GW - 28

REPORTS

YEAR(S):

1995

2of2

VOLUME II
RCRA FACILITY INVESTIGATION
THREE-MILE DITCH & EVAPORATION PONDS
PHASE III REPORT
(Revised)
NAVAJO REFINERY
ARTESIA, NEW MEXICO

Topical Report RSI-0611

prepared for

Navajo Refining Company
501 East Main Street
Artesia, New Mexico 88210

October 1995

RE/SPEC INC.
RESEARCH / SPECIALISTS

RSI-0611

VOLUME II
RCRA FACILITY INVESTIGATION, THREE-MILE DITCH & EVAPORATION PONDS
PHASE III REPORT (Revised)
NAVAJO REFINERY, ARTESIA, NEW MEXICO
OCTOBER, 1995

RE/SPEC Inc.

APPENDIX D

APPENDIX E

APPENDIX F

APPENDIX F

June 1995 Groundwater Sampling Analytical Data Reports

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

Mr. David Boyer
RE/SPEC
4775 Indian School Road
NE Ste. 300
Albuquerque, New Mexico 87110-3927

July 12, 1995

Dear Mr. Boyer,

On June 24, 1995, ten water samples and one trip blank were received, cool and intact, by Inter-Mountain Laboratories - College Station. The samples were identified by project name "RFI Phase III." Analyses for Semivolatiles, general water chemistry, and Metals were performed as requested on the accompanying chain of custody and the updated analysis request faxed on July 4, 1995. BTEX was analyzed by Method 8020 not 8240 because of instrument problems.

It is the policy of this laboratory to employ, whenever possible, preparatory and analytical methods which have been approved by regulatory agencies. The methods used in the analysis of the sample reported here are found in "Test Methods for Evaluating Solid Waste", SW-846, USEPA, Final Update I, July 1992. All reports in this package reference the methods utilized.

Methods used for each analysis are listed on the reports. All detection limits are practical quantitation limits (PQLs). PQLs have been corrected for dilutions and sample volume analyzed.

Two samples were analyzed for BTEX past the 14 day holding time. OCD-3 was analyzed on July 6, 1995, at 18:27 CDT, holding time expired at 13:35 CDT. OCD-5 was analyzed on July 6, 1995, at 19:32 CDT, holding time expired at 16:15 CDT. No target compounds were found at the stated detection limits. MW-3 had one surrogate outside acceptance limits. There was co-elution interference from the sample .

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

Sincerely,

Ulonda M Rogers

Ulonda M. Rogers

Enclosures

NAV0954

Inter- Mountain Laboratories, Inc.

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
NAVAJO Refining Co/RFI Phase III	Artesia, NM
Sampler: (Signature) W K Boyd	**Chain of Custody Tape No.**

Sample No./ Identification	Date	Time	Lab Number	Matrix	No. of Containers	8240 VOC-BTEX	Semi-Volatiles	Metals As, Cr, Ni, Pb	Water Chem.	Remarks
										Metals Methods
										As - 7061
MW-5C	6/21/95	1115	06956-954	Water	4	✓		✓	✓	Cr, Pb, Ni 7000
MW-5B		1410	955					✓	✓	Series
MW-5A		1440	956			✓		✓	✓	Cr - 7191
MW-3		1520	957			✓		✓	✓	Pb - 7421
MW-6A	6/22/95	1000	958			✓	✓	✓	✓	Ni - 7520
MW-2A	6/22/95	1045	959					✓		
OCD-1		1115	960			✓		✓	✓	
OCD-2A		1155	961					✓		
OCD-3		1235	962			✓		✓	✓	
OCD-5		1515	963			✓		✓	✓	
~~TRIP BLANK~~			964			✓				
										RFI D: COOL &
										INTACT.

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
W K Boyd	6/23/95	1030			
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by laboratory: (Signature)	Date	Time
			Barn L Hall	6/24/95	1135

Inter-Mountain Laboratories, Inc.

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

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

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

☐ 1160 Research Dr., Bozeman, Montana 59715, Telephone (406) 586-8450

☐ 11183 SH 30, College Station, TX 77845, Telephone (409) 776-8945

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

25452

jml

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 - 5C	Date Sampled:	06/21/95
Sample Number:	0695G00954	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:	10:39 AM

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	106%	75 - 125%
Bromofluorobenzene	101%	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

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 - 5C
Lab ID: 0495W05647/0695G00954
Matrix: Water
Condition: Intact

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

Parameter	Concentration	PQL	Method
Total Metals			
Total Arsenic	ND*	0.005 mg/L	SW-846 7061A
Total Chromium	ND*	0.005 mg/L	SW-846 7191
Total Lead	ND*	0.01 mg/L	SW-846 7421
Total Nickel	ND*	0.05 mg/L	SW-846 7520

*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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM
Sample ID: MW - 5C
Lab ID: 0495W05647/0695G00954
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)	4200 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180° C)	3490 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	179 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	1670 mg/L	1	Calculation
Fluoride	1.1 mg/L	0.1	EPA 340.2

Calcium	474 mg/L	23.65 meq/L	1 mg/L	SW-846 6010A
Magnesium	119 mg/L	9.79 meq/L	1 mg/L	SW-846 6010A
Potassium	4 mg/L	0.11 meq/L	1 mg/L	SW-846 6010A
Sodium	404 mg/L	17.57 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	218 mg/L	3.57 meq/L	1 mg/L	EPA 310.1
Carbonate	ND*	0.00	1 mg/L	EPA 310.1
Chloride	609 mg/L	17.18 meq/L	1 mg/L	SW-846 9251
Sulfate	1460 mg/L	30.40 meq/L	5 mg/L	SW-846 9036
Major Cation Sum	51.12 meq/L		N/A	Calculation
Major Anion Sum	51.15 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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM
Sample ID: MW - 5B
Lab ID: 0495W05648/0695G00955
Matrix: Water
Condition: Intact

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

Parameter	Concentration	PQL	Method
Total Metals			
Total Arsenic	0.087 mg/L	0.005	SW-846 7061A
Total Chromium	ND*	0.005 mg/L	SW-846 7191
Total Lead	ND*	0.01 mg/L	SW-846 7421
Total Nickel	ND*	0.05 mg/L	SW-846 7520

*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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM
Sample ID: MW - 5B
Lab ID: 0495W05648/0695G00955
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)	7.0 s.u.	0.1	SW-846 9040
Conductivity (Lab)	9050 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180° C)	7110 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	307 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	2060 mg/L	1	Calculation
Fluoride	1.4 mg/L	0.1	EPA 340.2

Calcium	530 mg/L	26.45 meq/L	1 mg/L	SW-846 6010A
Magnesium	178 mg/L	14.65 meq/L	1 mg/L	SW-846 6010A
Potassium	7 mg/L	0.19 meq/L	1 mg/L	SW-846 6010A
Sodium	1490 mg/L	64.68 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	374 mg/L	6.13 meq/L	1 mg/L	EPA 310.1
Carbonate	ND*	0.00	1 mg/L	EPA 310.1
Chloride	1770 mg/L	49.96 meq/L	1 mg/L	SW-846 9251
Sulfate	2470 mg/L	51.49 meq/L	5 mg/L	SW-846 9036
Major Cation Sum	105.97 meq/L		N/A	Calculation
Major Anion Sum	107.58 meq/L		N/A	Calculation
Cation/Anion Balance	-0.75 % 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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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 - 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.

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 - 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
Total Metals			
Total Arsenic	0.099 mg/L	0.005	SW-846 7061A
Total Chromium	ND*	0.005 mg/L	SW-846 7191
Total Lead	ND*	0.01 mg/L	SW-846 7421
Total Nickel	ND*	0.05 mg/L	SW-846 7520

*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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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

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.

Reviewed By:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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

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

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
Total Metals			
Total Arsenic	0.031 mg/L	0.005	SW-846 7061A
Total Chromium	0.006 mg/L	0.005	SW-846 7191
Total Lead	ND*	0.01 mg/L	SW-846 7421
Total Nickel	ND*	0.05 mg/L	SW-846 7520

*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:

Robert Alford
Supervisor, Water Laboratory

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

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.

Reviewed By:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

jml

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 - 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.

Analyst

Review

imL

Inter-Mountain Laboratories, Inc.

Inorganics Laboratory
1183 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

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

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

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

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

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:

Analyst

Review

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

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
Total Metals			
Total Arsenic	0.034 mg/L	0.005	SW-846 7061A
Total Chromium	0.015 mg/L	0.005	SW-846 7191
Total Lead	ND*	0.01 mg/L	SW-846 7421
Total Nickel	ND*	0.05 mg/L	SW-846 7520

*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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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 - 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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM
Sample ID: MW - 2A
Lab ID: 0495W05652/0695G00959
Matrix: Water
Condition: Intact

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

Parameter	Concentration	PQL	Method
Total Metals			
Total Arsenic	0.023 mg/L	0.005	SW-846 7061A
Total Chromium	0.012 mg/L	0.005	SW-846 7191
Total Lead	ND*	0.01 mg/L	SW-846 7421
Total Nickel	ND*	0.05 mg/L	SW-846 7520

*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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

jml

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:	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

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

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
Total Metals			
Total Arsenic	0.051 mg/L	0.005	SW-846 7061A
Total Chromium	ND*	0.005 mg/L	SW-846 7191
Total Lead	ND*	0.01 mg/L	SW-846 7421
Total Nickel	ND*	0.05 mg/L	SW-846 7520

*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:

Robert Alford
Supervisor, Water Laboratory

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: 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.

Reviewed By:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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: OCD - 2A
Lab ID: 0495W05654/0695G00961
Matrix: Water
Condition: Intact

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

Parameter	Concentration	PQL	Method
Total Metals			
Total Arsenic	0.020 mg/L	0.005	SW-846 7061A
Total Chromium	ND*	0.005 mg/L	SW-846 7191
Total Lead	ND*	0.01 mg/L	SW-846 7421
Total Nickel	ND*	0.05 mg/L	SW-846 7520

*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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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:	07/06/95
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

Review

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

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
Total Metals			
Total Arsenic	ND*	0.005 mg/L	SW-846 7061A
Total Chromium	ND*	0.005 mg/L	SW-846 7191
Total Lead	0.02 mg/L	0.01	SW-846 7421
Total Nickel	ND*	0.05 mg/L	SW-846 7520

*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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

jml

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: 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.

Reviewed By:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

jml

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:	07/06/95
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

Review

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

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
Total Metals			
Total Arsenic	ND*	0.005 mg/L	SW-846 7061A
Total Chromium	ND*	0.005 mg/L	SW-846 7191
Total Lead	0.01 mg/L	0.01	SW-846 7421
Total Nickel	ND*	0.05 mg/L	SW-846 7520

*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:

Robert Alford
Supervisor, Water Laboratory

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

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.

Reviewed By:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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:	07/06/95
Sample ID:	Trip Blank	Date Sampled:	NA
Sample Number:	0695G00964	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:	8:06 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	105%	75 - 125%
Bromofluorobenzene	85%	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

QUALITY CONTROL REPORTS

* *Duplicate Analyses*

* *Matrix Spike Analyses*

* *Method Blank Analyses*

jml

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

QUALITY CONTROL REPORT - MATRIX SPIKE
VOLATILE AROMATIC HYDROCARBONS

Sample Number:	0695G00958 SPIKE	Report Date:	07/05/95
Sample Matrix:	Water	Date Sampled:	06/22/95
Preservative:	Cool	Date Received:	06/24/95
Condition:	Intact	Date Extracted:	07/05/95
		Date Analyzed:	07/05/95
		Time Analyzed:	4:15 PM

Analyte	Spike Added (ug/L)	Sample Result (ug/L)	Spike Result (ug/L)	Percent Recovery	Acceptance Limit
Benzene	100	ND	112	112%	39-150%
Toluene	100	ND	107	102%	46-148%
Ethylbenzene	100	5.9	108	102%	32-160%
m-Xylene	100	ND	114	111%	50-150%
o-Xylene	100	11	107	96%	50-150%

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	94%	75 - 125%
Bromofluorobenzene	100%	70 - 120%

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

Comments:

Analyst

Review

jml

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

QUALITY CONTROL REPORT - MATRIX SPIKE DUPLICATE
VOLATILE AROMATIC HYDROCARBONS

Sample Number:	0695G00958 SPK DUP	Report Date:	07/05/95
Sample Matrix:	Water	Date Sampled:	06/22/95
Preservative:	Cool	Date Received:	06/24/95
Condition:	Intact	Date Extracted:	07/05/95
		Date Analyzed:	07/05/95
		Time Analyzed:	4:51 PM

Analyte	Spike Recovery (%)	Duplicate Recovery (%)	Percent Difference
Benzene	112%	102%	9%
Toluene	102%	91%	12%
Ethylbenzene	102%	90%	12%
m-Xylene	111%	98%	12%
o-Xylene	96%	84%	13%

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
a,a,a-Trifluorotoluene	99%	75 - 125%
Bromofluorobenzene	101%	70 - 120%

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

Comments:

Analyst

Review

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

QUALITY CONTROL REPORT - METHOD BLANK
VOLATILE AROMATIC HYDROCARBONS

Sample Number MB0706V2
Sample Matrix: Water

Report Date: 07/06/95
Date Analyzed: 07/06/95
Time Analyzed: 5:57 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	92%	70 - 120%

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

Comments:

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

QUALITY CONTROL REPORT - METHOD BLANK
VOLATILE AROMATIC HYDROCARBONS

Sample Number MB0705V2
Sample Matrix: Water

Report Date: 07/05/95
Date Analyzed: 07/05/95
Time Analyzed: 1:17 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	96%	75 - 125%
Bromofluorobenzene	94%	70 - 120%

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

Comments:

Analyst

Review

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

QUALITY CONTROL REPORT - METHOD BLANK

EPA Method 8270

SEMIVOLATILE ORGANIC COMPOUNDS

Sample ID:	Method Blank	Report Date:	06/26/95
Laboratory ID:	MB228	Date Extracted:	06/26/95
Sample Matrix:	Water	Date Analyzed:	06/26/95
		Time Analyzed:	2:13 PM

