

GW - 32

REPORTS

YEAR(S):

1990 → 1988

ANALYTICAL DATA



Route 3, Box 7
Gallup, New Mexico
87301

505
722-3833

June 12, 1990

David Boyer
Director
New Mexico Oil Conservation Division
P. O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87504

RE: TABULATED ANALYTICAL FOR DISCHARGE PERMIT GW-32

Dear Mr. Boyer:

The enclosed analyses is the hard copy and tabulated analytical for both waste and groundwater samples as required by Discharge Permit GW-32.

If you have any questions, contact me at (505) 722-3833 extension 217.

Sincerely,

A handwritten signature in cursive script that reads "Claud Rosendale".

Claud Rosendale
Environmental Manager
Ciniza Refinery

CCR:ctf

cc - w/o enclosures
Kim Bullerdick, Corporate Counsel/Giant Industries

ANALYTICAL RESULTS
FOR
GIANT REFINING
ENSECO-RMAL NO. 008875



APRIL 17, 1990

OW well 115

Reviewed by:

Julie Essey

Julie Essey
Jeanne B. Howbert

Jeanne B. Howbert

Introduction

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

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

All analyses at Enseco are performed so that the maximum concentration of sample consistent with the method is analyzed. Dilutions are at times required to achieve linearity of the specific parameter or to reduce matrix interferences. In this event, reporting limits are adjusted proportionately.

Although benzo(j)fluoranthene was an analyte of interest, it does not appear in this report. This compound exhibits identical mass ionization to that of other benzo fluoranthene compounds and cannot be chromatographically resolved (or isolated) from its isomers. Laboratory studies have shown that benzo(j)fluoranthene will coelute with either benzo(b)fluoranthene or benzo(k)fluoranthene depending on the relative concentration of these two compounds in solution. Therefore, if benzo(j)fluoranthene is present, it will be detected and reported as benzo(b) and/or benzo(k)fluoranthene. To further complicate the issue, a standard for benzo(j)fluoranthene is not commercially available and many times is not obtainable at all. Because of these problems, Enseco does not offer this analyte by Method 8270.

Sample Description Information

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

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

Analytical Test Requests

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

SAMPLE DESCRIPTION INFORMATION
for
Giant Refining

Lab ID	Client ID	Matrix	Sampled Date	Time	Received Date
008875-0001-SA	OW-1	AQUEOUS	28 MAR 90	09:30	29 MAR 90
008875-0002-SA	OW-2	AQUEOUS	28 MAR 90	09:05	29 MAR 90
008875-0003-SA	OW-3	AQUEOUS	28 MAR 90	08:35	29 MAR 90
008875-0004-SA	OW-11	AQUEOUS	28 MAR 90	08:02	29 MAR 90
008875-0005-SA	TRIP BLANK	AQUEOUS	28 MAR 90	08:50	29 MAR 90

ANALYTICAL TEST REQUESTS
for
Giant Refining

Page 1 of 2

Lab ID: 008875	Group Code	Analysis Description	Custom Test?
0004	A	Total Organic Carbon (TOC)	N
		Total Organic Carbon (TOC)	N
		Total Organic Carbon (TOC)	N
		Total Organic Carbon (TOC)	N
		Total Organic Halogen (TOX)	N
		Total Organic Halogen (TOX)	N
		Total Organic Halogen (TOX)	N
		Total Organic Halogen (TOX)	N
		ICP Metals (Dissolved)	Y
		Arsenic, Furnace AA (Dissolved)	N
		Selenium, Furnace AA (Dissolved)	N
		ICP Metals (Total)	Y
		Prep - Total Metals, ICP	N
		Lead, Furnace AA (Total)	N
		Prep - Total Metals, Furnace AA	N
		Mercury, Cold Vapor AA (Total)	N
		Prep - Mercury, Cold Vapor AA (Total)	N
		Chloride, Ion Chromatography	N
		Sulfate, Ion Chromatography	N
		Alkalinity,	Y
		Total/Carbonate/Bicarbonate/Hydroxide	Y
		Total Dissolved Solids (TDS)	N
		Phenolics (4-AAP)	N
		TCL Volatile Organics	Y
		Prep-Volatile Organics by GC/MS	N
		pH	N
		Specific Conductance	N
		Prep - Semivolatile Organics by GC/MS	N
		Refinery Hazardous Constituent Semivolatiles-	Y
		TCL Volatile Organics	Y
0001 - 0003	B	Total Organic Carbon (TOC)	N
		Total Organic Carbon (TOC)	N
		Total Organic Carbon (TOC)	N
		Total Organic Carbon (TOC)	N
		Total Organic Halogen (TOX)	N
		Total Organic Halogen (TOX)	N
		Total Organic Halogen (TOX)	N
		Total Organic Halogen (TOX)	N
		ICP Metals (Dissolved)	Y
		Chloride, Ion Chromatography	N
		Sulfate, Ion Chromatography	N
		Alkalinity,	Y

ANALYTICAL TEST REQUESTS
for
Giant Refining

Page 2 of 2

Lab ID: 008875	Group Code	Analysis Description	Custom Test?
		Total/Carbonate/Bicarbonate/Hydroxide	Y
		Total Dissolved Solids (TDS)	N
		TCL Volatile Organics	Y
		Prep-Volatile Organics by GC/MS	N
		pH	N
		Specific Conductance	N
0005	C	Total Organic Carbon (TOC)	N
		Total Organic Carbon (TOC)	N
		Total Organic Carbon (TOC)	N
		Total Organic Carbon (TOC)	N
		Total Organic Halogen (TOX)	N
		Total Organic Halogen (TOX)	N
		Total Organic Halogen (TOX)	N
		Total Organic Halogen (TOX)	N
		ICP Metals (Dissolved)	Y
		Arsenic, Furnace AA (Dissolved)	N
		Selenium, Furnace AA (Dissolved)	N
		ICP Metals (Total)	Y
		Prep - Total Metals, ICP	N
		Lead, Furnace AA (Total)	N
		Prep - Total Metals, Furnace AA	N
		Mercury, Cold Vapor AA (Total)	N
		Prep - Mercury, Cold Vapor AA (Total)	N
		Chloride, Ion Chromatography	N
		Sulfate, Ion Chromatography	N
		Alkalinity,	Y
		Total/Carbonate/Bicarbonate/Hydroxide	Y
		Total Dissolved Solids (TDS)	N
		Phenolics (4-AAP)	N
		pH	N
		Specific Conductance	N
		TCL Volatile Organics	Y
		Prep-Volatile Organics by GC/MS	N
		TCL Volatile Organics	Y

Analytical Results

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

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

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

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

TCL Volatile Organics**Method 8240****Client Name:** Giant Refining**Client ID:** OW-1**Lab ID:** 008875-0001-SA**Matrix:** AQUEOUS**Authorized:** 29 MAR 90**Enseco ID:** 1070248**Sampled:** 28 MAR 90**Prepared:** 02 APR 90**Received:** 29 MAR 90**Analyzed:** 03 APR 90

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
Toluene-d8	104	%	--
4-Bromofluorobenzene	97	%	--
1,2-Dichloroethane-d4	98	%	--

ND = Not detected
NA = Not applicable**Reported By:** Cesar Rojas**Approved By:** Jeff Lowry

Metals

Dissolved Metals

Client Name: Giant Refining
Client ID: OW-1
Lab ID: 008875-0001-SA
Matrix: AQUEOUS
Authorized: 29 MAR 90

Enseco ID: 1070248
Sampled: 28 MAR 90
Prepared: See Below

Received: 29 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Calcium	2.4	mg/L	0.20	6010	NA	04 APR 90
Magnesium	0.33	mg/L	0.20	6010	NA	04 APR 90
Potassium	ND	mg/L	5.0	6010	NA	04 APR 90
Sodium	297	mg/L	5.0	6010	NA	04 APR 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Roxanne Sullivan

General Inorganics

Client Name: Giant Refining
 Client ID: OW-1
 Lab ID: 008875-0001-SA
 Matrix: AQUEOUS
 Authorized: 29 MAR 90

Enseco ID: 1070248
 Sampled: 28 MAR 90
 Prepared: See Below

Received: 29 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO ₃ at pH 4.5	391	mg/L	5.0	310.1	NA	29 MAR 90
Alkalinity, Carb. as CaCO ₃ at pH 8.3	31.0	mg/L	5.0	310.1	NA	29 MAR 90
Chloride	34.2	mg/L	3.0	300.0	NA	03 APR 90
pH	8.7	units	--	9040	NA	29 MAR 90
Sulfate	232	mg/L	5.0	300.0	NA	03 APR 90
Specific Conductance at 25 deg.C	1220	umhos/cm	1.0	120.1	NA	29 MAR 90
Total Organic Carbon	3.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	3.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	3.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	2.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	05 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	05 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	05 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	05 APR 90
Total Dissolved Solids	838	mg/L	10.0	160.1	NA	29 MAR 90

ND = Not detected
 NA = Not applicable

Reported By: Jennifer Franzen

Approved By: Tammy Bailey

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
 Client ID: OW-2
 Lab ID: 008875-0002-SA
 Matrix: AQUEOUS
 Authorized: 29 MAR 90

Enseco ID: 1070249
 Sampled: 28 MAR 90
 Prepared: 02 APR 90

Received: 29 MAR 90
 Analyzed: 04 APR 90

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
Toluene-d8	104	%	--
4-Bromofluorobenzene	96	%	--
1,2-Dichloroethane-d4	99	%	--

ND = Not detected
 NA = Not applicable

Reported By: Cesar Rojas

Approved By: Jeff Lowry

Metals**Dissolved Metals**

Client Name: Giant Refining
Client ID: OW-2
Lab ID: 008875-0002-SA
Matrix: AQUEOUS
Authorized: 29 MAR 90

Enseco ID: 1070249
Sampled: 28 MAR 90
Prepared: See Below

Received: 29 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Calcium	8.5	mg/L	0.20	6010	NA	04 APR 90
Magnesium	3.0	mg/L	0.20	6010	NA	04 APR 90
Potassium	ND	mg/L	5.0	6010	NA	04 APR 90
Sodium	298	mg/L	5.0	6010	NA	04 APR 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Roxanne Sullivan

General Inorganics

Client Name: Giant Refining
 Client ID: OW-2
 Lab ID: 008875-0002-SA
 Matrix: AQUEOUS
 Authorized: 29 MAR 90

Enseco ID: 1070249
 Sampled: 28 MAR 90
 Prepared: See Below

Received: 29 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO ₃ at pH 4.5	681	mg/L	5.0	310.1	NA	29 MAR 90
Alkalinity, Carb. as CaCO ₃ at pH 8.3	ND	mg/L	5.0	310.1	NA	29 MAR 90
Chloride	36.7	mg/L	3.0	300.0	NA	03 APR 90
pH	8.0	units	--	9040	NA	29 MAR 90
Sulfate	7.3	mg/L	5.0	300.0	NA	03 APR 90
Specific Conductance at 25 deg.C	1180	umhos/cm	1.0	120.1	NA	29 MAR 90
Total Organic Carbon	6.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	6.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	6.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	6.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	05 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	05 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	05 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	05 APR 90
Total Dissolved Solids	944	mg/L	10.0	160.1	NA	29 MAR 90

ND = Not detected
 NA = Not applicable

Reported By: Jennifer Franzen

Approved By: Tammy Bailey

TCL Volatile Organics**Method 8240**

Client Name: Giant Refining
Client ID: OW-3
Lab ID: 008875-0003-SA
Matrix: AQUEOUS
Authorized: 29 MAR 90

Enseco ID: 1070250
Sampled: 28 MAR 90
Prepared: 02 APR 90

Received: 29 MAR 90
Analyzed: 04 APR 90

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
Toluene-d8	101	%	--
4-Bromofluorobenzene	95	%	--
1,2-Dichloroethane-d4	95	%	--

ND = Not detected
NA = Not applicable

Reported By: Cesar Rojas

Approved By: Jeff Lowry

Metals

Dissolved Metals

Client Name: Giant Refining
 Client ID: OW-3
 Lab ID: 008875-0003-SA
 Matrix: AQUEOUS
 Authorized: 29 MAR 90

Enseco ID: 1070250
 Sampled: 28 MAR 90
 Prepared: See Below

Received: 29 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Calcium	9.4	mg/L	0.20	6010	NA	04 APR 90
Magnesium	3.1	mg/L	0.20	6010	NA	04 APR 90
Potassium	ND	mg/L	5.0	6010	NA	04 APR 90
Sodium	292	mg/L	5.0	6010	NA	04 APR 90

ND = Not detected
 NA = Not applicable

Reported By: Sandra Jones

Approved By: Roxanne Sullivan

General Inorganics

Client Name: Giant Refining
Client ID: OW-3
Lab ID: 008875-0003-SA
Matrix: AQUEOUS
Authorized: 29 MAR 90

Enseco ID: 1070250
Sampled: 28 MAR 90
Prepared: See Below

Received: 29 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO ₃ at pH 4.5	669	mg/L	5.0	310.1	NA	29 MAR 90
Alkalinity, Carb. as CaCO ₃ at pH 8.3	ND	mg/L	5.0	310.1	NA	29 MAR 90
Chloride	36.7	mg/L	3.0	300.0	NA	03 APR 90
pH	8.1	units	--	9040	NA	29 MAR 90
Sulfate	15.4	mg/L	5.0	300.0	NA	03 APR 90
Specific Conductance at 25 deg.C	1170	umhos/cm	1.0	120.1	NA	29 MAR 90
Total Organic Carbon	5.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	7.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	7.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	5.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	05 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	05 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	05 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	05 APR 90
Total Dissolved Solids	865	mg/L	10.0	160.1	NA	29 MAR 90

ND = Not detected
NA = Not applicable

Reported By: Jennifer Franzen

Approved By: Tammy Bailey

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
 Client ID: OW-11
 Lab ID: 008875-0004-SA
 Matrix: AQUEOUS
 Authorized: 29 MAR 90

Enseco ID: 1070251
 Sampled: 28 MAR 90
 Prepared: 02 APR 90

Received: 29 MAR 90
 Analyzed: 04 APR 90

Parameter	Result	Units	Reporting Limit
1,1-Dichloroethene	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
Toluene-d8	103	%	--
4-Bromofluorobenzene	94	%	--
1,2-Dichloroethane-d4	96	%	--

ND = Not detected
 NA = Not applicable

Reported By: Cesar Rojas

Approved By: Jeff Lowry

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
Client ID: OW-11
Lab ID: 008875-0004-SA
Matrix: AQUEOUS
Authorized: 29 MAR 90

Enseco ID: 1070251
Sampled: 28 MAR 90
Prepared: 02 APR 90

Received: 29 MAR 90
Analyzed: 04 APR 90

Parameter	Result	Units	Reporting Limit
1,1-Dichloroethene	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
Toluene-d8	102	%	--
4-Bromofluorobenzene	95	%	--
1,2-Dichloroethane-d4	98	%	--

ND = Not detected
NA = Not applicable

Reported By: Cesar Rojas

Approved By: Jeff Lowry

Refinery Hazardous Constituent Semivolatiles

Method 8270

Client Name: Giant Refining
 Client ID: OW-11
 Lab ID: 008875-0004-SA
 Matrix: AQUEOUS
 Authorized: 29 MAR 90

Enseco ID: 1070251
 Sampled: 28 MAR 90
 Prepared: 01 APR 90

Received: 29 MAR 90
 Analyzed: 06 APR 90

Parameter	Result	Units	Reporting Limit
Benzo(a)anthracene	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ug/L	10
Chrysene	ND	ug/L	10
7,12-Dimethylbenz(a)- anthracene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
1-Methylnaphthalene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Phenanthrene	ND	ug/L	10
Pyrene	ND	ug/L	10
o-Cresol	ND	ug/L	10
m & p-Cresol(s)	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
Nitrobenzene-d5	49	%	--
2-Fluorobiphenyl	53	%	--
Terphenyl-d14	79	%	--
Phenol-d5	54	%	--
2-Fluorophenol	49	%	--
2,4,6-Tribromophenol	88	%	--

ND = Not detected
 NA = Not applicable

Reported By: Belinda Guerra

Approved By: Jeff Lowry

Metals

Dissolved Metals

Client Name: Giant Refining
Client ID: OW-11
Lab ID: 008875-0004-SA
Matrix: AQUEOUS
Authorized: 29 MAR 90

Enseco ID: 1070251
Sampled: 28 MAR 90
Prepared: See Below

Received: 29 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	0.0050	7060	NA	03 APR 90
Barium	0.014	mg/L	0.010	6010	NA	04 APR 90
Cadmium	ND	mg/L	0.0050	6010	NA	04 APR 90
Calcium	4.8	mg/L	0.20	6010	NA	04 APR 90
Copper	ND	mg/L	0.010	6010	NA	04 APR 90
Manganese	ND	mg/L	0.010	6010	NA	04 APR 90
Nickel	ND	mg/L	0.040	6010	NA	04 APR 90
Selenium	ND	mg/L	0.050	7740	NA	03 APR 90
Silver	ND	mg/L	0.010	6010	NA	04 APR 90
Sodium	382	mg/L	5.0	6010	NA	04 APR 90
Zinc	ND	mg/L	0.010	6010	NA	04 APR 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Roxanne Sullivan

Metals

Total Metals

Client Name: Giant Refining
Client ID: OW-11
Lab ID: 008875-0004-SA
Matrix: AQUEOUS
Authorized: 29 MAR 90

Enseco ID: 1070251
Sampled: 28 MAR 90
Prepared: See Below

Received: 29 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	ND	mg/L	0.010	6010	31 MAR 90	03 APR 90
Lead	ND	mg/L	0.0050	7421	31 MAR 90	02 APR 90
Mercury	ND	mg/L	0.00020	7470	31 MAR 90	31 MAR 90

ND = Not detected
NA = Not applicable

Reported By: Frank Carman

Approved By: Roxanne Sullivan

General Inorganics

Client Name: Giant Refining
 Client ID: OW-11
 Lab ID: 008875-0004-SA
 Matrix: AQUEOUS
 Authorized: 29 MAR 90

Enseco ID: 1070251
 Sampled: 28 MAR 90
 Prepared: See Below

Received: 29 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO ₃ at pH 4.5	461	mg/L	5.0	310.1	NA	29 MAR 90
Alkalinity, Carb. as CaCO ₃ at pH 8.3	ND	mg/L	5.0	310.1	NA	29 MAR 90
Chloride	123	mg/L	3.0	300.0	NA	03 APR 90
pH	8.3	units	--	9040	NA	29 MAR 90
Phenolics	ND	mg/L	0.010	9065	NA	04 APR 90
Sulfate	294	mg/L	5.0	300.0	NA	03 APR 90
Specific Conductance at 25 deg.C	1650	umhos/cm	1.0	120.1	NA	29 MAR 90
Total Organic Carbon	6.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	6.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	6.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	6.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	05 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	05 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	05 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	05 APR 90
Total Dissolved Solids	1110	mg/L	10.0	160.1	NA	29 MAR 90

ND = Not detected
 NA = Not applicable

Reported By: Jennifer Franzen

Approved By: Tammy Bailey

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
 Client ID: TRIP BLANK
 Lab ID: 008875-0005-SA
 Matrix: AQUEOUS
 Authorized: 29 MAR 90

Enseco ID: 1070252
 Sampled: 28 MAR 90
 Prepared: 04 APR 90

Received: 29 MAR 90
 Analyzed: 04 APR 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	14	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene			
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	ug/L	10
1,2-Dibromoethane (EDB)	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	5.0
1,3-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Cesar Rojas

Approved By: Jeff Lowry

TCL Volatile Organics (CONT.)

Method 8240

Client Name: Giant Refining
Client ID: TRIP BLANK
Lab ID: 008875-0005-SA
Matrix: AQUEOUS
Authorized: 29 MAR 90

Enseco ID: 1070252
Sampled: 28 MAR 90
Prepared: 04 APR 90

Received: 29 MAR 90
Analyzed: 04 APR 90

Parameter	Result	Units	Reporting Limit
Toluene-d8	101	%	--
4-Bromofluorobenzene	93	%	--
1,2-Dichloroethane-d4	94	%	--

ND = Not detected
NA = Not applicable

Reported By: Cesar Rojas

Approved By: Jeff Lowry

Metals

Dissolved Metals

Client Name: Giant Refining
 Client ID: TRIP BLANK
 Lab ID: 008875-0005-SA
 Matrix: AQUEOUS
 Authorized: 29 MAR 90

Enseco ID: 1070252
 Sampled: 28 MAR 90
 Prepared: See Below

Received: 29 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	0.0050	7060	NA	04 APR 90
Barium	ND	mg/L	0.010	6010	NA	04 APR 90
Cadmium	ND	mg/L	0.0050	6010	NA	04 APR 90
Calcium	ND	mg/L	0.20	6010	NA	04 APR 90
Magnesium	ND	mg/L	0.20	6010	NA	04 APR 90
Manganese	ND	mg/L	0.010	6010	NA	04 APR 90
Potassium	ND	mg/L	5.0	6010	NA	04 APR 90
Selenium	ND	mg/L	0.0050	7740	NA	05 APR 90
Silver	ND	mg/L	0.010	6010	NA	04 APR 90
Sodium	ND	mg/L	5.0	6010	NA	04 APR 90
Zinc	ND	mg/L	0.010	6010	NA	04 APR 90

ND = Not detected
 NA = Not applicable

Reported By: Sandra Jones

Approved By: Roxanne Sullivan

Metals

Total Metals

Client Name: Giant Refining
 Client ID: TRIP BLANK
 Lab ID: 008875-0005-SA
 Matrix: AQUEOUS
 Authorized: 29 MAR 90

Enseco ID: 1070252
 Sampled: 28 MAR 90
 Prepared: See Below

Received: 29 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	ND	mg/L	0.010	6010	31 MAR 90	03 APR 90
Lead	ND	mg/L	0.010	7421	31 MAR 90	02 APR 90
Mercury	ND	mg/L	0.00020	7470	31 MAR 90	31 MAR 90

ND = Not detected
 NA = Not applicable

Reported By: Frank Carman

Approved By: Roxanne Sullivan

General Inorganics

Client Name: Giant Refining
Client ID: TRIP BLANK
Lab ID: 008875-0005-SA
Matrix: AQUEOUS
Authorized: 29 MAR 90

Enseco ID: 1070252
Sampled: 28 MAR 90
Prepared: See Below

Received: 29 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO ₃ at pH 4.5	ND	mg/L	5.0	310.1	NA	29 MAR 90
Alkalinity, Carb. as CaCO ₃ at pH 8.3	ND	mg/L	5.0	310.1	NA	29 MAR 90
Chloride	ND	mg/L	3.0	300.0	NA	03 APR 90
pH	5.0	units	--	9040	NA	29 MAR 90
Phenolics	ND	mg/L	0.010	9065	NA	04 APR 90
Sulfate	ND	mg/L	5.0	300.0	NA	03 APR 90
Specific Conductance at 25 deg.C	3.5	umhos/cm	1.0	120.1	NA	29 MAR 90
Total Organic Carbon	ND	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	ND	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	ND	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	ND	mg/L	1.0	9060	NA	10 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	10 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	10 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	10 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	10 APR 90
Total Dissolved Solids	ND	mg/L	10.0	160.1	NA	29 MAR 90

ND = Not detected
NA = Not applicable

Reported By: Jennifer Franzen

Approved By: Tammy Bailey

Quality Control Results

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

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

The standard laboratory QC package is designed to:

- 1) establish a strong, cost-effective QC program that ensures the generation of scientifically valid, legally defensible data
- 2) assess the laboratory's performance of the analytical method using control limits generated with a well-defined matrix
- 3) establish clear-cut guidelines for acceptability of analytical data so that QC decisions can be made immediately at the bench, and
- 4) provide a standard set of reportables which assures the client of the quality of his data.

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

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

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

Accuracy for DCS and SCS is measured by Percent Recovery.

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

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

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

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

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
008875-0001-SA	AQUEOUS	624-A	02 APR 90-F	03 APR 90-F2
008875-0002-SA	AQUEOUS	624-A	02 APR 90-F	03 APR 90-F2
008875-0003-SA	AQUEOUS	624-A	02 APR 90-F	03 APR 90-F2
008875-0004-SA	AQUEOUS	624-A	02 APR 90-F	03 APR 90-F2
008875-0004-SA	AQUEOUS	624-A	02 APR 90-F	03 APR 90-F2
008875-0005-SA	AQUEOUS	624-A	02 APR 90-F	03 APR 90-F2

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Spiked	Concentration		Measured	AVG	Accuracy		Precision	
		DCS1	DCS2	DCS2		Average(%)	Limits	(RPD)	DCS Limit
Category: 624-A									
Matrix: AQUEOUS									
QC Lot: 02 APR 90-F									
Concentration Units: ug/L									
1,1-Dichloroethene	50	48.5	47.9	48.2	96	61-145	1.2	14	
Trichloroethene	50	51.9	51.6	51.8	104	71-120	0.6	14	
Benzene	50	51.1	54.1	52.6	105	76-127	5.7	11	
Toluene	50	55.0	53.5	54.2	109	76-125	2.8	13	
Chlorobenzene	50	54.8	54.1	54.4	109	75-130	1.3	13	

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

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration		Accuracy(%)	
	Spiked	Measured	SCS	Limits

Category: 624-A
Matrix: AQUEOUS
QC Lot: 02 APR 90-F QC Run: 03 APR 90-F2
Concentration Units: ug/L

1,2-Dichloroethane-d4	50.0	48.8	98	76-114
4-Bromofluorobenzene	50.0	47.9	96	86-115
Toluene-d8	50.0	49.8	100	88-110

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

METHOD BLANK REPORT
Volatile Organics by GC/MS

Analyte	Result	Units	Reporting Limit
Test: 624-TCL-AP			
Matrix: AQUEOUS			
QC Lot: 02 APR 90-F QC Run: 03 APR 90-F2			
Benzene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0

Test: 624-TCL-AP
 Matrix: AQUEOUS
 QC Lot: 02 APR 90-F QC Run: 03 APR 90-F2

1,1-Dichloroethene	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0

Test: 624-TCL-AP
 Matrix: AQUEOUS
 QC Lot: 02 APR 90-F QC Run: 03 APR 90-F2

Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene	ND	ug/L	5.0
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10

METHOD BLANK REPORT
 Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 624-TCL-AP			
Matrix: AQUEOUS			
QC Lot: 02 APR 90-F QC Run: 03 APR 90-F2			
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	ug/L	10
1,2-Dibromoethane (EDB)	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	5.0
1,3-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
008875-0004-SA	AQUEOUS	625-A	01 APR 90-A	01 APR 90-A

DUPLICATE CONTROL SAMPLE REPORT
 Semivolatile Organics by GC/MS

Analyte	Spiked	Concentration		AVG	Accuracy		Precision	
		DCS1	Measured DCS2		Average(%)	Limits	(RPD)	DCS Limit
Category: 625-A								
Matrix: AQUEOUS								
QC Lot: 01 APR 90-A								
Concentration Units: ug/L								
Phenol	100	69.6	82.9	76.2	76	12- 89	17	42
2-Chlorophenol	100	65.1	76.1	70.6	71	27-123	16	40
1,4-Dichlorobenzene	50	22.1	24.0	23.0	46	36- 97	8.2	28
N-Nitroso-di-								
n-propylamine	50	39.1	45.7	42.4	85	41-116	16	38
1,2,4-Trichlorobenzene	50	24.2	25.0	24.6	49	39- 98	3.3	28
4-Chloro-3-methylphenol	100	75.5	87.1	81.3	81	23- 97	14	42
Acenaphthene	50	27.6	31.3	29.4	59	46-118	13	31
4-Nitrophenol	100	68.5	66.7	67.6	68	10- 80	2.7	50
2,4-Dinitrotoluene	50	29.1	35.1	32.1	64	24- 96	19	38
Pentachlorophenol	100	78.8	79.6	79.2	79	9-103	1.0	50
Pyrene	50	27.2	33.4	30.3	61	26-127	20	31

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

SINGLE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

Analyte	Concentration		Accuracy(%)	
	Spiked	Measured	SCS	Limits

Category: 625-A

Matrix: AQUEOUS

QC Lot: 01 APR 90-A QC Run: 01 APR 90-A

Concentration Units: ug/L

Nitrobenzene-d5	100	55.7	56	35-114
2-Fluorobiphenyl	100	49.7	50	43-116
Terphenyl-d14	100	53.5	54	33-141
2-Fluorophenol	200	124	62	21-100
Phenol-d5	200	133	66	10- 94
2,4,6-Tribromophenol	200	154	77	10-123

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

METHOD BLANK REPORT
Semivolatile Organics by GC/MS

Analyte	Result	Units	Reporting Limit
Test: 625-REF-A			
Matrix: AQUEOUS			
QC Lot: 01 APR 90-A QC Run: 01 APR 90-A			
Benzo(a)anthracene	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ug/L	10
Chrysene	ND	ug/L	10
7,12-Dimethylbenz(a)- anthracene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
1-Methylnaphthalene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Phenanthrene	ND	ug/L	10
Pyrene	ND	ug/L	10
o-Cresol	ND	ug/L	10
m & p-Cresol(s)	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10

QC LOT ASSIGNMENT REPORT Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
008875-0001-SA	AQUEOUS	ICP-AD	04 APR 90-A	-
008875-0002-SA	AQUEOUS	ICP-AD	04 APR 90-A	-
008875-0003-SA	AQUEOUS	ICP-AD	04 APR 90-A	-
008875-0004-SA	AQUEOUS	ICP-AD	04 APR 90-A	-
008875-0004-SA	AQUEOUS	AS-FAA-AD	03 APR 90-D	-
008875-0004-SA	AQUEOUS	SE-FAA-AD	03 APR 90-D	-
008875-0004-SA	AQUEOUS	ICP-AT	31 MAR 90-D	31 MAR 90-D
008875-0004-SA	AQUEOUS	PB-FAA-AT	31 MAR 90-D	31 MAR 90-D
008875-0004-SA	AQUEOUS	HG-CVAA-AT	31 MAR 90-A	31 MAR 90-A
008875-0005-SA	AQUEOUS	ICP-AD	04 APR 90-A	-
008875-0005-SA	AQUEOUS	AS-FAA-AD	04 APR 90-A	-
008875-0005-SA	AQUEOUS	SE-FAA-AD	05 APR 90-A	-
008875-0005-SA	AQUEOUS	ICP-AT	31 MAR 90-D	31 MAR 90-D
008875-0005-SA	AQUEOUS	PB-FAA-AT	31 MAR 90-D	31 MAR 90-D
008875-0005-SA	AQUEOUS	HG-CVAA-AT	31 MAR 90-A	31 MAR 90-A

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

Analyte	Concentration		Measured DCS2	AVG	Accuracy Average(%)		Precision (RPD)	
	Spiked	DCS1			DCS	Limits	DCS	Limit
Category: ICP-AD								
Matrix: AQUEOUS								
QC Lot: 04 APR 90-A								
Concentration Units: mg/L								
Aluminum	2.0	1.90	1.91	1.90	95	75-125	0.7	20
Antimony	0.5	0.473	0.474	0.473	95	75-125	0.2	20
Arsenic	0.5	0.461	0.462	0.461	92	75-125	0.2	20
Barium	2.0	1.65	1.66	1.66	83	75-125	0.9	20
Beryllium	0.05	0.0456	0.0457	0.0456	91	75-125	0.4	20
Cadmium	0.05	0.0475	0.0461	0.0468	94	75-125	3.1	20
Calcium	100	88.1	88.9	88.5	88	75-125	0.9	20
Chromium	0.2	0.193	0.190	0.192	96	75-125	1.5	20
Cobalt	0.5	0.455	0.459	0.457	91	75-125	0.8	20
Copper	0.25	0.247	0.250	0.248	99	75-125	0.9	20
Iron	1.0	0.948	0.956	0.952	95	75-125	0.8	20
Lead	0.5	0.475	0.479	0.477	95	75-125	1.0	20
Magnesium	50	44.3	44.9	44.6	89	75-125	1.5	20
Manganese	0.5	0.487	0.491	0.489	98	75-125	0.9	20
Nickel	0.5	0.445	0.449	0.447	89	75-125	0.9	20
Potassium	50	43.7	44.7	44.2	88	75-125	2.2	20
Silver	0.05	0.0426	0.0426	0.0426	85	75-125	0.0	20
Sodium	100	88.0	89.7	88.9	89	75-125	2.0	20
Vanadium	0.5	0.456	0.461	0.458	92	75-125	0.9	20
Zinc	0.5	0.461	0.466	0.463	93	75-125	1.0	20

Category: AS-FAA-AD
Matrix: AQUEOUS
QC Lot: 03 APR 90-D
Concentration Units: mg/L

Arsenic	0.04	0.0378		0.0403	0.0390	98	75-125	6.4	20
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Category: SE-FAA-AD
Matrix: AQUEOUS
QC Lot: 03 APR 90-D
Concentration Units: mg/L

Selenium	0.01	0.00930		0.00950	0.00940	94	75-125	2.1	20
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Calculations are performed before rounding to avoid round-off errors in calculated results.

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation (cont.)

Analyte	Concentration		Measured DCS2	AVG	Accuracy Average(%)		Precision (RPD)	
	Spiked	DCS1			DCS	Limits	DCS	Limit
Category: ICP-AT								
Matrix: AQUEOUS								
QC Lot: 31 MAR 90-D								
Concentration Units: mg/L								
Aluminum	2.0	1.89	1.89	1.89	94	75-125	0.2	20
Antimony	0.5	0.461	0.470	0.465	93	75-125	2.1	20
Arsenic	0.5	0.443	0.473	0.458	92	75-125	6.6	20
Barium	2.0	1.63	1.65	1.64	82	75-125	1.3	20
Beryllium	0.05	0.0446	0.0440	0.0443	89	75-125	1.2	20
Cadmium	0.05	0.0474	0.0450	0.0462	92	75-125	5.2	20
Calcium	100	87.7	90.6	89.1	89	75-125	3.2	20
Chromium	0.2	0.191	0.192	0.191	96	75-125	0.8	20
Cobalt	0.5	0.437	0.461	0.449	90	75-125	5.5	20
Copper	0.25	0.241	0.249	0.245	98	75-125	3.4	20
Iron	1.0	0.943	0.954	0.948	95	75-125	1.2	20
Lead	0.5	0.455	0.476	0.465	93	75-125	4.4	20
Magnesium	50	43.9	45.4	44.6	89	75-125	3.4	20
Manganese	0.5	0.462	0.490	0.476	95	75-125	5.8	20
Nickel	0.5	0.425	0.453	0.439	88	75-125	6.3	20
Potassium	50	43.7	45.5	44.6	89	75-125	3.9	20
Silver	0.05	0.0422	0.0435	0.0429	86	75-125	3.1	20
Sodium	100	87.7	90.9	89.3	89	75-125	3.5	20
Vanadium	0.5	0.455	0.461	0.458	92	75-125	1.2	20
Zinc	0.5	0.451	0.483	0.467	93	75-125	6.7	20

Category: PB-FAA-AT
Matrix: AQUEOUS
QC Lot: 31 MAR 90-D
Concentration Units: mg/L

Lead	0.020	0.0230	0.0238	0.0234	117	75-125	3.4	20
------	-------	--------	--------	--------	-----	--------	-----	----

Category: HG-CVAA-AT
Matrix: AQUEOUS
QC Lot: 31 MAR 90-A
Concentration Units: mg/L

Mercury	0.0010	0.00107	0.00111	0.00109	109	75-125	3.7	20
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Calculations are performed before rounding to avoid round-off errors in calculated results.

DUPLICATE CONTROL SAMPLE REPORT Metals Analysis and Preparation (cont.)

Analyte	Spiked	Concentration		Measured	AVG	Accuracy		Precision	
		DCS1	DCS2			DCS	Average(%) Limits	(RPD) DCS Limit	

Category: AS-FAA-AD
 Matrix: AQUEOUS
 QC Lot: 04 APR 90-A
 Concentration Units: mg/L

Arsenic	0.04	0.0384	0.0347	0.0366	91	75-125	10	20
---------	------	--------	--------	--------	----	--------	----	----

Category: SE-FAA-AD
 Matrix: AQUEOUS
 QC Lot: 05 APR 90-A
 Concentration Units: mg/L

Selenium	0.01	0.00960	0.00900	0.00930	93	75-125	6.5	20
----------	------	---------	---------	---------	----	--------	-----	----

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

METHOD BLANK REPORT
Metals Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: ICP-AT Matrix: AQUEOUS QC Lot: 31 MAR 90-D QC Run: 31 MAR 90-D			
Chromium	ND	mg/L	0.010
Test: PB-FAA-AT Matrix: AQUEOUS QC Lot: 31 MAR 90-D QC Run: 31 MAR 90-D			
Lead	ND	mg/L	0.0050
Test: HG-CVAA-AT Matrix: AQUEOUS QC Lot: 31 MAR 90-A QC Run: 31 MAR 90-A			
Mercury	ND	mg/L	0.00020
Test: ICP-AT Matrix: AQUEOUS QC Lot: 31 MAR 90-D QC Run: 31 MAR 90-D			
Chromium	ND	mg/L	0.010
Test: PB-FAA-AT Matrix: AQUEOUS QC Lot: 31 MAR 90-D QC Run: 31 MAR 90-D			
Lead	ND	mg/L	0.0050
Test: HG-CVAA-AT Matrix: AQUEOUS QC Lot: 31 MAR 90-A QC Run: 31 MAR 90-A			
Mercury	ND	mg/L	0.00020

QC LOT ASSIGNMENT REPORT

Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
008875-0001-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0001-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0001-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0001-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0001-SA	AQUEOUS	CL-IC-A	03 APR 90-M	-
008875-0001-SA	AQUEOUS	SO4-IC-A	03 APR 90-M	-
008875-0001-SA	AQUEOUS	ALK-A	29 MAR 90-O	-
008875-0001-SA	AQUEOUS	TDS-A	29 MAR 90-R	29 MAR 90-R
008875-0001-SA	AQUEOUS	PH-A	29 MAR 90-O	-
008875-0001-SA	AQUEOUS	COND-A	29 MAR 90-O	-
008875-0002-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0002-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0002-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0002-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0002-SA	AQUEOUS	CL-IC-A	03 APR 90-M	-
008875-0002-SA	AQUEOUS	SO4-IC-A	03 APR 90-M	-
008875-0002-SA	AQUEOUS	ALK-A	29 MAR 90-O	-
008875-0002-SA	AQUEOUS	TDS-A	29 MAR 90-R	29 MAR 90-R
008875-0002-SA	AQUEOUS	PH-A	29 MAR 90-O	-
008875-0002-SA	AQUEOUS	COND-A	29 MAR 90-O	-
008875-0003-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0003-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0003-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0003-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0003-SA	AQUEOUS	CL-IC-A	03 APR 90-M	-
008875-0003-SA	AQUEOUS	SO4-IC-A	03 APR 90-M	-
008875-0003-SA	AQUEOUS	ALK-A	29 MAR 90-O	-
008875-0003-SA	AQUEOUS	TDS-A	29 MAR 90-R	29 MAR 90-R
008875-0003-SA	AQUEOUS	PH-A	29 MAR 90-O	-
008875-0003-SA	AQUEOUS	COND-A	29 MAR 90-O	-
008875-0004-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0004-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0004-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0004-SA	AQUEOUS	CL-IC-A	03 APR 90-M	-
008875-0004-SA	AQUEOUS	SO4-IC-A	03 APR 90-M	-
008875-0004-SA	AQUEOUS	ALK-A	29 MAR 90-O	-
008875-0004-SA	AQUEOUS	TDS-A	29 MAR 90-R	29 MAR 90-R
008875-0004-SA	AQUEOUS	PHEN-A	03 APR 90-R	03 APR 90-R
008875-0004-SA	AQUEOUS	PH-A	29 MAR 90-O	-
008875-0004-SA	AQUEOUS	COND-A	29 MAR 90-O	-
008875-0005-SA	AQUEOUS	TOX-A	10 APR 90-A	-
008875-0005-SA	AQUEOUS	TOX-A	10 APR 90-A	-
008875-0005-SA	AQUEOUS	TOX-A	10 APR 90-A	-
008875-0005-SA	AQUEOUS	TOX-A	10 APR 90-A	-
008875-0005-SA	AQUEOUS	CL-IC-A	03 APR 90-M	-
008875-0005-SA	AQUEOUS	SO4-IC-A	03 APR 90-M	-

QC LOT ASSIGNMENT REPORT
Wet Chemistry Analysis and Preparation (cont.)

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
008875-0005-SA	AQUEOUS	ALK-A	29 MAR 90-0	-
008875-0005-SA	AQUEOUS	TDS-A	29 MAR 90-R	29 MAR 90-R
008875-0005-SA	AQUEOUS	PHEN-A	03 APR 90-R	03 APR 90-R
008875-0005-SA	AQUEOUS	PH-A	29 MAR 90-0	-
008875-0005-SA	AQUEOUS	COND-A	29 MAR 90-0	-

DUPLICATE CONTROL SAMPLE REPORT Wet Chemistry Analysis and Preparation

Analyte	Spiked	Concentration		Measured DCS2	AVG	Accuracy Average(%)		Precision (RPD)	
		DCS1				DCS	Limits	DCS	Limit
Category: TOX-A Matrix: AQUEOUS QC Lot: 05 APR 90-A Concentration Units: ug Cl/L									
Total Organic Halogen as Cl	100	98.3		114	106	106	80-120	15	20
Category: CL-IC-A Matrix: AQUEOUS QC Lot: 03 APR 90-M Concentration Units: mg/L									
Chloride	100	99.9		98.4	99.2	99	92-108	1.5	20
Category: SO4-IC-A Matrix: AQUEOUS QC Lot: 03 APR 90-M Concentration Units: mg/L									
Sulfate	200	198		194	196	98	93-107	2.0	20
Category: ALK-A Matrix: AQUEOUS QC Lot: 29 MAR 90-0 Concentration Units: mg/L									
Alkalinity, Total as CaCO3 at pH 4.5	157	163		161	162	103	90-110	1.2	10
Category: TDS-A Matrix: AQUEOUS QC Lot: 29 MAR 90-R Concentration Units: mg/L									
Total Dissolved Solids	1270	1200		1200	1200	94	90-110	0.0	10

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

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation (cont.)

Analyte	Spiked	Concentration		Measured DCS2	AVG	Accuracy Average(%)		Precision (RPD)	
		DCS1				DCS	Limits	DCS	Limit
Category: PH-A Matrix: AQUEOUS QC Lot: 29 MAR 90-0 Concentration Units: units									
pH	9.1	9.06	9.06	9.06	100	98-102	0.0	5	
Category: COND-A Matrix: AQUEOUS QC Lot: 29 MAR 90-0 Concentration Units: umhos/cm									
Specific Conductance at 25 deg.C	1650	1650	1650	1650	100	95-105	0.0	5	
Category: PHEN-A Matrix: AQUEOUS QC Lot: 03 APR 90-R Concentration Units: mg/L									
Phenolics	0.20	0.203	0.208	0.206	103	78-122	2.4	20	
Category: TOX-A Matrix: AQUEOUS QC Lot: 10 APR 90-A Concentration Units: ug Cl/L									
Total Organic Halogen as Cl	100	110	94.9	102	102	80-120	15	20	

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

METHOD BLANK REPORT
Wet Chemistry Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: TDS-BAL-A Matrix: AQUEOUS QC Lot: 29 MAR 90-R QC Run: 29 MAR 90-R			
Total Dissolved Solids	ND	mg/L	10.0
Test: TDS-BAL-A Matrix: AQUEOUS QC Lot: 29 MAR 90-R QC Run: 29 MAR 90-R			
Total Dissolved Solids	ND	mg/L	10.0
Test: PHEN-SPEC-A Matrix: AQUEOUS QC Lot: 03 APR 90-R QC Run: 03 APR 90-R			
Phenolics	ND	mg/L	0.010
Test: TDS-BAL-A Matrix: AQUEOUS QC Lot: 29 MAR 90-R QC Run: 29 MAR 90-R			
Total Dissolved Solids	ND	mg/L	10.0
Test: PHEN-SPEC-A Matrix: AQUEOUS QC Lot: 03 APR 90-R QC Run: 03 APR 90-R			
Phenolics	ND	mg/L	0.010

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

Analyte	Concentration		Measured	AVG	Accuracy		Precision	
	Spiked	DCS1	DCS2		Average(%)	Limit	(RPD)	Limit
					DCS		DCS	
Category: TOC-A								
Matrix: AQUEOUS								
QC Lot: 10 APR 90-Z								
Concentration Units: mg/L								
Total Organic Carbon	200	216	216	216	108	70-130	0	30

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

QC LOT ASSIGNMENT REPORT
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)
008875-0001-SA	AQUEOUS	TOC-A	10 APR 90-Z
008875-0001-SA	AQUEOUS	TOC-A	10 APR 90-Z
008875-0001-SA	AQUEOUS	TOC-A	10 APR 90-Z
008875-0001-SA	AQUEOUS	TOC-A	10 APR 90-Z
008875-0002-SA	AQUEOUS	TOC-A	10 APR 90-Z
008875-0002-SA	AQUEOUS	TOC-A	10 APR 90-Z
008875-0002-SA	AQUEOUS	TOC-A	10 APR 90-Z
008875-0002-SA	AQUEOUS	TOC-A	10 APR 90-Z
008875-0003-SA	AQUEOUS	TOC-A	10 APR 90-Z
008875-0003-SA	AQUEOUS	TOC-A	10 APR 90-Z
008875-0003-SA	AQUEOUS	TOC-A	10 APR 90-Z
008875-0003-SA	AQUEOUS	TOC-A	10 APR 90-Z
008875-0004-SA	AQUEOUS	TOC-A	10 APR 90-Z
008875-0004-SA	AQUEOUS	TOC-A	10 APR 90-Z
008875-0004-SA	AQUEOUS	TOC-A	10 APR 90-Z
008875-0004-SA	AQUEOUS	TOC-A	10 APR 90-Z
008875-0005-SA	AQUEOUS	TOC-A	10 APR 90-Z
008875-0005-SA	AQUEOUS	TOC-A	10 APR 90-Z
008875-0005-SA	AQUEOUS	TOC-A	10 APR 90-Z
008875-0005-SA	AQUEOUS	TOC-A	10 APR 90-Z

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

Analyte	Concentration		Measured DCS2	AVG	Accuracy		Precision	
	Spiked	DCS1			Average(%)	Limit	(RPD)	DCS Limit
Category: TOC-A								
Matrix: AQUEOUS								
QC Lot: 10 APR 90-Z								
Concentration Units: mg/L								
Total Organic Carbon	200	216	216	216	108	70-130	0	30

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



CHAIN OF CUSTODY

Attn: Julie Essey

Enseco Client Giant Refinery
Project Spring Wells OGD+ETD
Sampling Co. Ciniza
Sampling Site Ciniza
Team Leader Celand Rosendale

1. Packed by: _____ Seal # _____
 2. Seal Intact Upon Receipt by Sampling Co.: Good Yes ☒ No ☐
 3. Condition of Contents: Good Rosedale
 4. Sealed for Shipping by: _____
 5. Initial Contents Temp.: 45 °F Seal # _____
 6. Sampling Status: Done Continuing Until _____
 7. Seal Intact Upon Receipt by Laboratory: Yes ☐ No ☐
 8. Contents Temperature Upon Receipt by Lab: _____ °C
 9. Condition of Contents: _____

[illegible]

Relinquished by: (signed)	Received by: (signed)	Date	Time
<i>David Tomalak</i>		3-28-90	1115

Delivered to Shipper by: Clayton Rosendale
Method of Shipment: Fed. Ex. Ampill # _____
Received for Lab: RNAL Signed: Clayton Date/Time 03-29-90
Enseco Project No. 0890



303/421-6611 Facsimile: 303/431-7171

Enseco Client Giant Refinery

Project Spring Sampling OCD + EID

Sampling Co. Gia/29

Sampling Site Cubiz

Team Leader Claudia Rosenthal

 $\dot{z}$

1. Packed by: _____ Seal # _____

2. Seal Intact Upon Receipt by Sampling Co.:

3. Condition of Contents:

4. Sealed for Shipping by:

5. Initial Contents Temp.:

6. Sampling Status:

7. Seal Intact Upon Receipt

8. Contents Temperature

9. Condition of Contents:

Seal #

No

1.

2

1

100

No

1

1

30

Relinquished by: (signed) _____
Received by: (signed) _____

Date Time

3-28-92 1115

Quadrant

10

SHIPPING DETAILS

Delivered to Shipper by:

Method of Shipment:

Received for Lab: _____
Method of shipment: _____

***** Project No.

SHIPPING DETAILS

David Rosendake

[Handwritten signature]

Signed: Albert

E

Date/Time 03-29-96 1800

Enseco - Rocky Mountain Analytical

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

Attn: Julie Essex

Enseco Client Giant Refinery

Project Spring Wells OGD + EED

Sampling Co. Crizg

Sampling Site Craig

Team Leader Clayton Rosendale

CHAIN OF CUSTODY

No.

SAMPLE SAFE™ CONDITIONS

1. Packed by: _____ Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: good
4. Sealed for Shipping by: Clayton Rosendale
5. Initial Contents Temp.: 52 °F Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: _____ °C
9. Condition of Contents: _____

Date	Time	Sample ID/Description	Sample Type	No. Containers #	Analysis Parameters	Remarks
3-28-90	0802	OW-11	Water	1		
				1		
				2		
				4		
				4		Filtered
				6		
				11		2 Replicates
				2		2 Replicates
				12		
				1		
				15		

CUSTODY TRANSFERS PRIOR TO SHIPPING

1. Relinquished by: (signed) Clayton Rosendale Date 3-28-90 Time 1115
2. _____
3. _____

SHIPPING DETAILS

- Delivered to Shipper by: Clayton Rosendale
- Method of Shipment: Fed. Ex. Airbill # _____
- Received for Lab: RNAL Signed: Clayton Date/Time 3-29-90 0800
- Enseco Project No. _____



Arvada, Colorado 80002

303/421-6611 Facsimile: 303/431-7171

Attn: Julie Essex

Enseco Client

Project 500.30 Sampling 00004500

Sampling Co.

Sampling site: Chiz-a

Team leader
Clara J. Ross

 $\dot{z}$

SAMPLE SAFE™ CONDITIONS

Seal #

Yes ☒ No ☐

1

Handwritten signature: *Handwritten signature*

Deal # _____

Se
No

1000

Date	Time	Sample ID/Description	Sample Type	No. Containers / <i>Bottle</i>	Analysis Parameters	Remarks
3-28-90 3-28-90	0850	Trip Blank	Water	1 1		
				1 2		
				1 4		
				3 11		
				1 12		
				1 15		

Relinquished by: (signed) Received by: (signed)

5111 06-87-5

1. *What is the main purpose of this study?*

2. *What are the research objectives?*

3. *What is the significance of this study?*

4. *What are the limitations of this study?*

5. *What are the conclusions of this study?*

Delivered to Shipper by: Kamal Bhandari

Method of Shipment: **Fed Ex**

Received for Lab: RMAL Signed: [Signature]

Enseco Project No.

White and Pink Copies to Lab

Yellow to Sampler

SS-001

Analysis For OW-1, OW-2, OW-3

Parameter	Method
1. Total Organic Carbon (TOC) / 4 replicates	415.1
2. Total Organic Halogen (TOX) / 4 replicates	9020
3. Sodium	6010
4. Calcium	6010
5. Potassium	6010
6. Magnesium	6010
7. Chloride	300.0
8. Sulfate	300.0
9. Carbonate	310.1
10. Bicarbonate	310.1
11. Total Dissolved Solids (TDS)	160.1
12. Volatile Aromatic Compounds	8240 TCL Partial
a) Benzene	
b) Ethyl benzene	
c) Toluene	
d) Total Xylenes	

Analysis For OW-11

Parameter	Method
1. Total Organic Carbon (TOC) 4 replicates	415.1
2. Total Organic Halogens (TOX) 4 replicates	9020
3. Arsenic FAA	7060
4. Barium	6010
5. Cadmium	6010
6. Chromium (Total) CL	6010
7. Copper	6010
8. Lead (Total) FAA	7421
9. Mercury Total	7470
10. Nickel	6010
11. Selenium FAA	7740
12. Silver	6010
13. Sodium	6010
14. Zinc	6010
15. Calcium	6010
16. Manganese FAA	6010
17. Chloride	300.0
18. Sulfate	300.0
19. Carbonate FAA	310.1
20. Bicarbonate FAA	310.1
21. Total Dissolved Solids (TDS)	160.1
22. Phenol	9065
23. Organic PHC's (see attached)	

ORGANIC PHC'S
For Giant Refining

WELLS

OW-11

VOLATILES

8240-TCL (partial)

1,1-dichloroethene
1,1,1-trichloroethane
Tetrachloroethene
Benzene
Ethyl benzene
Toluene
Total xylenes
Methyl ethyl ketone (2-Butanone)

Limit: ug/L

SEMIVOLATILES

8270-Refinery (partial)

o-Cresol ✓ <i>2-m phenol</i>	10
m&p-Cresol ✓ <i>4-m phenol</i>	10
Pyrene	10
Phenanthrene	10
1-Methylnaphthalene *	10
Chrysene	10
Benzo(b)fluoranthene	10
7,12-Dimethylbenzanthracene *	10
Benzo(a)anthracene	10
bis(2-Ethylhexyl)phthalate	10
Fluoranthene	10
Benzo(a)pyrene	10
Naphthalene ✓	10

8270-TCL (partial)

2,4,6-Trichlorophenol ✓	10
2-Chlorophenol ✓	10

Library Search

Benzo(j)fluoranthene

--

*collected
w/ Benzo (i)
Benzo (k)*

Trip Blank & Field Blank

Parameter	Method
1. Total Organic Carbon (TOC) 4 replicates /	415.1
2. Total Organic Halogen (TOX) 4 replicates /	9020
Arsenic -	7060
Barium -	6016
Cadmium -	6016
Chromium (Total) -	6010
Lead (Total) -	7421
Mercury (Total) -	7470
Silver -	6010
Selenium -	7740
Sodium -	6016
Calcium -	6010
Potassium - ADD	6010
Magnesium - ADD	6010
Manganese -	6010
Chloride -	300.0
Sulfate -	300.0
Carbonate -	310.1
Bicarbonate -	310.1
Total Dissolved Solids (TDS) -	160.1
Phenol -	9065
Volatile Contaminant List (See Attached)	
2 Replicates	

NO COPPER
NO NICKEL

VOLATILE CONTAMINANT LIST

For Giant Refining
wells

SMW-1, SMW-2, SMW-3, SMW-4, SMW-5, SMW-6
MW-1, MW-2, MW-4, MW-5

Method 8240-TCL

Chloromethane -
Bromomethane -
Vinyl chloride -
Chloroethane -
Methylene chloride -
1,1-Dichloroethane -
1,1-Dichloroethane -
1,2-Dichloroethane (cis/trans) -
Chloroform -
1,1,2-Trichloro-2,2,1-trifluoroethane * -
1,2-Dichloroethane -
1,1,1-Trichloroethane -
Carbon tetrachloride -
Bromodichloromethane -
1,2-Dichloropropane -
trans-1,3-Dichloropropene -
Trichloroethene -
Chlorodibromomethane -
Cis-1,3-Dichloropropene -
1,1,2-Trichloroethane -
EDB (1,2-Dibromomethane) *
1,1,2,2-Tetrachloroethane -

Tetrachloroethene -

Chlorobenzene -

Methyl ethyl ketone (2-Butanone) -

Benzene -

Toluene -

Chlorobenzene *

Ethylbenzene -

Xylenes (Total) -

1,3-Dichlorobenzene * /

1,4-Dichlorobenzene * /

1,2-Dichlorobenzene * /

Acetone -

Carbon disulfide -

Vinyl Acetate -

Styrene -

2-Hexanone -

4-methyl-2-pentanone -

2-chloroethyl vinyl ether -

ANALYTICAL RESULTS
FOR
GIANT REFINING
ENSECO-RMAL NO. 008877



APRIL 20, 1990

Accreted Lagoon, API Effluent

RECEIVED

JUN 14 1990

OIL CONSERVATION DIV.
SANTA FE

Reviewed by:

Julie Essey

Julie Essey

Jeanne B. Howbert

Jeanne B. Howbert

Introduction

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

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

All analyses at Enseco are performed so that the maximum concentration of sample consistent with the method is analyzed. Dilutions are at times required to achieve linearity of the specific parameter or to reduce matrix interferences. In this event, reporting limits are adjusted proportionately. Surrogate compounds may be measurable or recovered below Enseco's established limits in samples which have been diluted.

Due to matrix interference originating from non-target analytes, dilutions were performed for the test and samples listed below:

<u>Sample Number</u>	<u>Test</u>
008877-0001	Method 8270
008877-0001	Method 6010
008877-0001	Method 7470

Sample Description Information

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

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

Analytical Test Requests

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

SAMPLE DESCRIPTION INFORMATION
for
Giant Refining

Lab ID	Client ID	Matrix	Sampled		Received
			Date	Time	
008877-0001-SA	Aerated Lagoon Effluent	AQUEOUS	27 MAR 90	09:45	29 MAR 90
008877-0002-SA	API Effluent	AQUEOUS	27 MAR 90	09:55	29 MAR 90

ANALYTICAL TEST REQUESTS
for
Giant Refining

Lab ID: 008877	Group Code	Analysis Description	Custom Test?
0001	A	Total Organic Carbon (TOC)	N
		ICP Metals (Total)	Y
		Prep - Total Metals, ICP	N
		Lead, Furnace AA (Total)	N
		Prep - Total Metals, Furnace AA	N
		Mercury, Cold Vapor AA (Total)	N
		Prep - Mercury, Cold Vapor AA (Total)	N
		Total Dissolved Solids (TDS)	N
		pH	N
		Refinery Hazardous Constituent Volatiles	N
		Prep-Volatile Organics by GC/MS	N
		Refinery Hazardous Constituent Semivolatiles	N
		Prep - Semivolatile Organics by GC/MS	N
		Oil & Grease, Gravimetric	N
		Biochemical Oxygen Demand (BOD)	N
		Chemical Oxygen Demand (COD)	N
		Arsenic, Furnace AA (Total)	N
		Selenium, Furnace AA (Total)	N
		Sulfide, Total	N
0002	B	Biochemical Oxygen Demand (BOD)	N
		Chemical Oxygen Demand (COD)	N
		Total Organic Carbon (TOC)	N
		Total Dissolved Solids (TDS)	N

Refinery Hazardous Constituent Volatiles

Method 8240

Client Name: Giant Refining
 Client ID: Aerated Lagoon Effluent
 Lab ID: 008877-0001-SA Enseco ID: 1070254
 Matrix: AQUEOUS Sampled: 27 MAR 90 Received: 29 MAR 90
 Authorized: 29 MAR 90 Prepared: 01 APR 90 Analyzed: 03 APR 90

Parameter	Result	Units	Reporting Limit
Benzene	7.8	ug/L	5.0
Carbon disulfide	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
EDB (1,2-Dibromoethane)	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,4-Dioxane	ND	ug/L	100
Ethylbenzene	ND	ug/L	5.0
2-Butanone (MEK)	310	ug/L	10
Toluene	12	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	59	ug/L	5.0
Toluene-d8	101	%	--
4-Bromofluorobenzene	100	%	--
1,2-Dichloroethane-d4	100	%	--

31

10 10 14

ND = Not detected
 NA = Not applicable

Reported By: Michael Blades

Approved By: Jeff Lowry

Refinery Hazardous Constituent Semivolatiles

Method 8270

Client Name: Giant Refining
 Client ID: Aerated Lagoon Effluent
 Lab ID: 008877-0001-SA Enseco ID: 1070254
 Matrix: AQUEOUS Sampled: 27 MAR 90
 Authorized: 29 MAR 90 Prepared: 01 APR 90 Received: 29 MAR 90
 Analyzed: 06 APR 90

Parameter	Result	Units	Reporting Limit
Anthracene	ND	ug/L	50
Benzo(a)anthracene	ND	ug/L	50
Benzo(b)fluoranthene	ND	ug/L	50
Benzo(k)fluoranthene	ND	ug/L	50
Benzo(a)pyrene	ND	ug/L	50
bis(2-Ethylhexyl) phthalate	ND	ug/L	50
Butyl benzyl phthalate	ND	ug/L	50
Chrysene	ND	ug/L	50
Dibenz(a,h)anthracene	ND	ug/L	50
Di-n-butyl phthalate	ND	ug/L	50
1,2-Dichlorobenzene	ND	ug/L	50
1,3-Dichlorobenzene	ND	ug/L	50
1,4-Dichlorobenzene	ND	ug/L	50
Diethyl phthalate	ND	ug/L	50
7,12-Dimethylbenz(a)-anthracene	ND	ug/L	50
Dimethyl phthalate	ND	ug/L	50
Di-n-octyl phthalate	ND	ug/L	50
Fluoranthene	ND	ug/L	50
Indene	ND	ug/L	50
1-Methylnaphthalene	ND	ug/L	50
Naphthalene	ND	ug/L	50
Phenanthrene	ND	ug/L	50
Pyrene	ND	ug/L	50
Pyridine	ND	ug/L	50
Quinoline	ND	ug/L	50
Benzenethiol	150	ug/L	--
o-Cresol	ND	ug/L	50
m & p-Cresol(s)	ND	ug/L	50
2,4-Dimethylphenol	ND	ug/L	50
2,4-Dinitrophenol	ND	ug/L	250
4-Nitrophenol	ND	ug/L	250
Phenol	ND	ug/L	50
Nitrobenzene-d5	86	%	--
2-Fluorobiphenyl	60	%	--
Terphenyl-d14	26	%	--
Phenol-d5	80	%	--
2-Fluorophenol	74	%	--
2,4,6-Tribromophenol	78	%	--

ND = Not detected
 NA = Not applicable

Reported By: Belinda Guerra

Approved By: Jeff Lowry

Metals

Total Metals

Client Name: Giant Refining
 Client ID: Aerated Lagoon Effluent
 Lab ID: 008877-0001-SA Enseco ID: 1070254
 Matrix: AQUEOUS Sampled: 27 MAR 90 Received: 29 MAR 90
 Authorized: 29 MAR 90 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	0.069	mg/L	0.0050	7060	31 MAR 90	03 APR 90
Cadmium	ND	mg/L	0.010	6010	31 MAR 90	03 APR 90
Chromium	ND	mg/L	0.020	6010	31 MAR 90	03 APR 90
Lead	ND	mg/L	0.010	7421	31 MAR 90	02 APR 90
Mercury	0.0026	mg/L	0.00040	7470	31 MAR 90	04 APR 90
Nickel	ND	mg/L	0.080	6010	31 MAR 90	03 APR 90
Selenium	ND	mg/L	0.050	7740	31 MAR 90	03 APR 90

15

8

7

11

ND = Not detected
 NA = Not applicable

Reported By: David Patterson

Approved By: Toni Lusk

General Inorganics

Client Name: Giant Refining
 Client ID: Aerated Lagoon Effluent
 Lab ID: 008877-0001-SA Enseco ID: 1070254
 Matrix: AQUEOUS Sampled: 27 MAR 90 Received: 29 MAR 90
 Authorized: 29 MAR 90 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Biochemical Oxygen Demand	246	mg/L	2.0	405.1	NA	29 MAR 90
Chemical Oxygen Demand (Regular)	609	mg/L	250	410.4	NA	04 APR 90
Oil and Grease	6.7	mg/L	1.0	9070	NA	04 APR 90
pH	7.8	units	--	9040	NA	29 MAR 90
Sulfide, Total	3.4	mg/L	1.2	9030M	NA	02 APR 90
Total Organic Carbon	100	mg/L	1.0	9060	NA	10 APR 90
Total Dissolved Solids	4650	mg/L	50.0	160.1	NA	29 MAR 90

ND = Not detected
 NA = Not applicable

Reported By: Jennifer Franzen

Approved By: Toni Stovall

General Inorganics

Client Name: Giant Refining
Client ID: API Effluent
Lab ID: 008877-0002-SA
Matrix: AQUEOUS
Authorized: 29 MAR 90

Enseco ID: 1070256
Sampled: 27 MAR 90
Prepared: See Below

Received: 29 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Biochemical Oxygen Demand	358	mg/L	2.0	405.1	NA	29 MAR 90
Chemical Oxygen Demand (Regular)	1760	mg/L	250	410.4	NA	04 APR 90
Total Organic Carbon	250	mg/L	1.0	9060	NA	10 APR 90
Total Dissolved Solids	3700	mg/L	50.0	160.1	NA	29 MAR 90

ND = Not detected
NA = Not applicable

Reported By: Jennifer Franzen

Approved By: Toni Stovall

Quality Control Results

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

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

The standard laboratory QC package is designed to:

- 1) establish a strong, cost-effective QC program that ensures the generation of scientifically valid, legally defensible data
- 2) assess the laboratory's performance of the analytical method using control limits generated with a well-defined matrix
- 3) establish clear-cut guidelines for acceptability of analytical data so that QC decisions can be made immediately at the bench, and
- 4) provide a standard set of reportables which assures the client of the quality of his data.

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

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

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

Accuracy for DCS and SCS is measured by Percent Recovery.

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

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

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

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

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
008877-0001-SA	AQUEOUS	624-A	28 MAR 90-H	02 APR 90-H

DUPLICATE CONTROL SAMPLE REPORT Volatile Organics by GC/MS

Analyte	Spiked	Concentration		AVG	Accuracy		Precision	
		DCS1	Measured DCS2		DCS	Average(%) Limits	(RPD) DCS	Limit
Category: 624-A								
Matrix: AQUEOUS								
QC Lot: 28 MAR 90-H								
Concentration Units: ug/L								
1,1-Dichloroethene	50	54.5	49.1	51.8	104	61-145	10	14
Trichloroethene	50	51.2	51.4	51.3	103	71-120	0.4	14
Benzene	50	51.4	51.8	51.6	103	76-127	0.8	11
Toluene	50	50.6	49.7	50.2	100	76-125	1.8	13
Chlorobenzene	50	52.7	53.1	52.9	106	75-130	0.8	13

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

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration		Accuracy(%)	
	Spiked	Measured	SCS	Limits

Category: 624-A

Matrix: AQUEOUS

QC Lot: 28 MAR 90-H QC Run: 02 APR 90-H

Concentration Units: ug/L

1,2-Dichloroethane-d4	50.0	48.2	96	76-114
4-Bromofluorobenzene	50.0	51.3	103	86-115
Toluene-d8	50.0	51.1	102	88-110

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

METHOD BLANK REPORT
Volatile Organics by GC/MS

Analyte	Result	Units	Reporting Limit
Test: 624-REF-AP			
Matrix: AQUEOUS			
QC Lot: 28 MAR 90-H QC Run: 02 APR 90-H			
Benzene	ND	ug/L	5.0
Carbon disulfide	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
EDB (1,2-Dibromoethane)	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,4-Dioxane	ND	ug/L	100
Ethylbenzene	ND	ug/L	5.0
2-Butanone (MEK)	ND	ug/L	10
Toluene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0

QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
008877-0001-SA	AQUEOUS	625-A	01 APR 90-A	01 APR 90-A

DUPLICATE CONTROL SAMPLE REPORT Semivolatile Organics by GC/MS

Analyte	Spiked	Concentration		Measured	AVG	Accuracy		Precision	
		DCS1	DCS2			DCS	Average(%) Limits	(RPD) DCS Limit	DCS Limit
Category: 625-A									
Matrix: AQUEOUS									
QC Lot: 01 APR 90-A									
Concentration Units: ug/L									
Phenol	100	69.6	82.9	76.2	76	12- 89	17	42	
2-Chlorophenol	100	65.1	76.1	70.6	71	27-123	16	40	
1,4-Dichlorobenzene	50	22.1	24.0	23.0	46	36- 97	8.2	28	
N-Nitroso-di- n-propylamine	50	39.1	45.7	42.4	85	41-116	16	38	
1,2,4-Trichlorobenzene	50	24.2	25.0	24.6	49	39- 98	3.3	28	
4-Chloro-3-methylphenol	100	75.5	87.1	81.3	81	23- 97	14	42	
Acenaphthene	50	27.6	31.3	29.4	59	46-118	13	31	
4-Nitrophenol	100	68.5	66.7	67.6	68	10- 80	2.7	50	
2,4-Dinitrotoluene	50	29.1	35.1	32.1	64	24- 96	19	38	
Pentachlorophenol	100	78.8	79.6	79.2	79	9-103	1.0	50	
Pyrene	50	27.2	33.4	30.3	61	26-127	20	31	

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

SINGLE CONTROL SAMPLE REPORT
Semivolatiles Organics by GC/MS

Analyte	Concentration		Accuracy(%)	
	Spiked	Measured	SCS	Limits

Category: 625-A

Matrix: AQUEOUS

QC Lot: 01 APR 90-A QC Run: 01 APR 90-A

Concentration Units: ug/L

Nitrobenzene-d5	100	55.7	56	35-114
2-Fluorobiphenyl	100	49.7	50	43-116
Terphenyl-d14	100	53.5	54	33-141
2-Fluorophenol	200	124	62	21-100
Phenol-d5	200	133	66	10- 94
2,4,6-Tribromophenol	200	154	77	10-123

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

METHOD BLANK REPORT
Semivolatile Organics by GC/MS

Analyte	Result	Units	Reporting Limit
Test: 625-REF-A			
Matrix: AQUEOUS			
QC Lot: 01 APR 90-A QC Run: 01 APR 90-A			
Anthracene	ND	ug/L	10
Benzo(a)anthracene	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
Chrysene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
7,12-Dimethylbenz(a)-anthracene	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Indene	ND	ug/L	10
1-Methylnaphthalene	ND	ug/L	10
Naphthalene	ND	ug/L	10
Phenanthrene	ND	ug/L	10
Pyrene	ND	ug/L	10
Pyridine	ND	ug/L	10
Quinoline	ND	ug/L	10
Benzenethiol	ND	ug/L	--
o-Cresol	ND	ug/L	10
m & p-Cresol(s)	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
Phenol	ND	ug/L	10

QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
008877-0001-SA	AQUEOUS	ICP-AT	31 MAR 90-D	31 MAR 90-D
008877-0001-SA	AQUEOUS	PB-FAA-AT	31 MAR 90-D	31 MAR 90-D
008877-0001-SA	AQUEOUS	HG-CVAA-AT	03 APR 90-A	03 APR 90-A
008877-0001-SA	AQUEOUS	AS-FAA-AT	31 MAR 90-D	31 MAR 90-D
008877-0001-SA	AQUEOUS	SE-FAA-AT	31 MAR 90-D	31 MAR 90-D

DUPLICATE CONTROL SAMPLE REPORT Metals Analysis and Preparation

Analyte	Concentration		Measured DCS2	AVG	Accuracy Average(%)		Precision (RPD)	
	Spiked	DCS1			DCS	Limits	DCS	Limit
Category: ICP-AT								
Matrix: AQUEOUS								
QC Lot: 31 MAR 90-D								
Concentration Units: mg/L								
Aluminum	2.0	1.89	1.89	1.89	94	75-125	0.2	20
Antimony	0.5	0.461	0.470	0.465	93	75-125	2.1	20
Arsenic	0.5	0.443	0.473	0.458	92	75-125	6.6	20
Barium	2.0	1.63	1.65	1.64	82	75-125	1.3	20
Beryllium	0.05	0.0446	0.0440	0.0443	89	75-125	1.2	20
Cadmium	0.05	0.0474	0.0450	0.0462	92	75-125	5.2	20
Calcium	100	87.7	90.6	89.1	89	75-125	3.2	20
Chromium	0.2	0.191	0.192	0.191	96	75-125	0.8	20
Cobalt	0.5	0.437	0.461	0.449	90	75-125	5.5	20
Copper	0.25	0.241	0.249	0.245	98	75-125	3.4	20
Iron	1.0	0.943	0.954	0.948	95	75-125	1.2	20
Lead	0.5	0.455	0.476	0.465	93	75-125	4.4	20
Magnesium	50	43.9	45.4	44.6	89	75-125	3.4	20
Manganese	0.5	0.462	0.490	0.476	95	75-125	5.8	20
Nickel	0.5	0.425	0.453	0.439	88	75-125	6.3	20
Potassium	50	43.7	45.5	44.6	89	75-125	3.9	20
Silver	0.05	0.0422	0.0435	0.0429	86	75-125	3.1	20
Sodium	100	87.7	90.9	89.3	89	75-125	3.5	20
Vanadium	0.5	0.455	0.461	0.458	92	75-125	1.2	20
Zinc	0.5	0.451	0.483	0.467	93	75-125	6.7	20

Category: PB-FAA-AT
 Matrix: AQUEOUS
 QC Lot: 31 MAR 90-D
 Concentration Units: mg/L

Lead	0.020	0.0230	0.0238	0.0234	117	75-125	3.4	20
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Category: HG-CVAA-AT
 Matrix: AQUEOUS
 QC Lot: 03 APR 90-A
 Concentration Units: mg/L

Mercury	0.0010	0.00112	0.00114	0.00113	113	75-125	1.8	20
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Calculations are performed before rounding to avoid round-off errors in calculated results.

