

GW - 32

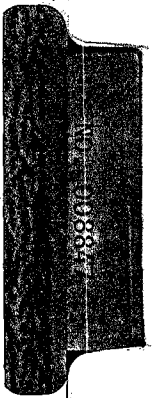
REPORTS

YEAR(S):

1990 ANALYTICAL

ANALYTICAL RESULTS
FOR
GIANT REFINING
ENSECO-RMAL NO. 008847
APRIL 20, 1990

ANALYTICAL RESULTS
FOR
GIANT REFINING
ENSECO-RMAL NOS.
008847, 008875, 008877



418330 SECTION DIVISION
RECEIVED

'90 MAY 11 PM 3 02

ANALYTICAL RESULTS
FOR
GIANT REFINING
ENSECO-RMAL NO. 008847



APRIL 20, 1990

MW & SMN wells

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

<u>Reporting Limit / Units</u>				
<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			
(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: 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 (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: 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

(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-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 CaCO ₃ at pH 4.5	563	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	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

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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 $\pm$ 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)
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		Measured DCS2	AVG	Accuracy Average(%)		Precision (RPD)	
		DCS1				DCS	Limits	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)	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

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	Concentration		Measured DCS2	AVG	Accuracy Average(%)		Precision (RPD)	
	Spiked	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
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Test: ICP-AT

Matrix: AQUEOUS

QC Lot: 29 MAR 90-D QC Run: 29 MAR 90-D

Chromium	ND	mg/L	0.010
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Test: PB-FAA-AT

Matrix: AQUEOUS

QC Lot: 29 MAR 90-D QC Run: 29 MAR 90-D

Lead	ND	mg/L	0.0050
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Test: HG-CVAA-AT

Matrix: AQUEOUS

QC Lot: 29 MAR 90-A QC Run: 29 MAR 90-A

Mercury	ND	mg/L	0.00020
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Test: ICP-AT

Matrix: AQUEOUS

QC Lot: 29 MAR 90-D QC Run: 29 MAR 90-D

Chromium	ND	mg/L	0.010
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Test: PB-FAA-AT

Matrix: AQUEOUS

QC Lot: 29 MAR 90-D QC Run: 29 MAR 90-D

Lead	ND	mg/L	0.0050
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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		Measured DCS2	AVG	Accuracy Average(%)		Precision (RPD)	
		DCS1				DCS	Limits	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	
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	

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
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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	AVG	Accuracy		Precision	
	Spiked	DCS1			DCS2	DCS	Limit	DCS
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



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

Enseco Client Giant Refinery

Project Sp. ba well

Sampling Co. Gibbs

Sampling Site Cinjez

Team Leader Chad Rose

CHAIN OF CUSTODY

 $\dot{z}$

SAMPLE SAFE™ CONDITIONS

1. Packed by: _____ Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes
3. Condition of Contents: good
4. Sealed for Shipping by: Claudia Rosendahl
5. Initial Contents Temp.: 51 °C 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 <i>(1)</i>	Analysis Parameters	Remarks
3-22-90	0730	NW-4	water	1		
				1		
				2		
				4		
				4		Filtered
				6	2 replicates	
				1	15	

CUSTODY TRANSFERS PRIOR TO SHIPPING

Relinquished by: (signed)	Received by: (signed)	Date	Time
<i>David M. ...</i>		3-27-92	1430

_____ 2 _____

_____ 3 _____

SHIPPING DETAILS

Delivered to Shipper by: Wendy Rasmussen
Method of Shipment: Fed Ex. Airbill # 32870
Received for Lab: Kual Signed: [Signature] Date/Time 0300
Enseco Project No. 003347



Attn: Julie Esser

Enseco Client Giant Refinery

Project Spring Sampling

Sampling Co. Cigizog

Sampling Site C's 129

Team Leader Clayd Rosecrance

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: Clair Rosecrance
5. Initial Contents Temp.: 50 °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]

CUSTODY TRANSFERS PRIOR TO SHIPPING

Relinquished by: (signed) _____
 Received by: (signed) _____
 Date 3-27-90 Time 1430

Date	Time
3-27-90	1430

SHIPPING DETAILS:

Delivered to Shipper by: Elwood Rosendahl
Method of Shipment: Fed Ex Airbill # 312870
Received for Lab: RNAL Signed: Al Stappes Date/Time 6:30
Enseco Project No. 3847



Arvada, Colorado 80002

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

14

Julie Essay

Enseco Client Giant Reef

Project Spring well/S O&D & ETD

Sampling Co. Giziga

Sampling Site Cia 29

Team Leader Clayd Rosendale

no.