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
Benzoic acid	ND	0.010
Benzyl alcohol	ND	0.010
Bis(2-chloroethoxy)methane	ND	0.010
Bis(2-chloroethyl)ether	ND	0.010
Bis(2-chloroisopropyl)ether	ND	0.025
Bis(2-ethylhexyl)phthalate	ND	0.025
4-Bromophenyl phenyl ether	ND	0.010
Butyl benzyl phthalate	ND	0.010
p - Chloroaniline	ND	0.010
p - Chloro - m - cresol	ND	0.010
2 - Chloronaphthalene	ND	0.010
2 - Chlorophenol	ND	0.010
4-Chlorophenyl phenyl ether	ND	0.010
Chrysene	ND	0.010
o - Cresol	ND	0.010
m,p - Cresol	ND	0.010
Di - n - butylphthalate	ND	0.025
Dibenz(a,h)anthracene	ND	0.010
Dibenzofuran	ND	0.010
o - Dichlorobenzene	ND	0.010
m - Dichlorobenzene	ND	0.010
p - Dichlorobenzene	ND	0.010
3,3 - Dichlorobenzidine	ND	0.010
2,4 - Dichlorophenol	ND	0.010
Diethyl phthalate	ND	0.010
2,4 - Dimethylphenol	ND	0.010
Dimethyl phthalate	ND	0.010

ND - Analyte not detected at stated limit of detection

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

QUALITY CONTROL REPORT - METHOD BLANK

EPA Method 8270

SEMIVOLATILE ORGANIC COMPOUNDS (cont)

Sample ID: Method Blank
Laboratory ID: MB228

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

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
4,6 - Dinitro -2- methylphenol	ND	0.025
2,4 - Dinitrophenol	ND	0.025
2,4 - Dinitrotoluene	ND	0.010
2,6 - Dinitrotoluene	ND	0.010
Di-n-octyl phthalate	ND	0.025
Fluoranthene	ND	0.010
Fluorene	ND	0.010
Hexachlorobenzene	ND	0.010
Hexachlorocyclopentadiene	ND	0.025
Hexachloroethane	ND	0.010
Hexachlorobutadiene	ND	0.010
Ideno(1,2,3-cd)pyrene	ND	0.010
Isophorone	ND	0.010
2 - Methylnaphthalene	ND	0.010
Naphthalene	ND	0.010
o - Nitroaniline	ND	0.010
m - Nitroaniline	ND	0.010
p - Nitroaniline	ND	0.010
Nitrobenzene	ND	0.010
o - Nitrophenol	ND	0.010
p - Nitrophenol	ND	0.010
n - Nitrosodimethylamine	ND	0.010
n - Nitrosodiphenylamine	ND	0.010
n-Nitroso-di-n-propylamine	ND	0.010
Pentachlorophenol	ND	0.025
Phenanthrene	ND	0.010
Phenol	ND	0.010
Pyrene	ND	0.010
1,2,4 - Trichlorobenzene	ND	0.010
2,4,5 - Trichlorophenol	ND	0.010
2,4,6 - Trichlorophenol	ND	0.010

ND - Analyte not detected at stated limit of detection

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

QUALITY CONTROL REPORT - METHOD BLANK

EPA Method 8270

SEMIVOLATILE HYDROCARBONS

ADDITIONAL DETECTED COMPOUNDS

Sample ID:	Method Blank	Report Date:	06/26/95
Laboratory ID:	MB228	Date Analyzed:	06/26/95

Tentative Identification	Retention Time (Minutes)	Concentration* (mg/L)
None detected at reported limits of detection.		

* - Concentration calculated using assumed Relative Response Factor = 1

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
2 - Fluorophenol	37%	21 - 110%
Phenol - d5	36%	10 - 110%
Nitrobenzene - d5	52%	35 - 114%
2 - Fluorobiphenyl	70%	43 - 116%
2,4,6 - Tribromophenol	55%	10 - 123%
Terphenyl - d14	90%	33 - 141%

References:

Method 3510: Separatory Funnel Liquid-Liquid Extraction.
Method 8270B: 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:

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

QUALITY CONTROL REPORT - BLANK SPIKE

EPA Method 8270
SEMIVOLATILE ORGANIC COMPOUNDS

Sample ID:	Blank Spike	Report Date:	06/26/95
Laboratory ID:	DI227	Date Extracted:	06/26/95
Sample Matrix:	Water	Date Analyzed:	06/26/95
		Time Analyzed:	2:58 PM

Analyte	Spike Conc. (mg/L)	Blank Conc. (mg/L)	Spike Added (mg/L)	Percent Recovery	QC Limits
Phenol	0.097	ND	0.200	49%	5 - 112%
2 - Chlorophenol	0.114	ND	0.200	57%	23 - 134%
1,4 - Dichlorobenzene	0.054	ND	0.100	54%	20 - 124%
n-Nitroso-di-propylamine	0.065	ND	0.100	65%	D - 230%
1,2,4 - Trichlorobenzene	0.055	ND	0.100	55%	44 - 142%
4-Chloro-3-methylphenol	0.113	ND	0.200	57%	22 - 147%
Acenaphthene	0.065	ND	0.100	65%	47 - 145%
4 - Nitrophenol	0.134	ND	0.200	67%	D - 132%
2,4 - Dinitrotoluene	0.072	ND	0.100	72%	39 - 139%
Pentachlorophenol	0.145	ND	0.200	73%	14 - 176%
Pyrene	0.095	ND	0.100	95%	52 - 115%

ND - Analyte not detected at stated limit of detection.

Spike Recovery: 0 of 11 spike recoveries outside QC limits.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
2 - Fluorophenol	39%	21 - 110%
Phenol - d6	39%	10 - 110%
Nitrobenzene - d5	47%	35 - 114%
2 - Fluorobiphenyl	60%	43 - 116%
2,4,6 - Tribromoph	56%	10 - 123%
Terphenyl - d14	90%	33 - 141%

Reference: Method 3510: Separatory Funnel Liquid-Liquid Extraction.
Method 8270B: 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.

Analyst

Review

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

Quality Control Report
Duplicate Analysis

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	Original Conc.	Duplicate Conc.	Relative % Diff.	PQL	Method
Total Metals					
Total Arsenic	0.031	0.031	0	0.005 mg/L	SW-846 7061A
Total Chromium	0.006	0.007	8	0.005 mg/L	SW-846 7191
Total Lead	ND*	ND*	NC*	0.01 mg/L	SW-846 7421
Total Nickel	ND*	ND*	NC*	0.05 mg/L	SW-846 7520

*ND - Parameter not detected at stated Practical Quantitation Limit.
*NC - Non-Calculable RPD due to value(s) less than PQL

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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

jml

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

Quality Control Report
Duplicate Analysis

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	Original Conc.	Duplicate Conc.	Relative % Diff.	PQL	Method
pH (Lab)	7.2	7.2	0	0.1 s.u.	SW-846 9040
Conductivity (Lab)	6660	6660	0	1 µmhos/cm	SW-846 9050
Total Dissolved Solids (180° C)	5250	5360	1	10 mg/L	EPA 160.1
Total Alkalinity (as CaCO3)	317	317	0	1 mg/L	EPA 310.1
Total Hardness (as CaCO3)	1860	1770	2	1 mg/L	Calculation
Fluoride	3.0	3.0	0	0.1 mg/L	EPA 340.2
Calcium	499	476	2	1 mg/L	SW-846 6010A
Magnesium	148	141	2	1 mg/L	SW-846 6010A
Potassium	10	10	0	1 mg/L	SW-846 6010A
Sodium	935	994	3	1 mg/L	SW-846 6010A
Bicarbonate	387	387	0	1 mg/L	EPA 310.1
Carbonate	ND*	ND*	NC*	1 mg/L	EPA 310.1
Chloride	1090	1090	0	1 mg/L	SW-846 9251
Sulfate	2060	2050	0	5 mg/L	SW-846 9036
Major Cation Sum	78.04	78.84	1	meq/L	Calculation
Major Anion Sum	79.93	79.76	0	meq/L	Calculation
Cation/Anion Balance	-1.20	-0.58		% Diff	Calculation

*ND - Parameter not detected at stated Practical Quantitation Limit.
*NC - Non-Calculable RPD due to value(s) less than PQL

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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

jml

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

QUALITY CONTROL REPORT
MATRIX SPIKE

Client: **Navajo Refining Co.**
Project: RFI Phase III / Artesia, NM
Sample ID: MW-5C
Lab ID: 0495W05647/0695G00954
Matrix: Water
Condition Intact

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

Analyte	Unspiked Sample Concentration (mg/L)	Spiked Sample Concentration (mg/L)	Spike Amount (mg/L)	Percent Recovery
Total Arsenic	ND	0.012	0.010	120
Total Chromium	ND	0.057	0.05	114
Total Lead	ND	0.04	0.05	80
Total Nickel	ND	0.90	1.00	90

Reference: SW-846-"Test Methods for Evaluating Solid Waste: Physical/Chemical Methods US EPA,Third Edition, Final Update 1,July 1992.

Reviewed by:

Robert Alford
Supervisor, Water Laboratory

jml

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

QUALITY CONTROL REPORT
METHOD BLANK

CLIENT: Navajo Refining Co.
PROJECT: RFI Phase III / Artesia, NM

Sample ID: Blank W5647-01 **Report Date:** 07/11/95
Sample Matrix: Water

Analyte	Concentration	Units	POL	Method Reference
Total Arsenic	ND	mg/L	0.005	SW-846 7061A
Total Chromium	ND	mg/L	0.005	SW-846 7191
Total Lead	ND	mg/L	0.01	SW-846 7421
Total Nickel	ND	mg/L	0.05	SW-846 7520

ND - Parameter not detected at stated detection limit.

Reference: SW-846-"Test Methods for Evaluating Solid Waste: Physical/Chemical Methods US EPA,Third Edition, Final Update 1,July 1992.

Reviewed by:

Robert Alford
Supervisor, Water Laboratory

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

Mr. David Boyer
RE/SPEC
4775 Indian School Road
NE Ste. 300
Albuquerque, New Mexico 87110-3927

July 13, 1995

Dear Mr. Boyer,

On June 29, 1995, seven water samples and one trip blank were received, cool and intact, by Inter-Mountain Laboratories - College Station. The samples were identified by project name "RFI Phase III." Analyses for BTEX by Method 8240, general water chemistry, and Metals were performed as requested on the accompanying chain of custody and the updated analysis request faxed on July 4, 1995.

It is the policy of this laboratory to employ, whenever possible, preparatory and analytical methods which have been approved by regulatory agencies. The methods used in the analysis of the sample reported here are found in "Test Methods for Evaluating Solid Waste", SW-846, USEPA, Final Update I, July 1992. All reports in this package reference the methods utilized.

Methods used for each analysis are listed on the reports. All detection limits are practical quantitation limits (PQLs). PQLs have been corrected for dilutions and sample volume analyzed.

Sample "NCL Boring 7" had one surrogate out for Method 8240. The sample was analyzed multiple times and still had the same surrogate out. No target analytes were detected.

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

Sincerely,

Ulonda M. Rogers

Enclosures

NAV0971

Inter- Mountain Laboratories, Inc.

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location	ANALYSES / PARAMETERS
NAVAJO REF PHOSPH	ARTESIA NM	
Sampler: (Signature) A G Boyd	Chain of Custody Tape No.	

Sample No./ Identification	Date	Time	Lab Number	Matrix	No. of Containers	BTEX 8240	Metals As, Cr, Ni, Pb	Water Chemistry		Remarks
NCL Boring #1	6/24/95	1645	0695600971	Water	2	✓				Rush - 10 Work Days
NCL Boring #2	"	1715	972	"	2	✓				" "
NCL Boring #3	6/24/95	1605	973	"	2	✓				" "
OCA JAR	6/24/95	1530	974	"	4	✓	✓	✓		
OCA JC	"	1610	975	"	2		✓	✓		
~~OCA~~ MW-10	"	1745	976	"	1		✓			
MW-15	6/23/95	1630	977	"	3	✓		✓		
TRIP BLANK	—	—	978	"	1	✓				

Rec'd Cool & Intact

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
A G Boyd	6/28/95	8:45AM	[illegible]	6/29/95	900
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by laboratory: (Signature)	Date	Time

Inter-Mountain Laboratories, Inc.

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

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

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

☐ 1160 Research Dr., Bozeman, Montana 59715, Telephone (406) 586-8450

☐ 11183 SH 30, College Station, TX 77845, Telephone (409) 776-8945

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

25424

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

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

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

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
Total Metals			
Total Arsenic	0.159 mg/L	0.005	SW-846 7061A
Total Chromium	0.009 mg/L	0.005	SW-846 7191
Total Lead	ND*	0.01 mg/L	SW-846 7421
Total Nickel	ND*	0.05 mg/L	SW-846 7520

*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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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

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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM
Sample ID: OCD - 7C
Lab ID: 0495W05729/0695G00975
Matrix: Water
Condition: Intact

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

Parameter	Concentration	PQL	Method
Total Metals			
Total Arsenic	0.012 mg/L	0.005	SW-846 7061A
Total Chromium	0.007 mg/L	0.005	SW-846 7191
Total Lead	ND*	0.01 mg/L	SW-846 7421
Total Nickel	ND*	0.05 mg/L	SW-846 7520

*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.

eviewed By:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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: OCD - 7C
Lab ID: 0495W05729/0695G00975
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)	7.2 s.u.	0.1	SW-846 9040
Conductivity (Lab)	11500 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180° C)	8900 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	378 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	2540 mg/L	1	Calculation
Fluoride	1.2 mg/L	0.1	EPA 340.2

Calcium	646 mg/L	32.24 meq/L	1 mg/L	SW-846 6010A
Magnesium	225 mg/L	18.52 meq/L	1 mg/L	SW-846 6010A
Potassium	11 mg/L	0.28 meq/L	1 mg/L	SW-846 6010A
Sodium	2000 mg/L	86.95 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	461 mg/L	7.56 meq/L	1 mg/L	EPA 310.1
Carbonate	ND*	0.00	1 mg/L	EPA 310.1
Chloride	2450 mg/L	69.11 meq/L	1 mg/L	SW-846 9251
Sulfate	2860 mg/L	59.48 meq/L	5 mg/L	SW-846 9036
Major Cation Sum	137.99 meq/L		N/A	Calculation
Major Anion Sum	136.14 meq/L		N/A	Calculation
Cation/Anion Balance	0.67 % 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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

jml

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 - 10
Lab ID: 0495W05730/0695G00976
Matrix: Water
Condition: Intact

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

Parameter	Concentration	PQL	Method
Total Metals			
Total Arsenic	0.009 mg/L	0.005	SW-846 7061A
Total Chromium	0.007 mg/L	0.005	SW-846 7191
Total Lead	ND*	0.01 mg/L	SW-846 7421
Total Nickel	ND*	0.05 mg/L	SW-846 7520

*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.

