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BHI-00932
Rev. 0

1996 Phase II Soil Sampling at the 183-H Solar Evaporation Basin Site

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Date Published
October 1996

NOV 1996
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Prepared for the U.S. Department of Energy
Office of Environmental Restoration and
Waste Management

Bechtel Hanford, Inc.
Richland, Washington

9713540.2364

BHI-00932
REV: 0
OU: N/A
TSD: N/A
ERA: N/A

APPROVAL PAGE

Title of Document: 1996 PHASE II SOIL SAMPLING AT THE 183-H SOLAR EVAPORATION BASIN SITE

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10/3/96
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BHI-DIS 10-15-96 JH

PREFACE

Documents produced for federal agencies must provide measurement standards according to the International System of Units (SI), which is also known as the metric system. Much of the work described by this document was performed and reported using nonmetric units. The following chart is provided to meet readers' needs for conversions between units.

Metric Conversion Chart

Into Metric Units			Out of Metric Units		
If You Know	*Multiply By*	*To Get*	*If You Know*	*Multiply By*	*To Get*
Length			**Length**		
inches	25.4	millimeters	millimeters	0.039	inches
inches	2.54	centimeters	centimeters	0.394	inches
feet	0.305	meters	meters	3.281	feet
yards	0.914	meters	meters	1.094	yards
miles	1.609	kilometers	kilometers	0.621	miles
Area			**Area**		
sq. inches	6.452	sq. centimeters	sq. centimeters	0.155	sq. inches
sq. feet	0.093	sq. meters	sq. meters	10.76	sq. feet
sq. yards	.0836	sq. meters	sq. meters	1.196	sq. yards
acres	0.405	hectares	hectares	2.47	acres
Mass (weight)			**Mass (weight)**		
ounces	28.35	grams	grams	0.035	ounces
pounds	0.454	kilograms	kilograms	2.205	pounds
Volume			**Volume**		
teaspoons	5	milliliters	milliliters	0.033	fluid ounces
tablespoons	15	milliliters	liters	2.1	pints
fluid ounces	30	milliliters	liters	1.057	quarts
pints	0.47	liters	liters	0.264	gallons
quarts	0.95	liters	cubic meters	35.315	cubic feet
gallons	3.8	liters	cubic meters	1.308	cubic yards
cubic feet	0.028	cubic meters			
cubic yards	0.765	cubic meters			
Temperature			**Temperature**		
Fahrenheit	subtract 32, then multiply by 5/9	Celsius	Celsius	multiply by 9/5, then add 32	Fahrenheit
Radioactivity			**Radioactivity**		
picocuries	37	millibecquerel	millibecquerel	0.027	picocuries

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ABBREVIATIONS AND ACRONYMS

CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
COC	contaminants of concern
DOE	U.S. Department of Energy
EAL	Environmental Analytical Laboratory
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ERC	Environmental Restoration Contractor
GEA	gamma energy analysis
HEIS	Hanford Environmental Information System
RCRA	*Resource Conservation and Recovery Act of 1976*
RPD	relative percent difference
SAP	sampling and analysis plan
SDG	sample delivery group
TCLP	toxicity characteristic leaching procedure
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TSD	treatment, storage, and/or disposal facility
WHC	Westinghouse Hanford Company

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1.0 INTRODUCTION

This report consolidates 1996 soil sampling data collected from the 183-H Solar Evaporation Basin site. This report is intended to be a data reference and does not make comparisons or conclusions regarding specific regulatory criteria. Other reports providing site-related data include the *RCRA Closure Data Evaluation Report: 183-H Solar Evaporation Basins Soil and Concrete* (DOE-RL 1995c) and the *1995 Phase I Concrete Sampling at the Decontaminated 183-H Basins* (BHI 1996a) report.

Chemical and radiological data were collected to support cleanup activities at the site. Soil sampling occurred beneath and next to the former basin structures. All data collection activities were conducted in accordance with the *Sampling and Analysis Plan for the 183-H Solar Evaporation Basins--Phase II - Soil* (BHI 1995).

Samples were collected from outside and inside the former footprint of the basins. Outside the former footprint of the basins, samples were collected from the loading ramp and three berm piles. Inside the former footprint of the basins, samples were collected from any uncontaminated shallow soils in place, shallow soils within the area of excavation, and deep vadose zone soils.

This chapter presents a brief synopsis of the basin history and regulatory status, and the sampling and analysis plan (SAP) (BHI 1995). Chapters 2.0 through 4.0 present summary information about sampling (1) beneath the loading ramp and berm piles, (2) in shallow soils beneath the former basin floor, and (3) deep vadose soils. Detailed data are provided in the appendices.

1.1 BASIN HISTORY AND REGULATORY STATUS

The 183-H Solar Evaporation Basins, which consisted of four adjoining concrete basins, were located in the 100 Area of the Hanford Site, north of the retired 105-H Reactor (Figure 1-1). Originally, the basins were built as part of the 100-H water treatment structures. They were constructed in 1949 and used for 100-H Area water treatment until the mid-1960's (BHI 1995). Most of the water treatment structures, including 12 additional adjoining basins, were demolished in 1974 (DOE-RL 1995a). The four remaining basins were inactive until 1973 when radioactive and dangerous (mixed) waste from the 300 Area Fuel Fabrication Facility was shipped to the basins for storage and treatment. The basins were used for solar evaporation of the waste. The last shipment of waste to the 183-H Basins took place in November 1985 (DOE-RL 1995a). Decontamination of the cement structure took place in 1995. The structure has subsequently been dismantled and disposed.

The contiguous basins have been designated an interim-status storage, treatment, and/or disposal facility (TSD) unit under the *Resource Conservation and Recovery Act of 1976* (RCRA). The unit is being closed in compliance with the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1994) and requirements of the Hanford Site RCRA

permitting process. The U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology (Ecology) jointly administer the RCRA regulations in Washington State. Ecology has been delegated the lead role at the 183-H TSD site.

The 183-H Solar Evaporation Basins stored and treated RCRA-listed waste as well as characteristic and criteria-regulated waste. Ecology granted a request for a "contained-in determination" for listed waste soils associated with 183-H Solar Evaporation Basins on October 4, 1995 (Stohr 1995). This determination removes the listed waste designation from the soils contingent upon the following: (1) confirmatory sampling to ascertain that no contaminant concentration exceeds *Model Toxics Control Act* Method C values for direct soil exposure and (2) disposal of soils in the vicinity of the 200 Areas in a lined trench from which leachate will be collected.

Potential hazardous substance contamination in the 100 Area is being addressed under the authority of the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA). Area waste sites have been assigned to geographic operable units. The 183-H Solar Evaporation Basins were assigned to the 100-HR-1 source operable unit. (The groundwater operable unit beneath this source is the 100-HR-3 unit.) The EPA oversees all Hanford CERCLA activities.

1.2 SAMPLING AND ANALYSIS PLAN

The *Sampling and Analysis Plan for the 183-H Solar Evaporation Basins--Phase II - Soil* (BHI 1995) set forth how soil samples would be collected to verify the RCRA closure, what analyses would be performed, and how results would be reported to the 183-H Lead Engineer. The SAP is based on the 183-H Solar Evaporation Basin Soils Data Quality Object Process Summary Report (BHI 1995, Appendix A), regulatory guidance, and project needs for dispositioning waste and restoring the site. The plan is designed to provide additional data about particular contaminants of concern (COC) applicable to each sampling area.

Sampling areas outside the basin footprint included the loading ramp and berm piles. A minimum of three soil samples were specified from the ramp area below the asphalt surface. Samples were specified from north of Basin 4, another north of Basins 2 and 3, and the third from east of borehole BH-5 (drilled for 1991 sampling north of Basin 1). The SAP specified that one sample was to be collected from each of the three berm piles located southeast of the basins.

The target COCs for the berm piles and loading ramp were identical. Chemical analytes included metals, hexavalent chromium, cyanide, sulfide, pH, and anions. Radiological analyses of interest included gross alpha, gross beta, uranium-234, uranium-235, uranium-238, technetium-99, total uranium, and gamma energy analysis (GEA).

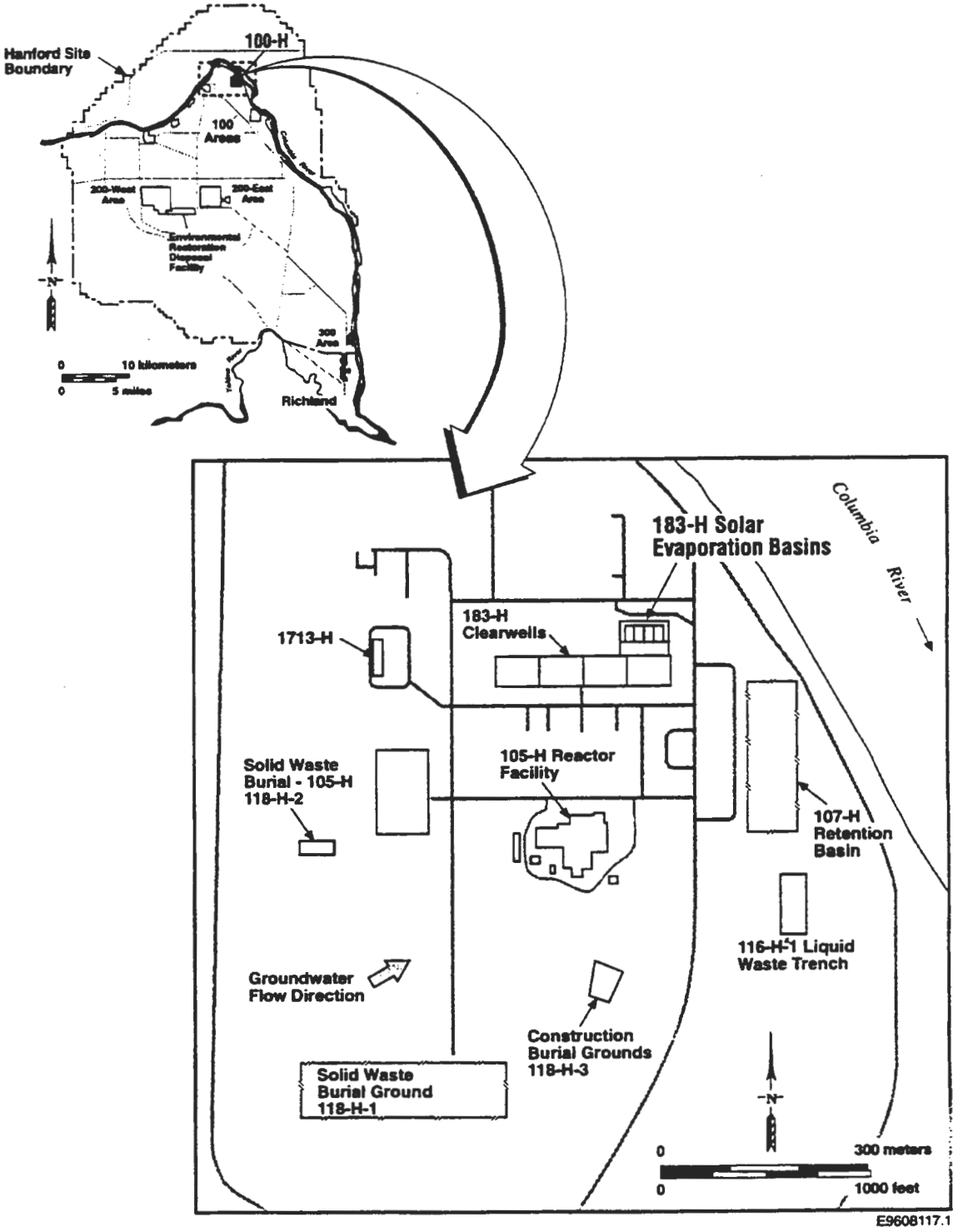
Inside the former footprint of the basins, samples were collected from one of three categorical areas: (1) any uncontaminated shallow soils remaining in place, (2) shallow soils within the area

of excavation, or (3) remaining deep vadose zone soils. After removal of the concrete floors, additional shallow soil was removed throughout the site. This abolished the first category of shallow soils, and the need to prove soil immediately beneath the removed concrete was uncontaminated. (At the time the SAP was issued, it was unknown whether this option would be exercised.)

Target COCs for the shallow soils remaining in the area of excavation were arsenic, copper, nickel, nitrates, fluoride, and hexavalent chromium. Target COCs for the remaining deeper vadose zone soil were fluoride and hexavalent chromium. Radiological analyses of interest included gross alpha, gross beta, uranium-234, uranium-235, uranium-238, technetium-99, total uranium, and GEA.

Data concerning radioactive contaminants are included for the audience interested in this RCRA closure. However, the radioactive portion of mixed waste is interpreted by the U.S. Department of Energy (DOE) to be regulated under the *Atomic Energy Act of 1954* instead of RCRA.

Figure 1-1. The 100-H Area at the Hanford Site.



2.0 LOADING RAMP AND BERM SAMPLES

Field sampling of the loading ramp and berm piles occurred in January 1996. Samples were shipped offsite for analysis.

2.1 SAMPLING AND ANALYSIS

Soils beneath the former loading ramp and the berm piles were sampled by Environmental Restoration Contractor (ERC) personnel on January 8, 1996. Sampling logbook entries are provided in Appendix A. The field logbook was EFL-1133-1. The sampling authorization form number was B96-052.

Table 2-1 summarizes the loading ramp and berm sampling. Eight samples were collected. Aliquots were assigned to multiple containers. All samples were collected with clean stainless steel tools and stored in clean sample containers. Each field sample was described as a sandy gravel (Appendix A). Stones larger than approximately 0.5 in. were not collected. Samples from beneath the ramp north of Basins 2 and 4 contained some asphaltic material. Samples were dug from holes below the asphalt. Berm pile samples were collected with clean tools after shoveling into the middle of the piles.

Samples were assigned Hanford Environmental Information System (HEIS) identification numbers. Soil associated with the eight samples was also collected and shipped to the 222-S Laboratory for a total activity analysis. These aliquots were assigned "N" series numbers. Results of total activity analyses are used in the shipping and handling of associated samples.

One of the samples, B0H0H0, was a silica sand field blank for which a separate total activity aliquot was not collected. Samplers designated N6195 to be used for shipping purposes. Sample B0H0H5 and its duplicate, B0H0H6, are associated with one total activity sample, N6199.

The Chain-of-Custody/Sample Analysis Request form specified the following analyses: toxicity characteristic leaching procedure (TCLP) metals, cyanide, sulfide, anions (F, Cl, SO4, PO4, NO2, and NO3), pH, hexavalent chromium, gross alpha, gross beta, uranium-234, uranium-235, uranium-238, technetium-99, total uranium, total activity, and a GEA. Total activity analyses were performed at the 222-S Laboratory. The 222-S Laboratory is operated for DOE by Westinghouse Hanford Company (WHC). After receipt of results for 222-S aliquots, the primary samples were delivered to Quanterra Environmental Services, Richland, Washington, for analysis. On January 15, 1996 project personnel requested the addition of EPA Method 6010 metals analyses for all samples listed in Table 2-1, but submitted no additional sample. An additional total chromium analysis was reported by the laboratory.

The eight samples were assigned by the laboratory to a single sample delivery group (SDG) W0871. SDGs are used for laboratory reporting and grouping samples for quality assurance/

quality control purposes. Quanterra, St. Louis, performed chemical analyses, except for hexavalent chromium, which was performed by Quanterra, Richland. Reported results are referenced to standard EPA methods. Results and methods are presented in the Appendix B data validation package, which includes laboratory narratives.

For chemical analyses, a laboratory control sample and method blank were analyzed with each preparation batch. Matrix spike and matrix spike duplicate or sample duplicate was performed per the protocol for the analyses in the SDG. The pH analysis used only a sample duplicate for matrix quality control.

Quanterra, Richland, performed radiological analyses. For radiological analyses, at least one laboratory control sample, one method (reagent) blank, and one duplicate were run for each type of analysis. Results are discussed in a laboratory narrative (Appendix B). Methods were referenced to internal laboratory procedures. Alpha spectroscopy was used measuring uranium-234, uranium-235, and uranium-238. Gas proportional counting was employed for the gross alpha and gross beta measurements. Liquid scintillation counting was used for measuring technetium-99. Total uranium was determined by lithium fluoride fusion and fluorometry.

2.2 DATA VALIDATION

Independent data validation was performed by Golder Associates, Inc., Redmond, Washington. Validation was conducted to level C in accordance with routine validation procedures (WHC 1993a, 1993b). Data are subdivided into three sets for validation: inorganics, general chemistry, and radiochemistry. Each is reported separately in the data validation package (Appendix B). Qualifier definitions are included for each section.

Inorganic validation identified no major deficiencies that required the loading ramp or berm data to be qualified as unusable. The TCLP barium was qualified as undetected in one sample (B0H0H0, the silica sand) due to traces of barium in the laboratory blank.

General chemistry validation identified no major deficiencies that required data from the loading ramp or berm to be qualified as unusable. All pH, nitrate, nitrite, and phosphate measurements were qualified based on holding time exceedances. Validators deemed this a minor deficiency. Associated results were qualified as estimated (J) or undetected and estimated (UJ).

Radiochemistry validation identified no major deficiencies that required the loading ramp or berm data to be qualified as unusable. No minor deficiencies were found. Sample results reported less than the minimum detectable activity were qualified as undetected (U).

2.3 RESULTS AND DISCUSSION

Validated chemical data are shown in Table 2-2. Additional details are provided in Appendix B. Few analytes were found at detectable concentrations. One TCLP chromium result was reported above an instrument detection limit but below a contract required detection limit ("B" flagged data). All other TCLP results except barium were below detection limits. Barium is a natural soil component and is expected in site soils. The silica sand equipment blank results for barium were qualified as undetected at 276 µg/L. Actual soil samples were reported at less than twice this value, and are far below limits that would cause a waste to be regulated on the basis of hazardous characteristics. Identical concentrations were reported for the duplicate and regular sample, B0H0H6 and B0H0H5. Hexavalent chromium, chloride, nitrite, ortho-phosphate, cyanide, and sulfide were also below detection limits for all site soil samples.

Reported concentrations of detected inorganic constituents are consistent with natural background for the Hanford Site. Total chromium was measurable in all site soil samples. The field duplicate pair showed a relative percent difference (RPD) of 37% and a sample standard deviation of 2.40 mg/kg. Fluoride was reported in about half the samples, but always close to the nominal 1 µg/g detection limit. Fluoride was reported in both duplicate pair samples and showed good agreement; the RPD was 10%. Nitrate, although qualified as estimated (J) due to holding time, was present in all samples including the equipment blank. Nitrate was reported by two methods. Results were reasonably consistent. Detectable sulfate was reported in two loading ramp samples and one berm pile sample. Soil nitrate and sulfate concentrations do not exceed natural background (DOE-RL 1995b).

Data concerning radioactive constituents appear in Table 2-3 and are included for the audience interested in this RCRA closure. These data are presented for informational purposes only.

Table 2-4 summarizes comparisons between the two berm pile samples, B0H0H5 and its duplicate B0H0H6. All chemical and radionuclide analytes are included. Comparisons are made on a relative basis using the RPD statistic. RPD is a number expressed as a percent equal to the absolute difference between two respective values divided by their mean. (Negative values are shown when the mean is negative.) Typically, larger RPDs can be expected as true concentrations approach detection or quantitation limit capabilities. Comparisons on an absolute basis are shown by the sample standard deviation. Variability on an absolute basis is relatively small slightly above detection limits.

Results for each statistic are most meaningful when both samples contain clearly detectable quantities. Comparable duplicate results, although very limited, show good agreement. (In general, there are differences in reporting methodologies between the chemical and radionuclide analytes. Higher relative variation is present in radionuclide data, in part, because it is not censored to a detection limit in the same manner as are chemical results.)

Table 2-1. Loading Ramp and Berm Piles Sample Key.

SAF No. B96-052		Collection Date: 01-08-96		Logbook #EFL-1133-1
Sample	**Associated N-number**	**Location**	**Media**	**Comment**
B0H0H0	(N6195)	NA	Silica Sand	QA sample[a]
B0H0H1	N6195	South side of BH-5, north of Basin 1	Sandy gravel	Loading Ramp
B0H0H2	N6196	North of Basin 2	Sandy gravel	Loading Ramp
B0H0H3	N6197	North of Basin 4	Sandy gravel	Loading Ramp
B0H0H4	N6198	North Berm Pile	Sandy gravel	Southeast of Basin 1
B0H0H5	N6199	Middle Berm Pile	Sandy gravel	Southeast of Basin 1
B0H0H6	N6199	Middle Berm Pile	Sandy gravel	QA Duplicate of B0H0H5
B0H0H7	N6201	South Berm Pile	Sandy gravel	Southeast of Basin 1

[a]Material is clean silica sand poured over a shovel and collected in the sampling bowl.

NA = not applicable
QA = quality assurance
SAF = Sample Authorization Form

Table 2-2. Loading Ramp and Berm Pile Chemical Sample Results.

Sample Number	B0H0H0	B0H0H1	B0H0H2	B0H0H3	B0H0H4	B0H0H5	B0H0H6	B0H0H7
Location	NA	North of Basin 1, (S of BH-5)	North of Basin 2	North of Basin 4	North Berm Pile	Middle Berm Pile	Middle Berm Pile	South Berm Pile
Comment	QA sample	Loading Ramp	Loading Ramp	Loading Ramp	Southeast of Basin 1	Southeast of Basin 1	QA Duplicate of B0H0H5	Southeast of Basin 1
Soil Description	Silica Sand	Sandy gravel	Sandy gravel	Sandy gravel	Sandy gravel	Sandy gravel	Sandy gravel	Sandy gravel
METHOD/ ANALYTE								
EPA 1311/6010 (TCLP)								
Arsenic (ug/L)	65.5 U	65.5 U	65.5 U	65.5 U	65.5 U	65.5 U	65.5 U	65.5 U
Barium	276 U	457	459	436	387	430	430	451
Cadmium	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U
Chromium	4.4 U	9.1 B	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Lead	34.3 U	34.3 U	34.3 U	34.3 U	34.3 U	34.3 U	34.3 U	34.3 U
Selenium	47.0 U	47.0 U	47.0 U	47.0 U	47.0 U	47.0 U	47.0 U	47.0 U
Silver	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
EPA 1311/7470 (TCLP)								
Mercury (ug/L)	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
EPA 3060A								
Hexavalent Chromium (mg/kg)	0.57 U	0.57 U	0.57 U	0.57 U	0.57 U	0.57 U	0.57 U	0.57 U
EPA 6010								
Total Chromium (mg/kg)	0.44 U	10.0	13.9	5.5	6.0	7.5	10.9	8.1
EPA 300.0								
Chloride (ug/g)	3.41	2.11 U	2.04 U	1.95 U	1.88 U	1.89 U	2.10 U	2.04 U
Fluoride	1.00 U	1.06 U	1.40	0.98 U	0.94 U	1.29	1.42	1.02 U
Nitrate-N	0.31 J	1.41 J	0.57 J	0.29 J	3.57 J	0.38 J	0.40 J	0.41 J
Nitrite-N	0.20 UJ	0.21 UJ	0.20 UJ	0.20 UJ	0.19 UJ	0.19 UJ	0.21 UJ	0.20 UJ
Ortho-Phosphate	5.00 UJ	5.28 UJ	5.10 UJ	4.88 UJ	4.69 UJ	4.73 UJ	5.24 UJ	5.11 UJ
Sulfate	5.00 U	23.8	8.65	4.88 U	8.66	4.73 U	5.24 U	5.11 U
EPA 353.1								
Nitrite Nitrate (ug/g)	0.50 U	0.95	0.54 U	0.53 U	3.05	0.53 U	0.53 U	0.53 U
EPA 335.2								
Cyanide (ug/g)	0.50 U	0.53 U	0.54 U	0.52 U	0.52 U	0.53 U	0.52 U	0.52 U
EPA 9030								
Sulfide (ug/g)	10.6 U	10.7 U	11.2 U	10.8 U	10.9 U	11.0 U	10.9 U	11.3 U
EPA 9045								
pH	6.42 J	9.02 J	8.60 J	8.60 J	8.61 J	8.74 J	8.73 J	8.64 J

J = Qualified as estimated due to a minor quality control deficiency.
U = Undetected at the associated quantitation limit.

NA = not applicable
QA = quality assurance
TCLP = toxicity characteristic leaching procedure

Table 2-3. Loading Ramp and Berm Pile Radionuclide Sample Results. (Sheet 1 of 2)

Sample Number	B0H0H0			B0H0H1			B0H0H2			B0H0H3		
Location	NA			North of Basin 1, (S of BH-5)			North of Basin 2			North of Basin 4		
Comment	QA sample			Loading Ramp			Loading Ramp			Loading Ramp		
Soil Description	Silica Sand			Sandy gravel			Sandy gravel			Sandy gravel		
222-S Aliquot ID	(N6195)			N6195			N6196			N6197		
222-S Liquid Scintillation												
Total Activity pCi/g	----			<5E+01			<5E+01			<5E+01		
Quanterra Richland	Result	Q	Total Error (2S)	Result	Q	Total Error (2S)	Result	Q	Total Error (2S)	Result	Q	Total Error (2S)
Gas Proportional Counting												
Gross Alpha pCi/g	1.86E+01		6.5E+00	1.49E+01		5.6E+00	9.58E+00		4.6E+00	5.25E+00		3.5E+00
Gross Beta pCi/g	7.43E+01		7.6E+00	2.45E+01		3.9E+00	2.64E+01		4.1E+00	2.09E+01		3.6E+00
Gamma Spectroscopy												
Cesium-137 pCi/g	1.04E-03	U	1.1E-02	4.69E-03	U	1.1E-02	2.46E-02		1.2E-02	1.44E-03	U	1.0E-02
Cobalt-58 pCi/g	1.29E-02	U	1.2E-02	-3.65E-03	U	1.1E-02	3.37E-04	U	1.1E-02	-6.28E-03	U	9.2E-03
Cobalt-60 pCi/g	-3.40E-03	U	1.2E-02	-3.23E-03	U	1.1E-02	1.64E-02	U	1.1E-02	1.10E-02	U	8.9E-03
Europium-152 pCi/g	8.16E-03	U	2.5E-02	-2.25E-02	U	2.8E-02	1.48E-02	U	2.8E-02	5.94E-03	U	2.3E-02
Europium-154 pCi/g	-4.92E-02	U	4.2E-02	1.18E-02	U	3.6E-02	1.46E-02	U	3.2E-02	-1.19E-02	U	3.1E-02
Europium-155 pCi/g	1.41E-02	U	2.7E-02	5.62E-02		3.4E-02	2.50E-02	U	2.6E-02	2.86E-02	U	2.6E-02
Iron-59 pCi/g	1.73E-03	U	3.0E-02	5.52E-03	U	2.8E-02	5.35E-03	U	2.7E-02	-2.82E-02	U	2.5E-02
Potassium-40 pCi/g	2.03E+01		2.1E+00	1.26E+01		1.3E+00	1.40E+01		1.5E+00	1.21E+01		1.3E+00
Radium-224 pCi/g	2.46E-01		3.8E-02	6.14E-01		6.8E-02	6.50E-01		7.2E-02	5.39E-01		6.0E-02
Radium-226 pCi/g	2.36E-01		4.8E-02	4.62E-01		6.7E-02	5.52E-01		7.0E-02	4.84E-01		6.4E-02
Radium-228 pCi/g	3.33E-01		7.9E-02	7.39E-01		1.1E-01	6.91E-01		1.1E-01	5.71E-01		8.6E-02
Uranium-238 pCi/g	6.64E-01		4.5E-01	----		----	3.97E-01		2.6E-01	3.24E-01		3.8E-01
Liquid Scintillation Counting												
Technetium-99 pCi/g	-1.06E-01	U	1.1E+00	5.90E-01		1.2E+00	1.71E-01	U	1.2E+00	-1.94E-01	U	1.1E+00
Total U by Fluorometry												
Uranium ug/g	1.36E+00		1.8E-01	7.82E-01		1.1E-01	1.16E+00		1.6E-01	8.53E-01		1.2E-01
Alpha Spectroscopy												
Uranium-234 pCi/g	1.05E+00		2.2E-01	1.02E+00		2.3E-01	6.49E-01		1.7E-01	5.44E-01		1.4E-01
Uranium-235 pCi/g	5.19E-02		3.4E-02	5.70E-02		3.8E-02	4.16E-02		3.3E-02	2.03E-02	U	2.3E-02
Uranium-238 pCi/g	1.08E+00		2.3E-01	9.23E-01		2.1E-01	6.73E-01		1.7E-01	5.91E-01		1.5E-01

Table 2-3. Loading Ramp and Berm Pile Radionuclide Sample Results. (Sheet 2 of 2)

Sample Number	B0H0H4			B0H0H5			B0H0H6			B0H0H7		
Location	North Berm Pile			Middle Berm Pile			Middle Berm Pile			South Berm Pile		
Comment	Southeast of Basin 1			Southeast of Basin 1			QA Duplicate of B0H0H5			Southeast of Basin 1		
Soil Description	Sandy gravel			Sandy gravel			Sandy gravel			Sandy gravel		
222-S Aliquot ID	N6198			N6199			(N6201)			N6201		
222-S Liquid Scintillation												
Total Activity pCi/g	<5E+01			<5E+01			----			<5E+01		
Quanterra Richland	Result	Q	Total Error (2S)	Result	Q	Total Error (2S)	Result	Q	Total Error (2S)	Result	Q	Total Error (2S)
Gas Proportional Counting												
Gross Alpha pCi/g	1.05E+01		4.7E+00	8.60E+00		4.6E+00	1.35E+01		5.4E+00	1.04E+01		4.7E+00
Gross Beta pCi/g	2.53E+01		4.0E+00	2.48E+01		3.9E+00	2.49E+01		4.0E+00	2.28E+01		3.8E+00
Gamma Spectroscopy												
Cesium-137 pCi/g	1.21E-02	U	1.2E-02	3.12E-02		1.3E-02	2.06E-02	U	1.2E-02	6.51E-03	U	1.2E-02
Cobalt-58 pCi/g	4.58E-03	U	1.1E-02	5.12E-03	U	1.0E-02	3.70E-04	U	1.2E-02	-6.21E-04	U	1.2E-02
Cobalt-60 pCi/g	3.73E-03	U	1.2E-02	5.30E-03	U	1.1E-02	9.72E-03	U	1.1E-02	3.86E-03	U	1.3E-02
Europium-152 pCi/g	-7.45E-03	U	2.7E-02	-4.43E-03	U	2.5E-02	-1.58E-02	U	2.9E-02	2.62E-03	U	2.9E-02
Europium-154 pCi/g	7.38E-03	U	3.7E-02	-6.82E-03	U	3.4E-02	2.49E-02	U	3.7E-02	-3.31E-02	U	3.6E-02
Europium-155 pCi/g	1.11E-02	U	2.9E-02	3.44E-02	U	2.8E-02	7.01E-03	U	3.3E-02	4.98E-02	U	3.5E-02
Iron-59 pCi/g	-3.47E-02	U	2.9E-02	6.69E-03	U	2.5E-02	-2.99E-02	U	3.1E-02	6.18E-04	U	3.1E-02
Potassium-40 pCi/g	1.45E+01		1.5E+00	1.27E+01		1.3E+00	1.47E+01		1.6E+00	1.35E+01		1.4E+00
Radium-224 pCi/g	6.35E-01		7.1E-02	5.38E-01		6.2E-02	6.10E-01		6.9E-02	5.46E-01		6.2E-02
Radium-226 pCi/g	5.97E-01		7.5E-02	4.68E-01		6.3E-02	5.12E-01		7.1E-02	4.08E-01		6.5E-02
Radium-228 pCi/g	7.18E-01		1.1E-01	5.89E-01		9.5E-02	6.37E-01		1.0E-01	5.33E-01		1.0E-01
Uranium-238 pCi/g	4.71E-01		4.0E-01	6.61E-01		4.9E-01	----		----	----		----
Liquid Scintillation Counting												
Technetium-99 pCi/g	4.64E-01		1.2E+00	-2.48E-01	U	1.1E+00	-1.13E-02	U	1.1E+00	2.18E-01	U	1.2E+00
Total U by Fluorometry												
Uranium ug/g	1.14E+00		1.5E-01	2.10E+00		2.8E-01	1.00E+00		1.4E-01	1.37E+00		1.9E-01
Alpha Spectroscopy												
Uranium-234 pCi/g	7.27E-01		1.9E-01	7.21E-01		1.8E-01	5.70E-01		1.5E-01	5.98E-01		1.4E-01
Uranium-235 pCi/g	5.79E-02		4.2E-02	3.94E-02		3.3E-02	2.56E-02	U	2.5E-02	1.87E-02	U	2.0E-02
Uranium-238 pCi/g	7.80E-01		2.0E-01	8.07E-01		2.0E-01	6.00E-01		1.5E-01	6.26E-01		1.5E-01

U = Undetected at the associated quantitation limit.

NA = not applicable
QA = quality assurance

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Table 2-4. Berm Pile Field Duplicate Comparisons (Samples B0H0H5 and B0H0H6).

Method	Analyte	One or Both Undetected, (U)?	Relative Percent Difference	Sample Standard Dev.
EPA 1311/6010	Arsenic	True	0%	0.00 E+00 µg/L
(TCLP)	Barium	False	0%	0.00 E+00 µg/L
	Cadmium	True	0%	0.00 E+00 µg/L
	Chromium	True	0%	0.00 E+00 µg/L
	Lead	True	0%	0.00 E+00 µg/L
	Selenium	True	0%	0.00 E+00 µg/L
	Silver	True	0%	0.00 E+00 µg/L
EPA 1311/7470	Mercury	True	0%	0.00 E+00 µg/L
EPA 3060A	Hexavalent Chromium	True	0%	0.00 E+00 mg/kg
EPA 6010	Total Chromium	False	37%	2.40 E+00 mg/kg
EPA 300.0	Chloride	True	11%	1.48 E-01 µg/g
	Fluoride	False	10%	9.19 E-02 µg/g
	Nitrate-N	False	5%	1.41 E-02 µg/g
	Nitrite-N	True	10%	1.41 E-02 µg/g
	Ortho-Phosphate	True	10%	3.61 E-01 µg/g
	Sulfate	True	10%	3.61 E-01 µg/g
EPA 353.1	Nitrite Nitrate	True	0%	0.00 E+00 µg/g
EPA 335.2	Cyanide	True	2%	7.07 E-03 µg/g
EPA 9030	Sulfide	True	1%	7.07 E-02 µg/g
EPA 9045	pH	False	0%	7.07 E-03
222-S Liquid Scintillation Total Activity		True	0%	0.00 E+00 pCi/g
Quanterra Gas Proportional Counting				
	Gross Alpha	False	44%	3.46 E+00 pCi/g
	Gross Beta	False	0%	7.07 E-02 pCi/g
Gamma	Cesium-137	True	41%	7.50 E-03 pCi/g
Spectroscopy	Cobalt-58	True	173%	3.36 E-03 pCi/g
	Cobalt-60	True	59%	3.13 E-03 pCi/g
	Europium-152	True	-112%	8.04 E-03 pCi/g
	Europium-154	True	351%	2.24 E-02 pCi/g
	Europium-155	True	132%	1.94 E-02 pCi/g
	Iron-59	True	-315%	2.59 E-02 pCi/g
	Potassium-40	False	15%	1.41 E+00 pCi/g
	Radium-224	False	13%	5.09 E-02 pCi/g
	Radium-226	False	9%	3.11 E-02 pCi/g
	Radium-228	False	8%	3.39 E-02 pCi/g
	Uranium-238	True	----	----
Liquid Scintillation Counting Tc-99		True	-183%	1.67 E-01 pCi/g
Total Uranium by Fluorometry		False	71%	7.78 E-01 µg/g
Alpha Spectroscopy Uranium-234		False	23%	1.07 E-01 pCi/g
	Uranium-235	True	42%	9.76 E-03 pCi/g
	Uranium-238	False	29%	1.46 E-01 pCi/g

3.0 SHALLOW SOILS WITHIN THE FORMER FOOTPRINT

This chapter reports results for samples taken from beneath the facility after removal of the structure and initial near-surface excavation beneath the facility. The initial excavation removed about 0.6 m (2 ft) of soil from the area of the sedimentation basins and extended laterally a few feet beyond the former location of the basin walls. Sampling was performed to assess soils for RCRA closure, to confirm assessment results, and to define boundaries for further excavation.

The analytical strategy initially set forth in the SAP (BHI 1995) was elaborated in the document *Field Screening Sampling and Analysis Strategy and Methodology for the 183-H Solar Evaporation Basins--Phase II - Soils* (BHI 1996b). This supplementary document will hereafter be referred to as the Field Screening Plan. It provides a sampling/analytical strategy and methodology for RCRA closure of the 183-H Solar Evaporation Basins within the boundaries and requirements identified in the initial SAP. It includes sampling and analytical strategy documentation, sample location information, and analytical methodology documentation.

3.1 CHEMICAL SAMPLING AND ANALYSIS

Samples for RCRA closure were collected by ERC personnel from the locations shown in Figure 3-1. Sampling logbook entries are contained in Appendix A. The sampler's field logbook was EL-1287. The sampling authorization form number was B96-060. The SAP called for field screening a minimum of 11 samples with 3 samples sent to a laboratory for confirmation.

Shallow soils were first sampled from 11 locations on February 12, 1996. Samples were assigned HEIS identification numbers. Aliquots were assigned to multiple containers. All samples were collected with clean stainless steel tools and stored in clean sample containers. Samples were referenced to a grid overlying the site. (Reference to Washington State Plane coordinates can be found in Appendix A.)

One specific location of interest was sampled on February 12, a location beneath Basin 1 associated with high arsenic concentrations in previous sampling. The remaining sample locations were randomly selected as outlined in the Field Screening Plan. Duplicate and split samples were collected from the site of the previous high arsenic concentration and two additional locations.

COCs were nitrate, arsenic, copper and nickel (BHI 1996b). Data on fluoride and hexavalent chromium were also sought because these two constituents would be of concern for deeper vadose zone sampling. Routine laboratory radiological screening was performed to support offsite sample shipping and handling.

The Environmental Analytical Laboratory (EAL) was used as the primary verification laboratory. Quanterra was used as an offsite laboratory for confirmation. Field analysis was also performed for fluoride to supplement the data set and establish excavation boundaries for deeper vadose zone soils.

In response to initial February sampling, additional cleanup (excavation) work was performed. Additional near-surface sampling was performed through February 26, 1996.

Final near-surface closure sampling occurred February 26, 1996. Eleven locations were sampled; ten locations were selected at random. One location, the arsenic "hot spot," was selected based on prior information. In all, 18 HEIS samples and 1 equipment blank were collected February 26. A representative from Ecology present during near-surface sampling on February 26, also collected split samples.

Samples gathered to support RCRA closure were assigned HEIS numbers and sent to the EAL and/or Quanterra for analysis. Table 3-1 summarizes all shallow soil samples assigned HEIS numbers.

Shallow samples not assigned HEIS sample numbers are listed in this report by their field screening identification numbers. All field screening samples were assigned field screening identification numbers. These quick-turnaround analyses were intended to assist field work. Sometimes soil was collected on the same date and from the same location as samples appearing in Table 3-1, while at other times, a unique date and location was attributed to the field screening sample.

Field screening sample data are presented in Appendix C. More than 75 shallow soil samples were collected from the area of excavation and analyzed in the field for fluoride. (Additional deep vadose soils were also collected and analyzed.) Soil from a few field screening locations and a nearby former orchard was also sent to the EAL. Additional analyses were performed at the EAL on some field screening samples.

3.2 DATA VALIDATION

Laboratory and field screening deliverables for shallow soil samples were not independently validated. Information is provided to the reader to make functional validation judgements. Sample analysis and reporting was subject to routine controls of the EAL, Quanterra, and Field Screening analytical groups. Field screening results appear in Appendix C. Contents of the analytical data packages from the EAL and Quanterra are reproduced in Appendices D and E.

3.3 RESULTS AND DISCUSSION

Results of the February 26, 1996 closure sampling appear in Table 3-2. The field screening document (BHI 1996b) stated established remedial action levels for each COC. Soil sampling results for one location, the authoritatively selected "hot spot," exceeded the predetermined action levels for arsenic. The arsenic action level was set at 6.41 ppm. (This is very close to the EAL quantitation and reporting limit of 5 µg/g.) Multiple results were associated with the "hot spot" location (basin sampling coordinates: north 113, east 189). Values of 16 and 9 µg/g (average 12.5) are in good agreement with the 11.7 result from the Quanterra split sample, B0H6Y9. The sampling on February 26, 1996 collected soil from an estimated 1.1 m (3.5 ft) below the basin. Arsenic results did not differ appreciatively from the three samples collected February 12, 1996 at a depth of 0.6 m (2 ft). (The earlier EAL arsenic results were 16 and 12 µg/g, and the associated Quanterra split sample, B0H6V8, was reported at 10.7 mg/kg.)

No other February 26 shallow soil result exceeded the shallow soil COC action levels. (Fluoride and hexavalent chromium were not shallow soil COCs, only vadose zone COCs.) All shallow soil action levels listed in the Field Screening Plan (BHI 1996b) are as follows:

- Arsenic 6.41 ppm
- Copper 59.2 ppm
- Nickel 19.1 ppm
- Nitrate 4,400 ppm

Table 3-3 summarizes EAL results for all HEIS shallow soil samples (February 12, 16, and 26, 1996). Arsenic results appear to vary by collection/analytical batch. There are few detected values among samples collected on February 16 and 26. Detectable concentrations were reported for all 11 locations sampled on February 12, 1996. On average, the arsenic concentration of samples collected February 12 was about 16.7 mg/kg (equivalent to 16.7 ppm). The average sample variance of four detected duplicate pairs was 10.25; a pooled sample standard deviation for individual February EAL results is 3.2 mg/kg.

Associated split sample results from Quanterra suggest slightly lower arsenic concentrations. Samples sent to Quanterra were measured by a slightly more sensitive method for arsenic (EPA 7060 versus EPA 6010). Interlaboratory comparisons are complicated by the higher quantitation limit at the EAL. Of the four split samples sent to Quanterra (February 12, 1996 sampling), only the 10.7 mg/kg "hot spot" split (B0H6V8) was reported above the action level.

As mentioned in Section 3.1, soil from a few field screening locations and a nearby former orchard was also sent to the EAL for additional analyses. (These informational samples are identified in Appendix C. They were assigned only field screening sample numbers. Formal results from the EAL are in Appendix D.) The five EAL-reported orchard soil samples had an arsenic average of 11.4, a range of 6-19, and a sample standard deviation of 6.5 mg/kg.

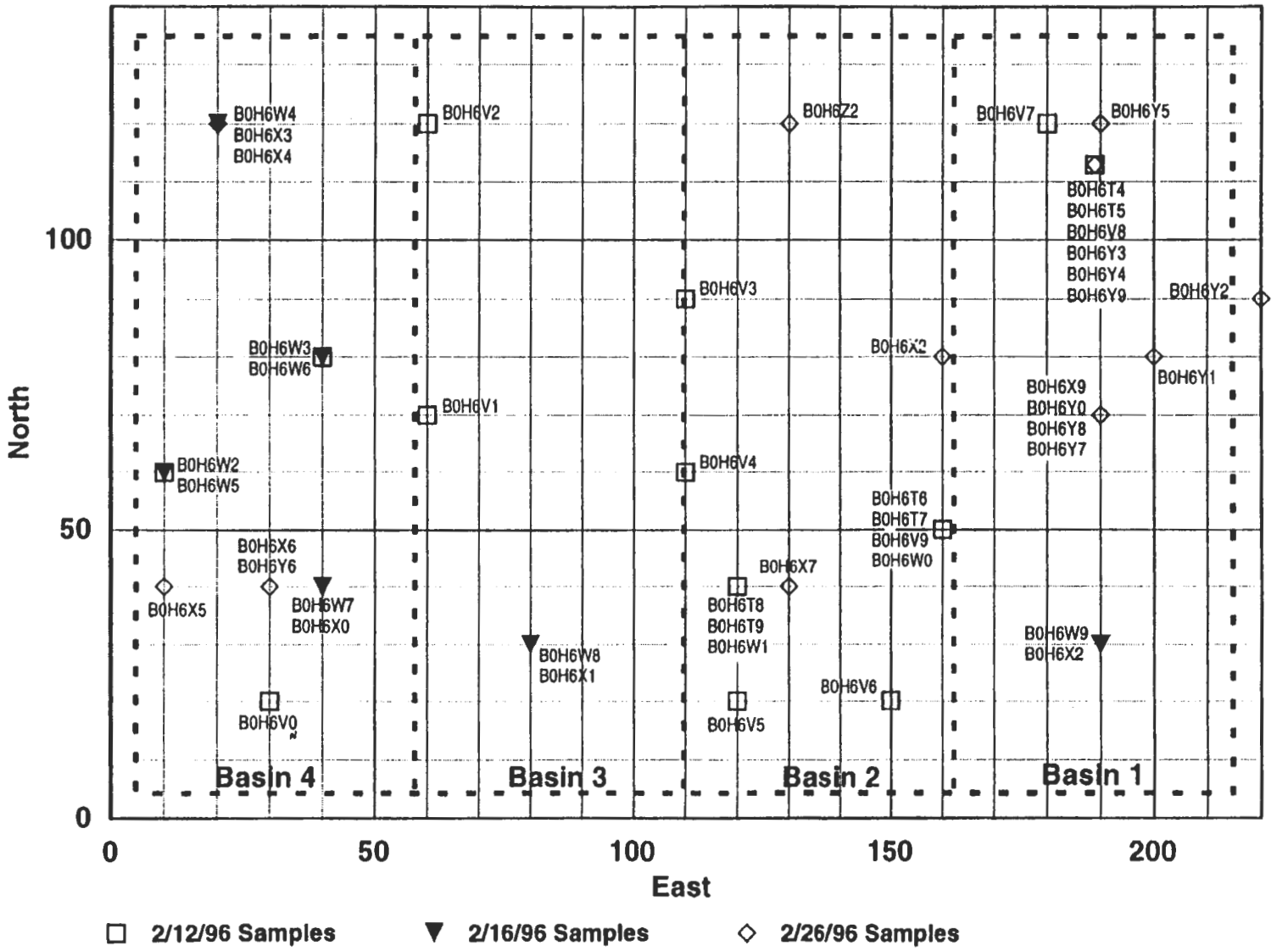

Figure 3-1. Shallow Soil HEIS Sample Locations.

Table 3-1. Shallow Soil HEIS Sample Key.

Sample Number	Date Collected	Depth (m)	Grid Reference North	Grid Reference East	Laboratory	Comments
B0H6T4	2/12/96	0.6	113	189	EAL	Arsenic hot spot
B0H6T5	2/12/96	0.6	113	189	EAL	Duplicate of B0H6T4
B0H6T6	2/12/96	0.6	50	160	EAL	
B0H6T7	2/12/96	0.6	50	160	EAL	Duplicate of B0H6T6
B0H6T8	2/12/96	0.6	40	120	EAL	
B0H6T9	2/12/96	0.6	40	120	EAL	Duplicate of B0H6T8
B0H6V0	2/12/96	0.6	20	30	EAL	Potential hydraulic leak site
B0H6V1	2/12/96	0.6	70	60	EAL	
B0H6V2	2/12/96	0.6	120	60	EAL	
B0H6V3	2/12/96	0.6	90	110	EAL	
B0H6V4	2/12/96	0.6	60	110	EAL	
B0H6V5	2/12/96	0.6	20	120	EAL	
B0H6V6	2/12/96	0.6	20	150	EAL	
B0H6V7	2/12/96	0.6	120	180	EAL	
B0H6V8	2/12/96	0.6	113	189	QES	Split of B0H6T4
B0H6V9	2/12/96	0.6	50	160	QES	Split of B0H6T6
B0H6W0	2/12/96	0.6	50	160	QES	Duplicate of B0H6V9
B0H6W1	2/12/96	0.6	40	120	QES	Split of B0H6T8
B0H6W2	2/16/96	0.9	60	10	QES	Sand and pebbles. Split of B0H6W5
B0H6W3	2/16/96	0.9	80	40	QES	Sand and pebbles. Split of B0H6W6
B0H6W4	2/16/96	0.9	120	20	EAL	Silt, sand, and pebbles.
B0H6W5	2/16/96	0.9	60	10	EAL	Sand and pebbles.
B0H6W6	2/16/96	0.9	80	40	EAL	Sand and pebbles.
B0H6W7	2/16/96	0.9	40	40	EAL	Sand and pebbles.
B0H6W8	2/16/96	0.9	30	80	EAL	Silt, sand, and pebbles.
B0H6W9	2/16/96	0.9	30	190	EAL	Silt and pebbles.
B0H6X0	2/16/96	0.9	40	40	QES	Sand and pebbles. Split of B0H6W7
B0H6X1	2/16/96	0.9	30	80	QES	Silt, sand, and pebbles. Split of B0H6W8
B0H6X2	2/16/96	0.9	30	190	QES	Silt and pebbles. Split of B0H6W9
B0H6X3	2/16/96	0.9	120	20	QES	Silt, sand, and pebbles. Split of B0H6W4
B0H6X4	2/26/96	1.1	120	20	EAL	
B0H6X5	2/26/96	1.1	40	10	EAL	Ecology split H96009
B0H6X6	2/26/96	1.1	40	30	EAL	
B0H6X7	2/26/96	1.1	40	130	EAL	
B0H6X8	2/26/96	1.1	80	160	EAL	
B0H6X9	2/26/96	1.1	70	190	EAL	
B0H6Y0	2/26/96	1.1	70	190	EAL	Duplicate of B0H6X9
B0H6Y1	2/26/96	1.1	80	200	EAL	Ecology split H96010
B0H6Y2	2/26/96	1.1	90	220	EAL	
B0H6Y3	2/26/96	1.1	113	189	EAL	Arsenic hot spot. Ecology split H96011
B0H6Y4	2/26/96	1.1	113	189	EAL	Duplicate of B0H6Y3
B0H6Y5	2/26/96	1.1	120	190	EAL	
B0H6Y6	2/26/96	1.1	40	30	QES	Split of B0H6X6
B0H6Y7	2/26/96	1.1	70	190	QES	Split of B0H6X9
B0H6Y8	2/26/96	1.1	70	190	QES	Duplicate of B0H6Y7
B0H6Y9	2/26/96	1.1	113	189	QES	Split of B0H6Y3
B0H6Z2	2/26/96	1.1	120	130	EAL	
B0H6Z3	2/26/96	N/A	N/A	N/A	EAL	Equipment blank

EAL = Environmental Analytical Laboratory
QES = Quanterra Environmental Services

Table 3-2. Individual Results of February 26, 1996 Soil Sampling.

	B0H6X4	B0H6X5	B0H6X6	B0H6X7	B0H6X8	B0H6X9	B0H6Y0	B0H6Y1	B0H6Y2
North	120	40	40	40	80	70	70	80	90
East	20	10	30	130	160	190	190	200	220
Basin Area	4	4	4	2	2	1	1	1	1
Laboratory	EAL	EAL	EAL	EAL	EAL	EAL	EAL	EAL	EAL
Comment							Duplicate of B0H6X9		
Results in mg/kg									
Arsenic	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	9
Copper	16	13	12	29	12	15	13	12	19
Hexavalent Cr	0.88 U	0.409	0.359	0.538	0.5	0.574	0.184	1	0.88 U
Fluoride	2.21	0.1 U	0.1 U	127	0.1 U	14.9	9.44	7.07	20.1
Nickel	9.7	8.4	8.3	11	8.6	11	11	9	15
Nitrate-Nitrogen	6.62	17.7	11.4	246	477	592	594	1390	489

	B0H6Y3	B0H6Y4	B0H6Y5	B0H6Z2	B0H6Z3	B0H6Y6	B0H6Y7	B0H6Y8	B0H6Y9
North	113	113	120	120	NA	40	70	70	113
East	189	189	190	170	NA	30	190	190	189
Basin Area	1	1	1	1	NA	4	1	1	1
Laboratory	EAL	EAL	EAL	EAL	EAL	QES	QES	QES	QES
Comment		Duplicate of B0H6Y3			Silica Sand	Split of B0H6X6	Split of B0H6X9	Duplicate of B0H6Y7	Split of B0H6Y3
Results in mg/kg									
Arsenic	16	9	5 U	5 U	5 U	1.1	1.1	1.1	11.7
Copper	16	17	15	29	1 U	----	----	----	----
Hexavalent Cr	0.88 U	0.88 U	0.88 U	0.88 U	0.08 U	0.57 U	0.57 U	0.57 U	0.57 U
Fluoride	1.24 U	1.4 U	1.19 U	1.94	0.1 U	0.98 U	3.31	3.64	1.04 U
Nickel	13	15	14	15	2 U	----	----	----	----
Nitrate-Nitrogen	23.4	27.2	2.95	6.47	0.023 U	9.85	491	458	25.9

EAL = Environmental Analytical Laboratory
NA = not applicable
QES = Quanterra Environmental Services
U = Undetected at the associated quantitation limit

Table 3-3. Summary of Shallow Soil Samples.[a]

Analyte	CollectionDate	Number of Routine Samples	Number of Nondetects	Minimum (mg/kg)	Maximum (mg/kg)	Average (Mean) (mg/kg)	Standard Deviation of the Mean (mg/kg)
Arsenic	2/12/96	11	0	5	30	16.7	2.4
	2/16/96	6	6	5 U	5 U	NC	NC
	2/26/96	11	9	5 U	[illegible]	NC	NC
Copper	2/12/96	11	7	1 U	[illegible]	NC	NC
	2/16/96	6	5	1 U	[illegible]	NC	NC
	2/26/96	11	0	12	[illegible]	17.1	1.9
Hexavalent Chromium	2/12/96	11	4	0.08 U	[illegible]	NC	NC
	2/26/96	11	5	0.359	[illegible]	NC	NC
Fluoride	2/12/96	11	0	2.37	[illegible]	16.6	7.5
	2/26/96	11	5	0.1 U	127	NC	NC
Nickel	2/12/96	11	0	5	18	11	1
	2/16/96	6	0	9	20	16	2
	2/26/96	11	0	8	15	11	1
Nitrate- Nitrogen	2/12/96	11	0	17.3	922	274	114
	2/26/96	11	0	2.95	1390	297	129

[a]Environmental Analytical Laboratory analyses (see Appendix C for field fluoride screening results).

NC = not calculated
U = Undetected at the associated quantitation limit.

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4.0 DEEP VADOSE SOILS

This chapter reports results of samples collected from an excavation greater than 1.2 m (4 ft) beneath the base of the former facility. In accordance with the Field Screening Plan, quick-turnaround field fluoride analyses were performed during excavation of the vadose zone, with a subset of samples sent to the EAL for fluoride and hexavalent chromium analyses (BHI 1996b). At the end of this final stage of excavation, 11 closure verification samples and 3 quality control samples were analyzed at the EAL. An additional three split samples, a split sample duplicate, and an equipment blank were sent offsite for confirmation of screening results.

4.1 SAMPLING AND ANALYSIS

Samples for RCRA closure were collected by ERC personnel from the locations shown in Figure 4-1. Ten locations were randomly selected beneath the site of the No. 1 sedimentation basin. One additional location (north 85, east 185) was authoritatively selected as an area of potentially high fluoride concentration based on existing data. Samples were visually referenced to the same sampling grid previously used for shallow soil samples. Sampling logbook entries are reproduced in Appendix A. The sampler's field logbook was EL-1287. The sampling authorization form number was B96-056.

Deep vadose zone samples collected for closure verification were assigned HEIS sample numbers and are listed in Table 4-1. Nineteen HEIS samples were collected March 4, 1996, including two silica sand equipment blanks. Aliquots were assigned to multiple containers. Split and duplicate sample sets were homogenized in a clean stainless steel bowl prior to allocating to sample containers. All samples were collected with clean stainless steel tools and stored in clean sample containers.

A representative from Ecology present during vadose zone sampling on March 4, 1996 collected split samples from three locations: north 85, east 185; north 90, east 200; and north 70, east 170.

COCs were fluoride and hexavalent chromium (BHI 1996b). Data were also collected on shallow soil COCs (nitrate, arsenic, copper, and nickel). The EAL was used as the primary verification laboratory. Quanterra was used as an offsite laboratory for confirmation. Quick-turnaround field analyses were also performed for fluoride.

The EAL analyses were performed per EAL procedures based on EPA Methods 300.0, 6010, and 7196A. Routine laboratory radiological screening was performed to support offsite sample shipping and handling.

Analyses by Quanterra referenced EPA Methods 300.0, 6010, 7060, and 7196. [Quanterra reported total chromium by Method 6010 (see Appendix E) in addition to hexavalent chromium by Method 7196. Arsenic was reported by Method 7060 instead of the 6010-based method used

by the EAL. Nitrate was reported by EPA Method 353.1 (see Appendix E) in addition to Method 300.0.] Samples for offsite analysis were delivered to Quanterra, Richland. Hexavalent chromium analyses were performed at the Richland laboratory. Remaining chemical analyses were performed at Quanterra, St. Louis, Missouri.

Samples collected for quick-turnaround analyses to guide field excavation were assigned only field identification numbers. More than 85 field fluoride analyses were performed, which was more than initially planned. Samples were collected as deep as 7.6 m (25 ft). These results are documented in Appendix C. Some field screening samples had additional analyses performed at the EAL.

