to rework or repair the ponds to eliminate lateral seepage.

4. Notification and approval of the OCD is required for any pond modifications or expansions.

5. Navajo plans for the closure of the ditch and Pond #1 after the wastewater plant and new pipeline are in operation. Sumbit copies for the discharge plan file of the proposed EID closure plan.

We are currently preparing for issuance of a public notice. Upon satisfactory resolution of the issues listed here and in our letter of August 3, and after review and consideration of any public comments, we expect to issue discharge plan approval. We look forward to discussing these issues on August 28, and at any other time so that we can conclude work on the plan.

Sincerely,

David G. Boyer
Hydrogeologist/Environmental Bureau Chief

DGB:cr

cc: OCD - Artesia
EID - Hazardous Waste Bureau

Site copy
Pond Work File

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

August 3, 1987

GARREY CARRUTHERS
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. David Griffin
Environmental Affairs Superintendent
Navajo Refining Company
P.O. Drawer 159
Artesia, New Mexico 88210

RE: Navajo Refinery Discharge Plan, GW-28

Dear Mr. Griffin:

The Oil Conservation Division has received the final report by Geoscience Consultants, LTD., on the ground water investigation in the area of your disposal ponds. We have only recently received (and have enclosed) the laboratory results from our sample trips in April and May. Due to the inconclusive laboratory results from our sampling, we could not independently verify information on volatile hydrocarbons provided in the report. Because of the importance of this issue in discharge plan approval, we have decided to resample selected wells in the pond area including the USGS piezometers. Although we may not agree with all the conclusions in the GCL report, the data it provides does materially aid in completion of the discharge plan review. Comments on any substantial differences with the investigation report will be delayed until our resampling is completed. As you know, resampling is scheduled for Wednesday August 12.

Because of the necessary resampling and because Bureau staff resources since June 1 have been concentrated on resolving an environmental problem in Bloomfield, OCD will not be prepared to grant discharge plan approval before the September 15, 1987, expiration date of the current extension to discharge without an approved plan. Therefore, I will recommend to the Director that an extension, likely to be in range of 90 to 120 days, be granted Navajo to allow evaluation of the additional sampling results, resolve remaining discharge plan issues, and issue discharge plan public notice and allow for public comment.

We are researching previous correspondence to identify remaining issues that need to be resolved before discharge plan approval. Although that has not been completed, I am providing a listing of major issues that remain to be addressed. A complete list with specifics will be provided to you within thirty days. The following information and schedules must be submitted for review before approval is granted:

A. Refinery Area

1st IP on 1/11/88

1. A contingency plan for the reporting and action to be taken if major leaks, spills and upsets of oil, chemicals, wastewater, etc., occur outside of curbed and paved areas. Such plan should include actions to be taken in the event of tank failure even though the area may be diked but not paved. revising SPCC – by 6/30/88

2nd IP on 1/11/88

2. A schedule for the replacement of bolted or riveted tanks over the five year term of the discharge plan and cleanup of oil-saturated areas inside the dikes. See answer by Navajo!

detailed in OCD 8/27 letter

3. Submittal of proposed housekeeping procedures to repair and/or isolate by curbing and paving, small wastewater and oil drips and leaks at tanks, pumps and other discharge points. Many of these were observated at several locations during the April and May inspections. Examples include the pumps at the carbon black loading area, diesel loading area, and the transfer pump south of tank 135.

4th IP Pg 3 1/11/88 OK

4. A schedule for initial testing of remaining underground crude oil and product piping for integrity, with repetitive testing every six months until replacement by above ground pipes. Initial testing should commence no later than March 31, 1988. Alternative methods of determining integrity will be considered if they are demonstratively effective. OK propose testing every 2 yrs I agree w/annual

5th IP P3 1/11/88 OK

5. A schedule for testing buried wastewater piping to determine if significant leaks that could impact ground water quality are occurring. Such tests are being required at all gas plants and refineries over twenty years of age as a condition for plan renewal, and must be completed within five years, and repeated prior to each succeeding plan renewal.

6th IP Pg 3 1/11/88

6. A method to demonstrate that the old fire pond (with a current TDS concentration 3538 mg/1, Cl of 321 mg/1, SO_4 of 1718 mg/1, and F of 3.4 mg/1) does not cause exceedence of ground water standards at a place of present or future use. Some options previously discussed with Navajo include lining, fresh water storage, dilution with fresh water to below standards, or a demonstration of maximum seepage loss of 0.5 acre-ft/acre/ year. The high fluoride concentration, which exceeds the Part A standard of 1.6 mg/1, will exclude use of the latter method unless the concentration of that constitutent is reduced to the standard. will reroute Bailer Blowdown into sewer No data to verify this will accomplish the above requirement

B. Pond Area

Last sent p4 1/11/88 OK

1. A map showing the maximum inundation expected during the 100-yr flood, and demonstration of adequate pond protection from such flooding.

2. A showing of adequate freeboard to protect the pond from runover during maximum wind velocities. Since the pond has been expanded, the large surface area will require more freeboard. Navajo will be required to maintain that freeboard at all times.

OK

3. A map showing the current property boundaries and names of adjacent landowners. not submitted on 1/11/85

Upon receipt of all sampling results, and review of all information submitted, OCD will prepare a draft summary of all necessary monitoring, commitments and completion dates. Requirements for discharge plan monitoring in the refinery area will depend on decisions regarding the old fire pond. Otherwise ground water monitoring is not expected to be required there as part of the discharge plan, but will be necessary later to monitor product cleanup efforts. At the pond area, monitoring on some regular basis yet to be determined will be necessary for effluent discharge quantity and quality, and for at least some of the monitor wells. The schedule can be readjusted depending on the effectiveness of the new wastewater treatment system.

We look forward to working with you to resolve the remaining issues leading to discharge plan approval.

Sincerely,

David G. Boyer

David G. Boyer
Hydrogeologist/Environmental Bureau Chief

DGB/cr

Encl.

cc: Les Clements, OCD Artesia
Jack Ellvinger, EID Hazardous Waste

PS Form 3811, July 1983 447-845 DOMESTIC RETURN RECEIPT

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2. ☐ Restricted Delivery.

3. Article Addressed to:
Mr. David Griffin
P.O. Drawer 159
Artesia, N.M. 88210

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6. Signature — Agent
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8/4/87

8. Addressee's Address (ONLY if requested and fee paid)

Refinery Pond File

STATE OF NEW MEXICO

ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

March 30, 1987

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. David Griffin
Environmental Affairs Superintendent
Navajo Refinery
P.O. Drawer 159
Artesia, New Mexico 88210

RE: Discharge Plan GW-28, Navajo Refinery; comments on 10/29/86 Technical Report to EID

Dear Mr. Griffin:

On January 12, 1987, the Oil Conservation Division received a copy of the technical report prepared for the Environmental Improvement Division (EID) entitled "Proposed Site Investigations of Pond #1 and Conveyance Ditch to Determine Potential Effects to Ground Water Quality, Navajo Refinery, Artesia, New Mexico," revision of October 29, 1986. On that date in January we also received water level elevation maps for September, October and November. Review of that information lead us to question some of the interpretations provided by Navajo's consultants, Geoscience Consultants, Ltd. (GCL). These issues are relevant since much of the same information will be needed by OCD to complete review of the refinery discharge plan before expiration on September 15, 1987, of the current extension to discharge without an approved discharge plan.

Section 4.1 - Geology:

1. On page 19, the Artesia area structure is described as both having a strike and dip to the southeast; since strike and dip are perpendicular to each other, this situation can not occur.
2. The statement on page 20 that ground water does not extend under the refinery site is incorrect. Although there do not appear to be any water bearing zones greater than a few feet thick within 20-25 feet of the surface, these units and wells drilled into them are water bearing (Plate 12). Also, deeper zones are known to contain ground water; some may be as shallow as 30-65 feet in depth (see comments on refinery area hydrogeology).

Section 4.1 - Soils:

1. Contrary to page 20 of the report, the U.S. Soil Conservation Survey map (Plate 7) shows the refinery to be located on Pima silt loam and Reagan loam although the TEL site is on Karro loam. The Reagan and Karro soils may have calcareous or gypsiferous substrata as was observed in cores from wells drilled in the refinery area.
2. The effluent ditch passes through Pima silt and clay loams, Arno silty clay loam, and the Arno-Harkey complex enroute to the ponds (Plates 7 and 8).