Reviewed By:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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

EPA Method 8240
VOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project :	RFI Phase III	Report Date:	07/06/95
Sample ID:	MW-15	Date Sampled:	06/27/95
Laboratory ID:	0695G00977	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:	7:43 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	117%	86 - 118%
Toluene-d8	90%	88 - 110%
Bromofluorobenzene	95%	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

jml

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 - 15
Lab ID: 0495W05731/0695G00977
Matrix: Water
Condition: Intact

Report Date: 07/12/95
Receipt Date: 06/29/95
Sample Date: 06/27/95

Parameter	Concentration	PQL	Method
pH (Lab)	7.7 s.u.	0.1	SW-846 9040
Conductivity (Lab)	4580 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180° C)	3400 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	127 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	1310 mg/L	1	Calculation
Fluoride	0.8 mg/L	0.1	EPA 340.2

Calcium	357 mg/L	17.81 meq/L	1 mg/L	SW-846 6010A
Magnesium	102 mg/L	8.40 meq/L	1 mg/L	SW-846 6010A
Potassium	4 mg/L	0.11 meq/L	1 mg/L	SW-846 6010A
Sodium	568 mg/L	24.71 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	154 mg/L	2.52 meq/L	1 mg/L	EPA 310.1
Carbonate	ND*	0.00	1 mg/L	EPA 310.1
Chloride	798 mg/L	22.51 meq/L	1 mg/L	SW-846 9251
Sulfate	1280 mg/L	26.57 meq/L	5 mg/L	SW-846 9036
Major Cation Sum	51.03 meq/L		N/A	Calculation
Major Anion Sum	51.61 meq/L		N/A	Calculation
Cation/Anion Balance	-0.57 % 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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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

EPA Method 8240
VOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project :	RFI Phase III	Report Date:	07/02/95
Sample ID:	Trip Blank	Date Sampled:	N/A
Laboratory ID:	0695G00978	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:	4:06 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	97%	86 - 118%
Toluene-d8	97%	88 - 110%
Bromofluorobenzene	94%	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

QUALITY CONTROL REPORTS

* *Duplicate Analyses*

* *Matrix Spike Analyses*

* *Method Blank Analyses*

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

QUALITY CONTROL REPORT - MATRIX SPIKE / SPIKE DUPLICATE ANALYSIS

EPA Method 8240 - VOLATILE ORGANICS

Laboratory ID:	0695G0972	Report Date:	07/06/95
Sample Matrix:	Water	Date Sampled:	06/24/95
Preservative:	Cool, HCl	Date Received:	06/29/95
Condition:	Intact, pH <2	Date Analyzed:	07/02/95
		Time Analyzed:	9:02 PM/9:39 PM

MATRIX SPIKE ANALYSIS

Analyte	Spiked Sample Result (mg/L)	Sample Result (mg/L)	Spike Added (mg/L)	Percent Recovery	QC Limits Recovery
Benzene	0.045	ND	0.050	89%	76 - 127
Toluene	0.042	ND	0.050	84%	76 - 125
Ethyl benzene	0.047	ND	0.050	94%	37 - 162
Xylenes	0.131	ND	0.150	87%	50 - 150

MATRIX SPIKE DUPLICATE ANALYSIS

Analyte	Duplicate Result (mg/L)	Percent Recovery	Original Spike Result (mg/L)	RPD	QC Limits RPD	QC Limits Rec.
Benzene	0.046	92%	89%	3%	11%	76 - 127
Toluene	0.041	83%	84%	1%	13%	76 - 125
Ethyl Benzene	0.048	96%	94%	2%	13%	37 - 162
Xylenes	0.149	99%	87%	13%	13%	50 - 150

ND - Analyte not detected at stated limit of detection

Spike Recovery: 0 out of 10 outside QC Limits
RPD: 0 out of 5 outside QC Limits

Quality Control:

Surrogate	Spike Recovery	Duplicate Recovery	Recovery Limits
Dibromofluoromethane	117%	118%	86 - 118%
Toluene-d8	90%	90%	88 - 110%
Bromofluorobenzene	99%	92%	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

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

QUALITY CONTROL REPORT - METHOD BLANK
EPA METHOD 8240 VOLATILE ORGANIC COMPOUNDS

Sample ID: Method Blank
Laboratory ID: MB0702B
Sample Matrix: Water

Report Date: 07/06/95
Date Extracted: 07/02/95
Date Analyzed: 07/02/95
Time Analyzed: 2:59 PM

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Acetone	ND	0.025
Benzene	ND	0.005
Bromodichloromethane	ND	0.005
Bromoform	ND	0.005
Bromomethane	ND	0.005
2-Butanone (MEK)	ND	0.005
Carbon disulfide	ND	0.005
Carbon tetrachloride	ND	0.005
Chlorobenzene	ND	0.005
Chloroethane	ND	0.010
Chloroform	ND	0.005
Chloromethane	ND	0.010
Dibromochloromethane	ND	0.005
1,1-Dichloroethane	ND	0.005
1,1-Dichloroethene	ND	0.005
trans-1,2-Dichloroethene	ND	0.005
1,2-Dichloroethane	ND	0.005
1,2-Dichloropropane	ND	0.005
cis-1,3-Dichloropropene	ND	0.005
trans-1,3-Dichloropropene	ND	0.005
Ethylbenzene	ND	0.005
2-Hexanone	ND	0.005
Methylene chloride	ND	0.005
4-Methyl-2-pentanone	ND	0.005
Styrene	ND	0.005
1,1,2,2-Tetrachloroethane	ND	0.005
Tetrachloroethene	ND	0.005
Toluene	ND	0.005
1,1,1-Trichloroethane	ND	0.005
1,1,2-Trichloroethane	ND	0.005
Trichloroethene	ND	0.005
Vinyl acetate	ND	0.005
Vinyl chloride	ND	0.005
Xylenes (total)	ND	0.005

ND - Analyte not detected at stated limit of detection

jml

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

QUALITY CONTROL REPORT - METHOD BLANK

EPA METHOD 8240 VOLATILE ORGANIC COMPOUNDS

ADDITIONAL DETECTED COMPOUNDS

Sample ID:	Method Blank	Report Date:	07/06/95
Laboratory ID:	MB0702B	Date Sampled:	07/02/95
Sample Matrix:	Water	Date Analyzed:	07/02/95
		TimE Analyzed:	2:59 PM

Tentative Identification	Retention Time (Minutes)	Concentration (mg/L) *
None detected at reportable levels		

* - Concentration calculated using assumed Relative Response Factor = 1

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
Dibromofluoromethane	103%	86 - 118%
Toluene - d8	98%	88 - 110%
Bromofluorobenzene	92%	86 - 115%

Reference: Method 8240B: 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: * Methylene chloride is a common laboratory contaminate.

Analyst

Review

jml

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

Quality Control Report
Duplicate Analysis

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM
Sample ID: MW - 10
Lab ID: 0495W05730/0695G00976
Matrix: Water
Condition: Intact

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

Parameter	Original Conc.	Duplicate Conc.	Relative % Diff.	PQL	Method
Total Metals					
Total Arsenic	0.009	0.008	6	0.005 mg/L	SW-846 7061A
Total Chromium	0.007	0.007	0	0.005 mg/L	SW-846 7191
Total Lead	ND*	ND*	NC*	0.01 mg/L	SW-846 7421
Total Nickel	ND*	ND*	NC*	0.05 mg/L	SW-846 7520

*ND - Parameter not detected at stated Practical Quantitation Limit.
*NC - Non-Calculable RPD due to value(s) less than PQL

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

Reviewed By:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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

QUALITY CONTROL REPORT
MATRIX SPIKE

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

Analyte	Unspiked Sample Concentration (mg/L)	Spiked Sample Concentration (mg/L)	Spike Amount (mg/L)	Percent Recovery
Total Arsenic	0.159	0.179	0.020	100
Total Chromium	0.008	0.063	0.05	110
Total Lead	ND	0.05	0.05	100
Total Nickel	ND	0.96	1.00	96

Reference: SW-846-"Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", US EPA,Third Edition, Final Update 1,July 1992.

Reviewed by:

Robert Alford
Supervisor, Water Laboratory

jml

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

QUALITY CONTROL REPORT
METHOD BLANK

CLIENT: **Navajo Refining Co.**
PROJECT: **RFI Phase III / Artesia, NM**

Sample ID: Blank W5728-31 **Report Date:** 07/12/95
Sample Matrix: Water

Analyte	Concentration	Units	POL	Method Reference
Total Arsenic	ND	mg/L	0.005	SW-846 7061A
Total Chromium	ND	mg/L	0.005	SW-846 7191
Total Lead	ND	mg/L	0.01	SW-846 7421
Total Nickel	ND	mg/L	0.05	SW-846 7520

ND - Parameter not detected at stated detection limit.

Reference: SW-846-"Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", US EPA,Third Edition, Final Update 1,July 1992.

Reviewed by:

Robert Alford
Supervisor, Water Laboratory

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

Mr. David Boyer
RE/SPEC
4775 Indian School Road NE, Ste. 300
Albuquerque, New Mexico 87110-3927

July 18, 1995

Dear Mr. Boyer,

On June 30, 1995, seven water samples and one trip blank were received, cool and intact, by Inter-Mountain Laboratories - College Station. The samples were identified by project name "RFI Phase III." Analyses for Volatiles by Method 8240, general water chemistry, and Metals were performed as requested on the accompanying chain of custody and the updated analysis request faxed on July 4, 1995.

It is the policy of this laboratory to employ, whenever possible, preparatory and analytical methods which have been approved by regulatory agencies. The methods used in the analysis of the sample reported here are found in "Test Methods for Evaluating Solid Waste", SW-846, USEPA, Final Update I, July 1992. All reports in this package reference the methods utilized.

Methods used for each analysis are listed on the reports. All detection limits are practical quantitation limits (PQLs). PQLs have been corrected for dilutions and sample volume analyzed.

The volatiles analysis was done at our Bozeman, MT lab. The column they use changes the elution of various compounds slightly. Bromofluorobenzene (one of the surrogates) and an unknown peak co-eluted on this column. Surrogate recoveries are high since the ion used for quantitation was also present in the unknown. MW-18 was the only sample without the interference.

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

Sincerely,

Ulonda M Rogers

Ulonda M. Rogers

Enclosures

NAV0981

Inter- Mountain Laboratories, Inc.

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
NAVAJO REFINING CO	ARTESIA, NM
Sampler: (Signature)	**Chain of Custody Tape No.**
W.A. Boyd	

ANALYSES / PARAMETERS

Sample No./ Identification	Date	Time	Lab Number	Matrix	No. of Containers	8240 BTEX + MEK + C32	8270 Full Suite	Metals As Cr Pb Ni	7000 series Water Chem	Remarks
MW-4A	6/29/95	1030	06956009981	Water	6	✓	✓	✓	✓	~~BTEX~~
MW-4C	"	1120	982	"	4	✓		✓	✓	
Pipe Effluent	"	1340	983	"	5	✓	✓	✓	✓	will call w/ Metals
MW-22A	"	1535	984	"	2			✓	✓	
MW-7A	"	1650	985	"	2	✓		✓	✓	
NCL Up Grad Well	6/29/95	1030	986	" Full Suite B240	5	✓	✓	✓	✓	will call w/ Metals
MW-18(NCL)	"	1110	987	" Rush!	2	✓				BTEX ONLY for 8240
Trip Blank	—	—	988	"	2	✓				
										Rec'd. cool intact

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
W.A. Boyd	6/29/95	1330		6/30/95	0900
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by laboratory: (Signature)	Date	Time

Inter-Mountain Laboratories, Inc.

☐ 1633 Terra Avenue Sheridan, Wyoming 82801 Telephone (307) 672-8945	☐ 1714 Phillips Circle Gillette, Wyoming 82716 Telephone (307) 682-8945	☐ 2506 West Main Street Farmington, NM 87401 Telephone (505) 326-4737	☐ 1160 Research Dr. Bozeman, Montana 59715 Telephone (406) 586-8450	☐ 11183 SH 30 College Station, TX 77845 Telephone (409) 776-8945	☒ 3304 Longmire Drive College Station, TX 77845 Telephone (409) 774-4999

25423

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

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.

Analyst

Review

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

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

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

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

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

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:

Analyst

Review

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

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
Total Metals			
Total Arsenic	0.061 mg/L	0.005	SW-846 7061A
Total Chromium	0.006 mg/L	0.005	SW-846 7191
Total Lead	ND*	0.01 mg/L	SW-846 7421
Total Nickel	ND*	0.05 mg/L	SW-846 7520

*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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

jml

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 - 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.