4.2 DATA VALIDATION

The five confirmation samples sent for offsite analysis were independently validated. (Field and EAL analyses were not independently validated.) Data validation was performed by Golder Associates, Inc., Redmond, Washington. Validation was conducted to level C in accordance with routine validation procedures (WHC 1993a, 1993b). Data were subdivided into two sets for validation, inorganics and general chemistry. Data validation summary packages (for each set) prepared by the validators are included in Appendix F. Qualifier definitions are included for each section.

Inorganic validation identified no major deficiencies that required the vadose data to be qualified as unusable. Arsenic results were qualified with "J" or "BJ" flags. Arsenic was detected at a negative concentration in the associated preparation blank. Arsenic spike recoveries were slightly below the 80% control limits.

General chemistry validation identified no major deficiencies that required the vadose data to be qualified as unusable. Validators qualified nitrate and hexavalent chromium results with "J" or "UJ" flags because holding times exceeded the control limit.

4.3 RESULTS AND DISCUSSION

Individual vadose HEIS sample results appear in Table 4-2. Table 4-3 summarizes results, excluding duplicates, silica sand equipment "blank" and split samples.

The Field Screening Plan vadose action levels were 8 ppm for hexavalent chromium and 96 ppm for fluoride. No individual hexavalent chromium results approach the action level. The maximum reported hexavalent chromium concentration is about 1 ppm.

Fluoride was undetectable in 8 of the 11 routine samples. Each of the remaining three samples had reported fluoride above the action level, 384, 165, and 542 mg/kg. One of these samples, B0H6P8, also had a split sent to Quanterra. The Quanterra result of 116 was <u>less than half</u> the

384 mg/kg reported by the EAL. No field fluoride analyses were performed for samples collected March 4, 1996. (Later excavation, field fluoride analyses, and EAL checks of field screening samples were performed.)

Other analytes reported for vadose soils include arsenic, copper, nickel, and nitrate. Copper and nitrate values were well below the previously identified shallow soil action levels. One nickel concentration slightly exceeded the shallow soil action level of 19.1 ppm, but the average nickel result was clearly well below 19.1 ppm. EAL arsenic results ranged from 5 (U) to 9 mg/kg. All results are very close to the 5 mg/kg quantitation and reporting limit. Again, associated Quanterra split samples were reported at considerably lower concentrations. Arsenic was analyzed by a slightly more sensitive method than used by the EAL. However, Quanterra arsenic results were qualified as estimated (J) by validators due to minor quality control deficiencies.

Nitrate in Quanterra samples was reported by two methods. Values reported in this chapter correspond to the EPA 300.0 method referenced by the EAL procedure. Total chromium was also reported for Quanterra samples, but not the EAL samples. Results are available in the appendices.

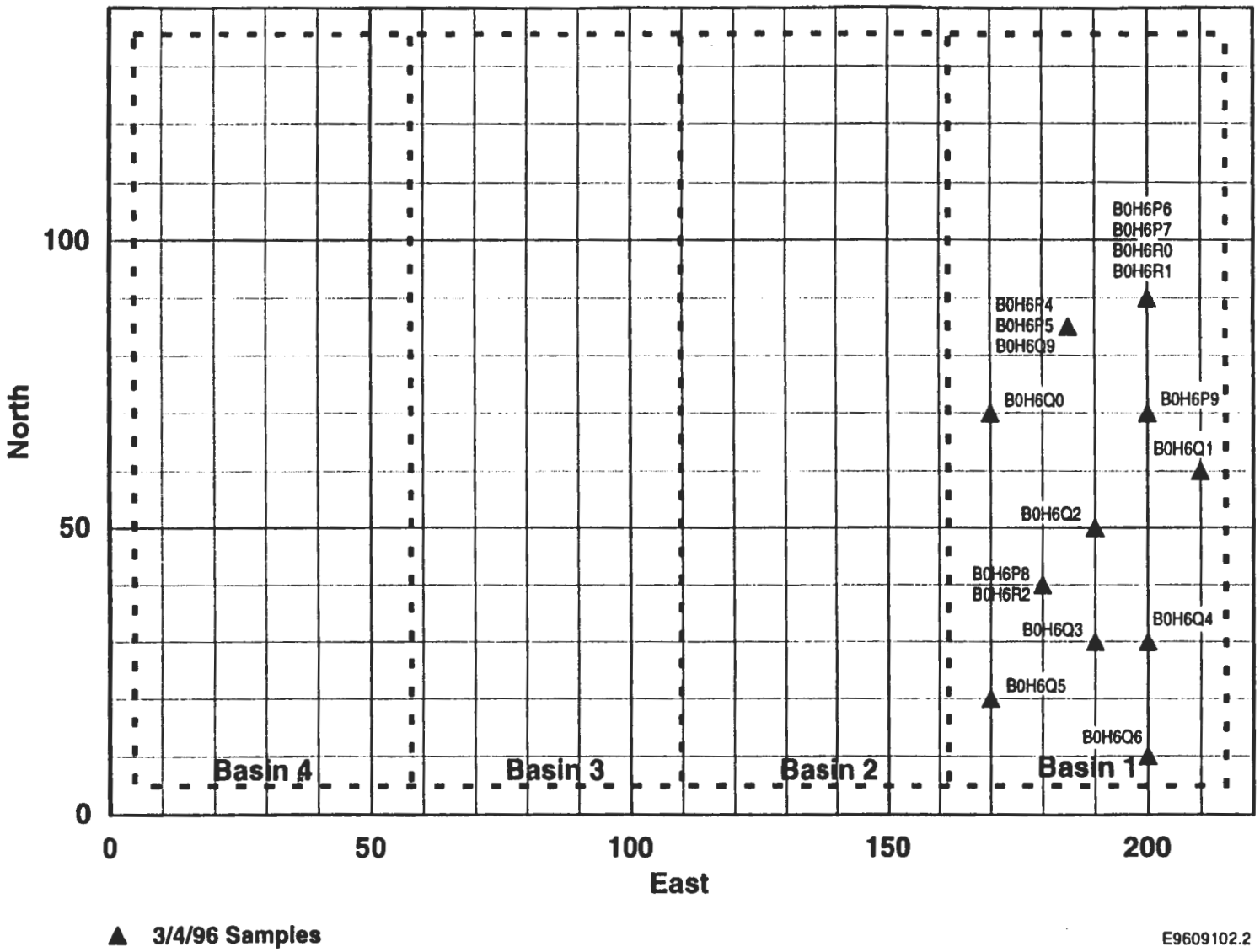

Figure 4-1. Deep Vadose HEIS Sample Locations.

Table 4-1. Vadose Soil HEIS Sample Key.

Sample Number	Date Collected	Analyte Code	Depth (m)	Grid Reference North	Grid Reference East	Laboratory	Comments
B0H6P4	3/4/96	1	3.4	85	185	EAL	F hot spot (previous data), Ecology split H96012
B0H6P5	3/4/96	2	3.4	85	185	EAL	Duplicate of B0H6P4
B0H6P6	3/4/96	1	3.4	90	200	EAL	Ecology split H96013
B0H6P7	3/4/96	2	3.4	90	200	EAL	Duplicate of B0H6P6
B0H6P8	3/4/96	1	3.4	40	180	EAL	
B0H6P9	3/4/96	2	3.4	70	200	EAL	
B0H6Q0	3/4/96	1	3.4	70	170	EAL	Ecology split H96014
B0H6Q1	3/4/96	2	3.4	60	210	EAL	
B0H6Q2	3/4/96	2	3.4	50	190	EAL	
B0H6Q3	3/4/96	2	3.4	30	190	EAL	
B0H6Q4	3/4/96	2	3.4	30	200	EAL	
B0H6Q5	3/4/96	2	3.4	20	170	EAL	
B0H6Q6	3/4/96	2	3.4	10	200	EAL	
B0H6Q7	3/4/96	1	NA	NA	NA	EAL	Equipment blank silica sand
B0H6Q8	3/4/96	1	NA	NA	NA	Quanterra	Split of B0H6Q7
B0H6Q9	3/4/96	1	3.4	85	185	Quanterra	Split of B0H6P5
B0H6R0	3/4/96	1	3.4	90	200	Quanterra	Split of B0H6P7
B0H6R1	3/4/96	1	3.4	90	200	Quanterra	Duplicate of B0H6R0
B0H6R2	3/4/96	1	3.4	40	180	Quanterra	Split of B0H6P8

1 = Requested Analytes: IC anions, fluoride, nitrate EPA Method 6010 metals, arsenic, chromium, copper, nickel, hexavalent chromium, radioactivity screening, and gamma energy analysis.

2 = Requested Analytes: IC anions, fluoride, nitrate EPA Method 6010 metals, arsenic, chromium, copper, nickel, hexavalent chromium, and radioactivity screening.

Ecology = Washington State Department of Ecology
EPA = U.S. Environmental Protection Agency
NA = not applicable

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Table 4-2. Individual Results of March 4, 1996 Soil Sampling.

	B0H6P4	B0H6P5	B0H6P6	B0H6P7	B0H6P8	B0H6P9	B0H6Q0	B0H6Q1	B0H6Q2	B0H6Q3
North	85	85	90	90	40	70	70	60	50	30
East	185	185	200	200	180	200	170	210	190	190
Basin Area	1	1	1	1	1	1	1	1	1	1
Depth (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Laboratory	EAL	EAL	EAL	EAL	EAL	EAL	EAL	EAL	EAL	EAL
Comment		Duplicate of B0H6P4		Duplicate of B0H6P6						
Results in mg/kg										
Arsenic	5 U	6	7	7	6	7	5 U	8	9	7
Copper	11	10	10	9	12	9	11	11	10	10
Hexavalent Cr	0.08 U	0.08 U	0.369	0.471	0.093	0.173	0.08 U	0.175	0.479	1.07
Fluoride	1.01 U	1.83	0.1 U	0.1 U	384	0.1 U	0.1 U	165	0.1 U	0.1 U
Nickel	12	10	9	9	10	10	12	23	9	10
Nitrate-Nitrogen	26.9	70.4	1880	1970	55.4	986	416	588	625	1930

	B0H6Q4	B0H6Q5	B0H6Q6	B0H6Q7	B0H6Q8	B0H6Q9	B0H6R0	B0H6R1	B0H6R2
North	30	20	10	NA	NA	85	90	90	40
East	200	170	200	NA	NA	185	200	200	180
Basin Area	1	1	1	NA	NA	1	1	1	1
Depth (m)	3.5	3.5	3.5	NA	NA	3.5	3.5	3.5	3.5
Laboratory	EAL	EAL	EAL	EAL	QES	QES	QES	QES	QES
Comment				Silica Sand	Split of B0H6Q7	Split of B0H6P5	Split of B0H6P7	Duplicate of B0H6R0	Split of B0H6P8
Results in mg/Kg									
Arsenic	6	5 U	7	5 U	0.30 B	1.1 J	0.66 BJ	0.72 BJ	0.96 BJ
Copper	11	13	32	1 U	0.89 B	10.8	13.0	10.9	15.1
Hexavalent Cr	0.239	0.338	0.08 U	0.08 U	0.57 U	0.57 UJ	0.673 J(1)	0.57 UJ	0.57 UJ
Fluoride	0.1 U	1.22 U	542	1 U	0.97 U	0.99 U	1.02 U	1.01 U	116
Nickel	11	12	11	2 U	1.6 U	8.4	6.4	8.9	8.6
Nitrate-Nitrogen	1,580	1,890	129	0.601 U	0.25 J	33.0 J	1,810 J	1880 J	45.1 J

(1) Undetected in laboratory duplicate of this sample.

B = Detected above an instrument detection limit but below a contract required detection limit.
J = Qualified as estimated due to a minor quality control deficiency.
U = Undetected at the associated quantitation limit.

EAL = Environmental Analytical Laboratory
NA = not applicable
QES = Quanterra Environmental Services

Table 4-3. Environmental Analtyical Laboratory Vadose Soil Summary.[a]

Analyte	Collection Date	Number of Routine Samples	Number of Nondetects	Minimum	Maximum	Average (Mean)	Standard Deviation of the Mean
Arsenic	3/4/96	11	3	5 U	9	[6.5]	[0.4]
Copper	3/4/96	11	0	9	32	12.7	2.0
Hexavalent Chromium	3/4/96	11	3	0.08 U	1.07	[0.3]	[0.1]
Fluoride	3/4/96	11	8	0.1 U	542	NC	NC
Nickel	3/4/96	11	0	9	23	11.7	1.2
Nitrate- Nitrogen	3/4/96	11	0	26.9	1930	918.8	232.5

[a]See Appendix C for Field Screening results.

NC = not calculated
U = Undetected at the associated quantitation limit
[ ] = Parameters estimated using non-detected concentrations at laboratory reported limit.

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APPENDIX A

SAMPLERS LOGBOOK ENTRIES AND GLOBAL POSITIONING SYSTEM SURVEY RESULTS

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APPENDIX A -- CONTENTS

LOADING RAMP AND BERM PILE SAMPLING LOG, JANUARY 8, 1996 ..... A-5

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GLOBAL POSITIONING SYSTEM SURVEY RESULTS, MARCH 27, 1996 ..... A-17

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1-8-96 183-H Solar Basin EFL-1133-1

Entrant: M. Mehlhorn, Samplers: D. Bowers, M. Mehlhorn

0952 Sample bottle lot Numbers are recorded at the 4701-C Building as follows:

HEIS #	N #	Lot #	Bottle, Analysis
B0H0H0		X2296030	1L/AG, Gross Alpha/Beta
B0H0H0		I/2 4024100	60ml/AG, NO_2-NO_3
B0H0H0		I/2 4024100	60ml/AG, Cr^{6+}
B0H0H0		I/2 4024100	60ml/AG, Anions: F, Cl, NO_2, NO_3, SO_4
B0H0H0		I/2 4024100	60ml/AG, Sulfide
B0H0H0		F 5146070	250ml/AG, Cyanide
B0H0H0		1311061	125ml/AG, TCLP Metals
B0H0H0			20ml/P, Activity Scan
B0H0H0	N6194		20ml/p, Rad ~~Scan~~ Scr

1006 For Samples B0H0H1 to B0H0H7, all bottle sets, lot numbers, and analysis are similar, except that the 60ml bottle set lot number changes to I/2 4080010 past sample number B0H0H4.

1010 Two-1-liter amber glass jars, lot# 5112010 are filled with silica sand for taking field and equipment blank samples.

1030 We depart the 4701-C building.

1108 D. Bowers/M. Mehlhorn arrive and sign-in at 183-H.

1110 B. Allenbough outlines all the sample locations. Two are situated on the 183-H berm, and the others are near piles. This meeting also entails a pre-job safety briefing.

1120 We prepare to sample at location #1 (behind basin #1). Weather conditions: Cloudy, foggy, ~40°F. Sample location #1 is situated near a vadose zone borehole, which has bentonite hole plug extending to the surface. The sample will be taken along the S. margin of the Vadose borehole to be more representative of in-place fill materia

1137 Sample # B0H0H0 is taken as an equipment blank. Silica sand was poured over the shovel into the sampling bowel, and the sample was taken after it was composited. Rod Screen sample # N6194 was not taken. Sample # N6195 will be used as shipping criteria for B0H0H0.

1158 Sample # B0H0H1, N6195. Sample consists of: Sandy Gravel, sG, 50% gravel, 50% sand; 60% mp, 20% fp, 20% vfp, 80% c.s, 20% ms, gravel and sand are moderately-sorted. The sample was taken from an 8" boring; the upper 3" ~~are a~~ consist of a sandy gravel with a dark sand matrix, and makes an abrupt contact with the gravel outlined above. The sample was shoveled into a stainless steel bowel and composited prior to sampling. All cobbles with diameters greater than 0.5" were remov prior to sampling. The sand was slightly moist, and water was pending above the bentonite.

1-8-96 183-H Solar Basin EFL-1133-1

1210 Move to sample location #2. Top of berm, behind basin #2. The sample location is a pit broken into the pavement. There is a 3" layer of dark gray gravel below the asphalt.

1236 Sample B0H0H2, N6196 . Consists of: Sandy Gravel, SG, 60% gravel, 40% sand; 20% cp, 30% mp, 25% fp, 25% vfp, 20% cs, 80% m.s., moist; Some asphalt is sloughing into the hole, making it impossible to keep asphalt out of the sample. All cobbles with diameters exceeding 0.5" were not sampled due to their size.

1250 Move to sample location #3. West end of berm, behind basin #4. This site is also a hole that is flush with the asphalt. The dark gray sandy gravel extends downward 2.3", and asphalt is present in the center due to the boring tool.

1303 Sample # B0H0H3, N6197. Consists of: Sandy Gravel, 50% gravel, 50% sand; 5% vcp, 20% cp, 30% mp, 30% fp, 15% vfp, 5% vcs, 20% cs, 75% ms, moist; the sample has ~15% asphaltic sand from the center of the sample.

1319 We make to the berm piles.

1323 Excavation begins at berm pile #1, sample location #4.

1349 The excavation concludes, and we prepare for sampling.

1352 Sample # B0H0H4, N6198. Consists of: Sandy Gravel, SG, 50% gravel, 50% sand; 5% cp, 55% mp, 20% fp, 20% vfp, 10% vcs, 10% cs, 80% ms, slightly moist.

1353 Excavation at berm pile #2, sample location #5 begins.

1415 Sample # B0H0H5, N6199, and duplicate sample # B0H0H6, N6200. Consists of: Same material as sample # B0H0H4.

1420 Excavation begins at berm pile #3, sample location #6.

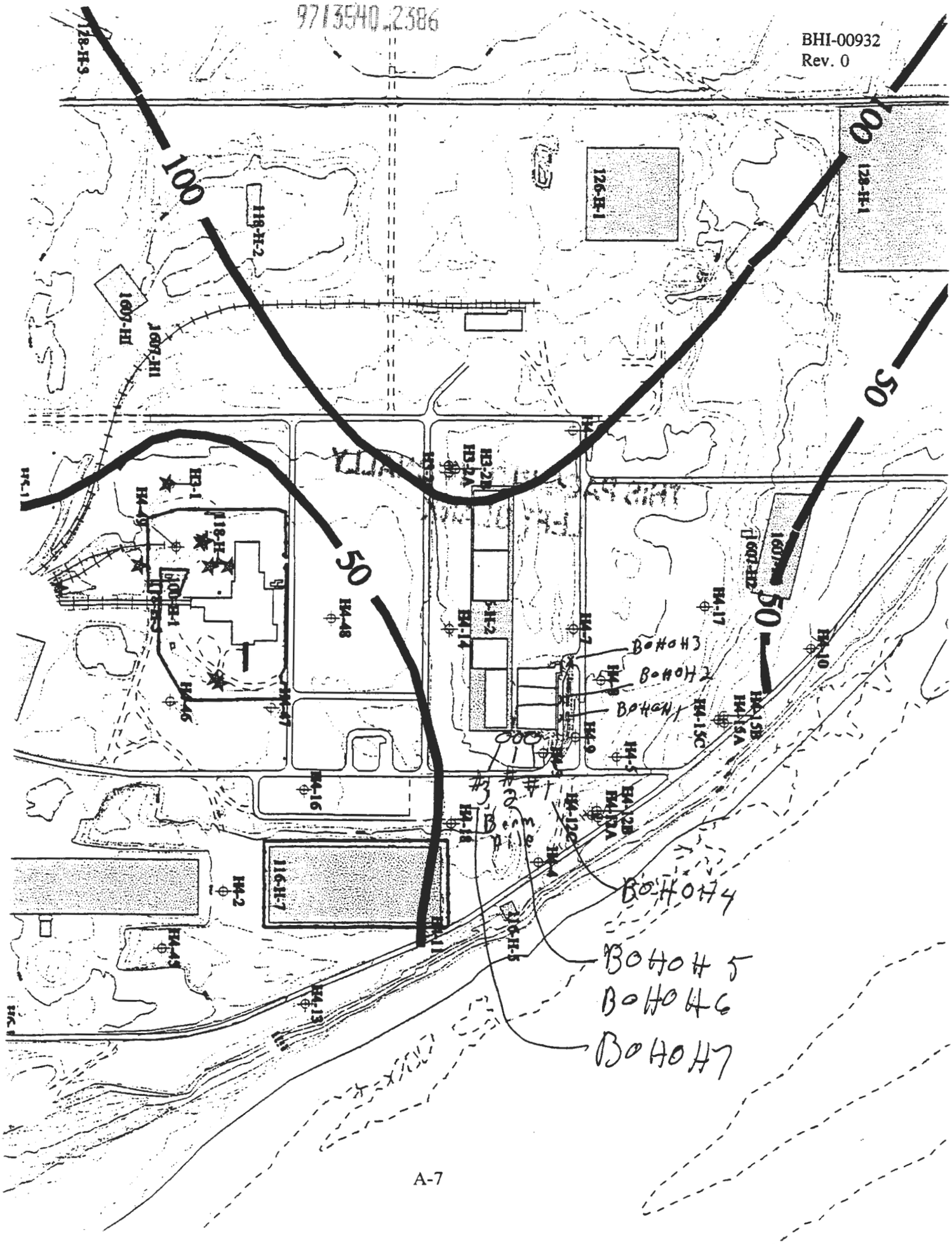
1452 Sample # B0H0H7, N6201. Consist of: Same material as above.

1510 Sampling concludes. Note: Sample #N6200 was not taken, and sample #N6199, B0H0H5 will be used as shipping criteria for sample B0H0H6. All samples were scoped into a stainless steel bowl and composited prior to sampling.

1525 All paperwork concludes, and we exit the site.

Monty Mehlhorn / Monty Mehlhorn 1-8-95

N A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H4-47
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Bermpile

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183-H Solar Basins Sampling

Feb 12, 1996

Todays work involves collation of soil samples from the 183-H Solar Evaporation Basins. Work will follow BHI-EE-01 Environmental Investigation Procedures, Sampling & Analysis Plan BHI-00525 and the Field Screening Sampling & Analysis Strategy.

Samplers onsite: J.D. Fambrx, R. Fahlberg, HPT: Julia Martin

The sampling grid was completed and sample locations staked. At each location approx 1 ft of overburden was removed, then the sample was collected. SAF B96-060

Sample#	Time	Location		Lab	Analysis	Notes
BOH6T4	1022	113N	189E	EAL	Anions, Metals, Cr6, Rad, As	As hot spot
BOH6T5	1022	113N	189E	EAL	Anions, Metals, Cr6, Rad, As	Duplicate of BOH6T4
BOH6T6	1050	50N	160E	EAL	Anions, Metals, Cr6, Rad, As	
BOH6T7	1050	50N	160E	EAL	Anions, Metals, Cr6, Rad, As	Duplicate of BOH6T6
BOH6T8	1112	40N	120E	EAL	Anions, Metals, Cr6, Rad, As	
BOH6T9	1112	40N	120E	EAL	Anions, Metals, Cr6, Rad, As	Duplicate of BOH6T8
BOH6V0	1130	20N	30E	EAL	Anions, Metals, Cr6, Rad, As	potential hydraulic leak site
BOH6V1	1140	70N	60E	EAL	Anions, Metals, Cr6, Rad, As	
BOH6V2	1144	120N	60E	EAL	Anions, Metals, Cr6, Rad, As	
BOH6V3	1200	90N	110E	EAL	Anions, Metals, Cr6, Rad, As	
BOH6V4	1207	60N	110E	EAL	Anions, Metals, Cr6, Rad, As	
BOH6V5	1216	20N	120E	EAL	Anions, Metals, Cr6, Rad, As	
BOH6V6	1225	20N	150E	EAL	Anions, Metals, Cr6, Rad, As	
BOH6V7	1236	120N	180E	EAL	Anions, Metals, Cr6, Rad, As	
BOH6V8	1022	113N	189E	Quantum	Anions, As, Cr6, Rad	Split of BOH6T4
BOH6V9	1050	50N	160E	Quant	Anions, As, Cr6, Rad	Split of BOH6T6
BOH6W0	1050	50N	160E	Quant	Anions, As, Cr6, Rad	Duplicate of BOH6V9
BOH6W1	1112	40N	120E	Quant	Anions, As, Cr6, Rad	Split of BOH6T8

Samples marked & labeled & placed on ice.

Feb. 12, 1996 183-H

Record of Decontaminated Sampling equipment used on this project:

6268 CLEANING FACILITY

EQUIPMENT CHECK OUT FORM

QUANTITY	ITEM	CUSTOMER	PROJECT	TPCN or WORK ORDER
18	SS Bowls (med)	M. Mehlhorn	183-H	X60263
18	SS Spoons (med)	M. Mehlhorn	183-H	X60263

*All equipment has been cleaned per EII 5.5, Rev. 4, "Laboratory Cleaning of RCRA/CERCLA Sampling Equipment.

Custodian Signature: [signature] Print Name: DE Richards Date: 2/9/96

Customer Signature: [signature] Print Name: M Mehlhorn Date: 2/9/96

END OF Day [signature]

183-H

February 16, 1996

Todays Sampling involved Jon Fancher and Bob Fahlberg digging 1 ft Deeper and collecting 6 samples and 6 Split Samples for analysis per SAF B96-060

Sample #	Time	Location North	Location East	Depth	LAB	Analysis
BOH6W4	1024	120	20	-3	EAL	Anions, Fluoride, Nitrate, ICP metals As, Cr6, Rad
BOH6W5	1012	60	10	-3	EAL	Same
BOH6W6	1035	80	40	-3	EAL	Same
BOH6W7	1048	40	40	-3	EAL	Same
BOH6W8	1100	30	80	-3	EAL	Same
BOH6W9	1112	30	190	-3	EAL	Same
BOH6X3	1024	120	20	-3	Quantera	Anions, Fluoride, Nitrate, As, Cr6, Rad Split BOH6W4
BOH6W2	1012	60	10	-3	Quantera	Same Split BOH6W5
BOH6W3	1035	80	40	-3	Quantera	Same Split BOH6W6
BOH6X0	1048	40	40	-3	Quantera	Same Split BOH6W7
BOH6X1	1100	30	80	-3	Quantera	Same Split BOH6W8
BOH6X2	1112	30	190	-3	Quantera	Same Split BOH6W9

Sample #	Lithology
BOH6W4	Silt, Sand & pebbles
BOH6W5	Sand & pebbles
BOH6W6	Sand & pebbles
BOH6W7	Sand + pebbles
BOH6W8	Silt, Sand & pebbles
BOH6W9	Silt & pebbles

After collection samples were surveyed on of the CA and packaged and shipped to appropriate labs.

END of Day

J. D. Fancher

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Feb 26, 1996 183-H

Arrived on site 6:50 AM. Went over plan of the day. Prepared Bottles for Today's Sampling Sampling will be conducted per the Field Screening Strategy and Sampling & Analysis plan BHI-00575 and SAF B96-060. Dr. Alex Stone (Ecology) observed and assisted in sampling.
Depth - 3.5 ft

Sample #	Time	North	East	Lab
BOH6X4	0930	120	20	EAL
BOH6X5	0942	40	10	EAL Ecology Split # H96009
BOH6X6	1000	40	30	EAL Number is BOH6X6
BOH6Y6	1000	40	30	Quantarin, Split of BOH6X6
BOH6X7	1015	40	130	EAL
BOH6X8	1025	80	160	EAL
BOH6X9	1040	70	190	EAL
BOH6Y0	1040	70	190	EAL ~~EAL~~, Duplicate of BOH6X9
BOH6Y7	1040	70	190	Quantarin, Split of BOH6X9
BOH6Y8	1040	70	190	Quantarin, Duplicate of BOH6Y7
BOH6Y1	1058	80	200	EAL Ecology Split # H96010
BOH6Y2	1110	90	220	EAL
BOH6Y3	1120	113	189	EAL Ash hot spot Ecology Split # H96011
BOH6Y9	1120	113	189	Quantarin Split of BOH6Y3
BOH6Y4	1120	113	189	EAL Duplicate of BOH6Y3
BOH6Y5	1130	120	190	EAL
BOH622	1138	120	170	EAL
BOH623	1154	N/A	N/A	EAL Equipment Blank

Equipment blank used monitoring well filter pack sand poured over clean sampling equipment.

End of Day

J. D. Franklin

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3-4-96 DMS

March ~~05~~ 04, 1996 183-H Excavation

Arrived on-site at 07:10, samplers Jon Fancher and David St. John. Sampling personnel signed in at site and sat in on safety meeting. Field Screening personnel Rick McCain on-site. Dr. Alex Stone on-site representing Wash. Dept of Ecology. Sampling to be conducted per SAF B96-056. Jon Fancher reviewed previous efforts and familiarized David St. John for pass off of project as Jon Fancher could not be present for this morning sampling.

Sample No	Time	North	East	Lab / comments
BOH6P4	0910	85	185	EAL main Hot spot w/Ecology
BOH6P5	0910	85	185	EAL Dup HP96012
BOH6Q9	0910	85	185	Quanterra Split
BOH6P6	0931	90	200	EAL main w/Ecology HP96011
BOH6P7	0931	90	200	EAL dup
BOH6R0				Quanterra split
BOH6R1	0931		200	Quanterra dup of split
BOH6P9	0946	70	200	EAL
BOH6Q0	0955	70	170	EAL - Marionette w/Ecology HP96011
BOH6Q1	1006	60	210	EAL
BOH6Q2	1012	50	190	EAL
BOH6P8	1018	40	180	EAL
BOH6R2	1018	40	180	Quanterra Split
BOH6Q3	1027	30	190	EAL
BOH6Q4	1033	30	200	EAL
BOH6Q5	1040	20	170	EAL
BOH6Q6	1047	10	200	EAL
BOH6Q7	1114	N/A	N/A	EAL EQ Blank
BOH6Q8	1114	N/A	N/A	Quanterra split of EQ Blank

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11 of the above samples were collected at the minus eleven foot level below the original pre excavation grade.
At approximately 11:30 Jon Fancher returned to the site and assisted with preparing bottles and paperwork for sample transport.
11 samples collected with either split sets or duplicate sets were first homogenized in a stainless steel bowl using a stainless steel spoon prior to filling the sample containers. The equipment blank samples consisted of clean silica sand.
At 1230 sampling completed and left site to deliver samples.
End of Day
David St. John

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GLOBAL POSITIONING SYSTEM SURVEY RESULTS, MARCH 27, 1996

Survey Date: March 27, 1996
By: LB Peterson

GPS ID	Easting	Northing	Elevation	Label
7001	577913.6934	152821.2728	128.8090	E220 N25 GPS-POINT
7002	577846.6670	152821.1481	129.2674	E000 N25 GPS-POINT

Two stake GPS Survey March 27, 1996
Horizontal DATUM: NAD83
Vertical DATUM: NAVD88/91
Coordinates: Washington State Plane South Zone (WCS83)
Units: Meters

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APPENDIX B

LOADING RAMP AND BERM PILE SAMPLE VALIDATION REPORT

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APPENDIX B -- CONTENTS

TRANSMITTAL OF DATA VALIDATION PACKAGE,
CONTRACT NO. MSH-SWV-315905 ..... B-5

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W0871-QES (943-1610.125 871INO.HB) B-7
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Attachment 2: Summary of Data Qualifications B-11
Attachment 3: Qualified Data Summary and Annotated Laboratory Reports B-13
Attachment 4: Laboratory Narrative and Chain-of-Custody Documentation B-33
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GENERAL CHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE
W0871-QES (943-1610.125 871GEN.HB) B-47
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RADIOCHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE
W0871-QES (943-1610.125 871RAD.HB) B-79
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Rev. 0

Golder Associates Inc.

4104-148th Avenue, NE
Redmond, WA 98052
Telephone (206) 883-0777
Fax (206) 882-5498

Golder Associates

MAR 1996
RECEIVED
Validation
Log In

March 25, 1996

Our ref: 943-1610.125.0400
94-1610/O/488

CH2M Hill
1022 Lee Blvd.
Richland, Washington 99352

ATTENTION: Ms. Jeanette Duncan

RE: TRANSMITTAL OF DATA VALIDATION PACKAGE,
CONTRACT NO. MSH-SWV-313905

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Dear Ms. Duncan:

This letter is to transmit the following data validation package:

SAF#	Project	Data Package	Analyses
B96-052	183-H Basin D&D Soil Screening/ Verification	W0871-QES	Radiochemistry, Inorganics, General Chemistry

Please call if you have any questions.

Sincerely,

GOLDER ASSOCIATES INC.

Tom Stapp

Thomas M. Stapp
Project Manager

Enclosures

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OFFICES IN AUSTRALIA, CANADA, GERMANY, HUNGARY, ITALY, SWEDEN, UNITED KINGDOM, UNITED STATES

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MEMORANDUM

TO: 183-H Basin D&D, Soil Screen/Verification Project QA Record

March 25, 1996

FR: Heidi Gregerson, Golder Associates Inc. HG

RE: INORGANIC DATA VALIDATION SUMMARY FOR DATA PACKAGE W0871-QES (943-1610.125 871INO.HB)

INTRODUCTION

This memo presents the results of data validation for the analyses specified below on data package W0871-QES prepared by Quanterra Environmental Services. Sample information is provided in the following table.

SAMPLE ID	COMMENTS	ANALYSIS	MEDIA
B0H0H0		TCLP METALS	SOIL
B0H0H1		TOTAL CHROMIUM	SOIL
B0H0H2		HEXAVALENT CHROMIUM	SOIL
B0H0H3			SOIL
B0H0H4		SEE ATTACHMENT 4	SOIL
B0H0H5			SOIL
B0H0H6			SOIL
B0H0H7			SOIL

Data validation was conducted to level C in accordance with the WHC statement of work (WHC 1994) and validation procedures (WHC 1993). Attachments 1 through 5 provide the following information as indicated below:

Attachment 1. Glossary of Data Reporting Qualifiers
Attachment 2. Summary of Data Qualifications
Attachment 3. Qualified Data Summary and Annotated Laboratory Reports
Attachment 4. Laboratory Narrative and Chain-of-Custody Documentation
Attachment 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

This section presents a summary of the data quality in terms of the referenced validation criteria.

Precision. Goals for precision were met.

Accuracy. Goals for accuracy were met.

Detection Limits. Detection limit goals were met for all sample results.

Completeness. The data package was complete for all requested analyses. A total of eight samples were validated in this data package with a total of 72 determinations reported, all of which were deemed valid. This results in a completeness of 100%, which meets the 90% objective of the work plan.

MAJOR DEFICIENCIES

No major deficiencies were identified during data validation which required qualification of data as unusable.

MINOR DEFICIENCIES

The following minor deficiencies were identified during data validation which required qualification of data:

Blanks

- Barium was detected in the TCLP blank. Attachments 2 and 5 provide a summary of samples affected, data qualifications applied and supporting documentation.

REFERENCES

WHC 1993, Data Validation Procedures for Chemical Analyses, WHC-SD-EN-SPP-002, Rev. 2, 1993. Westinghouse Hanford Company, Richland, Washington.

WHC 1994, Environmental and Waste Characterization Analytical Data Validation, Purchase Order MSH-SWV-315905; Validation Statement of Work, Revision 1.0, September 7, 1994; Westinghouse Hanford Company, Richland, Washington.

ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

Glossary of Inorganic Data Reporting Qualifiers.

B - Indicates the constituent was analyzed for and detected. The concentration reported is less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). The associated data should be considered usable for decision making purposes.

U - Indicates the constituent was analyzed for and not detected. The concentration reported is the sample detection limit corrected for aliquot size, dilution and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.

UJ - Indicates the constituent was analyzed for and not detected. Due to a minor quality control deficiency identified during data validation the concentration may not accurately reflect the sample detection limit. The associated data have been qualified as estimated but should be considered usable for decision making purposes.

BJ - Indicates the constituent was analyzed for and detected at a concentration less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.

J - Indicates the constituent was analyzed for and detected. Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.

UR - Indicates the constituent was analyzed for and not detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.

R - Indicates the constituent was analyzed for and detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.

ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

WHC-SD-EN-SPP-002, REV.2

DATA QUALIFICATION SUMMARY - FORM B-7

SDG:W0871-QES	REVIEWER: H. Gregerson	DATE: 3-25-96	PAGE 1 OF 1
COMMENTS: TCLP METALS /TOTAL CHROMIUM/HEXAVALENT CHROMIUM			
COMPOUND/ANALYTE	QUALIFIER	SAMPLES AFFECTED	REASON
BARIUM	U	B0H0H0	DETECTED IN TCLP BLANK

006

ATTACHMENT 3

QUALIFIED DATA SUMMARY and ANNOTATED LABORATORY REPORTS

Validated Data Summary, Data Package: W0871-QES

	Sample #	B0H0H0		B0H0H1		B0H0H2		B0H0H3		B0H0H4		B0H0H5		B0H0H6		B0H0H7	
	Date	1/8/96		1/8/96		1/8/96		1/8/96		1/8/96		1/8/96		1/8/96		1/8/96	
	Location																
	Depth																
	Type	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
	Comments																
Parameter	Units	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
TCLP ARSENIC	UG/L	65.500	U	65.500	U	65.500	U	65.500	U	65.500	U	65.500	U	65.500	U	65.500	U
TCLP BARIUM	UG/L	276.000	U	457.000		459.000		436.000		387.000		430.000		430.000		451.000	
TCLP CADMIUM	UG/L	3.400	U	3.400	U	3.400	U	3.400	U	3.400	U	3.400	U	3.400	U	3.400	U
TCLP CHROMIUM	UG/L	4.400	U	9.100	B	4.400	U	4.400	U	4.400	U	4.400	U	4.400	U	4.400	U
TCLP LEAD	UG/L	34.300	U	34.300	U	34.300	U	34.300	U	34.300	U	34.300	U	34.300	U	34.300	U
TCLP MERCURY	UG/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
TCLP SELENIUM	UG/L	47.000	U	47.000	U	47.000	U	47.000	U	47.000	U	47.000	U	47.000	U	47.000	U
TCLP SILVER	UG/L	5.000	U	5.000	U	5.000	U	5.000	U	5.000	U	5.000	U	5.000	U	5.000	U
HEXAVALENT CHROMIUM	MG/KG	0.570	U	0.570	U	0.570	U	0.570	U	0.570	U	0.570	U	0.570	U	0.570	U
TOTAL CHROMIUM	MG/KG	0.440	U	10.000		13.900		5.500		6.000		7.500		10.900		8.100	

The decimal places shown do not reflect the precision reported by the laboratory.

Verified HRG
3/25/96

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1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H0H0

Lab Name: QUANTERRA_MO Contract: 550.118

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0871

Matrix (soil/water): WATER Lab Sample ID: P10125-001

Level (low/med): LOW Date Received: 01/10/96

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	65.5	U	N	P
7440-39-3	Barium	276		N	P
7440-43-9	Cadmium	3.4	U	N	P
7440-47-3	Chromium	4.4	U	N	P
7439-92-1	Lead	34.3	U	N	P
7439-97-6	Mercury	0.10	U		CV
7782-49-2	Selenium	47.0	U	N	P
7440-22-4	Silver	5.0	U		P

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1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H0H0

Lab Name: QUANTERRA_MO Contract: 550.118

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0871

Matrix (soil/water): SOIL Lab Sample ID: 10125-001

Level (low/med): LOW Date Received: 01/10/96

% Solids: 99.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-43-9	Cadmium				NR
7440-47-3	Chromium	0.44	U		P
7439-92-1	Lead				NR
7439-97-6	Mercury				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR

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1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H0H1

Lab Name: QUANTERRA_MO Contract: 550.118

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0871

Matrix (soil/water): WATER Lab Sample ID: P10125-002

Level (low/med): LOW Date Received: 01/10/96

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	65.5	U	N	P
7440-39-3	Barium	457		N	P
7440-43-9	Cadmium	3.4	U	N	P
7440-47-3	Chromium	9.1	B	N	P
7439-92-1	Lead	34.3	U	N	P
7439-97-6	Mercury	0.10	U		CV
7782-49-2	Selenium	47.0	U	N	P
7440-22-4	Silver	5.0	U		P

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1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H0H1

ab Name: QUANTERRA_MO Contract: 550.118

ab Code: ITMO Case No.: SAS No.: SDG No.: W0871

latrix (soil/water): SOIL Lab Sample ID: 10125-002

evel (low/med): LOW Date Received: 01/10/96

; Solids: 94.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-43-9	Cadmium				NR
7440-47-3	Chromium	10.0			P
7439-92-1	Lead				NR
7439-97-6	Mercury				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR

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1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H0H2

Lab Name: QUANTERRA_MO Contract: 550.118

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0871

Matrix (soil/water): WATER Lab Sample ID: P10125-003

Level (low/med): LOW Date Received: 01/10/96

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	65.5	U	N	P
7440-39-3	Barium	459		N	P
7440-43-9	Cadmium	3.4	U	N	P
7440-47-3	Chromium	4.4	U	N	P
7439-92-1	Lead	34.3	U	N	P
7439-97-6	Mercury	0.10	U		CV
7782-49-2	Selenium	47.0	U	N	P
7440-22-4	Silver	5.0	U		P

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H0H2

Lab Name: QUANTERRA_MO Contract: 550.118

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0871

Matrix (soil/water): SOIL Lab Sample ID: 10125-003

Level (low/med): LOW Date Received: 01/10/96

% Solids: 92.7

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-43-9	Cadmium				NR
7440-47-3	Chromium	13.9			P
7439-92-1	Lead				NR
7439-97-6	Mercury				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H0H3

Lab Name: QUANTERRA_MO Contract: 550.118

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0871

Matrix (soil/water): WATER Lab Sample ID: P10125-004

Level (low/med): LOW Date Received: 01/10/96

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	65.5	U	N	P
7440-39-3	Barium	436		N	P
7440-43-9	Cadmium	3.4	U	N	P
7440-47-3	Chromium	4.4	U	N	P
7439-92-1	Lead	34.3	U	N	P
7439-97-6	Mercury	0.10	U		CV
7782-49-2	Selenium	47.0	U	N	P
7440-22-4	Silver	5.0	U		P

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1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H0H3

Lab Name: QUANTERRA_MO Contract: 550.118

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0871

Matrix (soil/water): SOIL Lab Sample ID: 10125-004

Level (low/med): LOW Date Received: 01/10/96

% Solids: 94.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-43-9	Cadmium				NR
7440-47-3	Chromium	5.5			P
7439-92-1	Lead				NR
7439-97-6	Mercury				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H0H4

Lab Name: QUANTERRA_MO Contract: 550.118

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0871

Matrix (soil/water): WATER Lab Sample ID: P10125-005

Level (low/med): LOW Date Received: 01/10/96

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	65.5	U	N	P
7440-39-3	Barium	387		N	P
7440-43-9	Cadmium	3.4	U	N	P
7440-47-3	Chromium	4.4	U	N	P
7439-92-1	Lead	34.3	U	N	P
7439-97-6	Mercury	0.10	U		CV
7782-49-2	Selenium	47.0	U	N	P
7440-22-4	Silver	5.0	U		P

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1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H0H4

Lab Name: QUANTERRA_MO Contract: 550.118

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0871

Matrix (soil/water): SOIL Lab Sample ID: 10125-005

Level (low/med): LOW Date Received: 01/10/96

% Solids: 95.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-43-9	Cadmium				NR
7440-47-3	Chromium	6.0			P
7439-92-1	Lead				NR
7439-97-6	Mercury				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR

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Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

TCLP

018 HRG 3/25/96
~~00061~~

9713540.2404

BHI-00932
Rev. 0

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H0H5

Lab Name: QUANTERRA_MO Contract: 550.118

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0871

Matrix (soil/water): WATER Lab Sample ID: P10125-006

Level (low/med): LOW Date Received: 01/10/96

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	65.5	U	N	P
7440-39-3	Barium	430		N	P
7440-43-9	Cadmium	3.4	U	N	P
7440-47-3	Chromium	4.4	U	N	P
7439-92-1	Lead	34.3	U	N	P
7439-97-6	Mercury	0.10	U		CV
7782-49-2	Selenium	47.0	U	N	P
7440-22-4	Silver	5.0	U		P

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

TCLP

HRG 3/25/96

019 ~~00062~~

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H0H5

Lab Name: QUANTERRA_MO Contract: 550.118

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0871

Matrix (soil/water): SOIL Lab Sample ID: 10125-006

Level (low/med): LOW Date Received: 01/10/96

% Solids: 94.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-43-9	Cadmium				NR
7440-47-3	Chromium	7.5			P
7439-92-1	Lead				NR
7439-97-6	Mercury				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

TCLP

020 HRG 3/25/96 ~~00063~~

9713540.2405

BHI-00932
Rev. 0

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H0H6

Lab Name: QUANTERRA_MO Contract: 550.118

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0871

Matrix (soil/water): WATER Lab Sample ID: P10125-007

Level (low/med): LOW Date Received: 01/10/96

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	65.5	U	N	P
7440-39-3	Barium	430		N	P
7440-43-9	Cadmium	3.4	U	N	P
7440-47-3	Chromium	4.4	U	N	P
7439-92-1	Lead	34.3	U	N	P
7439-97-6	Mercury	0.10	U		CV
7782-49-2	Selenium	47.0	U	N	P
7440-22-4	Silver	5.0	U		P

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

TCLP

021 HRG 3/25/96
~~00064~~

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H0H6

Lab Name: QUANTERRA_MO Contract: 550.118

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0871

Matrix (soil/water): SOIL Lab Sample ID: 10125-007

Level (low/med): LOW Date Received: 01/10/96

% Solids: 95.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-43-9	Cadmium				NR
7440-47-3	Chromium	10.9			P
7439-92-1	Lead				NR
7439-97-6	Mercury				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

TCLP

022 HRG 3/25/96 ~~00065~~

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BHI-00932
Rev. 0

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H0H7

Lab Name: QUANTERRA_MO Contract: 550.118

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0871

Matrix (soil/water): WATER Lab Sample ID: P10125-008

Level (low/med): LOW Date Received: 01/10/96

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	65.5	U	N	P
7440-39-3	Barium	451		N	P
7440-43-9	Cadmium	3.4	U	N	P
7440-47-3	Chromium	4.4	U	N	P
7439-92-1	Lead	34.3	U	N	P
7439-97-6	Mercury	0.10	U		CV
7782-49-2	Selenium	47.0	U	N	P
7440-22-4	Silver	5.0	U		P

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

TCLP

023 HRG 3/25/96
~~00066~~

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H0H7

Lab Name: QUANTERRA_MO Contract: 550.118

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0871

Matrix (soil/water): SOIL Lab Sample ID: 10125-008

Level (low/med): LOW Date Received: 01/10/96

% Solids: 94.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-43-9	Cadmium				NR
7440-47-3	Chromium	8.1			P
7439-92-1	Lead				NR
7439-97-6	Mercury				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

TCLP

024 HRG 3/25/96
~~00067~~

HEXAVALENT CHROMIUM DATA SUMMARY

SDG: W0871

ANALYSIS DATE: 1/12/96

MATRIX: SOIL

MDL: 0.57 mg/kg

SAMPLE LAB. ID	CLIENT ID	SAMPLE RESULT	UNITS	SPIKE ADDED	UNITS	SPIKE RECOVERED	UNITS	PERCENT RECOVERY
Preparation Blank		0.001	mg/L					
LCS		0.876	mg/L	1.000	mg/L	0.876	mg/L	87.6
60113601	B0H0H0	<0.57	mg/kg					
60113602	B0H0H1	<0.57	mg/kg					
60113603	B0H0H2	<0.57	mg/kg					
60113604	B0H0H3	<0.57	mg/kg					
60113605	B0H0H4	<0.57	mg/kg					
60113606	B0H0H5	<0.57	mg/kg					
60113607	B0H0H6	<0.57	mg/kg					
60113608	B0H0H7	<0.57	mg/kg					
60113608 DUP	B0H0H7	<0.57	mg/kg					
60113608 MS	B0H0H7	33.36	mg/kg	40.0	mg/kg	33.36	mg/kg	83.4
60113608 PbCrO4 MS	B0H0H7	896.0	mg/kg	926.72	mg/kg	896.0	mg/kg	96.7

COMMENTS:

To convert preparation blank in mg/L to mg/kg: mg/kg = (mg/L * 0.1 L) / 0.01 kg

(R3) 1-15-96

Form No.:CG-196, 8/95, Rev. 0

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ATTACHMENT 4

LABORATORY NARRATIVE and CHAIN-OF-CUSTODY DOCUMENTATION

Quanterra Incorporated
13715 Rider Trail North
Earth City, Missouri 63045

314 298-8566 Telephone
314 298-8757 Fax

CERTIFICATE OF ANALYSIS

Bechtel Hanford Incorporated
P.O. Box 1970
Richland, Washington 99352

January 24, 1996

Attention: Joan Kessner

JAN 1996
RECEIVED
Data
Log In

Project number	:	550.118
Date Received by Lab	:	January 10, 1996
Number of Samples	:	Eight (8)
Sample Type	:	Soil
SDG Number	:	W0871
Data Deliverable	:	Summary

I. Introduction

On January 10, 1996, eight (8) soil samples were received by Quanterra, Richland and transferred to Quanterra, St. Louis for chemical analysis. Upon receipt, the samples were given the following laboratory ID numbers to correspond with the specific client ID's:

St Louis ID	WHC ID	Richland ID	Matrix	Date of Receipt
10125-001	B0H0H0	60113501	Soil	01/10/96
10125-002	B0H0H1	60113502	Soil	01/10/96
10125-003	B0H0H2	60113503	Soil	01/10/96
10125-004	B0H0H3	60113504	Soil	01/10/96
10125-005	B0H0H4	60113505	Soil	01/10/96
10125-006	B0H0H5	60113506	Soil	01/10/96
10125-007	B0H0H6	60113507	Soil	01/10/96
10125-008	B0H0H7	60113508	Soil	01/10/96

027

HLG 3/25/96
~~CCCER~~

II. Analytical Results/ Methodology

The analytical results for this report are presented by analytical test. Each set of data includes sample identification information, analytical results and the appropriate detection limits.

Analyses requested: ICP Metals by EPA method 6010 and Mercury by EPA method 7470 following TCLP Extraction by EPA method 1311. Chromium by EPA method 6010. pH by EPA method 9045. Cyanide by EPA Method 335.2. Chloride, Fluoride, Nitrite, Nitrate, Phosphate and Sulfate by EPA Method 300.0. Nitrate/Nitrite by EPA Method 353.1. Sulfide by EPA Method 9030. Hexavalent Chromium by EPA method 3060A performed at QTESRL.

III. Quality Control

A Laboratory Control Sample and Method Blank were analyzed with each preparation batch. Matrix Spike and Matrix Spike Duplicate or Sample Duplicate were performed per the protocol for the analyses in this SDG. pH analysis uses only Sample Duplicate for matrix QC.

IV. Definitions

The following codes are used to denote laboratory quality control samples and can be found in the data summary section of this report:

QCBLK- Quality Control Blank, Method Blank
QCLCS- Quality Control Laboratory Control Sample, Blank Spike

Quanterra
Environmental Services

Bechtel Hanford Incorporated
January 24, 1996
Project Number: 550.118
SDG: W0871
Page 3

V. Comments

Total Chromium analysis was added after the samples were received and therefore does not appear on the Chain of Custody.

Metals
Due to software limitations all the forms in the SDG W0871 package are labelled "TCLP " even though both Total and TCLP results were reported.

TCLP:
The recoveries of the Matrix Spike Duplicate for the following list of elements was less than 80%, therefore all associated data was flagged with an " N ". All the recoveries for the Matrix Spike were within the 80%-120% range. See NCM # SL-2387.

	% REC
Arsenic	76.4
Barium	76.6
Cadmium	78.7
Chromium	78.7
Lead	78.5
Selenium	78.7

Chromium:
There are no comments or nonconformances associated with the Total Chromium analysis.

029

HRG 3/25/96
~~CCCCY~~

Bechtel Hanford Incorporated
January 24, 1996
Project Number: 550.118
SDG: W0871
Page 4

Wet Chemistry

The Relative Percent Differences could not be calculated for the Fluoride, Sulfate, Phosphate and Nitrite analyses due to the values being below the detection limits for sample 10125-001 and its duplicate.

The Relative Percent Differences could not be calculated for the Nitrate/Nitrite analysis due to the values being below the detection limits for sample 10125-001 and its duplicate.

The Relative Percent Differences could not be calculated for the Cyanide analysis due to the values being below the detection limits for sample 10125-001 and its duplicate.

The Relative Percent Differences could not be calculated for the Sulfide analysis due to the values being below the detection limits for sample 10125-001 and its duplicate.

I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:

Wade H. Price
Project Manager
e:\\price$\abbydave\hanw0871.nar

HRG 3/25/9
~~CCCOS~~

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Data Turnaround: X Priority / Normal

Collector: Doug Bowers	Company Contact: D. B. Encke	Telephone: 373-3461
Project Designation: 183-H Soil Screen/Verification (Loading ramp/Berm pile)	Sampling Location: 183-H Solar Basin	SAF No.: B96-052
Ice Chest No.: ER-17	Field Logbook No.: EFL-1133-1	Method of Shipment: Hand deliver
Shipped To: Quanterra	Offsite Property No.	Bill of Lading/Air Bill No.
Possible Sample Hazards/Remarks: none		
Special Handling and/or Storage		

SAMPLE ANALYSIS: 601135 SDG W0871

Preservation	none	cool to 4C	cool to 4C	cool to 4C	cool to 4C	cool to 4C	none	none		
Type of Container	P/G	P/G	P/G	P/G	P/G	P/G	P/G	P/G		
No. of Container(s)	1	1	1	1	1	1	2	1		
Volume	120 mL	250 mL	60 mL	60 mL	60 mL	60 ml	1 L	20 mL		
%	100	100	100	100	100		601136			
	TCLP Metals	Cyanide	Sulfide	See Item #1 below	NO2-NO3	Chromium Hex	See Item #2 below	Activity Scan		

Sample No.	Matrix*	Date Sampled	Time Sampled	TCLP Metals	Cyanide	Sulfide	See Item #1 below	NO2-NO3	Chromium Hex	See Item #2 below	Activity Scan		
B0H0H0 01	S	1-8-96	1137	X	X	X	X	X	X	X	X	N6	195
B0H0H1 02	S	1-8-96	1158	X	X	X	X	X	X	X	X	N6	195
B0H0H2 03	S	1-8-96	1236	X	X	X	X	X	X	X	X	N6	196
B0H0H3 04	S	1-8-96	1303	X	X	X	X	X	X	X	X	N6	197
B0H0H4 05	S	1-8-96	1352	X	X	X	X	X	X	X	X	N6	198
B0H0H5 06	S	1-8-96	1415	X	X	X	X	X	X	X	X	N6	199

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
Doug Bowers	1-9-95/0800	EC / B Britton	0800 / 1-9-95
EC / B Britton	10:30 / 1-10-96	Duane Sullivan	10:30 / 1-10-96

SPECIAL INSTRUCTIONS

Hexavalent chrom must be extracted per SW-846 3060A with a holding time of 96 hours.

Sample analysis for nitrate, nitrite, and phosphate by EPA 300.0 are being requested for Information only. The ERC Contractor acknowledges the holding times will not be met.

Item #1; Anions - IC F, Cl, SO4, PO4, NO2, NO3, pH

Item #2; Gross Alpha/Beta, U-234, -235, -238, Tc-99, Total U, Gamma Spec.

Matrix*: S = Soil; SE = Sediment; SO = Solid; SL = Sludge; W = Water; O = Oil; A = Air; DS = Drum Solids; DL = Drum Liquids; T = Tissue; Wt = Wipe; L = Liquid; V = Vegetation; X = Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSAL	Disposal Method	Disposed By	Date/Time

B-38

U3-

BHI-00932 Rev. 0

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Data Turnaround: X Priority / Normal

Collector: Doug Bowers	Company Contact: D. B. Encke	Telephone: 373-3461
Project Designation: 183-H Soil Screen/Verification (Loading ramp/Berm pile)	Sampling Location: 183-H Solar Basin	SAF No.: B96-052
Ice Chest No.: ER-17	Field Logbook No.	Method of Shipment: Hand deliver
Shipped To: Quanterra	Offsite Property No.	Bill of Lading/Air Bill No.
Possible Sample Hazards/Remarks: none		

Preservation	none	cool to 4C	cool to 4C	cool to 4C	cool to 4C	cool to 4C	none	none		
Type of Container	P/G	P/G	P/G	P/G	P/G	P/G	P/G	P/G		
No. of Container(s)	1	1	1	1	1	1	2	1		
Volume	120 mL	250 mL	60 mL	60 mL	60 mL	60 ml	1 L	20 mL		
SAMPLE ANALYSIS 601135 SDG W0871 %	100 TCLP Metals	100 Cyanide	100 Sulfide	100 See Item #1 below	100 NO2-NO3	Chromium Hex	601136 See Item #2 below	Activity Scan		

Special Handling and/or Storage

Sample No.	Matrix*	Date Sampled	Time Sampled	TCLP Metals	Cyanide	Sulfide	See Item #1 below	NO2-NO3	Chromium Hex	See Item #2 below	Activity Scan	
B0H0H6 07	S	1-8-96	1415	X	X	X	X	X	X	X	X	N 6199
B0H0H7 08	S	1-8-96	1452	X	X	X	X	X	X	X	X	N 6201

CHAIN OF POSSESSION	Sign/Print Names	Date/Time
Relinquished By: Doug Bowers		1-8-96/0800
Received By: Kim Wells (ERC)		1-8-96 0800
Relinquished By: Kim Wells (ERC)		1-10-96 10:30
Received By: Karen Stenberg		1-10-96 10:30
Relinquished By: Karen Stenberg		1-10-96
Received By:		
Relinquished By:		
Received By:		

SPECIAL INSTRUCTIONS

Hexavalent chrom must be extracted per SW-846 3060A with a holding time of 96 hours.