Section 4.4 - Local Hydrogeology

A. Refinery area.

1. Plate 9 shows the Bcwer Sand as permeable bedrock at the southeastern end of the refinery area. The log of RA-768 (located about 350 feet north of RW-5 on Plate 11) shows a sand and gyp layer from 30 to 80 feet. RA-602 (located about 150 feet north of #18 on Plate 11) shows a sand zone from 51 to 59 feet. Both wells are correctly pictured on Plate 9. Numerous monitoring wells have been drilled between RA-768 and RA-602, but with the exception of #28 and several in the TEL area (#21, 39, 40, 41, 42) none have gone below 25 feet. Of these, none went below 33 feet. Three of the wells (#40, 41, 42) found increasing clastic material (silt, sandy silt) below 28 feet in contrast to tight evaporitic material above. Since none of the wells between RA-768 and 602 went to depths of 50 to 60 feet, the existence of permeable sand or other non-evaporitic water bearing zones can not be ruled out. However, at least seven other water wells within a one-half mile of the refinery have reported sand or water sands within this range:

RA#	Depth	RA#	Depth
1090	30-35 ft.	3282	50-60 ft.
2568	61-118	City	30-40
3225	65-70	Southworth	25-58
3262	70-80		

In 1954, wells 3225 and 3262 just north of the refinery were completed in these shallow zones. The existence of a shallcw zone, its extent, and water quality may need to be investigated further as part of OCD's evaluation of Navajo's product recovery efforts, which are separate from this discharge plan review.

2. Questions raised by OCD regarding continued use of the unlined fire pond as long as it continues to receive boiler blowdown need to be answered. These were first asked in my letter of February 7, 1985, and repeated on October 1, 1985. The Navajo response of March 5, 1985, was inadequate in this regard. OCD's concern regarding the fire pond would be alleviated if only raw water instead of boiler

effluent was placed in the pond, or if pond contaminant concentrations were kept less than naturally occuring, and agreed upon, background levels.

3. The static water level shown on Plate 12 for wells AA and AB is 10 feet above that shown on Plate 11 for the same wells.

B. Pond Area

1. The ground water level elevation maps provided for September, October, and November, 1986, do not appear to include the ponds as a source of water, nor the river as a possible discharge point. Data for August 7, 1986 (provided in Navajo letter to EID dated 8/15/86) was plotted on Plate 2. Additional data was obtained from the USGS for the Artesia Pecos River Station for that date (Gage height 2.15 ft., gage elevation 3291.92 ft., mean discharge approx. 25 cfs). This data was used along with the river channel topographic gradient (approx. 3.1×10^{-4} ft/ft.) to determine approximate river elevations opposite the appropriate ground water monitoring wells. Calculated river elevations and measured ground water elevations are shown in the below table:

Well #3	Measured Water Level (ft.)	Calculated River Level (ft.)
#3	3301.32	3299.9
#4	3301.47	3299.9
MW2	3302.6	3299.6
#5	3302.38	3299.4
#7	3304.4	3297.2

Pond elevations were approximated after talking with Zeke Sherman of Navajo and are based on elevations shown on Plate 13, dike elevations, and the fact that the ponds were likely still high after inflow during the June, 1986, floods. The attached plate shows ground water movement from the ponds to the river on the three sides of the site where the river is present. Contours were plotted at the 3300, 3301, 3302 and 3305 feet elevations.

If the measurement at Well Point #2 is correct, the August contours show a slight mounding effect southeast of Pond 2. This could indicate more seepage from Ponds 2 and 3 than Pond 1. This would be consistent with some reduction in Pond 1 permeability due to deposition of asphaltic-like sediments from the refinery over the years. The lack of a mound southeast of the new pond may be due to the fact that the pond had only been used for a short period of time (several months maximum) through August, and a mound may not have had time to form in the area of wells #9, 12 and MW-7. The southeastward orientation of the "mound" near Pond 2 is consistent

with the slope of the topographic surface of the flood plain alluvium at this location.

2. An aquifer test was performed by GCL in the pond area on July 17, 1986, using a 4" PVC well installed for the purpose near Pond 1. Two piezometers and an existing well (#13) were used for observation wells. The well was pumped for opproximately 27 hours followed by 19 hours of recovery. Data sheets (included in the GCL report) indicate that the initial pumping rate of 9.6 gpm was reduced to 7.0 gpm about 2.5 hours after the test began. A final rate of 6.5 gpm was used in test calculations. Drawdown data was adjusted for water-table effects by using Jacob's correction. Water levels and the log of the PVC well indicate an effective aquifier thickness of about 25 feet.

   The following comments are made on the test, data analysis, and interpretation:

   A. Only one analysis of the data (and one transmissivity) was shown in the report. No discussion of other methods, and possible errors in interpretation of the results we presented. Especially crucial is whether the Jacob modification of the Theis method is applicable given the relatively short length of the test. Several other methods of analysis are available, and were applied by OCD using the supplied data. Since discharge was not kept constant, curve matching using the Theis method was not used by OCD because less than one log-cycle of time data at a constant rate was available.

      Observation Well #1, r = 15.5', time-drawdown plot:
      T = 7270 gpd/ft., S = 2.65
      Comment: Since S can not exceed specific yield (maximum 0.2 to .3), this value is incorrect. Verification of the Jacob method using S = 2.6 and u less than 0.05 shows minimum time needed for use of method is 4715 minutes (3.3 days).

      Observation Well #2, r = 23.2', time-drawdown plot:
      T = 4613 gpd/ft., S = 0.29
      Comment: Although S range is realistic (but high), the minimum time needed to apply the method is 1816 minutes (u less than 0.05).

      Observation Well #3, r = 48.2' time-drawdown plot:
      T = 11071 gpd/ft., S = 0.089
      Comment: This S value is realistic for a fine grained sand and silt. The minimum time needed to use the method (u less than 0.05) is 1005 minutes (vs. 1624 for the total test). Therefore, the last four data points (which plot as a straight line on semi-long paper) can be used in the calculations.

      Wells #2 and #3, distance-drawdown plot:

T = 6130 gpd/ft., S = 0.18
Comment: These results are similar to those reported by GCL. Well #1 could not be used since drawdown was less than either well #2 or #3, although it was closer to the pumped well. This indicates that the hydraulic connection between #1 and the pumped well is poor, possibly because of the presence of finer grained materials. Verification of the method (u less than 0.05) shows that minimum time must exceed 3600 minutes (2.5 days) for the results using wells #2 and #3 to be acceptable.

Recovery, Pumped well:
T = 10,400 gpd/ft., S can not be determined with this method.
Comment: Use of the 19 hours of recovery data produced a resultant T close to that for observation well #3. Calculations show that the casing storage effects were overcome in the first few minutes after recovery started.

B. From the #3 time-drawdown and pumped well analyses, an average T of approximately 10,700 gpd/ft., and S of 0.09 were determined. The effective aquifer thickness (assuming 100% screen for submerged depth of well) is m = 32 - 7 = 25 feet. Since K = T/m, the horizonal aquifer permeability can be approximated as 430 gallons/day/foot^2. This value is in the upper range of values for silty sands given by Freeze and Cherry (page 29), but would not be expected given the silts, fine grained sands, and silty clays shown in the 4" PVC well log.

C. The transmissivity value (6240) given on pages 36 and 38 of the report is reported in units of permeability (gpd/ft^2) and compared directly to permeabilities for silty and clean sands. As shown in B. above, the correct value is about 430 gpd/ft^2. Using this value, an effective porosity of 0.2, and the hydraulic gradient, a rough estimate of horizontal seepage velocity away from the ponds can be made. Since the hydraulic gradient near the ponds is impacted by the seepage mound, the topographic gradient parallel to the river was used. In the area of the ponds, the flood plain gradient is between 10/5500 and 10/6000 ft/ft, or about 0.0017. The calculated seepage velocity is:

$$V = \frac{430}{7.48} \times \frac{0.0017}{0.2} \frac{ft}{day} = 0.5 ft/day \text{ or } 180 ft/year$$

If the gradient is nearer the straight-line river gradient (10/16,000) the seepage velocity is decreased by about one-third. If a ground water model is prepared using actual water level data, these seepage velocities can be compared with the model velocities.

The OCD is awaiting receipt of further hydrologic and water quality results from recent measurements at the pond site. We plan to collect additional data

during our visit the week of April 27. However, it is apparent that as a result of our examination of the data available to date, Navajo will need to better define the relationship between the ponds, alluvium ground water levels, and the river prior to discharge plan approval. The impact of the unlined fire pond also remains to be determined.

If you have any questions, please contact me at 827-5812.