DUPLICATE CONTROL SAMPLE REPORT Metals Analysis and Preparation (cont.)

Analyte	Spiked	Concentration		AVG	Accuracy		Precision	
		DCS1	Measured DCS2		DCS	Average(%) Limits	(RPD) DCS	Limit

Category: AS-FAA-AT
 Matrix: AQUEOUS
 QC Lot: 31 MAR 90-D
 Concentration Units: mg/L

Arsenic	0.04	0.0415	0.0432	0.0424	106	75-125	4.0	20
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Category: SE-FAA-AT
 Matrix: AQUEOUS
 QC Lot: 31 MAR 90-D
 Concentration Units: mg/L

Selenium	0.01	0.00970	0.00930	0.00950	95	75-125	4.2	20
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Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Metals Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: ICP-AT			
Matrix: AQUEOUS			
QC Lot: 31 MAR 90-D QC Run: 31 MAR 90-D			
Cadmium	ND	mg/L	0.0050
Chromium	ND	mg/L	0.010
Nickel	ND	mg/L	0.040
Test: PB-FAA-AT			
Matrix: AQUEOUS			
QC Lot: 31 MAR 90-D QC Run: 31 MAR 90-D			
Lead	ND	mg/L	0.0050
Test: HG-CVAA-AT			
Matrix: AQUEOUS			
QC Lot: 03 APR 90-A QC Run: 03 APR 90-A			
Mercury	ND	mg/L	0.00020
Test: AS-FAA-AT			
Matrix: AQUEOUS			
QC Lot: 31 MAR 90-D QC Run: 31 MAR 90-D			
Arsenic	ND	mg/L	0.0050
Test: SE-FAA-AT			
Matrix: AQUEOUS			
QC Lot: 31 MAR 90-D QC Run: 31 MAR 90-D			
Selenium	ND	mg/L	0.0050

QC LOT ASSIGNMENT REPORT
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
008877-0001-SA	AQUEOUS	TDS-A	29 MAR 90-S	29 MAR 90-S
008877-0001-SA	AQUEOUS	PH-A	29 MAR 90-O	-
008877-0001-SA	AQUEOUS	O&G-G-A	04 APR 90-R	04 APR 90-R
008877-0001-SA	AQUEOUS	BOD-A	29 MAR 90-A	-
008877-0001-SA	AQUEOUS	COD-A	04 APR 90-A	-
008877-0001-SA	AQUEOUS	S-A	02 APR 90-A	-
008877-0002-SA	AQUEOUS	BOD-A	29 MAR 90-A	-
008877-0002-SA	AQUEOUS	COD-A	04 APR 90-A	-
008877-0002-SA	AQUEOUS	TDS-A	29 MAR 90-S	29 MAR 90-S

DUPLICATE CONTROL SAMPLE REPORT Wet Chemistry Analysis and Preparation

Analyte	Spiked	Concentration		Measured DCS2	AVG	Accuracy Average(%)		Precision (RPD)	
		DCS1				DCS	Limits	DCS	Limit
Category: TDS-A Matrix: AQUEOUS QC Lot: 29 MAR 90-S Concentration Units: mg/L									
Total Dissolved Solids	1270	1210	1220	1220	96	90-110	0.8	10	
Category: PH-A Matrix: AQUEOUS QC Lot: 29 MAR 90-0 Concentration Units: units									
pH	9.1	9.06	9.06	9.06	100	98-102	0.0	5	
Category: O&G-G-A Matrix: AQUEOUS QC Lot: 04 APR 90-R Concentration Units: mg/L									
Oil and Grease	50	43.4	44.8	44.1	88	75-125	3.2	20	
Category: BOD-A Matrix: AQUEOUS QC Lot: 29 MAR 90-A Concentration Units: mg/L									
Biochemical Oxygen Demand	200	182	170	176	88	80-120	6.8	20	
Category: COD-A Matrix: AQUEOUS QC Lot: 04 APR 90-A Concentration Units: mg/L									
Chemical Oxygen Demand (Regular)	117	105	112	108	93	76-124	6.5	20	

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

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation (cont.)

Analyte	Spiked	Concentration		Measured DCS2	AVG	Accuracy Average(%)		Precision (RPD)	
		DCS1				DCS	Limits	DCS	Limit

Category: S-A
Matrix: AQUEOUS
QC Lot: 02 APR 90-A
Concentration Units: mg/L

Sulfide, Total	0.42	0.338	0.338	0.338	80	80-120	0.0	20
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Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Wet Chemistry Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: TDS-BAL-A Matrix: AQUEOUS QC Lot: 29 MAR 90-S QC Run: 29 MAR 90-S			
Total Dissolved Solids	ND	mg/L	10.0
Test: O&G-G-A Matrix: AQUEOUS QC Lot: 04 APR 90-R QC Run: 04 APR 90-R			
Oil and Grease	ND	mg/L	1.0
Test: TDS-BAL-A Matrix: AQUEOUS QC Lot: 29 MAR 90-S QC Run: 29 MAR 90-S			
Total Dissolved Solids	ND	mg/L	10.0

QC LOT ASSIGNMENT REPORT
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)
008877-0001-SA	AQUEOUS	TOC-A	10 APR 90-Z
008877-0001-SA	AQUEOUS	TOC-A	10 APR 90-Z
008877-0001-SA	AQUEOUS	TOC-A	10 APR 90-Z
008877-0001-SA	AQUEOUS	TOC-A	10 APR 90-Z
008877-0002-SA	AQUEOUS	TOC-A	10 APR 90-Z
008877-0002-SA	AQUEOUS	TOC-A	10 APR 90-Z
008877-0002-SA	AQUEOUS	TOC-A	10 APR 90-Z
008877-0002-SA	AQUEOUS	TOC-A	10 APR 90-Z

DUPLICATE CONTROL SAMPLE REPORT Wet Chemistry Analysis and Preparation

Analyte	Concentration		Measured	AVG	Accuracy		Precision	
	Spiked	DCS1	DCS2		DCS	Average(%) Limit	DCS	(RPD) Limit

Category: TOC-A
Matrix: AQUEOUS
QC Lot: 10 APR 90-Z
Concentration Units: mg/L

Total Organic Carbon	200	216	216	216	108	70-130	0	30
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Calculations are performed before rounding to avoid round-off errors in calculated results.

OW-1

Giant Refining Gallup, New Mexico

Date: 03 Apr 90

TCL Volatile Organics
Method 8240

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0

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DW-1

Giant Refinery Gallup, New Mexico

Date: 03 Apr 90

Metals
Dissolved Metals

Parameter	Result	Units	Reporting Limit
Calcium	2.4	mg/L	0.20
Magnesium	0.33	mg/L	0.20
Potassium	ND	mg/L	5.0
Sodium	297	mg/L	5.0

OW-1

Giant Refining Gallup, New Mexico

Date: 03 Apr 90

General Inorganics

Parameter	Result	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	391	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	31.0	mg/L	5.0
Chloride	34.2	mg/L	3.0
pH	8.41	units	--
pH	8.41	units	--
pH	8.42	units	--
pH	8.40	units	--
Average pH	8.41	units	--
Sulfate	232	mg/L	5.0
Specific Conductance at 25 deg.C	1380	umhos/cm	1.0
Specific Conductance at 25 deg.C	1380	umhos/cm	1.0
Specific Conductance at 25 deg.C	1370	umhos/cm	1.0
Specific Conductance at 25 deg.C	1370	umhos/cm	1.0
Average Specific Conductance at 25 deg.C	1375	umhos/cm	1.0
Total Organic Carbon	3.0	mg/L	1.0
Total Organic Carbon	3.0	mg/L	1.0
Total Organic Carbon	3.0	mg/L	1.0
Total Organic Carbon	2.0	mg/L	1.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Dissolved Solids	838	mg/L	10.0
Water Elevation	6868.0	ft	--

OW1 Giant Ciniza Refinery Gallup, New Mexico

DATE 12/80 3/86 4/87 4/88 7/89

PARAMETER

pH	7.80	8.00	9.15	8.80	8.70 8.70 8.70 8.60
Average	7.80	8.00	9.15	8.80	8.67
Sp. Cond.	NA	880	1200	1400	1140 1130 1130 1180
Average		880	1200	1400	1145

mg/L (unless otherwise indicated)

Benzene			<0.001	43.8ug/L	ND
Tolulene			<0.001	1.1ug/L	ND
Ethyl Benzene			<0.001	<0.1ug/L	ND
Xylene			<0.001	<0.1ug/L	ND
Ag	NA	<0.1			
As	<0.1	0.034			
Al	NA	210.00			
Ba	NA	1.80			
Be		<0.1			
B		0.40			
Cd	NA	<0.1			
Ca		100.00	124.00	1.13	4.10
Cl	28.00	92.10	41.60	34.70	36.00
CN	<0.1				
Cr	0.007	<0.1			
Co	NA	<0.1			
Cu	NA	<0.1			
F	0.55				
Fe	0.07	65.00			
Hg	NA				
K		58.50	6.60	1.08	ND
Mg		66.00	22.60	0.48	0.60
Mn	0.04	1.70			
Mo	NA	<0.1			
Na	270.00	460.00	460.00	158.75	318.00
Ni	NA	<0.1			
Pb	NA	0.30			
Se	<0.1	<0.005			
Si		10.00			
Sn		0.10			
St		7.20			
V		<0.1			
Zn	NA	0.40			
Bicarbonate		542.00	328.00	368.00	358.00
Carbonate		55.20	32.00	24.00	30.00
Nitrate	0.50				

Phenols	NA				
Sulfate	167.00	177.00	73.00	148.00	226.00
TDS	776.00	N/A	1150.00	980.00	850.00
TOC	NA				
TOX	NA				

OW-2

Giant Refining Gallup, New Mexico

Date: 03 APR 90

TCL Volatile Organics
Method 8240

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0

OW-2

Giant Refining Gallup, New Mexico

Date: 03 Apr 90

Metals
Dissolved Metals

Parameter	Result	Units	Reporting Limit
Calcium	8.5	mg/L	0.20
Magnesium	3.0	mg/L	0.20
Potassium	ND	mg/L	5.0
Sodium	298	mg/L	5.0

OW-2

Giant Refining

Gallup, New Mexico

Date: 03 Apr 90

General Inorganics

Parameter	Result	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	681	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5.0
Chloride	36.7	mg/L	3.0
pH	7.97	units	--
pH	7.96	units	--
pH	8.00	units	--
pH	7.98	units	--
Average pH	7.98	units	--
Sulfate	7.3	mg/L	5.0
Specific Conductance at 25 deg.C	1380	umhos/cm	1.0
Specific Conductance at 25 deg.C	1420	umhos/cm	1.0
Specific Conductance at 25 deg.C	1410	umhos/cm	1.0
Specific Conductance at 25 deg.C	1420	umhos/cm	1.0
Average Specific Conductance at 25 deg.C	1415	umhos/cm	1.0
Total Organic Carbon	6.0	mg/L	1.0
Total Organic Carbon	6.0	mg/L	1.0
Total Organic Carbon	6.0	mg/L	1.0
Total Organic Carbon	6.0	mg/L	1.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Dissolved Solids	944	mg/L	10.0
Water Elevation	6841.83	ft	--

OW2 Giant Ciniza Refinery Gallup, New Mexico

DATE 11/80 12/80 6/81 9/81 3/86 4/87 4/88 7/89

PARAMETER

pH	7.60				7.50	8.16	8.70	8.1 8.2 8.0 8.1
Average	7.60				7.50	8.16	8.70	8.1
Sp. Cond.	1180.00				950	1300	1300	1130 1120 1120 1130
Average	1180.00							1125

mg/L (unless otherwise indicated)

Benzene						<0.001	<1ug/L	ND
Tolulene						<0.001	<1ug/L	ND
Ethyl Benzene						<0.001	<1ug/L	ND
Xylene						<0.001	<1ug/L	ND
Ag				<0.03	<0.1			
As	<0.01			0.030	0.006			
Al					0.60			
Ba				1.300	0.10			
Be					<0.1			
Bo					0.80			
Ca	20.00				9.90	2.25	4.12	13
Cd				<0.01	<0.1			
Cl	39.00				41.50	40.60	377.00	40
CN	<0.1				<0.01			
Cr	0.003	1.60	0.60	0.016	<0.1			
Co					<0.1			
Cu					<0.1			
F	1.60							
Fe	1.10				0.30			
Hg				<0.002				
K					3.12	1.37	0.61	ND
Mg					3.20	0.38	3.55	4.7
Mn	0.20			1.170	0.12			
Molybdenum					<0.1			
Na	390.00				294.00	250.00	178.75	319
Ni					<0.1			
Pb			0.53		<0.1			
Se	0.01			0.042	<0.005			
Silicon					5.20			
St					0.40			
Tin					<0.1			
Vanadium					<0.1			
Zn					<0.1			
Bicarbonate					802.00	568.00	604.00	664

Carbonate		0.00	(5	(2	ND
Sulfate	16.00	30.50	40.00	20.50	11
TDS	856.00	865.00	565.00	840.00	1040
TOC					
TOX					

OW-3

Giant Refining Gallup, New Mexico

Date: 03 APR 90

TCL Volatile Organics
Method 8240

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0

OW-3

Giant Refining Gallup, New Mexico

Date: 03 Apr 90

Metals
Dissolved Metals

Parameter	Result	Units	Reporting Limit
Calcium	9.4	mg/L	0.20
Magnesium	3.1	mg/L	0.20
Potassium	ND	mg/L	5.0
Sodium	292	mg/L	5.0

OW-3

Giant Refining Gallup, New Mexico

Date: 03 Apr 90

General Inorganics

Parameter	Result	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	669	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5.0
Chloride	36.7	mg/L	3.0
pH	8.00	units	--
pH	7.98	units	--
pH	8.01	units	--
pH	8.00	units	--
Average pH	8.00	units	--
Sulfate	15.4	mg/L	5.0
Specific Conductance at 25 deg.C	1360	umhos/cm	1.0
Specific Conductance at 25 deg.C	1370	umhos/cm	1.0
Specific Conductance at 25 deg.C	1380	umhos/cm	1.0
Specific Conductance at 25 deg.C	1370	umhos/cm	1.0
Average Specific Conductance at 25 deg.C	1370	umhos/cm	1.0
Total Organic Carbon	5.0	mg/L	1.0
Total Organic Carbon	7.0	mg/L	1.0
Total Organic Carbon	7.0	mg/L	1.0
Total Organic Carbon	5.0	mg/L	1.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Dissolved Solids	865	mg/L	10.0
Water Elevation	6844.47	ft	--

OW3 Giant Ciniza Refinery Gallup, New Mexico

DATE 11/80 3/86 4/87 4/88 7/89

PARAMETER

pH	7.70	7.70	8.14	8.20	8.00 8.10 8.00 8.20
Average	7.70	7.70	8.14	8.20	8.08
Sp. Cond.	1280	910	1250	1200	1120 1110 1120 1110
Average	1280	910	1250	1200	1115

mg/L (unless otherwise indicated)

Benzene			<0.001	<1ug/L	ND
Tolulene			<0.001	<1ug/L	ND
Ethyl Benzene			<0.001	<1ug/L	ND
Xylene			<0.001	<1ug/L	ND
Ag		<0.1			
As	<0.01	0.006			
Al		<0.1			
Ba		<0.1			
Be		<0.1			
B		0.70			
Cd		<0.1			
Ca	3.40	36.00	7.77	4.50	12.00
Cl	36.00	41.20	39.70	32.80	39.00
CN	<0.1				
Cr	0.007	<0.1			
Co		<0.1			
Cu		<0.1			
F	1.40				
Fe	1.80	<0.1			
Hg					
K		0.00	0.76	0.34	ND
Mg		8.20	5.80	3.63	4.00
Mn	0.003	0.13			
Mo		<0.1			
Na	370.00	276.00	200.00	187.50	318.00
Ni		<0.1			
Pb		<0.1			
Se	<0.01	<0.005			
Si		3.10			
Sn		<0.1			
St		0.70			
V		<0.1			
Zn		<0.1			
Bicarbonate		619.00	544.00	612.00	650.00

Aromatic HC				ND		
Bicarbonate				645.00	448.00	463.00
Carbonate				20.40	12	ND
Halogenated HC				ND		
Phenols		(0.001	1.80			ND
Sulfate	196.00		167.00	40.30	137.00	217.00
TDS	935.00			805.00	986.00	1080.00
TOX ug/L		(0.4		7.00		
				7.00		
				7.00		
				8.00		
AVERAGE				7.25		
TOC ug/L				7.00		
				7.00		
				8.00		
				8.00		
AVERAGE				7.50		

MW-1

Giant Refining Gallup, New Mexico

Date: 01 Apr 90

TCL Volatile Organics
Method 8240

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomthane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	10
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	10
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Stryene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2- trifluoroethane	ND	ug/L	10
1,2-Dibromoethane (EDB)	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	5.0
1,3-Dichlorobenzene	ND	ug/L	5.0

MW-1

Giant Refinery Gallup, New Mexico

Date: 01 Apr 90

Metals
Dissolved Metals

Parameter	Result	Units	Reporting Limit
Arsenic	ND	mg/L	0.0050
Barium	ND	mg/L	0.010
Cadmium	ND	mg/L	0.0050
Calcium	1.8	mg/L	0.20
Magnesium	0.25	mg/L	0.20
Manganese	ND	mg/L	0.010
Potassium	ND	mg/L	5.00
Selenium	ND	mg/L	0.0050
Silver	ND	mg/L	0.010
Sodium	252	mg/L	5.0

MW-1

Giant Refining Gallup, New Mexico

Date: 01 Apr 90

Metals
Total Metals

Parameter	Result	Units	Reporting Limit
Chromium	ND	mg/L	0.010
Lead	ND	mg/L	0.0050
Mercury	ND	mg/L	0.00020

MW-1

Giant Refining Gallup, New Mexico

Date: 03 Apr 90

General Inorganics

Parameter	Result	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	300	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	48.6	mg/L	5.0
Chloride	44.9	mg/L	3.0
pH	8.61	units	--
pH	8.64	units	--
pH	8.61	units	--
pH	8.65	units	--
Average pH	8.63	units	--
Phenolics	ND	mg/L	0.010
Sulfate	156	mg/L	5.0
Specific Conductance at 25 deg.C	1120	umhos/cm	1.0
Specific Conductance at 25 deg.C	1120	umhos/cm	1.0
Specific Conductance at 25 deg.C	1110	umhos/cm	1.0
Specific Conductance at 25 deg.C	1120	umhos/cm	1.0
Average Specific Conductance at 25 deg.C	1118	umhos/cm	1.0
Total Organic Carbon	1.0	mg/L	1.0
Total Organic Carbon	1.0	mg/L	1.0
Total Organic Carbon	1.0	mg/L	1.0
Total Organic Carbon	1.0	mg/L	1.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Dissolved Solids	687	mg/L	10.0
Water Elevation	6869.18	ft	--

MM-1 Ciniza Refinery Giant Refining Gallup, New Mexico

DATE	10/82	20/82	30/82	40/82	7/83	1/84	2/84	3/84	4/84	11/84	12/84	1/85
PARAMETER												
TOC mg/l	8.80	5.35	2.50	5.90	1.50	5.65	5.96	4.92	87.00	6.92	8.00	7.40
AVERAGE	8.80	5.35	2.50	5.90	1.50	5.65	5.96	4.92		6.92	8.00	7.40
TOX mg/l (begin 5/87 units are ug/l)	2.80	2.60	1.65	1.77	1.50	0.95	0.72	0.68	0.015	0.140	0.005	0.005
AVERAGE	2.80	2.60	1.65	1.77	1.50	0.95	0.72	0.68	0.030	0.140	0.010	0.010
pH	8.60	8.80	8.80	8.80	8.60	8.50	8.80	8.22	8.84	8.61	8.70	8.80
AVERAGE	8.60	8.80	8.80	8.80	8.60	8.50	8.80	8.22	8.84	8.61	8.70	8.80
CONDUCTIVITY mhos/cm	930	1021	1100	995	1050	992	1038	1010	1068	1030	1180	1100
AVERAGE	930	1021	1100	995	1050	992	1038	1010	1068	1030	1180	1100
WATER ELEVATION	6868.9	6869.5	6870.3	6870.1	6869.2	6870.9	6870.9	6870.9	6871.6	6870.2	6870.6	6869.9
Ag mg/l					0.0005		0.0005		0.0050	0.00005		
As mg/l					0.0040		0.0005		0.0050	0.0005		
Ba mg/l					0.0200		0.0100		0.0500	0.0100		
Ca mg/l												
Cd mg/l					0.0005		0.0005		0.0005	0.0005		
Cl mg/l					58.00		54.00		55.00	47.00		47.00
Cr mg/l					0.0005		0.0005		0.0050	0.0005		
Fe mg/l					0.130		0.05		0.08	0.29		0.077
Hg mg/l					0.0001		0.0001			0.0001		0.001
Na mg/l					250.00		256.00		270.00	257.00		234.00
Pb mg/l					0.0050		0.0005		0.0040	0.0025		0.009
Se mg/l					0.0005		0.0005		0.0100	0.0005		
SO4 mg/l					172.00		135.00		170.00	151.00		150.00

MM-1

Ciniza Refinery Giant Refining Gallup, New Mexico

DATE	10/85	2/86	5/86	10/86	5/87	5/87R	10/87	10/87D	11/87	12/87	8/88	1/89
PARAMETER												
TOC mg/l	2.00	3.00	1.00	7.00	2.00		2.00	0.70	0.70	2.00	1.10	3.00
			1.00	7.00	2.00		2.00	0.60	0.60	2.00	1.10	3.00
			0.90	7.00	3.00		1.00	0.70	0.70	1.00	1.10	4.00
			0.90	7.00	2.00		1.00	0.70	0.70	1.00	1.10	4.00
AVERAGE	2.00	3.00	1.00	7.00	2.00		2.00	0.05	0.68	1.50	1.10	3.50
TOX mg/l	0.005	0.005	10	2.50	38.00	2.50	2.50	5.00	5.00	2.50	2.50	17.00
(begin 5/87			10	2.50	37.00	2.50	2.50	5.00	5.00	2.50	2.50	25.00
units are			10	5.00	37.00	8.00	7.00	5.00	5.00	7.00	2.50	20.00
ug/l)			10	5.00	39.00	5.00	2.50	5.00	5.00	2.50	2.50	10.00
AVERAGE	0.010	0.010	10	5.00		6.00	7.00	5.00	5.00	3.63	2.50	18.00
pH	8.50	8.40	8.60	8.80	8.51		9.10	8.60	8.60	9.10	9.13	8.90
			8.60	8.79	8.50		9.00	8.60	8.60	9.10	9.18	8.85
			8.70	8.81	8.51		9.10	8.60	8.60	9.00	9.16	8.90
			8.60	8.80	8.52		9.10	8.60	8.60	9.10	9.19	8.90
AVERAGE	8.50	8.40	8.60	8.80	8.51		9.10	8.60	8.60	9.10	9.17	8.90
CONDUCTIVITY	1003	1162	1000	1200	1100		1400	1180.00	1180.00	1400.00	1100.00	1100.00
μhos/cm			1080	1190	1000		1400	1190.00	1190.00	1400.00	1020.00	1100.00
			1100	1190	1100		1400	1190.00	1190.00	1400.00	1010.00	1100.00
			1110	1200	1100		1400	1180.00	1180.00	1400.00	1080.00	1100.00
AVERAGE	1003	1162	1073	1195	1075		1400	1185.00	1185.00	1400.00	1053.00	1100.00
WATER ELEVATION	6870.7	6870.9	6871.5	6871.10	6871.80	---	6871.20	---	6871.20	---	6871.10	6871.00
Ag mg/l			0.025									
As mg/l			0.025									
Ba mg/l			0.005									
Ca mg/l				0.96							1.02	
Cd mg/l			0.005									
Cl mg/l			57.00	50.00	44.60						44.70	
Cr mg/l			0.025	0.025							0.03	
Fe mg/l			0.110	0.170	0.3						0.05	
Hg mg/l			0.001									
Na mg/l			290.00	267.30	227.00						224.00	
Pb mg/l			0.025	0.025								
Se mg/l			0.005									
SO4 mg/l			223.00	131.00	148.00						203.00	

MW-1 Ciniza Refinery Giant Refining Gallup, New Mexico

DATE 6/89

PARAMETER

TOC mg/l

AVERAGE

TOX mg/l
(begin 5/87
units are
ug/l)

AVERAGE

pH 8.70

AVERAGE 8.70

CONDUCTIVITY 965.00
mhos/cm

AVERAGE 965.00

WATER ELEVATION

Ag mg/l	ND
As mg/l	0.0025
Ba mg/l	0.01
Ca mg/l	2.10
Cd mg/l	0.001
Cl mg/l	49.00
Cr mg/l	0.005
Fe mg/l	ND
Hg mg/l	0.0001
Na mg/l	250.00
Pb mg/l	0.005
Se mg/l	0.005
SO4 mg/l	165.00

MW-2

Giant Refining Gallup, New Mexico

Date: 01 Apr 90

TCL Volatile Organics
Method 8240

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene			
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Stryene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-			
trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

MW-2

Giant Refinery Gallup, New Mexico

Date: 01 Apr 90

Metals
Dissolved Metals

Parameter	Result	Units	Reporting Limit
Arsenic	ND	mg/L	0.010
Barium	0.019	mg/L	0.010
Cadmium	ND	mg/L	0.0050
Calcium	1.7	mg/L	0.20
Magnesium	ND	mg/L	0.20
Manganese	ND	mg/L	0.010
Potassium	ND	mg/L	5.00
Selenium	ND	mg/L	0.0050
Silver	ND	mg/L	0.010
Sodium	259	mg/L	5.0

MW-2

Giant Refining Gallup, New Mexico

Date: 01 Apr 90

Metals
Total Metals

Parameter	Result	Units	Reporting Limit
Chromium	ND	mg/L	0.010
Lead	ND	mg/L	0.010
Mercury	ND	mg/L	0.00020

MW-2

Giant Refining Gallup, New Mexico

Date: 02 Apr 90

General Inorganics

Parameter	Result	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	288	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	47.6	mg/L	5.0
Chloride	54.0	mg/L	3.0
pH	8.63	units	--
pH	8.60	units	--
pH	8.72	units	--
pH	8.64	units	--
Average pH	8.65	units	--
Phenolics	ND	mg/L	0.010
Sulfate	165	mg/L	5.0
Specific Conductance at 25 deg.C	1030	umhos/cm	1.0
Specific Conductance at 25 deg.C	1040	umhos/cm	1.0
Specific Conductance at 25 deg.C	1030	umhos/cm	1.0
Specific Conductance at 25 deg.C	1050	umhos/cm	1.0
Average Specific Conductance at 25 deg.C	1038	umhos/cm	1.0
Total Organic Carbon	1.0	mg/L	1.0
Total Organic Carbon	1.0	mg/L	1.0
Total Organic Carbon	1.0	mg/L	1.0
Total Organic Carbon	1.0	mg/L	1.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	31.5	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Dissolved Solids	688	mg/L	10.0
Water Elevation	6869.98	ft	--

WELL: MM-2 Ciniza Refinery Giant Refining Gallup, New Mexico

DATE	1Q/82	2Q/82	3Q/82	4Q/82	7/83	1/84	2/84	3/84	4/84	11/84	12/84	1/85
PARAMETER												
TOC mg/l	6.30	9.00	3.30	7.50	6.80	3.33	3.45	3.02	85.00	3.68	7.00	5.80
AVERAGE	6.30	9.00	3.30	7.50	6.80	3.33	3.45	3.02		3.68	7.00	5.80
TOX mg/l (Begin 5/87 units are ug/l)	1.90	2.30	2.71	1.90	1.70	1.25	0.91	0.88	0.015	0.190	0.005	0.005
AVERAGE	1.90	2.30	2.71	1.90	1.70	1.25	0.91	0.88	0.03	0.19	0.010	0.010
pH	8.70	8.90	8.90	8.90	8.70	8.68	8.84	8.55	8.92	8.61	8.95	8.80
AVERAGE	8.70	8.90	8.90	8.90	8.70	8.68	8.84	8.55	8.92	8.61	8.95	8.80
CONDUCTIVITY umhos/cm	1000	1012	1000	1000	995	1035	1048	1005	1158	1035	1100	1180
AVERAGE	1000	1012	1000	1000	995	1035	1048	1005	1158	1035	1100	1180
WATER ELEVATION	6869.2	6871.2	6870.0	6871.0	6869.6	6870.3	6870.6	6870.5	6870.4	6868.8	6868.8	6869.7
Ag mg/l					0.0005		0.0005		0.0050	0.0005		
As mg/l					0.0040		0.0020		0.0050	0.0005		
Ba mg/l					0.0200		0.0200		0.0500	0.0200		
Ca mg/l												
Cd mg/l					0.0005		0.0005		0.0005	0.0005		
Cl mg/l					60.00		57.00		63.00	56.00		56.00
Cr mg/l					0.0005		0.0030		0.0050	0.0005		
Fe mg/l					0.160		0.21		0.09	1.20		0.037
Hg mg/l					0.0001							0.0010
Na mg/l					270.00		260.00		270.00	261.00		195.00
Pb mg/l					0.0050		0.0500		0.0050	0.0080		0.0100
Se mg/l					0.0005		0.0005		0.0200	0.0005		
SO4 mg/l					172.00							157.00

WELL: MW-2 Ciniza Refinery Gia

DATE	10/85	2/86	5/86	10/86	5/87	10/87	10/87D	11/87	12/87	8/88	1/89	6/89
PARAMETER												
TOC mg/l	3.00	2.00	1.00	1.00	4.00	1.00	0.90	0.90	1.00	0.80	4.00	
		2.00	1.00	1.00	4.00	1.00	0.90	0.90	1.00	1.00	4.00	
		2.00	0.90	1.00	3.00	1.00	0.90	0.90	1.00	0.90	4.00	
		2.00	0.90	1.00	3.00	2.00	0.90	0.90	2.00	1.00	3.00	
AVERAGE	3.00	2.00	0.95	1.00	3.50	1.25	0.90	0.90	1.30	0.90	3.80	
TOX mg/l	0.005	0.005	0.010	0.016	8.00	6.00	5.00	5.00	2.50	2.50	24.00	
(Begin 5/87		0.005	0.010	0.016	6.00	6.00	5.00	5.00	6.00	2.50	17.00	
units are ug/l)		0.005	0.010	0.017	6.00	2.50	5.00	5.00	6.00	2.50	20.00	
		0.005	0.010	0.017	6.00	2.50	5.00	5.00	2.50	2.50	11.00	
AVERAGE	0.010	0.005	0.010	0.017	6.50	6.00	10.00	5.00	6.00	2.50	18.00	
pH	8.90	8.40	8.60	8.80	8.65	9.10	8.70	8.70	9.10	9.18	8.90	8.80
		8.40	8.70	8.82	8.69	9.20	8.70	8.70	9.20	9.20	8.90	
		8.40	8.60	8.81	8.65	9.10	8.60	8.60	9.10	9.19	8.90	
		8.40	8.60	8.80	8.72	9.10	8.70	8.70	9.10	9.20	8.90	
AVERAGE	8.90	8.40	8.60	8.81	8.68	9.13	8.70	8.60	9.10	9.20	8.90	8.80
CONDUCTIVITY	1003	1160	1000	1199	1000	1200	1200.00	1200.00	1200.00	1220.00	1100.00	965.00
umhos/cm		1161	1080	1198	1000	1200	1200.00	1200.00	1200.00	1210.00	1100.00	
		1162	1100	1199	1000	1200	1200.00	1200.00	1200.00	1210.00	1100.00	
		1160	1110	1199	1000	1200	1200.00	1200.00	1200.00	1280.00	1100.00	
AVERAGE	1003	1161	1073	1199	1000	1200	1200.00	1205.00	1200.00	1230.00	1100.00	965.00
WATER ELEVATION	6869.7	6870.7	6870.4	6870.5	6871.1	6871.2	—	6871.2	—	6871.2	6870.8	
Ag mg/l		0.0250	0.0250									
As mg/l		0.0250	0.0250									0.0025
Ba mg/l		0.0200	0.0200									0.05
Ca mg/l				0.91						0.89		3.80
Cd mg/l		0.0050	0.0050									0.0025
Cl mg/l		63.00	57.00	59.00	59.50					52.10		56.00
Cr mg/l		0.0250	0.0250	0.025						0.03		0.005
Fe mg/l		0.180	0.11	0.170	0.015					0.05		
Hg mg/l		0.0010	0.0010									0.0002
Na mg/l		260.00	290.00	265.20	256.00					215.00		259.00
Pb mg/l		0.0250	0.0250	0.025								0.005
Se mg/l		0.0050	0.0050									0.005
SD4 mg/l		213.00	223.00	174.00	173.00					200.00		166.00

WELL: MW-3 Ciniza Refinery Giant Refining Gallup, New Mexico

DATE	10/82	20/82	30/82	40/82	7/83	1/84	2/84	3/84	4/84	11/84	12/84	1/85
PARAMETER												
TDC mg/l	5.00	7.50	4.50	9.30	4.70	1.28	1.28	1.18	120.00 110.00 110.00 120.00	1.70	5.30	8.20
AVERAGE	5.00	7.50	4.50	9.30	4.70	1.28	1.28	1.18		1.70	5.30	8.20
TOX mg/l (begin 10/86 units are ug/l)	2.10	1.90	2.22	2.05	1.95	1.22	1.24	0.81	0.015	0.220	0.005	0.005
AVERAGE	2.10	1.90	2.22	2.05	1.95	1.22	1.24	0.81	0.03	0.22	0.01	0.01
pH	8.60	8.40	8.40	8.40	8.50	8.31	8.42	8.45	8.80	8.56	8.85	8.70
AVERAGE	8.60	8.40	8.40	8.40	8.50	8.31	8.42	8.45	8.80	8.56	8.85	8.70
CONDUCTIVITY mhos/cm	950	1008	995	980	1080	990	1060	990	1148	1030	1100	1100
AVERAGE	950	1008	995	980	1080	990	1060	990	1148	1030	1100	1100
WATER ELEVATION	6850.7	6853.8	6855.0	6854.6	6853.8	6855.3	6855.3	6855.1	6856.3	6852.1	6862.9	6809.5
Na mg/l					250.00				270.00	261.00		140.00
Ca mg/l												
SO4 mg/l					148.00							120.00
Cl mg/l					58.00		23.00		63.00	57.00		57.00
As mg/l					0.0050		0.0020		0.0050	0.0020		
Ba mg/l					0.0100		0.0200		0.0500	0.0100		
Cd mg/l					0.0050		0.0005		0.0005	0.0005		
Cr mg/l					0.0050		0.0020		0.0050	0.0005		
Pb mg/l					0.0020		0.0200		0.0030	0.0030		0.0100
Hg mg/l					0.0001		0.0001			0.0010		0.0010
Se mg/l					0.0005		0.0005		0.0100	0.0005		
Ag mg/l					0.0005		0.0005		0.0050	0.00005		
Fe mg/l					0.0005		0.37		0.07	0.30		0.020

WELL: MW-3 Ciniza Refinery Giant Refining Gallup, New Mexico

DATE	10/85	2/86	5/86	10/86	5/87
<u>PARAMETER</u>					
TOC mg/l	2.00	2.00	2.00	3.00	1.00
		2.00	2.00	4.00	1.00
		2.00	2.00	4.00	2.00
		2.00	1.90	3.00	2.00
AVERAGE	2.00	2.00	2.00	3.50	1.50
TOX mg/l	0.005	0.005	0.002	8.00	5.00
(begin 10/86		0.005	0.002	6.00	5.00
units are		0.005	0.002	8.00	7.00
ug/l)		0.005	0.002	6.00	5.00
AVERAGE	0.01	0.005	0.002	7.00	5.50
pH	8.70	8.39	8.72	8.77	8.67
		8.34	8.70	8.77	8.64
		8.31	8.65	8.79	8.64
		8.30	8.60	8.78	8.61
AVERAGE	8.70	8.34	8.67	8.78	8.64
CONDUCTIVITY	1001	1160	1110	1000	1000
μhos/cm		1161	1115	1010	1000
		1162	1100	1000	1000
		1163	1100	1020	1000
AVERAGE	1001	1162	1106	1008	1000
WATER ELEVATION	6849.6	6843.9	6856.5	6856.8	6856.7
Na mg/l			295.00	265.00	257.00
Ca mg/l					
SO4 mg/l			180.00	131.00	223.00
Cl mg/l			65.00	56.00	55.50
As mg/l			0.0250		
Ba mg/l			0.0100		
Cd mg/l			0.0100	0.0100	
Cr mg/l			0.0250	0.0250	
Pb mg/l			0.0250	0.0250	
Hg mg/l			0.0010		
Se mg/l			0.0050		
Ag mg/l			0.0250		
Fe mg/l			0.120	0.210	0.015

MW-4

Giant Refining Gallup, New Mexico

Date: 01 Apr 90

TCL Volatile Organics
Method 8240

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene			
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	10
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	10
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Stryene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-			
trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,3-Dichlorobenzene	ND	ug/L	5.0

MW-4

Giant Refinery Gallup, New Mexico

Date: 01 Apr 90

Metals
Dissolved Metals

Parameter	Result	Units	Reporting Limit
Arsenic	ND	mg/L	0.010
Barium	0.017	mg/L	0.010
Cadmium	ND	mg/L	0.0050
Calcium	2.0	mg/L	0.20
Magnesium	0.24	mg/L	0.20
Manganese	ND	mg/L	0.010
Potassium	ND	mg/L	5.00
Selenium	ND	mg/L	0.0050
Silver	ND	mg/L	0.010
Sodium	277	mg/L	5.0

MW-4

Giant Refining Gallup, New Mexico

Date: 01 Apr 90

Metals
Total Metals

Parameter	Result	Units	Reporting Limit
Chromium	ND	mg/L	0.010
Lead	ND	mg/L	0.0050
Mercury	ND	mg/L	0.00020

MW-4

Giant Refining Gallup, New Mexico

Date: 03 Apr 90

General Inorganics

Parameter	Result	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	424	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	31.3	mg/L	5.0
Chloride	14.0	mg/L	3.0
pH	8.38	units	--
pH	8.41	units	--
pH	8.40	units	--
pH	8.42	units	--
Average pH	8.40	units	--
Phenolics	ND	mg/L	0.010
Sulfate	143	mg/L	5.0
Specific Conductance at 25 deg.C	1090	umhos/cm	1.0
Specific Conductance at 25 deg.C	1110	umhos/cm	1.0
Specific Conductance at 25 deg.C	1100	umhos/cm	1.0
Specific Conductance at 25 deg.C	1110	umhos/cm	1.0
Average Specific Conductance at 25 deg.C	1103	umhos/cm	1.0
Total Organic Carbon	1.0	mg/L	1.0
Total Organic Carbon	2.0	mg/L	1.0
Total Organic Carbon	2.0	mg/L	1.0
Total Organic Carbon	1.0	mg/L	1.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Dissolved Solids	729	mg/L	10.0
Water Elevation	6873.12	ft	--

MM-4 Giant Refining Ciniza Refinery Gallup, New Mexico

DATE	3/84	4/84	11/84	12/84	1/85	10/85	2/86	5/86	8/86	10/86	5/87
PARAMETER											
TOC mg/L	4.70	1.10 1.40 1.40 1.50	5.28	6.00	10.80	2.00	1.00	4.00 4.00 3.90 4.10	4.00 3.00 4.00 4.00	6.00 6.00 7.00 7.00	2.00 3.00 3.00 4.00
AVERAGE	4.70	1.35	5.28	6.00	10.80	2.00	1.00	4.00	3.75	6.50	3.00
TOX mg/L (BEGIN 5/87 UNITS ARE ug/l)	1.04	0.150	0.220	0.005	0.005	0.005	0.005	0.01 0.01 0.01 0.01	0.005 0.006 0.007 0.008	8.000 7.000 8.000 7.000	8.000 7.000 9.000 9.000
AVERAGE	1.04	0.30	0.22	0.01	0.01	0.01	0.005	0.01	0.007	8.000	8.000
pH	8.45	8.74	8.44	8.60	8.60	8.20	8.20	8.33 8.39 8.37 8.30	9.04 9.04 9.05 9.05	8.56 8.56 8.55 8.54	8.48 8.44 8.54 8.47
AVERAGE	8.45	8.74	8.44	8.60	8.60	8.20	8.20	8.35	9.05	8.55	8.48
CONDUCTIVITY MHOS/CM	1020	1225	1050	1200	1200	1000	1191	1020 1075 1100 1110	1175 1180 1179 1170	1100 1150 1100 1150	1100 1000 1000 1000
AVERAGE	1020	1225	1050	1200	1200	1000	1191	1076	1176	1125	1025
WATER ELEVATION	6873.6	6873.8	6872.3	6873.6	6873.3	6873.7	6873.8	6874.3	6873.8	6873.6	6876.2
Ag mg/l		0.0050	0.00005					0.0500	0.0500		
As mg/l		0.0050	0.0005					0.0250	0.0250		
Ba mg/l		0.0500	0.0100					0.0200	0.9000		
Ca mg/l											
Cd mg/l		0.0005	0.0005					0.0100	0.0100		
Cl mg/l					16.00			34.00	59.00	23.00	19.80
Cr mg/l		0.0050	0.0005					0.0250	0.0250	0.0250	
Fe mg/l		0.20	0.14		0.085			0.180	0.780	0.270	0.15
Hg mg/l			0.0001					0.0020	0.0020		
Na mg/l		300.00	281.00		277.00			300.00	286.00	284.00	271.00
Pb mg/l		0.0040	0.0030		0.0060			0.0250	0.0250	0.0250	
Se mg/l		0.0200	0.0005					0.0100			
SO4 mg/l		150.00	144.00		120.00			192.00	177.00	154.00	222.00

MM-4 Giant Refining Ciniza Refinery Gallup, New Mexico

DATE 10/87 10/87D 11/87 12/87 8/88 1/89 6/89

PARAMETER

TOC mg/L	10/87	10/87D	11/87	12/87	8/88	1/89	6/89
	5.00	1.10	1.10	5.00	1.40	4.00	
	5.00	1.00	1.00	5.00	1.40	4.00	
	5.00	1.00	1.00	5.00	1.30	5.00	
	6.00	0.90	0.90	6.00	1.30	5.00	

AVERAGE 5.25 1.00 1.00 5.30 1.40 4.50

TOX mg/L	10/87	10/87D	11/87	12/87	8/88	1/89	6/89
	3.000	5.000	5.00	2.50	2.50	22.00	
(BEGIN 5/87	3.000	5.000	5.00	2.50	2.50	23.00	
UNITS ARE	3.000	5.000	5.00	2.50	2.50	14.00	
ug/l)	3.000	5.000	5.00	2.50	2.50	23.00	

AVERAGE 3.000 5.000 5.00 2.50 2.50 20.50

pH	10/87	10/87D	11/87	12/87	8/88	1/89	6/89
	8.90	8.50	8.50	8.90	8.90	8.60	8.60
	8.90	8.50	8.50	8.90	8.88	8.55	
	8.80	8.50	8.50	8.80	8.89	8.60	
	8.90	8.50	8.50	8.90	8.89	8.55	

AVERAGE 8.88 8.50 8.50 8.90 8.89 8.58 8.60

CONDUCTIVITY	10/87	10/87D	11/87	12/87	8/88	1/89	6/89
	1200	1240.00	1240.00	1200.00	1190.00	1100.00	1010.00
MHOS/CM	1200	1240.00	1240.00	1200.00	1110.00	1200.00	
	1200	1270.00	1270.00	1200.00	1390.00	1200.00	
	1200	1260.00	1260.00	1200.00	1370.00	1200.00	

AVERAGE 1200 1253.00 1253.00 1200.00 1265.00 1175.00 1010.00

WATER ELEVATION 6874.0 — 6874.0 — 6873.4 6873.6

Ag mg/l	10/87	10/87D	11/87	12/87	8/88	1/89	6/89
As mg/l						0.0025	
Ba mg/l						0.02	
Ca mg/l					0.51	2.20	
Cd mg/l						0.001	
Cl mg/l					16.90	17.00	
Cr mg/l					0.03	0.005	
Fe mg/l					0.05		
Hg mg/l						0.0001	
Na mg/l					360.00	273.00	
Pb mg/l						0.015	
Se mg/l						0.005	
SO4 mg/l					164.00	154.00	

MW-5

Giant Refining Gallup, New Mexico

Date: 02 Apr 90

TCL Volatile Organics
Method 8240

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene			
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	10
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	10
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Stryene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2- trifluoroethane	ND	ug/L	10
1,2-Dibromoethane (EDB)	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

MW-5

Giant Refinery Gallup, New Mexico

Date: 02 Apr 90

Metals
Dissolved Metals

Parameter	Result	Units	Reporting Limit
Arsenic	ND	mg/L	0.010
Barium	0.12	mg/L	0.010
Cadmium	ND	mg/L	0.0050
Calcium	1.9	mg/L	0.20
Magnesium	0.20	mg/L	0.20
Manganese	ND	mg/L	0.010
Potassium	ND	mg/L	5.00
Selenium	ND	mg/L	0.0050
Silver	ND	mg/L	0.010
Sodium	255	mg/L	5.0

MW-5

Giant Refining Gallup, New Mexico

Date: 02 Apr 90

Metals
Total Metals

Parameter	Result	Units	Reporting Limit
Chromium	ND	mg/L	0.010
Lead	ND	mg/L	0.0050
Mercury	ND	mg/L	0.00020

MW-5

Giant Refining Gallup, New Mexico

Date: 03 Apr 90

General Inorganics

Parameter	Result	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	272	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	47.0	mg/L	5.0
Chloride	62.1	mg/L	3.0
pH	8.46	units	--
pH	8.49	units	--
pH	8.52	units	--
pH	8.50	units	--
Average pH	8.49	units	--
Phenolics	ND	mg/L	0.010
Sulfate	170	mg/L	5.0
Specific Conductance at 25 deg.C	1070	umhos/cm	1.0
Specific Conductance at 25 deg.C	1060	umhos/cm	1.0
Specific Conductance at 25 deg.C	1080	umhos/cm	1.0
Specific Conductance at 25 deg.C	1080	umhos/cm	1.0
Average Specific Conductance at 25 deg.C	1073	umhos/cm	1.0
Total Organic Carbon	1.0	mg/L	1.0
Total Organic Carbon	2.0	mg/L	1.0
Total Organic Carbon	1.0	mg/L	1.0
Total Organic Carbon	1.0	mg/L	1.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Dissolved Solids	687	mg/L	10.0
Water Elevation	6870.44	ft	--

WELL: MW-5 Ciniza Refinery Giant Refining Gallup, New Mexico

DATE	1Q/82	2Q/82	3Q/82	4Q/82	7/83	1/84	2/84	3/84	4/84	11/84	12/84	1/85
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PARAMETER

TOC mg/l

AVERAGE

TOX ug/l

AVERAGE

pH

AVERAGE

CONDUCTIVITY
 μhos/cm

AVERAGE

WATER ELEVATION

Na mg/l
Ca mg/l
SO₄ mg/l
Cl mg/l
As mg/l
Ba mg/l
Cd mg/l
Cr mg/l
Pb mg/l
Hg mg/l
Se mg/l
Ag mg/l
Fe mg/l

WELL: MW-5 Ciniza Refinery Giant Refining Gallup, New Mexico

DATE	10/85	2/86	5/86	8/86	10/86	1/87	5/87	5/87R	10/87	10/87D	11/87	12/87
PARAMETER												
TOC mg/l					1.00	3.00	1.00		5.00	0.80	0.80	5.00
					2.00	3.00	1.00		5.00	0.70	0.70	5.00
					1.00	3.00	1.00		5.00	0.90	0.90	5.00
					2.00	3.00	2.00		4.00	0.80	0.80	4.00
AVERAGE					1.50	3.00	1.25		4.75	0.80	0.80	4.80
TOX ug/l					17.00	13.00	2.50	2.50	2.50	5.00	5.00	2.50
					17.00	13.00	2.50	2.50	7.00	5.00	5.00	7.00
					16.00	13.00	2.50	2.50	2.50	5.00	5.00	2.50
					16.00	13.00	6.00	2.50	2.50	5.00	5.00	2.50
AVERAGE					16.50	13.00	6.00	2.50	7.00	5.00	5.00	7.00
pH					8.86	9.04	8.74		9.00	8.60	8.60	9.00
					8.86	9.04	8.68		9.10	8.70	8.70	9.10
					8.85	9.03	8.67		9.10	8.70	8.70	9.10
					8.85	9.03	8.65		9.10	8.60	8.60	9.10
AVERAGE					8.86	9.04	8.69		9.08	8.70	8.70	9.10
CONDUCTIVITY					1100	1200	1000		1100	1260.00	1260.00	1100.00
mhos/cm					1110	1190	1000		1100	1220.00	1220.00	1100.00
					1100	1190	1000		1100	1220.00	1220.00	1100.00
					1110	1200	1000		1100	1220.00	1220.00	1100.00
AVERAGE					1105	1195	1000		1100	1230.00	1230.00	1100.00
WATER ELEVATION					6870.7	6871.5	6871.3		6871.0			
Na mg/l					261.70	278.00	246.00					
Ca mg/l												
SO4 mg/l					186.00	205.00	239.00					
Cl mg/l					59.00	61.00	46.00					
As mg/l												
Ba mg/l												
Cd mg/l												
Cr mg/l					0.025							
Pb mg/l					0.025							
Hg mg/l												
Se mg/l												
Ag mg/l												
Fe mg/l					0.220		0.15					

WELL: MW-5 Ciniza Refinery Giant Refining Gallup, New Mexico

DATE 8/88 1/89 6/89

PARAMETER

TOC mg/l	1.10	4.00	
	1.10	4.00	
	0.90	4.00	
	1.00	3.00	
AVERAGE	1.00	3.80	
TOX ug/l	2.50	3.00	
	7.00	5.00	
	2.50	3.00	
	2.50	4.00	
AVERAGE	7.00	3.80	
pH	8.00	8.90	8.90
	7.99	8.90	
	7.99	8.90	
	7.94	8.90	
AVERAGE	8.00	8.90	8.90
CONDUCTIVITY	1270.00	1200.00	996.00
mhos/cm	1240.00	1150.00	
	1240.00	1100.00	
	1250.00	1150.00	
AVERAGE	1250.00	1150.00	996.00

WATER ELEVATION

Na mg/l	367.00	253.00
Ca mg/l	0.46	14.00
SO4 mg/l	200.00	173.00
Cl mg/l	58.60	65.00
As mg/l		0.025
Ba mg/l		0.120
Cd mg/l		0.0003
Cr mg/l	0.03	0.005
Pb mg/l		0.007
Hg mg/l		0.0001
Se mg/l		0.005
Ag mg/l		
Fe mg/l		

SMW-1

Giant Refining Gallup, New Mexico

Date: 02 Apr 90

TCL Volatile Organics
Method 8240

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene			
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	10
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	10
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-			
trifluoroethane	ND	ug/L	10
1,2-Dibromoethane (EDB)	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

SMW-1

Giant Refining Gallup, New Mexico

Date: 27 MAR 90

Metals
Dissolved Metals

Parameter	Result	Units	Reporting Limit
Calcium	182	mg/L	0.40
Magnesium	56.5	mg/L	0.40
Potassium	ND	mg/L	10.0
Sodium	1250	mg/L	10.0

SMW-1

Giant Refining

Gallup, New Mexico

Metals
Total Metals

Date: 27 MAR 90

Parameter	Result	Units	Reporting Limit
Chromium	ND	mg/L	0.010
Lead	ND	mg/L	0.0050

SMW-1

Giant Refining

Gallup, New Mexico

Date: 03 Apr 90

General Inorganics

Parameter	Result	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	611	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5.0
Chloride	1120	mg/L	30.0
pH	7.38	units	--
pH	7.42	units	--
pH	7.39	units	--
pH	7.40	units	--
Average pH	7.40	units	--
Sulfate	1330	mg/L	50.0
Specific Conductance at 25 deg.C	6940	umhos/cm	1.0
Specific Conductance at 25 deg.C	6930	umhos/cm	1.0
Specific Conductance at 25 deg.C	6950	umhos/cm	1.0
Specific Conductance at 25 deg.C	6940	umhos/cm	1.0
Average Specific Conductance at 25 deg.C	6940	umhos/cm	1.0
Total Organic Carbon	19.0	mg/L	1.0
Total Organic Carbon	16.0	mg/L	1.0
Total Organic Carbon	18.0	mg/L	1.0
Total Organic Carbon	21.0	mg/L	1.0
Total Organic Halogen as Cl	61.6	ug/L	30.0
Total Organic Halogen as Cl	49.2	ug/L	30.0
Total Organic Halogen as Cl	48.9	ug/L	30.0
Total Organic Halogen as Cl	46.7	ug/L	30.0
Total Dissolved Solids	4330	mg/L	50.0
Water Elevation	6857.78	ft	--

WELL:SMW1 Ciniza Refinery Giant Refining Gallup, New Mexico

DATE	11/85	2/86	5/86	9/86	2/87	3/87	4/88	6/89	7/89
PARAMETER									
TOC(mg/l)	7.8 7.9 8.0 8.2	10.1 10.2 10.0 10.0	25.0	27.0 31.0 30.0 28.0					
AVERAGE	8.0	10.1	25.0	29.0					
TOX(mg/l)	(0.01 (0.01 (0.01 (0.01	(0.01 (0.01 (0.01 (0.01	0.26	0.11 0.11 0.11 0.11					
AVERAGE	(0.01	(0.01	0.26	0.11					
pH	7.6 7.6 7.6 7.6	7.70 7.75 7.65 7.68	7.7	7.52 7.53 7.52 7.52	7.34		7.5	7.4	
AVERAGE	7.6	7.70	7.7	7.52	7.34		7.5	7.4	
CONDUCT. (mhos/cm)	5600 5600 5600 5600	5850 5810 5890 5830	5820.0	5650.0 5700.0 5680.0 5700.0	5500.0		3900.0	6450.0	
AVERAGE	5600	5845	5820	5683	5500.0		3900.0	6450.0	
(mg/l)									
Ag	(0.05	(0.05	(0.050	(0.050					
As	0.08	(0.05	(0.05	(0.050					
Ba	6.0	(0.005	(0.01	0.02					
Ca			172.0	142.0	230.8		155.8		182.0
Cd	0.06	0.09	0.012	0.04					
Cl	1489	1340	1180.0	1399.6	1112.0		1032.0		
Cr	(0.05	0.065	(0.050	0.10		0.011		0.22	
Fe	0.45	(0.04	0.080	0.3					
Hg	(0.002	(0.002	0.002	(0.002					
K									ND
Mg									58.0
Mn	0.16	(0.02	0.080	(0.02					
Na	2438	1692	1865.0	1300.0	1135.0		1116.3		1230.0
Pb	0.116	0.10	(0.050	0.11		0.32		0.0025	
Se	0.066	(0.01	(0.010	(0.010					
SO4	2833	1704	1471.0		1833.0		934.0		
Phenols	(0.001	(0.001	0.005	(0.001					
Fluoride	0.28	0.42	0.440						

NO3(N)	0.1	(0.01	(0.01	
Endrin	(0.0002	(0.0002	(0.0002	(0.0002
Lindane	(0.004	(0.004	(0.004	(0.004
Methoxych	(0.1	(0.1	(0.1	(0.1
Toxaphene	(0.005	(0.005	(0.005	(0.005
2,4-D	(0.1	(0.1	(0.1	(0.1
2,4,5-TP	(0.01	(0.01	(0.01	(0.01
Coliform	(1/100	(1/10	(1/100	(1/100
(pCi/l)				
Radium	(5	0		
Gross Alp	0	280	0	0.0
Gross Bet	0	20	0	0.0
(FTU)				
Turbidity	78	175		

SMW-2

Giant Refining Gallup, New Mexico

Date: 02 Apr 90

TCL Volatile Organics
Method 8240

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomthane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene			
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	10
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	10
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Stryene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-			
trifluoroethane	ND	ug/L	10
1,2-Dibromoethane (EDB)	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

SMW-2

Giant Refinery Gallup, New Mexico

Date: 03 Apr 90

Metals
Dissolved Metals

Parameter	Result	Units	Reporting Limit
Calcium	147	mg/L	1.0
Magnesium	44.3	mg/L	1.0
Potassium	ND	mg/L	25.0
Sodium	1630	mg/L	25.0

SMW-2

Giant Refining Gallup, New Mexico

Metals
Total Metals

Date: 27 MAR 90

Parameter	Result	Units	Reporting Limit
Chromium	0.19	mg/L	0.050
Lead	0.0071	mg/L	0.0050

SMW-2

Giant Refining Gallup, New Mexico

Date: 27 MAR 90

General Inorganics

Parameter	Result	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	563	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5.0
Chloride	1320	mg/L	30.0
pH	7.51	units	--
pH	7.50	units	--
pH	7.50	units	--
pH	7.51	units	--
Average pH	7.40	units	--
Sulfate	1590	mg/L	50.0
Specific Conductance at 25 deg.C	6920	umhos/cm	1.0
Specific Conductance at 25 deg.C	6920	umhos/cm	1.0
Specific Conductance at 25 deg.C	6930	umhos/cm	1.0
Specific Conductance at 25 deg.C	6940	umhos/cm	1.0
Average Specific Conductance at 25 deg.C	6928	umhos/cm	1.0
Total Organic Carbon	12.0	mg/L	1.0
Total Organic Carbon	12.0	mg/L	1.0
Total Organic Carbon	14.0	mg/L	1.0
Total Organic Carbon	13.0	mg/L	1.0
Total Organic Halogen as Cl	45.6	ug/L	30.0
Total Organic Halogen as Cl	39.7	ug/L	30.0
Total Organic Halogen as Cl	37.2	ug/L	30.0
Total Organic Halogen as Cl	49.0	ug/L	30.0
Total Dissolved Solids	5180	mg/L	50.0
Water Elevation	6851.53	ft	--

WELL:SMW2 Ciniza Refinery Giant Refining Gallup, New Mexico

DATE	11/85	2/86	5/86	9/86	2/87	3/87	4/88	6/89	7/89
PARAMETER									
TOC(mg/l)	9.0	9.6	11.0	11.00					
	9.0	9.8		11.00					
	9.2	10.2		11.00					
	8.9	10.0		11.00					
AVERAGE	9.0	9.9	11.0	11.00					
TOX(mg/l)	(0.01	(0.01	0.79	0.11					
	(0.01	(0.01		0.11					
	(0.01	(0.01		0.11					
	(0.01	(0.01		0.11					
AVERAGE	(0.01	(0.01	0.79	0.11					
pH	7.7	7.5	7.5	7.6	6.6		7.7	7.7	
	7.7	7.5		7.6					
	7.7	7.6		7.6					
	7.7	7.6		7.6					
AVERAGE	7.7	7.6	7.5	7.6	6.6		7.7	7.7	
CONDUCT. (mhos/cm)	6900.0	7300	7400.0	7190	6700.0		5200.0	8120.0	
	6900.0	7340		7200					
	6900.0	7420		7250					
	6900.0	7210		7200					
AVERAGE	6900.0	7317.5	7400.0	7210.0	6700.0		5200.0	8120.0	
(mg/l)									
Ag	(0.050	(0.050	(0.05	(0.05					
As	0.10	(0.05	(0.05	(0.05					
Ba	4.00	(0.005	0.01	(0.01					
Ca			150.0	148	273.5		147.1		153.0
Cd	0.10	0.13	0.024	0.050					
Cl	1985.0	1340	1699.0	2049	1588.0		1419.0		
Cr	(0.050	0.067	(0.05	0.092		1.4		0.1200	
Fe	0.62	(0.04	0.08	0.180					
Hg	(0.002	(0.002	0.003	(0.002					
K									ND
Mg									46.0
Mn	2.0	(0.02	0.10	(0.02					
Na	2660.0	1690	2400.0	1780	1625.0		1450.0		1500.0
Pb	0.19	0.28	(0.05	0.110		0.58		(0.005	
Se	0.13	(0.01	(0.01	(0.01					
SO4	3473.0	2429	1950.0	2380	2083.0		1504.6		
Phenols	(0.001	(0.001	0.006	(0.001					
Fluoride	0.34	0.55	0.37	0.242					

NO3(N)	2.0	0.1	(0.01	0.126
Endrin	(0.0002	(0.0002	(0.0002	(0.0002
Lindane	(0.004	(0.004	(0.004	(0.004
Methoxych	(0.1	(0.1	(0.1	(0.1
Toxaphene	(0.005	(0.005	(0.005	(0.005
2,4-D	(0.1	(0.1	(0.1	(0.1
2,4,5-TP	(0.01	(0.01	(0.01	(0.01
Coliform	(1/100	(1/100	(1/100	(1/100
(pCi/l)				
Radium	(5	0.0		
Gross Alp	0.0	0.0	0.0	0.0
Gross Bet	0.0	0.0	0.0	0.0
(FTU)				
Turbidity	27.0	175.0		

SMW-3

Giant Refining Gallup, New Mexico

Date: 27 MAR 90

TCL Volatile Organics
Method 8240

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomthane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene			
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	10
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	10
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Stryene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-			
trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,3-Dichlorobenzene	ND	ug/L	5.0

SMW-3

Giant Refinery Gallup, New Mexico

Date: 03 Apr 90

Metals
Dissolved Metals

Parameter	Result	Units	Reporting Limit
Calcium	59.0	mg/L	0.40
Magnesium	16.2	mg/L	0.40
Potassium	ND	mg/L	10.0
Sodium	739	mg/L	10.0

SMW-3

Giant Refining Gallup, New Mexico

Metals
Total Metals

Date: 27 MAR 90

Parameter	Result	Units	Reporting Limit
Chromium	ND	mg/L	0.023
Lead	ND	mg/L	0.0065

SMW-3

Giant Refining Gallup, New Mexico

General Inorganics

Date: 27 MAR 90

Parameter	Result	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	681	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5.0
Chloride	49.1	mg/L	30.0
pH	7.84	units	--
pH	7.86	units	--
pH	7.85	units	--
pH	7.85	units	--
Average pH	7.85	units	--
Sulfate	1180	mg/L	50.0
Specific Conductance at 25 deg.C	3040	umhos/cm	1.0
Specific Conductance at 25 deg.C	3000	umhos/cm	1.0
Specific Conductance at 25 deg.C	2980	umhos/cm	1.0
Specific Conductance at 25 deg.C	2990	umhos/cm	1.0
Average Specific Conductance at 25 deg.C	3003	umhos/cm	1.0
Total Organic Carbon	4.0	mg/L	1.0
Total Organic Carbon	4.0	mg/L	1.0
Total Organic Carbon	4.0	mg/L	1.0
Total Organic Carbon	4.0	mg/L	1.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Dissolved Solids	2560	mg/L	50.0
Water Elevation	6849.70	ft	--

WELL:SMW3 Ciniza Refinery Giant Refining Gallup, New Mexico

DATE	11/85	2/86	5/86	9/86	2/87	3/87	4/88	6/89	7/89
PARAMETER									
TOC(mg/l)	6.0	7.0	11.0	8.0					
	6.1	6.9		7.0					
	6.0	6.8		8.0					
	6.5	7.0		7.0					
AVERAGE	6.2	6.9	11.0	8.0					
TOX(mg/l)	(0.01	(0.01	0.02	0.56					
	(0.01	(0.01		0.56					
	(0.01	(0.01		0.57					
	(0.01	(0.01		0.56					
AVERAGE	(0.01	(0.01	0.02	0.56					
pH	8.0	7.9	7.5	7.9	8.1		7.9	8.1	
	8.0	7.9		7.9					
	8.0	7.8		8.0					
	8.0	7.8		8.0					
AVERAGE	8.0	7.9	7.5	8.0	8.1		7.9	8.1	
CONDUCT.	3075.0	3720.0	3500.0	3400.0	3200.0		3500.0	3910.0	
(mhos/cm)	3075.0	3610.0		3400.0					
	3075.0	3720.0		3410.0					
	3075.0	3710.0		3405.0					
AVERAGE	3075	3690	3500	3404	3200		3500	3910.0	
(mg/l)									
Ag	(0.050	(0.050	(0.050	(0.050					
As	0.063	(0.050	(0.050	(0.050					
Ba	1.70	(0.005	0.010	(0.010					
Ca			84.0	17.0	75.0		63.5		49.0
Cd	(0.010	0.02	0.008	(0.010					
Cr	(0.050	0.055	(0.050	(0.050		0.06		(0.01	
Fe	0.04	(0.04	0.080	0.21					
Hg	(0.002	(0.002	0.003	(0.002					
K									ND
Mg									14.0
Mn	0.02	(0.02	0.030	(0.02					
Na	440.0	832.0	1280.0	998.0	700.0		662.5		736.0
Pb	(0.050	(0.050	(0.050	(0.050		0.37		(0.01	
Se	0.10	(0.01	(0.01	(0.01					
SO4	1784.0	3766.0	1567.0	1750.0	2237.0		1090.2		
Phenols	(0.001	(0.001	0.004	(0.001					
Fluoride	0.43	0.72	0.740	0.41					
NO3(N)	0.20	0.8	(0.01	(0.01					

Endrin	<0.0002	<0.0002	<0.0002	<0.0002
Lindane	<0.004	<0.004	<0.004	<0.004
Methoxych	<0.1	<0.1	<0.1	<0.1
Toxaphene	<0.005	<0.005	<0.005	<0.005
2,4-D	<0.1	<0.1	<0.1	<0.1
2,4,5-TP	<0.01	<0.01	<0.01	<0.01
Coliform	<1/100	<1/100	<1/100	<1/100
(pCi/l)				
Radium	<5	0.0		
Gross Alp	0.0	0.0	0.0	0.0
Gross Bet	0.0	0.0	0.0	0.0
(FTU)				
Turbidity	7.50	120.0		

SMW-4

Giant Refining Gallup, New Mexico

Date: 27 MAR 90

TCL Volatile Organics
Method 8240

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene			
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	10
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	10
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Stryene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2- trifluoroethane	ND	ug/L	10
1,2-Dibromoethane (EDB)	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

SMW-4

Giant Refinery Gallup, New Mexico

Metals
Dissolved Metals

Date: 27 MAR 90

Parameter	Result	Units	Reporting Limit
Calcium	4.7	mg/L	0.20
Magnesium	1.2	mg/L	0.20
Potassium	ND	mg/L	5.0
Sodium	296	mg/L	5.0

SMW-4

Giant Refining Gallup, New Mexico

Total Metals

Parameter	Result	Units	Reporting Limit
Chromium	ND	mg/L	0.010
Lead	ND	mg/L	0.0050

SMW-4

Giant Refining

Gallup, New Mexico

General Inorganics

Date: 27 MAR 90

Parameter	Result	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	434	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	9.4	mg/L	5.0
Chloride	53.2	mg/L	30.0
pH	8.10	units	--
pH	8.16	units	--
pH	8.14	units	--
pH	8.11	units	--
Average pH	8.13	units	--
Sulfate	178	mg/L	50.0
Specific Conductance at 25 deg.C	1220	umhos/cm	1.0
Specific Conductance at 25 deg.C	1210	umhos/cm	1.0
Specific Conductance at 25 deg.C	1230	umhos/cm	1.0
Specific Conductance at 25 deg.C	1220	umhos/cm	1.0
Average Specific Conductance at 25 deg.C	1220	umhos/cm	1.0
Total Organic Carbon	3.0	mg/L	1.0
Total Organic Carbon	2.0	mg/L	1.0
Total Organic Carbon	2.0	mg/L	1.0
Total Organic Carbon	2.0	mg/L	1.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Dissolved Solids	852	mg/L	50.0
Water Elevation	6845.72	ft	--

WELL:SMW4 Ciniza Refinery Giant Refining Gallup, New Mexico

DATE	11/85	2/86	5/86	9/86	12/86	2/87	3/87	7/87	7/87R	11/87	12/87	4/88
PARAMETER												
TOC(mg/l)	1.0	3.0	7.00	3.00	7.0			12.0	2.0	1.3	12.0	
	1.5	2.8		3.00	8.0			12.0	3.0			
	2.0	2.9		3.00	8.0			11.0	2.0			
	1.0	3.0		3.00	7.0			11.0	2.0			
AVERAGE	1.4	2.9	7.00	3.00	7.5			11.5	2.3	1.3	12.0	
TOX(mg/l)	(0.01	(0.01	0.02	0.10	0.007			0.007	0.013	(0.01	0.007	
	(0.01	(0.01		0.10	0.007			0.007	0.013			
	(0.01	(0.01		0.10	0.006			0.008	0.006			
	(0.01	(0.01		0.10	0.006			0.007	0.010			
AVERAGE	(0.01	(0.01	0.02	0.10	0.007			0.007	0.004	(0.01	0.007	
pH	8.4	8.1	8.1	8.5		8.3		8.1		8.0	8.3	8.40
	8.4	8.0		8.5								
	8.4	8.1		8.5								
	8.4	8.1		8.5								
AVERAGE	8.4	8.1	8.1	8.5		8.3		8.1		8.0	8.3	8.4
CONDUCT.	1200.0	1340.0	1650.0	1270	1300.0	1300.0		1200.0		1860.0	1600.0	1300.0
(mhos/cm)	1200.0	1300.0		1280	1300.0							
	1200.0	1390.0		1290	1300.0							
	1200.0	1280.0		1290	1300.0							
AVERAGE	1200.0	1327.5	1650.0	1282.5	1300.0	1300.0		1200.0		1860.0	1600.0	1300
(mg/l)												
Ag	(0.050	(0.050	(0.050	(0.050								
As	(0.050	(0.050	(0.050	(0.050								
Ba	(1.0	(0.005	(0.010	(0.010								
Ca			40.0	3		2.2						1.9
Cd	(0.010	(0.010	(0.010	(0.010								
Cl	51.0	58.0	121.0	49.9		53.6						47.6
Cr	(0.050	(0.050	(0.050	(0.050	(0.05		(0.05	(0.05		(0.01	(0.05	
Fe	1.20	0.09	0.09	0.240								
Hg	(0.002	(0.002	(0.002	(0.002								
K												
Mg												
Mn	0.08	(0.02	0.02	(0.02								
Na	320.0	556.0	600.0	340		335.0						173.8
Pb	(0.050	(0.050	(0.050	(0.050	(0.05		0.11	(0.05		(0.002	(0.05	
Se	0.026	(0.010	(0.010	(0.010								
SO4	192.0	167.0	187.0	300		165.0						145.9
Phenols	(0.001	(0.001	0.002	(0.001								
Fluoride	0.61	1.0	1.08	0.577								