Sample analysis for nitrate, nitrite, and phosphate by EPA 300.0 are being requested for information only. The ERC Contractor acknowledges the holding times will not be met.

Lithium bacon

Item #1; Anions - IC F, Cl, SO4, PO4, NO2, NO3, pH

Item #2; Gross Alpha/Beta, U-234, -235, -238, Tc-99, Total U, Gamma Spec.

Matrix*: S = Soil; SE = Sediment; SO = Solid; SL = Sludge; W = Water; O = Oil; A = Air; DS = Drum Solids; DL = Drum Liquids; T = Tissue; WI = Wipe; L = Liquid; V = Vegetation; X = Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE	Disposal Method	Disposal By	Date/Time

B-39

032

HEG 3/25/96

Rev. 0

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ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

WHC-SD-EN-SPP-002, Rev. 2

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 183-H Basin D&D			DATA PACKAGE:		
VALIDATOR: H. GREGERSON		LAB: QUANTERRA		DATE: 3/25/96	
CASE:			SDG: W0871-QES		
ANALYSES PERFORMED					
☐ CLP/ICP	☐ CLP/GFAA	☐ CLP/Hg	☐ CLP/Cyanide	☒ TCLP-Metals	☒ TCLP/Hg
☐ SW-846/ICP	☐ SW-846/GFAA	☐ SW-846/Hg	☐ SW-846 Cyanide	☒ Cr/ICP Total	☒ Hexavalent Cr
SAMPLES/MATRIX B0H0H0	B0H0H1	B0H0H2	B0H0H3	B0H0H4	
B0H0H5	B0H0H6	B0H0H7 / SOIL			

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . Yes No N/A

Is a case narrative present? . . . . . Yes No N/A

Comments:

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . Yes No N/A

Comments:

034

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

Were initial calibrations performed on all instruments? . . . . Yes No N/A
Are initial calibrations acceptable? . . . . . Yes No N/A
Are ICP interference checks acceptable? . . . . . Yes No N/A
Were ICV and CCV checks performed on all instruments? . . . . . Yes No N/A
Are ICV and CCV checks acceptable? . . . . . Yes No N/A

Comments:

4. BLANKS

HRG 3/25/96

Were ICB and CCB checks performed for all applicable analyses? ~~Yes~~ No N/A
Are ICB and CCB results acceptable? . . . . . Yes No N/A
Were preparation blanks analyzed? . . . . . Yes No 1, N/A
Are preparation blank results acceptable? . . . . . Yes No N/A
Were field/trip blanks analyzed? . . . . . Yes No N/A
Are field/trip blank results acceptable? . . . . . Yes No N/A

Comments:
1. Ba detected in TCLP blank and associated samples were qualified. See supporting document.

5. ACCURACY

Were spike samples analyzed? . . . . . Yes No N/A
Are spike sample recoveries acceptable? . . . . . Yes No N/A
Were laboratory control samples (LCS) analyzed? . . . . . Yes No N/A
Are LCS recoveries acceptable? . . . . . Yes No N/A

Comments:

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

6. PRECISION

Were laboratory duplicates analyzed? . . . . . Yes No N/A
Are laboratory duplicate samples RPD values acceptable? . . . Yes No N/A
Were ICP serial dilution samples analyzed? . . . . . Yes No N/A
Are ICP serial dilution %D values acceptable? . . . . . Yes No N/A
Are field duplicate RPD values acceptable? . . . . . Yes No N/A
Are field split RPD values acceptable? . . . . . Yes No N/A

Comments:

7. FURNACE AA QUALITY CONTROL

Were duplicate injections performed as required? . . . . . Yes No N/A
Are duplicate injection %RSD values acceptable? . . . . . Yes No N/A
Were analytical spikes performed as required? . . . . . Yes No N/A
Are analytical spike recoveries acceptable? . . . . . Yes No N/A
Was MSA performed as required? . . . . . Yes No N/A
Are MSA results acceptable? . . . . . Yes No N/A

Comments:

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses? . . . . . Yes No N/A
Are all results supported in the raw data? . . . . . Yes No N/A
Are results calculated properly? . . . . . Yes No N/A
Do results meet the CRDLs? . . . . . Yes No N/A

Comments:

HOLDING TIME SUMMARY

SDG: U0871-QES | VALIDATOR: HEIDI GREGERSON | DATE: 3/25/96 | PAGE 1 OF 1

COMMENTS:

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
B0H0H0	TCLP	1/8/96	1/14/96	HG 3/25/96 1/16/96	6	2	none
	Cr		1/18/96	1/19/96	10	1	none
B0H0H1	TCLP		1/14/96	HG 3/25/96 1/16/96	6	2	none
	Cr		1/18/96	1/19/96	10	1	none
B0H0H2	TCLP		1/14/96	1/16/96	6	2	none
	Cr		1/18/96	HG 3/25/96 1/19/96	10	1	none
B0H0H3	TCLP		1/14/96	1/16/96	6	2	none
	Cr		1/18/96	1/18/96	10	1	none
B0H0H4	TCLP		1/14/96	1/16/96	6	2	none
	Cr		1/18/96	HG 3/25/96 1/19/96	10	1	none
B0H0H5	TCLP		1/14/96	1/16/96	6	2	none
	Cr		1/18/96	1/19/96	10	1	none
B0H0H6	TCLP		1/14/96	1/16/96	6	2	none
HG 3/25/96 X	Cr		1/18/96	1/19/96	10	1	none
B0H0H7	TCLP		1/14/96	1/16/96	6	2	none
	Cr	↓	1/18/96	1/19/96	10	1	none

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PBT88513

Lab Name: QUANTERRA_MO Contract: 550.118

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0871

Matrix (soil/water): WATER Lab Sample ID: PBT88513

Level (low/med): LOW Date Received: 01/10/96

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	65.5	U	N	P
7440-39-3	Barium	60.1	B	N	P
7440-43-9	Cadmium	3.4	U	N	P
7440-47-3	Chromium	4.4	U	N	P
7439-92-1	Lead	34.3	U	N	P
7439-97-6	Mercury	0.10	U		CV
7782-49-2	Selenium	47.0	U	N	P
7440-22-4	Silver	5.0	U		P

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN Sample Affected: BCHOHO TCLP

038 HRG 3/25/96
~~00068~~

MEMORANDUM

TO: 183-H Basin D&D, Soil Screen/Verification Project QA Record March 25, 1996

FR: Heidi Gregerson, Golder Associates Inc. HRG

RE: GENERAL CHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE W0871-QES (943-1610.125 871GEN.HB)

INTRODUCTION

This memo presents the results of data validation for the analysis indicated below on data package W0871-QES prepared by Quanterra Environmental Services. Sample information is provided in the following table.

SAMPLE ID	COMMENTS	ANALYSIS	MEDIA
B0H0H0		GENERAL CHEMISTRY	SOIL
B0H0H1			SOIL
B0H0H2		SEE ATTACHMENT 4	SOIL
B0H0H3			SOIL
B0H0H4			SOIL
B0H0H5			SOIL
B0H0H6			SOIL
B0H0H7			SOIL

Data validation was conducted to level C in accordance with the WHC statement of work (WHC 1994) and validation procedures (WHC 1993). Attachments 1 through 5 provide the following information as indicated below:

Attachment 1. Glossary of Data Reporting Qualifiers
Attachment 2. Summary of Data Qualifications
Attachment 3. Qualified Data Summary and Annotated Laboratory Reports
Attachment 4. Laboratory Narrative and Chain-of-Custody Documentation
Attachment 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

This section presents a summary of the data quality in terms of the referenced validation criteria.

Precision. Goals for precision were met.

Accuracy. Goals for accuracy were met.

Completeness. The data package was complete for all requested analyses. A total of eight samples were validated in this data package with a total of 80 determinations reported, all of which were deemed valid. This results in a completeness of 100 percent, which meets the 90% objective of the work plan.

Detection Limits. Detection limit goals were met for all the sample results, with the exception of chloride and ortho-phosphate. Qualification is not required.

MAJOR DEFICIENCIES

No major deficiencies were identified during data validation which required qualification of data as unusable.

MINOR DEFICIENCIES

The following minor deficiencies were identified during data validation which required qualification of data:

Holding Times

- The holding time for pH, nitrate, nitrite, and ortho-phosphate was exceeded. Attachments 2 and 5 provide a summary of data qualifications applied and supporting documentation.

REFERENCES

WHC 1993, Data Validation Procedures for Chemical Analyses, WHC-SD-EN-SPP-002, Rev. 2, 1993. Westinghouse Hanford Company, Richland, Washington.

WHC 1994, Environmental and Waste Characterization Analytical Data Validation, Purchase Order MSH-SWV-315905; Validation Statement of Work, Revision 1.0, September 7, 1994; Westinghouse Hanford Company, Richland, Washington.

ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

Glossary of Inorganic Data Reporting Qualifiers.

B - Indicates the constituent was analyzed for and detected. The concentration reported is less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). The associated data should be considered usable for decision making purposes.

U - Indicates the constituent was analyzed for and not detected. The concentration reported is the sample detection limit corrected for aliquot size, dilution and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.

UJ - Indicates the constituent was analyzed for and not detected. Due to a minor quality control deficiency identified during data validation the concentration may not accurately reflect the sample detection limit. The associated data have been qualified as estimated but should be considered usable for decision making purposes.

BJ - Indicates the constituent was analyzed for and detected at a concentration less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.

J - Indicates the constituent was analyzed for and detected. Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.

UR - Indicates the constituent was analyzed for and not detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.

R - Indicates the constituent was analyzed for and detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.

ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

WHC-SD-EN-SPP-002, REV.2

DATA QUALIFICATION SUMMARY - FORM B-7

SDG: W0871-QES	REVIEWER: Heidi Gregerson	DATE: 3-25-96	PAGE 1 OF 1
COMMENTS: GENERAL CHEMISTRY			
COMPOUND/ANALYTE	QUALIFIER	SAMPLES AFFECTED	REASON
pH	J	ALL SAMPLES	HOLDING TIME EXCEEDED
NITRATE-N	J	ALL SAMPLES	HOLDING TIME EXCEEDED
NITRITE-N	UJ	ALL SAMPLES	HOLDING TIME EXCEEDED
ORTHO-PHOSPHATE	UJ	ALL SAMPLES	HOLDING TIME EXCEEDED

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ATTACHMENT 3

QUALIFIED DATA SUMMARY and ANNOTATED LABORATORY REPORTS

Validated Data Summary, Data Package: W0871-QES

	Sample #	B0H10H0		B0H10H1		B0H10H2		B0H10H3		B0H10H4		B0H10H5		B0H10H6		B0H10H7	
	Date	1/8/96		1/8/96		1/8/96		1/8/96		1/8/96		1/8/96		1/8/96		1/8/96	
	Location																
	Depth																
	Type	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
	Comments																
Parameter	Units	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
CYANIDE	UG/G	0.500	U	0.530	U	0.540	U	0.520	U	0.520	U	0.530	U	0.520	U	0.520	U
SULFIDE	UG/G	10.600	U	10.700	U	11.200	U	10.800	U	10.900	U	11.000	U	10.900	U	11.300	U
CHLORIDE	UG/G	3.410		2.110	U	2.040	U	1.950	U	1.880	U	1.890	U	2.100	U	2.040	U
FLUORIDE	UG/G	1.000	U	1.060	U	1.400		0.980	U	0.940	U	1.290		1.420		1.020	U
NITRATE-N	UG/G	0.310	J	1.410	J	0.570	J	0.290	J	3.570	J	0.380	J	0.400	J	0.410	J
NITRITE-N	UG/G	0.200	UJ	0.210	UJ	0.200	UJ	0.200	UJ	0.190	UJ	0.190	UJ	0.210	UJ	0.200	UJ
ORTHO-PHOSPHATE	UG/G	5.000	UJ	5.280	UJ	5.100	UJ	4.880	UJ	4.690	UJ	4.730	UJ	5.240	UJ	5.110	UJ
SULFATE	UG/G	5.000	U	23.800		8.650		4.880	U	8.660		4.730	U	5.240	U	5.110	U
PH	PH	6.420	J	9.020	J	8.600	J	8.600	J	8.610	J	8.740	J	8.730	J	8.640	J
NITRATE/NITRITE-N	UG/G	0.5	U	0.95		0.54	U	0.53	U	3.05		0.53	U	0.53	U	0.53	U

The decimal places shown do not reflect the precision reported by the laboratory.

Verified HRG
3/25/96

9713540.2419

Quanterra Environmental Services

BHI-00932
Rev. 0

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.118

Category: Cyanide
Method: EPA 335.2
Matrix: SOLID

Sample Date : 01/08/96
Receipt Date : 01/10/96
Report Date : 01/22/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	D
B0H0H0	10125-001	Cyanide	57-12-5	QCBLK88399-2	01/12/96	01/16/96	0.50	UG/G	U	0.50	
B0H0H0	10125-001DUP	Cyanide	57-12-5	QCBLK88399-2	01/12/96	01/16/96	0.50	UG/G	U	0.50	
B0H0H0	10125-001MS	Cyanide	57-12-5	QCBLK88399-2	01/12/96	01/16/96	94	%REC			
B0H0H1	10125-002	Cyanide	57-12-5	QCBLK88399-2	01/12/96	01/16/96	0.53	UG/G	U	0.53	
B0H0H2	10125-003	Cyanide	57-12-5	QCBLK88399-2	01/12/96	01/16/96	0.54	UG/G	U	0.54	
B0H0H3	10125-004	Cyanide	57-12-5	QCBLK88399-2	01/12/96	01/16/96	0.52	UG/G	U	0.52	
B0H0H4	10125-005	Cyanide	57-12-5	QCBLK88399-2	01/12/96	01/16/96	0.52	UG/G	U	0.52	
B0H0H5	10125-006	Cyanide	57-12-5	QCBLK88399-2	01/12/96	01/16/96	0.53	UG/G	U	0.53	
B0H0H6	10125-007	Cyanide	57-12-5	QCBLK88399-2	01/12/96	01/16/96	0.52	UG/G	U	0.52	
B0H0H7	10125-008	Cyanide	57-12-5	QCBLK88399-2	01/12/96	01/16/96	0.52	UG/G	U	0.52	
NA	QCBLK88399-2	Cyanide	57-12-5	QCBLK88399-2	01/12/96	01/16/96	0.50	UG/G	U	0.50	
NA	QCLCS88399-2	Cyanide	57-12-5	QCBLK88399-2	01/12/96	01/16/96	94	%REC			

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HRG 3/25/96

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Quanterra Environmental Services

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.118

Category: Sulfide EPA 9030
Method: EPA 9030
Matrix: SOLID

Sample Date : 01/08/96
Receipt Date : 01/10/96
Report Date : 01/22/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	C
BOHOH0	10125-001	Sulfide	18496-25-8	QCBLK88499-1	01/12/96	01/12/96	10.6	UG/G	U	10.6	
BOHOH0	10125-001DUP	Sulfide	18496-25-8	QCBLK88499-1	01/12/96	01/12/96	10.5	UG/G	U	10.5	
BOHOH0	10125-001MS	Sulfide	18496-25-8	QCBLK88499-1	01/12/96	01/12/96	80	%REC			
BOHOH1	10125-002	Sulfide	18496-25-8	QCBLK88499-1	01/12/96	01/12/96	10.7	UG/G	U	10.7	
BOHOH2	10125-003	Sulfide	18496-25-8	QCBLK88499-1	01/12/96	01/12/96	11.2	UG/G	U	11.2	
BOHOH3	10125-004	Sulfide	18496-25-8	QCBLK88499-1	01/12/96	01/12/96	10.8	UG/G	U	10.8	
BOHOH4	10125-005	Sulfide	18496-25-8	QCBLK88499-1	01/12/96	01/12/96	10.9	UG/G	U	10.9	
BOHOH5	10125-006	Sulfide	18496-25-8	QCBLK88499-1	01/12/96	01/12/96	11.0	UG/G	U	11.0	
BOHOH6	10125-007	Sulfide	18496-25-8	QCBLK88499-1	01/12/96	01/12/96	10.9	UG/G	U	10.9	
BOHOH7	10125-008	Sulfide	18496-25-8	QCBLK88499-1	01/12/96	01/12/96	11.3	UG/G	U	11.3	
NA	QCBLK88499-1	Sulfide	18496-25-8	QCBLK88499-1	01/12/96	01/12/96	10.6	UG/G	U	10.6	
NA	QCLCS88499-1	Sulfide	18496-25-8	QCBLK88499-1	01/12/96	01/12/96	82	%REC			

HRG 3/25/96
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BHI-0093
Rev. 0

Quanterra
Environmental Services

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.118

Category: CHLORIDE
Method: EPA 300.0
Matrix: SOLID

Sample Date : 01/08/96
Receipt Date : 01/10/96
Report Date : 01/22/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit
BOHOH0	10125-001	Chloride	16887-00-6	QCBLK88682-2	01/12/96	01/12/96	3.41	UG/G		2.00
BOHOH0	10125-001DUP	Chloride	16887-00-6	QCBLK88682-2	01/12/96	01/12/96	3.57	UG/G		1.99
BOHOH0	10125-001MS	Chloride	16887-00-6	QCBLK88682-2	01/12/96	01/12/96	95	%REC		
BOHOH1	10125-002	Chloride	16887-00-6	QCBLK88682-2	01/12/96	01/12/96	2.11	UG/G	U	2.11
BOHOH2	10125-003	Chloride	16887-00-6	QCBLK88682-2	01/12/96	01/12/96	2.04	UG/G	U	2.04
BOHOH3	10125-004	Chloride	16887-00-6	QCBLK88682-2	01/12/96	01/12/96	1.95	UG/G	U	1.95
BOHOH4	10125-005	Chloride	16887-00-6	QCBLK88682-2	01/12/96	01/12/96	1.88	UG/G	U	1.88
BOHOH5	10125-006	Chloride	16887-00-6	QCBLK88682-2	01/12/96	01/12/96	1.89	UG/G	U	1.89
BOHOH6	10125-007	Chloride	16887-00-6	QCBLK88682-2	01/12/96	01/12/96	2.10	UG/G	U	2.10
BOHOH7	10125-008	Chloride	16887-00-6	QCBLK88682-2	01/12/96	01/12/96	2.04	UG/G	U	2.04
NA	QCBLK88682-2	Chloride	16887-00-6	QCBLK88682-2	01/12/96	01/12/96	2.00	UG/G	U	2.00
NA	QCLCS88682-2	Chloride	16887-00-6	QCBLK88682-2	01/12/96	01/12/96	92	%REC		

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Quanterra
Environmental Services

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.118

Category: FLUORIDE
Method: EPA 300.0
Matrix: SOLID

Sample Date : 01/08/96
Receipt Date : 01/10/96
Report Date : 01/22/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	D
BOHOH0	10125-001	Fluoride	16984-48-8	QCBLK88682-2	01/12/96	01/12/96	1.00	UG/G	U	1.00	
BOHOH0	10125-001DUP	Fluoride	16984-48-8	QCBLK88682-2	01/12/96	01/12/96	0.99	UG/G	U	0.99	
BOHOH0	10125-001MS	Fluoride	16984-48-8	QCBLK88682-2	01/12/96	01/12/96	110	%REC			
BOHOH1	10125-002	Fluoride	16984-48-8	QCBLK88682-2	01/12/96	01/12/96	1.06	UG/G	U	1.06	
BOHOH2	10125-003	Fluoride	16984-48-8	QCBLK88682-2	01/12/96	01/12/96	1.40	UG/G		1.02	
BOHOH3	10125-004	Fluoride	16984-48-8	QCBLK88682-2	01/12/96	01/12/96	0.98	UG/G	U	0.98	
BOHOH4	10125-005	Fluoride	16984-48-8	QCBLK88682-2	01/12/96	01/12/96	0.94	UG/G	U	0.94	
BOHOH5	10125-006	Fluoride	16984-48-8	QCBLK88682-2	01/12/96	01/12/96	1.29	UG/G		0.95	
BOHOH6	10125-007	Fluoride	16984-48-8	QCBLK88682-2	01/12/96	01/12/96	1.42	UG/G		1.05	
BOHOH7	10125-008	Fluoride	16984-48-8	QCBLK88682-2	01/12/96	01/12/96	1.02	UG/G	U	1.02	
NA	QCBLK88682-2	Fluoride	16984-48-8	QCBLK88682-2	01/12/96	01/12/96	1.00	UG/G	U	1.00	
NA	QCLCS88682-2	Fluoride	16984-48-8	QCBLK88682-2	01/12/96	01/12/96	~~106~~ 91%	%REC		0.10	

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HRG 3/25/96

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Quanterra Environmental Services

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.118

Category: Nitrate
Method: EPA 300.0
Matrix: SOLID

Sample Date : 01/08/96
Receipt Date : 01/10/96
Report Date : 01/22/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit
BOHOH0	10125-001	Nitrate	NO3-N	QCBLK88682-2	01/12/96	01/12/96	0.31	UG/G	J	0.20
BOHOH0	10125-001DUP	Nitrate	NO3-N	QCBLK88682-2	01/12/96	01/12/96	0.30	UG/G		0.20
BOHOH0	10125-001MS	Nitrate	NO3-N	QCBLK88682-2	01/12/96	01/12/96	103	%REC		
BOHOH1	10125-002	Nitrate	NO3-N	QCBLK88682-2	01/12/96	01/12/96	1.41	UG/G	J	0.21
BOHOH2	10125-003	Nitrate	NO3-N	QCBLK88682-2	01/12/96	01/12/96	0.57	UG/G	J	0.20
BOHOH3	10125-004	Nitrate	NO3-N	QCBLK88682-2	01/12/96	01/12/96	0.29	UG/G	J	0.20
BOHOH4	10125-005	Nitrate	NO3-N	QCBLK88682-2	01/12/96	01/12/96	3.57	UG/G	J	0.19
BOHOH5	10125-006	Nitrate	NO3-N	QCBLK88682-2	01/12/96	01/12/96	0.38	UG/G	J	0.19
BOHOH6	10125-007	Nitrate	NO3-N	QCBLK88682-2	01/12/96	01/12/96	0.40	UG/G	J	0.21
BOHOH7	10125-008	Nitrate	NO3-N	QCBLK88682-2	01/12/96	01/12/96	0.41	UG/G	J	0.20
NA	QCBLK88682-2	Nitrate	NO3-N	QCBLK88682-2	01/12/96	01/12/96	0.20	UG/G	U	0.20
NA	QCLCS88682-2	Nitrate	NO3-N	QCBLK88682-2	01/12/96	01/12/96	104	%REC		

Quanterra
Environmental Services

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.118

Category: Nitrite
Method: EPA 300.0
Matrix: SOLID

Sample Date : 01/08/96
Receipt Date : 01/10/96
Report Date : 01/22/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit
BOHOH0	10125-001	Nitrite-N	14797-65-0	QCBLK88682-2	01/12/96	01/12/96	0.20	UG/G	~~U~~ UJ	0.20
BOHOH0	10125-001DUP	Nitrite-N	14797-65-0	QCBLK88682-2	01/12/96	01/12/96	0.20	UG/G	U	0.20
BOHOH0	10125-001MS	Nitrite-N	14797-65-0	QCBLK88682-2	01/12/96	01/12/96	90	%REC		
BOHOH1	10125-002	Nitrite-N	14797-65-0	QCBLK88682-2	01/12/96	01/12/96	0.21	UG/G	~~U~~ UJ	0.21
BOHOH2	10125-003	Nitrite-N	14797-65-0	QCBLK88682-2	01/12/96	01/12/96	0.20	UG/G	~~U~~ UJ	0.20
BOHOH3	10125-004	Nitrite-N	14797-65-0	QCBLK88682-2	01/12/96	01/12/96	0.20	UG/G	~~U~~ UJ	0.20
BOHOH4	10125-005	Nitrite-N	14797-65-0	QCBLK88682-2	01/12/96	01/12/96	0.19	UG/G	~~U~~ UJ	0.19
BOHOH5	10125-006	Nitrite-N	14797-65-0	QCBLK88682-2	01/12/96	01/12/96	0.19	UG/G	~~U~~ UJ	0.19
BOHOH6	10125-007	Nitrite-N	14797-65-0	QCBLK88682-2	01/12/96	01/12/96	0.21	UG/G	~~U~~ UJ	0.21
BOHOH7	10125-008	Nitrite-N	14797-65-0	QCBLK88682-2	01/12/96	01/12/96	0.20	UG/G	~~U~~ UJ	0.20
NA	QCBLK88682-2	Nitrite-N	14797-65-0	QCBLK88682-2	01/12/96	01/12/96	0.20	UG/G	U	0.20
NA	QCLCS88682-2	Nitrite-N	14797-65-0	QCBLK88682-2	01/12/96	01/12/96	95	%REC		

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Rev. 0

Quanterra Environmental Services

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.118

Category: Orthophosphate
Method: EPA 300.0
Matrix: SOLID

Sample Date : 01/08/96
Receipt Date : 01/10/96
Report Date : 01/22/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	D
BOHOH0	10125-001	Ortho-Phosphate	14265-44-2	QCBLK88682-2	01/12/96	01/12/96	5.00	UG/G	~~U~~ UJ	5.00	
BOHOH0	10125-001DUP	Ortho-Phosphate	14265-44-2	QCBLK88682-2	01/12/96	01/12/96	4.97	UG/G	U	4.97	
BOHOH0	10125-001MS	Ortho-Phosphate	14265-44-2	QCBLK88682-2	01/12/96	01/12/96	100	%REC			
BOHOH1	10125-002	Ortho-Phosphate	14265-44-2	QCBLK88682-2	01/12/96	01/12/96	5.28	UG/G	~~U~~ UJ	5.28	
BOHOH2	10125-003	Ortho-Phosphate	14265-44-2	QCBLK88682-2	01/12/96	01/12/96	5.10	UG/G	~~U~~ UJ	5.10	
BOHOH3	10125-004	Ortho-Phosphate	14265-44-2	QCBLK88682-2	01/12/96	01/12/96	4.88	UG/G	~~U~~ UJ	4.88	
BOHOH4	10125-005	Ortho-Phosphate	14265-44-2	QCBLK88682-2	01/12/96	01/12/96	4.69	UG/G	~~U~~ UJ	4.69	
BOHOH5	10125-006	Ortho-Phosphate	14265-44-2	QCBLK88682-2	01/12/96	01/12/96	4.73	UG/G	~~U~~ UJ	4.73	
BOHOH6	10125-007	Ortho-Phosphate	14265-44-2	QCBLK88682-2	01/12/96	01/12/96	5.24	UG/G	~~U~~ UJ	5.24	
BOHOH7	10125-008	Ortho-Phosphate	14265-44-2	QCBLK88682-2	01/12/96	01/12/96	5.11	UG/G	~~U~~ UJ	5.11	
NA	QCBLK88682-2	Ortho-Phosphate	14265-44-2	QCBLK88682-2	01/12/96	01/12/96	5.00	UG/G	U	5.00	
NA	QCLCS88682-2	Ortho-Phosphate	14265-44-2	QCBLK88682-2	01/12/96	01/12/96	104	%REC			

015 HRG 3/25/96
~~00084~~

Quanterra Environmental Services

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.118

Category: SULFATE
Method: EPA 300.0
Matrix: SOLID

Sample Date : 01/08/96
Receipt Date : 01/10/96
Report Date : 01/22/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit
BOHOH0	10125-001	Sulfate	14808-79-8	QCBLK88682-2	01/12/96	01/12/96	5.00	UG/G	U	5.00
BOHOH0	10125-001DUP	Sulfate	14808-79-8	QCBLK88682-2	01/12/96	01/12/96	4.97	UG/G	U	4.97
BOHOH0	10125-001MS	Sulfate	14808-79-8	QCBLK88682-2	01/12/96	01/12/96	99	%REC		
BOHOH1	10125-002	Sulfate	14808-79-8	QCBLK88682-2	01/12/96	01/12/96	23.8	UG/G		5.28
BOHOH2	10125-003	Sulfate	14808-79-8	QCBLK88682-2	01/12/96	01/12/96	8.65	UG/G		5.10
BOHOH3	10125-004	Sulfate	14808-79-8	QCBLK88682-2	01/12/96	01/12/96	4.88	UG/G	U	4.88
BOHOH4	10125-005	Sulfate	14808-79-8	QCBLK88682-2	01/12/96	01/12/96	8.66	UG/G		4.69
BOHOH5	10125-006	Sulfate	14808-79-8	QCBLK88682-2	01/12/96	01/12/96	4.73	UG/G	U	4.73
BOHOH6	10125-007	Sulfate	14808-79-8	QCBLK88682-2	01/12/96	01/12/96	5.24	UG/G	U	5.24
BOHOH7	10125-008	Sulfate	14808-79-8	QCBLK88682-2	01/12/96	01/12/96	5.11	UG/G	U	5.11
NA	QCBLK88682-2	Sulfate	14808-79-8	QCBLK88682-2	01/12/96	01/12/96	5.00	UG/G	U	5.00
NA	QCLCS88682-2	Sulfate	14808-79-8	QCBLK88682-2	01/12/96	01/12/96	89	%REC		

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9713540.2423

Rev. 0

Quanterra
Environmental Services

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.118

Category: pH EPA 9045
Method: EPA 9045
Matrix: SOLID

Sample Date : 01/08/96
Receipt Date : 01/10/96
Report Date : 01/22/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	D
BOHOH0	10125-001	pH	PH	QCBLK88502-1	01/16/96	01/16/96	6.42	PH	J		
BOHOH0	10125-001DUP	pH	PH	QCBLK88502-1	01/16/96	01/16/96	6.47	PH			
BOHOH1	10125-002	pH	PH	QCBLK88502-1	01/16/96	01/16/96	9.02	PH	J		
BOHOH2	10125-003	pH	PH	QCBLK88502-1	01/16/96	01/16/96	8.60	PH	J		
BOHOH3	10125-004	pH	PH	QCBLK88502-1	01/16/96	01/16/96	8.60	PH	J		
BOHOH4	10125-005	pH	PH	QCBLK88502-1	01/16/96	01/16/96	8.61	PH	J		
BOHOH5	10125-006	pH	PH	QCBLK88502-1	01/16/96	01/16/96	8.74	PH	J		
BOHOH6	10125-007	pH	PH	QCBLK88502-1	01/16/96	01/16/96	8.73	PH	J		
BOHOH7	10125-008	pH	PH	QCBLK88502-1	01/16/96	01/16/96	8.64	PH	J		
NA	QCBLK88502-1	pH	PH	QCBLK88502-1	01/16/96	01/16/96	4.91	PH			

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Quanterra Environmental Services

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.118

Category: NO2-NO3
Method: EPA 353.1
Matrix: SOLID

Sample Date : 01/08/96
Receipt Date : 01/10/96
Report Date : 01/22/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit
BOHOH0	10125-001	Nitrate/Nitrite	NO2+NO3-N	QCBLK88482-1	01/12/96	01/12/96	0.50	UG/G	U	0.50
BOHOH0	10125-001DUP	Nitrate/Nitrite	NO2+NO3-N	QCBLK88482-1	01/12/96	01/12/96	0.50	UG/G	U	0.50
BOHOH0	10125-001MS	Nitrate/Nitrite	NO2+NO3-N	QCBLK88482-1	01/12/96	01/12/96	109	%REC		
BOHOH1	10125-002	Nitrate/Nitrite	NO2+NO3-N	QCBLK88482-1	01/12/96	01/12/96	0.95	UG/G		0.53
BOHOH2	10125-003	Nitrate/Nitrite	NO2+NO3-N	QCBLK88482-1	01/12/96	01/12/96	0.54	UG/G	U	0.54
BOHOH3	10125-004	Nitrate/Nitrite	NO2+NO3-N	QCBLK88482-1	01/12/96	01/12/96	0.53	UG/G	U	0.53
BOHOH4	10125-005	Nitrate/Nitrite	NO2+NO3-N	QCBLK88482-1	01/12/96	01/12/96	3.05	UG/G		0.53
BOHOH5	10125-006	Nitrate/Nitrite	NO2+NO3-N	QCBLK88482-1	01/12/96	01/12/96	0.53	UG/G	U	0.53
BOHOH6	10125-007	Nitrate/Nitrite	NO2+NO3-N	QCBLK88482-1	01/12/96	01/12/96	0.53	UG/G	U	0.53
BOHOH7	10125-008	Nitrate/Nitrite	NO2+NO3-N	QCBLK88482-1	01/12/96	01/12/96	0.53	UG/G	U	0.53
NA	QCBLK88482-1	Nitrate/Nitrite	NO2+NO3-N	QCBLK88482-1	01/12/96	01/12/96	0.50	UG/G	U	0.50
NA	QCLCS88482-1	Nitrate/Nitrite	NO2+NO3-N	QCBLK88482-1	01/12/96	01/12/96	96	%REC		

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ATTACHMENT 4

LABORATORY NARRATIVE and CHAIN-OF-CUSTODY DOCUMENTATION

Quanterra Environmental Services

Quanterra Incorporated
13715 Rider Trail North
Earth City, Missouri 63045

314 298-8566 Telephone
314 298-8757 Fax

CERTIFICATE OF ANALYSIS

Bechtel Hanford Incorporated
P.O. Box 1970
Richland, Washington 99352

JAN 1996
RECEIVED
Data
Log In

January 24, 1996

Attention: Joan Kessner

Project number	:	550.118
Date Received by Lab	:	January 10, 1996
Number of Samples	:	Eight (8)
Sample Type	:	Soil
SDG Number	:	W0871
Data Deliverable	:	Summary

I. Introduction

On January 10, 1996, eight (8) soil samples were received by Quanterra, Richland and transferred to Quanterra, St. Louis for chemical analysis. Upon receipt, the samples were given the following laboratory ID numbers to correspond with the specific client ID's:

St Louis ID	WHC ID	Richland ID	Matrix	Date of Receipt
10125-001	B0H0H0	60113501	Soil	01/10/96
10125-002	B0H0H1	60113502	Soil	01/10/96
10125-003	B0H0H2	60113503	Soil	01/10/96
10125-004	B0H0H3	60113504	Soil	01/10/96
10125-005	B0H0H4	60113505	Soil	01/10/96
10125-006	B0H0H5	60113506	Soil	01/10/96
10125-007	B0H0H6	60113507	Soil	01/10/96
10125-008	B0H0H7	60113508	Soil	01/10/96

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II. Analytical Results/ Methodology

The analytical results for this report are presented by analytical test. Each set of data includes sample identification information, analytical results and the appropriate detection limits.

Analyses requested: ICP Metals by EPA method 6010 and Mercury by EPA method 7470 following TCLP Extraction by EPA method 1311. Chromium by EPA method 6010. pH by EPA method 9045. Cyanide by EPA Method 335.2. Chloride, Fluoride, Nitrite, Nitrate, Phosphate and Sulfate by EPA Method 300.0. Nitrate/Nitrite by EPA Method 353.1. Sulfide by EPA Method 9030. Hexavalent Chromium by EPA method 3060A performed at QTESRL.

III. Quality Control

A Laboratory Control Sample and Method Blank were analyzed with each preparation batch. Matrix Spike and Matrix Spike Duplicate or Sample Duplicate were performed per the protocol for the analyses in this SDG. pH analysis uses only Sample Duplicate for matrix QC.

IV. Definitions

The following codes are used to denote laboratory quality control samples and can be found in the data summary section of this report:

QCBLK- Quality Control Blank, Method Blank
QCLCS- Quality Control Laboratory Control Sample, Blank Spike

Quanterra Environmental Services

Bechtel Hanford Incorporated
January 24, 1996
Project Number: 550.118
SDG: W0871
Page 3

V. Comments

Total Chromium analysis was added after the samples were received and therefore does not appear on the Chain of Custody.

Metals
Due to software limitations all the forms in the SDG W0871 package are labelled "TCLP " even though both Total and TCLP results were reported.

TCLP:
The recoveries of the Matrix Spike Duplicate for the following list of elements was less than 80%, therefore all associated data was flagged with an " N ". All the recoveries for the Matrix Spike were within the 80%-120% range. See NCM # SL-2387.

	% REC
Arsenic	76.4
Barium	76.6
Cadmium	78.7
Chromium	78.7
Lead	78.5
Selenium	78.7

Chromium:
There are no comments or nonconformances associated with the Total Chromium analysis.

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HRG 3/25/96
CCCCY

Quanterra Environmental Services

Bechtel Hanford Incorporated
January 24, 1996
Project Number: 550.118
SDG: W0871
Page 4

Wet Chemistry

The Relative Percent Differences could not be calculated for the Fluoride, Sulfate, Phosphate and Nitrite analyses due to the values being below the detection limits for sample 10125-001 and its duplicate.

The Relative Percent Differences could not be calculated for the Nitrate/Nitrite analysis due to the values being below the detection limits for sample 10125-001 and its duplicate.

The Relative Percent Differences could not be calculated for the Cyanide analysis due to the values being below the detection limits for sample 10125-001 and its duplicate.

The Relative Percent Differences could not be calculated for the Sulfide analysis due to the values being below the detection limits for sample 10125-001 and its duplicate.

I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:

Wade H. Price
Project Manager
e:\\price$\abbydave\hanw0871.nar

023

HRG 3/25/96
~~CCCCS~~

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Data Turnaround: X Priority / Normal

Collector: Doug Bowers	Company Contact: D. B. Encke	Telephone: 373-3461
Project Designation: 183-H Soil Screen/Verification (Loading ramp/Berm pile)	Sampling Location: 183-H Solar Basin	SAF No.: B96-052
Ice Chest No.: ER-17	Field Logbook No.: EFL-1133-1	Method of Shipment: Hand deliver
Shipped To: Quanterra	Offsite Property No.	Bill of Lading/Air Bill No.
Possible Sample Hazards/Remarks: none		
Special Handling and/or Storage		

SAMPLE ANALYSIS: 601135 SDG 601871

Preservation	none	cool to 4C	cool to 4C	cool to 4C	cool to 4C	cool to 4C	none	none		
Type of Container	P/G	P/G	P/G	P/G	P/G	P/G	P/G	P/G		
No. of Container(s)	1	1	1	1	1	1	2	1		
Volume	120 mL	250 mL	60 mL	60 mL	60 mL	60 ml	1 L	20 mL		
%	100	100	100	100	100		601136			
	TCLP Metals	Cyanide	Sulfide	See Item #1 below	NO2-NO3	Chromium Hex	See Item #2 below	Activity Scan		
Sample No. / Matrix* / Date Sampled / Time Sampled										
BOHOH0 01 / S / 1-8-96 / 1137	X	X	X	X	X	X	X	X	N6	195
BOHOH1 02 / S / 1-8-96 / 1158	X	X	X	X	X	X	X	X	N6	196
BOHOH2 03 / S / 1-8-96 / 1236	X	X	X	X	X	X	X	X	N6	196
BOHOH3 04 / S / 1-8-96 / 1303	X	X	X	X	X	X	X	X	N6	197
BOHOH4 05 / S / 1-8-96 / 1352	X	X	X	X	X	X	X	X	N6	198
BOHOH5 06 / S / 1-8-96 / 1415	X	X	X	X	X	X	X	X	N6	199

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
Doug Bowers	1-7-96/0800	EK / B. Gritta	0600 1-9-96
EK / B. Gritta	10:30 1-10-96	[illegible]	10:30 1-10-96

SPECIAL INSTRUCTIONS

Hexavalent chrom must be extracted per SW-846 3060A with a holding time of 96 hours.

Sample analysis for nitrate, nitrite, and phosphate by EPA 300.0 are being requested for Information only. The ERC Contractor acknowledges the holding times will not be met.

Item #1; Anions - IC F, Cl, SO4, PO4, NO2, NO3, pH

Item #2; Gross Alpha/Beta, U-234, -235, -238, Tc-99, Total U, Gamma Spec.

Matrix*: S = Soil; SE = Sediment; SO = Solid; SL = Sludge; W = Water; O = Oil; A = Air; DS = Drum Solids; DL = Drum Liquids; T = Tissue; WI = Wipe; L = Liquid; V = Vegetation; X = Other

LABORATORY SECTION: Received By | Title | Date/Time

FINAL SAMPLE DISPOSITION: Disposal Method | Disposed By | Date/Time

B-70

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BHI-0093 Rev. 0

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Data Turnaround: X Priority / Normal

Collector: Doug Bowers	Company Contact: D. B. Encke	Telephone: 373-3461
Project Designation: 183-H Soil Screen/Verification (Loading ramp/Berm pile)	Sampling Location: 183-H Solar Basin	SAF No.: B96-052
Ice Chest No.: ER-17	Field Logbook No.	Method of Shipment: Hand deliver
Shipped To: Quanterra	Offsite Property No.	Bill of Lading/Air Bill No.

Possible Sample Hazards/Remarks: none

Special Handling and/or Storage

SAMPLE ANALYSIS: 601135 SDG WO871 %

Preservation	none	cool to 4C	cool to 4C	cool to 4C	cool to 4C	cool to 4C	none	none		
Type of Container	P/G	P/G	P/G	P/G	P/G	P/G	P/G	P/G		
No. of Container(s)	1	1	1	1	1	1	2	1		
Volume	120 mL	250 mL	60 mL	60 mL	60 mL	60 ml	1 L	20 mL		
%	100	100	100	100	100		601136			
	TCLP Metals	Cyanide	Sulfide	See Item #1 below	NO2-NO3	Chromium Hex	See Item #2 below	Activity Scan		

Sample No.	Matrix*	Date Sampled	Time Sampled	TCLP Metals	Cyanide	Sulfide	See Item #1 below	NO2-NO3	Chromium Hex	See Item #2 below	Activity Scan		
B0H0H6 07	S	1-8-96	1415	X	X	X	X	X	X	X	X	N 6199	
B0H0H7 08	S	1-8-96	1452	X	X	X	X	X	X	X	X	N 6201	

CHAIN OF POSSESSION

Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
Doug Bowers	1-8-96/0800	Kim Wells / B. Wells	1-8-96 0800
Kim Wells / B. Wells	ERC 10:30 1-10-96	Kim Wells / B. Wells	10:30 1-10-96

SPECIAL INSTRUCTIONS

Hexavalent chrom must be extracted per SW-846 3060A with a holding time of 96 hours.

Sample analysis for nitrate, nitrite, and phosphate by EPA 300.0 are being requested for information only. The ERC Contractor acknowledges the holding times will not be met.

Item #1; Anions - IC F, Cl, SO4, PO4, NO2, NO3, pH

Item #2; Gross Alpha/Beta, U-234, -235, -238, Tc-99, Total U, Gamma Spec.

Matrix*: S = Soil; SE = Sediment; SO = Solid; SL = Sludge; W = Water; O = Oil; A = Air; DS = Drum Solids; DL = Drum Liquids; T = Tissue; WI = Wipe; L = Liquid; V = Vegetation; X = Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE	Disposal Method		

B-71

025

HLG 3/25/96 +5 [illegible]

Rev. 0

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ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

WHC-SD-EN-SPP-002, Rev. 2

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E

PROJECT: 183-H Basin D+D		DATA PACKAGE:
VALIDATOR: H. GREGERSON	LAB: QUANTERRA	DATE: 3/25/96
CASE:		SDG: W0871-QES

ANALYSES PERFORMED

☒ Anions/IC	☐ TOC	☐ TOX	☐ TPH-418.1	Oil and Grease	Alkalinity
☐ Ammonia	☐ BOD/COD	☒ Chloride	☐ Chromium-VI	☒ pH	☒ NO_3/NO_2
☒ Sulfate	☐ TDS	☐ TKN	☒ Phosphate	☒ CN	☒ Sulfide
☐	☐	☐	☐	☐	☐

SAMPLES/MATRIX B0H0H0 B0H0H1 B0H0H2 B0H0H3
B0H0H4 B0H0H5 B0H0H6 B0H0H7/SOIL

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . Yes No N/A

Is a case narrative present? . . . . . Yes No N/A

Comments:

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . Yes No[1] N/A

Comments:

[1] The holding time for Nitrate, nitrite, ~~and~~ pH, and ortho-phosphate were exceeded and all samples were qualified. See supporting document.

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GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

3. INSTRUMENT CALIBRATION

Was initial calibration performed for all applicable analyses? Yes No N/A
Are initial calibration results acceptable? . . . . . Yes No N/A
Was a calibration check performed for all applicable analyses? Yes No N/A
Are calibration check results acceptable? . . . . . Yes No N/A
Comments:

4. BLANKS

Were laboratory blanks analyzed? . . . . . Yes No N/A
Are laboratory blank results acceptable? . . . . . Yes No N/A
Were field/trip blanks analyzed? . . . . . Yes No N/A
Are field/trip blank results acceptable? . . . . . Yes No N/A
Comments:

5. ACCURACY

Were spike samples analyzed at the required frequency? . . . . Yes No N/A
Are spike recoveries acceptable? . . . . . Yes No N/A
Were LCS analyses performed at the required frequency? . . . . Yes No N/A
Are LCS recoveries acceptable? . . . . . Yes No N/A
Comments:

6. PRECISION

Were laboratory duplicate samples analyzed
at the required frequency? . . . . . Yes No N/A
Are laboratory duplicate sample RPD values acceptable? . . . . Yes No N/A
Are field duplicate RPD values acceptable? . . . . . Yes No N/A
Are field split RPD values acceptable? . . . . . Yes No N/A

028

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

Comments:

7. ANALYTE QUANTITATION

Was analyte quantitation performed properly? . . . . . Yes No N/A

Comments:

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses? . . . . . Yes No N/A

Are results supported in the raw data? . . . . . Yes No N/A

Are results calculated properly? . . . . . Yes No N/A

Do results meet the CRDLs? . . . . . Yes No N/A

Comments:

The CRDLs for Cl and PO4 were exceeded for all sample results. Qualification of data is not required.

HOLDING TIME SUMMARY

SDG: W0871-QES | VALIDATOR: HEIDI GREGERSON | DATE: 3/25/96 | PAGE 1 OF 2

COMMENTS:

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
B0H0H0	Anions, sulfide NO2/NO3	1/8/96	1/12/96	1/12/96	4	4	NO3, NO2, PO4 J/UJ
↓	pH	↓	1/16/96	1/16/96	8	8	J
↓	CN	↓	1/12/96	1/16/96	4	8	none
B0H0H1	Anions, sulfide NO3/NO2	↓	1/12/96	1/12/96	4	4	NO3, NO2, PO4 J/UJ
↓	pH	↓	1/16/96	1/16/96	8	8	J
↓	CN	↓	1/12/96	1/16/96	4	8	none
B0H0H2	Anions, sulfide, NO2/NO3	↓	1/12/96	1/12/96	4	4	NO3, NO2, PO4 J/UJ
↓	pH	↓	HEG 3/25/96 1/16/96	1/16/96	8	8	J
↓	CN	↓	1/12/96	1/16/96	4	8	none
B0H0H3	Anions, sulfide NO2/NO3	↓	1/12/96	1/12/96	4	4	NO3, NO2, PO4 J/UJ
↓	pH	↓	1/16/96	1/16/96	8	8	J
↓	CN	↓	1/12/96	1/16/96	4	8	none
B0H0H4	Anions, sulfide, NO2/NO3	↓	1/12/96	1/12/96	4	4	NO3, NO2, PO4 J/UJ
↓	pH	↓	1/16/96	1/16/96	8	8	J
↓	CN	↓	1/12/96	1/16/96	4	8	none
B0H0H5	Anions, sulfide, NO2/NO3	↓	1/12/96	1/12/96	4	4	NO3/NO2/PO4 J/UJ
↓	pH	↓	1/16/96	1/16/96	8	8	J

9713WHC-SD-EN-SPP-002, REV.2

HOLDING TIME SUMMARY

SDG: W0871-QES | VALIDATOR: HEIDI GREGERSON | DATE: 3/25/96 | PAGE 2 OF 2

COMMENTS:

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
B0H0H5	CN	1/8/96	1/12/96	1/16/96	3/25/96 ~~14~~ 4	8	none
B0H0H6	Anions, sulfide, NO_2/NO_3		1/12/96	1/12/96	4	4	NO_3, NO_2, PO_4 J, UJ
	pH		1/16/96	1/16/96	8	8	J
	CN		1/12/96	1/16/96	3/25/96 ~~14~~ 4	8	none
B0H0H7	Anions, sulfide, NO_2/NO_3		1/12/96	1/12/96	4	4	NO_3, NO_2, PO_4 J/UJ
	pH		1/16/96	1/16/96	8	8	J
	CN		1/12/96	1/16/96	3/25/96 ~~14~~ 4	8	none

MEMORANDUM

TO: 183-H Soil Screen Verification/
Loading Ramp and Berm Piles Project QA Record

March 25, 1996

FR: Tom Stapp, Golder Associates Inc. TS

RE: RADIOCHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE W0871-QES (943-1610.125 871RAD.HB)

INTRODUCTION

This memo presents the results of data validation for the analysis specified below on data package W0871-QES prepared by Quanterra Environmental Services. Sample information is provided in the following table.

SAMPLE ID	COMMENTS	ANALYSIS	MEDIA
B0H0H0		RADIOCHEMISTRY	SOIL
B0H0H1			SOIL
B0H0H2		SEE ATTACHMENT 4	SOIL
B0H0H3			SOIL
B0H0H4			SOIL
B0H0H5			SOIL
B0H0H6			SOIL
B0H0H7			SOIL

Data validation was conducted to level C in accordance with the WHC statement of work (WHC 1994) and validation procedures (WHC 1993). Attachments 1 through 5 provide the following information as indicated below:

Attachment 1. Glossary of Data Reporting Qualifiers
Attachment 2. Summary of Data Qualifications
Attachment 3. Qualified Data Summary and Annotated Laboratory Reports
Attachment 4. Laboratory Narrative and Chain-of-Custody Documentation
Attachment 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

This section presents a summary of the data quality in terms of the referenced validation criteria.

Precision. Goals for precision were met.

Accuracy. Goals for accuracy were met.

Detection Limits. Detection limit goals were met for all sample results.

Data Package ID: W0871-OES Analysis: Radiochemistry

Completeness. The data package was complete for all requested analyses. A total of eight samples were validated in this data package with a total of 149 determinations reported, all of which were deemed valid. This results in a completeness of 100 percent, which meets the 90 percent objective of the work plan.

MAJOR DEFICIENCIES

No major deficiencies were identified during data validation which required qualification of data as unusable:

MINOR DEFICIENCIES

No minor deficiencies were identified during data validation which required qualification of data:

DATA REPORTING

- Reported sample results which are less than the minimum detectable activity (MDA) have been qualified as undetected (U) on the laboratory results form (see Attachment 3).

REFERENCES

WHC 1993, Data Validation Procedures for Radiochemical Analyses, WHC-SD-EN-SPP-001, Rev. 1, 1993. Westinghouse Hanford Company, Richland, Washington.

WHC 1994, Environmental and Waste Characterization Analytical Data Validation, Purchase Order MSH-SWV-315905; Validation Statement of Work, Revision 1.0, September 7, 1994; Westinghouse Hanford Company, Richland, Washington.

ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

GLOSSARY OF RADIOCHEMISTRY DATA REPORTING QUALIFIERS

U- Indicates the constituent was analyzed for, but was not detected at a concentration above the minimum detectable activity (MDA). The concentration reported is the laboratory result corrected for sample aliquot size, dilution factors and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.

UJ- Indicates the constituent was analyzed for and was not detected at a concentration above the MDA. Due to a quality control deficiency identified during data validation, the concentration reported may not accurately reflect the sample quantitation limit. The associated data should be considered usable for decision making purposes.

J- Indicates the constituent was analyzed for and detected. The concentration reported is qualified as estimated due to a quality control deficiency identified during data validation. The associated data should be considered usable for decision making purposes.

UR- Indicates the constituent was analyzed for and detected. The concentration reported is qualified as unusable due to a quality control deficiency identified during data validation. The associated data should be considered unusable for decision making purposes.

R- Indicates the constituent was analyzed for and detected. The concentration reported is qualified as unusable due to a quality control deficiency identified during data validation. The associated data should be considered unusable for decision making purposes.

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ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

WHC-SD-EN-SPP-002, REV.2

DATA QUALIFICATION SUMMARY - FORM B-7

SDG: W0871-QES	REVIEWER: T. Stapp	DATE: 03-25-96	PAGE 1 OF 1
COMMENTS: RADIOCHEMISTRY			
COMPOUND/ANALYTE	QUALIFIER	SAMPLES AFFECTED	REASON
NO QUALIFICATIONS REQUIRED			

ATTACHMENT 3

QUALIFIED DATA SUMMARY and ANNOTATED LABORATORY REPORTS

Validated Data Summary, Data Package: W0871-QES

	Sample #	B0H0H0		B0H0H1		B0H0H2		B0H0H3		B0H0H4		B0H0H5		B0H0H6		B0H0H7	
	Date	1/8/96		1/8/96		1/8/96		1/8/96		1/8/96		1/8/96		1/8/96		1/8/96	
	Location																
	Depth																
	Type	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
	Comments																
Parameter	Units	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
URANIUM-234	pCi/G	1.050		1.020		0.042		0.544		0.727		0.721		0.570		0.598	
URANIUM-235	pCi/G	0.052		0.057		0.649		0.020	U	0.058		0.039		0.026	U	0.019	U
URANIUM-238	pCi/G	1.080		0.923		0.673		0.591		0.780		0.807		0.600		0.626	
COBALT-58	pCi/G	0.013	U	-0.004	U	0.000	U	-0.006	U	0.005	U	0.005	U	0.000	U	-0.001	U
COBALT-60	pCi/G	-0.003	U	-0.003	U	0.016	U	0.011	U	0.004	U	0.005	U	0.010	U	0.004	U
CESIUM-137DA	pCi/G	0.001	U	0.005	U	0.025		0.001	U	0.012	U	0.031		0.021	U	0.007	U
EUROPIUM-152	pCi/G	0.008	U	-0.023	U	0.015	U	0.006	U	-0.007	U	-0.004	U	-0.016	U	0.003	U
EUROPIUM-154	pCi/G	-0.049	U	0.012	U	0.015	U	-0.012	U	0.007	U	-0.007	U	0.025	U	-0.033	U
EUROPIUM-155	pCi/G	0.014	U	0.056		0.025	U	0.029	U	0.011	U	0.034	U	0.007	U	0.050	U
IRON-59	pCi/G	0.002	U	0.006	U	0.005	U	-0.028	U	-0.035	U	0.007	U	-0.030	U	0.001	U
POTASSIUM-40	pCi/G	20.300		12.600		14.000		12.100		14.500		12.700		14.700		13.500	
RADIUM-224DA	pCi/G	0.246		0.614		0.650		0.539		0.635		0.538		0.610		0.546	
RADIUM-226DA	pCi/G	0.236		0.462		0.552		0.485		0.597		0.468		0.512		0.408	
RADIUM-228DA	pCi/G	0.333		0.739		0.691		0.571		0.718		0.589		0.637		0.533	
URANIUM-238DLP	pCi/G	0.664				0.397		0.324		0.471		0.661					
GROSS ALPHA	pCi/G	18.600		14.900		9.580		5.250		10.500		8.600		13.500		10.400	
GROSS BETA	pCi/G	74.300		24.500		26.400		20.900		25.300		24.800		24.900		22.800	
TECHNETIUM-99	pCi/G	-0.106	U	0.590		0.171	U	-0.194	U	0.464		-0.248	U	-0.011	U	0.218	U
TOTAL URANIUM	UG/GM	1.360		0.782		1.160		0.853		1.140		2.100		1.000		1.370	

The decimal places shown do not reflect the precision reported by the laboratory.