Sincerely,

David G. Boyer
Hydrogeologist
Environmental Bureau Chief

DGB/cr

cc: GCL Consultants
NM EID Hazardous Waste Section

Attachment

ELEPHONE
(505) 748-3311

EASYLINK
62905278

REFINING COMPANY
501 EAST MAIN STREET • P. O. DRAWER 159
ARTESIA, NEW MEXICO 88210

August 15, 1986

Ms. Alice Barr
Hazardous Waste Section
NMEID
P.O. Box 968
Santa Fe, NM 87504-0968

RE: Activities During
July-August, 1986

Dear Ms. Barr:

This monthly letter report is to keep you advised of activities that have occurred at Navajo Refinery Company's Artesia refinery as of August 15, 1986. Two major milestones did occur during the time period July 15-August 15, 1986: development of all RCRA ground water monitoring wells and completion of the first ground water sampling event.

During the period July 16-19, 1986, Navajo completed development of the new ground water monitoring wells installed during June 1986. The following equipment was used for well development: 1 1/2" stainless steel air lift pump and a gas driven compressor. Pumping rates ranged from .5 to .8 gallons per minute depending on the degree of silt and the amount of water the well produced. Each well was pumped for approximately 2 hours. MW-1 was the only well that would not make sufficient water to continually pump for 2 hours. The pump and tubing bundles were steam cleaned after each well was pumped. Table 1 lists the well number and the amount of water removed during development.

During this same time period, a pump test was conducted on the newly installed PVC test well using a 4" submersible pump and a gasoline powered generator. Average pumping rate was 7 gallons/minute. Water level readings were recorded for the pump test well and 3 other wells located 31', 46.4' and 96.4' away from the pumped well. Water levels were taken at approximately 5 minute intervals for the first 15 minutes, at 10 minute intervals for the next 30 minutes, and 15 minute readings were taken for a half hour. The next 5 hours, water levels were measured every hour and the remaining readings were taken 4 hours apart. One well (#16) appears to be plugged as water levels were not consistent with the other wells. Our preliminary data analyses indicates a transmissivity of 6.101×10^3 g/d/ft. A more detailed analysis of the data is needed to provide additional information.

On August 6-7, 1986 the first ground water monitoring samples were collected from wells at the Navajo Refinery evaporation ponds and waste conveyance ditch. Three down-gradient wells (MW-6, MW-3 and #13) and one up-gradient well (MW-1) in the evaporation pond area were sampled for those Priority Pollutants previously analyzed for by EPA in their 1984 and 1985 analyses. Two wells, MW-8 and MW-9, between the waste conveyance ditch and Eagle Draw were also sampled for the same set of parameters. Results for the analyses should be available in approximately 3-4 weeks. Once the analyses have been reviewed, the decision will be made as to whether additional analyses should be conducted for the initial phase of ground water monitoring.

Enclosed, you will also find copies of the surveys recently conducted at Navajo's evaporation ponds and a portion of the waste conveyance ditch. These plates identify the surveyed locations of all new RCRA monitoring wells. Table 2 lists the water levels measured in a number of wells during the August sampling event. Clarification of certain reference elevations is being conducted so that a water table map can be constructed.

Navajo fully expects to proceed on schedule with its proposed assessment program as originally presented to NMEID and as may ultimately be issued in any CO/CS. We anticipate conducting the second ground water monitoring sampling series in September, pending review and evaluation of the first set of analytical results.

If I can provide any additional information, please feel free to contact me at (505) 748-3311 or Mr. Trent Thomas at (505) 842-0001.

Sincerely,

David G. Griffin
Supt. of Environmental
Affairs & Quality Control

DGG/ls/NAVAJO/GRIFF011.LTR

Enclosures

cc: Dave Boyer

TABLE 1
NAVAJO REFINERY WELL DEVELOPMENT

DATE	WELL	WATER QUANTITY	COMMENTS
7-18	MW-1	7 gallons	Pumped well dry allowed well to recover and pumped well dry allowed well to recover and pumped well dry.
7-18	MW-1	6 gallons	
7-19	MW-1	10 gallons	
7-18	MW-2	80 gallons	
7-16	MW-3	100 gallons	
7-18	MW-4	80 gallons	
7-19	MW-5	85 gallons	
7-17	MW-6	75 gallons	
7-19	MW-7	80 gallons	
7-17	MW-8	70 gallons	
7-17	MW-9	85 gallons	

TABLE 2
WATER TABLE ELEVATIONS AT
NAVAJO REFINERY
AUGUST 7, 1986

WELL #	H_2O TABLE ELEVATION
Boyer Test Well	3301.47'
MW-1	3301.41'
#3	3301.32'
#4	3301.47'
MW-2	3302.6'
#5	3302.38'
#6	Dry
#7	3304.4'
#10	3300.62'
#14	3300.97'
#17	3301.25'
MW-7	3299.85'
#12	3301.68'
#9	3301.71'
Well Point #1	3301.55'
MW-5	6.21'*
Well Point #2	3301.52'
MW-4	3299.9'
#13	6.81'*
#P-2	3300.2'
#P-3	3300.41'
MW-3	3300.46'
MW-6	3299.77'

*Depth to Water from Top of Casing

Navajo - Ditch to be "closed" - what about sludge?

3308
3304.4
3.6 ST 180 cm 3.1 x 10^-4 ST/
180

1/3.6 x 180 = 50
2/3.6 x 180 = 100
3/3.6 x 180 = 150

At well #7, (21,500 - 11,500) up from GS (or 10,880 SF)
∴ change in elevation is 3.1 ST [illegible]
at Well 7, or 3299.0'
At 680' [illegible] #7, 3297'
At well #5 21,500 - 15 [illegible]
(or [illegible] SF) change is 5.3 ST
At [illegible] change is 5.5
[illegible] 4 change
21,500 - 3000, [illegible]
At MW 1, 21,500 - 1600, or [illegible]

3291.9
2.15
3294.1 8/2/86

3308
3304
2.4

8.0 .4
7.0 1.04
.4 x 131 1.4
1.04
2.4
3305.8 3.4
3302.5
3.3 ST 3.4
1.4
2.4

.2 x 100 = 40
.5 x 190 = .6
1.5 .4 .25 530'
2.5 3297 75 3.6
3
3300.6
3297.0
3.6

12,020
1,461
10,559 gal

Meter
14,611. ~~12,020~~ = ~~106,409~~ gal

$\bar{Q} = 6.5$ gpm

DATA SHEET FOR RECORDING PUMP TEST DATA

County : _____ Observation well no. #

Location: Navajo Pumped well no. #

Average Q 6.5 gpm r = 0 ft. r^2 = _____

Date	Hour	t (min)	$\frac{t}{t'}$ (min)	Δt t/t'	Depth to water	s (unadjusted)	~~adjustment~~ Δs	s' (adjusted)	Q (gpm)	Remarks
9/17	0830				6.96				9.5	static
	0836 ~~0856~~	0								start
	0842	6	.78	6	9.45	2.49	-2.49	2.37		
	0853	17	1.23	11	9.61	2.65	-.16	2.51	9.6	
	0900	24	1.38	7	9.65	2.69	-.04	2.55		
	0914	38	1.58	14	9.74	2.78	-.09	2.63		
	0930	54	1.73	16	9.80	2.84	-.06	2.68		
Decreased to 7 gpm @ 1100	1100	144	2.16	90	9.875	2.92	-.08	2.75	7.0	Added 50' hose for better discharge control
	1158	202	2.31	58	8.25	1.29	+1.63	1.26	7.0	
	1258	262	2.42	60	8.826	1.92	-0.63	1.84		
	1359	321	2.51	59	8.89	1.93	-.01	1.83		
1556	1456	440	2.64	119	8.95	1.99	-.06	1.91		
1750	1850	554	2.74	114	9.00	2.04	-.05	1.96		
	2100	744	2.87	190	9.08	2.12	-.08	2.03		
9/18	2400	924			9.15	2.19		2.09		
	0330	1134			9.17	2.21		2.11		
	0640	1324			9.23	~~2.27~~ 2.26		2.17		
27 hrs 9 min = 1629 min	0915	1479			9.23	~~2.27~~ 2.26		2.17		
	1140	1624			9.26	~~2.30~~ 2.29		2.19		
$\Rightarrow \bar{Q} = 6.5$ gpm	1145	1629	t'	t/t'	9.26	2.30		2.19		Pump off
	1146	1630	1	1630	9.125	1.17		1.14		Recovery
	1150	1634	5	326.8	7.45	0.49		0.49		
	1152	1636	7	233.7	7.39	0.43		0.43		
	1156	1640	11	149.1	7.35	0.39		0.39		
	1200	1644	15	109.6	7.31	0.35		0.35		

