

Enseco Incorporated

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ANALYTICAL RESULTS  
FOR  
U.S. GEOLOGICAL SURVEY  
ENSECO-RMAL NO. 011204

OCTOBER 4, 1990



KAFB1054



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**ANALYTICAL RESULTS  
FOR  
U.S. GEOLOGICAL SURVEY  
ENSECO-RMAL NO. 011204**



**OCTOBER 4, 1990**

011204  
10/04/90

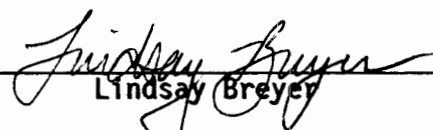
ANALYTICAL RESULTS  
FOR  
U.S. GEOLOGICAL SURVEY  
ENSECO-RMAL NO. 011204

Enseco

OCTOBER 4, 1990

Reviewed by:

  
\_\_\_\_\_  
Randall Thompson

  
\_\_\_\_\_  
Lindsay Breyer

## **Introduction**

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

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

## **Sample Description Information**

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

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

## **Analytical Test Requests**

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

SAMPLE DESCRIPTION INFORMATION  
for  
U.S. Geological Survey

Lab ID	Client ID	Matrix	Sampled Date	Time	Received Date
011204-0001-SA	KAFB090207-2	AQUEOUS	04 SEP 90	14:55	05 SEP 90
011204-0002-SA	KAFB090208-2	AQUEOUS	04 SEP 90	14:55	05 SEP 90

ANALYTICAL TEST REQUESTS  
for  
U.S. Geological Survey

Lab ID: 011204	Group Code	Analysis Description	Custom Test?
0001 - 0002	A	Total Organic Carbon (TOC)	N
		Total Organic Halogen (TOX)	N
		Nitrate Plus Nitrite	N
		Chromium, Furnace AA	N
		Chromium, Furnace AA (Total)	N
		Prep - Total Metals, ICP	N
		Halogenated Volatile Organics	N
		Halogenated Volatile Organics-2nd Column Analysis	N
		Semivolatile Organics Appendix IX List	N
		Prep - Semivolatile Organics by GC/MS	N
		Semivolatiles Library Search (20 Compound ID)	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, May, 1989.

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

Semivolatile Organics  
Appendix IX List  
Method 8270

Client Name: U.S. Geological Survey  
 Client ID: KAFB090207-2  
 Lab ID: 011204-0001-SA  
 Matrix: AQUEOUS  
 Authorized: 05 SEP 90

Sampled: 04 SEP 90  
 Prepared: 06 SEP 90

Received: 05 SEP 90  
 Analyzed: 17 SEP 90

Parameter	Result	Units	Reporting Limit
Acenaphthene	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acetophenone	ND	ug/L	10
2-Acetylaminofluorene	ND	ug/L	100
4-Aminobiphenyl	ND	ug/L	10
Aniline	ND	ug/L	10
Anthracene	ND	ug/L	10
Aramite	ND	ug/L	10
Benzo(a)anthracene	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Benzyl alcohol	ND	ug/L	10
4-Bromophenyl phenyl ether	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
2-sec-Butyl-4,6-dinitro- phenol	ND	ug/L	10
4-Chloroaniline	ND	ug/L	10
bis(2-Chloroethoxy)- methane	ND	ug/L	10
bis(2-Chloroethyl) ether	ND	ug/L	10
bis(2-Chloroisopropyl)- ether	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Chrysene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Dibenzofuran	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
2,4-Dichlorophenol	ND	ug/L	10
2,6-Dichlorophenol	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10

(continued on following page)

ND = Not detected  
 NA = Not applicable

Reported By: Dan Albritton

Approved By: Jeff Lowry



Semivolatile Organics  
Appendix IX List  
Method 8270

Client Name: U.S. Geological Survey  
Client ID: KAFB090207-2  
Lab ID: 011204-0001-SA  
Matrix: AQUEOUS  
Authorized: 05 SEP 90

Sampled: 04 SEP 90  
Prepared: 06 SEP 90

Received: 05 SEP 90  
Analyzed: 17 SEP 90

Parameter	Result	Units	Reporting Limit
Dimethoate	ND	ug/L	--
p-Dimethylaminoazobenzene	ND	ug/L	10
7,12-Dimethylbenz(a)-anthracene	ND	ug/L	10
3,3'-Dimethylbenzidine	ND	ug/L	10
a,a-Dimethylphenethylamine	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
1,3-Dinitrobenzene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
2,4-Dinitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Diphenylamine	ND	ug/L	10
Disulfoton bis(2-Ethylhexyl)phthalate	ND	ug/L	50
Ethyl methanesulfonate	ND	ug/L	10
Famphur	ND	ug/L	--
Fluoranthene	ND	ug/L	10
Fluorene	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Hexachlorophene	ND	ug/L	--
Hexachloropropene	ND	ug/L	10
Indeno(1,2,3-cd)pyrene	ND	ug/L	10
Isophorone	ND	ug/L	10
Isosafrole	ND	ug/L	20
Methapyrilene	ND	ug/L	10
3-Methylcholanthrene	ND	ug/L	10
Methyl methanesulfonate	ND	ug/L	10
2-Methylnaphthalene	ND	ug/L	10
Methyl parathion	ND	ug/L	50
2-Methylphenol	ND	ug/L	10
3/4-Methylphenol	ND	ug/L	10
Naphthalene	ND	ug/L	10

(continued on following page)

ND = Not detected  
NA = Not applicable

Reported By: Dan Albritton

Approved By: Jeff Lowry

Semivolatile Organics  
Appendix IX List  
Method 8270

Client Name: U.S. Geological Survey  
Client ID: KAFB090207-2  
Lab ID: 011204-0001-SA  
Matrix: AQUEOUS  
Authorized: 05 SEP 90

Sampled: 04 SEP 90  
Prepared: 06 SEP 90

Received: 05 SEP 90  
Analyzed: 17 SEP 90

Parameter	Result	Units	Reporting Limit
1,4-Naphthoquinone	ND	ug/L	10
1-Naphthylamine	ND	ug/L	10
2-Naphthylamine	ND	ug/L	10
2-Nitroaniline	ND	ug/L	50
3-Nitroaniline	ND	ug/L	50
4-Nitroaniline	ND	ug/L	50
Nitrobenzene	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
4-Nitrophenol	ND	ug/L	50
4-Nitroquinoline-1-oxide	ND	ug/L	--
N-Nitroso-di-n-butylamine	ND	ug/L	10
N-Nitrosodiethylamine	ND	ug/L	10
N-Nitrosodimethylamine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
N-Nitrosomethylethylamine	ND	ug/L	10
N-Nitrosomorpholine	ND	ug/L	10
N-Nitrosopiperidine	ND	ug/L	10
N-Nitrosopyrrolidine	ND	ug/L	10
5-Nitro-o-toluidine	ND	ug/L	10
Parathion	ND	ug/L	50
Pentachlorobenzene	ND	ug/L	10
Pentachloroethane	ND	ug/L	10
Pentachloronitrobenzene	ND	ug/L	50
Pentachlorophenol	ND	ug/L	50
Phenacetin	ND	ug/L	10
Phenanthrene	ND	ug/L	10
Phenol	ND	ug/L	10
4-Phenylenediamine	ND	ug/L	--
Phorate	ND	ug/L	100
2-Picoline	ND	ug/L	10
Pronamide	ND	ug/L	10
Pyrene	ND	ug/L	10
Pyridine	ND	ug/L	20
Safrole	ND	ug/L	10
Sulfotepp	ND	ug/L	50
1,2,4,5-Tetrachlorobenzene	ND	ug/L	10
2,3,4,6-Tetrachlorophenol	ND	ug/L	50
Thionazin	ND	ug/L	50

