

GW - 28

WORK PLANS

1995

TELEPHONE

(505) 746-3311

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

March 27, 1995

Mr Bill Olson
Hydrogeologist
Environmental Bureau
Oil Conservation Division
2040 S. Pacheco St.
Santa Fe, NM 87505-5472

RE: Investigative Report - Ground Water Remediation, Navajo Refining Co., Eddy County, NM

Dear Bill,

In response to your letter of December 9, 1994, please find enclosed: 1) Well logs and construction diagrams for each of the five new monitor wells, 2) a summary of field measurements and laboratory results from each new well, 3) a water table elevation map from all refinery monitor wells showing each well's location, and 4) a product thickness map based on all refinery monitor wells. The product thickness map shows only the product in monitor wells. Past borings were not incorporated into this map, since in most cases, those measurements are over two years old.

Several interesting observations came out of this study. First of all, the recovery trenches do a very good job of removing product. For instance, the apparent product thickness in front of the trenches at the Truck-by-Pass Landfarm is in some cases over three feet thick; however, in monitor well 29, which is behind the trench, the apparent product thickness is 0.01". In every instance where we have a recovery trench with monitor wells both in front and behind, the product thickness is dramatically reduced behind the trench.

Also, on the water table elevation map, we have further proof that Eagle Draw is an area of recharge throughout the area of the map except where the channel is cemented. Eagle Draw is cemented from west of the plant to the Truck-by-Pass. On this map, as on past maps, Eagle Draw is a high.

On the product thickness map, the biggest surprise is the absence of product in KWB-10. If you will recall, this is the area of the greatest concentration of product in the study KWBrown did for us. We rechecked this well after the first measurement with the same result. We are in the process of checking screen placement and water level in this well to try and explain this puzzling scenario.

Finally, monitor well 52 has 11 ppm Aluminum in it. We have no idea why it would be so high. It is off our property and although we know the recent history of that site, it doesn't provide any clues about these results. It could just be a one time anomaly.

For your information, on March 10, we sampled for the annual constituents mentioned in your letter of July 25, 1994. Those results, along with the appropriate bi-weekly, monthly and/or quarterly results will be sent with our next quarterly report. That report will be forwarded as soon as the results are received from the lab. That should be within the next week.

If there are any questions concerning this report, please call me at 505-748-3311. Thank you for your time in this matter.

Sincerely,

NAVAJO REFINING COMPANY

A handwritten signature in black ink that reads "Darrell Moore". The signature is written in a cursive, flowing style.

Darrell Moore
Environmental Specialist

Enclosures

48

Monitor Well / Boring Log

Monitor Well
Details

Monitor Well Set? YES NO

DEPTH. FT.	SYMBOL(USCS)	SAMPLE DESCRIPTION	SPT BLOWS	SAMPLE NO.	SAMPLING TOOL	MOISTURE	CONTAMINATION		DEPTH. FT.	STRATIGRAPHY	WATER LEVEL
							ORGANIC VAPOR CONC. (PPM)	VISIBLE Y= YES N= NO			
		0-4 Top Soil									
5		4-13 Grey stained							5		
10		caliche. strong color.							10		
15		13-29 Silty clay,							15		
20		stained, strong color.							20		
25		29-34 Silty clay							25		
30		w/ some gravel							30		
35									35		
40		H ₂ O @ 24'							40		
45		w/ some free product							45		
50									50		
55									55		
60									60		

in B.S. yard
next to Norberto
fence.

Client: _____ Job No.: _____ Date Drilled: 12/14/99 Well No.: 64
 Size: _____ Top of Casing Elevation: _____
 Comments: _____
 Driller: _____ Logged By: _____

REMARKS: MW Set to 34' w/ 15' .00"
 Screen (2" NC) 74-~~29~~ 55 to 18'
 Best seal 18-16. gravel to seal

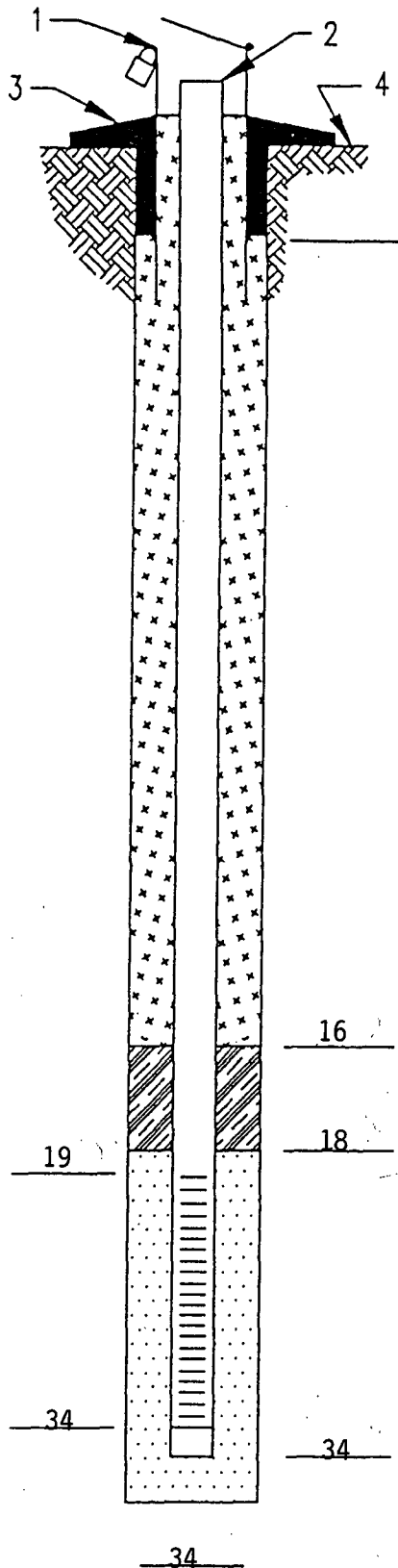
POOL
 ENVIRONMENTAL DRILLING, INC.
 ROSWELL, NEW MEXICO

FIGURE NO.

Monitoring Well 48

Piezometer

Design Specifications



Depths in Feet
from Ground Surface
(Not to Scale)

Elevations: 1 3366.30 ' 2 3366.14
(feet MSL) 3 4 3366.20

Coordinates: X Y

Type of Casing: ☒ PVC Sched. 40 Flush Thread
☐ Stainless Steel ☐

Casing Diameter: ☒ 2" ☐ 3" ☐ 4" ☐ 6" ☐

Screen Slot: ☐ 0.008 ☒ 0.010 ☐

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐

Sand Pack: CSSI 16-40

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry
☒ 1/4" Pellets ☐

Grout Type: Portland Weight:

Bore Hole Diameter: 8"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐

Drilled By: Pool Drlg.

Logged By: Sonny Pool

Completion Date: 12/14/94

Date	D-T-W	MSL	Date	Field pH	Field EC

Comments: Concrete with 5% bentonite used to grout
from seal to surface.



Project: 622092001-237 (1A)
Location: ARTESIA, NEW MEXICO

Monitor Well / Boring Log

Monitor Well
Details

Monitor Well Set? ☒ YES ☐ NO

DEPTH, FT.	SYMBOL(USCS)	SAMPLE DESCRIPTION	SPT BLOWS	SAMPLE NO.	SAMPLING TOOL	MOISTURE	CONTAMINATION		DEPTH, FT.	STRATIGRAPHY	WATER LEVEL	North of ~~Station~~ Evolution unit, next to road.
							ORGANIC VAPOR CONC. (PPM)	VISIBLE Y= YES N= NO				
0-4		Tan Silty Top Soil							0-4			
4-8		light tan caliche							4-8			
8-14		Grey/Blue stained caliche w/ sh. odor							8-14			
14-22		Gray Silty Clay							14-22			
22-29		" " " w/ gravel & odor							22-29			
29-34		Tan Silty Clay							29-34			
34									34			
WLC 24'												

Client: _____ Job No.: _____ Date Drilled: 12-20-94 Well No.: 157
 Size: _____ Top of Casing Elevation: _____
 Comments: _____
 Driller: _____ Logged By: _____

REMARKS: MW set to 31.5' w/ 1.010"
 slot screen 34-219'. WLC 24'.
 Sand pack to 18'. Bent seal 18'-16'.
 Grout to surface. WLC 24'

POOL

ENVIRONMENTAL DRILLING, INC.

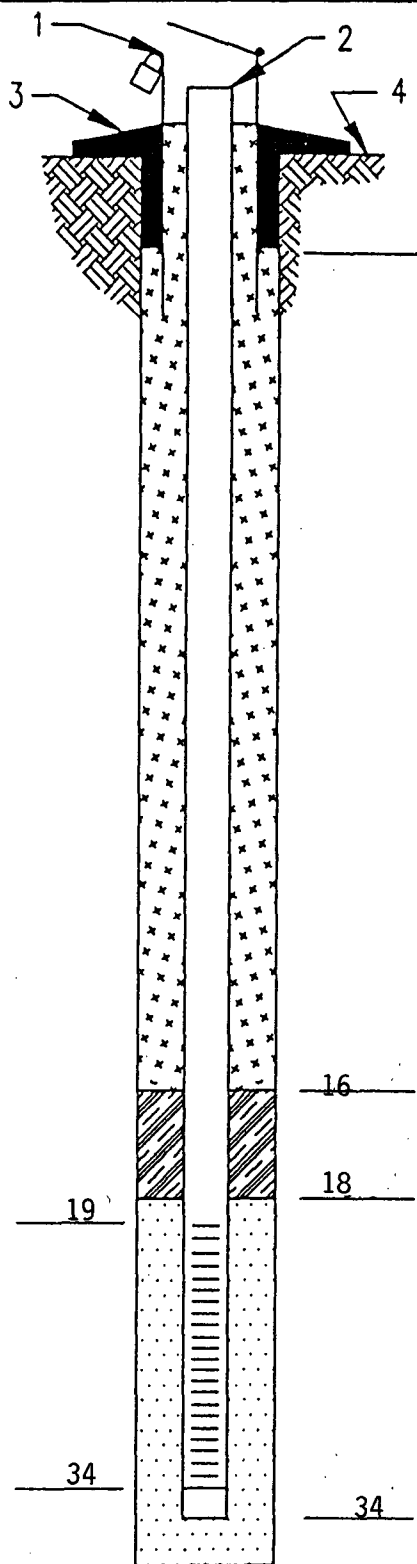
ROSWELL, NEW MEXICO

FIGURE NO.

Monitoring Well 49

Piezometer

Design Specifications



Elevations: 1 3362.93 2 3362.92
 (feet MSL) 3 4 3360.20

Coordinates: X Y

Type of Casing: ☒ PVC Sched. 40 Flush Thread
☐ Stainless Steel ☐

Casing Diameter: ☒ 2" ☐ 3" ☐ 4" ☐ 6" ☐

Screen Slot: ☐ 0.008 ☒ 0.010 ☐

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐

Sand Pack: CSSI 16-40

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry
☒ 1/4" Pellets ☐

Grout Type: Portland Weight:

Bore Hole Diameter: 8"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐

Drilled By: Pool Drlg

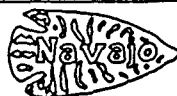
Logged By: Sonny Pool

Completion Date: 12/10/94

Date	D-T-W	MSL	Date	Field pH	Field EC

Comments: Concrete with 5% bentonite used to grout
from seal to surface.

Depths in Feet
 from Ground Surface
 (Not to Scale)



Project: 622092001-237 (1A)
 Location: ARTESIA, NEW MEXICO

~~50~~ 50 Monitor Well / Boring Log

Monitor Well
Details

Monitor Well Set? ☒ YES ☐ NO

DEPTH, FT.	SYMBOL(USCS)	SAMPLE DESCRIPTION	SPT BLOWS	SAMPLE NO.	SAMPLING TOOL	MOISTURE	CONTAMINATION		DEPTH, FT.	STRATIGRAPHY	WATER LEVEL	
							ORGANIC VAPOR CONC. (PPM)	VISIBLE Y= YES N= NO				
0-5		0-6 Brown Top Soil.							5			
5-10		6-11 Gravel							10			
10-15		11-16 Grey silty clay							15			
15-20		16-21 Gravel & clay w/ strong H.C. odor							20			
20-25		21-28 Silty Sand w/ odor.							25			
25-30									30			
30-35									35			
35-40		120 @ 17'							40			
40-45									45			
45-50									50			
50-55									55			
55-60									60			

Client: _____ Job No.: _____ Date Drilled: 12-21-94 Well No.: 4th
 Size: _____ Top of Casing Elevation: _____
 Comments: _____
 Driller: _____ Logged By: _____

REMARKS: MW set w/ 15" .010" screen
 27 to 12', silty sand to 11'. Port
 seal 11-8'. Grout to surface

POOL

ENVIRONMENTAL DRILLING, INC.

ROSWELL, NEW MEXICO

FIGURE NO.