NO3(N)	0.10	(0.010	(0.010	0.14
Endrin	(0.0002	(0.0002	(0.0002	(0.0002
Lindane	(0.004	(0.004	(0.004	(0.004
Methoxych	(0.1	(0.1	(0.1	(0.1
Toxaphene	(0.005	(0.005	(0.005	(0.005
2,4-D	(0.1	(0.1	(0.1	(0.1
2,4,5-TP	(0.01	(0.01	(0.01	(0.01
Coliform	(1/100	(1/100	(1/100	(1/100
(pCi/l)				
Radium	(5	0.0		
Gross Alp	0.0	0.0	0.0	0.0
Gross Bet	0.0	0.0	0.0	0.0
(FTU)				
Turbidity	86.0	15.0		

WELL:SMW4 Ciniza Refinery Giant Refining Gallup, New Mexico

DATE 7/88 7/88R 6/89 7/89

PARAMETER

TOC(mg/l) 2.6 2.6

AVERAGE 2.6 2.6

TOX(mg/l) <5 <0.0005

AVERAGE <5 <0.0005

pH 8.50 8.50 8.4

AVERAGE 8.5 8.5 8.4

CONDUCT. 1080.0 1080.0 1370.0
(mhos/cm)

AVERAGE 1080 1080 1370.0

(mg/l)

Ag				
As				
Ba				
Ca				48.0
Cd				
Cl	35.7	35.7		
Cr		<0.05	<0.01	
Fe				
Hg				
K				ND
Mg				14.0
Mn				
Na				734.0
Pb	<0.05	<0.05	<0.005	
Se				
SO4				
Phenols				
Fluoride				

SMW-5

Giant Refining Gallup, New Mexico

Date: 27 MAR 90

TCL Volatile Organics
Method 8240

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomthane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene			
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	10
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	10
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Stryene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-			
trifluoroethane	ND	ug/L	10
1,2-Dibromoethane (EDB)	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	5.0
1,3-Dichlorobenzene	ND	ug/L	5.0

SMW-5

Giant Refinery Gallup, New Mexico

Date: 03 Apr 90

Metals
Dissolved Metals

Parameter	Result	Units	Reporting Limit
Calcium	3.9	mg/L	0.20
Magnesium	0.82	mg/L	0.20
Potassium	5.6	mg/L	5.0
Sodium	254	mg/L	5.0

SMW-5

Giant Refining Gallup, New Mexico

Metals
Total Metals

Date: 27 MAR 90

Parameter	Result	Units	Reporting Limit
Chromium	0.025	mg/L	0.010
Lead	0.018	mg/L	0.0050

SMW-5

Giant Refining

Gallup, New Mexico

General Inorganics

Date: 27 MAR 90

Parameter	Result	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	287	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	24.2	mg/L	5.0
Chloride	55.1	mg/L	3.0
pH	8.31	units	--
pH	8.38	units	--
pH	8.36	units	--
pH	8.37	units	--
Average pH	8.36	units	--
Sulfate	147	mg/L	5.0
Specific Conductance at 25 deg.C	1070	umhos/cm	1.0
Specific Conductance at 25 deg.C	1080	umhos/cm	1.0
Specific Conductance at 25 deg.C	1080	umhos/cm	1.0
Specific Conductance at 25 deg.C	1070	umhos/cm	1.0
Average Specific Conductance at 25 deg.C	1075	umhos/cm	1.0
Total Organic Carbon	2.0	mg/L	1.0
Total Organic Carbon	2.0	mg/L	1.0
Total Organic Carbon	2.0	mg/L	1.0
Total Organic Carbon	1.0	mg/L	1.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Dissolved Solids	769	mg/L	10.0
Water Elevation	6849.83	ft	--

WELL:SMWS Ciniza Refinery Giant Refining Gallup, New Mexico

DATE	11/85	2/86	5/86	9/86	12/86	2/87	3/87	7/87	7/87R	11/87	12/87	4/88
PARAMETER												
TOC(mg/l)	6.0 6.0 5.5 5.9	5.9 6.0 5.8 6.0	7.0	6.0 6.0 6.0 7.0	7.0 8.0 7.0 8.0			8.0 11.0 10.0 10.0	2.0 2.0 3.0 3.0	1.3	17.0	
AVERAGE	(0.01	(0.01	(0.01	0.045	7.50			0.006		(0.01	0.006	
pH	8.7 8.7 8.7 8.7	8.4 8.4 8.3 8.3	8.4	8.8 8.8 8.8 8.8		8.4		8.4		8.5	8.80	8.70
AVERAGE	8.7	8.4	8.4	8.8		8.4		8.4		8.5	8.8	8.7
CONDUCT. (mhos/cm)	1150.0 1150.0 1150.0 1150.0	1180.0 1100.0 1100.0 1100.0	1120	1200 1190 1190 1190	1100.0 1100.0 1100.0 1100.0	1200.0		1000.0		1240.0	1100.0	1200.0
AVERAGE	1150.0	1120.0	1120.0	1192.5	1100.0	1200.0		1000.0		1240.0	1100	1200
(mg/l)												
Ag	(0.050	(0.050	(0.050	(0.050								
As	0.064	(0.05	(0.05	(0.05								
Ba	(1	(0.005	(0.010	(0.010								
Ca			25	1.5		21.7						1.5
Cd	(0.010	(0.010	(0.010	(0.010								
Cl	54.0	80.0	64	59.9		61.5						52.6
Cr	(0.050	(0.050	(0.050	(0.050	(0.05		0.12	(0.05		ND	(0.05	
Fe	(0.050	0.33	0.11	0.140								
Hg	(0.002	(0.002	0.001	(0.002								
K												
Mg												
Mn	0.05	(0.02	(0.02	(0.02								
Na	342.0	520.0	610	376		265.0						128.8
Pb	(0.050	(0.050	(0.050	(0.050	(0.05		0.25	(0.05		ND	(0.05	
Se	0.022	(0.01	(0.01	(0.01								
SD4	189.0	111.0	123	280		186.0						114.8
Phenols	(0.001	(0.001	0.007	(0.001								
Fluoride	0.69	0.80	0.69	0.396								
NO3(N)	0.10	(0.01	(0.01	0.125								
Endrin	(0.0002	(0.0002	(0.0002	(0.0002								
Lindane	(0.004	(0.004	(0.004	(0.004								
Methoxych	(0.1	(0.1	(0.1	(0.1								
Toxaphene	(0.005	(0.005	(0.005	(0.005								
2,4-D	(0.1	(0.1	(0.1	(0.1								

2,4,5-TP	(0.01	(0.01	(0.01	(0.01
Coliform	(1/100	(1/100	(1/100	(1/100
(pCi/l)				
Radium	(5	0.0		
Gross Alp	0.0	0.0	0	0
Gross Bet	0.0	0.0	0	0
(FTU)				
Turbidity	66.0	49.0		

WELL:SMW5 Ciniza Refinery Giant Refining Gallup, New Mexico

DATE 7/88 7/88R 6/89 7/89

PARAMETER

TOC(mg/l) 1.0 1.0

AVERAGE

pH 8.80 8.80 8.6

AVERAGE 8.8 8.8 8.6

CONDUCT. 1190.0 1190.0 1240.0
(mhos/cm)

AVERAGE 1190 1190 1240.0

(mg/l)

Ag				
As				
Ba				
Ca				9.0
Cd				
Cl	50.6	50.6		
Cr		(0.05	(0.05	
Fe				
Hg				
K				ND
Mg				2.2
Mn				
Na				279.0
Pb	(0.05	(0.05	0.006	
Se				
SO4				
Phenols				
Fluoride				
NO3(N)				
Endrin				
Lindane				
Methoxychlor				
Toxaphene				
2,4-D				

SMW-6

Giant Refining Gallup, New Mexico

Date: 27 MAR 90

TCL Volatile Organics
Method 8240

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomthane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene			
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	10
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	10
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Stryene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-			
trifluoroethane	ND	ug/L	10
1,2-Dibromoethane (EDB)	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

SMW-6

Giant Refinery Gallup, New Mexico

Metals
Dissolved Metals

Parameter	Result	Units	Reporting Limit
Calcium	8.3	mg/L	0.20
Magnesium	2.5	mg/L	0.20
Potassium	ND	mg/L	5.0
Sodium	379	mg/L	5.0

SMW-6

Giant Refining Gallup, New Mexico

Metals
Total Metals

Date: 27 MAR 90

Parameter	Result	Units	Reporting Limit
Chromium	0.011	mg/L	0.010
Lead	ND	mg/L	0.0050

SMW-6

Giant Refining Gallup, New Mexico

General Inorganics

Date: 27 MAR 90

Parameter	Result	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	572	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5.0
Chloride	77.3	mg/L	3.0
pH	8.09	units	--
pH	8.10	units	--
pH	8.10	units	--
pH	8.09	units	--
Average pH	8.10	units	--
Sulfate	215	mg/L	5.0
Specific Conductance at 25 deg.C	1570	umhos/cm	1.0
Specific Conductance at 25 deg.C	1580	umhos/cm	1.0
Specific Conductance at 25 deg.C	1560	umhos/cm	1.0
Specific Conductance at 25 deg.C	1570	umhos/cm	1.0
Average Specific Conductance at 25 deg.C	1570	umhos/cm	1.0
Total Organic Carbon	1.0	mg/L	1.0
Total Organic Carbon	2.0	mg/L	1.0
Total Organic Carbon	3.0	mg/L	1.0
Total Organic Carbon	2.0	mg/L	1.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Dissolved Solids	1090	mg/L	10.0
Water Elevation	6846.46	ft	--

WELL:SMW6

Ciniza Refinery Giant Refining Gallup, New Mexico

DATE	11/85	2/86	5/86	9/86	12/86	2/87	3/87	7/87	11/87	12/87	4/88	7/88
PARAMETER												
TOC (mg/l)	5.0	5.0	25.0	9.0	10.0			12.0	1.2	4.0		1.50
	5.5	5.6		9.0	9.0			11.0				
	5.1	5.8		10.0	9.0			11.0				
	5.0	5.5		9.0	10.0			12.0				
AVERAGE	5.2	5.5	25.0	9.0	9.5			11.5	1.2	4.0		1.5
TOX (mg/l)	(0.01	(0.01	0.015	0.017	0.008			0.001	ND	(0.005		(5
	(0.01	(0.01		0.017	0.009			0.001				
	(0.01	(0.01		0.017	0.009			0.001				
	(0.01	(0.01		0.018	0.009			0.001				
AVERAGE	(0.01	(0.01	0.015	0.017	0.009			0.001	(0.01	(0.005		(5
pH	8.4	8.0	7.9	8.3		8.24		7.83	8.1	8.5	8.20	8.40
	8.4	8.0		8.3								
	8.4	8.0		8.3								
	8.4	8.0		8.3								
AVERAGE	8.4	8.0	7.9	8.3		8.24		7.83	8.1	8.5	8.2	8.4
CONDUCT.	1275	1590.0	1500	1400.0	1700.0	1400.0		1600.0		1200.0	1700.0	1000.0
(mhos/cm)	1275.0	1490.0		1410.0	1710.0							
	1275.0	1500.0		1400.0	1710.0							
	1275.0	1480.0		1420.0	1700.0							
AVERAGE	1275.0	1515.0	1500	1407.5	1705.0	1400.0		1600.0	1410.0	1200.0	1700	1000
(mg/l)												
Ag	(0.050	(0.050	(0.050	(0.050								
As	(0.050	(0.050	(0.050	(0.050								
Ba	(1	(0.005	0.010	0.010								
Ca			13	1.7		3.3					3.7	
Cd	(0.010	(0.010	(0.010	(0.010								
Cl	70.0	76.0	82	62.9		63.5					67.0	38.7
Cr	0.050	(0.050	(0.050	0.055	(0.05		0.062	(0.05	ND	(0.05		
Fe	0.62	0.3	0.150	1.100								
Hg	(0.002	(0.002	0.002	(0.002								
K												
Mg												
Mn	0.17	(0.02	(0.02	(0.02								
Na	348.0	424.0	950	376.0		320.0					312.5	
Pb	(0.050	(0.050	(0.050	(0.050	(0.05		0.220	(0.05	ND	(0.05		(0.05
Se	0.02	(0.010	(0.010	(0.010								
SO4	261.0	164.0	223	453.0		136.0					82.8	
Phenols	(0.001	(0.001	0.002	(0.001								
Fluoride	0.63	0.9	0.950	0.549								

NO3(N)	0.20	1.0	(0.010	0.700
Endrin	(0.0002	(0.0002	(0.0002	(0.0002
Lindane	(0.004	(0.004	(0.004	(0.004
Methoxych	(0.1	(0.1	(0.1	(0.1
Toxaphene	(0.005	(0.005	(0.005	(0.005
2,4-D	(0.1	(0.1	(0.1	(0.1
2,4,5-TP	(0.01	(0.01	(0.01	(0.01
Coliform	(1/100	(1/100	(1/100	(1/100
(pCi/l)				
Radium	(5	(5		
Gross Alp	0.0	0.0	0.0	0.0
Gross Bet	0.0	0.0	0.0	0.0
(FTU)				
Turbidity	51.0			

WELL:SMW6 Ciniza Refinery Giant Refining Gallup, New Mexico

DATE 7/88R 6/89 7/89

PARAMETER

TOC (mg/l) 1.5

AVERAGE 1.5

TOX (mg/l) (0.005

AVERAGE (0.005

pH 8.40 8.2

AVERAGE 8.4 8.2

CONDUCT. 1000.0 1760.0
(mhos/cm)

AVERAGE 1000 1760.0

(mg/l)

Ag
As
Ba
Ca 236.0 8.8
Cd
Cl 38.7 78.0
Cr (0.05
Fe
Hg
K ND
Mg 2.5
Mn
Na 344.0
Pb (0.05
Se
SO4
Phenols
Fluoride

Giant Refining Gallup, New Mexico

API Effluent
General Inorganics

Date: 27 MAR 90

Parameter	Result	Units	Reporting Limit
Biochemical Oxygen Demand	358	mg/L	2.0
Chemical Oxygen Demand (regular)	1760	mg/L	250
Total Organic Carbon	250	mg/L	1.0
Total Dissolved Solids	3700	mg/L	50.0

Giant Refining Gallup, New Mexico

Aerated Lagoon Effluent
Refinery Hazardous Constituent Volatiles

Date: 27 MAR 90

Parameter	Result	Units	Reporting Limit
Bnezene	7.8	ug/L	5.0
Carbon disulfide	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
EDB (1,2-Dibromoethane)	ND	ug/L	5.0
1,2-Dichoroethane	ND	ug/L	5.0
1,4-Dioxane	ND	ug/L	100.0
Ethylbenzene	ND	ug/L	5.0
2-Butanone (MEK)	310	ug/L	10.0
Toluene	12	ug/L	5.0
Stryene	ND	ug/L	5.0
Xylenes (total)	59	ug/L	5.0

Giant Refining Gallup, New Mexico

Aerated Lagoon Effluent
Refinery Hazardous Constituent Semivolatiles

Date: 27 MAR 90

Parameter	Result	Units	Reporting Limit
Anthracene	ND	ug/L	50
Benzo(a)anthracene	ND	ug/L	50
Benzo(b)fluoranthene	ND	ug/L	50
Benzo(k)fluorathene	ND	ug/L	50
Benzo(a)pyrene	ND	ug/L	50
bis(2-Ethylhexyl) phthalate	ND	ug/L	50
Butyl benzyl phthalate	ND	ug/L	50
Chrysene	ND	ug/L	50
Dibenz(a,h)anthracene	ND	ug/L	50
Di-n-butyl phthalate	ND	ug/L	50
1,2-Dichlorobenzene	ND	ug/L	50
1,3-Dichlorobenzene	ND	ug/L	50
1,4-Dichlorobenzene	ND	ug/L	50
Diethyl phthalate	ND	ug/L	50
7,12-Dimethylbenz(a)- anthracene	ND	ug/L	50
Dimethyl phthalate	ND	ug/L	50
Di-n-octyl phthalate	ND	ug/L	50
Fluoranthene	ND	ug/L	50
Indene	ND	ug/L	50
1-Methylnaphthalene	ND	ug/L	50
Naphthalene	ND	ug/L	50
Phenanthrene	ND	ug/L	50
Pyrene	ND	ug/L	50
Pyridine	ND	ug/L	50
Quinoline	ND	ug/L	50
Benzenethiol	150	ug/L	50
o-Cresol	ND	ug/L	50
m & p-Cresol(s)	ND	ug/L	50
2,4-Dimethylphenol	ND	ug/L	50
2,4-Dinitrophenol	ND	ug/L	250
4-Nitrophenol	ND	ug/L	250
Phenol	ND	ug/L	50

Giant Refining Gallup, New Mexico

Aerated Lagoon Effluent
Metals - Total Metals

Date: 27 MAR 90

Parameter	Result	Units	Reporting Limit
Arsenic	0.069	mg/L	0.0050
Cadmium	ND	mg/L	0.010
Chromium	ND	mg/L	0.020
Lead	ND	mg/L	0.010
Mercury	0.0026	mg/L	0.00040
Nickel	ND	mg/L	0.080
Selenium	ND	mg/L	0.050

Giant Refining Gallup, New Mexico

Aerated Lagoon Effluent
General Inorganics

Date: 27 MAR 90

Parameter	Result	Units	Reporting Limit
Biochemical Oxygen Demand	246	mg/L	2.0
Chemical Oxygen Demand (regular)	609	mg/L	250
Oil and Grease	6.7	mg/L	1.0
pH	7.8	mg/L	--
Sulfide, Total	3.4	mg/L	1.2
Total Organic Carbon	100	mg/L	1.0
Total Dissolved Solids	4650	mg/L	50.0

ANALYTICAL RESULTS
FOR
GIANT REFINING
ENSECO-RMAL NO. 008847



APRIL 20, 1990

MW & SMN wells

RECEIVED

JUN 14 1990
OIL CONSERVATION DIV.
SANTA FE

Reviewed by:

Julie Essey

Julie Essey
Jeanne B. Howbert

Jeanne B. Howbert

Introduction

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

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

All analyses at Enseco are performed so that the maximum concentration of sample consistent with the method is analyzed. Dilutions are at times required to achieve linearity of the specific parameter or to reduce matrix interferences. In this event, reporting limits are adjusted proportionately.

Due to matrix interference originating from non-target analytes, dilutions were performed for the tests and samples listed below:

<u>Sample Number</u>	<u>Test</u>
008847-0005	Method 6010
008847-0006	Method 6010
008847-0007	Method 6010

Following is a discussion concerning samples analyzed by graphite furnace atomic absorption (GFAA):

Enseco protocol states that samples analyzed by graphite furnace atomic absorption (GFAA), will have a spiked aliquot analyzed with each sample. If the spike recovery does not meet established criteria, the reporting limit for that analysis is raised proportionately. Poor spike recoveries of this type are typically due to interferences from the sample matrix.

In reviewing the GFAA metals data it is necessary to know what the nominal reporting limits are in order to determine whether or not those limits were raised due to matrix interference. The most common GFAA elements and their nominal reporting limits are listed in the table following. These are provided to facilitate the review of the GFAA metals data.

Common GFAA Elements

Reporting Limit / Units

<u>Element</u>	<u>Aqueous (mg/L)</u>	<u>Soil (mg/kg)</u>	<u>Waste (mg/kg)</u>	<u>Leachate (mg/L)</u>
Arsenic	0.005	0.5 **	0.5 **	0.050**
Lead	0.005	0.5	0.5 **	0.050**
Selenium	0.005	0.5	0.5	0.050
Thallium	0.005	0.5	0.5	0.050

** For the matrix listed, the preferred method for this element is by Method 6010

Sample Description Information

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

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

Analytical Test Requests

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

SAMPLE DESCRIPTION INFORMATION
for
Giant Refining

Lab ID	Client ID	Matrix	Sampled		Received
			Date	Time	
008847-0001-SA	MW-1	AQUEOUS	27 MAR 90	10:00	28 MAR 90
008847-0002-SA	MW-2	AQUEOUS	27 MAR 90	09:35	28 MAR 90
008847-0003-SA	MW-4	AQUEOUS	27 MAR 90	07:30	28 MAR 90
008847-0004-SA	MW-5	AQUEOUS	27 MAR 90	09:15	28 MAR 90
008847-0005-SA	SMW-1	AQUEOUS	27 MAR 90	11:40	28 MAR 90
008847-0006-SA	SMW-2	AQUEOUS	27 MAR 90	11:10	28 MAR 90
008847-0007-SA	SMW-3	AQUEOUS	27 MAR 90	08:30	28 MAR 90
008847-0008-SA	SMW-4	AQUEOUS	27 MAR 90	12:45	28 MAR 90
008847-0009-SA	SMW-5	AQUEOUS	27 MAR 90	12:20	28 MAR 90
008847-0010-SA	SMW-6	AQUEOUS	27 MAR 90	12:00	28 MAR 90
008847-0011-SA	Duplicate 1	AQUEOUS	27 MAR 90	08:00	28 MAR 90

ANALYTICAL TEST REQUESTS
for
Giant Refining

Page 1 of 2

Lab ID: 008847	Group Code	Analysis Description	Custom Test?
0001 - 0004	A	Total Organic Carbon (TOC)	N
		Total Organic Carbon (TOC)	N
		Total Organic Carbon (TOC)	N
		Total Organic Carbon (TOC)	N
		Total Organic Halogen (TOX)	N
		Total Organic Halogen (TOX)	N
		Total Organic Halogen (TOX)	N
		Total Organic Halogen (TOX)	N
		ICP Metals (Dissolved)	Y
		Arsenic, Furnace AA (Dissolved)	N
		Selenium, Furnace AA (Dissolved)	N
		ICP Metals (Total)	Y
		Prep - Total Metals, ICP	N
		Lead, Furnace AA (Total)	N
		Prep - Total Metals, Furnace AA	N
		Mercury, Cold Vapor AA (Total)	N
		Prep - Mercury, Cold Vapor AA (Total)	N
		Chloride, Ion Chromatography	N
		Sulfate, Ion Chromatography	N
		Alkalinity,	Y
		Total/Carbonate/Bicarbonate/Hydroxide	Y
		Total Dissolved Solids (TDS)	N
		Phenolics (4-AAP)	N
		TCL Volatile Organics	Y
		Prep-Volatile Organics by GC/MS	N
		TCL Volatile Organics	Y
		pH	N
		Specific Conductance	N
0005 - 0011	B	Total Organic Carbon (TOC)	N
		Total Organic Carbon (TOC)	N
		Total Organic Carbon (TOC)	N
		Total Organic Carbon (TOC)	N
		Total Organic Halogen (TOX)	N
		Total Organic Halogen (TOX)	N
		Total Organic Halogen (TOX)	N
		Total Organic Halogen (TOX)	N
		ICP Metals (Dissolved)	Y
		ICP Metals (Total)	Y
		Prep - Total Metals, ICP	N
		Lead, Furnace AA (Total)	N
		Prep - Total Metals, Furnace AA	N
		Chloride, Ion Chromatography	N

ANALYTICAL TEST REQUESTS
for
Giant Refining

Page 2 of 2

Lab ID: 008847	Group Code	Analysis Description	Custom Test?
		Sulfate, Ion Chromatography	N
		Alkalinity,	Y
		Total/Carbonate/Bicarbonate/Hydroxide	Y
		Total Dissolved Solids (TDS)	N
		TCL Volatile Organics	Y
		Prep-Volatile Organics by GC/MS	N
		pH	N
		Specific Conductance	N

Analytical Results

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

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

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

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

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
 Client ID: MW-1
 Lab ID: 008847-0001-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070038
 Sampled: 27 MAR 90
 Prepared: 01 APR 90

Received: 28 MAR 90
 Analyzed: 01 APR 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene			
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-			
trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,3-Dichlorobenzene	ND	ug/L	5.0

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Keith Beauvais

Approved By: Jeff Lowry

TCL Volatile Organics (CONT.)

Method 8240

Client Name: Giant Refining
Client ID: MW-1
Lab ID: 008847-0001-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070038
Sampled: 27 MAR 90
Prepared: 01 APR 90

Received: 28 MAR 90
Analyzed: 01 APR 90

Parameter	Result	Units	Reporting Limit
1,4-Dichlorobenzene	ND	ug/L	5.0
Toluene-d8	99	%	--
4-Bromofluorobenzene	95	%	--
1,2-Dichloroethane-d4	87	%	--

ND = Not detected
NA = Not applicable

Reported By: Keith Beauvais

Approved By: Jeff Lowry

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
Client ID: MW-1
Lab ID: 008847-0001-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070038
Sampled: 27 MAR 90
Prepared: 01 APR 90

Received: 28 MAR 90
Analyzed: 03 APR 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene	ND	ug/L	5.0
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

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ND = Not detected
NA = Not applicable

Reported By: Bryan Anderson

Approved By: Jeff Lowry

TCL Volatile Organics (CONT.)

Method 8240

Client Name: Giant Refining
 Client ID: MW-1
 Lab ID: 008847-0001-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070038
 Sampled: 27 MAR 90
 Prepared: 01 APR 90

Received: 28 MAR 90
 Analyzed: 03 APR 90

Parameter	Result	Units	Reporting Limit
1,3-Dichlorobenzene	ND	ug/L	5.0
Toluene-d8	105	%	--
4-Bromofluorobenzene	99	%	--
1,2-Dichloroethane-d4	102	%	--

ND = Not detected
 NA = Not applicable

Reported By: Bryan Anderson

Approved By: Jeff Lowry

Metals

Dissolved Metals

Client Name: Giant Refining
Client ID: MW-1
Lab ID: 008847-0001-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070038
Sampled: 27 MAR 90
Prepared: See Below

Received: 28 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	0.010	7060	NA	02 APR 90
Barium	ND	mg/L	0.010	6010	NA	03 APR 90
Cadmium	ND	mg/L	0.0050	6010	NA	03 APR 90
Calcium	1.8	mg/L	0.20	6010	NA	03 APR 90
Magnesium	0.25	mg/L	0.20	6010	NA	03 APR 90
Manganese	ND	mg/L	0.010	6010	NA	03 APR 90
Potassium	ND	mg/L	5.0	6010	NA	03 APR 90
Selenium	ND	mg/L	0.0050	7740	NA	30 MAR 90
Silver	ND	mg/L	0.010	6010	NA	03 APR 90
Sodium	252	mg/L	5.0	6010	NA	03 APR 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Toni Lusk

Metals

Total Metals

Client Name: Giant Refining
 Client ID: MW-1
 Lab ID: 008847-0001-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070038
 Sampled: 27 MAR 90
 Prepared: See Below

Received: 28 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	ND	mg/L	0.010	6010	29 MAR 90	31 MAR 90
Lead	ND	mg/L	0.0050	7421	29 MAR 90	02 APR 90
Mercury	ND	mg/L	0.00020	7470	29 MAR 90	30 MAR 90

ND = Not detected
 NA = Not applicable

Reported By: Micky Gehring

Approved By: Toni Lusk

General Inorganics

Client Name: Giant Refining
Client ID: MW-1
Lab ID: 008847-0001-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070038
Sampled: 27 MAR 90
Prepared: See Below

Received: 28 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO ₃ at pH 4.5	300	mg/L	5.0	310.1	NA	28 MAR 90
Alkalinity, Carb. as CaCO ₃ at pH 8.3	48.6	mg/L	5.0	310.1	NA	28 MAR 90
Chloride	44.9	mg/L	3.0	300.0	NA	02 APR 90
pH	8.9	units	--	9040	NA	28 MAR 90
Phenolics	ND	mg/L	0.010	9065	NA	30 MAR 90
Sulfate	156	mg/L	5.0	300.0	NA	02 APR 90
Specific Conductance at 25 deg.C	1040	umhos/cm	1.0	120.1	NA	28 MAR 90
Total Organic Carbon	1.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	1.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	1.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	1.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	02 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	02 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	02 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	02 APR 90
Total Dissolved Solids	687	mg/L	10.0	160.1	NA	29 MAR 90

ND = Not detected
NA = Not applicable

Reported By: Jennifer Franzen

Approved By: Toni Stovall

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
 Client ID: MW-2
 Lab ID: 008847-0002-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070039
 Sampled: 27 MAR 90
 Prepared: 01 APR 90

Received: 28 MAR 90
 Analyzed: 03 APR 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene	ND	ug/L	5.0
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

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ND = Not detected
 NA = Not applicable

Reported By: Bryan Anderson

Approved By: Jeff Lowry

TCL Volatile Organics (CONT.)

Method 8240

Client Name: Giant Refining
Client ID: MW-2
Lab ID: 008847-0002-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070039
Sampled: 27 MAR 90
Prepared: 01 APR 90

Received: 28 MAR 90
Analyzed: 03 APR 90

Parameter	Result	Units	Reporting Limit
1,3-Dichlorobenzene	ND	ug/L	5.0
Toluene-d8	101	%	--
4-Bromofluorobenzene	97	%	--
1,2-Dichloroethane-d4	94	%	--

ND = Not detected
NA = Not applicable

Reported By: Bryan Anderson

Approved By: Jeff Lowry

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
 Client ID: MW-2
 Lab ID: 008847-0002-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070039
 Sampled: 27 MAR 90
 Prepared: 01 APR 90

Received: 28 MAR 90
 Analyzed: 05 APR 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Cesar Rojas

Approved By: Jeff Lowry

TCL Volatile Organics (CONT.)

Method 8240

Client Name: Giant Refining
 Client ID: MW-2
 Lab ID: 008847-0002-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070039
 Sampled: 27 MAR 90
 Prepared: 01 APR 90

Received: 28 MAR 90
 Analyzed: 05 APR 90

Parameter	Result	Units	Reporting Limit
1,3-Dichlorobenzene	ND	ug/L	5.0
Toluene-d8	102	%	--
4-Bromofluorobenzene	98	%	--
1,2-Dichloroethane-d4	100	%	--

ND = Not detected
 NA = Not applicable

Reported By: Cesar Rojas

Approved By: Jeff Lowry

Metals

Dissolved Metals

Client Name: Giant Refining
Client ID: MW-2
Lab ID: 008847-0002-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070039
Sampled: 27 MAR 90
Prepared: See Below

Received: 28 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	0.010	7060	NA	02 APR 90
Barium	0.019	mg/L	0.010	6010	NA	03 APR 90
Cadmium	ND	mg/L	0.0050	6010	NA	03 APR 90
Calcium	1.7	mg/L	0.20	6010	NA	03 APR 90
Magnesium	ND	mg/L	0.20	6010	NA	03 APR 90
Manganese	ND	mg/L	0.010	6010	NA	03 APR 90
Potassium	ND	mg/L	5.0	6010	NA	03 APR 90
Selenium	ND	mg/L	0.0050	7740	NA	30 MAR 90
Silver	ND	mg/L	0.010	6010	NA	03 APR 90
Sodium	259	mg/L	5.0	6010	NA	03 APR 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Toni Lusk

Metals

Total Metals

Client Name: Giant Refining
Client ID: MW-2
Lab ID: 008847-0002-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070039
Sampled: 27 MAR 90
Prepared: See Below

Received: 28 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	ND	mg/L	0.010	6010	29 MAR 90	31 MAR 90
Lead	ND	mg/L	0.010	7421	29 MAR 90	02 APR 90
Mercury	ND	mg/L	0.00020	7470	29 MAR 90	30 MAR 90

ND = Not detected
NA = Not applicable

Reported By: Micky Gehring

Approved By: Toni Lusk

General Inorganics

Client Name: Giant Refining
Client ID: MW-2
Lab ID: 008847-0002-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070039
Sampled: 27 MAR 90
Prepared: See Below

Received: 28 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO ₃ at pH 4.5	288	mg/L	5.0	310.1	NA	28 MAR 90
Alkalinity, Carb. as CaCO ₃ at pH 8.3	47.6	mg/L	5.0	310.1	NA	28 MAR 90
Chloride	54.0	mg/L	3.0	300.0	NA	02 APR 90
pH	8.9	units	--	9040	NA	28 MAR 90
Phenolics	ND	mg/L	0.010	9065	NA	30 MAR 90
Sulfate	165	mg/L	5.0	300.0	NA	02 APR 90
Specific Conductance at 25 deg.C	1050	umhos/cm	1.0	120.1	NA	28 MAR 90
Total Organic Carbon	1.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	1.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	1.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	1.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	02 APR 90
Total Organic Halogen as Cl	31.5	ug/L	30.0	9020	NA	02 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	02 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	02 APR 90
Total Dissolved Solids	688	mg/L	10.0	160.1	NA	29 MAR 90

ND = Not detected
NA = Not applicable

Reported By: Jennifer Franzen

Approved By: Toni Stovall

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
 Client ID: MW-4
 Lab ID: 008847-0003-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070040
 Sampled: 27 MAR 90
 Prepared: 01 APR 90

Received: 28 MAR 90
 Analyzed: 03 APR 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene			
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-			
trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,3-Dichlorobenzene	ND	ug/L	5.0

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Bryan Anderson

Approved By: Jeff Lowry

TCL Volatile Organics (CONT.)

Method 8240

Client Name: Giant Refining
 Client ID: MW-4
 Lab ID: 008847-0003-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070040
 Sampled: 27 MAR 90
 Prepared: 01 APR 90

Received: 28 MAR 90
 Analyzed: 03 APR 90

Parameter	Result	Units	Reporting Limit
1,4-Dichlorobenzene	ND	ug/L	5.0
Toluene-d8	104	%	--
4-Bromofluorobenzene	99	%	--
1,2-Dichloroethane-d4	98	%	--

ND = Not detected
 NA = Not applicable

Reported By: Bryan Anderson

Approved By: Jeff Lowry

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
Client ID: MW-4
Lab ID: 008847-0003-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070040
Sampled: 27 MAR 90
Prepared: 01 APR 90

Received: 28 MAR 90
Analyzed: 05 APR 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene			
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-			
trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,3-Dichlorobenzene	ND	ug/L	5.0

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Cesar Rojas

Approved By: Jeff Lowry

TCL Volatile Organics (CONT.)

Method 8240

Client Name: Giant Refining
Client ID: MW-4
Lab ID: 008847-0003-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070040
Sampled: 27 MAR 90
Prepared: 01 APR 90

Received: 28 MAR 90
Analyzed: 05 APR 90

Parameter	Result	Units	Reporting Limit
1,4-Dichlorobenzene	ND	ug/L	5.0
Toluene-d8	103	%	--
4-Bromofluorobenzene	98	%	--
1,2-Dichloroethane-d4	95	%	--

ND = Not detected
NA = Not applicable

Reported By: Cesar Rojas

Approved By: Jeff Lowry

Metals

Dissolved Metals

Client Name: Giant Refining
 Client ID: MW-4
 Lab ID: 008847-0003-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070040
 Sampled: 27 MAR 90
 Prepared: See Below

Received: 28 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	0.010	7060	NA	02 APR 90
Barium	0.017	mg/L	0.010	6010	NA	03 APR 90
Cadmium	ND	mg/L	0.0050	6010	NA	03 APR 90
Calcium	2.0	mg/L	0.20	6010	NA	03 APR 90
Magnesium	0.24	mg/L	0.20	6010	NA	03 APR 90
Manganese	ND	mg/L	0.010	6010	NA	03 APR 90
Potassium	ND	mg/L	5.0	6010	NA	03 APR 90
Selenium	ND	mg/L	0.0050	7740	NA	30 MAR 90
Silver	ND	mg/L	0.010	6010	NA	03 APR 90
Sodium	277	mg/L	5.0	6010	NA	03 APR 90

ND = Not detected
 NA = Not applicable

Reported By: Sandra Jones

Approved By: Toni Lusk

Metals

Total Metals

Client Name: Giant Refining
Client ID: MW-4
Lab ID: 008847-0003-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070040
Sampled: 27 MAR 90
Prepared: See Below

Received: 28 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	ND	mg/L	0.010	6010	29 MAR 90	31 MAR 90
Lead	ND	mg/L	0.0050	7421	29 MAR 90	02 APR 90
Mercury	ND	mg/L	0.00020	7470	29 MAR 90	30 MAR 90

ND = Not detected
NA = Not applicable

Reported By: Micky Gehring

Approved By: Toni Lusk

General Inorganics

Client Name: Giant Refining
 Client ID: MW-4
 Lab ID: 008847-0003-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070040
 Sampled: 27 MAR 90
 Prepared: See Below

Received: 28 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO ₃ at pH 4.5	424	mg/L	5.0	310.1	NA	28 MAR 90
Alkalinity, Carb. as CaCO ₃ at pH 8.3	31.3	mg/L	5.0	310.1	NA	28 MAR 90
Chloride	14.0	mg/L	3.0	300.0	NA	02 APR 90
pH	8.6	units	--	9040	NA	28 MAR 90
Phenolics	ND	mg/L	0.010	9065	NA	30 MAR 90
Sulfate	143	mg/L	5.0	300.0	NA	02 APR 90
Specific Conductance at 25 deg.C	1070	umhos/cm	1.0	120.1	NA	28 MAR 90
Total Organic Carbon	1.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	2.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	2.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	2.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	03 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	03 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	03 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	03 APR 90
Total Dissolved Solids	729	mg/L	10.0	160.1	NA	29 MAR 90

ND = Not detected
 NA = Not applicable

Reported By: Jennifer Franzen

Approved By: Toni Stovall

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
Client ID: MW-5
Lab ID: 008847-0004-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070041
Sampled: 27 MAR 90
Prepared: 01 APR 90

Received: 28 MAR 90
Analyzed: 02 APR 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2- trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Keith Beauvais

Approved By: Jeff Lowry

TCL Volatile Organics (CONT.)

Method 8240

Client Name: Giant Refining
Client ID: MW-5
Lab ID: 008847-0004-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070041
Sampled: 27 MAR 90
Prepared: 01 APR 90

Received: 28 MAR 90
Analyzed: 02 APR 90

Parameter	Result	Units	Reporting Limit
1,3-Dichlorobenzene	ND	ug/L	5.0
Toluene-d8	100	%	--
4-Bromofluorobenzene	93	%	--
1,2-Dichloroethane-d4	98	%	--

ND = Not detected
NA = Not applicable

Reported By: Keith Beauvais

Approved By: Jeff Lowry

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
 Client ID: MW-5
 Lab ID: 008847-0004-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070041
 Sampled: 27 MAR 90
 Prepared: 01 APR 90

Received: 28 MAR 90
 Analyzed: 03 APR 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene	ND	ug/L	5.0
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,3-Dichlorobenzene	ND	ug/L	5.0

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ND = Not detected
 NA = Not applicable

Reported By: Bryan Anderson

Approved By: Jeff Lowry

TCL Volatile Organics (CONT.)

Method 8240

Client Name: Giant Refining
Client ID: MW-5
Lab ID: 008847-0004-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070041
Sampled: 27 MAR 90
Prepared: 01 APR 90

Received: 28 MAR 90
Analyzed: 03 APR 90

Parameter	Result	Units	Reporting Limit
1,4-Dichlorobenzene	ND	ug/L	5.0
Toluene-d8	104	%	--
4-Bromofluorobenzene	100	%	--
1,2-Dichloroethane-d4	97	%	--

ND = Not detected
NA = Not applicable

Reported By: Bryan Anderson

Approved By: Jeff Lowry

Metals

Dissolved Metals

Client Name: Giant Refining
 Client ID: MW-5
 Lab ID: 008847-0004-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070041
 Sampled: 27 MAR 90
 Prepared: See Below

Received: 28 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	0.010	7060	NA	02 APR 90
Barium	0.12	mg/L	0.010	6010	NA	03 APR 90
Cadmium	ND	mg/L	0.0050	6010	NA	03 APR 90
Calcium	1.9	mg/L	0.20	6010	NA	03 APR 90
Magnesium	0.20	mg/L	0.20	6010	NA	03 APR 90
Manganese	ND	mg/L	0.010	6010	NA	03 APR 90
Potassium	ND	mg/L	5.0	6010	NA	03 APR 90
Selenium	ND	mg/L	0.0050	7740	NA	30 MAR 90
Silver	ND	mg/L	0.010	6010	NA	03 APR 90
Sodium	255	mg/L	5.0	6010	NA	03 APR 90

ND = Not detected
 NA = Not applicable

Reported By: Sandra Jones

Approved By: Toni Lusk

Metals

Total Metals

Client Name: Giant Refining
 Client ID: MW-5
 Lab ID: 008847-0004-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070041
 Sampled: 27 MAR 90
 Prepared: See Below

Received: 28 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	ND	mg/L	0.010	6010	29 MAR 90	31 MAR 90
Lead	ND	mg/L	0.0050	7421	29 MAR 90	02 APR 90
Mercury	ND	mg/L	0.00020	7470	29 MAR 90	30 MAR 90

ND = Not detected
 NA = Not applicable

Reported By: Micky Gehring

Approved By: Toni Lusk

General Inorganics

Client Name: Giant Refining
 Client ID: MW-5
 Lab ID: 008847-0004-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070041
 Sampled: 27 MAR 90
 Prepared: See Below

Received: 28 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO ₃ at pH 4.5	272	mg/L	5.0	310.1	NA	28 MAR 90
Alkalinity, Carb. as CaCO ₃ at pH 8.3	47.0	mg/L	5.0	310.1	NA	28 MAR 90
Chloride	62.1	mg/L	3.0	300.0	NA	02 APR 90
pH	8.9	units	--	9040	NA	28 MAR 90
Phenolics	ND	mg/L	0.010	9065	NA	30 MAR 90
Sulfate	170	mg/L	5.0	300.0	NA	02 APR 90
Specific Conductance at 25 deg.C	1040	umhos/cm	1.0	120.1	NA	28 MAR 90
Total Organic Carbon	1.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	2.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	1.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	1.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	03 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	03 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	03 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	03 APR 90
Total Dissolved Solids	687	mg/L	10.0	160.1	NA	29 MAR 90

ND = Not detected
 NA = Not applicable

Reported By: Jennifer Franzen

Approved By: Toni Stovall

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
 Client ID: SMW-1
 Lab ID: 008847-0005-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070043
 Sampled: 27 MAR 90
 Prepared: 01 APR 90

Received: 28 MAR 90
 Analyzed: 02 APR 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Keith Beauvais

Approved By: Jeff Lowry

TCL Volatile Organics (CONT.)

Method 8240

Client Name: Giant Refining
Client ID: SMW-1
Lab ID: 008847-0005-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070043
Sampled: 27 MAR 90
Prepared: 01 APR 90

Received: 28 MAR 90
Analyzed: 02 APR 90

Parameter	Result	Units	Reporting Limit
1,3-Dichlorobenzene	ND	ug/L	5.0
Toluene-d8	104	%	--
4-Bromofluorobenzene	91	%	--
1,2-Dichloroethane-d4	99	%	--

ND = Not detected
NA = Not applicable

Reported By: Keith Beauvais

Approved By: Jeff Lowry

Metals

Dissolved Metals

Client Name: Giant Refining
 Client ID: SMW-1
 Lab ID: 008847-0005-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070043
 Sampled: 27 MAR 90
 Prepared: See Below

Received: 28 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Calcium	182	mg/L	0.40	6010	NA	03 APR 90
Magnesium	56.5	mg/L	0.40	6010	NA	03 APR 90
Potassium	ND	mg/L	10.0	6010	NA	03 APR 90
Sodium	1250	mg/L	10.0	6010	NA	03 APR 90

ND = Not detected
 NA = Not applicable

Reported By: Sandra Jones

Approved By: Toni Lusk

Metals

Total Metals

Client Name: Giant Refining
 Client ID: SMW-1
 Lab ID: 008847-0005-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070043
 Sampled: 27 MAR 90
 Prepared: See Below

Received: 28 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	0.077	mg/L	0.020	6010	29 MAR 90	31 MAR 90
Lead	ND	mg/L	0.010	7421	29 MAR 90	02 APR 90

ND = Not detected
 NA = Not applicable

Reported By: Mike Befort

Approved By: Toni Lusk

General Inorganics

Client Name: Giant Refining
 Client ID: SMW-1
 Lab ID: 008847-0005-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070043
 Sampled: 27 MAR 90
 Prepared: See Below

Received: 28 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO ₃ at pH 4.5	611	mg/L	5.0	310.1	NA	28 MAR 90
Alkalinity, Carb. as CaCO ₃ at pH 8.3	ND	mg/L	5.0	310.1	NA	28 MAR 90
Chloride	1120	mg/L	30.0	300.0	NA	02 APR 90
pH	7.5	units	--	9040	NA	28 MAR 90
Sulfate	1330	mg/L	50.0	300.0	NA	02 APR 90
Specific Conductance at 25 deg.C	5630	umhos/cm	1.0	120.1	NA	28 MAR 90
Total Organic Carbon	19.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	16.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	18.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	21.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Halogen as Cl	61.6	ug/L	30.0	9020	NA	03 APR 90
Total Organic Halogen as Cl	49.2	ug/L	30.0	9020	NA	03 APR 90
Total Organic Halogen as Cl	48.9	ug/L	30.0	9020	NA	03 APR 90
Total Organic Halogen as Cl	46.7	ug/L	30.0	9020	NA	03 APR 90
Total Dissolved Solids	4330	mg/L	50.0	160.1	NA	29 MAR 90

ND = Not detected
 NA = Not applicable

Reported By: Jennifer Franzen

Approved By: Toni Stovall

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
 Client ID: SMW-2
 Lab ID: 008847-0006-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070044
 Sampled: 27 MAR 90
 Prepared: 01 APR 90

Received: 28 MAR 90
 Analyzed: 02 APR 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene	ND	ug/L	5.0
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Keith Beauvais

Approved By: Jeff Lowry

TCL Volatile Organics (CONT.)

Method 8240

Client Name: Giant Refining
Client ID: SMW-2
Lab ID: 008847-0006-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070044
Sampled: 27 MAR 90
Prepared: 01 APR 90

Received: 28 MAR 90
Analyzed: 02 APR 90

Parameter	Result	Units	Reporting Limit
1,3-Dichlorobenzene	ND	ug/L	5.0
Toluene-d8	99	%	--
4-Bromofluorobenzene	90	%	--
1,2-Dichloroethane-d4	97	%	--

ND = Not detected
NA = Not applicable

Reported By: Keith Beauvais

Approved By: Jeff Lowry

Metals

Dissolved Metals

Client Name: Giant Refining
Client ID: SMW-2
Lab ID: 008847-0006-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070044
Sampled: 27 MAR 90
Prepared: See Below

Received: 28 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Calcium	147	mg/L	1.0	6010	NA	03 APR 90
Magnesium	44.3	mg/L	1.0	6010	NA	03 APR 90
Potassium	ND	mg/L	25.0	6010	NA	03 APR 90
Sodium	1630	mg/L	25.0	6010	NA	03 APR 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Toni Lusk

Metals**Total Metals**

Client Name: Giant Refining
Client ID: SMW-2
Lab ID: 008847-0006-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070044
Sampled: 27 MAR 90
Prepared: See Below

Received: 28 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	0.19	mg/L	0.050	6010	29 MAR 90	31 MAR 90
Lead	0.0071	mg/L	0.0050	7421	29 MAR 90	02 APR 90

ND = Not detected
NA = Not applicable

Reported By: Mike Befort

Approved By: Toni Lusk

General Inorganics

Client Name: Giant Refining
 Client ID: SMW-2
 Lab ID: 008847-0006-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070044
 Sampled: 27 MAR 90
 Prepared: See Below

Received: 28 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO3 at pH 4.5	563	mg/L	5.0	310.1	NA	28 MAR 90
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5.0	310.1	NA	28 MAR 90
Chloride	1320	mg/L	30.0	300.0	NA	02 APR 90
pH	7.7	units	--	9040	NA	28 MAR 90
Sulfate	1590	mg/L	50.0	300.0	NA	02 APR 90
Specific Conductance at 25 deg.C	6980	umhos/cm	1.0	120.1	NA	28 MAR 90
Total Organic Carbon	12.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	12.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	14.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	13.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Halogen as Cl	45.6	ug/L	30.0	9020	NA	03 APR 90
Total Organic Halogen as Cl	39.7	ug/L	30.0	9020	NA	03 APR 90
Total Organic Halogen as Cl	37.2	ug/L	30.0	9020	NA	03 APR 90
Total Organic Halogen as Cl	49.0	ug/L	30.0	9020	NA	03 APR 90
Total Dissolved Solids	5180	mg/L	50.0	160.1	NA	29 MAR 90

ND = Not detected
 NA = Not applicable

Reported By: Jennifer Franzen

Approved By: Toni Stovall

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
 Client ID: SMW-3
 Lab ID: 008847-0007-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070045
 Sampled: 27 MAR 90
 Prepared: 01 APR 90

Received: 28 MAR 90
 Analyzed: 02 APR 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene			
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,3-Dichlorobenzene	ND	ug/L	5.0

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Keith Beauvais

Approved By: Jeff Lowry

TCL Volatile Organics (CONT.)

Method 8240

Client Name: Giant Refining
Client ID: SMW-3
Lab ID: 008847-0007-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070045
Sampled: 27 MAR 90
Prepared: 01 APR 90

Received: 28 MAR 90
Analyzed: 02 APR 90

Parameter	Result	Units	Reporting Limit
1,4-Dichlorobenzene	ND	ug/L	5.0
Toluene-d8	100	%	--
4-Bromofluorobenzene	94	%	--
1,2-Dichloroethane-d4	96	%	--

ND = Not detected
NA = Not applicable

Reported By: Keith Beauvais

Approved By: Jeff Lowry

Metals

Dissolved Metals

Client Name: Giant Refining
Client ID: SMW-3
Lab ID: 008847-0007-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070045
Sampled: 27 MAR 90
Prepared: See Below

Received: 28 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Calcium	59.0	mg/L	0.40	6010	NA	03 APR 90
Magnesium	16.2	mg/L	0.40	6010	NA	03 APR 90
Potassium	ND	mg/L	10.0	6010	NA	03 APR 90
Sodium	739	mg/L	10.0	6010	NA	03 APR 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Toni Lusk

Metals

Total Metals

Client Name: Giant Refining
Client ID: SMW-3
Lab ID: 008847-0007-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070045
Sampled: 27 MAR 90
Prepared: See Below

Received: 28 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	0.023	mg/L	0.010	6010	29 MAR 90	02 APR 90
Lead	0.0065	mg/L	0.0050	7421	29 MAR 90	02 APR 90

ND = Not detected
NA = Not applicable

Reported By: Mike Befort

Approved By: Toni Lusk

General Inorganics

Client Name: Giant Refining
 Client ID: SMW-3
 Lab ID: 008847-0007-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070045
 Sampled: 27 MAR 90
 Prepared: See Below

Received: 28 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO ₃ at pH 4.5	681	mg/L	5.0	310.1	NA	28 MAR 90
Alkalinity, Carb. as CaCO ₃ at pH 8.3	ND	mg/L	5.0	310.1	NA	28 MAR 90
Chloride	49.1	mg/L	3.0	300.0	NA	02 APR 90
pH	8.1	units	--	9040	NA	28 MAR 90
Sulfate	1180	mg/L	25.0	300.0	NA	02 APR 90
Specific Conductance at 25 deg.C	3060	umhos/cm	1.0	120.1	NA	28 MAR 90
Total Organic Carbon	4.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	4.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	4.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	4.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	03 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	03 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	03 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	03 APR 90
Total Dissolved Solids	2560	mg/L	50.0	160.1	NA	29 MAR 90

ND = Not detected
 NA = Not applicable

Reported By: Jennifer Franzen

Approved By: Toni Stovall

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
 Client ID: SMW-4
 Lab ID: 008847-0008-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070046
 Sampled: 27 MAR 90
 Prepared: 01 APR 90

Received: 28 MAR 90
 Analyzed: 02 APR 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene			
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-			
trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,3-Dichlorobenzene	ND	ug/L	5.0

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Keith Beauvais

Approved By: Jeff Lowry

TCL Volatile Organics (CONT.)**Method 8240**

Client Name: Giant Refining
Client ID: SMW-4
Lab ID: 008847-0008-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070046
Sampled: 27 MAR 90
Prepared: 01 APR 90

Received: 28 MAR 90
Analyzed: 02 APR 90

Parameter	Result	Units	Reporting Limit
1,4-Dichlorobenzene	ND	ug/L	5.0
Toluene-d8	99	%	--
4-Bromofluorobenzene	92	%	--
1,2-Dichloroethane-d4	96	%	--

ND = Not detected
NA = Not applicable

Reported By: Keith Beauvais

Approved By: Jeff Lowry

Metals

Dissolved Metals

Client Name: Giant Refining
 Client ID: SMW-4
 Lab ID: 008847-0008-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070046
 Sampled: 27 MAR 90
 Prepared: See Below

Received: 28 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Calcium	4.7	mg/L	0.20	6010	NA	31 MAR 90
Magnesium	1.2	mg/L	0.20	6010	NA	31 MAR 90
Potassium	ND	mg/L	5.0	6010	NA	31 MAR 90
Sodium	296	mg/L	5.0	6010	NA	31 MAR 90

ND = Not detected
 NA = Not applicable

Reported By: Fred Velasquez

Approved By: Toni Lusk

Metals

Total Metals

Client Name: Giant Refining
 Client ID: SMW-4
 Lab ID: 008847-0008-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070046
 Sampled: 27 MAR 90
 Prepared: See Below

Received: 28 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	ND	mg/L	0.010	6010	29 MAR 90	31 MAR 90
Lead	ND	mg/L	0.0050	7421	29 MAR 90	02 APR 90

ND = Not detected
 NA = Not applicable

Reported By: Mike Befort

Approved By: Toni Lusk

General Inorganics

Client Name: Giant Refining
Client ID: SMW-4
Lab ID: 008847-0008-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070046
Sampled: 27 MAR 90
Prepared: See Below

Received: 28 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO ₃ at pH 4.5	434	mg/L	5.0	310.1	NA	28 MAR 90
Alkalinity, Carb. as CaCO ₃ at pH 8.3	9.4	mg/L	5.0	310.1	NA	28 MAR 90
Chloride	53.2	mg/L	3.0	300.0	NA	04 APR 90
pH	8.4	units	--	9040	NA	28 MAR 90
Sulfate	178	mg/L	5.0	300.0	NA	04 APR 90
Specific Conductance at 25 deg.C	1200	umhos/cm	1.0	120.1	NA	28 MAR 90
Total Organic Carbon	3.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	2.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	2.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	2.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	04 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	04 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	04 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	04 APR 90
Total Dissolved Solids	852	mg/L	10.0	160.1	NA	29 MAR 90

ND = Not detected
NA = Not applicable

Reported By: Jennifer Franzen

Approved By: Toni Stovall

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
 Client ID: SMW-5
 Lab ID: 008847-0009-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070047
 Sampled: 27 MAR 90
 Prepared: 01 APR 90

Received: 28 MAR 90
 Analyzed: 05 APR 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene			
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-			
trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Cesar Rojas

Approved By: Jeff Lowry

TCL Volatile Organics (CONT.)

Method 8240

Client Name: Giant Refining
 Client ID: SMW-5
 Lab ID: 008847-0009-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070047
 Sampled: 27 MAR 90
 Prepared: 01 APR 90

Received: 28 MAR 90
 Analyzed: 05 APR 90

Parameter	Result	Units	Reporting Limit
1,3-Dichlorobenzene	ND	ug/L	5.0
Toluene-d8	104	%	--
4-Bromofluorobenzene	97	%	--
1,2-Dichloroethane-d4	96	%	--

ND = Not detected
 NA = Not applicable

Reported By: Cesar Rojas

Approved By: Jeff Lowry

Metals**Dissolved Metals**

Client Name: Giant Refining
Client ID: SMW-5
Lab ID: 008847-0009-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070047
Sampled: 27 MAR 90
Prepared: See Below

Received: 28 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Calcium	3.9	mg/L	0.20	6010	NA	03 MAR 90
Magnesium	0.82	mg/L	0.20	6010	NA	03 MAR 90
Potassium	5.6	mg/L	5.0	6010	NA	03 MAR 90
Sodium	254	mg/L	5.0	6010	NA	03 MAR 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Toni Lusk

Metals**Total Metals**

Client Name: Giant Refining
Client ID: SMW-5
Lab ID: 008847-0009-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070047
Sampled: 27 MAR 90
Prepared: See Below

Received: 28 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	0.025	mg/L	0.010	6010	29 MAR 90	31 MAR 90
Lead	0.018	mg/L	0.0050	7421	29 MAR 90	02 APR 90

ND = Not detected
NA = Not applicable

Reported By: Mike Befort

Approved By: Toni Lusk

General Inorganics

Client Name: Giant Refining
 Client ID: SMW-5
 Lab ID: 008847-0009-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070047
 Sampled: 27 MAR 90
 Prepared: See Below

Received: 28 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO ₃ at pH 4.5	287	mg/L	5.0	310.1	NA	28 MAR 90
Alkalinity, Carb. as CaCO ₃ at pH 8.3	24.2	mg/L	5.0	310.1	NA	28 MAR 90
Chloride	55.1	mg/L	3.0	300.0	NA	04 APR 90
pH	8.7	units	--	9040	NA	28 MAR 90
Sulfate	147	mg/L	5.0	300.0	NA	04 APR 90
Specific Conductance at 25 deg.C	1050	umhos/cm	1.0	120.1	NA	28 MAR 90
Total Organic Carbon	2.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	2.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	2.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	1.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	04 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	04 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	04 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	04 APR 90
Total Dissolved Solids	769	mg/L	10.0	160.1	NA	29 MAR 90

ND = Not detected
 NA = Not applicable

Reported By: Jennifer Franzen

Approved By: Toni Stovall

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
 Client ID: SMW-6
 Lab ID: 008847-0010-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070048
 Sampled: 27 MAR 90
 Prepared: 01 APR 90

Received: 28 MAR 90
 Analyzed: 05 APR 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene			
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-			
trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,3-Dichlorobenzene	ND	ug/L	5.0

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Cesar Rojas

Approved By: Jeff Lowry

TCL Volatile Organics (CONT.)**Method 8240**

Client Name: Giant Refining
Client ID: SMW-6
Lab ID: 008847-0010-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070048
Sampled: 27 MAR 90
Prepared: 01 APR 90

Received: 28 MAR 90
Analyzed: 05 APR 90

Parameter	Result	Units	Reporting Limit
1,4-Dichlorobenzene	ND	ug/L	5.0
Toluene-d8	104	%	--
4-Bromofluorobenzene	98	%	--
1,2-Dichloroethane-d4	96	%	--

ND = Not detected
NA = Not applicable

Reported By: Cesar Rojas

Approved By: Jeff Lowry

Metals

Dissolved Metals

Client Name: Giant Refining
Client ID: SMW-6
Lab ID: 008847-0010-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070048
Sampled: 27 MAR 90
Prepared: See Below

Received: 28 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Calcium	8.3	mg/L	0.20	6010	NA	03 APR 90
Magnesium	2.5	mg/L	0.20	6010	NA	03 APR 90
Potassium	ND	mg/L	5.0	6010	NA	03 APR 90
Sodium	379	mg/L	5.0	6010	NA	03 APR 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Toni Lusk

Metals

Total Metals

Client Name: Giant Refining
 Client ID: SMW-6
 Lab ID: 008847-0010-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070048
 Sampled: 27 MAR 90
 Prepared: See Below

Received: 28 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	0.011	mg/L	0.010	6010	29 MAR 90	31 MAR 90
Lead	ND	mg/L	0.0050	7421	29 MAR 90	02 APR 90

ND = Not detected
 NA = Not applicable

Reported By: Mike Befort

Approved By: Toni Lusk

General Inorganics

Client Name: Giant Refining
 Client ID: SMW-6
 Lab ID: 008847-0010-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070048
 Sampled: 27 MAR 90
 Prepared: See Below

Received: 28 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO ₃ at pH 4.5	572	mg/L	5.0	310.1	NA	28 MAR 90
Alkalinity, Carb. as CaCO ₃ at pH 8.3	ND	mg/L	5.0	310.1	NA	28 MAR 90
Chloride	77.3	mg/L	3.0	300.0	NA	02 APR 90
pH	8.3	units	--	9040	NA	28 MAR 90
Sulfate	215	mg/L	5.0	300.0	NA	02 APR 90
Specific Conductance at 25 deg.C	1570	umhos/cm	1.0	120.1	NA	28 MAR 90
Total Organic Carbon	1.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	2.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	3.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	2.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	04 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	04 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	04 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	04 APR 90
Total Dissolved Solids	1090	mg/L	10.0	160.1	NA	29 MAR 90

ND = Not detected
 NA = Not applicable

Reported By: Jennifer Franzen

Approved By: Toni Stovall

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
 Client ID: Duplicate 1
 Lab ID: 008847-0011-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070049
 Sampled: 27 MAR 90
 Prepared: 01 APR 90

Received: 28 MAR 90
 Analyzed: 02 APR 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Keith Beauvais

Approved By: Jeff Lowry

TCL Volatile Organics (CONT.)

Method 8240

Client Name: Giant Refining
Client ID: Duplicate 1
Lab ID: 008847-0011-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070049
Sampled: 27 MAR 90
Prepared: 01 APR 90

Received: 28 MAR 90
Analyzed: 02 APR 90

Parameter	Result	Units	Reporting Limit
1,3-Dichlorobenzene	ND	ug/L	5.0
Toluene-d8	102	%	--
4-Bromofluorobenzene	92	%	--
1,2-Dichloroethane-d4	104	%	--

ND = Not detected
NA = Not applicable

Reported By: Keith Beauvais

Approved By: Jeff Lowry

Metals

Dissolved Metals

Client Name: Giant Refining
 Client ID: Duplicate 1
 Lab ID: 008847-0011-SA
 Matrix: AQUEOUS
 Authorized: 28 MAR 90

Enseco ID: 1070049
 Sampled: 27 MAR 90
 Prepared: See Below

Received: 28 MAR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Calcium	2.0	mg/L	0.20	6010	NA	03 APR 90
Magnesium	0.26	mg/L	0.20	6010	NA	03 APR 90
Potassium	ND	mg/L	5.0	6010	NA	03 APR 90
Sodium	273	mg/L	5.0	6010	NA	03 APR 90

ND = Not detected
 NA = Not applicable

Reported By: Sandra Jones

Approved By: Toni Lusk

Metals

Total Metals

Client Name: Giant Refining
Client ID: Duplicate 1
Lab ID: 008847-0011-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070049
Sampled: 27 MAR 90
Prepared: See Below

Received: 28 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	ND	mg/L	0.010	6010	29 MAR 90	31 MAR 90
Lead	ND	mg/L	0.0050	7421	29 MAR 90	02 APR 90

ND = Not detected
NA = Not applicable

Reported By: Mike Befort

Approved By: Toni Lusk

General Inorganics

Client Name: Giant Refining
Client ID: Duplicate 1
Lab ID: 008847-0011-SA
Matrix: AQUEOUS
Authorized: 28 MAR 90

Enseco ID: 1070049
Sampled: 27 MAR 90
Prepared: See Below

Received: 28 MAR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO ₃ at pH 4.5	421	mg/L	5.0	310.1	NA	28 MAR 90
Alkalinity, Carb. as CaCO ₃ at pH 8.3	33.8	mg/L	5.0	310.1	NA	28 MAR 90
Chloride	14.1	mg/L	3.0	300.0	NA	02 APR 90
pH	8.7	units	--	9040	NA	28 MAR 90
Sulfate	146	mg/L	5.0	300.0	NA	02 APR 90
Specific Conductance at 25 deg.C	1090	umhos/cm	1.0	120.1	NA	28 MAR 90
Total Organic Carbon	2.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	2.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	2.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Carbon	2.0	mg/L	1.0	9060	NA	10 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	04 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	04 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	04 APR 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	04 APR 90
Total Dissolved Solids	724	mg/L	10.0	160.1	NA	29 MAR 90

ND = Not detected
NA = Not applicable

Reported By: Jennifer Franzen

Approved By: Toni Stovall

Quality Control Results

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

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

The standard laboratory QC package is designed to:

- 1) establish a strong, cost-effective QC program that ensures the generation of scientifically valid, legally defensible data
- 2) assess the laboratory's performance of the analytical method using control limits generated with a well-defined matrix
- 3) establish clear-cut guidelines for acceptability of analytical data so that QC decisions can be made immediately at the bench, and
- 4) provide a standard set of reportables which assures the client of the quality of his data.

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

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

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

Accuracy for DCS and SCS is measured by Percent Recovery.

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

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

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

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

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
008847-0001-SA	AQUEOUS	624-A	20 MAR 90-L	01 APR 90-L
008847-0001-SA	AQUEOUS	624-A	02 APR 90-F	03 APR 90-F
008847-0002-SA	AQUEOUS	624-A	02 APR 90-F	03 APR 90-F
008847-0002-SA	AQUEOUS	624-A	06 APR 90-F	05 APR 90-F
008847-0003-SA	AQUEOUS	624-A	02 APR 90-F	03 APR 90-F
008847-0003-SA	AQUEOUS	624-A	06 APR 90-F	05 APR 90-F
008847-0004-SA	AQUEOUS	624-A	20 MAR 90-L	01 APR 90-L
008847-0004-SA	AQUEOUS	624-A	02 APR 90-F	03 APR 90-F
008847-0005-SA	AQUEOUS	624-A	20 MAR 90-L	01 APR 90-L
008847-0006-SA	AQUEOUS	624-A	20 MAR 90-L	01 APR 90-L
008847-0007-SA	AQUEOUS	624-A	20 MAR 90-L	01 APR 90-L
008847-0008-SA	AQUEOUS	624-A	20 MAR 90-L	01 APR 90-L
008847-0009-SA	AQUEOUS	624-A	06 APR 90-F	05 APR 90-F
008847-0010-SA	AQUEOUS	624-A	06 APR 90-F	05 APR 90-F
008847-0011-SA	AQUEOUS	624-A	02 APR 90-L	01 APR 90-L

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Spiked	Concentration		AVG	Accuracy		Precision	
		DCS1	Measured DCS2		Average(%) DCS	Limits	(RPD) DCS	Limit

Category: 624-A
 Matrix: AQUEOUS
 QC Lot: 20 MAR 90-L
 Concentration Units: ug/L

1,1-Dichloroethene	50	56.7	57.0	56.8	114	61-145	0.5	14
Trichloroethene	50	48.7	51.2	50.0	100	71-120	5.0	14
Benzene	50	54.2	54.1	54.2	108	76-127	0.2	11
Toluene	50	54.1	55.9	55.0	110	76-125	3.3	13
Chlorobenzene	50	52.4	54.8	53.6	107	75-130	4.5	13

Category: 624-A
 Matrix: AQUEOUS
 QC Lot: 02 APR 90-F
 Concentration Units: ug/L

1,1-Dichloroethene	50	48.5	47.9	48.2	96	61-145	1.2	14
Trichloroethene	50	51.9	51.6	51.8	104	71-120	0.6	14
Benzene	50	51.1	54.1	52.6	105	76-127	5.7	11
Toluene	50	55.0	53.5	54.2	109	76-125	2.8	13
Chlorobenzene	50	54.8	54.1	54.4	109	75-130	1.3	13

Category: 624-A
 Matrix: AQUEOUS
 QC Lot: 06 APR 90-F
 Concentration Units: ug/L

1,1-Dichloroethene	50	49.4	47.2	48.3	97	61-145	4.6	14
Trichloroethene	50	54.1	51.1	52.6	105	71-120	5.7	14
Benzene	50	43.6	42.8	43.2	86	76-127	1.9	11
Toluene	50	52.4	53.7	53.0	106	76-125	2.5	13
Chlorobenzene	50	54.2	54.1	54.2	108	75-130	0.2	13

Category: 624-A
 Matrix: AQUEOUS
 QC Lot: 02 APR 90-L
 Concentration Units: ug/L

1,1-Dichloroethene	50	45.0	47.5	46.2	93	61-145	5.4	14
Trichloroethene	50	55.6	56.6	56.1	112	71-120	1.8	14
Benzene	50	55.2	57.4	56.3	113	76-127	3.9	11
Toluene	50	52.3	50.8	51.6	103	76-125	2.9	13

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

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Spiked	Concentration		Measured DCS2	AVG	Accuracy Average(%)		Precision (RPD)	
		DCS1				DCS	Limits	DCS	Limit
Category: 624-A									
Matrix: AQUEOUS									
QC Lot: 02 APR 90-L									
Concentration Units: ug/L									
Chlorobenzene	50	54.0		53.0	53.5	107	75-130	1.9	13

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

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration		Accuracy(%)	
	Spiked	Measured	SCS	Limits

Category: 624-A

Matrix: AQUEOUS

QC Lot: 20 MAR 90-L QC Run: 01 APR 90-L

Concentration Units: ug/L

1,2-Dichloroethane-d4	50.0	46.0	92	76-114
4-Bromofluorobenzene	50.0	46.2	92	86-115
Toluene-d8	50.0	48.0	96	88-110

Category: 624-A

Matrix: AQUEOUS

QC Lot: 02 APR 90-F QC Run: 03 APR 90-F

Concentration Units: ug/L

1,2-Dichloroethane-d4	50.0	49.0	98	76-114
4-Bromofluorobenzene	50.0	49.7	99	86-115
Toluene-d8	50.0	52.2	104	88-110

Category: 624-A

Matrix: AQUEOUS

QC Lot: 06 APR 90-F QC Run: 05 APR 90-F

Concentration Units: ug/L

1,2-Dichloroethane-d4	50.0	48.4	97	76-114
4-Bromofluorobenzene	50.0	48.7	97	86-115
Toluene-d8	50.0	51.5	103	88-110

Category: 624-A

Matrix: AQUEOUS

QC Lot: 02 APR 90-L QC Run: 01 APR 90-L

Concentration Units: ug/L

1,2-Dichloroethane-d4	50.0	46.0	92	76-114
4-Bromofluorobenzene	50.0	46.2	92	86-115
Toluene-d8	50.0	48.0	96	88-110

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

METHOD BLANK REPORT
Volatile Organics by GC/MS

Analyte	Result	Units	Reporting Limit
Test: 624-TCL-AP			
Matrix: AQUEOUS			
QC Lot: 20 MAR 90-L QC Run: 01 APR 90-L			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene			
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-			
trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,3-Dichlorobenzene	ND	ug/L	5.0

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 624-TCL-AP Matrix: AQUEOUS QC Lot: 20 MAR 90-L QC Run: 01 APR 90-L			
1,4-Dichlorobenzene	ND	ug/L	5.0
Test: 624-TCL-AP Matrix: AQUEOUS QC Lot: 02 APR 90-F QC Run: 03 APR 90-F			
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene	ND	ug/L	5.0
(cis/trans)			
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 624-TCL-AP			
Matrix: AQUEOUS			
QC Lot: 02 APR 90-F QC Run: 03 APR 90-F			
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,3-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

Test: 624-TCL-AP
Matrix: AQUEOUS
QC Lot: 06 APR 90-F QC Run: 05 APR 90-F

Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 624-TCL-AP			
Matrix: AQUEOUS			
QC Lot: 06 APR 90-F QC Run: 05 APR 90-F			
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,3-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

Test: 624-TCL-AP
 Matrix: AQUEOUS
 QC Lot: 20 MAR 90-L QC Run: 01 APR 90-L

Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 624-TCL-AP			
Matrix: AQUEOUS			
QC Lot: 20 MAR 90-L QC Run: 01 APR 90-L			
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,3-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

Test: 624-TCL-AP
 Matrix: AQUEOUS
 QC Lot: 06 APR 90-F QC Run: 05 APR 90-F

Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 624-TCL-AP			
Matrix: AQUEOUS			
QC Lot: 06 APR 90-F QC Run: 05 APR 90-F			
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,3-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

Test: 624-TCL-AP
 Matrix: AQUEOUS
 QC Lot: 02 APR 90-L QC Run: 01 APR 90-L

Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 624-TCL-AP			
Matrix: AQUEOUS			
QC Lot: 02 APR 90-L QC Run: 01 APR 90-L			
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene			
(cis/trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Chlorodibromomethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
2-Chloroethyl vinyl ether	ND	ug/L	10
Bromoform	ND	ug/L	5.0
4-Methyl-2-pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0
1,1,2 Trichloro-1,2,2-			
trifluoroethane	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	5.0
1,2-Dichlorobenzene	ND	ug/L	5.0
1,3-Dichlorobenzene	ND	ug/L	5.0
1,4-Dichlorobenzene	ND	ug/L	5.0

QC LOT ASSIGNMENT REPORT Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
008847-0001-SA	AQUEOUS	ICP-AD	03 APR 90-A	-
008847-0001-SA	AQUEOUS	AS-FAA-AD	02 APR 90-A	-
008847-0001-SA	AQUEOUS	SE-FAA-AD	30 MAR 90-B	-
008847-0001-SA	AQUEOUS	ICP-AT	29 MAR 90-D	29 MAR 90-D
008847-0001-SA	AQUEOUS	PB-FAA-AT	29 MAR 90-D	29 MAR 90-D
008847-0001-SA	AQUEOUS	HG-CVAA-AT	29 MAR 90-A	29 MAR 90-A
008847-0002-SA	AQUEOUS	ICP-AD	03 APR 90-A	-
008847-0002-SA	AQUEOUS	AS-FAA-AD	02 APR 90-A	-
008847-0002-SA	AQUEOUS	SE-FAA-AD	30 MAR 90-B	-
008847-0002-SA	AQUEOUS	ICP-AT	29 MAR 90-D	29 MAR 90-D
008847-0002-SA	AQUEOUS	PB-FAA-AT	29 MAR 90-D	29 MAR 90-D
008847-0002-SA	AQUEOUS	HG-CVAA-AT	29 MAR 90-A	29 MAR 90-A
008847-0003-SA	AQUEOUS	ICP-AD	03 APR 90-A	-
008847-0003-SA	AQUEOUS	AS-FAA-AD	02 APR 90-A	-
008847-0003-SA	AQUEOUS	SE-FAA-AD	30 MAR 90-B	-
008847-0003-SA	AQUEOUS	ICP-AT	29 MAR 90-D	29 MAR 90-D
008847-0003-SA	AQUEOUS	PB-FAA-AT	29 MAR 90-D	29 MAR 90-D
008847-0003-SA	AQUEOUS	HG-CVAA-AT	29 MAR 90-A	29 MAR 90-A
008847-0004-SA	AQUEOUS	ICP-AD	03 APR 90-A	-
008847-0004-SA	AQUEOUS	AS-FAA-AD	02 APR 90-A	-
008847-0004-SA	AQUEOUS	SE-FAA-AD	30 MAR 90-B	-
008847-0004-SA	AQUEOUS	ICP-AT	29 MAR 90-D	29 MAR 90-D
008847-0004-SA	AQUEOUS	PB-FAA-AT	29 MAR 90-D	29 MAR 90-D
008847-0004-SA	AQUEOUS	HG-CVAA-AT	29 MAR 90-A	29 MAR 90-A
008847-0005-SA	AQUEOUS	ICP-AD	03 APR 90-A	-
008847-0005-SA	AQUEOUS	ICP-AT	29 MAR 90-D	29 MAR 90-D
008847-0005-SA	AQUEOUS	PB-FAA-AT	29 MAR 90-D	29 MAR 90-D
008847-0006-SA	AQUEOUS	ICP-AD	03 APR 90-A	-
008847-0006-SA	AQUEOUS	ICP-AT	29 MAR 90-D	29 MAR 90-D
008847-0006-SA	AQUEOUS	PB-FAA-AT	29 MAR 90-D	29 MAR 90-D
008847-0007-SA	AQUEOUS	ICP-AD	03 APR 90-A	-
008847-0007-SA	AQUEOUS	ICP-AT	29 MAR 90-D	29 MAR 90-D
008847-0007-SA	AQUEOUS	PB-FAA-AT	29 MAR 90-D	29 MAR 90-D
008847-0008-SA	AQUEOUS	ICP-AD	03 APR 90-A	-
008847-0008-SA	AQUEOUS	ICP-AT	29 MAR 90-D	29 MAR 90-D
008847-0008-SA	AQUEOUS	PB-FAA-AT	29 MAR 90-D	29 MAR 90-D
008847-0009-SA	AQUEOUS	ICP-AD	03 APR 90-A	-
008847-0009-SA	AQUEOUS	ICP-AT	29 MAR 90-D	29 MAR 90-D
008847-0009-SA	AQUEOUS	PB-FAA-AT	29 MAR 90-D	29 MAR 90-D
008847-0010-SA	AQUEOUS	ICP-AD	03 APR 90-A	-
008847-0010-SA	AQUEOUS	ICP-AT	29 MAR 90-D	29 MAR 90-D
008847-0010-SA	AQUEOUS	PB-FAA-AT	29 MAR 90-D	29 MAR 90-D
008847-0011-SA	AQUEOUS	ICP-AD	03 APR 90-A	-
008847-0011-SA	AQUEOUS	ICP-AT	29 MAR 90-D	29 MAR 90-D
008847-0011-SA	AQUEOUS	PB-FAA-AT	29 MAR 90-D	29 MAR 90-D

DUPLICATE CONTROL SAMPLE REPORT Metals Analysis and Preparation

Analyte	Spiked	Concentration		Measured DCS2	AVG	Accuracy Average(%)		Precision (RPD)	
		DCS1				DCS	Limits	DCS	Limit
Category: ICP-AD									
Matrix: AQUEOUS									
QC Lot: 03 APR 90-A									
Concentration Units: mg/L									
Aluminum	2.0	1.86		1.89	1.88	94	75-125	1.3	20
Antimony	0.5	0.461		0.476	0.468	94	75-125	3.2	20
Arsenic	0.5	0.488		0.484	0.486	97	75-125	0.9	20
Barium	2.0	1.63		1.66	1.64	82	75-125	1.4	20
Beryllium	0.05	0.0451		0.0453	0.0452	90	75-125	0.4	20
Cadmium	0.05	0.0427		0.0456	0.0441	88	75-125	6.6	20
Calcium	100	87.7		88.9	88.3	88	75-125	1.3	20
Chromium	0.2	0.191		0.191	0.191	96	75-125	0.0	20
Cobalt	0.5	0.438		0.444	0.441	88	75-125	1.3	20
Copper	0.25	0.235		0.238	0.236	95	75-125	1.2	20
Iron	1.0	0.946		0.955	0.950	95	75-125	0.9	20
Lead	0.5	0.446		0.462	0.454	91	75-125	3.3	20
Magnesium	50	43.4		44.1	43.8	88	75-125	1.6	20
Manganese	0.5	0.466		0.472	0.469	94	75-125	1.2	20
Nickel	0.5	0.424		0.429	0.426	85	75-125	1.2	20
Potassium	50	42.9		43.6	43.2	86	75-125	1.6	20
Silver	0.05	0.0409		0.0419	0.0414	83	75-125	2.4	20
Sodium	100	86.8		88.0	87.4	87	75-125	1.4	20
Vanadium	0.5	0.453		0.457	0.455	91	75-125	1.1	20
Zinc	0.5	0.447		0.455	0.451	90	75-125	1.7	20

Category: AS-FAA-AD
 Matrix: AQUEOUS
 QC Lot: 02 APR 90-A
 Concentration Units: mg/L

Arsenic	0.04	0.0343		0.0406	0.0374	94	75-125	17	20
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Category: SE-FAA-AD
 Matrix: AQUEOUS
 QC Lot: 30 MAR 90-B
 Concentration Units: mg/L

Selenium	0.01	0.0104		0.00940	0.00990	99	75-125	10	20
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Calculations are performed before rounding to avoid round-off errors in calculated results.

