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GIANT
REFINING CO.

Route 3, Box 7
Gallup, New Mexico
87301

505
722-3833

August 21, 1990

AUG 1990
RECEIVED
HAZARDOUS WASTE
PROGRAM

Dr. Bruce A. Swanton
Hazardous Waste Section
Environmental Improvement Division
Harold Runnels Building
1190 St. Francis Drive
Santa Fe, New Mexico 87504-0968

Dear Dr. Swanton:

As indicated in our August 14, 1990 meeting, OW-11 has been sampled and analyzed for all parameters in Tables G-2, G-3 and G-4 of the operating permit except the specific xylene isomers and benzo(j)flouranthene. Explanations for these parameters are outlined in the attached letter from Enseco. The analytical reports for the March 28, 1990 and June 13, 1990 sampling of OW-11 is also attached. Subsequent quarterly sampling of this well is scheduled to occur in September and December.

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

Sincerely,

Claud Rosendale

Claud Rosendale
Environmental Manager
Ciniza Refinery

CR:ctf

attachments

LIBRARY COPY

Enseco

May 21, 1990

Mr. Claud Rosendale
Giant Refining Company
Route 3, Box 7
Gallup, NM 87301

Dear Mr. Rosendale:

This letter is in reference to benzo(j)fluoranthene and the ortho (o), meta (m) and para (p) xylene isomers.

Benzo(j)fluoranthene 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.

The xylene isomers, ortho, meta and para, resolve differently depending on the type of GC column used. On a packed column the o&p isomers coleute; whereas, on a capillary column the m&p isomers coelute. Because both columns are acceptable to use, it is Enseco's policy to report the total concentrations as "total xylenes." This policy is enforced to provide consistency in reporting xylene data. In addition, it is required by the Contract Laboratory Program (CLP) to report xylenes as total concentrations. Finally, it should be noted that the reporting limit remains unaffected.

Please do not hesitate to call if you have any questions or need additional information.

Sincerely,

J A Essey

Julie Essey
Program Administrator

JE/dmh

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

OW-11 Giant Refining Gallup, New Mexico

Date: 04 ~~APR~~ 28 May 90

TCL Volatile Organics
Method 8240

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

OW-11

Giant Refining Gallup, New Mexico

Date: ~~04~~ 28 ~~APR~~ Mar 90

Refinery Hazard Constituent Semivolatiles
Method 8270

Parameter	Result	Units	Reporting Limit
Benzo(a)anthracene	ND	ug/L	10
Benzo(b)fluorathene	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
Fluorathene	ND	ug/L	10
1-Mthylnaphthalene	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

OW-11

Giant Refinery Gallup, New Mexico

Date: ~~04 APR~~ 28 Mar 90

Metals
Dissolved Metals

Parameter	Result	Units	Reporting Limit
Arsenic	ND	mg/L	0.0050
Barium	0.014	mg/L	0.010
Cadmium	ND	mg/L	0.0050
Calcium	4.8	mg/L	0.20
Copper	ND	mg/L	0.010
Manganese	ND	mg/L	0.010
Nickel	ND	mg/L	0.040
Selenium	ND	mg/L	0.050
Silver	ND	mg/L	0.010
Sodium	382	mg/L	5.0
Zinc	ND	mg/L	0.010

OW-11

Giant Refining Gallup, New Mexico

Date: ~~04 APR~~ 28 Mar 90

Total Metals
Dissolved Metals

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

OW-11 Giant Refining Gallup, New Mexico

Date: ~~01~~ 28 ~~APR~~ Mar 90

General Inorganics

Parameter	Result	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	461	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5.0
Chloride	123	mg/L	3.0
pH	8.26	units	--
pH	8.24	units	--
pH	8.21	units	--
pH	8.24	units	--
Phenolics	ND	mg/L	0.010
Sulfate	294	mg/L	5.0
Specific Conductance at 25 deg.C	1640	umhos/cm	1.0
Specific Conductance at 25 deg.C	1640	umhos/cm	1.0
Specific Conductance at 25 deg.C	1640	umhos/cm	1.0
Specific Conductance at 25 deg.C	1630	umhos/cm	1.0
Total Organic Carbon	6.0	mg/L	1.0
Total Organic Carbon	6.0	mg/L	1.0
Total Organic Carbon	6.0	mg/L	1.0
Total Organic Carbon	6.0	mg/L	1.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Dissolved Solids	1110	mg/L	10.0
Water Elevation	6902.09	ft	--

OW-11 Giant Refining Gallup, New Mexico

Date: 13 JUN 90

TCL Volatile Organics
Method 8240

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

OW-11

Giant Refining Gallup, New Mexico

Date: 13 JUN 90

Refinery Hazard Constituent Semivolatiles
Method 8270

Parameter	Result	Units	Reporting Limit
Benzo(a)anthracene	ND	ug/L	10
Benzo(b)fluorathene	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
Fluorathene	ND	ug/L	10
1-Mthylnaphthalene	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