(continued on following page)

ND = Not detected  
NA = Not applicable

Reported By: Dan Albritton

Approved By: Jeff Lowry

Semivolatile Organics  
 Appendix IX List  
 Method 8270

Client Name: U.S. Geological Survey  
 Client ID: KAFB090207-2  
 Lab ID: 011204-0001-SA  
 Matrix: AQUEOUS  
 Authorized: 05 SEP 90

Sampled: 04 SEP 90  
 Prepared: 06 SEP 90

Received: 05 SEP 90  
 Analyzed: 17 SEP 90

Parameter	Result	Units	Reporting Limit
2-Toluidine	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
2,4,5-Trichlorophenol	ND	ug/L	50
0,0,0-Triethylphosphorothioate	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
1,3,5-Trinitrobenzene	ND	ug/L	10
Surrogate	Recovery		
Nitrobenzene-d5	83	%	--
2-Fluorobiphenyl	70	%	--
Terphenyl-d14	90	%	--
Phenol-d5	78	%	--
2-Fluorophenol	73	%	--
2,4,6-Tribromophenol	76	%	--

ND = Not detected  
 NA = Not applicable

Reported By: Dan Albritton

Approved By: Jeff Lowry

TENTATIVELY IDENTIFIED COMPOUNDS

FOR

U.S. GEOLOGICAL SURVEY

SAMPLE NUMBER 011204-0001

<u>Compound Name</u>	<u>Fraction</u>	<u>Confidence Level</u>	<u>Estimated Concentration ug/L</u>
None detected	BNA		

NOTES:

Confidence Levels

- Level 3 - Confirmed Identification
- Level 2 - Confident Identification
- Level 1 - Tentative Identification

Please refer to the discussion for further details.

Semivolatile Organics  
 Appendix IX List  
 Method 8270

Client Name: U.S. Geological Survey  
 Client ID: KAFB090208-2  
 Lab ID: 011204-0002-SA  
 Matrix: AQUEOUS  
 Authorized: 05 SEP 90

Sampled: 04 SEP 90  
 Prepared: 06 SEP 90

Received: 05 SEP 90  
 Analyzed: 17 SEP 90

Parameter	Result	Units	Reporting Limit
Acenaphthene	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acetophenone	ND	ug/L	10
2-Acetylaminofluorene	ND	ug/L	100
4-Aminobiphenyl	ND	ug/L	10
Aniline	ND	ug/L	10
Anthracene	ND	ug/L	10
Aramite	ND	ug/L	10
Benzo(a)anthracene	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Benzyl alcohol	ND	ug/L	10
4-Bromophenyl phenyl ether	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
2-sec-Butyl-4,6-dinitro- phenol	ND	ug/L	10
4-Chloroaniline	ND	ug/L	10
bis(2-Chloroethoxy)- methane	ND	ug/L	10
bis(2-Chloroethyl) ether	ND	ug/L	10
bis(2-Chloroisopropyl)- ether	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Chrysene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Dibenzofuran	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
2,4-Dichlorophenol	ND	ug/L	10
2,6-Dichlorophenol	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10

(continued on following page)

ND = Not detected  
 NA = Not applicable

Reported By: Dan Albritton

Approved By: Jeff Lowry

Semivolatile Organics  
Appendix IX List  
Method 8270

Client Name: U.S. Geological Survey  
Client ID: KAFB090208-2  
Lab ID: 011204-0002-SA  
Matrix: AQUEOUS  
Authorized: 05 SEP 90

Sampled: 04 SEP 90  
Prepared: 06 SEP 90

Received: 05 SEP 90  
Analyzed: 17 SEP 90

Parameter	Result	Units	Reporting Limit
Dimethoate	ND	ug/L	--
p-Dimethylaminoazobenzene	ND	ug/L	10
7,12-Dimethylbenz(a)-anthracene	ND	ug/L	10
3,3'-Dimethylbenzidine	ND	ug/L	10
a,a-Dimethylphenethylamine	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
1,3-Dinitrobenzene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
2,4-Dinitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Diphenylamine	ND	ug/L	10
Disulfoton bis(2-Ethylhexyl)phthalate	ND	ug/L	50
Ethyl methanesulfonate	ND	ug/L	10
Famphur	ND	ug/L	--
Fluoranthene	ND	ug/L	10
Fluorene	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Hexachlorophene	ND	ug/L	--
Hexachloropropene	ND	ug/L	10
Indeno(1,2,3-cd)pyrene	ND	ug/L	10
Isophorone	ND	ug/L	10
Isosafrole	ND	ug/L	20
Methapyrilene	ND	ug/L	10
3-Methylcholanthrene	ND	ug/L	10
Methyl methanesulfonate	ND	ug/L	10
2-Methylnaphthalene	ND	ug/L	10
Methyl parathion	ND	ug/L	50
2-Methylphenol	ND	ug/L	10
3/4-Methylphenol	ND	ug/L	10
Naphthalene	ND	ug/L	10

(continued on following page)

ND = Not detected  
NA = Not applicable

Reported By: Dan Albritton

Approved By: Jeff Lowry

Semivolatile Organics  
Appendix IX List  
Method 8270

Client Name: U.S. Geological Survey  
Client ID: KAFB090208-2  
Lab ID: 011204-0002-SA  
Matrix: AQUEOUS  
Authorized: 05 SEP 90

Sampled: 04 SEP 90  
Prepared: 06 SEP 90

Received: 05 SEP 90  
Analyzed: 17 SEP 90

Parameter	Result	Units	Reporting Limit
1,4-Naphthoquinone	ND	ug/L	10
1-Naphthylamine	ND	ug/L	10
2-Naphthylamine	ND	ug/L	10
2-Nitroaniline	ND	ug/L	50
3-Nitroaniline	ND	ug/L	50
4-Nitroaniline	ND	ug/L	50
Nitrobenzene	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
4-Nitrophenol	ND	ug/L	50
4-Nitroquinoline-1-oxide	ND	ug/L	--
N-Nitroso-di-n-butylamine	ND	ug/L	10
N-Nitrosodiethylamine	ND	ug/L	10
N-Nitrosodimethylamine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
N-Nitrosomethylethylamine	ND	ug/L	10
N-Nitrosomorpholine	ND	ug/L	10
N-Nitrosopiperidine	ND	ug/L	10
N-Nitrosopyrrolidine	ND	ug/L	10
5-Nitro-o-toluidine	ND	ug/L	10
Parathion	ND	ug/L	50
Pentachlorobenzene	ND	ug/L	10
Pentachloroethane	ND	ug/L	10
Pentachloronitrobenzene	ND	ug/L	50
Pentachlorophenol	ND	ug/L	50
Phenacetin	ND	ug/L	10
Phenanthrene	ND	ug/L	10
Phenol	ND	ug/L	10
4-Phenylenediamine	ND	ug/L	--
Phorate	ND	ug/L	100
2-Picoline	ND	ug/L	10
Pronamide	ND	ug/L	10
Pyrene	ND	ug/L	10
Pyridine	ND	ug/L	20
Safrole	ND	ug/L	10
Sulfotepp	ND	ug/L	50
1,2,4,5-Tetrachloro-benzene	ND	ug/L	10
2,3,4,6-Tetrachlorophenol	ND	ug/L	50
Thionazin	ND	ug/L	50