Piezometer

Elevations: 1 3374.21 2 3374.10
(feet MSL) 3 4 3371.3

Coordinates: X _____ Y _____

Type of Casing: ☒ PVC Sched. 40 Flush Thread
☐ Stainless Steel ☐ _____

Casing Diameter: ☒ 2" ☐ 3" ☐ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: CSSI 16-40

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry
☒ 1/4" Pellets ☐ _____

Grout Type: Portland Weight: _____

Bore Hole Diameter: 8"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: _____ Pool Drlg _____

Logged By: Sonny Pool

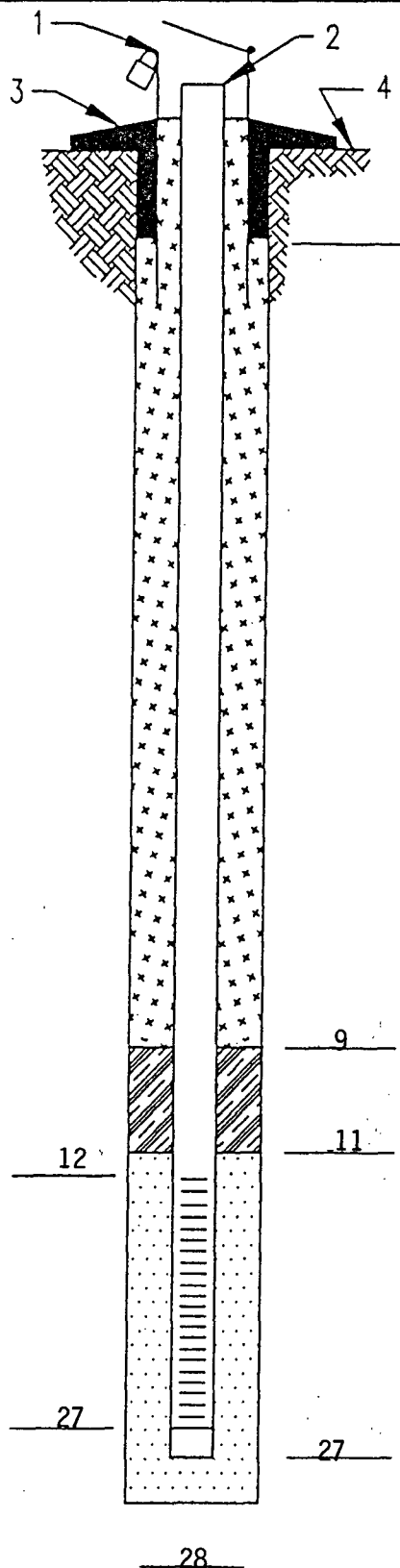
Completion Date: 12/21/94

Date	D-T-W	MSL	Date	Field pH	Field EC

Comments: Concrete with 5% bentonite used to grout
from seal to surface.



Project: 622092001-237 (1A)
Location: ARTESIA, NEW MEXICO



Depths in Feet
from Ground Surface
(Not to Scale)

Monitor Well / Boring Log

Monitor Well
Details

Monitor Well Set? ☒ YES ☐ NO

DEPTH, FT.	SYMBOL(USCS)	SAMPLE DESCRIPTION	SPT BLOWS	SAMPLE NO.	SAMPLING TOOL	MOISTURE	CONTAMINATION		DEPTH, FT.	STRATIGRAPHY	WATER LEVEL
							ORGANIC VAPOR CONC. (PPM)	VISIBLE Y= YES N= NO			
0-11		Brown Silty clay.							0-11		
11-17		Lt. Tan Caliche							11-17		
17-23		H tan clay (Damp).							17-23		
23-31		Silty clay w/ gravel - no color. (moist.)							23-31		
WLC 21											

Client: _____ Job No.: _____ Date Drilled: 12-20-94 Well No.: 2nd
 Size: _____ Top of Casing Elevation: _____
 Comments: _____
 Driller: _____ Logged By: _____

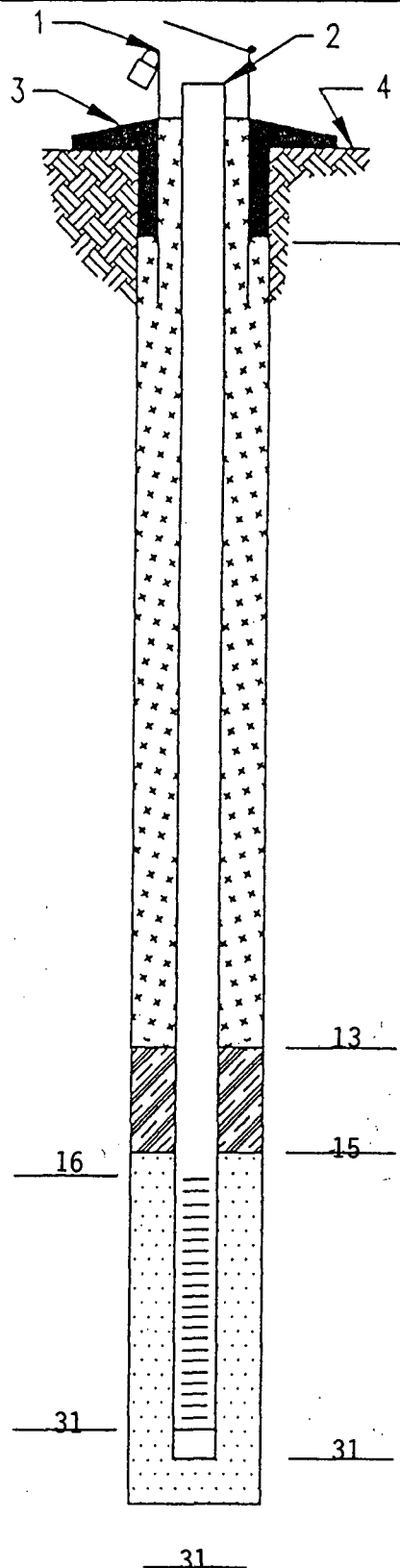
REMARKS: MW set w/ 15' 1010" screen
 from 31' - 16'. Sent to 15'. Bore
 soil 15' - 13'. brought to surface.
 WLC 21'

POOL
 ENVIRONMENTAL DRILLING, INC.
 ROSWELL, NEW MEXICO

FIGURE NO.

Monitoring Well 51
Piezometer

Design Specifications



Elevations: 1 3376.31 2 3376.31
(feet MSL) 3 4 3373.60

Coordinates: X Y

Type of Casing: ☒ PVC Sched. 40 Flush Thread
☐ Stainless Steel ☐

Casing Diameter: ☒ 2" ☐ 3" ☐ 4" ☐ 6" ☐

Screen Slot: ☐ 0.008 ☒ 0.010 ☐

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐

Sand Pack: CSSL 16-40

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry
☒ 1/4" Pellets ☐

Grout Type: Portland Weight:

Bore Hole Diameter: 8"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐

Drilled By: Pool Drlg.

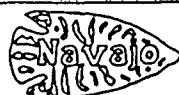
Logged By: Sonny Pool

Completion Date: 121/20/94

Date	D-T-W	MSL	Date	Field pH	Field EC

Comments: Concrete with 5% bentonite used to grout
from seal to surface.

Depths in Feet
from Ground Surface
(Not to Scale)



Project: 622092001-237 (1A)
Location: ARTESIA, NEW MEXICO

52 Monitor Well / Boring Log

Monitor Well
Details

Monitor Well Set? YES NO

DEPTH, FT.	SYMBOL (USCS)	SAMPLE DESCRIPTION	SPT BLOWS	SAMPLE NO.	SAMPLING TOOL	MOISTURE	CONTAMINATION		DEPTH, FT.	STRATIGRAPHY	WATER LEVEL
							ORGANIC VAPOR CONC. (PPM)	VISIBLE Y=YES N=NO			
0-3'		Ben Top sand Dry							0-5'		
3-14'		Dark Ben Silty Clay - moist.							5-10'		
14-25'		Tan Silty clay H ₂ O @ 2i.							10-15'		
25-34'		Tan Silty clay w/ small gravel from 26-29, TO 34'.							15-20'		
									20-25'		
									25-30'		
									30-35'		
									35-40'		
									40-45'		
									45-50'		
									50-55'		
									55-60'		

2" I.D. PVC .010" SLOTTED SCREEN FROM 34-19' 6" BOTTOM SUMP. BLANK CAS-ING TO SURFACE.

FILTER PACK w/ 10/20 SILICA SAND, 19' to 34'.

BENT. SEAL 19' - 13' CEMENT GROUT TO SURF.

8" FLUSH MOUNT WELL COVER.

LOG # P493. SAME AS OTHERS.

Client: NITVITV Job No.: ML ACCESS Date Drilled: 1-14-95 Well No.: _____

Size: 2" STREET Top of Casing Elevation: _____

Comments: _____

Driller: POOL Logged By: FEPTU

D. MOORE

REMARKS: _____

POOL

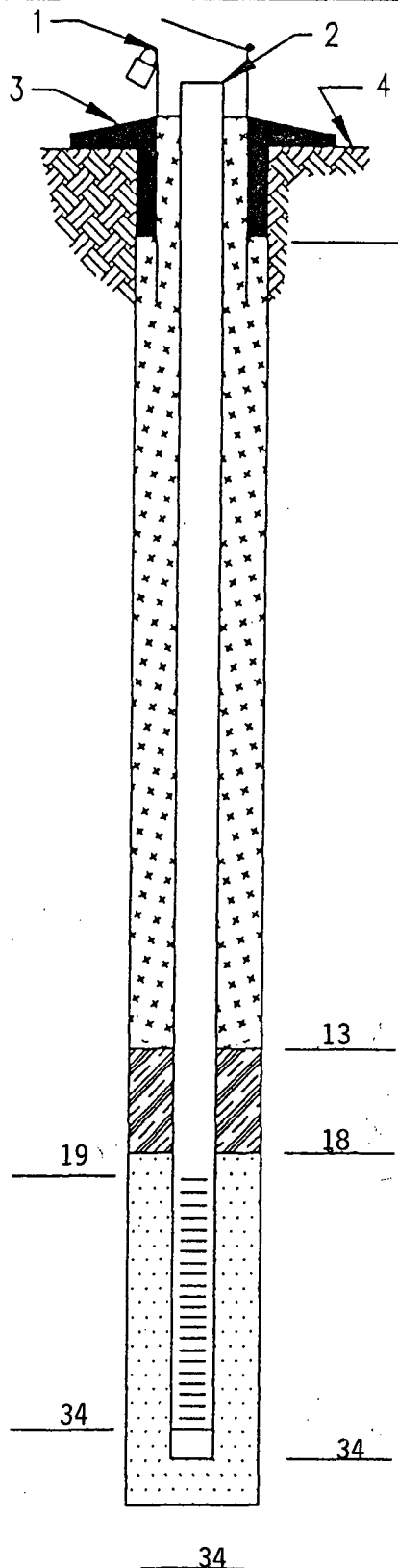
ENVIRONMENTAL DRILLING, INC.

ROSWELL, NEW MEXICO

FIGURE NO.

Monitoring Well 52
Piezometer

Design Specifications



Elevations: 1 3371.67 2 3371.49
(feet MSL) 3 4 3371.70

Coordinates: X Y

Type of Casing: ☒ PVC Sched. 40 Flush Thread
☐ Stainless Steel ☐

Casing Diameter: ☒ 2" ☐ 3" ☐ 4" ☐ 6" ☐

Screen Slot: ☐ 0.008 ☒ 0.010 ☐

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐

Sand Pack: CSSL 16-40

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry
☒ 1/4" Pellets ☐

Grout Type: Portland Weight:

Bore Hole Diameter: 8"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐

Drilled By: Pool Drlg.

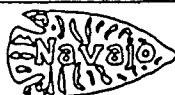
Logged By: Sonny Pool

Completion Date: 1/14/95

Date	D-T-W	MSL	Date	Field pH	Field EC

Comments: Concrete with 5% bentonite used to grout
from seal to surface.

Depths in Feet
from Ground Surface
(Not to Scale)



Project: 622092001-237 (1A)
Location: ARTESIA, NEW MEXICO

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

PAGE 1 of 2

January 28, 1995

Receiving Date: 01/18/95

Sample Type: Water

Project No: NA

Project Location: Artesia, NM

Analysis Date: 01/18/95

Sampling Date: 01/17/95

Sample Condition: Intact & Cool

Sample Received by: YL

Project Name: NA

EPA 8240 Compounds (ppb)	Detection Limit	T31112 MW 52	QC	%P	%EA	%IA
Dichlorodifluoromethane	1	ND				
Chloromethane	1	ND				
Vinyl chloride	2	ND	52.8			106
Bromomethane	1	ND				
Chloroethane	1	ND				
Trichlorofluoromethane	1	ND				
1,1-Dichloroethene	2	ND	51.1	100	109	102
Iodomethane	1	ND				
Carbon disulfide	1	ND				
Methylene chloride	1	ND				
trans-1,2-Dichloroethene	1	ND				
1,1-Dichloroethane	1	ND				
Vinyl acetate	1	ND				
2-Butanone	2	ND				
Chloroform	1	ND	48.5			97
1,1,1-Trichloroethane	1	ND				
1,2-Dichloroethane	2	ND				
Benzene	1	ND		100	102	
Carbon Tetrachloride	10	ND				
1,2-Dichloropropane	2	ND	49.0			98
Trichloroethene	2	ND		101	100	
Bromodichloromethane	1	ND				
cis-1,3-Dichloropropene	2	ND				
4-Methyl-2-pentanone	10	ND				
trans-1,3-Dichloropropene	2	ND		100	94	
Toluene	1	ND	48.1			96
1,1,2-Trichloroethane	1	ND				
2-Hexanone	10	ND				

TRACE ANALYSIS, INC.

