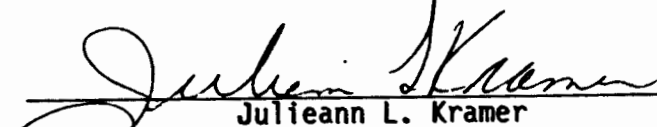



 ENTERED

ANALYTICAL RESULTS
FOR
U.S. GEOLOGICAL SURVEY
ENSECO-RMAL NO. 024120

August 29, 1992

Reviewed by:


Julieann L. Kramer


Mark Dymerski

KAFB1250


I. OVERVIEW

On July 28, 1992, Enseco-Rocky Mountain Analytical Laboratory received seven aqueous samples from U.S. Geological Survey.

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

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.

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.

SAMPLE DESCRIPTION INFORMATION
for
U.S. Geological Survey

Lab ID	Client ID	Matrix	Sampled		Received
			Date	Time	Date
024120-0001-SA	KAFB094307-2	AQUEOUS	27 JUL 92	10:30	28 JUL 92
024120-0002-EB	KAFB094308-2	AQUEOUS	27 JUL 92	10:29	28 JUL 92
024120-0003-SA	KAFB094408-2	AQUEOUS	27 JUL 92	11:10	28 JUL 92
024120-0003-MS	KAFB094409-2	AQUEOUS	27 JUL 92	11:10	28 JUL 92
024120-0003-SD	KAFB094410-2	AQUEOUS	27 JUL 92	11:10	28 JUL 92
024120-0004-SA	KAFB094509-2	AQUEOUS	27 JUL 92	11:15	28 JUL 92
024120-0005-SA	KAFB094510-2	AQUEOUS	27 JUL 92	11:15	28 JUL 92

ANALYTICAL TEST REQUESTS
for
U.S. Geological Survey

Lab ID: 024120	Group Code	Analysis Description	Custom Test?
0001 , 0003, 0004 - 0005	A	Appendix IX Metals (Total) done by ICP	N
		Prep - Total Metals, ICP	N
		Appendix IX Metals done by ICP	N
		Arsenic, Furnace AA (Total)	N
		Prep - Total Metals, Furnace AA	N
		Arsenic, Furnace AA (Dissolved)	N
		Lead, Furnace AA (Total)	N
		Lead, Furnace AA (Dissolved)	N
		Selenium, Furnace AA (Dissolved)	N
		Selenium, Furnace AA (Total)	N
		Mercury, Cold Vapor AA (Dissolved)	N
		Prep - Mercury, Cold Vapor AA, (Dissolved)	N
		Mercury, Cold Vapor AA (Total)	N
		Prep - Mercury, Cold Vapor AA (Total)	N
		Thallium, Furnace AA (Dissolved)	N
Thallium, Furnace AA (Total)	N		
0002	B	Appendix IX Metals done by ICP	N
		Arsenic, Furnace AA (Dissolved)	N
		Lead, Furnace AA (Dissolved)	N
		Selenium, Furnace AA (Dissolved)	N
		Mercury, Cold Vapor AA (Dissolved)	N
		Prep - Mercury, Cold Vapor AA, (Dissolved)	N
Thallium, Furnace AA (Dissolved)	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, May, 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

All nominal reporting limits for metals have been established from instrument detection limit (IDL) evaluations and represent the level above which reliable data can be routinely obtained. Low level standards are analyzed seven times on three non-consecutive days on each instrument. The standard deviations of the three runs are summed to yield the IDL. Nominal reporting limits are generally 2-5 times the IDL (consistent with the American Chemical Society definition for the Limit of Quantification). The ability to achieve these quoted reporting limits is verified each quarter. Reporting limits above the nominal levels are often submitted due to matrix interferences or elevated analyte levels.

Reporting limits for metals analyzed by Inductively Coupled Plasma (ICP) are typically raised only for dilution due to an analyte exceeding the instrument linear range. Background and interelement interferences are corrected automatically and do not require dilution.

Metals analyzed by Graphite Furnace Atomic Absorption (GFAA) are subject to matrix interferences. Consequently, Enseco protocol is to analyze a spiked aliquot with every sample. The severity of the interference, based upon analyte level and spike recovery, is assessed against specific criteria and the need for an elevated reporting limit or dilution is determined.

The analysis of mercury by Cold Vapor Atomic Absorption (CVAA) is generally free from matrix interferences. As with ICP, reporting limits are raised only for dilution due to a sample concentration exceeding the linear range of the instrument.

Reporting limits for metals analyzed by inductively coupled plasma - mass spectrometry (ICPMS) may be raised for dilution due to an analyte exceeding the linear range of the instrument or matrix interference. An internal standard is analyzed with each sample to measure the degree of matrix interference - a dilution is performed when appropriate. Isobaric and

molecular interferences are corrected at the instrument and do not require dilution.

Metals
Total Metals

Client Name: U.S. Geological Survey
 Client ID: KAFB094307-2
 Lab ID: 024120-0001-SA
 Matrix: AQUEOUS
 Authorized: 28 JUL 92

Sampled: 27 JUL 92
 Prepared: See Below

Received: 28 JUL 92
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/L	0.060	6010	03 AUG 92	18 AUG 92
Arsenic	0.020	mg/L	0.0050	7060	03 AUG 92	18 AUG 92
Barium	1.8	mg/L	0.010	6010	03 AUG 92	18 AUG 92
Beryllium	0.0083	mg/L	0.0020	6010	03 AUG 92	18 AUG 92
Cadmium	ND	mg/L	0.0050	6010	03 AUG 92	18 AUG 92
Chromium	0.12	mg/L	0.010	6010	03 AUG 92	18 AUG 92
Cobalt	0.051	mg/L	0.010	6010	03 AUG 92	18 AUG 92
Copper	0.15	mg/L	0.020	6010	03 AUG 92	18 AUG 92
Lead	0.14	mg/L	0.025	7421	03 AUG 92	25 AUG 92
Mercury	ND	mg/L	0.00020	7470	05 AUG 92	05 AUG 92
Nickel	0.14	mg/L	0.040	6010	03 AUG 92	18 AUG 92
Selenium	ND	mg/L	0.0050	7740	03 AUG 92	15 AUG 92
Silver	ND	mg/L	0.010	6010	03 AUG 92	18 AUG 92
Thallium	ND	mg/L	0.010	7841	03 AUG 92	14 AUG 92
Tin	ND	mg/L	0.10	6010	03 AUG 92	18 AUG 92
Vanadium	0.23	mg/L	0.010	6010	03 AUG 92	18 AUG 92
Zinc	0.53	mg/L	0.020	6010	03 AUG 92	18 AUG 92

ND = Not detected
 NA = Not applicable

Reported By: Steven Gouy

Approved By: Sandra Jones

Metals

Total Metals

Client Name: U.S. Geological Survey
 Client ID: KAFB094408-2
 Lab ID: 024120-0003-SA
 Matrix: AQUEOUS
 Authorized: 28 JUL 92

