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5 of 10  
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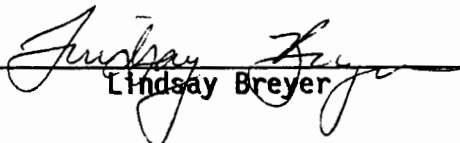
ANALYTICAL RESULTS  
FOR  
U.S. GEOLOGICAL SURVEY  
ENSECO-RMAL NO. 013845



MARCH 25, 1991

Reviewed by:

  
Randall Thompson

  
Lindsay Breyer

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

KAFB1106  


## **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
013845-0001-SA	KAFB060806-2	AQUEOUS	04 MAR 91	13:05	05 MAR 91
013845-0002-SA	KAFB060807-2	AQUEOUS	04 MAR 91	14:35	05 MAR 91

ANALYTICAL TEST REQUESTS  
 for  
 U.S. Geological Survey

Lab ID: 013845	Group Code	Analysis Description	Custom Test?
0001 - 0002	A	Chromium, Furnace AA	N
		Chromium, Furnace AA (Total)	N
		Prep - Total Metals, ICP	N
		Chromium VI (Dissolved)	N
		Chromium VI (Total)	N
		Nitrate Plus Nitrite	N
		Uranium, Natural	N
		Gross Alpha & Beta	N
		Total Organic Carbon (TOC)	N
		Total Organic Halogen (TOX)	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**

**Total Metals**

Client Name: U.S. Geological Survey  
 Client ID: KAFB060806-2  
 Lab ID: 013845-0001-SA  
 Matrix: AQUEOUS  
 Authorized: 05 MAR 91

Sampled: 04 MAR 91  
 Prepared: See Below

Received: 05 MAR 91  
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium (VI)	0.023	mg/L	0.010	7196	NA	05 MAR 91
Chromium	0.075	mg/L	0.0010	7191	11 MAR 91	19 MAR 91

*Sample*

*@1215*

ND = Not detected  
 NA = Not applicable

Reported By: Mike Settell

Approved By: Dave Roberts

Metals

Total Metals

Client Name: U.S. Geological Survey

Client ID: KAFB060807-2

Lab ID: 013845-0002-SA

Matrix: AQUEOUS

Authorized: 05 MAR 91

Sampled: 04 MAR 91

Prepared: See Below

Received: 05 MAR 91

Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium (VI)	ND	mg/L	0.010	7196	NA	05 MAR 91
Chromium	0.0078	mg/L	0.0010	7191	11 MAR 91	19 MAR 91

*Handwritten signature*

*@1215*

ND = Not detected  
 NA = Not applicable

Reported By: Mike Settell

Approved By: Dave Roberts

Metals

Dissolved Metals

Client Name: U.S. Geological Survey  
 Client ID: KAFB060806-2  
 Lab ID: 013845-0001-SA  
 Matrix: AQUEOUS  
 Authorized: 05 MAR 91  
 Sampled: 04 MAR 91  
 Prepared: See Below  
 Received: 05 MAR 91  
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date @1215
Chromium (VI)	ND	mg/L	0.010	7196	NA	05 MAR 91
Chromium	0.011	mg/L	0.0010	7191	NA	19 MAR 91

ND = Not detected  
 NA = Not applicable

Reported By: Mike Settell

Approved By: Dave Roberts



Metals

Dissolved Metals

Client Name: U.S. Geological Survey  
 Client ID: KAFB060807-2  
 Lab ID: 013845-0002-SA  
 Matrix: AQUEOUS  
 Authorized: 05 MAR 91

Sampled: 04 MAR 91  
 Prepared: See Below

Received: 05 MAR 91  
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium (VI)	ND	mg/L	0.010	7196	NA	05 MAR 91
Chromium	ND	mg/L	0.0010	7191	NA	19 MAR 91

*@1215*

ND = Not detected  
 NA = Not applicable

Reported By: Mike Settell

Approved By: Dave Roberts

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General Inorganics



Client Name: U.S. Geological Survey  
Client ID: KAFB060806-2  
Lab ID: 013845-0001-SA  
Matrix: AQUEOUS  
Authorized: 05 MAR 91