Verified TWS 960410

960410 TWS Revised

Quanterra Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0871
LAB SAMPLE ID:	60113601	MATRIX:	SOIL
CLIENT ID:	B0H0H0	DATE RECEIVED:	1/10/96 10:30:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
U-234	1.05E+00	1.5E-01	2.2E-01	2.97E-02	pCi/g	80.60%	RICHRC5030
U-235	5.19E-02	3.3E-02	3.4E-02	3.22E-02	pCi/g	80.60%	RICHRC5030
U-238	1.08E+00	1.5E-01	2.3E-01	3.91E-02	pCi/g	80.60%	RICHRC5030
CO-58.	1.29E-02 U	1.2E-02	1.2E-02	2.03E-02	pCi/g	N/A	RICHRC5017
CO-60.	-3.40E-03 U	1.2E-02	1.2E-02	1.92E-02	pCi/g	N/A	RICHRC5017
CS-137DA.	1.04E-03 U	1.1E-02	1.1E-02	1.80E-02	pCi/g	N/A	RICHRC5017
EU-152.	8.16E-03 U	2.5E-02	2.5E-02	4.24E-02	pCi/g	N/A	RICHRC5017
EU-154.	-4.92E-02 U	4.1E-02	4.2E-02	6.47E-02	pCi/g	N/A	RICHRC5017
EU-155.	1.41E-02 U	2.7E-02	2.7E-02	4.32E-02	pCi/g	N/A	RICHRC5017
FE-59.	1.73E-03 U	3.0E-02	3.0E-02	5.02E-02	pCi/g	N/A	RICHRC5017
K-40.	2.03E+01	5.8E-01	2.1E+00	N/A	pCi/g	N/A	RICHRC5017
RA-224DA.	2.46E-01	2.9E-02	3.8E-02	N/A	pCi/g	N/A	RICHRC5017
RA-226DA.	2.36E-01	4.2E-02	4.8E-02	N/A	pCi/g	N/A	RICHRC5017
RA-228DA.	3.33E-01	7.1E-02	7.9E-02	N/A	pCi/g	N/A	RICHRC5017
U-238DLP.	6.64E-01	4.5E-01	4.5E-01	N/A	pCi/g	N/A	RICHRC5017
ALPHA	1.86E+01	6.2E+00	6.5E+00	5.94E+00	pCi/g	100.00%	RD3222
BETA	7.43E+01	5.8E+00	7.6E+00	3.60E+00	pCi/g	100.00%	RD3222
TC-99	-1.06E-01 U	3.9E-01	1.1E+00	3.70E-01	pCi/g	100.00%	ITAS-IT-RS-0001
TOTAL-URANIUM	1.36E+00	N/A	1.8E-01	6.05E-04	ug/g	N/A	RICHRC5058

Number of Results: 19

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SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0871
LAB SAMPLE ID:	60113602	MATRIX:	SOIL
CLIENT ID:	B0H0H1	DATE RECEIVED:	1/10/96 10:30:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
U-234	1.02E+00	1.5E-01	2.3E-01	3.14E-02	pCi/g	71.80%	RICHRC5030
U-235	5.70E-02	3.7E-02	3.8E-02	3.14E-02	pCi/g	71.80%	RICHRC5030
U-238	9.23E-01	1.5E-01	2.1E-01	2.69E-02	pCi/g	71.80%	RICHRC5030
CO-58.	-3.65E-03 U	1.1E-02	1.1E-02	1.76E-02	pCi/g	N/A	RICHRC5017
CO-60.	-3.23E-03 U	1.1E-02	1.1E-02	1.91E-02	pCi/g	N/A	RICHRC5017
CS-137DA.	4.69E-03 U	1.1E-02	1.1E-02	1.85E-02	pCi/g	N/A	RICHRC5017
EU-152.	-2.25E-02 U	2.8E-02	2.8E-02	4.35E-02	pCi/g	N/A	RICHRC5017
EU-154.	1.18E-02 U	3.6E-02	3.6E-02	6.23E-02	pCi/g	N/A	RICHRC5017
EU-155.	5.62E-02	3.4E-02	3.4E-02	5.21E-02	pCi/g	N/A	RICHRC5017
FE-59.	5.52E-03 U	2.8E-02	2.8E-02	4.59E-02	pCi/g	N/A	RICHRC5017
K-40.	1.26E+01	4.6E-01	1.3E+00	N/A	pCi/g	N/A	RICHRC5017
RA-224DA.	6.14E-01	2.9E-02	6.8E-02	N/A	pCi/g	N/A	RICHRC5017
RA-226DA.	4.62E-01	4.8E-02	6.7E-02	N/A	pCi/g	N/A	RICHRC5017
RA-228DA.	7.39E-01	8.2E-02	1.1E-01	N/A	pCi/g	N/A	RICHRC5017
ALPHA	1.49E+01	5.4E+00	5.6E+00	4.20E+00	pCi/g	100.00%	RD3222
BETA	2.45E+01	3.6E+00	3.9E+00	3.79E+00	pCi/g	100.00%	RD3222
TC-99	5.90E-01	4.1E-01	1.2E+00	3.70E-01	pCi/g	100.00%	ITAS-IT-RS-0001
TOTAL-URANIUM	7.82E-01	N/A	1.1E-01	6.05E-04	ug/g	N/A	RICHRC5058

Number of Results: 18

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SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0871
LAB SAMPLE ID:	60113603	MATRIX:	SOIL
CLIENT ID:	B0H0H2	DATE RECEIVED:	1/10/96 10:30:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
U-235.	4.16E-02	N/A	3.3E-02	2.42E-02	pCi/g	66.70%	
U-234	6.49E-01	1.3E-01	1.7E-01	2.75E-02	pCi/g	66.70%	RICHRC5030
U-238	6.73E-01	1.3E-01	1.7E-01	2.75E-02	pCi/g	66.70%	RICHRC5030
CO-58.	3.37E-04 U	1.1E-02	1.1E-02	1.77E-02	pCi/g	N/A	RICHRC5017
CO-60.	1.64E-02 U	1.1E-02	1.1E-02	1.98E-02	pCi/g	N/A	RICHRC5017
CS-137DA.	2.46E-02	1.2E-02	1.2E-02	2.14E-02	pCi/g	N/A	RICHRC5017
EU-152.	1.48E-02 U	2.8E-02	2.8E-02	4.59E-02	pCi/g	N/A	RICHRC5017
EU-154.	1.46E-02 U	3.2E-02	3.2E-02	5.55E-02	pCi/g	N/A	RICHRC5017
EU-155.	2.50E-02 U	2.5E-02	2.6E-02	4.29E-02	pCi/g	N/A	RICHRC5017
FE-59.	5.35E-03 U	2.7E-02	2.7E-02	4.44E-02	pCi/g	N/A	RICHRC5017
K-40.	1.40E+01	4.8E-01	1.5E+00	N/A	pCi/g	N/A	RICHRC5017
RA-224DA.	6.50E-01	3.1E-02	7.2E-02	N/A	pCi/g	N/A	RICHRC5017
RA-226DA.	5.52E-01	4.3E-02	7.0E-02	N/A	pCi/g	N/A	RICHRC5017
RA-228DA.	6.91E-01	8.3E-02	1.1E-01	N/A	pCi/g	N/A	RICHRC5017
U-238DLP.	3.97E-01	2.6E-01	2.6E-01	N/A	pCi/g	N/A	RICHRC5017
ALPHA	9.58E+00	4.5E+00	4.6E+00	4.74E+00	pCi/g	100.00%	RD3222
BETA	2.64E+01	3.7E+00	4.1E+00	3.83E+00	pCi/g	100.00%	RD3222
TC-99	1.71E-01 U	4.0E-01	1.2E+00	3.70E-01	pCi/g	100.00%	ITAS-IT-RS-0001
TOTAL-URANIUM	1.16E+00	N/A	1.6E-01	6.05E-04	ug/g	N/A	RICHRC5058

Number of Results: 19

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SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0871
LAB SAMPLE ID:	60113604	MATRIX:	SOIL
CLIENT ID:	B0H0H3	DATE RECEIVED:	1/10/96 10:30:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
U-234	5.44E-01	1.1E-01	1.4E-01	3.84E-02	pCi/g	70.20%	RICHRC5030
U-235	2.03E-02 U	2.3E-02	2.3E-02	3.42E-02	pCi/g	70.20%	RICHRC5030
U-238	5.91E-01 ~~U~~ TWS 960322	1.2E-01	1.5E-01	3.71E-02	pCi/g	70.20%	RICHRC5030
CO-58.	-6.28E-03 U	9.2E-03	9.2E-03	1.50E-02	pCi/g	N/A	RICHRC5017
CO-60.	1.10E-02 U	8.8E-03	8.9E-03	1.63E-02	pCi/g	N/A	RICHRC5017
CS-137DA.	1.44E-03 U	1.0E-02	1.0E-02	1.67E-02	pCi/g	N/A	RICHRC5017
EU-152.	5.94E-03 U	2.3E-02	2.3E-02	3.79E-02	pCi/g	N/A	RICHRC5017
EU-154.	-1.19E-02 U	3.1E-02	3.1E-02	5.01E-02	pCi/g	N/A	RICHRC5017
EU-155.	2.86E-02 U	2.6E-02	2.6E-02	4.05E-02	pCi/g	N/A	RICHRC5017
FE-59.	-2.82E-02 U	2.5E-02	2.5E-02	3.96E-02	pCi/g	N/A	RICHRC5017
K-40.	1.21E+01	4.6E-01	1.3E+00	N/A	pCi/g	N/A	RICHRC5017
RA-224DA.	5.39E-01	2.6E-02	6.0E-02	N/A	pCi/g	N/A	RICHRC5017
RA-226DA.	4.85E-01	4.2E-02	6.4E-02	N/A	pCi/g	N/A	RICHRC5017
RA-228DA.	5.71E-01	6.5E-02	8.6E-02	N/A	pCi/g	N/A	RICHRC5017
U-238DLP.	3.24E-01	3.8E-01	3.8E-01	N/A	pCi/g	N/A	RICHRC5017
ALPHA	5.25E+00	3.4E+00	3.5E+00	4.48E+00	pCi/g	100.00%	RD3222
BETA	2.09E+01	3.3E+00	3.6E+00	3.61E+00	pCi/g	100.00%	RD3222
TC-99	-1.94E-01 U	3.9E-01	1.1E+00	3.70E-01	pCi/g	100.00%	ITAS-IT-RS-0001
TOTAL-URANIUM	8.53E-01	N/A	1.2E-01	6.05E-04	ug/g	N/A	RICHRC5058

Number of Results: 19

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Quanterra Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0871
LAB SAMPLE ID:	60113605	MATRIX:	SOIL
CLIENT ID:	B0H0H4	DATE RECEIVED:	1/10/96 10:30:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
U-234	7.27E-01	1.4E-01	1.9E-01	3.08E-02	pCi/g	61.40%	RICHRC5030
U-235	5.79E-02	4.1E-02	4.2E-02	3.81E-02	pCi/g	61.40%	RICHRC5030
U-238	7.80E-01	1.5E-01	2.0E-01	3.36E-02	pCi/g	61.40%	RICHRC5030
CO-58.	4.58E-03 U	1.1E-02	1.1E-02	1.95E-02	pCi/g	N/A	RICHRC5017
CO-60.	3.73E-03 U	1.2E-02	1.2E-02	1.98E-02	pCi/g	N/A	RICHRC5017
CS-137DA.	1.21E-02 U	1.2E-02	1.2E-02	1.97E-02	pCi/g	N/A	RICHRC5017
EU-152.	-7.45E-03 U	2.7E-02	2.7E-02	4.44E-02	pCi/g	N/A	RICHRC5017
EU-154.	7.38E-03 U	3.7E-02	3.7E-02	6.05E-02	pCi/g	N/A	RICHRC5017
EU-155.	1.11E-02 U	2.9E-02	2.9E-02	4.62E-02	pCi/g	N/A	RICHRC5017
FE-59.	-3.47E-02 U	2.9E-02	2.9E-02	4.55E-02	pCi/g	N/A	RICHRC5017
K-40.	1.45E+01	5.4E-01	1.5E+00	N/A	pCi/g	N/A	RICHRC5017
RA-224DA.	6.35E-01	3.1E-02	7.1E-02	N/A	pCi/g	N/A	RICHRC5017
RA-226DA.	5.97E-01	4.6E-02	7.5E-02	N/A	pCi/g	N/A	RICHRC5017
RA-228DA.	7.18E-01	8.4E-02	1.1E-01	N/A	pCi/g	N/A	RICHRC5017
U-238DLP.	4.71E-01	3.9E-01	4.0E-01	N/A	pCi/g	N/A	RICHRC5017
ALPHA	1.05E+01	4.6E+00	4.7E+00	4.05E+00	pCi/g	100.00%	RD3222
BETA	2.53E+01	3.6E+00	4.0E+00	3.74E+00	pCi/g	100.00%	RD3222
TC-99	4.64E-01	4.1E-01	1.2E+00	3.70E-01	pCi/g	100.00%	ITAS-IT-RS-0001
TOTAL-URANIUM	1.14E+00	N/A	1.5E-01	6.05E-04	ug/g	N/A	RICHRC5058

Number of Results: 19

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Quanterra Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0871
LAB SAMPLE ID:	60113606	MATRIX:	SOIL
CLIENT ID:	B0H0H5	DATE RECEIVED:	1/10/96 10:30:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
U-234	7.21E-01	1.3E-01	1.8E-01	3.27E-02	pCi/g	65.90%	RICHRC5030
U-235	3.94E-02	3.3E-02	3.3E-02	3.79E-02	pCi/g	65.90%	RICHRC5030
U-238	8.07E-01	1.4E-01	2.0E-01	4.78E-02	pCi/g	65.90%	RICHRC5030
CO-58.	5.12E-03 U	1.0E-02	1.0E-02	1.73E-02	pCi/g	N/A	RICHRC5017
CO-60.	5.30E-03 U	1.1E-02	1.1E-02	1.83E-02	pCi/g	N/A	RICHRC5017
CS-137DA.	3.12E-02	1.3E-02	1.3E-02	N/A	pCi/g	N/A	RICHRC5017
EU-152.	-4.43E-03 U	2.5E-02	2.5E-02	4.04E-02	pCi/g	N/A	RICHRC5017
EU-154.	-6.82E-03 U	3.4E-02	3.4E-02	5.47E-02	pCi/g	N/A	RICHRC5017
EU-155.	3.44E-02 U	2.8E-02	2.8E-02	4.52E-02	pCi/g	N/A	RICHRC5017
FE-59.	6.69E-03 U	2.5E-02	2.5E-02	4.29E-02	pCi/g	N/A	RICHRC5017
K-40.	1.27E+01	4.4E-01	1.3E+00	N/A	pCi/g	N/A	RICHRC5017
RA-224DA.	5.38E-01	3.0E-02	6.2E-02	N/A	pCi/g	N/A	RICHRC5017
RA-226DA.	4.68E-01	4.3E-02	6.3E-02	N/A	pCi/g	N/A	RICHRC5017
RA-228DA.	5.89E-01	7.5E-02	9.5E-02	N/A	pCi/g	N/A	RICHRC5017
U-238DLP.	6.61E-01	4.9E-01	4.9E-01	N/A	pCi/g	N/A	RICHRC5017
ALPHA	8.60E+00	4.5E+00	4.6E+00	5.93E+00	pCi/g	100.00%	RD3222
BETA	2.48E+01	3.5E+00	3.9E+00	3.60E+00	pCi/g	100.00%	RD3222
TC-99	-2.48E-01 U	3.9E-01	1.1E+00	3.70E-01	pCi/g	100.00%	ITAS-IT-RS-0001
TOTAL-URANIUM	2.10E+00	N/A	2.8E-01	6.05E-04	ug/g	N/A	RICHRC5058

Number of Results: 19

-014 TMS 960322 000011

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0871
LAB SAMPLE ID:	60113607	MATRIX:	SOIL
CLIENT ID:	B0H0H6	DATE RECEIVED:	1/10/96 10:30:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
U-234	5.70E-01	1.1E-01	1.5E-01	3.30E-02	pCi/g	75.90%	RICHRC5030
U-235	2.56E-02 U	2.5E-02	2.5E-02	3.14E-02	pCi/g	75.90%	RICHRC5030
U-238	6.00E-01	1.2E-01	1.5E-01	2.24E-02	pCi/g	75.90%	RICHRC5030
CO-58.	3.70E-04 U	1.2E-02	1.2E-02	1.98E-02	pCi/g	N/A	RICHRC5017
CO-60.	9.72E-03 U	1.1E-02	1.1E-02	2.03E-02	pCi/g	N/A	RICHRC5017
CS-137DA.	2.06E-02 U	1.2E-02	1.2E-02	2.12E-02	pCi/g	N/A	RICHRC5017
EU-152.	-1.58E-02 U	2.9E-02	2.9E-02	4.69E-02	pCi/g	N/A	RICHRC5017
EU-154.	2.49E-02 U	3.7E-02	3.7E-02	6.50E-02	pCi/g	N/A	RICHRC5017
EU-155.	7.01E-03 U	3.3E-02	3.3E-02	5.41E-02	pCi/g	N/A	RICHRC5017
FE-59.	-2.99E-02 U	3.1E-02	3.1E-02	5.01E-02	pCi/g	N/A	RICHRC5017
K-40.	1.47E+01	5.3E-01	1.6E+00	N/A	pCi/g	N/A	RICHRC5017
RA-224DA.	6.10E-01	3.2E-02	6.9E-02	N/A	pCi/g	N/A	RICHRC5017
RA-226DA.	5.12E-01	4.9E-02	7.1E-02	N/A	pCi/g	N/A	RICHRC5017
RA-228DA.	6.37E-01	8.0E-02	1.0E-01	N/A	pCi/g	N/A	RICHRC5017
ALPHA	1.35E+01	5.2E+00	5.4E+00	4.35E+00	pCi/g	100.00%	RD3222
BETA	2.49E+01	3.6E+00	4.0E+00	3.91E+00	pCi/g	100.00%	RD3222
TC-99	-1.13E-02 U	3.9E-01	1.1E+00	3.70E-01	pCi/g	100.00%	ITAS-IT-RS-0001
TOTAL-URANIUM	1.00E+00	N/A	1.4E-01	6.05E-04	ug/g	N/A	RICHRC5058

Number of Results: 18

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TWS

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Quanterra Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0871
LAB SAMPLE ID:	60113608	MATRIX:	SOIL
CLIENT ID:	B0H0H7	DATE RECEIVED:	1/10/96 10:30:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
U-234	5.98E-01	1.1E-01	1.4E-01	1.96E-02	pCi/g	82.50%	RICHRC5030
U-235	1.87E-02 U	1.9E-02	2.0E-02	2.22E-02	pCi/g	82.50%	RICHRC5030
U-238	6.26E-01	1.1E-01	1.5E-01	2.43E-02	pCi/g	82.50%	RICHRC5030
CO-58.	-6.21E-04 U	1.2E-02	1.2E-02	1.95E-02	pCi/g	N/A	RICHRC5017
CO-60.	3.86E-03 U	1.3E-02	1.3E-02	2.18E-02	pCi/g	N/A	RICHRC5017
CS-137DA.	6.51E-03 U	1.2E-02	1.2E-02	1.96E-02	pCi/g	N/A	RICHRC5017
EU-152.	2.62E-03 U	2.9E-02	2.9E-02	4.55E-02	pCi/g	N/A	RICHRC5017
EU-154.	-3.31E-02 U	3.6E-02	3.6E-02	5.83E-02	pCi/g	N/A	RICHRC5017
EU-155.	4.98E-02 U	3.5E-02	3.5E-02	5.33E-02	pCi/g	N/A	RICHRC5017
FE-59.	6.18E-04 U	3.1E-02	3.1E-02	5.05E-02	pCi/g	N/A	RICHRC5017
K-40.	1.35E+01	5.1E-01	1.4E+00	N/A	pCi/g	N/A	RICHRC5017
RA-224DA.	5.46E-01	2.9E-02	6.2E-02	N/A	pCi/g	N/A	RICHRC5017
RA-226DA.	4.08E-01	5.1E-02	6.5E-02	N/A	pCi/g	N/A	RICHRC5017
RA-228DA.	5.33E-01	9.0E-02	1.0E-01	N/A	pCi/g	N/A	RICHRC5017
ALPHA	1.04E+01	4.6E+00	4.7E+00	4.21E+00	pCi/g	100.00%	RD3222
BETA	2.28E+01	3.5E+00	3.8E+00	3.79E+00	pCi/g	100.00%	RD3222
TC-99	2.18E-01 U	4.0E-01	1.2E+00	3.70E-01	pCi/g	100.00%	ITAS-IT-RS-0001
TOTAL-URANIUM	1.37E+00	N/A	1.9E-01	6.05E-04	ug/g	N/A	RICHRC5058

Number of Results: 18

016

TAS 960322
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ATTACHMENT 4

LABORATORY NARRATIVE and CHAIN-OF-CUSTODY DOCUMENTATION

Quanterra Incorporated
2800 George Washington Way
Richland, Washington 99352

509 375-3131 Telephone
509 375-5590 Fax

CERTIFICATE OF ANALYSIS

JAN 1996
RECEIVED
Data
Log In

Bechtel Hanford, Inc.
345 Hills
Richland, WA 99352

January 30, 1996

Attention: Joan Kessner

SAF Number	:	B96-052
Date SDG Closed	:	January 10, 1996
Number of Samples	:	Eight (8)
Sample Type	:	Soil
SDG Number	:	W0871
Data Deliverable	:	Summary

I. Introduction

On January 10, 1996, eight soil samples were received by the Quanterra Environmental Services Richland Laboratory (QTESRL) for radiochemical analysis. Upon receipt, the samples were assigned the following laboratory ID numbers to correspond with the Bechtel Hanford, Inc. (BHI) specific IDs:

QTESRL ID#	BHI ID#	MATRIX	DATE OF RECEIPT
60113601	B0H0H0	SOIL	1/10/96
60113602	B0H0H1	SOIL	1/10/96
60113603	B0H0H2	SOIL	1/10/96
60113604	B0H0H3	SOIL	1/10/96
60113605	B0H0H4	SOIL	1/10/96
60113606	B0H0H5	SOIL	1/10/96
60113607	B0H0H6	SOIL	1/10/96
60113608	B0H0H7	SOIL	1/10/96

II. Analytical Results/Methodology

The analytical results for this report are presented by laboratory sample ID. Each set of data includes sample identification information, analytical results and the appropriate associated statistical errors.

The requested analyses were:

Alpha Spectroscopy
Uranium-234, -235, -238 by method RICHRC-5030
Gamma Spectroscopy
Gamma Scan by method RICHRC-5017
Gas Proportional Counting
Gross Alpha by method ITAS-RD-3222
Gross Beta by method ITAS-RD-3222
Liquid Scintillation Counting
Technetium-99 by method ITAS-IT-RS-0001
Total Uranium
Total Uranium by method RICHRC-5058

III. Quality Control

The analytical results for each analysis performed under SDG W0871 include a minimum of one Laboratory Control Sample (LCS), one method (reagent) blank, and one duplicate. Any exceptions have been noted in the "Comments" section.

Quality control sample results are reported in the same units as sample results for all analyses except alpha and beta, where quality control results are reported as pCi/sample.

IV. Comments

Alpha Spectroscopy

Uranium-234, -235, -238 by method RICHRC-5030
The LCS, batch blank, sample and sample duplicate (B0H0H3) results are within contractual requirements.

Gamma Spectroscopy

Gamma Scan by method RICHRC-5017
The blank matrix is Ottawa Sand and natural products Ra-224DA, Ra-226DA, and U-238DLP are detected and reported. Cd-109 was detected each of the samples. However, the result is not reported because it is false positive detection caused by x-ray lines produced by energy reflection from the detector shielding. The LCS, batch blank, sample and sample duplicate (B0H0H0) results are within contractual requirements.

Gas Proportional Counting

Gross Alpha by method ITAS-RD-3222
The LCS, batch blank, sample and sample duplicate (B0H0H0) results are within contractual requirements.

Gross Beta by method ITAS-RD-3222
The LCS, batch blank, sample and sample duplicate (B0H0H0) results are within contractual requirements.

Liquid Scintillation Counting

Technetium-99 by method ITAS-IT-RS-0001
The matrix spike, LCS, batch blank, sample and sample duplicate (B0H0H7) results are within contractual requirements.

Total Uranium

Total Uranium by method RICHRC-5058
The sample and its duplicate are outside the three sigma control limit (3.9 sigma achieved) due to a possible soil inconsistency or matrix effect. Except as noted, the matrix spike, LCS, batch blank, sample and sample duplicate (B0H0H3) results are within contractual requirements.

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Quanterra Environmental Services

Bechtel Hanford, Inc.
January 30, 1996
Page 4

I certify that this Certificate of Analysis is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:

Suzanne Gaines
Project Manager

for S.L. 1-30-96

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Data Turnaround: X Priority / Normal

Collector: Doug Bowers	Company Contact: D. B. Encke	Telephone: 373-3461
Project Designation: 183-H Soil Screen/Verification (Loading ramp/Berm pile)	Sampling Location: 183-H Solar Basin	SAF No.: B96-052
Ice Chest No.: EC-17	Field Logbook No.: EFL-1133-1	Method of Shipment: Hand deliver
Shipped To: Quanterra	Offsite Property No.	Bill of Lading/Air Bill No.
Possible Sample Hazards/Remarks: none		

Sample No.	Matrix*	Date Sampled	Time Sampled	TCLP Metals	Cyanide	Sulfide	See Item #1 below	NO2-NO3	Chromium Hex	See Item #2 below	Activity Scan		
Preservation				none	cool to 4C	cool to 4C	cool to 4C	cool to 4C	cool to 4C	none	none		
Type of Container				P/G	P/G	P/G	P/G	P/G	P/G	P/G	P/G		
No. of Container(s)				1	1	1	1	1	1	2	1		
Volume				120 mL	250 mL	60 mL	60 mL	60 mL	60 ml	1 L	20 mL		
SAMPLE ANALYSIS				100	100	100	100	100		601136			
BoHoH0 01	S	1-8-96	1137	X	X	X	X	X	X	X	X	N6	195
BoHoH1 02	S	1-8-96	1158	X	X	X	X	X	X	X	X	N6	195
BoHoH2 03	S	1-8-96	1236	X	X	X	X	X	X	X	X	N6	196
BoHoH3 04	S	1-8-96	1303	X	X	X	X	X	X	X	X	N6	197
BoHoH4 05	S	1-8-96	1352	X	X	X	X	X	X	X	X	N6	198
BoHoH5 06	S	1-8-96	1415	X	X	X	X	X	X	X	X	N6	199

SDG W0871

601135

CHAIN OF POSSESSION

Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
Doug Bowers	1-9-96/0800	EC B. Britton	1-9-96 0800
EC B. Britton	1-10-96 10:30	[illegible]	1-10-96 10:30

SPECIAL INSTRUCTIONS

Hexavalent chrom must be extracted per SW-846 3060A with a holding time of 96 hours.

Sample analysis for nitrate, nitrite, and phosphate by EPA 300.0 are being requested for information only. The ERC Contractor acknowledges the holding times will not be met.

Item #1; Anions - IC F, Cl, SO4, PO4, NO2, NO3, pH

Item #2; Gross Alpha/Beta, U-234, -235, -238, Tc-99, Total U, Gamma Spec.

Matrix*
S = Soil
SE = Sediment
SO = Solid
SL = Sludge
W = Water
O = Oil
A = Air
DS = Drum Solids
DL = Drum Liquids
T = Tissue
WI = Wipe
L = Liquid
V = Vegetation
X = Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

B-100

U2-[illegible]

BHI-00932
Rev. 0

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Data Turnaround: X Priority / Normal

Collector: Doug Bowers	Company Contact: D. B. Encke	Telephone: 373-3461
Project Designation: 183-H Soil Screen/Verification (Loading ramp/Berm pile)	Sampling Location: 183-H Solar Basin	SAF No.: B96-052
Ice Chest No.: ER-17	Field Logbook No.	Method of Shipment: Hand delivar
Shipped To: Quanterra	Offsite Property No.	Bill of Lading/Air Bill No.

Possible Sample Hazards/Remarks: none

Special Handling and/or Storage

SAMPLE ANALYSIS: 601135 SDG WO871 %

Preservation	none	cool to 4C	cool to 4C	cool to 4C	cool to 4C	cool to 4C	none	none		
Type of Container	P/G	P/G	P/G	P/G	P/G	P/G	P/G	P/G		
No. of Container(s)	1	1	1	1	1	1	2	1		
Volume	120 mL	250 mL	60 mL	60 mL	60 mL	60 ml	1 L	20 mL		
%	100	100	100	100	100		601136			
	TCLP Metals	Cyanide	Sulfide	See Item #1 below	NO2-NO3	Chromium Hex	See Item #2 below	Activity Scan		

Sample No.	Matrix*	Date Sampled	Time Sampled	TCLP Metals	Cyanide	Sulfide	See Item #1 below	NO2-NO3	Chromium Hex	See Item #2 below	Activity Scan		
B0H0H6 07	S	1-8-96	1415	X	X	X	X	X	X	X	X	N 6199	
B0H0H7 08	S	1-8-96	1452	X	X	X	X	X	X	X	X	N 6201	

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
Doug Bowers	1-8-96/0800	ERC B. Butler	1-8-96 0800
ERC B. Butler	1-10-96 10:30	Quanterra Karen Schlenker	1-10-96 10:30

SPECIAL INSTRUCTIONS

Hexavalent chrom must be extracted per SW-846 3060A with a holding time of 96 hours.

Sample analysis for nitrate, nitrite, and phosphate by EPA 300.0 are being requested for information only. The ERC Contractor acknowledges the holding times will not be met.

Item #1; Anions - IC F, Cl, SO4, PO4, NO2, NO3, pH

Item #2; Gross Alpha/Beta, U-234, -235, -238, Tc-99, Total U, Gamma Spec.

Matrix*: S = Soil; SE = Sediment; SO = Solid; SL = Sludge; W = Water; O = Oil; A = Air; DS = Drum Solids; DL = Drum Liquids; T = Tissue; WI = Wipe; L = Liquid; V = Vegetation; X = Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

B-101

023

BHI-0093
Rev. 0

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ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E

PROJECT: 183 H SOIL SCREEN VERIF	DATA PACKAGE: W0871-GES
VALIDATOR: T. STAPP / LAB: QUANTERRA	DATE: 960322
CASE:	SDG:

ANALYSES PERFORMED

☒ Gross Alpha/Beta	☐ Strontium-90	☒ Technetium-99	☒ Alpha Spectroscopy	☒ Gamma Spectroscopy	
☒ Total Uranium	☐ Radium-22	☐ Tritium	☐		

SAMPLES/MATRIX	
B0H0H0 / SOIL	B0H0H5 / SOIL
H0H1 /	B0H0H6 /
H0H2 /	B0H H7 /
H0H3 /	
H0H4 /	

1. Completeness . . . . . ☐ N/A

Technical verification forms present? . . . . . (Yes) No N/A

Comments:

2. Initial Calibration . . . . . ☒ N/A

Instruments/detectors calibrated within one year of sample analysis? . . . . . Yes No (N/A)

Initial calibration acceptable? . . . . . Yes No (N/A)

Standards NIST traceable? . . . . . Yes No (N/A)

Standards Expired? . . . . . Yes No (N/A)

Comments:

3. Continuing Calibration . . . . . ☒ N/A

Calibration checked within one week of sample analysis? . . . Yes No N/A
Calibration check acceptable? . . . . . Yes No N/A
Calibration check standards NIST traceable? . . . . . Yes No N/A
Calibration check standards expired? . . . . . Yes No N/A

Comments:

4. Blanks . . . . . ☐ N/A

Method blank analyzed? . . . . . Yes No N/A
Method blank results acceptable? . . . . . NOTE ① . . . Yes No N/A
Analytes detected in method blank? . . . . . NOTE ① . . . Yes No N/A
Field blank(s) analyzed? . . . . . Yes No N/A
Field blank results acceptable? . . . . . Yes No N/A
Analytes detected in field blank(s)? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments: ① Total U reported above MDA however, both are well below the RDL of 1 ug/gm and qualification will not be applied. Sample results are greater than five times the blank value.

5. Matrix Spikes . . . . . ☐ N/A

Matrix spike analyzed? . . . . NOTE ① . . . . . Yes No N/A
Spike recoveries acceptable? . . . . . Yes No N/A
Spike source traceable? . . . . . Yes No N/A
Spike source expired? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments: ① Tc-99 and total U were analyzed for MS recoveries. No qualifications were applied.

6. Laboratory Control Samples . . . . . ☐ N/A

LCS analyzed? . . . . . Yes No N/A
LCS recoveries acceptable? . . . . . Yes No N/A
LCS traceable? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments:_____

7. Chemical Recovery . . . . . ☐ N/A

Chemical carrier added? . . . . . Yes No N/A
Chemical recovery acceptable? . . . . . Yes No N/A
Chemical carrier traceable? . . . . . Yes No N/A
Chemical carrier expired? . . . . . Yes No N/A
Transcription/Calculation errors? . . . . . Yes No N/A

Comments:_____

8. Duplicates . . . . . ☐ N/A

Duplicates Analyzed? . . . . . Yes No N/A
RPD Values Acceptable? . . . . . Yes No N/A.
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments:_____

027

9. Field QC Samples . . . . . ☐ N/A

Field duplicate sample(s) analyzed? . . NOTE ① . . . . . Yes No N/A
Field duplicate RPD values acceptable? . . . . . Yes No N/A
Field split sample(s) analyzed? . . . . . Yes No N/A
Field split RPD values acceptable? . . . . . Yes No N/A
Performance audit sample(s) analyzed? . . . . . Yes No N/A
Performance audit sample results acceptable? . . . . . Yes No N/A

Comments: ① Field QC was not identified for this sample set.

10. Holding Times

Are sample holding times acceptable? . . . . . Yes No N/A

Comments: Collected/Analyzed: Iso U Gamma GrsK β
All Samples: 01-08-96/ 1-25-96 1-24-96 1-23-96 1-22-96
Tc-99 Total U
1-25-96 1-24-96

11. Results and Detection Limits (Levels D & E) . . . . . ☐ N/A

Results reported for all required sample analyses? . . . . Yes No N/A
Results supported in raw data? . . . . . Yes No N/A
Results Acceptable? . . . . . Yes No N/A
Transcription/Calculation errors? . . . . . Yes ~~No~~ N/A TMX 960322
MDA's meet required detection limits? . . . . . Yes No N/A
Transcription/calculation errors? . . . . . Yes No N/A

Comments:

028

Comments:

029

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APPENDIX C

FIELD MEASUREMENT RESULTS AND DOCUMENTATION

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APPENDIX C

FIELD MEASUREMENT RESULTS AND DOCUMENTATION

This appendix contains daily field analysis data summaries. One spreadsheet page of data was generated in the field for each day that field analyses were performed. Calibration and quality control sample results are included in the spreadsheets.

Fluoride concentrations in soil are listed in the columns labeled "Csoil". The "Date" column in the spreadsheets indicates the day of analysis, not necessarily the same as the sample collection date. Field sample numbers are coded to indicate the day of sample collection. (The first number, 6, stands for 1996. The alphabetic letter stands for the month, "B" for February, "C" for March. The next two digits indicate the day of collection. Sample locations reference the same sample grid used for samples described in the body of this report. Corresponding Hanford Environmental Information System (HEIS) samples are not always shown in the notes. Sample depths were not recorded for samples 6B2301 through 6B2320 and 6B2621 through 6B2639.

Nitrate was analyzed in addition to fluoride on March 11 and March 13, 1996. The concentration of nitrate is given in the respective "Csoil" columns; nitrate nitrogen is given in the "NO3-N" columns.

The following informational samples were assigned field identification numbers but are not represented in the daily field analysis summaries. These samples were among those sent to the Environmental Analytical Laboratory for additional analyses.

Field ID	Collection Date	North	East	Depth
6B2201	960222	120	20	3
6B2202	960222	40	40	3
6B2203	960222	70	90	3
6B2204	960222	115	140	3
6B2205	960222	30	190	3
6B2206	960222	70	190	3
6C0401	960304	113	189	2
6C0402	960304	120	200	2
6C0403	960304	120	170	2
6B0801	960308	Orchard		
6B0802	960308	Orchard		
6B0803	960308	Orchard		
6B0804	960308	Orchard		
6B0805	960308	Orchard		
6B0806	960308	Orchard		

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Field Screening for Soluble Fluoride in Soil
February 13, 1996
R B Kerkow

ISE constants
a = -56.6
b = 86.86

	Sample	GRID N	GRID E	D	Date yymmdd	Time hh.mm	Ww (g)	Wd (g)	Vw (ml)	ISE (mV)	Cext (ppm)	Csoil (mg/Kg)	NLYS	Notes
	Tuesday 2/13/96				Cal Check Prior to samples									
CAL	STD 1 ppm (2/9)				960213	11.15	0.0	0.0	0	86.2	1.0	0.0	RBK	
CAL	STD 10 ppm (2/9)				960213	11.18	0.0	0.0	0	31.6	9.5	0.0	RBK	
CAL	STD 100 ppm (2/9)				960213	11.21	0.0	0.0	0	-26.5	100.7	0.0	RBK	
CAL	STD 15 ppm (2/9)				960213	11.24	0.0	0.0	0	21.6	14.2	0.0	RBK	
1	6B1201	113	189	2	960213	13.42	10.1	9.7	25	125.7	0.2	0.5	RBK	B0H6T4
2	6B1202	50	160	2	960213	13.43	10.2	9.8	25	108.0	0.4	1.0	RBK	B0H6T6
3	6B1203	40	120	2	960213	13.43	10.0	9.4	25	85.8	1.0	2.6	RBK	B0H6T8
4	6B1204	20	30	2	960213	14.32	10.0	9.3	25	102.8	0.5	1.3	RBK	B0H6V0
5	6B1205	70	60	2	960213	14.32	10.2	9.9	25	115.2	0.3	0.8	RBK	B0H6V1
6	6B1206	120	60	2	960213	13.55	10.1	9.7	25	132.2	0.2	0.4	RBK	B0H6V2
7	6B1207	90	110	2	960213	13.55	10.0	9.4	25	93.4	0.8	1.9	RBK	B0H6V3
8	6B1208	60	110	2	960213	13.56	9.9	8.7	25	89.4	0.9	2.3	RBK	B0H6V4
9	6B1209	20	120	2	960213	14.06	10.0	9.4	25	86.9	1.0	2.5	RBK	B0H6V5
10	6B1210	20	150	2	960213	14.06	10.0	9.3	25	64.5	2.5	6.2	RBK	B0H6V6
11	6B1211	120	180	2	960213	14.31	10.1	9.5	25	119.9	0.3	0.6	RBK	B0H6V7
	Quality Control Samples													
11sd	(B0H6V7)	120	180	2	960213	15.47	10.0	9.5	25	41.1	6.4	16.1	RBK	11sd - spike (15ppm) & dried soil
10dw	(B0H6V6)	20	150	2	960213	15.48	10.0	10.0	25	65.6	2.4	5.9	RBK	10dw - duplicate sample using "wet" soil
10dd	(B0H6V6)	20	150	2	960213	15.48	10.1	9.4	25	64.4	2.5	6.2	RBK	10dd - duplicate sample using dried soil
10sd	(B0H6V6)	20	150	2	960213	15.49	10.0	9.3	25	23.3	13.3	33.2	RBK	10sd - spike (15ppm) & dried soil
					Cal Check after samples									
CAL	STD 1 ppm (2/13)				960213	16.02	0.0	0.0	0	86.8	1.0	0.0	RBK	
CAL	STD 10 ppm (2/9)				960213	16.03	0.0	0.0	0	31.3	9.6	0.0	RBK	
CAL	STD 100 ppm (2/9)				960213	16.04	0.0	0.0	0	-26.1	99.0	0.0	RBK	
CAL	STD 15 ppm (2/9)				960213	16.03	0.0	0.0	0	22.0	14.0	0.0	RBK	

183HFLDV.XLS, 6B13RK

9713540.2448

Field Screening for Soluble Fluoride in Soil
February 14, 1996
R B Kerkow

ISE constants
a = -56.6
b = 86.86

	Sample	GRID N	GRID E	D	Date yymmdd	Time hh.mm	Ww (g)	Wd (g)	Vw (ml)	ISE (mV)	Cext (ppm)	Csoil (mg/Kg)	NLYS	Notes
	Wednesday 2/14/96			Cal Check Prior to samples										
CAL	STD 1 ppm (2/13)				960214	7.51	0.0	0.0	0	86.6	1.0	0.0	RBK	
CAL	STD 10 ppm (2/9)				960214	7.52	0.0	0.0	0	31.0	9.7	0.0	RBK	
CAL	STD 15 ppm (2/9)				960214	7.53	0.0	0.0	0	21.6	14.2	0.0	RBK	
CAL	STD 100 ppm (2/9)				960214	7.53	0.0	0.0	0	-25.6	97.0	0.0	RBK	
	Samples 2/12/96													
1	6B1201	113	189	2	960214	8.25	10.1	9.7	25	112.9	0.3	0.9	RBK	B0H6T4
2	6B1202	50	160	2	960214	8.25	10.2	9.8	25	95.5	0.7	1.7	RBK	B0H6T6
3	6B1203	40	120	2	960214	8.26	10.0	9.4	25	77.3	1.5	3.7	RBK	B0H6T8
4	6B1204	20	30	2	960214	8.26	10.0	9.3	25	93.8	0.8	1.9	RBK	B0H6V0
5	6B1205	70	60	2	960214	8.27	10.2	9.9	25	107.7	0.4	1.0	RBK	B0H6V1
6	6B1206	120	60	2	960214	8.27	10.1	9.7	25	125.0	0.2	0.5	RBK	B0H6V2
7	6B1207	90	110	2	960214	8.28	10.0	9.4	25	86.2	1.0	2.6	RBK	B0H6V3
8	6B1208	60	110	2	960214	8.28	9.9	8.7	25	81.5	1.2	3.1	RBK	B0H6V4
9	6B1209	20	120	2	960214	8.29	10.0	9.4	25	75.9	1.6	3.9	RBK	B0H6V5
10	6B1210	20	150	2	960214	8.29	10.0	9.3	25	54.5	3.7	9.3	RBK	B0H6V6
11	6B1211	120	180	2	960214	8.29	10.1	9.5	25	115.0	0.3	0.8	RBK	B0H6V7
	Quality Control Samples													
10dw	(B0H6V6)	20	150	2	960214	8.43	10.0	10.0	25	56.7	3.4	8.5	RBK	10dw - duplicate sample using "wet" soil
10dd	(B0H6V6)	20	150	2	960214	8.44	10.1	9.4	25	52.9	4.0	9.9	RBK	10dd - duplicate sample using dried soil
10sd	(B0H6V6)	20	150	2	960214	8.45	10.0	9.3	25	21.5	14.3	N/A	RBK	10sd - spike (15ppm) & dried soil
11sd	(B0H6V7)	120	180	2	960214	8.46	10.0	9.5	25	37.4	7.5	N/A	RBK	11sd - spike (15ppm) & dried soil
	Wednesday 2/14/96			Cal Check Prior to samples										
CAL	STD 1 ppm (2/13)				960214	11.05	0.0	0.0	0	82.0	1.2	0.0	RBK	
CAL	STD 10 ppm (2/9)				960214	11.07	0.0	0.0	0	30.0	10.1	0.0	RBK	
CAL	STD 15 ppm (2/9)				960214	11.08	0.0	0.0	0	21.2	14.5	0.0	RBK	
CAL	STD 100 ppm (2/14)				960214	11.09	0.0	0.0	0	-25.5	96.6	0.0	RBK	

Field Screening for Soluble Fluoride in Soil
February 14, 1996
R B Kerkow

ISE constants
a = -56.6
b = 86.86

	Sample	GRID N	E	D	Date yymmdd	Time hh.mm	Ww (g)	Wd (g)	Vw (ml)	ISE (mV)	Cext (ppm)	Csoil (mg/Kg)	NLYS	Notes
	Field screening samples collected 2/14/96													
1	6B1401	10	130	2	960214	13.35	10.0	9.4	25	57.8	3.3	8.2	RBK	1
2	6B1402	30	130	2	960214	13.36	10.0	8.7	25	81.9	1.2	3.1	RBK	2
3	6B1403	50	130	2	960214	13.36	10.0	9.6	25	68.5	2.1	5.3	RBK	3
4	6B1404	70	130	2	960214	13.37	10.0	9.1	25	64.8	2.5	6.1	RBK	4
5	6B1405	90	130	2	960214	13.38	10.0	9.1	25	33.0	8.9	22.4	RBK	5
6	6B1406	0	140	2	960214	13.38	10.0	9.6	25	112.0	0.4	0.9	RBK	6
7	6B1407	20	140	2	960214	13.39	10.0	8.6	25	62.3	2.7	6.8	RBK	7
8	6B1408	40	140	2	960214	13.39	10.0	9.6	25	73.9	1.7	4.2	RBK	8
9	6B1409	60	140	2	960214	13.40	10.0	9.7	25	70.7	1.9	4.8	RBK	9
10	6B1410	80	140	2	960214	13.41	10.0	8.9	25	41.1	6.4	16.1	RBK	10
11	6B1411	100	140	2	960214	13.41	10.0	9.3	25	94.3	0.7	1.8	RBK	11
12	6B1412	10	150	2	960214	13.42	10.0	9.6	25	70.7	1.9	4.8	RBK	12
	Cal Check after samples													
CAL	STD 1 ppm (2/13)				960214	14.01	0.0	0.0	0	86.6	1.0	0.0	RBK	
CAL	STD 10 ppm (2/9)				960214	14.02	0.0	0.0	0	30.7	9.8	0.0	RBK	
CAL	STD 15 ppm (2/9)				960214	14.04	0.0	0.0	0	21.5	14.3	0.0	RBK	
	STD 100 ppm (2/14)				960214	14.03	0.0	0.0	0	-25.7	97.4	0.0	RBK	
	Samples collected 2/14/96 (second round)													
13	6B1413	0	120	2	960214	15.05	10.0	8.7	25	44.3	5.6	14.1	RBK	13
14	6B1414	60	120	2	960214	15.05	10.0	8.4	25	75.0	1.6	4.1	RBK	14
15	6B1415	80	120	2	960214	15.06	10.0	8.8	25	65.9	2.3	5.9	RBK	15
16	6B1416	100	110	2	960214	15.06	10.0	8.9	25	92.6	0.8	2.0	RBK	16
17	6B1417	70	110	2	960214	15.07	10.0	8.9	25	84.7	1.1	2.7	RBK	17
18	6B1418	50	110	2	960214	15.07	10.0	9.0	25	112.0	0.4	0.9	RBK	18
19	6B1419	30	140	2	960214	15.08	10.0	9.2	25	92.4	0.8	2.0	RBK	19
20	6B1420	10	140	2	960214	15.08	10.0	9.0	25	73.2	1.7	4.4	RBK	20
21	6B1421	20	140	2	960214	15.09	10.0	9.3	25	87.7	1.0	2.4	RBK	21
22	6B1422	40	140	2	960214	15.09	10.0	9.3	25	66.1	2.3	5.8	RBK	22
23	6B1423	60	140	2	960214	15.09	10.0	9.3	25	103.9	0.5	1.2	RBK	23
24	6B1424	80	150	2	960214	15.10	10.0	9.4	25	99.8	0.6	1.5	RBK	24

9713540.2449

Field Screening for Soluble Fluoride in Soil
February 14, 1996
R B Kerkow

ISE constants
a = -56.6
b = 86.86

	Sample	GRID N	E	D	Date yymmdd	Time hh.mm	Ww (g)	Wd (g)	Vw (ml)	ISE (mV)	Cext (ppm)	Csoil (mg/Kg)	NLYS	Notes
25	6B1425	55	205	2	960214	15.10	10.0	9.6	25	22.0	14.0	35.0	RBK	25
					Cal Check after samples									
CAL	STD 1 ppm (2/13)				960214	15.15	0.0	0.0	0	86.6	1.0	0.0	RBK	
CAL	STD 10 ppm (2/9)				960214	15.15	0.0	0.0	0	30.7	9.8	0.0	RBK	
CAL	STD 15 ppm (2/9)				960214	15.15	0.0	0.0	0	21.5	14.3	0.0	RBK	
CAL	STD 100 ppm (2/14)				960214	15.16	0.0	0.0	0	-25.7	97.4	0.0	RBK	
QC samples 2/14/96														
11dw	6B1426	100	140	2	960214	16.02	10.0	10.0	25	100.4	0.6	1.4	RBK	26 duplicate of 6B1411
5dw	6B1427	90	130	2	960214	16.04	10.0	10.0	25	36.5	7.8	19.4	RBK	27 duplicate of 6B1405
	Cal Check after samples													
CAL	STD 1 ppm (2/13)				960214	16.15	0.0	0.0	0	86.5	1.0	0.0	RBK	
CAL	STD 10 ppm (2/9)				960214	16.15	0.0	0.0	0	30.8	9.8	0.0	RBK	
CAL	STD 15 ppm (2/9)				960214	16.16	0.0	0.0	0	21.7	14.2	0.0	RBK	
CAL	STD 100 ppm (2/14)				960214	16.16	0.0	0.0	0	-25.9	98.2	0.0	RBK	

Field Screening for Soluble Fluoride in Soil
February 15, 1996
R B Kerkow

ISE constants
a = -56.6
b = 86.86

	Sample	GRID N	E	D	Date yymmdd	Time hh.mm	Ww (g)	Wd (g)	Vw (ml)	ISE (mV)	Cext (ppm)	Csoil (mg/Kg)	NLYS	Notes
	Thursday 2/15/96			Cal Check Prior to samples										
CAL	STD 1 ppm (2/15)				960215	11.02	0.0	0.0	0	86.0	1.0	0.0	RBK	
CAL	STD 10 ppm (2/15)				960215	11.03	0.0	0.0	0	30.5	9.9	0.0	RBK	
CAL	STD 15 ppm (2/15)				960215	11.04	0.0	0.0	0	20.7	14.8	0.0	RBK	
CAL	STD 100 ppm (2/15)				960215	11.04	0.0	0.0	0	-25.6	97.0	0.0	RBK	
	Field screening samples collected 2/15/96													
1	6B1501	30	150	2	960215	12.15	10.0	9.9	25	57.7	3.3	8.2	RBK	1
2	6B1502	50	150	2	960215	12.18	10.0	9.9	25	51.4	4.2	10.6	RBK	2
3	6B1503	70	150	2	960215	12.19	10.0	9.0	25	52.6	4.0	10.1	RBK	3
4	6B1504	90	150	2	960215	12.20	10.0	9.6	25	50.4	4.4	11.0	RBK	4
5	6B1505	100	160	2	960215	12.22	10.0	9.6	25	117.6	0.3	0.7	RBK	5
6	6B1506	80	160	2	960215	12.23	10.0	8.8	25	84.7	1.1	2.7	RBK	6
7	6B1507	60	160	2	960215	12.25	10.0	8.7	25	90.4	0.9	2.2	RBK	7
8	6B1508	40	160	2	960215	12.27	10.0	8.9	25	67.8	2.2	5.4	RBK	8
9	6B1509	20	160	2	960215	12.29	10.0	9.5	25	35.1	8.2	20.5	RBK	9
10	6B1510	0	160	2	960215	13.41	10.0	9.6	25	50.7	4.4	10.9	RBK	10
11	6B1511	10	170	2	960215	13.41	10.0	8.7	25	37.4	7.5	18.7	RBK	11
12	6B1512	30	170	2	960215	13.42	10.0	8.7	25	34.8	8.3	20.8	RBK	12
13	6B1513	50	170	2	960215	13.12	10.0	8.6	25	57.1	3.4	8.4	RBK	13
14	6B1514	70	170	2	960215	13.13	10.0	9.1	25	96.0	0.7	1.7	RBK	14
15	6B1515	90	170	2	960215	13.14	10.0	9.9	25	60.0	3.0	7.5	RBK	15
16	6B1516	100	180	2	960215	13.15	10.0	9.3	25	110.5	0.4	1.0	RBK	16
17	6B1517	80	180	2	960215	13.15	10.0	9.1	25	61.1	2.9	7.1	RBK	17
18	6B1518	60	180	2	960215	13.16	10.0	9.4	25	64.6	2.5	6.2	RBK	18
19	6B1519	40	180	2	960215	13.16	10.0	8.8	25	17.0	17.2	42.9	RBK	19
20	6B1520	20	180	2	960215	13.17	10.0	9.9	25	26.3	11.7	29.4	RBK	20
21	6B1521	0	180	2	960215	13.17	10.0	9.7	25	90.0	0.9	2.2	RBK	21
22	6B1522	10	190	2	960215	13.18	10.0	8.9	25	37.2	7.5	18.9	RBK	22

Field Screening for Soluble Fluoride in Soil
February 15, 1996
R B Kerkow

ISE constants
a = -56.6
b = 86.86

	Sample	GRID N	GRID E	D	Date yymmdd	Time hh.mm	Ww (g)	Wd (g)	Vw (ml)	ISE (mV)	Cext (ppm)	Csoil (mg/Kg)	NLYS	Notes
23	6B1523	30	190	2	960215	13.18	10.0	8.3	25	48.5	4.8	11.9	RBK	23
24	6B1524	50	190	2	960215	13.19	10.0	8.9	25	30.7	9.8	24.6	RBK	24
00	6B1500	60	200	2	960215	13.25	10.0	8.9	25	26.1	11.8	29.6	RBK	25
	Cal Check after samples													
CAL	STD 1 ppm (2/15)				960215	13.39	0.0	0.0	0	86.5	1.0	0.0	JDF	
CAL	STD 10 ppm (2/15)				960215	13.40	0.0	0.0	0	31.3	9.6	0.0	JDF	
CAL	STD 15 ppm (2/15)				960215	13.43	0.0	0.0	0	21.3	14.4	0.0	JDF	
CAL	STD 100 ppm (2/15)				960215	13.45	0.0	0.0	0	-25.7	97.4	0.0	JDF	
QC samples 2/15/96														
04dw	6B1525	90	150	2	960215	14.42	10.0	10.0	25	50.4	4.4	11.0	RBK	25 duplicate of 6B1504
06dw	6B1526	80	160	2	960215	14.43	10.0	10.0	25	81.9	1.2	3.1	RBK	26 duplicate of 6B1506
19dw	6B1527	40	180	2	960215	14.45	10.0	10.0	25	9.4	23.4	58.4	RBK	27 duplicate of 6B1519
	Cal Check after samples													
CAL	STD 1 ppm (2/15)				960215	15.16	0.0	0.0	0	87.9	1.0	0.0	RBK	
CAL	STD 10 ppm (2/15)				960215	15.17	0.0	0.0	0	32.3	9.2	0.0	RBK	
CAL	STD 15 ppm (2/15)				960215	15.18	0.0	0.0	0	22.0	14.0	0.0	RBK	
CAL	STD 100 ppm (2/15)				960215	15.19	0.0	0.0	0	-24.2	91.7	0.0	RBK	

Field Screening for Soluble Fluoride in Soil
February 16, 1996
J D Fancher

ISE constants
a = -56.6
b = 86.86

	Sample	GRID N	GRID E	D	Date yymmdd	Time hh.mm	Ww (g)	Wd (g)	Vw (ml)	ISE (mV)	Cext (ppm)	Csoil (mg/Kg)	NLYS	Notes
	Friday 2/16/96			Cal Check Prior to samples										
CAL	STD 1 ppm (2/16)				960216	13.58	0.0	0.0	0	89.0	0.9	0.0	JDF	
CAL	STD 10 ppm (2/16)				960216	14	0.0	0.0	0	32.0	9.3	0.0	JDF	
CAL	STD 15 ppm (2/16)				960216	14.03	0.0	0.0	0	21.8	14.1	0.0	JDF	
CAL	STD 100 ppm (2/16)				960216	14.05	0.0	0.0	0	-26.3	99.8	0.0	JDF	
	Field screening samples collected 2/16/96													
1	6B1601	80	40	3	960216	14.17	10.0	9.7	25	110.7	0.4	0.9	RBK	1
2	6B1602	120	20	3	960216	14.21	10.0	9.4	25	121.3	0.2	0.6	RBK	2
3	6B1603	60	10	3	960216	14.25	10.0	9.3	25	105.8	0.5	1.2	RBK	3
4	6B1604	30	80	3	960216	14.28	10.0	9.0	25	81.8	1.2	3.1	RBK	4
5	6B1605	30	190	3	960216	14.30	10.0	8.6	25	35.1	8.2	20.5	RBK	5
6	6B1606	40	40	3	960216	14.32	10.0	9.6	25	98.4	0.6	1.6	RBK	6
	Cal Check after samples													
CAL	STD 1 ppm (2/16)				960216	14.35	0.0	0.0	0	89.4	0.9	0.0	RBK	
CAL	STD 10 ppm (2/16)				960216	14.39	0.0	0.0	0	32.0	9.3	0.0	RBK	
CAL	STD 15 ppm (2/16)				960216	14.45	0.0	0.0	0	21.9	14.1	0.0	RBK	
CAL	STD 100 ppm (2/16)				960216	14.47	0.0	0.0	0	-26.0	98.6	0.0	RBK	

9713540.2450

BHI-00932
Rev. 0

Field Screening for Soluble Fluoride in Soil
February 20, 1996
R B Kerkow

ISE constants
a = -56.6
b = 86.86

		Sample	GRID N	GRID E	D	Date yymmdd	Time hh.mm	Ww (g)	Wd (g)	Vw (ml)	ISE (mV)	Cext (ppm)	Csoil (mg/Kg)	NLYS	Notes
Monday		2/20/96													
		Cal Check before samples													
CAL		STD 1 ppm (2/20)				960220	11.20	0.0	0.0	0	87.0	1.0	0.0	RBK	
CAL		STD 10 ppm (2/20)				960220	11.22	0.0	0.0	0	30.5	9.9	0.0	RBK	
CAL		STD 15 ppm (2/20)				960220	11.25	0.0	0.0	0	20.7	14.8	0.0	RBK	
CAL		STD 100 ppm (2/20)				960220	11.26	0.0	0.0	0	-26.6	101.1	0.0	RBK	
	1	6B1511	10	170	2	960220	11.40	10.0	10.0	25	35.1	8.2	20.5	RBK	1
	2	6B1512	30	170	2	960220	11.42	10.0	10.0	25	14.7	18.8	47.1	RBK	2
	3	6B1519	40	180	2	960220	11.43	10.0	10.0	25	0.8	33.2	82.9	RBK	3
	4	6B1520	20	180	2	960220	11.44	10.0	10.0	25	7.1	25.7	64.1	RBK	4
	5	6B1522	10	190	2	960220	11.44	10.0	10.0	25	36.0	7.9	19.8	RBK	5
	6	6B1523	30	190	2	960220	11.45	10.0	10.0	25	50.3	4.4	11.1	RBK	6
	7	6B1524	50	190	2	960220	11.45	10.0	10.0	25	24.4	12.7	31.7	RBK	7
	9	6B1425	55	205	2	960220	11.47	10.0	10.0	25	22.5	13.7	34.3	RBK	9
	8	6B1519x	40	180	2	960220	11.55	25.0	25.0	25	-18.9	73.9	73.9	RBK	8
		Cal Check after samples													
CAL		STD 1 ppm (2/20)				960220	12.05	0.0	0.0	0	87.9	1.0	0.0	RBK	
CAL		STD 10 ppm (2/20)				960220	12.07	0.0	0.0	0	31.0	9.7	0.0	RBK	
CAL		STD 15 ppm (2/20)				960220	12.07	0.0	0.0	0	21.3	14.4	0.0	RBK	
CAL		STD 100 ppm (2/20)				960220	12.08	0.0	0.0	0	-26.2	99.4	0.0	RBK	