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation (cont.)

Analyte	Concentration		Measured DCS2	AVG	Accuracy Average(%)		Precision (RPD)	
	Spiked	DCS1			DCS	Limits	DCS	Limit
Category: ICP-AT								
Matrix: AQUEOUS								
QC Lot: 29 MAR 90-D								
Concentration Units: mg/L								
Aluminum	2.0	2.01	2.01	2.01	101	75-125	0.0	20
Antimony	0.5	0.495	0.490	0.492	98	75-125	1.0	20
Arsenic	0.5	0.558	0.549	0.554	111	75-125	1.6	20
Barium	2.0	1.81	1.81	1.81	90	75-125	0.3	20
Beryllium	0.05	0.0486	0.0484	0.0485	97	75-125	0.4	20
Cadmium	0.05	0.0495	0.0556	0.0526	105	75-125	12	20
Calcium	100	94.2	93.5	93.8	94	75-125	0.8	20
Chromium	0.2	0.197	0.194	0.196	98	75-125	1.8	20
Cobalt	0.5	0.508	0.505	0.507	101	75-125	0.7	20
Copper	0.25	0.274	0.278	0.276	110	75-125	1.2	20
Iron	1.0	1.06	1.04	1.05	105	75-125	1.9	20
Lead	0.5	0.524	0.516	0.520	104	75-125	1.5	20
Magnesium	50	47.4	47.2	47.3	95	75-125	0.5	20
Manganese	0.5	0.524	0.521	0.523	105	75-125	0.5	20
Nickel	0.5	0.492	0.492	0.492	98	75-125	0.0	20
Potassium	50	46.9	46.8	46.9	94	75-125	0.2	20
Silver	0.05	0.0469	0.0446	0.0458	92	75-125	5.0	20
Sodium	100	91.7	91.2	91.5	91	75-125	0.5	20
Vanadium	0.5	0.503	0.502	0.503	101	75-125	0.2	20
Zinc	0.5	0.533	0.530	0.531	106	75-125	0.5	20

Category: PB-FAA-AT
 Matrix: AQUEOUS
 QC Lot: 29 MAR 90-D
 Concentration Units: mg/L

Lead	0.02	0.0257	0.0238	0.0248	124	75-125	7.7	20
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Category: HG-CVAA-AT
 Matrix: AQUEOUS
 QC Lot: 29 MAR 90-A
 Concentration Units: mg/L

Mercury	0.0010	0.00108	0.00103	0.00106	106	75-125	4.7	20
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Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Metals Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: ICP-AT Matrix: AQUEOUS QC Lot: 29 MAR 90-D QC Run: 29 MAR 90-D			
Chromium	ND	mg/L	0.010
Test: PB-FAA-AT Matrix: AQUEOUS QC Lot: 29 MAR 90-D QC Run: 29 MAR 90-D			
Lead	ND	mg/L	0.0050
Test: HG-CVAA-AT Matrix: AQUEOUS QC Lot: 29 MAR 90-A QC Run: 29 MAR 90-A			
Mercury	ND	mg/L	0.00020
Test: ICP-AT Matrix: AQUEOUS QC Lot: 29 MAR 90-D QC Run: 29 MAR 90-D			
Chromium	ND	mg/L	0.010
Test: PB-FAA-AT Matrix: AQUEOUS QC Lot: 29 MAR 90-D QC Run: 29 MAR 90-D			
Lead	ND	mg/L	0.0050

QC LOT ASSIGNMENT REPORT Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
008847-0001-SA	AQUEOUS	TOX-A	02 APR 90-A	-
008847-0001-SA	AQUEOUS	TOX-A	02 APR 90-A	-
008847-0001-SA	AQUEOUS	TOX-A	02 APR 90-A	-
008847-0001-SA	AQUEOUS	TOX-A	02 APR 90-A	-
008847-0001-SA	AQUEOUS	CL-IC-A	02 APR 90-M	-
008847-0001-SA	AQUEOUS	SO4-IC-A	02 APR 90-M	-
008847-0001-SA	AQUEOUS	ALK-A	28 MAR 90-A	-
008847-0001-SA	AQUEOUS	TDS-A	29 MAR 90-S	29 MAR 90-S
008847-0001-SA	AQUEOUS	PHEN-A	29 MAR 90-R	29 MAR 90-R
008847-0001-SA	AQUEOUS	PH-A	28 MAR 90-C	-
008847-0001-SA	AQUEOUS	COND-A	28 MAR 90-A	-
008847-0002-SA	AQUEOUS	TOX-A	02 APR 90-A	-
008847-0002-SA	AQUEOUS	TOX-A	02 APR 90-A	-
008847-0002-SA	AQUEOUS	TOX-A	02 APR 90-A	-
008847-0002-SA	AQUEOUS	TOX-A	02 APR 90-A	-
008847-0002-SA	AQUEOUS	CL-IC-A	02 APR 90-M	-
008847-0002-SA	AQUEOUS	SO4-IC-A	02 APR 90-M	-
008847-0002-SA	AQUEOUS	ALK-A	28 MAR 90-A	-
008847-0002-SA	AQUEOUS	TDS-A	29 MAR 90-S	29 MAR 90-S
008847-0002-SA	AQUEOUS	PHEN-A	29 MAR 90-R	29 MAR 90-R
008847-0002-SA	AQUEOUS	PH-A	28 MAR 90-C	-
008847-0002-SA	AQUEOUS	COND-A	28 MAR 90-A	-
008847-0003-SA	AQUEOUS	TOX-A	03 APR 90-A	-
008847-0003-SA	AQUEOUS	TOX-A	03 APR 90-A	-
008847-0003-SA	AQUEOUS	TOX-A	03 APR 90-A	-
008847-0003-SA	AQUEOUS	TOX-A	03 APR 90-A	-
008847-0003-SA	AQUEOUS	CL-IC-A	02 APR 90-M	-
008847-0003-SA	AQUEOUS	SO4-IC-A	02 APR 90-M	-
008847-0003-SA	AQUEOUS	ALK-A	28 MAR 90-A	-
008847-0003-SA	AQUEOUS	TDS-A	29 MAR 90-S	29 MAR 90-S
008847-0003-SA	AQUEOUS	PHEN-A	29 MAR 90-R	29 MAR 90-R
008847-0003-SA	AQUEOUS	PH-A	28 MAR 90-C	-
008847-0003-SA	AQUEOUS	COND-A	28 MAR 90-A	-
008847-0004-SA	AQUEOUS	TOX-A	03 APR 90-A	-
008847-0004-SA	AQUEOUS	TOX-A	03 APR 90-A	-
008847-0004-SA	AQUEOUS	TOX-A	03 APR 90-A	-
008847-0004-SA	AQUEOUS	TOX-A	03 APR 90-A	-
008847-0004-SA	AQUEOUS	CL-IC-A	02 APR 90-M	-
008847-0004-SA	AQUEOUS	SO4-IC-A	02 APR 90-M	-
008847-0004-SA	AQUEOUS	ALK-A	28 MAR 90-A	-
008847-0004-SA	AQUEOUS	TDS-A	29 MAR 90-S	29 MAR 90-S
008847-0004-SA	AQUEOUS	PHEN-A	29 MAR 90-R	29 MAR 90-R
008847-0004-SA	AQUEOUS	PH-A	28 MAR 90-C	-
008847-0004-SA	AQUEOUS	COND-A	28 MAR 90-A	-
008847-0005-SA	AQUEOUS	TOX-A	03 APR 90-A	-
008847-0005-SA	AQUEOUS	TOX-A	03 APR 90-A	-
008847-0005-SA	AQUEOUS	TOX-A	03 APR 90-A	-

QC LOT ASSIGNMENT REPORT
Wet Chemistry Analysis and Preparation (cont.)

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
008847-0005-SA	AQUEOUS	TOX-A	03 APR 90-A	-
008847-0005-SA	AQUEOUS	CL-IC-A	02 APR 90-M	-
008847-0005-SA	AQUEOUS	SO4-IC-A	02 APR 90-M	-
008847-0005-SA	AQUEOUS	ALK-A	28 MAR 90-A	-
008847-0005-SA	AQUEOUS	TDS-A	29 MAR 90-S	29 MAR 90-S
008847-0005-SA	AQUEOUS	PH-A	28 MAR 90-C	-
008847-0005-SA	AQUEOUS	COND-A	28 MAR 90-A	-
008847-0006-SA	AQUEOUS	TOX-A	03 APR 90-A	-
008847-0006-SA	AQUEOUS	TOX-A	03 APR 90-A	-
008847-0006-SA	AQUEOUS	TOX-A	03 APR 90-A	-
008847-0006-SA	AQUEOUS	TOX-A	03 APR 90-A	-
008847-0006-SA	AQUEOUS	CL-IC-A	02 APR 90-M	-
008847-0006-SA	AQUEOUS	SO4-IC-A	02 APR 90-M	-
008847-0006-SA	AQUEOUS	ALK-A	28 MAR 90-A	-
008847-0006-SA	AQUEOUS	TDS-A	29 MAR 90-S	29 MAR 90-S
008847-0006-SA	AQUEOUS	PH-A	28 MAR 90-C	-
008847-0006-SA	AQUEOUS	COND-A	28 MAR 90-A	-
008847-0007-SA	AQUEOUS	TOX-A	03 APR 90-A	-
008847-0007-SA	AQUEOUS	TOX-A	03 APR 90-A	-
008847-0007-SA	AQUEOUS	TOX-A	03 APR 90-A	-
008847-0007-SA	AQUEOUS	CL-IC-A	02 APR 90-M	-
008847-0007-SA	AQUEOUS	SO4-IC-A	02 APR 90-M	-
008847-0007-SA	AQUEOUS	ALK-A	28 MAR 90-A	-
008847-0007-SA	AQUEOUS	TDS-A	29 MAR 90-S	29 MAR 90-S
008847-0007-SA	AQUEOUS	PH-A	28 MAR 90-C	-
008847-0007-SA	AQUEOUS	COND-A	28 MAR 90-A	-
008847-0008-SA	AQUEOUS	TOX-A	04 APR 90-A	-
008847-0008-SA	AQUEOUS	TOX-A	04 APR 90-A	-
008847-0008-SA	AQUEOUS	TOX-A	04 APR 90-A	-
008847-0008-SA	AQUEOUS	TOX-A	04 APR 90-A	-
008847-0008-SA	AQUEOUS	CL-IC-A	04 APR 90-M	-
008847-0008-SA	AQUEOUS	SO4-IC-A	04 APR 90-M	-
008847-0008-SA	AQUEOUS	ALK-A	28 MAR 90-A	-
008847-0008-SA	AQUEOUS	TDS-A	29 MAR 90-S	29 MAR 90-S
008847-0008-SA	AQUEOUS	PH-A	28 MAR 90-C	-
008847-0008-SA	AQUEOUS	COND-A	28 MAR 90-A	-
008847-0009-SA	AQUEOUS	TOX-A	04 APR 90-A	-
008847-0009-SA	AQUEOUS	TOX-A	04 APR 90-A	-
008847-0009-SA	AQUEOUS	TOX-A	04 APR 90-A	-
008847-0009-SA	AQUEOUS	TOX-A	04 APR 90-A	-
008847-0009-SA	AQUEOUS	CL-IC-A	04 APR 90-M	-
008847-0009-SA	AQUEOUS	SO4-IC-A	04 APR 90-M	-
008847-0009-SA	AQUEOUS	ALK-A	28 MAR 90-A	-
008847-0009-SA	AQUEOUS	TDS-A	29 MAR 90-S	29 MAR 90-S
008847-0009-SA	AQUEOUS	PH-A	28 MAR 90-C	-
008847-0009-SA	AQUEOUS	COND-A	28 MAR 90-A	-

QC LOT ASSIGNMENT REPORT Wet Chemistry Analysis and Preparation (cont.)

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
008847-0010-SA	AQUEOUS	TOX-A	04 APR 90-A	-
008847-0010-SA	AQUEOUS	TOX-A	04 APR 90-A	-
008847-0010-SA	AQUEOUS	TOX-A	04 APR 90-A	-
008847-0010-SA	AQUEOUS	TOX-A	04 APR 90-A	-
008847-0010-SA	AQUEOUS	CL-IC-A	02 APR 90-M	-
008847-0010-SA	AQUEOUS	SO4-IC-A	02 APR 90-M	-
008847-0010-SA	AQUEOUS	ALK-A	28 MAR 90-A	-
008847-0010-SA	AQUEOUS	TDS-A	29 MAR 90-S	29 MAR 90-S
008847-0010-SA	AQUEOUS	PH-A	28 MAR 90-C	-
008847-0010-SA	AQUEOUS	COND-A	28 MAR 90-A	-
008847-0011-SA	AQUEOUS	TOX-A	04 APR 90-A	-
008847-0011-SA	AQUEOUS	TOX-A	04 APR 90-A	-
008847-0011-SA	AQUEOUS	TOX-A	04 APR 90-A	-
008847-0011-SA	AQUEOUS	TOX-A	04 APR 90-A	-
008847-0011-SA	AQUEOUS	CL-IC-A	02 APR 90-M	-
008847-0011-SA	AQUEOUS	SO4-IC-A	02 APR 90-M	-
008847-0011-SA	AQUEOUS	ALK-A	28 MAR 90-A	-
008847-0011-SA	AQUEOUS	TDS-A	29 MAR 90-S	29 MAR 90-S
008847-0011-SA	AQUEOUS	PH-A	28 MAR 90-C	-
008847-0011-SA	AQUEOUS	COND-A	28 MAR 90-A	-

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

Analyte	Spiked	Concentration		Measured DCS2	AVG	Accuracy Average(%)		Precision (RPD)	
		DCS1				DCS	Limits	DCS	Limit
Category: TOX-A Matrix: AQUEOUS QC Lot: 02 APR 90-A Concentration Units: ug Cl/L									
Total Organic Halogen as Cl	100	102		111	106	107	80-120	8.5	20
Category: CL-IC-A Matrix: AQUEOUS QC Lot: 02 APR 90-M Concentration Units: mg/L									
Chloride	100	102		102	102	102	92-108	0.0	20
Category: SO4-IC-A Matrix: AQUEOUS QC Lot: 02 APR 90-M Concentration Units: mg/L									
Sulfate	200	202		202	202	101	93-107	0.0	20
Category: ALK-A Matrix: AQUEOUS QC Lot: 28 MAR 90-A Concentration Units: mg/L									
Alkalinity, Total as CaCO3 at pH 4.5	157	162		162	162	103	90-110	0.0	10
Category: TDS-A Matrix: AQUEOUS QC Lot: 29 MAR 90-S Concentration Units: mg/L									
Total Dissolved Solids	1270	1210		1220	1220	96	90-110	0.8	10

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

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation (cont.)

Analyte	Spiked	Concentration		Measured DCS2	AVG	Accuracy Average(%)		Precision (RPD)	
		DCS1				DCS	Limits	DCS	Limit
Category: PHEN-A Matrix: AQUEOUS QC Lot: 29 MAR 90-R Concentration Units: mg/L									
Phenolics	0.20	0.206		0.205	0.206	103	78-122	0.5	20
Category: PH-A Matrix: AQUEOUS QC Lot: 28 MAR 90-C Concentration Units: units									
pH	9.1	9.01		9.04	9.02	99	98-102	0.3	5
Category: COND-A Matrix: AQUEOUS QC Lot: 28 MAR 90-A Concentration Units: umhos/cm									
Specific Conductance at 25 deg.C	1650	1660		1650	1660	100	95-105	0.6	5
Category: TOX-A Matrix: AQUEOUS QC Lot: 03 APR 90-A Concentration Units: ug Cl/L									
Total Organic Halogen as Cl	100	96.1		98.4	97.2	97	80-120	2.4	20
Category: TOX-A Matrix: AQUEOUS QC Lot: 04 APR 90-A Concentration Units: ug Cl/L									
Total Organic Halogen as Cl	100	98.1		97.7	97.9	98	80-120	0.4	20

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

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation (cont.)

Analyte	Spiked	Concentration		AVG	Accuracy		Precision	
		DCS1	Measured DCS2		DCS	Average(%) Limits	(RPD) DCS Limit	

Category: CL-IC-A
 Matrix: AQUEOUS
 QC Lot: 04 APR 90-M
 Concentration Units: mg/L

Chloride	100	98.1	98.2	98.2	98	92-108	0.1	20
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Category: S04-IC-A
 Matrix: AQUEOUS
 QC Lot: 04 APR 90-M
 Concentration Units: mg/L

Sulfate	200	195	194	194	97	93-107	0.5	20
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Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Wet Chemistry Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: TDS-BAL-A Matrix: AQUEOUS QC Lot: 29 MAR 90-S QC Run: 29 MAR 90-S			
Total Dissolved Solids	ND	mg/L	10.0
Test: PHEN-SPEC-A Matrix: AQUEOUS QC Lot: 29 MAR 90-R QC Run: 29 MAR 90-R			
Phenolics	ND	mg/L	0.010
Test: TDS-BAL-A Matrix: AQUEOUS QC Lot: 29 MAR 90-S QC Run: 29 MAR 90-S			
Total Dissolved Solids	ND	mg/L	10.0

QC LOT ASSIGNMENT REPORT Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)
008847-0001-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0001-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0001-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0001-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0002-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0002-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0002-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0002-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0003-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0003-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0003-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0003-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0004-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0004-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0004-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0004-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0005-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0005-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0005-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0005-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0006-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0006-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0006-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0006-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0007-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0007-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0007-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0007-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0008-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0008-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0008-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0008-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0009-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0009-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0009-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0009-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0010-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0010-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0010-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0010-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0011-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0011-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0011-SA	AQUEOUS	TOC-A	10 APR 90-Z
008847-0011-SA	AQUEOUS	TOC-A	10 APR 90-Z

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

Analyte	Concentration		Measured DCS2	AVG	Accuracy Average(%)		Precision (RPD)	
	Spiked	DCS1			DCS	Limit	DCS	Limit
Category: TOC-A								
Matrix: AQUEOUS								
QC Lot: 10 APR 90-Z								
Concentration Units: mg/L								
Total Organic Carbon	200	217	219	218	109	70-130	1	30

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

APPENDIX



Route 3, Box 7
Gallup, New Mexico
87301

505
722-3833

Hand Delivered

May 10, 1990

David Boyer
Director
New Mexico Oil Conservation Division
P.O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87504

RE: Analytical Data for Discharge Permit GW-32

The enclosed analyses is the hard copy analytical results for both waste and groundwater samples as required by groundwater discharge permit GW-32 for Giant Refining Company. The tabulated form for all analyses will follow under separate cover in approximately one month.

If you have any question, contact me at (505)722-3833, ext. 217.

Sincerely,

Claud C. Rosendale
Environmental Manager
Ciniza Refinery

cc: w/o enclosure: Kim Bullerdick, Corporate Counsel
Giant Industries
John Stokes, Refinery Manager/Giant
Industries

20 8 11 PM 11 NOV 90.

CLAUDE
ROSENDALE



Route 3, Box 7
Gallup, New Mexico
87301

505
722-3833

May 30, 1990

David Boyer
Director
New Mexico Oil Conservation Division
P. O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87504

RE: OW-17 INVESTIGATION AND ACTIONS

Dear Mr. Boyer:

The liquid from OW-17 is currently being pumped to the drums, measured for hydrocarbon/water volumes and transferred to the sewer/APIS system. The first pumping of OW-17 produced a substantial volume of hydrocarbons however, since that time there is only a thin ($\frac{1}{2}$ ") emulsified layer of hydrocarbon/water each time the well is pumped (12-15 gal.). The well pump will be set up to operate by a timer and will be pumped to a tank for measuring before being drained to the sewer. Total volumes pumped as of May 29, 1990 is 624 gallons of water and 41 gallons of hydrocarbon emulsions.

OW-16, which is approximately 150 feet to the southwest of OW-17, was sampled in September, 1989 and March 1990. The analytical for each sampling date is enclosed.

Giant Industries, Inc. has analyzed the hydrocarbon layer that was initially detected in OW-17 and compared the results to products produced by the Refinery. The comparison most closely resembles kerosene, however, the results vary enough to prohibit positive identification. As a result, it is impossible to determine the exact origin of the hydrocarbons causing the contamination.

Giant will also proceed with the following investigative and preventative actions.

- 1) As indicated by the ground water elevation contour map, the water flow is generally from the southeast to northwest. During the month of June, Giant will dig holes on the downgradient side of many of the storage tanks. Regular inspections will be conducted to detect possible leaching which will aid in our assessment for potentially leaking tanks.

- 2) An inspection of all underground process water lines in the immediate upgradient area should be completed by the end of August, 1990.
- 3) Giant will slowly be installing spill containment (drip pans or curbing) around all tank valves and sample points.
- 4) Drain pipes will be extended into sewer outlets to prevent overflows and spillage when draining tanks.
- 5) Improved reporting procedures and weekly inspections, which will aid in spill prevention and corrective action, will be implemented by the end of June.

If you have any questions, please contact me at (505) 722-3833 ext. 217.

Sincerely,



Claud Rosendale
Environmental Manager
Ciniza Refinery

CR:ctf

cc: Richard Mitzelfelt, Director/N.M.E.I.D.
John Stokes, Refinery Manager/Giant Industries

OW-16

Giant Refining Gallup, New Mexico

Appendix IX Semivolatile Organics

Date: 27 SEP 89 12 APR 90

Parameter	Results	Results	Units	Reporting Limit
Acenaphthene	ND	ND	ug/L	10
Acenaphthylene	ND	ND	ug/L	10
Acetophenone	ND	ND	ug/L	10
2-Acetylaminofluorene	ND	ND	ug/L	10
4-Aminobiphenyl	ND	ND	ug/L	10
Aniline	ND	ND	ug/L	10
Anthracene	ND	ND	ug/L	10
Aramite	ND	ND	ug/L	10
Benzo(a)anthracene	ND	ND	ug/L	10
Benzo(b)fluoranthene	ND	ND	ug/L	10
Benzo(k)fluoranthene	ND	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ND	ug/L	10
bis(2-Chloroethoxy) methane	ND	ND	ug/L	10
Benzyl alcohol	ND	ND	ug/L	10
bis(2-Chloroethyl)ether	ND	ND	ug/L	10
bis(2-Chloroisopropyl) ether	ND	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ND	ug/L	10
4-Bromophenyl phenyl ether	ND	ND	ug/L	10
Butyl benzyl phthalate	ND	ND	ug/L	10
2sec-Butyl-4,6-dinitro- phenol (Dinoseb)	ND	ND	ug/L	10
4-Chloroaniline	ND	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ND	ug/L	10
2-Chloronaphthalene	ND	ND	ug/L	10
2-Chlorophenol	ND	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ND	ug/L	10
o-Cresol	ND	ND	ug/L	10
m & p-Cresol(s)	ND	ND	ug/L	10
Chrysene	ND	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ND	ug/L	10
Dibenzofuran	ND	ND	ug/L	10
Di-n-butyl phthalate	ND	ND	ug/L	10
1,2-Dichlorobenzene	ND	ND	ug/L	10
1,3-Dichlorobenzene	ND	ND	ug/L	10
1,4-Dichlorobenzene	ND	ND	ug/L	10

OW-16

Giant Refining

Gallup, New Mexico

Appendix IX Semivolatile Organics (CONT.)

Date: 28 SEP 89 12 APR 90

Parameter	Results	Results	Units	Reporting Limit
3,3'-Dichlorobenzidine	ND	ND	ug/L	20
2,4-Dichlorophenol	ND	ND	ug/L	10
2,6-Dichlorophenol	ND	ND	ug/L	10
Diethyl phthalate	ND	ND	ug/L	10
p-Dimethylaminoazobenzene	ND	ND	ug/L	10
7,12-Dimethylbenz-	ND	ND		
anthracene	ND	ND	ug/L	10
3,3'-Dimethylbenzidine	ND	ND	ug/L	10
a,a-Dimethylphen-	ND	ND		
ethylamine	ND	ND	ug/L	10
2,4-Dimethylphenol	ND	ND	ug/L	10
Dimethyl phthalate	ND	ND	ug/L	10
1,3-Dinitrobenzene	ND	ND	ug/L	10
4,6-Dinitro-o-cresol	ND	ND	ug/L	50
2,4-Dinitrophenol	ND	ND	ug/L	50
2,4-Dinitrotoluene	ND	ND	ug/L	10
2,6-Dinitrotoluene	ND	ND	ug/L	10
Di-n-octyl phthalate	ND	ND	ug/L	10
Diphenylamine	ND	ND	ug/L	10
Ethyl methacrylate	ND	ND	ug/L	10
Ethyl methanesulfonate	ND	ND	ug/L	10
Fluoranthene	ND	ND	ug/L	10
Fluorene	ND	ND	ug/L	10
Hexachlorobenzene	ND	ND	ug/L	10
Hexachlorobutadiene	ND	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ND	ug/L	10
Hexachloroethane	ND	ND	ug/L	10
Hexachlorophene	ND	ND	ug/L	--
Hexachloropropene	ND	ND	ug/L	20
Indeno(1,2,3-c,d)pyrene	ND	ND	ug/L	10
Isophorone	ND	ND	ug/L	10
Isofrole	ND	ND	ug/L	20
Methapyrilene	ND	ND	ug/L	10
3-Methylcholanthrene	ND	ND	ug/L	20
Methyl mehtacrylate	ND	ND	ug/L	10
Methyl methanesulfonate	ND	ND	ug/L	10
2-Methylnaphthalene	ND	ND	ug/L	10
Napthalene	ND	ND	ug/L	10
1,4-Naphthoquinone	ND	ND	ug/L	10
1-Naphthylamine	ND	ND	ug/L	10
2-Naphthylamine	ND	ND	ug/L	10

OW-16

Giant Refining Gallup, New Mexico

Appendix IX Semivolatile Organics (CONT.)

Date: 28 SEP 89 12 APR 90

Parameter	Results	Results	Units	Reporting Limit
2-Nitroaniline	ND	ND	ug/L	50
3-Nitroaniline	ND	ND	ug/L	50
4-Nitroaniline	ND	ND	ug/L	50
Nitrobenzene	ND	ND	ug/L	10
2-Nitrophenol	ND	ND	ug/L	10
4-Nitrophenol	ND	ND	ug/L	50
4-Nitroquinoline-1-oxide	ND	ND	ug/L	--
N-Nitrosodi-n-butylamine	ND	ND	ug/L	10
N-Nitrosodiethylamine	ND	ND	ug/L	10
N-Nitrosodimethylamine	ND	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ND	ug/L	10
N-Nitrosomethylethylamine	ND	ND	ug/L	10
N-Nitrosomorpholine	ND	ND	ug/L	10
N-Nitrosopiperidine	ND	ND	ug/L	10
N-Nitrosopyrrolidine	ND	ND	ug/L	10
5-Nitro-o-toluidine	ND	ND	ug/L	10
Pentachlorobenzene	ND	ND	ug/L	10
Pentachloroethane	ND	ND	ug/L	10
Pentachloronitrobenzene	ND	ND	ug/L	50
Pentachlorophenol	ND	ND	ug/L	50
Phenacetin	ND	ND	ug/L	10
Phenanthrene	ND	ND	ug/L	10
Phenol	ND	ND	ug/L	10
p-Phenylenediamine	ND	ND	ug/L	--
2-Picoline	ND	ND	ug/L	10
Pronamide	ND	ND	ug/L	20
Pyrene	ND	ND	ug/L	10
Pyridine	ND	ND	ug/L	10
Safrole	ND	ND	ug/L	10
1,2,4,5-Tetrachloro-benzene	ND	ND	ug/L	10
2,3,4,6-Tetrachlorophenol	ND	ND	ug/L	20
o-Toluidine	ND	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ND	ug/L	10
2,4,5-Trichlorophenol	ND	ND	ug/L	50
0,0,0-Triethylphosphorothioate	ND	ND	ug/L	50
2,4,6-Trichlorophenol	ND	ND	ug/L	10
Ethyl parathion	ND	ND	ug/L	50

OW-16

Giant Refining Gallup, New Mexico

Appendix IX Semivolatile Organics (CONT.)

Date: 28 SEP 89 12 APR 90

Parameter	Results	Results	Units	Reporting Limit
Phorate (Thimet)	ND	ND	ug/L	100
Sulfotepp	ND	ND	ug/L	50
Thionzin	ND	ND	ug/L	50
sym-Trinitrobenzene	ND	ND	ug/L	10
Dimethoate	ND	ND	ug/L	--
Disulfoton	ND	ND	ug/L	50
Famphur	ND	ND	ug/L	100
Methyl parathion	ND	ND	ug/L	50

OW-16

Giant Refining Gallup, New Mexico

Halogenated Volatile Organics

Date: 28 SEP 89 12 APR 90

Parameter	Results	Results	Units	Reporting Limit
Chloromethane	ND	ND	ug/L	5.0
Bromomethane	ND	ND	ug/L	5.0
Vinyl chloride	ND	ND	ug/L	1.0
Chloroethane	ND	ND	ug/L	5.0
Methylene chloride	ND	ND	ug/L	5.0
1,1-Dichloroethene	ND	ND	ug/L	0.50
1,1-Dichloroethane	ND	ND	ug/L	0.50
1,2-Dichloroethene (cis/trans)	ND	ND	ug/L	0.50
Chloroform	ND	ND	ug/L	0.50
1,1,2-Trichloro-2,2, 1-trifluoroethane	ND	ND	ug/L	1.0
1,2-Dichloroethane	7.7	7.9	ug/L	1.0
1,1,1-Trichloroethane	ND	ND	ug/L	0.50
Carbon tetrachloride	ND	ND	ug/L	0.50
Bromodichloromethane	ND	ND	ug/L	1.0
1,2-Dichloropropane	ND	ND	ug/L	1.0
trans-1,3-Dichloropropene	ND	ND	ug/L	1.0
Trichloroethene	ND	ND	ug/L	0.50
Chlorodibromomethane	ND	ND	ug/L	1.0
cis-1,3-Dichloropropene	ND	ND	ug/L	2.0
1,1,2-Trichloroethane	ND	ND	ug/L	1.0
EDB (1,2-Dibromoethane)	ND	ND	ug/L	2.0
Bromoform	ND	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ND	ug/L	1.0
Tetrachloroethene	ND	ND	ug/L	0.50
Chlorobenzene	ND	ND	ug/L	2.0

OW-16

Giant Refining Gallup, New Mexico

Aromatic Volatile Organics

Date: 28 SEP 89 12 APR 90

Parameter	Results	Results	Units	Reporting Limit
Benzene	ND	ND	ug/L	0.50
Toluene	ND	ND	ug/L	0.50
Chlorobenzene	ND	ND	ug/L	0.50
Ethyl benzene	ND	ND	ug/L	0.50
Total xylenes	ND	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ND	ug/L	0.50
1,4-Dichlorobenzene	ND	ND	ug/L	0.50
1,2-Dichlorobenzene	ND	ND	ug/L	0.50

OW-16

Giant Refining Gallup, New Mexico

Metals
Dissolved Metals

Date: 27 SEP 89 11 APR 90

Parameter	Results	Results	Units	Reporting Limit
Arsenic	ND	ND	mg/L	0.0050
Barium	0.06	0.038	mg/L	0.010
Cadmium	ND	ND	mg/L	0.0050
Calcium	7.5	5.4	mg/L	0.020
Chromium	ND	ND	mg/L	0.010
Lead	ND	ND	mg/L	0.010
Manganese	0.02	ND	mg/L	0.010
Selenium	0.024	ND	mg/L	0.0050
Silver	ND	ND	mg/L	0.010
Sodium	260	242	mg/L	5.0

OW-16

Giant Refining

Gallup, New Mexico

General Inorganics

Date: 27 SEP 89

11 APR 90

Parameter	Results	Results	Units	Reporting Limit
Alkalinity, Total as CaCO3 at pH 4.5	285		mg/L	5.0
Alkalinity, Bicarb. as CaCO3 at pH 4.5	272	285	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	13	14	mg/L	5.0
Alkalinity, Hydrox. as CaCO3	ND		mg/L	5.0
Chloride	168	154	mg/L	3.0
pH	8.5	8.5	units	--
pH	8.5		units	--
pH	8.5		units	--
pH	8.5		units	--
Phenolics	ND	ND	mg/L	0.010
Sulfate	34	28.4	mg/L	5.0
Specific Conductance at 25 deg.C	1070	1060	umhos/c	1.0
Specific Conductance at 25 deg.C	1070		umhos/c	1.0
Specific Conductance at 25 deg.C	1070		umhos/c	1.0
Specific Conductance at 25 deg.C	1070		umhos/c	1.0
Total Dissolved Solids	760	678	mg/L	10.0

Appendix IX Semivolatile Organics

Method 8270

Client Name: Giant Refining
 Client ID: OW-16
 Lab ID: 009051-0001-SA
 Matrix: AQUEOUS
 Authorized: 12 APR 90

Enseco ID: 1071704
 Sampled: 11 APR 90
 Prepared: 15 APR 90

Received: 12 APR 90
 Analyzed: 19 APR 90

Parameter	Result	Units	Reporting Limit
Acenaphthene	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acetophenone	ND	ug/L	10
2-Acetylaminofluorene	ND	ug/L	10
4-Aminobiphenyl	ND	ug/L	10
Aniline	ND	ug/L	10
Anthracene	ND	ug/L	10
Aramite	ND	ug/L	10
Benzo(a)anthracene	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
bis(2-Chloroethoxy)-methane	ND	ug/L	10
Benzyl alcohol	ND	ug/L	20
bis(2-Chloroethyl) ether	ND	ug/L	10
bis(2-Chloroisopropyl)-ether	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ug/L	10
4-Bromophenyl phenyl ether	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
2-sec-Butyl-4,6-dinitro-phenol	ND	ug/L	10
4-Chloroaniline	ND	ug/L	20
4-Chloro-3-methylphenol	ND	ug/L	20
2-Chloronaphthalene	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
o-Cresol	ND	ug/L	10
m & p-Cresol(s)	ND	ug/L	10
Chrysene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Dibenzofuran	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Donna Reinwald

Approved By: Jeff Lowry

Appendix IX Semivolatile Organics (CONT.)

Method 8270

Client Name: Giant Refining
 Client ID: OW-16
 Lab ID: 009051-0001-SA
 Matrix: AQUEOUS
 Authorized: 12 APR 90

Enseco ID: 1071704
 Sampled: 11 APR 90
 Prepared: 15 APR 90

Received: 12 APR 90
 Analyzed: 19 APR 90

Parameter	Result	Units	Reporting Limit
3,3'-Dichlorobenzidine	ND	ug/L	20
2,4-Dichlorophenol	ND	ug/L	10
2,6-Dichlorophenol	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
p-Dimethylaminoazobenzene	ND	ug/L	10
7,12-Dimethylbenz(a)-anthracene	ND	ug/L	10
3,3'-Dimethylbenzidine	ND	ug/L	10
a,a-Dimethylphenethyl-amine	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
1,3-Dinitrobenzene	ND	ug/L	10
4,6-Dinitro-o-cresol	ND	ug/L	50
2,4-Dinitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Diphenylamine	ND	ug/L	10
Ethyl methacrylate	ND	ug/L	10
Ethyl methanesulfonate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Fluorene	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Hexachlorophene	ND	ug/L	--
Hexachloropropene	ND	ug/L	20
Indeno(1,2,3-cd)pyrene	ND	ug/L	10
Isophorone	ND	ug/L	10
Isosafrole	ND	ug/L	20
Methapyrilene	ND	ug/L	10
3-Methylcholanthrene	ND	ug/L	20
Methyl methacrylate	ND	ug/L	10
Methyl methanesulfonate	ND	ug/L	10
2-Methylnaphthalene	ND	ug/L	10
Naphthalene	ND	ug/L	10
1,4-Naphthoquinone	ND	ug/L	10
1-Naphthylamine	ND	ug/L	10
2-Naphthylamine	ND	ug/L	10

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Donna Reinwald

Approved By: Jeff Lowry

Appendix IX Semivolatile Organics (CONT.)

Method 8270

Client Name: Giant Refining
 Client ID: OW-16
 Lab ID: 009051-0001-SA
 Matrix: AQUEOUS
 Authorized: 12 APR 90

Enseco ID: 1071704
 Sampled: 11 APR 90
 Prepared: 15 APR 90

Received: 12 APR 90
 Analyzed: 19 APR 90

Parameter	Result	Units	Reporting Limit
2-Nitroaniline	ND	ug/L	50
3-Nitroaniline	ND	ug/L	50
4-Nitroaniline	ND	ug/L	50
Nitrobenzene	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
4-Nitrophenol	ND	ug/L	50
4-Nitroquinoline-1-oxide	ND	ug/L	--
N-Nitroso-di-n-butylamine	ND	ug/L	10
N-Nitrosodiethylamine	ND	ug/L	10
N-Nitrosodimethylamine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
N-Nitrosomethylethylamine	ND	ug/L	10
N-Nitrosomorpholine	ND	ug/L	10
N-Nitrosopiperidine	ND	ug/L	10
N-Nitrosopyrrolidine	ND	ug/L	10
5-Nitro-o-toluidine	ND	ug/L	10
Pentachlorobenzene	ND	ug/L	10
Pentachloroethane	ND	ug/L	10
Pentachloronitrobenzene	ND	ug/L	50
Pentachlorophenol	ND	ug/L	50
Phenacetin	ND	ug/L	10
Phenanthrene	ND	ug/L	10
Phenol	ND	ug/L	10
p-Phenylenediamine	ND	ug/L	--
2-Picoline	ND	ug/L	10
Pronamide	ND	ug/L	20
Pyrene	ND	ug/L	10
Pyridine	ND	ug/L	10
Safrole	ND	ug/L	10
1,2,4,5-Tetrachloro-benzene	ND	ug/L	10
2,3,4,6-Tetrachlorophenol	ND	ug/L	20
o-Toluidine	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
2,4,5-Trichlorophenol	ND	ug/L	50
0,0,0-Triethylphosphorothioate	ND	ug/L	50
2,4,6-Trichlorophenol	ND	ug/L	10
Ethyl parathion	ND	ug/L	50

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Donna Reinwald

Approved By: Jeff Lowry

Appendix IX Semivolatile Organics (CONT.)

Method 8270

Client Name: Giant Refining
Client ID: OW-16
Lab ID: 009051-0001-SA
Matrix: AQUEOUS
Authorized: 12 APR 90

Enseco ID: 1071704
Sampled: 11 APR 90
Prepared: 15 APR 90

Received: 12 APR 90
Analyzed: 19 APR 90

Parameter	Result	Units	Reporting Limit
Phorate (Thimet)	ND	ug/L	100
Sulfotepp	ND	ug/L	50
Thionazin	ND	ug/L	50
sym-Trinitrobenzene	ND	ug/L	10
Dimethoate	ND	ug/L	--
Disulfoton	ND	ug/L	50
Famphur	ND	ug/L	100
Methyl parathion	ND	ug/L	50
Nitrobenzene-d5	58	%	--
2-Fluorobiphenyl	56	%	--
Terphenyl-d14	63	%	--
Phenol-d5	56	%	--
2-Fluorophenol	48	%	--
2,4,6-Tribromophenol	60	%	--

ND = Not detected
NA = Not applicable

Reported By: Donna Reinwald

Approved By: Jeff Lowry

Halogenated Volatile Organics**Method 8010**

Client Name: Giant Refining

Client ID: OW-16

Lab ID: 009051-0001-SA

Matrix: AQUEOUS

Authorized: 12 APR 90

Enseco ID: 1071704

Sampled: 11 APR 90

Prepared: NA

Received: 12 APR 90

Analyzed: 12 APR 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	5.0
Bromomethane	ND	ug/L	5.0
Vinyl chloride	ND	ug/L	1.0
Chloroethane	ND	ug/L	5.0
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	0.50
1,1-Dichloroethane	ND	ug/L	0.50
trans-1,2-Dichloroethene	ND	ug/L	0.50
Chloroform	ND	ug/L	0.50
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	ug/L	1.0
1,2-Dichloroethane	7.9	ug/L	1.0
1,1,1-Trichloroethane	ND	ug/L	0.50
Carbon tetrachloride	ND	ug/L	0.50
Bromodichloromethane	ND	ug/L	1.0
1,2-Dichloropropane	ND	ug/L	1.0
trans-1,3-Dichloropropene	ND	ug/L	1.0
Trichloroethene	ND	ug/L	0.50
Chlorodibromomethane	ND	ug/L	1.0
cis-1,3-Dichloropropene	ND	ug/L	2.0
1,1,2-Trichloroethane	ND	ug/L	1.0
EDB (1,2-Dibromoethane)	ND	ug/L	2.0
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0
Tetrachloroethene	ND	ug/L	0.50
Chlorobenzene	ND	ug/L	2.0

ND = Not detected

NA = Not applicable

Reported By: Leewaphath Xaiyasang

Approved By: Kim Zilis

Halogenated Volatile Organics

Method 8010

Client Name: Giant Refining

Client ID: Trip Blank

Lab ID: 009051-0002-SA

Matrix: AQUEOUS

Authorized: 12 APR 90

Enseco ID: 1071707

Sampled: Unknown

Prepared: NA

Received: 12 APR 90

Analyzed: 12 APR 90

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	5.0
Bromomethane	ND	ug/L	5.0
Vinyl chloride	ND	ug/L	1.0
Chloroethane	ND	ug/L	5.0
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	0.50
1,1-Dichloroethane	ND	ug/L	0.50
trans-1,2-Dichloroethene	ND	ug/L	0.50
Chloroform	ND	ug/L	0.50
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	ug/L	1.0
1,2-Dichloroethane	ND	ug/L	1.0
1,1,1-Trichloroethane	ND	ug/L	0.50
Carbon tetrachloride	ND	ug/L	0.50
Bromodichloromethane	ND	ug/L	1.0
1,2-Dichloropropane	ND	ug/L	1.0
trans-1,3-Dichloropropene	ND	ug/L	1.0
Trichloroethene	ND	ug/L	0.50
Chlorodibromomethane	ND	ug/L	1.0
cis-1,3-Dichloropropene	ND	ug/L	2.0
1,1,2-Trichloroethane	ND	ug/L	1.0
EDB (1,2-Dibromoethane)	ND	ug/L	2.0
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0
Tetrachloroethene	ND	ug/L	0.50
Chlorobenzene	ND	ug/L	2.0

ND = Not detected
 NA = Not applicable

Reported By: Leewaphath Xaiyasang

Approved By: Kim Zilis

Aromatic Volatile Organics**Method 8020****Client Name:** Giant Refining**Client ID:** OW-16**Lab ID:** 009051-0001-SA**Matrix:** AQUEOUS**Authorized:** 12 APR 90**Enseco ID:** 1071704**Sampled:** 11 APR 90**Prepared:** NA**Received:** 12 APR 90**Analyzed:** 12 APR 90

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Chlorobenzene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	0.50
1,4-Dichlorobenzene	ND	ug/L	0.50
1,2-Dichlorobenzene	ND	ug/L	0.50

ND = Not detected

NA = Not applicable

Reported By: Greg Gustina**Approved By:** Kim Zilis

Aromatic Volatile Organics**Method 8020**

Client Name: Giant Refining
Client ID: Trip Blank
Lab ID: 009051-0002-SA
Matrix: AQUEOUS
Authorized: 12 APR 90

Enseco ID: 1071707
Sampled: Unknown
Prepared: NA

Received: 12 APR 90
Analyzed: 12 APR 90

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Chlorobenzene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	0.50
1,4-Dichlorobenzene	ND	ug/L	0.50
1,2-Dichlorobenzene	ND	ug/L	0.50

ND = Not detected
NA = Not applicable

Reported By: Greg Gustina

Approved By: Kim Zilis

Metals**Dissolved Metals**

Client Name: Giant Refining
Client ID: OW-16
Lab ID: 009051-0001-SA
Matrix: AQUEOUS
Authorized: 12 APR 90

Enseco ID: 1071704
Sampled: 11 APR 90
Prepared: See Below

Received: 12 APR 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	0.0050	7060	NA	19 APR 90
Barium	0.038	mg/L	0.010	6010	NA	24 APR 90
Cadmium	ND	mg/L	0.0050	6010	NA	24 APR 90
Calcium	5.4	mg/L	0.20	6010	NA	24 APR 90
Chromium	ND	mg/L	0.010	6010	NA	24 APR 90
Lead	ND	mg/L	0.0050	7421	NA	19 APR 90
Manganese	ND	mg/L	0.010	6010	NA	24 APR 90
Selenium	ND	mg/L	0.025	7740	NA	19 APR 90
Silver	ND	mg/L	0.010	6010	NA	24 APR 90
Sodium	242	mg/L	5.0	6010	NA	24 APR 90

ND = Not detected
NA = Not applicable

Reported By: Fred Velasquez

Approved By: Toni Lusk

General Inorganics

Client Name: Giant Refining
 Client ID: OW-16
 Lab ID: 009051-0001-SA
 Matrix: AQUEOUS
 Authorized: 12 APR 90

Enseco ID: 1071704
 Sampled: 11 APR 90
 Prepared: See Below

Received: 12 APR 90
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO ₃ at pH 4.5	285	mg/L	5.0	310.1	NA	12 APR 90
Alkalinity, Carb. as CaCO ₃ at pH 8.3	14.0	mg/L	5.0	310.1	NA	12 APR 90
Chloride	154	mg/L	3.0	300.0	NA	25 APR 90
pH	8.5	units	--	9040	NA	12 APR 90
Phenolics	ND	mg/L	0.010	9065	NA	17 APR 90
Sulfate	28.4	mg/L	5.0	300.0	NA	25 APR 90
Specific Conductance at 25 deg.C	1060	umhos/cm	1.0	120.1	NA	12 APR 90
Total Dissolved Solids	678	mg/L	10.0	160.1	NA	15 APR 90

ND = Not detected
 NA = Not applicable

Reported By: Linda Sullivan

Approved By: Toni Lusk

Halogenated Volatile Organics

Method 601

Client Name: Giant Refining
Client ID: OW-16
Lab ID: 006769-0008-SA
Matrix: AQUEOUS
Authorized: 28 SEP 89

Enseco ID: 1054296
Sampled: 27 SEP 89
Prepared: NA

Received: 28 SEP 89
Analyzed: 04 OCT 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	5.0
Bromomethane	ND	ug/L	5.0
Vinyl chloride	ND	ug/L	1.0
Chloroethane	ND	ug/L	5.0
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	0.50
1,1-Dichloroethane	ND	ug/L	0.50
1,2-Dichloroethene			
(cis/trans)	ND	ug/L	0.50
Chloroform	ND	ug/L	0.50
1,1,2-Trichloro-2,2, 1-trifluoroethane	ND	ug/L	1.0
1,2-Dichloroethane	7.7	ug/L	1.0
1,1,1-Trichloroethane	ND	ug/L	0.50
Carbon tetrachloride	ND	ug/L	0.50
Bromodichloromethane	ND	ug/L	1.0
1,2-Dichloropropane	ND	ug/L	1.0
trans-1,3-Dichloropropene	ND	ug/L	1.0
Trichloroethene	ND	ug/L	0.50
Chlorodibromomethane	ND	ug/L	1.0
cis-1,3-Dichloropropene	ND	ug/L	2.0
1,1,2-Trichloroethane	ND	ug/L	1.0
EDB (1,2-Dibromoethane)	ND	ug/L	2.0
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0
Tetrachloroethene	ND	ug/L	0.50
Chlorobenzene	ND	ug/L	2.0

ND = Not detected
NA = Not applicable

Reported By: William Sullivan

Approved By: Stephanie Boehnke

Aromatic Volatile Organics

Method 602

Client Name: Giant Refining
Client ID: OW-16
Lab ID: 006769-0008-SA
Matrix: AQUEOUS
Authorized: 28 SEP 89

Enseco ID: 1054296
Sampled: 27 SEP 89
Prepared: NA

Received: 28 SEP 89
Analyzed: 04 OCT 89

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Chlorobenzene	ND	ug/L	0.50
Ethyl benzene	ND	ug/L	0.50
Total xylenes	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	0.50
1,4-Dichlorobenzene	ND	ug/L	0.50
1,2-Dichlorobenzene	ND	ug/L	0.50

ND = Not detected
NA = Not applicable

Reported By: William Sullivan

Approved By: Stephanie Boehnke

Appendix IX Semivolatile Organics

Method 625

Client Name: Giant Refining
 Client ID: OW-16
 Lab ID: 006769-0008-SA
 Matrix: AQUEOUS
 Authorized: 28 SEP 89

Enseco ID: 1054296
 Sampled: 27 SEP 89
 Prepared: 02 OCT 89

Received: 28 SEP 89
 Analyzed: 09 OCT 89

Parameter	Result	Units	Reporting Limit
Acenaphthene	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acetophenone	ND	ug/L	10
2-Acetylaminofluorene	ND	ug/L	10
4-Aminobiphenyl	ND	ug/L	10
Aniline	ND	ug/L	10
Anthracene	ND	ug/L	10
Aramite	ND	ug/L	10
Benzo(a)anthracene	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
bis(2-Chloroethoxy) methane	ND	ug/L	10
Benzyl alcohol	ND	ug/L	20
bis(2-Chloroethyl)ether	ND	ug/L	10
bis(2-Chloroisopropyl) ether	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ug/L	10
4-Bromophenyl phenyl ether	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
2sec-Butyl-4,6-dinitro- phenol (Dinoseb)	ND	ug/L	10
4-Chloroaniline	ND	ug/L	20
4-Chloro-3-methylphenol	ND	ug/L	20
2-Chloronaphthalene	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
o-Cresol	ND	ug/L	10
m & p-Cresol(s)	ND	ug/L	10
Chrysene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Dibenzofuran	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Michael Gallik

Approved By: Jeff Lowry

Appendix IX Semivolatile Organics (CONT.)

Method 625

Client Name: Giant Refining

Client ID: OW-16

Lab ID: 006769-0008-SA

Matrix: AQUEOUS

Authorized: 28 SEP 89

Enseco ID: 1054296

Sampled: 27 SEP 89

Prepared: 02 OCT 89

Received: 28 SEP 89

Analyzed: 09 OCT 89

Parameter	Result	Units	Reporting Limit
3,3'-Dichlorobenzidine	ND	ug/L	20
2,4-Dichlorophenol	ND	ug/L	10
2,6-Dichlorophenol	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
p-Dimethylaminoazobenzene	ND	ug/L	10
7,12-Dimethylbenz-anthracene	ND	ug/L	10
3,3'-Dimethylbenzidine	ND	ug/L	10
a,a-Dimethylphenethylamine	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
1,3-Dinitrobenzene	ND	ug/L	10
4,6-Dinitro-o-cresol	ND	ug/L	50
2,4-Dinitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Diphenylamine	ND	ug/L	10
Ethyl methacrylate	ND	ug/L	10
Ethyl methanesulfonate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Fluorene	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Hexachlorophene	ND	ug/L	--
Hexachloropropene -	ND	ug/L	20
Indeno(1,2,3-c,d)pyrene	ND	ug/L	10
Isophorone -	ND	ug/L	10
Isosafrole	ND	ug/L	20
Methapyrilene	ND	ug/L	10
3-Methylcholanthrene	ND	ug/L	20
Methyl methacrylate	ND	ug/L	10
Methyl methanesulfonate	ND	ug/L	10
2-Methylnaphthalene	ND	ug/L	10
Naphthalene	ND	ug/L	10
1,4-Naphthoquinone	ND	ug/L	10
1-Naphthylamine	ND	ug/L	10
2-Naphthylamine	ND	ug/L	10

(continued on following page)

ND = Not detected

NA = Not applicable

Reported By: Michael Gallik

Approved By: Jeff Lowry

Appendix IX Semivolatile Organics (CONT.)

Method 625

Client Name: Giant Refining
 Client ID: OW-16
 Lab ID: 006769-0008-SA
 Matrix: AQUEOUS
 Authorized: 28 SEP 89

Enseco ID: 1054296
 Sampled: 27 SEP 89
 Prepared: 02 OCT 89

Received: 28 SEP 89
 Analyzed: 09 OCT 89

Parameter	Result	Units	Reporting Limit
2-Nitroaniline	ND	ug/L	50
3-Nitroaniline	ND	ug/L	50
4-Nitroaniline	ND	ug/L	50
Nitrobenzene	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
4-Nitrophenol	ND	ug/L	50
4-Nitroquinoline-1-oxide	ND	ug/L	--
N-Nitrosodi-n-butylamine	ND	ug/L	10
N-Nitrosodiethylamine	ND	ug/L	10
N-Nitrosodimethylamine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
N-Nitrosomethylethylamine	ND	ug/L	10
N-Nitrosomorpholine	ND	ug/L	10
N-Nitrosopiperidine	ND	ug/L	10
N-Nitrosopyrrolidine	ND	ug/L	10
5-Nitro-o-toluidine	ND	ug/L	10
Pentachlorobenzene	ND	ug/L	10
Pentachloroethane	ND	ug/L	10
Pentachloronitrobenzene	ND	ug/L	50
Pentachlorophenol	ND	ug/L	50
Phenacetin	ND	ug/L	10
Phenanthrene	ND	ug/L	10
Phenol	ND	ug/L	10
p-Phenylenediamine	ND	ug/L	--
2-Picoline	ND	ug/L	10
Pronamide	ND	ug/L	20
Pyrene	ND	ug/L	10
Pyridine	ND	ug/L	10
Safrole	ND	ug/L	10
1,2,4,5-Tetrachloro-benzene	ND	ug/L	10
2,3,4,6-Tetrachlorophenol	ND	ug/L	20
o-Toluidine	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
2,4,5-Trichlorophenol	ND	ug/L	50
o,o,o-Triethylphosphorothioate	ND	ug/L	50
2,4,6-Trichlorophenol	ND	ug/L	10
Ethyl parathion	ND	ug/L	50

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Michael Gallik

Approved By: Jeff Lowry

Appendix IX Semivolatile Organics (CONT.)

Method 625

Client Name: Giant Refining
Client ID: OW-16
Lab ID: 006769-0008-SA
Matrix: AQUEOUS
Authorized: 28 SEP 89

Enseco ID: 1054296
Sampled: 27 SEP 89
Prepared: 02 OCT 89

Received: 28 SEP 89
Analyzed: 09 OCT 89

Parameter	Result	Units	Reporting Limit
Phorate (Thimet)	ND	ug/L	100
Sulfotepp	ND	ug/L	50
Thionazin	ND	ug/L	50
sym-Trinitrobenzene	ND	ug/L	10
Dimethoate	ND	ug/L	--
Disulfoton	ND	ug/L	50
Famphur	ND	ug/L	100
Methyl parathion	ND	ug/L	50
Nitrobenzene-d5	57.1	%	--
2-Fluorobiphenyl	46.6	%	--
Terphenyl-d14	41.3	%	--
Phenol-d5	58.0	%	--
2-Fluorophenol	52.5	%	--
2,4,6-Tribromophenol	57.5	%	--

ND = Not detected
NA = Not applicable

Reported By: Michael Gallik

Approved By: Jeff Lowry

Metals

Dissolved Metals

Client Name: Giant Refining
 Client ID: OW-16
 Lab ID: 006769-0008-SA
 Matrix: AQUEOUS
 Authorized: 28 SEP 89

Enseco ID: 1054296
 Sampled: 27 SEP 89
 Prepared: See Below

Received: 28 SEP 89
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	0.005	206.2	NA	24 OCT 89
Barium	0.06	mg/L	0.01	200.7	NA	01 NOV 89
Cadmium	ND	mg/L	0.005	200.7	NA	01 NOV 89
Calcium	7.5	mg/L	0.2	200.7	NA	01 NOV 89
Chromium	ND	mg/L	0.01	200.7	NA	01 NOV 89
Lead	ND	mg/L	0.01	239.2	NA	24 OCT 89
Manganese	0.02	mg/L	0.01	200.7	NA	01 NOV 89
Selenium	0.024	mg/L	0.005	270.2	NA	24 OCT 89
Silver	ND	mg/L	0.01	200.7	NA	01 NOV 89
Sodium	260	mg/L	5	200.7	NA	01 NOV 89

ND = Not detected
 NA = Not applicable

Reported By: Bryan Anderson

Approved By: Tammy Bailey

General Inorganics

Client Name: Giant Refining
Client ID: OW-16
Lab ID: 006769-0008-SA
Matrix: AQUEOUS
Authorized: 28 SEP 89

Enseco ID: 1054296
Sampled: 27 SEP 89
Prepared: See Below

Received: 28 SEP 89
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyz Date
Alkalinity, Total as CaCO3 at pH 4.5	285	mg/L	5	310.1	NA	29 SEP
Alkalinity, Bicarb. as CaCO3 at pH 4.5	272	mg/L	5	310.1	NA	29 SEP
Alkalinity, Carb. as CaCO3 at pH 8.3	13	mg/L	5	310.1	NA	29 SEP
Alkalinity, Hydrox. as CaCO3	ND	mg/L	5	310.1	NA	29 SEP
Chloride	168	mg/L	3	300.0	NA	29 SEP
pH	8.5	units	--	150.1	NA	29 SEP
pH	8.5	units	--	150.1	NA	29 SEP
pH	8.5	units	--	150.1	NA	29 SEP
pH	8.5	units	--	150.1	NA	29 SEP
Phenolics	ND	mg/L	0.01	420.1	NA	19 OCT
Sulfate	34	mg/L	5	300.0	NA	29 SEP
Specific Conductance at 25 deg.C	1070	umhos/c	1	120.1	NA	29 SEP
Specific Conductance at 25 deg.C	1070	umhos/c	1	120.1	NA	29 SEP
Specific Conductance at 25 deg.C	1070	umhos/c	1	120.1	NA	29 SEP
Specific Conductance at 25 deg.C	1070	umhos/c	1	120.1	NA	29 SEP
Total Dissolved Solids	760	mg/L	10	160.1	NA	03 OCT

ND = Not detected
NA = Not applicable

Reported By: Blake Besser

Approved By: Kimberly Conroy

DATE:	12/80	1/781	6/81	9/81	3/86
WELL #	OW20	OW20	OW20	OW20	OW20
PARAMETER					

pH		11.60			12.20
Average		11.60			12.20
Sp. Cond.		1950			7500
Average		1950			7500
mg/L					
Benzene					110
Tolulene					130
Ethyl Benzene					4
Xylene					22
Ag		<0.01		<0.01	<0.1
As					
Al					<0.1
Ba				1.00	2.80
Be					<0.1
B					<0.1
Cd				<0.001	<0.1
Ca		6.60			510.00
Cl		100.00			362.90
CN		<0.1			
Cr	0.10	0.10	0.044		<0.1
Co					<0.1
Cu					<0.1
F		0.40			
Fe		0.30			<0.1
Hg				<0.0004	
K					58.10
Mg					<0.1
Mn		0.02			<0.05
Mo					<0.1
Na		320.00			409.40
Ni					<0.1
Pb	0.04	0.04	0.055	0.015	<0.1
Se		<0.01			
Si					<0.1
Sn					<0.1
St					11.00
V					<0.1
Zn					<0.1
Aromatic HC					
Bicarbonate					0.00
Carbonate					0.00
Halogenated HC					
Oil & Grease		5.50			
Phenols				<0.001	
Sulfate		214.00			17.50
TDS		841.00		2340.00	

Gallup, New Mexico

[illegible]

OW24

Giant Ciniza Refinery

Gallup, New Mexico

DATE	1/81	6/81	9/81	1/85	3/86	12/86	8/87	11/87	12/87	6/89
PARAMETER										
pH	7.80			8.00	7.00			7.60	8.00	7.90
Average	7.80			8.00	7.00			7.60	8.00	7.90
Sp. Cond.	1500			1100	800	1170 1170 1180 1175		1200	1000	1200
Average	1500			1100	800	1172		1200	1000	1200
mg/L (unless otherwise indicated)										
Benzene										ND
Tolulene										ND
Ethyl Benzene										ND
Xylene										ND
Ag			<0.01	<0.03	<0.1					
As	<0.01			0.024	0.006					0.005
Al					0.40					
Ba			0.30	1.50	<0.1					0.120
Be					<0.1					ND
B					0.60					
Cd		<0.001		0.01	<0.1					ND
Ca	11.00				11.00					14
Cl	88.00				33.50					29.000
CN	<0.1									
Cr	0.003	0.003	0.003	0.007	<0.1	<0.05		ND	<0.05	ND
Co					<0.1					ND
Cu					<0.1					
F	0.20	0.086								
Fe					0.30					
Hg			<0.0004	<0.002						ND
K					1.95					
Mg					3.30					4.400
Mn	0.03			1.59	0.05					0.100
Mo					<0.1					
Na	380.00				246.00					258.000
Ni					<0.1					ND
Pb	0.002	0.004	0.021	0.087	<0.1	<0.05		ND	<0.05	ND
Se	<0.01				0.048	<0.005				
Si						4.40				
St						0.40				
Sn						<0.1				
T						<0.1				
Tn						<0.1				
Aromatic HC						ND				
Bicarbonate						645.00				
Carbonate						20.40				
Halogenated HC						ND				
Sulfate	196.00					40.30				
Phenolics			<0.001							
FDS	935.00					805.00				
FOX ug/L			<0.04				7.00	<5		5.00
							7.00			
							7.00			
							7.00			
AVERAGE			<0.04				7.00			
FOC mg/L		20.00		8.00	10.00	1.60	11.00	ND	5.00	
				7.00	10.00					
				7.00	10.00					
				8.00	10.00					
AVERAGE		20.00		7.50	10.00	1.60	11.00			

INLET TO AERATION BASIN
ANALYTICAL DATA

<u>PARAMETER/DATE</u>	<u>7/89</u>	<u>8/88</u>	<u>6/88</u>	<u>4/88</u>
BOD total	1990 mg/L	567 mg/L	467 mg/L	380.7 mg/L
BOD soluble		468 mg/L		
COD total	2930 mg/L	872 mg/L	666.7 mg/L	1238 mg/L
COD soluble		718 mg/L		
SO4		1190 mg/L		
TSS		28 mg/L	136 mg/L	128 mg/L
TDS	228 mg/L	2364 mg/L		
COD				

	<u>7/87</u>	<u>6/87</u>	<u>5/87</u>
BODt	448 mg/L		
BODs			
CODt	603 mg/L	1199 mg/L	1066 mg/L
CODs			
SO4			
TSS	74 mg/L		
TDS			
COD			

AERATION BASIN CELL #1*
ANALYTICAL DATA

<u>PARAMETER/DATE</u>	<u>7/89</u>	<u>8/88</u>	<u>6/88</u>	<u>4/88</u>
BOD soluble	98.7 mg/L	93.6 mg/L	56.3 mg/L	122.1 mg/L
COD total				1714.3 mg/L
COD soluble	1660 mg/L	308 mg/L	333.3 mg/L	
COD				
TSS	154 mg/L	266 mg/L	586 mg/L	266 mg/L
MLSS				
MLVSS				

	<u>7/87</u>	<u>6/87</u>	<u>5/87</u>
BODs	90.9 mg/L		
CODt			
CODs	214 mg/L	590 mg/L	362 mg/L
TSS			
MLSS	95 mg/L		
MLVSS	460 mg/L		

* This Basin has also been referred to as Cell A
and Pond A in previous laboratory data.

AERATION BASIN CELL #2*
ANALYTICAL DATA

<u>PARAMETER/DATE</u>	<u>7/89</u>	<u>8/88</u>	<u>6/88</u>	<u>4/88</u>
BOD soluble	683 mg/L	962 mg/L	88.2 mg/L	244 mg/L
COD soluble	249 mg/L	205 mg/L	263.2 mg/L	476.2 mg/L
TSS	198 mg/L	168 mg/L	198 mg/L	122.3 mg/L
MLSS				
MLVSS				

	<u>7/87</u>	<u>6/87</u>	<u>5/87</u>
BODs	79.2 mg/L		
CODs	175 mg/L	230 mg/L	247 mg/L
TSS			
MLSS	45 mg/L		
MLVSS	310 mg/L		

* This Basin has also been referred to as Cell B
and Pond B in previous laboratory data.

