GW - 32

REPORTS

YEAR(S):

1991 - EPA RCRA Book 3

PHASE I FINAL

RCRA FACILITY INVESTIGATION
PHASE I - FINAL REPORT
GIANT REFINING COMPANY
GALLUP, NEW MEXICO
APRIL 8, 1991
BOOK 3

This Booklet Includes

Section 9.0

9.1.1

9.1.2

9.1.3

9.1.4

9.2.1

Section 9.1.1
RMAL No. 010179

ANALYTICAL RESULTS

FOR

GIANT REFINING

ENSECO-RMAL NO. 010179

JULY 19, 1990

Enseco

Reviewed by:

Julie Essey

Sue Dalla

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

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.

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.

Enseco
A CORNING Company

SAMPLE DESCRIPTION INFORMATION
for
Giant Refining

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
010179-0001-SA	RFI0608V.5	SOIL	27 JUN 90	07:05	28 JUN 90
010179-0002-SA	RFI0608V4.0	SOIL	27 JUN 90	07:55	28 JUN 90
010179-0003-SA	RFI0608V7.5	SOIL	27 JUN 90	08:20	28 JUN 90
010179-0004-SA	RFI0616V.5	SOIL	27 JUN 90	08:44	28 JUN 90
010179-0005-SA	RFI0616V4.0	SOIL	27 JUN 90	09:00	28 JUN 90
010179-0006-SA	RFI0616V7.5	SOIL	27 JUN 90	09:31	28 JUN 90
010179-0007-SA	RFI0618V.5	SOIL	27 JUN 90	09:49	28 JUN 90
010179-0008-SA	RFI0618V4.0	SOIL	27 JUN 90	10:00	28 JUN 90
010179-0009-SA	RFI0618V7.5	SOIL	27 JUN 90	11:07	28 JUN 90
010179-0010-SA	RFI0610V.5	SOIL	27 JUN 90	12:01	28 JUN 90
010179-0011-SA	RFI0610V4.0	SOIL	27 JUN 90	12:31	28 JUN 90
010179-0012-SA	RFI0610V7.5	SOIL	27 JUN 90	12:44	28 JUN 90
010179-0013-SA	RFI0620V.5	SOIL	27 JUN 90	13:15	28 JUN 90
010179-0014-SA	RFI0620V4.0	SOIL	27 JUN 90	13:45	28 JUN 90
010179-0015-SA	RFI0620V7.5	SOIL	27 JUN 90	14:07	28 JUN 90
010179-0016-SA	RFI0609A0.0	SOIL	27 JUN 90	13:15	28 JUN 90
010179-0017-SA	RFI0609A3.5	SOIL	27 JUN 90	13:20	28 JUN 90
010179-0018-SA	RFI0609A7.0	SOIL	27 JUN 90	13:30	28 JUN 90
010179-0019-SA	TRIP BLANK	AQUEOUS			28 JUN 90

ANALYTICAL TEST REQUESTS
for
Giant Refining

Lab ID: 010179	Group Code	Analysis Description	Custom Test?
0001 - 0018	A	ICP Metals (Total)	Y
		Prep - Total Metals, ICP	N
		Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)	N
0019	B	Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)	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.

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0608V.5
Lab ID: 010179-0001-SA Enseco ID: 1081273
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 02 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0608V4.0
Lab ID: 010179-0002-SA Enseco ID: 1081274
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 02 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0608V7.5
Lab ID: 010179-0003-SA Enseco ID: 1081276
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 02 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	1000	ug/kg	500
Toluene	3000	ug/kg	500
Ethylbenzene	2300	ug/kg	500
Xylenes (total)	45000	ug/kg	1000

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0616V.5
Lab ID: 010179-0004-SA Enseco ID: 1081277
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 02 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	260	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	210	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0616V4.0
Lab ID: 010179-0005-SA Enseco ID: 1081278
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 02 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	800	ug/kg	500
Toluene	2700	ug/kg	500
Ethylbenzene	5800	ug/kg	500
Xylenes (total)	32000	ug/kg	1000

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0616V7.5
Lab ID: 010179-0006-SA Enseco ID: 1081279
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 02 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	500
Toluene	1500	ug/kg	500
Ethylbenzene	2400	ug/kg	500
Xylenes (total)	20000	ug/kg	1000

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0618V.5
Lab ID: 010179-0007-SA Enseco ID: 1081280
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 02 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0618V4.0
Lab ID: 010179-0008-SA Enseco ID: 1081281
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 03 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	2500
Toluene	ND	ug/kg	2500
Ethylbenzene	3600	ug/kg	2500
Xylenes (total)	110000	ug/kg	5000

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0618V7.5
Lab ID: 010179-0009-SA Enseco ID: 1081283
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 04 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	500
Toluene	650	ug/kg	500
Ethylbenzene	2000	ug/kg	500
Xylenes (total)	24000	ug/kg	1000

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0610V.5
Lab ID: 010179-0010-SA Enseco ID: 1081286
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 02 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0610V4.0
Lab ID: 010179-0011-SA Enseco ID: 1081287
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 02 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	600	ug/kg	50
Ethylbenzene	83	ug/kg	50
Xylenes (total)	2000	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0610V7.5
Lab ID: 010179-0012-SA Enseco ID: 1081289
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 02 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	1600	ug/kg	50
Ethylbenzene	360	ug/kg	50
Xylenes (total)	2700	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0620V.5
Lab ID: 010179-0013-SA Enseco ID: 1081293
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 03 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0620V4.0
Lab ID: 010179-0014-SA Enseco ID: 1081295
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 05 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	2500
Toluene	4500	ug/kg	2500
Ethylbenzene	5100	ug/kg	2500
Xylenes (total)	95000	ug/kg	5000

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0620V7.5
Lab ID: 010179-0015-SA Enseco ID: 1081297
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 03 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	500
Toluene	ND	ug/kg	500
Ethylbenzene	ND	ug/kg	500
Xylenes (total)	10000	ug/kg	1000

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0609A0.0
Lab ID: 010179-0016-SA Enseco ID: 1081298
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 03 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0609A3.5
Lab ID: 010179-0017-SA Enseco ID: 1081299
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 03 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0609A7.0
Lab ID: 010179-0018-SA Enseco ID: 1081300
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 03 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 8020

Client Name: Giant Refining
Client ID: TRIP BLANK
Lab ID: 010179-0019-SA Enseco ID: 1081301
Matrix: AQUEOUS Sampled: Unknown Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 05 JUL 90

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	1.0

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0608V.5
Lab ID: 010179-0001-SA
Matrix: SOIL
Authorized: 29 JUN 90

Enseco ID: 1081273
Sampled: 27 JUN 90
Prepared: See Below

Received: 28 JUN 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	23.1	mg/kg	10.0	6010	12 JUL 90	13 JUL 90
Nickel	ND	mg/kg	8.0	6010	12 JUL 90	13 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Toni Lusk

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0608V4.0
Lab ID: 010179-0002-SA
Enseco ID: 1081274
Matrix: SOIL
Sampled: 27 JUN 90
Received: 28 JUN 90
Authorized: 29 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	5.3	mg/kg	5.0	6010	12 JUL 90	13 JUL 90
Nickel	ND	mg/kg	4.0	6010	12 JUL 90	13 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones
Approved By: Toni Lusk

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0608V7.5
Lab ID: 010179-0003-SA
Matrix: SOIL
Authorized: 29 JUN 90

Enseco ID: 1081276
Sampled: 27 JUN 90
Prepared: See Below

Received: 28 JUN 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	14.2	mg/kg	5.0	6010	12 JUL 90	13 JUL 90
Nickel	9.7	mg/kg	4.0	6010	12 JUL 90	13 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Toni Lusk

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0616V.5
Lab ID: 010179-0004-SA
Matrix: SOIL
Authorized: 29 JUN 90

Enseco ID: 1081277
Sampled: 27 JUN 90
Prepared: See Below

Received: 28 JUN 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	238	mg/kg	10.0	6010	12 JUL 90	13 JUL 90
Nickel	32.9	mg/kg	8.0	6010	12 JUL 90	13 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Toni Lusk

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0616V4.0
Lab ID: 010179-0005-SA
Enseco ID: 1081278
Matrix: SOIL
Sampled: 27 JUN 90
Received: 28 JUN 90
Authorized: 29 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	301	mg/kg	5.0	6010	12 JUL 90	13 JUL 90
Nickel	58.2	mg/kg	4.0	6010	12 JUL 90	13 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones
Approved By: Toni Lusk

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0616V7.5
Lab ID: 010179-0006-SA
Matrix: SOIL
Authorized: 29 JUN 90

Enseco ID: 1081279
Sampled: 27 JUN 90
Prepared: See Below

Received: 28 JUN 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	55.3	mg/kg	5.0	6010	12 JUL 90	13 JUL 90
Nickel	6.5	mg/kg	4.0	6010	12 JUL 90	13 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Toni Lusk

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0618V.5
Lab ID: 010179-0007-SA
Matrix: SOIL
Authorized: 29 JUN 90

Enseco ID: 1081280
Sampled: 27 JUN 90
Prepared: See Below

Received: 28 JUN 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	14.8	mg/kg	5.0	6010	12 JUL 90	13 JUL 90
Nickel	7.1	mg/kg	4.0	6010	12 JUL 90	13 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Toni Lusk

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0618V4.0
Lab ID: 010179-0008-SA
Matrix: SOIL
Authorized: 29 JUN 90

Enseco ID: 1081281
Sampled: 27 JUN 90
Prepared: See Below

Received: 28 JUN 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	12.3	mg/kg	10.0	6010	12 JUL 90	13 JUL 90
Nickel	ND	mg/kg	8.0	6010	12 JUL 90	13 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Toni Lusk

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0618V7.5
Lab ID: 010179-0009-SA
Enseco ID: 1081283
Matrix: SOIL
Sampled: 27 JUN 90
Received: 28 JUN 90
Authorized: 29 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	21.2	mg/kg	10.0	6010	12 JUL 90	13 JUL 90
Nickel	ND	mg/kg	8.0	6010	12 JUL 90	13 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones
Approved By: Toni Lusk

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0610V.5
Lab ID: 010179-0010-SA
Matrix: SOIL
Authorized: 29 JUN 90
Enseco ID: 1081286
Sampled: 27 JUN 90
Prepared: See Below
Received: 28 JUN 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	129	mg/kg	5.0	6010	12 JUL 90	13 JUL 90
Nickel	15.2	mg/kg	4.0	6010	12 JUL 90	13 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones
Approved By: Toni Lusk

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0610V4.0
Lab ID: 010179-0011-SA
Matrix: SOIL
Authorized: 29 JUN 90

Enseco ID: 1081287
Sampled: 27 JUN 90
Prepared: See Below

Received: 28 JUN 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/kg	10.0	6010	12 JUL 90	13 JUL 90
Nickel	ND	mg/kg	8.0	6010	12 JUL 90	13 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Toni Lusk

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0610V7.5
Lab ID: 010179-0012-SA
Enseco ID: 1081289
Matrix: SOIL
Sampled: 27 JUN 90
Received: 28 JUN 90
Authorized: 29 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	10.3	mg/kg	5.0	6010	12 JUL 90	13 JUL 90
Nickel	5.4	mg/kg	4.0	6010	12 JUL 90	13 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones
Approved By: Toni Lusk

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0620V.5
Lab ID: 010179-0013-SA
Matrix: SOIL
Authorized: 29 JUN 90

Enseco ID: 1081293
Sampled: 27 JUN 90
Prepared: See Below

Received: 28 JUN 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	21.6	mg/kg	5.0	6010	12 JUL 90	13 JUL 90
Nickel	49.8	mg/kg	4.0	6010	12 JUL 90	13 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Toni Lusk

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0620V4.0
Lab ID: 010179-0014-SA
Enseco ID: 1081295
Matrix: SOIL
Sampled: 27 JUN 90
Received: 28 JUN 90
Authorized: 29 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	9.9	mg/kg	5.0	6010	12 JUL 90	13 JUL 90
Nickel	4.9	mg/kg	4.0	6010	12 JUL 90	13 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones
Approved By: Toni Lusk

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0620V7.5
Lab ID: 010179-0015-SA
Enseco ID: 1081297
Matrix: SOIL
Sampled: 27 JUN 90
Received: 28 JUN 90
Authorized: 29 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	7.8	mg/kg	5.0	6010	12 JUL 90	13 JUL 90
Nickel	6.8	mg/kg	4.0	6010	12 JUL 90	13 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones
Approved By: Toni Lusk

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0609A0.0
Lab ID: 010179-0016-SA
Matrix: SOIL
Authorized: 29 JUN 90

Enseco ID: 1081298
Sampled: 27 JUN 90
Prepared: See Below

Received: 28 JUN 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	10.6	mg/kg	5.0	6010	12 JUL 90	13 JUL 90
Nickel	4.5	mg/kg	4.0	6010	12 JUL 90	13 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Toni Lusk

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0609A3.5
Lab ID: 010179-0017-SA
Matrix: SOIL
Authorized: 29 JUN 90

Enseco ID: 1081299
Sampled: 27 JUN 90
Prepared: See Below

Received: 28 JUN 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	8.0	mg/kg	5.0	6010	12 JUL 90	13 JUL 90
Nickel	6.3	mg/kg	4.0	6010	12 JUL 90	13 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Toni Lusk

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0609A7.0
Lab ID: 010179-0018-SA
Enseco ID: 1081300
Matrix: SOIL
Sampled: 27 JUN 90
Received: 28 JUN 90
Authorized: 29 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	8.3	mg/kg	5.0	6010	12 JUL 90	13 JUL 90
Nickel	4.3	mg/kg	4.0	6010	12 JUL 90	13 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones
Approved By: Toni Lusk

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).

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

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

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
010179-0001-SA	SOIL	8020-S	02 JUL 90-P	02 JUL 90-P
010179-0002-SA	SOIL	8020-S	02 JUL 90-P	02 JUL 90-P
010179-0003-SA	SOIL	8020-S	02 JUL 90-P	02 JUL 90-P
010179-0004-SA	SOIL	8020-S	02 JUL 90-P	02 JUL 90-P
010179-0005-SA	SOIL	8020-S	02 JUL 90-P	02 JUL 90-P
010179-0006-SA	SOIL	8020-S	02 JUL 90-P	02 JUL 90-P
010179-0007-SA	SOIL	8020-S	02 JUL 90-P	02 JUL 90-P
010179-0008-SA	SOIL	8020-S	03 JUL 90-P	03 JUL 90-P
010179-0009-SA	SOIL	8020-S	03 JUL 90-P	03 JUL 90-P
010179-0010-SA	SOIL	8020-S	02 JUL 90-P	02 JUL 90-P
010179-0011-SA	SOIL	8020-S	02 JUL 90-P	02 JUL 90-P
010179-0012-SA	SOIL	8020-S	02 JUL 90-P	02 JUL 90-P
010179-0013-SA	SOIL	8020-S	03 JUL 90-P	03 JUL 90-P
010179-0014-SA	SOIL	8020-S	05 JUL 90-L	05 JUL 90-L
010179-0015-SA	SOIL	8020-S	03 JUL 90-P	03 JUL 90-P
010179-0016-SA	SOIL	8020-S	03 JUL 90-P	03 JUL 90-P
010179-0017-SA	SOIL	8020-S	03 JUL 90-P	03 JUL 90-P
010179-0018-SA	SOIL	8020-S	03 JUL 90-P	03 JUL 90-P
010179-0019-SA	AQUEOUS	602-A	05 JUL 90-P	05 JUL 90-P

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: 8020-S Matrix: SOIL QC Lot: 02 JUL 90-P Concentration Units: ug/kg								
Benzene	500	582	588	585	117	75-125	1.0	15
Toluene	500	542	546	544	109	75-125	0.7	15
Ethylbenzene	500	544	545	544	109	75-125	0.2	15
Xylenes (total)	500	535	539	537	107	75-125	0.7	15
1,3-Dichlorobenzene	500	519	538	528	106	75-125	3.6	15
Category: 8020-S Matrix: SOIL QC Lot: 03 JUL 90-P Concentration Units: ug/kg								
Benzene	500	581	578	580	116	75-125	0.5	15
Toluene	500	538	536	537	107	75-125	0.4	15
Ethylbenzene	500	546	539	542	109	75-125	1.3	15
Xylenes (total)	500	532	530	531	106	75-125	0.4	15
1,3-Dichlorobenzene	500	519	536	528	106	75-125	3.2	15
Category: 8020-S Matrix: SOIL QC Lot: 05 JUL 90-L Concentration Units: ug/kg								
Benzene	500	546	538	542	108	75-125	1.5	15
Toluene	500	568	561	564	113	75-125	1.2	15
Ethylbenzene	500	568	555	562	112	75-125	2.3	15
Xylenes (total)	500	572	560	566	113	75-125	2.1	15
1,3-Dichlorobenzene	500	561	541	551	110	75-125	3.6	15
Category: 602-A Matrix: AQUEOUS QC Lot: 05 JUL 90-P Concentration Units: ug/L								
Benzene	5.0	5.82	5.84	5.83	117	80-120	0.3	15
Toluene	5.0	5.38	5.40	5.39	108	80-120	0.4	15
Ethylbenzene	5.0	5.28	5.31	5.30	106	80-120	0.6	15
Xylenes (total)	5.0	5.30	5.32	5.31	106	80-120	0.4	15

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

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

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: 602-A Matrix: AQUEOUS QC Lot: 05 JUL 90-P Concentration Units: ug/L								
1,3-Dichlorobenzene	5.0	5.22	5.30	5.26	105	80-120	1.5	15

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

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC

Analyte	Concentration Spiked	Measured	Accuracy(%) SCS	Limits
Category: 8020-S Matrix: SOIL QC Lot: 02 JUL 90-P QC Run: 02 JUL 90-P Concentration Units: ug/kg				
a,a,a-Trifluorotoluene	3000	3030	101	20-160
Category: 8020-S Matrix: SOIL QC Lot: 03 JUL 90-P QC Run: 03 JUL 90-P Concentration Units: ug/kg				
a,a,a-Trifluorotoluene	3000	3030	101	20-160
Category: 8020-S Matrix: SOIL QC Lot: 05 JUL 90-L QC Run: 05 JUL 90-L Concentration Units: ug/kg				
a,a,a-Trifluorotoluene	500	483	97	20-160
Category: 602-A Matrix: AQUEOUS QC Lot: 05 JUL 90-P QC Run: 05 JUL 90-P Concentration Units: ug/L				
a,a,a-Trifluorotoluene	30.0	30.3	101	20-160

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

Enseco
A CORNING Company

METHOD BLANK REPORT
Volatile Organics by GC

Analyte	Result	Units	Reporting Limit
Test: 8020-BTEX-S			
Matrix: SOIL			
QC Lot: 02 JUL 90-P QC Run: 02 JUL 90-P			
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100
Test: 8020-BTEX-S			
Matrix: SOIL			
QC Lot: 03 JUL 90-P QC Run: 03 JUL 90-P			
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100
Test: 8020-BTEX-S			
Matrix: SOIL			
QC Lot: 05 JUL 90-L QC Run: 05 JUL 90-L			
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100
Test: 602-BTEX-AP			
Matrix: AQUEOUS			
QC Lot: 05 JUL 90-P QC Run: 05 JUL 90-P			
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	1.0

Enseco
A CORNING Company

QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
010179-0001-SA	SOIL	ICP-S	11 JUL 90-R	11 JUL 90-R
010179-0002-SA	SOIL	ICP-S	11 JUL 90-R	11 JUL 90-R
010179-0003-SA	SOIL	ICP-S	11 JUL 90-R	11 JUL 90-R
010179-0004-SA	SOIL	ICP-S	11 JUL 90-R	11 JUL 90-R
010179-0005-SA	SOIL	ICP-S	11 JUL 90-R	11 JUL 90-R
010179-0006-SA	SOIL	ICP-S	11 JUL 90-R	11 JUL 90-R
010179-0007-SA	SOIL	ICP-S	11 JUL 90-R	11 JUL 90-R
010179-0008-SA	SOIL	ICP-S	11 JUL 90-R	11 JUL 90-R
010179-0009-SA	SOIL	ICP-S	11 JUL 90-R	11 JUL 90-R
010179-0010-SA	SOIL	ICP-S	11 JUL 90-R	11 JUL 90-R
010179-0011-SA	SOIL	ICP-S	11 JUL 90-R	11 JUL 90-R
010179-0012-SA	SOIL	ICP-S	11 JUL 90-R	11 JUL 90-R
010179-0013-SA	SOIL	ICP-S	11 JUL 90-R	11 JUL 90-R
010179-0014-SA	SOIL	ICP-S	11 JUL 90-R	11 JUL 90-R
010179-0015-SA	SOIL	ICP-S	11 JUL 90-R	11 JUL 90-R
010179-0016-SA	SOIL	ICP-S	11 JUL 90-R	11 JUL 90-R
010179-0017-SA	SOIL	ICP-S	11 JUL 90-R	11 JUL 90-R
010179-0018-SA	SOIL	ICP-S	11 JUL 90-R	11 JUL 90-R

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: ICP-S								
Matrix: SOIL								
QC Lot: 11 JUL 90-R								
Concentration Units: mg/kg								
Aluminum	200	193	191	192	96	75-125	0.8	20
Antimony	50	42.1	44.5	43.3	87	75-125	5.5	20
Arsenic	50	40.5	36.7	38.6	77	75-125	9.9	20
Barium	200	173	173	173	87	75-125	0.2	20
Beryllium	5.0	4.67	4.62	4.65	93	75-125	0.9	20
Cadmium	5.0	4.59	3.98	4.28	86	75-125	14	20
Calcium	10000	8620	8750	8680	87	75-125	1.5	20
Chromium	20	18.8	18.3	18.6	93	75-125	2.5	20
Cobalt	50	41.7	38.1	39.9	80	75-125	9.1	20
Copper	25	23.3	21.7	22.5	90	75-125	7.1	20
Iron	100	94.1	93.5	93.8	94	75-125	0.7	20
Lead	50	42.2	38.2	40.2	80	75-125	10	20
Magnesium	5000	4350	4420	4380	88	75-125	1.5	20
Manganese	50	42.1	38.8	40.4	81	75-125	8.2	20
Nickel	50	41.9	38.5	40.2	80	75-125	8.3	20
Potassium	5000	4280	4350	4320	86	75-125	1.6	20
Silver	5.0	4.50	4.46	4.48	90	75-125	0.9	20
Sodium	10000	8710	8860	8780	88	75-125	1.8	20
Vanadium	50	47.8	47.7	47.8	96	75-125	0.3	20
Zinc	50	42.0	38.5	40.2	80	75-125	8.7	20

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

Enseco
A CORNING Company

METHOD BLANK REPORT
Metals Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: ICP-S			
Matrix: SOIL			
QC Lot: 11 JUL 90-R QC Run: 11 JUL 90-R			
Lead	ND	mg/kg	5.0
Nickel	ND	mg/kg	4.0

Enseco - Rocky Mountain Analytical

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

Attn: Julie Essex

CHAIN OF CUSTODY

No.