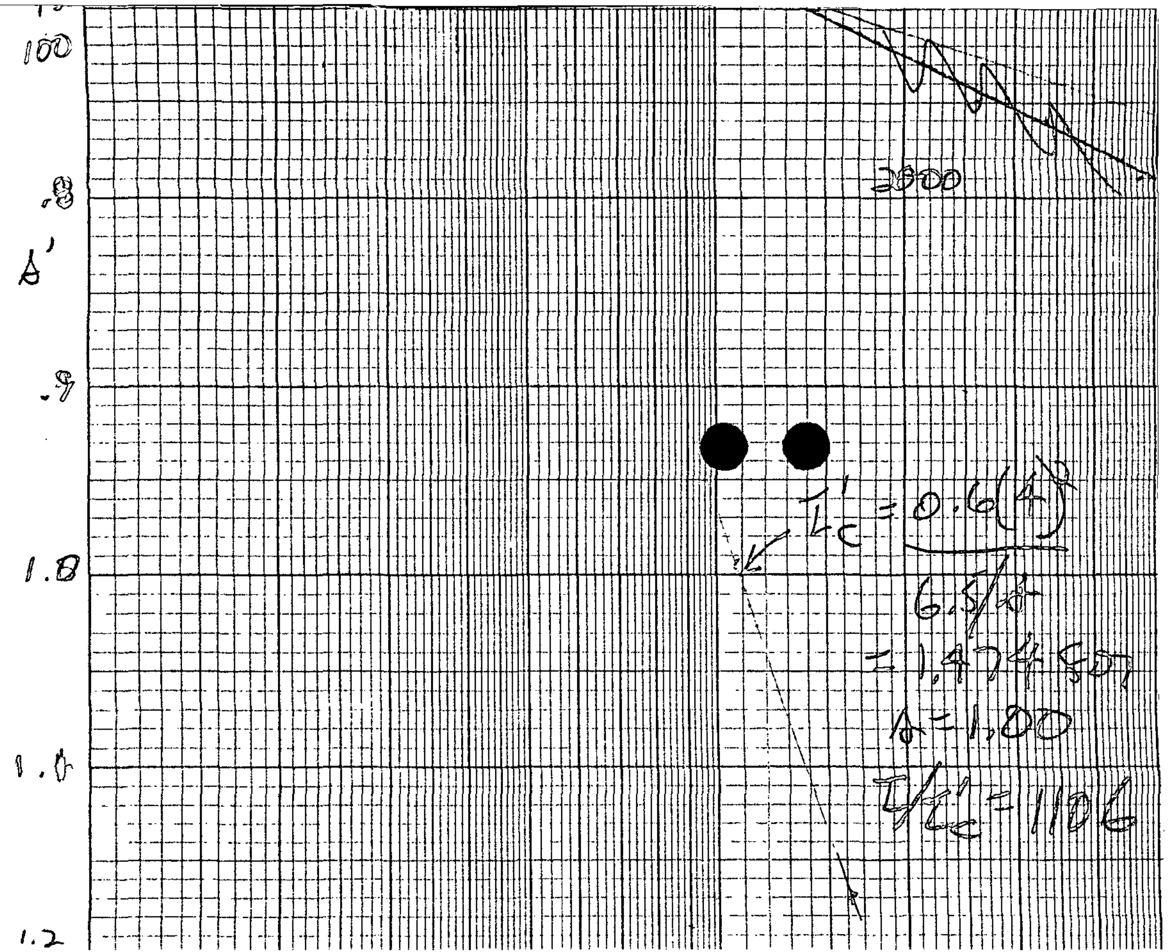
DATA SHEET FOR RECORDING PUMP TEST DATA

County : _____ Observation well no. 4

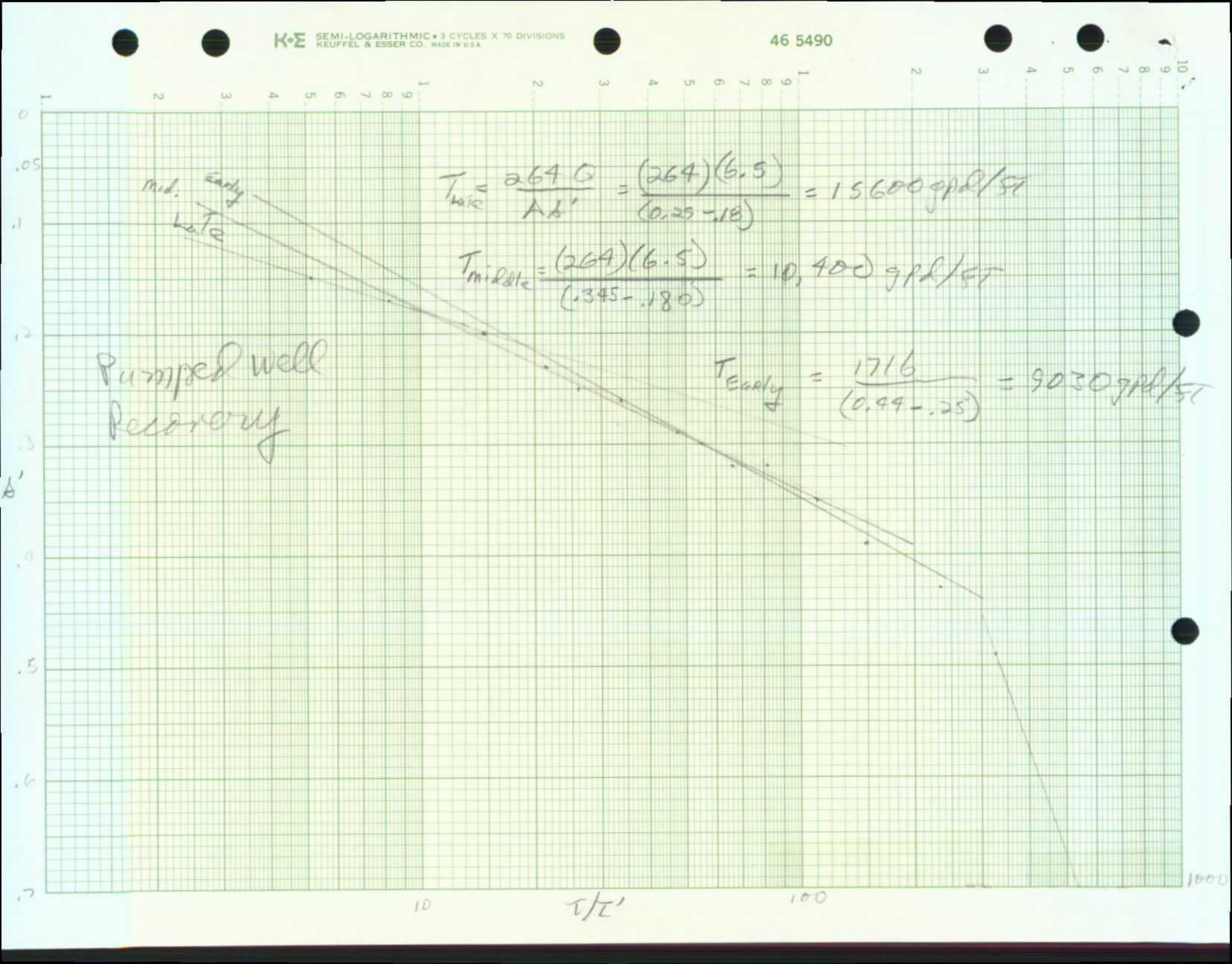
Location: _____ Pumped well no. 1

Average Q _____ gpm r = _____ ft. r^2 = _____

Date	Hour	t (min)	$A_{t'}^{t}$ (min)	t/t'	Depth to water	s (unadjusted)	Adjustment As	s' (adjusted)	Q (gpm)	Remarks
7/18	1205	1649	20	82.5	7.28	0.32		0.32		
	1210	1654	~~25~~	66.2	7.275	0.32		0.31		
	1215	1659	~~30~~	55.3	7.26	0.30		0.30		
	1220	1664	~~35~~	47.5	7.25	0.29		0.29		
	1235	1679	~~50~~	33.6	7.22	0.26		0.26		
	1250	1694	~~65~~	26.1	7.21	0.25		0.25		
	1305	1709	~~80~~	21.4	7.19	0.23		0.23		
	1345	1749	120	14.6	7.16	0.20		0.20		
	1530	1854	225	8.24	7.13	0.17		0.17		
1820	1820	2024	395	5.12	7.11	0.15		0.15		
7/19	0720	2804	1175	2.39	7.19	0.23		0.23		