POND #1 *EFFLUENT
ANALYTICAL DATA

<u>PARAMETER/DATE</u>	<u>7/89</u>	<u>8/88</u>	<u>6/88</u>	<u>4/88</u>	<u>7/87</u>	<u>5/87</u>
COD total	488 mg/L	359 mg/L	380.9 mg/L		781 mg/L	38 mg
COD soluble	293 mg/L	205 mg/L				
COD total	155 mg/L	62 mg/L	89.4 mg/L			
BOD soluble	122 mg/L	48.5 mg/L				
Total Sus. Solids	72.0 mg/L	114 mg/L	56 mg/L			
Sodium	1061 mg/L	802.5 mg/L		670 mg/L		
Calcium	85.1 mg/L	101.1 mg/L	69.5 mg/L			
Magnesium	42.5 mg/L	20.43 mg/L				
Chloride	20.2 mg/L	347.4 mg/L				
Sulfate	1410 mg/L	1456 mg/L	1630 mg/L			
Carbonate	2.0 mg/L					
Bicarbonate	582 mg/L					
NO3	0.01 mg/L	0.01 mg/L	0.01 mg/L			
NH3	144 mg/L	170 mg/L	18.25 mg/L	153.3 mg/L		
Total Dis. Solids	4010 mg/L	2544 mg/L	2974 mg/L	1218 mg/L		
Ec		9400 umhos/cm				
Zn			0.156 mg/L			
As			0.099 mg/L	0.098 mg/L		
Ba			1.0 mg/L	1.0 mg/L		
Cd			0.023 mg/L	0.021 mg/L		
Cr			0.05 mg/L	0.05 mg/L		
Pb			0.05 mg/L	0.120 mg/L		
Hg			0.002 mg/L	0.002 mg/L		
Ag			0.05 mg/L	0.055 mg/L		
Se			0.028 mg/L	0.0911 mg/L		

7/87

COD,t	233 mg/L
BOD,t	67.2 mg/L
TSS	42 mg/L
BOD,s	68.5 mg/L
COD,s	136 mg/L

* This Basin has also been referred to as Cell #3,
Cell C and Pond C in previous laboratory data.

POND #2
ANALYTICAL DATA

<u>PARAMETER/DATE</u>	<u>7/89</u>	<u>8/88</u>	<u>4/88</u>	<u>7/87</u>
COD total	390 mg/L	359 mg/L	428.6 mg/L	369 mg/L
COD soluble	195 mg/L		238.1 mg/L	
BOD total	91.4 mg/L	79.6 mg/L	83.9 mg/L	
BOD soluble	38.8 mg/L		86.2 mg/L	
Na	1115 mg/L			
Ca	96.3 mg/L			
Mg	49.2 mg/L			
Cl	21.3 mg/L			
SO4	2190 mg/L			
Carbonate	2.0 mg/L			
Bicarbonate	282 mg/L			
NO3	0.01 mg/L			
NH3	115 mg/L	161 mg/L		
TDS	4690 mg/L	3412 mg/L		
Al	0.7 mg/L			
Cd	0.004 mg/L			
Ba	0.1 mg/L			
As	0.026 mg/L			
Cr	0.06 mg/L			
Cu	0.22 mg/L			
Pb	0.01 mg/L			
Mn	0.35 mg/L			
Hg	0.002 mg/L			
Ni	0.11 mg/L			
Se	0.26 mg/L			
Zn	0.9 mg/L			
TSS	148 mg/L	146 mg/L	364 mg/L	

POND #3
ANALYTICAL DATA

<u>PARAMETER/DATE</u>	<u>6/88</u>
BOD, T	74.7 mg/L
COD, T	857.1 mg/L
TSS	94 mg/L
TDS	20834 mg/L
EC	67600 umhos/cm
Cl	9926 mg/L
SO4	1174 mg/L
NH3	53.0 mg/L
NO3	0.123 mg/L
Ca	2080.0 mg/L
Na	4460.0 mg/L
Mg	281.25 mg/L
Zn	0.075 mg/L
As	0.103 mg/L
Ba	1.0 mg/L
Cd	0.01 mg/L
Cr	0.118 mg/L
Pb	0.05 mg/L
Hg	0.002 mg/L
Ag	0.05 mg/L
Se	0.032 mg/L



Post Office Box 968
Santa Fe, New Mexico 87504-0968

ENVIRONMENTAL IMPROVEMENT DIVISION

Michael J. Burkhardt
Director

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

May 3, 1988

Mr. Robert McClenahan, Environmental Coordinator
Giant Refinery Company
Route 3 Box 7
Gallup, NM 87301

RE: NMD 000333211

Dear Mr. McClenahan:

This letter will reference our telephone conversation of April 27, 1988, regarding the existing disposition of Giant Refinery Company (GRC) hydrological data base. The hydrological in the text of this correspondence addresses all the geohydrological and water quality data which GRC has accumulated privately or through consulting firms allied to the RCRA program at Ciniza.

The GRC hydrological data base is too massive and complex in its present form for the Environmental Improvement Division (EID) to provide adequate interpretation. Therefore, in order to facilitate EID's technical interpretative position, the data must be reduced to numerical summaries or graphical presentations. This will entail compilation and summarization of the historical and current data bases. Specifically, the ground water quality for each well where data exists must be extracted and compiled from the available report, and summarized to provide EID with the historical and current concentration trends. The end result, the concentration trends for all the inorganic and organic parameters which have been monitored at the GRC RCRA site since 1981. A complete bibliography would be useful if source documents need to also be reviewed.

Robert McClenahan
May 3, 1988
Page -2

Your prompt attention to this request is required in order that EID proceed with evaluation of your permit application. It is important that this information be received in this office by May 16, 1988 to ensure an adequate period for interpretation.

Thank you.

Sincerely, \

Don-Edward Donaldson

Don-Edward Donaldson
Water Resource Specialist
Hazardous Waste Bureau

DED/pv



May 27, 1988

Route 3, Box 7
Gallup, New Mexico
87301

Don-Edward Donaldson
Water Resources Specialist
NMEID
P.O. Box 968
Santa Fe, New Mexico 87504-0968

505
722-3833

RE: Giant's Ciniza Facilities Ground Water Data, EPA
ID #NMD000333211

Dear Mr. Donaldson:

Attached are the collated data for our facility per your request. The data includes all information previously submitted to your office in our yearly ground water monitoring reports for our upper most aquifer (The Sonsela).

In reviewing the data, there are two points that should be noted. First, the TOC values for 4/30/84 are abnormally high compared with all the other values, both prior and since. They were also not replicates, but were taken during a year with five other samplings which do not confirm that high of a value.

Second, the data submitted for 1987 mistakenly has the units for TOX of MW-1, 2 and 3 as milligrams per liter (mg/l) rather than micrograms per liter (μ g/l). Monitor wells 4 and 5 are labeled properly.

Additional data and graphs will be forthcoming as they become available. If you have any questions regarding this information, please feel free to contact me.

Sincerely,

Robert L. McClenahan, Jr.
Environmental Coordinator
Giant Refining Company

RLM:ds

Attachments

cc: Tanga Winkle, USEPA
Julie Wanslow, NMEID
Kim Bullerdick, GI
Carl Shook

WELL: MW-1

DATE	1ST QTR 1982	2ND QTR 1982	3RD QTR 1982	4TH QTR 1982	07-05-83	01-12-84	02-16-84
PARAMETER -----							
TOC mg/l	8.80	5.35	2.50	5.90	1.50	5.65	5.96
AVERAGE	8.80	5.35	2.50	5.90	1.50	5.65	5.96
TOX mg/l	2.80	2.60	1.65	1.77	1.50	0.95	0.72
AVERAGE	2.80	2.60	1.65	1.77	1.50	0.95	0.72
pH	8.60	8.80	8.80	8.80	8.60	8.50	8.80
AVERAGE	8.60	8.80	8.80	8.80	8.60	8.50	8.80
CONDUCTIVITY mhos/cm	930	1021	1100	995	1050	992	1038
AVERAGE	930	1021	1100	995	1050	992	1038
WATER ELEVATION	6868.9	6869.5	6870.3	6870.1	6869.2	6870.9	6870.9
Na mg/l					250.00		256.00
Ca mg/l							
SO4 mg/l					172.00		135.00
Cl mg/l					58.00		54.00
As mg/l					0.004		<.001
Ba mg/l					0.020		0.01
Cd mg/l					<.001		<.001
Cr mg/l					<.001		<.001
Pb mg/l					0.005		<.001
Hg mg/l					<.0002		<.0002
Se mg/l					<.001		<.001
Ag mg/l					<.001		<.001
Fe mg/l					0.130		0.05

WELL: MW-1

DATE 03-08-84 04-30-84 11-07-84 12-05-84 01-13-85 10-14-85 02-11-86

PARAMETER

PARAMETER	03-08-84	04-30-84	11-07-84	12-05-84	01-13-85	10-14-85	02-11-86
TOC mg/l	4.92	87.00	6.92	8.00	7.40	2.00	3.00
AVERAGE	4.92	87.00	6.92	8.00	7.40	2.00	3.00
TOX mg/l	0.68	<0.03	0.14	<0.01	<0.01	<0.01	<0.01
AVERAGE	0.68	<0.03	0.14	<0.01	<0.01	<0.01	<0.01
pH	8.22	8.84	8.61	8.70	8.80	8.50	8.40
AVERAGE	8.22	8.84	8.61	8.70	8.80	8.50	8.40
CONDUCTIVITY mhos/cm	1010	1068	1030	1180	1100	1003	1162
AVERAGE	1010	1068	1030	1180	1100	1003	1162
WATER ELEVATION	6870.9	6871.6	6870.2	6870.6	6869.9	6870.7	6870.9
Na mg/l		270.00	257.00		234.00		
Ca mg/l							
SO4 mg/l		170.00	151.00		150.00		
Cl mg/l		55.00	47.00		47.00		
As mg/l		<.01	<.001				
Ba mg/l		<0.1	0.01				
Cd mg/l		<.001	<.001				
Cr mg/l		<.01	<.001				
Pb mg/l		0.004	0.005		0.009		
Hg mg/l			<.0002		<.002		
Se mg/l		0.01	<.001				
Ag mg/l		<.01	<.0001				
Fe mg/l		0.08	0.29		0.077		

WELL: MW-1

DATE	02-15-86	08-20-86	10-28-86	01-87	05-87	RETEST	10-87	10-87 DUP
PARAMETER								

TOC mg/l	1.00		7.00		2.00		2.00	0.7
	1.00		7.00		2.00		2.00	0.6
	0.90		7.00		3.00		1.00	0.7
	0.90		7.00		2.00		1.00	0.7
AVERAGE	1.00		7.00		2.00		2.00	0.05
TOX ug/l	<20		<5		38.00	<5	<5	<10
	<20		<5		37.00	<5	<5	<10
	<20		5.00		37.00	8.00	7.00	<10
	<20		5.00		39.00	5.00	<5	<10
AVERAGE	<20		<5		38.00	6.00	7.00	<10
pH	8.60		8.80		8.51		9.10	8.60
	8.60		8.79		8.50		9.00	8.60
	8.70		8.81		8.51		9.10	8.60
	8.60		8.80		8.52		9.10	8.60
AVERAGE	8.60		8.80		8.51		9.10	8.60
CONDUCTIVITY	1000		1200		1100		1400	1180
mhos/cm	1080		1190		1000		1400	1190
	1100		1190		1100		1400	1190
	1110		1200		1100		1400	1180
AVERAGE	1073		1195		1075		1400	1185
WATER ELEVATION	6871.5	6871.10	6871.10	6872.00	6871.80		6871.20	
Na mg/l	290.00		267.30		227.00			
Ca mg/l			0.96					
SO4 mg/l	223.00		131.00		148.00			
Cl mg/l	57.00		50.00		44.60			
As mg/l	<0.050							
Ba mg/l	<0.010							
Cd mg/l	<0.010							
Cr mg/l	<0.050		<0.050					
Pb mg/l	<0.050		<0.050					
Hg mg/l	<0.002							
Se mg/l	<0.010							
Ag mg/l	<0.050							
Fe mg/l	0.110		0.170		<0.3			

WELL: MW-2

DATE	1ST QTR 1982	2ND QTR 1982	3RD QTR 1982	4TH QTR 1982	07-05-83	01-12-84	02-16-84
PARAMETER -----							
TOC mg/l	6.30	9.00	3.30	7.50	6.80	3.33	3.45
AVERAGE	6.30	9.00	3.30	7.50	6.80	3.33	3.45
TOX mg/l	1.90	2.30	2.71	1.90	1.70	1.25	0.91
AVERAGE	1.90	2.30	2.71	1.90	1.70	1.25	0.91
pH	8.70	8.90	8.90	8.90	8.70	8.68	8.84
AVERAGE	8.70	8.90	8.90	8.90	8.70	8.68	8.84
CONDUCTIVITY mhos/cm	1000	1012	1000	1000	995	1035	1048
AVERAGE	1000	1012	1000	1000	995	1035	1048
WATER ELEVATION	6869.2	6871.2	6870.0	6871.0	6869.6	6870.3	6870.6
Na mg/l					270.00		260.00
Ca mg/l							
SO4 mg/l					172.00		
Cl mg/l					60.00		57.00
As mg/l					0.004		0.002
Ba mg/l					0.020		0.02
Cd mg/l					<.001		<.001
Cr mg/l					<.001		0.003
Pb mg/l					0.005		0.05
Hg mg/l					<.0002		
Se mg/l					<.001		<.001
Ag mg/l					<.001		<.001
Fe mg/l					0.160		0.21

WELL: MW-2

DATE 03-08-84 04-30-84 11-07-84 12-05-84 01-13-85 10-14-85 02-11-86

PARAMETER

PARAMETER	03-08-84	04-30-84	11-07-84	12-05-84	01-13-85	10-14-85	02-11-86
TOC mg/l	3.02	85.00	3.68	7.00	5.80	3.00	2.00
AVERAGE	3.02	85.00	3.68	7.00	5.80	3.00	2.00
TOX mg/l	0.88	<.03	0.19	<.01	<0.01	<0.01	<0.01
AVERAGE	0.88	<.03	0.19	<.01	<0.01	<0.01	<0.01
pH	8.55	8.92	8.61	8.95	8.80	8.90	8.40
AVERAGE	8.55	8.92	8.61	8.95	8.80	8.90	8.40
CONDUCTIVITY mhos/cm	1005	1158	1035	1100	1180	1003	1191
AVERAGE	1005	1158	1035	1100	1180	1003	1191
WATER ELEVATION	6870.5	6870.4	6868.8	6868.8	6869.7	6869.7	6870.7
Na mg/l		270.00	261.00		195.00		
Ca mg/l							
SO4 mg/l					157.00		
Cl mg/l		63.00	56.00		56.00		
As mg/l		<.01	<.001				
Ba mg/l		<.1	0.02				
Cd mg/l		<.001	<.001				
Cr mg/l		<.01	<.001				
Pb mg/l		0.005	0.008		0.010		
Hg mg/l					<0.002		
Se mg/l		0.02	<.001				
Ag mg/l		<.01	<.001				
Fe mg/l		0.09	1.20		0.037		

WELL: MW-2

DATE	02-15-86	08-20-86	10-28-86	01-87	05-87	RETEST	10-87	10-87 DUP
PARAMETER								

TOC mg/l	16.00		1.00		4.00		1.00	0.90
	16.10		1.00		4.00		1.00	0.90
	16.00		1.00		3.00		1.00	0.90
	16.10		1.00		3.00		2.00	0.90
AVERAGE	16.05		1.00		3.50		1.25	0.90
TOX µg/l	<20		16.00		8.00		6.00	<10
			16.00		6.00		6.00	<10
			17.00		6.00		<5	<10
			17.00		6.00		<5	<10
AVERAGE	<20		16.50		6.50		5.00	<10
pH	8.59		8.80		8.65		9.10	8.70
	8.69		8.82		8.69		9.20	8.70
	8.56		8.81		8.65		9.10	8.60
	8.55		8.80		8.72		9.10	8.70
AVERAGE	8.60		8.81		8.68		9.13	8.70
CONDUCTIVITY	1100		1199		1000		1200	1200
mhos/cm	1110		1198		1000		1200	1200
	1090		1199		1000		1200	1200
	1090		1199		1000		1200	1200
AVERAGE	1098		1199		1000		1200	1200
WATER ELEVATION	6870.4	6870.4	6870.5	6871.3	6871.1		6871.2	
Na mg/l	260.00		265.20		256.00			
Ca mg/l			0.91					
SO4 mg/l	213.00		174.00		173.00			
Cl mg/l	63.00		59.00		59.50			
As mg/l	<0.050							
Ba mg/l	0.02							
Cd mg/l	<0.010							
Cr mg/l	<0.050		<0.050					
Pb mg/l	<0.050		<0.050					
Hg mg/l	<0.002							
Se mg/l	<0.010							
Ag mg/l	<0.050							
Fe mg/l	0.180		0.170		<0.3			

WELL: MW-3

DATE	1ST QTR 1982	2ND QTR 1982	3RD QTR 1982	4TH QTR 1982	07-05-83	01-12-84	02-16-84
PARAMETER -----							
TOC mg/l	5.00	7.50	4.50	9.30	4.70	1.28	1.28
AVERAGE	5.00	7.50	4.50	9.30	4.70	1.28	1.28
TOX mg/l	2.10	1.90	2.22	2.05	1.95	1.22	1.24
AVERAGE	2.10	1.90	2.22	2.05	1.95	1.22	1.24
pH	8.60	8.40	8.40	8.40	8.50	8.31	8.42
AVERAGE	8.60	8.40	8.40	8.40	8.50	8.31	8.42
CONDUCTIVITY mhos/cm	950	1008	995	980	1080	990	1060
AVERAGE	950	1008	995	980	1080	990	1060
WATER ELEVATION	6850.7	6853.8	6855.0	6854.6	6853.8	6855.3	6855.3
Na mg/l					250.00		
Ca mg/l							
SO4 mg/l					148.00		
Cl mg/l					58.00		23.00
As mg/l					0.005		0.002
Ba mg/l					0.010		0.02
Cd mg/l					<.001		<.001
Cr mg/l					<.001		0.002
Pb mg/l					0.002		0.02
Hg mg/l					<.0002		<.0002
Se mg/l					<.001		<.001
Ag mg/l					<.001		<.001
Fe mg/l					0.180		0.37

WELL: MW-3

DATE 03-08-84 04-30-84 11-07-84 12-05-84 01-13-85 10-14-85 02-11-86

PARAMETER

PARAMETER	03-08-84	04-30-84	11-07-84	12-05-84	01-13-85	10-14-85	02-11-86
TOC mg/l	1.18	88.00	1.70	5.30	8.20	2.00	4.00
AVERAGE	1.18	88.00	1.70	5.30	8.20	2.00	4.00
TOX mg/l	0.81	<.03	0.22	<.01	<0.01	<0.01	<0.01
AVERAGE	0.81	<.03	0.22	<.01	<0.01	<0.01	<0.01
pH	8.45	8.80	8.56	8.85	8.70	8.70	8.30
AVERAGE	8.45	8.80	8.56	8.85	8.70	8.70	8.30
CONDUCTIVITY mhos/cm	990	1148	1030	1100	1100	1001	1161
AVERAGE	990	1148	1030	1100	1100	1001	1161
WATER ELEVATION	6855.1	6856.3	6852.1	6862.9	6809.5	6849.6	6856.4
Na mg/l		270.00	261.00		140.00		
Ca mg/l							
SO4 mg/l					120.00		
Cl mg/l		63.00	57.00		57.00		
As mg/l		<.01	0.002				
Ba mg/l		<.1	0.01				
Cd mg/l		<.001	<.001				
Cr mg/l		<.01	<.001				
Pb mg/l		0.003	0.003		0.010		
Hg mg/l			<.0002		<0.002		
Se mg/l		0.01	<.001				
Ag mg/l		<.01	<.0001				
Fe mg/l		0.07	0.30		0.020		

WELL: MW-3

DATE	02-15-86	08-20-86	10-28-86	01-87	05-87	RETEST	10-87	10-87 DUP
PARAMETER								

TOC mg/l	2.00		3.00		1.00			
	2.00		4.00		1.00			
	2.00		4.00		2.00			
	1.90		3.00		2.00			
AVERAGE	1.98		3.50		1.50			
TOX μ g/l	<20		8.00		5.00			
	<20		6.00		5.00			
	<20		8.00		7.00			
	<20		6.00		5.00			
AVERAGE	<20		7.00		5.50			
pH	8.72		8.77		8.67			
	8.70		8.77		8.64			
	8.65		8.79		8.64			
	8.60		8.78		8.61			
AVERAGE	8.67		8.78		8.64			
CONDUCTIVITY	1110		1000		1000			
mhos/cm	1115		1010		1000			
	1100		1000		1000			
	1100		1020		1000			
AVERAGE	1106		1008		1000			
WATER ELEVATION	6843.9	6856.5	6856.8	6880.8	6856.7			
Na mg/l	295.00		265.00		257.00			
Ca mg/l								
SO4 mg/l	180.00		131.00		223.00			
Cl mg/l	65.00		56.00		55.50			
As mg/l	<0.050							
Ba mg/l	0.01							
Cd mg/l	0.01		0.01					
Cr mg/l	<0.050		<0.050					
Pb mg/l	<0.050		<0.050					
Hg mg/l	0.002							
Se mg/l	0.010							
Ag mg/l	0.050							
Fe mg/l	0.120		0.210		<0.3			

WELL: MW-4

	1ST QTR	2ND QTR	3RD QTR	4TH QTR	07-05-83	01-12-84	02-16-84
DATE	1982	1982	1982	1982			
PARAMETER							

TOC mg/l	8.30	6.50	5.00	9.60	8.58	5.00	5.00
	8.30	6.30	5.50	9.60			
	8.50	6.50	5.00	9.45			
	8.70	6.30	6.00	9.50			
AVERAGE	8.45	6.40	5.38	9.54	8.58	5.00	5.00
TOX mg/l	2.50	2.10	2.51	2.85		1.35	1.35
	2.20	2.00	2.60	2.90			
	2.70	2.10	2.54	2.80			
	2.00	2.50	2.60	2.95			
AVERAGE	2.35	2.18	2.56	2.88		1.35	1.35
pH	8.60	8.60	8.50	8.40		8.50	8.69
	8.50	8.62	8.50	8.35			
	8.70	8.65	8.45	8.30			
	8.60	8.60	8.50	8.30			
AVERAGE	8.60	8.62	8.49	8.34		8.50	8.69
CONDUCTIVITY	1025	950	950	1000	1100	1110	1058
mhos/cm	1050	940	955	990	1100		
	1050	950	960	995	1100		
	1030	940	950	1000	1100		
AVERAGE	1039	945	954	996	1100	1110	1058
WATER ELEVATION	6873.0	6872.4	6873.3	6872.7	6872.8	6871.4	6871.4
Na mg/l					255.00		258.00
Ca mg/l							
SO4 mg/l					138.00		126.00
Cl mg/l					22.00		
As mg/l					0.003		0.002
Ba mg/l					0.040		0.01
Cd mg/l					<.001		<.001
Cr mg/l					<.001		0.00
Pb mg/l					0.002		0.02
Hg mg/l					<.0002		<.0002
Se mg/l					<.001		<.001
Ag mg/l					<.001		<.001
Fe mg/l					0.110		0.14

WELL: MW-4

DATE 03-08-84 04-30-84 11-07-84 12-05-84 01-13-85 10-14-85 02-11-86

PARAMETER

PARAMETER	03-08-84	04-30-84	11-07-84	12-05-84	01-13-85	10-14-85	02-11-86
TOC mg/l	4.70	115.00	5.28	6.00	10.80	2.00	1.00
AVERAGE	4.70	115.00	5.28	6.00	10.80	2.00	1.00
TOX mg/l	1.04	<0.3	0.22	<.01	<0.01	<0.01	<0.01
AVERAGE	1.04	<0.3	0.22	<.01	<0.01	<0.01	<0.01
pH	8.45	8.74	8.44	8.60	8.60	8.20	8.20
AVERAGE	8.45	8.74	8.44	8.60	8.60	8.20	8.20
CONDUCTIVITY mhos/cm	1020	1225	1050	1200	1200	1000	1191
AVERAGE	1020	1225	1050	1200	1200	1000	1191
WATER ELEVATION	6873.6	6873.8	6872.3	6873.6	6873.3	6873.7	6873.8
Na mg/l		300.00	281.00		277.00		
Ca mg/l							
SO4 mg/l		150.00	144.00		120.00		
Cl mg/l					16.00		
As mg/l		<.01	<.001				
Ba mg/l		<.1	0.01				
Cd mg/l		<.001	<.001				
Cr mg/l		<.01	<.001				
Pb mg/l		0.004	0.003		0.006		
Hg mg/l			<.0002				
Se mg/l		0.02	<.001				
Ag mg/l		<.01	<.0001				
Fe mg/l		0.20	0.14		0.086		



OIL CONSERVATION DIVISION
RECEIVED

'89 OCT 30 AM 11 06

Route 3, Box 7
Gallup, New Mexico
87301

505
722-3833

October 23, 1989

David Boyer
Oil Conservation Division
POB 2088
Land Office Bld.
Santa Fe, NM 87501

RE: Giant Industries Discharge Permit GW-32 Analytical
Data

Dear Mr. Boyer:

Attached is a summary of ground water data and pond sampling data from our Ciniza Refinery since 1985. We have consolidated all available data from both the monitoring wells and biological waste water treatment system into chronological tables for your convenience. If you wish to review the original laboratory data sheets, please contact John Stokes.

It has been a pleasure working with both you and your staff, and I'd like to extend my best regards for the future.

Sincerely,

Bob McClenahan Jr.
Environmental Coordinator
Giant Refinery

cc: John Stokes
Kim Bullerdick

WELL:SMW1

Ciniza Refinery Giant Refining Gallup, New Mexico

DATE	11/85	2/86	5/86	9/86	2/87	3/87	4/88	6/89	7/89
PARAMETER									
TOC(ms/l)	7.8 7.9 8.0 8.2	10.1 10.2 10.0 10.0	25.0	27.0 31.0 30.0 28.0					
AVERAGE	8.0	10.1	25.0	29.0					
TOX(ms/l)	<0.01 <0.01 <0.01 <0.01	<0.01 <0.01 <0.01 <0.01	0.26	0.11 0.11 0.11 0.11					
AVERAGE	<0.01	<0.01	0.26	0.11					
PH	7.6 7.6 7.6 7.6	7.70 7.75 7.65 7.68	7.7	7.52 7.53 7.52 7.52	7.34		7.5	7.4	
AVERAGE	7.6	7.70	7.7	7.52	7.34		7.5	7.4	
CONDUCT. (mhos/cm)	5600 5600 5600 5600	5850 5810 5890 5830	5820.0	5650.0 5700.0 5680.0 5700.0	5500.0		3900.0	6450.0	
AVERAGE	5600	5845	5820	5683	5500.0		3900.0	6450.0	
(ms/l)									
As	<0.05	<0.05	<0.050	<0.050					
As	0.08	<0.05	<0.05	<0.050					
Ba	6.0	<0.005	<0.01	0.02					
Ca			172.0	142.0	230.8		155.8		182.0
Cd	0.06	0.09	0.012	0.04					
Cl	1489	1340	1180.0	1399.6	1112.0		1032.0		
Co	<0.05	0.065	<0.050	0.10		0.011		0.22	
Cr	0.45	<0.04	0.080	0.3					
Hg	<0.002	<0.002	0.002	<0.002					
K									
Mg									
Mn	0.16	<0.02	0.080	<0.02					
Na	2438	1692	1865.0	1300.0	1135.0		1116.3		1230.0
Pb	0.116	0.10	<0.050	0.11		0.32		0.0025	
Se	0.066	<0.01	<0.010	<0.010					
904	2833	1704	1471.0		1833.0		934.0		
Phenols	<0.001	<0.001	0.005	<0.001					
Fluoride	0.28	0.42	0.440						
NO3(N)	0.1	<0.01	<0.01						
Endrin	<0.0002	<0.0002	<0.0002	<0.0002					
Lindane	<0.004	<0.004	<0.004	<0.004					
Methoxych	<0.1	<0.1	<0.1	<0.1					
Toxaphene	<0.005	<0.005	<0.005	<0.005					
2,4-D	<0.1	<0.1	<0.1	<0.1					
2,4,5-TP	<0.01	<0.01	<0.01	<0.01					
Coliform (pCi/l)	<1/100	<1/10	<1/100	<1/100					
Radium	<5	0							
Gross Alp	0	230	0	0.0					
Gross Bet (FTU)	0	20	0	0.0					
Turbidity	78	175							

WELL:SMW2

Ciniza Refinery Giant Refining Gallup, New Mexico

DATE	11/85	2/86	5/86	9/86	2/87	3/87	4/88	6/89	7/89
<u>PARAMETER</u>									
TOC (mg/l)	9.0 9.0 9.2 8.9	9.6 9.8 10.2 10.0	11.0	11.00 11.00 11.00 11.00					
AVERAGE	9.0	9.9	11.0	11.00					
TOX (mg/l)	<0.01 <0.01 <0.01 <0.01	<0.01 <0.01 <0.01 <0.01	0.79	0.11 0.11 0.11 0.11					
AVERAGE	<0.01	<0.01	0.79	0.11					
PH	7.7 7.7 7.7 7.7	7.5 7.5 7.6 7.6	7.5	7.6 7.6 7.6 7.6	6.6		7.7	7.7	
AVERAGE	7.7	7.6	7.5	7.6	6.6		7.7	7.7	
CONDUCT. (mhos/cm)	6900.0 6900.0 6900.0 6900.0	7300 7340 7420 7210	7400.0	7190 7200 7250 7200	6700.0		5200.0	8120.0	
AVERAGE	6900.0	7317.5	7400.0	7210.0	6700.0		5200.0	8120.0	
(mg/l)									
As	<0.050	<0.050	<0.05	<0.05					
As	0.10	<0.05	<0.05	<0.05					
Ba	4.00	<0.005	0.01	<0.01					
Ca			150.0	148	273.5		147.1		153.0
Cd	0.10	0.13	0.024	0.050					
Cl	1985.0	1340	1699.0	2049	1588.0		1419.0		
Cr	<0.050	0.067	<0.05	0.092		1.4		0.1200	
Fe	0.62	<0.04	0.08	0.180					
Hg	<0.002	<0.002	0.003	<0.002					
K									ND
Mg									46.0
Mn	2.0	<0.02	0.10	<0.02					
Na	2660.0	1690	2400.0	1780	1625.0		1450.0		1500.0
Pb	0.19	0.28	<0.05	0.110		0.58		<0.005	
Se	0.13	<0.01	<0.01	<0.01					
SO4	3473.0	2429	1950.0	2380	2083.0		1504.6		
Phenols	<0.001	<0.001	0.006	<0.001					
Fluoride	0.34	0.55	0.37	0.242					
NO3(N)	2.0	0.1	<0.01	0.126					
Endrin	<0.0002	<0.0002	<0.0002	<0.0002					
Lindane	<0.004	<0.004	<0.004	<0.004					
Methoxych	<0.1	<0.1	<0.1	<0.1					
Toxaphene	<0.005	<0.005	<0.005	<0.005					
2,4-D	<0.1	<0.1	<0.1	<0.1					
2,4,5-TP	<0.01	<0.01	<0.01	<0.01					
Coliform (FCI/l)	<1/100	<1/100	<1/100	<1/100					
Radium	<5	0.0							
Gross Alp	0.0	0.0	0.0	0.0					
Gross Bet (FTU)	0.0	0.0	0.0	0.0					
Turbidity	27.0	175.0							

WELL:SMW3 Ciniza Refinery Giant Refinings Gallup, New Mexico

DATE	11/85	2/86	5/86	9/86	2/87	3/87	4/88	6/89	7/89
<u>PARAMETER</u>									
TOC(ms/l)	6.0 6.1 6.0 6.5	7.0 6.9 6.8 7.0	11.0	8.0 7.0 8.0 7.0					
AVERAGE	6.2	6.9	11.0	8.0					
TOX(ms/l)	<0.01 <0.01 <0.01 <0.01	<0.01 <0.01 <0.01 <0.01	0.02	0.56 0.56 0.57 0.56					
AVERAGE	<0.01	<0.01	0.02	0.56					
PH	8.0 8.0 8.0 8.0	7.9 7.9 7.8 7.8	7.5	7.9 7.9 8.0 8.0	8.1		7.9	8.1	
AVERAGE	8.0	7.9	7.5	8.0	8.1		7.9	8.1	
CONDUCT. (mhos/cm)	3075.0 3075.0 3075.0 3075.0	3720.0 3610.0 3720.0 3710.0	3500.0	3400.0 3400.0 3410.0 3405.0	3200.0		3500.0	3910.0	
AVERAGE	3075	3690	3500	3404	3200		3500	3910.0	
(ms/l)									
As	<0.050	<0.050	<0.050	<0.050					
As	0.063	<0.050	<0.050	<0.050					
Ba	1.70	<0.005	0.010	<0.010					
Ca			84.0	17.0	75.0		63.5		49.0
Cd	<0.010	0.02	0.008	<0.010					
Cr	<0.050	0.055	<0.050	<0.050		0.06		<0.01	
Fe	0.04	<0.04	0.080	0.21					
Hg	<0.002	<0.002	0.003	<0.002					
K									
Mg									ND
Mn	0.02	<0.02	0.030	<0.02					14.0
Na	440.0	832.0	1280.0	998.0	700.0		662.5		736.0
Pb	<0.050	<0.050	<0.050	<0.050		0.37		<0.01	
Se	0.10	<0.01	<0.01	<0.01					
SO4	1784.0	3766.0	1567.0	1750.0	2237.0		1090.2		
Phenols	<0.001	<0.001	0.004	<0.001					
Fluoride	0.43	0.72	0.740	0.41					
NO3(N)	0.20	0.8	<0.01	<0.01					
Endrin	<0.0002	<0.0002	<0.0002	<0.0002					
Lindane	<0.004	<0.004	<0.004	<0.004					
Methoxych	<0.1	<0.1	<0.1	<0.1					
Toxaphene	<0.005	<0.005	<0.005	<0.005					
2,4-D	<0.1	<0.1	<0.1	<0.1					
2,4,5-TP	<0.01	<0.01	<0.01	<0.01					
Coliform (PCi/l)	<1/100	<1/100	<1/100	<1/100					
Radium	<5	0.0							
Gross Alp	0.0	0.0	0.0	0.0					
Gross Bet (FTU)	0.0	0.0	0.0	0.0					
Turbidity	7.50	120.0							

7189

Ciniza Refinery Giant Refining Gallup, New Mexico

WELL:SNW6

Ciniza Refinery Giant Refining Gallup, New Mexico

DATE	11/85	2/86	5/86	9/86	12/86	2/87	3/87	7/87	11/87	12/87	4/88	7/88	7/88R	6/89	7/89
PARAMETER															
TOC (mg/l)	5.0 5.5 5.0	5.0 5.6 5.5	25.0	9.0 9.0 9.0	10.0 9.0 10.0			12.0 11.0 12.0	1.2	4.0		1.50		1.5	
AVERAGE	5.2	5.5	25.0	9.0	9.5			11.5	1.2	4.0		1.5		1.5	
TOX (mg/l)	<0.01 <0.01 <0.01	<0.01 <0.01 <0.01	0.015	0.017 0.017 0.018	0.008 0.009 0.009			0.001 0.001 0.001	ND	<0.005		<5		<0.005	
AVERAGE	<0.01	<0.01	0.015	0.017	0.009			0.001	<0.01	<0.005		<5		<0.005	
PH	8.4 8.4 8.4	8.0 8.0 8.0	7.9	8.3 8.3 8.3		8.24		7.83	8.1	8.5	8.20	8.40		8.40	8.2
AVERAGE	8.4	8.0	7.9	8.3		8.24		7.83	8.1	8.5	8.20	8.40		8.40	8.2
CONDUCT. (mhos/cm)	1275 1275 1275	1590.0 1490.0 1500.0	1500	1400.0 1410.0 1400.0	1700.0 1710.0 1710.0	1400.0		1600.0		1200.0	1700.0	1000.0		1000.0	1760.0
AVERAGE	1275.0	1515.0	1500	1407.5	1705.0	1400.0		1600.0	1410.0	1200.0	1700	1000		1000	1760.0
(mg/l)															
As	<0.050	<0.050	<0.050	<0.050	<0.050										
As	<0.050	<0.050	<0.050	<0.050	<0.050										
Ba	<1	<0.005	<0.010	<0.010	<0.010	3.3									236.0
Ca	<0.010	<0.010	<0.010	<0.010	<0.010										8.8
Cl	70.0	70.0	70.0	62.0	62.0	63.5									
Cr	0.050	0.050	0.050	0.050	0.050										
Fe	0.62	0.62	0.62	1.100	1.100										
Hs	<0.002	<0.002	<0.002	<0.002	<0.002										
K															
Mn	0.17	0.02	0.02	0.02	0.02										
Na	348.0	424.0	950	376.0	376.0	320.0									
Ni	<0.050	<0.050	<0.050	<0.050	<0.050										
Pb	<0.050	<0.050	<0.050	<0.050	<0.050										
Se	26.0	14.0	223	453.0	453.0										
Si	<0.001	<0.001	0.002	0.002	0.002										
Fluoride	0.63	0.9	0.950	0.549	0.700										
NO3(N)	0.20	1.0	0.010	0.010	0.010										
Endrin	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002										
Lindane	<0.004	<0.004	<0.004	<0.004	<0.004										
Methoxych	<0.01	<0.01	<0.01	<0.01	<0.01										
Toxaphene	<0.005	<0.005	<0.005	<0.005	<0.005										
2,4-D	<0.01	<0.01	<0.01	<0.01	<0.01										
2,4,5-TP	<0.01	<0.01	<0.01	<0.01	<0.01										
Coliform (FC1/1)	<1/100	<1/100	<1/100	<1/100	<1/100										
Radium	<5	<5													
Gross Alp (FTU)	0.0	0.0	0.0	0.0	0.0										
Gross Bet	0.0	0.0	0.0	0.0	0.0										
Turbidity	51.0														

344.0

ND

2.5

OW1 Giant Ciniza Refinery Gallup, New Mexico

DATE 12/80 3/86 4/87 4/88 7/89

PARAMETER

pH	7.80	8.00	9.15	8.80	8.70 8.70 8.70 8.60 8.67
Average	7.80	8.00	9.15	8.80	8.67
Sp. Cond.		880	1200	1400	1140 1130 1130 1180 1145
Average		880	1200	1400	1145

mg/L (unless otherwise indicated)

Benzene			<0.001	43.8ug/L	ND
Tolulene			<0.001	1.1ug/L	ND
Ethyl Benzene			<0.001	<0.1ug/L	ND
Xylene			<0.001	<0.1ug/L	ND
Ag		<0.1			
As	<0.1	0.034			
Al		210.00			
Ba		1.80			
Be		<0.1			
B		0.40			
Cd		<0.1			
Ca		100.00	124.00	1.13	4.10
Cl	28.00	92.10	41.60	34.70	36.00
CN	<0.1				
Cr	0.007	<0.1			
Co		<0.1			
Cu		<0.1			
F	0.55				
Fe	0.07	65.00			
Hg					
K		58.50	6.60	1.08	ND
Mg		66.00	22.60	0.48	0.60
Mn	0.04	1.70			
Mo		<0.1			
Na	270.00	460.00	460.00	158.75	318.00
Ni		<0.1			
Pb		0.30			
Se	<0.1	<0.005			
Si		10.00			
Sn		0.10			
St		7.20			
V		<0.1			
Zn		0.40			
Bicarbonate		542.00	328.00	368.00	358.00
Carbonate		55.20	32.00	24.00	30.00
Nitrate	0.50				
Sulfate	167.00	177.00	73.00	148.00	226.00
TDS	776.00		1150.00	980.00	860.00

OW2

Giant Ciniza Refinery

Gallup, New Mexico

DATE	11/80	12/80	6/81	9/81	3/86	4/87	4/88	7/89
PARAMETER								

pH	7.60				7.50	8.16	8.70	8.1 8.2 8.0 8.1 8.1
Average	7.60				7.50	8.16	8.70	8.1
Sp. Cond.	1180.00				950	1300	1300	1130 1120 1120 1130 1125
Average	1180.00							
mg/L (unless otherwise indicated)								
Benzene						<0.001	<1ug/L	ND
Tolulene						<0.001	<1ug/L	ND
Ethyl Benzene						<0.001	<1ug/L	ND
Xylene						<0.001	<1ug/L	ND
Ag				<0.03	<0.1			
As	<0.01			0.030	0.006			
Al					0.60			
Ba				1.300	0.10			
Be					<0.1			
B					0.80			
Ca	20.00				9.90	2.25	4.12	13
Cd				<0.01	<0.1			
Cl	39.00				41.50	40.60	377.00	40
CN	<0.1				<0.01			
Cr	0.003	1.60	0.60	0.016	<0.1			
Co					<0.1			
Cu					<0.1			
F	1.60							
Fe	1.10				0.30			
Hg				<0.002				
K					3.12	1.37	0.61	ND
Mg					3.20	0.38	3.55	4.7
Mn	0.20			1.170	0.12			
Mo					<0.1			
Na	390.00				294.00	250.00	178.75	319
Ni					<0.1			
Pb			0.53		<0.1			
Se	0.01			0.042	<0.005			
Si					5.20			
St					0.40			
Tin					<0.1			
V					<0.1			
Zn					<0.1			
Bicarbonate					802.00	568.00	604.00	664
Carbonate					0.00	<5	<2	ND
Sulfate	16.00				30.50	40.00	20.50	11
TDS	856.00				865.00	565.00	840.00	1040

OW3

Giant Ciniza Refinery

Gallup, New Mexico

DATE	11/80	3/86	4/87	4/88	7/89
PARAMETER					

pH	7.70	7.70	8.14	8.20	8.00 8.10 8.00 8.20
Average	7.70	7.70	8.14	8.20	8.08
Sp. Cond.	1280	910	1250	1200	1120 1110 1120 1110
Average	1280	910	1250	1200	1115
mg/L (unless otherwise indicated)					
Benzene			<0.001	<1ug/L	ND
Tolulene			<0.001	<1ug/L	ND
Ethyl Benzene			<0.001	<1ug/L	ND
Xylene			<0.001	<1ug/L	ND
Ag		<0.1			
As	<0.01	0.006			
Al		<0.1			
Ba		<0.1			
Be		<0.1			
B		0.70			
Cd		<0.1			
Ca	3.40	36.00	7.77	4.50	12.00
Cl	36.00	41.20	39.70	32.80	39.00
CN	<0.1				
Cr	0.007	<0.1			
Co		<0.1			
Cu		<0.1			
F	1.40				
Fe	1.80	<0.1			
Hg					
K		0.00	0.76	0.34	ND
Mg		8.20	5.80	3.63	4.00
Mn	0.003	0.13			
Mo		<0.1			
Na	370.00	276.00	200.00	187.50	318.00
Ni		<0.1			
Pb		<0.1			
Se	<0.01	<0.005			
Si		3.10			
Sn		<0.1			
St		0.70			
V		<0.1			
Zn		<0.1			
Bicarbonate		619.00	544.00	612.00	650.00
Carbonate		12.00	<5	<2	ND
Sulfate	79.00	71.00	17.00	8.59	17.00
TDS	876.00	805.00	755.00	704.00	920.00

OW4-OW20

Giant Ciniza Refinery

Gallup, New Mexico

(excluding OW11,OW24)

DATE:	12/80	6/81	9/81	12/80	12/84	3/86
WELL #	OW4	OW4	OW4	OW7	OW7	OW7
PARAMETER						

pH	8.10			8.70	8.70	7.70
Average	8.10			8.70	8.70	7.70
Sp. Cond.				1050	1200	820
Average				1050	1200	820
mg/L						
Benzene						
Tolulene						
Ethyl Benzene						
Xylene						
Ag			<0.1			<0.1
As	<0.1			<0.01		<0.005
Al						0.30
Ba			0.30			<0.1
Be						<0.1
B						0.40
Cd			<0.001			<0.1
Ca	14.00			34.00		2.30
Cl	57.00			21.00		30.00
CN	<0.1			<0.1		
Cr	1.00	0.60	0.55	0.003		<0.1
Co						<0.1
Cu						<0.1
F				0.37		
Fe	0.10			0.30		0.10
Hg			0.0042			
K						6.75
Mg						0.30
Mn	0.07			0.02		<0.05
Mo						<0.1
Na	230.00					2530.00
Ni						<0.1
Pb	0.005		0.002			<0.1
Se	<0.01			<0.01		<0.005
Si						3.20
Sn						<0.1
St						0.20
V						<0.1
Zn						<0.1
Aromatic HC						ND
Bicarbonate						547.00
Carbonate						30.00
Halogenated HC						ND
Oil & Grease						
Phenols			<0.001			
Sulfate	188.00			166.00		174.00
TDS	741.00			717.00		785.00
TOC						

OW4-OW20

(excluding 1,OW24)

Giant Ciniza Refinery

Gallup, New Mexico

DATE:	12/80	3/86	12/80	12/80	9/81	3/86
WELL #	OW9	OW9	OW10	OW12	OW12	OW12
PARAMETER						

pH	7.80	6.70	7.60			12.10
Average	7.80	6.70	7.60			12.10
Sp. Cond.	1575	1010	1477			4850
Average	1575	1010	1477			4850
mg/L						
Benzene						51*
Tolulene						160*
Ethyl Benzene						10*
Xylene						91*
Ag		<0.1		<0.1		<0.1
As	<0.01	<0.005	<0.01			<0.005
Al		<0.1				<0.1
Ba		<0.1		1.00		0.20
Be		<0.1				<0.1
B		0.40				0.10
Cd		<0.1		<0.001		<0.1
Ca	19.00	13.00	17.00			94.00
Cl	56.00	97.20	79.00			86.60
CN			<0.1			
Cr	0.004	<0.1	0.002	0.004	0.15	<0.1
Co		<0.1				<0.1
Cu		<0.1				<0.1
F	0.80		0.64			
Fe	0.02	<0.1	0.60			<0.1
Hg				<0.0004		
K		0.00				18.00
Mg		1.50				0.20
Mn	0.02	<0.05	0.03			<0.05
Mo		<0.1				<0.1
Na	350.00	322.00	360.00			402.50
Ni		<0.1				<0.1
Pb		<0.1		0.03	0.08	<0.1
Se	<0.01	0.009	0.01			0.007
Si		1.60				<0.1
Sn		<0.1				<0.1
St		0.90				3.30
V		<0.1				<0.1
Zn		<0.1				
Aromatic HC		ND				
Bicarbonate		427.00				
Carbonate		0.00				
Halogenated HC		ND				
Oil & Grease						
Phenols					<0.001	
Sulfate	391.00	282.00	331.00			
TDS	1060.00	1045.00	1030.00			
TOC						
TOX		<0.4				

(excluding OW11,OW24)

DATE:	1/81	3/86	1/81	3/86	4/86	12/80	3/86
WELL #	OW13	OW13	OW14	OW14	OW14	OW16	OW16
PARAMETER							

pH	8.50	8.50	7.30	7.50	8.20	7.60	8.20
Average	8.50	8.50	7.30	7.50	8.20	7.60	8.20
Sp. Cond.	1150	900	1425	1160	1300		900
Average	1150	900	1425	1160	1300		900
mg/L							
Benzene							
Tolulene							
Ethyl Benzene							
Xylene							
Ag		<0.1		<0.1	<0.1		<0.1
As			<0.01	<0.005		0.03	
Al	<0.01	<0.1		<0.1	<0.1		<0.1
Ba		<0.1		<0.1	0.10		<0.1
Be		<0.1		<0.1	<0.1		<0.1
B		0.30		0.40	0.40		1.50
Cd		<0.1		<0.1	<0.1		<0.1
Ca	6.50	12.00	34.00	34.00	42.00	24.00	7.40
Cl	19.00	15.00	210.00	224.00	204.00	230.00	
CN	<0.1		<0.1			<0.1	
Cr	0.009	<0.1	0.008	<0.1	<0.1	0.003	<0.1
Co		<0.1		<0.1	<0.1		<0.1
Cu		<0.1		<0.1	<0.1		<0.1
F			0.62			0.90	
Fe	0.60	<0.1	0.20	<0.1	<0.1	1.00	<0.1
Hg							
K		0.39		0.00	0.00		
Mg		1.80		8.70	10.00		1.30
Mn	0.06	<0.05	0.06	0.50	0.56	0.06	<0.05
Mo		<0.1		<0.1	<0.1		<0.1
Na	270.00	280.60	290.00	292.00	315.00	270.00	
Ni		<0.1		<0.1	<0.1		<0.1
Pb	0.03	<0.1	0.02	<0.1	<0.1		<0.1
Se	<0.01		<0.01	<0.005		0.01	
Si		1.10		3.60	2.50		3.00
Sn		<0.1		<0.1	<0.1		<0.1
St		0.90		1.30	1.40		0.30
V		<0.1		<0.1	<0.1		<0.1
Zn		<0.1		<0.1	<0.1		<0.1
Aromatic HC		ND		ND	ND		ND
Bicarbonate		546.00		595.00	592.90		
Carbonate		5.80		15.60	0.00		
Halogenated HC		ND		*1	*1		*1
Oil & Grease			6.40			4.00	
Phenols							
Sulfate	207.00	156.00	104.00	40.00	48.90	1015.00	
TDS	659.00	788.00	839.00	945.00	1014.00	799.00	
TOC							
TOX							<0.4

*1

1,2 dichloroethane
18,20,6 ug/L

OW4-OW20

(excluding OW24)

Giant Ciniza Refinery

Gallup, New Mexico

DATE:	1/81	6/81	3/86	4/86
WELL #	OW17	OW17	OW17	OW17

PARAMETER

pH	7.40	7.00	7.40
Average	7.40	7.00	7.40
Sp. Cond.	1400	1500	1700
Average	1400	1500	1700
mg/L			
Benzene		8265	9100
Tolulene		15000	21000
Ethyl Benzene		1240	1200
Xylene		9830	13200
Ag		<0.1	<0.1
As	0.02	<0.005	
Al		<0.1	<0.1
Ba		0.30	0.40
Be		<0.1	<0.1
B		0.30	0.40
Cd		<0.1	<0.1
Ca	400.00	97.00	110.00
Cl	86.00	595.00	246.00
CN	<0.1		
Cr	0.02	<0.1	<0.1
Co		<0.1	<0.1
Cu		<0.1	<0.1
F	0.47		
Fe	4.50	<0.1	<0.1
Hg			
K		1.56	1.17
Mg		17.00	20.00
Mn	4.20	2.20	2.10
Mo		<0.1	<0.1
Na	250.00	276.00	338.00
Ni		<0.1	<0.1
Pb	0.50	<0.1	<0.1
Se	<0.01	<0.005	
Si		2.90	1.80
Sn		<0.1	<0.1
St		3.50	4.10
V		<0.1	<0.1
Zn		<0.1	<0.1
Aromatic HC			
Bicarbonate		276.00	276.50
Carbonate		0.00	0.00
Halogenated HC		ND	
Oil & Grease	25.00		
Phenols			
Sulfate	319.00	35.00	22.00
TDS		1155.00	1358.00
TOC		43.00	
TOX			

WELL: MW-4

DATE	02-15-86	08-20-86	10-28-86	01-87	05-87	RETEST	10-87	10-87 DUP
PARAMETER								

TOC mg/l	4.00	4.00	6.00		2.00		5.00	1.10
	4.00	3.00	6.00		3.00		5.00	1.00
	3.90	4.00	7.00		3.00		5.00	1.00
	4.10	4.00	7.00		4.00		6.00	0.90
AVERAGE	4.00	3.75	6.50		3.00		5.25	1.00
TOX µg/l	<20	5.00	8.00		8.00		<5	<10
	<20	6.00	7.00		7.00		<5	<10
	<20	7.00	8.00		9.00		<5	<10
	<20	8.00	7.00		9.00		<5	<10
AVERAGE	<20	6.50	7.50		8.25		<5	<10
pH	8.33	9.04	8.56		8.48		8.90	8.50
	8.39	9.04	8.56		8.44		8.90	8.50
	8.37	9.05	8.55		8.54		8.80	8.50
	8.30	9.05	8.54		8.47		8.90	8.50
AVERAGE	8.35	9.05	8.55		8.48		8.88	8.50
CONDUCTIVITY	1020	1175	1100		1100		1200	1240
µhos/cm	1075	1180	1150		1000		1200	1240
	1100	1179	1100		1000		1200	1270
	1110	1170	1150		1000		1200	1260
AVERAGE	1076	1176	1125		1025		1200	1253
WATER ELEVATION	6874.3	6873.8	6873.6	6874.5	6876.2		6874.0	
Na mg/l	300.00	286.00	284.00		271.00			
Ca mg/l								
SO4 mg/l	192.00	177.00	154.00		222.00			
Cl mg/l	34.00	59.00	23.00		19.80			
As mg/l	<0.050	<0.050						
Ba mg/l	0.020	0.900						
Cd mg/l	0.010	0.010						
Cr mg/l	<0.050	<0.050	<0.050					
Pb mg/l	<0.050	<0.050	<0.050					
Hg mg/l	0.002	0.002						
Se mg/l	0.010							
Ag mg/l	0.050	0.050						
Fe mg/l	0.180	0.780	0.270		<0.3			

WELL: MW-5

DATE	02-15-86	08-20-86	10-28-86	01-87	05-87	RETEST	10-87	10-87 DUP
PARAMETER								

TOC mg/l	1.00	3.00	1.00				5.00	0.80
	2.00	3.00	1.00				5.00	0.70
	1.00	3.00	1.00				5.00	0.90
	2.00	3.00	2.00				4.00	0.80
AVERAGE	1.50	3.00	1.25				4.75	0.80
TOX µg/l	17.00	13.00	<5	<5	<5	<5	<10	
	17.00	13.00	<5	<5	<5	7.00	<10	
	16.00	13.00	<5	<5	<5	<5	<10	
	16.00	13.00	6.00	<5	<5	<5	<10	
AVERAGE	16.50	13.00	5.00	5.00	5.00	5.00	<10	
pH	8.86	9.04	8.74				9.00	8.60
	8.86	9.04	8.68				9.10	8.70
	8.85	9.03	8.67				9.10	8.70
	8.85	9.03	8.65				9.10	8.60
AVERAGE	8.86	9.04	8.69				9.08	8.70
CONDUCTIVITY	1100	1200	1000				1100	1260
mhos/cm	1110	1190	1000				1100	1220
	1100	1190	1000				1100	1220
	1110	1200	1000				1100	1220
AVERAGE	1105	1195	1000				1100	1230
WATER ELEVATION	6870.7	6871.5	6871.3				6871.0	
Na mg/l	261.70	278.00	246.00					
Ca mg/l								
SO4 mg/l	186.00	205.00	239.00					
Cl mg/l	59.00	61.00	46.00					
As mg/l								
Ba mg/l								
Cd mg/l								
Cr mg/l	<0.050							
Pb mg/l	<0.050							
Hg mg/l								
Se mg/l								
Ag mg/l								
Fe mg/l	0.220		<0.3					

Memo

From

DAVID G. BOYER

Hydrogeologist

To

OW 2 - 88

$$\frac{178.75}{23} = 7.77$$

$$\frac{377.2}{35.45} = 10.64$$

$$\frac{.605}{39} = 0.02$$

$$\frac{20.5}{48.03} = 0.43$$

$$\frac{4.12}{20} = 0.21$$

$$\frac{604}{61.01} = 9.9$$

$$\frac{3.55}{12.1} = 0.29$$

$$\frac{20.97}{(11.39 \text{ w/c} = 37.7)}$$

NS 849

(547)

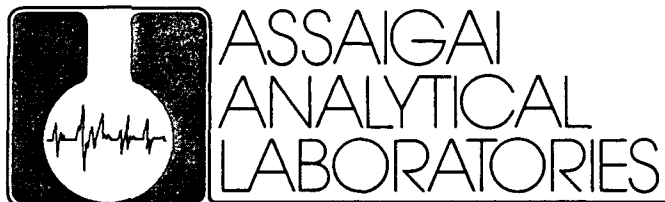
87

11.05

11.29

TDS 903

(619)



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 28 April 1988
WORK ORDER NO: 2505

SAMPLE ID: SMW-1

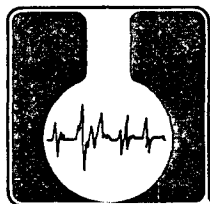
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Na	1116.25 mg/l	0.02 mg/l
K	0.950 mg/l	0.05 mg/l
Ca	155.75 mg/l	0.25 mg/l
Mg	70.75 mg/l	0.01 mg/l
Cl	1032 mg/l	1.0 mg/l
Duplicate	1052 mg/l	1.0 mg/l
SO 4	934.0 mg/l	1.0 mg/l
CO 3	<2 mg/l	2 mg/l
HCO 3	1368 mg/l	2 mg/l
TDS	4088 mg/l	1 mg/l
pH		0.01
EC	3900 umhos/cm	1 umhos/cm
Aromatic Hydrocarbons		
Benzene	<1 ug/l	1 ug/l
Toluene	<1 ug/l	1 ug/l
Ethyl Benzene	<1 ug/l	1 ug/l
Total Xylenes	<1 ug/l	1 ug/l

RECEIVED
JUN - 9 1988
OIL CONSERVATION DIVISION
SANTA FE

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,

Donald P. Stanton
Vice President



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 28 April 1988
WORK ORDER NO: 2505

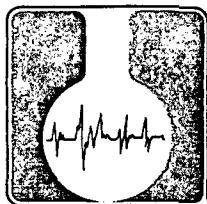
SAMPLE ID: SMW-2

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Na	1450.0 mg/l	0.02 mg/l
K	0.850 mg/l	0.05 mg/l
Ca	147.05 mg/l	0.25 mg/l
Mg	60.25 mg/l	0.01 mg/l
Cl	1419 mg/l	1.0 mg/l
SO 4	1504.6 mg/l	1.0 mg/l
CO 3	<2 mg/l	2 mg/l
HCO 3	492 mg/l	2 mg/l
TDS	4964 mg/l	1 mg/l
pH	7.7	0.01
EC	5200 umhos/cm	1 umhos/cm
<u>Aromatic Hydrocarbons</u>		
Benzene	<1 ug/l	1 ug/l
Toluene	<1 ug/l	1 ug/l
Ethyl Benzene	<1 ug/l	1 ug/l
Total Xylenes	<1 ug/l	1 ug/l

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Sincerely,

Donald P. Stanton
Vice President



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 28 April 1988
WORK ORDER NO: 2505

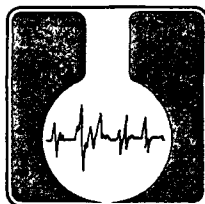
SAMPLE ID: SMW-3

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Na	662.50 mg/l	0.02 mg/l
K	1.125 mg/l	0.05 mg/l
Ca	63.45 mg/l	0.25 mg/l
Mg	26.25 mg/l	0.01 mg/l
Cl	42.7 mg/l	1.0 mg/l
SO 4	1090.2 mg/l	1.0 mg/l
CO 3	<2 mg/l	2 mg/l
HCO 3	604 mg/l	2 mg/l
TDS	2672 mg/l	1 mg/l
pH	7.9	0.01
EC	3500 umhos/cm	1 umhos/cm
<u>Aromatic Hydrocarbons</u>		
Benzene	<1 ug/l	1 ug/l
Toluene	<1 ug/l	1 ug/l
Ethyl Benzene	<1 ug/l	1 ug/l
Total Xylenes	<1 ug/l	1 ug/l

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,

Donald P. Stanton
Vice President



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 28 April 1988
WORK ORDER NO: 2505

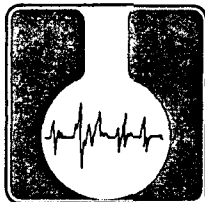
SAMPLE ID: SMW-4

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Na	173.75 mg/l	0.02 mg/l
K	0.672 mg/l	0.05 mg/l
Ca	1.862 mg/l	0.25 mg/l
Mg	1.20 mg/l	0.01 mg/l
Cl	47.6 mg/l	1.0 mg/l
SO 4	144.3 mg/l	1.0 mg/l
Duplicate	147.5 mg/l	1.0 mg/l
CO 3	40 mg/l	2 mg/l
HCO 3	412 mg/l	2 mg/l
TDS	752 mg/l	1 mg/l
pH	8.4	0.01
EC	1300 umhos/cm	1 umhos/cm
<u>Aromatic Hydrocarbons</u>		
Benzene	<1 ug/l	1 ug/l
Toluene	<1 ug/l	1 ug/l
Ethyl Benzene	<1 ug/l	1 ug/l
Total Xylenes	<1 ug/l	1 ug/l

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,

Donald P. Stanton
Vice President



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClerahan
Route 3 Box 7
Gallup, NM 87301

DATE: 28 April 1988
WORK ORDER NO: 2505

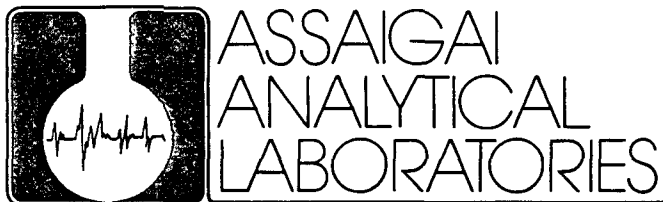
SAMPLE ID: SMW-5

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Na	128.75 mg/l	0.02 mg/l
K	0.732 mg/l	0.05 mg/l
Ca	1.539 mg/l	0.25 mg/l
Mg	0.668 mg/l	0.01 mg/l
Cl	52.6 mg/l	1.0 mg/l
SO 4	114.8 mg/l	1.0 mg/l
CO 3	20 mg/l	2 mg/l
HCO 3	352 mg/l	2 mg/l
TDS	760 mg/l	1 mg/l
pH	8.7	0.01
EC	1200 umhos/cm	1 umhos/cm
<u>Aromatic Hydrocarbons</u>		
Benzene	<1 ug/l	1 ug/l
Toluene	<1 ug/l	1 ug/l
Ethyl Benzene	<1 ug/l	1 ug/l
Total Xylenes	<1 ug/l	1 ug/l

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Sincerely,

Donald P. Stanton
Vice President



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 28 April 1988
WORK ORDER NO: 2505

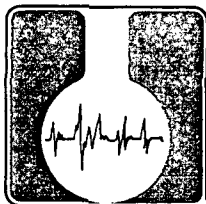
SAMPLE ID: SMW-6

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Na	312.50 mg/l	0.02 mg/l
K	0.913 mg/l	0.05 mg/l
Ca	3.674 mg/l	0.25 mg/l
Mg	2.77 mg/l	0.01 mg/l
Cl	62.5 mg/l	1.0 mg/l
Duplicate	71.5 mg/l	1.0 mg/l
SO 4	82.8 mg/l	1.0 mg/l
CO 3	<2 mg/l	2 mg/l
HCO 3	532 mg/l	2 mg/l
TDS	1028 mg/l	1 mg/l
pH	8.2	0.01
EC	1700 umhos/cm	1 umhos/cm
<u>Aromatic Hydrocarbons</u>		
Benzene	<1 ug/l	1 ug/l
Toluene	<1 ug/l	1 ug/l
Ethyl Benzene	<1 ug/l	1 ug/l
Total Xylenes	<1 ug/l	1 ug/l

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Sincerely,

Donald P. Stanton
Vice President



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 28 April 1988
WORK ORDER NO: 2505

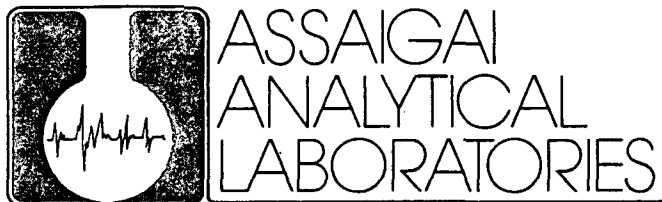
SAMPLE ID: OW-2

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Na	178.75 mg/l	0.02 mg/l
K	0.605 mg/l	0.05 mg/l
Ca	4.120 mg/l	0.25 mg/l
Mg	3.55 mg/l	0.01 mg/l
Cl	? 377.2 mg/l	1.0 mg/l
SO 4	20.5 mg/l	1.0 mg/l
CO 3	<2 mg/l	2 mg/l
HCO 3	604 mg/l	2 mg/l
TDS	840 mg/l	1 mg/l
pH	8.7	0.01
EC	1300 umhos/cm	1 umhos/cm
<u>Aromatic Hydrocarbons</u>		
Benzene	<1 ug/l	1 ug/l
Toluene	<1 ug/l	1 ug/l
Ethyl Benzene	<1 ug/l	1 ug/l
Total Xylenes	<1 ug/l	1 ug/l

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,

Donald P. Stanton
Vice President



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 28 April 1988
WORK ORDER NO: 2505

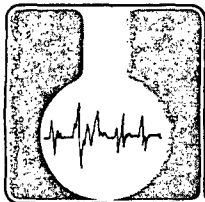
SAMPLE ID: OW-3

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Na	187.50 mg/l	0.02 mg/l
K	0.341 mg/l	0.05 mg/l
Ca	4.528 mg/l	0.25 mg/l
Mg	3.63 mg/l	0.01 mg/l
Cl	32.8 mg/l	1.0 mg/l
SO 4	8.59 mg/l	1.0 mg/l
CO 3	<2 mg/l	2 mg/l
HCO 3	612 mg/l	2 mg/l
TDS	704 mg/l	1 mg/l
pH	8.2	0.01
EC	1200 umhos/cm	1 umhos/cm
<u>Aromatic Hydrocarbons</u>		
Benzene	<1 ug/l	1 ug/l
Toluene	<1 ug/l	1 ug/l
Ethyl Benzene	<1 ug/l	1 ug/l
Total Xylenes	<1 ug/l	1 ug/l

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,

Donald P. Stanton
Vice President



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refining
ATTN: Bob McClenahan
Rt 3 Box 7
Gallup, NM 87301

DATE: 17 February 1987
0154

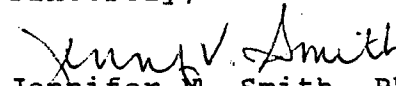
SAMPLE ID: SMW-1

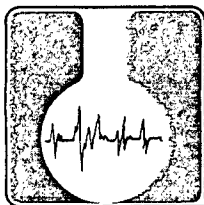
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
SO 4	1833 mg/l	1.0 mg/l
TDS	4582 mg/l	1 mg/l
Na	1135 mg/l	0.1 mg/l
K	1.19 mg/l	0.1 mg/l
Ca	230.8 mg/l	0.1 mg/l
Mg	68.9 mg/l	0.01 mg/l
CO 3	<5 mg/l	5 mg/l
HCO 3	510 mg/l	5 mg/l
pH	7.34	0.01
EC	5500 umhos/cm	1 umhos/cm
Cl	1112 mg/l	1.0 mg/l
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refining
ATTN: Bob McClenahan
Rt 3 Box 7
Gallup, NM 87301

DATE: 17 February 1987
0154

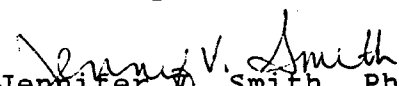
SAMPLE ID: SMW-3

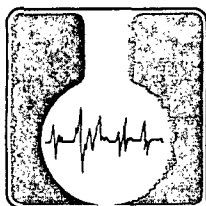
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
SO 4	2237 mg/l	1.0 mg/l
TDS	2704 mg/l	1 mg/l
Na	700 mg/l	0.1 mg/l
K	2.19 mg/l	0.1 mg/l
Ca	75.0 mg/l	0.1 mg/l
Mg	19.2 mg/l	0.01 mg/l
CO 3	<5 mg/l	5 mg/l
HCO 3	624 mg/l	5 mg/l
pH	8.13	0.01
EC	3200 umhos/cm	1 umhos/cm
Cl	43.6 mg/l	1.0 mg/l
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: " Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refining
ATTN: Bob McClenahan
Rt 3 Box 7
Gallup, NM 87301

DATE: 17 February 1987
0154

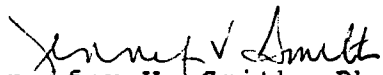
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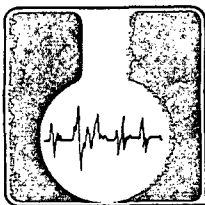
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
SO 4	2083 mg/l	1.0 mg/l
TDS	4418 mg/l	1 mg/l
Na	1625 mg/l	0.1 mg/l
K	1.25 mg/l	0.1 mg/l
Ca	273.5 mg/l	0.1 mg/l
Mg	61.5 mg/l	0.01 mg/l
CO 3	<5 mg/l	5 mg/l
HCO 3	320 mg/l	5 mg/l
pH	6.61	0.01
EC	6700 umhos/cm	1 umhos/cm
Cl	1588 mg/l	1.0 mg/l
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE:" Test Methods for Evaluating Solid Waste,
Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting
Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



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ATTN: Bob McClenahan
Rt 3 Box 7
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DATE: 17 February 1987
0154

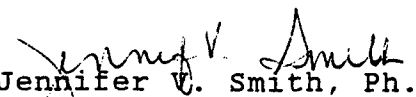
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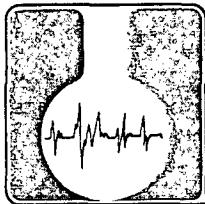
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
SO 4	165 mg/l	1.0 mg/l
TDS	890 mg/l	1 mg/l
Na	335 mg/l	0.1 mg/l
K	1.31 mg/l	0.1 mg/l
Ca	2.2 mg/l	0.1 mg/l
Mg	1.46 mg/l	0.01 mg/l
CO 3	<5 mg/l	5 mg/l
HCO 3	324 mg/l	5 mg/l
pH	8.28	0.01
EC	1300 umhos/cm	1 umhos/cm
Cl	53.6 mg/l	1.0 mg/l
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: " Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

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Laboratory Director



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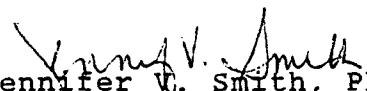
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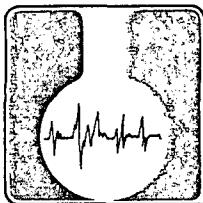
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
SO 4	186 mg/l	1.0 mg/l
TDS	892 mg/l	1 mg/l
Na	265 mg/l	0.1 mg/l
K	1.33 mg/l	0.1 mg/l
Ca	21.7 mg/l	0.1 mg/l
Mg	2.53 mg/l	0.01 mg/l
CO 3	<5 mg/l	5 mg/l
HCO 3	320 mg/l	5 mg/l
pH	8.38	0.01
EC	1200 umhos/cm	1 umhos/cm
Cl	61.5 mg/l	1.0 mg/l
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: " Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

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Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



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ATTN: Bob McClenahan
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Gallup, NM 87301

DATE: 17 February 1987
0154

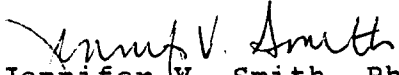
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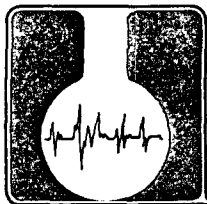
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
SO 4	136 mg/l	1.0 mg/l
TDS	818 mg/l	1 mg/l
Na	320 mg/l	0.1 mg/l
K	1.30 mg/l	0.1 mg/l
Ca	3.3 mg/l	0.1 mg/l
Mg	1.86 mg/l	0.01 mg/l
CO 3	<5 mg/l	5 mg/l
HCO 3	400 mg/l	5 mg/l
pH	8.24	0.01
EC	1400 umhos/cm	1 umhos/cm
Cl	63.5 mg/l	1.0 mg/l
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: " Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,


Jennifer W. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Rob McClenahan
Rte 3 Box 7
Gallup, NM 87301

DATE: 29 April 1987
0584

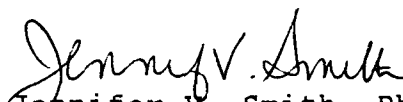
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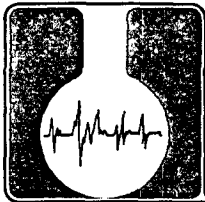
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
Na	460.0 mg/l	0.1 mg/l
K	6.60 mg/l	0.1 mg/l
Ca	124 mg/l	0.1 mg/l
Mg	22.6 mg/l	0.01 mg/l
Cl	41.6 mg/l	1.0 mg/l
SO 4	73 mg/l	1.0 mg/l
HCO 3	328 mg/l	5 mg/l
CO 3	32 mg/l	5 mg/l
TDS	1150 mg/l	1 mg/l
pH	9.15	0.01
EC	1200 umhos/cm	1 umhos/cm
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: "Test Methods for Evaluating Solid Waste, -Physical/Chemical Methods," USEPA, SW 846, EMSL-Cincinnati, 1982

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Rob McClenahan
Rte 3 Box 7
Gallup, NM 87301

DATE: 29 April 1987
0584

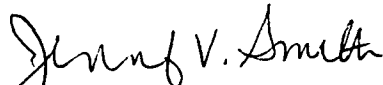
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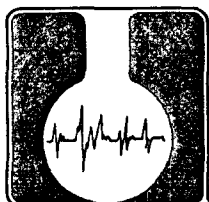
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
Na	250.0 mg/l	0.1 mg/l
K	1.37 mg/l	0.1 mg/l
Ca	2.25 mg/l	0.1 mg/l
Mg	0.38 mg/l	0.01 mg/l
Cl	40.6 mg/l	1.0 mg/l
SO 4	40 mg/l	1.0 mg/l
HCO 3	568 mg/l	5 mg/l
CO 3	<5 mg/l	5 mg/l
TDS	565 mg/l	1 mg/l
pH	8.16	0.01
EC	1300 umhos/cm	1 umhos/cm
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: "Test Methods for Evaluating Solid Waste, -Physical/Chemical Methods," USEPA, SW 846, EMSL-Cincinnati, 1982

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Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Rob McClenahan
Rte 3 Box 7
Gallup, NM 87301

DATE: 29 April 1987
0584

SAMPLE ID: OW-3

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
Na	200.0 mg/l	0.1 mg/l
K	0.76 mg/l	0.1 mg/l
Ca	7.77 mg/l	0.1 mg/l
Mg	5.80 mg/l	0.01 mg/l
Cl	39.7 mg/l	1.0 mg/l
SO 4	17 mg/l	1.0 mg/l
HCO 3	544 mg/l	5 mg/l
CO 3	<5 mg/l	5 mg/l
TDS	755 mg/l	1 mg/l
pH	8.14	0.01
EC	1250 umhos/cm	1 umhos/cm
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: "Test Methods for Evaluating Solid Waste, -Physical/Chemical Methods," USEPA, SW 846, EMSL-Cincinnati, 1982

An invoice for services is enclosed. Thank you for
contacting Assaigai Laboratories.