OW-11

Giant Refinery Gallup, New Mexico

Date: 13 JUN 90

Metals
Dissolved Metals

Parameter	Result	Units	Reporting Limit
Arsenic	ND	mg/L	0.010
Barium	0.016	mg/L	0.010
Cadmium	ND	mg/L	0.0050
Calcium	5.2	mg/L	0.20
Copper	ND	mg/L	0.010
Manganese	ND	mg/L	0.010
Nickel	ND	mg/L	0.040
Selenium	0.024	mg/L	0.010
Silver	ND	mg/L	0.010
Sodium	425	mg/L	5.0
Zinc	ND	mg/L	0.010

OW-11 Giant Refining Gallup, New Mexico

Date: 13 JUN 90

Total Metals
Dissolved Metals

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

OW-11 Giant Refining Gallup, New Mexico

Date: 13 JUN 90

General Inorganics

Parameter	Result	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	440	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5.0
Chloride	117	mg/L	3.0
pH	8.26	units	--
pH	8.30	units	--
pH	8.30	units	--
pH	8.32	units	--
Phenolics	ND	mg/L	0.010
Sulfate	327	mg/L	5.0
Specific Conductance at 25 deg.C	1420	umhos/cm	1.0
Specific Conductance at 25 deg.C	1420	umhos/cm	1.0
Specific Conductance at 25 deg.C	1410	umhos/cm	1.0
Specific Conductance at 25 deg.C	1420	umhos/cm	1.0
Total Organic Carbon	4.4	mg/L	1.0
Total Organic Carbon	4.2	mg/L	1.0
Total Organic Carbon	4.2	mg/L	1.0
Total Organic Carbon	4.3	mg/L	1.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Organic Halogen as Cl	ND	ug/L	30.0
Total Dissolved Solids	1180	mg/L	10.0
Water Elevation	6902.06	ft	--

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:

- Sample Description Information
- Analytical Test Requests
- Analytical Results
- 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.

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SAMPLE DESCRIPTION INFORMATION
for
Giant Refining

Lab ID	Client ID	Matrix	Sampled Date	Sampled 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

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

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.

Enseco
A CORNING Company

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
Client ID: OW-11
Lab ID: 008875-0004-SA
Enseco ID: 1070251
Matrix: AQUEOUS
Sampled: 28 MAR 90
Received: 29 MAR 90
Authorized: 29 MAR 90
Prepared: 02 APR 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

Enseco
A CORNING Company

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
Client ID: OW-11
Lab ID: 008875-0004-SA Enseco ID: 1070251
Matrix: AQUEOUS Sampled: 28 MAR 90 Received: 29 MAR 90
Authorized: 29 MAR 90 Prepared: 02 APR 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

Enseco
A CORNING Company

Refinery Hazardous Constituent Semivolatiles

Method 8270

Client Name: Giant Refining
Client ID: OW-11
Lab ID: 008875-0004-SA Enseco ID: 1070251
Matrix: AQUEOUS Sampled: 28 MAR 90 Received: 29 MAR 90
Authorized: 29 MAR 90 Prepared: 01 APR 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

Enseco
A CORNING Company

Metals

Dissolved Metals

Client Name: Giant Refining
Client ID: OW-11
Lab ID: 008875-0004-SA
Enseco ID: 1070251
Matrix: AQUEOUS
Sampled: 28 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	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

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: OW-11
Lab ID: 008875-0004-SA
Enseco ID: 1070251
Matrix: AQUEOUS
Sampled: 28 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
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

Enseco
A CORNING Company

General Inorganics

Client Name: Giant Refining
Client ID: OW-11
Lab ID: 008875-0004-SA
Enseco ID: 1070251
Matrix: AQUEOUS
Sampled: 28 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
Alkalinity, Bicarb. as CaCO3 at pH 4.5	461	mg/L	5.0	310.1	NA	29 MAR 90
Alkalinity, Carb. as CaCO3 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

S.C. 6702.01

ND = Not detected
NA = Not applicable

Reported By: Jennifer Franzen
Approved By: Tammy Bailey

Enseco
A CORNING Company

TCL Volatile Organics

Method 8240

Client Name: Giant Refining
Client ID: TRIP BLANK
Lab ID: 008875-0005-SA
Enseco ID: 1070252
Matrix: AQUEOUS
Sampled: 28 MAR 90
Received: 29 MAR 90
Authorized: 29 MAR 90
Prepared: 04 APR 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

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TCL Volatile Organics (CONT.)

Method 8240

Client Name: Giant Refining
Client ID: TRIP BLANK
Lab ID: 008875-0005-SA Enseco ID: 1070252
Matrix: AQUEOUS Sampled: 28 MAR 90 Received: 29 MAR 90
Authorized: 29 MAR 90 Prepared: 04 APR 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

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Metals

Dissolved Metals

Client Name: Giant Refining
Client ID: TRIP BLANK
Lab ID: 008875-0005-SA
Enseco ID: 1070252
Matrix: AQUEOUS
Sampled: 28 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	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

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Metals

Total Metals

Client Name: Giant Refining
Client ID: TRIP BLANK
Lab ID: 008875-0005-SA
Enseco ID: 1070252
Matrix: AQUEOUS
Sampled: 28 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
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

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General Inorganics

Client Name: Giant Refining
Client ID: TRIP BLANK
Lab ID: 008875-0005-SA
Enseco ID: 1070252
Matrix: AQUEOUS
Sampled: 28 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
Alkalinity, Bicarb. as CaCO3 at pH 4.5	ND	mg/L	5.0	310.1	NA	29 MAR 90
Alkalinity, Carb. as CaCO3 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 +/- 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.