A Laboratory for Advanced Environmental Research and Analysis

NAVAJO REFINING CO.

Project Location: Artesia, NM

PAGE 2 of 2

EPA 8240 Compounds (ppb)	Detection Limit	T31112 MW 52	QC	%P	%EA	%IA
Dibromochloromethane	1	ND				
Tetrachloroethene	2	ND				
Chlorobenzene	1	ND		99	98	
Ethylbenzene	1	ND	47.8			96
m & p-Xylene	1	ND				
Bromoform	1	ND				
Styrene	1	ND				
o-Xylene	1	ND				
1,1,2,2-Tetrachloroethane	1	ND				
trans 1,4-Dichloro-2-butene	5	ND				
cis 1,4-Dichloro-2-butene	5	ND				
1,4-Dichlorobenzene	2	ND				
1,3-Dichlorobenzene	2	ND				
1,2-Dichlorobenzene	2	ND				

SURROGATES

% RECOVERY

Dibromofluoromethane	107
Toluene-d8	104
4-Bromofluorobenzene	87

*ND = Not Detected

METHODS: EPA 8240.

BB

1-28-95

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

January 28, 1995
Receiving Date: 01/18/95
Sample Type: Water
Sample Condition: I & C
Sample Received by: YL
Analysis Date: 01/19/95

PAH's

T31112

EPA 8270 (ppm)	DL	MW 52	QC	%P	%EA	%IA
Naphthalene	0.001	ND	0.449			90
Acenaphthylene	0.001	ND	0.446			89
Acenaphthene	0.001	ND	0.436	103	103	87
Fluorene	0.001	ND	0.474			95
Phenanthrene	0.001	ND	0.532			106
Anthracene	0.001	ND	0.494			99
Fluoranthene	0.001	ND	0.491			98
Pyrene	0.001	ND	0.498	102	128	100
Benz[a]anthracene	0.001	ND	0.415			83
Chrysene	0.001	ND	0.416			83
Benzo[b]fluoranthene	0.001	ND	0.415			83
Benzo[k]fluoranthene	0.001	ND	0.384			77
Benzo[a]pyrene	0.001	ND	0.487			97
Indeno[1,2,3-cd]pyrene	0.001	ND	0.313			63
Dibenz[a,h]anthracene	0.001	ND	0.403			81
Benzo[g,h,i]perylene	0.001	ND	0.372			74

*ND = Not Detected

SURROGATES

% RECOVERY

2-Fluorophenol	86
Phenol-d5	78
Nitrobenzene-d5	72
2-Fluorobiphenyl	86
2,4,6-Tribromophenol	79
Terphenyl-d14	127

METHODS: EPA 8270.



Director, Dr. Blair Leftwich

Director, Dr. Bruce McDonell

1-28-95

DATE


TRACE ANALYSIS, INC.

A Laboratory for Advanced Environmental Research and Analysis

TRACE ANALYSIS, INC.

6701 Aberdeen Avenue

Lubbock, Texas 79424

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ANALYTICAL RESULTS FOR

NAVAJO REFINING

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

Analysis Date: 01/26/95

January 28, 1995

Receiving Date: 01/18/95

Sample Type: Water

Sample Condition: Intact & Cool

Project No: NA

Sample Received by: YL

Project Location: Artesia, NM

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)
T31112	MW 52	<0.1	<0.05	0.03	0.15	<0.01	<0.05	<0.05	4.86	0.2	<0.05	<0.05
QC	Quality Control	5.1	4.84	5.54	5.14	4.46	5.62	4.77	4.69	4.6	4.70	5.48
DETECTION LIMIT												
% Precision		100	100	102	102	102	101	101	101	104	101	1,000
% Extraction Accuracy		93	88	99	96	79	109	90	85	78	86	110
% Instrument Accuracy		102	97	111	103	89	112	95	94	92	94	110

	Al (ppm)	B (ppm)	Co (ppm)	Ba (ppm)	U (ppm)	Hg (ppm)	Se (ppm)	Pb (ppm)	Ag (ppm)
T31112	11.2	1.09	<0.05	<0.5	<0.5	<0.001	<0.001	<0.001	<0.001
QC	5.18	4.96	4.74	5.0	9.8	0.022	0.048	0.046	0.106
DETECTION LIMIT									
	0.08	0.05	0.05	0.05	0.5	0.001	0.001	0.001	0.001
% Precision	101	100	100	102	101	100	90	100	103
% Extraction Accuracy	104	98	91	100	99	100	84	112	128
% Instrument Accuracy	104	99	95	100	100	100	96	93	106

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.

RB

1-28-95

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

Attention: Darrell Moore

501 E. Main

Artesia, NM 88210

January 28, 1995

Receiving Date: 01/18/95

Sample Type: Water

Project No: NA

Project Location: Artesia, NM

Analysis Date: 01/18/95

Sampling Date: 01/17/95

Sample Condition: Intact & Cool

Sample Received by: YL

Project Name: RO Reject

ALKALINITY

(mg/L as CaCO₃)

SULFATE
(mg/L)

FLUORIDE
(mg/L)

CHLORIDE
(mg/L)

TA# FIELD CODE

T31112 MW 52

QC Quality Control

646

2,187

2.0

396

20

1.0

494

% Precision

% Extraction Accuracy

% Instrument Accuracy

100

102

100

100

106

104

101

99

103

99

DETECTION LIMIT

10

1

0.1

1

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.

BS

Director, Dr. Blair Leftwich

Director, Dr. Bruce McDonnell

Date

1-28-95

TRACE ANALYSIS, INC.

6701 Aberdeen Avenue

Lubbock, Texas 79424

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ANALYTICAL RESULTS FOR

NAVAJO REFINING

Attention: Darrell Moore

501 E. Main

Artesia, NM 88210

January 30, 1995

Receiving Date: 01/18/95

Sample Type: Water

Project No: NA

Project Location: Artesia, NM

Analysis Date: 01/26/95

Sampling Date: 01/17/95

Sample Condition: Intact & Cool

Sample Received by: YL

Project Name: RO Reject

TA#	Field Code	POTASSIUM (mg/L)	MAGNESIUM (mg/L)	CALCIUM (mg/L)	SODIUM (mg/L)
-----	------------	---------------------	---------------------	-------------------	------------------

T31112	MW 52	<0.1	395	443	384
QC	Quality Control	46.0	21.4	20.5	18.1

Detection Limit

0.1 0.1 0.05 0.1

% Precision

% Extraction Accuracy

% Instrument Accuracy

102	98	96	100
115	94	87	84
92	107	102	90

METHODS: EPA 200.7.

QC: Blank Spiked with 50.0 mg/L POTASSIUM; 20.0 mg/L MAGNESIUM, CALCIUM, SODIUM.

BS

Director, Dr. Blair Leftwich
Director, Dr. Bruce McDonnell

1-30-95

Date

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ANALYTICAL RESULTS FOR

NAVAJO REFINING

Attention: Darrell Moore

501 E. Main

Artesia, NM 88210

January 13, 1995

Receiving Date: 12/31/94

Sample Type: Water

Project No: NA

Project Location: Artesia, NM

Analysis Date: 01/05, 10/95

Sampling Date: 12/30/94

Sample Condition: Intact & Cool

Sample Received by: BL

Project Name: NA

ALKALINITY
(mg/L as CaCO3)
HCO3 C03

SULFATE
(mg/L)

FLUORIDE
(mg/L)

CHLORIDE
(mg/L)

785	853	0
491	692	0
612	450	0
,821	450	0
10	---	---

480	713	38	342	499
-----	-----	----	-----	-----

T30549	MW 48
T30550	MW 49
T30551	MW 50
T30552	MW 51
OC	Qualit

98	100	100
98	---	---
97	---	---

97 100 100

100 106 100

	% Precision	% Extraction	Accuracy
Instrument	99.99	99.99	99.99

$$\begin{array}{ccccccc} 1 & & & & & & 10 \\ & 1 & & & & & 10 \\ & & 1 & & & & 10 \\ & & & 1 & & & 10 \\ & & & & 1 & & 10 \\ & & & & & 1 & 10 \\ & & & & & & 10 \end{array}$$

0.1

1

DETECTION LIMIT

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 McDonnell

Date _____

1-13-95

TRACE ANALYSIS, INC.

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ANALYTICAL RESULTS FOR

NAVAJO REFINING

Attention: Darrell Moore

501 E. Main

Artesia, NM 88210

Analysis Date: 01/12/95

Sampling Date: 12/30/94

Sample Condition: Intact & Cool

Sample Received by: BL

Project Name: NA

January 13, 1995

Receiving Date: 12/31/94

Sample Type: Water

Project No: NA

Project Location: Artesia, NM

TA#	Field Code	POTASSIUM (mg/L)	MAGNESIUM (mg/L)	CALCIUM (mg/L)	SODIUM (mg/L)
T30549	MW 48	<0.1	254	187	453
T30550	MW 49	<0.1	269	216	402
T30551	MW 50	<0.1	772	146	105
T30552	MW 51	<0.1	448	256	315
QC	Quality Control	51.6	20.0	20.2	21.0

Detection Limit

0.1 0.1 0.05 0.1

% Precision

% Extraction Accuracy

% Instrument Accuracy

100 98 99
91 98 101
103 100 105

METHODS: EPA 200.7.

QC: Blank Spiked with 50.0 mg/L POTASSIUM; 20.0 mg/L MAGNESIUM, CALCIUM, SODIUM.

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

Date

1-13-95

TRACE ANALYSIS, INC.

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ANALYTICAL RESULTS FOR

NAVAJO REFINING

Attention: Darrell Moore

501 E. Main

Artesia, NM 88210

Analysis Date: 01/12/95

Sampling Date: 12/30/94

Sample Condition: Intact & Cool

Sample Received by: BL

Project Name: NA

January 13, 1995

Receiving Date: 12/31/94

Sample Type: Water

Project No: NA

Project Location: Artesia, NM

TOTAL METALS

TA#	FIELD CODE	As (ppm)	Mo (ppm)	Cr (ppm)	Zn (ppm)	Cd (ppm)	Ni (ppm)	Be (ppm)	Fe (ppm)	Co (ppm)	Mn (ppm)	V (ppm)
T30549	MW 48	0.2	0.06	0.01	0.17	<0.01	<0.05	<0.01	0.11	<0.05	2.7	<0.05
T30550	MW 49	0.1	<0.05	0.03	0.01	0.01	<0.05	<0.01	0.12	<0.05	0.4	<0.05
T30551	MW 50	0.1	0.07	0.03	0.01	<0.01	<0.05	<0.01	0.66	<0.05	1.6	<0.05
T30552	MW 51	0.1	<0.05	0.02	0.08	0.02	<0.05	<0.01	0.09	<0.05	0.3	<0.05
QC	Quality Control	4.9	5.12	5.16	5.08	5.07	5.10	5.01	5.02	5.06	5.1	5.08
DETECTION LIMIT												
% Precision		0.1	0.05	0.01	0.01	0.01	0.05	0.01	0.01	0.05	0.1	0.05
% Extraction Accuracy		106	104	104	103	102	102	102	100	102	101	102
% Instrument Accuracy		91	92	92	95	94	95	97	94	95	96	98
		98	102	103	102	101	102	100	100	101	102	102

	Cu (ppm)	Al (ppm)	B (ppm)	Ba (ppm)	U (ppm)	Hg (ppm)	Se (ppm)	Pb (ppm)	Ag (ppm)
T30549	MW 48	<0.05	<0.08	0.71	<0.5	<0.001	<0.001	<0.001	<0.001
T30550	MW 49	<0.05	<0.08	0.64	<0.5	<0.001	<0.001	<0.001	<0.001
T30551	MW 50	<0.05	<0.08	0.22	<0.5	<0.001	<0.001	<0.001	<0.001
T30552	MW 51	<0.05	<0.08	0.53	<0.5	<0.001	<0.001	<0.001	<0.001
QC	Quality Control	5.15	4.38	4.44	4.6	9.3	0.022	0.046	0.048
DETECTION LIMIT									
% Precision		0.08	0.05	0.5	0.5	0.001	0.001	0.001	0.001
% Extraction Accuracy		100	107	109	102	100	96	100	101
% Instrument Accuracy		96	75	88	93	100	108	112	104
		103	88	89	92	100	92	96	98

METHODS: EPA 200.7, 239.2, 270.2, 272.2.

QC: Blank Spiked with 5.0 ppm As, Mn, Ba; 5.00 ppm Mo, Cr, Zn, Cd, Ni, Be, Fe, Co, V, Cu, Al, B; 9.8 ppm U; 0.022 ppm Hg; 0.050 ppm Se, Pb; 0.100 ppm Ag.