Sincerely,

Jennifer V. Smith, Ph.D.
Laboratory Director

March 29, 1988



David G. Boyer
Oil Conservation Division
P.O. Box 2088
Land Office Building
Santa Fe, NM 87501

RE: Discharge Permit GW-32 for Giant's Ciniza Refinery

Dear Mr. Boyer:

Attached are the data for groundwater monitoring at our Ciniza facility. Additionally, data on the new aeration system are enclosed. The waste water flow to the aeration basin was approximately 180,000 Gallons Per Day (GPD) prior to the Travel Center opening and 238,000 GPD after opening. The average daily flow through the ion exchange rinse water neutralization system was 37,000 GPD.

Evaporation pond dike integrity was maintained throughout the year.

If you have any questions regarding this information, please feel free to call.

Sincerely,

Robert L. McClenahan, Jr.
Environmental Coordinator
Giant Refining Company

RLM:ds

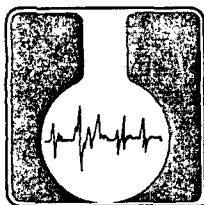
Enclosures

cc w/o enclosures: Carl Shook
Kim Bullerdick

AERATION BASIN DATA

DATE	INLET			1st CELL		2nd CELL		3rd CELL	
	COD	BOD	TSS	COD (s)	BOD (s)	COD (s)	BOD (s)	COD	BOD TSS
5/29	1066			362		247		380 (T) 324 (S)	
6/24	1199			590		230		781 (T)	
7/27	603	448	74	214	91	175	79	233 (T) 136 (S)	67 (T) 42 69 (S)

- Chemical Oxygen Demand
 - 5 day Biochemical Oxygen Demand
 - Total Suspended Solids
 - Total
 - Soluble



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refining
Attn: Mr. McClenahan
Rte 3 Box 7
Gallup, NM 87301

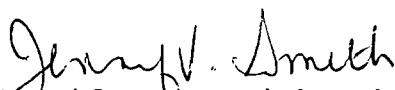
DATE: 29 May 1987
0817

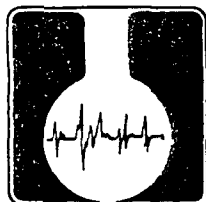
ANALYTE	SAMPLE ID/ANALYTICAL RESULTS		NOMINAL DETECTION LIMITS
	Pond A(S)	Pond B(S)	
COD	362 mg/l	247 mg/l	2 mg/l
	Pond C(T)	POND C(S)	
COD	380 mg/l	324 mg/l	2 mg/l
	Inlet(T)		
COD	1066 mg/l		2 mg/l

REFERENCE:" Test Methods for Evaluating Solid Waste Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1986.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Robert McClenahan
Route 3, Box 7
Gallup, NM 87031

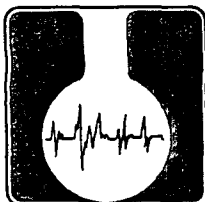
DATE: 24 June 1987
0742

ANALYTE

SAMPLE ID/ANALYTICAL RESULTS

	Inlet	Pond A	Pond B	Pond C
Total COD	1199 mg/l			781 mg/l
Soluble Filtered COD		590 mg/l		
Soluble COD			230 mg/l	

NOMINAL DETECTION LIMIT: 2 mg/l



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 27 July 1987
0991

SAMPLE ID: Inlet

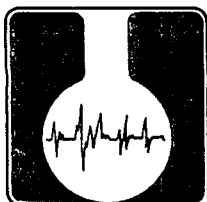
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
COD, T	603 mg/l	2 mg/l
BOD, T	448 mg/l	0.01 mg/l
TSS	74 mg/l	1 mg/l

REFERENCE: "Test Methods for Evaluating Solid Waste, -Physical
/Chemical Methods", USEPA, SW846, EMSL-Cincinnati,
1982.

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Sincerely,

Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 27 July 1987
0991

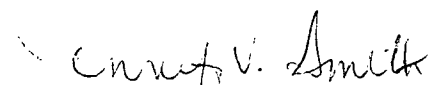
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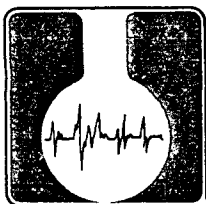
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
MLSS	95 mg/l	1 mg/l
MLVSS	460 mg/l	1 mg/l
BOD, S	90.9 mg/l	0.01 mg/l
COD, S	214 mg/l	2 mg/l

REFERENCE: "Test Methods for Evaluating Solid Waste,-Physical
/Chemical Methods", USEPA, SW846, EMSL-Cincinnati,
1982.

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Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



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TO: Giant Refinery
ATTN: Bob McClenahan
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DATE: 27 July 1987
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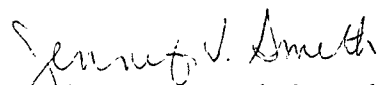
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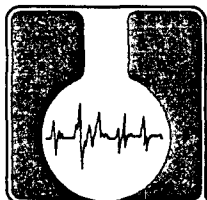
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
MLSS	45 mg/l	1 mg/l
MLVSS	310 mg/l	1 mg/l
BOD, S	79.2 mg/l	0.01 mg/l
COD, S	175 mg/l	2 mg/l

REFERENCE: "Test Methods for Evaluating Solid Waste, -Physical
/Chemical Methods", USEPA, SW846, EMSL-Cincinnati,
1982.

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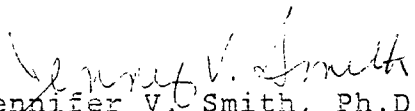
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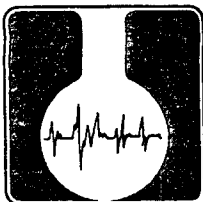
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
COD, T	233 mg/l	2 mg/l
BOD, T	67.2 mg/l	0.01 mg/l
TSS	42 mg/l	1 mg/l
BOD, S	68.5 mg/l	0.01 mg/l
COD, S	136 mg/l	2 mg/l

REFERENCE: "Test Methods for Evaluating Solid Waste, -Physical
/Chemical Methods", USEPA, SW846, EMSL-Cincinnati,
1982.

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Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 27 July 1987
0991

SAMPLE ID: Pond 2

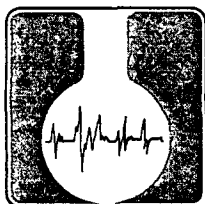
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
COD, T	369 mg/l	2 mg/l

REFERENCE: "Test Methods for Evaluating Solid Waste,-Physical
/Chemical Methods", USEPA, SW846, EMSL-Cincinnati,
1982.

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Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refining
ATTN: Bob McClenahan
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Gallup, NM 87301

DATE: 17 February 1987
0154

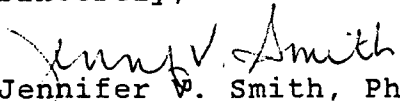
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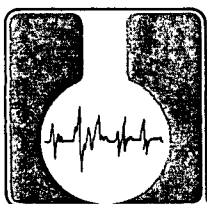
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
SO 4	1833 mg/l	1.0 mg/l
TDS	4582 mg/l	1 mg/l
Na	1135 mg/l	0.1 mg/l
K	1.19 mg/l	0.1 mg/l
Ca	230.8 mg/l	0.1 mg/l
Mg	68.9 mg/l	0.01 mg/l
CO 3	<5 mg/l	5 mg/l
HCO 3	510 mg/l	5 mg/l
pH	7.34	0.01
EC	5500 umhos/cm	1 umhos/cm
Cl	1112 mg/l	1.0 mg/l
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: " Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

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Sincerely,


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Laboratory Director



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TO: Giant Refining
ATTN: Bob McClenahan
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DATE: 17 February 1987
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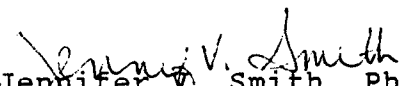
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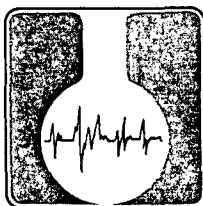
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
SO 4	2237 mg/l	1.0 mg/l
TDS	2704 mg/l	1 mg/l
Na	700 mg/l	0.1 mg/l
K	2.19 mg/l	0.1 mg/l
Ca	75.0 mg/l	0.1 mg/l
Mg	19.2 mg/l	0.01 mg/l
CO 3	<5 mg/l	5 mg/l
HCO 3	624 mg/l	5 mg/l
pH	8.13	0.01
EC	3200 umhos/cm	1 umhos/cm
Cl	43.6 mg/l	1.0 mg/l
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: " Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refining
ATTN: Bob McClenahan
Rt 3 Box 7
Gallup, NM 87301

DATE: 17 February 1987
0154

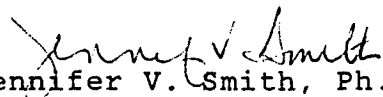
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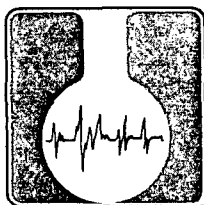
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
SO 4	2083 mg/l	1.0 mg/l
TDS	4418 mg/l	1 mg/l
Na	1625 mg/l	0.1 mg/l
K	1.25 mg/l	0.1 mg/l
Ca	273.5 mg/l	0.1 mg/l
Mg	61.5 mg/l	0.01 mg/l
CO 3	<5 mg/l	5 mg/l
HCO 3	320 mg/l	5 mg/l
pH	6.61	0.01
EC	6700 umhos/cm	1 umhos/cm
Cl	1588 mg/l	1.0 mg/l
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: " Test Methods for Evaluating Solid Waste,
Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

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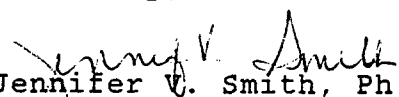
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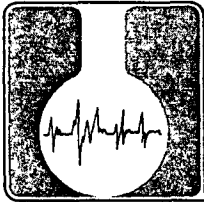
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
SO 4	165 mg/l	1.0 mg/l
TDS	890 mg/l	1 mg/l
Na	335 mg/l	0.1 mg/l
K	1.31 mg/l	0.1 mg/l
Ca	2.2 mg/l	0.1 mg/l
Mg	1.46 mg/l	0.01 mg/l
CO 3	<5 mg/l	5 mg/l
HCO 3	324 mg/l	5 mg/l
pH	8.28	0.01
EC	1300 umhos/cm	1 umhos/cm
Cl	53.6 mg/l	1.0 mg/l
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

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Laboratory Director



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DATE: 17 February 1987
0154

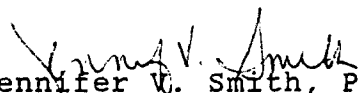
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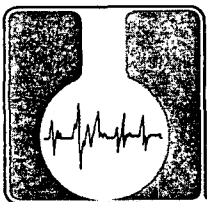
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
SO 4	186 mg/l	1.0 mg/l
TDS	892 mg/l	1 mg/l
Na	265 mg/l	0.1 mg/l
K	1.33 mg/l	0.1 mg/l
Ca	21.7 mg/l	0.1 mg/l
Mg	2.53 mg/l	0.01 mg/l
CO 3	<5 mg/l	5 mg/l
HCO 3	320 mg/l	5 mg/l
pH	8.38	0.01
EC	1200 umhos/cm	1 umhos/cm
Cl	61.5 mg/l	1.0 mg/l
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: " Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,


Jennifer W. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refining
ATTN: Bob McClenahan
Rt 3 Box 7
Gallup, NM 87301

DATE: 17 February 1987
0154

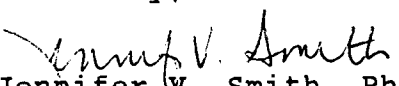
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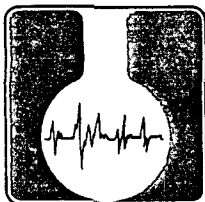
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
SO 4	136 mg/l	1.0 mg/l
TDS	818 mg/l	1 mg/l
Na	320 mg/l	0.1 mg/l
K	1.30 mg/l	0.1 mg/l
Ca	3.3 mg/l	0.1 mg/l
Mg	1.86 mg/l	0.01 mg/l
CO 3	<5 mg/l	5 mg/l
HCO 3	400 mg/l	5 mg/l
pH	8.24	0.01
EC	1400 umhos/cm	1 umhos/cm
Cl	63.5 mg/l	1.0 mg/l
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: " Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,


Jennifer W. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Rob McClenahan
Rte 3 Box 7
Gallup, NM 87301

DATE: 29 April 1987
0584

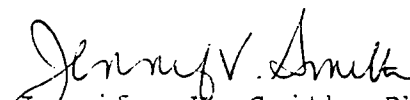
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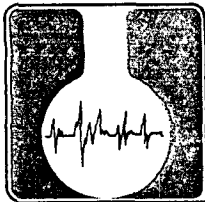
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
Na	460.0 mg/l	0.1 mg/l
K	6.60 mg/l	0.1 mg/l
Ca	124 mg/l	0.1 mg/l
Mg	22.6 mg/l	0.01 mg/l
Cl	41.6 mg/l	1.0 mg/l
SO 4	73 mg/l	1.0 mg/l
HCO 3	328 mg/l	5 mg/l
CO 3	32 mg/l	5 mg/l
TDS	1150 mg/l	1 mg/l
pH	9.15	0.01
EC	1200 umhos/cm	1 umhos/cm
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: "Test Methods for Evaluating Solid Waste, -Physical/Chemical Methods," USEPA, SW 846, EMSL-Cincinnati, 1982

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Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Rob McClenahan
Rte 3 Box 7
Gallup, NM 87301

DATE: 29 April 1987
0584

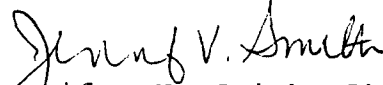
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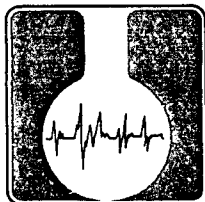
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
Na	250.0 mg/l	0.1 mg/l
K	1.37 mg/l	0.1 mg/l
Ca	2.25 mg/l	0.1 mg/l
Mg	0.38 mg/l	0.01 mg/l
Cl	40.6 mg/l	1.0 mg/l
SO 4	40 mg/l	1.0 mg/l
HCO 3	568 mg/l	5 mg/l
CO 3	<5 mg/l	5 mg/l
TDS	565 mg/l	1 mg/l
pH	8.16	0.01
EC	1300 umhos/cm	1 umhos/cm
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: "Test Methods for Evaluating Solid Waste, -Physical/Chemical Methods," USEPA, SW 846, EMSL-Cincinnati, 1982

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Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Rob McClenahan
Rte 3 Box 7
Gallup, NM 87301

DATE: 29 April 1987
0584

SAMPLE ID: OW-3

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
Na	200.0 mg/l	0.1 mg/l
K	0.76 mg/l	0.1 mg/l
Ca	7.77 mg/l	0.1 mg/l
Mg	5.80 mg/l	0.01 mg/l
Cl	39.7 mg/l	1.0 mg/l
SO 4	17 mg/l	1.0 mg/l
HCO 3	544 mg/l	5 mg/l
CO 3	<5 mg/l	5 mg/l
TDS	755 mg/l	1 mg/l
pH	8.14	0.01
EC	1250 umhos/cm	1 umhos/cm
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: "Test Methods for Evaluating Solid Waste, -Physical/Chemical
Methods," USEPA, SW 846, EMSL-Cincinnati, 1982

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Sincerely,

Jennifer V. Smith, Ph.D.
Laboratory Director



ROUTE 3, BOX 7 • GALLUP, NEW MEXICO 87301
(505) 722-3833 • TWX 910-981-0504

February 29, 1988

Julie Wanslow
Water Resources Specialist
Hazardous Waste Section
NMEID
P.O. Box 968
Santa Fe, New Mexico 87504-0968

RE: Annual Ground Water Monitoring Report for the
Calendar Year 1987, Facility EPA I.D. #NMD000333211

Dear Ms. Wanslow:

Enclosed is the ground water data and analysis thereof for Giant's Ciniza TSD facility as per NMHWR-3 Section 206.C.1.e(1)(b). The data includes the MW series and SMW (early detection) data for 1987.

During 1987 Monitor Well #3 was replaced by #5. All data taken from both wells are presented. The spring sampling showed some anomalies for TOC and/or TOX in MW-1, MW-5, SMW-4, SMW-5 and OW-24. These wells were resampled and the data showed that there was not an increase in these parameters. The fall sampling also confirmed this. Duplicates of all analyses were taken during the fall sampling and analyzed by separate laboratories as a quality assurance check. Only minor variation in PH and electro conductivity were observed. All of the data are attached.

The ground water velocity in the sonsela aquifer under the land treatment area is estimated to be 0.011 ft/day (4.02 ft/yr) by the following calculation.

$V = KI/n$
V = Velocity, ft/day
K = Conductivity, 0.35 ft/day
I = Potentiometric gradient, 0.003 ft/ft.
n = Porosity (10%)

"I" was calculated by using the average differential elevation between wells MW-4 and MW-2 in 1987.

(1)

February 29, 1988
Ms. Wanslow

Page 2

In summary, the data shows no migration of hazardous constituents from our land treatment area, nor degradation to the ground water.

Sincerely,

signed ~~2/29/88~~ 2/29/88 *gsh*

Carl D. Shook
Vice President Refining Operations

CDS/jvl

cc: Tanga Winkle, USEPA Region VI
Bob McClenahan, Jr.
Frank Deluca AES
Kim Bullerdick (no enclosures)

INORGANICS

MW SAMPLES

ANALYTE	MW-1	MW-2	MW-3	MW-4	MW-5		NOMINAL DETECTION LIMITS
	SPRING	SPRING	SPRING	SPRING	WINTER	SPRING	
Cl (mg/l)	44.6	59.5	55.5	19.8	61	46	1.0
Fe	<0.3	<0.3	<0.3	<0.3		<0.3	0.3
Mn	<0.05	<0.05	<0.05	<0.05		<0.05	0.05
Mg	0.26	0.21	0.41	0.29		0.20	0.01
Na	227	256	257	271	278	246	0.1
K	1.14	1.19	1.35	1.41	0.98	1.17	0.1
SO4	148	173	223	222	205	239	1.0
HCO3	274	256	254	380	248	266	5
CO3	32	32	36	16	40	24	5
TDS	610	624	620	658	650	638	1

ORGANICS

MW SAMPLES

ANALYTE	MW-1			MW-2			MW-3	NOMINAL DETECTION LIMITS
	SPRING	FALL	DUP	SPRING	FALL	DUP	SPRING	
Phenols	0.32			0.012			0.009	0.001
pH (S.U.)	8.51	9.1	8.6	8.65	9.1	8.7	8.67	--
	8.50	9.1	8.6	8.69	9.2	8.7	8.64	
	8.51	9.0	8.6	8.65	9.1	8.6	8.64	
	8.52	9.1	8.6	8.72	9.1	8.7	8.61	
$\bar{X}$	8.51	9.1	8.6	8.68	9.1	8.7	8.64	
S2	6.7x10 ⁻⁵	0.003	0	0.001	0.003	0.003	0.001	
EC, μ hos/cm)	1100	1400	1180	1000	1200	1200	1000	1
	1000	1400	1190	1000	1200	1200	1000	
	1100	1400	1190	1000	1200	1200	1000	
	1100	1400	1180	1000	1200	1200	1000	
$\bar{X}$	1075	1400	1185	1000	1200	1200	1000	
S2	2500	0	33	0	0	0	0	
		<u>NDL</u>		<u>NDL</u>				
TOC (mg/l)	2	(1) 2	0.7	(0.5) 4	1	0.9	1	1/0.5
	2	2	0.6	4	1	0.9	1	
	3	1	0.7	3	1	0.9	2	
	2	1	0.7	3	2	0.9	2	
$\bar{X}$	2	2	0.7	4	1	0.9	2	
S2	0.25	0.33	0.05	0.33	0.25	0	0.33	
		<u>RETEST</u> <u>NDL</u>		<u>NDL</u>				
TOX (mg/l)	38 <5	(5) <5	<10	(10) 8	<5	<10	5	5/10
	37 <5	<5	<10	6	6	<10	5	
	37 8	7	<10	6	6	<10	7	
	39 5	<5	<10	6	<5	<10	5	
$\bar{X}$	38 6	7	<10	7	5	<10	6	
S2	0.9	2.25 --	--	1.0	--	--	1.0	

ORGANICS

MW SAMPLES

ANALYTE	MW-4				MW-5			NOMINAL DETECTION LIMITS
	SPRING	FALL	DUP	WINTER	SPRING	FALL	DUP	
Phenols	0.036			0.097	<0.001			0.001
pH (S.U.)	8.48	8.9	8.5	9.04	8.74	9.0	8.6	--
	8.44	8.9	8.5	9.04	8.68	9.1	8.7	
	8.54	8.8	8.5	9.03	8.67	9.1	8.7	
	8.47	8.9	8.5	9.03	8.65	9.1	8.6	
$\bar{X}$	8.48	8.9	8.5	9.04	8.69	9.1	8.7	
S2	0.002	0.003	0	3×10^{-5}	0.002	0.003	0.003	
EC μ mhos/cm)	1100	1200	1240	1200	1000	1100	1260	1
	1000	1200	1240	1190	1000	1100	1220	
	1000	1200	1270	1190	1000	1100	1220	
	1000	1200	1260	1200	1000	1100	1220	
$\bar{X}$	1025	1200	1253	1195	1000	1100	1230	
S2	2500	0	225	33	0	0	400	
TOC (mg/l)	2	5	1.1	3	1	5	0.8	1/0.5
	3	5	1.0	3	1	5	0.7	
	3	5	1.0	3	1	5	0.9	
	4	6	0.9	3	2	4	0.8	
$\bar{X}$	3	5	1.0	3	1	5	0.8	
S2	0.67	0.25	0.007	0	0.25	0.25	0.007	
					RETEST			
TOX μ g/l)	8	<5	<10	13	15	<5	<5	5/10
	7	<5	<10	13	11	<5	7	
	9	<5	<10	13	12	<5	<5	
	9	<5	<10	13	10	6	<5	
$\bar{X}$	8	<5	<10	13	12	5	5	
S2	0.9	--	--	0.0	4.7	--	--	

SHALLOW MONITOR WELLS

ANALYTE	SMW-4			SMW-5			NOMINAL DETECTION LIMITS
	SPRING	FALL	DUP	SPRING	FALL	DUP	
Pb (mg/l)	<0.05	<0.05	<0.002	<0.05	<0.05	<0.002	0.05/0.002
Cr (mg/l)	<0.05	<0.05	<0.010	<0.05	<0.05	<0.010	0.05/0.010
pH S.U.	8.1	8.3	8.0	8.42	8.8	8.5	--
EC (μmhos/cm)	1200	1600	1860	1000	1100	1240	--
TOC (mg/l)	12	<u>RETEST</u> 2 12	1.3	10	<u>RETEST</u> 3 17	1.3	1/0.5
TOX (g/l)	7 11	7	<10	6	-- 6	<10	5/10

ANALYTE	SMW-6			OW-24			NOMINAL DETECTION LIMITS
	SPRING	FALL	DUP	SPRING	FALL	DUP	
Pb (mg/l)	<0.05	<0.05	<0.002	<0.05	<0.05	<0.002	0.05/0.002
Cr (mg/l)	<0.05	<0.05	<0.010	<0.05	<0.05	<0.010	0.05/0.010
pH S.U.	7.83	8.5	8.1	8.12	8.0	7.6	--
EC (μmhos/cm)	1600	1200	1410	1000	1000	1200	--
TOC (mg/l)	12	4	1.2	14	<u>RETEST</u> 10 11	1.6	1/0.5
TOX (μg/l)	11	<5	<10	30	5 5	<10	5/10

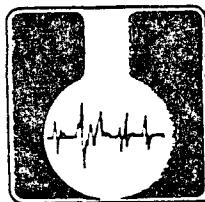
WATER LEVEL ELEVATIONS
MW SERIES RCRA MONITORING WELLS

ELEVATION OF:	MW-1	MW-2	MW-3	MW-4	MW-5
4/8/87 (#5 WINTER)	6872.0	6871.3		6874.5	6871.5
TOC	6876.9	6878.6	6880.8	6880.4	6880.8
DEPTH TO WATER	4.9	7.3		5.9	9.3
6/19/87 (SPRING SAMPLING)	6871.8	6871.1	6856.7	6876.2	6871.3
DEPTH TO WATER	5.1	7.5	24.1	6.2	9.5
11/19/87 (FALL SAMPLING)	6871.2	6871.2		6874.0	6871.0
DEPTH TO WATER	5.7	7.4	--	6.4	9.8

SMW SERIES MONITORING WELLS

ELEVATION OF:	SMW-4	SMW-5	SMW-6	OW-24
6/19/87	6846.26	6844.91	6846.54	6845.60
TOC	6877.74	6875.68	6878.35	6878.00
DEPTH TO WATER	31.48	30.77	31.81	32.40
11/19/87	6846.67	6844.48	6846.68	6844.90
DEPTH TO WATER	31.07	31.20	31.67	33.10

TOC = TOP OF WELL CASING



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 27 July 1987
0991

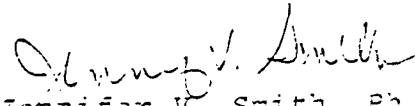
SAMPLE ID: MW-1

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Cl	44.6 mg/l	1.0 mg/l
Fe	<0.3 mg/l	0.3 mg/l
Mn	<0.05 mg/l	0.05 mg/l
Mg	0.26 mg/l	0.01 mg/l
Na	227 mg/l	0.1 mg/l
K	1.14 mg/l	0.1 mg/l
Ca	1.21 mg/l	0.1 mg/l
SO 4	143 mg/l	1.0 mg/l
HCO 3	274 mg/l	5 mg/l
CO 3	32 mg/l	5 mg/l
TDS	610 mg/l	1 mg/l
Phenols	0.32 mg/l	0.001 mg/l
pH	8.51 8.50 8.51 8.52	0.01
EC	1100 umhos/cm 1000 umhos/cm 1100 umhos/cm 1100 umhos/cm	1 umhos/cm
TOC	2 mg/l 2 mg/l 3 mg/l 2 mg/l	1 mg/l
TOX	38 ug/l 37 ug/l 37 ug/l 39 ug/l	5 ug/l

REFERENCE: "Test Methods for Evaluating Solid Waste, -Physical
/Chemical Methods", USEPA, SW846, EMSL-Cincinnati,
1982.

An invoice for services is enclosed. Thank you for
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Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



INDICATORS
PROJECT: RCRA SAMPLING

SAMPLE DATE: 11/16/87
LAB RECEIPT DATE: 11/19/87
MATRIX: WATER

SAMPLE ID: MW 1
LOCATION:
LAB SAMPLE #: 3598-1
UNITS:

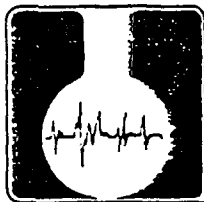
<u>ANALYSIS DATE</u>	<u>CONSTITUENT NAME</u>	<u>DILUTION FACTOR</u>	<u>DETECTION LIMIT</u>	<u>RESULT</u>
12/04/87	TOTAL ORGANIC CARBON (TOC)	1	0.5	0.7 mg/l 0.6 mg/l 0.7 mg/l 0.7 mg/l
12/08/87	TOTAL ORGANIC HALIDE (TOX)	1	0.010	ND ND ND ND
11/23/87	pH			8.6 8.6 8.6 8.6
11/23/87	CONDUCTIVITY			1180 umhos 1190 1190 1180

* THE LISTED DETECTION LIMITS REFLECT ANY SAMPLE DILUTION.

NOTE: ND = NOT DETECTED
NA = NOT ANALYZED

PROJECT MANAGER: *Jand*

DATE: 12/21/87



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 27 July 1987
0991

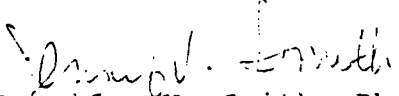
SAMPLE ID: MW-2

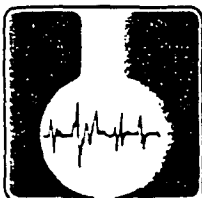
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Cl	59.5 mg/l	1.0 mg/l
Fe	<0.3 mg/l	0.3 mg/l
Mn	<0.05 mg/l	0.05 mg/l
Mg	0.21 mg/l	0.01 mg/l
Na	256 mg/l	0.1 mg/l
K	1.19 mg/l	0.1 mg/l
Ca	1.32 mg/l	0.1 mg/l
SO 4	173 mg/l	1.0 mg/l
HCO 3	256 mg/l	5 mg/l
CO 3	32 mg/l	5 mg/l
TDS	624 mg/l	1 mg/l
Phenols	0.012 mg/l	0.001 mg/l
pH	8.65	0.01
	8.69	
	8.65	
	8.72	
EC	1000 umhos/cm	1 umhos/cm
	1000 umhos/cm	
	1000 umhos/cm	
	1000 umhos/cm	
TOC	4 mg/l	1 mg/l
	4 mg/l	
	3 mg/l	
	3 mg/l	
TOX	8 ug/l	5 ug/l
	6 ug/l	
	6 ug/l	
	6 ug/l	

REFERENCE: "Test Methods for Evaluating Solid Waste, -Physical /Chemical Methods", USEPA, SW846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 31 December 1987
WORK ORDER NO: 1873

ANALYTE	SAMPLE ID/ANALYTICAL RESULTS		NOMINAL DETECTION LIMIT
	MW-1	MW-2	
TOC	2 mg/l	1 mg/l	1 mg/l
	2 mg/l	1 mg/l	
	1 mg/l	1 mg/l	
	1 mg/l	2 mg/l	
TOX	<5 ug/l	<5 ug/l	5 ug/l
	<5 ug/l	6 ug/l	
	7 ug/l	6 ug/l	
	<5 ug/l	<5 ug/l	
EC	1400 umhos/cm	1200 umhos/cm	1 umhos/cm
	1400 umhos/cm	1200 umhos/cm	
	1400 umhos/cm	1200 umhos/cm	
	1400 umhos/cm	1200 umhos/cm	
pH	9.1	9.1	0.01
	9.1	9.2	
	9.0	9.1	
	9.1	9.1	

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,

Donald P. Stanton
Vice President



INDICATORS
PROJECT: RCRA SAMPLING

SAMPLE DATE: 11/16/87
LAB RECEIPT DATE: 11/19/87
MATRIX: WATER

SAMPLE ID: MW 2
LOCATION:
LAB SAMPLE #: 3598-2
UNITS:

<u>ANALYSIS</u> <u>DATE</u>	<u>CONSTITUENT</u> <u>NAME</u>	<u>DILUTION</u> <u>FACTOR</u>	<u>DETECTION</u> <u>LIMIT</u>	<u>RESULT</u>
12/04/87	TOTAL ORGANIC CARBON (TOC)	1	0.5	0.9 mg/l 0.9 mg/l 0.9 mg/l 0.9 mg/l
12/08/87	TOTAL ORGANIC HALIDE (TOX)	1	0.010	ND ND ND ND
11/23/87	pH			8.7 8.7 8.6 8.7
11/23/87	CONDUCTIVITY			1200 umhos 1200 1200 1220

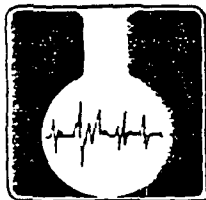
* THE LISTED DETECTION LIMITS REFLECT ANY SAMPLE DILUTION.

NOTE: ND = NOT DETECTED
NA = NOT ANALYZED

PROJECT MANAGER:

pmh

DATE: 12/21/87



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 27 July 1987
0991

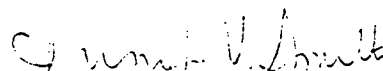
SAMPLE ID: MW-3

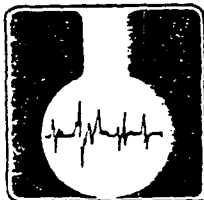
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Cl	55.5 mg/l	1.0 mg/l
Fe	<0.3 mg/l	0.3 mg/l
Mn	<0.05 mg/l	0.05 mg/l
Mg	0.41 mg/l	0.01 mg/l
Na	257 mg/l	0.1 mg/l
K	1.35 mg/l	0.1 mg/l
Ca	1.60 mg/l	0.1 mg/l
SO 4	223 mg/l	1.0 mg/l
HCO 3	254 mg/l	5 mg/l
CO 3	36 mg/l	5 mg/l
TDS	620 mg/l	1 mg/l
Phenols	0.009 mg/l	0.001 mg/l
pH	8.67 8.64 8.64 8.61	0.01
EC	1000 umhos/cm 1000 umhos/cm 1000 umhos/cm 1000 umhos/cm	1 umhos/cm
TOC	1 mg/l 1 mg/l 2 mg/l 2 mg/l	1 mg/l
TOX	5 ug/l 5 ug/l 7 ug/l 5 ug/l	5 ug/l

REFERENCE: "Test Methods for Evaluating Solid Waste,-Physical
/Chemical Methods", USEPA, SW846, EMSL-Cincinnati,
1982.

An invoice for services is enclosed. Thank you for
contacting Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 27 July 1987
0991

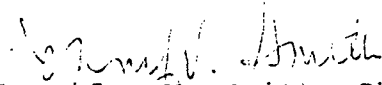
SAMPLE ID: MW-4

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Cl	19.8 mg/l 19.8 mg/l duplicate	1.0 mg/l
Fe	<0.3 mg/l	0.3 mg/l
Mn	<0.05 mg/l	0.05 mg/l
Mg	0.29 mg/l	0.01 mg/l
Na	271 mg/l	0.1 mg/l
K	1.41 mg/l	0.1 mg/l
Ca	1.37 mg/l	0.1 mg/l
SO 4	222 mg/l	1.0 mg/l
HCO 3	380 mg/l	5 mg/l
CO 3	16 mg/l	5 mg/l
TDS	658 mg/l	1 mg/l
Phenols	0.036 mg/l	0.001 mg/l
pH	8.48 8.44 8.45 8.47	0.01
EC	1100 umhos/cm 1000 umhos/cm 1000 umhos/cm 1000 umhos/cm	1 umhos/cm
TOC	2 mg/l 3 mg/l 3 mg/l 4 mg/l	1 mg/l
TOX	8 ug/l 7 ug/l 9 ug/l 9 ug/l	5 ug/l

REFERENCE: "Test Methods for Evaluating Solid Waste, -Physical /Chemical Methods", USEPA, SW846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director

- 7300 Jefferson, N.E. • Albuquerque, New Mexico 87109 • (505) 345-8964



INDICATORS
PROJECT: RCRA SAMPLING

SAMPLE DATE: 11/16/87
LAB RECEIPT DATE: 11/19/87
MATRIX: WATER

SAMPLE ID: MW 4
LOCATION:
LAB SAMPLE #: 3598-3
UNITS:

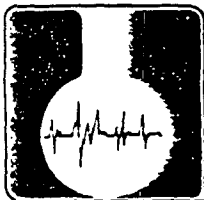
<u>ANALYSIS DATE</u>	<u>CONSTITUENT NAME</u>	<u>DILUTION FACTOR</u>	<u>DETECTION LIMIT</u>	<u>RESULT</u>
12/04/87	TOTAL ORGANIC CARBON (TOC)	1	0.5	1.1 mg/l 1.0 mg/l 1.0 mg/l 0.9 mg/l
12/08/87	TOTAL ORGANIC HALIDE (TOX)	1	0.010	ND ND ND ND
11/23/87	pH			8.5 8.5 8.5 8.5
11/23/87	CONDUCTIVITY			1240 umhos 1240 1270 1260

* THE LISTED DETECTION LIMITS REFLECT ANY SAMPLE DILUTION.

NOTE: ND = NOT DETECTED
NA = NOT ANALYZED

PROJECT MANAGER: *JmH*

DATE: 12/21/87



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Rob McClenahan
Rte 3 Box 7
Gallup, NM 87301

DATE: 29 April 1987
0584

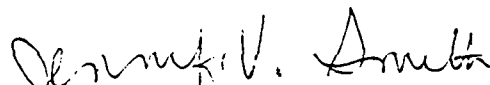
SAMPLE ID: MW-5

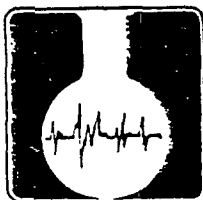
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
Na	278.0 mg/l	0.1 mg/l
K	0.98 mg/l	0.1 mg/l
Ca	6.68 mg/l	0.1 mg/l
Cl	61 mg/l	1.0 mg/l
SO 4	205 mg/l	1.0 mg/l
HCO 3	248 mg/l	5 mg/l
CO 3	40 mg/l	5 mg/l
TDS	650 mg/l	1 mg/l
pH	9.04	0.01
	9.04	
	9.03	
	9.03	
EC	1200 umhos/cm	1 umhos/cm
	1190	
	1190	
	1200	
Phenols	0.097 mg/l	0.01 mg/l
TOC	3 mg/l	1 mg/l
	3 mg/l	
	3 mg/l	
	3 mg/l	
TOX	13 ug/l	1 ug/l
	13 ug/l	
	13 ug/l	
	13 ug/l	

REFERENCE: "Test Methods for Evaluating Solid Waste, -Physical/Chemical Methods," USEPA, SW 846, EMSL-Cincinnati, 1982

An invoice for services is enclosed. Thank you for
contacting Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 27 July 1987
0991

SAMPLE ID: MW-5

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Cl	46 mg/l	1.0 mg/l
Fe	<0.3 mg/l	0.3 mg/l
Mn	<0.05 mg/l	0.05 mg/l
Mg	0.20 mg/l	0.01 mg/l
Na	246 mg/l	0.1 mg/l
K	1.17 mg/l	0.1 mg/l
Ca	1.23 mg/l	0.1 mg/l
SO 4	239 mg/l	1.0 mg/l
HCO 3	260 mg/l	5 mg/l
CO 3	24 mg/l	5 mg/l
TDS	638 mg/l	1 mg/l
Phenols	<0.001 mg/l	0.001 mg/l
	<0.001 mg/l duplicate	
pH	8.74	0.01
	8.68	
	8.67	
	8.65	
EC	1000 umhos/cm	1 umhos/cm
	1000 umhos/cm	
	1000 umhos/cm	
	1000 umhos/cm	
TOC	1 mg/l	1 mg/l
	1 mg/l	
	1 mg/l	
	2 mg/l	
TOX	15 ug/l	5 ug/l
	11 ug/l	
	12 ug/l	
	10 ug/l	

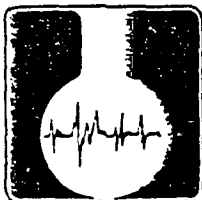
REFERENCE: "Test Methods for Evaluating Solid Waste, -Physical
/Chemical Methods", USEPA, SW846, EMSL-Cincinnati,
1982.

An invoice for services is enclosed. Thank you for
contacting Assaigai Laboratories.

Sincerely,

Jennifer V. Smith
Jennifer V. Smith, Ph.D.
Laboratory Director

7300 Jefferson, N.E. • Albuquerque, New Mexico 87109 • (505) 345-8964



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 31 December 1987
WORK ORDER NO: 1873

ANALYTE	SAMPLE ID/ANALYTICAL RESULTS		NOMINAL DETECTION LIMIT
	MW-4	MW-5	
TOC	5 mg/l	5 mg/l	1 mg/l
	5 mg/l	5 mg/l	
	5 mg/l	5 mg/l	
	6 mg/l	4 mg/l	
TOX	<5 ug/l	<5 ug/l	5 ug/l
	<5 ug/l	7 ug/l	
	<5 ug/l	<5 ug/l	
	<5 ug/l	<5 ug/l	
EC	1200 umhos/cm	1100 umhos/cm	1 umhos/cm
	1200 umhos/cm	1100 umhos/cm	
	1200 umhos/cm	1100 umhos/cm	
	1200 umhos/cm	1100 umhos/cm	
pH	8.9	9.0	0.01
	8.9	9.1	
	8.8	9.1	
	8.9	9.1	

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,

Donald P. Stanton
Vice President



INDICATORS
PROJECT: RCRA SAMPLING

SAMPLE DATE: 11/16/87
LAB RECEIPT DATE: 11/19/87
MATRIX: WATER

SAMPLE ID: MW 5
LOCATION:
LAB SAMPLE #: 3598-4
UNITS:

<u>ANALYSIS</u> <u>DATE</u>	<u>CONSTITUENT</u> <u>NAME</u>	<u>DILUTION</u> <u>FACTOR</u>	<u>DETECTION</u> <u>LIMIT</u>	<u>RESULT</u>
12/04/87	TOTAL ORGANIC CARBON (TOC)	1	0.5	0.8 mg/l 0.7 mg/l 0.9 mg/l 0.8 mg/l
12/08/87	TOTAL ORGANIC HALIDE (TOX)	1	0.010	ND ND ND ND
11/23/87	pH			8.6 8.7 8.7 8.6
11/23/87	CONDUCTIVITY			1260 umhos 1220 1220 1220

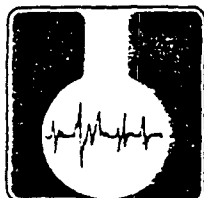
* THE LISTED DETECTION LIMITS REFLECT ANY SAMPLE DILUTION.

NOTE: ND = NOT DETECTED
NA = NOT ANALYZED

PROJECT MANAGER:

[Signature]

DATE: 12/21/87



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Robert McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 31 August 1987
1282

SAMPLE ID: 8/11/87

Retest of 6/19/87 samples

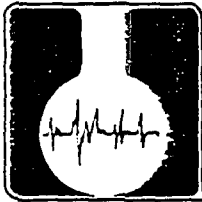
ANALYTE	SAMPLE ID/ANALYTICAL RESULTS			NOMINAL DETECTION LIMITS
	SMW 4	SMW 5	OW 24	
TOC	2 mg/l	2 mg/l	10 mg/l	1 mg/l
	3 mg/l	2 mg/l	10 mg/l	
	2 mg/l	3 mg/l	10 mg/l	
	2 mg/l	3 mg/l	10 mg/l	
TOX	13 ug/l		<5 ug/l	5 ug/l
	13 ug/l		<5 ug/l	
	6 ug/l		5 ug/l	
	10 ug/l		6 ug/l	
	MW 5	MW 1		
TOX	<5 ug/l	<5 ug/l		5 ug/l
	<5 ug/l	<5 ug/l		
	<5 ug/l	8 ug/l		
	6 ug/l	5 ug/l		

REFERENCE: "Standard Methods for the Examination of Water and Wastewater", 16th Edition, APHA, N.Y., 1985.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,

Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 27 July 1987
0991

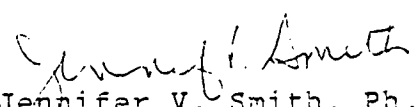
SAMPLE ID: SMW-4

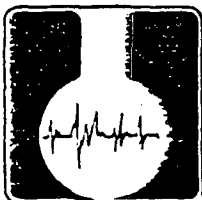
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Pb	<0.05 mg/l	0.05 mg/l
Cr	<0.05 mg/l	0.05 mg/l
pH	8.10	0.01
EC	1200 umhos/cm	1 umhos/cm
TOC	12 mg/l	1 mg/l
	12 mg/l	
	11 mg/l	
	11 mg/l	
TOX	7 ug/l	5 ug/l
	8 ug/l	
	7 ug/l	
	7 ug/l	

REFERENCE: "Test Methods for Evaluating Solid Waste, -Physical /Chemical Methods", USEPA, SW846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 31 December 1987
WORK ORDER NO: 1873

ANALYTE	SAMPLE ID/ANALYTICAL RESULTS		NOMINAL DETECTION LIMIT
	SMW-4	SMW-5	
TOC	12 mg/l	17 mg/l	1 mg/l
TOX	7 ug/l	6 ug/l	5 ug/l
EC	1000 umhos/cm	1100 umhos/cm	1 umhos/cm
pH	8.3	8.8	0.01
Pb	<0.05 mg/l	<0.05 mg/l	0.05 mg/l
Cr	<0.05 mg/l	<0.05 mg/l	0.05 mg/l
ANALYTE	SAMPLE ID/ANALYTICAL RESULTS		NOMINAL DETECTION LIMIT
	SMW-6	OW-24	
TOC	4 mg/l	11 mg/l	1 mg/l
TOX	<5 ug/l	5 ug/l	5 ug/l
EC	1200 umhos/cm	1000 umhos/cm	1 umhos/cm
pH	8.5	8.0	0.01
Pb	<0.05 mg/l	<0.05 mg/l	0.05 mg/l
Cr	<0.05 mg/l	<0.05 mg/l	0.05 mg/l

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,

Donald P. Stanton
Vice President



INDICATORS
PROJECT: RCRA SAMPLING

SAMPLE DATE: 11/16/87
LAB RECEIPT DATE: 11/19/87
MATRIX: WATER

SAMPLE ID: SMW4
LOCATION:
LAB SAMPLE #: 3598-5
UNITS:

<u>ANALYSIS DATE</u>	<u>CONSTITUENT NAME</u>	<u>DILUTION FACTOR</u>	<u>DETECTION LIMIT</u>	<u>RESULT</u>
12/04/87	TOTAL ORGANIC CARBON (TOC)	1	0.5	1.3 mg/l
12/08/87	TOTAL ORGANIC HALIDE (TOX)	1	0.010	ND
11/23/87	CORROSIVITY (pH)	-	----	8.0
11/23/87	CONDUCTIVITY	-	----	1860 umhos

* THE LISTED DETECTION LIMITS REFLECT ANY SAMPLE DILUTION.

NOTE: ND = NOT DETECTED
NA = NOT ANALYZED

PROJECT MANAGER:

JMW

DATE: 12/21/87



METALS

PROJECT: RCRA SAMPLING

SAMPLE DATE: 11/16/87

LAB RECEIPT DATE: 11/19/87

MATRIX: WATER

SAMPLE ID: SMW4

LOCATION:

LAB SAMPLE #: 3598-5

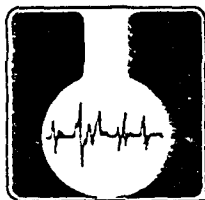
UNITS: mg/l

<u>ANALYSIS</u> <u>DATE</u>	<u>CONSTITUENT</u> <u>NAME</u>	<u>DILUTION</u> <u>FACTOR</u>	<u>DETECTION</u> <u>LIMIT</u>	<u>RESULT</u>
11/24/87	TOTAL CHROMIUM (Cr Tot)	1	0.010	ND
11/19/87	LEAD (Pb)	1	0.002	ND

* THE LISTED DETECTION LIMITS REFLECT ANY SAMPLE DILUTION.

NOTE: ND = NOT DETECTED
NA = NOT ANALYZEDPROJECT MANAGER: *QmH*

DATE: 12/21/87



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 27 July 1987
0991

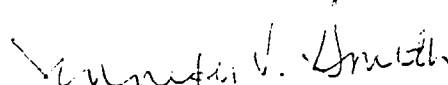
SAMPLE ID: SMW-5

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Pb	<0.05 mg/l	0.05 mg/l
Cr	<0.05 mg/l	0.05 mg/l
pH	8.42	0.01
EC	1000 umhos/cm	1 umhos/cm
TOC	9 mg/l	1 mg/l
	11 mg/l	
	10 mg/l	
	10 mg/l	
TOX	8 ug/l	5 ug/l
	6 ug/l	
	6 ug/l	
	5 ug/l	

REFERENCE: "Test Methods for Evaluating Solid Waste, -Physical
/Chemical Methods", USEPA, SW846, EMSL-Cincinnati,
1982.

An invoice for services is enclosed. Thank you for
contacting Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



INDICATORS
PROJECT: RCRA SAMPLING

SAMPLE DATE: 11/16/87
LAB RECEIPT DATE: 11/19/87
MATRIX: WATER

SAMPLE ID: SMW5
LOCATION:
LAB SAMPLE #: 3598-6
UNITS:

<u>ANALYSIS DATE</u>	<u>CONSTITUENT NAME</u>	<u>DILUTION FACTOR</u>	<u>DETECTION LIMIT</u>	<u>RESULT</u>
12/04/87	TOTAL ORGANIC CARBON (TOC)	1	0.5	1.3 mg/l
12/08/87	TOTAL ORGANIC HALIDE (TOX)	1	0.010	ND
11/23/87	CORROSIVITY (pH)	-	----	8.5
11/23/87	CONDUCTIVITY	-	----	1240 umhos

* THE LISTED DETECTION LIMITS REFLECT ANY SAMPLE DILUTION.

NOTE: ND = NOT DETECTED
NA = NOT ANALYZED

PROJECT MANAGER: *pmh*

DATE: 12/21/87



METALS

PROJECT: RCRA SAMPLING

SAMPLE DATE: 11/16/87

SAMPLE ID: SMW5

LAB RECEIPT DATE: 11/19/87

LOCATION:

MATRIX: WATER

LAB SAMPLE #: 3598-6

UNITS: mg/l

<u>ANALYSIS</u> <u>DATE</u>	<u>CONSTITUENT</u> <u>NAME</u>	<u>DILUTION</u> <u>FACTOR</u>	<u>DETECTION</u> <u>LIMIT</u>	<u>RESULT</u>
11/24/87	TOTAL CHROMIUM (Cr Tot)	1	0.010	ND
11/19/87	LEAD (Pb)	1	0.002	ND

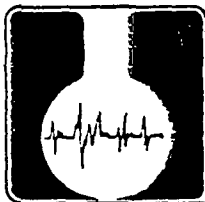
* THE LISTED DETECTION LIMITS REFLECT ANY SAMPLE DILUTION.

NOTE: ND = NOT DETECTED

NA = NOT ANALYZED

PROJECT MANAGER: *SMW*

DATE: 12/21/87



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 27 July 1987
0991

SAMPLE ID: SMW-6

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Pb	<0.05 mg/l	0.05 mg/l
Cr	<0.05 mg/l	0.05 mg/l
pH	7.83	0.01
EC	1600 umhos/cm	1 umhos/cm
TOC	12 mg/l	1 mg/l
	11 mg/l	
	11 mg/l	
	12 mg/l	
TOX	10 ug/l	5 ug/l
	11 ug/l	
	11 ug/l	
	11 ug/l	

REFERENCE: "Test Methods for Evaluating Solid Waste, -Physical
/Chemical Methods", USEPA, SW846, EMSL-Cincinnati,
1982.

An invoice for services is enclosed. Thank you for
contacting Assaigai Laboratories.

Sincerely,

Jennifer V. Smith, Ph.D.
Laboratory Director



INDICATORS
PROJECT: RCRA SAMPLING

SAMPLE DATE: 11/16/87
LAB RECEIPT DATE: 11/19/87
MATRIX: WATER

SAMPLE ID: SMW6
LOCATION:
LAB SAMPLE #: 3598-7
UNITS:

<u>ANALYSIS</u> <u>DATE</u>	<u>CONSTITUENT</u> <u>NAME</u>	<u>DILUTION</u> <u>FACTOR</u>	<u>DETECTION</u> <u>LIMIT</u>	<u>RESULT</u>
12/04/87	TOTAL ORGANIC CARBON (TOC)	1	0.5	1.2 mg/l
12/08/87	TOTAL ORGANIC HALIDE (TOX)	1	0.010	ND
11/23/87	CORROSIVITY (pH)	-	----	8.1
11/23/87	CONDUCTIVITY	-	----	1410 umhos

* THE LISTED DETECTION LIMITS REFLECT ANY SAMPLE DILUTION.

NOTE: ND = NOT DETECTED
NA = NOT ANALYZED

PROJECT MANAGER: *[Signature]*

DATE: 12/21/87



METALS

PROJECT: RCRA SAMPLING

SAMPLE DATE: 11/16/87

LAB RECEIPT DATE: 11/19/87

MATRIX: WATER

SAMPLE ID: SMW6

LOCATION:

LAB SAMPLE #: 3598-7

UNITS: mg/l

<u>ANALYSIS</u> <u>DATE</u>	<u>CONSTITUENT</u> <u>NAME</u>	<u>DILUTION</u> <u>FACTOR</u>	<u>DETECTION</u> <u>LIMIT</u>	<u>RESULT</u>
11/24/87	TOTAL CHROMIUM (Cr Tot)	1	0.010	ND
11/19/87	LEAD (Pb)	1	0.002	ND

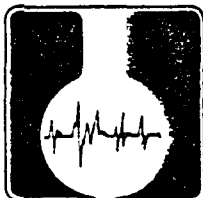
* THE LISTED DETECTION LIMITS REFLECT ANY SAMPLE DILUTION.

NOTE: ND = NOT DETECTED

NA = NOT ANALYZED

PROJECT MANAGER: *Jan M*

DATE: 12/21/87



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob McClenahan
Route 3 Box 7
Gallup, NM 87301

DATE: 27 July 1987
0991

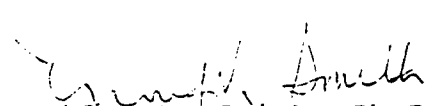
SAMPLE ID: OW-24

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Pb	<0.05 mg/l	0.05 mg/l
Cr	<0.05 mg/l	0.05 mg/l
pH	8.12	0.01
EC	1000 umhos/cm	1 umhos/cm
TOC	12 mg/l	1 mg/l
	13 mg/l	
	15 mg/l	
	15 mg/l	
TOX	28 ug/l	5 ug/l
	30 ug/l	
	32 ug/l	
	29 ug/l	

REFERENCE: "Test Methods for Evaluating Solid Waste,-Physical
/Chemical Methods", USEPA, SW846, EMSL-Cincinnati,
1982.

An invoice for services is enclosed. Thank you for
contacting Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



INDICATORS
PROJECT: RCRA SAMPLING

SAMPLE DATE: 11/16/87
LAB RECEIPT DATE: 11/19/87
MATRIX: WATER

SAMPLE ID: OW24
LOCATION:
LAB SAMPLE #: 3598-8
UNITS:

<u>ANALYSIS DATE</u>	<u>CONSTITUENT NAME</u>	<u>DILUTION FACTOR</u>	<u>DETECTION LIMIT</u>	<u>RESULT</u>
12/04/87	TOTAL ORGANIC CARBON (TOC)	1	0.5	1.6 mg/l
12/08/87	TOTAL ORGANIC HALIDE (TOX)	1	0.010	ND
11/23/87	CORROSIVITY (pH)	-	----	7.6
11/23/87	CONDUCTIVITY	-	----	1200 umhos

* THE LISTED DETECTION LIMITS REFLECT ANY SAMPLE DILUTION.

NOTE: ND = NOT DETECTED
NA = NOT ANALYZED

PROJECT MANAGER: *JAN*

DATE: 12/21/87



METALS

PROJECT: RCRA SAMPLING

SAMPLE DATE: 11/16/87

LAB RECEIPT DATE: 11/19/87

MATRIX: WATER

SAMPLE ID: OW24

LOCATION:

LAB SAMPLE #: 3598-8

UNITS: mg/l

<u>ANALYSIS</u> <u>DATE</u>	<u>CONSTITUENT</u> <u>NAME</u>	<u>DILUTION</u> <u>FACTOR</u>	<u>DETECTION</u> <u>LIMIT</u>	<u>RESULT</u>
11/24/87	TOTAL CHROMIUM (Cr Tot)	1	0.010	ND
11/19/87	LEAD (Pb)	1	0.002	ND

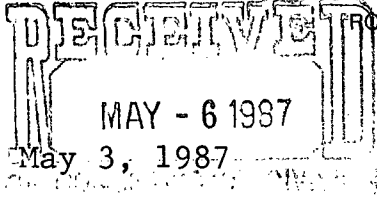
* THE LISTED DETECTION LIMITS REFLECT ANY SAMPLE DILUTION.

NOTE: ND = NOT DETECTED

NA = NOT ANALYZED

PROJECT MANAGER: *Jmb*

DATE: 12/21/87



ROUTE 3, BOX 7 • GALLUP, NEW MEXICO 87301
(505) 722-3833 • TWX 910-981-0504

Roger Anderson
Environmental Engineer
NMOCD
P.O. Box 2088
Land Office Building
Santa Fe, NM 87501

RE: Discharge Plan GW-32 Ground Water Monitoring

Dear Mr. Anderson:

Enclosed are the remaining data from our monitoring program. This data was obtained from wells that were inaccessible for our sampling of earlier this year.

If you have any questions, please feel free to call.

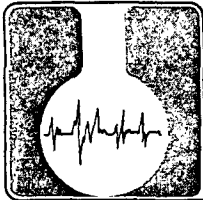
Sincerely,

Robert McClenahan, Jr.
Environmental Coordinator
Giant Refining Company

RLM:ds

Enclosures

cc: Carl Shook
Trent Thomas, GCL
OCD - Aztec, NM



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Rob McClenahan
Rte 3 Box 7
Gallup, NM 87301

DATE: 29 April 1987
0584

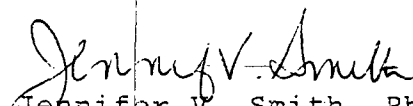
SAMPLE ID: OW-1

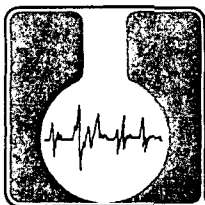
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
Na	460.0 mg/l	0.1 mg/l
K	6.60 mg/l	0.1 mg/l
Ca	124 mg/l	0.1 mg/l
Mg	22.6 mg/l	0.01 mg/l
Cl	41.6 mg/l	1.0 mg/l
SO 4	73 mg/l	1.0 mg/l
HCO 3	328 mg/l	5 mg/l
CO 3	32 mg/l	5 mg/l
TDS	1150 mg/l	1 mg/l
pH	9.15	0.01
EC	1200 umhos/cm	1 umhos/cm
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: "Test Methods for Evaluating Solid Waste, -Physical/Chemical Methods," USEPA, SW 846, EMSL-Cincinnati, 1982

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Rob McClenahan
Rte 3 Box 7
Gallup, NM 87301

DATE: 29 April 1987
0584

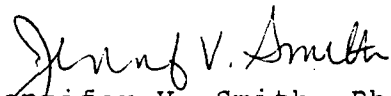
SAMPLE ID: OW-2

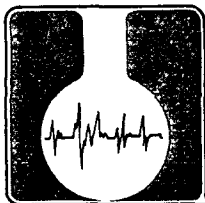
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
Na	250.0 mg/l	0.1 mg/l
K	1.37 mg/l	0.1 mg/l
Ca	2.25 mg/l	0.1 mg/l
Mg	0.38 mg/l	0.01 mg/l
Cl	40.6 mg/l	1.0 mg/l
SO 4	40 mg/l	1.0 mg/l
HCO 3	568 mg/l	5 mg/l
CO 3	<5 mg/l	5 mg/l
TDS	565 mg/l	1 mg/l
pH	8.16	0.01
EC	1300 umhos/cm	1 umhos/cm
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: "Test Methods for Evaluating Solid Waste, -Physical/Chemical Methods," USEPA, SW 846, EMSL-Cincinnati, 1982

An invoice for services is enclosed. Thank you for
contacting Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Rob McClenahan
Rte 3 Box 7
Gallup, NM 87301

DATE: 29 April 1987
0584

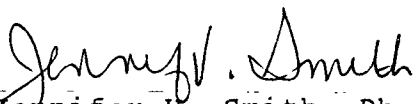
SAMPLE ID: OW-3

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
Na	200.0 mg/l	0.1 mg/l
K	0.76 mg/l	0.1 mg/l
Ca	7.77 mg/l	0.1 mg/l
Mg	5.80 mg/l	0.01 mg/l
Cl	39.7 mg/l	1.0 mg/l
SO 4	17 mg/l	1.0 mg/l
HCO 3	544 mg/l	5 mg/l
CO 3	<5 mg/l	5 mg/l
TDS	755 mg/l	1 mg/l
pH	8.14	0.01
EC	1250 umhos/cm	1 umhos/cm
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: "Test Methods for Evaluating Solid Waste, -Physical/Chemical Methods," USEPA, SW 846, EMSL-Cincinnati, 1982

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

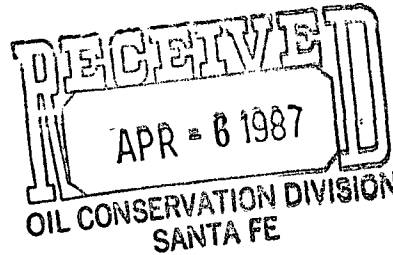
Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ROUTE 3, BOX 7 • GALLUP, NEW MEXICO 87301
(505) 722-3833 • TWX 910-981-0504

April 3, 1987



Roger Anderson
Environmental Engineer
P.O. Box 2088
Land Office Building
Santa Fe, NM 87501

RE: Ground Water Monitoring, Giant's Ciniza Facility, GW-32

Dear Roger:

Enclosed are the ground water data collected at our Ciniza Refinery in 1986, along with the data on the SMW series wells taken in January. The three OW series wells (1, 2 & 3) were not sampled due to lack of access caused by the muddy conditions. These wells are scheduled to be sampled next week, and the results will be sent as soon as they are verified.

Sincerely,

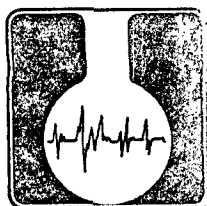
A handwritten signature in cursive script, appearing to read "Bob McClenahan".

Robert L. McClenahan, Jr.
Environmental Coordinator
Giant Refining Company

RLM:ds

Enclosure

cc: Carl Shook
Trent Thomas, GCL



ASSAIGAI LABORATORIES

TO: Giant Refining
ATTN: Bob McClenahan
Rt 3 Box 7
Gallup, NM 87301

DATE: 17 February 1987
0154

SAMPLE ID: SMW-1

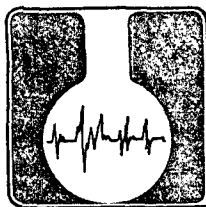
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
SO 4	1833 mg/l	1.0 mg/l
TDS	4582 mg/l	1 mg/l
Na	1135 mg/l	0.1 mg/l
K	1.19 mg/l	0.1 mg/l
Ca	230.8 mg/l	0.1 mg/l
Mg	68.9 mg/l	0.01 mg/l
CO 3	<5 mg/l	5 mg/l
HCO 3	510 mg/l	5 mg/l
pH	7.34	0.01
EC	5500 umhos/cm	1 umhos/cm
Cl	1112 mg/l	1.0 mg/l
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE:" Test Methods for Evaluating Solid Waste,
Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting
Assaigai Laboratories.

Sincerely,

Jennifer V. Smith
Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refining
ATTN: Bob McClenahan
Rt 3 Box 7
Gallup, NM 87301

DATE: 17 February 1987
0154

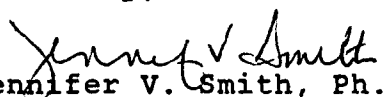
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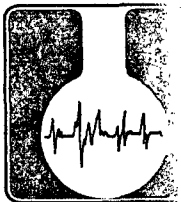
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
SO 4	2083 mg/l	1.0 mg/l
TDS	4418 mg/l	1 mg/l
Na	1625 mg/l	0.1 mg/l
K	1.25 mg/l	0.1 mg/l
Ca	273.5 mg/l	0.1 mg/l
Mg	61.5 mg/l	0.01 mg/l
CO 3	<5 mg/l	5 mg/l
HCO 3	320 mg/l	5 mg/l
pH	6.61	0.01
EC	6700 umhos/cm	1 umhos/cm
Cl	1588 mg/l	1.0 mg/l
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: " Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Gil Refining
AT: Bob McClenahan
Rt: Box 7
Ga: NM 87301

DATE: 17 February 1987
0154

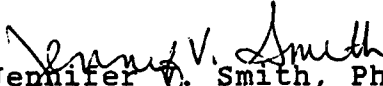
SAMPLE : SMW-3

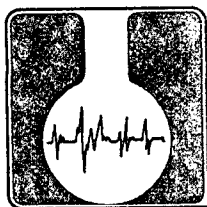
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
SO 4	2237 mg/l	1.0 mg/l
TDS	2704 mg/l	1 mg/l
Na	700 mg/l	0.1 mg/l
K	2.19 mg/l	0.1 mg/l
Ca	75.0 mg/l	0.1 mg/l
Mg	19.2 mg/l	0.01 mg/l
CO 3	<5 mg/l	5 mg/l
HCO 3	624 mg/l	5 mg/l
pH	8.13	0.01
EC	3200 umhos/cm	1 umhos/cm
Cl	43.6 mg/l	1.0 mg/l
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: " Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refining
ATTN: Bob McClenahan
Rt 3 Box 7
Gallup, NM 87301

DATE: 17 February 1987
0154

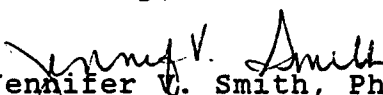
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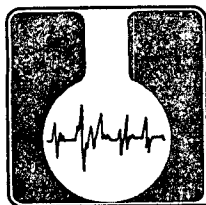
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
SO 4	165 mg/l	1.0 mg/l
TDS	890 mg/l	1 mg/l
Na	335 mg/l	0.1 mg/l
K	1.31 mg/l	0.1 mg/l
Ca	2.2 mg/l	0.1 mg/l
Mg	1.46 mg/l	0.01 mg/l
CO 3	<5 mg/l	5 mg/l
HCO 3	324 mg/l	5 mg/l
pH	8.28	0.01
EC	1300 umhos/cm	1 umhos/cm
Cl	53.6 mg/l	1.0 mg/l
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: " Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



AS: AIGAI ANALYTICAL LABORATORIES

TO: Giant Refining
ATTN: Bob McClenahan
Rt 3 Box 7
Gallup, NM 87301

DATE: 17 February 1987
0154

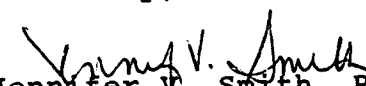
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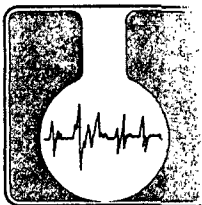
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
SO 4	186 mg/l	1.0 mg/l
TDS	892 mg/l	1 mg/l
Na	265 mg/l	0.1 mg/l
K	1.33 mg/l	0.1 mg/l
Ca	21.7 mg/l	0.1 mg/l
Mg	2.53 mg/l	0.01 mg/l
CO 3	<5 mg/l	5 mg/l
HCO 3	320 mg/l	5 mg/l
pH	8.38	0.01
EC	1200 umhos/cm	1 umhos/cm
Cl	61.5 mg/l	1.0 mg/l
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE:" Test Methods for Evaluating Solid Waste,
Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting
Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Glamco Refining
ATTN: Bob McClenahan
Rt 2 Box 7
Gallup, NM 87301

DATE: 17 February 1987
0154

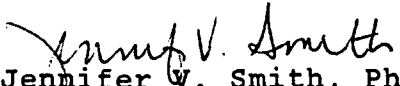
SAMPLE ID: SMW-6

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
SO 4	136 mg/l	1.0 mg/l
TDS	818 mg/l	1 mg/l
Na	320 mg/l	0.1 mg/l
K	1.30 mg/l	0.1 mg/l
Ca	3.3 mg/l	0.1 mg/l
Mg	1.86 mg/l	0.01 mg/l
CO 3	<5 mg/l	5 mg/l
HCO 3	400 mg/l	5 mg/l
pH	8.24	0.01
EC	1400 umhos/cm	1 umhos/cm
Cl	63.5 mg/l	1.0 mg/l
Benzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Ethyl Benzene	<0.001 mg/l	0.001 mg/l
Xylene	<0.001 mg/l	0.001 mg/l

REFERENCE: "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,


Jennifer W. Smith, Ph.D.
Laboratory Director

GIANT

REFINING COMPANY

ROUTE 3, BOX 7 • GALLUP, NEW MEXICO 87301
(505) 722-3833 • TWX 910-981-0504

February 27, 1987

Mr. Jack Elvinger
New Mexico EID
Hazardous Waste Section
P.O. Box 968
Santa Fe, NM 87504-0968

Subject: Annual ground water monitoring report for the
calendar year 1986, Facility EPA I.D. #FNMD
000333211

Dear Mr. Elvinger:

Enclosed is the ground water data and analysis thereof for Giant's Ciniza TSD facility. The data includes the MW series data for 1986 and all the SMW (early detection) data through the end of the year.

Analysis of the data by the Student "t" test indicates elevated levels of salts, when compared to the base year of 1982 in MW 2, 3 & 4. But do not show significant increases over the two preceding years.

TOX levels remain significantly below the base year values and are at or below detection limits.

The ground water velocity in the sonsela aquifer under the land treatment area is estimated to be 0.035 ft/day (12.78 ft/yr) by the following calculation.

$V = KI/n$
V = Velocity, ft/day
K = Conductivity, 0.35 ft/day
I = Potentiometric gradient, 0.010 ft/day
n = Porosity, 10%

In summary, the data shows no migrations of hazardous constituents from our land treatment area, nor degradation to the ground water.