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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

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DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precisio (RPD) DCS	Limi
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	1
Trichloroethene	50	51.9	51.6	51.8	104	71-120	0.6	1
Benzene	50	51.1	54.1	52.6	105	76-127	5.7	1
Toluene	50	55.0	53.5	54.2	109	76-125	2.8	1
Chlorobenzene	50	54.8	54.1	54.4	109	75-130	1.3	1

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

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SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) 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.

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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 (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

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

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

Analyte	Result	Units	Reporting Limit
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

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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

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DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

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

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SINGLE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

Category: 625-A
Matrix: AQUEOUS
QC Lot: 01 APR 90-A QC Run: 01 APR 90-A
Concentration Units: ug/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
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.

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METHOD BLANK REPORT
Semivolatile Organics by GC/MS

Test: 625-REF-A
Matrix: AQUEOUS
QC Lot: 01 APR 90-A QC Run: 01 APR 90-A

Analyte	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

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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

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DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

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

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

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

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: ICP-AT Matrix: AQUEOUS QC Lot: 31 MAR 90-D Concentration Units: mg/L								
Aluminum	2.0	1.89	1.89	1.89	94	75-125	0.2	20
Antimony	0.5	0.461	0.470	0.465	93	75-125	2.1	20
Arsenic	0.5	0.443	0.473	0.458	92	75-125	6.6	20
Barium	2.0	1.63	1.65	1.64	82	75-125	1.3	20
Beryllium	0.05	0.0446	0.0440	0.0443	89	75-125	1.2	20
Cadmium	0.05	0.0474	0.0450	0.0462	92	75-125	5.2	20
Calcium	100	87.7	90.6	89.1	89	75-125	3.2	20
Chromium	0.2	0.191	0.192	0.191	96	75-125	0.8	20
Cobalt	0.5	0.437	0.461	0.449	90	75-125	5.5	20
Copper	0.25	0.241	0.249	0.245	98	75-125	3.4	20
Iron	1.0	0.943	0.954	0.948	95	75-125	1.2	20
Lead	0.5	0.455	0.476	0.465	93	75-125	4.4	20
Magnesium	50	43.9	45.4	44.6	89	75-125	3.4	20
Manganese	0.5	0.462	0.490	0.476	95	75-125	5.8	20
Nickel	0.5	0.425	0.453	0.439	88	75-125	6.3	20
Potassium	50	43.7	45.5	44.6	89	75-125	3.9	20
Silver	0.05	0.0422	0.0435	0.0429	86	75-125	3.1	20
Sodium	100	87.7	90.9	89.3	89	75-125	3.5	20
Vanadium	0.5	0.455	0.461	0.458	92	75-125	1.2	20
Zinc	0.5	0.451	0.483	0.467	93	75-125	6.7	20
Category: PB-FAA-AT Matrix: AQUEOUS QC Lot: 31 MAR 90-D Concentration Units: mg/L								
Lead	0.020	0.0230	0.0238	0.0234	117	75-125	3.4	20
Category: HG-CVAA-AT Matrix: AQUEOUS QC Lot: 31 MAR 90-A Concentration Units: mg/L								
Mercury	0.0010	0.00107	0.00111	0.00109	109	75-125	3.7	20

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

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

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: AS-FAA-AD Matrix: AQUEOUS QC Lot: 04 APR 90-A Concentration Units: mg/L								
Arsenic	0.04	0.0384	0.0347	0.0366	91	75-125	10	20
Category: SE-FAA-AD Matrix: AQUEOUS QC Lot: 05 APR 90-A Concentration Units: mg/L								
Selenium	0.01	0.00960	0.00900	0.00930	93	75-125	6.5	20

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

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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