Enseco Client: Giant Refinery
Project: RFI
Sampling Co.: Giant
Sampling Site: Cinizo
Team Leader: M. McCaslin

Rma 10179

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: C Rosendale
5. Initial Contents Temp.: _____ °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	Analysis Parameters	Remarks
1	6-27-90	7:05	RFI0608V.5	01	SOIL	2	BTEX, Lead, Nickel	
2	6-27-90	7:55	RFI0608V4.0	02	SOIL	2	BTEX, Lead, Nickel	
3	6-27-90	8:20	RFI0608V7.5	03	SOIL	2	BTEX, Lead, Nickel	
4	6-27-90	8:44	RFI0616V.5	04	SOIL	2	BTEX, Lead, Nickel	
5	6-27-90	9:00	RFI0616V4.0	05	SOIL	2	BTEX, Lead, Nickel	
6	6-27-90	9:31	RFI0616V7.5	06	SOIL	2	BTEX, Lead, Nickel	
7	6-27-90	9:49	RFI0618V.5	07	SOIL	2	BTEX, Lead Nickel	
8	6-27-90	10:00	RFI0618V4.0	08	SOIL	2	BTEX, Lead, Nickel	
9	6-27-90	11:07	RFI0618V7.5	09	SOIL	2	BTEX, Lead, Nickel	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	C Rosendale		6-27-90	2145
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: C Rosendale
Method of Shipment: Fed Express Airbill #
Received for Lab: RMal Signed: Joseph A Nye Date/Time 6/25/90 0800
Enseco Project No. 10179

White and Pink Copies to Lab Yellow to Sampler

SS-001

Enseco - Rocky Mountain Analytical

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

Attn: Julie Essig

Enseco Client: Giant Refinery
Project: RFI
Sampling Co.: Giant
Sampling Site: Ciniza
Team Leader: M. McCaslin

10179

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: Chasendale
5. Initial Contents Temp.: _____ °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	Analysis Parameters	Remarks
10 6-27-90	12:01	RFI0610V.5	10	Soil	2	BTEX, Lead, Nickel	
11 6-27-90	12:31	RFI0610V4.0	11	Soil	2	BTEX, Lead, Nickel	
12 6-27-90	12:44	RFI0610V7.5	12	Soil	2	BTEX, Lead, Nickel	
13 6-27-90	1:15	RFI0610V.5	13	Soil	2	BTEX, Lead, Nickle	
14 6-27-90	1:45	RFI0610V4.0	14	Soil	2	BTEX, Lead, Nickle	
15 6-27-90	2:01	RFI0610V7.5	15	Soil	2	BTEX, Lead, Nickle	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	Chas Sandale		7-27-90	2:45 PM
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: Chasendale
Method of Shipment: Fed Express 30 Airbill #
Received for Lab: RMAC Signed: Jacqueline Mac Date/Time 6/28/90 0800
Enseco Project No. 10179

White and Pink Copies to Lab Yellow to Sampler

SS-001

Enseco - Rocky Mountain Analytical

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

CHAIN OF CUSTODY

No.

Attn: Tyler Essex

Enseco Client Conoco Ref Serv

Project RFE

Sampling Co. Rodgers & Co

Sampling Site Cisco 29

Team Leader Chad Rosendale

10179

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: C Rosendale
5. Initial Contents Temp.: _____ °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	Analysis Parameters	Remarks
6-27-90	1315	RFI 0609A 0.0	16	Soil	2	BTEX Lead Nickel	
6-27-90	1320	RFI 0609A 3.5	17	Soil	2	BTEX Lead Nickel	
6-27-90	1330	RFI 0609A 7.0	18	Soil	2	BTEX Lead Nickel	
6-27-90	—	Trip Blank	19	Water	1	VOA	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	Chad Rosendale		6-27-90	2:45p
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: C Rosendale

Method of Shipment: Fed. Express Airbill #

Received for Lab: RMAC Signed: Joseph Hyer Date/Time 6/28/90 0800

Enseco Project No. 10179

White and Pink Copies to Lab Yellow to Sampler

SS-001

Section 9.1.2
RMAL No. 010180

Rocky Mountain
Analytical Laboratory

Enseco

ANALYTICAL RESULTS

FOR

GIANT REFINING

ENSECO-RMAL NO. 010180

JULY 28, 1990

Reviewed by: /s/ A Essey

Julie Essey

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

I. OVERVIEW

On June 28, 1990, Enseco-Rocky Mountain Analytical Laboratory received 19 soil samples from Giant Refining.

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:

I. Overview
II. Sample Description Information/Analytical Test Requests
III. Analytical Results
IV. 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 avoid saturation of the detector, to achieve linearity for a specific target compound or to reduce matrix interferences. In this event, reporting limits are adjusted proportionately. Surrogate compounds may not be measurable in samples which have been diluted.

For this project, samples 010180-0009, -0010, and -0014 by Method 8020 were diluted due to elevated concentrations of target compounds. Likewise, several samples by Method 6010 were diluted; however, these dilutions were due to concentrations of calcium in the samples. The samples by Method 6010 which were diluted are 010180-0001 through -0005, -0007, -0008, -0011, -0012, -0015, -0017, and -0019. In all cases, the reporting limits were raised proportionately.

II. SAMPLE DESCRIPTION INFORMATION/ANALYTICAL TEST REQUESTS

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.

Enseco
A CORNING Company

SAMPLE DESCRIPTION INFORMATION
for
Giant Refining

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
010180-0001-SA	RFI0617A0.0	SOIL	27 JUN 90	10:10	28 JUN 90
010180-0002-SA	RFI0617A3.5	SOIL	27 JUN 90	10:20	28 JUN 90
010180-0003-SA	RFI0617A7.0	SOIL	27 JUN 90	10:25	28 JUN 90
010180-0004-SA	RFI0613A0.0	SOIL	27 JUN 90	11:10	28 JUN 90
010180-0005-SA	RFI0613A3.5	SOIL	27 JUN 90	11:20	28 JUN 90
010180-0006-SA	RFI0613A7.0	SOIL	27 JUN 90	11:25	28 JUN 90
010180-0007-SA	RFI0613D0.0	SOIL	27 JUN 90	11:15	28 JUN 90
010180-0008-SA	RFI0611A0.0	SOIL	27 JUN 90	12:15	28 JUN 90
010180-0009-SA	RFI0611A3.5	SOIL	27 JUN 90	12:25	28 JUN 90
010180-0010-SA	RFI0611A7.0	SOIL	27 JUN 90	12:30	28 JUN 90
010180-0011-SA	RFI0607A0.0	SOIL	27 JUN 90	06:30	28 JUN 90
010180-0012-SA	RFI0607A3.5	SOIL	27 JUN 90	06:45	28 JUN 90
010180-0013-SA	RFI0607A7.5	SOIL	27 JUN 90	06:50	28 JUN 90
010180-0014-SA	RFI0619A0.0	SOIL	27 JUN 90	08:00	28 JUN 90
010180-0015-SA	RFI0619A3.5	SOIL	27 JUN 90	08:05	28 JUN 90
010180-0016-SA	RFI0619A7.0	SOIL	27 JUN 90	08:10	28 JUN 90
010180-0017-SA	RFI0615A0.0	SOIL	27 JUN 90	08:50	28 JUN 90
010180-0018-SA	RFI0615A3.5	SOIL	27 JUN 90	09:10	28 JUN 90
010180-0019-SA	RFI0615A7.0	SOIL	27 JUN 90	09:10	28 JUN 90

Enseco
A CORNING Company

ANALYTICAL TEST REQUESTS
for
Giant Refining

Lab ID: 010180	Group Code	Analysis Description	Custom Test?
0001 - 0019	A	Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)	N
		ICP Metals (Total)	Y
		Prep - Total Metals, ICP	N

III. 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. The date prepared is typically the date an extraction or digestion was initiated. For volatile organic compounds in water, the date prepared is the date the screening of the sample was performed.

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.

In addition, surrogate recovery data is presented for all GC/MS analyses. The surrogate recovery is an indication of the affect of the sample matrix on the performance of the method. The results from the Standard Enseco QA/QC Program, which generates data which are independent of matrix effects, is given in Section IV.

The analytical data reported are subject to the following limitations of the analytical methodology:

Metals

Arsenic, selenium and thallium are customarily determined by graphite furnace atomic absorption (GFAA). All mercury determinations are by cold vapor atomic absorption. All other metals are determined using Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP).

All metals nominal reporting limits are statistically determined by analyzing a reagent blank seven times on three non-consecutive days. The standard deviations from each group of analyses are then summed (reporting limit = three times the standard deviation of a blank). The ability to attain the quoted reporting limits is verified each quarter. Reporting limits above nominal values are often reported since sample matrix interferences must be compensated for by dilutions prior to analysis or by the use of Method of Standard Additions. All GFAA reporting limits and results are verified by spike recoveries and represent the lowest attainable for each sample matrix. The metals reporting limits reported should not be viewed as quantitation limits. As recommended by the American Chemical Society Subcommittee on Environmental Analytical Chemistry (Analytical Chemistry 1980, 52, 2242-49), the Limit of Quantitation (LOQ) is equal to ten times the standard deviation of a blank or 3.3 times the reporting limit.

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0617A0.0
Lab ID: 010180-0001-SA Enseco ID: 1081264
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 06 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0617A3.5
Lab ID: 010180-0002-SA Enseco ID: 1081265
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 05 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0617A7.0
Lab ID: 010180-0003-SA Enseco ID: 1081266
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 05 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0613A0.0
Lab ID: 010180-0004-SA Enseco ID: 1081267
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 03 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0613A3.5
Lab ID: 010180-0005-SA Enseco ID: 1081268
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 03 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0613A7.0
Lab ID: 010180-0006-SA Enseco ID: 1081269
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 03 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0613D0.0
Lab ID: 010180-0007-SA Enseco ID: 1081270
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 03 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0611A0.0
Lab ID: 010180-0008-SA Enseco ID: 1081271
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 03 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0611A3.5
Lab ID: 010180-0009-SA Enseco ID: 1081272
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 03 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	5000
Toluene	73000	ug/kg	5000
Ethylbenzene	16000	ug/kg	5000
Xylenes (total)	180000	ug/kg	10000

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0611A7.0
Lab ID: 010180-0010-SA Enseco ID: 1081275
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 03 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	7400	ug/kg	5000
Toluene	84000	ug/kg	5000
Ethylbenzene	17000	ug/kg	5000
Xylenes (total)	140000	ug/kg	10000

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0607A0.0
Lab ID: 010180-0011-SA Enseco ID: 1081282
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 03 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0607A3.5
Lab ID: 010180-0012-SA
Enseco ID: 1081284
Matrix: SOIL
Sampled: 27 JUN 90
Received: 28 JUN 90
Authorized: 29 JUN 90
Prepared: NA
Analyzed: 03 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah
Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0607A7.5
Lab ID: 010180-0013-SA Enseco ID: 1081285
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 05 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0619A0.0
Lab ID: 010180-0014-SA Enseco ID: 1081288
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 03 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	5000
Toluene	ND	ug/kg	5000
Ethylbenzene	ND	ug/kg	5000
Xylenes (total)	180000	ug/kg	10000

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0619A3.5
Lab ID: 010180-0015-SA Enseco ID: 1081290
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 05 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0619A7.0
Lab ID: 010180-0016-SA Enseco ID: 1081291
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 05 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	160	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	73	ug/kg	50
Xylenes (total)	190	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0615A0.0
Lab ID: 010180-0017-SA Enseco ID: 1081292
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 03 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0615A3.5
Lab ID: 010180-0018-SA Enseco ID: 1081294
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 03 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0615A7.0
Lab ID: 010180-0019-SA Enseco ID: 1081296
Matrix: SOIL Sampled: 27 JUN 90 Received: 28 JUN 90
Authorized: 29 JUN 90 Prepared: NA Analyzed: 03 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Greg Gustina

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0617A0.0
Lab ID: 010180-0001-SA
Enseco ID: 1081264
Matrix: SOIL
Sampled: 27 JUN 90
Received: 28 JUN 90
Authorized: 29 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/kg	25.0	6010	23 JUL 90	24 JUL 90
Nickel	ND	mg/kg	20.0	6010	23 JUL 90	24 JUL 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: RFIC617A3.5
Lab ID: 010180-0002-SA
Matrix: SOIL
Authorized: 29 JUN 90

Enseco ID: 1081265
Sampled: 27 JUN 90
Prepared: See Below

Received: 28 JUN 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/kg	10.0	6010	23 JUL 90	24 JUL 90
Nickel	ND	mg/kg	8.0	6010	23 JUL 90	24 JUL 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: RFI0617A7.0
Lab ID: 010180-0003-SA
Enseco ID: 1081266
Matrix: SOIL
Sampled: 27 JUN 90
Received: 28 JUN 90
Authorized: 29 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/kg	20.0	6010	23 JUL 90	24 JUL 90
Nickel	ND	mg/kg	16.0	6010	23 JUL 90	24 JUL 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: RFI0613A0.0
Lab ID: 010180-0004-SA
Matrix: SOIL
Authorized: 29 JUN 90
Enseco ID: 1081267
Sampled: 27 JUN 90
Received: 28 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/kg	10.0	6010	23 JUL 90	24 JUL 90
Nickel	ND	mg/kg	8.0	6010	23 JUL 90	24 JUL 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: RFI0613A3.5
Lab ID: 010180-0005-SA
Matrix: SOIL
Authorized: 29 JUN 90

Enseco ID: 1081268
Sampled: 27 JUN 90
Prepared: See Below

Received: 28 JUN 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/kg	10.0	6010	23 JUL 90	24 JUL 90
Nickel	ND	mg/kg	8.0	6010	23 JUL 90	24 JUL 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: RFI0613A7.0
Lab ID: 010180-0006-SA
Matrix: SOIL
Authorized: 29 JUN 90

Enseco ID: 1081269
Sampled: 27 JUN 90
Prepared: See Below

Received: 28 JUN 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	5.2	mg/kg	5.0	6010	23 JUL 90	24 JUL 90
Nickel	ND	mg/kg	4.0	6010	23 JUL 90	24 JUL 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: RFI0613D0.0
Lab ID: 010180-0007-SA
Enseco ID: 1081270
Matrix: SOIL
Sampled: 27 JUN 90
Received: 28 JUN 90
Authorized: 29 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/kg	10.0	6010	23 JUL 90	24 JUL 90
Nickel	ND	mg/kg	8.0	6010	23 JUL 90	24 JUL 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: RFI0611A0.0
Lab ID: 010180-0008-SA
Enseco ID: 1081271
Matrix: SOIL
Sampled: 27 JUN 90
Received: 28 JUN 90
Authorized: 29 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	44.6	mg/kg	10.0	6010	23 JUL 90	24 JUL 90
Nickel	ND	mg/kg	8.0	6010	23 JUL 90	24 JUL 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: RFI0611A3.5
Lab ID: 010180-0009-SA
Matrix: SOIL
Authorized: 29 JUN 90

Enseco ID: 1081272
Sampled: 27 JUN 90
Prepared: See Below

Received: 28 JUN 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	21.4	mg/kg	5.0	6010	23 JUL 90	24 JUL 90
Nickel	6.2	mg/kg	4.0	6010	23 JUL 90	24 JUL 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: RFI0611A7.0
Lab ID: 010180-0010-SA
Enseco ID: 1081275
Matrix: SOIL
Sampled: 27 JUN 90
Received: 28 JUN 90
Authorized: 29 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	23.9	mg/kg	5.0	6010	23 JUL 90	24 JUL 90
Nickel	5.5	mg/kg	4.0	6010	23 JUL 90	24 JUL 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: RFI0607A0.0
Lab ID: 010180-0011-SA
Matrix: SOIL
Authorized: 29 JUN 90

Enseco ID: 1081282
Sampled: 27 JUN 90
Prepared: See Below

Received: 28 JUN 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/kg	10.0	6010	23 JUL 90	24 JUL 90
Nickel	ND	mg/kg	8.0	6010	23 JUL 90	24 JUL 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: RFI0607A3.5
Lab ID: 010180-0012-SA
Enseco ID: 1081284
Matrix: SOIL
Sampled: 27 JUN 90
Received: 28 JUN 90
Authorized: 29 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/kg	15.0	6010	23 JUL 90	24 JUL 90
Nickel	ND	mg/kg	12.0	6010	23 JUL 90	24 JUL 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: RFI0607A7.5
Lab ID: 010180-0013-SA
Enseco ID: 1081285
Matrix: SOIL
Sampled: 27 JUN 90
Received: 28 JUN 90
Authorized: 29 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	7.0	mg/kg	5.0	6010	23 JUL 90	24 JUL 90
Nickel	6.0	mg/kg	4.0	6010	23 JUL 90	24 JUL 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: RFI0619A0.0
Lab ID: 010180-0014-SA
Enseco ID: 1081288
Matrix: SOIL
Sampled: 27 JUN 90
Received: 28 JUN 90
Authorized: 29 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	19.1	mg/kg	5.0	6010	23 JUL 90	24 JUL 90
Nickel	9.6	mg/kg	4.0	6010	23 JUL 90	24 JUL 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: RFI0619A3.5
Lab ID: 010180-0015-SA
Enseco ID: 1081290
Matrix: SOIL
Sampled: 27 JUN 90
Received: 28 JUN 90
Authorized: 29 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/kg	15.0	6010	23 JUL 90	24 JUL 90
Nickel	ND	mg/kg	12.0	6010	23 JUL 90	24 JUL 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: RFI0619A7.0
Lab ID: 010180-0016-SA
Enseco ID: 1081291
Matrix: SOIL
Sampled: 27 JUN 90
Received: 28 JUN 90
Authorized: 29 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	8.0	mg/kg	5.0	6010	23 JUL 90	24 JUL 90
Nickel	7.1	mg/kg	4.0	6010	23 JUL 90	24 JUL 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: RFI0615A0.0
Lab ID: 010180-0017-SA
Enseco ID: 1081292
Matrix: SOIL
Sampled: 27 JUN 90
Received: 28 JUN 90
Authorized: 29 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	17.0	mg/kg	15.0	6010	23 JUL 90	24 JUL 90
Nickel	ND	mg/kg	12.0	6010	23 JUL 90	24 JUL 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: RFI0615A3.5
Lab ID: 010180-0018-SA
Matrix: SOIL
Authorized: 29 JUN 90

Enseco ID: 1081294
Sampled: 27 JUN 90
Prepared: See Below

Received: 28 JUN 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	6.7	mg/kg	5.0	6010	23 JUL 90	24 JUL 90
Nickel	6.1	mg/kg	4.0	6010	23 JUL 90	24 JUL 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: RFI0615A7.0
Lab ID: 010180-0019-SA
Matrix: SOIL
Authorized: 29 JUN 90

Enseco ID: 1081296
Sampled: 27 JUN 90
Prepared: See Below

Received: 28 JUN 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/kg	25.0	6010	23 JUL 90	24 JUL 90
Nickel	ND	mg/kg	20.0	6010	23 JUL 90	24 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Roxanne Sullivan

IV. QUALITY CONTROL REPORT

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 surrogate compounds appropriate to the method being used. In cases where no surrogate is available, (e.g., metals or conventional analyses) a single DCS serves as the control sample. An SCS is prepared for each sample lot for which the DCS pair are not analyzed. The recovery of the SCS is charted in exactly the same manner as described for the DCS, and provides a daily check on the performance of the method.

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).

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

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.