Sincerely,



Carl D. Shook

CDS:ds

cc: Bob McClenahan, Jr.
Trent Thomas, GCL

ANALYTE	MW SAMPLES										NOMINAL DETECTION LIMITS
	MW-1		MW-2		MW-3		MW-4		MW-5		
	SPRING	FALL	SPRING	FALL	SPRING	FALL	SPRING	FALL	SUMMER	FALL	
As (mg/l)	<0.050		<0.050		<0.050		<0.050		<0.050		0.050
Ba	<0.010		0.020		0.010		0.020		0.900		0.010
Fe	0.110	0.170	0.180	0.170	0.120	0.210	0.180	0.270	0.780	0.220	0.050
Pb	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050
Ag	<0.050		<0.050		0.050		0.050		0.050		0.050
Cd	<0.010		<0.010		0.010		0.010		0.010		0.010
Hg	<0.002		<0.002		0.002		0.002		0.002		0.002
Se	<0.010		<0.010		0.010		0.010		0.010		0.010
Na	290.0	267.3	260.0	265.2	295.0	265.0	300.0	284.0	286.0	261.7	0.100
Cr	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050
Mn	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020
SO4	223.0	131.0	213.0	174.0	180.0	131.0	192.0	154.0	177.0	186.0	1.000
Cl	57.0	50.0	63.0	59.	65.0	56.0	34.0	23.0	59.0	59.0	1.000
F	0.830		0.93		1.080		0.430		0.290		0.100
NO3 as N	0.620		0.57		0.73		0.62		0.24		0.010
K		1.650		1.560		1.840		1.880		1.590	0.100
Ca		0.960		0.910		1.190		1.490		1.000	0.100
Mg		0.270		0.190		0.390		0.380		0.270	0.010
HCO3		244.0		224.0		256.0		360.0		236.0	5.000
Co3		56.0		68.0		64.0		48.0		48.0	5.000
TDs		654.0		684.0		674.0		386.0		668.0	1.000
Turbidity (NTU)	5.000		14.400		5.000		27.200		-		5.000
Phenols (mg/l)	0.003	<0.01	0.002	<0.01	0.004	<0.01	<0.001	<0.01	<0.01	<0.01	0.001
Endrin	<0.0002		<0.0002		<0.0002		<0.0002		<0.0002		0.0002
Toxaphene	<0.004		<0.004		<0.004		<0.004		<0.004		0.004
Methoxyclor	<0.100		<0.100		<0.100		<0.100		<0.100		0.1
Lindane	<0.005		<0.005		<0.005		<0.005		<0.005		0.005
2,4-D	<0.100		<0.100		<0.100		<0.100		<0.100		0.1
2,4,5-TP	<0.010		<0.010		<0.010		<0.010		<0.010		0.01

* Spring Samples taken 2/15/86
 Summer Samples taken 8/20/86
 Fall Samples taken 10/28/86

ANALYTE	MW-1		MW-2		MW-3		MW-4		MW-5		NOMINAL DETECTION LIMITS
	SPRING	FALL	SPRING	FALL	SPRING	FALL	SPRING	FALL	SUMMER	FALL	
Gross Alpha (pCi/l)	4.8 ± 13		15 ± 14		7.6 ± 13		11 ± 15		22 ± 22		0.1
Gross Beta (pCi/l)	0 ± 51		0 ± 51		52 ± 53		4 ± 52		0 ± 120		0.1
Ra (pCi/l)	0 ± 3.8		0 ± 36		0 ± 4.0		0 ± 3.7		1.9 ± 2.3		0.1
pH (Std Units)	8.60	8.80	8.59	8.80	8.72	8.77	8.33	8.56	9.05	8.86	0.1 ± 0.1
	8.60	8.79	8.69	8.82	8.70	8.77	8.39	8.56	9.04	8.86	
	8.70	8.81	8.56	8.81	8.65	8.79	8.37	8.55	9.04	8.85	
	8.60	8.80	8.55	8.80	8.60	8.78	8.30	8.54	9.05	8.85	
	$\bar{X}$ 8.60	8.80	8.60	8.81	8.67	8.78	8.35	8.55	9.05	8.86	
	S^2 0.003	0.0001	0.004	0.0001	0.003	0.0001	0.002	0.0001	0.001	0.001	
E.C. (mhos/cm)	1000	1200	1100	1199	1110	1000	1020	1100	1175	1100	1.0
	1080	1190	1110	1198	1115	1010	1075	1150	1180	1110	
	1100	1190	1090	1199	1100	1000	1100	1100	1179	1100	
	1110	1200	1090	1199	1100	1020	1110	1150	1170	1110	
	$\bar{X}$ 1073	1195	1100	1199	1006	1008	1076	1125	1176	1105	
	S^2 2422	33	133	0.3	56	92	1623	833	21	33	
TOC (mg/l)	1.0	7.0	16.0	1.0	2.0	3.0	4.0	6.0	4.0	1.0	0.1
	1.0	7.0	16.1	1.0	2.0	4.0	4.0	6.0	4.0	2.0	
	0.9	7.0	16.0	1.0	2.0	4.0	3.9	7.0	3.0	1.0	
	0.9	7.0	16.1	1.0	1.9	3.0	4.1	7.0	4.0	2.0	
	$\bar{X}$ 1.0	7.0	16.1	1.0	2.0	4.0	4.0	7.0	4.0	2.0	
	S^2 0.01	0.0	0.01	0.0	0.003	0.7	0.01	0.7	0.3	0.7	
TOX (µg/l)	<20	5	<20	16	<20	8	<20	8	5	17	20 µg/l, 5.0
	<20	5	<20	16	<20	6	<20	7	6	17	
	<20	<5	<20	17	<20	8	<20	8	7	16	
	<20	<5	<20	17	<20	6	<20	7	8	16	
	$\bar{X}$ <20	<5	<20	17	<20	7	<20	8	7	17	
	S^2 0.0	0.0	0.0	0.7	0.0	1.3	0.0	0.7	2.0	0.7	

Student's t test

MW 1
S F

MW 2
S F

MW 3
S F

MW 4
S F

14	-2.53	.99	-4.21	-.80	1.37	2.04	-2.33	0.30
1C	1.41	5.17	14.9	64.5	6.14	5.20	4.07	6.34
1C	-3.58	1.06	7.83	-4.57	-4.07	-2.16	-3.40	-0.43

2X

$P = 5.841$ for MW 1, 2 + 3

$P = 2.977$ for MW 4

TABLE I

WATER LEVEL ELEVATIONS

MW SERIES RCRA MONITORING WELLS

	MW-1	MW-2	MW-3	MW-4	MW-5
2-13-86	6871.53'	6870.44'	6843.9'	6874.30'	
DEPTH TO WATER (TOC)	5.375'	8.175'	37.4'	6.125'	
8-15-86	6871.07'	6870.41'	6856.47'	6873.77'	6880.49'
DEPTH TO WATER (TOC)	5.83'	8.19'	24.83'	6.63'	10.31'
10-28-86	6871.05'	6870.52'	6856.8'	6873.59'	6870.65'
DEPTH TO WATER (TOC)	5.85'	8.08'	24.5'	6.81'	10.15'
ELEVATION OF INNER CASING	6876.9'	6878.6'	6881.3'	6880.4'	6880.8'

TOC = TOP OF INNER CASING

TABLE II

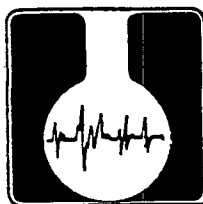
WATER LEVEL ELEVATIONS

SMW SERIES WELLS

1ST 4 QUARTERS RCRA SAMPLING

	SMW-1	SMW-2	SMW-3	SMW-4	SMW-5	SMW-6
10-10-85	6855.65'	6849.73'	6844.69'	6830.78'	6843.51'	6823.68'
DEPTH TO WATER (TOC)	25.08'	32.0 '	37.458'	46.958'	32.167'	54.667'
1-28-86	6855.47'	6849.67'	6845.92'	6841.32'	6843.81'	6829.48'
DEPTH TO WATER (TOC)	25.458'	32.06'	36.229'	36.417'	31.875'	48.875'
4-15-86	6855.19'	6849.60'	6847.02'	6844.61'	6844.05'	6845.10'
DEPTH TO WATER (TOC)	25.54'	32.13'	35.13'	33.13'	31.63'	33.25'
7-28-86	6856.13'	6850.06'	6847.18'	6844.44'	6844.11'	6832.80'
DEPTH TO WATER (TOC)	24.6 '	31.67'	34.97'	33.3 '	31.57'	45.55'
8-15-86	6856.23'	6850.10'	6842.73'	6844.86'	6843.30'	6845.62'
DEPTH TO WATER (TOC)	24.50'	31.63'	39.42'	32.88'	32.38'	32.73'
10-28-86	6856.02'	6850.06'	6847.94'	6846.03'	6844.14'	6845.95'
DEPTH TO WATER (TOC)	24.71'	31.67'	34.21'	31.71'	31.54'	32.40'
ELEVATION OF INNER CASING	6880.73'	6881.73'	6882.15'	6877.74'	6875.68'	6878.35'

TOC = TOP OF INNER CASING



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
Attn: Bob Anderson
Rt. 3 Box 7
Gallup, NM 87031

DATE: 20 May 1986

0659

Page 1 of

ANALYTE

SAMPLE ID/ ANALYTICAL RESULTS

	MW 1	MW 2	MW 3
-As	<0.050 mg/l	<0.050 mg/l	<0.050 mg/l
-Ba	<0.01 mg/l	0.02 mg/l	0.01 mg/l
Fe	0.11 mg/l	0.18 mg/l	0.12 mg/l
-Pb	<0.050 mg/l	<0.050 mg/l	<0.050 mg/l
-Ag	<0.050 mg/l	<0.050 mg/l	<0.050 mg/l
-Cd	<0.010 mg/l	<0.010 mg/l	<0.010 mg/l
-Hg	<0.002 mg/l	<0.002 mg/l	<0.002 mg/l
-Se	<0.010 mg/l	<0.010 mg/l	<0.010 mg/l
Na	290 mg/l	260 mg/l	295 mg/l
-Cr	<0.050 mg/l	<0.050 mg/l	<0.050 mg/l
Mn	<0.02 mg/l	<0.02 mg/l	<0.02 mg/l
pH	8.6	8.59	8.72
	8.6	8.69	8.70
	8.7	8.56	8.65
	8.6	8.55	8.60
EC	1000 umhos/cm	1110 umhos/cm	1110 umhos/cm
	1080 umhos/cm	1110 umhos/cm	1115 umhos/cm
	1100 umhos/cm	1090 umhos/cm	1100 umhos/cm
	1110 umhos/cm	1090 umhos/cm	1100 umhos/cm
TOC	1.0 mg/l	16.0 mg/l	2.0 mg/l
	1.0 mg/l	16.1 mg/l	2.0 mg/l
	0.9 mg/l	16.0 mg/l	2.0 mg/l
	0.9 mg/l	16.1 mg/l	1.9 mg/l
TOX	<20 ug/l	<20 ug/l	<20 ug/l
	<20 ug/l	<20 ug/l	<20 ug/l
	<20 ug/l	<20 ug/l	<20 ug/l
	<20 ug/l	<20 ug/l	<20 ug/l
SO 4	223 mg/l	213 mg/l	180 mg/l
Cl	57 mg/l	63 mg/l	65 mg/l
F	0.83 mg/l	0.93 mg/l	1.08 mg/l
Turbidity	<5 NTU	14.4 NTU	<5 NTU
NO 3-as N	0.62 mg/l	0.57 mg/l	0.73 mg/l
Phenols	0.003 mg/l	0.002 mg/l	0.004 mg/l
-Endrin	<0.0002 mg/l	<0.0002 mg/l	<0.0002 mg/l
-Toxaphene	<0.004 mg/l	<0.004 mg/l	<0.004 mg/l
-Methoxychlor	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l
-Lindane	<0.005 mg/l	<0.005 mg/l	<0.005 mg/l
-2,4-D	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l
-2,4,5-TP	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l
Gross Alpha	4.8 13 pCi/l	15 14 pCi/l	7.6 13 pCi/l
Gross Beta	0 51 pCi/l	0 51 pCi/l	52 53 pCi/l
Ra	0 3.8 pCi/l	0 36 pCi/l	0 4.0 pCi/l

TO: Giant Refinery

0659

Page 2 of 3

ANALYTE	SAMPLE ID/ ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
	MW 4	% Recovery
As	<0.050 mg/l	80 %
Ba	0.02 mg/l	
Fe	0.18 mg/l	
Pb	<0.050 mg/l	66 %
Ag	<0.050 mg/l	100 %
Cd	<0.010 mg/l	60 %
Hg	<0.002 mg/l	100 %
Se	<0.010 mg/l	100 %
Na	300 mg/l	
Cr	<0.050 mg/l	100 %
Mn	<0.02 mg/l	
pH	8.33	
	8.39	
	8.37	
	8.30	
EC	1020 umhos/cm	1 umhos/cm
	1075 umhos/cm	
	1100 umhos/cm	
	1110 umhos/cm	
TOC	4.0 mg/l	0.1 mg/l
	4.0 mg/l	
	3.9 mg/l	
	4.1 mg/l	
TOX	<20 ug/l	20 ug/l
	<20 ug/l	
	<20 ug/l	
	<20 ug/l	
SO 4	192 mg/l	1.0 mg/l
Cl	34 mg/l	1.0 mg/l
F	0.43 mg/l	0.1 mg/l
Turbidity	27.2 NTU	5 NTU
NO 3 as N	0.62 mg/l	0.01 mg/l
Phenols	<0.001 mg/l	0.001 mg/l
Endrin	<0.0002 mg/l	0.0002 mg/l
Toxaphene	<0.004 mg/l	0.004 mg/l
Methoxychlor	<0.1 mg/l	0.1 mg/l
Lindane	<0.005 mg/l	0.005 mg/l
2,4-D	<0.1 mg/l	0.1 mg/l
2,4,5-TP	<0.01 mg/l	0.01 mg/l
Gross Alpha	11 15 pCi/l	0.1 pCi/l
Gross Beta	4 52 pCi/l	0.1 pCi/l
Ra	0 3.7 pCi/l	0.1 pCi/l

ANALYTICAL LABORATORIES

TO: Giant Refinery
Attn: Bob Anderson
Rt. 3 Box 7
Gallup, NM 87301

DATE: 18 September 1986
1432

SAMPLE ID: MW-^{5 ml} 10A, 8/19/86

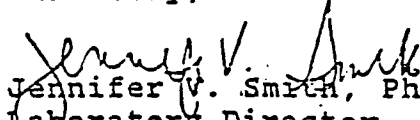
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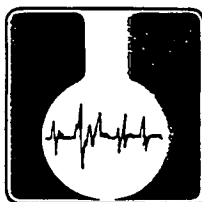
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
As	<0.050 mg/l	0.050 mg/l
Ba	0.90 mg/l	0.005 mg/l
Cd	<0.010 mg/l	0.010 mg/l
Cr	<0.050 mg/l	0.050 mg/l
F	0.290 mg/l	0.1 mg/l
Pb	<0.050 mg/l	0.050 mg/l
Hg	<0.002 mg/l	0.002 mg/l
NO3 as N	0.24 mg/l	0.1 mg/l
Se	<0.010 mg/l	0.010 mg/l
Ag	<0.050 mg/l	0.050 mg/l
Endrin	<0.0002 mg/l	0.0002 mg/l
Lindane	<0.004 mg/l	0.004 mg/l
Methoxychlor	<0.1 mg/l	0.1 mg/l
Toxaphene	<0.005 mg/l	0.005 mg/l
2,4-D	<0.1 mg/l	0.1 mg/l
2,4,5-TP (Silvex)	<0.01 mg/l	0.01 mg/l
Radium	1.9 + 2.3 pCi/l	0.1 pCi/l
Gross Alpha	22 + 22 pCi/l	0.1 pCi/l
Gross Beta	0 + 120 pCi/l	0.1 pCi/l
Cl	59 mg/l	1.0 mg/l
Fe	0.78 mg/l	0.05 mg/l
Mn	0.06 mg/l	0.005 mg/l
Na	286 1378 mg/l	0.1 mg/l
SO4	177 mg/l	1.0 mg/l
pH	9.05	0.01
	9.04	
	9.04	
	9.05	
EC	1175 umhos/cm	1.0 umhos/cm
	1180 umhos/cm	
	1179 umhos/cm	
	1170 umhos/cm	
TOC	4 mg/l	0.1 mg/l
	4 mg/l	
	3 mg/l	
	4 mg/l	
Phenols	<0.01 mg/l	0.01 mg/l
TOX	5 ug/l	0.1 ug/l
	6 ug/l	
	7 ug/l	
	8 ug/l	

REFERENCE: "Test Methods for Evaluating Solid Waste, Physical/Chemical Method", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
Attn: Bob McCunningham
Rt. 3 Box 7
Gallup, NM 87301

DATE: 14 October 1986
1432 revised Na results

SAMPLE ID: MW-3-5

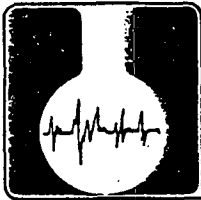
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Na	286 mg/l	0.1 mg/l

REFERENCE: "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,

Jennifer V. Smith
Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob Anderson
Rt. 3 Box 7
Gallup, NM 87301

DATE: 8 December 1986
1914

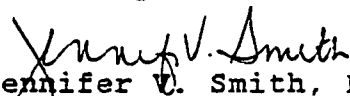
SAMPLE ID: MW 1

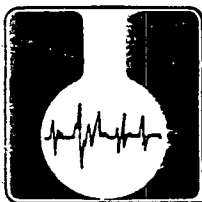
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
Cl	50 mg/l	1.0 mg/l
Fe	0.17 mg/l	0.05 mg/l
Mn	<0.02 mg/l	0.02 mg/l
Mg	0.27 mg/l	0.01 mg/l
Na	267.3 mg/l	0.1 mg/l
K	1.65 mg/l	0.1 mg/l
Ca	0.96 mg/l	0.1 mg/l
SO 4	131 mg/l	1.0 mg/l
HCO 3	244 mg/l	5 mg/l
CO 3	56 mg/l	5 mg/l
TDS	654 mg/l	1 mg/l
Pb	<0.05 mg/l	0.05 mg/l
Cr	<0.05 mg/l	0.05 mg/l
Phenols	<0.01 mg/l	0.01 mg/l
pH	8.80 8.79 8.81 8.80	0.01
EC	1200 umhos/cm 1190 umhos/cm 1190 umhos/cm 1200 umhos/cm	1 umhos/cm
TOX	5 ug/l 5 ug/l <5 ug/l <5 ug/l	5 ug/l
TOC	7 mg/l 7 mg/l 7 mg/l 7 mg/l	0.1 mg/l

REFERENCES: "Test Methods for Evaluating Solid Waste, -Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. - Thank you for contacting Assagai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob Anderson
Rt. 3 Box 7
Gallup, NM 87301

DATE: 8 December 1986
1914

SAMPLE ID: MW 2

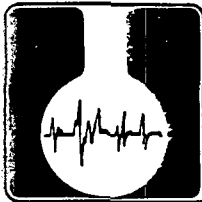
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
Cl	59 mg/l	1.0 mg/l
Fe	0.17 mg/l	0.05 mg/l
Mn	<0.02 mg/l	0.02 mg/l
Mg	0.19 mg/l	0.01 mg/l
Na	265.2 mg/l	0.1 mg/l
K	1.56 mg/l	0.1 mg/l
Ca	0.91 mg/l	0.1 mg/l
SO 4	174 mg/l	1.0 mg/l
HCO 3	224 mg/l	5 mg/l
CO 3	68 mg/l	5 mg/l
TDS	684 mg/l	1 mg/l
Pb	<0.05 mg/l	0.05 mg/l
Cr	<0.05 mg/l	0.05 mg/l
Phenols	<0.01 mg/l	0.01 mg/l
pH	8.80 8.82 8.81 8.80	0.01
EC	1199 umhos/cm 1198 umhos/cm 1199 umhos/cm 1199 umhos/cm	1 umhos/cm
TOX	16 ug/l 16 ug/l 17 ug/l 17 ug/l	5 ug/l
TOC	1 mg/l 1 mg/l 1 mg/l 1 mg/l	0.1 mg/l

REFERENCES: "Test Methods for Evaluating Solid Waste, -Physical/Chemical Methods", USEPA, SW 846, -EML-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assagai Laboratories.

Sincerely,

Jennifer V. Smith
Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob Anderson
Rt. 3 Box 7
Gallup, NM 87301

DATE: 8 December 1986
1914

SAMPLE ID: MW 3

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
Cl	56 mg/l	1.0 mg/l
Fe	0.21 mg/l	0.05 mg/l
Mn	<0.02 mg/l	0.02 mg/l
Mg	0.39 mg/l	0.01 mg/l
Na	265.0 mg/l	0.1 mg/l
K	1.84 mg/l	0.1 mg/l
Ca	1.19 mg/l	0.1 mg/l
SO 4	131 mg/l	1.0 mg/l
HCO 3	256 mg/l	5 mg/l
CO 3	64 mg/l	5 mg/l
TDS	674 mg/l	1 mg/l
Pb	<0.05 mg/l	0.05 mg/l
Cr	<0.05 mg/l	0.05 mg/l
Phenols	<0.01 mg/l	0.01 mg/l
pH	8.77	0.01
	8.77	
	8.79	
	8.78	
EC	1000 umhos/cm	1 umhos/cm
	1010 umhos/cm	
	1000 umhos/cm	
	1020 umhos/cm	
TOX	8 ug/l	5 ug/l
	6 ug/l	
	8 ug/l	
	6 ug/l	
TOC	3 mg/l	0.1 mg/l
	4 mg/l	
	4 mg/l	
	3 mg/l	

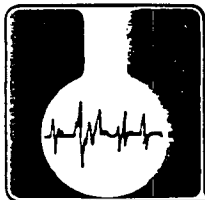
REFERENCES: "Test Methods for Evaluating Solid Waste, -Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

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Sincerely,

Jennifer V. Smith
Jennifer V. Smith, Ph.D.
Laboratory Director

7300 Jefferson, N.E. • Albuquerque, New Mexico 87109 • (505) 345-8964



ASSAGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob Anderson
Rt. 3 Box 7
Gallup, NM 87301

DATE: 8 December 1986
1914

SAMPLE ID: MW 4

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
Cl	23 mg/l	1.0 mg/l
Fe	0.27 mg/l	0.05 mg/l
Mn	<0.02 mg/l	0.02 mg/l
Mg	0.38 mg/l	0.01 mg/l
Na	284.0 mg/l	0.1 mg/l
K	1.88 mg/l	0.1 mg/l
Ca	1.49 mg/l	0.1 mg/l
SO 4	154 mg/l	1.0 mg/l
HCO 3	360 mg/l	5 mg/l
CO 3	48 mg/l	5 mg/l
TDS	686 mg/l	1 mg/l
Pb	<0.05 mg/l	0.05 mg/l
Cr	<0.05 mg/l	0.05 mg/l
Phenols	<0.01 mg/l	0.01 mg/l
pH	8.56	0.01
	8.56	
	8.55	
	8.54	
EC	1100 umhos/cm	1 umhos/cm
	1150 umhos/cm	
	1100 umhos/cm	
	1150 umhos/cm	
TOX	8 ug/l	5 ug/l
	7 ug/l	
	8 ug/l	
	7 ug/l	
TOC	6 mg/l	0.1 mg/l
	6 mg/l	
	7 mg/l	
	7 mg/l	

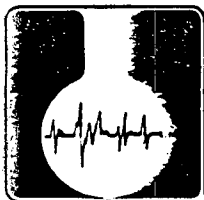
REFERENCES: "Test Methods for Evaluating Solid Waste, -Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

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Sincerely,

Jennifer V. Smith
Jennifer V. Smith, Ph.D.
Laboratory Director

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ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob Anderson
Rt. 3 Box 7
Gallup, NM 87301

DATE: 8 December 1986
1914

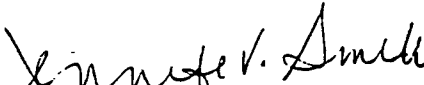
SAMPLE ID: MW 5

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
Cl	59 mg/l	1.0 mg/l
Fe	0.22 mg/l	0.05 mg/l
Mn	<0.02 mg/l	0.02 mg/l
Mg	0.27 mg/l	0.01 mg/l
Na	261.7 mg/l	0.1 mg/l
K	1.59 mg/l	0.1 mg/l
Ca	1.00 mg/l	0.1 mg/l
SO 4	186 mg/l	1.0 mg/l
HCO 3	236 mg/l	5 mg/l
CO 3	48 mg/l	5 mg/l
TDS	668 mg/l	1 mg/l
Pb	<0.05 mg/l	0.05 mg/l
Cr	<0.05 mg/l	0.05 mg/l
Phenols	<0.01 mg/l	0.01 mg/l
pH	8.86 8.86 8.85 8.85	0.01
EC	1100 umhos/cm 1110 umhos/cm 1100 umhos/cm 1110 umhos/cm	1 umhos/cm
TOX	17 ug/l 17 ug/l 16 ug/l 16 ug/l	5 ug/l
TOC	1 mg/l 2 mg/l 1 mg/l 2 mg/l	0.1 mg/l

REFERENCES: "Test Methods for Evaluating Solid Waste, -Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assagai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director

7300 Jefferson, N.E. • Albuquerque, New Mexico 87109 • (505) 345-8964

SMW 1

Analyte

	1 st QT	2 nd QT	3 rd QT	4 th QT	11/86
As (mg/l)	0.080	<0.050	<0.050	<0.050	
Ba	6.0	<0.005	<0.01	0.02	
Fe	0.45	<0.04	0.08	0.30	
Pb	0.116	0.10	<0.050	0.11	
Ag	<0.050	<0.050	<0.050	<0.050	
Cd	0.060	0.090	0.012	0.04	
Hg	<0.002	<0.002	0.002	<0.002	
Se	0.066	<0.010	<0.010	<0.010	
Na	2438.0	1692.	1865	1300	
CR	<0.050	0.065	<0.050	0.10	
Mn	0.16	<0.02	0.07	<0.02	
SO ₄	2833.0	1704.	1471	1850.	
Cl	1489.0	1340.	1180	1399.6	
F	0.28	0.42	0.44	0.235	
NO ₃ as N	0.1	<0.01	<0.01	0.155	
:					
Turbidity (NTU)	78	175			
Phenols (mg/l)	<0.001	<0.001	0.005	<0.001	
Endrin	<0.0002	<0.0002	<0.0002	<0.0002	
Toxaphene	<0.005	<0.005	<0.005	<0.005	
Methoxychlor	<0.1	<0.1	<0.1	<0.1	
Lindane	<0.004	<0.004	<0.004	<0.004	
2,4-D	<0.1	<0.1	<0.1	<0.1	
2,4,5-TP	<0.01	<0.01	<0.01	<0.01	

SMW 1

	<u>3rd QT</u>	<u>4th QT</u>
HCO ₃	498	426.
CO ₃	<5	<5.
TDS	5056	6194.
K	3.3	10.
Ca	172	142.
Mg	64	21.

5 MW 1Analyte

	1 st Qt	2 nd Qt	3 rd Qt	4 th Qt	11/86
Gross Alpha (pCi/e)	0 [±] 187	280 [±] 120	99 [±] 118	42 [±] 49	
Gross Beta	0 [±] 1097	20 [±] 96	0 [±] 423	0 [±] 65	
R _a	<5	0 [±] 3.7			

pH (S.V.)	7.6	7.70	7.7	7.52
	7.6	7.75		7.53
	7.6	7.65		7.52
	7.6	7.68		7.52

E.C. (umhos/cm)	5600	5850	5820	5650
	5600	5810		5700
	5600	5890		5680
	5600	5830		5700

T.O.C. (mg/e)	7.8	10.1	25.0	2.7
	7.9	10.2		3.1
	8.0	10.0		3.0
	8.2	10.0		2.8

TOX (mg/e)	<10	<10	264.	10.9
	<10	<10		11.0
	<10	<10		10.9
	<10	<10		11.1

Coliforms	<1/100ml	<1/100ml	<1/100ml	<1/100ml
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SMW2Analyte

	1 st QT	2 nd QT	3 rd QT	4 th QT	11/86
As (mg/l)	0.10	<0.050	<0.050	<0.050	
Ba	4.0	<0.005	0.01	<0.01	
Fe	0.62	<0.04	0.08	0.18	
Pb	0.19	0.28	<0.050	0.11	
Ag	<0.050	<0.050	<0.050	<0.050	
Cd	0.10	0.13	0.024	0.05	
Hg	<0.002	<0.002	0.003	<0.002	
Se	0.13	<0.010	<0.010	<0.010	
Na	2660.0	1690	2400	1780	
CR	<0.050	0.067	<0.050	0.092	
Mn	2.0	<0.02	0.10	<0.02	
SO ₄	3473.0	2429	1950	2380	
Cl	1945.0	1985	1699	2049.4	
F	0.34	0.55	0.37	0.242	
NO ₃ as N	2.0	0.1	<0.01	0.126	

Turbidity (NTU) 27 92

Phenols (mg/l)	<0.001	<0.001	0.006	<0.001
Endrin	<0.0002	<0.0002	<0.0002	<0.0002
Toxaphene	<0.005	<0.005	<0.005	<0.005
Methoxychlor	<0.1	<0.1	<0.1	<0.1
Lindane	<0.004	<0.004	<0.004	<0.004
2,4-D	<0.1	<0.1	<0.1	<0.1
2,4,5-TP	<0.01	<0.01	<0.01	<0.01

SMW2

Analyte

	<u>3rd QT</u>	4 th QT
HCO ₃	412	348.
CO ₃	<5	<5.
TDS	6916	7202.
K	3.9	7.
Ca	151	148.
Mg	50	60.

SMW2

Analyte

	1 st Qt	2 nd Qt	3 rd Qt	4 th Qt	11/86
Gross Alpha (pCi/l)	0 [±] 206	41 [±] 34		28 [±] 60	
Gross Beta	1010 [±] 1149	0 [±] 94		91 [±] 132	
R _a	<5.	0.3 [±] 3.9			

pH (S.V.)	7.7	7.51	7.5	7.58	
	7.7	7.53		7.57	
	7.7	7.60		7.57	
	7.7	7.62		7.56	

E.C. (amhos/cm)	6900	7300	7400	7190	
	6900	7340		7200	
	6900	7420		7250	
	6900	7210		7200	

T.O.C. (mg/l)	9.0	9.6	11.0	11.	
	9.0	9.8		11.	
	9.2	10.2		11.	
	8.9	10.0		11.	

TOX (mg/l)	<10	<10	79.	10.3	
	<10	<10		10.0	
	<10	<10		10.2	
	<10	<10		10.3	

Coliforms	<1/100ml	<1/100ml	<1/100ml	<1/100ml	
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Analyte	1 st QT	2 nd QT	3 rd QT	4 th QT
As (mg/L)	0.063	<0.050	<0.050	<0.050
Ba	1.7	<0.005	0.01	<0.01
Fe	0.04	<0.04	0.08	0.21
Pb	<0.050	<0.05	<0.050	<0.05
Ag	<0.050	<0.050	<0.050	<0.050
Cd	<0.010	0.020	0.008	<0.010
Hg	<0.002	<0.002	0.003	<0.002
Se	0.10	<0.010	<0.010	<0.010
Na	440.0	832	1280	998
Cr	<0.050	0.055	<0.050	<0.05
Mn	0.02	<0.02	0.03	<0.02
SO ₄	1784.0	3766	1567	1750
Cl	42.0	43.99	68	43.9
F	0.43	0.72	0.74	0.406
NO ₃ as N	0.2	0.4	<0.01	<0.01

Turbidity (NTU) 7.5 120

Phenols (mg/L)	<0.001	<0.001	0.002	<0.001
Endrin	<0.0002	<0.0002	<0.0002	<0.0002
Toxaphene	<0.005	<0.005	<0.005	<0.005
Methoxychlor	<0.1	<0.1	<0.1	<0.1
Lindane	<0.004	<0.004	<0.004	<0.004
2,4-D	<0.1	<0.1	<0.1	<0.1
2,4,5-TP	<0.01	<0.01	<0.01	<0.01

SMW 3

	<u>3rd Qt</u>	4 th Qt
HCO ₃	628	520
CO ₃	< 5	< 5
TDS	3068	3010
K	8.0	7
Ca	84.	17
Mg	22.	15

Analyte

	1 st Qt	2 nd Qt	3 rd Qt	4 th Qt
Gross Alpha (pCi/l)	97 ± 225	120 ± 73	31 ± 25	33 ± 34
Gross Beta	43 ± 1130	9 ± 246	51 ± 87	28 ± 130
R _a	< 5	0 ± 3.8		

pH (S.V.)	8.0	7.90	7.9	7.94
	8.0	7.90		7.95
	8.0	7.80		7.96
	8.0	7.80		7.96

E.C. (ambos/cm)	3075	3720	3500	3400
	3075	3610		3400
	3075	3720		3410
	3075	3710		3405

T.O.C. (mg/l)	6.0	7.0	7.0	8.
	6.1	6.9		7.
	6.0	6.8		8.
	6.5	7.0		7.

TOX (mg/l)	< 10	< 10	20.	560
	< 10	< 10		560
	< 10	< 10		565
	< 10	< 10		560

Coliforms	< 1/100ml	< 1/100ml	< 1/100ml	< 1/100ml
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SMW-4

Analyte

	1 st QT	2 nd QT	3 rd QT	4 th QT	11/86
As (mg/l)	<0.050	<0.050	<0.050	<0.050	
Ba	<1.0	<0.005	<0.01	<0.01	
Fe	1.2	0.09	0.09	0.24	
Pb	<0.050	<0.05	<0.050	<0.05	<0.05
Ag	<0.050	<0.050	<0.050	<0.050	
Cd	<0.010	<0.010	<0.010	<0.010	
Hg	<0.002	<0.002	0.003	<0.002	
Se	0.026	<0.010	<0.010	<0.010	
Na	320.0	556	600	340	
CR	<0.050	<0.05	<0.050	<0.05	<0.05
Mn	0.08	<0.02	0.020	<0.02	
SO ₄	192.0	167.	187	300.	
Cl	51.0	57.98	121	49.9	
F	0.61	1.0	1.08	0.577	
NO ₃ as N	0.1	<0.01	<0.01	0.14	

Turbidity (NTU) 86 15

Phenols (mg/l)	<0.001	<0.001	0.002	<0.001
Endrin	<0.0002	<0.0002	<0.0002	<0.0002
Toxaphene	<0.005	<0.005	<0.005	<0.005
Methoxychlor	<0.1	<0.1	<0.1	<0.1
Lindane	<0.004	<0.004	<0.004	<0.004
2,4-D	<0.1	<0.1	<0.1	<0.1
2,4,5-TP	<0.01	<0.01	<0.01	<0.01

SMW4

	<u>3rd Qt</u>	<u>4th Qt</u>
HCO ₃	360	272
CO ₃	<5	48
TDS	816	878
K	8.0	4
Ca	40	2.8
Mg	6.0	0.30

SMW-4

Analyte

	1 st QT	2 nd QT	3 rd QT	4 th QT	11/96
Gross Alpha (pCi/l)	0 $\pm$ 48	23 $\pm$ 21	31 $\pm$ 25	4 $\pm$ 12	
Gross Beta	72 $\pm$ 241	0 $\pm$ 95	51 $\pm$ 87	17 $\pm$ 65	
R _a	<5	2.1 $\pm$ 4.2			

pH (S.V.)	8.4	8.09	8.1	8.52	
	8.4	8.04		8.51	
	8.4	8.10		8.51	
	8.4	8.05		8.50	

E.C. (umhos/cm)	1200	1340	1650	1270	1300
	1200	1300		1280	1300
	1200	1390		1290	1300
	1200	1280		1290	1300

T.O.C. (mg/l)	1.0	3.0	7.0	3.	7.
	1.5	2.8		3.	8.
	2.0	2.9		3.	8.
	1.0	3.0		3.	8.

TOX (mg/l)	<10	<10	20.	10.1	7.
	<10	<10		10.0	7.
	<10	<10		10.4	6.
	<10	<10		10.1	6.

Coliforms	<1/100 ml	<1/10 ml	<1/100 ml	<1/100 ml	
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Analyte

	1 st Qt	2 nd Qt	3 rd Qt	4 th Qt	11/86
As (mg/l)	0.064	<0.050	<0.050	<0.050	
Ba	<1.0	<0.005	<0.01	<0.01	
Fe	1.8	0.33	0.11	0.14	
Pb	<0.050	<0.05	<0.050	<0.05	<0.05
Ag	<0.050	<0.050	<0.050	<0.050	
Cd	<0.010	<0.010	<0.010	<0.010	
Hg	<0.002	<0.002	0.001	<0.002	
Se	0.022	<0.010	<0.010	<0.010	
Na	342.0	670	610	312	
CR	<0.050	<0.05	<0.050	<0.05	<0.05
Mn	0.05	<0.02	<0.02	<0.02	
SO ₄	189.0	111.	123.	280.	
Cl	54.0	79.94	64.	59.9	
F	0.69	0.80	0.69	0.396	
NO ₃ as N	0.1	<0.01	<0.01	0.125	
Turbidity (NTU)	66	49			
Phenols (mg/l)	<0.001	<0.001	0.007	<0.001	
Endrin	<0.0002	<0.0002	<0.0002	<0.0002	
Toxaphene	<0.005	<0.005	<0.005	<0.005	
Methoxychlor	<0.1	<0.1	<0.1	<0.1	
Lindane	<0.004	<0.004	<0.004	<0.004	
2,4-D	<0.1	<0.1	<0.1	<0.1	
2,4,5-TP	<0.01	<0.01	<0.01	<0.01	

5 MW 5

3rd Qt

4th Qt

HCO₃

320

232

CO₃

<5

48

TDS

719

812

K

4.0

4.

Ca

25

1.5

Mg

4.0

0.17

Analyte	1 st Qt	2 nd Qt	3 rd Qt	4 th Qt	11/86
Gross Alpha (pCi/l)	0 [±] 51	37 [±] 23	31 [±] 24	19 [±] 15	
Gross Beta	0 [±] 273	86 [±] 91	60 [±] 88	1 [±] 65	
R _a	<5.	0 [±] 3.7			
pH (S.V.)	8.7	8.39	8.4	8.80	
	8.7	8.41		8.80	
	8.7	8.33		8.81	
	8.7	8.32		8.81	
E.C. (umhos/cm)	1150	1180	1120	1200	1100
	1150	1100		1190	1100
	1150	1100		1190	1100
	1150	1100		1190	1100
T.O.C. (mg/l)	6.0	5.9	7.0	6.	7
	6.0	6.0		6.	8
	5.5	5.8		6.	8
	5.9	6.0		7.	7
TOX (mg/l)	<10	<10	<10	45.	<5
	<10	<10		45.	<5
	<10	<10		45.	<5
	<10	<10		45.	<5
Coliforms	<1/100ml	<1/10ml	<1/100ml	<1/100ml	

Analyte

1st Q+ 2nd Q+ 3rd Q+ 4th Q+ "86

As (mg/l)	<0.050	<0.050	<0.050	<0.050	
Ba	<1.0	<0.005	0.01	0.01	
Fe	0.62	0.30	0.15	1.1	
Pb	<0.050	<0.05	<0.050	<0.05	<0.05
Ag	<0.050	<0.050	<0.050	<0.050	
Cd	<0.010	<0.010	<0.010	<0.010	
Hg	<0.002	<0.002	0.002	<0.002	
Se	0.020	<0.010	<0.010	<0.010	
Na	348.0	424	950	376	
CR	<0.050	<0.05	<0.050	0.055	<0.05
Mn	0.17	<0.02	<0.02	<0.02	
SO ₄	261.0	164.	223.	453	
Cl	70.0	75.98	82.	62.9	
F	0.63	0.90	0.95	0.549	
NO ₃ as N	0.2	1.0	<0.01	0.70	

Turbidity (NTU) 51 117 —

Phenols (mg/l)	<0.001	<0.001	0.002	<0.001
Endrin	<0.0002	<0.0002	<0.0002	<0.0002
Toxaphene	<0.005	<0.005	<0.005	<0.005
Methoxychlor	<0.1	<0.1	<0.1	<0.1
Lindane	<0.004	<0.004	<0.004	<0.004
2,4-D	<0.1	<0.1	<0.1	<0.1
2,4,5-TP	<0.01	<0.01	<0.01	<0.01

SMW-6

	<u>3rd Qt</u>	4 th Qt
HCO ₃	408	384
CO ₃	<5	<5
TDS	1020	1680
K	7.5	3
Ca	13	1.7
Mg	2.0	0.18

Analyte

	1 st QT	2 nd QT	3 rd QT	4 th QT	"'86
Gross Alpha (pCi/e)	4.8 $\pm$ 53	6.7 $\pm$ 30	4.3 $\pm$ 44	3.6 $\pm$ 37	
Gross Beta	153 $\pm$ 283	105 $\pm$ 94	134 $\pm$ 76	141 $\pm$ 131	
R _a	<5	0.7 $\pm$ 4.0			

pH (S.V.)	8.4	8.01	7.9	8.30	
	8.4	8.00		8.31	
	8.4	8.02		8.30	
	8.4	8.04		8.30	

E.C. (umhos/cm)	1275	1590	1500	1400	1700
	1275	1490		1410	1710
	1275	1500		1400	1710
	1275	1480		1420	

T.O.C. (mg/e)	5.0	5.0	25.	9.	10
	5.5	5.6		9.	9
	5.1	5.4		10.	9
	5.0	5.5		9.	10

TOX (mg/e)	<10	<10	15.	17.	8
	<10	<10		17.	9
	<10	<10		18.	9
	<10	<10		17.	9

Coliforms	<1/100ml	<1/10ml	<1/100ml	<1/100ml	
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ROUTE 3, BOX 7 • GALLUP, NEW MEXICO 87301
(505) 722-3833 • TWX 910-981 0504

November 11, 1985

Peter H. Pache
Program Manager
Hazardous Waste Section
N.M. EID
P.O. Box 968
Santa Fe, NM 87504-0968

RE: Analyses of Ground Water Samples, Giant Refining Company

Dear Mr. Pache:

Giant Refining Company is pleased to submit the analyses of ground water samples from the new monitor wells, installed in October, 1985, at the Ciniza Land Treatment Area. This submission presents data obtained from analyses of the first series of samples collected from the shallow, early-warning detection wells (SMW-series) which have been installed at Giant Refining Company's Ciniza Refinery land treatment unit.

These wells have been completed in the uppermost zone of ground water, and will provide representative samples of the confined ground water found in a sand lens in the Chinle formation. Six stainless steel wells have been installed, in three up-gradient and three down-gradient locations, and have been completed following procedures identical to those for RCRA ground-water monitoring wells. This insures that representative samples will be obtained for analysis of all appropriate parameters.

The initial series of sample collections, preservation, and analytical parameters followed the same guidelines established in the Part B application to evaluate ground water conditions in Giant's existing RCRA ground water monitoring wells. These wells (MW-series) are completed in the Sonsela Sandstone (uppermost aquifer).

As shown in the attached analyses, in the first sampling all early-detection wells exceeded at least one of the heavy metal standards from the Interim Primary Drinking Water Standards list. These metals represent background conditions due to their occurrence in both up and down gradient wells, and are not the result of refinery activities at the hazardous management unit (land farm).

All wells had varying levels of Gross Alpha and Gross Beta activity which could potentially exceed standards but it is believed that these are due to naturally occurring isotopes. No radioactive wastes of any type have ever been handled at the Ciniza facility. Additionally, Gross Beta activity, which is based on several man-made isotopes and specified as millrems/year (a dosage), cannot be fully characterized unless the specific isotopes are identified.

A summary of the analyses which are reported as being in excess of interim primary drinking water standards follows:

1.) Up-Gradient Wells

<u>Parameter</u>	SMW-1	<u>Concentration</u> ¹		SMW-3	<u>Standard</u>
		SMW-2			
As	0.08	0.10		0.063	0.05
Ba	6.0	4.0		1.7	1.0
Cd	0.06	0.10		NE ²	0.01
Pb	0.116	0.19		NE ²	0.05
Se	0.066	0.13		0.1	0.01
Gross Alpha	0±187 pCi/l	0± 206 pCi/l		97 ± 225 pCi/l	15 pCi/l
Gross Beta	0±1097 pCi/l	1010± 1148 pCi/l		43 ± 1130 pCi/l	4 mr/yr

¹ All concentrations in PPM unless otherwise noted

² Does not exceed standards

2.) Down-Gradient Wells

<u>Parameter</u>	SMW-4	<u>Concentration</u> ¹		SMW-6	<u>Standard</u>
		SMW-5			
As	NE ²	0.064		NE ²	0.05
Se	0.026	0.022		0.02	0.01
Gross Alpha	0± 48 pCi/l	0± 51 pCi/l		4.8± 53 pCi/l	14 pCi/l
Gross Beta	72± 281 pCi/l	0± 273 pCi/l		143± 283 pCi/l	4 mr/yr

¹ All concentrations in PPM unless otherwise noted

² Does not exceed standards

The above standard levels for As, Ba, Cd, Pb and Se in the up-gradient wells are greater than or essentially equal to those levels observed in the down-gradient wells. This, in conjunction with the lack of any detectable organic waste-constituents in any samples, is clear evidence that no contamination of the upper ground-water zone has occurred.

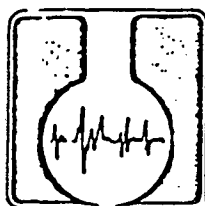
If you have any questions concerning the analytical results which have been provided, please feel free to contact me or Alberto A. Gutierrez at Geoscience Consultants, Ltd.'s Albuquerque office.

Very truly yours,
Giant Refining Company



Carl D. Shook
Vice President Refining Operations
CDS:ds

cc: Carlos Guerra, Giant Industries
Alberto A. Gutierrez, Geoscience Consultants, Ltd.



ASSAIGAI ANALYTICAL LABORATORIES

TO: Geoscience Consultants, Ltd.
500 Copper N.W. Suite 325
Albuquerque, NM 87102

DATE: 5 November 1985
1485
Page 1 of 4

ANALYTE

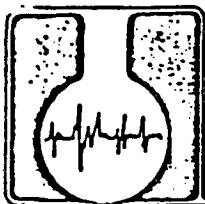
SAMPLE ID/ANALYTICAL RESULTS

	8510100930 SMH-1 (UP)	8510101045 SMH-4 (DOWN)	8510101140 SMH-5 (DOWN)
As	0.080 mg/l	<0.050 mg/l	0.064 mg/l
Ba	6.0 mg/l	<1.0 mg/l	<1.0 mg/l
Cr	<0.050 mg/l	<0.050 mg/l	<0.050 mg/l
Cd	0.060 mg/l	<0.010 mg/l	<0.010 mg/l
Hg	<0.002 mg/l	<0.002 mg/l	<0.002 mg/l
Se	0.066 mg/l	0.026 mg/l	0.022 mg/l
Ag	<0.050 mg/l	<0.050 mg/l	<0.050 mg/l
Pb	0.116 mg/l	<0.050 mg/l	<0.050 mg/l
F	0.28 mg/l	0.61 mg/l	0.69 mg/l
NO 3 as N	0.1 mg/l	0.1 mg/l	0.1 mg/l
Endrin	<0.0002 mg/l	<0.0002 mg/l	<0.0002 mg/l
Methoxychlor	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l
Lindane	<0.004 mg/l	<0.004 mg/l	<0.004 mg/l
Cl	1489.0 mg/l	51.0 mg/l	54.0 mg/l
Fe	0.45 mg/l	1.2 mg/l	1.8 mg/l
Mn	0.16 mg/l	0.08 mg/l	0.05 mg/l
Phenols	<0.001 mg/l	<0.001 mg/l	<0.001 mg/l
Na	2438.0 mg/l	320.0 mg/l	342.0 mg/l
SO 4	2833.0 mg/l	192.0 mg/l	189.0 mg/l
pH	7.6	8.4	8.7
	7.6	8.4	8.7
	7.6	8.4	8.7
	7.6	8.4	8.7
EC	5600 umhps/cm	1200 umhos/cm	1150 umhos/cm
	5600 umhos/cm	1200 umhos/cm	1150 umhos/cm
	5600 umhos/cm	1200 umhos/cm	1150 umhos/cm
	5600 umhos/cm	1200 umhos/cm	1150 umhos/cm
TOC	7.8 mg/l	1.0 mg/l	6.0 mg/l
	7.9 mg/l	1.5 mg/l	6.0 mg/l
	8.0 mg/l	2.0 mg/l	5.5 mg/l
	8.2 mg/l	1.0 mg/l	5.9 mg/l
TOX	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l
	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l
	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l
	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l
Toxaphene	<0.005 mg/l	<0.005 mg/l	<0.005 mg/l
2,4,-D	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l
2,4,5-TP	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l
Gross Alpha	0 ± 187 pCi/l	0 ± 48 pCi/l	0 ± 51 pCi/l
Gross Beta	0 ± 1097 pCi/l	72 ± 281 pCi/l	0 ± 273 pCi/l
Turbidity	78 FIU	86 FIU	66 FIU
Radium	<5 pCi/l	<5 pCi/l	<5 pCi/l

ANALYTE

SAMPLE ID/ANALYTICAL RESULTS

	8510101235 SMW-3 (UP)	8510101325 SMW-6 (DOWN)	8510101430 SMW-2 (UP)
As	0.063 mg/l	<0.050 mg/l	0.10 mg/l
Ba	1.7 mg/l	<1.0 mg/l	4.0 mg/l
Cr	<0.050 mg/l	<0.050 mg/l	<0.050 mg/l
Cd	<0.010 mg/l	<0.010 mg/l	0.10 mg/l
Hg	<0.002 mg/l	<0.002 mg/l	<0.002 mg/l
Se	0.10 mg/l	0.020 mg/l	0.13 mg/l
Ag	<0.050 mg/l	<0.050 mg/l	<0.050 mg/l
Pb	<0.050 mg/l	<0.050 mg/l	0.19 mg/l
F	0.43 mg/l	0.63 mg/l	0.34 mg/l
NO 3 as N	0.2 mg/l	0.2 mg/l	2.0 mg/l
Endrin	<0.0002 mg/l	<0.0002 mg/l	<0.0002 mg/l
Methoxychlor	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l
Lindane	<0.004 mg/l	<0.004 mg/l	<0.004 mg/l
Cl	42.0 mg/l	70.0 mg/l	1985.0 mg/l
Fe	0.04 mg/l	0.62 mg/l	0.62 mg/l
Mn	0.02 mg/l	0.17 mg/l	2.0 mg/l
Phenols	<0.001 mg/l	<0.001 mg/l	<0.001 mg/l
Na	440.0 mg/l	348.0 mg/l	2660.0 mg/l
SO 4	1784.0 mg/l	261.0 mg/l	3473.0 mg/l
pH	8.0	8.4	7.7
	8.0	8.4	7.7
	8.0	8.4	7.7
	8.0	8.4	7.7
EC	3075 umhos/cm	1275 umhos/cm	6900 umhos/cm
	3075 umhos/cm	1275 umhos/cm	6900 umhos/cm
	3075 umhos/cm	1275 umhos/cm	6900 umhos/cm
	3075 umhos/cm	1275 umhos/cm	6900 umhos/cm
TOC	6.0 mg/l	5.0 mg/l	9.0 mg/l
	6.1 mg/l	5.5 mg/l	9.0 mg/l
	6.0 mg/l	5.1 mg/l	9.2 mg/l
	6.5 mg/l	5.0 mg/l	8.9 mg/l
TOX	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l
	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l
	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l
	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l
Toxaphene	<0.005 mg/l	<0.005 mg/l	<0.005 mg/l
2,4,-D	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l
2,4,5-TP	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l
Gross Alpha	97 ± 225 pCi/l	4.8 ± 53 pCi/l	0 ± 206 pCi/l
Gross Beta	43 ± 1130 pCi/l	153 ± 283 pCi/l	1010 ± 1148 pCi/l
Turbidity	7.5 FTU	51 FTU	27 FTU
Radium	<5 pCi/l	<5 pCi/l	<5 pCi/l



ASSAIGAI ANALYTICAL LABORATORIES

TO: GeoScience Consultants
500 Copper N.W.
Albuquerque, NM 87102

DATE: 5 November 1985
1485

SAMPLE IDENTIFICATION

8510100930
8510101045
8510101140
8510101235
8510101325
8510101430

ANALYTICAL RESULTS

<1 Coliform Colonies/100 ml
<1 Coliform Colonies/100 ml
<1 Coliform Colonies/100 ml
<1 Coliform Colonies/100 ml
<1 Coliform Colonies/100 ml
<1 Coliform Colonies/100 ml

NOMINAL DETECTION LIMIT: 1

Coliforms were confirmed according to the procedures in the Water Supply Laboratory Certification Manual, NMED-EID.

REFERENCE: "Standard Methods for the Examination of Water and Wastewater",
15th Edition, APHA, N.Y., 1980.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,

Jennifer V. Smith
Jennifer V. Smith, Ph.D.
Laboratory Director

TO: Geoscience Consultants, Ltd.

1485

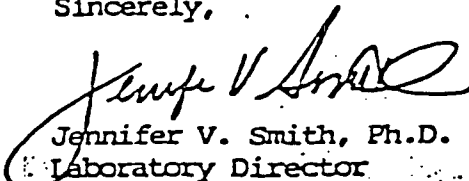
Page 3 of 4

ANALYTE	NOMINAL DETECTION LIMITS
As	0.050 mg/l
Ba	1.0 mg/l
Cr	0.050 mg/l
Cd	0.010 mg/l
Hg	0.002 mg/l
Se	0.002 mg/l
Ag	0.050 mg/l
Pb	0.050 mg/l
F	0.1 mg/l
NO 3 as N	0.01 mg/l
Endrin	0.0002 mg/l
Methoxychlor	0.1 mg/l
Lindane	0.004 mg/l
Cl	1.0 mg/l
Fe	0.05 mg/l
Mn	0.005 mg/l
Phenols	0.001 mg/l
Na	0.1 mg/l
SO 4	1.0 mg/l
pH	0.01
EC	0.1 umhps/cm
TOC	0.1 mg/l
TOX	0.01 mg/l
Toxaphene	0.005 mg/l
2,4,-D	0.1 mg/l
2,4,5-TP	0.01 mg/l
Gross Alpha	0.1 pCi/l
Gross Beta	0.1 pCi/l
Turbidity	0.1 FTU/NTU
Radium	5 pCi/l

REFERENCE: "Standard Methods for the Examination of Water and Wastewater",
15th Edition, APHA, N.Y., 1980.

An invoice for services is enclosed. Thank you for contacting Assaigai
Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director

Assaigal Analytical Laboratories, Inc.
7300 Jefferson N.E.
Albuquerque, NM 87109

TO: Geoscience Consultants, Ltd.
500 Copper N.W. Suite 325
Albuquerque, NM 87102

DATE: 18 February 1986
0143 Corrected
Page 1 of 4

Assaigai Analytical Laboratories, Inc.
7300 Jefferson N.E.
Albuquerque, NM 87109

TO: Geoscience Consultants, Ltd.
500 Copper N.W., Suite 325
Albuquerque, NM 87102

DATE: 20 February 1986
0143 Corrected
Page 2 of 4

ANALYTE	SAMPLE ID/ANALYTICAL RESULTS
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100	100

TOC	8601271245	8601271445	8601271545	8601271645	8601271745	8601271845
	SMW1	SMW2	SMW3	SMW4	SMW5	SMW6
	10.1 mg/l	9.6 mg/l	7.0 mg/l	3.0 mg/l	5.9 mg/l	5.0 mg/l
	10.2 mg/l	9.8 mg/l	6.9 mg/l	2.8 mg/l	6.0 mg/l	5.6 mg/l
	10.0 mg/l	10.2 mg/l	6.8 mg/l	2.9 mg/l	5.8 mg/l	5.4 mg/l
Phenols	10.0 mg/l	10.0 mg/l	7.0 mg/l	3.0 mg/l	6.0 mg/l	5.5 mg/l
	<0.001 mg/l	<0.001 mg/l	<0.001 mg/l	<0.001 mg/l	<0.001 mg/l	<0.001 mg/l
	<1 Colony/10 ml	<1 Colony/100 ml	<1 Colony/100 ml	<1 Colony/10 ml	<1 Colony/10 ml	<1 Colony/10 ml
Coliform Tox	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l
	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l
	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l
	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l
	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l

Asaigai Analytical Laboratories, Inc.
 7300 Jefferson N.E.
 Albuquerque, NM 87109

TO: Geoscience Consultants, Ltd.
 500 Copper N.W. Suite 325
 Albuquerque, NM 87102

DATE: 10 February 1986
 0143
 Page 3 of 4

ANALYTE SAMPLE ID/ANALYTICAL RESULTS

	8601271245 SM#1	8601271445 SM#2	8601271545 SM#3	8601271645 SM#4	8601271745 SM#5	8601271845 SM#6
Endrin	<0.0002 mg/l	<0.0002 mg/l	<0.0002 mg/l	<0.0002 mg/l	<0.0002 mg/l	<0.0002 mg/l
Toxaphene	<0.005 mg/l	<0.005 mg/l	<0.005 mg/l	<0.005 mg/l	<0.005 mg/l	<0.005 mg/l
Methoxychlor	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l
Lindane	<0.004 mg/l	<0.004 mg/l	<0.004 mg/l	<0.004 mg/l	<0.004 mg/l	<0.004 mg/l
2,4-D	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l
2,4,5-TP	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l
Gross Alpha	24.0 ± 12.0 pci/l	41 ± 34 pci/l	120 ± 73 pci/l	23 ± 21 pci/l	37 ± 23 pci/l	67 ± 30 pci/l
Gross Beta	20 ± 30 pci/l	0 ± 94 pci/l	9 ± 246 pci/l	0 ± 95 pci/l	86 ± 97 pci/l	105 ± 98 pci/l
Radium	0 ± 3.7 pci/l	0.3 ± 3.9 pci/l	0 ± 3.8 pci/l	2.1 ± 4.2 pci/l	0 ± 3.7 pci/l	0.7 ± 4.0 pci/l

ANALYTE

NOMINAL DETECTION LIMITS

NO 3 as N	0.01 mg/l
TOC	0.1 mg/l
TOX	10 ug/l
2,4-D	0.1 mg/l
2,4,5-TP	0.01 mg/l
Endrin	0.0002 mg/l
Lindane	0.004 mg/l
Methoxychlor	0.1 mg/l
Toxaphene	0.005 mg/l
Phenols	0.001 mg/l
Coliform	1
Gross Alpha	0.1 pCi/l
Gross Beta	0.1 pCi/l
Acrolein	25 ug/l
Acrylonitrile	25 ug/l
Benzene	5.0 ug/l
Bromoform	5.0 ug/l
Carbon Tetrachloride	5.0 ug/l
Chlorobenzene	5.0 ug/l
Chlorodibromomethane	5.0 ug/l
Chloroethane	5.0 ug/l
2-Chloroethylvinyl Ether	5.0 ug/l
Chloroform	5.0 ug/l
Dichlorodibromomethane	5.0 ug/l
1,1-Dichloroethane	5.0 ug/l
1,2-Dichloroethane	5.0 ug/l
1,1-Dichloroethylene	5.0 ug/l
1,2-Dichloropropane	5.0 ug/l
1,3-Dichloropropylene	5.0 ug/l
Ethylbenzene	5.0 ug/l
Methyl Bromide	5.0 ug/l
Methyl Chloride	5.0 ug/l
Methylene Chloride	5.0 ug/l
1,1,2,2-Tetrachloroethane	5.0 ug/l

TO: Geoscience Consultants Ltd.

0628

ANALYTE

NOMINAL DETECTION LIMITS

HCO 3	5 mg/l
CO 3	5 mg/l
pH	0.01
Cl	1.0 mg/l
F	0.1 mg/l
SO 4	1.0 mg/l
EC	1 umhos/cm
TDS	1 mg/l
Ca	0.1 mg/l
Na	0.1 mg/l
K	0.1 mg/l
Mg	0.01 mg/l
Ba	0.01 mg/l
Mn	0.02 mg/l
As	0.050 mg/l
Cd	0.010 mg/l
Fe	0.05 mg/l
Pb	0.050 mg/l
Ag	0.050 mg/l
Cr	0.050 mg/l
Hg	0.002 mg/l
Se	0.010 mg/l

TO: Geoscience Consultants Ltd.

0628

ANALYTE

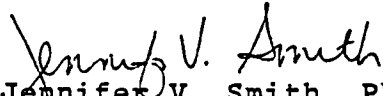
NOMINAL DETECTION LIMITS

Tetrachloroethylene	5.0 ug/l
Toluene	5.0 ug/l
1,2-Transdichloroethylene	5.0 ug/l
1,1,1-Trichloroethane	5.0 ug/l
1,1,2-Trichloroethane	5.0 ug/l
Trichloroethylene	5.0 ug/l
Trichlorofluoromethane	5.0 ug/l
Vinyl Chloride	5.0 ug/l

REFERENCE: "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director

ALCALI ANALYTICAL LABORATORIES
 Jefferson NE
 Albuquerque, NM 87109

Geoscience Consultants Ltd.
 Attn: Jan Martin
 500 Copper NW Suite 325
 Albuquerque, NM 87102

DATE: 11 September 1986
 1283

SAMPLE ID / ANALYTICAL RESULTS

SW-1	SW-2	SW-3	SW-4	SW-5	SW-6
8607281650	8607281800	8607281100	8607281320	8607281455	8607281555
7.52	7.58	7.94	8.52	8.80	8.30
7.53	7.57	7.95	8.51	8.80	8.31
7.52	7.57	7.96	8.51	8.81	8.30
7.52	7.56	7.96	8.50	8.81	8.30
5650 umhos/cm	7190 umhos/cm	3400 umhos/cm	1270 umhos/cm	1200 umhos/cm	1400 umhos/cm
5700 umhos/cm	7200 umhos/cm	3400 umhos/cm	1280 umhos/cm	1190 umhos/cm	1410 umhos/cm
5680 umhos/cm	7250 umhos/cm	3410 umhos/cm	1290 umhos/cm	1190 umhos/cm	1400 umhos/cm
5700 umhos/cm	7200 umhos/cm	3405 umhos/cm	1290 umhos/cm	1190 umhos/cm	1420 umhos/cm
0.235 mg/l	0.242 mg/l	0.406 mg/l	0.577 mg/l	0.396 mg/l	0.549 mg/l
1850 mg/l	2380 mg/l	1750 mg/l	300 mg/l	280 mg/l	453 mg/l
426 mg/l	348 mg/l	520 mg/l	272 mg/l	232 mg/l	384 mg/l
6194 mg/l	7202 mg/l	3010 mg/l	878 mg/l	812 mg/l	1680 mg/l
<5 mg/l	<5 mg/l	<5 mg/l	48 mg/l	48 mg/l	<5 mg/l
0.155 mg/l	0.126 mg/l	<0.01 mg/l	0.14 mg/l	0.125 mg/l	0.70 mg/l
27 mg/l	11 mg/l	8 mg/l	3 mg/l	6 mg/l	9 mg/l
31 mg/l	11 mg/l	7 mg/l	3 mg/l	6 mg/l	9 mg/l
30 mg/l	11 mg/l	8 mg/l	3 mg/l	6 mg/l	10 mg/l
28 mg/l	11 mg/l	7 mg/l	3 mg/l	7 mg/l	9 mg/l
109 ug/l	103 ug/l	560 ug/l	101 ug/l	45 ug/l	17 ug/l
110 ug/l	100 ug/l	560 ug/l	100 ug/l	45 ug/l	17 ug/l
109 ug/l	102 ug/l	565 ug/l	104 ug/l	45 ug/l	18 ug/l
111 ug/l	103 ug/l	560 ug/l	101 ug/l	45 ug/l	17 ug/l

VIGAL ANALYTICAL LABORATORIES
Jefferson NE
Albuquerque, NM 87109

Geoscience Consultants Ltd.
Attn: Jan Martin
500 Copper NW Suite 325
Albuquerque, NM 87102

DATE: 11 September 1986
1283

SAMPLE ID / ANALYTICAL RESULTS

ANALYTE	SW-1 8607281650	SW-2 8607281800	SW-3 8607281100	SW-4 8607281320	SW-5 8607281455	SW-6 8607281555
Polysulfide	<0.001 mg/l <1 Colony/ 100 ml	<0.001 mg/l <1 Colony/ 100 ml	<0.001 mg/l <1 Colony/ 100 ml	<0.001 mg/l <1 Colony/ 100 ml	<0.001 mg/l <1 Colony/ 100 ml	<0.001 mg/l <1 Colony/ 100 ml
	<0.050 mg/l	<0.050 mg/l	<0.050 mg/l	<0.050 mg/l	<0.050 mg/l	<0.050 mg/l
	0.02 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	0.01 mg/l
	0.30 mg/l	0.18 mg/l	0.21 mg/l	0.24 mg/l	0.14 mg/l	1.1 mg/l
	0.11 mg/l	0.11 mg/l	<0.05 mg/l	<0.05 mg/l	<0.05 mg/l	<0.05 mg/l
	1399.6 mg/l	2049.4 mg/l	43.9 mg/l	49.9 mg/l	59.9 mg/l	62.9 mg/l
	1300 mg/l	1780 mg/l	998 mg/l	340 mg/l	312 mg/l	376 mg/l
	<0.050 mg/l	<0.050 mg/l	<0.050 mg/l	<0.050 mg/l	<0.050 mg/l	<0.050 mg/l
	0.04 mg/l	0.05 mg/l	<0.010 mg/l	<0.010 mg/l	<0.010 mg/l	<0.010 mg/l
	<0.002 mg/l	<0.002 mg/l	<0.002 mg/l	<0.002 mg/l	<0.002 mg/l	<0.002 mg/l
	<0.010 mg/l	<0.010 mg/l	<0.010 mg/l	<0.010 mg/l	<0.010 mg/l	<0.010 mg/l
	10 mg/l	7 mg/l	7 mg/l	4 mg/l	4 mg/l	3 mg/l
	0.10 mg/l	0.092 mg/l	<0.05 mg/l	<0.05 mg/l	<0.05 mg/l	0.055 mg/l
	<0.02 mg/l	<0.02 mg/l	<0.02 mg/l	<0.02 mg/l	<0.02 mg/l	<0.02 mg/l
	142 mg/l	148 mg/l	17 mg/l	2.8 mg/l	1.5 mg/l	1.7 mg/l
	71 mg/l	60 mg/l	15 mg/l	0.30 mg/l	0.17 mg/l	0.18 mg/l
Chlorobenzene	<0.0002 mg/l	<0.0002 mg/l	<0.0002 mg/l	<0.0002 mg/l	<0.0002 mg/l	<0.0002 mg/l
Chlorobenzene	<0.004 mg/l	<0.004 mg/l	<0.004 mg/l	<0.004 mg/l	<0.004 mg/l	<0.004 mg/l
Chlorobenzene	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l
Chlorobenzene	<0.005 mg/l	<0.005 mg/l	<0.005 mg/l	<0.005 mg/l	<0.005 mg/l	<0.005 mg/l

IGAI ANALYTICAL LABORATORIES
Jefferson NE
Albuquerque, NM 87109

Geoscience Consultants Ltd.
Attn: Jan Martin
500 Copper NW Suite 325
Albuquerque, NM 87102

DATE: 11 September 1986
1283

YTS

SAMPLE ID / ANALYTICAL RESULTS

	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6
	8607281650	8607281800	8607281100	8607281320	8607281455	8607281555
D	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l	<0.1 mg/l
5-Tp	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l	<0.01 mg/l
s Alpha	42 ± 49 pci/l	28 ± 60 pci/l	33 ± 34 pci/l	4 ± 12 pci/l	19 ± 15 pci/l	36 ± 37 pci/l
s Beta	0 ± 65 pci/l	91 ± 132 pci/l	28 ± 130 pci/l	17 ± 65 pci/l	1 ± 65 pci/l	141 ± 131 pci/l

ASSAIGAI ANALYTICAL LABORATORIES
7300 Jefferson NE
Albuquerque, NM 87109

TO: Geoscience Consultants Ltd.

1283

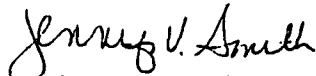
NOMINAL DETECTION LIMITS

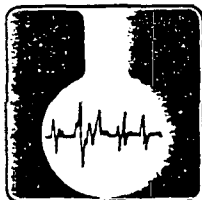
pH	0.01
EC	1 umhos/cm
F	0.1 mg/l
SO 4	1.0 mg/l
HCO 3	5 mg/l
TDS	1 mg/l
CO 3	5 mg/l
NO 3	0.01 mg/l
TOC	0.1 mg/l
TOX	0.01 ug/l
Phenols	0.001 mg/l
Coliform	1
As	0.050 mg/l
Ba	0.01 mg/l
Fe	0.05 mg/l
Pb	0.05 mg/l
Cl	1.0 mg/l
Na	0.1 mg/l
Ag	0.050 mg/l
Cd	0.010 mg/l
Hg	0.002 mg/l
Se	0.010 mg/l
K	0.1 mg/l
Cr	0.05 mg/l
Mn	0.02 mg/l
Ca	0.1 mg/l
Mg	0.01 mg/l
Endrin	0.0002 mg/l
Lindane	0.004 mg/l
Methoxychlor	0.1 mg/l
Toxaphene	0.005 mg/l
2,4-D	0.1 mg/l
2,4,5-TP	0.01 mg/l
Gross Alpha	0.1 pCi/l
Gross Beta	0.1 pCi/l

REFERENCE: "Test Methods for Evaluating Solid Waste, Physical/
Chemical Methods", USEPA, SW 846, EMSL-Cincinnati,
1982.

An invoice for services is enclosed. Thank you for contacting
Assaigai Analytical Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob Anderson
Rt. 3 Box 7
Gallup, NM 87301

DATE: 8 December 1986
1914

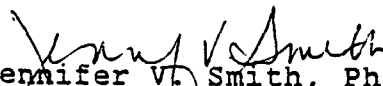
SAMPLE ID: SMW 4

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
Pb	<0.05 mg/l	0.05 mg/l
Cr	<0.05 mg/l	0.05 mg/l
EC	1300 umhos/cm	1 umhos/cm
	1300 umhos/cm	
	1300 umhos/cm	
	1300 umhos/cm	
TOX	7 ug/l	5 ug/l
	7 ug/l	
	6 ug/l	
	6 ug/l	
TOC	7 mg/l	0.1 mg/l
	8 mg/l	
	8 mg/l	
	7 mg/l	

REFERENCES: "Test Methods for Evaluating Solid Waste,--Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assagai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob Anderson
Rt. 3 Box 7
Gallup, NM 87301

DATE: 8 December 1986
1914

SAMPLE ID: SMW 5

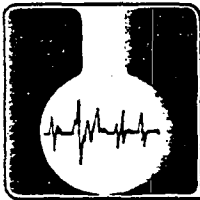
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
Pb	<0.05 mg/l	0.05 mg/l
Cr	<0.05 mg/l	0.05 mg/l
EC	1100 umhos/cm	1 umhos/cm
	1100 umhos/cm	
	1100 umhos/cm	
	1100 umhos/cm	
TOX	1 ug/l	5 ug/l
	1 ug/l	
	1 ug/l	
	1 ug/l	
TOC	7 mg/l	0.1 mg/l
	8 mg/l	
	8 mg/l	
	7 mg/l	

REFERENCES: "Test Methods for Evaluating Solid Waste, -Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assagai Laboratories.