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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)
008875-0001-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0001-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0001-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0001-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0001-SA	AQUEOUS	CL-IC-A	03 APR 90-M	-
008875-0001-SA	AQUEOUS	SO4-IC-A	03 APR 90-M	-
008875-0001-SA	AQUEOUS	ALK-A	29 MAR 90-O	-
008875-0001-SA	AQUEOUS	TDS-A	29 MAR 90-R	29 MAR 90-R
008875-0001-SA	AQUEOUS	PH-A	29 MAR 90-O	-
008875-0001-SA	AQUEOUS	COND-A	29 MAR 90-O	-
008875-0002-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0002-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0002-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0002-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0002-SA	AQUEOUS	CL-IC-A	03 APR 90-M	-
008875-0002-SA	AQUEOUS	SO4-IC-A	03 APR 90-M	-
008875-0002-SA	AQUEOUS	ALK-A	29 MAR 90-O	-
008875-0002-SA	AQUEOUS	TDS-A	29 MAR 90-R	29 MAR 90-R
008875-0002-SA	AQUEOUS	PH-A	29 MAR 90-O	-
008875-0002-SA	AQUEOUS	COND-A	29 MAR 90-O	-
008875-0003-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0003-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0003-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0003-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0003-SA	AQUEOUS	CL-IC-A	03 APR 90-M	-
008875-0003-SA	AQUEOUS	SO4-IC-A	03 APR 90-M	-
008875-0003-SA	AQUEOUS	ALK-A	29 MAR 90-O	-
008875-0003-SA	AQUEOUS	TDS-A	29 MAR 90-R	29 MAR 90-R
008875-0003-SA	AQUEOUS	PH-A	29 MAR 90-O	-
008875-0003-SA	AQUEOUS	COND-A	29 MAR 90-O	-
008875-0004-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0004-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0004-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0004-SA	AQUEOUS	TOX-A	05 APR 90-A	-
008875-0004-SA	AQUEOUS	CL-IC-A	03 APR 90-M	-
008875-0004-SA	AQUEOUS	SO4-IC-A	03 APR 90-M	-
008875-0004-SA	AQUEOUS	ALK-A	29 MAR 90-O	-
008875-0004-SA	AQUEOUS	TDS-A	29 MAR 90-R	29 MAR 90-R
008875-0004-SA	AQUEOUS	PHEN-A	03 APR 90-R	03 APR 90-R
008875-0004-SA	AQUEOUS	PH-A	29 MAR 90-O	-
008875-0004-SA	AQUEOUS	COND-A	29 MAR 90-O	-
008875-0005-SA	AQUEOUS	TOX-A	10 APR 90-A	-
008875-0005-SA	AQUEOUS	TOX-A	10 APR 90-A	-
008875-0005-SA	AQUEOUS	TOX-A	10 APR 90-A	-
008875-0005-SA	AQUEOUS	TOX-A	10 APR 90-A	-
008875-0005-SA	AQUEOUS	CL-IC-A	03 APR 90-M	-
008875-0005-SA	AQUEOUS	SO4-IC-A	03 APR 90-M	-

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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	-

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DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

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

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

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

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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

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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

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DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

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

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

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DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

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

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

Discussion

This report contains results and supporting quality control and sample identification information associated with analyses performed on this project. The results and supporting information are contained in tables following this section, arranged in the following order:

- Sample Description Information
- Analytical Test Requests
- Analytical Results
- Quality Control Report
- Data Quality Assessment

Analyses were performed in accordance with EPA methods and with Enseco's current Quality Assurance Program Plan for Environmental Chemical Monitoring. The specific analytical methods used are presented with each result. The first four sections below describes the format, content, and organization for the four corresponding separate components of this report. The fifth section provides an overall data quality assessment of the results.

Sample Description Information

The Sample Description Information lists all 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.

Analytical Results

The analytical results for this project are presented in data tables. Each data table includes sample identification information, and where available and appropriate, dates sampled, received, authorized, prepared, and analyzed.

Data sheets contain a listing of the parameters measured in each test, the analytical results, the analytical method, 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.

Quality Control Reports

As documented in more detail in Enseco's QAPP, various internal quality control checks are performed to assure that the laboratory was in control during the time that samples on this project were analyzed. The QC checks include analysis of method blanks, duplicate control samples (DCS), and single control samples (SCS). Results from these analyses are presented along with the control limits.

Method Blank Results: A method blank is a laboratory generated sample used to assess the degree to which laboratory operations and procedures cause false positive analytical results.

Duplicate Control Samples (DCS): Each DCS consists of a standard control matrix that is spiked with a group of target analytes representative of the method analytes. One Duplicate Control Sample is prepared for every twenty (20) samples.

Single Control Samples (SCS): An SCS is a spiked sample analyzed with each batch of samples.

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).

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

Data Quality Assessment

The results contained in this report were reviewed relative to data acceptance criteria as specified in Enseco's Quality Assurance Project Plan for completeness, precision, accuracy, representativeness and defensibility of the data. Unless otherwise stated below, no quality control problems or technical difficulties were encountered.

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SAMPLE DESCRIPTION INFORMATION
for
Giant Refining

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
009984-0001-SA	OW-11	AQUEOUS	13 JUN 90	09:45	14 JUN 90
009984-0002-SA	TRIP BLANK	AQUEOUS			14 JUN 90

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ANALYTICAL TEST REQUESTS
for
Giant Refining

Lab ID: 009984	Group Code	Analysis Description	Custom Test?
0001	A	Total Organic Carbon (TOC)	N
		Total Organic Halogen (TOX)	N
		Total Dissolved Solids (TDS)	N
		Refinery Hazardous Constituent Semivolatiles	Y
		Prep - Semivolatile Organics by GC/MS	N
		pH	N
		Specific Conductance	N
		TCL Volatile Organics	Y
		Prep-Volatile Organics by GC/MS	N
		Alkalinity,	Y
		Total/Carbonate/Bicarbonate/Hydroxide	Y
		Phenolics (4-AAP)	N
		ICP Metals (Dissolved)	Y
		Arsenic, Furnace AA (Dissolved)	N
		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
		Selenium, Furnace AA (Dissolved)	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
		ICP Metals (Total)	Y
		Chloride, Ion Chromatography	N
		Sulfate, Ion Chromatography	N
0002	B	TCL Volatile Organics	Y
		Prep-Volatile Organics by GC/MS	N