Field Screening for Soluble Fluoride in Soil
February 25, 1996
R B Kerkow

ISE constants
a = -56.6
b = 86.86

Sample	GRID N	E	Date yymmdd	Time hh.mm	Ws (g)	Vw (ml)	ISE (mV)	Cext (ppm)	Csoil (mg/Kg)	NLYS	NO3 PPM	Notes
Std 1 ppm			960225	14.40	0	25	88.1	1.0		RBK		
Std 10 ppm			960225	14.41	0	25	31.2	9.6		RBK		
Std 100 ppm			960225	14.42	0	25	-26.2	99.4		RBK		
Std 15 ppm			960225	14.42	0	25	21.1	14.5		RBK		
6B2301	40	130	960225	15.36	10.4	25	46.3	5.2	12.5	RBK	400	
6B2302	80	160	960225	15.37	10.6	25	122.0	0.2	0.6	RBK	4000-10000	
6B2303	120	170	960225	15.38	10.2	25	118.5	0.3	0.7	RBK	0-400	
6B2304	70	190	960225	15.40	10.7	25	72.9	1.8	4.1	RBK	4000	
6B2307	120	190	960225	16.12	10.1	25	126.1	0.2	0.5	RBK	0	
6B2308	113	189	960225	16.15	10.2	25	121.7	0.2	0.6	RBK	0	
6B2313	80	200	960225	16.04	11.2	25	81.8	1.2	2.7	RBK	4000-10000	
6B2305	90	190	960225	16.10	10.2	25	89.5	0.9	2.2	RBK	10000	
6B2306	110	190	960225	15.50	10.4	25	109.8	0.4	0.9	RBK	0	
6B2309	0	200	960225	15.52	10.4	25	104.0	0.5	1.2	RBK	400	
6B2310	20	200	960225	15.55	10.1	25	43.1	5.9	14.7	RBK	2000	
6B2311	40	200	960225	15.56	10.1	25	52.6	4.0	10.0	RBK	2000-4000	
6B2312	60	200	960225	15.57	10.1	25	120.1	0.3	0.6	RBK	4000	
6B2314	100	200	960225	15.58	10.2	25	92.1	0.8	2.0	RBK	0	
6B2315	10	210	960225	16.06	11.2	25	47.2	5.0	11.2	RBK	1000-2000	
6B2316	30	210	960225	16.08	10.2	25	83.8	1.1	2.8	RBK	400	
6B2317	50	210	960225	16.16	10.3	25	17.2	17.0	41.3	RBK	2000-4000	
6B2318	70	210	960225	16.21	10.3	25	12.5	20.6	50.0	RBK	2000	
6B2319	90	210	960225	16.06	11.2	25	107.4	0.4	1.0	RBK	2000-4000	
6B2320	110	210	960225	16.28	10.2	25	112.1	0.4	0.9	RBK	0	
Std 1 ppm			960225	16.36	0	25	88.5	0.9		RBK		
Std 10 ppm			960225	16.38	0	25	31.7	9.4		RBK		
Std 100 ppm			960225	16.40	0	25	-26	98.6		RBK		
Std 15 ppm			960225	16.41	0	25	21.6	14.2		RBK		

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Field Screening for Soluble Fluoride in Soil
February 26, 1996
R B Kerkow

ISE constants
a = -56.6
b = 86.86

	Sample	GRID N	E	D	Date yymmdd	Ws (g)	Vw (ml)	ISE (mV)	Cext (ppm)	Csoil (mg/Kg)	Time hh.mm	NLYST		Notes
	Std 1 ppm				960226	0	25	87.1	1.0		9.27	RBK		
	Std 10 ppm				960226	0	25	30.6	9.9		9.29	RBK		
	Std 15 ppm				960226	0	25	20.5	14.9		9.31	RBK		
	Std 100 ppm				960226	0	25	-26.3	99.8		9.33	RBK		
1	6B2601	120	20	3	960226	10.2	25	118.3	0.3	0.7	15.25	RBK	1	BOH6X4
2	6B2602	40	10	3	960226	10.3	25	119.1	0.3	0.7	15.28	RBK	2	BOH6X5
3	6B2603	40	30	3	960226	10.1	25	130.5	0.2	0.4	15.31	RBK	3	BOH6X6
4	6B2604	40	130	3	960226	10.1	25	30.9	9.7	24.1	15.33	RBK	4	BOH6X7
5	6B2605	80	160	3	960226	10.0	25	162.0	0.0	0.1	15.35	RBK	5	BOH6X8
6	6B2606	70	190	3	960226	10.2	25	97.2	0.7	1.6	15.38	RBK	6	BOH6X9
7	6B2607	80	200	3	960226	10.1	25	97.8	0.6	1.6	15.42	RBK	7	BOH6Y1
8	6B2608	90	220	3	960226	10.2	25	89.1	0.9	2.2	15.44	RBK	8	BOH6Y2
9	6B2609	113	189	3	960226	10.1	25	122.2	0.2	0.6	15.45	RBK	9	BOH6Y3
10	6B2610	120	190	3	960226	10.1	25	128.7	0.2	0.5	15.46	RBK	10	BOH6Y5
11	6B2611	120	170	3	960226	10.3	25	126.3	0.2	0.5	15.48	RBK	11	BOH6Z2
21	6B2621	10	140		960226	10.9	25	101.8	0.5	1.2	13.09	RBK	21	
22	6B2622	0	130		960226	10.1	25	135.0	0.1	0.3	13.11	RBK	22	
23	6B2623	30	140		960226	12.5	25	50.1	4.5	8.9	13.13	RBK	23	
24	6B2624	20	130		960226	10.1	25	52.6	4.0	10.0	13.15	RBK	24	
25	6B2625	50	140		960226	10.1	25	69.9	2.0	4.9	13.17	RBK	25	
26	6B2626	60	130		960226	10.1	25	84.7	1.1	2.7	13.18	RBK	26	
27	6B2627	70	140		960226	10.1	25	71.6	1.9	4.6	13.20	RBK	27	
28	6B2628	10	120		960226	10.7	25	73.8	1.7	4.0	13.23	RBK	28	
29	6B2629	0	110		960226	10.2	25	139.0	0.1	0.3	13.25	RBK	29	

Field Screening for Soluble Fluoride in Soil
February 26, 1996
R B Kerkow

ISE constants
a = -56.6
b = 86.86

	Sample	GRID N	GRID E	D	Date yymmdd	Ws (g)	Vw (ml)	ISE (mV)	Cext (ppm)	Csoil (mg/Kg)	Time hh.mm	NLYST		Notes
30	6B2630	30	120		960226	10.1	25	77.1	1.5	3.7	13.26	RBK	30	
31	6B2631	20	110		960226	10.4	25	106.7	0.4	1.1	13.28	RBK	31	
32	6B2632	50	120		960226	10.2	25	73.8	1.7	4.2	13.30	RBK	32	
33	6B2633	40	110		960226	10.2	25	125.4	0.2	0.5	13.33	RBK	33	
34	6B2634	70	120		960226	10.1	25	45.5	5.4	13.3	13.35	RBK	34	
35	6B2635	60	110		960226	10.9	25	118.6	0.3	0.6	13.38	RBK	35	
36	6B2636	20	90		960226	11.9	25	79.8	1.3	2.8	13.42	RBK	36	
37	6B2637	10	100		960226	10.2	25	134.2	0.1	0.4	14.01	RBK	37	
38	6B2638	0	90		960226	10.0	25	127.5	0.2	0.5	14.08	RBK	38	
39	6B2639	30	100		960226	10.2	25	99.6	0.6	1.5	14.11	RBK	39	
41	6B2641	20	200	8	960226	10.1	25	82.7	1.2	2.9	15.52	RBK	41	
42	6B2642	10	220	8	960226	10.3	25	160.0	0.1	0.1	15.54	RBK	42	
	Std 1 ppm				960226	0	25	88.6	0.9		16.04	RBK		
	Std 10 ppm				960225	0	25	32.9	9.0		16.06	RBK		
	Std 15 ppm				960225	0	25	22.7	13.6		16.07	RBK		
	Std 100 ppm				960225	0	25	-25.4	96.2		16.08	RBK		

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Rev. 0

C-15

Field Screening for Soluble Fluoride in Soil
February 27, 1996
J D Fancher

ISE constants
a = -56.6
b = 86.86

	Sample	GRID N	GRID E	GRID D	Date yymmdd	Ws (g)	Vw (ml)	ISE (mV)	Cext (ppm)	Csoil (mg/Kg)	Time hh.mm	NLYS	Notes
	Std 1 ppm				960227	0	25	83.6	1.1		8.06	JDF	
	Std 10 ppm				960227	0	25	29.3	10.4		8.11	JDF	
	Std 15 ppm				960227	0	25	19.4	15.6		8.14	JDF	
	Std 100 ppm				960227	0	25	-27.0	102.7		8.17	JDF	
1	6B2701	20	200	8	960227	10.1	25	127.5	0.2	0.5	8.27	JDF	
2	6B2702	20	220	8	960227	10.0	25	96.8	0.7	1.7	8.27	JDF	
3	6B2703	30	200	8	960227	10.0	25	39.6	6.8	17.1	9.00	JDF	
4	6B2704	30	220	8	960227	10.2	25	40.8	6.5	16.0	9.00	JDF	
5	6B2705	50	220	8	960227	10.7	25	25.3	12.2	28.6	10.30	JDF	
6	6B2706	50	200	8	960227	10.0	25	45.0	5.5	13.7	10.30	JDF	
7	6B2707	70	220	8	960227	10.2	25	51.3	4.2	10.4	10.30	JDF	
8	6B2708	70	200	8	960227	10.0	25	84.9	1.1	2.7	10.30	JDF	
9	6B2709	10	190	8	960227	10.1	25	40.6	6.6	16.3	11.30	JDF	
10	6B2710	10	175	8	960227	10.2	25	42.8	6.0	14.7	11.30	JDF	
11	6B2711	30	190	8	960227	10.4	25	57.4	3.3	8.0	11.30	JDF	
12	6B2712	30	175	8	960227	10.1	25	49.3	4.6	11.4	11.30	JDF	
13	6B2713	80	215	8	960227	10.3	25	100.6	0.6	1.4	13.00	JDF	
14	6B2714	80	200	8	960227	10.2	25	87.9	1.0	2.3	13.00	JDF	
15	6B2715	95	215	8	960227	10.0	25	150.5	0.1	0.2	13.00	JDF	
16	6B2716	95	200	8	960227	10.5	25	93.6	0.8	1.8	13.33	JDF	
17	6B2717	70	180	10	960227	10.6	25	171.4	0.0	0.1	13.33	JDF	
18	6B2718	90	180	10	960227	10.6	25	147.4	0.1	0.2	13.33	JDF	
19	6B2719	0	160	8	960227	10.0	25	125.5	0.2	0.5	15.11	JDF	
20	6B2720	10	160	8	960227	10.1	25	104.1	0.5	1.2	15.13	JDF	
21	6B2721	0	140	8	960227	10.4	25	133.1	0.2	0.4	15.15	JDF	

Field Screening for Soluble Fluoride in Soil
February 27, 1996
J D Fancher

ISE constants
a = -56.6
b = 86.86

	Sample	GRID N	E	D	Date yymmdd	Ws (g)	Vw (ml)	ISE (mV)	Cext (ppm)	Csoil (mg/Kg)	Time hh.mm	NLYS	Notes
22	6B2722	10	140	8	960227	10.2	25	109.9	0.4	1.0	15.17	JDF	
23	6B2723	0	130	8	960227	10.2	25	118.0	0.3	0.7	15.39	RGM	
24	6B2724	10	130	8	960227	10.4	25	129.5	0.2	0.4	15.42	RGM	
25	6B2703	30	200	8	960227	10.0	25	38.7	7.1	17.7	15.45	RGM	
26	6B2710	10	175	8	960227	10.2	25	41.8	6.3	15.3	15.49	RGM	
27	6B2720	10	160	8	960227	10.4	25	103.4	0.5	1.2	16.02	RGM	
28	6B2712	30	175	8	960227	10.1	25	48.7	4.7	11.7	16.06	RGM	
	Std 1 ppm				960227	0.0	25	90.2	0.9		16.10	RGM	
	Std 10 ppm				960227	0.0	25	33.7	8.7		16.16	RGM	
	Std 15 ppm				960227	0.0	25	23.6	13.1		16.18	RGM	
	Std 100 ppm				960227	0.0	25	-24.0	90.9		16.21	RGM	

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BHI-00932
Rev. 0

Field Screening for Soluble Fluoride in Soil
February 28, 1996
R B Kerkow

ISE constants
a = -56.6
b = 86.86

	Sample	GRID N	E	D	Date yymmdd	Ws (g)	Vw (ml)	ISE (mV)	Cext (ppm)	Csoil (mg/Kg)	Time hh.mm	NLYST		Notes
	Std 1 ppm				960228	0	25	86.3	1.0		8.04	RBK		
	Std 10 ppm				960228	0	25	30.2	10.0		8.06	RBK		
	Std 15 ppm				960228	0	25	20.3	15.0		8.09	RBK		
	Std 100 ppm				960228	0	25	-26.3	99.8		8.11	RBK		
1	6B2801	55	170	9	960228	10.1	25	53.3	3.9	9.7	9.45	RBK	1	
2	6B2802	65	170	9	960228	10.1	25	96.5	0.7	1.7	9.46	RBK	2	
3	6B2803	65	160	9	960228	10.1	25	122.1	0.2	0.6	9.47	RBK	3	
4	6B2804	75	160	9	960228	10.1	25	116.0	0.3	0.8	9.49	RBK	4	
5	6B2805	30	160	9	960228	10.1	25	32.8	9.0	22.3	10.15	RBK	5	
6	6B2806	50	160	9	960228	10.1	25	59.8	3.0	7.4	10.18	RBK	6	
7	6B2807	30	150	9	960228	10.9	25	86.4	1.0	2.3	10.32	RBK	7	No buffer added
8	6B2808	50	150	9	960228	11.0	25	82.2	1.2	2.7	10.35	RBK	8	No buffer added
9	6B2809	50	170	11	960228	10.5	25	92.0	0.8	1.9	15.10	RBK	9	No buffer added
10	6B2810	30	160	11	960228	10.0	25	45.5	5.4	13.4	15.14	RBK	10	
11	6B2811	80	180	11	960228	11.0	25	146.5	0.1	0.2	15.28	RBK	11	No buffer added
12	6B2812	90	130	3	960228	10.0	25	200.0	0.0	0.0	0.00	RBK	12	
13	6B2813	70	140	3	960228	10.0	25	200.0	0.0	0.0	0.00	RBK	13	
14	6B2814	30	120	3	960228	10.0	25	200.0	0.0	0.0	0.00	RBK	14	
	Std 1 ppm				960227	0	25	88.4	0.9		16.10	RBK		
	Std 10 ppm				960227	0	25	32.5	9.1		16.14	RBK		
	Std 15 ppm				960227	0	25	23.3	13.3		16.16	RBK		
	Std 100 ppm				960227	0	25	-24.8	93.9		16.18	RBK		

Field Screening for Soluble Fluoride in Soil
February 29, 1996
R B Kerkow

ISE constants
a = -56.6
b = 86.86

	Sample	GRID N	E	D	Date yymmdd	Ws (g)	Vw (ml)	ISE (mV)	Cext (ppm)	Csoil (mg/Kg)	Time hh.mm	NLYST		Notes
	Std 1 ppm				960229	0	25	86.9	1.0		10.15	RBK		New STD 2/29/96
	Std 10 ppm				960229	0	25	30.4	9.9		10.17	RBK		New STD 2/29/96
	Std 15 ppm				960229	0	25	21.2	14.5		10.19	RBK		New STD 2/29/96
	Std 100 ppm				960229	0	25	-26.5	100.7		10.22	RBK		New STD 2/29/96
10a	6B2810a	30	160	11	960229	10.0	25	42.6	6.1	15.1	10.54	RBK	10a	Original 2/28 sample
10b	6B2810b	30	160	11	960229	10.7	25	54.3	3.8	8.8	10.56	RBK	10b	Duplicate #1
10c	6B2810c	30	160	11	960229	10.7	25	56.2	3.5	8.1	10.58	RBK	10c	Duplicate #2
1	6B2901	10	160	11	960229	10.1	25	64.9	2.4	6.0	12.05	RBK	1	
2	6B2902	10	170	11	960229	10.3	25	117.6	0.3	0.7	12.07	RBK	2	
3	6B2903	75	190	11	960229	10.2	25	155.6	0.1	0.1	12.09	RBK	3	
4	6B2904	85	190	13	960229	10.1	25	148.5	0.1	0.2	12.12	RBK	4	
5	6B2905	20	160	11	960229	10.1	25	109.5	0.4	1.0	13.11	RBK	5	
6	6B2906	30	160	11	960229	10.3	25	79.9	1.3	3.2	13.14	RBK	6	
7	6B2907	40	160	11	960229	10.2	25	88.7	0.9	2.3	13.18	RBK	7	
8	6B2908	20	150	11	960229	10.2	25	98.2	0.6	1.5	13.21	RBK	8	
9	6B2909	30	190	11	960229	10.2	25	140.1	0.1	0.3	15.01	RBK	9	
10	6B2910	50	190	11	960229	10.4	25	61.2	2.8	6.8	15.04	RBK	10	
	Std 1 ppm				960229	0	25	88.5	0.9		15.12	RBK		
	Std 10 ppm				960229	0	25	31.9	9.4		15.15	RBK		
	Std 15 ppm				960229	0	25	21.8	14.1		15.17	RBK		
	Std 100 ppm				960229	0	25	-25.9	98.2		15.18	RBK		

Field Screening for Soluble Fluoride & Nitrate in Soil
March 11, 1996
R.G. McCain

ISE constants
a = -56.6
b = 86.86

Sample	GRID N	E	D	Date yymmdd	Ws (g)	V1 (ml)	ISE (mV)	Ce(F) (ppm)	Csoil (F) (mg/Kg)	V2 ml	V3 ml	RQflex ppm NO	Csoil (mg/Kg)	NO3-N (mg/Kg)	NLYS	Notes
Std 1 ppm F				960311		25	88.9	0.9							RGM	
Std 10 ppm F				960311		25	31.6	9.5							RGM	
Std 15 ppm F				960311		25	22.3	13.8							RGM	
Std 100 ppm F				960311		25	-25.3	95.9							RGM	
Std 44.3 ppm NO3				960311								42				
6C1101	120	220	15	960311	11.2	40	140.0	0.1	0.4	1	20	4	286	65	RGM	
6C1102	120	200	15	960311	10.1	40	166.0	0.0	0.2	1	20	0	0	0	RGM	
6C1103	120	180	15	960311	10.0	40	132.9	0.2	0.6	1	20	LO	0	0	RGM	
6C1104	110	210	15	960311	10.0	40	92.8	0.8	3.1	1	20	3	240	54	RGM	
6C1105	110	190	15	960311	10.1	40	162.0	0.0	0.2	1	20	7	554	125	RGM	
6C1106	110	170	15	960311	10.1	40	175.0	0.0	0.1	4	20	10	198	45	RGM	
6C1107	100	180	15	960311	10.0	40	32.2	9.2	37.0	4	10	96	960	217	RGM	
6C1108	100	200	15	960311	10.3	40	92.8	0.8	3.0	2	10	51	990	224	RGM	
6C1109	100	220	15	960311	10.2	40	140.0	0.1	0.5	2	10	17	333	75	RGM	
6C1110	90	210	15	960311	11.2	40	165.0	0.0	0.1	2	10	27	482	109	RGM	
6C1111	90	190	15	960311	10.2	40	158.0	0.1	0.2	2	10	97	1902	430	RGM	
6C1112	90	170	15	960311	10.3	40				2	10	HI		0	RGM	
6C1112	90	170	15	960311	10.3	40				2	20	HI		0	RGM	
6C1112	90	170	15	960311	10.3	40	123.6	0.2	0.9	1	20	59	4583	1035	RGM	
6C1113	80	180	15	960311	11.2	40	135.4	0.1	0.5	1	20	5	357	81	RGM	
6C1114	80	200	15	960311	11.1	40				1	10	HI		0	RGM	
6C1114	80	200	15	960311	11.1	40	132.7	0.2	0.6	1	20	59	4252	961	RGM	
6C1115	70	210	15	960311	10.8	40	35.6	8.0	29.8	1	10	71	2630	594	RGM	
6C1116	70	190	15	960311	10.3	40	160.7	0.0	0.2	1	20	61	4738	1070	RGM	
6C1117	70	170	15	960311	10.1	40	162.2	0.0	0.2	1	20	12	950	215	RGM	
6C1118	60	180	15	960311	10.0	40	89.4	0.9	3.6	1	10	21	840	190	RGM	
6C1119	60	200	15	960311	10.2	40	52.7	4.0	15.7	1	10	37	1451	328	RGM	
6C1120	50	210	15	960311	13.5	40				1	10	HI	0	0	RGM	
6C1120	50	210	15	960311	13.5	40	101.0	0.6	1.7	1	20	55	3259	736	RGM	
6C1111d				960311	10.5	40	163.3	0.0	0.2	1	10	57	2171	491	RGM	
6C1104s				960311	10.1	40	21.4	14.3	56.8						RGM	

Field Screening for Soluble Fluoride & Nitrate in Soil
March 11, 1996
R.G. McCain

ISE constants
a = -56.6
b = 86.86

Sample	GRID N	E	D	Date yymmdd	Ws (g)	V1 (ml)	ISE (mV)	Ce(F) (ppm)	Csoil (F) (mg/Kg)	V2 ml	V3 ml	RQflex ppm NO	Csoil (mg/Kg)	NO3-N (mg/Kg)	NLYS	Notes
6C1121	50	190	15	960311	10.1	40				1	10	HI	0	0	RGM	
6C1121	50	190	15	960311	10.1	40	114.0	0.3	1.3	1	20	67	5307	1199	RGM	
6C1122	50	170	15	960311	10.5	40	94.3	0.7	2.8	1	20	22	1676	379	RGM	
6C1123	40	180	15	960311	10.3	40	52.4	4.1	15.8	1	20	5	388	88	RGM	
6C1124	40	200	15	960311	10.1	40	160.9	0.0	0.2	1	20	18	1426	322	RGM	
6C1125	30	210	15	960311	10.4	40	170.0	0.0	0.1	1	20	4	308	70	RGM	
6C1126	30	190	15	960311	10.3	40	171.2	0.0	0.1	1	20	98	7612	1719	RGM	
6C1127	30	170	15	960311	10.3	40	38.0	7.3	28.3	1	20	7	544	123	RGM	
6C1128	20	160	15	960311	10.3	40	112.1	0.4	1.4	1	20	68	5282	1193	RGM	
6C1129	20	180	15	960311	10.5	40	36.6	7.7	29.4	1	20	10	762	172	RGM	
6C1130	20	200	15	960311	10.1	40	166.2	0.0	0.2	1	20	76	6020	1360	RGM	
6C1131	10	210	15	960311	10.5	40	167.2	0.0	0.1	1	20	35	2667	602	RGM	
6C1132	10	190	15	960311	10.1	40	74.6	1.6	6.5	1	20	40	3168	716	RGM	
6C1133	10	170	15	960311	10.6	40	144.7	0.1	0.4	1	20	33	2491	563	RGM	
6C1134	20	200	15	960311	10.4	40	157.1	0.1	0.2	1	20	20	1538	348	RGM	
6C1135	20	200	15	960311	10.3	40	70.3	2.0	7.6	1	20	23	1786	404	RGM	
Std 1 ppm				960311	0	25	89.8	0.9							RGM	
Std 10 ppm				960311	0	25	31.7	9.4							RGM	
Std 15 ppm				960311	0	25	22.3	13.8							RGM	
Std 100 ppm				960311	0	25	-25.6	97.0							RGM	
Std 44.3 ppm NO3				960311	0	25						51			RGM	no ISA

Field Screening for Soluble Fluoride & Nitrate in Soil
March 13, 1996
R G McCain

ISE constants
a = -56.6
b = 86.86

Sample	GRID N	E	D	Date yymmdd	Ws (g)	V1 (ml)	ISE (mV)	Ce(F) (ppm)	Csoil(F) (mg/Kg)	V2 ml	V3 ml	RQflex ppm NO	Csoil (mg/Kg)	NO3-N (mg/Kg)	NLYS	Notes
Std 1 ppm F				960311		25	88.6	0.9							RGM	
Std 10 ppm F				960311		25	31.4	9.5							RGM	
Std 15 ppm F				960311		25	22.2	13.9							RGM	
Std 100 ppm F				960311		25	-25.4	96.2							RGM	
Std 44.3 ppm NO3				960311								43				
6C1301	100	180	20	960313	10.0	40	25.4	12.2	48.7	1	20	14	1120	253	RGM	
6C1302	100	180	25	960313	10.2	40	17.3	16.9	66.4	1	20	1	78	18	RGM	
6C1303	70	200	15	960313	10.0	40	39.4	6.9	27.6	1	20	55	4400	994	RGM	
6C1303a	70	200	15	960313	10.2	40	36.9	7.6	29.9	1	20	59	4627	1045	RGM	
6C1304	70	200	20	960313	10.9	40	153.9	0.1	0.2	1	20	93	6826	1542	RGM	
6C1305	70	200	25	960313	11.3	40	146.3	0.1	0.3	1	20	57	4035	912	RGM	
6C1306	30	180	15	960313	12.0	40				1	20	HI			RGM	
6C1306	30	180	15	960313	12.0	40	101.2	0.6	1.9	0.3	10	40	5333	1205	RGM	
6C1307	30	180	20	960313	10.5	40	90.3	0.9	3.3	1	20	51	3886	878	RGM	
6C1308	30	180	25	960313	11.4	40	73.6	1.7	6.0	1	20	44	3088	698	RGM	
Std 1 ppm				960311	0	25	91.6	0.8							RGM	
Std 10 ppm				960311	0	25	33.2	8.9							RGM	
Std 15 ppm				960311	0	25	24.2	12.8							RGM	
Std 100 ppm				960311	0	25	-24.4	92.4							RGM	
Std 44.3 ppm NO3				960311	0	25						47			RGM	no ISA

9713540.2456

APPENDIX D

SAMPLE RESULTS FROM THE ENVIRONMENTAL ANALYTICAL LABORATORY

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FROM THE DESK OF: **DORIS E. AYRES**
SAMPLE & DATA MANAGEMENT
372-9022/B1-35

TO: **File E0013 and E0014** **DATE:** April 16, 1996

SUBJECT: **Incorrect Sample Numbers**

On March 22, 1996, Environmental Analytical Laboratory delivered the Data for package E0013 and E0014. Upon log-in an errors were discovered on page 23 - 25. There were numerous incorrect sample numbers listed on the ICP Metals results. The incorrect sample numbers and the assigned HEIS numbers are listed below:

Correct Sample Number	Incorrect Sample Number
B0H6P4	B0HGP4
B0H6Q5	B0HGQ5
B0H6Q0	B0HGQ0
B0H6Q1	B0HGQ1
B0H6Q2	B0HGQ2
B0H6Q3	B0HGQ3
B0H6Q4	B0HGQ4
B0H6Q6	B0HGQ6
B0H6Q7	B0HGQ7
B0H6P5	B0HGQ5
B0H6P6	B0HGP6
B0H6P7	B0HGP7
B0H6P8	B0HGP8
B0H6P9	B0HGP9

If you have any questions please feel free to contact me at the above number.

March 21, 1996

TO: Rex Miller, X5-53

COPY: Rick McCain, H9-10

INTRODUCTION:

The Environmental Analytical Laboratory supported the 183-H Solar Basin Project during February and March 1996. Samples were received in batches of fourteen on February 12, February 26, and March 4, 1996, as well as a batch of six on February 16, 1996. Your sample numbers were assigned the following EAL numbers.

Customer Sample Number	EAL Number	Matrix Type
B0H6T4	EAL01915	soil
B0H6T5	EAL01916	soil
B0H6T6	EAL01917	soil
B0H6T7	EAL01918	soil
B0H6T8	EAL01919	soil
B0H6T9	EAL01920	soil
B0H6V0	EAL01921	soil
B0H6V1	EAL01922	soil
B0H6V2	EAL01923	soil
B0H6V3	EAL01924	soil
B0H6V4	EAL01925	soil
B0H6V5	EAL01926	soil
B0H6V6	EAL01927	soil
B0H6V7	EAL01928	soil
B0H6X4	EAL02033	soil
B0H6X5	EAL02034	soil
B0H6X6	EAL02035	soil
B0H6X7	EAL02036	soil
B0H6X8	EAL02037	soil
B0H6X9	EAL02038	soil
B0H6Y0	EAL02039	soil
B0H6Y1	EAL02040	soil
B0H6Y2	EAL02041	soil
B0H6Y3	EAL02042	soil
B0H6Y4	EAL02043	soil
B0H6Y5	EAL02044	soil
B0H6Z2	EAL02045	soil
B0H6Z3	EAL02046	soil

MAR 1996
RECEIVED
Data
Log In

Customer Sample Number	EAL Number	Matrix Type
B0H6P4	EAL02092	soil
B0H6P5	EAL02093	soil
B0H6P6	EAL02094	soil
B0H6P7	EAL02095	soil
B0H6P8	EAL02096	soil
B0H6P9	EAL02097	soil
B0H6Q0	EAL02098	soil
B0H6Q1	EAL02099	soil
B0H6Q2	EAL02100	soil
B0H6Q3	EAL02101	soil
B0H6Q4	EAL02102	soil
B0H6Q5	EAL02103	soil
B0H6Q6	EAL02104	soil
B0H6Q7	EAL02105	soil
B0H6W4	EAL01970	soil
B0H6W5	EAL01971	soil
B0H6W6	EAL01972	soil
B0H6W7	EAL01973	soil
B0H6W8	EAL01974	soil
B0H6W9	EAL01975	soil

The samples were also assigned batch numbers of 960212D, 960216B, 960226C, and 960304B. The corresponding Sampling Analysis Form (SAF) number was
B96-060.

NOTABLE EVENTS:

Inductively Coupled Plasma (ICP)

During the ICP analysis of arsenic, it was noted that the high aluminum content (150 ppm) in soil, produced an interference for arsenic on the 193.7 nm wavelength. Due to this, an interelement correction factor of k_1 = 0.00145 was used.

On 2/16/96, 2/23/96, 2/28/96, 3/6/96, and 3/14/96 the recovery for the high calibration check standard was slightly high for some metals.

On 2/16/96 and 2/28/96, the recovery for the midpoint calibration check standard was not within acceptable limits for some metals.

On 2/28/96, 2/29/96, 3/6/96, 3/13/96, and 3/14/96, a soil laboratory control standard was substituted for the QC standard.

Hexavalent Chromium

Samples for hexavalent chromium analyses were extracted by the SW-846 3060 method prior to being analyzed by a spectrophotometer. The first batch of samples arrived at the EAL on 2/12/96 without the radiological release record. The ERC Radiological Survey Record was delivered to the EAL on 2/13/96. Because of the paperwork delay, the chromium (VI) samples were analyzed within 48 hours instead of 24 hours.

The first batch of samples, 960212D, experienced extreme color changes with this extraction. The color of the samples varied from a dark brown to a light tan. As a result, it was necessary to dilute the samples by a factor of 10 to lessen color interferences. However, even with the dilution some results may be falsely high due to color of the sample. An example of this is sample EAL01925. The sample had a result of 0.402 µg/g. However, the duplicate was not detected above the associated quantitation limit. The spike recovery for EAL01915 was low (64%) due to color interferences.

Approximately half the samples in the second batch, 960226C, were a light brown in color after the extraction. These samples were diluted by a factor of 11. Sample EAL02035 also had a high RPD (48%) due to heterogeneity of the soil and color differences between the sample and duplicate.

In the last batch, 960304B, three of the samples had some color present. These samples were diluted by a factor of two. Sample EAL02102 had a high RPD (85%) due to heterogeneity of the soil and color differences between the sample and duplicate.

The associated quantitation limits take the dilution factors into account. The color change appeared to be dependent upon the type of soil.

Anions

Samples for anion analyses were tumbled with DI water for a minimum of 18 hours prior to analysis. Sample EAL01915 had a high spike recovery (128%). There were no other significant events encountered during this analysis.

General

It should be noted that spike recoveries are provided as a measure of unavoidable matrix interference in the samples.

RESULTS:

A summary of results and associated quality control parameters is shown on spreadsheets included in this data package. All samples were analyzed in accordance with approved analytical methods and good laboratory practice. Please contact Stacey Bolling at 373-5433 or John McCluskey at 372-0642, if you have any questions.

John McCluskey — 03/22/96
Signature of Analyst — **Date**

Stacey D Bolling — 3/22/96
Signature of Analyst — **Date**

Paul E Nuertzen — 3/22/96
Signature of QA Coordinator — **Date**

EAL
BATCH # 960212D
SAMPLE RESULTS

ANALYST SIGNATURE: Stacey D Bolling

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
B0H6T4	EAL01915	Fluoride	2.37	ug/g	2/14/96	14693	2/15/96	0.1
B0H6T4	EAL01915	Nitrate-Nitrogen	18.6	ug/g	2/14/96	14693	2/15/96	0.023
B0H6T4	EAL01915	Cr(VI) (3060 method)	.08U	ug/g	2/14/96	3614045014	2/15/96	0.08
B0H6T5	EAL01916	Fluoride	2.23	ug/g	2/14/96	14693	2/15/96	0.1
B0H6T5	EAL01916	Nitrate-Nitrogen	20.1	ug/g	2/14/96	14693	2/15/96	0.023
B0H6T5	EAL01916	Cr(VI) (3060 method)	.08U	ug/g	2/14/96	3614045014	2/15/96	0.08
B0H6T6	EAL01917	Fluoride	5.56	ug/g	2/14/96	14693	2/15/96	0.1
B0H6T6	EAL01917	Nitrate-Nitrogen	922	ug/g	2/14/96	14693	2/15/96	0.023
B0H6T6	EAL01917	Cr(VI) (3060 method)	.08U	ug/g	2/14/96	3614045014	2/15/96	0.08
B0H6T7	EAL01918	Fluoride	6.82	ug/g	2/14/96	14693	2/15/96	0.1
B0H6T7	EAL01918	Nitrate-Nitrogen	1000	ug/g	2/14/96	14693	2/15/96	0.023
B0H6T7	EAL01918	Cr(VI) (3060 method)	3.83	ug/g	2/14/96	3614045014	2/15/96	0.08
B0H6T8	EAL01919	Fluoride	18.0	ug/g	2/14/96	14693	2/15/96	0.1
B0H6T8	EAL01919	Nitrate-Nitrogen	107	ug/g	2/14/96	14693	2/15/96	0.023
B0H6T8	EAL01919	Cr(VI) (3060 method)	.08U	ug/g	2/14/96	3614045014	2/15/96	0.08

U = analyte was not detected above the associated quantitation limit
Results based on dry weight.

EAL
BATCH # 960212D
SAMPLE RESULTS

ANALYST SIGNATURE: Stacey D Bailey

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
B0H6T9	EAL01920	Fluoride	19.4	ug/g	2/14/96	14693	2/15/96	0.1
B0H6T9	EAL01920	Nitrate-Nitrogen	102	ug/g	2/14/96	14693	2/15/96	0.023
B0H6T9	EAL01920	Cr(VI) {3060 method}	.8U	ug/g	2/14/96	3614045014	2/15/96	0.8
B0H6V0	EAL01921	Fluoride	9.16	ug/g	2/14/96	14693	2/15/96	0.1
B0H6V0	EAL01921	Nitrate-Nitrogen	52.7	ug/g	2/14/96	14693	2/15/96	0.023
B0H6V0	EAL01921	Cr(VI) {3060 method}	2.32	ug/g	2/14/96	3614045014	2/15/96	0.8
B0H6V1	EAL01922	Fluoride	2.96	ug/g	2/14/96	14693	2/15/96	0.1
B0H6V1	EAL01922	Nitrate-Nitrogen	17.3	ug/g	2/14/96	14693	2/15/96	0.023
B0H6V1	EAL01922	Cr(VI) {3060 method}	3.31	ug/g	2/14/96	3614045014	2/15/96	0.8
B0H6V2	EAL01923	Fluoride	2.86	ug/g	2/14/96	14693	2/15/96	0.1
B0H6V2	EAL01923	Nitrate-Nitrogen	45.0	ug/g	2/14/96	14693	2/15/96	0.023
B0H6V2	EAL01923	Cr(VI) {3060 method}	4.07	ug/g	2/14/96	3614045014	2/15/96	0.8
B0H6V3	EAL01924	Fluoride	8.02	ug/g	2/14/96	14693	2/15/96	0.1
B0H6V3	EAL01924	Nitrate-Nitrogen	90.0	ug/g	2/14/96	14693	2/15/96	0.023
B0H6V3	EAL01924	Cr(VI) {3060 method}	4.14	ug/g	2/14/96	3614045014	2/15/96	0.8

U = analyte was not detected above the associated quantitation limit
Results based on dry weight.

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EAL
BATCH # 960212D
SAMPLE RESULTS

ANALYST SIGNATURE: Stacey D Billing

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
B0H6V4	EAL01925	Fluoride	11.8	ug/g	2/14/96	14693	2/15/96	0.1
B0H6V4	EAL01925	Nitrate-Nitrogen	896	ug/g	2/14/96	14693	2/15/96	0.023
B0H6V4	EAL01925	Cr(VI) {3060 method}	0.402	ug/g	2/14/96	3614045014	2/15/96	0.8
B0H6V5	EAL01926	Fluoride	32.1	ug/g	2/14/96	14693	2/15/96	0.1
B0H6V5	EAL01926	Nitrate-Nitrogen	64.0	ug/g	2/14/96	14693	2/15/96	0.023
B0H6V5	EAL01926	Cr(VI) {3060 method}	.8U	ug/g	2/14/96	3614045014	2/15/96	0.8
B0H6V6	EAL01927	Fluoride	86.5	ug/g	2/14/96	14693	2/15/96	0.1
B0H6V6	EAL01927	Nitrate-Nitrogen	763	ug/g	2/14/96	14693	2/15/96	0.023
B0H6V6	EAL01927	Cr(VI) {3060 method}	5.15	ug/g	2/14/96	3614045014	2/15/96	0.8
B0H6V7	EAL01928	Fluoride	3.03	ug/g	2/14/96	14693	2/15/96	0.1
B0H6V7	EAL01928	Nitrate-Nitrogen	38.8	ug/g	2/14/96	14693	2/15/96	0.023
B0H6V7	EAL01928	Cr(VI) {3060 method}	4.53	ug/g	2/14/96	3614045014	2/15/96	0.8

U = analyte was not detected above the associated quantitation limit
Results based on dry weight.

EAL
BATCH # 960226C
SAMPLE RESULTS

ANALYST SIGNATURE: Stacey D Bolling

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
B0H6X4	EAL02033	Cr(VI) {3060 leach}	.88U	ug/g	2/27/96	3614045014	2/27/96	0.88
B0H6X5	EAL02034	Cr(VI) {3060 leach}	0.409	ug/g	2/27/96	3614045014	2/27/96	0.08
B0H6X6	EAL02035	Cr(VI) {3060 leach}	0.359	ug/g	2/27/96	3614045014	2/27/96	0.08
B0H6X7	EAL02036	Cr(VI) {3060 leach}	0.538	ug/g	2/27/96	3614045014	2/27/96	0.08
B0H6X8	EAL02037	Cr(VI) {3060 leach}	0.50	ug/g	2/27/96	3614045014	2/27/96	0.08
B0H6X9	EAL02038	Cr(VI) {3060 leach}	0.574	ug/g	2/27/96	3614045014	2/27/96	0.08
B0H6Y0	EAL02039	Cr(VI) {3060 leach}	0.184	ug/g	2/27/96	3614045014	2/27/96	0.08
B0H6Y1	EAL02040	Cr(VI) {3060 leach}	1.00	ug/g	2/27/96	3614045014	2/27/96	0.08
B0H6Y2	EAL02041	Cr(VI) {3060 leach}	.88U	ug/g	2/27/96	3614045014	2/27/96	0.88
B0H6Y3	EAL02042	Cr(VI) {3060 leach}	.88U	ug/g	2/27/96	3614045014	2/27/96	0.88
B0H6Y4	EAL02043	Cr(VI) {3060 leach}	.88U	ug/g	2/27/96	3614045014	2/27/96	0.88
B0H6Y5	EAL02044	Cr(VI) {3060 leach}	.88U	ug/g	2/27/96	3614045014	2/27/96	0.88
B0H6Z2	EAL02045	Cr(VI) {3060 leach}	.88U	ug/g	2/27/96	3614045014	2/27/96	0.88
B0H6Z3	EAL02046	Cr(VI) {3060 leach}	.08U	ug/g	2/27/96	3614045014	2/27/96	0.08

U = analyte was not detected above the associated quantitation limit
Results based on dry weight.

9713540-2461

EAL
BATCH # 960226C
SAMPLE RESULTS

ANALYST SIGNATURE: Stacey D Bolling

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
BOH6X4	EAL02033	Fluoride	2.21	ug/g	2/27/96	14693	2/28/96	0.1
BOH6X4	EAL02033	Nitrate-Nitrogen	6.62	ug/g	2/27/96	14693	2/28/96	0.023
BOH6X5	EAL02034	Fluoride	.1U	ug/g	2/27/96	14693	2/28/96	0.1
BOH6X5	EAL02034	Nitrate-Nitrogen	17.7	ug/g	2/27/96	14693	2/28/96	0.023
BOH6X6	EAL02035	Fluoride	.1U	ug/g	2/27/96	14693	2/28/96	0.1
BOH6X6	EAL02035	Nitrate-Nitrogen	11.4	ug/g	2/27/96	14693	2/28/96	0.023
BOH6X7	EAL02036	Fluoride	127	ug/g	2/27/96	14693	2/28/96	0.1
BOH6X7	EAL02036	Nitrate-Nitrogen	246	ug/g	2/27/96	14693	2/28/96	0.023
BOH6X8	EAL02037	Fluoride	.1U	ug/g	2/27/96	14693	2/28/96	0.1
BOH6X8	EAL02037	Nitrate-Nitrogen	477	ug/g	2/27/96	14693	2/28/96	0.023
BOH6X9	EAL02038	Fluoride	14.9	ug/g	2/27/96	14693	2/28/96	0.1
BOH6X9	EAL02038	Nitrate-Nitrogen	592	ug/g	2/27/96	14693	2/28/96	0.023
BOH6Y0	EAL02039	Fluoride	9.44	ug/g	2/27/96	14693	2/28/96	0.1
BOH6Y0	EAL02039	Nitrate-Nitrogen	594	ug/g	2/27/96	14693	2/28/96	0.023
BOH6Y1	EAL02040	Fluoride	7.07	ug/g	2/27/96	14693	2/28/96	0.1
BOH6Y1	EAL02040	Nitrate-Nitrogen	1390	ug/g	2/27/96	14693	2/28/96	0.023

U = analyte was not detected above the associated quantitation limit
Results based on dry weight.

EAL
BATCH # 960226C
SAMPLE RESULTS

ANALYST SIGNATURE: Sherry D Bolds

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
B0H6Y2	EAL02041	Fluoride	20.1	ug/g	2/27/96	14693	2/28/96	0.1
B0H6Y2	EAL02041	Nitrate-Nitrogen	489	ug/g	2/27/96	14693	2/28/96	0.023
B0H6Y3	EAL02042	Fluoride	<1.24	ug/g	2/27/96	14693	2/28/96	0.1
B0H6Y3	EAL02042	Nitrate-Nitrogen	23.4	ug/g	2/27/96	14693	2/28/96	0.023
B0H6Y4	EAL02043	Fluoride	<1.40	ug/g	2/27/96	14693	2/28/96	0.1
B0H6Y4	EAL02043	Nitrate-Nitrogen	27.2	ug/g	2/27/96	14693	2/28/96	0.023
B0H6Y5	EAL02044	Fluoride	<1.19	ug/g	2/27/96	14693	2/28/96	0.1
B0H6Y5	EAL02044	Nitrate-Nitrogen	2.95	ug/g	2/27/96	14693	2/28/96	0.023
B0H6Z2	EAL02045	Fluoride	1.94	ug/g	2/27/96	14693	2/28/96	0.1
B0H6Z2	EAL02045	Nitrate-Nitrogen	6.47	ug/g	2/27/96	14693	2/28/96	0.023
B0H6Z3	EAL02046	Fluoride	.1U	ug/g	2/27/96	14693	2/28/96	0.1
B0H6Z3	EAL02046	Nitrate-Nitrogen	.023U	ug/g	2/27/96	14693	2/28/96	0.023

U = analyte was not detected above the associated quantitation limit
< = analyte was detected but was below low calibration point
Results based on dry weight.

9713540.2462

EAL
BATCH # 960304B
SAMPLE RESULTS

ANALYST SIGNATURE: Stacey D Bell

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
B0H6P4	EAL02092	Cr(VI) {3060 method}	.08U	ug/g	3/5/96	3614045014	3/5/96	0.08
B0H6P5	EAL02093	Cr(VI) {3060 method}	.08U	ug/g	3/5/96	3614045014	3/5/96	0.08
B0H6P6	EAL02094	Cr(VI) {3060 method}	0.369	ug/g	3/5/96	3614045014	3/5/96	0.08
B0H6P7	EAL02095	Cr(VI) {3060 method}	0.471	ug/g	3/5/96	3614045014	3/5/96	0.08
B0H6P8	EAL02096	Cr(VI) {3060 method}	0.093	ug/g	3/5/96	3614045014	3/5/96	0.08
B0H6P9	EAL02097	Cr(VI) {3060 method}	0.173	ug/g	3/5/96	3614045014	3/5/96	0.08
B0H6Q0	EAL02098	Cr(VI) {3060 method}	.08U	ug/g	3/5/96	3614045014	3/5/96	0.08
B0H6Q1	EAL02099	Cr(VI) {3060 method}	0.175	ug/g	3/5/96	3614045014	3/5/96	0.16
B0H6Q2	EAL02100	Cr(VI) {3060 method}	0.479	ug/g	3/5/96	3614045014	3/5/96	0.16
B0H6Q3	EAL02101	Cr(VI) {3060 method}	1.07	ug/g	3/5/96	3614045014	3/5/96	0.16
B0H6Q4	EAL02102	Cr(VI) {3060 method}	0.239	ug/g	3/5/96	3614045014	3/5/96	0.08
B0H6Q5	EAL02103	Cr(VI) {3060 method}	0.338	ug/g	3/5/96	3614045014	3/5/96	0.08
B0H6Q6	EAL02104	Cr(VI) {3060 method}	.08U	ug/g	3/5/96	3614045014	3/5/96	0.08
B0H6Q7	EAL02105	Cr(VI) {3060 method}	.08U	ug/g	3/5/96	3614045014	3/5/96	0.08
B0H6P4	EAL02092	Fluoride	<1.01	ug/g	3/5/96	14693	3/6/96	0.1
B0H6P4	EAL02092	Nitrate-Nitrogen	26.9	ug/g	3/5/96	14693	3/6/96	0.023
B0H6P5	EAL02093	Fluoride	1.83	ug/g	3/5/96	14693	3/6/96	0.1
B0H6P5	EAL02093	Nitrate-Nitrogen	70.4	ug/g	3/5/96	14693	3/6/96	0.023

U = analyte was not detected above the associated quantitation limit

< = analyte was detected, but was present below calibration limits.

Results based on dry weight.

EAL
BATCH # 960304B
SAMPLE RESULTS

ANALYST SIGNATURE: Stacey D Bailey

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
B0H6P6	EAL02094	Fluoride	.1U	ug/g	3/5/96	14693	3/6/96	0.1
B0H6P6	EAL02094	Nitrate-Nitrogen	1880	ug/g	3/5/96	14693	3/6/96	0.023
B0H6P7	EAL02095	Fluoride	.1U	ug/g	3/5/96	14693	3/6/96	0.1
B0H6P7	EAL02095	Nitrate-Nitrogen	1970	ug/g	3/5/96	14693	3/6/96	0.023
B0H6P8	EAL02096	Fluoride	384	ug/g	3/5/96	14693	3/6/96	0.1
B0H6P8	EAL02096	Nitrate-Nitrogen	55.4	ug/g	3/5/96	14693	3/6/96	0.023
B0H6P9	EAL02097	Fluoride	.1U	ug/g	3/5/96	14693	3/6/96	0.1
B0H6P9	EAL02097	Nitrate-Nitrogen	986	ug/g	3/5/96	14693	3/6/96	0.023
B0H6Q0	EAL02098	Fluoride	.1U	ug/g	3/5/96	14693	3/6/96	0.1
B0H6Q0	EAL02098	Nitrate-Nitrogen	416	ug/g	3/5/96	14693	3/6/96	0.023
B0H6Q1	EAL02099	Fluoride	165	ug/g	3/5/96	14693	3/6/96	0.1
B0H6Q1	EAL02099	Nitrate-Nitrogen	588	ug/g	3/5/96	14693	3/6/96	0.023
B0H6Q2	EAL02100	Fluoride	.1U	ug/g	3/5/96	14693	3/6/96	0.1
B0H6Q2	EAL02100	Nitrate-Nitrogen	625	ug/g	3/5/96	14693	3/6/96	0.023
B0H6Q3	EAL02101	Fluoride	.1U	ug/g	3/5/96	14693	3/6/96	0.1
B0H6Q3	EAL02101	Nitrate-Nitrogen	1930	ug/g	3/5/96	14693	3/6/96	0.023
B0H6Q4	EAL02102	Fluoride	.1U	ug/g	3/5/96	14693	3/6/96	0.1
B0H6Q4	EAL02102	Nitrate-Nitrogen	1580	ug/g	3/5/96	14693	3/6/96	0.023

U = analyte was not detected above the associated quantitation limit

Results based on dry weight.

9713640.2463

EAL
BATCH # 960304B
Sample Results

ANALYST SIGNATURE: Stacy D Bell

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
B0H6Q5	EAL02103	Fluoride	<1.22	ug/g	3/5/96	14693	3/6/96	0.1
B0H6Q5	EAL02103	Nitrate-Nitrogen	1890	ug/g	3/5/96	14693	3/6/96	0.023
B0H6Q6	EAL02104	Fluoride	542	ug/g	3/5/96	14693	3/6/96	0.1
B0H6Q6	EAL02104	Nitrate-Nitrogen	129	ug/g	3/5/96	14693	3/6/96	0.023
B0H6Q7	EAL02105	Fluoride	<1.00	ug/g	3/5/96	14693	3/6/96	0.1
B0H6Q7	EAL02105	Nitrate-Nitrogen	<.601	ug/g	3/5/96	14693	3/6/96	0.023

U = analyte was not detected above the associated quantitation limit

< = analyte was detected, but was present below calibration limi

Results based on dry weight.