Sincerely,

Jennifer V. Smith
Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob Anderson
Rt. 3 Box 7
Gallup, NM 87301

DATE: 8 December 1986
1914

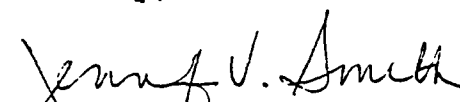
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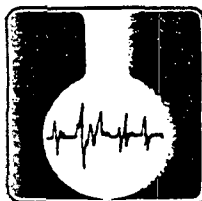
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
Pb	<0.05 mg/l	0.05 mg/l
Cr	<0.05 mg/l	0.05 mg/l
EC	1700 umhos/cm	1 umhos/cm
	1710 umhos/cm	
	1710 umhos/cm	
	1700 umhos/cm	
TOX	8 ug/l	5 ug/l
	9 ug/l	
	9 ug/l	
	9 ug/l	
TOC	10 mg/l	0.1 mg/l
	9 mg/l	
	9 mg/l	
	10 mg/l	

REFERENCES: "Test Methods for Evaluating Solid Waste, -Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assagai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
ATTN: Bob Anderson
Rt. 3 Box 7
Gallup, NM 87301

DATE: 8 December 1986
1914

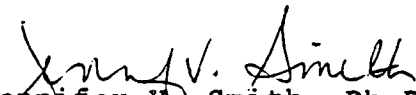
SAMPLE ID: OW 24

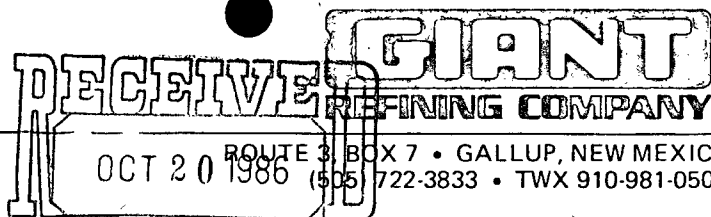
ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMITS
Pb	<0.05 mg/l	0.05 mg/l
Cr	<0.05 mg/l	0.05 mg/l
EC	1170 umhos/cm	1 umhos/cm
	1170 umhos/cm	
	1180 umhos/cm	
	1175 umhos/cm	
TOX	7 ug/l	5 ug/l
	7 ug/l	
	7 ug/l	
	7 ug/l	
TOC	8 mg/l	0.1 mg/l
	7 mg/l	
	7 mg/l	
	8 mg/l	

REFERENCES: "Test Methods for Evaluating Solid Waste, -Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assagai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



ROUTE 3 BOX 7 • GALLUP, NEW MEXICO 87301
(505) 722-3833 • TWX 910-981-0504

OIL CONSERVATION DIVISION
SANTA FE

October 15, 1986

Mr. Peter H. Pache
Program Manager
Hazardous Waste Section
NMEID
P.O. Box 968
Santa Fe, NM 87504-0968

RE: New Monitor Well at Ciniza Facility

Dear Mr. Pache:

Enclosed is the complete data on water quality for our new monitor well. Please replace the previously submitted incomplete analytical results with this sheet. We have decided to call this well MW-5 rather than MW-3' as previously indicated.

If you have any questions, please contact Bob McClenahan, of my staff.

Sincerely,

Carl D. Shook

CDS:ds

Enclosures

cc: David Boyer, NMOCD
Rosemary Martinez, EPA Region VI
Jim Hunter, Geoscience Consultants, Ltd.

ANALYTICAL LABORATORIES

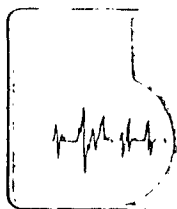
TO: Giant Refinery
Attn: Bob Anderson
Rt. 3 Box 7
Gallup, NM 87301

DATE: 18 September 1986
1432

SAMPLE ID: MW-^{5 pl}3, 10A, 8/19/86

:30

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
As	<0.050 mg/l	0.050 mg/l
Ba	0.90 mg/l	0.005 mg/l
Cd	<0.010 mg/l	0.010 mg/l
Cr	<0.050 mg/l	0.050 mg/l
F	0.290 mg/l	0.1 mg/l
Pb	<0.050 mg/l	0.050 mg/l
Hg	<0.002 mg/l	0.002 mg/l
NO3 as N	0.24 mg/l	0.1 mg/l
Se	<0.010 mg/l	0.010 mg/l
Ag	<0.050 mg/l	0.050 mg/l
Endrin	<0.0002 mg/l	0.0002 mg/l
Lindane	<0.004 mg/l	0.004 mg/l
Methoxychlor	<0.1 mg/l	0.1 mg/l
Toxaphene	<0.005 mg/l	0.005 mg/l
2,4-D	<0.1 mg/l	0.1 mg/l
2,4,5-TP(Silvex)	<0.01 mg/l	0.01 mg/l
Radium	1.9 + 2.3 pCi/l	0.1 pCi/l
Gross Alpha	22 + 22 pCi/l	0.1 pCi/l
Gross Beta	0 + 120 pCi/l	0.1 pCi/l
Cl	59 mg/l	1.0 mg/l
Fe	0.78 mg/l	0.05 mg/l
Mn	0.06 mg/l	0.005 mg/l
Na	286 mg/l <i>ref</i>	0.1 mg/l
SO4	177 mg/l	1.0 mg/l
pH	9.05	0.01
	9.04	
	9.04	
	9.05	
EC	1175 umhos/cm	1.0 umhos/cm
	1180 umhos/cm	
	1179 umhos/cm	
	1170 umhos/cm	
TOC	4 mg/l	0.1 mg/l
	4 mg/l	
	3 mg/l	
	4 mg/l	
Phenols	<0.01 mg/l	0.01 mg/l
TOX	5 ug/l	0.1 ug/l
	6 ug/l	
	7 ug/l	
	8 ug/l	



ASSAIGAI ANALYTICAL LABORATORIES

TO: Giant Refinery
Attn: Bob McCunningham
Rt. 3 Box 7
Gallup, NM 87301

DATE: 14 October 1986
1432 revised Na results

SAMPLE ID: MW-3

ANALYTE

ANALYTICAL RESULTS

NOMINAL DETECTION LIMIT

Na

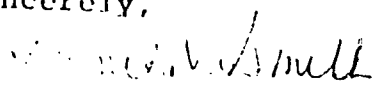
286 mg/l

0.1 mg/l

REFERENCE: "Test Methods for Evaluating Solid Waste, Physical/Chemical
Methods", USEPA, SW 846, EMSL-Cincinnati, 1982

An invoice for services is enclosed. Thank you for contacting
Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director



Ciniza Mon. Site

ROUTE 3, BOX 7 • GALLUP, NEW MEXICO 87301
(505) 722-3833 • TWX 910-981-0504

September 15, 1986

Mr. Peter H. Pache
Program Manager
Hazardous Waste Section
NMEID
P.O. Box 968
Santa Fe, NM 87504-0968

RE: New Monitor Well MW-3 at Ciniza Facility

Dear Mr. Pache:

This is a follow-up to my letter of August 18, in regards to ground water quality of our replacement monitor well MW-3. Attached are both the water elevations and water quality data on the new well.

I would like to address three items related to the data, for your clarification. First, there is a typographical error on the Sodium concentration, it should be 137.8 mg/l, which is consistent with both previous data and the electrical conductance values found. The pH is slightly higher, 0.2-0.5 standard units, than was expected. This may be due to influences from cementing and, or bentonite in the well. This well will be pumped thoroughly again before the next sampling date. Thirdly, the TOX results have not been received from our laboratory. They will be sent to you as soon as they are received, which should be within a week.

A cursory examination of the data on this new well shows that it is consistent with the other MW series wells on site, both in water quality and elevations. Our next full round of MW series sampling is scheduled for October.

If you have any questions regarding this information, please feel free to call Bob McClenahan of my staff.

Sincerely,

Carl D. Shook

CDS:ds

Attachments

cc: David Boyer, NMOCD
Bill Taylor, EPA Region VI
William Rhea, EPA Region VI
Will Focht, EPA Region VI
Rosemary Martinez, EPA Region VI
Carlos Castio, EPA Region VI
Jim Hunter, Geoscience Consultants, LTD.

TABLE I

Date - 8-15-86

<u>Well #</u>	<u>Casing Height</u>	<u>Depth to Water</u>	<u>Water Elevation</u>
1	6876.2	5.5'	6870.7
2	6878.3	8'	6870.3
3	6880.8	9.9'	6870.9
4	6880.4	6.8'	6873.6

Date - 8-19-86

1	As Above	5.8'	6870.4
2		8.2'	6870.1
3		10.3'	6870.5
4		6.6'	6873.8

Well #3 pumped 8/15 and 8/19 before sampling

ASSAIGAT ANALYTICAL LABORATORIES

TO: Giant Refinery
Attn: Bob Anderson
Rt. 3 Box 7
Gallup, NM 87301

DATE: 10 September 1986
1432

SAMPLE ID: MW-3, 10A, 8/19/86

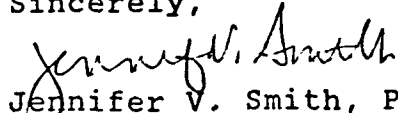
:30

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
As	<0.050 mg/l	0.050 mg/l
Ba	0.90 mg/l	0.005 mg/l
Cd	<0.010 mg/l	0.010 mg/l
Cr	<0.050 mg/l	0.050 mg/l
F	0.290 mg/l	0.1 mg/l
Pb	<0.050 mg/l	0.050 mg/l
Hg	<0.002 mg/l	0.002 mg/l
NO3 as N	0.24 mg/l	0.1 mg/l
Se	<0.010 mg/l	0.010 mg/l
Ag	<0.050 mg/l	0.050 mg/l
Endrin	<0.0002 mg/l	0.0002 mg/l
Lindane	<0.004 mg/l	0.004 mg/l
Methoxychlor	<0.1 mg/l	0.1 mg/l
Toxaphene	<0.005 mg/l	0.005 mg/l
2,4-D	<0.1 mg/l	0.1 mg/l
2,4,5-TP(Silvex)	<0.01 mg/l	0.01 mg/l
Radium	1.9 + 2.3 pCi/l	0.1 pCi/l
Gross Alpha	22 ± 22 pCi/l	0.1 pCi/l
Gross Beta	0 ± 120 pCi/l	0.1 pCi/l
Cl	59 mg/l	1.0 mg/l
Fe	0.78 mg/l	0.05 mg/l
Mn	0.06 mg/l	0.005 mg/l
Na	137.8 mg/l	0.1 mg/l
SO4	177 mg/l	1.0 mg/l
pH	9.05	0.01
	9.04	
	9.04	
	9.05	
EC	1175 umhos/cm1	1.0 umhos/cm1
	1180 umhos/cm1	
	1179 umhos/cm1	
	1170 umhos/cm1	
TOC	4 mg/l	0.1 mg/l
	4 mg/l	
	3 mg/l	
	4 mg/l	
Phenols	<0.01 mg/l	0.01 mg/l
TOX		

REFERENCE: "Test Methods for Evaluating Solid Waste, Physical/Chemical Method", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,


Jennifer V. Smith, Ph.D.
Laboratory Director

MONITORING WELL DATA
FOR EPA HAZARDOUS WASTE
ANNUAL REPORT NOV. 1982

FIRST QUARTER

	MW-1	MW-2	MW-3	MW-4 (UPGRADIENT)	$\bar{X}$ MEAN	S^2 VARIANCE
TOTAL ORGANIC CARBON	8.8	6.3	5.0	8.3, 8.3, 8.5, 8.7	8.45	.0367
TOTAL ORGANIC HALOGEN	2.8	1.9	2.1	2.5, 2.2, 2.7, 2.0	2.35	.0967
PH	8.6	8.7	8.6	8.6, 8.5, 8.7, 8.6	8.60	.0067
CONDUCTIVITY	930	1000	950	1025, 1050, 1050, 1030	1039	172.9
DEPTH FROM TOP OF CASING	7'3" 7'2"	9'1" 9.1	30'1" 30.1	6'9" 6'8"		

SECOND QUARTER

TOTAL ORGANIC CARBON	5.35	9.00	7.50	6.5, 6.3, 6.5, 6.3	6.4	.0133
TOTAL ORGANIC HALOGEN	2.60	2.30	1.90	2.1, 2.0, 2.1, 2.5	2.08	.0040
PH	8.80	8.90	8.40	8.60, 8.62, 8.65, 8.60	8.62	.0002
CONDUCTIVITY	1021	1012	1008	950, 940, 950, 940	945	33.33
DEPTH FROM TOP OF CASING	6'8" 6.7	7'1" 7.1	27'	7'5" 7.4		

THIRD QUARTER

TOTAL ORGANIC CARBON	2.50	3.30	4.50	5.0, 5.5, 5.0, 6.0	5.38	.225
TOTAL ORGANIC HALOGEN	1.65	2.71	2.22	2.51, 2.60, 2.54, 2.60	2.56	.002
PH	8.80	8.90	8.40	8.50, 8.50, 8.45, 8.50	8.49	.0006
CONDUCTIVITY	1100 5.9	1000 4.3	995 25.8	950, 955, 960, 950	954	22.92
DEPTH FROM TOP OF CASING	5'11"	8'4"	25'10"	6'6"		

MONITORING WELL DATA
FOR EPA HAZARDOUS WASTE
ANNUAL REPORT NOV. 1982

FOURTH QUARTER

MW-1

MW-2

MW-3

MW-4

(UPGRADIENT)

$\bar{X}$
MEAN

S^2
VARIANCE

TOTAL ORGANIC CARBON

5.90

7.50

9.30

9.60, 9.60,
9.45, 9.50

9.54

.0056

TOTAL ORGANIC HALOGEN

1.77

1.90

2.05

2.35, 2.80,
2.80, 2.95

2.88

.0042

PH

8.82

8.90

8.40

8.30, 8.30
8.35, 8.40

8.34

.0023

CONDUCTIVITY

995

1000

980

1020, 990,
995, 1000

996

22.9

DEPTH FROM TOP OF CASING

6'1"

7'4"

26'2"

7'1"

6.1

7.3

26.2

7.1

MONITORING WELL MW-4
UPGRADIENT
FIRST YEAR BACKGROUND

	1ST QTR	2ND QTR	3RD QTR	4TH QTR	$\bar{X}_B$ MEAN	S_B^2 VARIANCE
TOTAL ORGANIC CARBON	8.45	6.40	5.38	9.54	7.44	3.58
TOTAL ORGANIC HALOGEN	2.35	2.088	2.52	2.88	2.47	0.112
pH	8.60	8.62	8.49	8.34	8.51	.0165
CONDUCTIVITY	1039	945	954	996	983	1863

<u>MW-1</u> FIRST YEAR						
TOTAL ORGANIC CARBON	8.80	5.35	2.50	5.90	5.64	6.666
TOTAL ORGANIC HALOGEN	2.8	2.6	1.65	1.77	2.20	.336
pH	8.6	8.8	8.8	8.8	8.75	.010
CONDUCTIVITY	930	1021	1100	995	1012	4945

<u>MW-2</u> FIRST YEAR					$\bar{X}_m$	S_m^2
TOTAL ORGANIC CARBON	6.3	9.0	3.3	7.5	6.53	5.84
TOTAL ORGANIC HALOGEN	1.9	2.3	2.71	1.9	2.20	0.15
pH	8.7	8.9	8.9	8.9	8.85	0.01
CONDUCTIVITY	1000	1012	1000	1000	1003	360

<u>MW-3</u> FIRST YEAR						
TOTAL ORGANIC CARBON	5.0	7.50	4.50	9.30	6.58	5.02
TOTAL ORGANIC HALOGEN	2.1	1.90	2.22	2.05	2.07	0.018
pH	8.60	8.40	8.40	8.40	8.45	0.01
CONDUCTIVITY	1000	1000	950	1008	983	1.22

t -STATISTIC (t^*) AND t -STATISTIC (t_c)
FIRST YEAR

	<u>MW-1</u>		<u>MW-2</u>		<u>MW-3</u>	
	t^*	t_c	t^*	t_c	t^*	t_c
TOTAL ORGANIC CARBON	-1.124	2.353	0.593	2.353	-0.737	2.353
TOTAL ORGANIC HALOGEN	-0.807	2.353	-1.055	2.353	-4.681	2.353
pH	2.949	3.182	4.177	3.182	-0.737	3.182
CONDUCTIVITY	0.703	2.353	0.918	2.353	0	2.353

ALL CASES $n_m = 4$, $n_B = 4$

$$t^* = \frac{X_m - X_B}{\sqrt{\frac{S_m^2}{n_m} + \frac{S_B^2}{n_B}}}$$

$$W_B = \frac{S_B^2}{n_B}, \quad W_m = \frac{S_m^2}{n_m}$$

$$t_c = \frac{W_B t_B + W_m t_m}{W_B + W_m}$$

t_3 AND t_m ARE FROM
STANDARD T-TABLE



11.01.0.07.F
+ 11.01.0.07.E

ROUTE 3, BOX 7 • GALLUP, NEW MEXICO 87301
(505) 722-3833 • TWX 910-981-0504

September 23, 1983

Scott Nicholson, Engineer (6AW-HE)
U.S. ENVIRONMENTAL PROTECTION
AGENCY, REGION VI
1201 Elm Street
InterFirst Two Building
Dallas, Texas 75270

Dear Mr. Nicholson:

Enclosed is a copy of the Semi-Annual Monitoring Well Sample Analyses for our four land treatment wells.

The Group 3 Parameters have been statistically analyzed. A tabulation of this comparison is also enclosed. The comparison shows no statistically significant changes in the three down gradient wells from the first year back ground data with one exception. The conductivity on MW-3 is higher.

The conductivity tests for the upgradient well (MW-4) shows an increase from the background data. A recheck sample from MW-3 and MW-4 is being taken for follow up analyses.

Sincerely,

A handwritten signature in dark ink, appearing to read "Carl D. Shook".

Carl D. Shook
Refinery Manager

CDS/eb

Enclosures

bc: Carl D. Shook
Carlos Gurerra
Robert C. Anderson
File

MONITORING WELL DATA
FOR LAND TREATMENT AREA
SEMI-ANNUAL REPORT

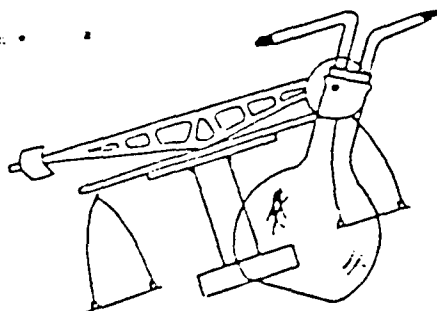
GROUP 3 PARAMETERS

SAMPLES COLLECTED 07/05/83

	<u>MW-1</u>	<u>MW-2</u>	<u>MW-3</u>	<u>UPGRADIENT MW-4</u>
TOTAL ORGANIC CARBON	1.5	6.8	4.7	8.2, 8.8, 8.8, 8.5
TOTAL ORGANIC HALOGEN	1.5	1.7	1.95	1.85, 1.9, 1.88, 1.87
pH	8.6	8.7	8.5	8.4, 8.4, 8.4, 8.4
CONDUCTIVITY	1050	995	1080	1100, 1100, 1100, 1100
DEPTH FROM TOP OF CASING	7' 0"	8' 8" 6.7	27' 0"	7' 0"

<u>FIRST YEAR BACKGROUND</u>	<u>X_B</u>	<u>S_B²</u>			<u>X_M</u>	<u>S_M²</u>
TOC; X _B , S _B ²	5.64,	6.66	6.53, 5.84	6.58, 5.02	7.44, 3.58	8.58, .28
TOH; X _B , S _B ²	2.20,	.336	2.20, 0.15	2.07, .018	2.47, .112	1.88, .02
pH; X _B , S _B ²	8.75,	.010	8.85, 0.01	8.45, 0.10	8.51, .016	8.4,
COND; X _B , S _B ²	1012,	4945	1003, 36.0	983, 1.22	983, 1863	1100,

	<u>TOC</u>		<u>TOX</u>		<u>pH</u>		<u>COND</u>	
	<u>t*</u>	<u>tc</u>	<u>t*</u>	<u>tc</u>	<u>t*</u>	<u>tc</u>	<u>t*</u>	<u>tc</u>
MW-1	-3.208	2.353	-2.415	2.353	2.999	3.182	-1.081	2.353
MW-2	0.223	2.353	-2.582	2.353	2.999	3.182	-2.666	2.353
MW-3	-1.678	2.353	-1.789	2.353	0.999	3.182	175.6	2.353
MW-4	1.159	2.353	-3.265	2.353	1.713	3.182	5.421	2.353



Ford Chemical

LABORATORY, INC.

Bacteriological and Chemical Analysis

40 WEST LOUISE AVENUE
SALT LAKE CITY, UTAH 84115

PHONE 466-8761

DATE: 09/13/83

CERTIFICATE OF ANALYSIS

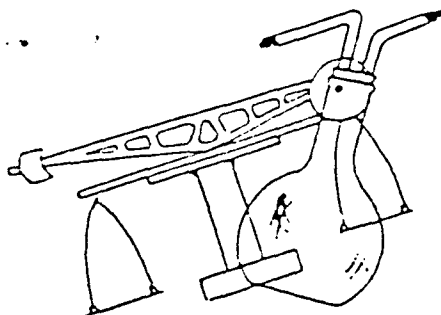
GIANT REFINING CO.
ROUTE 3, BOX 7
GALLUP, NEW MEXICO
87301

83-005469

SAMPLE: WATER SAMPLES COLLECTED 7-5-83 RECEIVED 7-11-83 FOR
RECOVERABLE ANALYSIS UNDER P.O. #60063.

	MW-1	MW-2	MW-3	MW-4
2, 4, D ms/l SM509B	<.001	<.001	<.001	<.001
2, 4, 5, -TP (Silvex) ms/l SM509B	<.001	<.001	<.001	<.001
Arsenic, As ms/l SM404C	.004	.004	.005	.003
Barium, Ba ms/l SM303A	.020	.020	.010	.040
Cadmium, Cd ms/l SM305A	<.001	<.001	<.001	<.001
Chloride, Cl ms/l SM408A	58.0	60.0	58.0	22.0
Chromium, Cr ms/l SM307A	<.001	<.001	<.001	<.001
Conductivity umhos/cm #1	1,050	995	1,080	1,100
Conductivity umhos/cm #2				1,100
Conductivity umhos/cm #3				1,100
Conductivity umhos/cm #4				1,100
Endrin ms/l SM509A	<.0001	<.0001	<.0001	<.0001
Fluoride, F ms/l SM414A&C	.93	.84	1.23	.41

actual sample



Ford Chemical

LABORATORY, INC.

Bacteriological and Chemical Analysis

40 WEST LOUISE AVENUE
SALT LAKE CITY, UTAH 84115

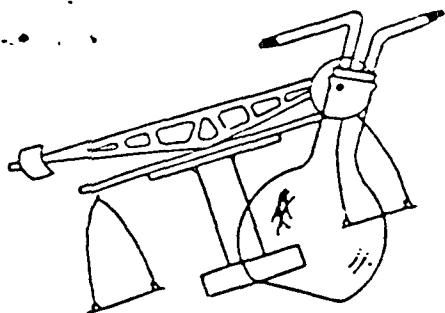
PHONE 466-8761

PAGE: 2

CERTIFICATE OF ANALYSIS
83-005469

MW-1 MW-2 MW-3 MW-4

	MW-1	MW-2	MW-3	MW-4
Gross Alpha pCi/l	<2.0	<2.0	<2.0	<2.0
Gross Beta pCi/l	<.1	<.1	<.1	<.1
Iron, Fe ms/l SM310B	.130	.160	.180	.110
Lead, Pb ms/l SM311A	.005	.005	.002	.002
Lindane ms/l SM509A	<.001	<.001	<.001	<.001
MPN Total Coli/100 ml SM908A	<2.0	<2.0	<2.0	<2.0
Manganese, Mn ms/l SM314A	.025	.023	.030	.012
Mercury, Hg ms/l SM315A	<.0002	<.0002	<.0002	<.0002
Methoxychlor ms/l SM509A	<.001	<.001	<.001	<.001
Nitrate, NO ₃ -N ms/l SM418C	<.02	<.02	<.02	<.02
Phenol ppm	<.001	<.001	<.001	<.001
Radium 226 pCi/l	<.05	<.05	<.05	<.05
Radium 228 pCi/l	<.05	<.05	<.05	<.05
Selenium, Se ms/l SM318C	<.001	<.001	<.001	<.001
Silver, Ag ms/l SM319A	<.001	<.001	<.001	<.001
Sodium, Na ms/l EPA273.1	250	270	250	255
Sulfate, SO ₄ ms/l SM427C	172	172	148	138



Ford Chemical

LABORATORY, INC.

Bacteriological and Chemical Analysis

40 WEST LOUISE AVENUE
SALT LAKE CITY, UTAH 84115

PHONE 466-8761

PAGE: 3

CERTIFICATE OF ANALYSIS
88-005469

MW-1 MW-2 MW-3 MW-4

Total Organic Carbon ms/l #1	1.50	6.80	4.70	8.20
Total Organic Carbon ms/l #2				8.80
Total Organic Carbon ms/l #3				8.80
Total Organic Carbon ms/l #4				8.50
Total Organic Halosen ms/l #1	1.500	1.700	1.950	1.850
Total Organic Halosen ms/l #2				1.900
Total Organic Halosen ms/l #3				1.880
Total Organic Halosen ms/l #4				1.870
Toxaphene ms/l SMS09A	<.001	<.001	<.001	<.001
PH Units #1	8.60	8.70	8.50	8.40
PH Units #2				8.40
PH Units #3				8.40
PH Units #4				8.40


FORD CHEMICAL LABORATORY, INC.



FILE 11.01.C.07. F
+ 11.01.C.07. E

ROUTE 3, BOX 7 • GALLUP, NEW MEXICO 87301
(505) 722-3833 • TWX 910-981-0504

February 27, 1985

Mr. Peter H. Pache
State of New Mexico
Environmental Improvement Division
Hazardous Waste Section
P.O. Box 968
Santa Fe, NM 87504-0968

SUBJECT: Annual ground water monitoring report for January 1 to
December 31, 1984
Facility EPA I.D. Number FNMD 00033321

Dear Mr. Pache:

As required by the New Mexico Hazardous Waste Management Regulation 206.C.I.E we are submitting a ground water monitoring Annual Report for the calendar year January 1 to December 31, 1984. Attached are summary sheets of the testing done on our four monitoring wells MW-1, MW-2, MW-3 and MW-4. By sending samples and split samples to different laboratories and by improving our sampling techniques, we have shown that TOX levels are below detection levels. TOX was thought to be a problem by EPA earlier in the year. The other constituent tests have been below the required limits.

The following is an excerpt from our Part B application Section 30.2 page 30-6. It is given to determine the ground water linear velocity.

The average linear velocity for water in the uppermost aquifer beneath the facility may be estimated from the relation:

$V=KI/n$, where K= horizontal hydraulic conductivity, ft/day
I= potentiometric gradient, ft/ft
n= porosity

A value for the horizontal hydraulic conductivity has been estimated for the sandstone units which comprise the Sonsela sandstone bed, of which the uppermost aquifer is a part, for the Ciniza area. The value for K was estimated from the water levels in observation and monitoring wells (limited to those completed in the aquifer) as 0.009 ft/ft. Porosity n is estimated at 16 percent based on the assumptions that the permeability is about 0.4 ft/day, or 167 millidarcies, and that the uppermost aquifer is composed of fine-grained sandstone.

r. Peter H. Pache
February 27, 1985
Page Two

The velocity thus determined is:

$$V=KI/n = (0.4 \text{ ft/day}) (0.009 \text{ ft/ft}) / 0.16 = 0.02 \text{ ft/day or } V=8.2 \text{ ft/yr.}$$

Our monitoring shows no evidence of migration of hazardous constituents from our land treatment area.

Also attached is a summary of the analysis of the samples taken by the EID at the refinery on February 1, 1984.

Sincerely,



C. D. Shook

CDS:ds

cc: 11.01.C.07.E

Attachments

GIANT REFINING COMPANY

1984 ANNUAL REPORT

MONITORING WELL
MW-1

DATE AND ANALYSIS / ELEVATIONS

IPDWS/
NM ST. DSC
1-12-84C
2-16-84C
3-8-84b
4-30-84C
11-7-84d
12-5-84

CONSTITUENT

ARSENIC, MG/L	.05/.1	NA	<.001	NA	<.01	<.001	NA
BARIUM, MG/L	1.0		.01		<.01	.01	
CADMIUM, MG/L	0.05		<.001		<.001	<.001	
CHROMIUM, MG/L	0.05		<.001		<.01	<.001	
FLUORIDE, MG/L	1.6		.90		.46	.72	
LEAD, MG/L	0.05		<.001		.004	.005	
MERCURY, MG/L	0.002		<.0002		NA	<.0002	
NITRATE -N, MG/L	10		.07		<.1	<.01	
SELENIUM, MG/L	0.01/.05		<.001		.01	<.001	
SILVER, MG/L	0.05		<.001		<.01	<.0001	
CHLORIDE, MG/L	250		54		55	47	
COPPER, MG/L	1.0		NA		NA	NA	
IRON, MG/L	1.0		.05		.08	.29	
MANGANESE, MG/L	0.2		.02		.009	.02	
PHENOLS, MG/L	.005		<.001		.01	<.001	
SULFATE, MG/L	600		135		170	151	↓
TDS, MG/L	1000	↓	NA	↓	NA	NA	
TOX, MG/L	0.05	0.95	.72	.68 a	<.03	.14	<.01 E
TOC, MG/L		5.65	5.96	4.92	87	6.92	8.0
ZINC, MG/L	10	NA	NA	NA	NA	NA	NA
pH	6-9	8.50	8.80	8.22 ↓	8.84	8.61	8.7 ↓
ALUMINUM, MG/L	5.0	NA	NA	NA	NA	NA	NA
COBALT, MG/L	.05						
MOLYBDENUM, MG/L	1.0						
NICKEL, MG/L	0.2	↓	↓	↓	↓	↓	↓
EC, MICROMHRS/GM	-	992	1038	1010 a	1068	1030	1180 E
SODIUM	-	NA	256	NA	270	257	NA
CYANIDE, MG/L	0.2		NA		NA	NA	
OIL & GREASE		↓	NA	↓	NA	NA	↓

STATIC WATER LEVEL 6870.9 6870.9 6870.9 6871.6 6870.2 6870.6

BOTTOM ELEVATION 6746.5 →

TOP OF CASING ELEVATION 6876.9 →

COMMENTS: NA = NOT ANALYSED ; a CEP, INC. TOX=.44, TOC=90, pH=8.79, EC=11250
 b CEP, INC.
 c FORD CHEMICAL LAB, INC.
 d ASSATGAT ANALYTICAL
 e ROCKY MOUNTAIN ANALYTICAL TOX= NOT DETECTED,
 TOC = 1.2, pH = 8.79, EC = 1152

1984 ANNUAL REPORT

COMMENTS: NA = NOT ANALYSED ;
 a CEP, INC. TOX = .32, TOC = 85, pH = 8.96, EC = 1275
 b CEP, INC.
 c FORD CHEMICAL LAB, INC.
 d ASSATGAI ANALYTICAL
 e ROCKY MOUNTAIN ANALYTICAL TOX = NOT DETECTED
 TOC = 1.2, pH = 8.88, EC = 1160

1984 ANNUAL REPORT

COMMENTS: NA = NOT ANALYSED ; a CEP, INC. TOX = .65, TOC = 86, pH = 8.93, EC = 120;
b CEP, INC.
c FORD CHEMICAL LAB, INC.
d ASSATGAI ANALYTICAL
e ROCKY MOUNTAIN ANALYTICAL TOX = NOT DETECTED,
TOC = 4.2, pH = 8.80, EC = 1165

1984 ANNUAL REPORT

COMMENTS: NA = NOT ANALYSED ;				a	CEP, INC. TOX = .37, TAC = 86, pH = 8.97, EC = 127
				b	CEP, INC.
				c	FORD CHEMICAL LAB, INC.
				d	ASSAIGAT ANALYTICAL
				e	ROCKY MOUNTAIN ANALYTICAL TOX = NOT DETECTED
					TOC = 4.0, pH = 8.59, EC = 1192



ROUTE 3, BOX 7 • GALLUP, NEW MEXICO 87301
(505) 722-3833 • TWX 910-981-0504

February 28, 1986

Mr. Peter H. Pache
State of New Mexico
Environmental Improvement Division
Hazardous Waste Section
P.O. Box 968
Santa Fe, NM 87504-0968

Subject: Annual ground water monitoring report for January 1
to December 31, 1985, Facility EPA I.D. Number FNMD 00033321

Dear Mr. Pache:

We are submitting a ground water monitoring Annual Report for the calendar year January 1 to December 31, 1985. Attached are summary sheets of the testing done on our four monitoring wells MW-1, MW-2, MW-3 and MW-4. MW-4 is up-gradient.

Six shallow monitoring wells were added around the land treatment area in the fall of 1985 for early detection. The testing done on these wells is also tabulated on the attached sheets. The shallow wells are SMW-1, SMW-2, SMW-3, SMW-4, SMW-5 and SMW-6. SMW-1, SMW-2 and SMW-3 are up-gradient to the land treatment area.

The TOX levels have remained below detection levels in 1985. The other constituent tests in the MW monitoring wells have been below the required limits.

The ground water velocity is estimated to be 8.2 ft/yr in the LTA vicinity. It is the same as estimated last year. The velocity is calculated by:

$$V = KI/n = (0.4 \text{ ft/day})(0.009 \text{ ft/ft})/0.16 = 0.02 \text{ ft/day} \\ = 8.2 \text{ ft/yr.}$$

Our monitoring shows no evidence of migration of hazardous constituents from our land treatment area. Some 1986 testing is included in the tabulations for your information.

Sincerely,

A handwritten signature in cursive script, appearing to read "Carl D. Shook".
Carl D. Shook

CDS:ds

Attachment

cc: 11.01.C.07.E
Alberto Gutierrez - Geoscience Consultants, Ltd.

GIANT REFINING COMPANY

1985 ANNUAL REPORT

MONITORING WELL MW-1	MW-1					SMW-1	
	IPDWS/ NM ST. DS	1-13-85	10-14-85	2-11-86		10-10-85	1-23-86
CONSTITUENT							
ARSENIC	MG/L	.05				0.080	<0.050
BARIUM	"	1.0				6.0	<0.005
CADMIUM	"	0.05				<0.060	0.090
CHROMIUM	"	0.05				<0.050	0.065
FLUORIDE	"	1.6				0.28	0.42
LEAD	"	0.05	.009			0.116	0.12
MERCURY	"	0.002	<0.002			<0.002	<0.002
NITRATE - N	"	10				0.1	<0.01
SELENIUM	"	0.01/0.05				0.066	<0.010
SILVER	"	0.05				<0.050	<0.050
CHLORIDE	"	250	47			1489.0	1340
COPPER	"	1.0	.077			0.45	<0.04
IRON	"	1.0	.024			0.16	<0.02
MANGANESE	"	0.2	.024			<0.001	<0.001
PHENOLS	"	0.005	<0.001				1704
SULFATE	"	600	150				
TDS	"	1000					
*TOK	"	0.05	<0.01	<0.01	<0.01	<0.01	<0.01
*TOC	"		7.4	2.0	3.0	8.0	10.1
ZINC	"	10					
*pH		6 - 9	8.8	8.5	8.4	7.6	7.7
ALUMINUM	MG/L	5.0					
COBALT	"	0.05					
MOLYBDENUM	"	1.0					
NICKEL	"	0.2					
*E. C. MICROBES/cm	-	1100	1003	1162		5600	5845
SODIUM	MG/L	-	234				1692
CYANIDE	"	0.2					
OIL & GREASE	"						
TURBIDITY, FTU						78	175
ENDRIN	"					<0.0002	
METHOXYCHLOR	"					<0.1	
LINDANE	"					<0.004	
TOXAPHENE	"					<0.005	
2,4,-D	"					<0.01	
2,4,5,-TP	"					<0.01	
GROSS ALPHA	PCI/L					0 ± 187	
GROSS BETA	"					0 ± 1097	
RADIUM	"					<5	
STATIC WATER ELEV.		6869.9	6870.7	6870.9		6855.2	6855.2
BOTTOM ELEV.		6746.5	6746.5	6746.5		6831.7	6831.7
TOP OF CASING ELEV.		6876.2	6876.2	6876.2		6878.2	6878.2
* AVE. OF FOUR REPLICATES							

1985 ANNUAL REPORT

MONITORING WELL MW-2		MW-2				SMW-2	
CONSTITUENT	IPDWS/ NM ST. DS	1-13-85	10-14-85	2-11-86		10-10-85	1-23-86
ARSENIC	MG/L	.05/.1				0.10	<0.050
BARIUM	"	1.0				4.0	<0.005
CADMIUM	"	0.05				0.10	0.13
CHROMIUM	"	0.05				<0.050	0.067
FLUORIDE	"	1.6				0.34	0.55
LEAD	"	0.05	0.010			0.19	0.28
MERCURY	"	0.002	<0.002			<0.002	<0.002
NITRATE - N	"	10				2.0	0.1
SELENIUM	"	0.01/0.05				0.13	0.010
SILVER	"	0.05				<0.050	<0.050
CHLORIDE	"	250	56.0			1985.0	1985.0
COPPER	"	1.0					
IRON	"	1.0	0.037			0.62	<0.04
MANGANESE	"	0.2	0.017			2.0	<0.02
PHENOLS	"	0.005	<0.001			<0.001	<0.001
SULFATE	"	600	157.0			3473.0	1985
TDS	"	1000					
* TOX	"	0.05	<0.01	<0.01	<0.01	<0.01	<0.01
* TOC	"		5.8	3.0	3.0	9.0	9.9
ZINC	"	10					
* pH		6 - 9	8.8	8.9	8.4	7.7	7.6
ALUMINUM	MG/L	5.0					
COBALT	"	0.05					
MOLYBDENUM	"	1.0					
NICKEL	"	0.2					
* E. C. MICROBES/CM	-	1180	1003	1191		5845	7318
SODIUM	MG/L	-	195			2660.0	1690
CYANIDE	"	0.2					
OIL & GREASE	"						
TURBIDITY, FTU						27	92
ENDRIN	"					<0.0002	
METHOXYCHLOR	"					<0.1	
LINDANE	"					<0.004	
TOXAPHENE	"					<0.005	
2,4,-D	"					<0.1	
2,4,5,-TP	"					<0.01	
STRESS ALPHA	PCI/P					0 ± 206	
CROSS BETA	"					1010 ± 1148	
RADIUM	"					<5	
STATIC WATER ELEV.		6869.7	6869.7	6870.7		6849.7	6849.7
BOTTOM ELEV.		6740.6	6740.6	6740.6		6824.9	6824.9
TOP OF CASING ELEV.		6878.3	6878.3	6878.3		6879.5	6879.5
* AVE. OF FOUR REPLICATES							

GIANT REFINING COMPANY

1985 ANNUAL REPORT

MONITORING WELL MW-3	MW-3					SMW-3	
	IPDWS/ NM ST. DS	1-13-85	10-14-85	2-11-86		10-10-85	1-23-86
CONSTITUENT							
ARSENIC	MG/L	.05/.1				0.063	<0.050
BARIUM	"	1.0				1.7	<0.050
CADMIUM	"	0.05				<0.010	<0.020
CHROMIUM	"	0.05				<0.050	0.055
FLUORIDE	"	1.6				0.43	0.72
LEAD	"	0.05	0.010			<0.050	<0.05
MERCURY	"	0.002	<0.002			<0.002	<0.002
NITRATE - N	"	10				0.2	0.8
SELENIUM	"	0.01/0.05				0.10	<0.010
SILVER	"	0.05				<0.050	<0.050
CHLORIDE	"	250	57.0			42.0	43.99
COPPER	"	1.0					
IRON	"	1.0	0.020			<0.04	<0.04
MANGANESE	"	0.2	0.029			0.02	<0.02
PHENOLS	"	0.005	<0.001			<0.001	<0.001
SULFATE	"	600	120.0			1784.0	3766
TDS	"	1000					
* TOX	"	0.05	<0.01	<0.01	<0.01	0.01	<0.01
* TOC	"		8.2	2.0	4.0	6.1	7.7
ZINC	"	10					
* pH		6 - 9	8.7	8.7	8.3	8.0	7.8
ALUMINUM	MG/L	5.0					
COBALT	"	0.05					
MOLYBDENUM	"	1.0					
NICKEL	"	0.2					
* E. C. MICROBES/CM		-	1100	1001	1161	3075	3690
SODIUM	MG/L	-	140.0			440.0	832
CYANIDE	"	0.2					
OIL & GREASE	"						
TURBIDITY, FTU						7.5	120
ENDRIN	"					<0.0002	
METHOXYCHLOR	"					<0.1	
LINDANE	"					<0.004	
TOXAPHENE	"					<0.005	
2,4,-D	"					<0.1	
2,4,5,-TP	"					<0.01	
GROSS ALPHA PC/L						97 ± 225	
GROSS BETA	"					43 ± 1130	
RADIUM	"					<5	
STATIC WATER ELEV.		6809.5	6849.6	6856.4		6847.6	6845.9
BOTTOM ELEV.		6752.3	6752.3	6752.3		6836.6	6836.6
TOP OF CASING ELEV.		6880.8	6880.8	6880.8		6880.1	6880.1
* AVE. OF FOUR REPLICATES							

GIANT REFINING COMPANY

1985 ANNUAL REPORT

MONITORING WELL MW-4		MW-4				SMW-4	
CONSTITUENT	IPDWS/ NM ST. DS	1-13-85	10-14-85	2-11-86		10-10-85	1-23-86
ARSENIC	MG/L	0.05/0.1				<0.050	<0.050
BARIUM	"	1.0				<1.0	<0.0050
CADMIUM	"	0.05				<0.010	<0.010
CHROMIUM	"	0.05				<0.050	<0.05
FLUORIDE	"	1.6				0.61	1.0
LEAD	"	0.05	0.006				<0.05
MERCURY	"	0.002				<0.002	<0.002
NITRATE - N	"	10				0.1	<0.01
SELENIUM	"	0.01/0.05				<0.006	<0.010
SILVER	"	0.05				<0.050	<0.050
CHLORIDE	"	250	16.0			51.0	57.98
COPPER	"	1.0					
IRON	"	1.0	0.086			1.2	<0.04
MANGANESE	"	0.2	0.038			0.08	<0.02
PHENOLS	"	0.005	<0.002			<0.001	<0.001
SULFATE	"	600	120.0			192.0	167
TDS	"	1000					
*TOX	"	0.05	<0.01	<0.01	<0.01	<0.01	<0.01
*TOC	"		10.8	2.0	1.0	1.7	2.9
ZINC	"	10					
*pH		6 - 9	8.6	8.2	8.2	8.4	8.1
ALUMINUM	MG/L	5.0					
COBALT	"	0.05					
MOLYBDENUM	"	1.0					
NICKEL	"	0.2					
*E. C. MICROBES/CM	-	1200.	1000	1191		1200	1328
SODIUM	MG/L	-	277.0			320.0	556
CYANIDE	"	0.2					
OIL & GREASE	"						
TURBIDITY, FTU						86	15
ENDRIN	"					<0.0002	
METHOXYCHLOR	"					<0.1	
LINDANE	"					<0.004	
TOXAPHENE	"					<0.005	
2,4,-D	"					<0.1	
2,4,5,-TP	"					<0.01	
GRASS ALPHA	PCI/P					0 ± 48	
GRASS BETA	"					72 ± 281	
RADIUM	"					<5	
STATIC WATER ELEV.		6873.3	6873.7	6873.8		6844.3	6841.3
BOTTOM ELEV.		6746.5	6746.5	6746.5		6746.5	6746.5
TOP OF CASING ELEV.		6879.8	6879.8	6879.8		6879.8	6879.8
* AVE OF FOUR REPLICATES							

86'

ANALYTE	MW SAMPLES										NOMINAL DETECTION LIMITS
	MW-1		MW-2		MW-3		MW-4		MW-5		
	SPRING	FALL	SPRING	FALL	SPRING	FALL	SPRING	FALL	SUMMER	FALL	
As (mg/l)	<0.050		<0.050		<0.050		<0.050		<0.050		0.050
Ba	<0.010		0.020		0.010		0.020		0.900		0.010
Be	0.110	0.170	0.180	0.170	0.120	0.210	0.180	0.270	0.780	0.220	0.050
Bb	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050
Bs	<0.050		<0.050		0.050		0.050		0.050		0.050
Ca	<0.010		<0.010		0.010		0.010		0.010		0.010
Cb	<0.002		<0.002		0.002		0.002		0.002		0.002
Ca	<0.010		<0.010		0.010		0.010		0.010		0.010
Ca	290.0	267.3	260.0	265.2	295.0	265.0	300.0	284.0	286.0	261.7	0.100
Cb	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050
Cn	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020
CO4	223.0	131.0	213.0	174.0	180.0	131.0	192.0	154.0	177.0	186.0	1.000
Cl	57.0	50.0	63.0	59.0	65.0	56.0	34.0	23.0	59.0	59.0	1.000
F	0.830		0.93		1.080		0.430		0.290		0.100
NO3 as N	0.620		0.57		0.73		0.62		0.24		0.010
Na		1.650		1.560		1.840		1.880		1.590	0.100
Ca		0.960		0.910		1.190		1.490		1.000	0.100
Mg		0.270		0.190		0.390		0.380		0.270	0.010
HCO3		244.0		224.0		256.0		360.0		236.0	5.000
Co3		56.0		68.0		64.0		48.0		48.0	5.000
TDs		654.0		684.0		674.0		386.0		668.0	1.000
Turbidity (NTU)	5.000		14.400		5.000		27.200		-		5.000
Phenols (mg/l)	0.003	<0.01	0.002	<0.01	0.004	<0.01	<0.001	<0.01	<0.01	<0.01	0.001
Endrin	<0.0002		<0.0002		<0.0002		<0.0002		<0.0002		0.0002
Toxaphene	<0.004		<0.004		<0.004		<0.004		<0.004		0.004
Methoxychlor	<0.100		<0.100		<0.100		<0.100		<0.100		0.1
Lindane	<0.005		<0.005		<0.005		<0.005		<0.005		0.005
2,4-D	<0.100		<0.100		<0.100		<0.100		<0.100		0.1
2,4,5-TP	<0.010		<0.010		<0.010		<0.010		<0.010		0.01

* Spring Samples taken 2/15/86
 Summer Samples taken 8/20/86
 Fall Samples taken 10/28/86

ANALYTE	MW-1		MW-2		MW-3		MW-4		MW-5		NOMINAL DETECTION LIMITS
	SPRING	FALL	SPRING	FALL	SPRING	FALL	SPRING	FALL	SUMMER	FALL	
Gross Alpha (pCi/l)	4.8 ± 13		15 ± 14		7.6 ± 13		11 ± 15		22 ± 22		0.1
Gross Beta (pCi/l)	0 ± 51		0 ± 51		52 ± 53		4 ± 52		0 ± 120		0.1
Ra (pCi/l)	0 ± 3.8		0 ± 36		0 ± 4.0		0 ± 3.7		1.9 ± 2.3		0.1
pH (Std Units)	8.60	8.80	8.59	8.80	8.72	8.77	8.33	8.56	9.05	8.86	0.1 ± 0.1
	8.60	8.79	8.69	8.82	8.70	8.77	8.39	8.56	9.04	8.86	
	8.70	8.81	8.56	8.81	8.65	8.79	8.37	8.55	9.04	8.85	
	8.60	8.80	8.55	8.80	8.60	8.78	8.30	8.54	9.05	8.85	
	$\bar{X}$ 8.60	8.80	8.60	8.81	8.67	8.78	8.35	8.55	9.05	8.86	
	S^2 0.003	0.0001	0.004	0.0001	0.003	0.0001	0.002	0.0001	0.001	0.001	
E.C. (mhos/cm)	1000	1200	1100	1199	1110	1000	1020	1100	1175	1100	1.0
	1080	1190	1110	1198	1115	1010	1075	1150	1180	1110	
	1100	1190	1090	1199	1100	1000	1100	1100	1179	1100	
	1110	1200	1090	1199	1100	1020	1110	1150	1170	1110	
	$\bar{X}$ 1073	1195	1100	1199	1006	1008	1076	1125	1176	1105	
	S^2 2422	33	133	0.3	56	92	1623	833	21	33	
TOC (mg/l)	1.0	7.0	16.0	1.0	2.0	3.0	4.0	6.0	4.0	1.0	0.1
	1.0	7.0	16.1	1.0	2.0	4.0	4.0	6.0	4.0	2.0	
	0.9	7.0	16.0	1.0	2.0	4.0	3.9	7.0	3.0	1.0	
	0.9	7.0	16.1	1.0	1.9	3.0	4.1	7.0	4.0	2.0	
	$\bar{X}$ 1.0	7.0	16.1	1.0	2.0	4.0	4.0	7.0	4.0	2.0	
	S^2 0.01	0.0	0.01	0.0	0.003	0.7	0.01	0.7	0.3	0.7	
TOX (μg/l)	<20	5	<20	16	<20	8	<20	8	5	17	20 μg/l, 5.0
	<20	5	<20	16	<20	6	<20	7	6	17	
	<20	<5	<20	17	<20	8	<20	8	7	16	
	<20	<5	<20	17	<20	6	<20	7	8	16	
	$\bar{X}$ <20	<5	<20	17	<20	7	<20	8	7	17	
	S^2 0.0	0.0	0.0	0.7	0.0	1.3	0.0	0.7	2.0	0.7	

SMW 1

Analyte

	1 st QT	2 nd QT	3 rd QT	4 th QT	11/86
As (mg/L)	0.080	<0.050	<0.050	<0.050	
Ba	6.0	<0.005	<0.01	0.02	
Fe	0.45	<0.04	0.08	0.30	
Pb	0.116	0.10	<0.050	0.11	
Ag	<0.050	<0.050	<0.050	<0.050	
Cd	0.060	0.090	0.012	0.04	
Hg	<0.002	<0.002	0.002	<0.002	
Se	0.066	<0.010	<0.010	<0.010	
Na	2438.0	1692.	1865	1300	
CR	<0.050	0.065	<0.050	0.10	
Mn	0.16	<0.02	0.07	<0.02	
SO ₄	2833.0	1704.	1471	1850.	
Cl	1489.0	1340.	1180	1399.6	
F	0.29	0.42	0.44	0.235	
NO ₃ as N	0.1	<0.01	<0.01	0.155	
:					
Turbidity (NTU)	78	175			
Phenols (mg/L)	<0.001	<0.001	0.005	<0.001	
Endrin	<0.0002	<0.0002	<0.0002	<0.0002	
Toxaphene	<0.005	<0.005	<0.005	<0.005	
Methoxychlor	<0.1	<0.1	<0.1	<0.1	
Lindane	<0.004	<0.004	<0.004	<0.004	
2,4-D	<0.1	<0.1	<0.1	<0.1	
2,4,5-TP	<0.01	<0.01	<0.01	<0.01	

SMW1

	<u>3rd QT</u>	<u>4th QT</u>
HCO ₃	498	426.
CO ₃	<5	<5.
TDS	5056	6194.
K	3.3	10.
Ca	172	142.
Mg	64	21.

SMW 1Analyte

	1 st Q+	2 nd Q+	3 rd Q+	4 th Q+	11/86
Gross Alpha (pCi/e)	0 [±] 187	280 [±] 120	99 [±] 118	42 [±] 49	
Gross Beta	0 [±] 1097	20 [±] 96	0 [±] 423	0 [±] 65	
R _A	<5	0 [±] 3.7			
H (S.V.)	7.6	7.70	7.7	7.52	
	7.6	7.75		7.53	
	7.6	7.65		7.52	
	7.6	7.68		7.52	
E.C. (umhos/cm)	5600	5850	5820	5650	
	5600	5810		5700	
	5600	5890		5680	
	5600	5830		5700	
T.O.C. (mg/e)	7.8	10.1	25.0	2.7	
	7.9	10.2		3.1	
	8.0	10.0		3.0	
	8.2	10.0		2.8	
TOX (mg/e)	<10	<10	264.	10.9	
	<10	<10		11.0	
	<10	<10		10.9	
	<10	<10		11.1	
Coliforms	<1/100ml	<1/100ml	<1/100ml	<1/100ml	

SMW2Analyte

	1 st QT	2 nd QT	3 rd QT	4 th QT	11/86
As (mg/L)	0.10	<0.050	<0.050	<0.050	
Ba	4.0	<0.005	0.01	<0.01	
Fe	0.62	<0.04	0.08	0.18	
Pb	0.19	0.28	<0.050	0.11	
Ag	<0.050	<0.050	<0.050	<0.050	
Cd	0.10	0.13	0.024	0.05	
Hg	<0.002	<0.002	0.003	<0.002	
Se	0.13	<0.010	<0.010	<0.010	
Na	2660.0	1690	2400	1780	
CR	<0.050	0.067	<0.050	0.092	
Mn	2.0	<0.02	0.10	<0.02	
SO ₄	3478.0	2429	1950	2380	
Cl	1945.0	1945	1699	2049.4	
F	0.34	0.55	0.37	0.242	
NO ₃ as N	2.0	0.1	<0.01	0.126	

Turbidity (NTU) 27 92

Phenols (mg/L)	<0.001	<0.001	0.006	<0.001
Endrin	<0.0002	<0.0002	<0.0002	<0.0002
Toxaphene	<0.005	<0.005	<0.005	<0.005
Methoxychlor	<0.1	<0.1	<0.1	<0.1
Lindane	<0.004	<0.004	<0.004	<0.004
2,4-D	<0.1	<0.1	<0.1	<0.1
2,4,5-TP	<0.01	<0.01	<0.01	<0.01

SMW 2

Analyte

	<u>3rd Qt</u>	4 th Qt
1+CO ₃	412	348.
CO ₃	<5	<5.
TDS	6916	7202.
K	3.9	7.
Ca	151	148.
Mg	50	60.

SMU 2

Analyte

	1 st Qt	2 nd Qt	3 rd Qt	4 th Qt	11/86
Gross Alpha (pCi/l)	0 $\pm$ 206	41 $\pm$ 34		28 $\pm$ 60	
Gross Beta	1010 $\pm$ 1149	0 $\pm$ 94		91 $\pm$ 132	
R _A	<5.	0.3 $\pm$ 3.9			

H (S.V.)	7.7	7.51	7.5	7.58
	7.7	7.53		7.57
	7.7	7.60		7.57
	7.7	7.62		7.56

E.C. (amhos/cm)	6900	7300	7400	7190
	6900	7340		7200
	6900	7420		7250
	6900	7210		7200

T.O.C. (mg/l)	9.0	9.6	11.0	11.
	9.0	9.8		11.
	9.2	10.2		11.
	8.9	10.0		11.

TOX (mg/l)	<10	<10	79.	10.3
	<10	<10		10.0
	<10	<10		10.2
	<10	<10		10.3

Coliforms	<1/100ml	<1/100ml	<1/100ml	<1/100ml
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Analyte

1st QT

2nd QT

3rd QT

4th QT

As (mg/L)	0.063	<0.050	<0.050	<0.050
Ba	1.7	<0.005	0.01	<0.01
Fe	0.04	<0.04	0.08	0.21
Pb	<0.050	<0.05	<0.050	<0.05
Ag	<0.050	<0.050	<0.050	<0.050
Cd	<0.010	0.020	0.008	<0.010
Hg	<0.002	<0.002	0.003	<0.002
Se	0.10	<0.010	<0.010	<0.010
Na	440.0	832	1280	998
Cr	<0.050	0.055	<0.050	<0.05
Mn	0.02	<0.02	0.03	<0.02
SO ₄	1784.0	3766	1567	1750
Cl	42.0	43.99	68	43.9
F	0.43	0.72	0.74	0.406
NO ₃ as N	0.2	0.4	<0.01	<0.01

Turbidity (NTU) 7.5

120

Phenols (mg/L)	<0.001	<0.001	0.002	<0.001
Endrin	<0.0002	<0.0002	<0.0002	<0.0002
Toxaphene	<0.005	<0.005	<0.005	<0.005
Methoxychlor	<0.1	<0.1	<0.1	<0.1
Lindane	<0.004	<0.004	<0.004	<0.004
2,4-D	<0.1	<0.1	<0.1	<0.1
2,4,5-TP	<0.01	<0.01	<0.01	<0.01

SMW 3

	<u>3rd Qt</u>	4 th Qt
HCO ₃	628	520
CO ₃	<5	<5
TDS	3068	3010
K	8.0	7
Ca	84.	17
Mg	22.	15

Analyte

	1 st QT	2 nd QT	3 rd QT	4 th QT
Gross Alpha (pCi/l)	97 ± 225	120 ± 73	31 ± 25	33 ± 34
Gross Beta	43 ± 1130	9 ± 246	51 ± 87	28 ± 130
R _a	< 5	0 ± 3.8		

H (S.V.)	8.0	7.90	7.9	7.94
	8.0	7.90		7.95
	8.0	7.80		7.96
	8.0	7.80		7.96

E.C. (amhos/cm)	3075	3720	3500	3400
	3075	3610		3400
	3075	3720		3410
	3075	3710		3405

T.O.C. (mg/l)	6.0	7.0	7.0	8.
	6.1	6.9		7.
	6.0	6.8		8.
	6.5	7.0		7.

TOX (mg/l)	< 10	< 10	20.	560
	< 10	< 10		560
	< 10	< 10		565
	< 10	< 10		560

Coliforms	< 1/100ml	< 1/100ml	< 1/100ml	< 1/100ml
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SMW-4

<u>Analyte</u>	<u>1st QT</u>	<u>2nd QT</u>	<u>3rd QT</u>	<u>4th QT</u>	<u>11/86</u>
As (mg/L)	<0.050	<0.050	<0.050	<0.050	
Ba	<1.0	<0.005	<0.01	<0.01	
Fe	1.2	0.09	0.09	0.24	
Pb	<0.050	<0.05	<0.050	<0.05	<0.05
Ag	<0.050	<0.050	<0.050	<0.050	
Cd	<0.010	<0.010	<0.010	<0.010	
Hg	<0.002	<0.002	0.003	<0.002	
Se	0.026	<0.010	<0.010	<0.010	
Na	320.0	556	600	340	
CR	<0.050	<0.05	<0.050	<0.05	<0.05
Mn	0.08	<0.02	0.020	<0.02	
SO ₄	192.0	167.	187	300.	
Cl	51.0	57.98	121	49.9	
F	0.61	1.0	1.08	0.577	
NO ₃ as N	0.1	<0.01	<0.01	0.14	
Turbidity (NTU)	86	15			
Phenols (mg/L)	<0.001	<0.001	0.002	<0.001	
Endrin	<0.0002	<0.0002	<0.0002	<0.0002	
Toxaphene	<0.005	<0.005	<0.005	<0.005	
Methoxychlor	<0.1	<0.1	<0.1	<0.1	
Lindane	<0.004	<0.004	<0.004	<0.004	
2,4-D	<0.1	<0.1	<0.1	<0.1	
2,4,5-TP	<0.01	<0.01	<0.01	<0.01	

SMW 4

	<u>3rd 01</u>	<u>4th 01</u>
HCO ₃	360	272
CO ₃	<5	48
TDS	816	878
K	8.0	4
Ca	40	2.8
Mg	6.0	0.30

SMW-4

Analyte

	1 st QT	2 nd QT	3 rd QT	4 th QT	11/96
Gross Alpha (pCi/e)	0 $\pm$ 48	23 $\pm$ 21	31 $\pm$ 25	4 $\pm$ 12	
Gross Beta	72 $\pm$ 281	0 $\pm$ 95	51 $\pm$ 87	17 $\pm$ 65	
R _A	<5	2.1 $\pm$ 4.2			

H (S.V.)	8.4	8.09	8.1	8.52	
	8.4	8.04		8.51	
	8.4	8.10		8.51	
	8.4	8.05		8.50	

E.C. (cmhos/cm)	1200	1340	1650	1270	1300
	1200	1300		1280	1300
	1200	1390		1290	1300
	1200	1280		1290	1300

O.C. (mg/e)	1.0	3.0	7.0	3.	7.
	1.5	2.8		3.	8.
	2.0	2.9		3.	8.
	1.0	3.0		3.	8.

TOX (mg/e)	<10	<10	20.	10.1	7.
	<10	<10		10.0	7.
	<10	<10		10.4	6.
	<10	<10		10.1	6.

Coliforms	<1/100ml	<1/10ml	<1/100ml	<1/100ml	
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SMW-5

Analyte	1 st Qt	2 nd Qt	3 rd Qt	4 th Qt	11/86
As (mg/L)	0.064	<0.050	<0.050	<0.050	
Ba	<1.0	<0.005	<0.01	<0.01	
Fe	1.8	0.33	0.11	0.14	
Pb	<0.050	<0.05	<0.050	<0.05	<0.05
Ag	<0.050	<0.050	<0.050	<0.050	
Cd	<0.010	<0.010	<0.010	<0.010	
Hg	<0.002	<0.002	0.001	<0.002	
Se	0.022	<0.010	<0.010	<0.010	
Na	342.0	620	610	312	
Cr	<0.050	<0.05	<0.050	<0.05	<0.05
Mn	0.05	<0.02	<0.02	<0.02	
SO ₄	159.0	111.	123.	280.	
Cl	54.0	79.94	64.	59.9	
F	0.69	0.80	0.69	0.396	
NO ₃ as N	0.1	<0.01	<0.01	0.125	
Turbidity (NTU)	66	49			
Phenols (mg/L)	<0.001	<0.001	0.007	<0.001	
Endrin	<0.0002	<0.0002	<0.0002	<0.0002	
Toxaphene	<0.005	<0.005	<0.005	<0.005	
Methoxychlor	<0.1	<0.1	<0.1	<0.1	
Lindane	<0.004	<0.004	<0.004	<0.004	
2,4-D	<0.1	<0.1	<0.1	<0.1	
2,4,5-TP	<0.01	<0.01	<0.01	<0.01	

5MW5

3rd Qt

4th Qt

HCO₃

320

232

CO₃

<5

48

TDS

719

812

K

4.0

4.

Ca

25

1.5

Mg

4.0

0.17

Analyte

1st Q1 2nd Q1 3rd Q1 4th Q1 11/86

Gross Alpha (pCi/l) 0[±]51 37[±]23 31[±]24 19[±]15

Gross Beta 0[±]273 86[±]91 60[±]88 1[±]65

Ra <5 0[±]3.7

H (S.V.) 8.7 8.39 8.4 8.90

8.7 8.41 8.80

8.7 8.33 8.81

8.7 8.32 8.81

≡ C. (amhos/cm) 1150 1180 1120 1200 1100

1150 1100 1190 1100

1150 1100 1190 1100

1150 1100 1190 1100

O.C. (mg/l) 6.0 5.9 7.0 6. 7

6.0 6.0 6. 8

5.5 5.8 6. 8

5.9 6.0 7. 7

TOX (ug/l) <10 <10 <10 45 <5

<10 <10 45 <5

<10 <10 45 <5

<10 <10 45 <5

Coliforms <1/100ml <1/10ml <1/100ml <1/100ml

SMW-6

Analyte	1 st QT	2 nd QT	3 rd QT	4 th QT	11/86
As (mg/L)	<0.050	<0.050	<0.050	<0.050	
Ba	<1.0	<0.005	0.01	0.01	
Fe	0.62	0.30	0.15	1.1	
Pb	<0.050	<0.05	<0.050	<0.05	<0.05
Ag	<0.050	<0.050	<0.050	<0.050	
Cd	<0.010	<0.010	<0.010	<0.010	
Hg	<0.002	<0.002	0.002	<0.002	
Se	0.020	<0.010	<0.010	<0.010	
Na	348.0	424	950	376	
CR	<0.050	<0.05	<0.050	0.055	<0.05
Mn	0.17	<0.02	<0.02	<0.02	
SO ₄	261.0	164.	223.	453	
Cl	70.0	75.99	82.	62.9	
F	0.63	0.90	0.95	0.549	
NO ₃ as N	0.2	1.0	<0.01	0.70	
Turbidity (NTU)	51	117			
Phenols (mg/L)	<0.001	<0.001	0.002	<0.001	
Endrin	<0.0002	<0.0002	<0.0002	<0.0002	
Toxaphene	<0.005	<0.005	<0.005	<0.005	
Methoxychlor	<0.1	<0.1	<0.1	<0.1	
Lindane	<0.004	<0.004	<0.004	<0.004	
2,4-D	<0.1	<0.1	<0.1	<0.1	
2,4,5-TP	<0.01	<0.01	<0.01	<0.01	

SMW-6

3rd Qt

4th Qt

HCO₃

408

384

CO₃

<5

<5

TDS

1020

1680

K

7.5

3

Ca

13

1.7

Mg

2.0

0.18

Analyte

1st QT 2nd QT 3rd QT 4th QT "186

Gross Alpha (pCi/e) 4.8 ± 53 6.7 ± 30 4.3 ± 44 3.6 ± 37

Gross Beta 153 ± 283 105 ± 94 134 ± 76 141 ± 131

R_a < 5 0.7 ± 4.0

H (S.V.) 8.4 8.01 7.9 8.30

8.4 8.00 8.31

8.4 8.02 8.30

8.4 8.04 8.30

E.C. (amhos/cm) 1275 1590 1500 1400 1700

1275 1490 1410 1710

1275 1500 1400 1710

1275 1480 1420

T.O.C. (mg/e) 5.0 5.0 25. 9. 10

5.5 5.6 9. 9

5.1 5.4 10. 9

5.0 5.5 9. 10

TOX (mg/e) < 10 < 10 15. 17. 8

< 10 < 10 17. 9

< 10 < 10 18. 9

< 10 < 10 17. 9

Coliforms < 1/100ml < 1/10ml < 1/100ml < 1/100ml

87'

INORGANICS

MW SAMPLES

ANALYTE	5/87				1/87		NOMINAL DETECTION LIMITS
	MW-1	MW-2	MW-3	MW-4	MW-5		
	SPRING	SPRING	SPRING	SPRING	WINTER	SPRING	
Cl (mg/l)	44.6	59.5	55.5	19.8	61	46	1.0
Fe	<0.3	<0.3	<0.3	<0.3		<0.3	0.3
Mn	<0.05	<0.05	<0.05	<0.05		<0.05	0.05
Mg	0.26	0.21	0.41	0.29		0.20	0.01
Na	227	256	257	271	278	246	0.1
K	1.14	1.19	1.35	1.41	0.98	1.17	0.1
SO4	148	173	223	222	205	239	1.0
HCO3	274	256	254	380	248	266	5
CO3	32	32	36	16	40	24	5
TDS	610	624	620	658	650	638	1

ORGANICS

MW SAMPLES

ANALYTE	MW-1			MW-2			MW-3	NOMINAL DETECTION LIMITS
	SPRING	FALL	DUP	SPRING	FALL	DUP	SPRING	
Phenols	0.32			0.012			0.009	0.001
pH (S.U.)	8.51	9.1	8.6	8.65	9.1	8.7	8.67	--
	8.50	9.1	8.6	8.69	9.2	8.7	8.64	
	8.51	9.0	8.6	8.65	9.1	8.6	8.64	
	8.52	9.1	8.6	8.72	9.1	8.7	8.61	
$\bar{X}$	8.51	9.1	8.6	8.68	9.1	8.7	8.64	
S2	6.7x10 ⁻⁵	0.003	0	0.001	0.003	0.003	0.001	
EC (μmhos/cm)	1100	1400	1180	1000	1200	1200	1000	1
	1000	1400	1190	1000	1200	1200	1000	
	1100	1400	1190	1000	1200	1200	1000	
	1100	1400	1180	1000	1200	1200	1000	
$\bar{X}$	1075	1400	1185	1000	1200	1200	1000	
S2	2500	0	33	0	0	0	0	
TOC (mg/l)	2	<u>NDL</u> (1)	2	0.7	<u>NDL</u> (0.5)	4	1	1/0.5
	2	2	0.6	4	1	0.9	1	
	3	1	0.7	3	1	0.9	2	
	2	1	0.7	3	2	0.9	2	
$\bar{X}$	2	2	0.7	4	1	0.9	2	
S2	0.25	0.33	0.05	0.33	0.25	0	0.33	
TOX (mg/l)	38	<u>RETEST</u> <5	<u>NDL</u> (5) <5	<10	<u>NDL</u> (10)	8	<5	5/10
	37	<5	<5	<10	6	6	<10	
	37	8	7	<10	6	6	<10	
	39	5	<5	<10	6	<5	<10	
$\bar{X}$	38	6	7	<10	7	5	<10	
S2	0.9	2.25	--	--	1.0	--	--	1.0

ORGANICS

MW SAMPLES

ANALYTE	MW-4				MW-5			NOMINAL DETECTION LIMITS
	SPRING	FALL	DUP	WINTER	SPRING	FALL	DUP	
Phenols	0.036			0.097	<0.001			0.001
pH (S.U.)	8.48	8.9	8.5	9.04	8.74	9.0	8.6	--
	8.44	8.9	8.5	9.04	8.68	9.1	8.7	
	8.54	8.8	8.5	9.03	8.67	9.1	8.7	
	8.47	8.9	8.5	9.03	8.65	9.1	8.6	
$\bar{X}$	8.48	8.9	8.5	9.04	8.69	9.1	8.7	
S2	0.002	0.003	0	3×10^{-5}	0.002	0.003	0.003	
EC (μ mhos/cm)	1100	1200	1240	1200	1000	1100	1260	1
	1000	1200	1240	1190	1000	1100	1220	
	1000	1200	1270	1190	1000	1100	1220	
	1000	1200	1260	1200	1000	1100	1220	
$\bar{X}$	1025	1200	1253	1195	1000	1100	1230	
S2	2500	0	225	33	0	0	400	
TOC (mg/l)	2	5	1.1	3	1	5	0.8	1/0.5
	3	5	1.0	3	1	5	0.7	
	3	5	1.0	3	1	5	0.9	
	4	6	0.9	3	2	4	0.8	
$\bar{X}$	3	5	1.0	3	1	5	0.8	
S2	0.67	0.25	0.007	0	0.25	0.25	0.007	
TOX (μ g/l)	8	<5	<10	13	15	<5	<10	5/10
	7	<5	<10	13	11	<5	<10	
	9	<5	<10	13	12	<5	<10	
	9	<5	<10	13	10	6	<10	
$\bar{X}$	8	<5	<10	13	12	5	<10	
S2	0.9	--	--	0.0	4.7	--	--	

RETEST

SHALLOW MONITOR WELLS

ANALYTE	SMW-4			SMW-5			NOMINAL DETECTION LIMITS
	SPRING	FALL	DUP	SPRING	FALL	DUP	
Pb (mg/l)	<0.05	<0.05	<0.002	<0.05	<0.05	<0.002	0.05/0.002
Cr (mg/l)	<0.05	<0.05	<0.010	<0.05	<0.05	<0.010	0.05/0.010
pH S.U.	8.1	8.3	8.0	8.42	8.8	8.5	--
EC (umhos/cm)	1200	1600	1860	1000	1100	1240	--
TOC (mg/l)	RETEST		1.3	10	RETEST		1/0.5
TOX (g/l)	7 11	7	<10	6	-- 6	<10	5/10

ANALYTE	SMW-6			OW-24			NOMINAL DETECTION LIMITS
	SPRING	FALL	DUP	SPRING	FALL	DUP	
Pb (mg/l)	<0.05	<0.05	<0.002	<0.05	<0.05	<0.002	0.05/0.002
Cr (mg/l)	<0.05	<0.05	<0.010	<0.05	<0.05	<0.010	0.05/0.010
pH S.U.	7.83	8.5	8.1	8.12	8.0	7.6	--
EC (umhos/cm)	1600	1200	1410	1000	1000	1200	--
TOC (mg/l)	12	4	1.2	14	RETEST		1/0.5
TOX (ug/l)	11	<5	<10	30	5 5	<10	5/10

WATER LEVEL ELEVATIONS
MW SERIES RCRA MONITORING WELLS

ELEVATION OF:	MW-1	MW-2	MW-3	MW-4	MW-5
4/8/87 (#5 WINTER)	6872.0	6871.3		6874.5	6871.5
TOC	6876.9	6878.6	6880.8	6880.4	6880.8
DEPTH TO WATER	4.9	7.3		5.9	9.3
6/19/87 (SPRING SAMPLING)	6871.8	6871.1	6856.7	6876.2	6871.3
DEPTH TO WATER	5.1	7.5	24.1	6.2	9.5
11/19/87 (FALL SAMPLING)	6871.2	6871.2		6874.0	6871.0
DEPTH TO WATER	5.7	7.4	--	6.4	9.8

SMW SERIES MONITORING WELLS

ELEVATION OF:	SMW-4	SMW-5	SMW-6	OW-24
6/19/87	6846.26	6844.91	6846.54	6845.60
TOC	6877.74	6875.68	6878.35	6878.00
DEPTH TO WATER	31.48	30.77	31.81	32.40
11/19/87	6846.67	6844.48	6846.68	6844.90
DEPTH TO WATER	31.07	31.20	31.67	33.10

TOC = TOP OF WELL CASING