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2 of 5
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ANALYTICAL RESULTS
FOR
U.S. GEOLOGICAL SURVEY
ENSECO-RMAL NO. 016360

Enseco

AUGUST 23, 1991

Reviewed by:

Debbie Fazio
Debbie Fazio

Cindy Patterson for
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
016360-0001-SA	GEO TECH-FILTER	AQUEOUS	13 AUG 91	10:30	14 AUG 91
016360-0002-SA	BOTTLED DI-CF-WATER	AQUEOUS	13 AUG 91	10:00	14 AUG 91

ANALYTICAL TEST REQUESTS
for
U.S. Geological Survey

Lab ID: 016360	Group Code	Analysis Description	Custom Test?
0001 - 0002	A	Sulfide, Total Cyanide, Total Appendix IX Metals done by ICP	N N 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.

Metals

Dissolved Metals

Client Name: U.S. Geological Survey
 Client ID: GEOTECH-FILTER
 Lab ID: 016360-0001-SA
 Matrix: AQUEOUS
 Authorized: 14 AUG 91

Sampled: 13 AUG 91
 Prepared: See Below

Received: 14 AUG 91
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/L	0.060	6010	NA	20 AUG 91
Barium	ND	mg/L	0.010	6010	NA	20 AUG 91
Beryllium	ND	mg/L	0.0020	6010	NA	20 AUG 91
Cadmium	ND	mg/L	0.0050	6010	NA	20 AUG 91
Chromium	ND	mg/L	0.010	6010	NA	20 AUG 91
Cobalt	ND	mg/L	0.010	6010	NA	20 AUG 91
Copper	ND	mg/L	0.020	6010	NA	20 AUG 91
Nickel	ND	mg/L	0.040	6010	NA	20 AUG 91
Silver	ND	mg/L	0.010	6010	NA	20 AUG 91
Tin	ND	mg/L	0.10	6010	NA	20 AUG 91
Vanadium	ND	mg/L	0.010	6010	NA	20 AUG 91
Zinc	ND	mg/L	0.020	6010	NA	20 AUG 91

ND = Not detected
 NA = Not applicable

Reported By: Carla Owen

Approved By: Harold Borquez

Metals

Dissolved Metals

Client Name: U.S. Geological Survey

Client ID: BOTTLED DI-CF-WATER

Lab ID: 016360-0002-SA

Matrix: AQUEOUS

Authorized: 14 AUG 91

Sampled: 13 AUG 91

Prepared: See Below

Received: 14 AUG 91

Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/L	0.060	6010	NA	20 AUG 91
Barium	ND	mg/L	0.010	6010	NA	20 AUG 91
Beryllium	ND	mg/L	0.0020	6010	NA	20 AUG 91
Cadmium	ND	mg/L	0.0050	6010	NA	20 AUG 91
Chromium	ND	mg/L	0.010	6010	NA	20 AUG 91
Cobalt	ND	mg/L	0.010	6010	NA	20 AUG 91
Copper	ND	mg/L	0.020	6010	NA	20 AUG 91
Nickel	ND	mg/L	0.040	6010	NA	20 AUG 91
Silver	ND	mg/L	0.010	6010	NA	20 AUG 91
Tin	ND	mg/L	0.10	6010	NA	20 AUG 91
Vanadium	ND	mg/L	0.010	6010	NA	20 AUG 91
Zinc	ND	mg/L	0.020	6010	NA	20 AUG 91

ND = Not detected

NA = Not applicable

Reported By: Carla Owen

Approved By: Harold Borquez

General Inorganics

Client Name: U.S. Geological Survey

Client ID: GEOTECH-FILTER

Lab ID: 016360-0001-SA

Matrix: AQUEOUS

Authorized: 14 AUG 91

Sampled: 13 AUG 91

Prepared: See Below

Received: 14 AUG 91

Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide	ND	mg/L	0.010	9012	NA	15 AUG 91
Sulfide, Total	ND	mg/L	0.050	376.2	NA	15 AUG 91

ND = Not detected
NA = Not applicable

Reported By: Jody Tolle

Approved By: Paula Hubble

General Inorganics

Client Name: U.S. Geological Survey
Client ID: BOTTLED DI-CF-WATER
Lab ID: 016360-0002-SA
Matrix: AQUEOUS
Authorized: 14 AUG 91

Sampled: 13 AUG 91
Prepared: See Below

Received: 14 AUG 91
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide	ND	mg/L	0.010	9012	NA	15 AUG 91
Sulfide, Total	ND	mg/L	0.050	376.2	NA	15 AUG 91