Sampled: 27 JUL 92
 Prepared: See Below

Received: 28 JUL 92
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/L	0.060	6010	03 AUG 92	18 AUG 92
Arsenic	0.024	mg/L	0.0050	7060	03 AUG 92	18 AUG 92
Barium	2.2	mg/L	0.010	6010	03 AUG 92	18 AUG 92
Beryllium	0.0099	mg/L	0.0020	6010	03 AUG 92	18 AUG 92
Cadmium	ND	mg/L	0.0050	6010	03 AUG 92	18 AUG 92
Chromium	0.14	mg/L	0.010	6010	03 AUG 92	18 AUG 92
Cobalt	0.065	mg/L	0.010	6010	03 AUG 92	18 AUG 92
Copper	0.17	mg/L	0.020	6010	03 AUG 92	18 AUG 92
Lead	0.17	mg/L	0.025	7421	03 AUG 92	25 AUG 92
Mercury	0.00036	mg/L	0.00020	7470	05 AUG 92	05 AUG 92
Nickel	0.17	mg/L	0.040	6010	03 AUG 92	18 AUG 92
Selenium	ND	mg/L	0.0050	7740	03 AUG 92	15 AUG 92
Silver	ND	mg/L	0.010	6010	03 AUG 92	18 AUG 92
Thallium	ND	mg/L	0.010	7841	03 AUG 92	14 AUG 92
Tin	ND	mg/L	0.10	6010	03 AUG 92	18 AUG 92
Vanadium	0.26	mg/L	0.010	6010	03 AUG 92	18 AUG 92
Zinc	0.64	mg/L	0.020	6010	03 AUG 92	18 AUG 92

ND = Not detected
 NA = Not applicable

Reported By: Steven Gouy

Approved By: Sandra Jones

Metals

Total Metals

Client Name: U.S. Geological Survey
 Client ID: KAFB094509-2
 Lab ID: 024120-0004-SA
 Matrix: AQUEOUS
 Authorized: 28 JUL 92

Sampled: 27 JUL 92
 Prepared: See Below

Received: 28 JUL 92
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/L	0.060	6010	03 AUG 92	18 AUG 92
Arsenic	0.023	mg/L	0.0050	7060	03 AUG 92	18 AUG 92
Barium	2.2	mg/L	0.010	6010	03 AUG 92	18 AUG 92
Beryllium	0.010	mg/L	0.0020	6010	03 AUG 92	18 AUG 92
Cadmium	ND	mg/L	0.0050	6010	03 AUG 92	18 AUG 92
Chromium	0.11	mg/L	0.010	6010	03 AUG 92	18 AUG 92
Cobalt	0.066	mg/L	0.010	6010	03 AUG 92	18 AUG 92
Copper	0.16	mg/L	0.020	6010	03 AUG 92	18 AUG 92
Lead	0.18	mg/L	0.025	7421	03 AUG 92	25 AUG 92
Mercury	0.00027	mg/L	0.00020	7470	05 AUG 92	05 AUG 92
Nickel	0.15	mg/L	0.040	6010	03 AUG 92	18 AUG 92
Selenium	ND	mg/L	0.0050	7740	03 AUG 92	15 AUG 92
Silver	ND	mg/L	0.010	6010	03 AUG 92	18 AUG 92
Thallium	ND	mg/L	0.010	7841	03 AUG 92	14 AUG 92
Tin	ND	mg/L	0.10	6010	03 AUG 92	18 AUG 92
Vanadium	0.23	mg/L	0.010	6010	03 AUG 92	18 AUG 92
Zinc	0.56	mg/L	0.020	6010	03 AUG 92	18 AUG 92

ND = Not detected
 NA = Not applicable

Reported By: Steven Gouy

Approved By: Sandra Jones

Metals

Total Metals

Client Name: U.S. Geological Survey
 Client ID: KAFB094510-2
 Lab ID: 024120-0005-SA
 Matrix: AQUEOUS
 Authorized: 28 JUL 92

Sampled: 27 JUL 92
 Prepared: See Below

Received: 28 JUL 92
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/L	0.060	6010	03 AUG 92	18 AUG 92
Arsenic	0.024	mg/L	0.0050	7060	03 AUG 92	18 AUG 92
Barium	2.3	mg/L	0.010	6010	03 AUG 92	18 AUG 92
Beryllium	0.011	mg/L	0.0020	6010	03 AUG 92	18 AUG 92
Cadmium	ND	mg/L	0.0050	6010	03 AUG 92	18 AUG 92
Chromium	0.13	mg/L	0.010	6010	03 AUG 92	18 AUG 92
Cobalt	0.068	mg/L	0.010	6010	03 AUG 92	18 AUG 92
Copper	0.17	mg/L	0.020	6010	03 AUG 92	18 AUG 92
Lead	0.26	mg/L	0.025	7421	03 AUG 92	17 AUG 92
Mercury	0.00022	mg/L	0.00020	7470	05 AUG 92	05 AUG 92
Nickel	0.16	mg/L	0.040	6010	03 AUG 92	18 AUG 92
Selenium	ND	mg/L	0.010	7740	03 AUG 92	15 AUG 92
Silver	ND	mg/L	0.010	6010	03 AUG 92	18 AUG 92
Thallium	ND	mg/L	0.010	7841	03 AUG 92	14 AUG 92
Tin	ND	mg/L	0.10	6010	03 AUG 92	18 AUG 92
Vanadium	0.26	mg/L	0.010	6010	03 AUG 92	18 AUG 92
Zinc	0.61	mg/L	0.020	6010	03 AUG 92	18 AUG 92

ND = Not detected
 NA = Not applicable

Reported By: Steven Gouy

Approved By: Sandra Jones

Metals

Dissolved Metals

Client Name: U.S. Geological Survey
 Client ID: KAFB094307-2
 Lab ID: 024120-0001-SA
 Matrix: AQUEOUS
 Authorized: 28 JUL 92

Sampled: 27 JUL 92
 Prepared: See Below

Received: 28 JUL 92
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/L	0.060	6010	NA	18 AUG 92
Arsenic	ND	mg/L	0.0050	7060	NA	18 AUG 92
Barium	0.074	mg/L	0.010	6010	NA	18 AUG 92
Beryllium	ND	mg/L	0.0020	6010	NA	18 AUG 92
Cadmium	ND	mg/L	0.0050	6010	NA	18 AUG 92
Chromium	ND	mg/L	0.010	6010	NA	18 AUG 92
Cobalt	ND	mg/L	0.010	6010	NA	18 AUG 92
Copper	ND	mg/L	0.020	6010	NA	18 AUG 92
Lead	ND	mg/L	0.0050	7421	NA	17 AUG 92
Mercury	ND	mg/L	0.00020	7470	05 AUG 92	05 AUG 92
Nickel	ND	mg/L	0.040	6010	NA	18 AUG 92
Selenium	ND	mg/L	0.0050	7740	NA	19 AUG 92
Silver	ND	mg/L	0.010	6010	NA	18 AUG 92
Thallium	ND	mg/L	0.0050	7841	NA	17 AUG 92
Tin	ND	mg/L	0.10	6010	NA	18 AUG 92
Vanadium	ND	mg/L	0.010	6010	NA	18 AUG 92
Zinc	ND	mg/L	0.020	6010	NA	18 AUG 92

ND = Not detected
 NA = Not applicable

Reported By: Steven Gouy

Approved By: Sandra Jones

Metals

Dissolved Metals

Client Name: U.S. Geological Survey
 Client ID: KAFB094308-2
 Lab ID: 024120-0002-EB
 Matrix: AQUEOUS
 Authorized: 28 JUL 92