(continued on following page)

ND = Not detected  
NA = Not applicable

Reported By: Dan Albritton

Approved By: Jeff Lowry

Semivolatile Organics  
 Appendix IX List  
 Method 8270

Client Name: U.S. Geological Survey  
 Client ID: KAFB090208-2  
 Lab ID: 011204-0002-SA  
 Matrix: AQUEOUS  
 Authorized: 05 SEP 90

Sampled: 04 SEP 90  
 Prepared: 06 SEP 90

Received: 05 SEP 90  
 Analyzed: 17 SEP 90

Parameter	Result	Units	Reporting Limit
2-Toluidine	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
2,4,5-Trichlorophenol	ND	ug/L	50
0,0,0-Triethylphosphorothioate	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
1,3,5-Trinitrobenzene	ND	ug/L	10
<b>Surrogate</b>	<b>Recovery</b>		
Nitrobenzene-d5	76	%	--
2-Fluorobiphenyl	67	%	--
Terphenyl-d14	78	%	--
Phenol-d5	76	%	--
2-Fluorophenol	70	%	--
2,4,6-Tribromophenol	75	%	--

ND = Not detected  
 NA = Not applicable

Reported By: Dan Albritton

Approved By: Jeff Lowry



TENTATIVELY IDENTIFIED COMPOUNDS

FOR

U.S. GEOLOGICAL SURVEY

SAMPLE NUMBER 011204-0002

<u>Compound Name</u>	<u>Fraction</u>	<u>Confidence Level</u>	<u>Estimated Concentration ug/L</u>
None detected	BNA		

NOTES:

Confidence Levels

- Level 3 - Confirmed Identification
- Level 2 - Confident Identification
- Level 1 - Tentative Identification

Please refer to the discussion for further details.

# Halogenated Volatile Organics

## Method 8010

Client Name: U.S. Geological Survey  
 Client ID: KAFB090207-2  
 Lab ID: 011204-0001-SA  
 Matrix: AQUEOUS  
 Authorized: 05 SEP 90

Sampled: 04 SEP 90  
 Prepared: NA

Received: 05 SEP 90  
 Analyzed: 10 SEP 90

Parameter	Result	Units	Reporting Limit	
Chloromethane	ND	ug/L	1.1	T
Bromomethane	ND	ug/L	6.0	
Dichlorodifluoromethane	ND	ug/L	9.0	
Vinyl chloride	ND	ug/L	0.60	
Chloroethane	ND	ug/L	3.0	
Methylene chloride	ND	ug/L	2.0	
Trichlorofluoromethane	ND	ug/L	5.0	
1,1-Dichloroethene	ND	ug/L	0.70	
1,1-Dichloroethane	ND	ug/L	0.40	
trans-1,2-Dichloroethene	ND	ug/L	0.50	
Chloroform	ND	ug/L	0.30	
1,2-Dichloroethane	0.59	ug/L	0.50	
1,1,1-Trichloroethane	ND	ug/L	0.20	
Carbon tetrachloride	ND	ug/L	0.60	
Bromodichloromethane	ND	ug/L	0.50	
1,2-Dichloropropane	ND	ug/L	0.50	
trans-1,3-Dichloropropene	ND	ug/L	2.0	
Trichloroethene	0.96	ug/L	0.60	
Dibromochloromethane	ND	ug/L	0.60	
1,1,2-Trichloroethane	ND	ug/L	0.20	
2-Chloroethyl vinyl ether	ND	ug/L	5.5	
Bromoform	ND	ug/L	1.0	
1,1,2,2-Tetrachloroethane	ND	ug/L	1.4	
Tetrachloroethene	ND	ug/L	0.40	
Chlorobenzene	ND	ug/L	1.2	
1,3-Dichlorobenzene	ND	ug/L	1.0	
1,2-Dichlorobenzene	ND	ug/L	0.50	
1,4-Dichlorobenzene	ND	ug/L	0.50	
Benzyl chloride	ND	ug/L	6.8	
Bromobenzene	ND	ug/L	5.0	
bis(2-Chloroisopropyl)- ether	ND	ug/L	10	
1-Chlorohexane	ND	ug/L	5.0	
4-Chlorotoluene	ND	ug/L	23	
Dibromomethane	ND	ug/L	5.0	
1,1,1,2-Tetrachloroethane	ND	ug/L	5.0	
1,2,3-Trichloropropane	ND	ug/L	5.0	

### Surrogate

### Recovery

Bromochloromethane	87	%	--
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(continued on following page)

ND = Not detected  
 NA = Not applicable

Reported By: Leewaphath Xaiyasang

Approved By: Jeff Lowry

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Halogenated Volatile Organics (CONT.)

Method 8010

Client Name: U.S. Geological Survey

Client ID: KAFB090207-2

Lab ID: 011204-0001-SA

Matrix: AQUEOUS

Authorized: 05 SEP 90

Sampled: 04 SEP 90

Prepared: NA

Received: 05 SEP 90

Analyzed: 10 SEP 90

Note T : Preferred values unless footnoted on secondary column test.

ND = Not detected

NA = Not applicable

Reported By: Leewaphath Xaiyasang

Approved By: Jeff Lowry

Halogenated Volatile Organics-2nd Column Analysis

Method 8010

Client Name: U.S. Geological Survey  
 Client ID: KAFB090207-2  
 Lab ID: 011204-0001-SA  
 Matrix: AQUEOUS  
 Authorized: 05 SEP 90