BS

1-13-95

Director, Dr. Blair Leftwich

Director, Dr. Bruce McDonell

DATE

6701 Aberdeen Avenue

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

PAGE 1 of 2

January 13, 1995

Receiving Date: 12/31/94

Sample Type: Water

Project No: NA

Project Location: Artesia, NM

Analysis Date: 01/06/95

Sampling Date: 12/30/94

Sample Condition: I & C

Sample Received by: BL

Project Name: NA

EPA 8240 Compounds (ppb)	T30552 MW 51	Detection Limit
Dichlorodifluoromethane	ND	1
Chloromethane	ND	1
Vinyl chloride	ND	2
Bromomethane	ND	1
Chloroethane	ND	1
Trichlorofluoromethane	ND	1
1,1-Dichloroethene	ND	2
Iodomethane	ND	1
Carbon disulfide	ND	1
Methylene chloride	ND	1
trans-1,2-Dichloroethene	ND	1
1,1-Dichloroethane	ND	1
Vinyl acetate	ND	1
2-Butanone	ND	20
Chloroform	ND	1
1,1,1-Trichloroethane	ND	1
1,2-Dichloroethane	2	2
Benzene	1	1
Carbon Tetrachloride	ND	10
1,2-Dichloropropane	ND	2
Trichloroethene	ND	2
Bromodichloromethane	ND	1
cis-1,3-Dichloropropene	ND	2
4-Methyl-2-pentanone	ND	10
trans-1,3-Dichloropropene	ND	2
Toluene	1	1
1,1,2-Trichloroethane	ND	1
2-Hexanone	ND	10

TRACE ANALYSIS, INC.

A Laboratory for Advanced Environmental Research and Analysis

NAVAJO REFINING COMPANY
Project Location: Artesia, NM

PAGE 2 of 2

EPA 8240 Compounds (ppb)	T30552 MW 51	Detection Limit
Dibromochloromethane	ND	1
Tetrachloroethene	ND	2
Chlorobenzene	ND	1
Ethylbenzene	1	1
m & p-Xylene	ND	1
Bromoform	ND	1
Styrene	ND	1
o-Xylene	ND	1
1,1,2,2-Tetrachloroethane	ND	1
1,4-Dichloro-2-butene	ND	5
1,4-Dichlorobenzene	ND	2
1,3-Dichlorobenzene	ND	2
1,2-Dichlorobenzene	ND	2

SURROGATES

% RECOVERY

1,2-Dichloroethane-d4	111
Toluene-d8	98
4-Bromofluorobenzene	89

*ND = Not Detected

METHODS: EPA SW 846-8240.



Director, Dr. Blair Leftwich
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1-13-95

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

PAGE 1 of 2

January 13, 1995

Receiving Date: 12/31/94

Sample Type: Water

Project No: NA

Project Location: Artesia, NM

Analysis Date: 01/06/95

Sampling Date: 12/30/94

Sample Condition: I & C

Sample Received by: BL

Project Name: NA

EPA 8240 Compounds (ppb)	T30551 MW 50	Detection Limit
Dichlorodifluoromethane	ND	1,000
Chloromethane	ND	100
Vinyl chloride	ND	2,000
Bromomethane	ND	1,000
Chloroethane	ND	1,000
Trichlorofluoromethane	ND	1,000
1,1-Dichloroethene	ND	2,000
Iodomethane	ND	1,000
Carbon disulfide	ND	1,000
Methylene chloride	ND	1,000
trans-1,2-Dichloroethene	ND	1,000
1,1-Dichloroethane	ND	1,000
Vinyl acetate	ND	1,000
2-Butanone	ND	20,000
Chloroform	ND	1,000
1,1,1-Trichloroethane	ND	1,000
1,2-Dichloroethane	ND	2,000
Benzene	ND	1,000
Carbon Tetrachloride	ND	10,000
1,2-Dichloropropane	ND	2,000
Trichloroethene	ND	2,000
Bromodichloromethane	ND	1,000
cis-1,3-Dichloropropene	ND	2,000
4-Methyl-2-pentanone	ND	10,000
trans-1,3-Dichloropropene	ND	2,000
Toluene	ND	1,000
1,1,2-Trichloroethane	ND	1,000
2-Hexanone	ND	10,000

TRACE ANALYSIS, INC.

A Laboratory for Advanced Environmental Research and Analysis

NAVAJO REFINING COMPANY

PAGE 2 of 2

Project Location: Artesia, NM

EPA 8240 Compounds (ppb)	T30551 MW 50	Detection Limit
Dibromochloromethane	ND	1,000
Tetrachloroethene	ND	2,000
Chlorobenzene	ND	1,000
Ethylbenzene	ND	1,000
m & p-Xylene	ND	1,000
Bromoform	ND	1,000
Styrene	ND	1,000
o-Xylene	ND	1,000
1,1,2,2-Tetrachloroethane	ND	1,000
1,4-Dichloro-2-butene	ND	5,000
1,4-Dichlorobenzene	ND	2,000
1,3-Dichlorobenzene	ND	2,000
1,2-Dichlorobenzene	ND	2,000

SURROGATES

% RECOVERY

1,2-Dichloroethane-d4	90
Toluene-d8	98
4-Bromofluorobenzene	94

*ND = Not Detected

METHODS: EPA SW 846-8240.



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

1-13-95

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

PAGE 1 of 2

January 13, 1995
Receiving Date: 12/31/94
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Analysis Date: 01/06/95
Sampling Date: 12/30/94
Sample Condition: I & C
Sample Received by: BL
Project Name: NA

EPA 8240 Compounds (ppb)	T30550 MW 49	Detection Limit
Dichlorodifluoromethane	ND	500
Chloromethane	ND	500
Vinyl chloride	ND	1,000
Bromomethane	ND	500
Chloroethane	ND	500
Trichlorofluoromethane	ND	500
1,1-Dichloroethene	ND	1,000
Iodomethane	ND	500
Carbon disulfide	ND	500
Methylene chloride	ND	500
trans-1,2-Dichloroethene	ND	500
1,1-Dichloroethane	ND	500
Vinyl acetate	ND	500
2-Butanone	ND	10,000
Chloroform	ND	500
1,1,1-Trichloroethane	ND	500
1,2-Dichloroethane	ND	1,000
Benzene	6,590	500
Carbon Tetrachloride	ND	5,000
1,2-Dichloropropane	ND	1,000
Trichloroethene	ND	1,000
Bromodichloromethane	ND	500
cis-1,3-Dichloropropene	ND	1,000
4-Methyl-2-pentanone	ND	5,000
trans-1,3-Dichloropropene	ND	1,000
Toluene	674	500
1,1,2-Trichloroethane	ND	500
2-Hexanone	ND	5,000

TRACE ANALYSIS, INC.

A Laboratory for Advanced Environmental Research and Analysis

NAVAJO REFINING COMPANY

PAGE 2 of 2

Project Location: Artesia, NM

EPA 8240 Compounds (ppb)	T30550 MW 49	Detection Limit
Dibromochloromethane	ND	500
Tetrachloroethene	ND	1,000
Chlorobenzene	ND	500
Ethylbenzene	690	500
m & p-Xylene	909	500
Bromoform	ND	500
Styrene	ND	500
o-Xylene	ND	500
1,1,2,2-Tetrachloroethane	ND	500
1,4-Dichloro-2-butene	ND	2,500
1,4-Dichlorobenzene	ND	1,000
1,3-Dichlorobenzene	ND	1,000
1,2-Dichlorobenzene	ND	1,000

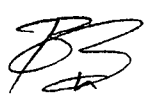
SURROGATES

% RECOVERY

1,2-Dichloroethane-d4	110
Toluene-d8	100
4-Bromofluorobenzene	89

*ND = Not Detected

METHODS: EPA SW 846-8240.



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

1-13-95

Date

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

PAGE 1 of 2

January 13, 1995
Receiving Date: 12/31/94
Sample Type: Water
Project No: NA
Project Location: Artesia, NM

Analysis Date: 01/06/95
Sampling Date: 12/30/94
Sample Condition: I & C
Sample Received by: BL
Project Name: NA

EPA 8240 Compounds (ppb)	T30549 MW 48	Detection Limit
Dichlorodifluoromethane	ND	1
Chloromethane	ND	1
Vinyl chloride	ND	2
Bromomethane	ND	1
Chloroethane	ND	1
Trichlorofluoromethane	ND	1
1,1-Dichloroethene	ND	2
Iodomethane	ND	1
Carbon disulfide	ND	1
Methylene chloride	ND	1
trans-1,2-Dichloroethene	ND	1
1,1-Dichloroethane	ND	1
Vinyl acetate	ND	1
2-Butanone	ND	20
Chloroform	ND	1
1,1,1-Trichloroethane	ND	1
1,2-Dichloroethane	37	2
Benzene	110	1
Carbon Tetrachloride	ND	10
1,2-Dichloropropane	ND	2
Trichloroethene	ND	2
Bromodichloromethane	ND	1
cis-1,3-Dichloropropene	ND	2
4-Methyl-2-pentanone	ND	10
trans-1,3-Dichloropropene	ND	2
Toluene	7	1
1,1,2-Trichloroethane	ND	1
2-Hexanone	ND	10

TRACE ANALYSIS, INC.

A Laboratory for Advanced Environmental Research and Analysis

NAVAJO REFINING COMPANY

Project Location: Artesia, NM

PAGE 2 of 2

EPA 8240 Compounds (ppb)	T30549 MW 48	Detection Limit
Dibromochloromethane	ND	1
Tetrachloroethene	ND	2
Chlorobenzene	ND	1
Ethylbenzene	1	1
m & p-Xylene	3	1
Bromoform	ND	1
Styrene	ND	1
o-Xylene	11	1
1,1,2,2-Tetrachloroethane	ND	1
1,4-Dichloro-2-butene	ND	5
1,4-Dichlorobenzene	ND	2
1,3-Dichlorobenzene	ND	2
1,2-Dichlorobenzene	ND	2

SURROGATES

% RECOVERY

1,2-Dichloroethane-d4	101
Toluene-d8	102
4-Bromofluorobenzene	110

*ND = Not Detected

METHODS: EPA SW 846-8240.



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

1-13-95

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

January 13, 1995
Receiving Date: 12/31/94
Sample Type: Water
Sample Condition: I & C
Sample Received by: BL
Project Location: Artesia, NM
Analysis Date: 01/04/95

PAH's

T30552

EPA 8270 (ppm)	DL	MW 51	QC	%P	%EA	%IA
Naphthalene	0.001	ND	0.442			88
Acenaphthylene	0.001	ND	0.460			92
Acenaphthene	0.001	ND	0.449	100	89	90
Fluorene	0.001	ND	0.487			97
Phenanthrene	0.001	ND	0.529			106
Anthracene	0.001	ND	0.486			97
Fluoranthene	0.001	ND	0.500			100
Pyrene	0.001	ND	0.501	100	123	100
Benz[a]anthracene	0.001	ND	0.425			85
Chrysene	0.001	ND	0.436			87
Benzo[b]fluoranthene	0.001	ND	0.396			79
Benzo[k]fluoranthene	0.001	ND	0.425			85
Benzo[a]pyrene	0.001	ND	0.469			94
Indeno[1,2,3-cd]pyrene	0.001	ND	0.368			74
Dibenz[a,h]anthracene	0.001	ND	0.379			76
Benzo[g,h,i]perylene	0.001	ND	0.345			69

*ND = Not Detected

% RECOVERY

2-Fluorophenol SURR	102
Phenol-d5 SURR	116
Nitrobenzene-d5 SURR	103
2-Fluorobiphenyl SURR	104
2,4,6-Tribromophenol SURR	111
Terphenyl-d14 SURR	131

METHODS: EPA 8270.



Director, Dr. Blair Leftwich

Director, Dr. Bruce McDonell

1-13-95

DATE


TRACE ANALYSIS, INC.

A Laboratory for Advanced Environmental Research and Analysis

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

January 13, 1995
Receiving Date: 12/31/94
Sample Type: Water
Sample Condition: I & C
Sample Received by: BL
Project Location: Artesia, NM
Analysis Date: 01/04/95

PAH's

T30551

EPA 8270 (ppm)	DL	MW 50	QC	%P	%EA	%IA
Naphthalene	0.001	0.046	0.442			88
Acenaphthylene	0.001	ND	0.460			92
Acenaphthene	0.001	ND	0.449	100	89	90
Fluorene	0.001	ND	0.487			97
Phenanthrene	0.001	ND	0.529			106
Anthracene	0.001	ND	0.486			97
Fluoranthene	0.001	ND	0.500			100
Pyrene	0.001	ND	0.501	100	123	100
Benz[a]anthracene	0.001	ND	0.425			85
Chrysene	0.001	ND	0.436			87
Benzo[b]fluoranthene	0.001	ND	0.396			79
Benzo[k]fluoranthene	0.001	ND	0.425			85
Benzo[a]pyrene	0.001	ND	0.469			94
Indeno[1,2,3-cd]pyrene	0.001	ND	0.368			74
Dibenz[a,h]anthracene	0.001	ND	0.379			76
Benzo[g,h,i]perylene	0.001	ND	0.345			69

*ND = Not Detected

% RECOVERY

2-Fluorophenol SURR	89
Phenol-d5 SURR	97
Nitrobenzene-d5 SURR	86
2-Fluorobiphenyl SURR	101
2,4,6-Tribromophenol SURR	124
Terphenyl-d14 SURR	133

METHODS: EPA 8270.



Director, Dr. Blair Leftwich

Director, Dr. Bruce McDonell

1-13-95

DATE


TRACE ANALYSIS, INC.