Environmental Analytical Laboratory
Batch # 960212D
Sample Results for Samples:
EAL01915-EAL01920

ICP Results

Analyst: John McCluskey

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	% MOISTURE	DRY WEIGHT RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
B0H6T4	EAL01915	As	3.8	16	ug/g	02/13/96	1545	02/14/96	5
		Cu	3.8	7	ug/g	02/13/96	1545	02/14/96	1
		Ni	3.8	6	ug/g	02/13/96	1545	02/14/96	2
B0H6T5	EAL01916	As	3.9	12	ug/g	02/13/96	1545	02/14/96	5
		Cu	3.9	5	ug/g	02/13/96	1545	02/14/96	1
		Ni	3.9	5	ug/g	02/13/96	1545	02/14/96	2
B0H6T6	EAL01917	As	1.8	5	ug/g	02/13/96	1545	02/14/96	5
		Cu	1.8	7	ug/g	02/13/96	1545	02/14/96	1
		Ni	1.8	5	ug/g	02/13/96	1545	02/14/96	2
B0H6T7	EAL01918	As	1.7	6	ug/g	02/13/96	1545	02/14/96	5
		Cu	1.7	9	ug/g	02/13/96	1545	02/14/96	1
		Ni	1.7	7	ug/g	02/13/96	1545	02/14/96	2
B0H6T8	EAL01919	As	9.4	5	ug/g	02/13/96	1545	02/14/96	5
		Cu	9.4	6	ug/g	02/13/96	1545	02/14/96	1
		Ni	9.4	6	ug/g	02/13/96	1545	02/14/96	2
B0H6T9	EAL01920	As	9.1	9	ug/g	02/13/96	1545	02/14/96	5
		Cu	9.1	8	ug/g	02/13/96	1545	02/14/96	1
		Ni	9.1	10	ug/g	02/13/96	1545	02/14/96	2

U = Not above the associated Quantitation Limit

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Environmental Analytical Laboratory **ICP Results**

Batch # 960212D **Analyst: John McCluskey**

Sample Results for Samples:
EAL01921-EAL01926

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	% MOISTURE	DRY WEIGHT RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
B0H6V0	EAL01921	As	8.7	18	ug/g	02/14/96	1545	02/14/96	5
		Cu	8.7	1U	ug/g	02/14/96	1545	02/14/96	1
		Ni	8.7	14	ug/g	02/14/96	1545	02/14/96	2
B0H6V1	EAL01922	As	3.1	14	ug/g	02/14/96	1545	02/14/96	5
		Cu	3.1	1U	ug/g	02/14/96	1545	02/14/96	1
		Ni	3.1	11	ug/g	02/14/96	1545	02/14/96	2
B0H6V2	EAL01923	As	8.9	24	ug/g	02/14/96	1545	02/14/96	5
		Cu	8.9	1U	ug/g	02/14/96	1545	02/14/96	1
		Ni	8.9	14	ug/g	02/14/96	1545	02/14/96	2
B0H6V3	EAL01924	As	10.3	21	ug/g	02/14/96	1545	02/14/96	5
		Cu	10.3	1U	ug/g	02/14/96	1545	02/14/96	1
		Ni	10.3	14	ug/g	02/14/96	1545	02/14/96	2
B0H6V4	EAL01925	As	14.6	30	ug/g	02/14/96	1545	02/14/96	5
		Cu	14.6	1U	ug/g	02/14/96	1545	02/14/96	1
		Ni	14.6	18	ug/g	02/14/96	1545	02/14/96	2
B0H6V5	EAL01926	As	3.8	10	ug/g	02/14/96	1545	02/14/96	5
		Cu	3.8	1U	ug/g	02/14/96	1545	02/14/96	1
		Ni	3.8	11	ug/g	02/14/96	1545	02/14/96	2

U = Not above the associated Quantitation Limit **D:\MSOFFICE\EXCEL\183-H15.XLS**

Environmental Analytical Laboratory
Batch # 960212D
Sample Results for Samples:
EAL01927-EAL01928

ICP Results

Analyst: John McCluskey

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	% MOISTURE	DRY WEIGHT RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
B0H6V6	EAL01927	As	5.6	16	ug/g	02/14/96	1545	02/14/96	5
		Cu	5.6	6	ug/g	02/14/96	1545	02/14/96	1
		Ni	5.6	15	ug/g	02/14/96	1545	02/14/96	2
B0H6V7	EAL01928	As	6.9	25	ug/g	02/14/96	1545	02/14/96	5
		Cu	6.9	1U	ug/g	02/14/96	1545	02/14/96	1
		Ni	6.9	12	ug/g	02/14/96	1545	02/14/96	2

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Environmental Analytical Laboratory
Batch # 960216B
Sample Results for Samples:
EAL01970-EAL01975

ICP Results

Analyst: John McCluskey

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	% MOISTURE	DRY WEIGHT RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
B0H6W4	EAL01970	As	6.3	5U	ug/g	02/16/96	1545	02/16/96	5
		Cu	6.3	1U	ug/g	02/16/96	1545	02/16/96	1
		Ni	6.3	15	ug/g	02/16/96	1545	02/16/96	2
B0H6W5	EAL01971	As	6.0	5U	ug/g	02/16/96	1545	02/16/96	5
		Cu	6.0	1U	ug/g	02/16/96	1545	02/16/96	1
		Ni	6.0	16	ug/g	02/16/96	1545	02/16/96	2
B0H6W6	EAL01972	As	2.6	5U	ug/g	02/16/96	1545	02/16/96	5
		Cu	2.6	1U	ug/g	02/16/96	1545	02/16/96	1
		Ni	2.6	15	ug/g	02/16/96	1545	02/16/96	2
B0H6W7	EAL01973	As	3.8	5U	ug/g	02/16/96	1545	02/16/96	5
		Cu	3.8	1U	ug/g	02/16/96	1545	02/16/96	1
		Ni	3.8	9	ug/g	02/16/96	1545	02/16/96	2
B0H6W8	EAL01974	As	9.1	5U	ug/g	02/16/96	1545	02/16/96	5
		Cu	9.1	1U	ug/g	02/16/96	1545	02/16/96	1
		Ni	9.1	18	ug/g	02/16/96	1545	02/16/96	2
B0H6W9	EAL01975	As	11.9	5U	ug/g	02/16/96	1545	02/16/96	5
		Cu	11.9	64	ug/g	02/16/96	1545	02/16/96	1
		Ni	11.9	20	ug/g	02/16/96	1545	02/16/96	2

U = Not above the associated Quantitation Limit

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Environmental Analytical Laboratory
Batch # 960222A
Sample Results for Samples:
EAL02015-EAL02020

ICP Results

Analyst: John McCluskey

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	% MOISTURE	DRY WEIGHT RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
6B2201	EAL02015	As	4.1	9	ug/g	02/22/96	1545	02/23/96	5
		Cu	4.1	10	ug/g	02/22/96	1545	02/23/96	1
		Ni	4.1	10	ug/g	02/22/96	1545	02/23/96	2
6B2202	EAL02016	As	2.1	7	ug/g	02/22/96	1545	02/23/96	5
		Cu	2.1	9	ug/g	02/22/96	1545	02/23/96	1
		Ni	2.1	8	ug/g	02/22/96	1545	02/23/96	2
6B2203	EAL02017	As	2.0	9	ug/g	02/22/96	1545	02/23/96	5
		Cu	2.0	10	ug/g	02/22/96	1545	02/23/96	1
		Ni	2.0	10	ug/g	02/22/96	1545	02/23/96	2
6B2204	EAL02018	As	5.7	13	ug/g	02/22/96	1545	02/23/96	5
		Cu	5.7	13	ug/g	02/22/96	1545	02/23/96	1
		Ni	5.7	10	ug/g	02/22/96	1545	02/23/96	2
6B2205	EAL02019	As	2.9	9	ug/g	02/22/96	1545	02/23/96	5
		Cu	2.9	14	ug/g	02/22/96	1545	02/23/96	1
		Ni	2.9	10	ug/g	02/22/96	1545	02/23/96	2
6B2206	EAL02020	As	2.4	7	ug/g	02/22/96	1545	02/23/96	5
		Cu	2.4	12	ug/g	02/22/96	1545	02/23/96	1
		Ni	2.4	8	ug/g	02/22/96	1545	02/23/96	2

U = Not above the associated Quantitation Limit

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Environmental Analytical Laboratory
Batch # 960226C
Sample Results for Samples:
EAL02033-EAL02038

ICP Results

Analyst: John McCluskey

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	% MOISTURE	DRY WEIGHT RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
B0H6X4	EAL02033	As	5.1	5U	ug/g	02/26/96	1545	02/28/96	5
		Cu	5.1	16	ug/g	02/26/96	1545	02/28/96	1
		Ni	5.1	10	ug/g	02/26/96	1545	02/28/96	2
B0H6X5	EAL02034	As	2.3	5U	ug/g	02/26/96	1545	02/28/96	5
		Cu	2.3	13	ug/g	02/26/96	1545	02/28/96	1
		Ni	2.3	8	ug/g	02/26/96	1545	02/28/96	2
B0H6X6	EAL02035	As	2.5	5U	ug/g	02/26/96	1545	02/28/96	5
		Cu	2.5	12	ug/g	02/26/96	1545	02/28/96	1
		Ni	2.5	8	ug/g	02/26/96	1545	02/28/96	2
B0H6X7	EAL02036	As	3.4	5U	ug/g	02/26/96	1545	02/28/96	5
		Cu	3.4	29	ug/g	02/26/96	1545	02/28/96	1
		Ni	3.4	11	ug/g	02/26/96	1545	02/28/96	2
B0H6X8	EAL02037	As	2.5	5U	ug/g	02/26/96	1545	02/28/96	5
		Cu	2.5	12	ug/g	02/26/96	1545	02/28/96	1
		Ni	2.5	9	ug/g	02/26/96	1545	02/28/96	2
B0H6X9	EAL02038	As	2.5	NA	NA	02/26/96	NA	NA	NA
		Cu	2.5	NA	NA	02/26/96	NA	NA	NA
		Ni	2.5	NA	NA	02/26/96	NA	NA	NA

U = Not above the associated Quantitation Limit
Note: EAL02038 was lost in process and had to be rerun

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Environmental Analytical Laboratory
Batch # 960226C
Sample Results for Samples:
EAL02038-EAL02042

ICP Results

Analyst: John McCluskey

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	% MOISTURE	DRY WEIGHT RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
B0H6X9	EAL02038	As	2.5	5U	ug/g	02/27/96	1545	02/28/96	5
		Cu	2.5	15	ug/g	02/27/96	1545	02/28/96	1
		Ni	2.5	11	ug/g	02/27/96	1545	02/28/96	2
B0H6Y0	EAL02039	As	2.0	5U	ug/g	02/27/96	1545	02/28/96	5
		Cu	2.0	13	ug/g	02/27/96	1545	02/28/96	1
		Ni	2.0	11	ug/g	02/27/96	1545	02/28/96	2
B0H6Y1	EAL02040	As	2.8	5U	ug/g	02/27/96	1545	02/28/96	5
		Cu	2.8	12	ug/g	02/27/96	1545	02/28/96	1
		Ni	2.8	9	ug/g	02/27/96	1545	02/28/96	2
B0H6Y2	EAL02041	As	9.4	9	ug/g	02/27/96	1545	02/28/96	5
		Cu	9.4	19	ug/g	02/27/96	1545	02/28/96	1
		Ni	9.4	15	ug/g	02/27/96	1545	02/28/96	2
B0H6Y3	EAL02042	As	5.1	16	ug/g	02/27/96	1545	02/28/96	5
		Cu	5.1	16	ug/g	02/27/96	1545	02/28/96	1
		Ni	5.1	13	ug/g	02/27/96	1545	02/28/96	2
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	NA	NA	NA

U = Not above the associated Quantitation Limit

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BHI-00932
Rev. 0

97 3642 2467

Environmental Analytical Laboratory
Batch # 960226C
Sample Results for Samples:
EAL02043-EAL02046

ICP Results

Analyst: John McCluskey

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	% MOISTURE	DRY WEIGHT RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
B0HGY4	EAL02043	As	5.3	9	ug/g	02/27/96	1545	02/28/96	5
		Cu	5.3	17	ug/g	02/27/96	1545	02/28/96	1
		Ni	5.3	15	ug/g	02/27/96	1545	02/28/96	2
B0HGY5	EAL02044	As	4.0	5U	ug/g	02/27/96	1545	02/28/96	5
		Cu	4.0	15	ug/g	02/27/96	1545	02/28/96	1
		Ni	4.0	14	ug/g	02/27/96	1545	02/28/96	2
B0HGZ2	EAL02045	As	7.0	5U	ug/g	02/27/96	1545	02/28/96	5
		Cu	7.0	29	ug/g	02/27/96	1545	02/28/96	1
		Ni	7.0	15	ug/g	02/27/96	1545	02/28/96	2
B0HGZ3	EAL02046	As	0.2	5U	ug/g	02/27/96	1545	02/28/96	5
		Cu	0.2	1U	ug/g	02/27/96	1545	02/28/96	1
		Ni	0.2	2U	ug/g	02/27/96	1545	02/28/96	2
NA	NIST SRM 2704	As	NA	16 (68%R)	ug/g	02/27/96	1545	02/28/96	5
		Cu	NA	125 (127%R)	ug/g	02/27/96	1545	02/28/96	1
		Ni	NA	48 (109%R)	ug/g	02/27/96	1545	02/28/96	2
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	NA	NA	NA

U = Not above the associated Quantitation Limit

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Environmental Analytical Laboratory
Batch # 960228B
Sample Results for Samples:
EAL02067-EAL02072

ICP Results

Analyst: John McCluskey

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	% MOISTURE	DRY WEIGHT RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
6B2809	EAL02067	As	2.5	5U	ug/g	02/28/96	1545	02/29/96	5
		Cu	2.5	11	ug/g	02/28/96	1545	02/29/96	1
		Ni	2.5	12	ug/g	02/28/96	1545	02/29/96	2
6B2810	EAL02068	As	2.9	5U	ug/g	02/28/96	1545	02/29/96	5
		Cu	2.9	13	ug/g	02/28/96	1545	02/29/96	1
		Ni	2.9	11	ug/g	02/28/96	1545	02/29/96	2
6B2811	EAL02069	As	1.6	5U	ug/g	02/28/96	1545	02/29/96	5
		Cu	1.6	13	ug/g	02/28/96	1545	02/29/96	1
		Ni	1.6	13	ug/g	02/28/96	1545	02/29/96	2
6B2812	EAL02070	As	2.5	5U	ug/g	02/28/96	1545	02/29/96	5
		Cu	2.5	14	ug/g	02/28/96	1545	02/29/96	1
		Ni	2.5	13	ug/g	02/28/96	1545	02/29/96	2
6B2813	EAL02071	As	3.4	5U	ug/g	02/28/96	1545	02/29/96	5
		Cu	3.4	13	ug/g	02/28/96	1545	02/29/96	1
		Ni	3.4	12	ug/g	02/28/96	1545	02/29/96	2
6B2814	EAL02072	As	3.8	5U	ug/g	02/28/96	1545	02/29/96	5
		Cu	3.8	15	ug/g	02/28/96	1545	02/29/96	1
		Ni	3.8	12	ug/g	02/28/96	1545	02/29/96	2

U = Not above the associated Quantitation Limit

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9715240.2468

Environmental Analytical Laboratory **ICP Results**
Batch # 960304B **Analyst: John McCluskey**
Sample Results for 183-H Project:
EAL02092, EAL02098, EAL02107-2109

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	% MOISTURE	DRY WEIGHT RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
B0HGP4	EAL02092	As	1.8	5U	ug/g	03/04/96	1545	03/06/96	5
		Cu	1.8	11	ug/g	03/04/96	1545	03/06/96	1
		Ni	1.8	12	ug/g	03/04/96	1545	03/06/96	2
B0HGQ5	EAL02103	As	1.4	5U	ug/g	03/04/96	1545	03/06/96	5
		Cu	1.4	13	ug/g	03/04/96	1545	03/06/96	1
		Ni	1.4	12	ug/g	03/04/96	1545	03/06/96	2
B0HGQ0	EAL02098	As	2.1	5U	ug/g	03/04/96	1545	03/06/96	5
		Cu	2.1	11	ug/g	03/04/96	1545	03/06/96	1
		Ni	2.1	12	ug/g	03/04/96	1545	03/06/96	2
6C0401	EAL02107	As	5.5	8	ug/g	03/04/96	1545	03/06/96	5
		Cu	5.5	14	ug/g	03/04/96	1545	03/06/96	1
		Ni	5.5	16	ug/g	03/04/96	1545	03/06/96	2
6C0402	EAL02108	As	3.3	5U	ug/g	03/04/96	1545	03/06/96	5
		Cu	3.3	11	ug/g	03/04/96	1545	03/06/96	1
		Ni	3.3	12	ug/g	03/04/96	1545	03/06/96	2
6C0403	EAL02109	As	6.0	11	ug/g	03/04/96	1545	03/06/96	5
		Cu	6.0	14	ug/g	03/04/96	1545	03/06/96	1
		Ni	6.0	15	ug/g	03/04/96	1545	03/06/96	2

U = Not above the associated Quantitation Limit

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Environmental Analytical Laboratory
Batch # 960304B
Sample Results for 183-H Project:
EAL02099-2102, EAL02104-2105

ICP Results

Analyst: John McCluskey

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	% MOISTURE	DRY WEIGHT RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
B0HGQ1	EAL02099	As	2.9	8	ug/g	03/05/96	1545	03/06/96	5
		Cu	2.9	11	ug/g	03/05/96	1545	03/06/96	1
		Ni	2.9	23	ug/g	03/05/96	1545	03/06/96	2
B0HGQ2	EAL02100	As	2.2	9	ug/g	03/05/96	1545	03/06/96	5
		Cu	2.2	10	ug/g	03/05/96	1545	03/06/96	1
		Ni	2.2	9	ug/g	03/05/96	1545	03/06/96	2
B0HGQ3	EAL02101	As	1.8	7	ug/g	03/05/96	1545	03/06/96	5
		Cu	1.8	10	ug/g	03/05/96	1545	03/06/96	1
		Ni	1.8	10	ug/g	03/05/96	1545	03/06/96	2
B0HGQ4	EAL02102	As	2.8	6	ug/g	03/05/96	1545	03/06/96	5
		Cu	2.8	11	ug/g	03/05/96	1545	03/06/96	1
		Ni	2.8	11	ug/g	03/05/96	1545	03/06/96	2
B0HGQ6	EAL02104	As	2.6	7	ug/g	03/05/96	1545	03/06/96	5
		Cu	2.6	32	ug/g	03/05/96	1545	03/06/96	1
		Ni	2.6	11	ug/g	03/05/96	1545	03/06/96	2
B0HGQ7	EAL02105	As	0.2	5U	ug/g	03/05/96	1545	03/06/96	5
		Cu	0.2	1U	ug/g	03/05/96	1545	03/06/96	1
		Ni	0.2	2U	ug/g	03/05/96	1545	03/06/96	2

U = Not above the associated Quantitation Limit

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9713540.2469

Environmental Analytical Laboratory **ICP Results**
Batch # 960304B **Analyst: John McCluskey**
Sample Results for 183-H Project:
EAL02093-2097

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	% MOISTURE	DRY WEIGHT RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
B0HGP5	EAL02093	As	1.8	6	ug/g	03/05/96	1545	03/06/96	5
		Cu	1.8	10	ug/g	03/05/96	1545	03/06/96	1
		Ni	1.8	10	ug/g	03/05/96	1545	03/06/96	2
B0HGP6	EAL02094	As	4.0	7	ug/g	03/05/96	1545	03/06/96	5
		Cu	4.0	10	ug/g	03/05/96	1545	03/06/96	1
		Ni	4.0	9	ug/g	03/05/96	1545	03/06/96	2
B0HGP7	EAL02095	As	4.0	7	ug/g	03/05/96	1545	03/06/96	5
		Cu	4.0	9	ug/g	03/05/96	1545	03/06/96	1
		Ni	4.0	9	ug/g	03/05/96	1545	03/06/96	2
B0HGP8	EAL02096	As	3.1	6	ug/g	03/05/96	1545	03/06/96	5
		Cu	3.1	12	ug/g	03/05/96	1545	03/06/96	1
		Ni	3.1	10	ug/g	03/05/96	1545	03/06/96	2
B0HGP9	EAL02097	As	2.1	7	ug/g	03/05/96	1545	03/06/96	5
		Cu	2.1	9	ug/g	03/05/96	1545	03/06/96	1
		Ni	2.1	10	ug/g	03/05/96	1545	03/06/96	2
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	NA	NA	NA

U = Not above the associated Quantitation Limit

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Environmental Analytical Laboratory
Batch # 960311A
Sample Results for 183-H Project:
EAL02219-EAL02224

ICP Results

Analyst: John McCluskey

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	% MOISTURE	DRY WEIGHT RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
6C11-05	EAL02219	As	3.1	5U	ug/g	03/12/96	1545	03/13/96	5
		Cu	3.1	11	ug/g	03/12/96	1545	03/13/96	1
		Ni	3.1	11	ug/g	03/12/96	1545	03/13/96	2
6C11-06	EAL02220	As	1.7	5U	ug/g	03/12/96	1545	03/13/96	5
		Cu	1.7	13	ug/g	03/12/96	1545	03/13/96	1
		Ni	1.7	10	ug/g	03/12/96	1545	03/13/96	2
6C11-16	EAL02221	As	1.8	5U	ug/g	03/12/96	1545	03/13/96	5
		Cu	1.8	14	ug/g	03/12/96	1545	03/13/96	1
		Ni	1.8	11	ug/g	03/12/96	1545	03/13/96	2
6C11-26	EAL02222	As	2.5	5U	ug/g	03/12/96	1545	03/13/96	5
		Cu	2.5	13	ug/g	03/12/96	1545	03/13/96	1
		Ni	2.5	12	ug/g	03/12/96	1545	03/13/96	2
6C11-34	EAL02223	As	2.9	5U	ug/g	03/12/96	1545	03/13/96	5
		Cu	2.9	11	ug/g	03/12/96	1545	03/13/96	1
		Ni	2.9	10	ug/g	03/12/96	1545	03/13/96	2
6C11-35	EAL02224	As	3.4	5U	ug/g	03/12/96	1545	03/13/96	5
		Cu	3.4	11	ug/g	03/12/96	1545	03/13/96	1
		Ni	3.4	12	ug/g	03/12/96	1545	03/13/96	2

U = Not above the associated Quantitation Limit

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9713540.2470

Environmental Analytical Laboratory
Batch # 960313B
Sample Results for 183-H Project:
EAL02240-2241, EAL02243-2244, EAL02246-2247

ICP Results

Analyst: John McCluskey

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	% MOISTURE	DRY WEIGHT RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
6C1301	EAL02240	As	3.2	5U	ug/g	03/14/96	1545	03/14/96	5
		Cu	3.2	92	ug/g	03/14/96	1545	03/14/96	1
		Ni	3.2	12	ug/g	03/14/96	1545	03/14/96	2
6C1302	EAL02241	As	2.8	5U	ug/g	03/14/96	1545	03/14/96	5
		Cu	2.8	104	ug/g	03/14/96	1545	03/14/96	1
		Ni	2.8	17	ug/g	03/14/96	1545	03/14/96	2
6C1304	EAL02243	As	1.9	5U	ug/g	03/14/96	1545	03/14/96	5
		Cu	1.9	11	ug/g	03/14/96	1545	03/14/96	1
		Ni	1.9	12	ug/g	03/14/96	1545	03/14/96	2
6C1305	EAL02244	As	2.1	5U	ug/g	03/14/96	1545	03/14/96	5
		Cu	2.1	12	ug/g	03/14/96	1545	03/14/96	1
		Ni	2.1	13	ug/g	03/14/96	1545	03/14/96	2
6C1307	EAL02246	As	2.3	5U	ug/g	03/14/96	1545	03/14/96	5
		Cu	2.3	13	ug/g	03/14/96	1545	03/14/96	1
		Ni	2.3	12	ug/g	03/14/96	1545	03/14/96	2
6C1308	EAL02247	As	1.8	5U	ug/g	03/14/96	1545	03/14/96	5
		Cu	1.8	11	ug/g	03/14/96	1545	03/14/96	1
		Ni	1.8	12	ug/g	03/14/96	1545	03/14/96	2

U = Not above the associated Quantitation Limit

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Environmental Analytical Laboratory
Batch # 960308C
Sample Results for the Orchard Project:
EAL02173-EAL02178

ICP Results

Analyst: John McCluskey

CUSTOMER ID OR HEIS NUMBER	LABORATORY ID	ANALYTE	% MOISTURE	DRY WEIGHT RESULT	UNITS	DATE PREPARED	INSTRUMENT SERIAL NUMBER	DATE ANALYZED	QUANTITATION LIMIT
6B0801	EAL02173	As	6.5	7	ug/g	03/12/96	1545	03/14/96	5
		Cu	6.5	14	ug/g	03/12/96	1545	03/14/96	1
		Ni	6.5	14	ug/g	03/12/96	1545	03/14/96	2
6B0802	EAL02174	As	8.0	19	ug/g	03/12/96	1545	03/14/96	5
		Cu	8.0	13	ug/g	03/12/96	1545	03/14/96	1
		Ni	8.0	14	ug/g	03/12/96	1545	03/14/96	2
6B0803	EAL02175	As	6.8	6	ug/g	03/12/96	1545	03/14/96	5
		Cu	6.8	14	ug/g	03/12/96	1545	03/14/96	1
		Ni	6.8	16	ug/g	03/12/96	1545	03/14/96	2
6B0804	EAL02176	As	9.9	18	ug/g	03/12/96	1545	03/14/96	5
		Cu	9.9	14	ug/g	03/12/96	1545	03/14/96	1
		Ni	9.9	14	ug/g	03/12/96	1545	03/14/96	2
6B0805	EAL02177	As	13.3	sample spilled	ug/g	03/12/96	1545	spilled	5
		Cu	13.3	sample spilled	ug/g	03/12/96	1545	spilled	1
		Ni	13.3	sample spilled	ug/g	03/12/96	1545	spilled	2
6B0806	EAL02178	As	14.4	7	ug/g	03/12/96	1545	03/14/96	5
		Cu	14.4	12	ug/g	03/12/96	1545	03/14/96	1
		Ni	14.4	16	ug/g	03/12/96	1545	03/14/96	2

U = Not above the associated Quantitation Limit

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9713640.2471

EAL
BATCH # 960212D
QUALITY CONTROL

ANALYST SIGNATURE: Stacy D Bolling

ANALYTE	SAMPLE USED FOR QC	LCS OR SPIKE RECOVERY	RELATIVE PERCENT DIFFERENCE BETWEEN DUPLICATES	METHOD BLANK CONCENTRATION
nitrate-nitrogen	EAL1915	128%	2%	.023U
fluoride	EAL1915	92%	14%	.1U
Cr(VI) {3060 method}	EAL1915	64%	N/A*	.8U
nitrate-nitrogen	EAL1927	109%	5%	.023U
fluoride	EAL1927	92%	9%	.1U
Cr(VI) {3060 method}	EAL1925	114%	**	.8U

U = analyte was not detected above the associated quantitation limit

*sample & duplicate were not detected above the associated quantitation limit

**refer to discussion in narrative

EAL
BATCH # 960226C
QUALITY CONTROL

ANALYST SIGNATURE: Stacey D Bell

ANALYTE	SAMPLE USED FOR QC	LCS OR SPIKE RECOVERY	RELATIVE PERCENT DIFFERENCE BETWEEN DUPLICATES	METHOD BLANK CONCENTRATION
Cr(VI)	EAL2035	82%	48%	.08U
Cr(VI)	EAL2041	102%	N/A*	.08U
fluoride	EAL02033	117%	15%	.1U
nitrate-nitrogen	EAL02033	97%	1%	.023U
fluoride	EAL02042	114%	N/A*	.1U
nitrate-nitrogen	EAL02042	105%	14%	.023U

U = analyte was not detected above the associated quantitation limit
*sample & duplicate were not detected above the associated quantitation limit

97 3640.2472

EAL
BATCH # 960304B
QUALITY CONTROL

ANALYST SIGNATURE: Stacy D Bell

ANALYTE	SAMPLE USED FOR QC	LCS OR SPIKE RECOVERY	RELATIVE PERCENT DIFFERENCE BETWEEN DUPLICATES	METHOD BLANK CONCENTRATION
Cr(VI)	EAL02094	111%	13%	.08U
Cr(VI)	EAL02102	104%	85%	.08U
nitrate-nitrogen	EAL02096	116%	3%	.023U
fluoride	EAL02094	86%	N/A*	.1U
fluoride	EAL02104	104%	8%	.1U
nitrate-nitrogen	EAL02104	107%	3%	.023U

U = analyte was not detected above the associated quantitation limit

*sample & duplicate were not detected above the associated quantiation limit

Environmental Analytical Laboratory ICP Results

Batch # 960212D

Quality Control Results for Samples: Analyst: John McCluskey

EAL01915-EAL01928 analyzed 02/14/96

Name of QC	HEIS #	EAL #	Analyte	Expected Result	Analytical Result
Method Blank	NA	NA	As	< MDL (5ug/g) for Soil Matrix	5U
			Cu	< MDL (1ug/g) for Soil Matrix	1U
			Ni	< MDL (2ug/g) for Soil Matrix	2U
Matrix Spike (MS)	B0H6T4	EAL01915	As	Calculate % Recovery	59%
			Cu	Calculate % Recovery	82%
			Ni	Calculate % Recovery	97%
Matrix Spike Dup (MSD)	B0H6T4	EAL01915	As	Calculate % Recovery	43%
			Cu	Calculate % Recovery	80%
			Ni	Calculate % Recovery	76%
Relative Percent Difference (RPD)	B0H6T4	EAL01915	As	Calculate RPD	31%
			Cu	Calculate RPD	2%
			Ni	Calculate RPD	24%
Laboratory Control Sample (LCS)	NA	NA	As	80ug/L	68ug/L
water			Cu	20ug/L	26ug/L
			Ni	40ug/L	47ug/L

MDL = Method Detection Limit

U = Not above the associated Quantitation Limit

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Environmental Analytical Laboratory

ICP Results

Batch # 960216B

Quality Control Results for Samples:

Analyst: John McCluskey

EAL01970-EAL01975

analyzed 02/16/96

Name of QC	HEIS #	EAL #	Analyte	Expected Result	Analytical Result
Method Blank	NA	NA	As	< MDL (5ug/g) for Soil Matrix	5U
			Cu	< MDL (1ug/g) for Soil Matrix	1U
			Ni	< MDL (2ug/g) for Soil Matrix	2U
Matrix Spike (MS)	B0H6W6	EAL01972	As	Calculate % Recovery	0%
			Cu	Calculate % Recovery	54%
			Ni	Calculate % Recovery	87%
Matrix Spike Dup (MSD)	B0H6W6	EAL01972	As	Calculate % Recovery	15%
			Cu	Calculate % Recovery	52%
			Ni	Calculate % Recovery	2%
Relative Percent Difference (RPD)	B0H6W6	EAL01972	As	Calculate RPD	5%
			Cu	Calculate RPD	5%
			Ni	Calculate RPD	1%
Laboratory Control Sample (LCS)	NA	NA	As	80ug/L	54ug/L
water			Cu	20ug/L	29ug/L
			Ni	40ug/L	57ug/L

MDL = Method Detection Limit

D:\MSOFFICE\EXCEL\183-H16.XLS

U = Not above the associated Quantitation Limit

Environmental Analytical Laboratory **ICP Results**
Batch # 960222A
Quality Control Results for Samples: **Analyst: John McCluskey**
EAL02015-EAL02020 analyzed 02/23/96

Name of QC	HEIS #	EAL #	Analyte	Expected Result	Analytical Result
Method Blank	NA	NA	As	< MDL (5ug/g) for Soil Matrix	5U
			Cu	< MDL (1ug/g) for Soil Matrix	1U
			Ni	< MDL (2ug/g) for Soil Matrix	2U
Matrix Spike (MS)	6B2206	EAL02020	As	Calculate % Recovery	109%
			Cu	Calculate % Recovery	100%
			Ni	Calculate % Recovery	98%
Matrix Spike Dup (MSD)	6B2206	EAL02020	As	Calculate % Recovery	110%
			Cu	Calculate % Recovery	89%
			Ni	Calculate % Recovery	101%
Relative Percent Difference (RPD)	6B2206	EAL02020	As	Calculate RPD	1%
			Cu	Calculate RPD	9%
			Ni	Calculate RPD	2%
Laboratory Control Sample (LCS)	NA	NA	As	80ug/L	76ug/L
water			Cu	20ug/L	36ug/L
			Ni	40ug/L	39ug/L

MDL = Method Detection Limit
U = Not above the associated Quantitation Limit **D:\MSOFFICE\EXCEL\183-H17.XLS**

Environmental Analytical Laboratory **ICP Results**

Batch # 960226C

Quality Control Results for Samples: **Analyst: John McCluskey**

EAL02033-EAL02038 **analyzed 02/28/96**

Name of QC	HEIS #	EAL #	Analyte	Expected Result	Analytical Result
Method Blank	NA	NA	As	< 5ug/g for Soil Matrix	5U
			Cu	< 1ug/g for Soil Matrix	1U
			Ni	< 2ug/g for Soil Matrix	2U
Matrix Spike (MS)	B0H6X6	EAL02035	As	Calculate % Recovery	93%
			Cu	Calculate % Recovery	125%
			Ni	Calculate % Recovery	121%
Matrix Spike Dup (MSD)	B0H6X6	EAL02035	As	Calculate % Recovery	99%
			Cu	Calculate % Recovery	124%
			Ni	Calculate % Recovery	116%
Relative Percent Difference (RPD)	B0H6X6	EAL02035	As	Calculate RPD	5%
			Cu	Calculate RPD	1%
			Ni	Calculate RPD	3%
Laboratory Control Sample (LCS)	NA	NA	As	917ug/g, Calculate % Recovery	112%
soil			Cu	6910ug/g, Calculate % Recovery	146%
			Ni	61ug/g, Calculate % Recovery	116%
Laboratory Control Sample (LCS)	NA	NA	NA	NA	NA
water			NA	NA	NA
			NA	NA	NA

U = Not above the associated Quantitation Limit **D:\MSOFFICE\EXCEL\183-H18.XLS**

Environmental Analytical Laboratory **ICP Results**

Batch # 960226C

Quality Control Results for Samples: **Analyst: John McCluskey**

EAL02038-EAL02042 **analyzed 02/28/96**

Name of QC	HEIS #	EAL #	Analyte	Expected Result	Analytical Result
Method Blank	NA	NA	As	< 5ug/g for Soil Matrix	5U
			Cu	< 1ug/g for Soil Matrix	1U
			Ni	< 2ug/g for Soil Matrix	2U
Matrix Spike (MS)	B0H6Y0	EAL02039	As	Calculate % Recovery	89%
			Cu	Calculate % Recovery	114%
			Ni	Calculate % Recovery	183%
Matrix Spike Dup (MSD)	B0H6Y0	EAL02039	As	Calculate % Recovery	116%
			Cu	Calculate % Recovery	121%
			Ni	Calculate % Recovery	113%
Relative Percent Difference (RPD)	B0H6Y0	EAL02039	As	Calculate RPD	18%
			Cu	Calculate RPD	5%
			Ni	Calculate RPD	34%
Laboratory Control Sample (LCS)	NA	EPA 0287	As	917ug/g, Calculate % Recovery	125%
soil			Cu	6910ug/g, Calculate % Recovery	150%
			Ni	61ug/g, Calculate % Recovery	131%
Laboratory Control Sample (LCS)	NA	NA	As	80ug/L, Calculate % Recovery	24%
water			Cu	20ug/L, Calculate % Recovery	195%
			Ni	40ug/L, Calculate % Recovery	78%

U = Not above the associated Quantitation Limit **D:\MSOFFICE\EXCEL\183-H19.XLS**

Environmental Analytical Laboratory **ICP Results**

Batch # 960226C

Quality Control Results for Samples: **Analyst: John McCluskey**

EAL02043-EAL02046 **analyzed 02/28/96**

Name of QC	HEIS #	EAL #	Analyte	Expected Result	Analytical Result
Method Blank	NA	NA	As	< 5ug/g for Soil Matrix	5U
			Cu	< 1ug/g for Soil Matrix	1U
			Ni	< 2ug/g for Soil Matrix	2U
Matrix Spike (MS)	B0HGY4	EAL02043	As	Calculate % Recovery	90%
			Cu	Calculate % Recovery	132%
			Ni	Calculate % Recovery	110%
Matrix Spike Dup (MSD)	B0HGY4	EAL02043	As	Calculate % Recovery	113%
			Cu	Calculate % Recovery	128%
			Ni	Calculate % Recovery	114%
Relative Percent Difference (RPD)	B0HGY4	EAL02043	As	Calculate RPD	9%
			Cu	Calculate RPD	2%
			Ni	Calculate RPD	2%
Laboratory Control Sample (LCS)	NA	EPA 0287	As	917ug/g, Calculate % Recovery	115%
soil			Cu	6910ug/g, Calculate % Recovery	173%
			Ni	61ug/g, Calculate % Recovery	145%
Laboratory Control Sample (LCS)	NA	NA	As	80ug/L, Calculate % Recovery	76%
water			Cu	20ug/L, Calculate % Recovery	170%
			Ni	40ug/L, Calculate % Recovery	102%

U = Not above the associated Quantitation Limit **D:\MSOFFICE\EXCEL\183-H20.XLS**

Environmental Analytical Laboratory **ICP Results**

Batch # 960228B

Quality Control Results for Samples: **Analyst: John McCluskey**

EAL02067-EAL02072 **analyzed 02/29/96**

Name of QC	HEIS #	EAL #	Analyte	Expected Result	Analytical Result
Method Blank	NA	NA	As	< 5ug/g for Soil Matrix	5U
			Cu	< 1ug/g for Soil Matrix	1U
			Ni	< 2ug/g for Soil Matrix	2U
Matrix Spike (MS)	6B2814	EAL02072	As	Calculate % Recovery	20%
			Cu	Calculate % Recovery	114%
			Ni	Calculate % Recovery	118%
Matrix Spike Dup (MSD)	6B2814	EAL02072	As	Calculate % Recovery	33%
			Cu	Calculate % Recovery	110%
			Ni	Calculate % Recovery	107%
Relative Percent Difference (RPD)	6B2814	EAL02072	As	Calculate RPD	48%
			Cu	Calculate RPD	3%
			Ni	Calculate RPD	6%
Laboratory Control Sample (LCS)	NA	EPA 0287	As	917ug/g, Calculate % Recovery	90%
soil			Cu	6910ug/g, Calculate % Recovery	141%
			Ni	61ug/g, Calculate % Recovery	131%
Laboratory Control Sample (LCS)	NA	NA	NA	NA	NA
water			NA	NA	NA
			NA	NA	NA

U = Not above the associated Quantitation Limit **D:\MSOFFICE\EXCEL\183-H23.XLS**

Environmental Analytical Laboratory **ICP Results**

Batch # 960304B

Quality Control Results for 183-H Project: Analyst: John McCluskey

Covers samples EAL02092, EAL02103, EAL02098, EAL02107-EAL02109 analyzed 03/06/96

Name of QC	HEIS #	EAL #	Analyte	Expected Result	Analytical Result
Method Blank	NA	NA	As	< 5ug/g for Soil Matrix	5U
			Cu	< 1ug/g for Soil Matrix	1U
			Ni	< 2ug/g for Soil Matrix	2U
Matrix Spike (MS)	B0HGQ0	EAL02098	As	Calculate % Recovery	80%
			Cu	Calculate % Recovery	107%
			Ni	Calculate % Recovery	117%
Matrix Spike Dup (MSD)	B0HGQ0	EAL02098	As	Calculate % Recovery	97%
			Cu	Calculate % Recovery	105%
			Ni	Calculate % Recovery	110%
Relative Percent Difference (RPD)	B0HGQ0	EAL02098	As	Calculate RPD	20%
			Cu	Calculate RPD	2%
			Ni	Calculate RPD	4%
Laboratory Control Sample (LCS)	NA	EPA 0287	As	917ug/g, Calculate % Recovery	121%
soil			Cu	6910ug/g, Calculate % Recovery	138%
			Ni	61ug/g, Calculate % Recovery	137%
Laboratory Control Sample (LCS)	NA	NA	NA	NA	NA
water			NA	NA	NA
			NA	NA	NA

U = Not above the associated Quantitation Limit D:\MSOFFICE\EXCEL\183-H24.XLS

Environmental Analytical Laboratory **ICP Results**

Batch # 960304B

Quality Control Results for 183-H Project: Analyst: John McCluskey

Covers samples EAL02099-EAL02102, EAL02104-EAL02105 analyzed 03/06/96

Name of QC	HEIS #	EAL #	Analyte	Expected Result	Analytical Result
Method Blank	NA	NA	As	< 5ug/g for Soil Matrix	5U
			Cu	< 1ug/g for Soil Matrix	1U
			Ni	< 2ug/g for Soil Matrix	2U
Matrix Spike (MS)	B0HGQ1	EAL02099	As	Calculate % Recovery	77%
			Cu	Calculate % Recovery	91%
			Ni	Calculate % Recovery	17%
Matrix Spike Dup (MSD)	B0HGQ1	EAL02099	As	Calculate % Recovery	100%
			Cu	Calculate % Recovery	101%
			Ni	Calculate % Recovery	32%
Relative Percent Difference (RPD)	B0HGQ1	EAL02099	As	Calculate RPD	10%
			Cu	Calculate RPD	9%
			Ni	Calculate RPD	11%
Laboratory Control Sample (LCS)	NA	EPA 0287	As	917ug/g, Calculate % Recovery	95%
soil			Cu	6910ug/g, Calculate % Recovery	134%
			Ni	61ug/g, Calculate % Recovery	107%
Laboratory Control Sample (LCS)	NA	NA	NA	NA	NA
water			NA	NA	NA
			NA	NA	NA

U = Not above the associated Quantitation Limit **D:\MSOFFICE\EXCEL\183-H25.XLS**

Environmental Analytical Laboratory **ICP Results**

Batch # 960304B

Quality Control Results for 183-H Project: Analyst: John McCluskey

Covers samples EAL02093-EAL02097 analyzed 03/06/96

Name of QC	HEIS #	EAL #	Analyte	Expected Result	Analytical Result
Method Blank	NA	NA	As	< 5ug/g for Soil Matrix	5U
			Cu	< 1ug/g for Soil Matrix	1U
			Ni	< 2ug/g for Soil Matrix	2U
Matrix Spike (MS)	B0HGP5	EAL02093	As	Calculate % Recovery	83%
			Cu	Calculate % Recovery	97%
			Ni	Calculate % Recovery	95%
Matrix Spike Dup (MSD)	B0HGP5	EAL02093	As	Calculate % Recovery	106%
			Cu	Calculate % Recovery	96%
			Ni	Calculate % Recovery	103%
Relative Percent Difference (RPD)	B0HGP5	EAL02093	As	Calculate RPD	12%
			Cu	Calculate RPD	1%
			Ni	Calculate RPD	5%
Laboratory Control Sample (LCS)	NA	EPA 0287	As	917ug/g, Calculate % Recovery	96%
soil			Cu	6910ug/g, Calculate % Recovery	130%
			Ni	61ug/g, Calculate % Recovery	110%
Laboratory Control Sample (LCS)	NA	NA	As	80ug/L, Calculate % Recovery	96%
water			Cu	20ug/L, Calculate % Recovery	55%
			Ni	40ug/L, Calculate % Recovery	72%

U = Not above the associated Quantitation Limit **D:\MSOFFICE\EXCEL\183-H26.XLS**

Environmental Analytical Laboratory **ICP Results**

Batch # 960311A

Quality Control Results for 183-H Project: Analyst: John McCluskey

Covers samples EAL02019-EAL02024 analyzed 03/13/96

Name of QC	HEIS #	EAL #	Analyte	Expected Result	Analytical Result
Method Blank	NA	NA	As	< 5ug/g for Soil Matrix	5U
			Cu	< 1ug/g for Soil Matrix	1U
			Ni	< 2ug/g for Soil Matrix	2U
Matrix Spike (MS)	6C11-05	EAL02219	As	Calculate % Recovery	79%
			Cu	Calculate % Recovery	114%
			Ni	Calculate % Recovery	108%
Matrix Spike Dup (MSD)	6C11-05	EAL02219	As	Calculate % Recovery	45%
			Cu	Calculate % Recovery	103%
			Ni	Calculate % Recovery	96%
Relative Percent Difference (RPD)	6C11-05	EAL02219	As	Calculate RPD	47%
			Cu	Calculate RPD	9%
			Ni	Calculate RPD	8%
Laboratory Control Sample (LCS)	NA	EPA 0287	As	917ug/g, Calculate % Recovery	98%
soil			Cu	6910ug/g, Calculate % Recovery	153%
			Ni	61ug/g, Calculate % Recovery	124%
Laboratory Control Sample (LCS)	NA	NA	NA	NA	NA
water			NA	NA	NA
			NA	NA	NA

U = Not above the associated Quantitation Limit **D:\MSOFFICE\EXCEL\183-H27.XLS**

Environmental Analytical Laboratory **ICP Results**

Batch # 960313B

Quality Control Results for 183-H Project: Analyst: John McCluskey

Covers samples EAL02240-41,EAL02243-44,EAL02246-47 analyzed 03/13/96

Name of QC	HEIS #	EAL #	Analyte	Expected Result	Analytical Result
Method Blank	NA	NA	As	< 5ug/g for Soil Matrix	5U
			Cu	< 1ug/g for Soil Matrix	1U
			Ni	< 2ug/g for Soil Matrix	2U
Matrix Spike (MS)	6C1301	EAL02240	As	Calculate % Recovery	80%
			Cu	Calculate % Recovery	90%
			Ni	Calculate % Recovery	91%
Matrix Spike Dup (MSD)	6C1301	EAL02240	As	Calculate % Recovery	75%
			Cu	Calculate % Recovery	107%
			Ni	Calculate % Recovery	103%
Relative Percent Difference (RPD)	6C1301	EAL02240	As	Calculate RPD	7%
			Cu	Calculate RPD	7%
			Ni	Calculate RPD	7%
Laboratory Control Sample (LCS)	NA	EPA 0287	As	917ug/g, Calculate % Recovery	105%
soil			Cu	6910ug/g, Calculate % Recovery	131%
			Ni	61ug/g, Calculate % Recovery	132%
Laboratory Control Sample (LCS)	NA	NA	NA	NA	NA
water			NA	NA	NA
			NA	NA	NA

U = Not above the associated Quantitation Limit **D:\MSOFFICE\EXCEL\183-H28.XLS**

Environmental Analytical Laboratory **ICP Results**

Batch # 960308C

Quality Control Results for the Orchard Project: Analyst: John McCluskey

Covers samples EAL02173-EAL02178 (EAL02177 was lost after extraction) analyzed 03/14/96

Name of QC	HEIS #	EAL #	Analyte	Expected Result	Analytical Result
Method Blank	NA	NA	As	< 5ug/g for Soil Matrix	5U
			Cu	< 1ug/g for Soil Matrix	1U
			Ni	< 2ug/g for Soil Matrix	2U
Matrix Spike (MS)	6B0801	EAL02173	As	Calculate % Recovery	97%
			Cu	Calculate % Recovery	100%
			Ni	Calculate % Recovery	104%
Matrix Spike Dup (MSD)	6B0801	EAL02173	As	Calculate % Recovery	166%
			Cu	Calculate % Recovery	100%
			Ni	Calculate % Recovery	102%
Relative Percent Difference (RPD)	6B0801	EAL02173	As	Calculate RPD	29%
			Cu	Calculate RPD	0%
			Ni	Calculate RPD	1%
Laboratory Control Sample (LCS)	NA	EPA 0287	As	917ug/g, Calculate % Recovery	123%
soil			Cu	6910ug/g, Calculate % Recovery	131%
			Ni	61ug/g, Calculate % Recovery	132%
Laboratory Control Sample (LCS)	NA	NA	NA	NA	NA
water			NA	NA	NA
			NA	NA	NA

U = Not above the associated Quantitation Limit D:\MSOFFICE\EXCEL\ORCHARD1.XLS

9713540.2479

GENERAL VALIDATION CHECKLIST

BATCH NUMBER (from Sample Logbook): 960212D, 960216B, 960226C, 960304B

SAMPLE NUMBERS: EAL01915-01928, EAL02033-02046, EAL02092-02105

ANALYTES REQUESTED: Fluoride, Nitrate-Nitrogen, Hexavalent Chromium, Copper, Nickel, Arsenic

VALIDATOR: PAUL E DUERKSEN **SIGNATURE:** Paul E Duerksen **DATE:** 3/22/93

Requested analytes were performed	Yes	No
Chain-of-custody forms are complete	Yes	Not Available
Anomaly reports are complete and signed	Yes *	None
Organic peer review checklist is complete	Yes	Not Required
Inorganic peer review checklist is complete	Yes	Not Required
Radiochemical peer review checklist is complete	Yes	Not Required
Spreadsheets (for Results and QC) are in proper format and have been signed	Yes	No
HEIS numbers have been included	Yes	Not Required
Client sample identification has been included	Yes	Not Required
EAL sample numbers have been included	Yes	No
SAF has been included	Yes	No
Narrative has been included and signed	Yes	No

* two anomaly reports are in process

INORGANIC PEER REVIEW CHECKLIST

SAMPLE #: EAL01915-1928 DATE SAMPLED: 02/12/96 DATE ANALYZED: 02/15/96

PEER REVIEWER: John McCluskey SIGNATURE: John McCluskey DATE: 03/22/96

IC Anions and/or Cations

Water samples for sulfate and/or nitrate were refrigerated to 4°C	Yes	NA
Holding time requirement was met: 48 hours from date sampled for nitrate; 28 days for other ions	Yes	No
Date of multi-point calibration	02/15/96	–
The calibration check standard met acceptance criteria for each ion reported	Yes	No
The response for each ion reported in each sample was less than the response for that ion in the highest calibration standard	Yes	No
Spike recovery and RPD calculations are correct, and the values were reported on the QC spreadsheet	Yes	No
Spike recovery met acceptance criteria for each ion reported	Yes	No
The reagent blank was analyzed and reported on the QC spreadsheet	Yes	No
Conversion to soil concentration was correct	Yes	NA

One nitrate spike was 128%

INORGANIC PEER REVIEW CHECKLIST

SAMPLE #: EAL02033-2046 DATE SAMPLED: 02/26/96 DATE ANALYZED: 02/28/96

PEER REVIEWER: John McCluskey SIGNATURE: John McCluskey DATE: 03/22/96

IC Anions and/or Cations

Water samples for sulfate and/or nitrate were refrigerated to 4°C	Yes	NA
Holding time requirement was met: 48 hours from date sampled for nitrate; 28 days for other ions	Yes	No
Date of multi-point calibration	02/22/96	–
The calibration check standard met acceptance criteria for each ion reported	Yes	No
The response for each ion reported in each sample was less than the response for that ion in the highest calibration standard	Yes	No
Spike recovery and RPD calculations are correct, and the values were reported on the QC spreadsheet	Yes	No
Spike recovery met acceptance criteria for each ion reported	Yes	No
The reagent blank was analyzed and reported on the QC spreadsheet	Yes	No
Conversion to soil concentration was correct	Yes	NA

INORGANIC PEER REVIEW CHECKLIST

SAMPLE #: EAL07092-2105 DATE SAMPLED: 03/04/96 DATE ANALYZED: 03/06/96

PEER REVIEWER: John McClusky SIGNATURE: John McClusky DATE: 03/22/96

IC Anions and/or Cations

Water samples for sulfate and/or nitrate were refrigerated to 4°C	Yes	NA
Holding time requirement was met: 48 hours from date sampled for nitrate; 28 days for other ions	Yes	No
Date of multi-point calibration	03/06/96	–
The calibration check standard met acceptance criteria for each ion reported	Yes	No
The response for each ion reported in each sample was less than the response for that ion in the highest calibration standard	Yes	No
Spike recovery and RPD calculations are correct, and the values were reported on the QC spreadsheet	Yes	No
Spike recovery met acceptance criteria for each ion reported	Yes	No
The reagent blank was analyzed and reported on the QC spreadsheet	Yes	No
Conversion to soil concentration was correct	Yes	NA

INORGANIC PEER REVIEW CHECKLIST

SAMPLE #: EAL01915-1928 DATE SAMPLED: 02/12/96 DATE ANALYZED: 02/15/96

PEER REVIEWER: John McCluskey SIGNATURE: John McCluskey DATE: 03/22/96

Hexavalent Chromium

NA

Water samples were refrigerated to 4°C	Yes	No
Holding time requirement was met: 24 hours from date sampled	Yes	No
Date of multi-point calibration	01/22/96	–
The calibration check standard met acceptance criteria	Yes	No
The response for hexavalent chromium in each sample was less than the response in the highest calibration standard	Yes	No
Spike recovery and RPD calculations are correct, and the values were reported on the QC spreadsheet	Yes	No
Spike recovery met acceptance criteria	Yes	No
The reagent blank was analyzed and reported on the QC spreadsheet	Yes	No
Conversion to soil concentration was correct	Yes	NA

INORGANIC PEER REVIEW CHECKLIST

SAMPLE #: EAL02033-2046 DATE SAMPLED: 02/26/96 DATE ANALYZED: 02/27/96

PEER REVIEWER: John McCluskey SIGNATURE: John McCluskey DATE: 03/22/96

Hexavalent Chromium

Water samples were refrigerated to 4°C	Yes	No	NA
Holding time requirement was met: 24 hours from date sampled	Yes	No	
Date of multi-point calibration	01/22/96	–	
The calibration check standard met acceptance criteria	Yes	No	
The response for hexavalent chromium in each sample was less than the response in the highest calibration standard	Yes	No	
Spike recovery and RPD calculations are correct, and the values were reported on the QC spreadsheet	Yes	No	
Spike recovery met acceptance criteria	Yes	No	
The reagent blank was analyzed and reported on the QC spreadsheet	Yes	No	
Conversion to soil concentration was correct	Yes	NA	

INORGANIC PEER REVIEW CHECKLIST

SAMPLE #: EAL0692 2105 DATE SAMPLED: 03/04/96 DATE ANALYZED: 03/05/96

PEER REVIEWER: John McCluskey SIGNATURE: John McCluskey DATE: 03/22/96

Hexavalent Chromium

Water samples were refrigerated to 4°C	Yes	No	NA
Holding time requirement was met: 24 hours from date sampled	Yes	No	
Date of multi-point calibration	01/22/96	–	
The calibration check standard met acceptance criteria	Yes	No	
The response for hexavalent chromium in each sample was less than the response in the highest calibration standard	Yes	No	
Spike recovery and RPD calculations are correct, and the values were reported on the QC spreadsheet	Yes	No	
Spike recovery met acceptance criteria	Yes	No	
The reagent blank was analyzed and reported on the QC spreadsheet	Yes	No	
Conversion to soil concentration was correct	Yes	NA	

INORGANIC PEER REVIEW CHECKLIST

SAMPLE #: EAL01915-EAL01928 DATE SAMPLED: _____ DATE ANALYZED: 2/14/96

PEER REVIEWER: PE DUERKSEN SIGNATURE: Paul E Duerksen DATE: 3/21/96

ICP Metals

Water samples were preserved with nitric acid to pH <2. Soil samples were refrigerated at 4°C.	Yes	No
Holding time requirement was met: 6 months from date sampled.	Yes	No
Date of multi-point calibration	2/14/96	–
The high calibration check standard was within 5% of expected value for each metal reported	Yes	No
The midpoint calibration check standard was within 10% of expected value for each metal reported	Yes	No
The response for each metal reported in each sample was less than the response for that metal in the highest calibration standard	Yes	No
The QC Standard (LCS) recovery and RPD calculations are correct, and the values were reported on the QC spreadsheet	Yes	No
The QC standard (LCS), at ≈10 x MDL, met acceptance criteria for each metal reported	Yes *	No
The reagent blank was analyzed and reported on the QC spreadsheet for each metal reported	Yes	No
Conversion to soil concentration was correct	Yes	NA

* control limits have not been established

INORGANIC PEER REVIEW CHECKLIST

SAMPLE #: EAL01970 – EAL01975 DATE SAMPLED: _____ DATE ANALYZED: 2/16/96

PEER REVIEWER: P.E. DUERKSEN SIGNATURE: Paul E Duerksen DATE: 3/21/96

ICP Metals

Water samples were preserved with nitric acid to pH <2. Soil samples were refrigerated at 4°C.	Yes	No
Holding time requirement was met: 6 months from date sampled.	Yes	No
Date of multi-point calibration	2/16/96	–
The high calibration check standard was within 5% of expected value for each metal reported	Yes	No
The midpoint calibration check standard was within 10% of expected value for each metal reported	Yes	No
The response for each metal reported in each sample was less than the response for that metal in the highest calibration standard	Yes	No
The QC Standard (LCS) recovery and RPD calculations are correct, and the values were reported on the QC spreadsheet	Yes	No
The QC standard (LCS), at ≈10 x MDL, met acceptance criteria for each metal reported	Yes *	No
The reagent blank was analyzed and reported on the QC spreadsheet for each metal reported	Yes	No
Conversion to soil concentration was correct	Yes	NA

high calibration check standard recovery for Ni = 110%
midpoint calibration check standard recovery for As = 76%
midpoint calibration check standard recovery for Ni = 112%
* control limits have not been established

INORGANIC PEER REVIEW CHECKLIST

SAMPLE #: EAL02015-EAL02020 DATE SAMPLED: _____ DATE ANALYZED: 2/23/96

PEER REVIEWER: P. E. DUERKSEN SIGNATURE: Paul E Duerksen DATE: 3/21/96

ICP Metals

Water samples were preserved with nitric acid to pH <2. Soil samples were refrigerated at 4°C.	Yes	No
Holding time requirement was met: 6 months from date sampled.	Yes	No
Date of multi-point calibration	2/23/96	–
The high calibration check standard was within 5% of expected value for each metal reported	Yes	No
The midpoint calibration check standard was within 10% of expected value for each metal reported	Yes	No
The response for each metal reported in each sample was less than the response for that metal in the highest calibration standard	Yes	No
The QC Standard (LCS) recovery and RPD calculations are correct, and the values were reported on the QC spreadsheet	Yes	No
The QC standard (LCS), at ≈10 x MDL, met acceptance criteria for each metal reported	Yes *	No
The reagent blank was analyzed and reported on the QC spreadsheet for each metal reported	Yes	No
Conversion to soil concentration was correct	Yes	NA

high calibration check standard recovery for As = 108%
high calibration check standard recovery for Cu = 109%
* control limits have not been established

INORGANIC PEER REVIEW CHECKLIST

SAMPLE #: EAL02033-EAL02042 DATE SAMPLED: _____ DATE ANALYZED: 2/28/96

PEER REVIEWER: P.E. DUERKSEN SIGNATURE: Paul E Duerksen DATE: 3/21/96

ICP Metals

Water samples were preserved with nitric acid to pH <2. Soil samples were refrigerated at 4°C.	Yes	No
Holding time requirement was met: 6 months from date sampled.	Yes	No
Date of multi-point calibration	2/28/96	–
The high calibration check standard was within 5% of expected value for each metal reported	Yes	No
The midpoint calibration check standard was within 10% of expected value for each metal reported	Yes	No
The response for each metal reported in each sample was less than the response for that metal in the highest calibration standard	Yes	No
The QC Standard (LCS) recovery and RPD calculations are correct, and the values were reported on the QC spreadsheet	Yes **	No
The QC standard (LCS), at ≈10 x MDL, met acceptance criteria for each metal reported	Yes *	No
The reagent blank was analyzed and reported on the QC spreadsheet for each metal reported	Yes	No
Conversion to soil concentration was correct	Yes	NA

high calibration check standard recovery = 111% for As
** a soil LCS was analyzed in placed of the QC standard
* control limits have not been established

INORGANIC PEER REVIEW CHECKLIST

SAMPLE #: EAL02043-EAL02046 DATE SAMPLED: _____ DATE ANALYZED: 2/28/96

PEER REVIEWER: P.E. DUERKSEN SIGNATURE: Paul E Duerksen DATE: 3/21/96

ICP Metals

Water samples were preserved with nitric acid to pH <2. Soil samples were refrigerated at 4°C.	Yes	No
Holding time requirement was met: 6 months from date sampled.	Yes	No
Date of multi-point calibration	2/28/96	–
The high calibration check standard was within 5% of expected value for each metal reported	Yes	No
The midpoint calibration check standard was within 10% of expected value for each metal reported	Yes	No
The response for each metal reported in each sample was less than the response for that metal in the highest calibration standard	Yes	No
The QC Standard (LCS) recovery and RPD calculations are correct, and the values were reported on the QC spreadsheet	Yes	No
The QC standard (LCS), at ≈10 x MDL, met acceptance criteria for each metal reported	Yes *	No
The reagent blank was analyzed and reported on the QC spreadsheet for each metal reported	Yes	No
Conversion to soil concentration was correct	Yes	NA

high calibration check standard recovery for Cu = 118%
midpoint calibration check standard recovery for Cu = 117%
* control limits have not been established

INORGANIC PEER REVIEW CHECKLIST

SAMPLE #: EAL02067-EAL02072 DATE SAMPLED: _____ DATE ANALYZED: 2/29/96

PEER REVIEWER: P.E. DUERKSEN SIGNATURE: Paul E Duerksen DATE: 3/21/96

ICP Metals

Water samples were preserved with nitric acid to pH <2. Soil samples were refrigerated at 4°C.	Yes	No
Holding time requirement was met: 6 months from date sampled.	Yes	No
Date of multi-point calibration	2/29/96	–
The high calibration check standard was within 5% of expected value for each metal reported	Yes	No
The midpoint calibration check standard was within 10% of expected value for each metal reported	Yes	No
The response for each metal reported in each sample was less than the response for that metal in the highest calibration standard	Yes	No
The QC Standard (LCS) recovery and RPD calculations are correct, and the values were reported on the QC spreadsheet	Yes **	No
The QC standard (LCS), at ≈10 x MDL, met acceptance criteria for each metal reported	Yes *	No
The reagent blank was analyzed and reported on the QC spreadsheet for each metal reported	Yes	No
Conversion to soil concentration was correct	Yes	NA

high calibration check standard recovery for As = 93%

** a soil LCS was analyzed in place of the QC standard

* control limits have not been established

INORGANIC PEER REVIEW CHECKLIST

SAMPLE #: EAL02092-2097 EAL02098-2105 EAL02107-2109 DATE SAMPLED: _____ DATE ANALYZED: 3/6/96

PEER REVIEWER: PE DUERKSEN SIGNATURE: Paul E Duerksen DATE: 3/21/96

ICP Metals

Water samples were preserved with nitric acid to pH <2. Soil samples were refrigerated at 4°C.	Yes	No
Holding time requirement was met: 6 months from date sampled.	Yes	No
Date of multi-point calibration	3/6/96	–
The high calibration check standard was within 5% of expected value for each metal reported	Yes	No
The midpoint calibration check standard was within 10% of expected value for each metal reported	Yes	No
The response for each metal reported in each sample was less than the response for that metal in the highest calibration standard	Yes	No
The QC Standard (LCS) recovery and RPD calculations are correct, and the values were reported on the QC spreadsheet	Yes **	No
The QC standard (LCS), at ≈10 x MDL, met acceptance criteria for each metal reported	Yes *	No
The reagent blank was analyzed and reported on the QC spreadsheet for each metal reported	Yes	No
Conversion to soil concentration was correct	Yes	NA

high calibration check standard recovery for Ni = 109%

** a soil LCS was analyzed in place of the QC standard

* control limits have not been established

INORGANIC PEER REVIEW CHECKLIST

SAMPLE #: EAL02219 - EAL02224 DATE SAMPLED: _____ DATE ANALYZED: 3/13/96

PEER REVIEWER: PE DUERKSEN SIGNATURE: Paul E Duerksen DATE: 3/21/96

ICP Metals

Water samples were preserved with nitric acid to pH <2. Soil samples were refrigerated at 4°C.	Yes	No
Holding time requirement was met: 6 months from date sampled.	Yes	No
Date of multi-point calibration	3/13/96	–
The high calibration check standard was within 5% of expected value for each metal reported	Yes	No
The midpoint calibration check standard was within 10% of expected value for each metal reported	Yes	No
The response for each metal reported in each sample was less than the response for that metal in the highest calibration standard	Yes	No
The QC Standard (LCS) recovery and RPD calculations are correct, and the values were reported on the QC spreadsheet	Yes **	No
The QC standard (LCS), at ≈10 x MDL, met acceptance criteria for each metal reported	Yes *	No
The reagent blank was analyzed and reported on the QC spreadsheet for each metal reported	Yes	No
Conversion to soil concentration was correct	Yes	NA

** a soil LCS was analyzed in place of the QC standard

* control limits have not been established

INORGANIC PEER REVIEW CHECKLIST

SAMPLE #: EAL02240 - EAL02247 DATE SAMPLED: _____ DATE ANALYZED: 3/14/96

PEER REVIEWER: PE DUERKSEN SIGNATURE: Paul E Duerksen DATE: 3/21/96

ICP Metals

Water samples were preserved with nitric acid to pH <2. Soil samples were refrigerated at 4°C.	Yes	No
Holding time requirement was met: 6 months from date sampled.	Yes	No
Date of multi-point calibration	3/14/96	-
The high calibration check standard was within 5% of expected value for each metal reported	Yes	No
The midpoint calibration check standard was within 10% of expected value for each metal reported	Yes	No
The response for each metal reported in each sample was less than the response for that metal in the highest calibration standard	Yes	No
The QC Standard (LCS) recovery and RPD calculations are correct, and the values were reported on the QC spreadsheet	Yes **	No
The QC standard (LCS), at ≈10 x MDL, met acceptance criteria for each metal reported	Yes *	No
The reagent blank was analyzed and reported on the QC spreadsheet for each metal reported	Yes	No
Conversion to soil concentration was correct	Yes	NA

high calibration check standard recovery for Cu = 106%

** a soil LCS was analyzed in place of the QC standard

* control limits have not been established

INORGANIC PEER REVIEW CHECKLIST

SAMPLE #: EAL02173-EAL02178 DATE SAMPLED: _____ DATE ANALYZED: 3/14/96

PEER REVIEWER: PEDUERKSEN SIGNATURE: Paul E Duerksen DATE: 3/21/96

ICP Metals

Water samples were preserved with nitric acid to pH <2. Soil samples were refrigerated at 4°C.	Yes	No
Holding time requirement was met: 6 months from date sampled.	Yes	No
Date of multi-point calibration		–
The high calibration check standard was within 5% of expected value for each metal reported	Yes	No
The midpoint calibration check standard was within 10% of expected value for each metal reported	Yes	No
The response for each metal reported in each sample was less than the response for that metal in the highest calibration standard	Yes	No
The QC Standard (LCS) recovery and RPD calculations are correct, and the values were reported on the QC spreadsheet	Yes **	No
The QC standard (LCS), at ≈10 x MDL, met acceptance criteria for each metal reported	Yes *	No
The reagent blank was analyzed and reported on the QC spreadsheet for each metal reported	Yes	No
Conversion to soil concentration was correct	Yes	NA

high calibration check standard recovery for As = 109%
** a soil LCS was analyzed in place of the QC Standard
* control limits have not been established

Analytical Services
Anomaly Report

BHI-00932
Rev. 0

Number: 40

Date: 3/22/96

Prepared By: John McCluskey and Paul Duerksen

Discrepancy

In the analysis for ICP metals, the recoveries for the midpoint calibration check standards were not within acceptance limits on the following days for the listed metals:

2/16/96 Arsenic 76%
2/16/96 Nickel 112%
2/28/96 Copper 117%

Disposition

Paul Duerksen and John McCluskey will evaluate possible causes, such as plasma character, selected wavelength, interelement correction, and calibration range

Approvals

Customer (If Applicable)

_____

EAL Manager

3/22/96

Corrective Action

EAL Manager

_____

Analytical Services
Anomaly Report

BHI-00932
Rev. 0

Number: 39

Date: 3/22/96

Prepared By: John McCluskey and Paul Duerksen

Discrepancy

In the analysis for ICP metals, the recoveries for the high calibration check standards were not within acceptance limits on the following days for the listed metals:

2/16/96	Nickel	110%
2/23/96	Arsenic	108%
2/23/96	Copper	109%
2/28/96	Arsenic	111%
2/28/96	Copper	118%
2/29/96	Arsenic	93%
3/6/96	Nickel	109%
3/14/96	Copper	106%
3/14/96	Arsenic	109%

Disposition

Paul Duerksen and John McCluskey will evaluate possible causes, such as plasma character, selected wavelength, interelement correction, and calibration range.