Sampled: 04 SEP 90  
 Prepared: NA

Received: 05 SEP 90  
 Analyzed: 10 SEP 90

Parameter	Result	Units	Reporting Limit	
Chloromethane	ND	ug/L	1.1	
Bromomethane	ND	ug/L	6.0	
Dichlorodifluoromethane	ND	ug/L	9.0	
Vinyl chloride	ND	ug/L	0.60	
Chloroethane	ND	ug/L	3.0	
Methylene chloride	ND	ug/L	2.0	
Trichlorofluoromethane	ND	ug/L	5.0	
1,1-Dichloroethene	ND	ug/L	0.70	
1,1-Dichloroethane	ND	ug/L	0.40	
trans-1,2-Dichloroethene	ND	ug/L	0.50	
Chloroform	0.52	ug/L	0.30	
1,2-Dichloroethane	0.62	ug/L	0.50	
1,1,1-Trichloroethane	ND	ug/L	0.20	
Carbon tetrachloride	ND	ug/L	0.60	
Bromodichloromethane	0.86	ug/L	0.50	L
1,2-Dichloropropane	ND	ug/L	0.50	
trans-1,3-Dichloropropene	ND	ug/L	2.0	
Trichloroethene	0.86	ug/L	0.60	L
Dibromochloromethane	ND	ug/L	0.60	
1,1,2-Trichloroethane	ND	ug/L	0.20	
2-Chloroethyl vinyl ether	ND	ug/L	5.5	
Bromoform	ND	ug/L	1.0	
1,1,2,2-Tetrachloroethane	ND	ug/L	1.4	
Tetrachloroethene	ND	ug/L	0.40	
Chlorobenzene	ND	ug/L	1.2	
1,3-Dichlorobenzene	ND	ug/L	1.0	
1,2-Dichlorobenzene	ND	ug/L	0.50	
1,4-Dichlorobenzene	ND	ug/L	0.50	
Benzyl chloride	ND	ug/L	6.8	
Bromobenzene	ND	ug/L	5.0	
bis(2-Chloroisopropyl)- ether	ND	ug/L	10	
1-Chlorohexane	ND	ug/L	5.0	
4-Chlorotoluene	ND	ug/L	23	
Dibromomethane	ND	ug/L	5.0	
1,1,1,2-Tetrachloroethane	ND	ug/L	5.0	
1,2,3-Trichloropropane	ND	ug/L	5.0	
Surrogate	Recovery			
Bromochloromethane	89	%	--	

(continued on following page)

ND = Not detected  
 NA = Not applicable

Reported By: Leewaphath Xaiyasang

Approved By: Jeff Lowry

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Halogenated Volatile Organics-2nd Column Analysis (CONT.)

Method 8010

Client Name: U.S. Geological Survey

Client ID: KAFB090207-2

Lab ID: 011204-0001-SA

Matrix: AQUEOUS

Authorized: 05 SEP 90

Sampled: 04 SEP 90

Prepared: NA

Received: 05 SEP 90

Analyzed: 10 SEP 90

Note L : These components are not separable using this method and are therefore quantified together.

ND = Not detected

NA = Not applicable

Reported By: Leewaphath Xaiyasang

Approved By: Jeff Lowry

Halogenated Volatile Organics

Method 8010

Client Name: U.S. Geological Survey  
Client ID: KAFB090208-2  
Lab ID: 011204-0002-SA  
Matrix: AQUEOUS  
Authorized: 05 SEP 90

Sampled: 04 SEP 90  
Prepared: NA

Received: 05 SEP 90  
Analyzed: 10 SEP 90

Parameter	Result	Units	Reporting Limit	
Chloromethane	ND	ug/L	1.1	T
Bromomethane	ND	ug/L	6.0	
Dichlorodifluoromethane	ND	ug/L	9.0	
Vinyl chloride	ND	ug/L	0.60	
Chloroethane	ND	ug/L	3.0	
Methylene chloride	ND	ug/L	2.0	
Trichlorofluoromethane	ND	ug/L	5.0	
1,1-Dichloroethene	ND	ug/L	0.70	
1,1-Dichloroethane	ND	ug/L	0.40	
trans-1,2-Dichloroethene	ND	ug/L	0.50	
Chloroform	ND	ug/L	0.30	
1,2-Dichloroethane	0.60	ug/L	0.50	
1,1,1-Trichloroethane	ND	ug/L	0.20	
Carbon tetrachloride	ND	ug/L	0.60	
Bromodichloromethane	ND	ug/L	0.50	
1,2-Dichloropropane	ND	ug/L	0.50	
trans-1,3-Dichloropropene	ND	ug/L	2.0	
Trichloroethene	0.93	ug/L	0.60	
Dibromochloromethane	ND	ug/L	0.60	
1,1,2-Trichloroethane	ND	ug/L	0.20	
2-Chloroethyl vinyl ether	ND	ug/L	5.5	
Bromoform	ND	ug/L	1.0	
1,1,2,2-Tetrachloroethane	ND	ug/L	1.4	
Tetrachloroethene	ND	ug/L	0.40	
Chlorobenzene	ND	ug/L	1.2	
1,3-Dichlorobenzene	ND	ug/L	1.0	
1,2-Dichlorobenzene	ND	ug/L	0.50	
1,4-Dichlorobenzene	ND	ug/L	0.50	
Benzyl chloride	ND	ug/L	6.8	
Bromobenzene	ND	ug/L	5.0	
bis(2-Chloroisopropyl)- ether	ND	ug/L	10	
1-Chlorohexane	ND	ug/L	5.0	
4-Chlorotoluene	ND	ug/L	23	
Dibromomethane	ND	ug/L	5.0	
1,1,1,2-Tetrachloroethane	ND	ug/L	5.0	
1,2,3-Trichloropropane	ND	ug/L	5.0	

Surrogate	Recovery		
Bromochloromethane	84	%	--

(continued on following page)

ND = Not detected  
NA = Not applicable

Reported By: Leewaphath Xaiyasang

Approved By: Jeff Lowry

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Halogenated Volatile Organics (CONT.)

Method 8010

Client Name: U.S. Geological Survey

Client ID: KAFB090208-2

Lab ID: 011204-0002-SA

Matrix: AQUEOUS

Authorized: 05 SEP 90

Sampled: 04 SEP 90

Prepared: NA

Received: 05 SEP 90

Analyzed: 10 SEP 90

Note T : Preferred values unless footnoted on secondary column test.

ND = Not detected

NA = Not applicable

Reported By: Leewaphath Xaiyasang

Approved By: Jeff Lowry

Halogenated Volatile Organics-2nd Column Analysis

Method 8010

Client Name: U.S. Geological Survey  
 Client ID: KAFB090208-2  
 Lab ID: 011204-0002-SA  
 Matrix: AQUEOUS  
 Authorized: 05 SEP 90

Sampled: 04 SEP 90  
 Prepared: NA

Received: 05 SEP 90  
 Analyzed: 10 SEP 90

Parameter	Result	Units	Reporting Limit	
Chloromethane	ND	ug/L	1.1	
Bromomethane	ND	ug/L	6.0	
Dichlorodifluoromethane	ND	ug/L	9.0	
Vinyl chloride	ND	ug/L	0.60	
Chloroethane	ND	ug/L	3.0	
Methylene chloride	ND	ug/L	2.0	
Trichlorofluoromethane	ND	ug/L	5.0	
1,1-Dichloroethene	ND	ug/L	0.70	
1,1-Dichloroethane	ND	ug/L	0.40	
trans-1,2-Dichloroethene	ND	ug/L	0.50	
Chloroform	0.48	ug/L	0.30	
1,2-Dichloroethane	0.61	ug/L	0.50	
1,1,1-Trichloroethane	ND	ug/L	0.20	
Carbon tetrachloride	ND	ug/L	0.60	
Bromodichloromethane	0.81	ug/L	0.50	L
1,2-Dichloropropane	ND	ug/L	0.50	
trans-1,3-Dichloropropene	ND	ug/L	2.0	
Trichloroethene	0.81	ug/L	0.60	L
Dibromochloromethane	ND	ug/L	0.60	
1,1,2-Trichloroethane	ND	ug/L	0.20	
2-Chloroethyl vinyl ether	ND	ug/L	5.5	
Bromoform	ND	ug/L	1.0	
1,1,2,2-Tetrachloroethane	ND	ug/L	1.4	
Tetrachloroethene	ND	ug/L	0.40	
Chlorobenzene	ND	ug/L	1.2	
1,3-Dichlorobenzene	ND	ug/L	1.0	
1,2-Dichlorobenzene	ND	ug/L	0.50	
1,4-Dichlorobenzene	ND	ug/L	0.50	
Benzyl chloride	ND	ug/L	6.8	
Bromobenzene	ND	ug/L	5.0	
bis(2-Chloroisopropyl)- ether	ND	ug/L	10	
1-Chlorohexane	ND	ug/L	5.0	
4-Chlorotoluene	ND	ug/L	23	
Dibromomethane	ND	ug/L	5.0	
1,1,1,2-Tetrachloroethane	ND	ug/L	5.0	
1,2,3-Trichloropropane	ND	ug/L	5.0	