ND = Not detected
NA = Not applicable

Reported By: Jody Tolle

Approved By: Paula Hubble

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
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
016360-0001-SA	AQUEOUS	ICP-AD	20 AUG 91-K	-
016360-0002-SA	AQUEOUS	ICP-AD	20 AUG 91-K	-

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

Analyte	Spiked	Concentration		AVG	Accuracy		Precision	
		DCS1	Measured DCS2		Average (%) DCS	Limits	(RPD) DCS	Limit
Category:	ICP-AD							
Matrix:	AQUEOUS							
QC Lot:	20 AUG 91-K							
Concentration Units:	mg/L							
Aluminum	2.0	2.03	2.04	2.04	102	75-125	0.5	20
Antimony	0.5	0.440	0.431	0.436	87	75-125	1.9	20
Arsenic	0.5	0.468	0.470	0.469	94	75-125	0.4	20
Barium	2.0	1.89	1.89	1.89	95	75-125	0.2	20
Beryllium	0.05	0.0546	0.0543	0.0545	109	75-125	0.7	20
Cadmium	0.05	0.0436	0.0439	0.0438	88	75-125	0.6	20
Calcium	100	96.8	96.7	96.7	97	75-125	0.0	20
Chromium	0.2	0.190	0.187	0.188	94	75-125	1.8	20
Cobalt	0.5	0.472	0.473	0.472	94	75-125	0.0	20
Copper	0.25	0.268	0.268	0.268	107	75-125	0.2	20
Iron	1.0	1.03	1.03	1.03	103	75-125	0.1	20
Lead	0.5	0.469	0.468	0.468	94	75-125	0.4	20
Magnesium	50	50.3	50.8	50.5	101	75-125	0.9	20
Manganese	0.5	0.477	0.478	0.477	95	75-125	0.3	20
Nickel	0.5	0.479	0.475	0.477	95	75-125	0.7	20
Potassium	50	49.3	50.8	50.0	100	75-125	3.1	20
Silver	0.05	0.0428	0.0444	0.0436	87	75-125	3.6	20
Sodium	100	102	105	103	103	75-125	2.8	20
Vanadium	0.5	0.485	0.486	0.486	97	75-125	0.2	20
Zinc	0.5	0.495	0.493	0.494	99	75-125	0.4	20

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

QC LOT ASSIGNMENT REPORT
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
016360-0001-SA	AQUEOUS	S-A	15 AUG 91-A	-
016360-0001-SA	AQUEOUS	CN-A	15 AUG 91-A	15 AUG 91-A
016360-0002-SA	AQUEOUS	S-A	15 AUG 91-A	-
016360-0002-SA	AQUEOUS	CN-A	15 AUG 91-A	15 AUG 91-A

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

Analyte	Spiked	Concentration		Measured	AVG	Accuracy		Precision	
		DCS1	DCS2			DCS	Limits	(RPD)	DCS Limit
Category: S-A Matrix: AQUEOUS QC Lot: 15 AUG 91-A Concentration Units: mg/L									
Sulfide, Total	0.456	0.376	0.401	0.388	85	80-120	6.4	20	
Category: CN-A Matrix: AQUEOUS QC Lot: 15 AUG 91-A Concentration Units: mg/L									
Cyanide	0.20	0.185	0.185	0.185	93	75-125	0.0	20	

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

METHOD BLANK REPORT
Wet Chemistry Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: CNTOT-TEC-A			
Matrix: AQUEOUS			
QC Lot: 15 AUG 91-A	QC Run: 15 AUG 91-A		
Cyanide	ND	mg/L	0.010

Appendix

ENSECO ANALYTICAL SERVICES REQUEST FORM

16360-01

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

Hazardous material

GEO TECH - FILTER
~~KAFB 09~~

Site Type (circle one)
~~SW~~ - Surface Water LK - Lake
 GW - Ground Water ES - Estuary
 ME - Meteorological SP - Spring
 SS - Special Source
 (505) 262-5344
 Phone (FTS)

Field ID
USGS/WRD/NM
 Field Office

KAFB IRP
 Project

Miko Roybal
 Collector

File Deposition* (Circle one)

Q - WATSTORE
 X - Lab File

[Blank Box]

For Laboratory Use Only

Sample identification

GEO TECH - FILTER
~~KAFB 09~~

Station ID or Unique Number*

463536001

Project Account #

1991 08 13 1030 N M 035 001
 Year* Month* Day* Time* Month Day Time State Code* District/ User Code* County Code