Sampled: 04 MAR 91  
Prepared: See Below

Received: 05 MAR 91  
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Nitrate plus Nitrite	25.4	mg/L	2.5	353.2	NA	09 MAR 91
Total Organic Carbon	5.4	mg/L	0.50	9060	NA	07 MAR 91
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	06 MAR 91

ND = Not detected  
NA = Not applicable

Reported By: Dan Appelhans

Approved By: Roxanne Sullivan

General Inorganics



Client Name: U.S. Geological Survey  
 Client ID: KAFB060807-2  
 Lab ID: 013845-0002-SA  
 Matrix: AQUEOUS  
 Authorized: 05 MAR 91

Sampled: 04 MAR 91  
 Prepared: See Below

Received: 05 MAR 91  
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Nitrate plus Nitrite Total Organic Carbon	ND	mg/L	0.050	353.2	NA	09 MAR 91
Total Organic Carbon	1.3	mg/L	0.50	9060	NA	07 MAR 91
Total Organic Halogen as Cl	ND	ug/L	30.0	9020	NA	06 MAR 91

ND = Not detected  
 NA = Not applicable

Reported By: Dan Appelhans

Approved By: Roxanne Sullivan

Radiochemistry



Client Name: U.S. Geological Survey  
Client ID: KAFB060806-2  
Lab ID: 013845-0001-SA  
Matrix: AQUEOUS  
Authorized: 05 MAR 91

Sampled: 04 MAR 91  
Prepared: See Below

Received: 05 MAR 91  
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Gross Alpha	5.4	pCi/L	+/- 4.0	900.0	NA	13 MAR 91
Gross Beta	2.7	pCi/L	+/- 3.4	900.0	NA	13 MAR 91
Uranium, Natural	0.003	mg/L	0.002	ASTM D2907-70T	NA	11 MAR 91

ND = Not detected  
NA = Not applicable

Reported By: Toni Lusk

Approved By: Tammy Bailey

Radiochemistry



Client Name: U.S. Geological Survey  
Client ID: KAFB060807-2  
Lab ID: 013845-0002-SA  
Matrix: AQUEOUS  
Authorized: 05 MAR 91

Sampled: 04 MAR 91  
Prepared: See Below

Received: 05 MAR 91  
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Gross Alpha	0.0	pCi/L	+/- 1.5	900.0	NA	13 MAR 91
Gross Beta	0.0	pCi/L	+/- 4.2	900.0	NA	13 MAR 91
Uranium, Natural	<0.002	mg/L	0.002	ASTM D2907-70T	NA	11 MAR 91

ND = Not detected  
NA = Not applicable

Reported By: Toni Lusk

Approved By: Tammy Bailey

## Quality Control Results

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

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

The standard laboratory QC package is designed to:

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

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

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

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

Accuracy for DCS and SCS is measured by Percent Recovery.

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

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

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

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



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

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
013845-0001-SA	AQUEOUS	CR-FAA-AD	19 MAR 91-E	-
013845-0001-SA	AQUEOUS	CR-FAA-AT	11 MAR 91-F	11 MAR 91-F
013845-0001-SA	AQUEOUS	CR6-A	05 MAR 91-A	-
013845-0001-SA	AQUEOUS	CR6-AT	05 MAR 91-A	-
013845-0002-SA	AQUEOUS	CR-FAA-AD	19 MAR 91-E	-
013845-0002-SA	AQUEOUS	CR-FAA-AT	11 MAR 91-F	11 MAR 91-F
013845-0002-SA	AQUEOUS	CR6-A	05 MAR 91-A	-
013845-0002-SA	AQUEOUS	CR6-AT	05 MAR 91-A	-