Sampled: 27 JUL 92
 Prepared: See Below

Received: 28 JUL 92
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/L	0.060	6010	NA	18 AUG 92
Arsenic	ND	mg/L	0.0050	7060	NA	18 AUG 92
Barium	ND	mg/L	0.010	6010	NA	18 AUG 92
Beryllium	ND	mg/L	0.0020	6010	NA	18 AUG 92
Cadmium	ND	mg/L	0.0050	6010	NA	18 AUG 92
Chromium	ND	mg/L	0.010	6010	NA	18 AUG 92
Cobalt	ND	mg/L	0.010	6010	NA	18 AUG 92
Copper	ND	mg/L	0.020	6010	NA	18 AUG 92
Lead	ND	mg/L	0.0050	7421	NA	17 AUG 92
Mercury	ND	mg/L	0.00020	7470	05 AUG 92	05 AUG 92
Nickel	ND	mg/L	0.040	6010	NA	18 AUG 92
Selenium	ND	mg/L	0.0050	7740	NA	19 AUG 92
Silver	ND	mg/L	0.010	6010	NA	18 AUG 92
Thallium	ND	mg/L	0.0050	7841	NA	17 AUG 92
Tin	ND	mg/L	0.10	6010	NA	18 AUG 92
Vanadium	ND	mg/L	0.010	6010	NA	18 AUG 92
Zinc	ND	mg/L	0.020	6010	NA	18 AUG 92

ND = Not detected
 NA = Not applicable

Reported By: Steven Gouy

Approved By: Sandra Jones

Metals

Dissolved Metals

Client Name: U.S. Geological Survey
 Client ID: KAFB094408-2
 Lab ID: 024120-0003-SA
 Matrix: AQUEOUS
 Authorized: 28 JUL 92

Sampled: 27 JUL 92
 Prepared: See Below

Received: 28 JUL 92
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/L	0.060	6010	NA	18 AUG 92
Arsenic	ND	mg/L	0.0050	7060	NA	18 AUG 92
Barium	0.069	mg/L	0.010	6010	NA	18 AUG 92
Beryllium	ND	mg/L	0.0020	6010	NA	18 AUG 92
Cadmium	ND	mg/L	0.0050	6010	NA	18 AUG 92
Chromium	ND	mg/L	0.010	6010	NA	18 AUG 92
Cobalt	ND	mg/L	0.010	6010	NA	18 AUG 92
Copper	ND	mg/L	0.020	6010	NA	18 AUG 92
Lead	ND	mg/L	0.0050	7421	NA	17 AUG 92
Mercury	ND	mg/L	0.00020	7470	05 AUG 92	05 AUG 92
Nickel	ND	mg/L	0.040	6010	NA	18 AUG 92
Selenium	ND	mg/L	0.0050	7740	NA	20 AUG 92
Silver	ND	mg/L	0.010	6010	NA	18 AUG 92
Thallium	ND	mg/L	0.0050	7841	NA	17 AUG 92
Tin	ND	mg/L	0.10	6010	NA	18 AUG 92
Vanadium	ND	mg/L	0.010	6010	NA	18 AUG 92
Zinc	ND	mg/L	0.020	6010	NA	18 AUG 92

ND = Not detected
 NA = Not applicable

Reported By: Steven Gouy

Approved By: Sandra Jones

Metals
Dissolved Metals

Client Name: U.S. Geological Survey
 Client ID: KAFB094509-2
 Lab ID: 024120-0004-SA
 Matrix: AQUEOUS
 Authorized: 28 JUL 92

Sampled: 27 JUL 92
 Prepared: See Below

Received: 28 JUL 92
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/L	0.060	6010	NA	18 AUG 92
Arsenic	ND	mg/L	0.0050	7060	NA	18 AUG 92
Barium	0.059	mg/L	0.010	6010	NA	18 AUG 92
Beryllium	ND	mg/L	0.0020	6010	NA	18 AUG 92
Cadmium	ND	mg/L	0.0050	6010	NA	18 AUG 92
Chromium	ND	mg/L	0.010	6010	NA	18 AUG 92
Cobalt	ND	mg/L	0.010	6010	NA	18 AUG 92
Copper	ND	mg/L	0.020	6010	NA	18 AUG 92
Lead	ND	mg/L	0.0050	7421	NA	17 AUG 92
Mercury	ND	mg/L	0.00020	7470	05 AUG 92	05 AUG 92
Nickel	ND	mg/L	0.040	6010	NA	18 AUG 92
Selenium	ND	mg/L	0.0050	7740	NA	19 AUG 92
Silver	ND	mg/L	0.010	6010	NA	18 AUG 92
Thallium	ND	mg/L	0.0050	7841	NA	17 AUG 92
Tin	ND	mg/L	0.10	6010	NA	18 AUG 92
Vanadium	ND	mg/L	0.010	6010	NA	18 AUG 92
Zinc	ND	mg/L	0.020	6010	NA	18 AUG 92

ND = Not detected
 NA = Not applicable

Reported By: Steven Gouy

Approved By: Sandra Jones

Metals

Dissolved Metals

Client Name: U.S. Geological Survey
 Client ID: KAFB094510-2
 Lab ID: 024120-0005-SA
 Matrix: AQUEOUS
 Authorized: 28 JUL 92

Sampled: 27 JUL 92
 Prepared: See Below

Received: 28 JUL 92
 Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/L	0.060	6010	NA	18 AUG 92
Arsenic	ND	mg/L	0.0050	7060	NA	18 AUG 92
Barium	0.061	mg/L	0.010	6010	NA	18 AUG 92
Beryllium	ND	mg/L	0.0020	6010	NA	18 AUG 92
Cadmium	ND	mg/L	0.0050	6010	NA	18 AUG 92
Chromium	ND	mg/L	0.010	6010	NA	18 AUG 92
Cobalt	ND	mg/L	0.010	6010	NA	18 AUG 92
Copper	ND	mg/L	0.020	6010	NA	18 AUG 92
Lead	ND	mg/L	0.0050	7421	NA	17 AUG 92
Mercury	ND	mg/L	0.00020	7470	05 AUG 92	05 AUG 92
Nickel	ND	mg/L	0.040	6010	NA	18 AUG 92
Selenium	ND	mg/L	0.0050	7740	NA	19 AUG 92
Silver	ND	mg/L	0.010	6010	NA	18 AUG 92
Thallium	ND	mg/L	0.0050	7841	NA	17 AUG 92
Tin	ND	mg/L	0.10	6010	NA	18 AUG 92
Vanadium	ND	mg/L	0.010	6010	NA	18 AUG 92
Zinc	ND	mg/L	0.020	6010	NA	18 AUG 92

ND = Not detected
 NA = Not applicable

Reported By: Steven Gouy

Approved By: Sandra Jones

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).