Surrogate	Recovery		
Bromochloromethane	94	%	--

(continued on following page)

ND = Not detected  
 NA = Not applicable

Reported By: Leewaphath Xaiyasang

Approved By: Jeff Lowry



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Halogenated Volatile Organics-2nd Column Analysis (CONT.)

Method 8010

Client Name: U.S. Geological Survey

Client ID: KAFB090208-2

Lab ID: 011204-0002-SA

Matrix: AQUEOUS

Authorized: 05 SEP 90

Sampled: 04 SEP 90

Prepared: NA

Received: 05 SEP 90

Analyzed: 10 SEP 90

Note L : These components are not separable using this method and are therefore quantified together.

ND = Not detected

NA = Not applicable

Reported By: Leewaphath Xaiyasang

Approved By: Jeff Lowry

**Metals**

**Total Metals**

Client Name: U.S. Geological Survey  
 Client ID: KAFB090207-2  
 Lab ID: 011204-0001-SA  
 Matrix: AQUEOUS  
 Authorized: 05 SEP 90

Sampled: 04 SEP 90  
 Prepared: See Below

Received: 05 SEP 90  
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	ND	mg/L	0.0050	7191	17 SEP 90	25 SEP 90

ND = Not detected  
 NA = Not applicable

Reported By: Mark Brundege

Approved By: Will Pratt

Metals

Total Metals

Client Name: U.S. Geological Survey  
Client ID: KAFB090208-2  
Lab ID: 011204-0002-SA  
Matrix: AQUEOUS  
Authorized: 05 SEP 90

Sampled: 04 SEP 90  
Prepared: See Below

Received: 05 SEP 90  
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	ND	mg/L	0.010	7191	17 SEP 90	25 SEP 90

ND = Not detected  
NA = Not applicable

Reported By: Mark Brundege

Approved By: Will Pratt

Metals

Dissolved Metals

Client Name: U.S. Geological Survey  
Client ID: KAFB090207-2  
Lab ID: 011204-0001-SA  
Matrix: AQUEOUS  
Authorized: 05 SEP 90

Sampled: 04 SEP 90  
Prepared: See Below

Received: 05 SEP 90  
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	ND	mg/L	0.0050	7191	NA	11 SEP 90

ND = Not detected  
NA = Not applicable

Reported By: Scott Moroschan

Approved By: Will Pratt

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**Metals**
**Dissolved Metals**

Client Name: U.S. Geological Survey  
 Client ID: KAFB090208-2  
 Lab ID: 011204-0002-SA  
 Matrix: AQUEOUS  
 Authorized: 05 SEP 90

Sampled: 04 SEP 90  
 Prepared: See Below

Received: 05 SEP 90  
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	ND	mg/L	0.0050	7191	NA	11 SEP 90

ND = Not detected  
 NA = Not applicable

Reported By: Scott Moroschan

Approved By: Will Pratt

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General Inorganics

Client Name: U.S. Geological Survey

Client ID: KAFB090207-2

Lab ID: 011204-0001-SA

Matrix: AQUEOUS

Authorized: 05 SEP 90

Sampled: 04 SEP 90

Prepared: See Below

Received: 05 SEP 90

Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Nitrate plus Nitrite	1.5	mg/L	0.10	353.2	NA	06 SEP 90
Total Organic Carbon	0.87	mg/L	0.50	9060	NA	07 SEP 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	18 SEP 90

ND = Not detected  
NA = Not applicable

Reported By: Steve Pope

Approved By: John Laferty

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General Inorganics

Client Name: U.S. Geological Survey  
Client ID: KAFB090208-2  
Lab ID: 011204-0002-SA  
Matrix: AQUEOUS  
Authorized: 05 SEP 90

Sampled: 04 SEP 90  
Prepared: See Below

Received: 05 SEP 90  
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Nitrate plus Nitrite	1.5	mg/L	0.10	353.2	NA	06 SEP 90
Total Organic Carbon	0.91	mg/L	0.50	9060	NA	07 SEP 90
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	18 SEP 90

ND = Not detected  
NA = Not applicable

Reported By: Steve Pope

Approved By: John Laferty

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)
011204-0001-SA	AQUEOUS	625-A	06 SEP 90-A	06 SEP 90-A
011204-0002-SA	AQUEOUS	625-A	06 SEP 90-A	06 SEP 90-A



DUPLICATE CONTROL SAMPLE REPORT  
Semivolatile Organics by GC/MS

Analyte	Concentration Spiked	Concentration Measured		AVG	Accuracy Average(%)		Precision (RPD)		
		DCS1	DCS2		DCS	Limits	DCS	Limit	
Category: 625-A									
Matrix: AQUEOUS									
QC Lot: 06 SEP 90-A									
Concentration Units: ug/L									
Phenol	100	83.1	102	92.6	93	12- 89	20	42	
2-Chlorophenol	100	85.7	98.0	91.8	92	27-123	13	40	
1,4-Dichlorobenzene	50	24.9	31.8	28.4	57	36- 97	24	28	
N-Nitroso-di- n-propylamine	50	33.8	37.6	35.7	71	41-116	11	38	
1,2,4-Trichlorobenzene	50	26.6	34.2	30.4	61	39- 98	25	28	
4-Chloro-3-methylphenol	100	82.6	88.8	85.7	86	23- 97	7.2	42	
Acenaphthene	50	28.6	33.7	31.2	62	46-118	16	31	
4-Nitrophenol	100	58.7	70.6	64.6	65	10- 80	18	50	
2,4-Dinitrotoluene	50	32.4	37.6	35.0	70	24- 96	15	38	
Pentachlorophenol	100	35.4	21.4	28.4	28	9-103	49	50	
Pyrene	50	42.7	51.5	47.1	94	26-127	19	31	

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

SINGLE CONTROL SAMPLE REPORT  
Semivolatile Organics by GC/MS

Analyte	Concentration		Accuracy(%)	
	Spiked	Measured	SCS	Limits
Category: 625-A				
Matrix: AQUEOUS				
QC Lot: 06 SEP 90-A		QC Run: 06 SEP 90-A		
Concentration Units: ug/L				
Nitrobenzene-d5	100	81.2	81	35-114
2-Fluorobiphenyl	100	81.5	82	43-116
Terphenyl-d14	100	66.7	67	33-141
2-Fluorophenol	200	157	78	21-100
Phenol-d5	200	170	85	10- 94
2,4,6-Tribromophenol	200	199	100	10-123