Reviewed By:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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

EPA Method 8240
VOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project :	Artesia, NM	Report Date:	07/18/95
Sample ID:	MW-4C	Date Sampled:	06/28/95
Laboratory ID:	0695G00982	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:	11:45 PM

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Benzene	0.015	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	95%	86 - 118%
Toluene-d8	107%	88 - 110%
Bromofluorobenzene	**1142%**	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

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 - 4C
Lab ID: 0495W05737/0695G00982
Matrix: Water
Condition: Intact

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

Parameter	Concentration	PQL	Method
Total Metals			
Total Arsenic	0.065 mg/L	0.005	SW-846 7061A
Total Chromium	0.006 mg/L	0.005	SW-846 7191
Total Lead	ND*	0.01 mg/L	SW-846 7421
Total Nickel	ND*	0.05 mg/L	SW-846 7520

*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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

jml

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 - 4C
Lab ID: 0495W05737/0695G00982
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)	7.1 s.u.	0.1	SW-846 9040
Conductivity (Lab)	5100 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180° C)	3970 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	233 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	1520 mg/L	1	Calculation
Fluoride	1.3 mg/L	0.1	EPA 340.2

Calcium	355 mg/L	17.71 meq/L	1 mg/L	SW-846 6010A
Magnesium	153 mg/L	12.59 meq/L	1 mg/L	SW-846 6010A
Potassium	2 mg/L	0.05 meq/L	1 mg/L	SW-846 6010A
Sodium	645 mg/L	28.06 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	284 mg/L	4.66 meq/L	1 mg/L	EPA 310.1
Carbonate	ND*	0.00	1 mg/L	EPA 310.1
Chloride	1010 mg/L	28.58 meq/L	1 mg/L	SW-846 9251
Sulfate	1300 mg/L	27.05 meq/L	5 mg/L	SW-846 9036
Major Cation Sum	58.41 meq/L		N/A	Calculation
Major Anion Sum	60.28 meq/L		N/A	Calculation
Cation/Anion Balance	-1.58 % 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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

jml

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

EPA Method 8240
VOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project :	Artesia, NM	Report Date:	07/18/95
Sample ID:	Pipe Effluent	Date Sampled:	06/28/95
Laboratory ID:	0695G00983	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:	12:23 AM

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Benzene	0.047	0.005
Toluene	0.077	0.005
Ethylbenzene	0.032	0.005
m,p-Xylene	0.170	0.005
o-Xylene	0.105	0.005
Methyl ethyl ketone	0.161	0.020
Carbon disulfide	0.006	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	101%	88 - 110%
Bromofluorobenzene	**261%**	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

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

EPA Method 8270
SEMIVOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project:	Artesia, NM	Report Date:	07/03/95
Sample ID:	Pipe Effuent	Date Sampled:	06/28/95
Laboratory ID:	0695G00983	Date Received:	06/30/95
Sample Matrix:	Water	Date Extracted:	06/30/95
Condition:	Intact	Date Analyzed:	07/03/95
Preservative:	Cool	Time Analyzed:	1:50 PM

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
Benzoic acid	ND	0.10
Benzyl alcohol	ND	0.10
Bis(2-chloroethoxy)methane	ND	0.10
Bis(2-chloroethyl)ether	ND	0.10
Bis(2-chloroisopropyl)ether	ND	0.25
Bis(2-ethylhexyl)phthalate	ND	0.25
4-Bromophenyl phenyl ether	ND	0.10
Butyl benzyl phthalate	ND	0.10
p - Chloroaniline	ND	0.10
p - Chloro - m - cresol	ND	0.10
2 - Chloronaphthalene	ND	0.10
2 - Chlorophenol	ND	0.10
4-Chlorophenyl phenyl ether	ND	0.10
Chrysene	ND	0.10
o - Cresol	ND	0.10
m,p - Cresol	ND	0.10
Di - n - butylphthalate	ND	0.25
Dibenz(a,h)anthracene	ND	0.10
o - Dichlorobenzene	ND	0.10
m - Dichlorobenzene	ND	0.10
p - Dichlorobenzene	ND	0.10
3,3 - Dichlorobenzidine	ND	0.10
2,4 - Dichlorophenol	ND	0.10
Diethyl phthalate	ND	0.10
2,4 - Dimethylphenol	ND	0.10
Dimethyl phthalate	ND	0.10

ND - Analyte not detected at stated limit of detection

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

EPA Method 8270
SEMIVOLATILE ORGANIC COMPOUNDS

Client: **NAVAJO REFINING COMPANY**
Project: Artesia, NM
Sample ID: Pipe Effuent
Laboratory ID: 0695G00983

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	0.25
2,4 - Dinitrophenol	ND	0.25
2,4 - Dinitrotoluene	ND	0.10
2,6 - Dinitrotoluene	ND	0.10
Di-n-octyl phthalate	ND	0.25
Fluoranthene	ND	0.10
Fluorene	ND	0.10
Hexachlorobenzene	ND	0.10
Hexachlorocyclopentadiene	ND	0.25
Hexachloroethane	ND	0.10
Hexachlorobutadiene	ND	0.10
Ideno(1,2,3-cd)pyrene	ND	0.10
Isophorone	ND	0.10
2 - Methylnaphthalene	ND	0.10
Naphthalene	ND	0.10
Mono-Naphthalene	ND	0.10
o - Nitroaniline	ND	0.10
m - Nitroaniline	ND	0.10
p - Nitroaniline	ND	0.10
Nitrobenzene	ND	0.10
o - Nitrophenol	ND	0.10
p - Nitrophenol	ND	0.10
n - Nitrosodimethylamine	ND	0.10
n - Nitrosodiphenylamine	ND	0.10
n-Nitroso-di-n-propylamine	ND	0.10
Pentachlorophenol	ND	0.25
Phenanthrene	ND	0.10
Phenol	ND	0.10
Pyrene	ND	0.10
1,2,4 - Trichlorobenzene	ND	0.10
2,4,5 - Trichlorophenol	ND	0.10
2,4,6 - Trichlorophenol	ND	0.10

ND - Analyte not detected at stated limit of detection

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

EPA Method 8270
SEMIVOLATILE HYDROCARBONS
ADDITIONAL DETECTED COMPOUNDS

Client: **NAVAJO REFINING COMPANY**
Project: Artesia, NM
Sample ID: Pipe Effuent
Laboratory ID: 0695G00983

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	4.04	0.3
Hydrocarbon envelope	7 - 30	-

* - Concentration calculated using assumed Relative Response Factor = 1

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
2 - Fluorophenol	45%	21 - 110%
Phenol - d5	47%	10 - 110%
Nitrobenzene - d5	60%	35 - 114%
2 - Fluorobiphenyl	80%	43 - 116%
2,4,6 - Tribromophenol	58%	10 - 123%
Terphenyl - d14	83%	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:

Analyst

Review

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

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM
Sample ID: Pipe Effluent
Lab ID: 0495W05738/0695G00983
Matrix: Water
Condition: Intact

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

Parameter	Concentration	PQL	Method
Total Metals			
Total Arsenic	0.082 mg/L	0.005	SW-846 7061A
Total Chromium	0.009 mg/L	0.005	SW-846 7191
Total Lead	ND*	0.01 mg/L	SW-846 7421
Total Nickel	ND*	0.05 mg/L	SW-846 7520

*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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

jml

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: Pipe Effluent
Lab ID: 0495W05738/0695G00983
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)	2430 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180° C)	1760 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	267 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	521 mg/L	1	Calculation
Fluoride	36.6 mg/L	0.1	EPA 340.2

Calcium	77 mg/L	3.82 meq/L	1 mg/L	SW-846 6010A
Magnesium	80 mg/L	6.59 meq/L	1 mg/L	SW-846 6010A
Potassium	18 mg/L	0.46 meq/L	1 mg/L	SW-846 6010A
Sodium	298 mg/L	12.96 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	326 mg/L	5.34 meq/L	1 mg/L	EPA 310.1
Carbonate	ND*	0.00	1 mg/L	EPA 310.1
Chloride	307 mg/L	8.66 meq/L	1 mg/L	SW-846 9251
Sulfate	493 mg/L	10.26 meq/L	5 mg/L	SW-846 9036
Major Cation Sum	23.83 meq/L		N/A	Calculation
Major Anion Sum	24.26 meq/L		N/A	Calculation
Cation/Anion Balance	-0.89 % 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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

jml

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 - 22A
Lab ID: 0495W05739/0695G00984
Matrix: Water
Condition: Intact

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

Parameter	Concentration	PQL	Method
Total Metals			
Total Arsenic	0.028 mg/L	0.005	SW-846 7061A
Total Chromium	ND*	0.005 mg/L	SW-846 7191
Total Lead	ND*	0.01 mg/L	SW-846 7421
Total Nickel	ND*	0.05 mg/L	SW-846 7520

*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:

Robert Alford
Supervisor, Water Laboratory

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

WATER QUALITY REPORT

Client: Navajo Refining Co.
Project: RFI Phase III / Artesia, NM
Sample ID: MW - 22A
Lab ID: 0495W05739/0695G00984
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)	7.4 s.u.	0.1	SW-846 9040
Conductivity (Lab)	6450 µmhos/cm	1	SW-846 9050
Total Dissolved Solids (180° C)	4740 mg/L	10	EPA 160.1
Total Alkalinity (as CaCO3)	163 mg/L	1	EPA 310.1
Total Hardness (as CaCO3)	1180 mg/L	1	Calculation
Fluoride	1.2 mg/L	0.1	EPA 340.2

Calcium	328 mg/L	16.37 meq/L	1 mg/L	SW-846 6010A
Magnesium	88 mg/L	7.24 meq/L	1 mg/L	SW-846 6010A
Potassium	3 mg/L	0.07 meq/L	1 mg/L	SW-846 6010A
Sodium	1140 mg/L	49.46 meq/L	1 mg/L	SW-846 6010A
Bicarbonate	199 mg/L	3.26 meq/L	1 mg/L	EPA 310.1
Carbonate	ND*	0.00	1 mg/L	EPA 310.1
Chloride	1370 mg/L	38.51 meq/L	1 mg/L	SW-846 9251
Sulfate	1510 mg/L	31.52 meq/L	5 mg/L	SW-846 9036
Major Cation Sum	73.14 meq/L		N/A	Calculation
Major Anion Sum	73.28 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.

Reviewed By:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

jml

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

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

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 - 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
Total Metals			
Total Arsenic	0.022 mg/L	0.005	SW-846 7061A
Total Chromium	ND*	0.005 mg/L	SW-846 7191
Total Lead	ND*	0.01 mg/L	SW-846 7421
Total Nickel	ND*	0.05 mg/L	SW-846 7520

*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:

Robert Alford
Supervisor, Water Laboratory

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

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.

Reviewed By:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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

EPA Method 8240
VOLATILE ORGANIC COMPOUNDS

Client:	**NAVAJO REFINING COMPANY**		
Project :	Artesia, NM	Report Date:	07/18/95
Sample ID:	Trip Blank	Date Sampled:	NA
Laboratory ID:	0695G00988	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:	2:54 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	90%	86 - 118%
Toluene-d8	103%	88 - 110%
Bromofluorobenzene	113%	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.

Analyst

Review

QUALITY CONTROL REPORTS

* *Duplicate Analyses*

* *Matrix Spike Analyses*

* *Method Blank Analyses*

jml

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

QUALITY CONTROL REPORT - METHOD BLANK
EPA METHOD 8240 VOLATILE ORGANIC COMPOUNDS

Sample ID: Method Blank
Laboratory ID: MB0711
Sample Matrix: Water

Report Date: 07/18/95
Date Extracted: 07/11/95
Date Analyzed: 07/11/95
Time Analyzed: 10:29 PM

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
Acetone	ND	0.025
Benzene	ND	0.005
Bromodichloromethane	ND	0.005
Bromoform	ND	0.005
Bromomethane	ND	0.005
2-Butanone (MEK)	ND	0.020
Carbon disulfide	ND	0.005
Carbon tetrachloride	ND	0.005
Chlorobenzene	ND	0.005
Chloroethane	ND	0.010
Chloroform	ND	0.005
Chloromethane	ND	0.010
Dibromochloromethane	ND	0.005
1,1-Dichloroethane	ND	0.005
1,1-Dichloroethene	ND	0.005
trans-1,2-Dichloroethene	ND	0.005
1,2-Dichloroethane	ND	0.005
1,2-Dichloropropane	ND	0.005
cis-1,3-Dichloropropene	ND	0.005
trans-1,3-Dichloropropene	ND	0.005
Ethylbenzene	ND	0.005
2-Hexanone	ND	0.005
Methylene chloride	ND	0.005
4-Methyl-2-pentanone	ND	0.005
Styrene	ND	0.005
1,1,2,2-Tetrachloroethane	ND	0.005
Tetrachloroethene	ND	0.005
Toluene	ND	0.005
1,1,1-Trichloroethane	ND	0.005
1,1,2-Trichloroethane	ND	0.005
Trichloroethene	ND	0.005
Vinyl acetate	ND	0.005
Vinyl chloride	ND	0.005
Xylenes (total)	ND	0.005

ND - Analyte not detected at stated limit of detection

jml

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

QUALITY CONTROL REPORT - METHOD BLANK

EPA METHOD 8240 VOLATILE ORGANIC COMPOUNDS

ADDITIONAL DETECTED COMPOUNDS

Sample ID:	Method Blank	Report Date:	07/18/95
Laboratory ID:	MB0711	Date Extracted:	07/11/95
Sample Matrix:	Water	Date Analyzed:	07/11/95
		Time Analyzed:	10:29 PM

Tentative Identification	Retention Time (Minutes)	Concentration (mg/L) *
None detected at reportable levels		

* - Concentration calculated using assumed Relative Response Factor = 1

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
1,2-Dichloroethane-d4	97%	86 - 118%
Toluene-d8	101%	88 - 110%
Bromofluorobenzene	113%	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.

Analyst

Review

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

QUALITY CONTROL REPORT - MATRIX SPIKE / SPIKE DUPLICATE ANALYSIS

EPA Method 8240 - VOLATILE ORGANICS

Laboratory ID: B955266 Spike and Spike Duplicate
Sample Matrix: Water
Preservative: Cool, HCl
Condition: Intact, pH <2

Report Date: 07/18/95
Date Sampled: NA
Date Received: NA
Date Analyzed: 07/12/95
Time Analyzed: 6:04 AM/6:41 AM

MATRIX SPIKE ANALYSIS

Analyte	Spiked Sample Result (mg/L)	Sample Result (mg/L)	Spike Added (mg/L)	Percent Recovery	QC Limits Recovery
1,1 - Dichloroethene	0.022	ND	0.020	110%	61 - 145
Trichloroethene	0.021	ND	0.020	105%	71 - 120
Benzene	0.023	ND	0.020	115%	76 - 127
Toluene	0.023	ND	0.020	115%	76 - 125
Chlorobenzene	0.022	ND	0.020	110%	75 - 130

MATRIX SPIKE DUPLICATE ANALYSIS

Analyte	Duplicate Result (mg/L)	Percent Recovery	Original Spike Result (mg/L)	RPD	QC Limits RPD	QC Limits Rec.
1,1 - Dichloroethene	0.022	110%	110%	0%	14%	61 - 145
Trichloroethene	0.021	105%	105%	0%	14%	71 - 120
Benzene	0.023	115%	115%	0%	11%	76 - 127
Toluene	0.023	115%	115%	0%	13%	76 - 125
Chlorobenzene	0.023	115%	110%	4%	13%	75 - 130

ND - Analyte not detected at stated limit of detection

Spike Recovery: 0 out of 10 outside QC Limits
RPD: 0 out of 5 outside QC Limits

Quality Control:

Surrogate	Spike Recovery	Duplicate Recovery	Recovery Limits
1,2-Dichloroethane-d4	101%	98%	86 - 118%
Toluene-d8	102%	101%	88 - 110%
Bromofluorobenzene	106%	112%	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.