100
.8
A'
.9
1.0
1.2
2000
= 1.474507
A = 1.80



DATA SHEET FOR RECORDING PUMP TEST DATA

County : _____ Observation well no. 1

Location: Navajo Pumped well no. _____

Average Q _____ gpm r = 15.5' ft. r^2 = 240.25 $\log r^2$ = 2.38

Date	Hour	t (min)	t' (min)	t/t'	Depth to water	s (unadjusted)	Adjustment As	s' (adjusted)	Q (gpm)	Remarks
7/17	0830				7.075				9.5	static
	0836	0			~~7.95~~	0				start
	0837				7.075					
	0839	1			7.075					
	0840	4			7.085					
	0849	13			7.075					
	0901	25			7.075					
	0913	37			7.075					
	0931	55			7.080	.005				
	1102	146			7.09	.015				added 50' hose
203	1159	203			7.10	.025				
	1259	263			7.10	.025				
	1358	322			7.11	.026				
	1557	441			7.11	.035				
	1756	560			7.125	.05				
	2100	744			7.13	.055				
7/18	2400	924			7.15	.075				
	0330	1134			7.175	.10				
	0640	1324			7.20	.125				
	0915	1479			7.20	.125				
	1140	1624			7.21	.135				
	1147				7.21	.135		.135		Rec
	1153				7.21					
	1157				7.21					

Static = 7.075 S_{max} = 7.210 = .135

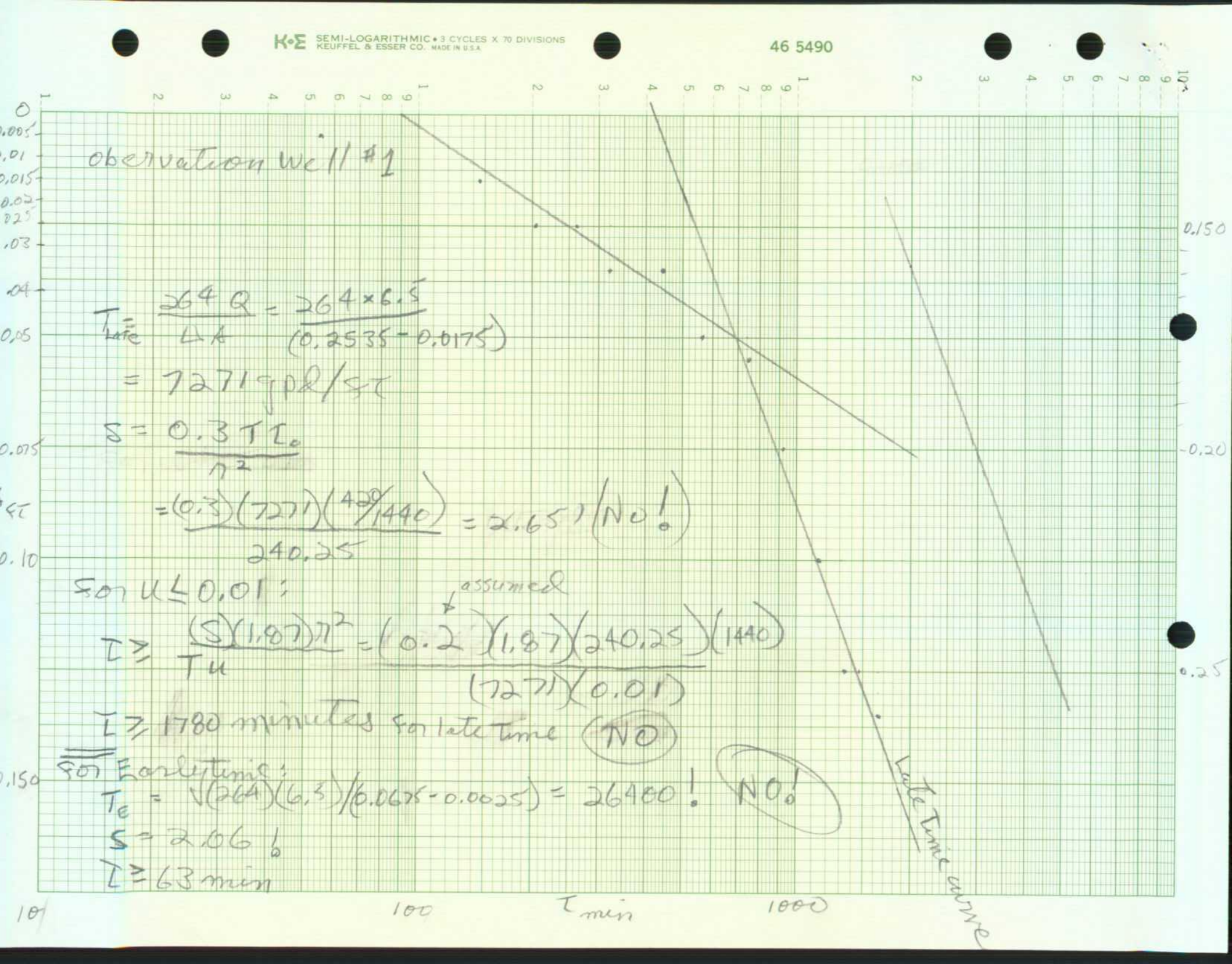
DATA SHEET FOR RECORDING PUMP TEST DATA

County : _____ Observation well no. 1

Location: _____ Pumped well no. _____

Average Q _____ gpm r = _____ ft. r^2 = _____

Date	Hour	t (min)	t' (min)	t/t'	Depth to water	s (unadjusted)	Adjustment Δs	s' (adjusted)	Q (gpm)	Remarks
7/18	1206				7.21					
	1211				7.21					
	1216				7.21					
	1221				7.21					
	1236				7.21					
	1251				7.21					
	1306				7.21					
	1346				7.21					
	1531				7.23					
	1920				7.24					
7/19	0720				7.31					


K•E SEMI-LOGARITHMIC • 3 CYCLES X 70 DIVISIONS
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46 5490
observation well #1
$T_{late} = \frac{264Q}{\Delta k} = \frac{264 \times 6.5}{(0.2535 - 0.0175)}$
$= 7271$ gpd/ft
$S = \frac{0.3 T t_o}{r^2}$
$= \frac{(0.3)(7271)(409/1440)}{240.25} = 2.65$ (No!)
For $u \leq 0.01$:
$t \geq \frac{(S)(1.87) r^2}{T u} = \frac{(0.2)(1.87)(240.25)(1440)}{(7271)(0.01)}$
assumed
$t \geq 1780$ minutes for late time (NO)
For Early time:
$T_e = \sqrt{(264)(6.5)/(0.0625 - 0.0025)} = 26480$! NO!
$S = 2.06$
$t \geq 63$ min
late time curve
t_{min}
0.150
0.20
0.25

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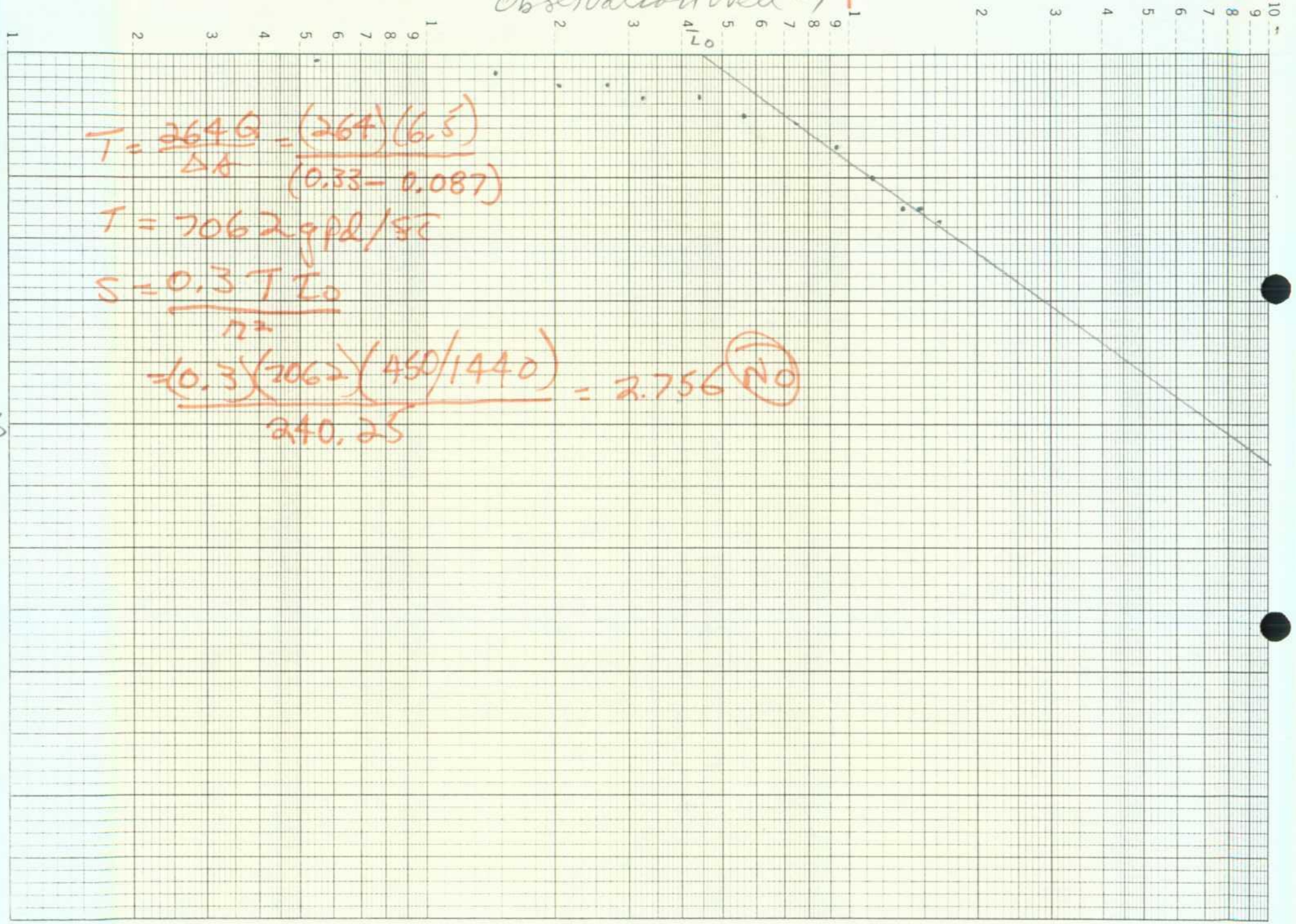
46 5490