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

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)
024120-0001-SA	AQUEOUS	ICP-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0001-SA	AQUEOUS	ICP-AD	18 AUG 92-G7	-
024120-0001-SA	AQUEOUS	AS-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0001-SA	AQUEOUS	AS-FAA-AD	18 AUG 92-M7	-
024120-0001-SA	AQUEOUS	PB-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0001-SA	AQUEOUS	PB-FAA-AD	17 AUG 92-M7	-
024120-0001-SA	AQUEOUS	SE-FAA-AD	19 AUG 92-M7	-
024120-0001-SA	AQUEOUS	SE-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0001-SA	AQUEOUS	HG-CVAA-AT	05 AUG 92-D7	05 AUG 92-D7
024120-0001-SA	AQUEOUS	HG-CVAA-AT	05 AUG 92-E7	05 AUG 92-E7
024120-0001-SA	AQUEOUS	TL-FAA-AD	17 AUG 92-Z7	-
024120-0001-SA	AQUEOUS	TL-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0002-EB	AQUEOUS	ICP-AD	18 AUG 92-G7	-
024120-0002-EB	AQUEOUS	AS-FAA-AD	18 AUG 92-M7	-
024120-0002-EB	AQUEOUS	PB-FAA-AD	17 AUG 92-M7	-
024120-0002-EB	AQUEOUS	SE-FAA-AD	19 AUG 92-M7	-
024120-0002-EB	AQUEOUS	HG-CVAA-AT	05 AUG 92-D7	05 AUG 92-D7
024120-0002-EB	AQUEOUS	TL-FAA-AD	17 AUG 92-Z7	-
024120-0003-SA	AQUEOUS	ICP-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0003-SA	AQUEOUS	ICP-AD	18 AUG 92-G7	-
024120-0003-SA	AQUEOUS	AS-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0003-SA	AQUEOUS	AS-FAA-AD	18 AUG 92-M7	-
024120-0003-SA	AQUEOUS	PB-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0003-SA	AQUEOUS	PB-FAA-AD	17 AUG 92-M7	-
024120-0003-SA	AQUEOUS	SE-FAA-AD	19 AUG 92-M7	-
024120-0003-SA	AQUEOUS	SE-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0003-SA	AQUEOUS	HG-CVAA-AT	05 AUG 92-D7	05 AUG 92-D7
024120-0003-SA	AQUEOUS	HG-CVAA-AT	05 AUG 92-E7	05 AUG 92-E7
024120-0003-SA	AQUEOUS	TL-FAA-AD	17 AUG 92-Z7	-
024120-0003-SA	AQUEOUS	TL-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0003-MS	AQUEOUS	ICP-AD	18 AUG 92-G7	-
024120-0003-MS	AQUEOUS	ICP-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0003-MS	AQUEOUS	AS-FAA-AD	18 AUG 92-M7	-
024120-0003-MS	AQUEOUS	AS-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0003-MS	AQUEOUS	PB-FAA-AD	17 AUG 92-M7	-
024120-0003-MS	AQUEOUS	PB-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0003-MS	AQUEOUS	SE-FAA-AD	19 AUG 92-M7	-
024120-0003-MS	AQUEOUS	SE-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0003-MS	AQUEOUS	HG-CVAA-AT	05 AUG 92-D7	05 AUG 92-D7
024120-0003-MS	AQUEOUS	HG-CVAA-AT	05 AUG 92-E7	05 AUG 92-E7
024120-0003-MS	AQUEOUS	TL-FAA-AD	17 AUG 92-Z7	-
024120-0003-MS	AQUEOUS	TL-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0003-SD	AQUEOUS	ICP-AD	18 AUG 92-G7	-
024120-0003-SD	AQUEOUS	ICP-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0003-SD	AQUEOUS	AS-FAA-AD	18 AUG 92-M7	-
024120-0003-SD	AQUEOUS	AS-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0003-SD	AQUEOUS	PB-FAA-AD	17 AUG 92-M7	-

QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation (cont.)

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
024120-0003-SD	AQUEOUS	PB-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0003-SD	AQUEOUS	SE-FAA-AD	19 AUG 92-M7	-
024120-0003-SD	AQUEOUS	SE-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0003-SD	AQUEOUS	HG-CVAA-AT	05 AUG 92-D7	05 AUG 92-D7
024120-0003-SD	AQUEOUS	HG-CVAA-AT	05 AUG 92-E7	05 AUG 92-E7
024120-0003-SD	AQUEOUS	TL-FAA-AD	17 AUG 92-Z7	-
024120-0003-SD	AQUEOUS	TL-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0004-SA	AQUEOUS	ICP-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0004-SA	AQUEOUS	ICP-AD	18 AUG 92-G7	-
024120-0004-SA	AQUEOUS	AS-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0004-SA	AQUEOUS	AS-FAA-AD	18 AUG 92-M7	-
024120-0004-SA	AQUEOUS	PB-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0004-SA	AQUEOUS	PB-FAA-AD	17 AUG 92-M7	-
024120-0004-SA	AQUEOUS	SE-FAA-AD	19 AUG 92-M7	-
024120-0004-SA	AQUEOUS	SE-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0004-SA	AQUEOUS	HG-CVAA-AT	05 AUG 92-D7	05 AUG 92-D7
024120-0004-SA	AQUEOUS	HG-CVAA-AT	05 AUG 92-E7	05 AUG 92-E7
024120-0004-SA	AQUEOUS	TL-FAA-AD	17 AUG 92-Z7	-
024120-0004-SA	AQUEOUS	TL-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0005-SA	AQUEOUS	ICP-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0005-SA	AQUEOUS	ICP-AD	18 AUG 92-G7	-
024120-0005-SA	AQUEOUS	AS-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0005-SA	AQUEOUS	AS-FAA-AD	18 AUG 92-M7	-
024120-0005-SA	AQUEOUS	PB-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0005-SA	AQUEOUS	PB-FAA-AD	17 AUG 92-M7	-
024120-0005-SA	AQUEOUS	SE-FAA-AD	19 AUG 92-M7	-
024120-0005-SA	AQUEOUS	SE-FAA-AT	03 AUG 92-D7	03 AUG 92-D7
024120-0005-SA	AQUEOUS	HG-CVAA-AT	05 AUG 92-D7	05 AUG 92-D7
024120-0005-SA	AQUEOUS	HG-CVAA-AT	05 AUG 92-E7	05 AUG 92-E7
024120-0005-SA	AQUEOUS	TL-FAA-AD	17 AUG 92-Z7	-
024120-0005-SA	AQUEOUS	TL-FAA-AT	03 AUG 92-D7	03 AUG 92-D7

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

Analyte	Concentration			AVG	Accuracy		Precision	
	Spiked	DCS1	Measured DCS2		DCS	Average(%) Limits	(RPD)	DCS Limit
Category: ICP-AT								
Matrix: AQUEOUS								
QC Lot: 03 AUG 92-D7								
Concentration Units: mg/L								
Aluminum	2.0	1.89	1.92	1.91	95	75-125	1.4	20
Antimony	0.5	0.497	0.489	0.493	99	75-125	1.7	20
Arsenic	0.5	0.410	0.407	0.409	82	75-125	0.6	20
Barium	2.0	1.93	1.94	1.94	97	75-125	0.5	20
Beryllium	0.05	0.0478	0.0482	0.0480	96	75-125	0.8	20
Cadmium	0.05	0.0495	0.0500	0.0497	99	75-125	1.1	20
Calcium	100	91.1	92.3	91.7	92	75-125	1.4	20
Chromium	0.2	0.174	0.178	0.176	88	75-125	2.2	20
Cobalt	0.5	0.422	0.428	0.425	85	75-125	1.5	20
Copper	0.25	0.230	0.230	0.230	92	75-125	0.3	20
Iron	1.0	0.955	0.973	0.964	96	75-125	1.8	20
Lead	0.5	0.412	0.454	0.433	87	75-125	9.8	20
Magnesium	50	44.6	45.0	44.8	90	75-125	1.0	20
Manganese	0.5	0.438	0.443	0.441	88	75-125	1.3	20
Nickel	0.5	0.450	0.452	0.451	90	75-125	0.6	20
Potassium	50	45.7	46.1	45.9	92	75-125	0.9	20
Silver	0.05	0.0447	0.0451	0.0449	90	75-125	0.9	20
Sodium	100	93.3	94.0	93.7	94	75-125	0.8	20
Vanadium	0.5	0.461	0.466	0.463	93	75-125	1.0	20
Zinc	0.5	0.512	0.519	0.515	103	75-125	1.4	20