Enseco
A CORNING Company

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
010180-0001-SA	SOIL	8020-S	06 JUL 90-L	06 JUL 90-L
010180-0002-SA	SOIL	8020-S	05 JUL 90-L	05 JUL 90-L
010180-0003-SA	SOIL	8020-S	05 JUL 90-L	05 JUL 90-L
010180-0004-SA	SOIL	8020-S	03 JUL 90-L	03 JUL 90-L
010180-0005-SA	SOIL	8020-S	03 JUL 90-L	03 JUL 90-L
010180-0006-SA	SOIL	8020-S	03 JUL 90-L	03 JUL 90-L
010180-0007-SA	SOIL	8020-S	03 JUL 90-L	03 JUL 90-L
010180-0008-SA	SOIL	8020-S	03 JUL 90-L	03 JUL 90-L
010180-0009-SA	SOIL	8020-S	03 JUL 90-P	03 JUL 90-P
010180-0010-SA	SOIL	8020-S	03 JUL 90-P	03 JUL 90-P
010180-0011-SA	SOIL	8020-S	03 JUL 90-L	03 JUL 90-L
010180-0012-SA	SOIL	8020-S	03 JUL 90-L	03 JUL 90-L
010180-0013-SA	SOIL	8020-S	05 JUL 90-L	05 JUL 90-L
010180-0014-SA	SOIL	8020-S	03 JUL 90-P	03 JUL 90-P
010180-0015-SA	SOIL	8020-S	05 JUL 90-L	05 JUL 90-L
010180-0016-SA	SOIL	8020-S	05 JUL 90-L	05 JUL 90-L
010180-0017-SA	SOIL	8020-S	03 JUL 90-L	03 JUL 90-L
010180-0018-SA	SOIL	8020-S	03 JUL 90-L	03 JUL 90-L
010180-0019-SA	SOIL	8020-S	03 JUL 90-L	03 JUL 90-L

Enseco
A CORNING Company

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: 8020-S Matrix: SOIL QC Lot: 06 JUL 90-L Concentration Units: ug/kg								
Benzene	500	523	526	524	105	75-125	0.6	15
Toluene	500	511	513	512	102	75-125	0.4	15
Ethylbenzene	500	552	551	552	110	75-125	0.2	15
Xylenes (total)	500	550	566	558	112	75-125	2.9	15
1,3-Dichlorobenzene	500	533	542	538	108	75-125	1.7	15
Category: 8020-S Matrix: SOIL QC Lot: 05 JUL 90-L Concentration Units: ug/kg								
Benzene	500	546	538	542	108	75-125	1.5	15
Toluene	500	568	561	564	113	75-125	1.2	15
Ethylbenzene	500	568	555	562	112	75-125	2.3	15
Xylenes (total)	500	572	560	566	113	75-125	2.1	15
1,3-Dichlorobenzene	500	561	541	551	110	75-125	3.6	15
Category: 8020-S Matrix: SOIL QC Lot: 03 JUL 90-L Concentration Units: ug/kg								
Benzene	500	553	553	553	111	75-125	0.0	15
Toluene	500	572	553	562	113	75-125	3.4	15
Ethylbenzene	500	566	574	570	114	75-125	1.4	15
Xylenes (total)	500	567	562	564	113	75-125	0.9	15
1,3-Dichlorobenzene	500	553	541	547	109	75-125	2.2	15
Category: 8020-S Matrix: SOIL QC Lot: 03 JUL 90-P Concentration Units: ug/kg								
Benzene	500	581	578	580	116	75-125	0.5	15
Toluene	500	538	536	537	107	75-125	0.4	15
Ethylbenzene	500	546	539	542	109	75-125	1.3	15
Xylenes (total)	500	532	530	531	106	75-125	0.4	15

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

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

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: 8020-S Matrix: SOIL QC Lot: 03 JUL 90-P Concentration Units: ug/kg								
1,3-Dichlorobenzene	500	519	536	528	106	75-125	3.2	15

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

Enseco
A CORNING Company

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC

Analyte	Concentration Spiked	Measured	Accuracy(%) SCS	Limits
Category: 8020-S Matrix: SOIL QC Lot: 06 JUL 90-L QC Run: 06 JUL 90-L Concentration Units: ug/kg				
a,a,a-Trifluorotoluene	500	485	97	20-160
Category: 8020-S Matrix: SOIL QC Lot: 05 JUL 90-L QC Run: 05 JUL 90-L Concentration Units: ug/kg				
a,a,a-Trifluorotoluene	500	483	97	20-160
Category: 8020-S Matrix: SOIL QC Lot: 03 JUL 90-L QC Run: 03 JUL 90-L Concentration Units: ug/kg				
a,a,a-Trifluorotoluene	500	487	97	20-160
Category: 8020-S Matrix: SOIL QC Lot: 03 JUL 90-P QC Run: 03 JUL 90-P Concentration Units: ug/kg				
a,a,a-Trifluorotoluene	3000	3030	101	20-160

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

Enseco
A CORNING Company

METHOD BLANK REPORT
Volatile Organics by GC

Analyte	Result	Units	Reporting Limit
Test: 8020-BTEX-S Matrix: SOIL QC Lot: 06 JUL 90-L QC Run: 06 JUL 90-L			
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100
Test: 8020-BTEX-S Matrix: SOIL QC Lot: 05 JUL 90-L QC Run: 05 JUL 90-L			
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100
Test: 8020-BTEX-S Matrix: SOIL QC Lot: 03 JUL 90-L QC Run: 03 JUL 90-L			
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100
Test: 8020-BTEX-S Matrix: SOIL QC Lot: 03 JUL 90-P QC Run: 03 JUL 90-P			
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

Enseco
A CORNING Company

QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
010180-0001-SA	SOIL	ICP-S	20 JUL 90-G	20 JUL 90-G
010180-0002-SA	SOIL	ICP-S	20 JUL 90-G	20 JUL 90-G
010180-0003-SA	SOIL	ICP-S	20 JUL 90-G	20 JUL 90-G
010180-0004-SA	SOIL	ICP-S	20 JUL 90-G	20 JUL 90-G
010180-0005-SA	SOIL	ICP-S	20 JUL 90-G	20 JUL 90-G
010180-0006-SA	SOIL	ICP-S	20 JUL 90-G	20 JUL 90-G
010180-0007-SA	SOIL	ICP-S	20 JUL 90-G	20 JUL 90-G
010180-0008-SA	SOIL	ICP-S	20 JUL 90-G	20 JUL 90-G
010180-0009-SA	SOIL	ICP-S	20 JUL 90-G	20 JUL 90-G
010180-0010-SA	SOIL	ICP-S	20 JUL 90-G	20 JUL 90-G
010180-0011-SA	SOIL	ICP-S	20 JUL 90-G	20 JUL 90-G
010180-0012-SA	SOIL	ICP-S	20 JUL 90-G	20 JUL 90-G
010180-0013-SA	SOIL	ICP-S	20 JUL 90-G	20 JUL 90-G
010180-0014-SA	SOIL	ICP-S	20 JUL 90-G	20 JUL 90-G
010180-0015-SA	SOIL	ICP-S	20 JUL 90-G	20 JUL 90-G
010180-0016-SA	SOIL	ICP-S	20 JUL 90-G	20 JUL 90-G
010180-0017-SA	SOIL	ICP-S	20 JUL 90-G	20 JUL 90-G
010180-0018-SA	SOIL	ICP-S	20 JUL 90-G	20 JUL 90-G
010180-0019-SA	SOIL	ICP-S	20 JUL 90-G	20 JUL 90-G

Enseco
A CORNING Company

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: ICP-S								
Matrix: SOIL								
QC Lot: 20 JUL 90-G								
Concentration Units: mg/kg								
Aluminum	200	186	190	188	94	75-125	2.0	20
Antimony	50	44.3	44.7	44.5	89	75-125	0.9	20
Arsenic	50	41.3	42.2	41.7	83	75-125	2.3	20
Barium	200	169	173	171	85	75-125	2.4	20
Beryllium	5.0	4.73	4.81	4.77	95	75-125	1.7	20
Cadmium	5.0	3.90	4.26	4.08	82	75-125	8.9	20
Calcium	10000	9610	9660	9640	96	75-125	0.6	20
Chromium	20	19.1	18.7	18.9	95	75-125	1.8	20
Cobalt	50	41.8	42.6	42.2	84	75-125	2.0	20
Copper	25	22.3	22.4	22.4	89	75-125	0.7	20
Iron	100	92.3	92.7	92.5	93	75-125	0.5	20
Lead	50	41.2	41.5	41.4	83	75-125	0.6	20
Magnesium	5000	4880	4930	4900	98	75-125	0.9	20
Manganese	50	43.4	43.7	43.5	87	75-125	0.6	20
Nickel	50	42.6	43.0	42.8	86	75-125	1.0	20
Potassium	5000	4580	4610	4600	92	75-125	0.7	20
Silver	5.0	4.98	4.98	4.98	100	75-125	0.0	20
Sodium	10000	9020	9090	9050	91	75-125	0.8	20
Vanadium	50	46.8	47.7	47.3	95	75-125	1.9	20
Zinc	50	40.8	41.2	41.0	82	75-125	1.1	20

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

Enseco
A CORNING Company

METHOD BLANK REPORT
Metals Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: ICP-S			
Matrix: SOIL			
QC Lot: 20 JUL 90-G QC Run: 20 JUL 90-G			
Lead	ND	mg/kg	5.0
Nickel	ND	mg/kg	4.0

Enseco - Rocky Mountain Analytical

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

Attn: Julie Essex

CHAIN OF CUSTODY

No.

Enseco Client: Giant Refinery
Project: RFI
Sampling Co.: Rodgers + Co
Sampling Site: Cis 129
Team Leader: Claud Rosendale

Rmc # 10180

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: C Rosendale
5. Initial Contents Temp.: — °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	Analysis Parameters	Remarks
01	6-27-90	1010	RFI 0617A 0.0	01	Soil	2	BTEX Lead Nickel	
02	6-27-90	1020	RFI 0617A 3.5	02	Soil	2	BTEX Lead Nickel	
03	6-27-90	1025	RFI 0617A 7.0	03	Soil	2	BTEX Lead Nickel	
04	6-27-90	1110	RFI 0613A 0.0	04	Soil	2	BTEX Lead Nickel	
05	6-27-90	1120	RFI 0613A 3.5	05	Soil	2	BTEX Lead Nickel	
06	6-27-90	1125	RFI 0613A 7.0	06	Soil	2	BTEX Lead Nickel	
07	6-27-90	1115	RFI 0613D 0.0	07	Soil	2	BTEX Lead Nickel	
08	6-27-90	1215	RFI 0611A 0.0	08	Soil	2	BTEX Lead Nickel	
09	6-27-90	1225	RFI 0611A 3.5	09	Soil	2	BTEX Lead Nickel	
10	6-27-90	1230	RFI 0611A 7.0	10	Soil	2	BTEX Lead Nickel	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	Claud Rosendale		6-27-90	2:45 pm
2				

SHIPPING DETAILS

Delivered to Shipper by: C Rosendale
Method of Shipment: Fed Express Airbill #
Received for Lab: RMAC Signed: Jenny A. Myers Date/Time 6/28/90 0900
Enseco Project No.

White and Pink Copies to Lab Yellow to Sampler

SS-001

Enseco - Rocky Mountain Analytical

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

Attn: Julie Essex

CHAIN OF CUSTODY

No.

Enseco Client: Giant Refinery
Project: RFI
Sampling Co.: Rodgers & Co
Sampling Site: Ciniza 9
Team Leader: Claud Rosendale

Rmatt 10180

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: C Rosendale
5. Initial Contents Temp.: _____ °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	Analysis Parameters	Remarks
11	6-27-90	0630	RFI 0607A 0.0	11	Soil	2	BTEX Lead Nickel	
12	6-27-90	0645	RFI 0607A 3.5	12	Soil	2	BTEX Lead Nickel	
13	6-27-90	0650	RFI 0607A 7.5	13	Soil	2	BTEX Lead Nickel	
14	6-27-90	0800	RFI 0619A 0.0	14	Soil	2	BTEX Lead Nickel	
15	6-27-90	0805	RFI 0619A 3.5	15	Soil	2	BTEX Lead Nickel	
16	6-27-90	0810	RFI 0619A 7.0	16	Soil	2	BTEX Lead Nickel	
17	6-27-90	0850	RFI 0615A 0.0	17	Soil	2	BTEX Lead Nickel	
18	6-27-90	0910	RFI 0615A 3.5	18	Soil	2	BTEX Lead Nickel	
19	6-27-90	0910	RFI 0615A 7.0	19	Soil	2	BTEX Lead Nickel	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	Claud Rosendale	_____	6-27-90	2:45 pm
2	_____	_____	_____	_____
3	_____	_____	_____	_____

SHIPPING DETAILS

Delivered to Shipper by: C Rosendale
Method of Shipment: Fed Express Airbill # _____
Received for Lab: RMAL Signed: Joseph A Myers Date/Time 6/28/90 0800
Enseco Project No. _____

White and Pink Copies to Lab Yellow to Sampler

SS-001

Section 9.1.3
RMAL No. 010231

Rocky Mountain
Analytical Laboratory

Enseco

ANALYTICAL RESULTS

FOR

GIANT REFINING

ENSECO-RMAL NO. 010231

JULY 28, 1990

Reviewed by: Julie Essey

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

II. SAMPLE DESCRIPTION INFORMATION/ANALYTICAL TEST REQUESTS

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.

I. OVERVIEW

On July 2, 1990, Enseco-Rocky Mountain Analytical Laboratory received 15 soil samples from Giant Refining.

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:

I. Overview
II. Sample Description Information/Analytical Test Requests
III. Analytical Results
IV. 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 avoid saturation of the detector, to achieve linearity for a specific target compound or to reduce matrix interferences. In this event, reporting limits are adjusted proportionately. Surrogate compounds may not be measurable in samples which have been diluted.

For this project, samples 010231-0001, through -0010, and -0015 by Method 8020 were diluted due to elevated concentrations of target and/or non-target compounds. Likewise, several samples by Method 6010 were diluted; however, these dilutions were due to concentrations of non-target analyte in the samples. The samples by Method 6010 which were diluted are 010231-0001, -0007, -0008, -0010, -0012, -0013, -0014, and -0015. In all cases, the reporting limits were raised proportionately.

Enseco
A CORNING Company

SAMPLE DESCRIPTION INFORMATION
for
Giant Refining

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
010231-0001-SA	RFI 0612V0.0	SOIL	29 JUN 90	09:35	02 JUL 90
010231-0002-SA	RFI 0612V3.5	SOIL	29 JUN 90	09:38	02 JUL 90
010231-0003-SA	RFI 0612V7.0	SOIL	29 JUN 90	09:58	02 JUL 90
010231-0004-SA	RFI 0614V0.0	SOIL	29 JUN 90	10:04	02 JUL 90
010231-0005-SA	RFI 0614V3.5	SOIL	29 JUN 90	10:23	02 JUL 90
010231-0006-SA	RFI 0614V7.0	SOIL	29 JUN 90	10:33	02 JUL 90
010231-0007-SA	RFI 0606V0.0	SOIL	29 JUN 90	11:43	02 JUL 90
010231-0008-SA	RFI 0606V3.5	SOIL	29 JUN 90	11:50	02 JUL 90
010231-0009-SA	RFI 0606V7.0	SOIL	29 JUN 90	12:03	02 JUL 90
010231-0010-SA	RFI 0602V0.0	SOIL	29 JUN 90	12:14	02 JUL 90
010231-0011-SA	RFI 0602V.35	SOIL	29 JUN 90	12:27	02 JUL 90
010231-0012-SA	RFI 0602V7.0	SOIL	29 JUN 90	13:00	02 JUL 90
010231-0013-SA	RFI 0604V0.0	SOIL	29 JUN 90	13:11	02 JUL 90
010231-0014-SA	RFI 0604V3.5	SOIL	29 JUN 90	13:15	02 JUL 90
010231-0015-SA	RFI 0604V7.0	SOIL	29 JUN 90	13:28	02 JUL 90

Enseco
A CORNING Company

ANALYTICAL TEST REQUESTS
for
Giant Refining

Lab ID: 010231	Group Code	Analysis Description	Custom Test?
0001 - 0015	A	Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)	N
		ICP Suite (Standard List)	Y
		Prep - Total Metals, ICP	N

III. 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. The date prepared is typically the date an extraction or digestion was initiated. For volatile organic compounds in water, the date prepared is the date the screening of the sample was performed.

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.

In addition, surrogate recovery data is presented for all GC/MS analyses. The surrogate recovery is an indication of the affect of the sample matrix on the performance of the method. The results from the Standard Enseco QA/QC Program, which generates data which are independent of matrix effects, is given in Section IV.

The analytical data reported are subject to the following limitations of the analytical methodology:

Metals

Arsenic, selenium and thallium are customarily determined by graphite furnace atomic absorption (GFAA). All mercury determinations are by cold vapor atomic absorption. All other metals are determined using Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP).

All metals nominal reporting limits are statistically determined by analyzing a reagent blank seven times on three non-consecutive days. The standard deviations from each group of analyses are then summed (reporting limit = three times the standard deviation of a blank). The ability to attain the quoted reporting limits is verified each quarter. Reporting limits above nominal values are often reported since sample matrix interferences must be compensated for by dilutions prior to analysis or by the use of Method of Standard Additions. All GFAA reporting limits and results are verified by spike recoveries and represent the lowest attainable for each sample matrix. The metals reporting limits reported should not be viewed as quantitation limits. As recommended by the American Chemical Society Subcommittee on Environmental Analytical Chemistry (Analytical Chemistry 1980, 52, 2242-49), the Limit of Quantitation (LOQ) is equal to ten times the standard deviation of a blank or 3.3 times the reporting limit.

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI 0612V0.0
Lab ID: 010231-0001-SA Enseco ID: 1081760
Matrix: SOIL Sampled: 29 JUN 90 Received: 02 JUL 90
Authorized: 02 JUL 90 Prepared: NA Analyzed: 09 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	250
Toluene	1700	ug/kg	250
Ethylbenzene	280	ug/kg	250
Xylenes (total)	2900	ug/kg	500

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI 0612V3.5
Lab ID: 010231-0002-SA Enseco ID: 1081761
Matrix: SOIL Sampled: 29 JUN 90 Received: 02 JUL 90
Authorized: 02 JUL 90 Prepared: NA Analyzed: 10 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	17000	ug/kg	10000
Toluene	500000	ug/kg	10000
Ethylbenzene	150000	ug/kg	10000
Xylenes (total)	1000000	ug/kg	20000

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI 0612V7.0
Lab ID: 010231-0003-SA Enseco ID: 1081762
Matrix: SOIL Sampled: 29 JUN 90 Received: 02 JUL 90
Authorized: 02 JUL 90 Prepared: NA Analyzed: 09 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	2500
Toluene	46000	ug/kg	2500
Ethylbenzene	14000	ug/kg	2500
Xylenes (total)	100000	ug/kg	5000

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI 0614V0.0
Lab ID: 010231-0004-SA Enseco ID: 1081763
Matrix: SOIL Sampled: 29 JUN 90 Received: 02 JUL 90
Authorized: 02 JUL 90 Prepared: NA Analyzed: 06 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	100
Toluene	1000	ug/kg	100
Ethylbenzene	ND	ug/kg	100
Xylenes (total)	580	ug/kg	200

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI 0614V3.5
Lab ID: 010231-0005-SA Enseco ID: 1081764
Matrix: SOIL Sampled: 29 JUN 90 Received: 02 JUL 90
Authorized: 02 JUL 90 Prepared: NA Analyzed: 09 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	1000
Toluene	ND	ug/kg	1000
Ethylbenzene	ND	ug/kg	1000
Xylenes (total)	28000	ug/kg	2000

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI 0614V7.0
Lab ID: 010231-0006-SA Enseco ID: 1081765
Matrix: SOIL Sampled: 29 JUN 90 Received: 02 JUL 90
Authorized: 02 JUL 90 Prepared: NA Analyzed: 09 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	5000
Toluene	75000	ug/kg	5000
Ethylbenzene	55000	ug/kg	5000
Xylenes (total)	330000	ug/kg	10000

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI 0606V0.0
Lab ID: 010231-0007-SA Enseco ID: 1081766
Matrix: SOIL Sampled: 29 JUN 90 Received: 02 JUL 90
Authorized: 02 JUL 90 Prepared: NA Analyzed: 09 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	150	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	220	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI 0606V3.5
Lab ID: 010231-0008-SA
Enseco ID: 1081767
Matrix: SOIL
Sampled: 29 JUN 90
Received: 02 JUL 90
Authorized: 02 JUL 90
Prepared: NA
Analyzed: 09 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	250
Toluene	1200	ug/kg	250
Ethylbenzene	ND	ug/kg	250
Xylenes (total)	6400	ug/kg	500

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah
Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI 0606V7.0
Lab ID: 010231-0009-SA Enseco ID: 1081768
Matrix: SOIL Sampled: 29 JUN 90 Received: 02 JUL 90
Authorized: 02 JUL 90 Prepared: NA Analyzed: 09 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	1000
Toluene	4600	ug/kg	1000
Ethylbenzene	6500	ug/kg	1000
Xylenes (total)	43000	ug/kg	2000