Discrepancies were not bad enough to affect sample results

Approvals

Customer (If Applicable)

_____

EAL Manager

3/22/96

Corrective Action

EAL Manager

_____

BHI-EAL-002

Analytical Services
Anomaly Report

BHI-00932
Rev. 0

Number: 38

Date: 3/22/96

Prepared By: John McCluskey and Paul Duerksen

Discrepancy

In the analysis for ICP metals a soil LCS was substituted for the QC standard on the following days:
2/28/96
2/29/96
3/6/96
3/13/96
3/14/96

Disposition

Analyst will run the QC standard for all batches from now on. Evaluation of other QC such as the soil LCS and matrix spikes indicated acceptable QC for the batches in question.

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Approvals

Customer (If Applicable)

_____

EAL Manager

Jill Tenh 3/22/96

Corrective Action

None

EAL Manager

Jill Tenh 3/22/96

BHI-EAL-002

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APPENDIX E

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SHALLOW SOIL RESULTS FROM QUANTERRA, INC.

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APPENDIX E -- CONTENTS

SAMPLE AND DATA MANAGEMENT ADMINISTRATIVE VERIFICATION
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BHI-00932
Rev. 0

SAMPLE AND DATA MANAGEMENT ADMINISTRATIVE VERIFICATION FORM

VER-B96-199
Verification Number

VERIFICATION DATE: 5/1/96	**VERIFIER:** JEAN M. MARSHALL Jean Marshall
PROJECT: SOILS FIELD SCREENING 183-H PHASE II	**SAF NUMBER:** B96-060
PACKAGE ID NUMBER: W0903	**SDR NUMBER:** NONE
SAMPLE NUMBERS: B0H6V8, B0H6V9, B0H6W0, B0H6W1	

DATA PACKAGE DEFICIENCIES:

WITHIN THE FOLLOWING SUBSETS NO DEFICIENCIES WERE FOUND;

WET CHEMISTRY

METALS

CHROMIUM VI

DATE DEFICIENCIES TRANSMITTED TO LAB:

DATE LAB RESPONSE DUE:	**DATE LAB RESPONSE RECEIVED:**

DATA ADMINSTRATIVE VERIFICATION CLOSED: 5/1/96 JMM

Analytical Data Package Prepared For

Bechtel Hanford

Chemical Analysis By

Quanterra Environmental Services
St. Louis Laboratory

APR 1996
RECEIVED
Data
Log In

Sample Delivery Group Number: W0903

BHI IDENTIFICATION NUMBER	QUANTERRA ID NUMBER
B0H6V8	10378-001
B0H6V9	10378-002
B0H6W0	10378-003
B0H6W1	10378-004

9713540.2493

BHI-00932
Rev. 0

Quanterra Environmental Services

Quanterra Incorporated
13715 Rider Trail North
Earth City, Missouri 63045

314 298-8566 Telephone
314 298-8757 Fax

CERTIFICATE OF ANALYSIS

Bechtel Hanford Incorporated
P.O. Box 1970
Richland, Washington 99352

February 23, 1996

Attention: Joan Kessner

APR 1996
RECEIVED
Data
Log In

Project number	:	550.122
Date Received by Lab	:	February 20, 1996
Number of Samples	:	Four (4)
Sample Type	:	Soil
SDG Number	:	W0903
Data Deliverable	:	Summary

I. Introduction

On February 20, 1996, four (4) soil samples were received by Quanterra, Richland and transferred to Quanterra, St. Louis for chemical analysis. Upon receipt, the samples were given the following laboratory ID numbers to correspond with the specific client ID's:

St Louis ID	WHC ID	Richland ID	Matrix	Date of Receipt
10378-001	B0H6V8	60224301	Soil	02/20/96
10378-002	B0H6V9	60224302	Soil	02/20/96
10378-003	B0H6W0	60224303	Soil	02/20/96
10378-004	B0H6W1	60224304	Soil	02/20/96

II. Analytical Results/ Methodology

The analytical results for this report are presented by analytical test. Each set of data includes sample identification information, analytical results and the appropriate detection limits.

Analyses requested: Arsenic by EPA method 7060. Fluoride and Nitrate by EPA method 300.0. Hexavalent Chromium by EPA method 7196 was performed by QTESRL. The data is included in this package.

0002

III. Quality Control

A Laboratory Control Sample and Method Blank were analyzed with each preparation batch. Matrix Spike and Matrix Spike Duplicate or Sample Duplicate analyses were performed per the protocol for each analyte.

IV. Definitions

The following codes are used to denote laboratory quality control samples and can be found in the data summary section of this report:

QCBLK- Quality Control Blank, Method Blank
QCLCS- Quality Control Laboratory Control Sample, Blank Spike

V. Comments

Metals
The recovery of the Matrix Spike Duplicate for Arsenic (144.9%) was greater than 120%, therefore all data was flagged with an "N ". The Relative Percent Difference was greater than the suggested QC limits of 20%. See NCM # SL-2497.

Wet Chemistry
The Relative Percent Difference could not be calculated due to the values being below the detection limits for sample 10372-001 on the Fluoride analysis.

Quanterra
Environmental Services

Bechtel Hanford Incorporated
February 23, 1996
Project Number: 550.122
SDG: W0903
Page 3

I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:

Wade H. Price
Project Manager
e:\\price$\abbydave\hanw0903.nar

Quanterra Environmental Services

LOG #: SL-94- 2497 page 1 of 2

LABORATORY NONCONFORMANCE MEMO (NCM)

PROJECT ID (Name/Number): 550.122 W0903
NCM INITIATED BY (Name/Date): K. Clay 02/22/96
PARAMETER(S): As - GFAA
SAMPLE NUMBER(S) AFFECTED: 10378-001 — 7004

AREA:

☐ SHIP/REC	☐ GC	☐ GEN CHEM	☐ BIOASSAY	☐ IH
☐ ORG EXT	☐ HPLC	☐ METALS	☐ RADIOCHEM	☐ DATA VERIFICATION
☐ INORG PREP	☐ GCMS	☐ GEO	☐ COUNTING	☐ REPORTING
☐ OTHER:	☐	☐	☐	☐

NONCONFORMANCE [check appropriate item(s)]:

1. ☐ Not enough sample received for proper analysis.
2. ☐ Holding time exceeded by _____ days due to:
   - 2.1. ☐ CATEGORY I: Out of Laboratory Control
     - ☐ Holding time expired at receipt.
   - 2.2. ☐ CATEGORY II: Laboratory Dependent
     - ☐ work backlog ☐ instrument failure
     - ☐ communication ☐ other (see #10)
   - 2.3. ☐ CATEGORY III: Laboratory Reruns
     - 2.3.1. ☐ *QA/QC:*
       - ☐ surrogates ☐ internal standards
       - ☐ spike recoveries ☐ blank contamination
     - 2.3.2. ☐ *CONFIRMATION:*
       - ☐ second column ☐ contamination check
       - ☐ other (see #10)
     - 2.3.3. ☐ *DILUTION:*
       - ☐ over calibration ☐ under calibration
       - ☐ other (see #10)
     - 2.3.4 ☐ *OTHER: (see #10)*
3. ☐ Sample lost during extraction/analysis; no re-prep or re-analysis possible.
4. ☐ QC data reported to client outside of:
   - ☑ method limits ☐ internal limits
   - ☐ QAPP limits ☐ contract limits
   - ☐ regulatory limits ☐ blank criteria
5. ☐ Incorrect procedure(s) used. (See #10)
6. ☐ Invalid instrument calibration. (See #10)
7. ☐ Incorrect/incomplete data reported to client. (See #10)
8. ☐ Reported detection limit(s) higher than:
   - ☐ method limits ☐ QAPP limits
   - ☐ contract limits ☐ other (see #10)

   Due to:
   - ☐ sample matrix ☐ insufficient sample
   - ☐ instrumentation ☐ other (see #10)
9. ☐ Other (specify):
   As MSD = 145 % > RPD 21.3%
   (MS) = 117%
10. ☐ Comments/Explanation:

NOTIFICATION [check appropriate item(s)]:

1. ☑ Client notified by (name and date): AW 2/23/96
   - ☑ in writing ☐ by FAX
   - ☐ by phone ☐ Other (explain) case narrative
2. ☐ Client's name _____ and response
   - ☐ process "as is" ☐ resample
   - ☐ on hold til ____ ☐ Other (explain)

PROJECT MANAGER (signature & date): Abigail Walden 2/23/96

FURTHER ACTION REQUIRED, SEE PAGE 2 OF 2

CORRECTIVE ACTION

☐ ROOT CAUSE: INITIALS/DATE Lec 02-22-96

Unknown

Mai Dec 02-22-96

☐ CORRECTIVE ACTION: INITIALS/DATE Lec 02-22-96

Report data

☐ RESPONSIBILITY FOR PERFORMING CORRECTIVE ACTION ASSIGNED TO:

☐ ACTIONS TO PREVENT RECURRENCE: INITIALS/DATE Lec 02-22-96

None

FIRST LEVEL SUPERVISOR: [signature] DATE: 2-22-96

RESPONSIBLE MANAGER: DATE:

QC REVIEW

☒ NONCONFORMANCE ☐ DEFICIENCY ☐ RERUN

☐ FURTHER ACTION REQUIRED:

ASSIGNED TO:

QC COORDINATOR: [signature] DATE: 2-23-96

CORRECTIVE ACTION VERIFICATION

☐ VERIFIED ☐ CANNOT VERIFY (specify reason)

REASON:

NCM CLOSURE

QC COORDINATOR: DATE:

SIGNED ORIGINAL MUST BE RETAINED IN FILE: ☐ QUALITY/OPERATIONS FILE ☐ PROJECT FILE

Quanterra February 21, 1996 11:42 am

Account: 10722 Project: 550.122 Quanterra-Richland QAS No. 550.122 Rev. 0

Master Sample Login: 10378

Project Manager: W. Price

Draft: (Final:) Entered and Reviewed by: Sue Bozo PM Review: Abby Wilder

Sample Header Template:

Sample No. / Comments / # / Data:	Client ID / Container Type	C-Matrix / Analysis	Date: Collected	Received	Due	Shipper	Rad Category	Rad Sample No. (Container Numbers:% Filled)
10378-001	BOH6V8	Soil	12-FEB-96 10:22	20-FEB-96 10:22	22-FEB-96	FED-EX	3*	R4703-004
RICHLAND I. D. 60224301								
1	GW - Glass Jar-2oz	AS/7060/Q4	S	COLD	22-FEB-96	10-AUG-96 T2A		(215231:100)
1	GN - Glass Jar-120ML	FL/300.0/Q4	S	COLD	22-FEB-96	11-MAR-96 T2A		(215230:100)
1		NO3/300.0/Q4	S	COLD	22-FEB-96	14-FEB-96 T2A		(215230:100)
1		PM/IT/Q4	S	COLD	22-FEB-96	10-AUG-96 T2A		(215230:100)
10378-001DUP	BOH6V8	Soil	12-FEB-96 10:22	20-FEB-96 10:22	22-FEB-96	FED-EX	3*	R4703-004
RICHLAND I. D. 60224301								
1	GN - Glass Jar-120ML	FL/300.0/Q4	S	COLD	22-FEB-96	11-MAR-96 T2A		(215230:100)
1		NO3/300.0/Q4	S	COLD	22-FEB-96	14-FEB-96 T2A		(215230:100)
10378-001MS	BOH6V8	Soil	12-FEB-96 10:22	20-FEB-96 10:22	22-FEB-96	FED-EX	3*	R4703-004
RICHLAND I. D. 60224301								
1	GW - Glass Jar-2oz	AS/7060/Q4	S	COLD	22-FEB-96	10-AUG-96 T2A		(215231:100)
1	GN - Glass Jar-120ML	FL/300.0/Q4	S	COLD	22-FEB-96	11-MAR-96 T2A		(215230:100)
1		NO3/300.0/Q4	S	COLD	22-FEB-96	14-FEB-96 T2A		(215230:100)
10378-001MSD	BOH6V8	Soil	12-FEB-96 10:22	20-FEB-96 10:22	22-FEB-96	FED-EX	3*	R4703-004
RICHLAND I. D. 60224301								
1	GW - Glass Jar-2oz	AS/7060/Q4	S	COLD	20-FEB-96	10-AUG-96 T2A		(215231:100)
10378-002	BOH6V9	Soil	12-FEB-96 10:50	20-FEB-96 10:22	22-FEB-96	FED-EX	3*	R4703-003
RICHLAND I. D. 60224302								
1	GW - Glass Jar-2oz	AS/7060/Q4	S	COLD	22-FEB-96	10-AUG-96 T2A		(215233:100)
1	GN - Glass Jar-120ML	FL/300.0/Q4	S	COLD	22-FEB-96	11-MAR-96 T2A		(215232:100)
1		NO3/300.0/Q4	S	COLD	22-FEB-96	14-FEB-96 T2A		(215232:100)
1		PM/IT/Q4	S	COLD	22-FEB-96	10-AUG-96 T2A		(215232:100)
10378-003	BOH6W0	Soil	12-FEB-96 10:50	20-FEB-96 10:22	22-FEB-96	FED-EX	3*	R4703-002
RICHLAND I. D. 60224303								
1	GW - Glass Jar-2oz	AS/7060/Q4	S	COLD	22-FEB-96	10-AUG-96 T2A		(215235:100)
1	GN - Glass Jar-120ML	FL/300.0/Q4	S	COLD	22-FEB-96	11-MAR-96 T2A		(215234:100)
1		NO3/300.0/Q4	S	COLD	22-FEB-96	14-FEB-96 T2A		(215234:100)
1		PM/IT/Q4	S	COLD	22-FEB-96	10-AUG-96 T2A		(215234:100)

3*=Sample has not been rad screened.

Quanterra February 21, 1996 11:42 am
Account: 10722 Project: 550.122 Quanterra-Richland QAS No. 550.122 Rev. 0
Master Sample Login: 10378

Project Manager: W. Price

Draft: Final: Entered and Reviewed by:_____ PM Review:_____

Sample Header Template: _____

Sample No. / Comments	Client ID	C-Matrix	Date: Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
10378-004	B0H6W1	Soil	12-FEB-96 11:12	20-FEB-96 10:22	22-FEB-96	FED-EX	3*	R4703-001
RICHLAND I. D. 60224304								

#	Container Type	Analysis	Class	Preservative	Anal. Due Date	Hold Date	Site	(Container Numbers:% Filled)
1	GW - Glass Jar-2oz	AS/7060/Q4	S	COLD	22-FEB-96	10-AUG-96	T2A	(215237:100)
1	GW - Glass Jar-120ML	FL/300.0/Q4	S	COLD	22-FEB-96	11-MAR-96	T2A	(215236:100)
1		NO3/300.0/Q4	S	COLD	22-FEB-96	14-FEB-96	T2A	(215236:100)
1		PM/IT/Q4	S	COLD	22-FEB-96	10-AUG-96	T2A	(215236:100)

Data:

3*=Sample has not been rad screened.

97 3540.2496
E-13
0008
BHI-00932
Rev. 0

Temp 2'c CurH 6382

Do: St Louis

Chain of Custody Record

Quanterra Environmental Services

QUA-4124-1

Client: Bechtel Hanford

Address:

City: | State: | Zip Code:

Project Name: SAF B96-060

Contract/Purchase Order/Quote No:

Project Manager: Van Pettey

Telephone Number (Area Code)/Fax Number:

Site Contact:

Lab Contact:

Carrier/Waybill Number:

Date: 2 20 96

Lab Number:

Chain Of Custody Number: 54223

Page 1 of 1

Analysis (Attach list if more space is needed): SEE WOC

Special Instructions/Conditions of Receipt

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Aqueous	Sed	Soil	Unpres	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH
60224301 BOH6V8	SEE WOC										
2 6V9											
3 6W0											
4 6W1											

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☑ Unknown

Sample Disposal: ☑ Return To Client ☐ Disposal By Lab ☐ Archive For Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☑ Other Dec 3-6 96

QC Requirements (Specify): SEE WOC 6103

		Date	Time
1 Relinquished By: Heidelberg	Quanterra	2-20 96	16:00
2 Relinquished By:			
3 Relinquished By:			

		Date	Time
1 Received By:		2-21-96	0845
2 Received By:			
3 Received By:			

Comments:

0009

E-14

BHI-00932 Rev. 0

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround: X Priority / Normal

Collector: Jon Fancher	Company Contact: L.R. Miller	Telephone: 509-373-9592
Project Designation: 183-H Basins Phase II Soils Field Screening	Sampling Location: 183-H basins soils	SAF No: B96-060
Ice Chest No.	Field Logbook No.	Method of Shipment: Hand carry on government vehicle
Shipped To: Quanterra	Offsite Property No.	Bill of Lading/Air Bill No.
Possible Sample Hazards/Remarks		
Special Handling and/or Storage		

SAMPLE ANALYSIS: 602243 SDL W0903

Preservation	Cool	Cool	Cool	none
Type of Container	P/G	P/G	P/G	P/G
No. of Container(s)	1	1	1	1
Volume	120ml	60ml	60ml	20ml
	1	2	3 (602244)	4

Sample No.	Matrix*	Date Sampled	Time Sampled	1	2	3	4
BOH6V8 01	S	2/12/96	1022	X	X	X	X
BOH6V9 02	S	2/12/96	1050	X	X	X	X
BOH6W0 03	S	2/12/96	1050	X	X	X	X
BOH6W1 04	S	2/12/96	1112	X	X	X	X
				100	100		

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
D. Fancher J.A. Fancher	2/12/96 1500	Bechtel	2-12-96 1500
Bechtel	2-20-96 945	Quanterra	2-20-96 945

SPECIAL INSTRUCTIONS
1 IC Anions, Fluoride, Nitrate
2 Arsenic
3 Chromium 6
4 Activity Scan

Matrix*: S = Soil; SE = Sediment; SO = Solid; SL = Sludge; W = Water; O = Oil; A = Air; DS = Drum Solids; DL = Drum Liquids; T = Tissue; Wi = Wipe; L = Liquid; V = Vegetation; X = Other

LABORATORY SECTION: Received By | Title | Date/Time

FINAL SAMPLE DISPOSITION: Disposal Method | Disposed By | Date/Time

9716940.2497

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E-15

0010

Client Sample Screening Results

20-Feb-96

CLIENT CODE	ID	MATRIX	RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTS A	NET CPM A	CNTS B	NET CPM B
BHI	B0H6J0		2/20/96 9:45:00 AM	QUAD21A	2/20/96 3:00:21 PM	B0H6J0	30	23	0.68066667	1568	51.264667
		LIQUID		Bkg:	2/17/96 7:35:15 AM	BKG	1000	86	0.086	1002	1.002
Anl Date: 2/20/96		Tot Sa, Alq: 1.00E+00	, 1.00E+01	Alp; (Dpm/ 2.80E-01	(uCi/ 1.26E-05	(pCi/ 1.26E+01	± 2.2E+01	CAT I	2.0E+00	Lab Alq	
Ppt mg: 0.8		Units: L	, ml	Bet; Alq): 1.02E+02	Sa): 4.59E-03	L/g): 4.59E+03	± 1.2E+02		1.1E-02	L/g	
BHI	B0H6J7		2/20/96 9:45:00 AM	QUAD21B	2/20/96 3:00:21 PM	B0H6J7	30	6	0.152	44	0.5416667
		LIQUID		Bkg:	2/17/96 7:35:15 AM	BKG	1000	48	0.048	925	0.925
Anl Date: 2/20/96		Tot Sa, Alq: 1.00E+00	, 1.00E+01	Alp; (Dpm/ 4.65E-01	(uCi/ 2.10E-05	(pCi/ 2.10E+01	± 2.2E+01	CAT I	1.2E+00	Lab Alq	
Ppt mg: 1.4		Units: L	, ml	Bet; Alq): 9.57E-01	Sa): 4.31E-05	L/g): 4.31E+01	± 1.9E+01		1.2E+00	L/g	
BHI	B0H6J8		2/20/96 9:45:00 AM	QUAD21C	2/20/96 3:00:21 PM	B0H6J8	30	2	0.00966667	37	0.3393333
		LIQUID		Bkg:	2/17/96 7:35:15 AM	BKG	1000	57	0.057	894	0.894
Anl Date: 2/20/96		Tot Sa, Alq: 1.00E+00	, 1.00E+01	Alp; (Dpm/ 1.84E-02	(uCi/ 8.28E-07	(pCi/ 8.28E-01	± 1.8E+01	CAT I	3.0E+01	Lab Alq	
Ppt mg: 0.9		Units: L	, ml	Bet; Alq): 6.61E-01	Sa): 2.98E-05	L/g): 2.98E+01	± 1.8E+01		1.7E+00	L/g	
BHI	B0H6K0		2/20/96 9:45:00 AM	QUAD21D	2/20/96 3:00:21 PM	B0H6K0	30	43	1.35433333	2898	95.592
		LIQUID		Bkg:	2/17/96 7:35:15 AM	BKG	1000	79	0.079	1008	1.008
Anl Date: 2/20/96		Tot Sa, Alq: 1.00E+00	, 1.00E+01	Alp; (Dpm/ 1.45E+00	(uCi/ 6.55E-05	(pCi/ 6.55E+01	± 2.7E+01	CAT I	3.8E-01	Lab Alq	
Ppt mg: 4.1		Units: L	, ml	Bet; Alq): 1.88E+02	Sa): 8.48E-03	L/g): 8.48E+03	± 1.6E+02		5.9E-03	L/g	
BHI	B0H6V8		2/20/96 9:45:00 AM	QUAD22A	2/20/96 3:00:25 PM	B0H6V8	30	28	0.88233333	148	3.9483333
		SOLID		Bkg:	2/17/96 7:35:23 AM	BKG	1000	51	0.051	985	0.985
Anl Date: 2/20/96		Tot Sa, Alq: 4.50E+02	, 8.02E+01	Alp; (Dpm/ 5.15E+00	(uCi/ 1.30E-02	(pCi/ 2.89E+01	± 7.1E+00	CAT II	1.7E+00	Lab Alq	
Ppt mg: 80.2		Units: g	, mg	Bet; Alq): 7.83E+00	Sa): 1.98E-02	L/g): 4.40E+01	± 4.7E+00		2.3E+00	L/g	

CLIENT CODE	ID	MATRIX	RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTS A	NET CPM A	CNTS B	NET CPM B
BHI	B0H6V9		2/20/96 9:45:00 AM	QUAD22B	2/20/96 3:00:25 PM	B0H6V9	30	47	1.50466667	250	7.3993333
		SOLID		Bkg:	2/17/96 7:35:23 AM	BKG	1000	62	0.062	934	0.934
Anl Date:	2/20/96	Tot Sa, Alq:	4.50E+02	, 9.05E+01	Alp; (Dpm/	9.26E+00	(uCi/ 2.08E-02	(pCi/ 4.61E+01	± 7.7E+00	CAT II	1.1E+00 Lab Alq
Ppt mg:	90.5	Units:	g	, mg	Bet; Alq):	1.51E+01	Sa): 3.38E-02	L/g): 7.52E+01	± 5.5E+00		1.3E+00 L/g
BHI	B0H6W0		2/20/96 9:45:00 AM	QUAD22C	2/20/96 3:00:25 PM	B0H6W0	30	9	0.25	117	2.974
		SOLID		Bkg:	2/17/96 7:35:23 AM	BKG	1000	50	0.05	926	0.926
Anl Date:	2/20/96	Tot Sa, Alq:	4.50E+02	, 1.01E+02	Alp; (Dpm/	1.49E+00	(uCi/ 2.97E-03	(pCi/ 6.61E+00	± 4.8E+00	CAT I	7.6E+00 Lab Alq
Ppt mg:	101.3	Units:	g	, mg	Bet; Alq):	6.34E+00	Sa): 1.27E-02	L/g): 2.82E+01	± 3.5E+00		3.5E+00 L/g
BHI	B0H6W1		2/20/96 9:45:00 AM	QUAD22D	2/20/96 3:00:25 PM	B0H6W1	30	200	6.59966667	695	22.239667
		SOLID		Bkg:	2/17/96 7:35:23 AM	BKG	1000	67	0.067	927	0.927
Anl Date:	2/20/96	Tot Sa, Alq:	4.50E+02	, 7.53E+01	Alp; (Dpm/	3.80E+01	(uCi/ 1.02E-01	(pCi/ 2.27E+02	± 1.5E+01	CAT III	2.2E-01 Lab Alq
Ppt mg:	75.3	Units:	g	, mg	Bet; Alq):	4.39E+01	Sa): 1.18E-01	L/g): 2.62E+02	± 1.1E+01		3.8E-01 L/g

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 3
To Bill Wilkins | From Al Davis
Co. | Co.
Dept. | Phone # 373-9731
Fax # 376-8851 | Fax #

GROSS RADIONUCLIDE SCREENING SAMPLE ANALYSIS REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID: B0HY6T4
EAL ID: EAL01915

Sent to B0H6V8 2-20-96 BW

SOILS
Pass screen (X)
Fail screen ( )

Other's at 50 pCi limit
Pass screen ( )
Fail screen (X)

2.49E+01	Calculated Beta Total Activity (pCi/g)
1.62E+01	Calculated Alpha Total Activity (pCi/g)
4.11E+01	Calculated total activity pCi/g
2.15E+01	Calculated total activity error
9.94E-03	Calculated total activity MDA

Screen sample based on (x) 99-Tc or ( ) 90-Sr for beta activity.

The screening for other's is based on 50 pCi/g Beta and Alpha, and 2 pCi/g Alpha including the 2 sigma error.

A passed for Soils indicates that the soil sample contained less than 200 pCi/g total radioactivity of which less than 20 pCi/g is from alpha emitting radionuclides. For conservatism, a failed screen may also have one or more of the following characteristics: The sum of the total gamma activity detected in the soil is above *5 pCi/g*; Beta emission from the bulk sample is found above the natural Hanford soil background (corresponding to approximately *5 pCi/g Sr-90 or 100 pCi/g Tc-99*); or Alpha emission from the bulk soil is found above the natural Hanford soil background (corresponding to approximately *10 pCi/g* Am-241). Naturally occuring radionuclides common to Hanford soil, tritium, and Carbon-14 are not included in the screening measurement.

Radiological Analyst — 2-16-96 Date

Albert I. Davis
Radiological Manager — 2-16-96 Date

Figure 1

SAMPLE CHECK-IN LIST

(1 Per Shipping Container)

Date/Time Received 2-20-96 Client Name BHI

Project/Client # B96-060 Batch or Case # _____

Cooler ID (if noted on outside of cooler) ER210

1. Condition of shipping container? O.K.
2. Custody Seals on cooler intact? Yes [X] No [ ]
3. Custody Seals dated and signed? Yes [X] No [ ]
4. Chain of Custody record is taped on inside of cooler lid? Yes [ ] No [X]
5. Vermiculite/packing material is: Wet [X] Dry [ ] _____
6. Each sample is in a plastic bag? Yes [ ] No [ ] _____
7. Number of sample containers in cooler: 32
8. Samples have: X tape ___ hazard labels; X custody seals ___ appropriate sample labels
9. Samples are: X in good condition ___ leaking; ___ broken ___ have air bubbles; ___ other
10. Coolant Present? Yes [X] No [ ] Sample Temperature 4°C
11. The following paperwork should be accounted for (N/A if not applicable):

    Chain of Custody #(s) N/A

    Request for Analysis #(s) ✓

    Airbill # ✓ Carrier N/A
12. Have any anomalies been identified above? Yes [ ] No [X]
13. Memos have been initiated for all anomalies identified above? Yes [ ]

Printed Name/Signature Karen Dettinburg Date/Time 2-20-96 945

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GROSS RADIONUCLIDE SCREENING SAMPLE ANALYSIS REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

		SOILS		
Customer ID:	B0HY6T8	Pass screen	( )	
EAL ID:	EAL01919	Fail screen	(X)	α + 2σ error other wise Pass α 2.
split of B0H6W1		Other's at 50 pCi limit		
		Pass screen	( )	
		Fail screen	(X)	

9.59E+01	Calculated Beta Total Activity (pCi/g)
1.89E+01	Calculated Alpha Total Activity (pCi/g)
1.15E+02	Calculated total activity pCi/g
1.82E+01	Calculated total activity error
9.94E-03	Calculated total activity MDA

Screen sample based on (x) 99-Tc or ( ) 90-Sr for beta activity.

The screening for other's is based on 50 pCi/g Beta and Alpha, and 2 pCi/g Alpha including the 2 sigma error.

A passed for Soils indicates that the soil sample contained less than 200 pCi/g total radioactivity of which less than 20 pCi/g is from alpha emitting radionuclides. For conservatism, a failed screen may also have one or more of the following characteristics: The sum of the total gamma activity detected in the soil is above *5 pCi/g*; Beta emission from the bulk sample is found above the natural Hanford soil background (corresponding to approximately *5 pCi/g Sr-90 or 100 pCi/g Tc-99*); or Alpha emission from the bulk soil is found above the natural Hanford soil background (corresponding to approximately *10 pCi/g* Am-241). Naturally occuring radionuclides common to Hanford soil, tritium, and Carbon-14 are not included in the screening measurement.

Radiological Analyst	2-16-96 Date	Albert I. Davis Radiological Manager	2-16-96 Date

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GROSS RADIONUCLIDE SCREENING SAMPLE ANALYSIS REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

		SOILS	
Customer ID:	B0HY6T6	Pass screen	( )
EAL ID:	EAL01917	Fail screen	(X)
		Other's at 50 pCi limit	
		Pass screen	( )
		Fail screen	(X)

split of B0H6V9 & B0H6W0
BW
2-20-96

1.16E+02	Calculated Beta Total Activity (pCi/g)
3.22E+01	Calculated Alpha Total Activity (pCi/g) α ?
1.49E+02	Calculated total activity pCi/g
5.66E+01	Calculated total activity error
9.72E-03	Calculated total activity MDA

Screen sample based on (x) 99-Tc or ( ) 90-Sr for beta activity.

The screening for other's is based on 50 pCi/g Beta and Alpha, and 2 pCi/g Alpha including the 2 sigma error.

A passed for Soils indicates that the soil sample contained less than 200 pCi/g total radioactivity of which less than 20 pCi/g is from alpha emitting radionuclides. For conservatism, a failed screen may also have one or more of the following characteristics: The sum of the total gamma activity detected in the soil is above *5 pCi/g*; Beta emission from the bulk sample is found above the natural Hanford soil background (corresponding to approximately *5 pCi/g Sr-90 or 100 pCi/g Tc-99*); or Alpha emission from the bulk soil is found above the natural Hanford soil background (corresponding to approximately *10 pCi/g* Am-241). Naturally occuring radionuclides common to Hanford soil, tritium, and Carbon-14 are not included in the screening measurement.

Radiological Analyst	2-16-96 Date	Albert I. Davis Radiological Manager	2-16-96 Date

Quanterra
Environmental Services

BHI-00932
Rev. 0

BWHWP
2-21-96
1105
B/ 2m

Login No.: _____

Condition Upon Receipt Variance Report
St. Louis Laboratory

Client: Richland
Date: 2-21-96 Time: 08:45
Project No: 550.122
Initiated by: Jul M Mitchell
Shipper/No: FED EX 1815394 095
RFA/COC Numbers: 54226

Condition/Variance (Check all that apply):

1. ☐ Sample received broken/leaking.
2. ☐ Sample received without proper preservative.
   - ☐ Cooler temperature not within 4°C ± 2°C
     Record temperature: _____
   - ☐ pH _____
   - ☐ other: _____
3. ☐ Sample received in improper container.
4. ☐ Sample received without proper paperwork. Explain: _____
5. ☐ Paperwork received without sample.
6. ☐ No sample ID on sample container.
7. ☐ Custody tape disturbed/broken/missing.
8. ☐ Sample ID on container does not match sample ID on paperwork. Explain: _____
9. ☐ All coolers on airbill not received with shipment.
10. ☐ Other (explain below): _____

☐ No variances were noted during sample receipt. Cooler Temperature Upon Receipt: 2°C

Notes: _____

Corrective Action:

☐ Client's Name: _____ Informed verbally on: _____ By: _____
☐ Client's Name: _____ Informed in writing on: _____ By: _____

☐ Sample(s) processed "as is". _____
☐ Sample(s) on hold until: _____ If released, notify: _____

Sample Control Supervisor Review: (or designee) Jul M Mitchell Date: 2-21-96
Project Management Review: Abby Walden Date: 2-21-96

FILED ORIGINAL SET RETAIN IN SAMPLE FILE

SL-ADMIN-0006, Revised 11/24/95

0017

METALS

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.122

Category: As EPA 7060
Method: EPA 7060
Matrix: SOLID

Sample Date : 02/12/96
Receipt Date : 02/20/96
Report Date : 02/22/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BOH6V8	10378-001	Arsenic	7440-38-2	QCBLK91997-1	02/21/96	02/21/96	10.7	MG/KG		2.1	2
BOH6V8	10378-001MS	Arsenic	7440-38-2	QCBLK91997-1	02/21/96	02/21/96	117	%REC			2
BOH6V8	10378-001MSD	Arsenic	7440-38-2	QCBLK91997-1	02/21/96	02/21/96	145	%REC			2
BOH6V9	10378-002	Arsenic	7440-38-2	QCBLK91997-1	02/21/96	02/21/96	1.5	MG/KG		1.0	1
BOH6W0	10378-003	Arsenic	7440-38-2	QCBLK91997-1	02/21/96	02/21/96	1.8	MG/KG		1.0	1
BOH6W1	10378-004	Arsenic	7440-38-2	QCBLK91997-1	02/21/96	02/21/96	4.7	MG/KG		1.1	1
NA	QCBLK91997-1	Arsenic	7440-38-2	QCBLK91997-1	02/21/96	02/21/96	0.10	MG/KG	U	1.0	1
NA	QCLCS91997-1	Arsenic	7440-38-2	QCBLK91997-1	02/21/96	02/21/96	97	%REC			20

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H6V8

Lab Name: QUANTERRA_MO Contract: 550.122
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0903
Matrix (soil/water): SOIL Lab Sample ID: 10378-001
Level (low/med): LOW Date Received: 02/20/96
% Solids: 95.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	10.7		N	F

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

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U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H6V9

Lab Name: QUANTERRA_MO Contract: 550.122
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0903
Matrix (soil/water): SOIL Lab Sample ID: 10378-002
Level (low/med): LOW Date Received: 02/20/96
% Solids: 97.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	1.5		N	F

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

SW-846

9713540.2503

BHI-00932
Rev. 0

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H6W0

Lab Name: QUANTERRA_MO Contract: 550.122
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0903
Matrix (soil/water): SOIL Lab Sample ID: 10378-003
Level (low/med): LOW Date Received: 02/20/96
% Solids: 97.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	1.8		N	F

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

SW-846

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H6W1

Lab Name: QUANTERRA_MO Contract: 550.122
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0903
Matrix (soil/water): SOIL Lab Sample ID: 10378-004
Level (low/med): LOW Date Received: 02/20/96
% Solids: 92.8

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	4.7		N	F

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

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U.S. EPA - CLP

3
BLANKS

Lab Name: QUANTERRA_MO Contract: 550.122

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W0903

Preparation Blank Matrix (soil/water): SOIL

Preparation Blank Concentration Units (ug/L or mg/kg): MG/KG

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Arsenic	1.0	U	1.0	U	1.0	U			0.100	U	F

FORM III - IN

SW-846

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

B0H6V8S

Lab Name: QUANTERRA_MO Contract: 550.122

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W0903

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids for Sample: 95.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Arsenic	80-120	15.6408		10.7206		4.20	117.1		F

Comments:

FORM V (Part 1) - IN SW-846

9713540.2505

BHI-00932
Rev. 0

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

B0H6V8SD

Lab Name: QUANTERRA_MO Contract: 550.122

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0903

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids for Sample: 95.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Arsenic	80-120	16.8088		10.7206		4.20	145.0	N	F

Comments:

FORM V (Part 1) - IN SW-846

U.S. EPA - CLP

6A
MATRIX SPIKE DUPLICATES

EPA SAMPLE NO.

B0H6V8S

Lab Name: QUANTERRA MO Contract: 550.122

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0903

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids: 95.2

Percent recoveries:

Analyte	Control Limit	Matrix Spike (S)		Matrix Spike Duplicate (SD)		RPD	Q	M
As	20%	117.10		145.00		21.3		F

U.S. EPA - CLP

LABORATORY CONTROL SAMPLE

Lab Name: QUANTERRA_MO Contract: 550.122

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W0903

Solid LCS Source: ERA

Aqueous LCS Source: _____

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Arsenic				82.5	80.2		40.4	123.0	97.2

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FORM VII - IN

SW-846

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Chromium VI

Quanterra Environmental Services

SAF B96-060

CHAIN-OF-CUSTODY FORM

ANALYSIS: CR+6 **CLIENT:** BHI **DATE DUE:** 3-6-96

SAMPLE DELIVERY GROUP: W0903 **BATCH NO.:** 02-244

LABORATORY ID	CLIENT ID	COMMENTS
60224401	B0H6V8	
2	6V9	
3	6W0	
4	6W1	

	INITIALS	DATE	SOP#
COC INITIATED	JH	2/20/96	NA
SAMPLE PREPARATION	R3	2/21/96	RICHWC5005
SAMPLE ANALYSIS	R3	2/21/96	RICHWC5005
DATA REVIEW	PK	2/22/96	RICHRC 002

Form No.: RC-075, 1/96, Rev. 2

0028B

HEXAVALENT CHROMIUM DATA SUMMARY

SDG: W0903

ANALYSIS DATE: 2/21/96

MATRIX: SOIL

MDL: 0.57 mg/kg

SAMPLE LAB. ID	CLIENT ID	SAMPLE RESULT	UNITS	SPIKE ADDED	UNITS	SPIKE RECOVERED	UNITS	PERCENT RECOVERY
Preparation Blank		0.002	mg/L					
LCS		0.854	mg/L	1.000	mg/L	0.854	mg/L	85.4
60224401	B0H6V8	<0.57	mg/kg					
60224401 Duplicate	B0H6V8	<0.57	mg/kg					
60224401MS	B0H6V8	31.58	mg/kg	39.68	mg/kg	31.58	mg/kg	79.6
60224401 MSD	B0H6V8	34.05	mg/kg	39.68	mg/kg	34.05	mg/kg	85.8
60224401 PbCrO4	B0H6V8	576.98	mg/kg	644.34	mg/kg	576.98	mg/kg	89.5
60224402	B0H6V9	<0.57	mg/kg					
60224403	B0H6W0	<0.57	mg/kg					
60224404	B0H6W1	<0.57	mg/kg					

COMMENTS:

R3 2/22/96

To convert preparation blank in mg/L to mg/kg: mg/kg = (mg/L * 0.1 L) / 0.0025 kg

Form No.: CG-196, 8/95, Rev. 0

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WET CHEMISTRY

Quanterra Environmental Services

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.122

Category: Fluoride
Method: EPA 300.0
Matrix: SOLID

Sample Date : 02/12/96
Receipt Date : 02/20/96
Report Date : 02/22/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
B0H6V8	10378-001	Fluoride	16984-48-8	QCBLK92000-1	02/21/96	02/21/96	1.03	UG/G	U	1.03	1
B0H6V8	10378-001DUP	Fluoride	16984-48-8	QCBLK92000-1	02/21/96	02/21/96	1.03	UG/G	U	1.03	1
B0H6V8	10378-001MS	Fluoride	16984-48-8	QCBLK92000-1	02/21/96	02/21/96	88	%REC			1
B0H6V9	10378-002	Fluoride	16984-48-8	QCBLK92000-1	02/21/96	02/21/96	1.54	UG/G		1.03	1
B0H6W0	10378-003	Fluoride	16984-48-8	QCBLK92000-1	02/21/96	02/21/96	1.60	UG/G		1.01	1
B0H6W1	10378-004	Fluoride	16984-48-8	QCBLK92000-1	02/21/96	02/21/96	3.98	UG/G		1.07	1
NA	QCBLK92000-1	Fluoride	16984-48-8	QCBLK92000-1	02/21/96	02/21/96	1.00	UG/G	U	1.00	1
NA	QCLCS92000-1	Fluoride	16984-48-8	QCBLK92000-1	02/21/96	02/21/96	95	%REC			1

Quanterra
Environmental Services

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.122

Category: Nitrate
Method: EPA 300.0
Matrix: SOLID

Sample Date : 02/12/96
Receipt Date : 02/20/96
Report Date : 02/22/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
B0H6V8	10378-001	Nitrate	NO3-N	QCBLK92000-1	02/21/96	02/21/96	16.1	UG/G		1.03	5
B0H6V8	10378-001DUP	Nitrate	NO3-N	QCBLK92000-1	02/21/96	02/21/96	18.3	UG/G		1.03	5
B0H6V8	10378-001MS	Nitrate	NO3-N	QCBLK92000-1	02/21/96	02/21/96	79	%REC			5
B0H6V9	10378-002	Nitrate	NO3-N	QCBLK92000-1	02/21/96	02/21/96	766	UG/G		41.1	200
B0H6W0	10378-003	Nitrate	NO3-N	QCBLK92000-1	02/21/96	02/21/96	706	UG/G		40.2	200
B0H6W1	10378-004	Nitrate	NO3-N	QCBLK92000-1	02/21/96	02/21/96	122	UG/G		4.29	20
NA	QCBLK92000-1	Nitrate	NO3-N	QCBLK92000-1	02/21/96	02/21/96	0.20	UG/G	U	0.20	1
NA	QCLCS92000-1	Nitrate	NO3-N	QCBLK92000-1	02/21/96	02/21/96	99	%REC			1

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BHI-00932
Rev. 0

SAMPLE AND DATA MANAGEMENT ADMINISTRATIVE VERIFICATION FORM

VER-B96-200
Verification Number

VERIFICATION DATE: 5/1/96	**VERIFIER:** JEAN M. MARSHALL Jean Marshall
PROJECT: SOILS FIELD SCREENING 183-H PHASE II	**SAF NUMBER:** B96-060
PACKAGE ID NUMBER: W0907	**SDR NUMBER:** NONE
SAMPLE NUMBERS: B0H6X3, B0H6X0, B0H6X1, B0H6X2, B0H6W2, B0H6W3	

DATA PACKAGE DEFICIENCIES:

WITHIN THE FOLLOWING SUBSETS NO DEFICIENCIES WERE FOUND:

WET CHEMISTRY

METALS

CHROMIUM VI

DATE DEFICIENCIES TRANSMITTED TO LAB:	
DATE LAB RESPONSE DUE:	**DATE LAB RESPONSE RECEIVED:**
DATA ADMINSTRATIVE VERIFICATION CLOSED: 5/1/96 JMM	

Analytical Data Package Prepared For

Bechtel Hanford

Chemical Analysis By

Quanterra Environmental Services
St. Louis Laboratory

APR 1996
RECEIVED
Data
Log In

Sample Delivery Group Number: W0907

BHI IDENTIFICATION NUMBER	QUANTERRA ID NUMBER
B0H6X3	10395-001
B0H6W2	10395-002
B0H6W3	10395-003
B0H6X0	10395-004
B0H6X1	10395-005
B0H6X2	10395-006

Quanterra
Environmental Services

Quanterra Incorporated
13715 Rider Trail North
Earth City, Missouri 63045

314 298-8566 Telephone
314 298-8757 Fax

CERTIFICATE OF ANALYSIS

APR 1996
RECEIVED
Data
Log In

Bechtel Hanford Incorporated
3350 George Washington Way
Richland, Washington 99352

March 6, 1996

Attention: Joan Kessner

Project number	:	550.122
Date Received by Lab	:	February 22, 1996
Number of Samples	:	Six (6)
Sample Type	:	Soil
SDG Number	:	W0907
Data Deliverable	:	Summary

I. Introduction

On February 22, 1996, six (6) soil samples were received by Quanterra, Richland and transferred to Quanterra, St. Louis for chemical analysis. Upon receipt, the samples were given the following laboratory ID numbers to correspond with the specific client ID's:

St Louis ID	WHC ID	Richland ID	Matrix	Date of Receipt
10395-001	B0H6X3	60228001	Soil	02/22/96
10395-002	B0H6W2	60228002	Soil	02/22/96
10395-003	B0H6W3	60228003	Soil	02/22/96
10395-004	B0H6X0	60228004	Soil	02/22/96
10395-005	B0H6X1	60228005	Soil	02/22/96
10395-006	B0H6X2	60228006	Soil	02/22/96

II. Analytical Results/ Methodology

The analytical results for this report are presented by analytical test. Each set of data includes sample identification information, analytical results and the appropriate detection limits.

Quanterra
Environmental Services

Bechtel Hanford Incorporated
March 6. 1996
Project Number: 550.122
SDG: W0907
Page 2

Analyses requested: Arsenic by EPA method 7060. Fluoride and Nitrate by EPA method 300.0. Hexavalent Chromium by EPA method 7196 was performed by QTESRL. The data is included in this package.

III. Quality Control

A Laboratory Control Sample and Method Blank were analyzed with each preparation batch. Matrix Spike and Matrix Spike Duplicate or Sample Duplicate analyses were performed per the protocol for each analyte.

IV. Definitions

The following codes are used to denote laboratory quality control samples and can be found in the data summary section of this report:

QCBLK- Quality Control Blank, Method Blank
QCLCS- Quality Control Laboratory Control Sample, Blank Spike

V. Comments

Metals
The Matrix Spike and Matrix Spike Duplicate recoveries were outside the acceptable limit for arsenic. The associated data for arsenic was flagged with an "N". See NCM # SL-2502.

Wet Chemistry
The Relative Percent Difference could not be calculated due to the values being below the detection limits for sample 10395-001 on the Fluoride analysis.

Quanterra
Environmental Services

Bechtel Hanford Incorporated
March 6, 1996
Project Number: 550.122
SDG: W0907
Page 3

I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:

Wade H. Price
Project Manager
e:\\price$\abbydave\hanw0907.nar

0004

Quanterra Environmental Services

LOG #: SL-94- 2502 page 1 of 2

BHI-00932
Rev. 0

LABORATORY NONCONFORMANCE MEMO (NCM)

PROJECT ID (Name/Number): Hanford / 530.122 W0907
NCM INITIATED BY (Name/Date): W. Lesko / 2-26-96
PARAMETER(S): As - GFAA
SAMPLE NUMBER(S) AFFECTED: 10395-001 thru -006

AREA:

☐ SHIP/REC	☐ GC	☐ GEN CHEM	☐ BIOASSAY	☐ IH
☐ ORG EXT	☐ HPLC	☒ METALS	☐ RADIOCHEM	☐ DATA VERIFICATION
☐ INORG PREP	☐ GCMS	☐ GEO	☐ COUNTING	☐ REPORTING
☐ OTHER	☐	☐	☐	☐

NONCONFORMANCE [check appropriate item(s)]:

1. ☐ Not enough sample received for proper analysis.
2. ☐ Holding time exceeded by _____ days due to:
   - 2.1 ☐ CATEGORY I: Out of Laboratory Control
     - ☐ Holding time expired at receipt.
   - 2.2 ☐ CATEGORY II: Laboratory Dependent
     - ☐ work backlog ☐ instrument failure
     - ☐ communication ☐ other (see #10)
   - 2.3 ☐ CATEGORY III: Laboratory Reruns
     - 2.3.1 ☐ *QA/QC:*
       - ☐ surrogates ☐ internal standards
       - ☐ spike recoveries ☐ blank contamination
     - 2.3.2 ☐ *CONFIRMATION:*
       - ☐ second column ☐ contamination check
       - ☐ other (see #10)
     - 2.3.3 ☐ *DILUTION:*
       - ☐ over calibration ☐ under calibration
       - ☐ other (see #10)
     - 2.3.4 ☐ *OTHER: (see #10)*
3. ☐ Sample lost during extraction/analysis: no re-prep or re-analysis possible.
4. ☒ QC data reported to client outside of:
   - ☒ method limits ☐ internal limits
   - ☐ QAPP limits ☐ contract limits
   - ☐ regulatory limits ☐ blank criteria
5. ☐ Incorrect procedure(s) used. (See #10)
6. ☐ Invalid instrument calibration. (See #10)
7. ☐ Incorrect/incomplete data reported to client. (See #10)
8. ☐ Reported detection limit(s) higher than:
   - ☐ method limits ☐ QAPP limits
   - ☐ contract limits ☐ other (see #10)

   Due to:
   - ☐ sample matrix ☐ insufficient sample
   - ☐ instrumentation ☐ other (see #10)
9. ☐ Other (specify):
10. ☐ Comments/Explanation: As MS 75.8% MSD 59.5% RPD 24.1

NOTIFICATION [check appropriate item(s)]:

1. ☒ Client notified by (name and date): AW 3/4/96.
   - ☒ in writing ☐ by FAX
   - ☐ by phone ☐ Other (explain) in case narrative
2. ☐ Client's name _____ and response
   - ☐ process "as is" ☐ resample
   - ☐ on hold til ___ ☐ Other (explain)

PROJECT MANAGER (signature & date): Abigail Wolden 3/4/96

FURTHER ACTION REQUIRED, SEE PAGE 2 OF 2

0005

CORRECTIVE ACTION

☐ ROOT CAUSE: INITIALS/DATE MKL 2-26-96

Not Known

☐ CORRECTIVE ACTION: INITIALS/DATE N.L 2-26-96

None / Report with qualifier

☐ RESPONSIBILITY FOR PERFORMING CORRECTIVE ACTION ASSIGNED TO:

☐ ACTIONS TO PREVENT RECURRENCE: INITIALS/DATE N.L 2-26-96

None

FIRST LEVEL SUPERVISOR: N. Le DATE: 2-26-96

RESPONSIBLE MANAGER: DATE:

QC REVIEW

☐ NONCONFORMANCE ☒ DEFICIENCY ☐ RERUN

☐ FURTHER ACTION REQUIRED:

ASSIGNED TO

QC COORDINATOR: [signature] DATE: 2-26-96

CORRECTIVE ACTION VERIFICATION

☐ VERIFIED ☐ CANNOT VERIFY (specify reason)

REASON:

NCM CLOSURE

QC COORDINATOR: DATE:

SIGNED ORIGINAL MUST BE RETAINED IN FILE: ☐ QUALITY/OPERATIONS FILE ☐ PROJECT FILE

Quanterra February 23, 1996 01:50 pm
Account: 10722 Project: 550.122 Quanterra-Richland PAS No. 550.122 Rev. 0
Master Sample Login: 10395

Project Manager: M. Price

Draft: Final: Entered and Reviewed by: PM Review:

Sample Header Template:

Sample No. / Comments / # / Container Type	Client ID	C-Matrix	Date: Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
Data:		Analysis	Class	Preservative	Anal. Due Date	Hold Date	Site	(Container Numbers:% Filled)
10395-001	B0H6X3	Soil	16-FEB-96 10:24	22-FEB-96 12:30	22-FEB-96	FED-EX	3*	R4712-001
RICHLAND I. D. 60228001								
1 GW - Glass Jar-2oz		AS/7060/Q4	S	COLD	22-FEB-96	14-AUG-96	T7B	(215595:100)
1 GN - Glass Jar-120ML		FL/300.0/Q4	S	COLD	22-FEB-96	15-MAR-96	T7B	(215594:100)
1		NO3/300.0/Q4	S	COLD	22-FEB-96	18-FEB-96	T7B	(215594:100)
1		PM/IT/Q4	S	COLD	22-FEB-96	14-AUG-96	T7B	(215594:100)
10395-001DUP	B0H6X3	Soil	16-FEB-96 10:24	22-FEB-96 12:30	24-FEB-96	FED-EX	3*	R4712-001
RICHLAND I. D. 60228001								
1 GN - Glass Jar-120ML		FL/300.0/Q4	S	COLD	22-FEB-96	15-MAR-96	T7B	(215594:100)
1		NO3/300.0/Q4	S	COLD	22-FEB-96	18-FEB-96	T7B	(215594:100)
10395-001MS	B0H6X3	Soil	16-FEB-96 10:24	22-FEB-96 12:30	24-FEB-96	FED-EX	3*	R4712-001
RICHLAND I. D. 60228001								
1 GW - Glass Jar-2oz		AS/7060/Q4	S	COLD	22-FEB-96	14-AUG-96	T7B	(215595:100)
1 GN - Glass Jar-120ML		FL/300.0/Q4	S	COLD	22-FEB-96	15-MAR-96	T7B	(215594:100)
1		NO3/300.0/Q4	S	COLD	22-FEB-96	18-FEB-96	T7B	(215594:100)
10395-001MSD	B0H6X3	Soil	16-FEB-96 10:24	22-FEB-96 12:30	24-FEB-96	FED-EX	3*	R4712-001
RICHLAND I. D. 60228001								
1 GW - Glass Jar-2oz		AS/7060/Q4	S	COLD	22-FEB-96	14-AUG-96	T7B	(215595:100)
10395-002	B0H6W2	Soil	16-FEB-96 10:12	22-FEB-96 12:30	24-FEB-96	FED-EX	3*	R4712-002
RICHLAND I. D. 60228002								
1 GW - Glass Jar-2oz		AS/7060/Q4	S	COLD	22-FEB-96	14-AUG-96	T7B	(215597:100)
1 GN - Glass Jar-120ML		FL/300.0/Q4	S	COLD	22-FEB-96	15-MAR-96	T7B	(215596:100)
1		NO3/300.0/Q4	S	COLD	22-FEB-96	18-FEB-96	T7B	(215596:100)
1		PM/IT/Q4	S	COLD	22-FEB-96	14-AUG-96	T7B	(215596:100)
10395-003	B0H6W3	Soil	16-FEB-96 10:35	22-FEB-96 12:30	24-FEB-96	FED-EX	3*	R4712-003
RICHLAND I. D. 60228003								
1 GW - Glass Jar-2oz		AS/7060/Q4	S	COLD	22-FEB-96	14-AUG-96	T7B	(215599:100)
1 GN - Glass Jar-120ML		FL/300.0/Q4	S	COLD	22-FEB-96	15-MAR-96	T7B	(215598:100)
1		NO3/300.0/Q4	S	COLD	22-FEB-96	18-FEB-96	T7B	(215598:100)
1		PM/IT/Q4	S	COLD	22-FEB-96	14-AUG-96	T7B	(215598:100)

3*=Sample has not been rad screened.