A Laboratory for Advanced Environmental Research and Analysis

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

January 13, 1995
Receiving Date: 12/31/94
Sample Type: Water
Sample Condition: I & C
Sample Received by: BL
Project Location: Artesia, NM
Analysis Date: 01/04/95

PAH's

T30550

EPA 8270 (ppm)	DL	MW 49	QC	%P	%EA	%IA
Naphthalene	0.001	ND	0.442			88
Acenaphthylene	0.001	ND	0.460			92
Acenaphthene	0.001	ND	0.449	100	89	90
Fluorene	0.001	ND	0.487			97
Phenanthrene	0.001	ND	0.529			106
Anthracene	0.001	ND	0.486			97
Fluoranthene	0.001	ND	0.500			100
Pyrene	0.001	ND	0.501	100	123	100
Benz[a]anthracene	0.001	ND	0.425			85
Chrysene	0.001	ND	0.436			87
Benzo[b]fluoranthene	0.001	ND	0.396			79
Benzo[k]fluoranthene	0.001	ND	0.425			85
Benzo[a]pyrene	0.001	ND	0.469			94
Indeno[1,2,3-cd]pyrene	0.001	ND	0.368			74
Dibenz[a,h]anthracene	0.001	ND	0.379			76
Benzo[g,h,i]perylene	0.001	ND	0.345			69

*ND = Not Detected

% RECOVERY

2-Fluorophenol SURR	100
Phenol-d5 SURR	112
Nitrobenzene-d5 SURR	98
2-Fluorobiphenyl SURR	104
2,4,6-Tribromophenol SURR	124
Terphenyl-d14 SURR	134

METHODS: EPA 8270.



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

1-13-95

DATE

TRACE ANALYSIS, INC.

A Laboratory for Advanced Environmental Research and Analysis

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

January 13, 1995
Receiving Date: 12/31/94
Sample Type: Water
Sample Condition: I & C
Sample Received by: BL
Project Location: Artesia, NM
Analysis Date: 01/04/95

PAH's

T30549

EPA 8270 (ppm)	DL	MW 48	QC	%P	%EA	%IA
Naphthalene	0.001	ND	0.442			88
Acenaphthylene	0.001	ND	0.460			92
Acenaphthene	0.001	ND	0.449	100	89	90
Fluorene	0.001	ND	0.487			97
Phenanthrene	0.001	ND	0.529			106
Anthracene	0.001	ND	0.486			97
Fluoranthene	0.001	ND	0.500			100
Pyrene	0.001	ND	0.501	100	123	100
Benz[a]anthracene	0.001	ND	0.425			85
Chrysene	0.001	ND	0.436			87
Benzo[b]fluoranthene	0.001	ND	0.396			79
Benzo[k]fluoranthene	0.001	ND	0.425			85
Benzo[a]pyrene	0.001	ND	0.469			94
Indeno[1,2,3-cd]pyrene	0.001	ND	0.368			74
Dibenz[a,h]anthracene	0.001	ND	0.379			76
Benzo[g,h,i]perylene	0.001	ND	0.345			69

*ND = Not Detected

% RECOVERY

2-Fluorophenol SURR	79
Phenol-d5 SURR	105
Nitrobenzene-d5 SURR	99
2-Fluorobiphenyl SURR	106
2,4,6-Tribromophenol SURR	91
Terphenyl-d14 SURR	138

METHODS: EPA 8270.



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

1-13-95

DATE


TRACE ANALYSIS, INC.

A Laboratory for Advanced Environmental Research and Analysis

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 #: 505-748-9877															
Company Name & Address: Navajo Refining Co.																	
Project #:																	
Project Location: Artesia NM																	
Sampler Signature: Darrell Moore																	
LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX						PRESERVATIVE METHOD				SAMPLING		REMARKS	
				WATER	SOIL	AIR	SLUDGE	OTHER	HCL	HNO3	ICE	NONE	OTHER	DATE	TIME		
50549	MW 48	5	X							X	X	X	X	X	12/30/94	11:40	
50	MW 49	"	"							"	"	"	"	"	"	12:15	
51	MW 50	"	"							"	"	"	"	"	"	13:00	
52	MW 51	"	"							"	"	"	"	"	"	13:30	
53	Alky Cooling Tower (Inlet Outlet)	4	"										X	X	"	13:30	
55	RO Reject Bi-weekly	2	"							X	X	X	X	X	"	14:00	
Relinquished by: Darrell Moore		Date: 12/30/94	Times: 16, 30	Received by:	REMARKS												
Relinquished by:		Date:	Times:	Received by:													
Relinquished by:		Date: 12-31-94	Times:	Received by Laboratory: FIC													

Type Well ☒ MW ☐ Production ☐ Other _____		Type of Data ☒ Development ☐ Sampling ☐ Pump Test ☐ Other _____		Well No. 48 Sheet 1 of 1 Sheets	
1. Project NAVAJO REFINING Co.		2. Project Location Artesia, NM		3. Date 12/28/94	
4. Technician CM BALNHILL		Control Box Set @ 226 Hz SET REEF 102 025'			
7. Method ☒ Pumping ☒ Surging ☐ Air Lift ☐ Bailing ☐ Other		8. Manufacturer's Designation of Rig DSR-1000		9. Location of Well (Site, Description) #48	

Water Levels		
Initial	Final	Final + 24 Hours
Date: 12/28/94 Time: 2:00 PM	Date: 12/28/94 Time: 3:30 PM	Date: _____ Time: _____
10. Total Depth of Well (from TOC) 33.6'	15. Total Depth of Well (from TOC) 33.6'	20. Total Depth of Well (from TOC)
11. Water Level (from TOC) 19.15'	16. Water Level (from TOC) 19.35'	21. Water Level (from TOC)

12. Water Column Height 14.45'	Nom Dia Sch 40 x = gal/ft Sch 80	17. 3 Well Volumes 7.55 GAL	22. Size and Type of Pump or Bailer
13. Well Diameter 2" Sch 40 PVC	2" 0.1743 0.1534 4" 0.6613 0.5972 6" 1.5007 1.3540 8" 2.5856 2.3720	18. 5 Well Volumes 12.59 GAL	1.3" PVC BAILER GRUNDFOS REEF 102 1.3" PUMP
14. Well Volume (gal) (s) w.e. height) 2.59 GAL		19. Purge Volume 55 GAL	

Final Field Analysis			
23. Total Amount of Water Removed 55 GAL	24. Was Well Pumped Dry? Yes ☐ No ☒	25. Was water added to well? No ☒ Yes ☐ If yes, source:	26. Was the Groundwater Sampled Yes ☒ No ☐ If yes, what was the sample number & Date: Sampling Personnel?

27. Final Parameters	Time	Temp °F	Conductivity $\times 1000$	pH	NTUs	WL (from TOC)	Removed	Flow Rate	Photo Roll #, Observations
	3:25 PM	69.0	4.15	6.78	< 2.0	19.35'	55 GAL	26 GPM	Clear H₂O

IF PETROLEUM IS IN THE WELL, DO NOT TAKE pH AND CONDUCTIVITY PARAMETERS

28. Physical Appearance and Remarks SILTY INITIALLY < 1.5 NTU'S AFTER DEVELOPMENT
29. Purgewater disposal method: IN DOT APPROVED 55 GAL DRUM

Sampling / Development Parameters								
Time	Temp °F	Conductivity $\times 1000$ (umhos/cm)	pH	NTUs	WL (from TOC)	Volume (gallons)	Flow Rate (gpm)	Photo #, Observations (1)
2:10 PM	71.9°	3.91	7.06	Silty	19.4'	1st Bail	0.25	Silty Brown w/ string add w/ or Hydrocarbons
2:20 PM	74.5	4.35	6.86	Silty	19.6'	5	0.25	" " "
2:30 PM	69.3	3.87	6.88	Silty	19.5	10	0.25	Silty Brown fine silty
2:48	69.0	3.77	6.91	Silty	19.5	15	0.25	Surged well w/ Bpdr
3:00 PM	started	Grundfos Rodiff 102 @ 13 GPM	19.5	15	16 GPM			Silty Brown
3:10 PM	68.2	4.05	6.67	Silty	19.5'	25	2.6 GPM	Silty Brown
3:20 PM	68.6	4.05	6.59	clearer	19.5	45	2.6 GPM	getting clear
3:25 PM	69.0	4.15	6.78	< 2.0	19.5'	55	2.6 GPM	Clear H₂O

(1) Note volume and physical character of sediments removed.
 NTU = Nephelometric turbidity units
 WL = Water Level from Top of PVC Casing

Checked By Clayton M. Baluh	Date 12/28/94
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WELL DATA FORM

Type Well ☒ MW ☐ Production ☐ Other _____		Type of Data ☐ Development ☒ Sampling ☐ Pump Test ☐ Other _____		Well No. <u>MW 48</u> Sheet 1 of 1 Sheets 1				
1. Project <u>NAVAJO REFINING CO.</u>		2. Project Location <u>ARTESIA, NM</u>		3. Date <u>12/30/94</u>				
4. Technician <u>CM BARNHILL</u>								
7. Method Pumping Surging Air Lift <u>Bailing</u> Other _____		8. Manufacturer's Designation of Rig <u>DSR-1000</u>		9. Location of Well (Site, Description) <u>MW # 48</u>				
Water Levels								
Initial		Final		Final + 24 Hours				
Date: <u>12/30/94</u> Time: <u>11:30 PM</u>		Date: _____ Time: _____		Date: _____ Time: _____				
10. Total Depth of Well (from TOC) <u>33.62'</u>		15. Total Depth of Well (from TOC)		20. Total Depth of Well (from TOC)				
11. Water Level (from TOC) <u>19.15'</u>		16. Water Level (from TOC)		21. Water Level (from TOC)				
12. Water Column Height		Nom Dia x = gal/ft Sch 40 Sch 80		17.3 Well Volumes				
13. Well Diameter <u>2" SCH 40 PVC.</u>		2" 0.1743 0.1534 4" 0.6613 0.5972 6" 1.5007 1.3540 8" 2.5856 2.3720		18.5 Well Volumes				
14. Well Volume (gal) (s) w.e. height)				19. Purge Volume <u>< 2 GAL.</u>				
				22. Size and Type of Pump or <u>Bailer</u> <u>1.8" DISPOSABLE BAILER</u>				
Final Field Analysis								
23. Total Amount of Water Removed <u>< 2 GAL.</u>		24. Was Well Pumped Dry? <u>No</u> Yes _____ No _____		25. Was water added to well? <u>No</u> Yes _____ If yes, source: _____				
				26. Was the Groundwater Sampled <u>Yes</u> No If yes, what was the sample number & Date: <u>CM BARNHILL 11:40 AM 48</u>				
27. Final Parameters Time <u>11:40 AM</u> Temp <u>61.1</u> Conductivity <u>3.13</u> pH <u>6.57</u> NTUs <u>71.5</u> WL <u>19.15</u> Removed <u>> 0.25 GAL</u> Flow Rate <u>—</u>				Photo Roll #, Observations <u>31541 Silty Brown</u>				
IF PETROLEUM IS IN THE WELL, DO NOT TAKE pH AND CONDUCTIVITY PARAMETERS								
28. Physical Appearance and Remarks <u>SLIGHTLY SILTY BROWN - VERY FINE SILT</u>								
29. Purgewater disposal method: <u>IN DOT APPROVED 55 GAL DRUM.</u>								
Sampling / Development Parameters								
Time <u>11:40 AM</u>	Temp <u>61.1</u>	Conductivity (umhos/cm) <u>3.13</u>	pH <u>6.57</u>	NTUs <u>71.5</u>	WL (from TOC) <u>19.15</u>	Volume (gallons) <u>< 2 gal</u>	Flow Rate (gpm) <u>0.25</u>	Photo #, Observations (1) <u>31541 Brown</u>
(1) Note volume and physical character of sediments removed. NTU = Nephelometric turbidity units WL = Water Level from Top of PVC Casing								
Checked By <u>Newton M Barnhill</u>							Date <u>12/30/94</u>	

Type Well ☒ MW ☐ Production ☐ Other _____		Type of Data ☒ Development ☐ Sampling ☐ Pump Test ☐ Other _____		Well No. <u>49</u> Sheet 1 of _____, Sheets/	
1. Project <u>NAVAJO REFINING CO.</u>		2. Project Location <u>ARTESIA, N.M.</u>		3. Date <u>12/29/94</u>	
4. Technician <u>CMBARNHILL</u>		REDI-Flow 2 set @ 25' depth Control Box set @ 230 Hz			
7. Method ☒ Pumping ☒ Surging Air Lift ☒ Bailing Other _____		8. Manufacturer's Designation of Rig <u>DSR-1000</u>		9. Location of Well (Site, Description) <u>WELL # 49</u>	

Water Levels		
Initial	Final	Final + 24 Hours
Date: <u>12/29/94</u> Time: <u>9:05 AM</u>	Date: <u>12/29/94</u> Time: <u>11:00 AM</u>	Date: _____ Time: _____
10. Total Depth of Well (from TOC) <u>33.15'</u>	15. Total Depth of Well (from TOC) <u>33.15'</u>	20. Total Depth of Well (from TOC)
11. Water Level (from TOC) <u>13.06' Product, WATER: 13.07'</u>	16. Water Level (from TOC) <u>13.4'</u>	21. Water Level (from TOC)