Category: ICP-AD
 Matrix: AQUEOUS
 QC Lot: 18 AUG 92-G7
 Concentration Units: mg/L

Aluminum	1.0	1.01	0.992	1.00	100	85-115	2.0	10
Antimony	1.0	1.06	1.01	1.04	104	85-115	4.5	10
Arsenic	1.0	0.962	0.972	0.967	97	85-115	1.0	10
Barium	1.0	0.970	0.980	0.975	97	85-115	1.0	10
Beryllium	1.0	0.967	0.965	0.966	97	85-115	0.3	10
Cadmium	1.0	0.977	0.961	0.969	97	85-115	1.8	10
Calcium	20.0	20.9	20.5	20.7	104	85-115	1.7	10
Chromium	1.0	0.979	0.968	0.974	97	85-115	1.1	10
Cobalt	1.0	0.962	0.944	0.953	95	85-115	1.9	10
Copper	1.0	0.975	0.981	0.978	98	85-115	0.7	10
Iron	1.0	0.976	0.952	0.964	96	85-115	2.4	10
Lead	1.0	0.959	0.937	0.948	95	85-115	2.4	10
Magnesium	20.0	20.5	20.3	20.4	102	85-115	0.6	10

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

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

Analyte	Spiked	Concentration		AVG	Accuracy		Precision		
		DCS1	Measured DCS2		Average(%) DCS	Limits	(RPD) DCS	Limit	
Category: ICP-AD Matrix: AQUEOUS QC Lot: 18 AUG 92-G7 Concentration Units: mg/L									
Manganese	1.0	0.963	0.955	0.959	96	85-115	0.8	10	
Nickel	1.0	1.00	0.991	0.996	100	85-115	1.1	10	
Potassium	20	20.4	20.5	20.5	102	85-115	0.6	10	
Silver	1.0	0.977	0.971	0.974	97	85-115	0.6	10	
Sodium	200	189	192	191	95	85-115	1.2	10	
Vanadium	1.0	0.986	0.978	0.982	98	85-115	0.7	10	
Zinc	1.0	0.996	0.975	0.985	99	85-115	2.1	10	

Category: AS-FAA-AT
 Matrix: AQUEOUS
 QC Lot: 03 AUG 92-D7
 Concentration Units: mg/L

Arsenic	0.03	0.0314	0.0316	0.0315	105	75-125	0.6	20
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Category: AS-FAA-AD
 Matrix: AQUEOUS
 QC Lot: 18 AUG 92-M7
 Concentration Units: mg/L

Arsenic	0.03	0.0270	0.0286	0.0278	93	75-125	5.8	20
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Category: PB-FAA-AT
 Matrix: AQUEOUS
 QC Lot: 03 AUG 92-D7
 Concentration Units: mg/L

Lead	0.03	0.0310	0.0319	0.0314	105	75-125	2.9	20
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Category: PB-FAA-AD
 Matrix: AQUEOUS
 QC Lot: 17 AUG 92-M7
 Concentration Units: mg/L

Lead	0.03	0.0286	0.0299	0.0292	98	75-125	4.4	20
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Calculations are performed before rounding to avoid round-off errors in calculated results.

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

Analyte	Spiked	Concentration		AVG	Accuracy		Precision		
		DCS1	Measured DCS2		DCS	Average(%) Limits	(RPD) DCS Limit	DCS Limit	
Category: SE-FAA-AD Matrix: AQUEOUS QC Lot: 19 AUG 92-M7 Concentration Units: mg/L									
Selenium	0.03	0.0302	0.0303	0.0302	101	75-125	0.3	20	
Category: SE-FAA-AT Matrix: AQUEOUS QC Lot: 03 AUG 92-D7 Concentration Units: mg/L									
Selenium	0.03	0.0304	0.0299	0.0302	101	75-125	1.7	20	
Category: HG-CVAA-AT Matrix: AQUEOUS QC Lot: 05 AUG 92-D7 Concentration Units: mg/L									
Mercury	0.0010	0.00101	0.00103	0.00102	102	75-125	1.9	20	
Category: HG-CVAA-AT Matrix: AQUEOUS QC Lot: 05 AUG 92-E7 Concentration Units: mg/L									
Mercury	0.0010	0.00100	0.00101	0.00101	101	75-125	1.0	20	
Category: TL-FAA-AD Matrix: AQUEOUS QC Lot: 17 AUG 92-Z7 Concentration Units: mg/L									
Thallium	0.030	0.0318	0.0312	0.0315	105	75-125	1.9	20	

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

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

Analyte	Spiked	Concentration		Measured	AVG	Accuracy		Precision	
		DCS1	DCS2			DCS	Average (%) Limits	(RPD) DCS Limit	
Category: TL-FAA-AT Matrix:- AQUEOUS QC Lot: 03 AUG 92-D7 Concentration Units: mg/L									
Thallium	0.03	0.0273	0.0266	0.0270	90	75-125	2.6	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: ICP-AP9-AT			
Matrix: AQUEOUS			
QC Lot: 03 AUG 92-D7 QC Run: 03 AUG 92-D7			
Antimony	ND	mg/L	0.060
Barium	ND	mg/L	0.010
Beryllium	ND	mg/L	0.0020
Cadmium	ND	mg/L	0.0050
Chromium	ND	mg/L	0.010
Cobalt	ND	mg/L	0.010
Copper	ND	mg/L	0.020
Nickel	ND	mg/L	0.040
Silver	ND	mg/L	0.010
Tin	ND	mg/L	0.10
Vanadium	ND	mg/L	0.010
Zinc	ND	mg/L	0.020

Test: AS-FAA-AT
Matrix: AQUEOUS
QC Lot: 03 AUG 92-D7 QC Run: 03 AUG 92-D7

Arsenic	ND	mg/L	0.0050
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Test: PB-FAA-AT
Matrix: AQUEOUS
QC Lot: 03 AUG 92-D7 QC Run: 03 AUG 92-D7

Lead	ND	mg/L	0.0050
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Test: SE-FAA-AT
Matrix: AQUEOUS
QC Lot: 03 AUG 92-D7 QC Run: 03 AUG 92-D7

Selenium	ND	mg/L	0.0050
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METHOD BLANK REPORT
Metals Analysis and Preparation (cont.)