Observation well #1



$$T = \frac{264Q}{\Delta s} = \frac{(264)(6.5)}{(0.33 - 0.087)}$$

$$T = 7062 \text{ gpd/ft}$$

$$S = \frac{0.3\,T\,t_0}{r^2}$$

$$= \frac{(0.3)(7062)(450/1440)}{240.25} = 2.756 \times 10^{-3}$$

DATA SHEET FOR RECORDING PUMP TEST DATA

County : _____ Observation well no. 2

Location: _____ Pumped well no. _____

Average Q _____ gpm r = 23.2' ft. r^2 = 538.24 $\log r^2$ = 2.73

Date	Hour	t (min)	Δt' (min)	t/t'	Depth to water	s (unadjusted)	Adjustment Δs	s' (adjusted)	Q (gpm)	Remarks
	0830	0			6.21		Δs			Static
	0836	0			6.21					Start.
	0841	5		1	6.21	0				
	0856	19	1	2	6.275	.07	-.07			
	0902	26		1	6.30	.09	-.02			
	0914	38			6.32	.11	-.02			
	0931	55			6.33	.12	-.01			
	1103	147			6.375	.17	-.05			
	1200	204		2	6.36	.15	+.02			
	1300	264		2	6.375	.17	-.02			
	1400	324		2	6.38	.17	0			
	1558	442		1	6.39	.18	-.01			
	1755	559			6.41	.20	-.02			
	2100	744			6.46	.25	-.05			
7/18	2400	924			6.50	.29	-.04			
	0330	1134			6.53	.32	-.03			
	0640	1324			6.55	.34	-.02			
	0915	1479			6.57	.36	-.02			
	1140	1624			6.58	.37				
	1148	1632	3	544	6.58	0.37				Rec
	1154	1638	9	182	6.57	0.36				
	1158	1642	13	126	6.56	0.35				

Static = 6.210 Sunf = 6.580 = .37'

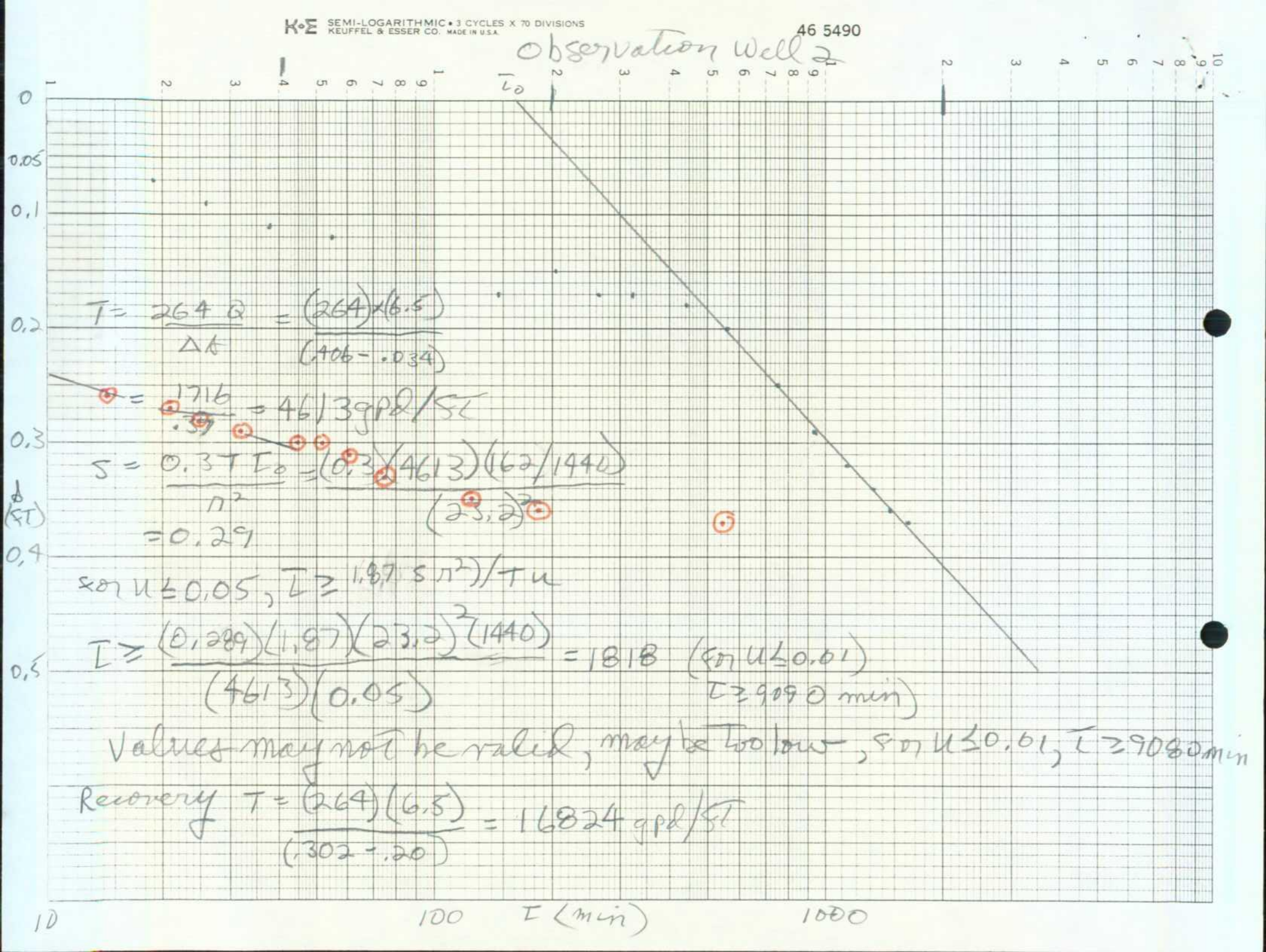
DATA SHEET FOR RECORDING PUMP TEST DATA

County :____________________ Observation well no. 2

Location:____________________ Pumped well no. ________

Average Q________ gpm r =______ ft. r^2 =______

Date	Hour	t (min)	t' (min)	t/t'	Depth to water	s (unadjusted)	Adjustment Δs	s' (adjusted)	Q (gpm)	Remarks
	1207	1651	22	75	6.54	.33				
	1212	1656	27	61	6.52	.31				
	1217	1661	32	52	6.51	.30				
	1222	1666	37	45	6.51	.30				
	1237	1681	52	32	6.50	.29				
	1252	1696	67	25	6.49	.28				
	1307	1711	82	21	6.48	.27				
	1347	1751	122	14.4	6.47	.26				
	1532	1856	227	8.2	6.44	.23				
	1820	[illegible]	375	5.1	6.425	.215				
7/19	0726	2804	1175	2.4	6.45	.24				