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TCL Volatile Organics

Method 8240

Client Name: Giant Refining
Client ID: OW-11
Lab ID: 009984-0001-SA
Matrix: AQUEOUS
Authorized: 14 JUN 90

Enseco ID: 1079683
Sampled: 13 JUN 90
Prepared: 18 JUN 90

Received: 14 JUN 90
Analyzed: 18 JUN 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	105	%	--
4-Bromofluorobenzene	88	%	--
1,2-Dichloroethane-d4	95	%	--

ND = Not detected
NA = Not applicable

Reported By: Cesar Rojas

Approved By: Jeff Lowry

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TCL Volatile Organics

Method 8240

Client Name: Giant Refining
Client ID: TRIP BLANK
Lab ID: 009984-0002-SA
Matrix: AQUEOUS
Authorized: 14 JUN 90

Enseco ID: 1079688
Sampled: Unknown
Prepared: 18 JUN 90

Received: 14 JUN 90
Analyzed: 18 JUN 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	105	%	--
4-Bromofluorobenzene	89	%	--
1,2-Dichloroethane-d4	97	%	--

ND = Not detected
NA = Not applicable

Reported By: Cesar Rojas

Approved By: Jeff Lowry

Enseco
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Refinery Hazardous Constituent Semivolatiles

Method 8270

Client Name: Giant Refining
Client ID: OW-11
Lab ID: 009984-0001-SA
Enseco ID: 1079683
Matrix: AQUEOUS
Sampled: 13 JUN 90
Received: 14 JUN 90
Authorized: 14 JUN 90
Prepared: 16 JUN 90
Analyzed: 27 JUN 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
2,4,6-Trichlorophenol	ND	ug/L	10
m & p-Cresol(s)	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
Nitrobenzene-d5	70	%	--
2-Fluorobiphenyl	66	%	--
Terphenyl-d14	77	%	--
Phenol-d5	66	%	--
2-Fluorophenol	63	%	--
2,4,6-Tribromophenol	78	%	--

ND = Not detected
NA = Not applicable

Reported By: Scott Frencis

Approved By: Jeff Lowry

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Metals

Total Metals

Client Name: Giant Refining
Client ID: OW-11
Lab ID: 009984-0001-SA
Enseco ID: 1079683
Matrix: AQUEOUS
Sampled: 13 JUN 90
Received: 14 JUN 90
Authorized: 14 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	ND	mg/L	0.010	6010	25 JUN 90	27 JUN 90
Lead	ND	mg/L	0.0050	7421	25 JUN 90	28 JUN 90
Mercury	ND	mg/L	0.00020	7470	26 JUN 90	27 JUN 90

ND = Not detected
NA = Not applicable

Reported By: Richard Persichitte
Approved By: Toni Stovall

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Metals

Dissolved Metals

Client Name: Giant Refining
Client ID: OW-11
Lab ID: 009984-0001-SA
Matrix: AQUEOUS
Authorized: 14 JUN 90

Enseco ID: 1079683
Sampled: 13 JUN 90
Prepared: See Below

Received: 14 JUN 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	0.010	7060	NA	25 JUN 90
Barium	0.016	mg/L	0.010	6010	NA	03 JUL 90
Cadmium	ND	mg/L	0.0050	6010	NA	03 JUL 90
Calcium	5.2	mg/L	0.20	6010	NA	03 JUL 90
Copper	ND	mg/L	0.010	6010	NA	03 JUL 90
Manganese	ND	mg/L	0.010	6010	NA	03 JUL 90
Nickel	ND	mg/L	0.040	6010	NA	03 JUL 90
Selenium	0.024	mg/L	0.010	7740	NA	25 JUN 90
Silver	ND	mg/L	0.010	6010	NA	03 JUL 90
Sodium	425	mg/L	5.0	6010	NA	03 JUL 90
Zinc	ND	mg/L	0.010	6010	NA	03 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Harold Borquez

Approved By: Toni Stovall

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General Inorganics

Client Name: Giant Refining
Client ID: OW-11
Lab ID: 009984-0001-SA
Matrix: AQUEOUS
Authorized: 14 JUN 90