Analyte	Result	Units	Reporting Limit
Test: HG-CVAA-AD Matrix: AQUEOUS QC Lot: 05 AUG 92-D7 QC Run: 05 AUG 92-D7			
Mercury	ND	mg/L	0.00020
Test: HG-CVAA-AT Matrix: AQUEOUS QC Lot: 05 AUG 92-E7 QC Run: 05 AUG 92-E7			
Mercury	ND	mg/L	0.00020
Test: TL-FAA-AT Matrix: AQUEOUS QC Lot: 03 AUG 92-D7 QC Run: 03 AUG 92-D7			
Thallium	ND	mg/L	0.0050
Test: HG-CVAA-AD Matrix: AQUEOUS QC Lot: 05 AUG 92-D7 QC Run: 05 AUG 92-D7			
Mercury	ND	mg/L	0.00020
Test: ICP-AP9-AT Matrix: AQUEOUS QC Lot: 03 AUG 92-D7 QC Run: 03 AUG 92-D7			
Antimony	ND	mg/L	0.060
Barium	ND	mg/L	0.010
Beryllium	ND	mg/L	0.0020
Cadmium	ND	mg/L	0.0050
Chromium	ND	mg/L	0.010
Cobalt	ND	mg/L	0.010
Copper	ND	mg/L	0.020
Nickel	ND	mg/L	0.040
Silver	ND	mg/L	0.010
Tin	ND	mg/L	0.10
Vanadium	ND	mg/L	0.010
Zinc	ND	mg/L	0.020

METHOD BLANK REPORT
Metals Analysis and Preparation (cont.)

Analyte	Result	Units	Reporting Limit
Test: AS-FAA-AT Matrix: AQUEOUS QC Lot: 03 AUG 92-D7 QC Run: 03 AUG 92-D7			
Arsenic	ND	mg/L	0.0050
Test: PB-FAA-AT Matrix: AQUEOUS QC Lot: 03 AUG 92-D7 QC Run: 03 AUG 92-D7			
Lead	ND	mg/L	0.0050
Test: SE-FAA-AT Matrix: AQUEOUS QC Lot: 03 AUG 92-D7 QC Run: 03 AUG 92-D7			
Selenium	ND	mg/L	0.0050
Test: HG-CVAA-AD Matrix: AQUEOUS QC Lot: 05 AUG 92-D7 QC Run: 05 AUG 92-D7			
Mercury	ND	mg/L	0.00020
Test: HG-CVAA-AT Matrix: AQUEOUS QC Lot: 05 AUG 92-E7 QC Run: 05 AUG 92-E7			
Mercury	ND	mg/L	0.00020
Test: TL-FAA-AT Matrix: AQUEOUS QC Lot: 03 AUG 92-D7 QC Run: 03 AUG 92-D7			
Thallium	ND	mg/L	0.0050

**MATRIX SPECIFIC QC
 ASSIGNMENT REPORT
 Metals Analysis and Preparation**

QC SAMPLE TYPE	TEST	LABORATORY SAMPLE NUMBER	QC LOT
MATRIX SPIKE DUPLICATE MATRIX SPIKE	ICP-AP9-AD ICP-AP9-AD	024120-0003-SD 024120-0003-MS	18 AUG 92-G7 18 AUG 92-G7
MATRIX SPIKE DUPLICATE MATRIX SPIKE	ICP-AP9-AT ICP-AP9-AT	024120-0003-SD 024120-0003-MS	03 AUG 92-D7 03 AUG 92-D7
MATRIX SPIKE DUPLICATE MATRIX SPIKE	AS-FAA-AD AS-FAA-AD	024120-0003-SD 024120-0003-MS	18 AUG 92-M7 18 AUG 92-M7
MATRIX SPIKE DUPLICATE MATRIX SPIKE	AS-FAA-AT AS-FAA-AT	024120-0003-SD 024120-0003-MS	03 AUG 92-D7 03 AUG 92-D7
MATRIX SPIKE DUPLICATE MATRIX SPIKE	PB-FAA-AD PB-FAA-AD	024120-0003-SD 024120-0003-MS	17 AUG 92-M7 17 AUG 92-M7
MATRIX SPIKE DUPLICATE MATRIX SPIKE	PB-FAA-AT PB-FAA-AT	024120-0003-SD 024120-0003-MS	03 AUG 92-D7 03 AUG 92-D7
MATRIX SPIKE DUPLICATE MATRIX SPIKE	SE-FAA-AD SE-FAA-AD	024120-0003-SD 024120-0003-MS	19 AUG 92-M7 19 AUG 92-M7
MATRIX SPIKE DUPLICATE MATRIX SPIKE	SE-FAA-AT SE-FAA-AT	024120-0003-SD 024120-0003-MS	03 AUG 92-D7 03 AUG 92-D7
MATRIX SPIKE DUPLICATE MATRIX SPIKE	HG-CVAA-AD HG-CVAA-AD	024120-0003-SD 024120-0003-MS	05 AUG 92-D7 05 AUG 92-D7
MATRIX SPIKE DUPLICATE MATRIX SPIKE	HG-CVAA-AT HG-CVAA-AT	024120-0003-SD 024120-0003-MS	05 AUG 92-E7 05 AUG 92-E7
MATRIX SPIKE DUPLICATE MATRIX SPIKE	TL-FAA-AD TL-FAA-AD	024120-0003-SD 024120-0003-MS	17 AUG 92-Z7 17 AUG 92-Z7
MATRIX SPIKE DUPLICATE MATRIX SPIKE	TL-FAA-AT TL-FAA-AT	024120-0003-SD 024120-0003-MS	03 AUG 92-D7 03 AUG 92-D7

MATRIX SPIKE / MATRIX SPIKE DUPLICATE REPORT
Metals Analysis and Preparation

Analyte	Sample	Concentration			Spiked		%Recovery		% RPD
		Matrix Spike	Matrix Spike Dup	MS	MSD	MS	MSD		
Test: ICP-AP9-AD									
Matrix AQUEOUS									
Sample: 024120-0003									
Units: mg/L									
Antimony	ND	0.51	0.54	0.50	0.50	103	107	4	
Barium	0.069	2.0	2.1	2.0	2.0	99	99	0	
Beryllium	ND	0.050	0.050	0.050	0.050	100	100	0	
Cadmium	ND	0.045	0.046	0.050	0.050	90	93	3	
Chromium	ND	0.19	0.18	0.20	0.20	93	92	0	
Cobalt	ND	0.45	0.45	0.50	0.50	89	90	1	
Copper	ND	0.24	0.24	0.25	0.25	98	97	0	
Nickel	ND	0.47	0.47	0.50	0.50	94	94	0	
Silver	ND	0.040	0.037	0.050	0.050	80	75	7	
Vanadium	ND	0.49	0.49	0.50	0.50	98	98	0	
Zinc	ND	0.47	0.47	0.50	0.50	94	94	0	

Test: ICP-AP9-AT
Matrix AQUEOUS
Sample: 024120-0003
Units: mg/L

Antimony	ND	0.17	0.16	0.50	0.50	34	33	6
Barium	2.2	3.8	3.9	2.0	2.0	84	86	2
Beryllium	0.0099	0.055	0.055	0.050	0.050	90	90	0
Cadmium	ND	0.043	0.043	0.050	0.050	86	87	1
Chromium	0.14	0.27	0.29	0.20	0.20	69	75	8
Cobalt	0.065	0.44	0.45	0.50	0.50	75	77	3
Copper	0.17	0.37	0.38	0.25	0.25	77	81	4
Nickel	0.17	0.54	0.55	0.50	0.50	74	78	5
Silver	ND	0.042	0.041	0.050	0.050	84	81	3
Vanadium	0.26	0.64	0.65	0.50	0.50	77	78	2
Zinc	0.64	0.95	0.97	0.50	0.50	60	66	9

Test: AS-FAA-AD
Matrix AQUEOUS
Sample: 024120-0003
Units: mg/L

Arsenic	ND	0.020	0.021	0.020	0.020	98	106	8
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ND = Not detected
NC = Not calculated, calculation not applicable

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

MATRIX SPIKE / MATRIX SPIKE DUPLICATE REPORT
 Metals Analysis and Preparation (cont.)