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

METHOD BLANK REPORT  
Semivolatile Organics by GC/MS

Analyte	Result	Units	Reporting Limit
Test: 8270CP-AP9-A			
Matrix: AQUEOUS			
QC Lot: 06 SEP 90-A    QC Run: 06 SEP 90-A			
Acenaphthene	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
Acetophenone	ND	ug/L	10
2-Acetylaminofluorene	ND	ug/L	100
4-Aminobiphenyl	ND	ug/L	10
Aniline	ND	ug/L	10
Anthracene	ND	ug/L	10
Aramite	ND	ug/L	10
Benzo(a)anthracene	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(g,h,i)perylene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Benzyl alcohol	ND	ug/L	10
4-Bromophenyl phenyl ether	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
2-sec-Butyl-4,6-dinitro- phenol	ND	ug/L	10
4-Chloroaniline	ND	ug/L	10
bis(2-Chloroethoxy)- methane	ND	ug/L	10
bis(2-Chloroethyl) ether	ND	ug/L	10
bis(2-Chloroisopropyl)- ether	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
2-Chloronaphthalene	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Chrysene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Dibenzofuran	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
2,4-Dichlorophenol	ND	ug/L	10
2,6-Dichlorophenol	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10

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

Analyte	Result	Units	Reporting Limit
Test: 8270CP-AP9-A			
Matrix: AQUEOUS			
QC Lot: 06 SEP 90-A    QC Run: 06 SEP 90-A			
Dimethoate	ND	ug/L	--
p-Dimethylaminoazobenzene	ND	ug/L	10
7,12-Dimethylbenz(a)-anthracene	ND	ug/L	10
3,3'-Dimethylbenzidine	ND	ug/L	10
a,a-Dimethylphenethylamine	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
1,3-Dinitrobenzene	ND	ug/L	10
4,6-Dinitro-2-methylphenol	ND	ug/L	50
2,4-Dinitrophenol	ND	ug/L	50
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Diphenylamine	ND	ug/L	10
Disulfoton	ND	ug/L	50
bis(2-Ethylhexyl) phthalate	250	ug/L	10
Ethyl methanesulfonate	ND	ug/L	10
Famphur	ND	ug/L	--
Fluoranthene	ND	ug/L	10
Fluorene	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
Hexachlorocyclopentadiene	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Hexachlorophene	ND	ug/L	--
Hexachloropropene	ND	ug/L	10
Indeno(1,2,3-cd)pyrene	ND	ug/L	10
Isophorone	ND	ug/L	10
Isosafrole	ND	ug/L	20
Methapyrilene	ND	ug/L	10
3-Methylcholanthrene	ND	ug/L	10
Methyl methanesulfonate	ND	ug/L	10
2-Methylnaphthalene	ND	ug/L	10
Methyl parathion	ND	ug/L	50
2-Methylphenol	ND	ug/L	10
3/4-Methylphenol	ND	ug/L	10
Naphthalene	ND	ug/L	10

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

Analyte	Result	Units	Reporting Limit
Test: 8270CP-AP9-A			
Matrix: AQUEOUS			
QC Lot: 06 SEP 90-A    QC Run: 06 SEP 90-A			
1,4-Naphthoquinone	ND	ug/L	10
1-Naphthylamine	ND	ug/L	10
2-Naphthylamine	ND	ug/L	10
2-Nitroaniline	ND	ug/L	50
3-Nitroaniline	ND	ug/L	50
4-Nitroaniline	ND	ug/L	50
Nitrobenzene	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
4-Nitrophenol	ND	ug/L	50
4-Nitroquinoline-1-oxide	ND	ug/L	--
N-Nitroso-di-n-butylamine	ND	ug/L	10
N-Nitrosodiethylamine	ND	ug/L	10
N-Nitrosodimethylamine	ND	ug/L	10
N-Nitrosodiphenylamine	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
N-Nitrosomethylethylamine	ND	ug/L	10
N-Nitrosomorpholine	ND	ug/L	10
N-Nitrosopiperidine	ND	ug/L	10
N-Nitrosopyrrolidine	ND	ug/L	10
5-Nitro-o-toluidine	ND	ug/L	10
Parathion	ND	ug/L	50
Pentachlorobenzene	ND	ug/L	10
Pentachloroethane	ND	ug/L	10
Pentachloronitrobenzene	ND	ug/L	50
Pentachlorophenol	ND	ug/L	50
Phenacetin	ND	ug/L	10
Phenanthrene	ND	ug/L	10
Phenol	ND	ug/L	10
4-Phenylenediamine	ND	ug/L	--
Phorate	ND	ug/L	100
2-Picoline	ND	ug/L	10
Pronamide	ND	ug/L	10
Pyrene	ND	ug/L	10
Pyridine	ND	ug/L	20
Safrole	ND	ug/L	10
Sulfotepp	ND	ug/L	50
1,2,4,5-Tetrachloro-benzene	ND	ug/L	10
2,3,4,6-Tetrachlorophenol	ND	ug/L	50
Thionazin	ND	ug/L	50

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

Analyte	Result	Units	Reporting Limit
Test: 8270CP-AP9-A			
Matrix: AQUEOUS			
QC Lot: 06 SEP 90-A    QC Run: 06 SEP 90-A			
2-Toluidine	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
2,4,5-Trichlorophenol	ND	ug/L	50
2,4,6-Trichlorophenol	ND	ug/L	10
0,0,0-Triethylphosphorothioate	ND	ug/L	10
1,3,5-Trinitrobenzene	ND	ug/L	10

## Quality Control Results

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

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

The standard laboratory QC package is designed to:

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

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

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

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

Accuracy for DCS and SCS is measured by Percent Recovery.

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

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

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



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

QC LOT ASSIGNMENT REPORT  
Volatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
011204-0001-SA	AQUEOUS	601-A	09 SEP 90-F	09 SEP 90-F
011204-0001-SA	AQUEOUS	601-A	09 SEP 90-F	09 SEP 90-F2
011204-0002-SA	AQUEOUS	601-A	09 SEP 90-F	09 SEP 90-F
011204-0002-SA	AQUEOUS	601-A	09 SEP 90-F	09 SEP 90-F2

DUPLICATE CONTROL SAMPLE REPORT  
Volatile Organics by GC

Analyte	Concentration Spiked	Concentration Measured		AVG	Accuracy Average (%)		Precision (RPD)		
		DCS1	DCS2		DCS	Limits	DCS	Limit	
Category: 601-A									
Matrix: AQUEOUS									
QC Lot: 09 SEP 90-F									
Concentration Units: ug/L									
1,1-Dichloroethane	5.0	4.27	4.05	4.16	83	80-130	5.3	20	
Chloroform	5.0	4.53	4.75	4.64	93	80-120	4.7	20	
Bromodichloromethane	10	8.60	8.30	8.45	85	80-120	3.6	20	
Trichloroethene	5.0	4.46	4.67	4.56	91	70-120	4.6	20	
Chlorobenzene	5.0	4.28	4.68	4.48	90	80-120	8.9	20	