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI 0602V0.0
Lab ID: 010231-0010-SA Enseco ID: 1081769
Matrix: SOIL Sampled: 29 JUN 90 Received: 02 JUL 90
Authorized: 02 JUL 90 Prepared: NA Analyzed: 06 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI 0602V.35
Lab ID: 010231-0011-SA Enseco ID: 1081770
Matrix: SOIL Sampled: 29 JUN 90 Received: 02 JUL 90
Authorized: 02 JUL 90 Prepared: NA Analyzed: 06 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI 0602V7.0
Lab ID: 010231-0012-SA Enseco ID: 1081771
Matrix: SOIL Sampled: 29 JUN 90 Received: 02 JUL 90
Authorized: 02 JUL 90 Prepared: NA Analyzed: 06 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI 0604V0.0
Lab ID: 010231-0013-SA Enseco ID: 1081772
Matrix: SOIL Sampled: 29 JUN 90 Received: 02 JUL 90
Authorized: 02 JUL 90 Prepared: NA Analyzed: 06 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI 0604V3.5
Lab ID: 010231-0014-SA Enseco ID: 1081773
Matrix: SOIL Sampled: 29 JUN 90 Received: 02 JUL 90
Authorized: 02 JUL 90 Prepared: NA Analyzed: 06 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI 0604V7.0
Lab ID: 010231-0015-SA Enseco ID: 1081774
Matrix: SOIL Sampled: 29 JUN 90 Received: 02 JUL 90
Authorized: 02 JUL 90 Prepared: NA Analyzed: 06 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	500
Toluene	760	ug/kg	500
Ethylbenzene	ND	ug/kg	500
Xylenes (total)	1700	ug/kg	1000

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Client Name: Giant Refining
Client ID: RFI 0612V0.0
Lab ID: 010231-0001-SA
Enseco ID: 1081760
Matrix: SOIL
Sampled: 29 JUN 90
Received: 02 JUL 90
Authorized: 02 JUL 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	736	mg/kg	10.0	6010	24 JUL 90	26 JUL 90
Nickel	41.3	mg/kg	8.0	6010	24 JUL 90	26 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones
Approved By: Will Pratt

Enseco
A CORNING Company

Client Name: Giant Refining
Client ID: RFI 0612V3.5
Lab ID: 010231-0002-SA
Matrix: SOIL
Authorized: 02 JUL 90

Enseco ID: 1081761
Sampled: 29 JUN 90
Prepared: See Below

Received: 02 JUL 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	11.0	mg/kg	5.0	6010	24 JUL 90	26 JUL 90
Nickel	4.4	mg/kg	4.0	6010	24 JUL 90	26 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Will Pratt

Enseco
A CORNING Company

Client Name: Giant Refining
Client ID: RFI 0612V7.0
Lab ID: 010231-0003-SA Enseco ID: 1081762
Matrix: SOIL Sampled: 29 JUN 90 Received: 02 JUL 90
Authorized: 02 JUL 90 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	9.4	mg/kg	5.0	6010	24 JUL 90	26 JUL 90
Nickel	ND	mg/kg	4.0	6010	24 JUL 90	26 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones Approved By: Will Pratt

Enseco
A CORNING Company

Client Name: Giant Refining
Client ID: RFI 0614V0.0
Lab ID: 010231-0004-SA
Enseco ID: 1081763
Matrix: SOIL
Sampled: 29 JUN 90
Received: 02 JUL 90
Authorized: 02 JUL 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	57.4	mg/kg	5.0	6010	24 JUL 90	26 JUL 90
Nickel	10.3	mg/kg	4.0	6010	24 JUL 90	26 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones
Approved By: Will Pratt

Enseco
A CORNING Company

Client Name: Giant Refining
Client ID: RFI 0614V3.5
Lab ID: 010231-0005-SA
Enseco ID: 1081764
Matrix: SOIL
Sampled: 29 JUN 90
Received: 02 JUL 90
Authorized: 02 JUL 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	9.0	mg/kg	5.0	6010	24 JUL 90	26 JUL 90
Nickel	5.0	mg/kg	4.0	6010	24 JUL 90	26 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones
Approved By: Will Pratt

Enseco
A CORNING Company

Client Name: Giant Refining
Client ID: RFI 0614V7.0
Lab ID: 010231-0006-SA
Matrix: SOIL
Authorized: 02 JUL 90

Enseco ID: 1081765
Sampled: 29 JUN 90
Prepared: See Below

Received: 02 JUL 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	12.0	mg/kg	5.0	6010	24 JUL 90	26 JUL 90
Nickel	7.3	mg/kg	4.0	6010	24 JUL 90	26 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Will Pratt

Enseco
A CORNING Company

Client Name: Giant Refining
Client ID: RFI 0606V0.0
Lab ID: 010231-0007-SA
Matrix: SOIL
Authorized: 02 JUL 90

Enseco ID: 1081766
Sampled: 29 JUN 90
Prepared: See Below

Received: 02 JUL 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	28.5	mg/kg	10.0	6010	24 JUL 90	26 JUL 90
Nickel	ND	mg/kg	8.0	6010	24 JUL 90	26 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Will Pratt

Enseco
A CORNING Company

Client Name: Giant Refining
Client ID: RFI 0606V3.5
Lab ID: 010231-0008-SA
Enseco ID: 1081767
Matrix: SOIL
Sampled: 29 JUN 90
Received: 02 JUL 90
Authorized: 02 JUL 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/kg	10.0	6010	24 JUL 90	26 JUL 90
Nickel	ND	mg/kg	8.0	6010	24 JUL 90	26 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones
Approved By: Will Pratt

Enseco
A CORNING Company

Client Name: Giant Refining
Client ID: RFI 0606V7.0
Lab ID: 010231-0009-SA Enseco ID: 1081768
Matrix: SOIL Sampled: 29 JUN 90 Received: 02 JUL 90
Authorized: 02 JUL 90 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	7.0	mg/kg	5.0	6010	24 JUL 90	26 JUL 90
Nickel	ND	mg/kg	4.0	6010	24 JUL 90	26 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones Approved By: Will Pratt

Enseco
A CORNING Company

Client Name: Giant Refining
Client ID: RFI 0602V0.0
Lab ID: 010231-0010-SA
Enseco ID: 1081769
Matrix: SOIL
Sampled: 29 JUN 90
Received: 02 JUL 90
Authorized: 02 JUL 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/kg	15.0	6010	24 JUL 90	26 JUL 90
Nickel	ND	mg/kg	12.0	6010	24 JUL 90	26 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones
Approved By: Will Pratt

Enseco
A CORNING Company

Client Name: Giant Refining
Client ID: RFI 0602V.35
Lab ID: 010231-0011-SA Enseco ID: 1081770
Matrix: SOIL Sampled: 29 JUN 90 Received: 02 JUL 90
Authorized: 02 JUL 90 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	9.5	mg/kg	5.0	6010	24 JUL 90	26 JUL 90
Nickel	4.6	mg/kg	4.0	6010	24 JUL 90	26 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones Approved By: Will Pratt

Enseco
A CORNING Company

Client Name: Giant Refining
Client ID: RFI 0602V7.0
Lab ID: 010231-0012-SA Enseco ID: 1081771
Matrix: SOIL Sampled: 29 JUN 90 Received: 02 JUL 90
Authorized: 02 JUL 90 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/kg	20.0	6010	24 JUL 90	26 JUL 90
Nickel	ND	mg/kg	16.0	6010	24 JUL 90	26 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones Approved By: Will Pratt

Enseco
A CORNING Company

Client Name: Giant Refining
Client ID: RFI 0604V0.0
Lab ID: 010231-0013-SA
Enseco ID: 1081772
Matrix: SOIL
Sampled: 29 JUN 90
Received: 02 JUL 90
Authorized: 02 JUL 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/kg	15.0	6010	24 JUL 90	26 JUL 90
Nickel	ND	mg/kg	12.0	6010	24 JUL 90	26 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones
Approved By: Will Pratt

Enseco
A CORNING Company

Client Name: Giant Refining
Client ID: RFI 0604V3.5
Lab ID: 010231-0014-SA
Matrix: SOIL
Authorized: 02 JUL 90

Enseco ID: 1081773
Sampled: 29 JUN 90
Prepared: See Below

Received: 02 JUL 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/kg	10.0	6010	24 JUL 90	26 JUL 90
Nickel	ND	mg/kg	8.0	6010	24 JUL 90	26 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones

Approved By: Will Pratt

Enseco
A CORNING Company

Client Name: Giant Refining
Client ID: RFI 0604V7.0
Lab ID: 010231-0015-SA Enseco ID: 1081774
Matrix: SOIL Sampled: 29 JUN 90 Received: 02 JUL 90
Authorized: 02 JUL 90 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/kg	20.0	6010	24 JUL 90	26 JUL 90
Nickel	ND	mg/kg	16.0	6010	24 JUL 90	26 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Sandra Jones Approved By: Will Pratt

IV. QUALITY CONTROL REPORT

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 surrogate compounds appropriate to the method being used. In cases where no surrogate is available, (e.g., metals or conventional analyses) a single DCS serves as the control sample. An SCS is prepared for each sample lot for which the DCS pair are not analyzed. The recovery of the SCS is charted in exactly the same manner as described for the DCS, and provides a daily check on the performance of the method.

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).

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

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.

Enseco
A CORNING Company

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
010231-0001-SA	SOIL	8020-S	09 JUL 90-L	09 JUL 90-L
010231-0002-SA	SOIL	8020-S	09 JUL 90-L	09 JUL 90-L
010231-0003-SA	SOIL	8020-S	09 JUL 90-L	09 JUL 90-L
010231-0004-SA	SOIL	8020-S	06 JUL 90-L	06 JUL 90-L
010231-0005-SA	SOIL	8020-S	09 JUL 90-L	09 JUL 90-L
010231-0006-SA	SOIL	8020-S	09 JUL 90-L	09 JUL 90-L
010231-0007-SA	SOIL	8020-S	09 JUL 90-L	09 JUL 90-L
010231-0008-SA	SOIL	8020-S	09 JUL 90-L	09 JUL 90-L
010231-0009-SA	SOIL	8020-S	09 JUL 90-L	09 JUL 90-L
010231-0010-SA	SOIL	8020-S	06 JUL 90-L	06 JUL 90-L
010231-0011-SA	SOIL	8020-S	06 JUL 90-L	06 JUL 90-L
010231-0012-SA	SOIL	8020-S	06 JUL 90-L	06 JUL 90-L
010231-0013-SA	SOIL	8020-S	06 JUL 90-L	06 JUL 90-L
010231-0014-SA	SOIL	8020-S	06 JUL 90-L	06 JUL 90-L
010231-0015-SA	SOIL	8020-S	06 JUL 90-L	06 JUL 90-L

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: 8020-S Matrix: SOIL QC Lot: 09 JUL 90-L Concentration Units: ug/kg								
Benzene	500	519	514	516	103	75-125	1.0	15
Toluene	500	514	507	510	102	75-125	1.4	15
Ethylbenzene	500	557	549	553	111	75-125	1.4	15
Xylenes (total)	500	555	553	554	111	75-125	0.4	15
1,3-Dichlorobenzene	500	554	537	546	109	75-125	3.1	15
Category: 8020-S Matrix: SOIL QC Lot: 06 JUL 90-L Concentration Units: ug/kg								
Benzene	500	523	526	524	105	75-125	0.6	15
Toluene	500	511	513	512	102	75-125	0.4	15
Ethylbenzene	500	552	551	552	110	75-125	0.2	15
Xylenes (total)	500	550	566	558	112	75-125	2.9	15
1,3-Dichlorobenzene	500	533	542	538	108	75-125	1.7	15

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

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC

Analyte	Concentration Spiked	Measured	Accuracy(%) SCS	Limits
Category: 8020-S Matrix: SOIL QC Lot: 09 JUL 90-L QC Run: 09 JUL 90-L Concentration Units: ug/kg				
a,a,a-Trifluorotoluene	500	482	96	20-160
Category: 8020-S Matrix: SOIL QC Lot: 06 JUL 90-L QC Run: 06 JUL 90-L Concentration Units: ug/kg				
a,a,a-Trifluorotoluene	500	485	97	20-160

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

Enseco
A CORNING Company

METHOD BLANK REPORT
Volatile Organics by GC

Analyte	Result	Units	Reporting Limit
Test: 8020-BTEX-S Matrix: SOIL QC Lot: 09 JUL 90-L QC Run: 09 JUL 90-L			
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100
Test: 8020-BTEX-S Matrix: SOIL QC Lot: 06 JUL 90-L QC Run: 06 JUL 90-L			
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

Enseco
A CORNING Company

QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
010231-0001-SA	SOIL	ICP-S	24 JUL 90-D	24 JUL 90-D
010231-0002-SA	SOIL	ICP-S	24 JUL 90-D	04 JUL 90-D
010231-0003-SA	SOIL	ICP-S	24 JUL 90-D	04 JUL 90-D
010231-0004-SA	SOIL	ICP-S	24 JUL 90-D	04 JUL 90-D
010231-0005-SA	SOIL	ICP-S	24 JUL 90-D	04 JUL 90-D
010231-0006-SA	SOIL	ICP-S	24 JUL 90-D	04 JUL 90-D
010231-0007-SA	SOIL	ICP-S	24 JUL 90-D	04 JUL 90-D
010231-0008-SA	SOIL	ICP-S	24 JUL 90-D	04 JUL 90-D
010231-0009-SA	SOIL	ICP-S	24 JUL 90-D	04 JUL 90-D
010231-0010-SA	SOIL	ICP-S	24 JUL 90-D	04 JUL 90-D
010231-0011-SA	SOIL	ICP-S	24 JUL 90-D	04 JUL 90-D
010231-0012-SA	SOIL	ICP-S	24 JUL 90-D	04 JUL 90-D
010231-0013-SA	SOIL	ICP-S	24 JUL 90-D	04 JUL 90-D
010231-0014-SA	SOIL	ICP-S	24 JUL 90-D	04 JUL 90-D
010231-0015-SA	SOIL	ICP-S	24 JUL 90-D	04 JUL 90-D

Enseco
A CORNING Company

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: ICP-S								
Matrix: SOIL								
QC Lot: 24 JUL 90-D								
Concentration Units: mg/kg								
Aluminum	200	202	202	202	101	75-125	0.0	20
Antimony	50	47.3	48.0	47.6	95	75-125	1.5	20
Arsenic	50	44.3	44.3	44.3	89	75-125	0.0	20
Barium	200	182	184	183	92	75-125	1.1	20
Beryllium	5.0	5.05	5.02	5.04	101	75-125	0.6	20
Cadmium	5.0	4.28	5.11	4.70	94	75-125	18	20
Calcium	10000	9890	9860	9880	99	75-125	0.3	20
Chromium	20	20.2	20.1	20.2	101	75-125	0.5	20
Cobalt	50	44.1	44.3	44.2	88	75-125	0.4	20
Copper	25	23.5	23.2	23.4	93	75-125	1.3	20
Iron	100	97.5	101	99.2	99	75-125	3.5	20
Lead	50	45.0	44.9	45.0	90	75-125	0.2	20
Magnesium	5000	5080	5060	5070	101	75-125	0.4	20
Manganese	50	45.1	47.8	46.4	93	75-125	5.8	20
Nickel	50	45.1	44.8	45.0	90	75-125	0.7	20
Potassium	5000	5020	5020	5020	100	75-125	0.0	20
Silver	5.0	5.16	5.25	5.20	104	75-125	1.7	20
Sodium	10000	10000	10000	10000	100	75-125	0.0	20
Vanadium	50	50.5	51.0	50.8	102	75-125	1.0	20
Zinc	50	44.5	44.5	44.5	89	75-125	0.0	20

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

Enseco
A CORNING Company

METHOD BLANK REPORT
Metals Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: ICPOCP-ICPS-S Matrix: SOIL QC Lot: 24 JUL 90-D QC Run: 24 JUL 90-D			
Lead	ND	mg/kg	5.0
Nickel	ND	mg/kg	4.0
Test: ICPOCP-ICPS-S Matrix: SOIL QC Lot: 24 JUL 90-D QC Run: 04 JUL 90-D			

Warning *** QI or QH record was not found.

Enseco - Rocky Mountain Analytical

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

Attn: Julie Essex

CHAIN OF CUSTODY

No.

Enseco Client: Giant Refinery
Project: RFE
Sampling Co.: Giant
Sampling Site: Gizzy
Team Leader: C Rosendale

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: C Rosendale
5. Initial Contents Temp.: — °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	Analysis Parameters	Remarks
6-29-90	9:35	RFID612V0.0 01	Soil	2	BTEX, Lead, Nickel	
6-29-90	9:38	RFID612V3.5 02	Soil	2	BTEX, Lead, Nickel	
6-29-90	9:50	RFID612V7.0 03	Soil	2	BTEX, Lead, Nickel	
6-29-90	10:04	RFID614V0.0 04	Soil	2	BTEX, Lead, Nickel	
6-29-90	10:23	RFID614V3.5 05	Soil	2	BTEX, Lead, Nickel	
6-29-90	10:35	RFID614V7.0 06	Soil	2	BTEX, Lead, Nickel	
6-29-90	11:43	RFID606V0.0 07	Soil	2	BTEX, Lead, Nickel	
6-29-90	11:50	RFID606V3.5 08	Soil	2	BTEX, Lead, Nickel	
6-29-90	12:03	RFID606V7.0 09	Soil	2	BTEX, Lead, Nickel	
6-29-90	12:14	RFID602V0.0 10	Soil	2	BTEX, Lead, Nickel	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	Daniel Rosendale		6-29-90	2:00pm
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: C Rosendale
Method of Shipment: Fed Express Airbill #
Received for Lab: RMAL Signed: Bob Ring Date/Time 2 July 90 0800
Enseco Project No. 1023

White and Pink Copies to Lab Yellow to Sampler

SS-001

9.166

Enseco - Rocky Mountain Analytical

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

Attn: Julie Essex

CHAIN OF CUSTODY

No.

Enseco Client: Giant Refinery
Project: RFI
Sampling Co.: Giant
Sampling Site: Cinizo
Team Leader: C Rosendale

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: C Rosendale
5. Initial Contents Temp.: — °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	Analysis Parameters	Remarks
6-29-90	12:27	RFID602V.35 11	Soil	2	BTEX, Lead Nickel	
6-29-90	1:00	RFID602V7.0 12	Soil	2	BTEX, Lead Nickel	
~~6-29-90~~	1:11	RFID604V0.0 13	Soil	2	BTEX, Lead Nickel	
6-29-90	1:15	RFID604V3.5 14	Soil	2	BTEX, Lead Nickel	
6-29-90	1:28	RFID604V7.0 15	Soil	2	BTEX, Lead Nickel	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	Claud Rosendale		6-29-90	2:10pm
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: C. Rosendale
Method of Shipment: Fed Express Airbill #
Received for Lab: RMAL Signed: Bob Reif Date/Time 2 JULY 9 0800
Enseco Project No. 10231

White and Pink Copies to Lab Yellow to Sampler

SS 001

9.167

Section 9.1.4
RMAL No. 010274

Rocky Mountain
Analytical Laboratory

ANALYTICAL RESULTS

FOR

GIANT REFINING

ENSECO-RMAL NO. 010274

AUGUST 2, 1990

Enseco

Reviewed by:

Julie Essey

Sue Dalla

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

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 avoid saturation of the detector, to achieve linearity for a specific target compound or to reduce matrix interferences. In this event, reporting limits are adjusted proportionately. Surrogate compounds may not be measurable in samples which have been diluted.

For this project, samples 010274-0002 and -0009 by Method 8020 were diluted due to elevated concentrations of target and/or non-target compounds. Likewise, several samples by Method 6010 were diluted; however, these dilutions were due to concentrations of calcium in the samples. The samples by Method 6010, which were diluted, are 010274-0001 through -0004 and -0006. In all cases, the reporting limits were raised proportionately.

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.

Enseco
A CORNING Company

SAMPLE DESCRIPTION INFORMATION
for
Giant Refining

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
010274-0001-SA	RFI0605A0.0	SOIL	05 JUL 90	08:17	06 JUL 90
010274-0002-SA	RFI0605A3.5	SOIL	05 JUL 90	08:45	06 JUL 90
010274-0003-SA	RFI0605A7.0	SOIL	05 JUL 90	10:20	06 JUL 90
010274-0004-SA	RFI0603A0.0	SOIL	05 JUL 90	10:30	06 JUL 90
010274-0005-SA	RFI0603A3.5	SOIL	05 JUL 90	11:30	06 JUL 90
010274-0006-SA	RFI0603A7.0	SOIL	05 JUL 90	11:55	06 JUL 90
010274-0007-SA	RFI0601A0.0	SOIL	05 JUL 90	11:40	06 JUL 90
010274-0008-SA	RFI0601A3.5	SOIL	05 JUL 90	13:40	06 JUL 90
010274-0009-SA	RFI0601A7.0	SOIL	05 JUL 90	14:00	06 JUL 90
010274-0010-SA	TRIP BLANK	AQUEOUS	05 JUL 90		06 JUL 90

Enseco
A CORNING Company

ANALYTICAL TEST REQUESTS
for
Giant Refining

Lab ID: 010274	Group Code	Analysis Description	Custom Test?
0001 - 0009	A	ICP Metals (Total)	Y
		Prep - Total Metals, ICP	N
		Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)	N
0010	B	Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)	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.