Enseco ID: 1079683
Sampled: 13 JUN 90
Prepared: See Below

Received: 14 JUN 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Bicarb. as CaCO3 at pH 4.5	440	mg/L	5.0	310.1	NA	14 JUN 90
Alkalinity, Carb. as CaCO3 at pH 8.3	ND	mg/L	5.0	310.1	NA	14 JUN 90
Chloride	117	mg/L	3.0	300.0	NA	21 JUN 90
pH	8.3	units	--	9040	NA	14 JUN 90
Phenolics	ND	mg/L	0.010	9065	NA	26 JUN 90
Sulfate	327	mg/L	5.0	300.0	NA	21 JUN 90
Specific Conductance at 25 deg.C	1760	umhos/cm	1.0	120.1	NA	14 JUN 90
Total Organic Carbon	4.4	mg/L	0.50	9060	NA	20 JUN 90
Total Organic Carbon	4.2	mg/L	0.50	9060	NA	20 JUN 90
Total Organic Carbon	4.2	mg/L	0.50	9060	NA	20 JUN 90
Total Organic Carbon	4.3	mg/L	0.50	9060	NA	20 JUN 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	25 JUN 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	25 JUN 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	25 JUN 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	25 JUN 90
Total Dissolved Solids	1180	mg/L	10.0	160.1	NA	18 JUN 90

pH 8.26, 8.3, 8.3, 8.32

S.C. 1420, 1420, 1410, 1420

Eh 6.902-.06

ND = Not detected
NA = Not applicable

Reported By: Mike Settell

Approved By: Mary Grehl

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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)
009984-0001-SA	AQUEOUS	624-A	17 JUN 90-F	17 JUN 90-F
009984-0002-SA	AQUEOUS	624-A	17 JUN 90-F	17 JUN 90-F

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DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Limit
Category: 624-A								
Matrix: AQUEOUS								
QC Lot: 17 JUN 90-F								
Concentration Units: ug/L								
1,1-Dichloroethene	50	35.8	36.0	35.9	72	61-145	0.6	1
Trichloroethene	50	47.6	49.8	48.7	97	71-120	4.5	1
Benzene	50	46.8	50.5	48.6	97	76-127	7.6	1
Toluene	50	53.0	52.4	52.7	105	76-125	1.1	1
Chlorobenzene	50	53.0	54.3	53.6	107	75-130	2.4	1

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

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SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 624-A				
Matrix: AQUEOUS				
QC Lot: 17 JUN 90-F QC Run: 17 JUN 90-F				
Concentration Units: ug/L				
1,2-Dichloroethane-d4	50.0	44.8	90	76-114
4-Bromofluorobenzene	50.0	44.3	89	86-115
Toluene-d8	50.0	50.8	102	88-110

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

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METHOD BLANK REPORT
Volatile Organics by GC/MS

Analyte	Result	Units	Reporting Limit
Test: 624-TCL-A			
Matrix: AQUEOUS			
QC Lot: 17 JUN 90-F QC Run: 17 JUN 90-F			
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-A			
Matrix: AQUEOUS			
QC Lot: 17 JUN 90-F QC Run: 17 JUN 90-F			
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

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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)
009984-0001-SA	AQUEOUS	625-A	16 JUN 90-A	16 JUN 90-B

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DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: 625-A								
Matrix: AQUEOUS								
QC Lot: 16 JUN 90-A								
Concentration Units: ug/L								
Phenol	100	81.2	81.0	81.1	81	12- 89	0.3	42
2-Chlorophenol	100	94.6	92.6	93.6	94	27-123	2.1	40
1,4-Dichlorobenzene	50	28.9	30.1	29.5	59	36- 97	4.1	28
N-Nitroso-di-n-propylamine	50	46.4	48.4	47.4	95	41-116	4.2	38
1,2,4-Trichlorobenzene	50	28.5	29.8	29.2	58	39- 98	4.5	28
4-Chloro-3-methylphenol	100	85.8	93.2	89.5	90	23- 97	8.3	42
Acenaphthene	50	30.5	31.0	30.8	62	46-118	1.6	31
4-Nitrophenol	100	70.7	72.9	71.8	72	10- 80	3.1	50
2,4-Dinitrotoluene	50	42.2	44.2	43.2	86	24- 96	4.6	38
Pentachlorophenol	100	60.2	44.8	52.5	53	9-103	29	50
Pyrene	50	42.0	48.9	45.4	91	26-127	15	31

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

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SINGLE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

Category: 625-A
Matrix: AQUEOUS
QC Lot: 16 JUN 90-A QC Run: 16 JUN 90-B
Concentration Units: ug/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Nitrobenzene-d5	100	89.5	90	35-114
2-Fluorobiphenyl	100	74.8	75	43-116
Terphenyl-d14	100	104	104	33-141
2-Fluorophenol	200	132	66	21-100
Phenol-d5	200	148	74	10- 94
2,4,6-Tribromophenol	200	147	74	10-123

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

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METHOD BLANK REPORT
Semivolatile Organics by GC/MS

Test: 625-REF-A
Matrix: AQUEOUS
QC Lot: 16 JUN 90-A QC Run: 16 JUN 90-B

Analyte	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
2,4,6-Trichlorophenol	ND	ug/L	10
m & p-Cresol(s)	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10

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QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
009984-0001-SA	AQUEOUS	ICP-AD	03 JUL 90-A	-
009984-0001-SA	AQUEOUS	AS-FAA-AD	25 JUN 90-A	-
009984-0001-SA	AQUEOUS	PB-FAA-AT	25 JUN 90-F	25 JUN 90-F
009984-0001-SA	AQUEOUS	HG-CVAA-AT	26 JUN 90-A	26 JUN 90-A
009984-0001-SA	AQUEOUS	SE-FAA-AD	25 JUN 90-A	-
009984-0001-SA	AQUEOUS	ICP-AT	25 JUN 90-F	25 JUN 90-F