SAMPLE SAFE™ CONDITIONS

Seal #

Yes

1

3. Contention of Contents: John Rosendale

4. Sealed for Shipping by: John Rosendale

Initial Contents Temp. 54 Seal # 79

3. Initial Comments Temp.: 7

6. Sampling Status: Done Continuing Until

7. Seal Intact Upon Receipt by Laboratory:		Yes	No
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8. Contents Temperature Upon Receipt by Lab: _____ °C

Condition of Contents

Date	Time	Sample ID/Description	Sample Type	No.	Containers & Bottle	Analysis Parameters	Remarks
3-22-98	1140	SMAW-1	w/ger	1	1		
				1	2		
				1	4		
				1	4		Filtered
				3	11		
				1	15		

CUSTODY TRANSFERS PRIOR TO SHIPPING

Belinauished by: (signed)

Received by: (signed)

Date _____ Time _____

David Harold

3.2792 1430

/ SHIPPING DETAILS

Delivered to Shipper by

Method of Shipment:

2021

141

0

8

2

5

3/28/90



Attn: John Essley

CHAIN OF CUSTODY

No.
SAMPLE SAFE™ CONDITIONS

1. Packed by: _____ Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes
3. Condition of Contents: good
4. Sealed for Shipping by: Clayton Rosenbake
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 <i>Perik</i>	Analysis Parameters	Remarks
8-27-90	0830	SNW-3	Water	1	1	
				1	2	
				1	4	
				1	4	Filtered
				3	11	
				1	15	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	<i>David Henderson</i>		3-27-90	1450
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: Clifford Rosendale Airbill # 0312870
Method of Shipment: Fed Ex Signed: Clifford Rosendale Date/Time 0800
Received for Lab: RNAL
Enseco Project No. 003347

White and Pink Copies to Lab

SS-001



Attn: Julie Essay

Enseco Client Giant Refining
Project Spring Sampling
Sampling Co. Ciaiz9
Sampling Site Ciaiz9
Team Leader Alfred Rosenbake

no.

SAMPLE SAFE™ CONDITIONS

1. Packed by: _____ Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes 2 No _____
3. Condition of Contents: good
4. Sealed for Shipping by: Edmund Rosendahl
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 <i>Box #</i>	Analysis Parameters	Remarks
3-27-90	12:45	S MW - 4 DB	Water	1 1		
				1 2		
				1 4		
				1 4		Filtered
				3 11		
				1 15		

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	<i>David Rosenfeld</i>		3-27	1450
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: Wendy Beaudette Airbill # _____
Method of Shipment: Fed Ex
Received for Lab: RNAL Signed: Wendy Beaudette Date/Time: 03/23/70 0800
Enseco Project No. 008847



Attn: Take Essay

CHAIN OF CUSTODY

SAMPLE SAFE™ CONDITIONS

1. Packed by: _____ Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: _____
3. Condition of Contents: good
4. Sealed for Shipping by: Carol Rosemeyer
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: _____

CUSTODY TRANSFERS PRIOR TO SHIPPING

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

Date Time

Received by: (signed)

Relinquished by: (signed)
David Randall

C

C

C

SHIPPING DETAILS

Delivered to Shipper by:

Delivered to Shipper:
Method of Shipment:

Received for Lab:

ciudad:

Received for Lab: _____
Enseco Project No. _____

008847

Yellow to Sampler

White and Pink Copies to Lab

SS-001



Attn: Julie Esser

Enseco Client Great Refinery
Project Spring Well OED & EED
Sampling Co. Ciniz
Sampling Site Ciniz
Team Leader Chad Rosendale

 $\dot{z}$

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: Flora Rosenda Be
5. Initial Contents Temp.: 50 °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]

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	<i>David Townsend</i>		3-27-90	1450
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: Clifford Rosen date 3/23/90
 Method of Shipment: FEDEX Airbill # 312340
 Received for Lab: RML Signed: Clifford Rosen Date/Time 3/23/90 0800
 Ensenco Project No. 008847

NO. 008875

ANALYTICAL RESULTS

FOR

GIANT REFINING

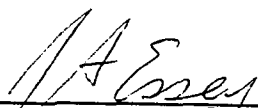
ENSECO-RMAL NO. 008875

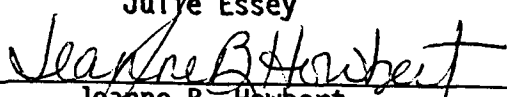
APRIL 17, 1990



ow wells

Reviewed by:



Julie Essey


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		AVG	Accuracy		Precision	
		DCS1	Measured DCS2		Average(%) DCS	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)	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	Spiked	Concentration		Measured DCS2	AVG	Accuracy Average(%)		Precision (RPD)	
		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			AVG	Accuracy Average(%)		Precision (RPD)	
	Spiked	DCS1	Measured DCS2		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: 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		AVG	Accuracy		Precision
		DCS1	Measured DCS2		Average(%) DCS 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
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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
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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			
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 90-0	-
008875-0001-SA	AQUEOUS	TDS-A	29 MAR 90-R	29 MAR 90-R
008875-0001-SA	AQUEOUS	PH-A	29 MAR 90-0	-
008875-0001-SA	AQUEOUS	COND-A	29 MAR 90-0	-
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 90-0	-
008875-0002-SA	AQUEOUS	TDS-A	29 MAR 90-R	29 MAR 90-R
008875-0002-SA	AQUEOUS	PH-A	29 MAR 90-0	-
008875-0002-SA	AQUEOUS	COND-A	29 MAR 90-0	-
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 90-0	-
008875-0003-SA	AQUEOUS	TDS-A	29 MAR 90-R	29 MAR 90-R
008875-0003-SA	AQUEOUS	PH-A	29 MAR 90-0	-
008875-0003-SA	AQUEOUS	COND-A	29 MAR 90-0	-
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 90-0	-
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 90-0	-
008875-0004-SA	AQUEOUS	COND-A	29 MAR 90-0	-
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-O 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

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		AVG	Accuracy		Precision	
	Spiked	Measured		Average(%)	(RPD)		
	DCS1	DCS2		DCS	Limit	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
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Calculations are performed before rounding to avoid round-off errors in calculated results.

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.



CHAIN OF CUSTODY

Attn: Julie Essex

SAMPLE SAFE™ CONDITIONS

1. Packed by: _____ Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Good Yes ☒ No ☐
3. Condition of Contents: Good
4. Sealed for Shipping by: Clad Rosedale
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: _____

CUSTODY TRANSFERS PRIOR TO SHIPPING

Relinquished by: (signed)	Received by: (signed)	Date	Time
1 <i>David H. ...</i>		3-28-90	1115
2			
3			

SHIPPING DETAILS

Delivered to Shipper by: Alquid Resende

Method of Shipment: Fed. Ex. Airmail # _____

Received for Lab: RNAL Signed: Alquid Resende

Enseco Project No. _____



Arvada, Colorado 80002

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

Attn: Julie Essay

Enseco Client Giant Refining

Project Spring wells OGD & ETD

Sampling Co. Coring

Sampling Site

Team Leader Cland Rosendale

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SAMPLE SAFE™ CONDITIONS

1. Packed by:

Seal #

2. Seal Intact Upon Receipt by Sampling Co.:

20

3. Condition of Contents:

3. Condition of Contents: Good
4. Sealed for Shipping by: Clark R. Sandoz

4. Sealed for Shipping by: _____ Seal # _____
5. Initial Contents Temp.: 49 °F

Seal # 6

6. Sampling Status:

Done: Continuing Until

7 Seal Intact Upon Receipt by Laboratory:		Yes	No
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8 Contents Temperature Upon Receipt by Lab:

_____ °C

9 Condition of Contents:

[illegible]

CUSTODY TRANSFERS PRIOR TO SHIPPING

Relinquished by: (signed)

Received by: (signed)

Date _____

Time

Relinquished by: (signed)

5111 06-87-E.

SHIPPING DETAILS

Delivered to Shipper by: Charles Rosendale

Method of Shipment:

Airbill #

CONCLUSION

✓

Received for Lab: _____

3-29-90

CHAIN OF CUSTODY

No.
SAMPLE SAFE™ CONDITIONS

1. Packed by:

2. Seal Intact Upon Receipt by Sampling Co.:

☒ Yes ☐ No

Enseco Client Giant Refinery

Claid Rosendale

Project: Spring Sampling OGD & EID

49 Seal #

Sampling Co. Ciaiza

Continuing Until _____

Sampling Site C. h. 29

Yes No

Team Leader Claud Rosendale

8. Contents Temperature Upon Receipt by Lab: _____ °C

9. Condition of Contents:

[illegible]

CUSTODY TRANSFERS PRIOR TO SHIPPING

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

Received by: (signed)

Date _____
Time _____

11-12-11 3.00.00 5/11

3-X-90 1115

511

SHIPPING DETAILS

Delivered to Shipper by: Clayton Rosendake

Claud Kosloski

[Signature]

11

100

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Method of Shipment: 0201 LTA

Arb. # 2

Arbille #

Received for Lab: KMA-C Signed: Colleen K...

Signed: Clifford

6

Enseco Project No.