Analyst

Review

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

QUALITY CONTROL REPORT - METHOD BLANK

EPA Method 8270
SEMIVOLATILE ORGANIC COMPOUNDS

Sample ID:	Method Blank	Report Date:	07/03/95
Laboratory ID:	MB240	Date Extracted:	06/30/95
Sample Matrix:	Water	Date Analyzed:	07/03/95
		Time Analyzed:	9:19 AM

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
Benzoic acid	ND	0.010
Benzyl alcohol	ND	0.010
Bis(2-chloroethoxy)methane	ND	0.010
Bis(2-chloroethyl)ether	ND	0.010
Bis(2-chloroisopropyl)ether	ND	0.025
Bis(2-ethylhexyl)phthalate	ND	0.025
4-Bromophenyl phenyl ether	ND	0.010
Butyl benzyl phthalate	ND	0.010
p - Chloroaniline	ND	0.010
p - Chloro - m - cresol	ND	0.010
2 - Chloronaphthalene	ND	0.010
2 - Chlorophenol	ND	0.010
4-Chlorophenyl phenyl ether	ND	0.010
Chrysene	ND	0.010
o - Cresol	ND	0.010
m,p - Cresol	ND	0.010
Di - n - butylphthalate	ND	0.025
Dibenz(a,h)anthracene	ND	0.010
Dibenzofuran	ND	0.010
o - Dichlorobenzene	ND	0.010
m - Dichlorobenzene	ND	0.010
p - Dichlorobenzene	ND	0.010
3,3 - Dichlorobenzidine	ND	0.010
2,4 - Dichlorophenol	ND	0.010
Diethyl phthalate	ND	0.010
2,4 - Dimethylphenol	ND	0.010
Dimethyl phthalate	ND	0.010

ND - Analyte not detected at stated limit of detection

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

QUALITY CONTROL REPORT - METHOD BLANK

EPA Method 8270

SEMIVOLATILE ORGANIC COMPOUNDS (cont)

Sample ID: Method Blank
Laboratory ID: MB240

Report Date: 07/03/95
Date Analyzed: 07/03/95

Analyte	Concentration (mg/L)	Detection Limit (mg/L)
4,6 - Dinitro -2- methylphenol	ND	0.025
2,4 - Dinitrophenol	ND	0.025
2,4 - Dinitrotoluene	ND	0.010
2,6 - Dinitrotoluene	ND	0.010
Di-n-octyl phthalate	ND	0.025
Fluoranthene	ND	0.010
Fluorene	ND	0.010
Hexachlorobenzene	ND	0.010
Hexachlorocyclopentadiene	ND	0.025
Hexachloroethane	ND	0.010
Hexachlorobutadiene	ND	0.010
Ideno(1,2,3-cd)pyrene	ND	0.010
Isophorone	ND	0.010
2 - Methylnaphthalene	ND	0.010
Naphthalene	ND	0.010
o - Nitroaniline	ND	0.010
m - Nitroaniline	ND	0.010
p - Nitroaniline	ND	0.010
Nitrobenzene	ND	0.010
o - Nitrophenol	ND	0.010
p - Nitrophenol	ND	0.010
n - Nitrosodimethylamine	ND	0.010
n - Nitrosodiphenylamine	ND	0.010
n-Nitroso-di-n-propylamine	ND	0.010
Pentachlorophenol	ND	0.025
Phenanthrene	ND	0.010
Phenol	ND	0.010
Pyrene	ND	0.010
1,2,4 - Trichlorobenzene	ND	0.010
2,4,5 - Trichlorophenol	ND	0.010
2,4,6 - Trichlorophenol	ND	0.010

ND - Analyte not detected at stated limit of detection

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

QUALITY CONTROL REPORT - METHOD BLANK

EPA Method 8270
SEMIVOLATILE HYDROCARBONS

ADDITIONAL DETECTED COMPOUNDS

Sample ID:	Method Blank	Report Date:	07/03/95
Laboratory ID:	MB240	Date Analyzed:	07/03/95

Tentative Identification	Retention Time (Minutes)	Concentration* (mg/L)
None detected at reported limits of detection.		

* - Concentration calculated using assumed Relative Response Factor = 1

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
2 - Fluorophenol	44%	21 - 110%
Phenol - d5	42%	10 - 110%
Nitrobenzene - d5	61%	35 - 114%
2 - Fluorobiphenyl	82%	43 - 116%
2,4,6 - Tribromophenol	54%	10 - 123%
Terphenyl - d14	105%	33 - 141%

References:

Method 3510: Separatory Funnel Liquid-Liquid Extraction.
Method 8270B: 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:

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

QUALITY CONTROL REPORT - METRIX SPIKE

EPA Method 8270

SEMIVOLATILE ORGANIC COMPOUNDS

Sample ID:	Matrix Spike	Report Date:	07/03/95
Laboratory ID:	0694G00981	Date Sampled:	06/28/95
Sample Matrix:	Water	Date Received:	06/30/95
Condition:	Intact	Date Extracted:	06/30/95
Preservative:	Cool	Date Analyzed:	07/03/95
		Time Analyzed:	1:04 PM

Analyte	Spike Concentration (mg/L)	Sample Concentration (mg/L)	Spike Added (mg/L)	Percent Recovery (%)	QC Limits
Phenol	0.126	ND	0.200	63%	5 - 112%
2 - Chlorophenol	0.133	ND	0.200	67%	23 - 134%
1,4 - Dichlorobenzene	0.060	ND	0.100	60%	20 - 124%
n-Nitroso-di-propylamine	0.079	ND	0.100	79%	D - 230%
1,2,4 - Trichlorobenzene	0.064	ND	0.100	64%	44 - 142%
4-Chloro-3-methylphenol	0.147	ND	0.200	74%	22 - 147%
Acenaphthene	0.080	ND	0.100	80%	47 - 145%
4 - Nitrophenol	0.111	ND	0.200	56%	D - 132%
2,4 - Dinitrotoluene	0.071	ND	0.100	71%	39 - 139%
Pentachlorophenol	0.157	ND	0.200	79%	14 - 176%
Pyrene	0.084	ND	0.100	84%	52 - 115%

ND - Analyte not detected at stated limit of detection

Spike Recovery: 0 of 11 recoveries outside acceptable limits.

Quality Control:

Surrogate	Percent Recovery	Acceptance Limits
2 - Fluorophenol	45%	21 - 110%
Phenol - d6	51%	10 - 110%
Nitrobenzene - d5	65%	35 - 114%
2 - Fluorobiphenyl	84%	43 - 116%
2,4,6 - Tribromophenol	63%	10 - 123%
Terphenyl - d14	89%	33 - 141%

Reference: 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:

Analyst

Review

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

Quality Control Report
Duplicate Analysis

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	Original Conc.	Duplicate Conc.	Relative % Diff.	PQL	Method
pH (Lab)	7.2	7.2	0	0.1 s.u.	SW-846 9040
Conductivity (Lab)	12000	12000	0	1 µmhos/cm	SW-846 9050
Total Dissolved Solids (180° C)	8960	8960	0	10 mg/L	EPA 160.1
Total Alkalinity (as CaCO3)	287	287	0	1 mg/L	EPA 310.1
Total Hardness (as CaCO3)	2310	2320	0	1 mg/L	Calculation
Fluoride	1.5	1.6	3	0.1 mg/L	EPA 340.2
Calcium	383	383	0	1 mg/L	SW-846 6010A
Magnesium	330	331	0	1 mg/L	SW-846 6010A
Potassium	6	5	9	1 mg/L	SW-846 6010A
Sodium	2290	2280	0	1 mg/L	SW-846 6010A
Bicarbonate	350	350	0	1 mg/L	EPA 310.1
Carbonate	ND*	ND*	NC*	1 mg/L	EPA 310.1
Chloride	2500	2540	1	1 mg/L	SW-846 9251
Sulfate	3410	3400	0	5 mg/L	SW-846 9036
Major Cation Sum	146.03	145.74	0	meq/L	Calculation
Major Anion Sum	147.17	147.95	0	meq/L	Calculation
Cation/Anion Balance	-0.39	-0.75		% Diff	Calculation

*ND - Parameter not detected at stated Practical Quantitation Limit.
*NC - Non-Calculable RPD due to value(s) less than PQL

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:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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

Quality Control Report
Duplicate Analysis

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	Original Conc.	Duplicate Conc.	Relative % Diff.	PQL	Method
Total Metals					
Total Arsenic	0.022	0.021	2	0.005 mg/L	SW-846 7061A
Total Chromium	ND*	ND*	NC*	0.005 mg/L	SW-846 7191
Total Lead	ND*	ND*	NC*	0.01 mg/L	SW-846 7421
Total Nickel	ND*	ND*	NC*	0.05 mg/L	SW-846 7520

*ND - Parameter not detected at stated Practical Quantitation Limit.
*NC - Non-Calculable RPD due to value(s) less than PQL

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:

Robert Alford
Supervisor, Water Laboratory

jml

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

QUALITY CONTROL REPORT
MATRIX SPIKE

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: 06/26/95
Sample Date: 06/21/95

Analyte	Unspiked Sample Concentration (mg/L)	Spiked Sample Concentration (mg/L)	Spike Amount (mg/L)	Percent Recovery
Total Arsenic	0.061	0.073	0.010	120
Total Chromium	0.005	0.06	0.05	110
Total Lead	ND	0.06	0.05	120
Total Nickel	ND	1.03	1.00	103

Reference: SW-846-"Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", US EPA,Third Edition, Final Update 1,July 1992.

Reviewed by:

Robert Alford

Robert Alford
Supervisor, Water Laboratory

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

QUALITY CONTROL REPORT
METHOD BLANK

CLIENT: **Navajo Refining Co.**
PROJECT: **RFI Phase III / Artesia, NM**

Sample ID: Blank W5736-41 **Report Date:** 07/13/95
Sample Matrix: Water

Analyte	Concentration	Units	POL	Method Reference
Total Arsenic	ND	mg/L	0.005	SW-846 7061A
Total Chromium	ND	mg/L	0.005	SW-846 7191
Total Lead	ND	mg/L	0.01	SW-846 7421
Total Nickel	ND	mg/L	0.05	SW-846 7520

ND - Parameter not detected at stated detection limit.

Reference: SW-846-"Test Methods for Evaluating Solid Waste: Physical/Chemical Methods", US EPA,Third Edition, Final Update 1,July 1992.

Reviewed by:

Robert Alford
Supervisor, Water Laboratory

APPENDIX G

APPENDIX G

Groundwater Risk Assessment, Pond 1 CMS Workplan, 8/31/95

3.3 Assessment of Potential For Future Site Usage

As discussed above, the most comprehensive guidance currently available to EPA indicates that the Pond 1 soils pose no apparent threat to the surrounding environment, or to human health on the basis of reasonable exposure scenarios. Notwithstanding the level of contaminant concentrations in the soil, a key component of establishing the overall human health risk posed by environmental contamination is consideration of the potential for exposure to the various contaminated environmental media. In this regard, it is essential to evaluate the potential future land usage of the Navajo Evaporation Ponds system and adjoining properties.

3.3.1 Potential for Future Industrial Use

The property where Pond 1 is located is dedicated to a specific industrial purpose. In a larger context, the selection of that particular site location can be considered to have arisen as a result of: the history of oil exploration and production in the region; the random nature of human business dealings; and, most directly, the unique geography of the local Artesia area. As such, the use of the subject property for an industrial function represents a highly unique event. For this reason alone, it must be considered extremely improbable that this particular location will again be utilized as an industrial site. As discussed below, there are also other, more compelling reasons associated with the physical setting of the site which greatly reduce the possibility that an alternative industrial use for the site will occur. Subsequent to discontinuation of operations and final closure of the pond system, there is no reasonable likelihood that future land usages at the property could result in significant human exposure via activities associated with industrial occupation.

3.3.2 Potential for Future Residential Use

In a residential land use scenario, potential exposure to environmental contaminants of concern associated with former operations at Pond 1 would occur primarily from direct exposure to contaminated soils and consumption of contaminated groundwater. However, due to factors described in the following sections, it is considered highly improbable that human exposure to contaminants at ingestion rates even remotely approaching those currently established for residential exposure scenarios will ever occur.

3.3.2.1 Local Demographics

The Navajo evaporation pond system is located several miles east of the city of Artesia. The population of the city of Artesia reached its current historical peak over thirty years ago around the time of the 1960 U.S. Population Census when the town recorded an official population of 12,000 inhabitants. Population trends since that time, as characterized by subsequent U.S. Census Bureau surveys, are as follows: 1970 - 10,315; 1980 - 10,385; 1990 - 10,610. It is evident that for the past 20 years, the city of Artesia has exhibited a relatively stable population base. While demographic data for the U.S. as a whole indicates significant population growth, no signifying demographic or economic trends or events have been identified to suggest that Artesia and surrounding areas either are, or will soon be, subject to rapid population expansion

that would in turn generate social and economic pressures for the subject property to be converted to residential land use.

3.3.2.2 Groundwater Suitability for Human Consumption

As was demonstrated by the Phase I and Phase II RFI studies, groundwater unimpacted by the ponds is non-potable. For example, TDS for several off-gradient wells (EPA-1, Pond Windmill, and MW-24 east of the river) range from 3,570 to 11,600 mg/l (Table 3-2). Two downgradient wells believed unimpacted by pond seepage (MW-18A and MW-19) have TDS concentrations of 5,720 and 12,600 mg/l, respectively. These naturally occurring high-salt concentrations make groundwater unacceptable for human consumption without significant and costly treatment such as distillation and reverse osmosis.

Table 3-2 Major Constituent Ion Concentrations in Naturally Occurring Groundwater in the Vicinity of the Navajo Refinery Evaporation Ponds

Well ID	Sample Date	TDS (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Chloride (mg/l)	Sulfate (mg/l)
EPA-1	10/90	3,570	N/A	N/A	950	1,220
	11/92	3,750	176	480	989	1,420
Pond Windmill	11/29	4,740	180	872	1,190	1,780
	11/94	4,260	165	697	1,130	1,440
MW-18A	11/92	12,600	664	2,420	3,930	3,950
	11/94	17,700	956	3,980	5,790	4,880
MW-19	11/92	5,720	226	718	1,370	1,950
	11/94	5,360	216	661	1,170	2,020
MW-24	11/92	11,600	240	2,500	4,170	2,910
Pecos River	11/92	5,110	186	733	1,470	1,660
	11/94	4,610	164	696	1,280	1,460

Water Quality Standards and Notes:

1. TDS: 500 mg/l (SMCL), 1,000 mg/l (NMWQCC)
2. Magnesium: 100 mg/l @ 5 liter/day (USAMRDC), 150 mg/l (WHO)
3. Sodium: 20 mg/l (DWEL), 100 mg/l (NAS)
4. Chloride: 250 mg/l (SMCL, NMWQCC), 600 mg/l (USAMRDC)
5. Sulfate: 250 mg/l (SMCL), 300 mg/l @ 5 liter/day (USAMRDC), 500 mg/l (proposed PMCL) 600 mg/l (NMWQCC), 630 mg/l (LOAEL)
6. Abbreviations: DWEL - EPA Drinking Water Equivalent Level; LOAEL - EPA Lowest Observable Adverse Effects Level; N/A - No analysis; NAS - National Academy of Sciences; NMWQCC - New Mexico Water Quality Control Commission; PMCL - EPA proposed Primary Maximum Contaminant Level, SMCL - EPA Secondary Maximum Contaminant Level; TDS - Total Dissolved Solids; USAMRDC - U.S. Army Medical Research and Development Command; WHO - World Health Organization.
7. Table data is from Navajo Phase I, Phase II and Phase III RFI Reports

Several constituents naturally occurring in groundwater in the vicinity of the evaporation ponds contribute to the unsuitability of untreated water for domestic consumption. Additionally, the total of these dissolved constituents, or TDS, produce adverse health effects by contributing to dehydration of body tissues either directly through osmotic effects after ingestion, or by refusal of individuals to drink the water because of the salty taste. The effects of the individual constituents and total salt concentrations on human health are discussed individually below.