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

SINGLE CONTROL SAMPLE REPORT  
Volatile Organics by GC

Analyte	Concentration		Accuracy(%)	
	Spiked	Measured	SCS	Limits

Category: 601-A  
Matrix: AQUEOUS  
QC Lot: 09 SEP 90-F    QC Run: 09 SEP 90-F  
Concentration Units: ug/L

Bromochloromethane	5.00	4.04	81	20-160
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Category: 601-A  
Matrix: AQUEOUS  
QC Lot: 09 SEP 90-F    QC Run: 09 SEP 90-F2  
Concentration Units: ug/L

Bromochloromethane	5.00	6.27	125	20-160
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Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT  
Volatile Organics by GC

Analyte	Result	Units	Reporting Limit
Test: 601-AFIR-A			
Matrix: AQUEOUS			
QC Lot: 09 SEP 90-F    QC Run: 09 SEP 90-F			
Chloromethane	ND	ug/L	1.1
Bromomethane	ND	ug/L	6.0
Dichlorodifluoromethane	ND	ug/L	9.0
Vinyl chloride	ND	ug/L	0.60
Chloroethane	ND	ug/L	3.0
Methylene chloride	ND	ug/L	2.0
Trichlorofluoromethane	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	0.70
1,1-Dichloroethane	ND	ug/L	0.40
trans-1,2-Dichloroethene	ND	ug/L	0.50
Chloroform	ND	ug/L	0.30
1,2-Dichloroethane	ND	ug/L	0.50
1,1,1-Trichloroethane	ND	ug/L	0.20
Carbon tetrachloride	ND	ug/L	0.60
Bromodichloromethane	ND	ug/L	0.50
1,2-Dichloropropane	ND	ug/L	0.50
trans-1,3-Dichloropropene	ND	ug/L	2.0
Trichloroethene	ND	ug/L	0.60
Dibromochloromethane	ND	ug/L	0.60
1,1,2-Trichloroethane	ND	ug/L	0.20
2-Chloroethyl vinyl ether	ND	ug/L	5.5
Bromoform	ND	ug/L	1.0
1,1,2,2-Tetrachloroethane	ND	ug/L	1.4
Tetrachloroethene	ND	ug/L	0.40
Chlorobenzene	ND	ug/L	1.2
1,3-Dichlorobenzene	ND	ug/L	1.0
1,2-Dichlorobenzene	ND	ug/L	0.50
1,4-Dichlorobenzene	ND	ug/L	0.50
Benzyl chloride	ND	ug/L	6.8
Bromobenzene	ND	ug/L	5.0
bis(2-Chloroisopropyl)- ether	ND	ug/L	10
1-Chlorohexane	ND	ug/L	5.0
4-Chlorotoluene	ND	ug/L	23
Dibromomethane	ND	ug/L	5.0
1,1,1,2-Tetrachloroethane	ND	ug/L	5.0
1,2,3-Trichloropropane	ND	ug/L	5.0

METHOD BLANK REPORT  
Volatile Organics by GC (cont.)

Analyte	Result	Units	Reporting Limit
Test: 601-AFIR-2-A			
Matrix: AQUEOUS			
QC Lot: 09 SEP 90-F QC Run: 09 SEP 90-F2			
Chloromethane	ND	ug/L	1.1
Bromomethane	ND	ug/L	6.0
Dichlorodifluoromethane	ND	ug/L	9.0
Vinyl chloride	ND	ug/L	0.60
Chloroethane	ND	ug/L	3.0
Methylene chloride	ND	ug/L	2.0
Trichlorofluoromethane	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	0.70
1,1-Dichloroethane	ND	ug/L	0.40
trans-1,2-Dichloroethene	ND	ug/L	0.50
Chloroform	ND	ug/L	0.30
1,2-Dichloroethane	ND	ug/L	0.50
1,1,1-Trichloroethane	ND	ug/L	0.20
Carbon tetrachloride	ND	ug/L	0.60
Bromodichloromethane	ND	ug/L	0.50
1,2-Dichloropropane	ND	ug/L	0.50
trans-1,3-Dichloropropene	ND	ug/L	2.0
Trichloroethene	ND	ug/L	0.60
Dibromochloromethane	ND	ug/L	0.60
1,1,2-Trichloroethane	ND	ug/L	0.20
2-Chloroethyl vinyl ether	ND	ug/L	5.5
Bromoform	ND	ug/L	1.0
1,1,2,2-Tetrachloroethane	ND	ug/L	1.4
Tetrachloroethene	ND	ug/L	0.40
Chlorobenzene	ND	ug/L	1.2
1,3-Dichlorobenzene	ND	ug/L	1.0
1,2-Dichlorobenzene	ND	ug/L	0.50
1,4-Dichlorobenzene	ND	ug/L	0.50
Benzyl chloride	ND	ug/L	6.8
Bromobenzene	ND	ug/L	5.0
bis(2-Chloroisopropyl)- ether	ND	ug/L	10
1-Chlorohexane	ND	ug/L	5.0
4-Chlorotoluene	ND	ug/L	23
Dibromomethane	ND	ug/L	5.0
1,1,1,2-Tetrachloroethane	ND	ug/L	5.0
1,2,3-Trichloropropane	ND	ug/L	5.0

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**QC LOT ASSIGNMENT REPORT**  
**Metals Analysis and Preparation**

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
011204-0001-SA	AQUEOUS	CR-FAA-AD	11 SEP 90-A	-
011204-0001-SA	AQUEOUS	CR-FAA-AT	17 SEP 90-B	17 SEP 90-B
011204-0002-SA	AQUEOUS	CR-FAA-AD	11 SEP 90-A	-
011204-0002-SA	AQUEOUS	CR-FAA-AT	17 SEP 90-B	17 SEP 90-B

**DUPLICATE CONTROL SAMPLE REPORT**  
**Metals Analysis and Preparation**

Analyte	Spiked	Concentration		AVG	Accuracy		Precision		
		DCS1	Measured DCS2		DCS	Average(%) Limits	(RPD) DCS Limit	DCS Limit	
Category: CR-FAA-AD Matrix: AQUEOUS QC Lot: 11 SEP 90-A Concentration Units: mg/L									
Chromium	0.02	0.0191	0.0188	0.0190	95	75-125	1.6	20	
Category: CR-FAA-AT Matrix: AQUEOUS QC Lot: 17 SEP 90-B Concentration Units: mg/L									
Chromium	0.2	0.195	0.220	0.208	104	75-125	12	20	

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



METHOD BLANK REPORT  
Metals Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: CR-FAA-AT Matrix: AQUEOUS QC Lot: 17 SEP 90-B    QC Run: 17 SEP 90-B			
Chromium	ND	mg/L	0.0050

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**QC LOT ASSIGNMENT REPORT**  
**Wet Chemistry Analysis and Preparation**