DUPLICATE CONTROL SAMPLE REPORT  
Metals Analysis and Preparation

Analyte	Concentration Spiked	Concentration Measured		AVG	Accuracy Average(%)		Precision (RPD)		
		DCS1	DCS2		DCS	Limits	DCS	Limit	
Category: CR-FAA-AD Matrix: AQUEOUS QC Lot: 19 MAR 91-E Concentration Units: mg/L									
Chromium	0.20	0.194	0.196	0.195	98	75-125	1.0	20	
Category: CR-FAA-AT Matrix: AQUEOUS QC Lot: 11 MAR 91-F Concentration Units: mg/L									
Chromium	0.20	0.193	0.190	0.192	96	75-125	1.6	20	
Category: CR6-A Matrix: AQUEOUS QC Lot: 05 MAR 91-A Concentration Units: mg/L									
Chromium (VI)	0.05	0.0489	0.0476	0.0482	97	75-125	2.7	20	
Category: CR6-AT Matrix: AQUEOUS QC Lot: 05 MAR 91-A Concentration Units: mg/L									
Chromium (VI)	0.05	0.0489	0.0476	0.0482	97	75-125	2.7	20	

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

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**METHOD BLANK REPORT**  
**Metals Analysis and Preparation**

Analyte	Result	Units	Reporting Limit
Test: CR-FAA-AT			
Matrix: AQUEOUS			
QC Lot: 11 MAR 91-F	QC Run: 11 MAR 91-F		
Chromium	ND	mg/L	0.0010

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)
013845-0001-SA	AQUEOUS	NO3-A	09 MAR 91-A	-
013845-0001-SA	AQUEOUS	TOC-A	07 MAR 91-A	-
013845-0001-SA	AQUEOUS	TOX-A	06 MAR 91-A	-
013845-0002-SA	AQUEOUS	NO3-A	09 MAR 91-A	-
013845-0002-SA	AQUEOUS	TOC-A	07 MAR 91-A	-
013845-0002-SA	AQUEOUS	TOX-A	06 MAR 91-A	-

DUPLICATE CONTROL SAMPLE REPORT  
Wet Chemistry Analysis and Preparation

Analyte	Spiked	Concentration		AVG	Accuracy		Precision		
		DCS1	Measured DCS2		DCS	Average(%) Limits	(RPD) DCS Limit	DCS Limit	
Category: NO3-A Matrix: AQUEOUS QC Lot: 09 MAR 91-A Concentration Units: mg/L									
Nitrate as N	5.4	5.12	5.45	5.28	98	91-109	6.2	10	
Category: TOC-A Matrix: AQUEOUS QC Lot: 07 MAR 91-A Concentration Units: mg/L									
Total Organic Carbon	25.0	25.3	25.3	25.3	101	91-109	0.0	20	
Category: TOX-A Matrix: AQUEOUS QC Lot: 06 MAR 91-A Concentration Units: ug Cl/L									
Total Organic Halogen as Cl	100	112	98.4	105	105	80-120	13	20	

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

ENSECO ANALYTICAL SERVICES REQUEST FORM

13845 - 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: AFB060806-2

Field ID: USGS/WRD/NEW MEX  
Field Office

Project: KIRTLAND AFB RP-SWMU'S

Collector: BILL DAM

Phone (FTS): (505) 262-5341

Deposition\* (circle one)

- WATSTORE
- Lab File

Sample identification

For Laboratory Use Only

Station ID or Unique Number: K A F B 0 6 0 8 0 6 - 2

Project Account #: 4 6 3 . 5 3 . 6 0 0 . 1

Year: 9 9 1 Month: 03 Day: 04 Time: 13 05 Month: 03 Day: 04 Time: 13 20 State Code: N M District/User Code: 0 3 5 County Code: 0 0 1

Analysis level codes and schedules

Sample Medium**	Geologic Unit	Analysis Status**	Analysis Source*	Hydrologic Condition**	Sample Type**	Hydrologic Event**
6		(H) or 9	9		9	9
PARAMETER:	<u>CHROMIUM TOTAL</u>	<u>CHROMIUM, DISS</u>	<u>CHROMIUM HEXAVALENT TOTAL</u>	<u>CHROMIUM HEXAVALENT DISSOLVED</u>		<u>NITRATE + NITRITE</u>
METHOD:	<u>SW3020/SW7191</u>	<u>SW3005/SW7191</u>	<u>SW7196</u>	<u>SW7196</u>		<u>E353.2</u>
PARAMETER:	<u>URANIUM GROSS ALPHA &amp; GROSS BETA</u>		<del>VOX</del>	<u>TDC, TOX</u>		<del>NITROGLYCERINE &amp; PETN</del>
METHOD:	<u>A711B, E900</u>		<del>SW5030/SW8010</del>	<u>SW7060, SW9020</u>		<del>USATHAMA</del>
PARAMETER:				<u>EHS.1</u>		
METHOD:						