12. Water Column Height <u>20.09</u>	Nom Dia <u>Sch 40</u> <u>X = gal/hr</u> Sch 80 <u>2"</u> <u>0.1743</u> 0.1534 4" 0.6613 0.5972 6" 1.5007 1.3540 8" 2.5856 2.3720	17.3 Well Volumes <u>10.50 GAL</u>	22. Size and Type of <u>Pump or Bailer</u>
13. Well Diameter <u>2" SCH 40 PVC</u>		18.5 Well Volumes <u>17.50 GAL</u>	<u>1.8" PVC BAILER</u>
14. Well Volume (gal) (s) w.e. height) <u>3.5 GAL.</u>		19. Purge Volume <u>55 GAL.</u>	<u>1.8" GRUNDOS REDI-Flow 2 Pump</u>

Final Field Analysis			
23. Total Amount of Water Removed <u>55 GAL.</u>	24. Was Well Pumped Dry? Yes ☒ No ☐	25. Was water added to well? <u>No</u> Yes ☐ If yes, source: _____	26. Was the Groundwater Sampled Yes ☒ No ☐ If yes, what was the sample number & Date: _____ Sampling Personnel? _____

27. Final Parameters	Time	Temp $^{\circ}$ F	Conductivity	pH	NTUs	WL	Removed	Flow Rate	Photo Roll #, Observations
	<u>10:38 AM</u>	<u>68.6</u>	<u>4.25</u>	<u>7.38</u>	<u><1.5</u>	<u>13.4'</u>	<u>55 GAL</u>	<u>2.5 GPM</u>	<u>Clear w/ H₂S smell</u>

IF PETROLEUM IS IN THE WELL, DO NOT TAKE pH AND CONDUCTIVITY PARAMETERS

28. Physical Appearance and Remarks <u>SILTY GRAY w/ strong H₂S INITIALLY, CLEAR w/ strong H₂S AFTER DEVELOPMENT</u>
29. Purgewater disposal method: <u>IN DOT APPROVED 55 GAL. DRUM.</u>

Sampling / Development Parameters								
Time	Temp $^{\circ}$ F	Conductivity (umhos/cm @ 25 $^{\circ}$ C)	pH	NTUs	WL (from TOC)	Volume (gallons)	Flow Rate (gpm)	Photo #, Observations (1)
<u>9:15 AM</u>	<u>62.3</u>	<u>3.76</u>	<u>7.30</u>	<u>>5</u>	<u>13.06'</u>	<u>15 GAL</u>	—	<u>GRAY, STRONG ODOR H₂S</u>
<u>9:40 AM</u>	<u>64.1</u>	<u>3.84</u>	<u>7.16</u>	<u>7.5</u>	<u>13.55'</u>	<u>10 GAL</u>	<u>0.40</u>	<u>STRONG H₂S GRAY COLOR</u>
<u>SURGED WELL EVERY 5 GAL. w/ SURGE BLOCK.</u>								
<u>10:00 AM</u>					<u>13.4'</u>	<u>15 GAL</u>	<u>0.40</u>	<u>" " "</u>
<u>10:15 AM</u>	<u>68.8</u>	<u>4.30</u>	<u>15.08</u>	<u>Silty</u>	<u>13.4'</u>	<u>15 GAL</u>	<u>2.5</u>	<u>GRAY STRONG COLOR H₂S</u>
<u>10:30 AM</u>	<u>67.3</u>	<u>4.15</u>	<u>7.03</u>	<u><1.5</u>	<u>13.4'</u>	<u>52.5</u>	<u>2.5</u>	<u>Clear H₂S</u>
<u>10:38 AM</u>	<u>68.6</u>	<u>4.25</u>	<u>7.38</u>	<u><1.5</u>	<u>13.4'</u>	<u>55</u>	<u>2.5</u>	<u>Clear H₂S smell w/ H₂S smell</u>

(1) Note volume and physical character of sediments removed.
 NTU = Nephelometric turbidity units
 WL = Water Level from Top of PVC Casing

Checked By <u>Clyton M Barnhill</u>	Date <u>12/29/94</u>
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Type Well - ☒ MW ☐ Production ☐ Other _____		Type of Data ☒ Development ☐ Sampling ☐ Pump Test ☐ Other _____		Well No. <u>MW #50</u> Sheet 1 of <u>1</u> Sheets	
1. Project <u>NAVAJO REFINING CO.</u>		2. Project Location <u>ARTESIA, NM</u>		3. Date <u>12/29/94</u>	
4. Technician <u>CM BARNHILL</u>		<u>PUMP SFT @ 20'</u> <u>Contr./Box @ 230 Hz</u>			
7. Method <u>Pumping</u> <u>Bailing</u> Air Lift <u>Bailing</u> Other _____		8. Manufacturer's Designation of Rig <u>DSR-1000</u>		9. Location of Well (Site, Description) <u>MW #50</u>	

Water Levels		
Initial	Final	Final + 24 Hours
Date: <u>12/29/94</u> Time: <u>1:15 PM</u>	Date: <u>12/29/94</u> Time: <u>2:40 PM</u>	Date: _____ Time: _____
10. Total Depth of Well (from TOC) <u>27.1'</u>	15. Total Depth of Well (from TOC) <u>27.1'</u>	20. Total Depth of Well (from TOC)
11. Water Level (from TOC) <u>16.58'</u>	16. Water Level (from TOC) <u>16.6'</u>	21. Water Level (from TOC)

12. Water Column Height <u>10.52</u>	Nom Dia <u>Sch 40</u> <u>X = gal/hr</u> Sch 40 Sch 80 <u>2"</u> <u>0.1743</u> 0.1534 4" 0.6613 0.5972 6" 1.5007 1.3540 8" 2.5856 2.3720	17. 3 Well Volumes <u>5.5 GAL</u>	22. Size and Type of <u>Pump or Bailer</u>
13. Well Diameter <u>2" SCH 40 PVC</u>		18. 5 Well Volumes <u>9.168 GAL</u>	<u>1.8" PVC BAILER</u>
14. Well Volume (gal) <u>1.83 gal</u> (s) w.e. height)		19. Purge Volume <u>55 GAL</u>	<u>1.8" Groundfos</u> <u>Redi Floz - Pump</u>

Final Field Analysis			
23. Total Amount of Water Removed <u>55 GAL</u>	24. Was Well Pumped Dry? Yes <u>No</u>	25. Was water added to well? <u>No</u> Yes If yes, source: _____	26. Was the Groundwater Sampled Yes <u>No</u> If yes, what was the sample number & Date: Sampling Personnel?

27. Final Parameters	Time	Temp $^{\circ}$ F	Conductivity	pH	NTUs	WL	Removed	Flow Rate	Photo Roll #, Observations
	<u>2:09 PM</u>	<u>66.1</u>	<u>2.29</u>	<u>8.12</u>	<u>>1.5</u>	<u>16.6</u>	<u>55</u>	<u>3.75</u>	<u>Clear w/ strong H₂S odor</u>
IF PETROLEUM IS IN THE WELL, DO NOT TAKE pH AND CONDUCTIVITY PARAMETERS									
28. Physical Appearance and Remarks <u>SILTY GRAY w/ strong Schem and H₂S odor INITIALLY, clear w/ strong H₂S odor</u>									
29. Purgewater disposal method: <u>IN DOT APPROVED 55 GAL DRUM</u>									

Sampling / Development Parameters								
Time	Temp $^{\circ}$ F	Conductivity (umhos/cm) X1000	pH	NTUs	WL (from TOC)	Volume (gallons)	Flow Rate (gpm)	Photo #, Observations (1)
<u>1:30 PM</u>	<u>70.0</u>	<u>2.59</u>	<u>18.01</u>	<u>Silty</u>	<u>16.58</u>	<u>5</u>	<u>0.25</u>	<u>gray color, strong odor</u>
<u>1:40 PM</u>	<u>69.1</u>	<u>3.18</u>	<u>17.86</u>	<u>Silty</u>	<u>16.6</u>	<u>10</u>	<u>0.25</u>	<u>gray color, strong odor</u>
<u>Well surged w/ Surge Block every 5 GAL. Bailed.</u>								
<u>1:55 PM</u>					<u>16.6</u>	<u>10</u>	<u>3.75</u>	
<u>STARTED REDI-FLOZ Pump. Silty</u>								
<u>2:05 PM</u>	<u>70.6</u>	<u>2.45</u>	<u>8.87</u>	<u>>1.5</u>	<u>16.6</u>	<u>47.5</u>	<u>3.75</u>	<u>clear H₂S strong H₂S odor</u>
<u>2:09 PM</u>	<u>66.1</u>	<u>2.29</u>	<u>8.12</u>	<u>>1.5</u>	<u>16.6</u>	<u>55</u>	<u>3.75</u>	<u>" " "</u>

(1) Note volume and physical character of sediments removed.
 NTU = Nephelometric turbidity units
 WL = Water Level from Top of PVC Casing

Checked By <u>Wayne M Barnhill</u>	Date <u>12/29/94</u>
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WELL DATA FORM

Type Well ☒ MW ☐ Production ☐ Other _____	Type of Data ☐ Development ☒ Sampling ☐ Pump Test ☐ Other _____	Well No. <u>MW # 50</u> Sheet 1 of 1 Sheets /						
1. Project <u>NAVAJO REFINING CO.</u>	2. Project Location <u>ARTESIA, NM</u>	3. Date <u>12/30/94</u>						
4. Technician <u>C.M. BARNHILL</u>								
7. Method Pumping Surging Air Lift <u>Bailing</u> Other	8. Manufacturer's Designation of Rig <u>DSR - 1000</u>	9. Location of Well (Site, Description) <u>MONITOR WELL # 50</u>						
Water Levels								
Initial	Final	Final + 24 Hours						
Date: <u>12/30/94</u> Time: <u>12:50 PM</u>	Date: Time:	Date: Time:						
10. Total Depth of Well (from TOC) <u>28.9'</u>	15. Total Depth of Well (from TOC)	20. Total Depth of Well (from TOC)						
11. Water Level (from TOC) <u>16.55'</u>	16. Water Level (from TOC)	21. Water Level (from TOC)						
12. Water Column Height	Nom Dia x = gal/ft Sch 40 Sch 80	17.3 Well Volumes	22. Size and Type of Pump or <u>Bailer</u>					
13. Well Diameter <u>2" SCH 40 PVC</u>	② 0.1743 0.1534 4" 0.6613 0.5972 6" 1.5007 1.3540 8" 2.5856 2.3720	18.5 Well Volumes	<u>1.8" DISPOSABLE BAILER</u>					
14. Well Volume (gal) (s.w.e. height)		19. Purge Volume <u>< 1 GAL</u>						
Final Field Analysis								
23. Total Amount of Water Removed <u>< 1.0 GAL.</u>	24. Was Well Pumped Dry? Yes <u>(NO)</u>	25. Was water added to well? <u>(NO)</u> Yes If yes, source:	26. Was the Groundwater Sampled <u>Yes</u> No If yes, what was the sample number & Date: Sampling Personnel? <u>M.W. 50 12/30/94 C.M. BARNHILL 1:00PM</u>					
27. Final Parameters Time Temp F Conductivity pH NTUs WL Removed Flow Rate Photo Roll #, <u>1:00 PM 64.2 2.19 X 1000 14.40 SILTY GRAY 16.55 < 1.0 GAL — SILTY GRAY w/ schoon + odor</u>								
IF PETROLEUM IS IN THE WELL, DO NOT TAKE pH AND CONDUCTIVITY PARAMETERS								
28. Physical Appearance and Remarks								
29. Purgewater disposal method: <u>IN DOT APPROVED 55 GAL. DRUM</u>								
Sampling / Development Parameters								
Time	F Temp °C	Conductivity (umhos/cm) X 1000	pH	NTUs	WL (from TOC)	Volume (gallons)	Flow Rate (gpm)	Photo #, Observations (1)
<u>1:00 PM</u>	<u>64.2</u>	<u>2.19</u>	<u>14.40</u>	<u>SILTY GRAY</u>	<u>16.55'</u>	<u>< 1.0</u>	<u>—</u>	<u>w/ schoon + odor</u>
(1) Note volume and physical character of sediments removed. NTU = Nephelometric turbidity units WL = Water Level from Top of PVC Casing								
Checked By <u>[Signature]</u>	Date <u>12/30/94</u>							