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0605A0.0
Lab ID: 010274-0001-SA Enseco ID: 1082096
Matrix: SOIL Sampled: 05 JUL 90 Received: 06 JUL 90
Authorized: 06 JUL 90 Prepared: NA Analyzed: 09 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0605A3.5
Lab ID: 010274-0002-SA Enseco ID: 1082097
Matrix: SOIL Sampled: 05 JUL 90 Received: 06 JUL 90
Authorized: 06 JUL 90 Prepared: NA Analyzed: 10 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	2500
Toluene	11000	ug/kg	2500
Ethylbenzene	10000	ug/kg	2500
Xylenes (total)	98000	ug/kg	5000

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0605A7.0
Lab ID: 010274-0003-SA Enseco ID: 1082098
Matrix: SOIL Sampled: 05 JUL 90 Received: 06 JUL 90
Authorized: 06 JUL 90 Prepared: NA Analyzed: 09 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	260	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0603A0.0
Lab ID: 010274-0004-SA Enseco ID: 1082099
Matrix: SOIL Sampled: 05 JUL 90 Received: 06 JUL 90
Authorized: 06 JUL 90 Prepared: NA Analyzed: 09 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0603A3.5
Lab ID: 010274-0005-SA Enseco ID: 1082100
Matrix: SOIL Sampled: 05 JUL 90 Received: 06 JUL 90
Authorized: 06 JUL 90 Prepared: NA Analyzed: 09 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0603A7.0
Lab ID: 010274-0006-SA Enseco ID: 1082101
Matrix: SOIL Sampled: 05 JUL 90 Received: 06 JUL 90
Authorized: 06 JUL 90 Prepared: NA Analyzed: 09 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0601A0.0
Lab ID: 010274-0007-SA Enseco ID: 1082102
Matrix: SOIL Sampled: 05 JUL 90 Received: 06 JUL 90
Authorized: 06 JUL 90 Prepared: NA Analyzed: 09 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0601A3.5
Lab ID: 010274-0008-SA Enseco ID: 1082103
Matrix: SOIL Sampled: 05 JUL 90 Received: 06 JUL 90
Authorized: 06 JUL 90 Prepared: NA Analyzed: 09 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	640	ug/kg	100

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTX)

Method 8020

Client Name: Giant Refining
Client ID: RFI0601A7.0
Lab ID: 010274-0009-SA Enseco ID: 1082104
Matrix: SOIL Sampled: 05 JUL 90 Received: 06 JUL 90
Authorized: 06 JUL 90 Prepared: NA Analyzed: 09 JUL 90

Parameter	Result	Wet wt. Units	Reporting Limit
Benzene	ND	ug/kg	500
Toluene	1500	ug/kg	500
Ethylbenzene	2100	ug/kg	500
Xylenes (total)	25000	ug/kg	1000

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 8020

Client Name: Giant Refining
Client ID: TRIP BLANK
Lab ID: 010274-0010-SA Enseco ID: 1082105
Matrix: AQUEOUS Sampled: 05 JUL 90 Received: 06 JUL 90
Authorized: 06 JUL 90 Prepared: NA Analyzed: 10 JUL 90

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	1.0

ND = Not detected
NA = Not applicable

Reported By: Nathaniel Biah Approved By: Anthony Allen

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0605A0.0
Lab ID: 010274-0001-SA
Enseco ID: 1082096
Matrix: SOIL
Sampled: 05 JUL 90
Received: 06 JUL 90
Authorized: 06 JUL 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	138	mg/kg	10.0	6010	27 JUL 90	01 AUG 90
Nickel	ND	mg/kg	8.0	6010	27 JUL 90	01 AUG 90

ND = Not detected
NA = Not applicable

Reported By: David Patterson
Approved By: Mary Grehl

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0605A3.5
Lab ID: 010274-0002-SA
Enseco ID: 1082097
Matrix: SOIL
Sampled: 05 JUL 90
Received: 06 JUL 90
Authorized: 06 JUL 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/kg	25.0	6010	27 JUL 90	01 AUG 90
Nickel	ND	mg/kg	20.0	6010	27 JUL 90	01 AUG 90

ND = Not detected
NA = Not applicable

Reported By: David Patterson
Approved By: Mary Grehl

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0605A7.0
Lab ID: 010274-0003-SA
Matrix: SOIL
Authorized: 06 JUL 90

Enseco ID: 1082098
Sampled: 05 JUL 90
Prepared: See Below

Received: 06 JUL 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/kg	25.0	6010	27 JUL 90	01 AUG 90
Nickel	ND	mg/kg	20.0	6010	27 JUL 90	01 AUG 90

ND = Not detected
NA = Not applicable

Reported By: David Patterson

Approved By: Mary Grehl

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0603A0.0
Lab ID: 010274-0004-SA
Matrix: SOIL
Authorized: 06 JUL 90

Enseco ID: 1082099
Sampled: 05 JUL 90
Prepared: See Below

Received: 06 JUL 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	27.7	mg/kg	25.0	6010	27 JUL 90	01 AUG 90
Nickel	ND	mg/kg	20.0	6010	27 JUL 90	01 AUG 90

ND = Not detected
NA = Not applicable

Reported By: David Patterson

Approved By: Mary Grehl

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0603A3.5
Lab ID: 010274-0005-SA
Enseco ID: 1082100
Matrix: SOIL
Sampled: 05 JUL 90
Received: 06 JUL 90
Authorized: 06 JUL 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	6.5	mg/kg	5.0	6010	27 JUL 90	01 AUG 90
Nickel	ND	mg/kg	4.0	6010	27 JUL 90	01 AUG 90

ND = Not detected
NA = Not applicable

Reported By: David Patterson
Approved By: Mary Grehl

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0603A7.0
Lab ID: 010274-0006-SA
Enseco ID: 1082101
Matrix: SOIL
Sampled: 05 JUL 90
Received: 06 JUL 90
Authorized: 06 JUL 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/kg	25.0	6010	27 JUL 90	01 AUG 90
Nickel	ND	mg/kg	20.0	6010	27 JUL 90	01 AUG 90

ND = Not detected
NA = Not applicable

Reported By: David Patterson
Approved By: Mary Grehl

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0601A0.0
Lab ID: 010274-0007-SA
Enseco ID: 1082102
Matrix: SOIL
Sampled: 05 JUL 90
Received: 06 JUL 90
Authorized: 06 JUL 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	14.9	mg/kg	5.0	6010	27 JUL 90	01 AUG 90
Nickel	5.3	mg/kg	4.0	6010	27 JUL 90	01 AUG 90

ND = Not detected
NA = Not applicable

Reported By: David Patterson
Approved By: Mary Grehl

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0601A3.5
Lab ID: 010274-0008-SA
Enseco ID: 1082103
Matrix: SOIL
Sampled: 05 JUL 90
Received: 06 JUL 90
Authorized: 06 JUL 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	16.6	mg/kg	5.0	6010	27 JUL 90	01 AUG 90
Nickel	6.6	mg/kg	4.0	6010	27 JUL 90	01 AUG 90

ND = Not detected
NA = Not applicable

Reported By: David Patterson
Approved By: Mary Grehl

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0601A7.0
Lab ID: 010274-0009-SA
Matrix: SOIL
Authorized: 06 JUL 90

Enseco ID: 1082104
Sampled: 05 JUL 90
Prepared: See Below

Received: 06 JUL 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	13.0	mg/kg	5.0	6010	27 JUL 90	01 AUG 90
Nickel	ND	mg/kg	4.0	6010	27 JUL 90	01 AUG 90

ND = Not detected
NA = Not applicable

Reported By: David Patterson

Approved By: Mary Grehl

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).

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

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.

Enseco
A CORNING Company

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
010274-0001-SA	SOIL	8020-S	09 JUL 90-R	09 JUL 90-R
010274-0002-SA	SOIL	8020-S	10 JUL 90-L	10 JUL 90-L
010274-0003-SA	SOIL	8020-S	09 JUL 90-R	09 JUL 90-R
010274-0004-SA	SOIL	8020-S	09 JUL 90-R	09 JUL 90-R
010274-0005-SA	SOIL	8020-S	09 JUL 90-R	09 JUL 90-R
010274-0006-SA	SOIL	8020-S	09 JUL 90-R	09 JUL 90-R
010274-0007-SA	SOIL	8020-S	09 JUL 90-R	09 JUL 90-R
010274-0008-SA	SOIL	8020-S	09 JUL 90-R	09 JUL 90-R
010274-0009-SA	SOIL	8020-S	09 JUL 90-R	09 JUL 90-R
010274-0010-SA	AQUEOUS	602-A	10 JUL 90-R	10 JUL 90-R

Enseco
A CORNING Company

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: 8020-S Matrix: SOIL QC Lot: 09 JUL 90-R Concentration Units: ug/kg								
Benzene	500	568	526	547	109	75-125	7.7	15
Toluene	500	535	491	513	103	75-125	8.6	15
Ethylbenzene	500	527	491	509	102	75-125	7.1	15
Xylenes (total)	500	543	498	520	104	75-125	8.6	15
1,3-Dichlorobenzene	500	552	510	531	106	75-125	7.9	15
Category: 8020-S Matrix: SOIL QC Lot: 10 JUL 90-L Concentration Units: ug/kg								
Benzene	500	525	500	512	103	75-125	4.9	15
Toluene	500	516	496	506	101	75-125	4.0	15
Ethylbenzene	500	552	531	542	108	75-125	3.9	15
Xylenes (total)	500	562	538	550	110	75-125	4.4	15
1,3-Dichlorobenzene	500	566	533	550	110	75-125	6.0	15
Category: 602-A Matrix: AQUEOUS QC Lot: 10 JUL 90-R Concentration Units: ug/L								
Benzene	5.0	4.71	4.97	4.84	97	80-120	5.4	15
Toluene	5.0	4.40	4.65	4.52	91	80-120	5.5	15
Ethylbenzene	5.0	4.44	4.75	4.60	92	80-120	6.7	15
Xylenes (total)	5.0	4.28	4.52	4.40	88	80-120	5.5	15
1,3-Dichlorobenzene	5.0	4.21	4.54	4.38	88	80-120	7.5	15

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

Enseco
A CORNING Company

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC

Analyte	Concentration Spiked	Measured	Accuracy(%) SCS	Limits
Category: 8020-S Matrix: SOIL QC Lot: 09 JUL 90-R QC Run: 09 JUL 90-R Concentration Units: ug/kg				
a,a,a-Trifluorotoluene	500	612	122	20-160
Category: 8020-S Matrix: SOIL QC Lot: 10 JUL 90-L QC Run: 10 JUL 90-L Concentration Units: ug/kg				
a,a,a-Trifluorotoluene	500	479	96	20-160
Category: 602-A Matrix: AQUEOUS QC Lot: 10 JUL 90-R QC Run: 10 JUL 90-R Concentration Units: ug/L				
a,a,a-Trifluorotoluene	5.00	5.62	112	20-160

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

Enseco
A CORNING Company

METHOD BLANK REPORT
Volatile Organics by GC

Analyte	Result	Units	Reporting Limit
Test: 8020-BTEX-S			
Matrix: SOIL			
QC Lot: 09 JUL 90-R QC Run: 09 JUL 90-R			
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100
Test: 8020-BTEX-S			
Matrix: SOIL			
QC Lot: 10 JUL 90-L QC Run: 10 JUL 90-L			
Benzene	ND	ug/kg	50
Toluene	ND	ug/kg	50
Ethylbenzene	ND	ug/kg	50
Xylenes (total)	ND	ug/kg	100
Test: 602-BTEX-AP			
Matrix: AQUEOUS			
QC Lot: 10 JUL 90-R QC Run: 10 JUL 90-R			
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	1.0

Enseco
A CORNING Company

QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
010274-0001-SA	SOIL	ICP-S	27 JUL 90-F	27 JUL 90-F
010274-0002-SA	SOIL	ICP-S	27 JUL 90-F	27 JUL 90-F
010274-0003-SA	SOIL	ICP-S	27 JUL 90-F	27 JUL 90-F
010274-0004-SA	SOIL	ICP-S	27 JUL 90-F	27 JUL 90-F
010274-0005-SA	SOIL	ICP-S	27 JUL 90-F	27 JUL 90-F
010274-0006-SA	SOIL	ICP-S	27 JUL 90-F	27 JUL 90-F
010274-0007-SA	SOIL	ICP-S	27 JUL 90-F	27 JUL 90-F
010274-0008-SA	SOIL	ICP-S	27 JUL 90-F	27 JUL 90-F
010274-0009-SA	SOIL	ICP-S	27 JUL 90-F	27 JUL 90-F

Enseco
A CORNING Company

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-S								
Matrix: SOIL								
QC Lot: 27 JUL 90-F								
Concentration Units: mg/kg								
Aluminum	200	197	206	202	101	75-125	4.4	20
Antimony	50	44.8	48.4	46.6	93	75-125	7.7	20
Arsenic	50	44.4	46.2	45.3	91	75-125	3.9	20
Barium	200	175	185	180	90	75-125	5.3	20
Beryllium	5.0	4.80	4.95	4.88	98	75-125	3.0	20
Cadmium	5.0	3.78	4.06	3.92	78	75-125	7.2	20
Calcium	10000	9510	9940	9730	97	75-125	4.4	20
Chromium	20	19.3	20.3	19.8	99	75-125	5.1	20
Cobalt	50	41.9	43.6	42.8	86	75-125	4.0	20
Copper	25	22.7	23.8	23.3	93	75-125	4.6	20
Iron	100	96.2	109	103	103	75-125	13	20
Lead	50	42.8	43.7	43.3	87	75-125	2.1	20
Magnesium	5000	4880	5110	4990	100	75-125	4.6	20
Manganese	50	44.4	46.1	45.3	91	75-125	3.7	20
Nickel	50	45.8	46.0	45.9	92	75-125	0.4	20
Potassium	5000	4800	5000	4900	98	75-125	4.1	20
Silver	5.0	4.11	4.31	4.21	84	75-125	4.8	20
Sodium	10000	9540	9960	9750	97	75-125	4.3	20
Vanadium	50	48.2	50.0	49.1	98	75-125	3.6	20
Zinc	50	43.4	45.0	44.2	88	75-125	3.7	20

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

Enseco
A CORNING Company

METHOD BLANK REPORT
Metals Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: ICP-S			
Matrix: SOIL			
QC Lot: 27 JUL 90-F QC Run: 27 JUL 90-F			
Lead	ND	mg/kg	5.0
Nickel	ND	mg/kg	4.0

Enseco

August 2, 1990

Mr. Claud Rosendale
Giant Refining
17 Miles East of Gallup
I-40, Exit 39
Gallup, NM 87301

Dear Mr. Rosendale:

Enclosed is the report for 10 samples we received at Enseco-Rocky Mountain Analytical Laboratory on July 6, 1990.

Included with the report is a quality control summary.

Please call if you have any questions.

Sincerely,

Julie Essey
Program Administrator

Reviewed by:

Sue Dalla
Manager
Program Administration

JE/SD/lw
Enclosures

RMAL #010274

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

Enseco - Rocky Mountain Analytical

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

Attn: Julie Essex

Enseco Client Grant Refinery
Project RFI
Sampling Co. Grant
Sampling Site Cuba
Team Leader M. McCaslin
MAT#

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: C. Rosendale
5. Initial Contents Temp.: — °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	Analysis Parameters	Remarks
7-5-90	8:17	RFI0605A0.0	Soil	2	BTEX, Lead, Nickel	
7-5-90	8:45	RFI0605A3.5	Soil	2	BTEX, Lead, Nickel	
7-5-90	10:20	RFI0605A7.0	Soil	2	BTEX, Lead, Nickel	
7-5-90	10:30	RFI0603A0.0	Soil	2	BTEX, Lead, Nickel	
7-5-90	11:30	RFI0603A3.5	Soil	2	BTEX, Lead, Nickel	
7-5-90	11:55	RFI0603A7.0	Soil	2	BTEX, Lead, Nickel	
7-5-90	11:40	RFI0601A0.0	Soil	2	BTEX Lead Nickel	
7-5-90	1:40	RFI0601A3.5	Soil	2	BTEX, Lead, Nickel	
7-5-90	2:00	RFI0601A7.0	Soil	2	BTEX, Lead, Nickel	4 L
7-5-90		Trip Blank	Water	1	VOA BTEX ONLY	Cleared Rosendale 7-6-90

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	[signature]	_____	7-5-90	2:45pm
2	_____	_____	_____	_____
3	_____	_____	_____	_____

SHIPPING DETAILS

Delivered to Shipper by: C. Rosendale
Method of Shipment: Fed Express Airbill # _____
Received for Lab: RMAL Signed: [signature] Date/Time 07-06-90 0800
Enseco Project No. 10274

[redacted] hite [redacted] nk C[redacted] to La[redacted] Ye[redacted] o Sa[redacted]

SS-001

9.205

Section 9.2.1.
RMAL No. 010120

Rocky Mountain
Analytical Laboratory

Enseco

ANALYTICAL RESULTS

FOR

GIANT REFINING

ENSECO-RMAL NO. 010120

JULY 28, 1990

Reviewed by:

Julie Essey

Sue Dalla

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

I. OVERVIEW

A. Standard Overview

On June 26, 1990, Enseco-Rocky Mountain Analytical Laboratory received six samples from Giant Refining.

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:

I. Overview
   A. Standard Overview
   B. Regulatory Overview - Refinery
II. Sample Description Information/Analytical Test Requests
III. Analytical Results
IV. Quality Control Report

Standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. All laboratory QC samples analyzed in conjunction with the samples in this project were within established control limits.

Consistent with directives in the CLP protocol in SW-846 and other EPA methods, all GC/MS analyses were performed so that the maximum concentration of sample was analyzed. Some samples required dilutions to avoid saturation of the detector, to achieve linearity for a specific target compound or to reduce matrix interferences. As stated in Section 7.5.4 of Method 8270, 7.4.1.16 of Method 8240 and Exhibit E of the CLP protocol these dilutions be performed. The reporting limits for these samples are therefore proportionate to the dilution required. Surrogate compounds may not be measurable in samples which have been diluted.

Due to interferences originating from non-target compounds, dilutions were performed for sample 010120-0002 by Method 8270. The reporting limits were raised accordingly.

Sample 010120-0003 by Method 8270 was originally prepared within holding times. Because of sample surrogate recoveries below Enseco's established limits, the sample was reprepped. The reprep data produced better surrogate recoveries and was therefore reported. The reprep was performed outside of holding times.

All 8270 samples were prepped according to SW-846 using 2.0 grams of sample followed by a 50% partition then concentration to 1.0 mL for analysis. With this prep method nominal reporting limits are generally 10,000 ug/kg. After careful review of all chromatograms it has been determined that we can lower the nominal reporting limit to 5,000 ug/kg for this project.

The Duplicate Control Sample (DCS) QC Lot 06 JUL 90-A by Method 8270 had 4-Nitrophenol and 2,4-Dinitrophenol slightly above Enseco's established limits. The quantitation was rechecked and found to be correct. Based on a thorough review of the data, it was determined that the sample results were not affected. It should be noted that control limits are based on statistical data and do not always represent the best possible recoveries.

An analytical standard is not available for methyl chrysene. Furthermore, many isomers of this compound including methyl benzanthracenes and methyl triphenylenes exist. These isomers are indistinguishable under the analytical condition of Method 8270. A selected ion current profile at mass 242 was performed to determine if any compounds corresponding to the molecular structure of methyl chrysene were present. All peaks which met this criteria were summed. An estimated concentration of "total methyl chrysenes" was determined by comparing the sum of the peak areas to the internal standard and using a response factor 1.0. Both the identification and quantification are highly suspect.

Total methyl chrysenes were not detected for samples 010120-0001 through -0006.

B. Regulatory Overview - Refinery

In 1984, the EPA distributed several versions of a subset of Appendix VIII constituents to be used principally for delisting petroleum refinery wastes (K048-K052). This list, commonly referred to as the "Skinner" list has been adapted for use in land treatment demonstrations, site closures and other related activities associated with petroleum refining RCRA programs. In early 1985, a modified version of the Skinner list appeared in "Petitions to Delist Hazardous Waste, A Guidance Manual" (EPA/530-SW-85-003). This revised list, as shown in Table I, consists of 12 metals and 43 organic compounds and currently forms the basis for analytical work on samples collected at petroleum refineries.

The organic compounds have been classified as volatile and semivolatile (base/neutral/acid) compounds. Two of the "compounds" listed (dichlorobenzenes and cresols) are measured and reported in terms of their specific isomers. Analytical standards are not available for two of the compounds, dibenz(a,h)acridine and methyl chrysene. Therefore, these compounds cannot be measured and analytical results are not presented for these compounds. Two of the remaining compounds, benzenethiol and pyridine cannot be recovered consistently from environmental samples and consequently, method detection limits for these compounds cannot be established. This statement is made based on the results of a methods evaluation study sponsored by API.

Table 2 summarizes the analytical methods used to determine Appendix VIII refinery constituents. For the organic compounds, methods are listed for both the complete list and a subset of this list analyzed by alternate methods.

Between October, 1983 and July, 1985, the EPA released three methods manuals and a "Guidance Manual" which were compendiums of modified SW-846 methods specifically adapted for the analysis of Appendix VIII constituents in petroleum refining wastes. The most useful document was an October, 1984 draft methods manual which was released but never formally distributed by EPA. These documents did not contain many of the important details that are critical to the successful analysis of environmental samples relevant to petroleum refineries.