Magnesium

Reported magnesium concentrations in background-quality groundwater in the vicinity of the Navajo Evaporation Ponds range from 176 to 664 mg/l. Health effects of elevated concentrations of magnesium include catharsis and voluntary and involuntary dehydration. In clinical medicine, a dose of 480 mg is recommended to induce laxative effects (USAMRDC, 1988). Above 100 mg/l, there is increasing susceptibility to dehydration due to increasing laxative effects with water intake. Also, voluntary dehydration may occur as a result of rejection of water due to taste. Although the World Health Organization's recommended limit is 150 mg/l, magnesium at concentrations less than that value impart astringent taste that make water less palatable (NAS, 1977a).

Sodium

Reported sodium concentrations in background-quality groundwater in the vicinity of the Navajo Evaporation Ponds range from 480 to 2,500 mg/l. Excessive sodium intake is linked to the development of hypertension. However, sodium in water usually provides only a small portion of sodium found in the diet. Commonly, for taste reasons, sodium is added to foods during processing, in home cooking, and at the table. Habitual intake bears no relationship to physiological need, but can be detrimental to individuals susceptible to hypertension through genetics, hormones, diet, or stress. An estimated 15 to 20 percent of the healthy American population is at risk of developing hypertension while about 3 percent is on a sodium restricted diet. A small portion of the population is on a severely restrictive diet that limits sodium content in water to 20 mg/l (NAS, 1977a). A more important limitation on use of sodium rich water is its impact on potability due to taste when, combined with the anions chloride and sulfate, elevated levels lead to rejection due to taste or possible dehydration due to internal osmotic effects of salt fluids on the human body.

Chloride

Reported chloride concentrations in background-quality groundwater in the vicinity of the Navajo Evaporation Ponds range from 950 to 4,170 mg/l. The major impacts of ingestion of high chloride water are its laxative effects and hypertension at higher concentrations, voluntary dehydration resulting from rejection of water due to taste, and involuntary dehydration resulting from loss of body fluids due to the process of osmoregulation in the digestive tract. At increasing concentrations above 600 mg/l, a greater proportion of the population is likely to refuse to drink the water because of taste. At concentrations above 1,200 mg/l, the water was judged so objectionable that it would be rejected leading to voluntary dehydration (USAMRDC, 1988). Laxative effects and osmoregulation effects are reported to occur at concentration levels three to four times higher than concentrations which lead to voluntary dehydration. Hypertension effects have been reported when sodium is the cation ion in solution with chloride.

Sulfate

Reported sulfate concentrations in background-quality groundwater in the vicinity of the Navajo Evaporation Ponds range from 1,010 to 3,950 mg/l. Elevated concentrations of sulfate, in combination with either sodium or magnesium, lead to increased laxative effects in water which may be used for drinking. Medical studies report that a 15-gram dose of Epsom salt ($MgSO_4 \cdot 7H_2O$) or Glauber's salt ($NaSO_4 \cdot 10H_2O$) will produce a cathartic response within three hours or less. A single five-gram dose of Epsom salt or Glauber's salt was reported to produce a significant laxative effect (USAMRDC, 1988). The latter level of Epsom or Glauber's salt (i.e., 1,950- or 1,450-mg dose of sulfate, respectively) are equivalent to the ingestion of two liters of water per day with sulfate concentrations ranging from about 700 to 1,000 mg/l. By comparison, the minimum concentration of sulfate in groundwater in the vicinity of the ponds is about 1,200 to 1,400 mg/l in EPA-1. More recently, in soliciting comments relating to a proposed maximum concentration limit goal (MCLG) for sulfate, EPA reported a concentration of 630 mg/l as the lowest observable adverse effect level in humans, in this case infant diarrhea (55 FR 30383, July 25, 1990). EPA has subsequently proposed a primary Maximum Contaminant Level for sulfates in drinking water of 500 mg/l (FR 59:65578, 12/20/94).

Total Dissolved Solids

Collectively, the sum of the individual salt constituents dissolved in water is referred to as total dissolved solids (TDS). Reported TDS concentrations in background-quality groundwater in the vicinity of the Navajo Evaporation Ponds range from 3,570 to 12,600 mg/l. Various authors have categorized waters above 1,000 mg/l as either brackish or saline. Davis and DeWiest (1966) categorize waters between 1,000 and 10,000 mg/l as brackish. Hem (1992) classifies water between 3,000 and 10,000 mg/l as moderately saline. Either classification is appropriate for the naturally occurring water found in the vicinity of the evaporation ponds.

The health impact of individual cations and anions has been presented above. Health risks due to elevated concentrations of TDS similarly occur in two general categories: the risk of dehydration caused by refusal to drink water and the possibility of laxative effects. Although some populations can tolerate TDS levels exceeding 2,000 mg/l if acclimated, one study estimates that 18 percent of the population will reject water as objectionable due to taste at that concentration. Although increasingly higher percentages of the population reject water with TDS above 2,000 mg/l due to taste, dehydration due to laxative effects becomes an increasing concern. At a concentration of 3,600 to 3,800 mg/l TDS, well EPA-1 (which represents the lowest reported TDS value among the background groundwater wells) contains sufficient sulfate and other ion concentrations to cause laxative effects which could lead to dehydration due to loss of body fluids.

To summarize, the concentration of natural salts in the groundwater in the vicinity of the evaporation ponds are above all current acceptable standards. At a minimum, this renders the water non-potable due to taste. Additionally, the untreated water contains elevated levels of naturally occurring constituents that can lead to serious health effects such as dehydration which results from the loss of bodily fluids as a result of laxative action of the water. Because the water is non-potable, extensive treatment would need to be performed by a potential user to remove elevated levels of salts prior to human consumption. Such point-of-use treatment would also act to remove any contaminants introduced into the groundwater by the evaporation ponds.

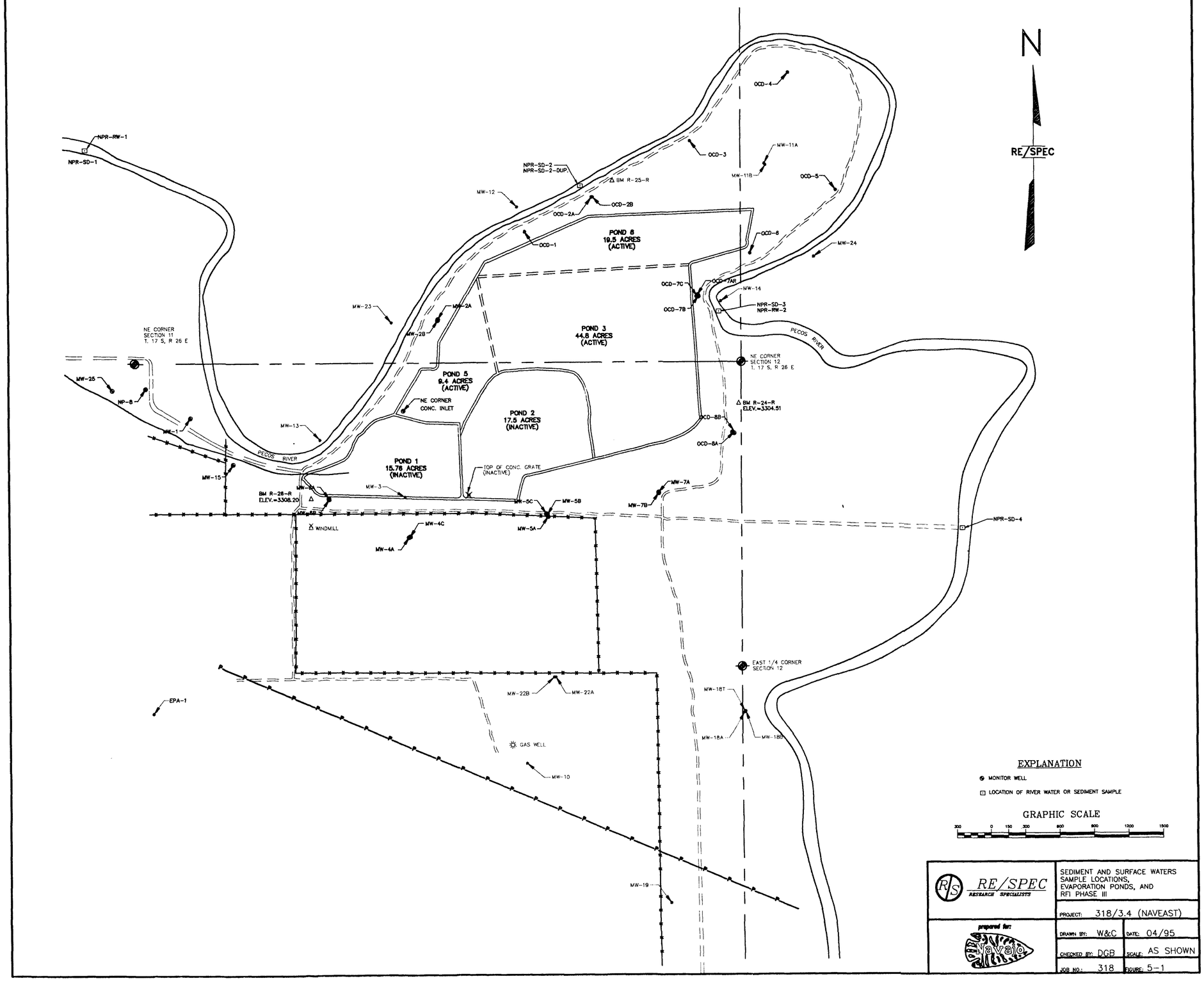
3.3.2.3 Site Suitability for Residential Habitation

The land area adjacent to and downgradient from the evaporation ponds, including inactive Pond 1, is subject to relatively frequent flooding by the Pecos River. Though the ponds themselves are protected by dikes from inundation by the 100-year flood, surrounding agricultural grazing land has no such protection. The Pecos River is deeply incised in a meander channel in the vicinity of the ponds and is somewhat restricted from changes in direction during flood events by thick growths of saltcedar along each bank. When the river floods, it overtops the restrictive channel in the vicinity of the northwest corner of Pond 1 and flows southerly via overland flow and exits the area via large box culverts beneath U.S. Highway 82 (Figure 1-1).

The Federal Emergency Management Agency (FEMA) has published flood insurance maps for much of the United States to use in administrating the National Flood Insurance Program. Among other features, the maps show areas of special flood hazards including the area subject to an 100-year flood. The maps, together with a review of other related information, should be used prior to purchase of property or construction. Map 350120 0200B (Eddy County, unincorporated areas) effective February, 1991, shows the Navajo evaporation ponds to be within an area inundated by at least an 100-year flood. The map shows the pond system lying in the approximate center of the 100-year flood zone (Figure 3-1), with the western boundary of the zone lying approximately 4,000 ft. west of Pond 1.

Additional information was obtained from U.S. government records to determine the frequency of flooding in the immediate proximity of the ponds. From 1905 through the present, the U.S. Geological Survey (USGS) has maintained a water discharge gauge at the Highway 82 crossing of the Pecos River (Station 08396500). This location is approximately 6,000 ft. southeast of Pond 1. The station documents flow and water quality for a 15,300 square-mile drainage area. Yearly water discharge records list average daily flow, and maximum and minimum flow for the year together with water level elevations (gage heights). The published data (Cruz et al., 1994) also includes dates, discharge and elevations of base floods above 2,000 cubic ft. per second (cfs) for each water year (October 1 to September 30).

In 1981 the gage was moved upstream 250 ft. and the stage-discharge relationship recalculated by the USGS. For the CMS, information in published records and received from the agency's Carlsbad office were used to evaluate at what elevation and flow the river overtopped its incised channel. River stage was graphically plotted versus discharge. An abrupt change in slope was noted at a river stage of about 11.1 to 11.2 ft. and at a flow of approximately 2,000 cfs (Figure 3-2). This change in slope is interpreted as the height at which the river overtops the channel and water moves via overland flow over a much broader area. The graph shows that the 2,000 cfs value, chosen by the USGS after evaluation of earlier flood events, continues to be a valid lower limit above which flooding occurs in the vicinity of the evaporation ponds.