K•E SEMI-LOGARITHMIC • 3 CYCLES X 70 DIVISIONS
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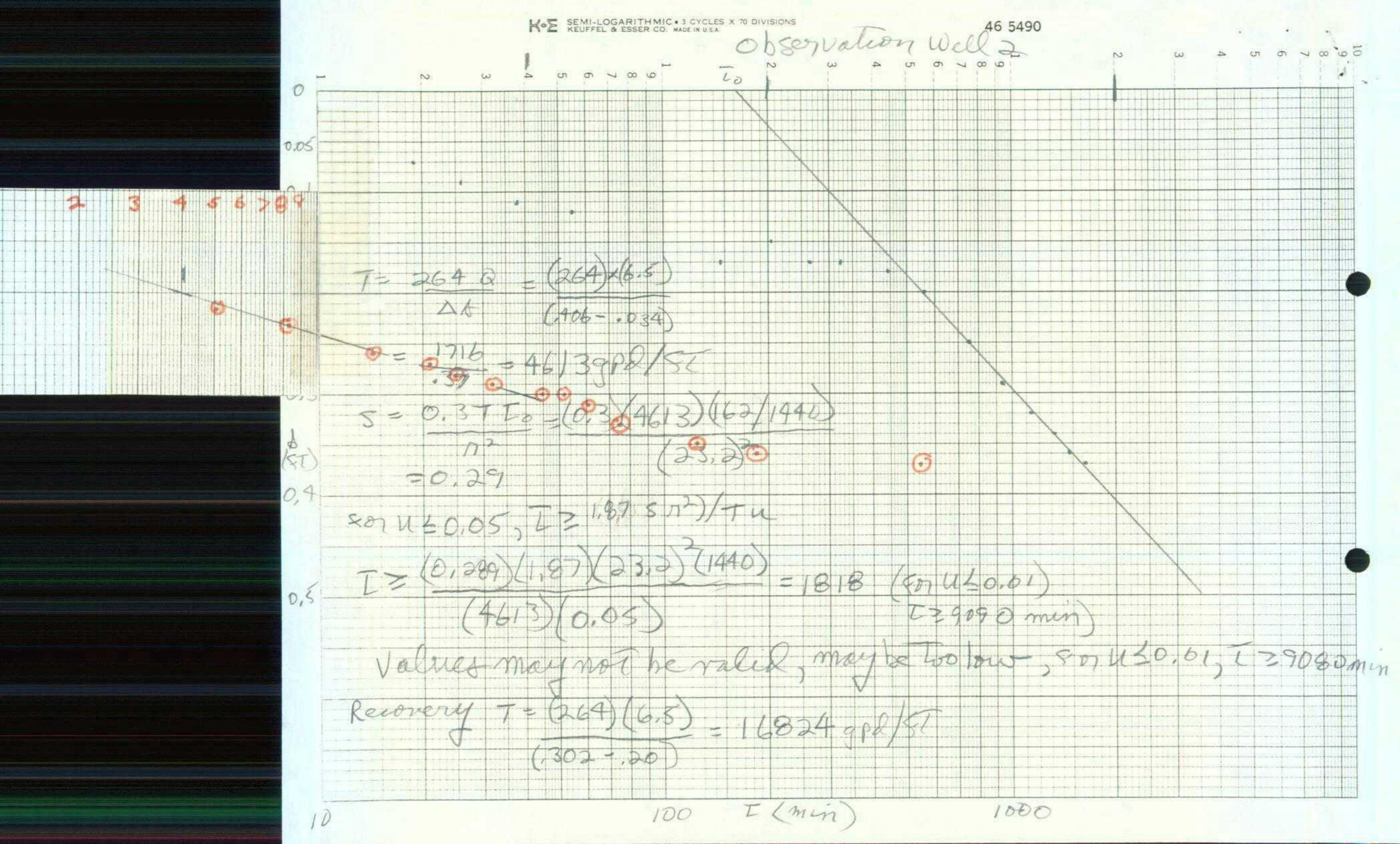
46 5490
observation well 2
t_0
0
0.05
0.1
0.2
0.3
0.4
0.5
s (FT)
10
100
t (min)
1000
$T = \frac{264\,Q}{\Delta s} = \frac{(264)\times(6.5)}{(.406 - .034)}$
$= \frac{1716}{.37} = 4639$ gpd/ft
$S = \frac{0.3\,T\,t_0}{r^2} = \frac{(0.3)(4613)(62/1440)}{(23.2)^2}$
$= 0.29$
for $u \leq 0.05$, $t \geq (1.87\,S\,r^2)/T\,u$
$t \geq \frac{(0.289)(1.87)(23.2)^2(1440)}{(4613)(0.05)} = 1818$ (for $u \leq 0.01$)
$t \geq 9090$ min
Values may not be valid, may be too low, for $u \leq 0.01$, $t \geq 9080$ min
Recovery $T = \frac{(264)(6.5)}{(.302 - .20)} = 16824$ gpd/ft


K•E SEMI-LOGARITHMIC • 3 CYCLES X 70 DIVISIONS
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46 5490
observation well 2
T = 264 Q / Δs = (264)(6.5) / (.406 - .034)
= 1716 / .37 = 4639 gpd/ft
S = 0.3 T t0 / r² = (0.3)(4613)(62/1440) / (23.2)²
= 0.29
for u ≤ 0.05, t ≥ (1.87 S r²)/T u
t ≥ (0.289)(1.87)(23.2)²(1440) / (4613)(0.05) = 1818 (for u ≤ 0.01)
t ≥ 9090 min)
Values may not be valid, may be too low, for u ≤ 0.01, t ≥ 9080 min
Recovery T = (264)(6.5) / (.302 - .20) = 16824 gpd/ft
s/Q (ft)
t (min)

DATA SHEET FOR RECORDING PUMP TEST DATA

County : _____ Observation well no. 3

Location: _____ Pumped well no. _____

Average Q _____ gpm r = 48.2' ft. r^2 = 2323.24 $\log r^2$ = 2.37

Date	Hour	t (min)	t' (min)	t/t'	Depth to water	s (unadjusted)	Adjustment As	s' (adjusted)	Q (gpm)	Remarks
5/10	0830		log t		6.43	S	AS			static
	0857	21	1.43	27	6.48	.05	.05			
	0903	27	1.54	6	6.49	.06	.01			
	0915	39	1.65	12	6.50	.07	.01			
	0932	56	1.79	17	6.50	.07	⊖			
	1103	147	2.18	91	6.52	.09	.02			
	1200	204	2.32	57	6.52	.09	⊖			
	1301	265	2.43	61	6.525	.095	.005			
	1401	325	2.52	60	6.525	.095	⊖			
	1600	444	2.65	119	6.525	.095	⊖			
	1756	560	2.75	116	6.525	.095	⊖			
	2100	744	2.88	184	6.540	.11	.02			
5/18	2400	924			6.56	.13	.02			
	0330	1134			6.60	.17	.04			
	0640	1324			6.61	.18	.01			
	0915	1479			6.62	.19	.01			
	1140	1624			6.625	.195				
	1149	1633	4	408	6.625	.195				Rec. Pump off @ 1145
	1155	1639	10	164	6.61	.180				
	1159	1643	14	117	6.60	.17				

Static = 6.430
Smax = 6.625
= .195

DATA SHEET FOR RECORDING PUMP TEST DATA

County : _____ Observation well no. 3

Location: _____ Pumped well no. _____

Average Q _____ gpm r = _____ ft. r^2 = _____

Date	Hour	t (min)	t' (min)	t/t'	Depth to water	s (unadjusted)	Adjustment Δs	s' (adjusted)	Q (gpm)	Remarks
	1208	1652	23	72	6.59	0,16				
	1213	1657	28	59	6.59	0,16				
	1218	1662	33	50	6.58	0,15				
	1223	1667	38	44	6.58	0,15				
	1228	1682	53	32	6.58	0,15				
	1255	1697	68	25	6.57	0,14				
	1308	1712	83	21	6.57	0,14				
	1348	1747	118	14,8	6.57	0,14				
	1532	1857	228	8,1	6.57	0,14				
	1820	2024	395	5,1	6.56	0,15				
7/19	0720	2804	1175	2,4	6.64	0,21				