Thus, although the methods used by Enseco-RMAL in the analysis of petroleum refinery wastes are based on these various EPA documents, the actual details of each method have been modified in order to generate acceptable data. These modifications have been based on information given in numerous documents, some of which are cited in Table 3. In addition to the documents listed in the bibliography, Enseco-RMAL an ongoing dialogue with EPA/OSW to ensure that the latest EPA guidance is incorporated into the analytical approach.

The analytical data tables which follow present results for the Appendix VIII refinery hazardous constituents which are measurable.

TABLE 1. APPENDIX VIII HAZARDOUS CONSTITUENT SUBSET FOR PETROLEUM REFINERY STUDIES*

Metals

Antimony
Arsenic
Barium
Beryllium
Cadmium
Chromium
Cobalt
Lead
Mercury
Nickel
Selenium
Vanadium

Volatile Organics

Benzene
Carbon disulfide
Chlorobenzene
Chloroform
1,2-Dibromoethane
1,2-Dichloroethane
1,4-Dioxane
Methyl ethyl ketone
Styrene
Ethyl benzene
Toluene
Xylenes

Base/Neutral Organics

Anthracene
Benz(a)anthracene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(a)pyrene
Bis(2-ethylhexyl)phthalate
Butyl benzyl phthalate
Chrysene
Dibenz(a,h)acridine[2]
Dibenz(a,h)anthracene
Di-n-butyl phthalate
Dichlorobenzenes[1]
Diethyl phthalate
7,12-Dimethylbenz(a)anthracene
Dimethyl phthalate
Di-n-octyl phthalate
Fluoranthene
Indene
Methyl chrysene[2]
1-Methylnaphthalene
Naphthalene
Phenanthrene
Pyrene
Pyridine[3]
Quinoline

Acid Organics

Benzenethiol[3]
Cresols[1]
2,4-Dimethylphenol
2,4-Dinitrophenol
4-Nitrophenol
Phenol

*"Petitions to Delist Hazardous Wastes, A Guidance Manual," EPA/530-SW-85-003, April, 1985.
1) Reported as ortho-, meta-, and para-isomers.
2) No analytical standard available.
3) Not consistently recoverable using standard analytical methods.

TABLE 2. SUMMARY OF ANALYTICAL METHODS FOR REFINERY CONSTITUENTS

Metals	Method
Antimony	7041
Arsenic	7060
Lead	7421
Mercury	7470
Selenium	7740
ICP Scan (Ba, Be, Cd, Cr, Co, Ni, V)	6010

	GC/MS Method	Screening Method
Volatile Organics	8240	8020[a]
Semivolatile Organics	8270	8310[b]

a) Volatile Aromatics
b) Polynuclear Aromatic Hydrocarbons

TABLE 3. BIBLIOGRAPHY

A. Documents Pertaining to Appendix VIII Constituents

(1) January, 1984 letter from Myles Morse pertaining to delisting petitions as well as land treatment demonstrations, including sampling procedures and data requirements.

(2) March, 1984 letter to delisting petitioners from Barbara Bush revising target parameters.

(3) April, 1984 memo from John Skinner to Permit Branch Chiefs concerning land treatment containing target parameters and analytical methods.

(4) May, 1984 memo from John Skinner clarifying previous memo.

(5) September, 1984 letter to Petitioners from Barbara Bush distributing Refinery Handbook.

(6) November, 1984 letter from Eileen Claussen to all delisting petitioners describing new RCRA requirements.

(7) May 3, 1985 RMAL Memo.

(8) January 8, 1985 RMAL letter to Eileen Claussen, EPA-OSW.

B. Documents Pertaining to Analytical Methods

(1) "Handbook for the Analysis of Petroleum Refinery Residuals and Waste", October, 1984 - prepared by Radian Corporation for EPA/OSW.

(2) "Evaluation of the Applicability of the SW-846 Manual To Support All RCRA Subtitle C Testing", December 20, 1984 - prepared by Rocky Mountain Analytical Laboratory for API.

(3) "Comments on the 'Handbook for the Analysis of Petroleum Refinery Residuals and Waste, October, 1984'", December 12, 1984 - Prepared by Rocky Mountain Analytical Laboratory for API.

(4) "Comments on the 'Handbook for the Analysis of Petroleum Refinery Residuals and Waste, April 2, 1984'", August 15, 1984 - Prepared by Rocky Mountain Analytical Laboratory for API.

(5) "Handbook for the Analysis of Petroleum Refinery Residuals and Waste", April 2, 1984 - prepared by S-Cubed for EPA/OSW.

(6) EPA document "Guidance for the Analysis of Refinery Wastes", July 5, 1985.

(7) "Recovery and Detection Limits of Organic Compounds in Petroleum Refinery Wastes", January 25, 1985.

(8) SW-846 - "Test Methods for Evaluating Solid Waste, Physical Chemical Methods" USEPA, 2nd Edition, 1982.

(9) 40 CFR 136 - "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act."

II. SAMPLE DESCRIPTION INFORMATION/ANALYTICAL TEST REQUESTS

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.

Enseco

July 28, 1990

Mr. Claud Rosendale
Giant Refining
17 Miles East of Gallup
I-40, Exit 39
Gallup, NM 87301

Dear Mr. Rosendale:

Enclosed is the report for six samples we received at Enseco-Rocky Mountain Analytical Laboratory on June 26, 1990.

Included with the report is a quality control summary.

Please call if you have any questions.

Sincerely,

Julie Essey
Program Administrator

Reviewed by:

Sue Dalla
Manager
Program Administration

JE/SD/ldc
Enclosures

RMAL #010120

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

Enseco
A CORNING Company

SAMPLE DESCRIPTION INFORMATION
for
Giant Refining

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
010120-0001-SA	RFI0804V10.5	SOIL	25 JUN 90	09:45	26 JUN 90
010120-0002-SA	RFI0804V08.0	SOIL	25 JUN 90	10:00	26 JUN 90
010120-0003-SA	RFI0804V05.0	SOIL	25 JUN 90	10:30	26 JUN 90
010120-0004-SA	RFI0805V10.5	SOIL	25 JUN 90	13:00	26 JUN 90
010120-0005-SA	RFI0805V08.0	SOIL	25 JUN 90	13:15	26 JUN 90
010120-0006-SA	RFI0805V05.0	SOIL	25 JUN 90	13:20	26 JUN 90

Enseco
A CORNING Company

ANALYTICAL TEST REQUESTS
for
Giant Refining

Lab ID: 010120	Group Code	Analysis Description	Custom Test?
0001 - 0006	A	Refinery Hazardous Constituent Volatiles	Y
		GC Screen For Medium Level Soils	N
		Refinery Hazardous Constituent Semivolatiles	Y
		Prep - Semivolatile Organics by GC/MS	N
		Mercury, Cold Vapor AA	Y
		Prep - Mercury, Cold Vapor AA	N
		Arsenic, Furnace AA	N
		Prep - Total Metals, Furnace AA	N
		Selenium, Furnace AA	N
		ICP Metals (Total)	Y
		Prep - Total Metals, ICP	N

III. ANALYTICAL RESULTS

The analytical results for this project are presented in the following data tables. The results are presented by sample, by test, with tests reported in the following order: GC/MS, Chromatography, Metals and Inorganics.

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. The date prepared is typically the date an extraction or digestion was initiated. For volatile organic compounds in water, the date prepared is the date the screening of the sample was performed.

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.

In addition, surrogate recovery data is presented for all GC/MS analyses. The surrogate recovery is an indication of the affect of the sample matrix on the performance of the method. The results from the Standard Enseco QA/QC Program, which generates data which are independent of matrix effects, is given in Section IV.

The analytical data reported are subject to the following limitations of the analytical methodology:

GC/MS

Volatile Organics

a) The cis- and trans-isomers of dichloroethylene cannot be distinguished using EPA Method 624. All dichloroethylene present is reported as trans-dichloroethylene.

Semivolatile Organics

a) Benzo(b) and benzo(k) fluoranthene cannot be differentiated based on their mass spectra; retention times are almost identical. The isomer which is the closest in retention time to the sample is reported.

b) 1,2-diphenylhydrazine is measured as azobenzene.

c) N-Nitrosodiphenylamine decomposes in the gas chromatographic inlet to diphenylamine.

Metals

Arsenic, selenium and thallium are customarily determined by graphite furnace atomic absorption (GFAA). All mercury determinations are by cold vapor atomic absorption. All other metals are determined using Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP).

All metals nominal reporting limits are statistically determined by analyzing a reagent blank seven times on three non-consecutive days. The standard deviations from each group of analyses are then summed (reporting limit = three times the standard deviation of a blank). The ability to attain the quoted reporting limits is verified each quarter. Reporting limits above nominal values are often reported since sample matrix interferences must be compensated for by dilutions prior to analysis or by the use of Method of

Standard Additions. All GFAA reporting limits and results are verified by spike recoveries and represent the lowest attainable for each sample matrix. The metals reporting limits reported should not be viewed as quantitation limits. As recommended by the American Chemical Society Subcommittee on Environmental Analytical Chemistry (Analytical Chemistry 1980, 52, 2242-49), the Limit of Quantitation (LOQ) is equal to ten times the standard deviation of a blank or 3.3 times the reporting limit.

Refinery Hazardous Constituent Volatiles

Enseco
A CORNING Company

Method 8240

Client Name: Giant Refining
Client ID: RFI0804V10.5
Lab ID: 010120-0001-SA Enseco ID: 1080749
Matrix: SOIL Sampled: 25 JUN 90 Received: 26 JUN 90
Authorized: 26 JUN 90 Prepared: 27 JUN 90 Analyzed: 05 JUL 90

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/kg	500
Carbon disulfide	ND	ug/kg	500
Chlorobenzene	ND	ug/kg	500
Chloroform	ND	ug/kg	500
EDB (1,2-Dibromoethane)	ND	ug/kg	1000
1,2-Dichloroethane	ND	ug/kg	500
1,4-Dioxane	ND	ug/kg	50000
Ethylbenzene	ND	ug/kg	500
2-Butanone (MEK)	ND	ug/kg	1000
Styrene	ND	ug/kg	500
Toluene	ND	ug/kg	500
Xylenes (total)	ND	ug/kg	500
Toluene-d8	97	%	--
4-Bromofluorobenzene	97	%	--
1,2-Dichloroethane-d4	99	%	--

ND = Not detected
NA = Not applicable

Reported By: Tim Miller

Approved By: Jeff Lowry

Enseco
A CORNING Company

Refinery Hazardous Constituent Volatiles

Method 8240

Client Name: Giant Refining
Client ID: RFI0804V08.0
Lab ID: 010120-0002-SA Enseco ID: 1080750
Matrix: SOIL Sampled: 25 JUN 90 Received: 26 JUN 90
Authorized: 26 JUN 90 Prepared: 27 JUN 90 Analyzed: 05 JUL 90

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/kg	500
Carbon disulfide	ND	ug/kg	500
Chlorobenzene	ND	ug/kg	500
Chloroform	ND	ug/kg	500
EDB (1,2-Dibromoethane)	ND	ug/kg	1000
1,2-Dichloroethane	ND	ug/kg	500
1,4-Dioxane	ND	ug/kg	50000
Ethylbenzene	690	ug/kg	500
2-Butanone (MEK)	ND	ug/kg	1000
Styrene	ND	ug/kg	500
Toluene	ND	ug/kg	500
Xylenes (total)	4800	ug/kg	500
Toluene-d8	101	%	--
4-Bromofluorobenzene	103	%	--
1,2-Dichloroethane-d4	94	%	--

ND = Not detected
NA = Not applicable

Reported By: Tim Miller Approved By: Jeff Lowry

Enseco
A CORNING Company

Refinery Hazardous Constituent Volatiles

Method 8240

Client Name: Giant Refining
Client ID: RFI0804V05.0
Lab ID: 010120-0003-SA Enseco ID: 1080751
Matrix: SOIL Sampled: 25 JUN 90 Received: 26 JUN 90
Authorized: 26 JUN 90 Prepared: 27 JUN 90 Analyzed: 05 JUL 90

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/kg	500
Carbon disulfide	ND	ug/kg	500
Chlorobenzene	ND	ug/kg	500
Chloroform	ND	ug/kg	500
EDB (1,2-Dibromoethane)	ND	ug/kg	1000
1,2-Dichloroethane	ND	ug/kg	500
1,4-Dioxane	ND	ug/kg	50000
Ethylbenzene	ND	ug/kg	500
2-Butanone (MEK)	ND	ug/kg	1000
Styrene	ND	ug/kg	500
Toluene	ND	ug/kg	500
Xylenes (total)	ND	ug/kg	500
Toluene-d8	99	%	--
4-Bromofluorobenzene	96	%	--
1,2-Dichloroethane-d4	99	%	--

ND = Not detected
NA = Not applicable

Reported By: Tim Miller Approved By: Jeff Lowry

Enseco
A CORNING Company

Refinery Hazardous Constituent Volatiles

Method 8240

Client Name: Giant Refining
Client ID: RFI08505V10.5
Lab ID: 010120-0004-SA Enseco ID: 1080752
Matrix: SOIL Sampled: 25 JUN 90 Received: 26 JUN 90
Authorized: 26 JUN 90 Prepared: 27 JUN 90 Analyzed: 05 JUL 90

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/kg	500
Carbon disulfide	ND	ug/kg	500
Chlorobenzene	ND	ug/kg	500
Chloroform	ND	ug/kg	500
EDB (1,2-Dibromoethane)	ND	ug/kg	1000
1,2-Dichloroethane	ND	ug/kg	500
1,4-Dioxane	ND	ug/kg	50000
Ethylbenzene	ND	ug/kg	500
2-Butanone (MEK)	ND	ug/kg	1000
Styrene	ND	ug/kg	500
Toluene	ND	ug/kg	500
Xylenes (total)	ND	ug/kg	500
Toluene-d8	100	%	--
4-Bromofluorobenzene	94	%	--
1,2-Dichloroethane-d4	101	%	--

ND = Not detected
NA = Not applicable

Reported By: Tim Miller Approved By: Jeff Lowry

Refinery Hazardous Constituent Volatiles

Method 8240

Client Name: Giant Refining
Client ID: RFI08505V08.0
Lab ID: 010120-0005-SA Enseco ID: 1080753
Matrix: SOIL Sampled: 25 JUN 90 Received: 26 JUN 90
Authorized: 26 JUN 90 Prepared: 27 JUN 90 Analyzed: 06 JUL 90

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/kg	500
Carbon disulfide	ND	ug/kg	500
Chlorobenzene	ND	ug/kg	500
Chloroform	ND	ug/kg	500
EDB (1,2-Dibromoethane)	ND	ug/kg	1000
1,2-Dichloroethane	ND	ug/kg	500
1,4-Dioxane	ND	ug/kg	50000
Ethylbenzene	ND	ug/kg	500
2-Butanone (MEK)	ND	ug/kg	1000
Styrene	ND	ug/kg	500
Toluene	ND	ug/kg	500
Xylenes (total)	ND	ug/kg	500
Toluene-d8	99	%	--
4-Bromofluorobenzene	98	%	--
1,2-Dichloroethane-d4	95	%	--

ND = Not detected
NA = Not applicable

Reported By: Tim Miller Approved By: Jeff Lowry

Enseco
A CORNING Company

Refinery Hazardous Constituent Volatiles

Method 8240

Client Name: Giant Refining
Client ID: RFI08505V05.0
Lab ID: 010120-0006-SA Enseco ID: 1080754
Matrix: SOIL Sampled: 25 JUN 90 Received: 26 JUN 90
Authorized: 26 JUN 90 Prepared: 27 JUN 90 Analyzed: 06 JUL 90

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/kg	500
Carbon disulfide	ND	ug/kg	500
Chlorobenzene	ND	ug/kg	500
Chloroform	ND	ug/kg	500
EDB (1,2-Dibromoethane)	ND	ug/kg	1000
1,2-Dichloroethane	ND	ug/kg	500
1,4-Dioxane	ND	ug/kg	50000
Ethylbenzene	ND	ug/kg	500
2-Butanone (MEK)	ND	ug/kg	1000
Styrene	ND	ug/kg	500
Toluene	ND	ug/kg	500
Xylenes (total)	ND	ug/kg	500
Toluene-d8	98	%	--
4-Bromofluorobenzene	97	%	--
1,2-Dichloroethane-d4	97	%	--

ND = Not detected
NA = Not applicable

Reported By: Tim Miller Approved By: Jeff Lowry

Refinery Hazardous Constituent Semivolatiles

Enseco
A CORNING Company

Method 8270

Client Name: Giant Refining
Client ID: RFI0804V10.5
Lab ID: 010120-0001-SA Enseco ID: 1080749
Matrix: SOIL Sampled: 25 JUN 90 Received: 26 JUN 90
Authorized: 26 JUN 90 Prepared: 03 JUL 90 Analyzed: 16 JUL 90

Parameter	Result	Units	Reporting Limit
Anthracene	ND	ug/kg	5000
Benzo(a)anthracene	ND	ug/kg	5000
Benzo(b)fluoranthene	ND	ug/kg	5000
Benzo(k)fluoranthene	ND	ug/kg	5000
Benzo(a)pyrene	ND	ug/kg	5000
bis(2-Ethylhexyl) phthalate	ND	ug/kg	5000
Butyl benzyl phthalate	ND	ug/kg	5000
Chrysene	ND	ug/kg	5000
Dibenz(a,h)anthracene	ND	ug/kg	5000
Di-n-butyl phthalate	ND	ug/kg	5000
1,2-Dichlorobenzene	ND	ug/kg	5000
1,3-Dichlorobenzene	ND	ug/kg	5000
1,4-Dichlorobenzene	ND	ug/kg	5000
Diethyl phthalate	ND	ug/kg	5000
7,12-Dimethylbenz(a)-anthracene	ND	ug/kg	5000
Dimethyl phthalate	ND	ug/kg	5000
Di-n-octyl phthalate	ND	ug/kg	5000
Fluoranthene	ND	ug/kg	5000
Indene	ND	ug/kg	5000
1-Methylnaphthalene	ND	ug/kg	5000
Naphthalene	ND	ug/kg	5000
Phenanthrene	ND	ug/kg	5000
Pyrene	ND	ug/kg	5000
Pyridine	ND	ug/kg	10000
Quinoline	ND	ug/kg	25000
Benzenethiol	ND	ug/kg	--
Dibenz(a,h)acridine	ND	ug/kg	--
o-Cresol	ND	ug/kg	5000
m & p-Cresol(s)	ND	ug/kg	5000
2,4-Dimethylphenol	ND	ug/kg	5000
2,4-Dinitrophenol	ND	ug/kg	25000
4-Nitrophenol	ND	ug/kg	25000
Phenol	ND	ug/kg	5000
Nitrobenzene-d5	86	%	--
2-Fluorobiphenyl	89	%	--
Terphenyl-d14	83	%	--
Phenol-d5	79	%	--
2-Fluorophenol	86	%	--

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel Approved By: Jeff Lowry

Refinery Hazardous Constituent Semivolatiles (CONT.)

Enseco
A CORNING Company

Method 8270

Client Name: Giant Refining
Client ID: RFI0804V10.5
Lab ID: 010120-0001-SA Enseco ID: 1080749
Matrix: SOIL Sampled: 25 JUN 90 Received: 26 JUN 90
Authorized: 26 JUN 90 Prepared: 03 JUL 90 Analyzed: 16 JUL 90

Parameter	Result	Units	Reporting Limit
2,4,6-Tribromophenol	75	%	--

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel Approved By: Jeff Lowry

Refinery Hazardous Constituent Semivolatiles

Enseco
A CORNING Company

Method 8270

Client Name: Giant Refining
Client ID: RFI0804V08.0
Lab ID: 010120-0002-SA Enseco ID: 1080750
Matrix: SOIL Sampled: 25 JUN 90 Received: 26 JUN 90
Authorized: 26 JUN 90 Prepared: 03 JUL 90 Analyzed: 16 JUL 90

Parameter	Result	Units	Reporting Limit
Anthracene	ND	ug/kg	20000
Benzo(a)anthracene	ND	ug/kg	20000
Benzo(b)fluoranthene	ND	ug/kg	20000
Benzo(k)fluoranthene	ND	ug/kg	20000
Benzo(a)pyrene	ND	ug/kg	20000
bis(2-Ethylhexyl) phthalate	ND	ug/kg	20000
Butyl benzyl phthalate	ND	ug/kg	20000
Chrysene	ND	ug/kg	20000
Dibenz(a,h)anthracene	ND	ug/kg	20000
Di-n-butyl phthalate	ND	ug/kg	20000
1,2-Dichlorobenzene	ND	ug/kg	20000
1,3-Dichlorobenzene	ND	ug/kg	20000
1,4-Dichlorobenzene	ND	ug/kg	20000
Diethyl phthalate	ND	ug/kg	20000
7,12-Dimethylbenz(a)-anthracene	ND	ug/kg	20000
Dimethyl phthalate	ND	ug/kg	20000
Di-n-octyl phthalate	ND	ug/kg	20000
Fluoranthene	ND	ug/kg	20000
Indene	ND	ug/kg	20000
1-Methylnaphthalene	37000	ug/kg	20000
Naphthalene	ND	ug/kg	20000
Phenanthrene	27000	ug/kg	20000
Pyrene	ND	ug/kg	20000
Pyridine	ND	ug/kg	40000
Quinoline	ND	ug/kg	100000
Benzenethiol	ND	ug/kg	--
Dibenz(a,h)acridine	ND	ug/kg	--
o-Cresol	ND	ug/kg	20000
m & p-Cresol(s)	ND	ug/kg	20000
2,4-Dimethylphenol	ND	ug/kg	20000
2,4-Dinitrophenol	ND	ug/kg	100000
4-Nitrophenol	ND	ug/kg	100000
Phenol	ND	ug/kg	20000
Nitrobenzene-d5	82	%	--
2-Fluorobiphenyl	89	%	--
Terphenyl-d14	76	%	--
Phenol-d5	78	%	--
2-Fluorophenol	78	%	--

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel Approved By: Jeff Lowry

Refinery Hazardous Constituent Semivolatiles (CONT.)