Type Well ☒ MW ☐ Production ☐ Other _____		Type of Data ☒ Development ☐ Sampling ☐ Pump Test ☐ Other _____		Well No. <u>MW # 51</u> Sheet 1 of _____ Sheets	
1. Project <u>NAVAJO REFINING Co.</u>		2. Project Location <u>ARTESIA, NM</u>		3. Date <u>12/29/94</u>	
4. Technician <u>CM BARNHILL</u>		Pump set @ <u>25'</u> Control Box @ <u>239 1/2'</u>			
7. Method ☒ Pumping ☒ Surging ☐ Air Lift ☐ Bailing ☐ Other		8. Manufacturer's Designation of Rig <u>DSR-1000</u>		9. Location of Well (Site, Description) <u>MW # 51</u>	
Water Levels					
Initial		Final		Final + 24 Hours	
Date: <u>12/29/94</u> Time: <u>2:50pm</u>		Date: <u>12/29/94</u> Time: <u>4:16pm</u>		Date: _____ Time: _____	
10. Total Depth of Well (from TOC) <u>33.1'</u>		15. Total Depth of Well (from TOC) <u>33.1'</u>		20. Total Depth of Well (from TOC)	
11. Water Level (from TOC) <u>19.5'</u>		16. Water Level (from TOC) <u>19.9'</u>		21. Water Level (from TOC)	
12. Water Column Height <u>13.6'</u>		Nom Dia <u>Sch 40</u> x = gal/ft Sch 80		17. 3 Well Volumes <u>7.11 GAL</u>	
13. Well Diameter <u>2" SCH 40 PVC</u>		2" <u>0.1743</u> 0.1534 4" 0.6613 0.5972 6" 1.5007 1.3540 8" 2.5856 2.3720		18. 5 Well Volumes <u>11.8 GAL</u>	
14. Well Volume (gal) (s) w.e. height) <u>2.37</u>				19. Purge Volume <u>80</u>	
				22. Size and Type of Pump or Bailer <u>1.8" PVC Bailer</u> <u>1.8" Grundfos Rodiflo-2 Pump</u>	
Final Field Analysis					
23. Total Amount of Water Removed <u>80 gal.</u>		24. Was Well Pumped Dry? Yes ☐ No ☒		25. Was water added to well? ☒ No Yes ☐ If yes, source: _____	
26. Was the Groundwater Sampled Yes ☒ No ☐ If yes, what was the sample number & Date: _____ Sampling Personnel: _____					
27. Final Parameters		Conductivity ¹⁰⁰⁰		pH	
Time	Temp	Conductivity	pH	NTUs	WL
<u>4:16pm</u>	<u>68.0</u>	<u>3.50</u>	<u>7.02</u>	<u>41.5</u>	<u>80</u>
Flow Rate		Photo Roll #, Observations			
<u>2.56 gpm</u>		<u>clear H₂O</u>			
IF PETROLEUM IS IN THE WELL, DO NOT TAKE pH AND CONDUCTIVITY PARAMETERS					
28. Physical Appearance and Remarks <u>INITIALLY SILTY BROWN - CLEAR AFTER DEVELOPMENT</u>					
29. Purgewater disposal method: <u>IN DOT APPROVED 55 GAL. DRUM.</u>					
Sampling / Development Parameters					
Time	Temp	Conductivity ¹⁰⁰⁰ (umhos/cm) X	pH	NTUs	WL (from TOC)
<u>3:10pm</u>	<u>67.3</u>	<u>3.27</u>	<u>6.38</u>	<u>SILTY</u>	<u>13.6'</u>
<u>3:25pm</u>	<u>68.1</u>	<u>3.43</u>	<u>7.52</u>	<u>Silty</u>	<u>19.9'</u>
<u>SURGED w/ SURGE Block every 5 GAL.</u>					
<u>3:37pm</u>	<u>STARTED GRUNDFOS-RODIFLO 2 Pump</u>				
<u>3:47pm</u>	<u>69.4</u>	<u>3.47</u>	<u>7.17</u>	<u>Silty</u>	<u>19.9'</u>
<u>3:57pm</u>	<u>66.1</u>	<u>3.48</u>	<u>7.77</u>	<u>Silty</u>	<u>19.9'</u>
<u>4:06pm</u>	<u>68.0</u>	<u>3.56</u>	<u>6.88</u>	<u>Silty</u>	<u>19.9'</u>
<u>4:16pm</u>	<u>68.0</u>	<u>3.50</u>	<u>7.02</u>	<u>Clear</u>	<u>19.9'</u>
			<u><1.5</u>		
Volume (gallons)		Flow Rate (gpm)		Photo #, Observations (1)	
<u>13' BAIL</u>		<u>0.25</u>		<u>Silty Brown color</u>	
<u>10 GAL</u>		<u>0.66</u>		<u>Silty Brown color</u>	
		<u>2.5</u>		<u>Getting clear.</u>	
<u>35</u>		<u>2.51.5</u>		<u>Clear some silty.</u>	
<u>50</u>		<u>0.5</u>		<u>Brown color silty.</u>	
<u>55</u>		<u>2.5</u>		<u>Brown silty.</u>	
<u>80</u>		<u>2.5</u>		<u>Clear H₂O</u>	
(1) Note volume and physical character of sediments removed. NTU = Nephelometric turbidity units WL = Water Level from Top of PVC Casing					
Checked By <u>Clayton M Barnhill</u>					Date <u>12/29/94</u>

Type Well ☒ MW ☐ Production ☐ Other _____		Type of Data ☐ Development ☒ Sampling ☐ Pump Test ☐ Other _____		Well No. <u>MW 51</u> Sheet 1 of <u>1</u> Sheets	
1. Project <u>NAVAJO REFINING CO</u>		2. Project Location <u>ARTESIA NM</u>		3. Date <u>12/30/94</u>	
4. Technician <u>C M BARNHILL</u>					
7. Method Pumping Surging Air Lift <u>Bailing</u> Other		8. Manufacturer's Designation of Rig <u>DSR-1000</u>		9. Location of Well (Site, Description) <u>MONITOR WELL #51</u>	

Water Levels		
Initial	Final	Final + 24 Hours
Date: <u>12/30/94</u> Time: <u>1:20pm</u>	Date: _____ Time: _____	Date: _____ Time: _____
10. Total Depth of Well (from TOC) <u>33.3'</u>	15. Total Depth of Well (from TOC)	20. Total Depth of Well (from TOC)
11. Water Level (from TOC) <u>19.7'</u>	16. Water Level (from TOC)	21. Water Level (from TOC)

12. Water Column Height	Nom Dia x = gal/ft Sch 40 Sch 80	17. 3 Well Volumes	22. Size and Type of Pump or Bailer
13. Well Diameter <u>2" SCH 40 PVC</u>	2" 0.1743 0.1534 4" 0.6613 0.5972 6" 1.5007 1.3540 8" 2.5856 2.3720	18. 5 Well Volumes	<u>1.8" Disposable Bailer</u>
14. Well Volume (gal) (s) w.e. height)		19. Purge Volume <u>< 2.0 GAL</u>	

Final Field Analysis			
23. Total Amount of Water Removed <u>< 2.0 GAL</u>	24. Was Well Pumped Dry? Yes ☐ No ☒	25. Was water added to well? <u>No</u> Yes ☐ If yes, source: _____	26. Was the Groundwater Sampled <u>Yes</u> No ☐ If yes, what was the sample number & Date: Sampling Personnel? <u>MW #51 12/30/94</u> <u>C M BARNHILL 1:30pm</u>

27. Final Parameters	Time	Temp $^{\circ}$ F	Conductivity $\times 1000$	pH	NTUs	WL	Removed	Flow Rate	Photo Roll #, Observations
	<u>1:30pm</u>	<u>64.1</u>	<u>3.61</u>	<u>7.84</u>	<u>Silty</u>	<u>19.7</u>	<u>< 2.0 GAL</u>	<u>—</u>	<u>31545 Silty Brown</u>

IF PETROLEUM IS IN THE WELL, DO NOT TAKE pH AND CONDUCTIVITY PARAMETERS

28. Physical Appearance and Remarks <u>1st Bail CLEAR - some fine silt.</u>
29. Purgewater disposal method: <u>IN DOT APPROVED 55 GAL. DRUM.</u>

Sampling / Development Parameters								
Time	Temp $^{\circ}$ F	Conductivity (umhos/cm) $\times 1000$	pH	NTUs	WL (from TOC)	Volume (gallons)	Flow Rate (gpm)	Photo #, Observations (1)
<u>1:30pm</u>	<u>64.1</u>	<u>3.61</u>	<u>7.84</u>	<u>Silty</u>	<u>19.7</u>	<u>< 2.0</u>	<u>—</u>	<u>31545 Brown</u>

(1) Note volume and physical character of sediments removed.
 NTU = Nephelometric turbidity units
 WL = Water Level from Top of PVC Casing

Checked By <u>Clayton M Barnhill</u>	Date <u>12/30/94</u>
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Type Well ☒ MW ☐ Production ☐ Other <u># 52</u>		Type of Data ☒ Development ☐ Sampling ☐ Pump Test ☐ Other		Well No. <u>MW-52</u> Sheet 1 of 1 Sheets	
1. Project <u>NAVAJO REFINING CO.</u>		2. Project Location <u>ARTESIA, NM</u>		3. Date <u>1/16/95</u>	
4. Technician <u>CM BARNHILL</u>		32° 50' 34" N Elev. 104° 23' 28" W 3322'		REDEF 2 pump Set @ 30' 275 ft. Casing	
7. Method ☒ Pumping ☒ Surging Air Lift ☒ Bailing Other		8. Manufacturer's Designation of Rig <u>DSR-1000</u>		9. Location of Well (Site, Description) <u>MW-52</u>	

Water Levels		
Initial	Final	Final + 24 Hours
Date: <u>1/16/95</u> Time: <u>9:45 AM</u>	Date: <u>1/16/95</u> Time: <u>11:40 AM</u>	Date: _____ Time: _____
10. Total Depth of Well (from TOC) <u>33.76'</u>	15. Total Depth of Well (from TOC) <u>33.76'</u>	20. Total Depth of Well (from TOC)
11. Water Level (from TOC) <u>20.79'</u>	16. Water Level (from TOC) <u>20.92'</u>	21. Water Level (from TOC)

12. Water Column Height <u>12.97'</u>	Nom Dia <u>Sch 40</u> x = gal/ft Sch 80	17. 3 Well Volumes <u>6.78 GAL</u>	22. Size and Type of Pump or Bailer
13. Well Diameter <u>2" SCH 40 PVC</u>	2" <u>0.1743</u> 0.1534 4" 0.6613 0.5972 6" 1.5007 1.3540 8" 2.5856 2.3720	18. 5 Well Volumes <u>11.30 GAL</u>	<u>1.8" PVC BAILER</u>
14. Well Volume (gal) (s) w.e. height) <u>2.26 GAL</u>		19. Purge Volume <u>110 GAL</u>	<u>1.8" BRUNNERS</u> <u>REDEF 2 pump</u>

Final Field Analysis			
23. Total Amount of Water Removed <u>110</u> <u>96 GAL</u>	24. Was Well Pumped Dry? Yes ☒ No	25. Was water added to well? ☒ No Yes If yes, source:	26. Was the Groundwater Sampled Yes ☒ No If yes, what was the sample number & Date: Sampling Personnel?

27. Final Parameters	Time	Temp ^F	Conductivity	pH	NTUs	WL	Removed	Flow Rate	Photo Roll #, Observations
	<u>11:33 AM</u>	<u>68.6</u>	<u>5.96</u>	<u>6.52</u>	<u>4.5</u>	<u>24.97'</u>	<u>96 GAL</u>	<u>2.6 GPM</u>	<u>Clear H₂O</u>

IF PETROLEUM IS IN THE WELL, DO NOT TAKE pH AND CONDUCTIVITY PARAMETERS

28. Physical Appearance and Remarks <u>SILTY white SURGING & BAILING - Clear after Dev.</u>
29. Purgewater disposal method: <u>IN DOT APPROVED 55 GAL DRUMS</u>

Sampling / Development Parameters								
Time	Temp ^F	Conductivity (umhos/cm)	pH	NTUs	WL (from TOC)	Volume (gallons)	Flow Rate (gpm)	Photo #, Observations (1)
<u>9:50 AM</u>	<u>BEGAN SURGING WELL</u>				<u>W/ SURGE BLOCK</u>			
<u>10:00 AM</u>	<u>64.1</u>	<u>4.92</u>	<u>6.65</u>	<u>VERY SILTY</u>	<u>20.79'</u>	<u>15 BAIL</u>	<u>—</u>	<u>VERY SILTY</u>
<u>10:20 AM</u>	<u>62.6</u>	<u>4.56</u>	<u>6.41</u>	<u>VERY SILTY</u>	<u>21.02'</u>	<u>10 GAL</u>	<u>0.50</u>	<u>Muddy - Reddish</u>
<u>SURGED well every 5 GALLONS.</u>					<u>21.02'</u>	<u>10 GAL</u>	<u>—</u>	<u>Silty</u>
<u>10:40 AM</u>	<u>63.1</u>	<u>4.87</u>	<u>6.50</u>	<u>Very Silty</u>	<u>21.02'</u>	<u>15 GAL</u>	<u>0.50</u>	<u>Very Silty</u>
<u>11:00 AM</u>	<u>Started Redef 2 pump.</u>					<u>—</u>	<u>2.6</u>	
<u>11:10 AM</u>	<u>62.9</u>	<u>5.61</u>	<u>6.52</u>	<u>4.5</u>	<u>24.1'</u>	<u>41</u>	<u>2.6</u>	<u>Clear H₂O</u>
<u>11:33 AM</u>	<u>68.6</u>	<u>5.96</u>	<u>6.52</u>	<u>4.5</u>	<u>24.97'</u>	<u>96</u>	<u>2.6</u>	<u>Clear H₂O</u>
						<u>110</u>	<u>3.0</u>	

(1) Note volume and physical character of sediments removed.
 NTU = Nephelometric turbidity units
 WL = Water Level from Top of PVC Casing