Begin Date

Composite End Date

Analysis level codes and schedules

Sample Medium**	Geologic Unit	H or 9 Analysis Status**	Analysis Source**	Hydrologic Condition**	Sample Type**	Hydrologic Event**
SW FILTER						
PARAMETER: APPX IX-VOC		APPX IX-SEMI-VOC		APPX IX-PESTICIDES		APPX IX-HERBICIDES
METHOD: SW5030/SW8240		SW3510/SW8270		SW3520/SW8080		SW3520/SW8150
PARAMETER: APPX IX-DIOXINS		APPX IX-ICP, TOTAL		APPX IX-ICP, DISS		APPX IX-CYANIDE
METHOD: SW3520/SW8280		SW3005/SW6010		SW3005/SW6010		SW9010
PARAMETER: APPX IX-SULFIDE		NITRATE + NITRITE		NITRITE		EXPLOSIVES
METHOD: SW9030		E353.2		E351.4		USATHAMA EXTRA SAMPLE

Chain-of-Custody Record

PROJECT NAME Kirtland AFB IRP PROJECT NO. 463536001 P.O. NO. _____

Relinquished by: (Signature) Miko Roybal Received by: (Signature) _____ Date 8/13/91 Time 1145

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

Relinquished by: (Signature) _____ Received at lab by: (Signature) Anthony Turner Date 8-14/91 Time 8:00

Relinquished from lab by: (Signature) _____ Received by: (Signature) _____ Date _____ Time _____

Comments (Only 50 characters stored in NWIS)

Record 5 GEO TECH FILTER (DISPOSABLE, P. 45 MICRON, # GD 045700, SPC = 5.7)

Record 6 _____

Total number of sample bottles for this request: 3

SHIP TO: LINDSAY BREYER OR R. THOMPSON
 Enesco-Rocky Mountain Analytical
 4955 Yarrow Street
 Arvada, CO 80002

ENSECO ANALYTICAL SERVICES REQUEST FORM

16360_02

Special Handling (Circle as appropriate and explain in record 5)
 Hazardous material BOTTLED DI-CF-WATER
 KAFB 09 Station Name

Field ID USGS/WRD/NM Field Office
 Project KAFB TRP Collector Miko Roybal
 Phone (FTS) (505) 262-5344

Site Type (circle one)
~~SW~~ - Surface Water LK - Lake
 GW - Ground Water ES - Estuary
 ME - Meteorological SP - Spring
SS - Special Source

File Deposition* (Circle one)
 Q - WATSTORE
 X - Lab File

Sample identification
BOTTLED DI-CF-WATER
 KAFB 09 Station ID or Unique Number*
 Project Account # 463536001

For Laboratory Use Only

1991 Year* 08 Month* 13 Day* 1000 Time*
 Begin Date

Month Day Time Composite End Date
 N M State Code* 035 District/ User Code* 001 County Code

Analysis level codes and schedules

Sample Medium**	Geologic Unit	H or 9 Analysis Status**	Analysis Source**	Hydrologic Condition**	Sample Type**	Hydrologic Event**
PARAMETER: APPX IX-VOC		APPX IX-SEMI-VOC		APPX IX PESTICIDES		APPX IX HERBICIDES
METHOD: SW5030/SW8240		SW3510/SW8270		SW3520/SW8080		SW3520/SW8150
PARAMETER: APPX IX-DIOXINS		APPX IX-ICP, TOTAL		APPX IX-ICP, DISS		APPX IX-CYANIDE
METHOD: SW3520/SW6280		SW3005/SW6010		SW3005/SW6010		SW9010
PARAMETER: APPX IX-SULFIDE		NITRATE + NITRITE		NITRATE		EXPLOSIVES
METHOD: SW9030		E353 2		E353 4		USATHAMA SAMPLE

Chain-of-Custody Record

PROJECT NAME Kirtland AFB TRP PROJECT NO. 463536001 P.O. NO. _____

Relinquished by: (Signature) Miko Roybal Received by: (Signature) _____ Date 8/13/91 Time 1145

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

Relinquished by: (Signature) _____ Received at lab by: (Signature) Anthony Turner Date 8/14/91 Time 8:00

Relinquished from lab by: (Signature) _____ Received by: (Signature) _____ Date _____ Time _____

Comments (Only 50 characters stored in NWIS)

Record 5 S.P.C = 3.8
BOTTLED 8/9/91 NEW FILTER FOR DI-CF SYSTEM LINE

Record 6 _____

Total number of sample bottles for this request: 3

SHIP TO: LINDSAY BREYER OR R. THOMPSON
 Enesco-Rocky Mountain Analytical
 4955 Yarrow Street
 Arvada, CO 80002