Enseco
A CORNING Company

Method 8270

Client Name: Giant Refining
Client ID: RFI0804V08.0
Lab ID: 010120-0002-SA Enseco ID: 1080750
Matrix: SOIL Sampled: 25 JUN 90 Received: 26 JUN 90
Authorized: 26 JUN 90 Prepared: 03 JUL 90 Analyzed: 16 JUL 90

Parameter	Result	Units	Reporting Limit
2,4,6-Tribromophenol	71	%	--

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel Approved By: Jeff Lowry

Refinery Hazardous Constituent Semivolatiles

Enseco
A CORNING Company

Method 8270

Client Name: Giant Refining
Client ID: RFI0804V05.0
Lab ID: 010120-0003-SA Enseco ID: 1080751
Matrix: SOIL Sampled: 25 JUN 90 Received: 26 JUN 90
Authorized: 26 JUN 90 Prepared: 17 JUL 90 Analyzed: 18 JUL 90

Parameter	Result	Units	Reporting Limit
Anthracene	ND	ug/kg	5000
Benzo(a)anthracene	ND	ug/kg	5000
Benzo(b)fluoranthene	ND	ug/kg	5000
Benzo(k)fluoranthene	ND	ug/kg	5000
Benzo(a)pyrene	ND	ug/kg	5000
bis(2-Ethylhexyl) phthalate	ND	ug/kg	5000
Butyl benzyl phthalate	ND	ug/kg	5000
Chrysene	ND	ug/kg	5000
Dibenz(a,h)anthracene	ND	ug/kg	5000
Di-n-butyl phthalate	ND	ug/kg	5000
1,2-Dichlorobenzene	ND	ug/kg	5000
1,3-Dichlorobenzene	ND	ug/kg	5000
1,4-Dichlorobenzene	ND	ug/kg	5000
Diethyl phthalate	ND	ug/kg	5000
7,12-Dimethylbenz(a)-anthracene	ND	ug/kg	5000
Dimethyl phthalate	ND	ug/kg	5000
Di-n-octyl phthalate	ND	ug/kg	5000
Fluoranthene	ND	ug/kg	5000
Indene	ND	ug/kg	5000
1-Methylnaphthalene	ND	ug/kg	5000
Naphthalene	ND	ug/kg	5000
Phenanthrene	ND	ug/kg	5000
Pyrene	ND	ug/kg	5000
Pyridine	ND	ug/kg	10000
Quinoline	ND	ug/kg	25000
Benzenethiol	ND	ug/kg	--
Dibenz(a,h)acridine	ND	ug/kg	--
o-Cresol	ND	ug/kg	5000
m & p-Cresol(s)	ND	ug/kg	5000
2,4-Dimethylphenol	ND	ug/kg	5000
2,4-Dinitrophenol	ND	ug/kg	25000
4-Nitrophenol	ND	ug/kg	25000
Phenol	ND	ug/kg	5000
Nitrobenzene-d5	53	%	--
2-Fluorobiphenyl	64	%	--
Terphenyl-d14	70	%	--
Phenol-d5	58	%	--
2-Fluorophenol	68	%	--

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Angie Poturalski Approved By: Jeff Lowry

Refinery Hazardous Constituent Semivolatiles (CONT.)

Enseco
A CORNING Company

Method 8270

Client Name: Giant Refining
Client ID: RFI0804V05.0
Lab ID: 010120-0003-SA Enseco ID: I080751
Matrix: SOIL Sampled: 25 JUN 90 Received: 26 JUN 90
Authorized: 26 JUN 90 Prepared: 17 JUL 90 Analyzed: 18 JUL 90

Parameter	Result	Units	Reporting Limit
2,4,6-Tribromophenol	82	%	--

ND = Not detected
NA = Not applicable

Reported By: Angie Poturalski Approved By: Jeff Lowry

Refinery Hazardous Constituent Semivolatiles

Enseco
A CORNING Company

Method 8270

Client Name: Giant Refining
Client ID: RFI08505V10.5
Lab ID: 010120-0004-SA Enseco ID: 1080752
Matrix: SOIL Sampled: 25 JUN 90 Received: 26 JUN 90
Authorized: 26 JUN 90 Prepared: 03 JUL 90 Analyzed: 16 JUL 90

Parameter	Result	Units	Reporting Limit
Anthracene	ND	ug/kg	5000
Benzo(a)anthracene	ND	ug/kg	5000
Benzo(b)fluoranthene	ND	ug/kg	5000
Benzo(k)fluoranthene	ND	ug/kg	5000
Benzo(a)pyrene	ND	ug/kg	5000
bis(2-Ethylhexyl) phthalate	ND	ug/kg	5000
Butyl benzyl phthalate	ND	ug/kg	5000
Chrysene	ND	ug/kg	5000
Dibenz(a,h)anthracene	ND	ug/kg	5000
Di-n-butyl phthalate	ND	ug/kg	5000
1,2-Dichlorobenzene	ND	ug/kg	5000
1,3-Dichlorobenzene	ND	ug/kg	5000
1,4-Dichlorobenzene	ND	ug/kg	5000
Diethyl phthalate	ND	ug/kg	5000
7,12-Dimethylbenz(a)-anthracene	ND	ug/kg	5000
Dimethyl phthalate	ND	ug/kg	5000
Di-n-octyl phthalate	ND	ug/kg	5000
Fluoranthene	ND	ug/kg	5000
Indene	ND	ug/kg	5000
1-Methylnaphthalene	ND	ug/kg	5000
Naphthalene	ND	ug/kg	5000
Phenanthrene	ND	ug/kg	5000
Pyrene	ND	ug/kg	5000
Pyridine	ND	ug/kg	10000
Quinoline	ND	ug/kg	25000
Benzenethiol	ND	ug/kg	--
Dibenz(a,h)acridine	ND	ug/kg	--
o-Cresol	ND	ug/kg	5000
m & p-Cresol(s)	ND	ug/kg	5000
2,4-Dimethylphenol	ND	ug/kg	5000
2,4-Dinitrophenol	ND	ug/kg	25000
4-Nitrophenol	ND	ug/kg	25000
Phenol	ND	ug/kg	5000
Nitrobenzene-d5	78	%	--
2-Fluorobiphenyl	82	%	--
Terphenyl-d14	80	%	--
Phenol-d5	69	%	--
2-Fluorophenol	73	%	--

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel Approved By: Jeff Lowry

Refinery Hazardous Constituent Semivolatiles (CONT.)

Enseco
A CORNING Company

Method 8270

Client Name: Giant Refining
Client ID: RFI08505V10.5
Lab ID: 010120-0004-SA Enseco ID: 1080752
Matrix: SOIL Sampled: 25 JUN 90 Received: 26 JUN 90
Authorized: 26 JUN 90 Prepared: 03 JUL 90 Analyzed: 16 JUL 90

Parameter	Result	Units	Reporting Limit
2,4,6-Tribromophenol	71	%	--

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel Approved By: Jeff Lowry

Refinery Hazardous Constituent Semivolatiles

Enseco
A CORNING Company

Method 8270

Client Name: Giant Refining
Client ID: RFI08505V08.0
Lab ID: 010120-0005-SA Enseco ID: 1080753
Matrix: SOIL Sampled: 25 JUN 90 Received: 26 JUN 90
Authorized: 26 JUN 90 Prepared: 03 JUL 90 Analyzed: 16 JUL 90

Parameter	Result	Units	Reporting Limit
Anthracene	ND	ug/kg	5000
Benzo(a)anthracene	ND	ug/kg	5000
Benzo(b)fluoranthene	ND	ug/kg	5000
Benzo(k)fluoranthene	ND	ug/kg	5000
Benzo(a)pyrene	ND	ug/kg	5000
bis(2-Ethylhexyl) phthalate	ND	ug/kg	5000
Butyl benzyl phthalate	ND	ug/kg	5000
Chrysene	ND	ug/kg	5000
Dibenz(a,h)anthracene	ND	ug/kg	5000
Di-n-butyl phthalate	ND	ug/kg	5000
1,2-Dichlorobenzene	ND	ug/kg	5000
1,3-Dichlorobenzene	ND	ug/kg	5000
1,4-Dichlorobenzene	ND	ug/kg	5000
Diethyl phthalate	ND	ug/kg	5000
7,12-Dimethylbenz(a)-anthracene	ND	ug/kg	5000
Dimethyl phthalate	ND	ug/kg	5000
Di-n-octyl phthalate	ND	ug/kg	5000
Fluoranthene	ND	ug/kg	5000
Indene	ND	ug/kg	5000
1-Methylnaphthalene	ND	ug/kg	5000
Naphthalene	ND	ug/kg	5000
Phenanthrene	ND	ug/kg	5000
Pyrene	ND	ug/kg	5000
Pyridine	ND	ug/kg	10000
Quinoline	ND	ug/kg	25000
Benzenethiol	ND	ug/kg	--
Dibenz(a,h)acridine	ND	ug/kg	--
o-Cresol	ND	ug/kg	5000
m & p-Cresol(s)	ND	ug/kg	5000
2,4-Dimethylphenol	ND	ug/kg	5000
2,4-Dinitrophenol	ND	ug/kg	25000
4-Nitrophenol	ND	ug/kg	25000
Phenol	ND	ug/kg	5000
Nitrobenzene-d5	84	%	--
2-Fluorobiphenyl	87	%	--
Terphenyl-d14	90	%	--
Phenol-d5	76	%	--
2-Fluorophenol	83	%	--

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel Approved By: Jeff Lowry

Method 8270

Client Name: Giant Refining
Client ID: RFI08505V08.0
Lab ID: 010120-0005-SA
Enseco ID: 1080753
Matrix: SOIL
Sampled: 25 JUN 90
Received: 26 JUN 90
Authorized: 26 JUN 90
Prepared: 03 JUL 90
Analyzed: 16 JUL 90

Parameter	Result	Units	Reporting Limit
2,4,6-Tribromophenol	76	%	--

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel

Approved By: Jeff Lowry

Enseco
A CORNING Company

Refinery Hazardous Constituent Semivolatiles

Method 8270

Client Name: Giant Refining
Client ID: RFI08505V05.0
Lab ID: 010120-0006-SA
Matrix: SOIL
Authorized: 26 JUN 90

Enseco ID: 1080754
Sampled: 25 JUN 90
Prepared: 03 JUL 90

Received: 26 JUN 90
Analyzed: 16 JUL 90

Parameter	Result	Units	Reporting Limit
Anthracene	ND	ug/kg	5000
Benzo(a)anthracene	ND	ug/kg	5000
Benzo(b)fluoranthene	ND	ug/kg	5000
Benzo(k)fluoranthene	ND	ug/kg	5000
Benzo(a)pyrene	ND	ug/kg	5000
bis(2-Ethylhexyl) phthalate	ND	ug/kg	5000
Butyl benzyl phthalate	ND	ug/kg	5000
Chrysene	ND	ug/kg	5000
Dibenz(a,h)anthracene	ND	ug/kg	5000
Di-n-butyl phthalate	ND	ug/kg	5000
1,2-Dichlorobenzene	ND	ug/kg	5000
1,3-Dichlorobenzene	ND	ug/kg	5000
1,4-Dichlorobenzene	ND	ug/kg	5000
Diethyl phthalate	ND	ug/kg	5000
7,12-Dimethylbenz(a)-anthracene	ND	ug/kg	5000
Dimethyl phthalate	ND	ug/kg	5000
Di-n-octyl phthalate	ND	ug/kg	5000
Fluoranthene	ND	ug/kg	5000
Indene	ND	ug/kg	5000
1-Methylnaphthalene	ND	ug/kg	5000
Naphthalene	ND	ug/kg	5000
Phenanthrene	ND	ug/kg	5000
Pyrene	ND	ug/kg	5000
Pyridine	ND	ug/kg	10000
Quinoline	ND	ug/kg	25000
Benzenethiol	ND	ug/kg	--
Dibenz(a,h)acridine	ND	ug/kg	--
o-Cresol	ND	ug/kg	5000
m & p-Cresol(s)	ND	ug/kg	5000
2,4-Dimethylphenol	ND	ug/kg	5000
2,4-Dinitrophenol	ND	ug/kg	25000
4-Nitrophenol	ND	ug/kg	25000
Phenol	ND	ug/kg	5000
Nitrobenzene-d5	78	%	--
2-Fluorobiphenyl	85	%	--
Terphenyl-d14	74	%	--
Phenol-d5	72	%	--
2-Fluorophenol	76	%	--

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel

Approved By: Jeff Lowry

Refinery Hazardous Constituent Semivolatiles (CONT.)

Enseco
A CORNING Company

Method 8270

Client Name: Giant Refining
Client ID: RFI08505V05.0
Lab ID: 010120-0006-SA Enseco ID: 1080754
Matrix: SOIL Sampled: 25 JUN 90 Received: 26 JUN 90
Authorized: 26 JUN 90 Prepared: 03 JUL 90 Analyzed: 16 JUL 90

Parameter	Result	Units	Reporting Limit
2,4,6-Tribromophenol	77	%	--

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel Approved By: Jeff Lowry

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI0804V10.5
Lab ID: 010120-0001-SA
Enseco ID: 1080749
Matrix: SOIL
Sampled: 25 JUN 90
Received: 26 JUN 90
Authorized: 26 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/kg	6.0	6010	18 JUL 90	23 JUL 90
Arsenic	ND	mg/kg	0.50	7060	16 JUL 90	18 JUL 90
Barium	216	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Beryllium	1.1	mg/kg	0.20	6010	18 JUL 90	23 JUL 90
Cadmium	ND	mg/kg	0.50	6010	18 JUL 90	23 JUL 90
Chromium	5.9	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Cobalt	2.6	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Copper	5.5	mg/kg	2.0	6010	18 JUL 90	23 JUL 90
Lead	9.5	mg/kg	5.0	6010	18 JUL 90	23 JUL 90
Mercury	ND	mg/kg	0.10	7471	17 JUL 90	17 JUL 90
Nickel	6.8	mg/kg	4.0	6010	18 JUL 90	23 JUL 90
Potassium	1500	mg/kg	500	6010	18 JUL 90	23 JUL 90
Selenium	ND	mg/kg	1.0	7740	16 JUL 90	18 JUL 90
Vanadium	15.8	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Zinc	11.4	mg/kg	2.0	6010	18 JUL 90	23 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Fred Velasquez
Approved By: Toni Lusk

Enseco
A CORNING Company

Total Metals

Client Name: Giant Refining
Client ID: RFI0804V08.0
Lab ID: 010120-0002-SA
Enseco ID: 1080750
Matrix: SOIL
Sampled: 25 JUN 90
Received: 26 JUN 90
Authorized: 26 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/kg	6.0	6010	18 JUL 90	23 JUL 90
Arsenic	ND	mg/kg	0.50	7060	16 JUL 90	18 JUL 90
Barium	276	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Beryllium	0.95	mg/kg	0.20	6010	18 JUL 90	23 JUL 90
Cadmium	ND	mg/kg	0.50	6010	18 JUL 90	23 JUL 90
Chromium	6.7	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Cobalt	2.5	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Copper	4.6	mg/kg	2.0	6010	18 JUL 90	23 JUL 90
Lead	9.6	mg/kg	5.0	6010	18 JUL 90	23 JUL 90
Mercury	ND	mg/kg	0.10	7471	17 JUL 90	17 JUL 90
Nickel	7.5	mg/kg	4.0	6010	18 JUL 90	23 JUL 90
Potassium	1030	mg/kg	500	6010	18 JUL 90	23 JUL 90
Selenium	ND	mg/kg	1.0	7740	16 JUL 90	18 JUL 90
Vanadium	15.5	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Zinc	10.9	mg/kg	2.0	6010	18 JUL 90	23 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Fred Velasquez
Approved By: Toni Lusk

Enseco
A CORNING Company

Total Metals

Client Name: Giant Refining
Client ID: RFI0804V05.0
Lab ID: 010120-0003-SA
Enseco ID: 1080751
Matrix: SOIL
Sampled: 25 JUN 90
Received: 26 JUN 90
Authorized: 26 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/kg	6.0	6010	18 JUL 90	23 JUL 90
Arsenic	ND	mg/kg	1.0	7060	16 JUL 90	18 JUL 90
Barium	291	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Beryllium	0.95	mg/kg	0.20	6010	18 JUL 90	23 JUL 90
Cadmium	ND	mg/kg	0.50	6010	18 JUL 90	23 JUL 90
Chromium	6.4	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Cobalt	2.0	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Copper	4.8	mg/kg	2.0	6010	18 JUL 90	23 JUL 90
Lead	13.3	mg/kg	5.0	6010	18 JUL 90	23 JUL 90
Mercury	ND	mg/kg	0.10	7471	17 JUL 90	17 JUL 90
Nickel	7.6	mg/kg	4.0	6010	18 JUL 90	23 JUL 90
Potassium	980	mg/kg	500	6010	18 JUL 90	23 JUL 90
Selenium	ND	mg/kg	1.0	7740	16 JUL 90	18 JUL 90
Vanadium	15.0	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Zinc	11.1	mg/kg	2.0	6010	18 JUL 90	23 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Fred Velasquez
Approved By: Toni Lusk

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI08505V10.5
Lab ID: 010120-0004-SA
Matrix: SOIL
Authorized: 26 JUN 90

Enseco ID: 1080752
Sampled: 25 JUN 90
Prepared: See Below

Received: 26 JUN 90
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/kg	6.0	6010	18 JUL 90	23 JUL 90
Arsenic	ND	mg/kg	0.50	7060	16 JUL 90	18 JUL 90
Barium	226	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Beryllium	0.61	mg/kg	0.20	6010	18 JUL 90	23 JUL 90
Cadmium	ND	mg/kg	0.50	6010	18 JUL 90	23 JUL 90
Chromium	3.8	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Cobalt	1.5	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Copper	3.8	mg/kg	2.0	6010	18 JUL 90	23 JUL 90
Lead	6.1	mg/kg	5.0	6010	18 JUL 90	23 JUL 90
Mercury	ND	mg/kg	0.10	7471	17 JUL 90	17 JUL 90
Nickel	4.3	mg/kg	4.0	6010	18 JUL 90	23 JUL 90
Potassium	610	mg/kg	500	6010	18 JUL 90	23 JUL 90
Selenium	ND	mg/kg	1.0	7740	16 JUL 90	18 JUL 90
Vanadium	11.5	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Zinc	7.5	mg/kg	2.0	6010	18 JUL 90	23 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Fred Velasquez

Approved By: Toni Lusk

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI08505V08.0
Lab ID: 010120-0005-SA
Enseco ID: 1080753
Matrix: SOIL
Sampled: 25 JUN 90
Received: 26 JUN 90
Authorized: 26 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/kg	6.0	6010	18 JUL 90	23 JUL 90
Arsenic	ND	mg/kg	0.50	7060	16 JUL 90	18 JUL 90
Barium	300	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Beryllium	1.1	mg/kg	0.20	6010	18 JUL 90	23 JUL 90
Cadmium	ND	mg/kg	0.50	6010	18 JUL 90	23 JUL 90
Chromium	8.3	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Cobalt	3.1	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Copper	5.7	mg/kg	2.0	6010	18 JUL 90	23 JUL 90
Lead	10.1	mg/kg	5.0	6010	18 JUL 90	23 JUL 90
Mercury	ND	mg/kg	0.10	7471	17 JUL 90	17 JUL 90
Nickel	9.1	mg/kg	4.0	6010	18 JUL 90	23 JUL 90
Potassium	2110	mg/kg	500	6010	18 JUL 90	23 JUL 90
Selenium	ND	mg/kg	1.0	7740	16 JUL 90	18 JUL 90
Vanadium	16.9	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Zinc	15.0	mg/kg	2.0	6010	18 JUL 90	23 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Fred Velasquez
Approved By: Toni Lusk

Enseco
A CORNING Company

Metals

Total Metals

Client Name: Giant Refining
Client ID: RFI08505V05.0
Lab ID: 010120-0006-SA
Enseco ID: 1080754
Matrix: SOIL
Sampled: 25 JUN 90
Received: 26 JUN 90
Authorized: 26 JUN 90
Prepared: See Below
Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/kg	6.0	6010	18 JUL 90	23 JUL 90
Arsenic	ND	mg/kg	0.50	7060	16 JUL 90	18 JUL 90
Barium	302	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Beryllium	0.93	mg/kg	0.20	6010	18 JUL 90	23 JUL 90
Cadmium	0.70	mg/kg	0.50	6010	18 JUL 90	23 JUL 90
Chromium	6.2	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Cobalt	2.1	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Copper	4.7	mg/kg	2.0	6010	18 JUL 90	23 JUL 90
Lead	9.3	mg/kg	5.0	6010	18 JUL 90	23 JUL 90
Mercury	ND	mg/kg	0.10	7471	17 JUL 90	17 JUL 90
Nickel	6.6	mg/kg	4.0	6010	18 JUL 90	23 JUL 90
Potassium	1060	mg/kg	500	6010	18 JUL 90	23 JUL 90
Selenium	ND	mg/kg	1.0	7740	16 JUL 90	18 JUL 90
Vanadium	14.8	mg/kg	1.0	6010	18 JUL 90	23 JUL 90
Zinc	10.5	mg/kg	2.0	6010	18 JUL 90	23 JUL 90

ND = Not detected
NA = Not applicable

Reported By: Fred Velasquez
Approved By: Toni Lusk

IV. QUALITY CONTROL REPORT

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 surrogate compounds appropriate to the method being used. In cases where no surrogate is available, (e.g., metals or conventional analyses) a single DCS serves as the control sample. An SCS is prepared for each sample lot for which the DCS pair are not analyzed. The recovery of the SCS is charted in exactly the same manner as described for the DCS, and provides a daily check on the performance of the method.