Analyte	Sample	Concentration			Spiked		%Recovery		% RPD
		Matrix Spike	Matrix Spike Dup	MS	MSD	MS	MSD		
Test: AS-FAA-AT Matrix AQUEOUS Sample: 024120-0003 Units: mg/L									
Arsenic	0.024	0.041	0.040	0.030	0.030	55	53	4	
Test: PB-FAA-AD Matrix AQUEOUS Sample: 024120-0003 Units: mg/L									
Lead	ND	0.021	0.020	0.020	0.020	105	98	6	
Test: PB-FAA-AT Matrix AQUEOUS Sample: 024120-0003 Units: mg/L									
Lead	0.17	0.22	0.16	0.030	0.030	NC	NC	NC	
Test: SE-FAA-AD Matrix AQUEOUS Sample: 024120-0003 Units: mg/L									
Selenium	ND	0.023	0.023	0.020	0.020	115	117	2	
Test: SE-FAA-AT Matrix AQUEOUS Sample: 024120-0003 Units: mg/L									
Selenium	ND	0.014	0.014	0.030	0.030	45	48	6	

ND = Not detected

NC = Not calculated, calculation not applicable

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

MATRIX SPIKE / MATRIX SPIKE DUPLICATE REPORT
 Metals Analysis and Preparation (cont.)

Analyte	Sample	Concentration			Spiked MS	MSD	%Recovery		% RPD
		Matrix Spike	Matrix Spike	Matrix Dup			MS	MSD	
Test: HG-CVAA-AD Matrix AQUEOUS Sample: 024120-0003 Units: mg/L									
Mercury	ND	0.0011	0.0011	0.0010	0.0010	108	110	2	
Test: HG-CVAA-AT Matrix AQUEOUS Sample: 024120-0003 Units: mg/L									
Mercury	0.00036	0.0012	0.0013	0.0010	0.0010	85	89	4	
Test: TL-FAA-AD Matrix AQUEOUS Sample: 024120-0003 Units: mg/L									
Thallium	ND	0.018	0.021	0.020	0.020	92	107	15	
Test: TL-FAA-AT Matrix AQUEOUS Sample: 024120-0003 Units: mg/L									
Thallium	ND	0.018	0.021	0.030	0.030	61	69	13	

ND = Not detected

NC = Not calculated, calculation not applicable

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



Appendix

ENSECO ANALYTICAL SERVICES REQUEST FORM

2420-01 ✓

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

KAFB094307-2 *sample*

Field ID
USGS/WRD/NEW MEX
Field Office

KIRTLAND AFB
IRP-SWMU'S
Project

MIKO ROYBAL
Collector

(505) 262-5399
Phone (FTS)

File Deposition*

- Q - WATSTORE
- X - Lab File

Sample identification

[Blank Box]
For Laboratory Use Only

K A F B 0 9 4 3 0 7 - 2
Station ID or Unique Number*

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

1 9 9 2 0 7 27 1 0 3 0
Year* Month* Day* Time*
Begin Date

Month Day Time
Composite End Date

N M 0 3 5 0 0 1
State Code* District/User Code* County Code

Analysis level codes and schedules

SW	Geologic Unit	H or 9	Analysis Source**	Hydrologic Condition**	Sample Type**	Hydrologic Event**
9						

PARAMETER: APPX-IX METALS-TOTAL (ARSENIC, LEAD, MERCURY, SELENIUM, THALLIUM)

METHOD: SW3005/ (SW7060, SW7421, SW7470, SW7740, SW7841)

PARAMETER: APPX-IX METALS-DISSOLVED (ARSENIC, LEAD, MERCURY, SELENIUM, THALLIUM)

METHOD: SW3005/ (SW7060, SW7421, SW7470, SW7740, SW7841)

PARAMETER:

METHOD:

Chain-of-Custody Record

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

Relinquished by: (*Signature*) Received by: (*Signature*) Date Time
Miko Roybal FEDERAL EXPRESS 27 JUL 92 1530

Relinquished by: (*Signature*) Received by: (*Signature*) Date Time
Justin Chappell 7/28/92 0845

Relinquished by: (*Signature*) Received at lab by: (*Signature*) Date Time

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

Comments (Only 50 characters stored in NWIS)

Record 5 SW SAMPLE FR TIJERAS, ARROYO, UPSTREAM

Record 6

Total number of sample bottles for this request: 2

SHIP TO: JULIE KRAMER/TRACY CONROY
Enseco-Rocky Mountain Analytical
4955 Yarrow Street
Arvada, CO 80002
(303) 421-6611

ATTENTION:

ENSECO ANALYTICAL SERVICES REQUEST FORM

24120 02 ✓

Special Handling

(Circle as appropriate and explain in record 5)

Hazardous material

EQUIPMENT BLANK

KAFB09 4308-2

Station Name

Field ID

USGS/WRD/NEW MEX

Field Office

KIRTLAND AFB

IRP-SWMU'S

Project

MIKO ROYBAL

Collector

Site Type (circle one)

Surface Water
 GW - Ground Water
 ME - Meteorological

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

(505) 262-5399
 Phone (FTS)

File Deposition*

Circle one)

Q - WATSTORE

X - Lab File

[Empty box for File Deposition]

For Laboratory Use Only

Sample identification

K A F B 0 9 4 3 0 8 - 2

Station ID or Unique Number*

4 6 3 5 3 6 0 0 1

Project Account #

1 9 9 2
 Year*

0 7
 Month*

2 7
 Day*

1 0 2 9
 Time*

Begin Date

Month

Day

Time

Composite End Date

N M
 State Code*

0 3 5
 District/
 User Code*

0 0 1
 County Code

Analysis level codes and schedules

SW
 9

Sample Medium**

Geologic Unit

H or 9

Analysis Status**

Analysis Source**

Hydrologic Condition**

Sample Type**

Hydrologic Event**

PARAMETER: APPX-IX METALS-TOTAL (ARSENIC, LEAD, MERCURY, SELENIUM, THALLIUM)

METHOD: SW3005/ (SW7060, SW7421, SW7470, SW7740, SW7841)

PARAMETER: APPX-IX METALS-DISSOLVED (ARSENIC, LEAD, MERCURY, SELENIUM, THALLIUM)

METHOD: SW3005/ (SW7060, SW7421, SW7470, SW7740, SW7841)

PARAMETER:

METHOD:

Chain-of-Custody Record

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

Relinquished by: (Signature) *Miko Roybal* Received by: (Signature) FEDERAL EXPRESS Date 27 JUL 92 Time 1530

Relinquished by: (Signature) Received by: (Signature) Date 7/28/92 Time 0845

Relinquished by: (Signature) Received at lab by: (Signature) Date 7/28/92 Time 0845

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

Comments (Only 50 characters stored in NWIS)

Record 5 EQUIPMENT, BLANK

Record 6

Total number of sample bottles for this request: 1

SHIP TO: JULIE KRAMER/TRACY CONROY
 Enseco-Rocky Mountain Analytical
 4955 Yarrow Street
 Arvada, CO 80002
 (303) 421-6611