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
011204-0001-SA	AQUEOUS	TOC-A	07 SEP 90-A	-
011204-0001-SA	AQUEOUS	TOX-A	18 SEP 90-A	-
011204-0001-SA	AQUEOUS	NO3-A	06 SEP 90-A	-
011204-0002-SA	AQUEOUS	TOC-A	07 SEP 90-A	-
011204-0002-SA	AQUEOUS	TOX-A	18 SEP 90-A	-
011204-0002-SA	AQUEOUS	NO3-A	06 SEP 90-A	-

DUPLICATE CONTROL SAMPLE REPORT  
Wet Chemistry Analysis and Preparation

Analyte	Concentration Spiked	Concentration Measured		AVG	Accuracy Average (%)		Precision (RPD)		
		DCS1	DCS2		DCS	Limits	DCS	Limit	
Category: TOC-A Matrix: AQUEOUS QC Lot: 07 SEP 90-A Concentration Units: mg/L									
Total Organic Carbon	25	25.6	25.8	25.7	103	91-109	0.8	20	
Category: TOX-A Matrix: AQUEOUS QC Lot: 18 SEP 90-A Concentration Units: ug Cl/L									
Total Organic Halogen as Cl	100	95.9	93.9	94.9	95	80-120	2.1	20	
Category: NO3-A Matrix: AQUEOUS QC Lot: 06 SEP 90-A Concentration Units: mg/L									
Nitrate as N	5.4	5.33	5.44	5.38	100	91-109	2.0	10	

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



# Appendix

ENSECO ANALYTICAL SERVICES REQUEST FORM

11204 - 01

Special Handling (Circle as appropriate and explain in record 5)

Hazardous material

Site Type (circle one)

- SW - Surface Water
- GW - Ground Water
- ME - Meteorological
- LK - Lake
- ES - Estuary
- SP - Spring
- SS - Special Source

Station Name: KAFB090207-2 Field ID: USGS/WRD/NEW MEXICO SWMU Project: USGS Collector: (505) 262-6678  
 Field Office: USGS Phone (FTS): BILL DAM

File Deposition\* (Circle one)

- Q - WATSTORE
- X - Lab File

Sample identification

For Laboratory Use Only

Station ID or Unique Number\*: KAFB090207-2 Project Account #: 463536001

Year: 1990 Month: 09 Day: 04 Time: 1455 Month: 09 Day: 04 Time: 1522 State Code\*: NM District/User Code\*: 035 County Code: 001

6 = GW  
9 = SW

Analysis level codes and schedules

- 1 = SPIKE
- 5 = DUPLICATE
- 9 = REGULAR
- J = STORM
- 9 = ROUTINE

Sample Medium**	Geologic Unit	H or 9 Analysis Status**	GS FIELD ANALYSIS-LAB G Analysis Source**	Hydrologic Condition**	Sample Type**	Hydrologic Event**
PARAMETER: <u>TOC</u>						
METHOD: <u>SW 9060</u>						
PARAMETER: <u>TOX</u>						
METHOD: <u>SW 9020</u>						
PARAMETER: <u>NO2+NO3</u>						
METHOD: <u>E 353.2</u>						
PARAMETER: <u>DISSOLVED CHROMIUM</u>						
METHOD: <u>SW 3005/SW 7191</u>						
PARAMETER: <u>TOTAL CHROMIUM</u>						
METHOD: <u>SW 3020/SW 7191</u>						
PARAMETER: <u>VOX</u>						
METHOD: <u>SW 5030/SW 8240</u>						
PARAMETER: <u>VOX</u>						
METHOD: <u>SW 5030/SW 8240</u>						
PARAMETER: <u>DIOXIN-FURANS</u>						
METHOD: <u>SW 3520/SW 8280</u>						
PARAMETER: <u>HERBICIDES</u>						
METHOD: <u>SW 3520/SW 8150</u>						
PARAMETER: <u>APP. IX ICP DISSOLVED</u>						
METHOD: <u>SW 3005/SW 6010</u>						
PARAMETER: <u>APP. IX ICP TOTAL</u>						
METHOD: <u>SW 3010/SW 6010</u>						
PARAMETER: <u>APP. IX SEMI-VOC</u>						
METHOD: <u>SW 3520/SW 8270</u>						

Chain-of-Custody Record

PROJECT NAME KIRTLAND AFB SWMU PROJECT NO. 463536001 P.O. NO. \_\_\_\_\_

Relinquished by: (Signature) Kim Ong Received by: (Signature) \_\_\_\_\_ Date 900904 Time 1800

Relinquished by: (Signature) \_\_\_\_\_ Received by: (Signature) \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_

Relinquished by: (Signature) \_\_\_\_\_ Received at lab by: (Signature) Robert M. Poff Date 550890 Time 0945hr

Relinquished from lab by: (Signature) \_\_\_\_\_ Received by: (Signature) \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_

Comments (Only 50 characters stored in NWIS)

Record 5 TIJERAS ARROYO WELL DS LOCATION

Record 6 \_\_\_\_\_

Total number of sample bottles for this request: 9 (includes extra G.C.C.) SHIP TO:

Enseco-Rocky Mountain Analytical  
4955 Yarrow Street  
Arvada, CO 80002  
(303) 421-6611

ATTENTION: THOMPSON, BREYER, OR MCDEVITT

11204-02

Special Handling (Circle as appropriate and explain in record 5)

Hazardous material

Site Type (circle one)

- SW - Surface Water, GW - Ground Water, ME - Meteorological, LK - Lake, ES - Estuary, SP - Spring, SS - Special Source

Station Name: KAFB090208-2, Field Office: USGS/WRD/NEW MEXICO SWMU, Project: USGS, Collector: (505) 262-6678, Phone (FTS): BILL DAM

File Deposition\* (Circle one)

Sample identification

Q - WATSTORE, X - Lab File, Station ID or Unique Number: KAFB090208-2, Project Account #: 463536001

Year: 1990, Month: 09, Day: 04, Time: 1455, Composite End Date: 09 04 1522, State Code: NM, District/User Code: 035, County Code: 001

Analysis level codes and schedules

6=GW, 9=SW, H or 9, GS FIELD, Analysis Status, Analysis Source, Hydrologic Condition, Sample Type, Hydrologic Event

PARAMETER: TOC, TOX, NO2+NO3, DISSOLVED CHROMIUM, TOTAL CHROMIUM, VOX, APP. IX ICP, DISSOLVED CO, CU, FE, PB, MN, MO, NI, V, ZN, APP. IX SEMI-VOC

Chain-of-Custody Record

PROJECT NAME KIRTLAND AFB SWMU, PROJECT NO. 463536001, P.O. NO.

Relinquished by: (Signature), Received by: (Signature), Date, Time, AIRBORNE EXPRESS, 900904 1800, Received at lab by: (Signature), Date, Time, Robert M. Reid (5 SEP 90, 0945 hrs)

Comments (Only 50 characters stored in NWIS)

Record 5 TILIERAS ARROYO WELL DS LOCATION, Record 6

Total number of sample bottles for this request: 9 (Includes Extra GCC) SHIP TO:

Enseco-Rocky Mountain Analytical, 4955 Yarrow Street, Arvada, CO 80002, (303) 421-6611

ATTENTION: THOMPSON, BREYER, OR MCDEVITT