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).

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

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.

Enseco
A CORNING Company

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)
010120-0001-SA	SOIL	8240-S	05 JUL 90-B	05 JUL 90-B2
010120-0002-SA	SOIL	8240-S	05 JUL 90-B	05 JUL 90-B2
010120-0003-SA	SOIL	8240-S	05 JUL 90-B	05 JUL 90-B2
010120-0004-SA	SOIL	8240-S	05 JUL 90-B	05 JUL 90-B2
010120-0005-SA	SOIL	8240-S	05 JUL 90-B	05 JUL 90-B2
010120-0006-SA	SOIL	8240-S	05 JUL 90-B	05 JUL 90-B2

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: 8240-S Matrix: SOIL QC Lot: 05 JUL 90-B Concentration Units: ug/kg								
1,1-Dichloroethene	5000	5750	5700	5720	115	59-172	0.9	22
Trichloroethene	5000	5230	5120	5180	104	62-137	2.1	24
Benzene	5000	5420	5910	5660	113	66-142	8.6	21
Toluene	5000	5290	5170	5230	105	59-139	2.3	21
Chlorobenzene	5000	5220	5200	5210	104	60-133	0.4	21

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

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Measured	Accuracy(%) SCS	Limits
Category: 8240-S				
Matrix: SOIL				
QC Lot: 05 JUL 90-B QC Run: 05 JUL 90-B2				
Concentration Units: ug/kg				
1,2-Dichloroethane-d4	5000	4860	97	70-121
4-Bromofluorobenzene	5000	4930	99	74-121
Toluene-d8	5000	4820	96	81-117

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: 8240-REF-S			
Matrix: SOIL			
QC Lot: 05 JUL 90-B QC Run: 05 JUL 90-B2			
Benzene	ND	ug/kg	500
Carbon disulfide	ND	ug/kg	500
Chlorobenzene	ND	ug/kg	500
Chloroform	ND	ug/kg	500
EDB (1,2-Dibromoethane)	ND	ug/kg	1000
1,2-Dichloroethane	ND	ug/kg	500
1,4-Dioxane	ND	ug/kg	50000
Ethylbenzene	ND	ug/kg	500
2-Butanone (MEK)	ND	ug/kg	1000
Styrene	ND	ug/kg	500
Toluene	ND	ug/kg	500
Xylenes (total)	ND	ug/kg	500

Enseco
A CORNING Company

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)
010120-0001-SA	SOIL	8270-S	03 JUL 90-B	03 JUL 90-C
010120-0002-SA	SOIL	8270-S	03 JUL 90-B	03 JUL 90-C
010120-0003-SA	SOIL	8270-S	17 JUL 90-A	17 JUL 90-A
010120-0004-SA	SOIL	8270-S	03 JUL 90-B	03 JUL 90-C
010120-0005-SA	SOIL	8270-S	03 JUL 90-B	03 JUL 90-C
010120-0006-SA	SOIL	8270-S	03 JUL 90-B	03 JUL 90-C

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: 8270-S Matrix: SOIL QC Lot: 03 JUL 90-B Concentration Units: ug/kg								
Phenol	6670	5480	4900	5190	78	26- 90	11	35
2-Chlorophenol	6670	5260	4960	5110	77	25-102	5.9	50
1,4-Dichlorobenzene	3330	2180	2100	2140	64	28-104	3.7	27
N-Nitroso-di-n-propylamine	3330	2400	2400	2400	72	41-126	0.0	38
1,2,4-Trichlorobenzene	3330	2350	2390	2370	71	38-107	1.7	23
4-Chloro-3-methylphenol	6670	6160	5770	5960	89	26-103	6.5	33
Acenaphthene	3330	2380	2220	2300	69	31-137	7.0	19
4-Nitrophenol	6670	3900	4630	4260	64	11-114	17	50
2,4-Dinitrotoluene	3330	2840	2710	2780	83	28- 89	4.7	47
Pentachlorophenol	6670	3780	5770	4780	72	17-109	42	47
Pyrene	3330	3070	2840	2960	89	35-142	7.8	36
Category: 8270-S Matrix: SOIL QC Lot: 17 JUL 90-A Concentration Units: ug/kg								
Phenol	6670	4640	4020	4330	65	26- 90	14	35
2-Chlorophenol	6670	6030	5100	5560	83	25-102	17	50
1,4-Dichlorobenzene	3330	2440	2110	2280	68	28-104	15	27
N-Nitroso-di-n-propylamine	3330	2180	1870	2020	61	41-126	15	38
1,2,4-Trichlorobenzene	3330	3080	2690	2880	87	38-107	14	23
4-Chloro-3-methylphenol	6670	5790	5100	5440	82	26-103	13	33
Acenaphthene	3330	2920	2530	2720	82	31-137	14	19
4-Nitrophenol	6670	4150	3020	3580	54	11-114	32	50
2,4-Dinitrotoluene	3330	3370	3020	3200	96	28- 89	11	47
Pentachlorophenol	6670	2480	1530	2000	30	17-109	47	47
Pyrene	3330	3190	2950	3070	92	35-142	7.8	36

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

Enseco
A CORNING Company

SINGLE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

Analyte	Concentration Spiked	Measured	Accuracy(%) SCS	Limits
Category: 8270-S Matrix: SOIL QC Lot: 03 JUL 90-B QC Run: 03 JUL 90-C Concentration Units: ug/kg				
Nitrobenzene-d5	1670	1050	63	23-120
2-Fluorobiphenyl	1670	1090	65	30-115
Terphenyl-d14	1670	1240	74	18-137
2-Fluorophenol	3330	2150	65	25-121
Phenol-d5	3330	2090	63	24-113
2,4,6-Tribromophenol	3330	2490	75	19-122
Category: 8270-S Matrix: SOIL QC Lot: 17 JUL 90-A QC Run: 17 JUL 90-A Concentration Units: ug/kg				
Nitrobenzene-d5	1670	1300	78	23-120
2-Fluorobiphenyl	1670	1340	80	30-115
Terphenyl-d14	1670	1390	83	18-137
2-Fluorophenol	3330	2460	74	25-121
Phenol-d5	3330	2430	73	24-113
2,4,6-Tribromophenol	3330	2100	63	19-122

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

Enseco
A CORNING Company

METHOD BLANK REPORT
Semivolatile Organics by GC/MS

Analyte	Result	Units	Reporting Limit
Test: 8270-REF-S			
Matrix: SOIL			
QC Lot: 03 JUL 90-B QC Run: 03 JUL 90-C			
Anthracene	ND	ug/kg	5000
Benzo(a)anthracene	ND	ug/kg	5000
Benzo(b)fluoranthene	ND	ug/kg	5000
Benzo(k)fluoranthene	ND	ug/kg	5000
Benzo(a)pyrene	ND	ug/kg	5000
bis(2-Ethylhexyl) phthalate	ND	ug/kg	5000
Butyl benzyl phthalate	ND	ug/kg	5000
Chrysene	ND	ug/kg	5000
Dibenz(a,h)anthracene	ND	ug/kg	5000
Di-n-butyl phthalate	ND	ug/kg	5000
1,2-Dichlorobenzene	ND	ug/kg	5000
1,3-Dichlorobenzene	ND	ug/kg	5000
1,4-Dichlorobenzene	ND	ug/kg	5000
Diethyl phthalate	ND	ug/kg	5000
7,12-Dimethylbenz(a)-anthracene	ND	ug/kg	5000
Dimethyl phthalate	ND	ug/kg	5000
Di-n-octyl phthalate	ND	ug/kg	5000
Fluoranthene	ND	ug/kg	5000
Indene	ND	ug/kg	5000
1-Methylnaphthalene	ND	ug/kg	5000
Naphthalene	ND	ug/kg	5000
Phenanthrene	ND	ug/kg	5000
Pyrene	ND	ug/kg	5000
Pyridine	ND	ug/kg	10000
Quinoline	ND	ug/kg	25000
Benzenethiol	ND	ug/kg	--
Dibenz(a,h)acridine	ND	ug/kg	--
o-Cresol	ND	ug/kg	5000
m & p-Cresol(s)	ND	ug/kg	5000
2,4-Dimethylphenol	ND	ug/kg	5000
2,4-Dinitrophenol	ND	ug/kg	25000
4-Nitrophenol	ND	ug/kg	25000
Phenol	ND	ug/kg	5000

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

Analyte	Result	Units	Reporting Limit
Test: 8270-REF-S			
Matrix: SOIL			
QC Lot: 17 JUL 90-A QC Run: 17 JUL 90-A			
Anthracene	ND	ug/kg	5000
Benzo(a)anthracene	ND	ug/kg	5000
Benzo(b)fluoranthene	ND	ug/kg	5000
Benzo(k)fluoranthene	ND	ug/kg	5000
Benzo(a)pyrene	ND	ug/kg	5000
bis(2-Ethylhexyl) phthalate	ND	ug/kg	5000
Butyl benzyl phthalate	ND	ug/kg	5000
Chrysene	ND	ug/kg	5000
Dibenz(a,h)anthracene	ND	ug/kg	5000
Di-n-butyl phthalate	ND	ug/kg	5000
1,2-Dichlorobenzene	ND	ug/kg	5000
1,3-Dichlorobenzene	ND	ug/kg	5000
1,4-Dichlorobenzene	ND	ug/kg	5000
Diethyl phthalate	ND	ug/kg	5000
7,12-Dimethylbenz(a)-anthracene	ND	ug/kg	5000
Dimethyl phthalate	ND	ug/kg	5000
Di-n-octyl phthalate	ND	ug/kg	5000
Fluoranthene	ND	ug/kg	5000
Indene	ND	ug/kg	5000
1-Methylnaphthalene	ND	ug/kg	5000
Naphthalene	ND	ug/kg	5000
Phenanthrene	ND	ug/kg	5000
Pyrene	ND	ug/kg	5000
Pyridine	ND	ug/kg	10000
Quinoline	ND	ug/kg	25000
Benzenethiol	ND	ug/kg	--
Dibenz(a,h)acridine	ND	ug/kg	--
o-Cresol	ND	ug/kg	5000
m & p-Cresol(s)	ND	ug/kg	5000
2,4-Dimethylphenol	ND	ug/kg	5000
2,4-Dinitrophenol	ND	ug/kg	25000
4-Nitrophenol	ND	ug/kg	25000
Phenol	ND	ug/kg	5000

Enseco
A CORNING Company

QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
010120-0001-SA	SOIL	HG-CVAA-S	17 JUL 90-A	17 JUL 90-A
010120-0001-SA	SOIL	AS-FAA-S	16 JUL 90-D	16 JUL 90-D
010120-0001-SA	SOIL	SE-FAA-S	16 JUL 90-D	16 JUL 90-D
010120-0001-SA	SOIL	ICP-S	18 JUL 90-D	18 JUL 90-D
010120-0002-SA	SOIL	HG-CVAA-S	17 JUL 90-A	17 JUL 90-A
010120-0002-SA	SOIL	AS-FAA-S	16 JUL 90-D	16 JUL 90-D
010120-0002-SA	SOIL	SE-FAA-S	16 JUL 90-D	16 JUL 90-D
010120-0002-SA	SOIL	ICP-S	18 JUL 90-D	18 JUL 90-D
010120-0003-SA	SOIL	HG-CVAA-S	17 JUL 90-A	17 JUL 90-A
010120-0003-SA	SOIL	AS-FAA-S	16 JUL 90-D	16 JUL 90-D
010120-0003-SA	SOIL	SE-FAA-S	16 JUL 90-D	16 JUL 90-D
010120-0003-SA	SOIL	ICP-S	18 JUL 90-D	18 JUL 90-D
010120-0004-SA	SOIL	HG-CVAA-S	17 JUL 90-A	17 JUL 90-A
010120-0004-SA	SOIL	AS-FAA-S	16 JUL 90-D	16 JUL 90-D
010120-0004-SA	SOIL	SE-FAA-S	16 JUL 90-D	16 JUL 90-D
010120-0004-SA	SOIL	ICP-S	18 JUL 90-D	18 JUL 90-D
010120-0005-SA	SOIL	HG-CVAA-S	17 JUL 90-A	17 JUL 90-A
010120-0005-SA	SOIL	AS-FAA-S	16 JUL 90-D	16 JUL 90-D
010120-0005-SA	SOIL	SE-FAA-S	16 JUL 90-D	16 JUL 90-D
010120-0005-SA	SOIL	ICP-S	18 JUL 90-D	18 JUL 90-D
010120-0006-SA	SOIL	HG-CVAA-S	17 JUL 90-B	17 JUL 90-B
010120-0006-SA	SOIL	AS-FAA-S	16 JUL 90-D	16 JUL 90-D
010120-0006-SA	SOIL	SE-FAA-S	16 JUL 90-D	16 JUL 90-D
010120-0006-SA	SOIL	ICP-S	18 JUL 90-D	18 JUL 90-D

Enseco
A CORNING Company

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: HG-CVAA-S Matrix: SOIL QC Lot: 17 JUL 90-A Concentration Units: mg/kg								
Mercury	0.50	0.510	0.522	0.516	103	75-125	2.3	20
Category: AS-FAA-S Matrix: SOIL QC Lot: 16 JUL 90-D Concentration Units: mg/kg								
Arsenic	4.0	3.63	3.78	3.70	93	75-125	4.0	20
Category: SE-FAA-S Matrix: SOIL QC Lot: 16 JUL 90-D Concentration Units: mg/kg								
Selenium	1.0	0.920	1.04	0.980	98	75-125	12	20
Category: ICP-S Matrix: SOIL QC Lot: 18 JUL 90-D Concentration Units: mg/kg								
Aluminum	200	204	203	204	102	75-125	0.6	20
Antimony	50	47.5	45.9	46.7	93	75-125	3.3	20
Arsenic	50	44.7	44.5	44.6	89	75-125	0.5	20
Barium	200	183	181	182	91	75-125	0.9	20
Beryllium	5.0	4.95	5.04	4.99	100	75-125	1.8	20
Cadmium	5.0	4.20	4.14	4.17	83	75-125	1.6	20
Calcium	10000	10200	10100	10200	102	75-125	1.5	20
Chromium	20	20.2	19.7	19.9	100	75-125	2.4	20
Cobalt	50	44.8	44.7	44.7	89	75-125	0.3	20
Copper	25	24.0	23.9	24.0	96	75-125	0.6	20
Iron	100	97.7	97.3	97.5	97	75-125	0.4	20
Lead	50	46.0	44.1	45.0	90	75-125	4.3	20
Magnesium	5000	5210	5140	5180	104	75-125	1.4	20
Manganese	50	46.1	45.7	45.9	92	75-125	0.8	20
Nickel	50	45.8	45.4	45.6	91	75-125	0.7	20
Potassium	5000	5070	5050	5060	101	75-125	0.5	20

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

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-S Matrix: SOIL QC Lot: 18 JUL 90-D Concentration Units: mg/kg								
Silver	5.0	4.96	4.91	4.94	99	75-125	0.9	20
Sodium	10000	10100	10100	10100	101	75-125	0.3	20
Vanadium	50	50.7	50.6	50.6	101	75-125	0.3	20
Zinc	50	44.7	43.8	44.3	89	75-125	1.9	20
Category: HG-CVAA-S Matrix: SOIL QC Lot: 17 JUL 90-B Concentration Units: mg/kg								
Mercury	0.50	0.522	0.534	0.528	106	75-125	2.3	20

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

Enseco
A CORNING Company

METHOD BLANK REPORT
Metals Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: HG-CVAA-S Matrix: SOIL QC Lot: 17 JUL 90-A QC Run: 17 JUL 90-A			
Mercury	ND	mg/kg	0.10
Test: AS-FAA-S Matrix: SOIL QC Lot: 16 JUL 90-D QC Run: 16 JUL 90-D			
Arsenic	ND	mg/kg	0.50
Test: SE-FAA-S Matrix: SOIL QC Lot: 16 JUL 90-D QC Run: 16 JUL 90-D			
Selenium	ND	mg/kg	0.50
Test: ICP-S Matrix: SOIL QC Lot: 18 JUL 90-D QC Run: 18 JUL 90-D			
Antimony	ND	mg/kg	6.0
Barium	ND	mg/kg	1.0
Beryllium	ND	mg/kg	0.20
Cadmium	ND	mg/kg	0.50
Chromium	ND	mg/kg	1.0
Cobalt	ND	mg/kg	1.0
Copper	ND	mg/kg	2.0
Lead	ND	mg/kg	5.0
Nickel	ND	mg/kg	4.0
Potassium	ND	mg/kg	500
Vanadium	ND	mg/kg	1.0
Zinc	ND	mg/kg	2.0

Enseco
A CORNING Company

METHOD BLANK REPORT
Metals Analysis and Preparation (cont.)

Analyte	Result	Units	Reporting Limit
Test: HG-CVAA-S			
Matrix: SOIL			
QC Lot: 17 JUL 90-B QC Run: 17 JUL 90-B			
Mercury	ND	mg/kg	0.10

Enseco - Rocky Mountain Analytical

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

CHAIN OF CUSTODY

No.

Attn: Julie Essex

Enseco Client Giant Refinery

Project RFI

Sampling Co. Giant Refining

Sampling Site Ciniza Refinery

Team Leader Claud Rosendale

RMAL # 10120

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: Claud Rosendale
5. Initial Contents Temp.: — °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	Analysis Parameters	Remarks
01	6-25-90	9:45	RFI 0804 V05.0	VOA	32	SEE Attached	
01	6-25-90	9:45	RFI0804 V05.0	metal. organic	30	SEE Attached	
02	6-25-90	10:00	RFI 0804 V08.0	VOA	32	SEE Attached	
02	6-25-90	10:00	RFI0804 V08.0	metal organic	30	SEE Attached	
03	6-25-90	10:30	RFI0804 V05.0	VOA	32	SEE Attached	
03	6-25-90	10:30	RFI0804 V05.0	metal. organic	30	SEE Attached	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	Claud Rosendale		6-25-90	2:15pm
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: Claud Rosendale

Method of Shipment: Fed. Express Airbill # _____

Received for Lab: RMAL Signed: Joseph A Myers Date/Time 6/26/90 0806

Enseco Project No. 10120

White and Pink Copies to Lab Yellow to Sampler

SS-0

Enseco - Rocky Mountain Analytical

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

CHAIN OF CUSTODY

No.

Attn: Julie Essex

Enseco Client Great Refinery

Project RFI

Sampling Co. Great Refinery

Sampling Site Ciniza Refinery

Team Leader Claud Rosendale

RMAL #10110

SAMPLE SAFE™ CONDITIONS

1. Packed by: _____ Seal # 04
2. Seal Intact Upon Receipt by Sampling Co.: (Yes) No
3. Condition of Contents: Good
4. Sealed for Shipping by: Claud Rosendale
5. Initial Contents Temp.: _____ °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: _____

RMA # 10120	Date	Time	Sample ID/Description	Sample Type	No. Containers	Analysis Parameters	Remarks
04	6-25-90	1:00	RIF09505V10.5 04	VOA	32	SEE Attached	
04	6-25-90	1:00	RIF09505V10.5 04	metal Organic	30	SEE Attached	
05	6-25-90	1:15	RIF09505VOA.0 05	VOA	32	SEE Attached	
05	6-25-90	1:15	RIF09505VOA.D 05	metal organic	30	SEE Attached	
06	6-25-90	1:20	RIF09505VO5.0 06	VOA	32	SEE Attached	
06	6-25-90	1:20	RIF09505VO5.0 06	metal organic	30	SEE Attached	
	~~6-25-90~~		→ 08 per Claude Rosendale				
	~~6-25-90~~						
	~~6-25-90~~						

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	Claud Rosendale		6-25-90	2:15
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: Claud Rosendale

Method of Shipment: Fed express Airbill #

Received for Lab: RMAL Signed: Joseph A Myers Date/Time 6/26/90

Enseco Project No. 10120 0 of 00

White and Pink Copies to Lab Yellow to Sampler

SS-001

9.264