RE/SPEC
RESEARCH SPECIALISTS

prepared for:
Navajo

SEDIMENT AND SURFACE WATERS SAMPLE LOCATIONS, EVAPORATION PONDS, AND RFI PHASE III

PROJECT: 318/3.4 (NAVEAST)	
DRAWN BY: W&C	DATE: 04/95
CHECKED BY: DGB	SCALE: AS SHOWN
JOB NO.: 318	FIGURE: 5-1

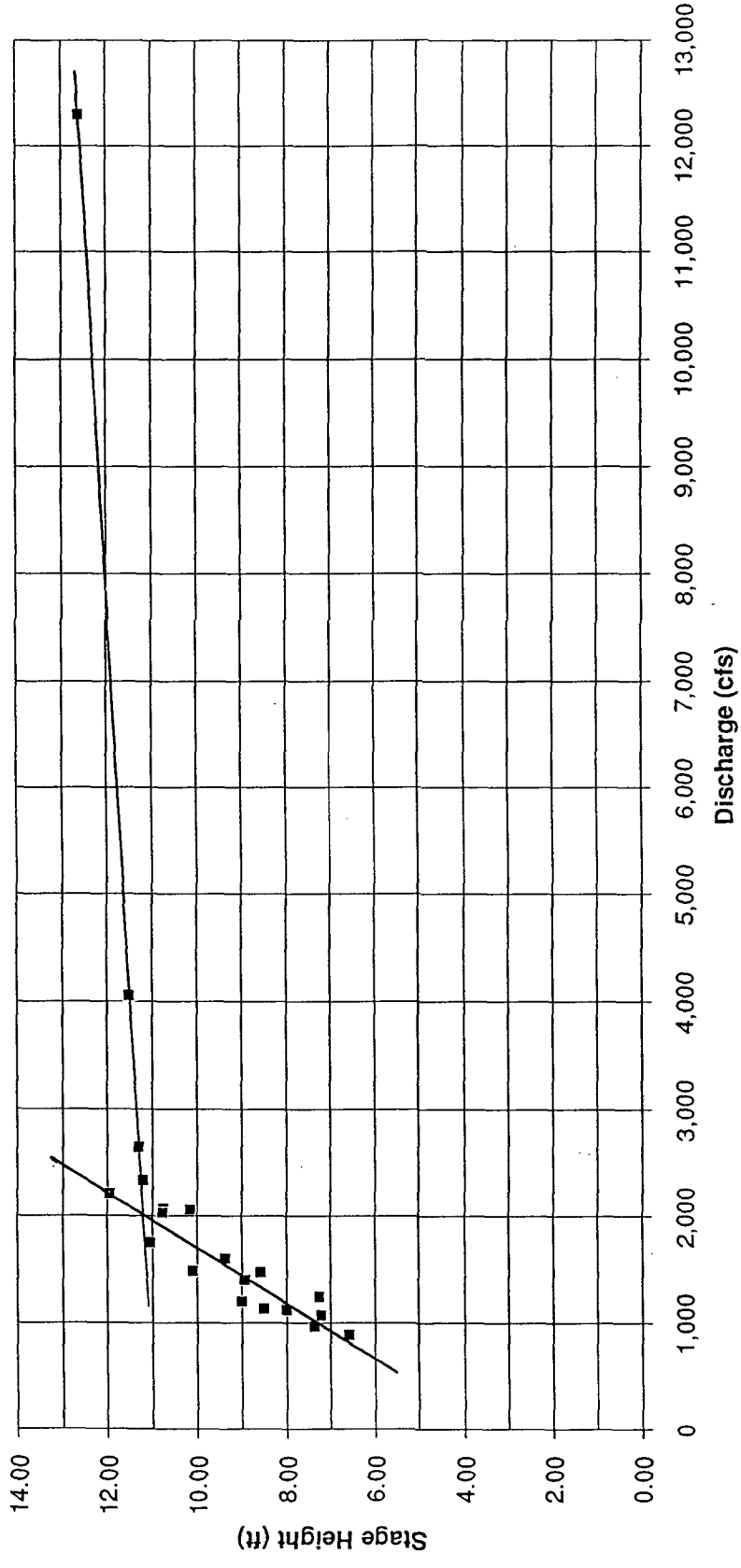


Figure 3-2. Stage-Discharge Relationship, 1981-1993

Records for water years 1964 through 1993 were researched and examined to determine the frequency and severity of flooding along this reach of the river. Records for earlier years provide historical perspective, but upstream dams have been constructed for flood control. The most recent major project completed was the Two Rivers Reservoir on tributary arroyos southwest of Roswell in July of 1963. Table 3-3 provides information on yearly maximum discharge and floods greater than 2,000 cfs at the Artesia gage for water years subsequent to completion of the Two Rivers Reservoir.

Figure 3-3 is a table showing maximum annual river discharge at the station and floods discharging greater than 2,000 cfs. During the 30-year time period under discussion, 30 flood events with a peak discharge greater than 2,000 cfs were recorded at the gauging station. During the past ten years, five events greater than 2,000 cfs were recorded. Even with increased flood control construction on river tributaries, the June 1986 flood at 12,300 cfs was the largest flood in the period of record researched for this report.

In summary, the historical hydrologic evidence demonstrates that the area downgradient from the evaporation ponds is prone to frequent and significant flooding even subsequent to flood control measures. No further flood control efforts are known to be planned in the vicinity of the ponds. No residential housing (including farm and ranch structures) are currently located downgradient from the ponds. Because of the documented frequent flooding potential, it is extremely unlikely that any residential housing will be constructed, and no domestic use of the groundwater will occur, irrespective of its natural quality. Therefore, there is no potential future human exposure to any water contaminants that may be present in groundwater due to seepage from Navajo's evaporation pond, and no risk to human population by this exposure pathway.

3.3.3 Potential for Future Agricultural Use

The Navajo evaporation pond system and surrounding property is situated inside a large west-to-south running bend of the Pecos River and is contained within the boundaries of the 100-year flood plain. Soils in this area are too saline for commercial-scale agricultural crop production and quality irrigation water is unavailable. Furthermore, the area is prone to periods of frequent and prolonged inundation from river overflow, which would severely disrupt any form of agricultural crop production (Section 3.3.2.3). Due to these factors, the property surrounding the Navajo ponds is utilized exclusively as open rangeland for livestock grazing, and open rangeland represents the only feasible usage of the Pond 1 site at a future time.

3.4 Human Health Risk Assessment for Pond 1 Soils and Groundwater

For this CMS plan, EPA has required that a human health risk assessment (RA) be conducted for organic and inorganic constituents contained in Pond 1 soils and groundwater. Specifically, an RA based on a residential exposure scenario involving human ingestion of contaminated surface soils, using RFI Phase II trench soil sample data obtained from the 0-1 ft. sample interval at four trenches (EP-TR-01, 02, 03, and 06) has been specified by the agency.

Table 3-3 Maximum Discharge Records and Floods Greater Than 2,000 Cubic Feet Per Second (cfs), Artesia Gage, Water Years 1964 - 1993

Water Year	Discharge (cfs)	Gage Height (ft)	Date	USGS Comment
1964	5,200	6.80	14-Jun-64	Flow bypassed gage
1965	4,700	12.34	30-Jul-65	Flow bypassed gage
1966	2,200	8.94	20-Jun-66	
1966	7,000	12.42	24-Aug-66	Flow bypassed gage
1967	2,300	9.48	30-May-67	
1967	2,060	8.80	17-Aug-67	
1968	4,000	12.30	7-Jul-68	
1969	3,360	12.26	12-Sep-69	
1969	3,580	12.31	19-Sep-69	
1970	2,050	- -	26-Jul-70	
1970	3,050	11.93	18-Sep-70	
1971	1,690	8.57	13-Aug-71	
1972	2,780	11.11	21-Jul-72	
1972	3,100	11.82	30-Aug-72	
1972	2,300	10.38	3-Sep-72	
1972	3,800	12.25	10-Sep-72	
1972	2,290	10.90	14-Sep-72	
1972	2,260	10.85	16-Sep-72	
1973	2,060	9.62	18-May-73	
1974	6,500	12.40	24-Sep-74	Flow bypassed gage
1974	4,300	- -	24-Oct-74	Flow bypassed gage
1976	4,300	12.20	24-Oct-75	Flow bypassed gage
1976	931	6.54	5-Aug-76	
1977	2,380	11.34	1-Sep-77	
1978	2,930	11.85	29-Jun-78	
1979	1,180	7.57	14-Jun-79	
1980	1,670	9.00	12-Sep-80	
1981	1,080	7.21	13-Aug-81	
1982	2,070	10.15	15-Sep-82	
1983	895	6.59	16-May-83	
1984	2,080	10.76	4-Nov-83	
1984	2,220	11.94	13-Aug-84	
1985	1,480	8.59	19-Jun-85	
1986	12,300	12.61	27-Jun-86	
1987	1,210	9.00	25-May-87	
1988	1,130	7.99	24-Sep-88	
1989	1,140	8.51	14-May-89	
1990	975	7.38	17-Aug-90	
1991	2,347	11.22	17-Jul-91	
1991	4,060	11.50	18-Jul-91	
1991	2,040	10.77	16-Aug-91	
1992	1,250	7.26	2-Jun-92	
1993	1,490	10.10	22-Jul-93	

Figure 3-3 Maximum Annual Discharge and Floods Greater than 2000 Cubic Feet Per Second, Artesia Gage, Water Years 1964-1993

The baseline RA described in the following sections has been conducted in general accordance with the guidance and methods described in the document entitled *Risk Assessment Guidance for Superfund: Vol. I, Human Health Evaluation Manual (Part A)* (EPA, 1989a).

3.4.1 Data Collection and Evaluation

Data reviewed for use in the RA for Pond 1 soils was obtained from the *RCRA Facility Investigation TMD and Evaporation Ponds, Phase II, (Revised)* report (KWBES, 1993). Data reviewed for use in the RA for groundwater in the vicinity of the unit came from the *RFI Phase I Report (Second Submittal)*, Mariah Associates, Inc., December, 1990 as well as the Phase II report.

Pond 1 soil analytical data for inorganic and organic constituents obtained from the from the RFI Phase II and employed in the RA is presented in Tables 3-4 and 3-5, respectively. Four of the five inorganic constituents of concern (arsenic, chromium, nickel, and zinc), were included in the RA evaluation. For volatile organic constituents, only those constituents detected at one or more of the designated soil sample location intervals were included for evaluation.

Potential human health risks posed by lead contaminants in Pond 1 soils were not quantified in the RA, since EPA currently considers it inappropriate to develop numerical estimates for either the RfD or oral slope factor parameters for this constituent. However, potential environmental risk posed by lead in Pond 1 soils was discussed in detail in Section 3.2, and the maximum soil concentration value for lead in Pond 1 soil samples obtained from the 0-1 ft. interval for the four sample locations of interest was 389 mg/kg, and the average value was 177 mg/kg. EPA's integrated exposure uptake model (IEUBK) defines a human blood lead concentration level not to exceed 10 ug/deciliter and a 95th-percentile population distribution to protect the most sensitive exposed individuals. Based on that criteria and standard exposure assumptions, the IEUBK establishes a permissible soil lead concentration of 400 mg/kg. Since the maximum observed lead concentration in Pond 1 soils is less than that value, and since average soil concentrations are significantly less than that value, the exclusion of lead from the current RA is not considered to be crucial to the evaluation.

Table 3-4 Summary of Pond 1 Soil Sampling Data for Total Metals (mg/kg)

Location	Arsenic	Chromium	Lead	Nickel	Zinc
EP-1	26.1	74	389	21	54
EP-2	38.6	1011	93	37	303
EP-3	22.6	633	73	14	434
EP-6	39.9	235	153	37	161

Table 3-5 Summary of Pond-1 Soil Sampling Data for Organic Constituents (mg/kg)

Constituent	Sample Location				
	EP-TR-01	EP-TR-02	EP-TR-03	EP-TR-06	
Volatile Organics(1)					**Maximum Value:**
Acetone	0.387	<0.391	<0.061	<0.263	0.387
Benzene	0.030	<0.196	<0.031	<0.132	0.030
Ethylbenzene	0.443	0.590	0.101	<0.132	0.590
Methylene chloride	<0.028	<0.196	0.076	<0.132	0.076
Toluene	0.622	0.376	0.114	0.147	0.622
Xylenes (total)	2.050	1.570	0.264	<0.132	2.050
Semivolatile Organics(2)					half - average(3)
Benzo(g,h,i)perylene	<80	<890	<6.0	<220	150
Benzo(a)pyrene	<80	<890	<6.0	<220	150
Chrysene	<80	<890	<6.0	<220	150
Dibenzofuran	<80	<890	<6.0	<220	150
2,4-Dimethylphenol	<80	<890	<6.0	<220	150
Fluorene	<80	<890	<6.0	<220	150
Naphthalene	<80	<890	<6.0	<220	150
2-Methylnaphthalene	<80	<890	<6.0	<220	150
Phenanthrene	<80	<890	8.0	<220	150
Pyrene	<80	<890	<6.0	<220	150

Notes:
(1) Only constituents detected in one or more samples are reported.
(2) Includes all constituents detected at any depth for total semivolatile and TCLP-semivolatile analyses.
(3) Average of 1/2 detection limit values.

Based on EPA specifications for data to be used in the assessment, environmental monitoring data for four soil samples and four groundwater groundwater samples were used in the RA. Due to the limited size of the data set, calculation of a 95% Upper Confidence Level for the arithmetic average of sample constituent concentrations was not appropriate. Considering the limited nature of the data set and the general inability to derive valid statistics for use in the RA, it was decided that the maximum values obtained for each inorganic and organic constituent would be used for the RA.

Assessment of semivolatile constituents was hampered by an absence of appropriate data. For the most part, semivolatile data presented in the final RFI Phase II report had sample detection limits which were too high to determine whether those constituents were present at levels of potential concern. In their review of the original submittal of the Pond 1 CMS Workplan, EPA

requested that the analytical results for split samples obtained by EPA contractors during the RFI Phase II field activities be used in the soils RA. However, it was subsequently discovered that split samples were not obtained for the locations of interest at the 0-1 foot sample interval. To address this shortcoming, it was decided to devise a conservative worst-case approach. For the sample locations of interest, all hazardous semivolatile constituents reported at any sample interval were compiled, including those reported in both total semivolatile analyses and TCLP-semivolatile analyses. For each constituent, the average value of one-half the reported detection limit was calculated for use in the RA.

Groundwater data for monitor wells selected by EPA for inclusion in the RA are presented in Table 3-6. Sample concentration data from the RFI Phase I and Phase II for the four metals of concern, and for all volatile and semivolatile constituents for which detection events were reported are summarized in Table 3-6. RFI Phase III results, presented in Table 2-3, reported constituent concentration values that are lower than the earlier results, especially for metals.

The sample analytical data used in the RA was obtained during the course of the Pond 1 RFI Phase I and Phase II. The data in question was collected under the auspices of the RFI quality assurance/quality control program, and has previously been reviewed by EPA. Therefore, the quality and reliability of the data is presumed to be acceptable for purposes of the RA.

Toxicity data used in the RA was obtained primarily from the Integrated Risk Information System (IRIS), an on-line EPA database carried on the National Library of Medicine on-line database system. The data obtained from IRIS at the time of the RA was current as of December, 1994.

Data obtained from IRIS consisted of reference dose (RfD) and oral slope factor data for the various constituents. For several constituents, information was lacking on these parameters on IRIS, and secondary sources of information were used to fill the information gaps as necessary. When alternate information sources were employed (e.g., Health Effects Summary Table, other EPA documents), the source of the information is cited in the summary tables. All calculations used in execution of the risk assessment are presented in Appendix H.

3.4.2 Risk Assessment for Pond 1 Soils

For purposes of the RA, EPA has stipulated that potential human health risks posed by Pond 1 soils be assessed on the basis of an oral ingestion exposure pathway under a residential occupation scenario. Calculation of the residential ingestion of soil contaminants was accomplished according to the residential soil ingestion equation presented in Exhibit 6-14 of the EPA Human Health Evaluation Manual, Part A (EPA, 1989a). Standard default exposure assumptions typically employed in a residential exposure assessment were used in the current RA. For the evaluation of non-carcinogenic of soil-borne constituents, the following assumptions were employed:

- exposed individual is a child, age 1-5 years;
- body weight is 16 kg;
- fraction of soil ingested from the contaminated source is 100 percent; and
- ingestion rate of contaminated soil is 200 mg per day.