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DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Average(%) Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: ICP-AD Matrix: AQUEOUS QC Lot: 03 JUL 90-A Concentration Units: mg/L								
Aluminum	2.0	1.85	1.85	1.85	93	75-125	0.0	20
Antimony	0.5	0.453	0.452	0.452	90	75-125	0.2	20
Arsenic	0.5	0.415	0.410	0.412	82	75-125	1.1	20
Barium	2.0	1.69	1.70	1.70	85	75-125	0.1	20
Beryllium	0.05	0.0460	0.0459	0.0460	92	75-125	0.3	20
Cadmium	0.05	0.0392	0.0409	0.0400	80	75-125	4.3	20
Calcium	100	87.7	87.7	87.7	88	75-125	0.0	20
Chromium	0.2	0.185	0.185	0.185	92	75-125	0.1	20
Cobalt	0.5	0.402	0.404	0.403	81	75-125	0.3	20
Copper	0.25	0.219	0.218	0.219	87	75-125	0.5	20
Iron	1.0	0.906	0.909	0.907	91	75-125	0.3	20
Lead	0.5	0.414	0.403	0.409	82	75-125	2.7	20
Magnesium	50	44.3	44.5	44.4	89	75-125	0.5	20
Manganese	0.5	0.409	0.410	0.409	82	75-125	0.3	20
Nickel	0.5	0.410	0.410	0.410	82	75-125	0.0	20
Potassium	50	43.6	43.7	43.7	87	75-125	0.3	20
Silver	0.05	0.0487	0.0490	0.0488	98	75-125	0.8	20
Sodium	100	86.8	86.8	86.8	87	75-125	0.1	20
Vanadium	0.5	0.464	0.465	0.464	93	75-125	0.1	20
Zinc	0.5	0.412	0.415	0.414	83	75-125	0.5	20
Category: AS-FAA-AD Matrix: AQUEOUS QC Lot: 25 JUN 90-A Concentration Units: mg/L								
Arsenic	0.04	0.0338	0.0371	0.0354	89	75-125	9.3	20
Category: PB-FAA-AT Matrix: AQUEOUS QC Lot: 25 JUN 90-F Concentration Units: mg/L								
Lead	0.02	0.0216	0.0184	0.0200	100	75-125	16	20

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

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

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Average(%) Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: HG-CVAA-AT Matrix: AQUEOUS QC Lot: 26 JUN 90-A Concentration Units: mg/L								
Mercury	0.0010	0.00102	0.00104	0.00103	103	75-125	1.9	20
Category: SE-FAA-AD Matrix: AQUEOUS QC Lot: 25 JUN 90-A Concentration Units: mg/L								
Selenium	0.01	0.00900	0.00880	0.00890	89	75-125	2.2	20
Category: ICP-AT Matrix: AQUEOUS QC Lot: 25 JUN 90-F Concentration Units: mg/L								
Aluminum	2.0	2.31	2.27	2.29	114	75-125	1.8	20
Antimony	0.5	0.549	0.542	0.545	109	75-125	1.4	20
Arsenic	0.5	0.551	0.558	0.554	111	75-125	1.2	20
Barium	2.0	2.15	2.10	2.13	106	75-125	2.3	20
Beryllium	0.05	0.0637	0.0640	0.0639	128	75-125	0.5	20
Cadmium	0.05	0.0423	0.0455	0.0439	88	75-125	7.2	20
Calcium	100	85.1	81.9	83.5	84	75-125	3.8	20
Chromium	0.2	0.223	0.221	0.222	111	75-125	0.9	20
Cobalt	0.5	0.534	0.523	0.528	106	75-125	2.1	20
Copper	0.25	0.292	0.287	0.289	116	75-125	1.8	20
Iron	1.0	1.13	1.13	1.13	113	75-125	0.8	20
Lead	0.5	0.521	0.505	0.513	103	75-125	3.1	20
Magnesium	50	44.6	43.2	43.9	88	75-125	3.2	20
Manganese	0.5	0.547	0.529	0.538	108	75-125	3.2	20
Nickel	0.5	0.546	0.528	0.537	107	75-125	3.4	20
Potassium	50	45.0	43.9	44.5	89	75-125	2.4	20
Silver	0.05	0.0503	0.0492	0.0498	100	75-125	2.1	20
Sodium	100	89.5	87.5	88.5	89	75-125	2.2	20
Vanadium	0.5	0.600	0.588	0.594	119	75-125	2.1	20
Zinc	0.5	0.517	0.501	0.509	102	75-125	3.1	20

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

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METHOD BLANK REPORT
Metals Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: PB-FAA-AT			
Matrix: AQUEOUS			
QC Lot: 25 JUN 90-F QC Run: 25 JUN 90-F			
Lead	ND	mg/L	0.0050
Test: HG-CVAA-AT			
Matrix: AQUEOUS			
QC Lot: 26 JUN 90-A QC Run: 26 JUN 90-A			
Mercury	ND	mg/L	0.00020
Test: ICP-AT			
Matrix: AQUEOUS			
QC Lot: 25 JUN 90-F QC Run: 25 JUN 90-F			
Chromium	ND	mg/L	0.010