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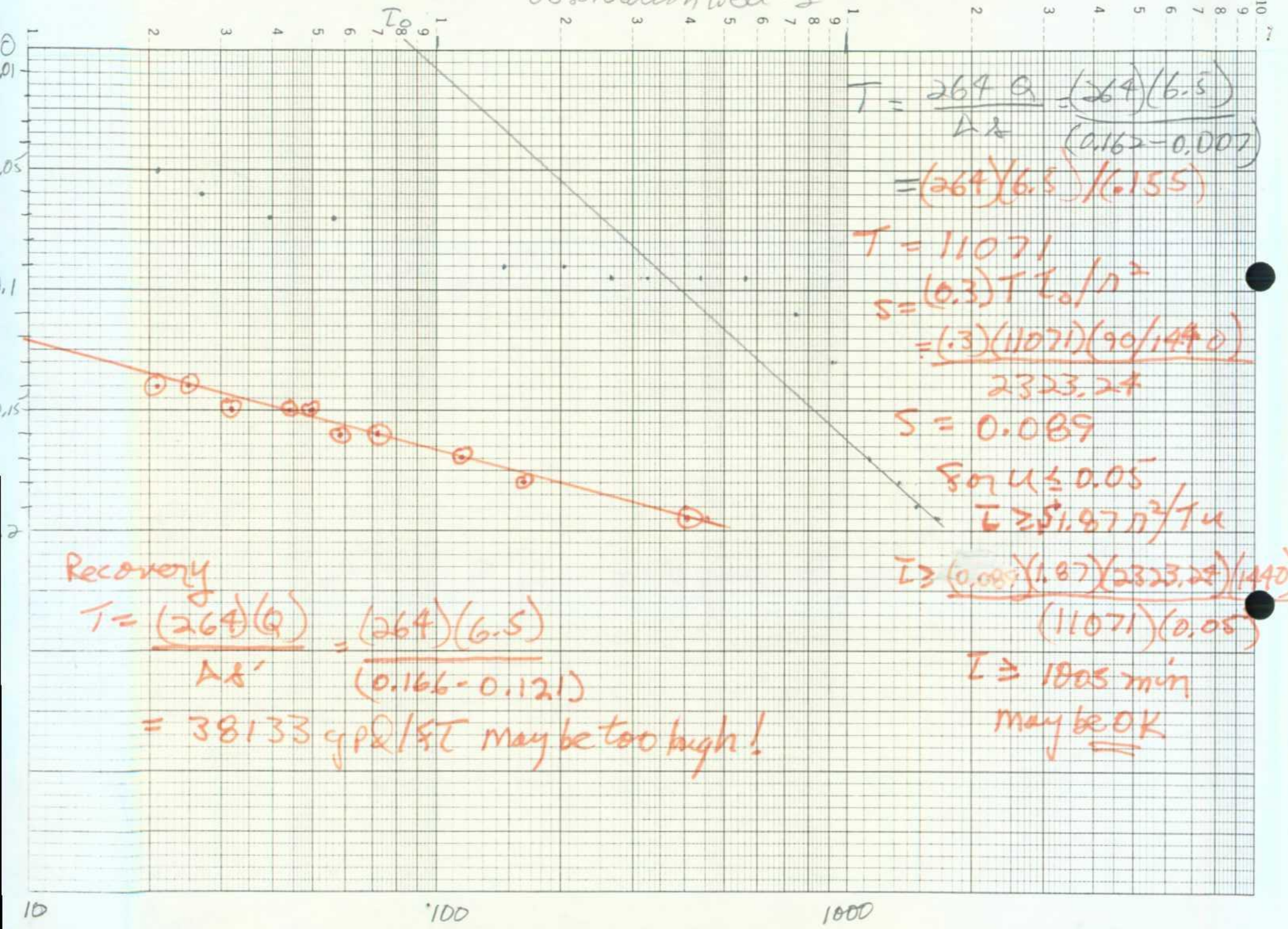
Observation well #3



$$T = \frac{264\,Q}{\Delta s} = \frac{(264)(6.5)}{(0.162 - 0.007)}$$

$$= (264)(6.5)/(.155)$$

$T = 11071$

$$S = (0.3)\,T\,I_o/D^2$$

$$= \frac{(.3)(11071)(90/1440)}{2323.24}$$

$S = 0.089$

for $u \leq 0.05$

$I \geq 1.87\,D^2/Tu$

$$I \geq \frac{(0.089)(1.87)(2323.24)(1440)}{(11071)(0.05)}$$

$I \geq 1805$ min

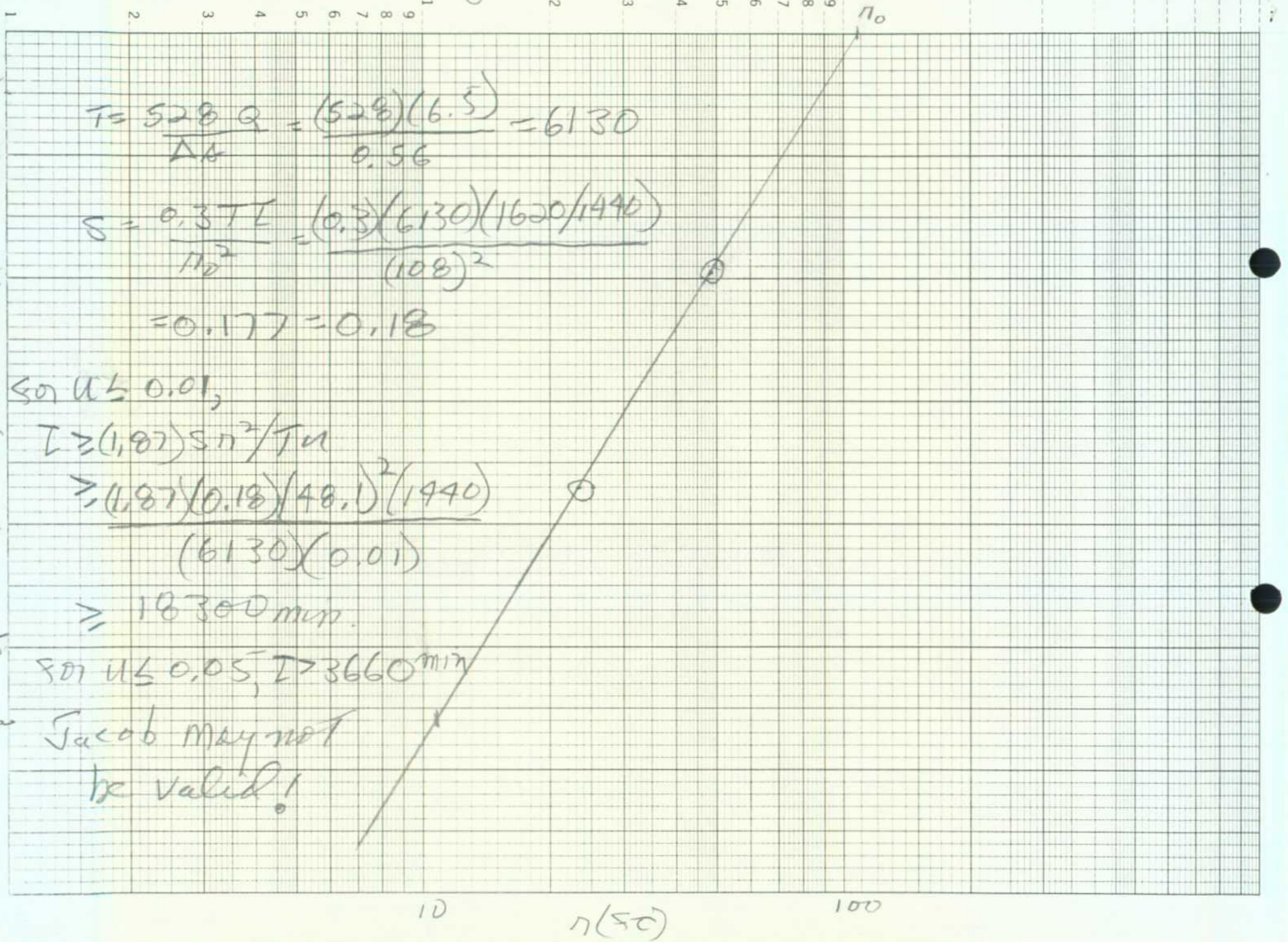
may be OK

Recovery

$$T = \frac{(264)(Q)}{\Delta s'} = \frac{(264)(6.5)}{(0.166 - 0.121)}$$

$= 38133$ gpd/ft may be too high!

Distance - Drawdown (at $\bar{t} = 1620$ min)



$$T = \frac{528\,Q}{\Delta s} = \frac{(528)(6.5)}{0.56} = 6130$$

$$S = \frac{0.3\,T\,\bar{t}}{r_o^2} = \frac{(0.3)(6130)(1620/1440)}{(108)^2}$$

$$= 0.177 = 0.18$$

For $u \leq 0.01$,

$$t \geq (1.87)\,S\,r^2/T$$

$$\geq \frac{(1.87)(0.18)(48.1)^2(1440)}{(6130)(0.01)}$$

≥ 18300 min.

For $u \leq 0.05$, $t > 3660$ min

Jacob may not be valid!