Enseco - Rocky Mountain Analytical

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

Attn: Julie Essey

Enseco Client Giant Refinery
 Project Spring Wells OCD + FID
 Sampling Co. Ciniza
 Sampling Site Ciniza
 Team Leader Claudia Rosendale

CHAIN OF CUSTODY

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: Claudia 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		2 Replicates
				2		2 Replicates
				1		
				15		

CUSTODY TRANSFERS PRIOR TO SHIPPING

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

SHIPPING DETAILS

Delivered to Shipper by: Claudia Rosendale
 Method of Shipment: Fed. Ex. Airbill # _____
 Received for Lab: RMAL Signed: Claudia Date/Time 3-29-90
 Enseco Project No. 9000



Attn: Julie Esser

Enseco Client Giant Resource
Project Spring Sampling OGD&ED
Sampling Co. Chizg
Sampling Site Chizg
Team Leader Cand Rossdale

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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: Chad Rasenaker
5. Initial Contents Temp.: 58°F °C 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 ✓/ Blank	Analysis Parameters	Remarks
3-28-96	0350	Trip Blank	Water	1 / 1		
				1 / 2		
				1 / 4		
				3 / 11		
				1 / 12		
				1 / 15		

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

Relinquished by: (signed) Grand Marshal Date 3-28-90 Time 1115

2 _____

3 _____

SHIPPING DETAILS

Delivered to Shipper by: Liquid Storage
Method of Shipment: Fed. Ex. Airtail # _____
Received for Lab: RMAL Signed: Ala. P. S. Date/Time 03-29-90
Enseco Project No. 0700

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) ^{ICP}	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}	312.1
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)

mit: ug/L

SEMIVOLATILES

8270-Refinery (partial)

o-Cresol	✓ 2 m pterol	10
m&p-Cresol	✓ 4 m pterol	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(b)
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 -	6010
Cadmium -	6010
Chromium (Total) -	6010
Lead (Total) -	7421
Mercury (Total) -	7470
Silver -	6010
Selenium -	7740
Sodium -	6010
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) /	140.1
Phenol /	9065
Volatile Contaminant List (See Attached)	
2 Replicates	

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

Aerated Lagoon, APF Effluent

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 Date	Time	Received Date
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	%	--

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 Received: 29 MAR 90
 Authorized: 29 MAR 90 Prepared: 01 APR 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

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 $\pm$ 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)
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		Average(%) DCS	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
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
Semivolatle 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			AVG	Accuracy		Precision	
	Spiked	DCS1	Measured DCS2		Average(%) DCS	Limits	(RPD) 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.

METHOD BLANK REPORT
Metals Analysis and Preparation

Analyte	Result	Units	Reporting Limit
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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
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Test: HG-CVAA-AT
Matrix: AQUEOUS
QC Lot: 03 APR 90-A QC Run: 03 APR 90-A

Mercury	ND	mg/L	0.00020
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Test: AS-FAA-AT
Matrix: AQUEOUS
QC Lot: 31 MAR 90-D QC Run: 31 MAR 90-D

Arsenic	ND	mg/L	0.0050
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Test: SE-FAA-AT
Matrix: AQUEOUS
QC Lot: 31 MAR 90-D QC Run: 31 MAR 90-D

Selenium	ND	mg/L	0.0050
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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	

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 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	216	216	216	108	70-130	0	30

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

APPENDIX



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

Enseco Client Giant Refinery

Project OKD Permit

Sampling Co. Cisiz9

Sampling Site Ciniza

Team Leader Cland Resendable

CHAIN OF CUSTODY

Z

SAMPLE SAFE™ CONDITIONS

1. Packed by:

2. Seal Intact Upon Receipt by Sampling Co.:

3. Condition of Contents:

4. Seated for Shipping by:

5. Initial Contents Temp.:

6. Sampling Status: ☒ Done ☐ Continuing Until

7. Seal Intact Upon Receipt by Laboratory: **Yes**

8. Contents Temperature Upon Receipt by Lab: _____ °C

9. Condition of Contents:

Date	Time	Sample ID/Description	Sample Type	No. Containers <i>per</i>	Analysis Parameters	Remarks
3-27-90	0945	Aerated Lagoon Effluent	Wastewater	1	1	
				1	2	
				1	3	
				1	4	
				1	7	
				3	11	
				2	12	

CUSTODY TRANSFERS PRIOR TO SHIPPING

Relinquished by: (signed) David Brada

Received by: (signed)

Date Time

1 David Brack

2

3

SHIPPING DETAILS

Delivered to Shipper by: Clayton Rosenbake

Method of Shipment: Fed. Ex. Airbill #

Received for Lab: KMAC Signed: [Signature]

Enseco Project No.

Date/Time 03-29-90