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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)
009984-0001-SA	AQUEOUS	TOC-A	20 JUN 90-A	-
009984-0001-SA	AQUEOUS	TOX-A	25 JUN 90-A	-
009984-0001-SA	AQUEOUS	TDS-A	18 JUN 90-A	18 JUN 90-A
009984-0001-SA	AQUEOUS	PH-A	14 JUN 90-B	-
009984-0001-SA	AQUEOUS	COND-A	14 JUN 90-A	-
009984-0001-SA	AQUEOUS	ALK-A	14 JUN 90-A	-
009984-0001-SA	AQUEOUS	PHEN-A	26 JUN 90-A	26 JUN 90-A
009984-0001-SA	AQUEOUS	TOC-A	20 JUN 90-A	-
009984-0001-SA	AQUEOUS	TOC-A	20 JUN 90-A	-
009984-0001-SA	AQUEOUS	TOC-A	20 JUN 90-A	-
009984-0001-SA	AQUEOUS	TOX-A	25 JUN 90-A	-
009984-0001-SA	AQUEOUS	TOX-A	25 JUN 90-A	-
009984-0001-SA	AQUEOUS	TOX-A	25 JUN 90-A	-
009984-0001-SA	AQUEOUS	CL-IC-A	21 JUN 90-M	-
009984-0001-SA	AQUEOUS	SO4-IC-A	21 JUN 90-M	-

Enseco
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DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Average(%) Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: TOC-A Matrix: AQUEOUS QC Lot: 20 JUN 90-A Concentration Units: mg/L								
Total Organic Carbon	25	24.7	24.8	24.8	99	91-109	0.4	20
Category: TOX-A Matrix: AQUEOUS QC Lot: 25 JUN 90-A Concentration Units: ug Cl/L								
Total Organic Halogen as Cl	100	98.9	99.5	99.2	99	80-120	0.6	20
Category: TDS-A Matrix: AQUEOUS QC Lot: 18 JUN 90-A Concentration Units: mg/L								
Total Dissolved Solids	935	887	892	890	95	90-110	0.6	10
Category: PH-A Matrix: AQUEOUS QC Lot: 14 JUN 90-B Concentration Units: units								
pH	9.1	9.11	9.10	9.10	100	98-102	0.1	5
Category: COND-A Matrix: AQUEOUS QC Lot: 14 JUN 90-A Concentration Units: umhos/cm								
Specific Conductance at 25 deg.C	276	285	284	284	103	95-105	0.3	20

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

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

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: ALK-A Matrix: AQUEOUS QC Lot: 14 JUN 90-A Concentration Units: mg/L								
Alkalinity, Total as CaCO3 at pH 4.5	210	213	215	214	102	90-110	0.9	10
Category: PHEN-A Matrix: AQUEOUS QC Lot: 26 JUN 90-A Concentration Units: mg/L								
Phenolics	0.2	0.190	0.206	0.198	99	78-122	8.1	20
Category: CL-IC-A Matrix: AQUEOUS QC Lot: 21 JUN 90-M Concentration Units: mg/L								
Chloride	100	100	96.3	98.2	98	92-108	3.8	20
Category: SO4-IC-A Matrix: AQUEOUS QC Lot: 21 JUN 90-M Concentration Units: mg/L								
Sulfate	200	197	190	194	97	93-107	3.6	20

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

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METHOD BLANK REPORT
Wet Chemistry Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: TDS-BAL-A			
Matrix: AQUEOUS			
QC Lot: 18 JUN 90-A QC Run: 18 JUN 90-A			
Total Dissolved Solids	ND	mg/L	10.0
Test: PHEN-SPEC-A			
Matrix: AQUEOUS			
QC Lot: 26 JUN 90-A QC Run: 26 JUN 90-A			
Phenolics	ND	mg/L	0.010

Enseco - Rocky Mountain Analytical

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

Attn: Julie Essey

CHAIN OF CUSTODY

No.

Enseco Client: Giant Refining
Project: Cinizza Refinery
Sampling Co.: Cinizza Refinery
Sampling Site: Cinizza Refinery
Team Leader: Claud Rosendale

RMA# 5984

SAMPLE SAFE™ CONDITIONS

1. Packed by: _____ Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes (Yes circled) No
3. Condition of Contents: Good
4. Sealed for Shipping by: M. McCaslin
5. Initial Contents Temp.: 59 °F Seal # —
6. Sampling Status: Done (Done circled) 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
6-13-90	0945	OW-11 - 01	Water	2 #1	See Attached	
				1-#2		
				1-#4		
				1-#4		Filtered
				3-#11		
				2-#12		
				1-#15		

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	Claud Rosendale		6-13-90	11:30 A
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: C. Rosendale
Method of Shipment: Fed. Ex. Airbill # _____
Received for Lab: RMAL Signed: [signature] Date/Time 06-14-90 0800
Enseco Project No. _____

White and Pink Copies to Lab Yellow to Sampler

SS-001