Chain-of-Custody Record

PROJECT NAME: KIRTLAND AFB-IRP, SWMU'S PROJECT NO: 463536001 P.O. NO: \_\_\_\_\_

Relinquished by: (Signature) Milo Royal Received by: (Signature) \_\_\_\_\_ Date: 3/4/91 Time: 1615

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

Relinquished by: (Signature) \_\_\_\_\_ Received at lab by: (Signature) Alpa AMAL Date: 03-05-91 Time: 0800

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

Comments (Only 50 characters stored in NWIS)

Record 5: WELL AT N.W. COR. OF GOLF COURSE POND.

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

Total number of sample bottles for this request: 7

SHIP TO:

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

ENSECO ANALYTICAL SERVICES REQUEST FORM

13845-02

Special Handling

(Circle as appropriate and explain in record 5)

Site Type (circle one)

Hazardous material

7 EQUIPMENT BLANK

SW - Surface Water  
 GW - Ground Water  
 ME - Meteorological

LK - Lake  
 ES - Estuary  
 SP - Spring  
 SS - Special Source

Station Name: KA FB 060807-2

Field Office: USGS/WRD/NEW MEX

Project: KIRTLAND AFB IRP-SWMU'S

Collector: BILL DAM

Phone (FTS): (505) 262-5341

Deposition\*

Sample identification

Circle one:  
 W - WATSTORE  
 L - Lab File

[Empty box for Laboratory Use Only]

Station ID or Unique Number: KA FB 060807-2

Project Account #: 463.53.600.1

Year: 91  
 Month: 03  
 Day: 04  
 Time: 1435  
 Begin Date

Month: [ ]  
 Day: [ ]  
 Time: [ ]  
 Composite End Date

State Code: N.M.  
 District/User Code: 035  
 County Code: 001

Analysis level codes and schedules

Sample Medium**	Geologic Unit	Analysis Status**	Analysis Source**	Hydrologic Condition**	Sample Type**	Hydrologic Event**
6		(H) or 9	9		9	9
PARAMETER: CHROMIUM, TOTAL		CHROMIUM, DISS	CHROMIUM HEXAVALENT TOTAL	CHROMIUM HEXAVALENT DISSOLVED		NITRATE + NITRITE
METHOD: SW3020/SW7191		SW3005/SW7191	SW7196	SW7196		E353.2
PARAMETER: URANIUM, GROSS ALPHA & GROSS BETA			<del>VOL</del>	TOC, TOX		<del>NITROGLYCERINE/PETN</del>
METHOD: A711B, E900			<del>SW5030/SW8010</del>	SW7060, SW9020		<del>HEATHAMA</del>
PARAMETER:				E415.1		
METHOD:						

Chain-of-Custody Record

PROJECT NAME KIRTLAND AFB-IRP, SWMU'S PROJECT NO. 463536001 P.O. NO. \_\_\_\_\_

Relinquished by: (Signature) Mike Royal Received by: (Signature) \_\_\_\_\_ Date 3/4/91 Time 1615

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

Relinquished by: (Signature) \_\_\_\_\_ Received at lab by: (Signature) Alma R MAL Date 03-05-91 Time 0800

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

Comments (Only 50 characters stored in NWIS)

Record 5 EQUIPMENT BLANK AT WELL NW COR OF GOLF COURSE POND.

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

Total number of sample bottles for this request: 7

SHIP TO:  
 Enseco-Rocky Mountain Analytical  
 4955 Yarrow Street  
 Arvada, CO 80002  
 (303) 421-6611  
 LINDSAY REYER