Checked By <u>Clayton M Barnhill</u>	Date <u>1/16/95</u>
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Type Well ☒ MW ☐ Production ☐ Other _____		Type of Data ☐ Development ☒ Sampling ☐ Pump Test ☐ Other _____		Well No. <u>MW-52</u> Sheet 1 of _____ Sheets	
1. Project <u>NAVAJO REFINING CO.</u>		2. Project Location <u>ARTESIA, NM</u>		3. Date <u>1/17/95</u>	
4. Technician <u>C.M. BARNHILL</u>					
7. Method Pumping Surging Air Lift <u>Bailing</u> Other _____		8. Manufacturer's Designation of Rig <u>DSR-1000</u>		9. Location of Well (Site, Description) <u>MW-52</u>	

Water Levels		
Initial	Final	Final + 24 Hours
Date: <u>1/17/95</u> Time: <u>3:10 PM</u>	Date: <u>1/17/95</u> Time: _____	Date: _____ Time: _____
10. Total Depth of Well (from TOC) <u>34.60</u>	15. Total Depth of Well (from TOC) <u>34.60</u>	20. Total Depth of Well (from TOC)
11. Water Level (from TOC) <u>20.84'</u>	16. Water Level (from TOC) <u>22.84'</u>	21. Water Level (from TOC)

12. Water Column Height	Nom Dia x = gal/ft Sch 40 Sch 80	17. 3 Well Volumes	22. Size and Type of Pump or Bailer
13. Well Diameter	2" 0.1743 0.1534 4" 0.6613 0.5972 6" 1.5007 1.3540 8" 2.5856 2.3720	18. 5 Well Volumes	<u>1.8" DISPOSABLE BAILER</u>
14. Well Volume (gal) <u>< 1 GAL</u> (s) w.e. height)		19. Purge Volume <u>< 1 GAL</u>	

Final Field Analysis			
23. Total Amount of Water Removed <u>< 1 GAL</u>	24. Was Well Pumped Dry? Yes ☒ No ☐	25. Was water added to well? <u>No</u> Yes If yes, source: _____	26. Was the Groundwater Sampled <u>Yes</u> No If yes, what was the sample number & Date: Sampling Personnel? <u>MW-52</u> <u>1/17/95 C.M. BARNHILL</u>

27. Final Parameters								Photo Roll #,
Time	Temp °F	Conductivity $\times 1000$	pH	NTUs	WL	Removed	Flow Rate	Observations
<u>3:30 PM</u>	<u>68.5</u>	<u>5.55</u>	<u>6.21</u>	<u>71.5</u>	<u>20.84'</u>	<u>< 1 GAL</u>	<u>—</u>	<u>Mostly clear</u>

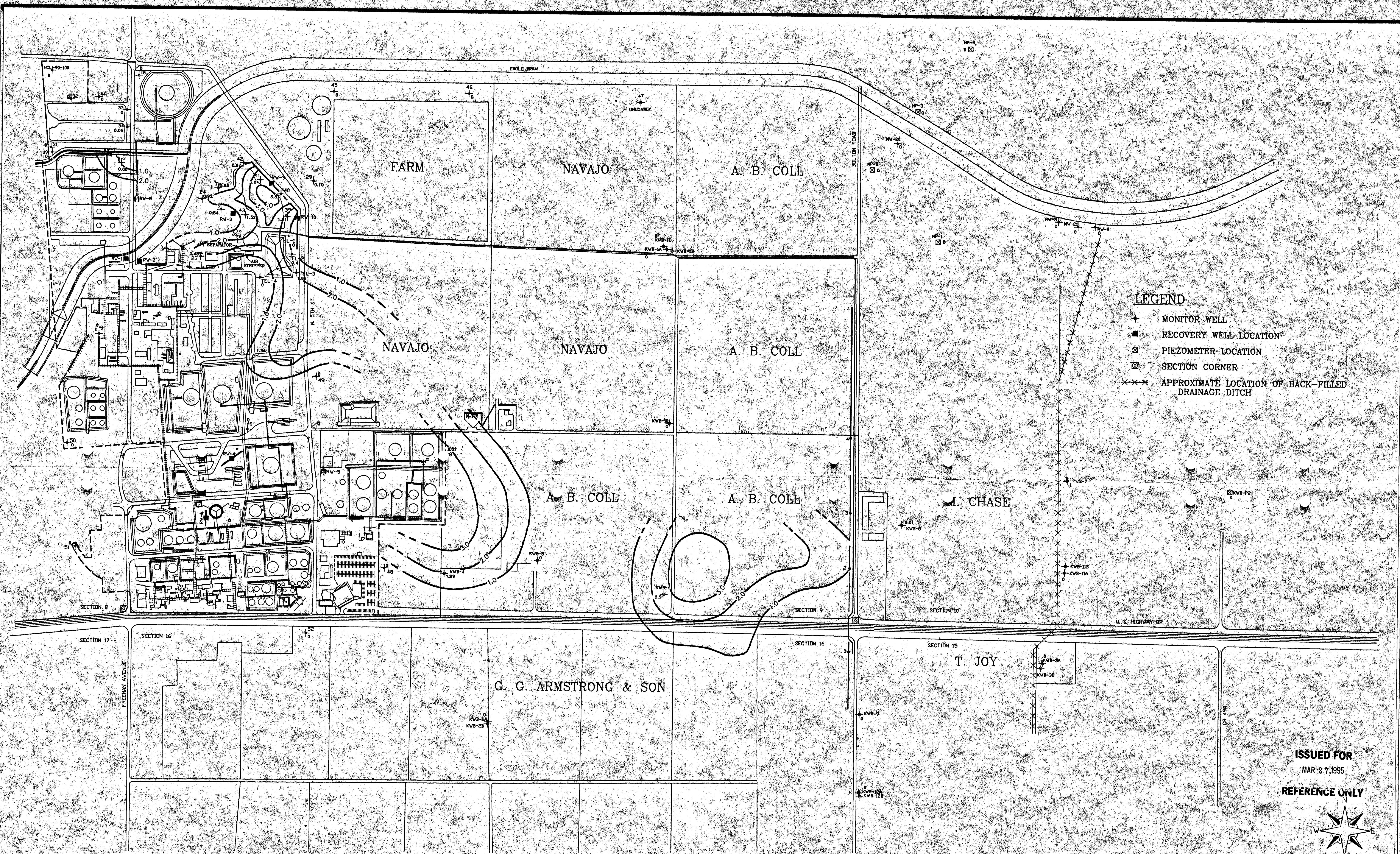
IF PETROLEUM IS IN THE WELL, DO NOT TAKE pH AND CONDUCTIVITY PARAMETERS

28. Physical Appearance and Remarks <u>Clear initially, slight silt - mostly clear. No odor.</u>	29. Purgewater disposal method: <u>IN DOT APPROVED 55 GAL DRUM</u>
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Sampling / Development Parameters								
Time	Temp °F	Conductivity (umhos/cm) $\times 1000$	pH	NTUs	WL (from TOC)	Volume (gallons)	Flow Rate (gpm)	Photo #, Observations (1)
<u>3:30 PM</u>	<u>68.5</u>	<u>5.55</u>	<u>6.21</u>	<u>71.5</u>	<u>20.84</u>	<u>< 1 GAL</u>	<u>—</u>	<u>Slight silt, mostly clear, NO ODOOR</u>

(1) Note volume and physical character of sediments removed.
 NTU = Nephelometric turbidity units
 WL = Water Level from Top of PVC Casing

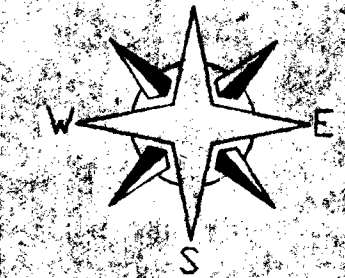
Checked By <u>C.M. Barnhill</u>	Date <u>1/17/95</u>
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- LEGEND**
- ★ MONITOR WELL
 - RECOVERY WELL LOCATION
 - ⊗ PIEZOMETER LOCATION
 - ⊠ SECTION CORNER
 - - - - - APPROXIMATE LOCATION OF BACK-FILLED DRAINAGE DITCH

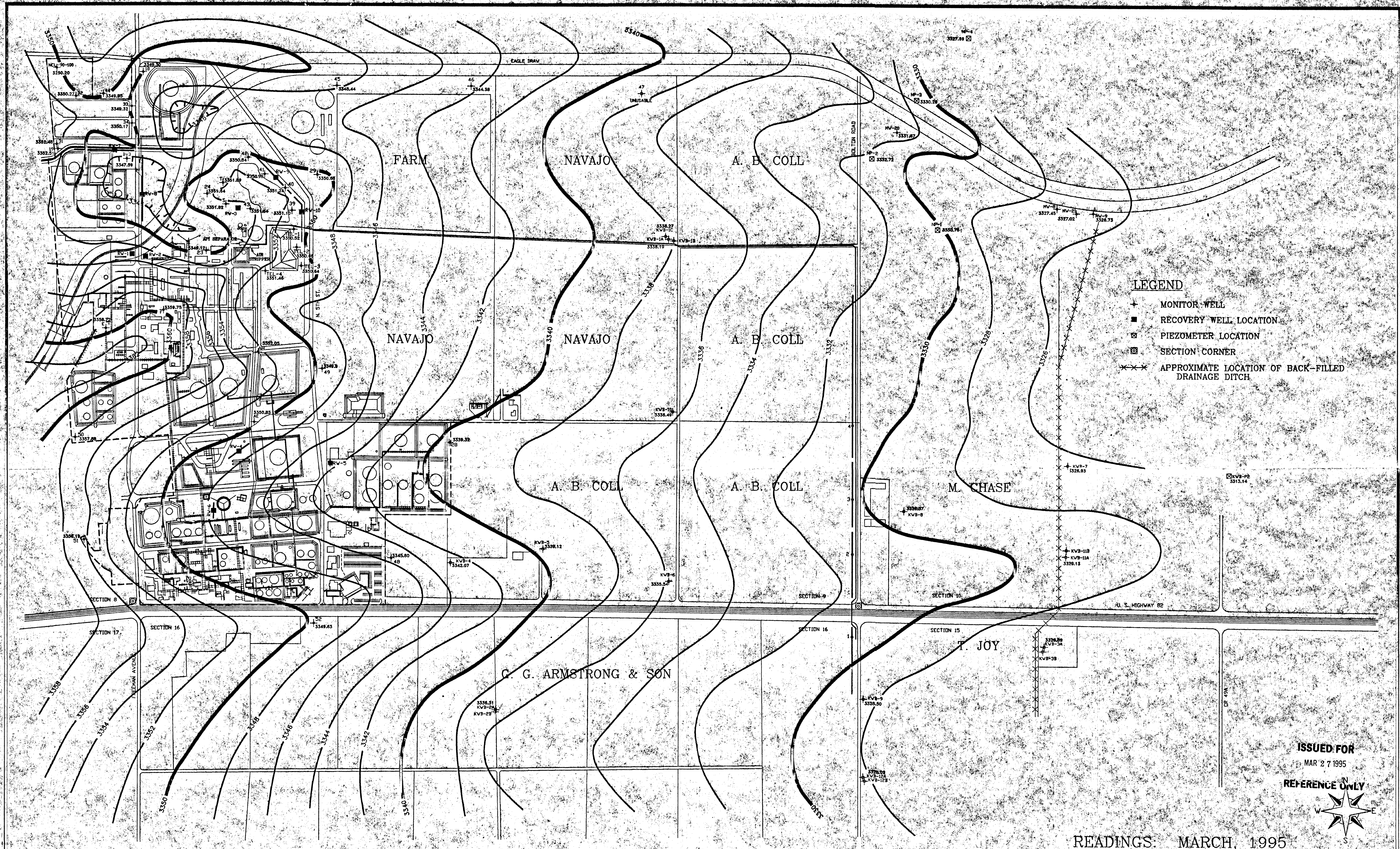
ISSUED FOR
MAR 27, 1995

REFERENCE ONLY



READINGS: MARCH, 1995

NOTES		REFERENCE DRAWINGS		NO. REVISIONS		BY	CHK.	DATE	APPR.	NO. REVISIONS	BY	CHK.	DATE	APPR.	DRAWING TITLE		NAVAJO REFINING CO. ENGINEERING DEPARTMENT P.O. DRAWER 159 ARTESIA, NEW MEXICO	
				0	ISSUED WITH MARCH, 1995 READINGS	PETE	DGM	3-27-95	ILS						PRODUCT THICKNESS MAP NAVAJO REFINING		DRAWN BY PETE	CHK'D BY DGM
															SCALE 1" = 300'		DATE 3-17-95	APPR BY ILS
															DRAWING NUMBER 90-45-D		REV 0	



NOTES	REFERENCE DRAWINGS	NO. REVISIONS BY CHK. DATE APPR. APPR.							NO. REVISIONS BY CHK. DATE APPR. APPR.							DRAWING TITLE	 NAVAJO REFINING CO. ENGINEERING DEPARTMENT P.O. DRAWER 159 ARTESIA, NEW MEXICO																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		0 ISSUED WITH MARCH, 1995 READINGS							PETE DGM 3-27-95 ILS									GROUNDWATER POTENTIOMETRIC MAP NAVAJO REFINING																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		