ENSECO ANALYTICAL SERVICES REQUEST FORM

24120-03 ✓

Special Handling

(Circle as appropriate and explain in record 5)

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

Hazardous material

SAMPLE

KAFB094408-2

Station Name

Field ID

USGS/WRD/NEW MEX

Field Office

KIRTLAND AFB
 RP-SWMU'S

Project

MIKO ROYBAL

Collector

(505) 262-5399
 Phone (FTS)

File Deposition*

(Circle one)

Sample Identification

Q - WATSTORE

X - Lab File

[Blank Box]

For Laboratory Use Only

K A F B . 0 . 9 . 4 . 4 . 0 . 8 - 2

Station ID or Unique Number*

4 6 3 . 5 3 . 6 0 0 . 1

Project Account #

1 9 9 2
 Year*

0 7
 Month*

2 7
 Day*

1 1 1 0
 Time*

Begin Date

Month

Day

Time

Composite End Date

N M
 State Code*

0 3 5
 District/ User Code*

0 0 1
 County Code

Analysis level codes and schedules

SW

9

Sample Medium**

Geologic Unit

H or 9

Analysis Status**

Analysis Source**

Hydrologic Condition**

Sample Type**

Hydrologic Event**

PARAMETER: APPX-IX METALS-TOTAL (ARSENIC, LEAD, MERCURY, SELENIUM, THALLIUM)

METHOD: SW3005/ (SW7060, SW7421, SW7470, SW7740, SW7841)

PARAMETER: APPX-IX METALS-DISSOLVED (ARSENIC, LEAD, MERCURY, SELENIUM, THALLIUM)

METHOD: SW3005/ (SW7060, SW7421, SW7470, SW7740, SW7841)

PARAMETER:

METHOD:

Chain-of-Custody Record

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

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

Miko Roybal

FEDERAL EXPRESS

27 JUL 92 1530

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

Justin Chappel

7/28/92 0845

Relinquished by: (Signature) Received at lab by: (Signature) Date Time

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

Comments (Only 50 characters stored in NWIS)

Record 5 S.W. SAMPLE FR. T.I. TERMS APPROX BY L.F.Z

Record 6

Total number of sample bottles for this request: 2

SHIP TO: JULIE KRAMER/TRACY CONROY
 Enseco-Rocky Mountain Analytical
 4955 Yarrow Street
 Arvada, CO 80002
 (303) 421-6611

ENSECO ANALYTICAL SERVICES REQUEST FORM

24120-03 MS 07 90

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

Site Type (circle one)
SW - Surface Water
GW - Ground Water
ME - Meteorological
LK - Lake
ES - Estuary
SP - Spring
SS - Special Source
(505) 262-5399
Phone (FTS)

Hazardous material
MATRIX SPIKE
KAFB09 4409-2
Station Name

Field ID
USGS/WRD/NEW MEX
Field Office
KIRTLAND AFB
RP-SWMU'S
Project
MIKO ROYBAL
Collector

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

Sample identification

For Laboratory Use Only

K A F B 0 9 4 4 0 9 - 2
Station ID or Unique Number*
4 6 3 5 3 6 0 0 1
Project Account #

1 9 9 2
Year*
0 7 2 7
Month* Day*
1 1 1 0
Month Day Time
Composite End Date
N M
State Code*
0 3 5
District/ User Code*
0 0 1
County Code

Analysis level codes and schedules

SW
9
Sample Medium**
Geologic Unit
H or 9
Analysis Status**
Analysis Source**
Hydrobiologic Condition**
Sample Type**
Hydrologic Event**

PARAMETER: APPX-IX METALS-TOTAL (ARSENIC, LEAD, MERCURY, SELENIUM, THALLIUM)
METHOD: SW3005/ (SW7060, SW7421, SW7470, SW7740, SW7841)
PARAMETER: APPX-IX METALS-DISSOLVED (ARSENIC, LEAD, MERCURY, SELENIUM, THALLIUM)
METHOD: SW3005/ (SW7060, SW7421, SW7470, SW7740, SW7841)
PARAMETER:
METHOD:

Chain-of-Custody Record

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

Relinquished by: (Signature) Received by: (Signature) Date Time
Miko Roybal FEDERAL EXPRESS 27 JUL 92 1530
Relinquished by: (Signature) Received by: (Signature) Date Time
Justin Chappell 7/28/92 0845
Relinquished by: (Signature) Received at lab by: (Signature) Date Time
Relinquished from lab by: (Signature) Received by: (Signature) Date Time

Comments (Only 50 characters stored in NWIS)

Record 5 MATRIX SPIKE - TIJERAS, ARROYO BY LFZ
Record 6

Total number of sample bottles for this request: 2

SHIP TO: JULIE KRAMER/TRACY CONROY
Enseco-Rocky Mountain Analytical
4955 Yarrow Street
Arvada, CO 80002
(303) 421-6611

ENSECO ANALYTICAL SERVICES REQUEST FORM

27120 0705 ✓

Special Handling

(Circle as appropriate and explain in record 5)

Site Type (circle one)

Hazardous material

Sample 2

SW - Surface Water
GW - Ground Water
ME - Meteorological

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

KAFB09 4510-2

Station Name

Field ID
USGS/WRD/NEW MEX

Field Office

KIRTLAND AFB
IRP-SWMU'S

Project

MIKO ROYBAL

Collector

(505) 262-5399
Phone (FTS)

File Deposition*

Circle one)

Sample identification

Q - WATSTORE

X - Lab File

[Blank Box]

For Laboratory Use Only

K A F B 0 9 4 5 1 0 - 2

Station ID or Unique Number*

4 6 3 5 3 6 0 0 1

Project Account #

1 9 9 2

Year*

0 7

Month*

2 7

Day*

1 1 1 5

Time*

Month

Day

Time

N M

State Code*

0 3 5

District/ User Code*

0 0 1

County Code

Begin Date

Composite End Date

Analysis level codes and schedules

SW

9

Sample Medium**

Geologic Unit

H or 9

Analysis Status**

Analysis Source**

Hydrologic Condition**

Sample Type**

Hydrologic Event**

PARAMETER: APPX-IX METALS-TOTAL (ARSENIC, LEAD, MERCURY, SELENIUM, THALLIUM)

METHOD: SW3005/ (SW7060, SW7421, SW7470, SW7740, SW7841)

PARAMETER: APPX-IX METALS-DISSOLVED (ARSENIC, LEAD, MERCURY, SELENIUM, THALLIUM)

METHOD: SW3005/ (SW7060, SW7421, SW7470, SW7740, SW7841)

PARAMETER:

METHOD:

Chain-of-Custody Record

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

Relinquished by: (Signature) *Miko Roybal* Received by: (Signature) FEDERAL EXPRESS Date 27 JUL 92 Time 1530

Relinquished by: (Signature) Received by: (Signature) Date 7/28/92 Time 0845

Relinquished by: (Signature) Received at lab by: (Signature) Date Time

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

Comments (Only 50 characters stored in NWIS)

Record 5 SW SAMPLE FROM TIGERAS APPROX DOWN STREAM

Record 6

Total number of sample bottles for this request: 2

SHIP TO: JULIE KRAMER/TRACY CONROY
Enseco-Rocky Mountain Analytical
4955 Yarrow Street
Arvada, CO 80002
(303) 421-6611