In addition, the product of the exposure frequency times duration were set to be equivalent to the averaging time, so that these terms canceled, and the oral ingestion exposure term was expressed in mg contaminant /kg body weight/day.

Table 3-6 RFI Phase I and Phase II Groundwater Contaminant Concentrations(1)

	RFI PHASE I(1)			RFI PHASE II(1)				EPA MCL(4)
Well ID:	**MW-3**	**MW-4**	**MW-6**	**MW-3**	**MW-4**	**MW-6A**	**MW-6B**	
Constituent (2)								
Arsenic	0.11	0.22	0.056	0.078	0.080	0.065	0.021	0.05
Chromium	0.01	0.02	0.01	0.03	<0.02	0.05	<0.02	0.1
Lead	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	0.015(5)
Nickel	0.01	0.07	<0.01	0.12	<0.11	0.11	<0.01	0.1
Benzene	0.041	ND(3)	ND	0.017	0.021	<0.005	0.009	0.005
Ethylbenzene	ND	0.032	0.011	0.016	0.019	0.007	<0.005	0.7
Toluene	ND	ND	0.013	0.021	0.009	0.006	0.006	1.0
Xylene	ND	0.023	0.019	0.025	0.032	0.014	<0.005	10
2-hexanone	0.014	ND	0.023	<0.005	<0.005	<0.005	<0.005	--
2-butanone	ND	ND	ND	<0.010	<0.010	<0.005	0.048	--
carbon disulfide	ND	ND	ND	<0.005	<0.005	<0.005	0.117	--
bis(2-chloro isopropyl) ether	ND	ND	0.022	<0.030	<0.050	<0.010	<0.010	--

Notes:
(1) RFI Phase III results are shown in Table 2-3.
(2) All constituent concentrations are milligrams per liter (mg/l).
(3) ND - Not Detected; detection limits not available for RFI Phase I groundwater data.
(4) Maximum Contaminant Level.
(5) Action level for domestic water at the tap.

For the soil contaminant non-carcinogenic health effects segment of the RA, maximum soil concentration values for the various constituents, calculated soil ingestion rates, reference doses for the various constituents, and the resulting hazard quotients and the cumulative hazard index are presented in Table 3-7.

For the evaluation of lifetime carcinogenic effects, the following standard assumptions were employed:

- exposed individual is an adult;
- body weight is 70 kg;
- fraction of soil ingested from the contaminated source is 100 percent; and
- ingestion rate of contaminated soil is 100 mg per day.

Table 3-7 Summary of Exposure Calculations, Toxicity Data and Risk Assessment Calculations for the Assessment of Non-Carcinogenic Health Effects for Pond 1 Soils

Constituent	Maximum Concentration (mg/kg)	Calculated Soil Intake (mg/kg/day)(1)	Reference Dose (mg/kg/day)(2)	Calculated Hazard Quotient
Arsenic	39.9	4.99E-04	3.00E-04	1.66E+00
Chromium	1011	1.26E-02	1.00E+00	1.26E-02
Nickel	37	4.63E-04	2.00E-02	2.32E-02
Zinc	434	5.43E-03	3.00E-01	1.81E-02
Acetone	0.387	4.84E-06	1.00E-01	4.84E-05
Benzene	0.03	3.75E-07	NA	NA
Ethylbenzene	0.59	7.38E-07	1.00E-01	7.38E-05
Methylene chloride	0.076	9.50E-07	6.00E-02	1.58E-05
Toluene	0.622	7.78E-06	2.00E-01	3.89E-05
Xylenes	2.05	2.56E-05	2.00E+00	1.28E-05
Benzo(g,h,i) perylene	150(3)	1.88E-03	NA	NA
Benzo(a)pyrene	150(3)	1.88E-03	NA	NA
Chrysene	150(3)	1.88E-03	NA	NA
Dibenzofuran	150(3)	1.88E-03	NA	NA
2,4-Dimethylphenol	150(3)	1.88E-03	2.00E-02	9.40E-02
Fluorene	150(3)	1.88E-03	4.00E-02	4.70E-02
Naphthalene (4)	150(3)	1.88E-03	4.00E-02	4.70E-02
2-Methylnaphthalene	150(3)	1.88E-03	NA	NA
Phenanthrene (5)	150(3)	1.88E-03	2.90E-02	6.48E-02
Pyrene	150(3)	1.88E-03	3.00E-02	6.27E-02
Hazard Index				**2.03E+00**

Notes:

(1) Assumptions: 200 mg soil intake/day; 16 kg body weight (ingestion by child)
(2) Based on 12/94 Integrated Risk Information System (IRIS) data.
(3) Based on average of one-half of constituent detection limits.
(4) RfD data obtained from HEAST.
(5) RfD data obtained from Region 3 risk-based screening guidance (EPA, 1993).
NA = Not Available.

Again, the product of the exposure frequency times duration were set to be equivalent to the averaging time, so that these terms canceled, and the oral ingestion exposure term was expressed in mg contaminant /kg body weight/day.

For the lifetime cancer risk portion of the RA, maximum soil concentration values for the various constituents, calculated soil ingestion rates, oral slope factors for the various constituents, and the resulting individual and cumulative cancer risks are presented in Table 3-8.

EPA typically considers a hazard index greater than 1 to be indicative of potentially unacceptable risk, while the results of the acute human health risk assessment for Pond 1 soils presented in Table 3-7 reveal an overall hazard index calculation of 2.03. However, there is ample reason to consider the derived hazard index to be an overestimate of the overall non-carcinogenic risk posed by Pond 1 soils. First, in the absence of a sufficient soil sample database from which to draw an estimate, maximum soil concentrations for each constituent were employed in the evaluation. More than 80 percent of the total contribution to the hazard index resulted from the hazard quotient of 1.66 obtained for arsenic. However, should the average arsenic value for Pond 1 soils actually be similar to the overall average for the six Pond 1 surface samples obtained during the RFI Phase II (25 mg/kg) the overall contribution of arsenic to the hazard index is reduced by nearly 40 percent. Furthermore, there is no evidence to support the extremely conservative concentration values assumed for the semivolatile constituents. The conservatively assumed maximum concentrations for these constituents contributed approximately 16 percent of the total hazard index.

Finally, while the residential exposure assumptions used in the non-carcinogenic evaluation (based on child exposure) were mandated by EPA, there is abundant reason to doubt that such an exposure scenario could ever occur at the site, as was discussed in preceding sections of this document If the exposure assumptions are modified to a more reasonable adult exposure scenario, using an ingestion rate of 100 mg/kg soil/day and a 70 kg adult body weight, the overall hazard index is reduced to a value of 0.232, which is nearly one tenth of the current value of 2.03, and also less than one-fourth of a hazard index value of 1.0.

For the carcinogenic risk assessment summarized in Table 3-8, an overall cumulative cancer risk of 1.7×10^{-3} was calculated. Again, the derived value is very likely to be a gross overestimate. Two semivolatile constituents, benzo(g,h,i)perylene and benzo(a)pyrene, contribute approximately 94 percent of the total estimated cumulative carcinogenic risk posed by the Pond 1 soils. There is no evidence to believe that these assumed values provide a realistic estimate of the true soil concentration values for these constituents. The assumed soil concentration for arsenic (39.9 mg/kg), which essentially contributes the remainder of the cancer risk, falls within an acceptable risk range of 10^{-4} to 10^{-6}, particularly when the extremely minimal potential for residential occupation of the site is taken into account.

Table 3-8 Summary of Exposure Calculations, Toxicity Data and Risk Assessment Calculations for the Assessment of Lifetime Cancer Risks for Pond 1 Soils

Constituent	Maximum Concentration (mg/kg)	Calculated Soil Intake (mg/kg/day)(1)	Oral Slope Factor (mg/kg/day)(2)	Calculated Cancer Risk
Arsenic	39.9	5.70E-05	1.75	9.98E-05
Chromium	1011	1.43E-04	NA	NA
Nickel	37	5.29E-05	NA	NA
Zinc	434	6.20E-04	NA	NA
Acetone	0.387	5.53E-07	NA	NA
Benzene	0.03	4.29E-08	2.90E-02	1.24E-09
Ethylbenzene	0.59	8.43E-07	NA	NA
Methylene chloride	0.076	1.09E-07	7.50E-03	8.18E-10
Toluene	0.622	8.89E-07	NA	NA
Xylenes	2.05	2.93E-06	NA	NA
Benzo(g,h,i)perylene (3)	150(4)	2.14E-04	1.55E-01	3.32E-05
Benzo(a)pyrene	150(4)	2.14E-04	7.30E+00	1.56E-03
Chrysene	150(4)	2.14E-04	NA	NA
Dibenzofuran	150(4)	2.14E-04	NA	NA
2,4-Dimethylphenol	150(4)	2.14E-04	NA	NA
Fluorene	150(4)	2.14E-04	NA	NA
Naphthalene	150(4)	2.14E-04	NA	NA
2-Methylnaphthalene	150(4)	2.14E-04	NA	NA
Phenanthrene	150(4)	2.14E-04	NA	NA
Pyrene	150(4)	2.14E-04	NA	NA
Total Cancer Risk				**1.70E-03**

Notes:

(1) Assumptions: 100 mg soil intake/day; 70 kg body weight (ingestion by adults).

(2) Based on 12/94 Integrated Risk Information System (IRIS) data.

(3) Oral slope factor data obtained from Region 3 risk-based screening guidance (EPA, 1993).

(4) Based on average of one-half of constituent detection limits.

3.4.3 Risk Assessment for Pond 1 Groundwater

For the Pond 1 groundwater RA, EPA also stipulated that potential human health risks posed by groundwater in the vicinity of the unit be assessed on the basis of an oral ingestion exposure pathway under a residential occupation scenario. Calculation of the residential ingestion of groundwater contaminants was determined according to the residential groundwater ingestion equation presented in Exhibit 6-11 of the EPA Human Health Evaluation Manual, Part A (EPA, 1989a). Again, standard default exposure assumptions typically employed in a residential exposure assessment were used in the current RA. For the evaluation of both non-carcinogenic and carcinogenic effects, the following assumptions were employed:

- exposed individual is an adult;
- body weight is 70 kg; and
- ingestion rate of contaminated groundwater is 1.4 liters/day.

As was the case for the soils assessment, the product of the exposure frequency times duration were set to be equivalent to the averaging time, so that these terms canceled, and the oral ingestion exposure term was expressed in mg contaminant /kg body weight/day.

Results of the assessment of non-carcinogenic effects of groundwater-ingestion are summarized in Table 3-9. The estimated hazard index for residential ingestion of groundwater was 14.8, with arsenic contributing 99 percent of the total. Since arsenic has been reported in site monitoring well samples at concentrations exceeding the arsenic MCL, it is reasonable to expect that a hazard index greater than 1.0 would be obtained. Similarly, while arsenic and benzene both contributed to the calculated cancer risk of 7.72×10^{-3} (Table 3-10), the total cancer risk was dominated by the estimated effects of arsenic.

Although the non-carcinogenic and carcinogenic risk parameter calculations described above might appear to indicate significant potential risk, scarce significance should be attached to these findings. More recent sampling utilizing low-flow purge techniques has significantly reduced turbidity and associated metals concentration. Also, preceding sections of this document have provided ample demonstration that human occupation of land overlying the groundwater in the vicinity of Pond 1 will not occur, and that, even if such occupation were to occur, the natural quality of the groundwater causes it to be grossly unsuitable for human consumption. Indeed, in providing guidance for characterizing the potential for human exposure to environmental contaminants, EPA has explicitly recognized that "an assumption of future residential land use may not be justifiable if the probability that the site will support residential land use in the future is exceedingly small" (EPA, 1989a).

Table 3-9 Summary of Exposure Calculations, Toxicity Data and Risk Assessment Calculations for the Assessment of Non-Carcinogenic Risks for Exposure to Pond 1 Groundwater

Constituent	Maximum Concentration (mg/l)	Calculated Ground-water Intake (mg/kg/day)(1)	Oral Reference Dose (2)	Hazard Quotient
Arsenic	0.22	4.40E-03	3.00E-04	1.47E+01
Chromium	0.05	1.00E-03	1.00E+00	1.00E-03
Nickel	0.12	2.40E-03	2.00E-02	1.20E-01
Benzene	0.041	8.00E-04	NA	NA
Ethylbenzene	0.032	6.00E-04	1.00E-01	6.00E-03
Toluene	0.021	4.00E-04	2.00E-01	2.00E-03
Xylene	0.032	6.40E-04	2.00E+00	3.20E-04
2-Hexanone	0.023	2.80E-04	NA	NA
2-Butanone	0.048	9.60E-04	6.00E-01	1.60E-03
Carbon disulfide	0.117	2.34E-03	1.00E-01	2.34E-02
Bis(2-chloro isopropyl)ether	0.022	4.40E-04	4.00E-02	1.10E-02
Hazard Index				**1.48E+01**

Notes:
(1) Assumptions: 1.4 liter intake/day; 70 kg adult body weight.
(2) Based on 12/94 Integrated Risk Information System (IRIS) data.

Table 3-10 Summary of Exposure Calculations, Toxicity Data and Risk Assessment Calculations for the Assessment of Carcinogenic Effects for Exposure to Pond 1 Groundwater

Constituent	Maximum Concentration (mg/l)	Calculated Groundwater Intake (mg/kg/day)(1)	Oral Slope Factor (mg/kg/day)(2)	Calculated Cancer Risk
Arsenic	0.22	4.40E-03	1.75E+00	7.70E-03
Chromium	0.05	1.00E-03	NA	NA
Nickel	0.12	2.40E-03	NA	NA
Benzene	0.041	8.00E-04	2.90E-02	2.32E-05
Ethylbenzene	0.032	6.00E-04	NA	NA
Toluene	0.021	4.00E-04	NA	NA
Xylene	0.032	6.40E-04	NA	NA
2-Hexanone	0.023	2.80E-04	NA	NA
2-Butanone	0.048	9.60E-04	NA	NA
Carbon disulfide	0.117	2.34E-03	NA	NA
Bis(2-chloro isopropyl) ether	0.022	4.40E-04	NA	NA
				7.72E-03

Notes:
(1) Assumptions: 1.4 liter intake/day; 70 kg adult body weight.
(2) Based on 12/94 Integrated Risk Information System (IRIS) data.