Quanterra February 23, 1996 01:50 pm
Account: 10722 Project: 550.122 Quanterra-Richland QAS No. 550.122 Rev. 0
Master Sample Login: 10395

Project Manager: W. Price

Draft: Final: Entered and Reviewed by:_____ PM Review:_____

Sample Header Template: _____

Sample No. / Client ID	C-Matrix	Date: Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
10395-004 B0H6X0 RICHLAND I. D. 60228004	Soil	16-FEB-96 10:48	22-FEB-96 12:30	24-FEB-96	FED-EX	3*	R4712-004

#	Comments / Container Type	Analysis	Class	Preservative	Anal. Due Date	Hold Date	Site	(Container Numbers:% Filled)
1	GW - Glass Jar-2oz	AS/7060/Q4	S	COLD	22-FEB-96	14-AUG-96	T7B	(215601:100)
1	GN - Glass Jar-120ML	FL/300.0/Q4	S	COLD	22-FEB-96	15-MAR-96	T7B	(215600:100)
1		NO3/300.0/Q4	S	COLD	22-FEB-96	18-FEB-96	T7B	(215600:100)
1		PM/IT/Q4	S	COLD	22-FEB-96	14-AUG-96	T7B	(215600:100)

Sample No. / Client ID	C-Matrix	Date: Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
10395-005 B0H6X1 RICHLAND I. D. 60228005	Soil	16-FEB-96 11:00	22-FEB-96 12:30	24-FEB-96	FED-EX	3*	R4712-005

#	Comments / Container Type	Analysis	Class	Preservative	Anal. Due Date	Hold Date	Site	(Container Numbers:% Filled)
1	GW - Glass Jar-2oz	AS/7060/Q4	S	COLD	22-FEB-96	14-AUG-96	T7B	(215603:100)
1	GN - Glass Jar-120ML	FL/300.0/Q4	S	COLD	22-FEB-96	15-MAR-96	T7B	(215602:100)
1		NO3/300.0/Q4	S	COLD	22-FEB-96	18-FEB-96	T7B	(215602:100)
1		PM/IT/Q4	S	COLD	22-FEB-96	14-AUG-96	T7B	(215602:100)

Sample No. / Client ID	C-Matrix	Date: Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
10395-006 B0H6X2 RICHLAND I. D. 60228006	Soil	16-FEB-96 11:12	22-FEB-96 12:30	24-FEB-96	FED-EX	3*	R4712-006

#	Comments / Container Type	Analysis	Class	Preservative	Anal. Due Date	Hold Date	Site	(Container Numbers:% Filled)
1	GW - Glass Jar-2oz	AS/7060/Q4	S	COLD	22-FEB-96	14-AUG-96	T7B	(215605:100)
1	GN - Glass Jar-120ML	FL/300.0/Q4	S	COLD	22-FEB-96	15-MAR-96	T7B	(215604:100)
1		NO3/300.0/Q4	S	COLD	22-FEB-96	18-FEB-96	T7B	(215604:100)
1		PM/IT/Q4	S	COLD	22-FEB-96	14-AUG-96	T7B	(215604:100)

3*=Sample has not been rad screened.

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Rev. 0

Temp 3 - Cooler

To St Louis

Chain of Custody Record

Quanterra Environmental Services

QUA-4124-1

Client: Bechtel Hanford	Project Manager: Van Pettey	Date: 2-22-96	Chain Of Custody Number: 54241
Address	Telephone Number (Area Code)/Fax Number	Lab Number	Page 1 of 1
City / State / Zip Code	Site Contact	Lab Contact	
Project Name: SAF B96-060	Carrier/Waybill Number		
Contract/Purchase Order/Quote No.			

Analysis (Attach list if more space is needed): SEE COC

Special Instructions/ Conditions of Receipt

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil		Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH
60228001 BOH6X3	SEE COC											
2 6W2												
3 6W3												
4 6X0												
5 6X1												
6 6X2												

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☑ Unknown

Sample Disposal: ☑ Return To Client ☐ Disposal By Lab ☐ Archive For Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☑ Other Due 3-8-96

QC Requirements (Specify): SDG W0907

	Date	Time		Date	Time
1. Relinquished By: Hudelberg Quanterra	2-22-96	16:00	1. Received By: [signature]	02-23-96	0845
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report, PINK - [illegible] Copy

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0009

BHI-00932 Rev. 0

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Date Turnaround: X Priority / Normal

Collector: Jon Fancher	Company Contact: L.R. Miller	Telephone: 509-373-9592
Project Designation: 183-H Basins Phase II Soils Field Screening	Sampling Location: 183-H basins soils	SAF No.: B96-060
Ice Chest No.: EL-210	Field Logbook No.	Method of Shipment: Hand carry on government vehicle
Shipped To: Quanterra	Offsite Property No.	Bill of Lading/Air Bill No.
Possible Sample Hazards/Remarks		
Special Handling and/or Storage		

SAMPLE ANALYSIS: 602280

Preservation	Cool	Cool	Cool	none
Type of Container	P/G	P/G	P/G	P/G
No. of Container(s)	1	1	1	1
Volume	120 ml	60 ml	60 ml	20 ml
	16:8	all full 100%	602281	
	1	2	3	4

Sample No.	Matrix*	Date Sampled	Time Sampled	1	2	3	4
BOH6X3 01	S	2/16/96	1024	X	X	X	X
BOH6W2 02	S	2/16/96	~~1024~~ 1012	X	X	X	X
BOH6W3 03	S	2/16/96	1035	X	X	X	X
BOH6X0 04	S	2/16/96	1048	X	X	X	X
BOH6X1 05	S	2/16/96	1100	X	X	X	X
BOH6X2 06	S	2/16/96	1112	X	X	X	X

CHAIN OF POSSESSION	Sign/Print Names	Date/Time	Received By	Date/Time
Relinquished By	Jon Fancher	2/16/96 1545		2/16/96 1545
Relinquished By		2/20/96 0840		2/20/96 0840
Relinquished By		2-22-96 1330		2-20-96 1330
Relinquished By				2-22-96
Relinquished By			Received By	Date/Time 2-22-96 1100 cpm

SPECIAL INSTRUCTIONS

1 IC Anions, Fluoride, Nitrate

2 Arsenic

3 Chromium 6

4 Activity Scan

Matrix*: S = Soil; SE = Sediment; SO = Solid; SL = Sludge; W = Water; O = Oil; A = Air; DS = Drum Solids; DL = Drum Liquids; T = Tissue; Wi = Wipe; L = Liquid; V = Vegetation; X = Other

LABORATORY RECEIPT	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

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BHI-00937
Rev. 0

97 3540.2516

BHI-00932
Rev. 0

GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: B0H6W9 split of B0H6X2 BW 2-22-96
EAL ID Number: EAL01975

Isotope		Activity, pCi/g on 22 February, 1996		
Be7	<	7.5e-01		
K40		1.7e+01	+/-	2.4e+00
Co57	<	8.5e-01		
Co60	<	1.8e-01		
RuRh106	<	1.1e+00		
Sb125	<	2.6e-01		
I129	<	7.7e+00		
Cs134	<	1.2e-01		
Cs137	<	1.3e-01		
Ce144	<	8.3e-01		
Eu152	<	7.1e-01		
Eu154	<	4.5e-01		
Eu155	<	6.6e-01		
Th32dau		8.0e-01	+/-	2.3e-01
U235	<	8.7e-01		
U238	<	1.6e+01		
U238dau		6.4e-01	+/-	2.5e-01
Np237	<	2.0e-01		
Pu239	<	1.5e+03		
Pu240	<	2.1e+04		
Am241	<	8.5e-01		

Alpha activities

Sr-90	N/R
Gross Alpha	N/R
Gross Beta	N/R
AEA	N/R

Definitions:
All errors reported at 2 standard deviations

For soils and natural samples, the following applies:
The analyses of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

U238dau is the activity of Pb214 and Bi214, short lived daughter products products of U238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.

Th32dau is the activity of Ac228, Pb212, and Tl208 short lived daughter products products of Th232. Equilibrium between parent and daughter products may not exist in disturbed materials.

Other samples, not containing natural materials, may have inapplicable results for the Th, U, transuranics and daughter products. The results must then be balanced against the gross alpha analysis.

N/R means no result or analysis not requested.

Radiological analyst — Date 2-23-96

Albert I. Davis, Radiological Manager — Date 02-22-96

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GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: 80H6W8 split of 80H6X1 BW 2-22-96
EAL ID Number: EAL01974

Isotope		Activity, pCi/g on 21 February, 1996		
Be7	<	6.4e-01		
K40		1.5e+01	+/-	2.1e+00
Co57	<	7.7e-01		
Co60	<	1.0e-01		
RuRh106	<	8.2e-01		
Sb125	<	1.9e-01		
I129	<	6.2e+00		
Cs134	<	1.2e-01		
Cs137	<	8.4e-02		
Ce144	<	7.6e-01		
Eu152	<	6.4e-01		
Eu154	<	3.4e-01		
Eu155	<	4.2e-01		
Th32dau		6.3e-01	+/-	2.1e-01
U235	<	7.6e-01		
U238	<	1.6e+01		
U238dau		5.1e-01	+/-	2.1e-01
Np237	<	1.9e-01		
Pu239	<	1.4e+03		
Pu240	<	2.0e+04		
Am241	<	6.4e-01		

Alpha activities

Sr-90	N/R
Gross Alpha	N/R
Gross Beta	N/R
AEA	N/R

Definitions:
All errors reported at 2 standard deviations

For soils and natural samples, the following applies:
The analysis of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

U238dau is the activity of Pb214 and Bi214, short lived daughter products products of U238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.

Th32dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products products of Th232. Equilibrium between parent and daughter products may not exist in disturbed materials.

Other samples, not containing natural materials, may have inapplicable results for the Th, U, transuranics and daughter products. The results must then be balanced against the gross alpha analysis.

N/R means no result or analysis not requested.

Radiological analyst — Date 2-21-96

Albert I. Davis, Radiological Manager — Date 02-22-96

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GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: B0H6W6 split of B0H6W3 BW 2-22-96
EAL ID Number: EAL01972

Isotope		Activity, pCi/g on 21 February, 1996		
Be7	<	6.7e-01		
K40		1.7e+01	+/-	2.1e+00
Co57	<	7.2e-01		
Co60	<	1.4e-01		
RuRh106	<	6.9e-01		
Sb125	<	2.1e-01		
I129	<	6.4e+00		
Cs134	<	1.0e-01		
Cs137	<	9.2e-02		
Ce144	<	7.0e-01		
Eu152	<	5.5e-01		
Eu154	<	3.2e-01		
Eu155	<	4.6e-01		
Th32dau		7.0e-01	+/-	2.0e-01
U235	<	6.9e-01		
U238	<	1.5e+01		
U238dau		4.3e-01	+/-	1.9e-01
Np237	<	1.5e-01		
Pu239	<	1.3e+03		
Pu240	<	1.8e+04		
Am241	<	5.9e-01		

Alpha activities

Sr-90	N/R
Gross Alpha	N/R
Gross Beta	N/R
AEA	N/R

Definitions:
All errors reported at 2 standard deviations

For soils and natural samples, the following applies:
The analysis of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

U238dau is the activity of Pb214 and Bi214, short lived daughter products products of U238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.

Th32dau is the activity of Ac228, Pb212 and Tl208, short lived daughter products products of Th232. Equilibrium between parent and daughter products may not exist in disturbed materials.

Other samples, not containing natural materials, may have inapplicable results for the Th, U, transuranics and daughter products. The results must then be balanced against the gross alpha analysis.

N/R means no result or analysis not requested.

Radiological analyst — Date 2-21-96

Albert I. Davis, Radiological Manager — Date 02-22-96

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GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: B0H6W7 split of B0H6X0 BW 2-22-96
EAL ID Number: EAL01973

Isotope		Activity, pCi/g on 21 February, 1996		
Be7	<	5.5e-01		
K40		1.4e+01	+/-	1.8e+00
Co57	<	7.1e-01		
Co60	<	8.9e-02		
RuRh106	<	7.7e-01		
Sb125	<	1.5e-01		
I129	<	5.5e+00		
Cs134	<	7.3e-02		
Cs137	<	1.0e-01		
Ce144	<	6.9e-01		
Eu152	<	2.2e-01		
Eu154	<	3.1e-01		
Eu155	<	3.9e-01		
Th32dau		4.7e-01	+/-	1.6e-01
U235	<	6.9e-01		
U238	<	1.3e+01		
U238dau		4.7e-01	+/-	1.8e-01
Np237	<	1.5e-01		
Pu239	<	1.3e+03		
Pu240	<	1.3e+04		
Am241	<	5.6e-01		

Alpha activities

Sr-90	N/R
Gross Alpha	N/R
Gross Beta	N/R
AEA	N/R

Definitions:
All errors reported at 2 standard deviations

For soils and natural samples, the following applies:
The analysis of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

U238dau is the activity of Pb214 and Bi214, short lived daughter products products of U238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.

Th32dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products products of Th232. Equilibrium between parent and daughter products may not exist in disturbed materials

Other samples, not containing natural materials, may have inapplicable results for the Th, U, transuranics and daughter products. The results must then be balanced against the gross alpha analysis.

N/R means no result or analysis not requested.

Radiological analyst — Date 2-21-96

Albert I. Davis, Radiological Manager — Date 02-22-96

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GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: B0H6W4 split of B0H6X3 BW 2-22-96
EAL ID Number: EAL01970

Isotope		Activity, pCi/g on 20 February, 1996		
Be7	<	7.1e-01		
K40		1.5e+01	+/-	2.1e+00
Co57	<	7.6e-01		
Co60	<	1.3e-01		
RuRh106	<	1.0e+00		
Sb125	<	2.7e-01		
I129	<	7.2e+00		
Cs134	<	1.2e-01		
Cs137	<	9.4e-02		
Ce144	<	7.4e-01		
Eu152	<	4.8e-01		
Eu154	<	4.4e-01		
Eu155	<	5.2e-01		
Th32dau		7.7e-01	+/-	2.2e-01
U235	<	7.8e-01		
U238	<	1.7e+01		
U238dau		3.7e-01	+/-	1.9e-01
Np237	<	1.7e-01		
Pu239	<	1.3e+03		
Pu240	<	1.8e+04		
Am241	<	7.0e-01		

Alpha activities

Sr-90	N/R
Gross Alpha	N/R
Gross Beta	N/R
AEA	N/R

Definitions:
All errors reported at 2 standard deviations

For soils and natural samples, the following applies:
The analyses of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

U238dau is the activity of Pb214 and Bi214 short lived daughter products products of U238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.

Th32dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products products of Th232. Equilibrium between parent and daughter products may not exist in disturbed materials

Other samples, not containing natural materials, may have inapplicable results for the Th, U, transuranics and daughter products. The results must then be balanced against the gross alpha analyses

N/R means no result or analyses not requested.

Radiological analyst — Date 2-22-96

Albert I. Davis, Radiological Manager — Date 02-22-96

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GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: B0H6W5 split of B0H6W2 BW 2-22-96
EAL ID Number: EAL01971

Isotope		Activity, pCi/g on 20 February, 1996		
Be7	<	5.6e-01		
K40		1.4e+01	+/-	1.9e+00
Co57	<	7.0e-01		
Co60	<	1.1e-01		
RuRh106	<	9.8e-01		
Sb125	<	2.5e-01		
I129	<	5.4e+00		
Cs134	<	1.0e-01		
Cs137	<	8.7e-02		
Ce144	<	6.8e-01		
Eu152	<	4.5e-01		
Eu154	<	4.0e-01		
Eu155	<	4.2e-01		
Th32dau		5.4e-01	+/-	1.7e-01
U235	<	1.2e-01		
U238	<	1.9e+01		
U238dau		5.1e-01	+/-	2.1e-01
Np237	<	1.5e-01		
Pu239	<	1.2e+03		
Pu240	<	1.7e+04		
Am241	<	6.6e-01		

Alpha activities

Sr-90	N/R
Gross Alpha	N/R
Gross Beta	N/R
AEA	N/R

Definitions:
All errors reported at 2 standard deviations

For soils and natural samples, the following applies:
The analysis of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

U238dau is the activity of Pb214 and Bi214, short lived daughter products products of U238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.

Th32dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products products of Th232. Equilibrium between parent and daughter products may not exist in disturbed materials.

Other samples not containing natural materials, may have inapplicable results for the Th, U, transuranics and daughter products. The results must then be balanced against the gross alpha analysis.

N/R means no result or analysis not requested.

S E Matthews 2-20-96
Radiological analyst Date

Albert I. Davis 02-22-96
Albert I. Davis Date
Radiological Manager

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Figure 1

SAMPLE CHECK-IN LIST

(1 Per Shipping Container)

Date/Time Received 2-22-96 Client Name BHI

Project/Client # B96-060 Batch or Case # _____

Cooler ID (if noted on outside of cooler) ER210

1. Condition of shipping container? O.K.
2. Custody Seals on cooler intact? Yes [X] No [ ]
3. Custody Seals dated and signed? Yes [X] No [ ]
4. Chain of Custody record is taped on inside of cooler lid? Yes [ ] No [X]
5. Vermiculite/packing material is: Wet [X] Dry [ ] _____
6. Each sample is in a plastic bag? Yes [ ] No [ ] _____
7. Number of sample containers in cooler: 40
8. Samples have: X tape ____ hazard labels
   X custody seals ____ appropriate sample labels
9. Samples are: X in good condition ____ leaking
   ____ broken ____ have air bubbles
   ____ other
10. Coolant Present? Yes [X] No [ ] Sample Temperature 4°C
11. The following paperwork should be accounted for (N/A if not applicable):
    Chain of Custody #(s) N/A
    Request for Analysis #(s) ✓
    Airbill # ✓ Carrier N/A
12. Have any anomalies been identified above? Yes [ ] No [X]
13. Memos have been initiated for all anomalies identified above? Yes [X]

Printed Name/Signature Karen Ottenburg Date/Time 2-22-96

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Quanterra Environmental Services

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C.O.C.
COPIED TO: BWLWP
DATE: 2-23-96
TIME: 12:15
BY: 2m

Login No.: 10395

Condition Upon Receipt Variance Report
St. Louis Laboratory

Client: Richland

Date: 02-23-96 Time: 08:45

Project No: 550.122

Initiated by: [illegible]

Shipper/No: FedX 181 6824 594 697 8630 ...

RFA/COC Numbers: 54241

Condition/Variance (Check all that apply):

1. ☐ Sample received broken/leaking.
2. ☐ Sample received without proper preservative.
   - ☐ Cooler temperature not within 4°C ± 2°C
     Record temperature: _____
   - ☐ pH _____
   - ☐ other: _____
3. ☐ Sample received in improper container.
4. ☐ Sample received without proper paperwork. Explain: _____
   - ☐ Paperwork received without sample.
6. ☐ No sample ID on sample container.
7. ☐ Custody tape disturbed/broken/missing.
8. ☐ Sample ID on container does not match sample ID on paperwork. Explain: _____
   - ☐ Coolers on airbill not received with shipment.
   - ☐ Other (explain below):

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☑ No variances were noted during sample receipt. Cooler Temperature Upon Receipt: 3°/5°C

Notes: BOH6X1 (Anions) has Richland ID 60228004

Corrective Action:

☐ Client's Name: _____ Informed verbally on: _____ By: _____

☐ Client's Name: _____ Informed in writing on: _____ By: _____

☐ Sample(s) processed "as is". _____

☐ Sample(s) on hold until: _____ If released, notify: _____

Sample Control Supervisor Review: (or designee) 2nd [illegible] Date: 2-23-96

Project Management Review: [illegible] Date: 2/23/96

SIGNED ORIGINAL MUST BE RETAINED IN THE PROJECT FILE

SL-ADMIN-0004, Revised 11/24/95

0018

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METALS

Quanterra Environmental Services

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352

Project: 550.122

Category: As EPA 7060
Method: EPA 7060
Matrix: SOLID

Sample Date : 02/16/96
Receipt Date : 02/22/96
Report Date : 03/01/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil
B0H6X3	10395-001	Arsenic	7440-38-2	QCBLK92406-1	02/23/96	02/23/96	3.5	MG/KG		1.1	1
B0H6X3	10395-001MS	Arsenic	7440-38-2	QCBLK92406-1	02/23/96	02/23/96	76	%REC			1
B0H6X3	10395-001MSD	Arsenic	7440-38-2	QCBLK92406-1	02/23/96	02/23/96	60	%REC			1
B0H6W2	10395-002	Arsenic	7440-38-2	QCBLK92406-1	02/23/96	02/23/96	4.3	MG/KG		1.1	1
B0H6W3	10395-003	Arsenic	7440-38-2	QCBLK92406-1	02/23/96	02/23/96	2.5	MG/KG		1.0	1
B0H6X0	10395-004	Arsenic	7440-38-2	QCBLK92406-1	02/23/96	02/23/96	2.2	MG/KG		1.0	1
B0H6X1	10395-005	Arsenic	7440-38-2	QCBLK92406-1	02/23/96	02/23/96	2.7	MG/KG		1.1	1
B0H6X2	10395-006	Arsenic	7440-38-2	QCBLK92406-1	02/23/96	02/23/96	2.5	MG/KG		1.2	1
NA	QCBLK92406-1	Arsenic	7440-38-2	QCBLK92406-1	02/23/96	02/23/96	-0.13	MG/KG	B	1.0	1
NA	QCLCS92406-1	Arsenic	7440-38-2	QCBLK92406-1	02/23/96	02/23/96	100	%REC			20

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1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H6W2

Lab Name: QUANTERRA_MO Contract: 550.122
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0907
Matrix (soil/water): SOIL Lab Sample ID: 10395-002
Level (low/med): LOW Date Received: 02/22/96
% Solids: 94.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	4.3		N	F

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

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U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

30H6W3

Lab Name: QUANTERRA MO Contract: 550.122
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0907
Matrix (soil/water): SOIL Lab Sample ID: 10395-003
Level (low/med): LOW Date Received: 02/22/96
% Solids: 97.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	2.5		N	F

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

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1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H6X0

Lab Name: QUANTERRA_MO Contract: 550.122
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0907
Matrix (soil/water): SOIL Lab Sample ID: 10395-004
Level (low/med): LOW Date Received: 02/22/96
% Solids: 96.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	2.2		N	F

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

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U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H6X1

Lab Name: QUANTERRA_MO
Lab Code: ITMO Case No.:
Matrix (soil/water): SOIL
Level (low/med): LOW
% Solids: 91.9

Contract: 550.122
SAS No.:
SDG No.: W0907
Lab Sample ID: 10395-005
Date Received: 02/22/96

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	2.7		N	F

Color Before:
Color After:
Clarity Before:
Clarity After:
Texture:
Artifacts:

Comments:

FORM I - IN

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U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H6X2

Lab Name: QUANTERRA MO Contract: 550.122
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0907
Matrix (soil/water): SOIL Lab Sample ID: 10395-006
Level (low/med): LOW Date Received: 02/22/96
% Solids: 86.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	2.5		N	F

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

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U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H6X3

Lab Name: QUANTERRA_MO
Contract: 550.122
Lab Code: ITMO
Case No.:
SAS No.:
SDG No.: W0907
Matrix (soil/water): SOIL
Lab Sample ID: 10395-001
Level (low/med): LOW
Date Received: 02/22/96
% Solids: 92.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.5		N	F

Color Before:
Clarity Before:
Texture:
Color After:
Clarity After:
Artifacts:

Comments:

FORM I - IN

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U.S. EPA - CLP

3
BLANKS

Lab Name: QUANTERRA_MO Contract: 550.122

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W0907

Preparation Blank Matrix (soil/water): SOIL

Preparation Blank Concentration Units (ug/L or mg/kg): MG/KG

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Arsenic	-1.9	B	-1.1	B	-2.3	B	1.0	U	-0.134	B	F

FORM III - IN

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U.S. EPA - CLP

3
BLANKS

Lab Name: QUANTERRA_MO Contract: 550.122

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W0907

Preparation Blank Matrix (soil/water): _____

Preparation Blank Concentration Units (ug/L or mg/kg): _____

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Arsenic			1.0	U							F

FORM III - IN

SW-846

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

B0H6X3S

Lab Name: QUANTERRA_MO Contract: 550.122

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W0907

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids for Sample: 92.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Arsenic	80-120	6.8227		3.5438		4.32	75.9	N	F

Comments:

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

B0H6X3SD

Lab Name: QUANTERRA_MO Contract: 550.122

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W0907

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids for Sample: 92.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Arsenic	80-120	6.1157		3.5438		4.32	59.5	N	F

Comments:

FORM V (Part 1) - IN SW-846

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6A
MATRIX SPIKE DUPLICATES

EPA SAMPLE NO.

B0H6X3S

Lab Name: QUANTERRA MO Contract: 550.122

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0907

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids: 92.5

Percent recoveries:

Analyte	Control Limit	Matrix Spike (S)		Matrix Spike Duplicate (SD)		RPD	Q	M
As	20%	75.90		59.50		24.2		F

U.S. EPA - CLP

BHI-00932
Rev. 0

7
LABORATORY CONTROL SAMPLE

Lab Name: QUANTERRA_MO Contract: 550.122

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W0907

Solid LCS Source: ERA

Aqueous LCS Source: _____

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Arsenic				82.5	82.4		40.4	123.0	99.9

FORM VII - IN

SW-846

Chromium VI

Quanterra Environmental Services

SAF B96-060

CHAIN-OF-CUSTODY FORM

ANALYSIS: CR+6 **CLIENT:** BHI **DATE DUE:** 3-8-96

SAMPLE DELIVERY GROUP: W0907 **BATCH NO.:** 02-281

LABORATORY ID	CLIENT ID	COMMENTS
60228101	BCH6X3	
2	6W2	
3	6W3	
4	6X0	
5	6X1	
6	6X2	

	INITIALS	DATE	SOP#
COC INITIATED	JH	2/22/96	NA
SAMPLE PREPARATION	RB	2/23/96	RICHWC 5005
SAMPLE ANALYSIS	RB	2/23/96	RICHWC 5005
DATA REVIEW	YK	2/28/96	RICHRC 002

Form No.: RC-075, 1/96, Rev. 2

HEXAVALENT CHROMIUM DATA SUMMARY

SDG: W0907

ANALYSIS DATE: 2/23/96

MATRIX: SOIL

MDL: 0.57 mg/kg

SAMPLE LAB. ID	CLIENT ID	SAMPLE RESULT	UNITS	SPIKE ADDED	UNITS	SPIKE RECOVERED	UNITS	PERCENT RECOVERY
Preparation Blank		0.001	mg/L					
LCS		0.930	mg/L	1.000	mg/L	0.930	mg/L	93.0
60228101	B0H6X6	<0.57	mg/kg					
60228102	B0H6W2	<0.57	mg/kg					
60228103	B0H6W3	<0.57	mg/kg					
60228103 DUP	B0H6W3	<0.57	mg/kg					
60228103 MS	B0H6W3	31.07	mg/kg	41.15	mg/kg	31.07	mg/kg	75.5
60228103 PbCrO4	B0H6W3	732.51	mg/kg	774.65	mg/kg	732.51	mg/kg	94.6
60228104	B0H6X0	<0.57	mg/kg					
60228105	B0H6X1	<0.57	mg/kg					
60228106	B0H6X2	<0.57	mg/kg					

COMMENTS:

To convert preparation blank in mg/L to mg/kg: mg/kg = (mg/L * 0.1 L) / 0.01 kg

2/25/96

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WET CHEMISTRY

Quanterra
Environmental Services

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352

Project: 550.122

Category: Nitrate
Method: EPA 300.0
Matrix: SOLID

Sample Date : 02/16/96
Receipt Date : 02/22/96
Report Date : 03/01/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
B0H6X3	10395-001	Nitrate	NO3-N	QCBLK92581-1	02/26/96	02/26/96	5.24	UG/G		0.21	1
B0H6X3	10395-001DUP	Nitrate	NO3-N	QCBLK92581-1	02/26/96	02/26/96	5.30	UG/G		0.21	1
B0H6X3	10395-001MS	Nitrate	NO3-N	QCBLK92581-1	02/26/96	02/26/96	103	%REC			5
B0H6W2	10395-002	Nitrate	NO3-N	QCBLK92581-1	02/26/96	02/26/96	142	UG/G		4.21	20
B0H6W3	10395-003	Nitrate	NO3-N	QCBLK92581-1	02/26/96	02/26/96	16.8	UG/G		0.40	2
B0H6X0	10395-004	Nitrate	NO3-N	QCBLK92581-1	02/26/96	02/26/96	6.62	UG/G		0.20	1
B0H6X1	10395-005	Nitrate	NO3-N	QCBLK92581-1	02/26/96	02/26/96	463	UG/G		21.4	100
B0H6X2	10395-006	Nitrate	NO3-N	QCBLK92581-1	02/26/96	02/26/96	452	UG/G		21.7	100
NA	QCBLK92581-1	Nitrate	NO3-N	QCBLK92581-1	02/26/96	02/26/96	0.20	UG/G	U	0.20	1
NA	QCLCS92581-1	Nitrate	NO3-N	QCBLK92581-1	02/26/96	02/26/96	98	%REC			1

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BHI-0093
Rev. 0

Quanterra Environmental Services

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352

Project: 550.122

egory: Fluoride
.ethod: EPA 300.0
Matrix: SOLID

Sample Date : 02/16/96
Receipt Date : 02/22/96
Report Date : 03/01/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
B0H6X3	10395-001	Fluoride	16984-48-8	QCBLK92581-1	02/26/96	02/26/96	1.06	UG/G	U	1.06	1
B0H6X3	10395-001DUP	Fluoride	16984-48-8	QCBLK92581-1	02/26/96	02/26/96	1.06	UG/G	U	1.06	1
B0H6X3	10395-001MS	Fluoride	16984-48-8	QCBLK92581-1	02/26/96	02/26/96	101	%REC			1
B0H6W2	10395-002	Fluoride	16984-48-8	QCBLK92581-1	02/26/96	02/26/96	4.05	UG/G		1.05	1
B0H6W3	10395-003	Fluoride	16984-48-8	QCBLK92581-1	02/26/96	02/26/96	1.01	UG/G	U	1.01	1
B0H6X0	10395-004	Fluoride	16984-48-8	QCBLK92581-1	02/26/96	02/26/96	1.87	UG/G		1.01	1
B0H6X1	10395-005	Fluoride	16984-48-8	QCBLK92581-1	02/26/96	02/26/96	5.83	UG/G		1.07	1
B0H6X2	10395-006	Fluoride	16984-48-8	QCBLK92581-1	02/26/96	02/26/96	66.7	UG/G		2.17	2
NA	QCBLK92581-1	Fluoride	16984-48-8	QCBLK92581-1	02/26/96	02/26/96	1.00	UG/G	U	1.00	1
NA	QCLCS92581-1	Fluoride	16984-48-8	QCBLK92581-1	02/26/96	02/26/96	93	%REC			1

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BHI-00932
Rev. 0

SAMPLE AND DATA MANAGEMENT ADMINISTRATIVE VERIFICATION FORM

VER-B96-201
Verification Number

VERIFICATION DATE: 5/1/96	**VERIFIER:** JEAN M. MARSHALL Jean Marshall
PROJECT: SOILS FIELD SCREENING 183-H PHASE II	**SAF NUMBER:** B96-060
PACKAGE ID NUMBER: W0915	**SDR NUMBER:** NONE
SAMPLE NUMBERS: B0H6Y6, B0H6Y7, B0H6Y8, B0H6Y9	

DATA PACKAGE DEFICIENCIES:

WITHIN THE FOLLOWING SUBSETS NO DEFICIENCIES WERE FOUND;

WET CHEMISTRY

METALS

CHROMIUM VI

DATE DEFICIENCIES TRANSMITTED TO LAB:

DATE LAB RESPONSE DUE:	**DATE LAB RESPONSE RECEIVED:**

DATA ADMINSTRATIVE VERIFICATION CLOSED: 5/1/96 JMM

PSA

Analytical Data Package Prepared For

Bechtel Hanford

Chemical Analysis By

Quanterra Environmental Services
St. Louis Laboratory

Sample Delivery Group Number: W0915

APR 1996
RECEIVED
Data
Log In

BHI IDENTIFICATION NUMBER	QUANTERRA ID NUMBER
B0H6Y6	10447-001
B0H6Y7	10447-002
B0H6Y8	10447-003
B0H6Y9	10447-004

9713540.2533

BHI-009
Rev. 0

Quanterra
Environmental Services

Quanterra Incorporated
13715 Rider Trail North
Earth City, Missouri 63045

314 298-8566 Telephone
314 298-8757 Fax

CERTIFICATE OF ANALYSIS

APR 1996
RECEIVED
Data
Log In

Bechtel Hanford Incorporated
3350 George Washington Way
Richland, Washington 99352

March 15, 1996

Attention: Joan Kessner

Project number	:	550.122
Date Received by Lab	:	February 27, 1996
Number of Samples	:	Four (4)
Sample Type	:	Soil
SDG Number	:	W0915
Data Deliverable	:	Summary

I. Introduction

On February 27, 1996, four (4) soil samples were received by Quanterra, Richland and transferred to Quanterra, St. Louis for chemical analysis. Upon receipt, the samples were given the following laboratory ID numbers to correspond with the specific client ID's:

St Louis ID	WHC ID	Richland ID	Matrix	Date of Receipt
10447-001	B0H6Y6	60235101	Soil	02/27/96
10447-002	B0H6Y7	60235102	Soil	02/27/96
10447-003	B0H6Y8	60235103	Soil	02/27/96
10447-004	B0H6Y9	60235104	Soil	02/27/96

II. Analytical Results/ Methodology

The analytical results for this report are presented by analytical test. Each set of data includes sample identification information, analytical results and the appropriate detection limits.

Analyses requested: Arsenic by EPA method 7060. Fluoride and Nitrate by EPA method 300.0. Hexavalent Chromium by EPA method 7196 was performed by QTESRL. The data is included in this package.

0002

Bechtel Hanford Incorporated
March 15, 1996
Project Number: 550.122
SDG: W0915
Page 2

III. Quality Control

A Laboratory Control Sample and Method Blank were analyzed with each preparation batch. Matrix Spike and Matrix Spike Duplicate or Sample Duplicate analyses were performed per the protocol for each analyte.

IV. Definitions

The following codes are used to denote laboratory quality control samples and can be found in the data summary section of this report:

QCBLK- Quality Control Blank, Method Blank
QCLCS- Quality Control Laboratory Control Sample, Blank Spike

V. Comments

Metals
The soil Laboratory Control Sample gave a," Background changing during BOC measurement" warning. Since the control sample is a known standard and its concentration was used to validate the batch a reanalysis of the Laboratory Control Sample was not performed. The Laboratory Control Sample recovery was well within the acceptable range.

For hexavalent chromium the preparation blank exceeded the MDL. All the samples were below the MDL so the data was reported.

Wet Chemistry
The Relative Percent Difference could not be calculated due to the values being below the detection limits for sample 10447-001 on the Fluoride analysis.

Bechtel Hanford Incorporated
March 15, 1996
Project Number: 550.122
SDG: W0915
Page 3

I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:

Wade H. Price
Project Manager
e:\\price$\abbydave\hanw0915.nar

0004 3/15/96
C003A

287

QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM)

LOG #: RD-96-_____

Project ID: BHI/W0915 NCM Initiated by: Roxie Ross

Sample Numbers: 60235201 → 04

Tests: CRHe by method RICHWC5005.

Matrix: SOIL

Analytical Area (check appropriate area):

- ☐ Sample control
- ☐ Organic preparation
- ☐ Inorganic preparation
- ☐ GC
- ☐ HPLC
- ☐ GC/MS
- ☒ Wet chemistry
- ☐ Metals
- ☐ Reporting
- ☐ Data review
- ☐ Radiochemistry
- ☐ Bioassay

Nonconformance (check appropriate area):

Holding Time Violations (exceeded by _____ days)

Category I: Laboratory Independent

- ☐ 1. Holding time expired in transit
- ☐ 2. Sample received > 48 hrs. or 1/2 holding time has expired
- ☐ 3. Test added by client after expiration

Category II: Laboratory Dependent

- ☐ 4. Instrument failure
- ☐ 5. Analyst error
- ☐ 6. Login error
- ☐ 7. Miscommunication
- ☐ 8. Other (complete description required)

Category III: Analysis Reruns (QA/QC)

- ☐ 9. Surrogates
- ☐ 10. Internal Standards
- ☐ 11. Spike Recoveries
- ☒ 12. Blank Contamination

Category IV: Analysis Reruns (Confirmation)

- ☐ 13. Second column
- ☐ 14. Contamination check
- ☐ 15. Confirmation of matrix effects
- ☐ 16. Other (complete description required)

Quality Assurance/Quality Control

- ☒ 17. QC data reported outside of controls
- ☐ 18. Incorrect procedure used
- ☐ 19. SOP intentionally modified with QA and Tech. approval
- ☐ 20. Invalid instrument calibration
- ☐ 21. Insufficient sample received for proper analysis

Incorrect or Incomplete Client Deliverable

- ☐ 22. Hardcopy deliverable error
- ☐ 23. Electronic deliverable error

Reported detection limits elevated due to:

- ☐ 24. Sample matrix
- ☐ 25. Insufficient sample volume
- ☐ 26. Other (complete description required)
- ☐ 27. ***Other (specify):*** _____

Comments/Explanation: Preparation blank exceeded MDL; all samples < MDL so data was reported.

Notification (check appropriate area):

Client notified by (name and date): _____

- ☐ in writing
- ☐ by facsimile
- ☐ by telephone
- ☐ other (explain)

Client's name and response: _____

- ☐ process "as is"
- ☐ re-sample
- ☐ on hold until _____
- ☐ other (explain)

Project Manager (signature and date): [signature] 4-1-96

0064A

QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM)

LOG#: RD-96-_____

Corrective Action

Root Cause Initial and date: (RS) 3/4/96

Either incidental contamination or bubbles in the spectrophotometer cell. The samples were all below MDL so blank was only affected result.

Corrective Action Initial and Date: (RS) 3/4/96

Inspect the spectrophotometer cell carefully for bubbles. If necessary, refill cell and reread on spectrophotometer.

Responsibility for performing CA assigned to: _____

Actions to prevent recurrence Initial and Date: (RS) 3/4/96

Wash all volumetrics thoroughly. Inspect cuvette for bubbles before reading & Remove all bubbles on cuvette faces before reading.

First Level Supervisor: Rosie R. Ross Date: 3/4/96.

Responsible Manager: Pam Kenitzer Date: 4-1-96

Quality Assurance Review

☑ Anomaly ☐ Deficiency ☐ Rerun

☐ Further action required: _____

Assigned to: _____

QA signature: [signature] Date: 4/1/96

Corrective Action Verification

☑ Verified

☐ Cannot Verify (specify reason): _____

Nonconformance Memo Closure

QA signature/date: [signature] 4/1/96

Quanterra February 28, 1996 12:51 pm
Account: 10722 Project: 550.122 Quanterra-Richland QAS No. 550.122 Rev. 0
Master Sample Login: 10447

Project Manager: W. Price

Draft: Final: Entered and Reviewed by: PM Review:

Sample Header Template:

Sample No. / Comments / Data:	Client ID	C-Matrix	Date: Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
10447-001	BOH6Y6	Soil	26-FEB-96 10:00	27-FEB-96 12:10	01-MAR-96	FED-EX	1	Screening not Required
	RICHLAND I. D. 60235101							

#	Container Type	Analysis	Class	Preservative	Anal. Due Date	Hold Date	Site	(Container Numbers:% Filled)
1	GW - Glass Jar-2oz	AS/7060/Q4	S	COLD	29-FEB-96	24-AUG-96	T7B	(216793:100)
1	GW - Glass Jar-120ML	FL/300.0/Q4	S	COLD	29-FEB-96	25-MAR-96	T7B	(216792:100)
1		NO3/300.0/Q4	S	COLD	29-FEB-96	28-FEB-96	T7B	(216792:100)
1		PM/IT/Q4	S	COLD	29-FEB-96	24-AUG-96	T7B	(216792:100)

10447-001DUP	BOH6Y6	Soil	26-FEB-96 10:00	27-FEB-96 12:10	01-MAR-96	FED-EX	1	Screening not Required
	RICHLAND I. D. 60235101							

1	GW - Glass Jar-120ML	FL/300.0/Q4	S	COLD	29-FEB-96	25-MAR-96	T7B	(216792:100)
1		NO3/300.0/Q4	S	COLD	29-FEB-96	28-FEB-96	T7B	(216792:100)

10447-001MS	BOH6Y6	Soil	26-FEB-96 10:00	27-FEB-96 12:10	01-MAR-96	FED-EX	1	Screening not Required
	RICHLAND I. D. 60235101							

1	GW - Glass Jar-2oz	AS/7060/Q4	S	COLD	29-FEB-96	24-AUG-96	T7B	(216793:100)
1	GW - Glass Jar-120ML	FL/300.0/Q4	S	COLD	29-FEB-96	25-MAR-96	T7B	(216792:100)
1		NO3/300.0/Q4	S	COLD	29-FEB-96	28-FEB-96	T7B	(216792:100)

10447-001MSD	BOH6Y6	Soil	26-FEB-96 10:00	27-FEB-96 12:10	01-MAR-96	FED-EX	1	Screening not Required
	RICHLAND I. D. 60235101							

1	GW - Glass Jar-2oz	AS/7060/Q4	S	COLD	29-FEB-96	24-AUG-96	T7B	(216793:100)

10447-002	BOH6Y7	Soil	26-FEB-96 10:40	27-FEB-96 12:10	01-MAR-96	FED-EX	1	Screening not Required
	RICHLAND I. D. 60235102							

1	GW - Glass Jar-2oz	AS/7060/Q4	S	COLD	29-FEB-96	24-AUG-96	T7B	(216795:100)
1	GW - Glass Jar-120ML	FL/300.0/Q4	S	COLD	29-FEB-96	25-MAR-96	T7B	(216794:100)
1		NO3/300.0/Q4	S	COLD	29-FEB-96	28-FEB-96	T7B	(216794:100)
1		PM/IT/Q4	S	COLD	29-FEB-96	24-AUG-96	T7B	(216794:100)

10447-003	BOH6Y8	Soil	26-FEB-96 10:40	27-FEB-96 12:10	01-MAR-96	FED-EX	1	Screening not Required
	RICHLAND I. D. 60235103							

1	GW - Glass Jar-2oz	AS/7060/Q4	S	COLD	29-FEB-96	24-AUG-96	T7B	(216797:100)
1	GW - Glass Jar-120ML	FL/300.0/Q4	S	COLD	29-FEB-96	25-MAR-96	T7B	(216796:100)
1		NO3/300.0/Q4	S	COLD	29-FEB-96	28-FEB-96	T7B	(216796:100)
1		PM/IT/Q4	S	COLD	29-FEB-96	24-AUG-96	T7B	(216796:100)

3*=Sample has not been rad screened.

Quanterra February 28, 1996 12:51 pm
Account: 10722 Project: 550.122 Quanterra-Richland QAS No. 550.122 Rev. 0
Master Sample Login: 10447

Project Manager: W. Price

Draft: Final: Entered and Reviewed by:_____ PM Review:_____

Sample Header Template: _____

Sample No. / Comments / # / Date:	Client ID / Container Type	C-Matrix / Analysis	Date: Collected / Class	Received / Preservative	Due / Anal. Due Date	Shipper / Hold Date	Site	Rad Category	Rad Sample No. (Container Numbers:% Filled)
10447-004	B0H6Y9	Soil	26-FEB-96 11:20	27-FEB-96 12:10	01-MAR-96	FED-EX		1	Screening not Required
RICHLAND I. D. 60235104									
1	GW - Glass Jar-2oz	AS/7060/Q4	S	COLD	29-FEB-96	24-AUG-96	T7B		(216799:100)
1	GW - Glass Jar-120ML	FL/300.0/Q4	S	COLD	29-FEB-96	25-MAR-96	T7B		(216798:100)
1		NO3/300.0/Q4	S	COLD	29-FEB-96	28-FEB-96	T7B		(216798:100)
1		PM/IT/Q4	S	COLD	29-FEB-96	24-AUG-96	T7B		(216798:100)

3 Sample has not been rad screened.

9713540.2536
E-93
0006
BHI-00932
Rev. 0

Temp 20c Curr# 6470

Jo: St Louis

Chain of Custody Record

Quanterra Environmental Services

QUA 4124-1

Client: Bechtel Hanford	Project Manager: Van Pettey	Date: 2 27 96	Chain Of Custody Number: 54251
Address	Telephone Number (Area Code)/Fax Number	Lab Number	Page 1 of 1
City / State / Zip Code	Site Contact	Lab Contact	
Project Name: SAF B96-060	Carrier/Waybill Number		
Contract/Purchase Order/Quote No.			

Analysis (Attach list if more space is needed): SEE COC

Special Instructions/ Conditions of Receipt

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH
60235101 B0H696		SEE			COC						
02 697											
03 698											
04 699											

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☑ Unknown

Sample Disposal: ☑ Return To Client ☐ Disposal By Lab ☐ Archive For Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☑ Other Due 3-13-96

QC Requirements (Specify): SDG-W0915

	Date	Time		Date	Time
1 Relinquished By: Heidelberg Quanterra	2-27-96	16:00	1 Received By: Jeral Mitchell	2-28-96	09:20
2 Relinquished By			2 Received By		
3 Relinquished By			3 Received By		

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK

E-94

0007

BHI-00932 Rev. 0

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround: X Priority / Normal

Collector: Jon Fancher	Company Contact: L.R. Miller	Telephone: 509-373-9592
Project Designation: 183-H Basins Phase II Soils Field Screening	Sampling Location: 183-H basins soils	SAF No.: B96-060
Ice Chest No.: ER-17	Field Logbook No.: EL-1287	Method of Shipment: Hand carry on government vehicle
Shipped To: Quanterra	Offsite Property No.	Bill of Lading/Air Bill No.
Possible Sample Hazards/Remarks		
Special Handling and/or Storage		

SAMPLE ANALYSIS: 602351

Preservation	Cool	Cool	Cool	none
Type of Container	P/G	P/G	P/G	P/G
No. of Container(s)	1	1	1	1
Volume	120ml	60ml	60ml	20ml
	SDG W0915	100% ↓	100% ↓	602352
	1	2	3	4

Sample No.	Matrix*	Date Sampled	Time Sampled	1	2	3	4
B0H696 01	S	2/26/96	1000	X	X	X	X
B0H697 02	S	2/26/96	~~1015~~ 1040	X	X	X	X
B0H698 03	S	2/26/96	1040	X	X	X	X
B0H699 04	S	2/26/96	1120	X	X	X	X

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By: J.R. Fancher	Date/Time: 2/26/96 1524	Received By: [illegible]	Date/Time: 1524 2-26-96
Relinquished By: [illegible]	Date/Time: 2-27-96 1310	Received By: [illegible]	Date/Time: 2-27-96 1310
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

1 IC Anions, Fluoride, Nitrate

2 Arsenic

3 Chromium 6

4 Activity Scan

Matrix*: S = Soil; SE = Sediment; SO = Solid; SL = Sludge; W = Water; O = Oil; A = Air; DS = Drum Solids; DL = Drum Liquids; T = Tissue; WI = Wipe; L = Liquid; V = Vegetation; X = Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

97 3540.2537

E-95

0008

BHI-0093
Rev. 0

GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: B0H6X9 split of B0H647 and B0H648 BW 2-27-96
EAL ID Number: EAL02038

Isotope		Activity, pCi/g on 26 February, 1998		
Be7	<	4.6e-01		
K40		1.2e+01	+/-	1.6e+00
Co57	<	5.8e-01		
Co60	<	7.4e-02		
RuRh106	<	6.1e-01		
Sb125	<	1.4e-01		
I129	<	4.9e+00		
Cs134	<	9.7e-02		
Cs137	<	8.0e-02		
Ce144	<	5.7e-01		
Eu152	<	3.5e-01		
Eu154	<	2.2e-01		
Eu155	<	3.7e-01		
Th32dau		4.3e-01	+/-	1.6e-01
U235	<	5.8e-01		
U238	<	1.4e+01		
U238dau		3.4e-01	+/-	1.2e-01
Np237	<	1.2e-01		
Pu239	<	1.0e+03		
Pu240	<	1.3e+04		
Am241	<	4.9e-01		

Alpha activities

Sr-90	N/R
Gross Alpha	N/R
Gross Beta	N/R
AEA	N/R

Definitions
All errors reported at 2 standard deviations

For soils and natural samples, the following applies:
The analysis of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

U238dau is the activity of Pb214 and Bi214, short lived daughter products products of U238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.

Th32dau is the activity of Ac228, Pb212, and Tl208 short lived daughter products products of Th232. Equilibrium between parent and daughter products may not exist in disturbed materials.

Other samples, not containing natural materials, may have inapplicable results for the Th, U transuranics and daughter products. The results must then be balanced against the gross alpha analysis.

N/R means no result or analysis not requested.

L E Matthews 2-26-98
Radiological analyst Date

Albert I. Davis 02-27-98
Albert I. Davis Date
Radiological Manager

GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: B0H6X8 split of B0H646 BW 2-27-96
EAL ID Number: EAL02035

Isotope		Activity, pCi/g on 28 February, 1996		
Be7	<	5.5e-01		
K40		1.4e+01	+/-	1.8e+00
Co57	<	5.7e-01		
Co60	<	5.1e-02		
RuRh106	<	6.2e-01		
Sb125	<	1.9e-01		
I129	<	4.9e+00		
Cs134	<	8.7e-02		
Cs137	<	8.2e-02		
Ce144	<	5.6e-01		
Eu152	<	3.5e-01		
Eu154	<	2.7e-01		
Eu155	<	3.4e-01		
Th32dau		5.0e-01	+/-	1.5e-01
U235	<	5.4e-01		
U238	<	1.4e+01		
U238dau		3.8e-01	+/-	1.6e-01
Np237	<	1.2e-01		
Pu239	<	1.0e+03		
Pu240	<	1.4e+04		
Am241	<	4.9e-01		

Alpha activities

Sr-90	N/R
Gross Alpha	N/R
Gross Beta	N/R
AEA	N/R

Definitions
All errors reported at 2 standard deviations

For soils and natural samples, the following applies:
The analysis of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

U238dau is the activity of Pb214 and Bi214, short lived daughter products products of U238. Equilibrium between parent and daughter products probably does not exist in disturbed materials

Th32dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products products of Th232. Equilibrium between parent and daughter products may not exist in disturbed materials

Other samples, not containing natural materials, may have inapplicable results for the Th, U, transuranics and daughter products. The results must then be balanced against the gross alpha analysis.

N/R means no result or analysis not requested.

T E Matthews 2-26-96
Radiological analyst Date

Albert I. Davis 02-27-96
Albert I. Davis Date
Radiological Manager

GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: B0H6Y3 split of B0H649 BW 2-27-96
EAL ID Number: EAL02042

Isotope		Activity, pCi/g on 28 February, 1996		
Be7	<	5.0e-01		
K40		1.4e+01	+/-	1.8e+00
Co57	<	5.9e-01		
Co60	<	6.8e-02		
RuRh106	<	6.7e-01		
Sb125	<	1.7e-01		
I129	<	4.7e+00		
Cs134	<	1.1e-01		
Cs137	<	8.1e-02		
Ce144	<	5.7e-01		
Eu152	<	3.2e-01		
Eu154	<	3.2e-01		
Eu155	<	3.8e-01		
Th32dau		5.0e-01	+/-	1.7e-01
U235	<	5.9e-01		
U238	<	1.6e+01		
U238dau		4.2e-01	+/-	1.6e-01
Np237	<	1.4e-01		
Pu239	<	1.0e+03		
Pu240	<	1.6e+04		
Am241	<	4.9e-01		

Alpha activities

Sr-90	N/R
Gross Alpha	N/R
Gross Beta	N/R
AEA	N/R

Definitions:
All errors reported at 2 standard deviations

For soils and natural samples, the following applies:
The analysis of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

U238dau is the activity of Pb214 and Bi214 short lived daughter products products of U238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.

Th32dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products products of Th232. Equilibrium between parent and daughter products may not exist in disturbed materials.

Other samples, not containing natural materials, may have inapplicable results for the Th, U, transuranics and daughter products. The results must then be balanced against the gross alpha analysis.

N/R means no result or analysis not requested

Radiological analyst — Date 2-28-96

Albert I. Davis, Radiological Manager — Date 02-27-96

Client Sample Screening Results

(B) 2/27/96

27-Feb-96

CLIENT CODE	ID	MATRIX	RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTS A	NET CPM A	CNTS B	NET CPM B
BHI	B0H0P2		2/27/96 12:00:00 PM	QUAD21A	2/27/96 3:41:46 PM	B0H0P2	30	7	0.19333333	64	1.1695833
		LIQUID		Bkg:	2/27/96 4:22:56 AM	BKG	800	32	0.04	771	0.96375
Anl Date: 2/27/96		Tot Sa, Alq: 1.00E+00	, 1.00E+01	Alp; (Dpm/ 5.52E-01	(uCi/ 2.49E-05	(pCi/ 2.49E+01	± 2.3E+01	CAT I	1.0E+00	Lab Alq Lig	
Ppt mg: 3		Units: L	, ml	Bet; Alq): 2.25E+00	Sa): 1.01E-04	Lig): 1.01E+02	± 2.4E+01		4.9E-01		
BHI	B0H0P4		2/27/96 12:00:00 PM	QUAD21B	2/27/96 3:41:46 PM	B0H0P4	30	30	0.95	103	2.5083333
		LIQUID		Bkg:	2/27/96 4:22:56 AM	BKG	800	40	0.05	740	0.925
Anl Date: 2/27/96		Tot Sa, Alq: 1.00E+00	, 1.00E+01	Alp; (Dpm/ 2.89E+00	(uCi/ 1.30E-04	(pCi/ 1.30E+02	± 2.9E+01	CAT I	1.9E-01	Lab Alq Lig	
Ppt mg: 0.1		Units: L	, ml	Bet; Alq): 4.26E+00	Sa): 1.92E-04	Lig): 1.92E+02	± 2.8E+01		2.6E-01		
BHI	B0H633		2/27/96 12:00:00 PM	QUAD21C	2/27/96 3:41:46 PM	B0H633	30	16	0.50333333	828	26.72125
		LIQUID		Bkg:	2/27/96 4:22:56 AM	BKG	800	24	0.03	703	0.87875
Anl Date: 2/27/96		Tot Sa, Alq: 1.00E+00	, 1.00E+01	Alp; (Dpm/ 6.81E-01	(uCi/ 3.07E-05	(pCi/ 3.07E+01	± 2.0E+01	CAT I	8.2E-01	Lab Alq Lig	
Ppt mg: 0		Units: L	, ml	Bet; Alq): 5.21E+01	Sa): 2.35E-03	Lig): 2.35E+03	± 8.4E+01		2.1E-02		
BHI	B0H634		2/27/96 12:00:00 PM	QUAD21D	2/27/96 3:41:46 PM	B0H634	30	11	0.30166667	75	1.625
		LIQUID		Bkg:	2/27/96 4:22:56 AM	BKG	800	52	0.065	700	0.875
Anl Date: 2/27/96		Tot Sa, Alq: 1.00E+00	, 1.00E+01	Alp; (Dpm/ 8.79E-01	(uCi/ 3.96E-05	(pCi/ 3.96E+01	± 2.3E+01	CAT I	6.3E-01	Lab Alq Lig	
Ppt mg: 0.1		Units: L	, ml	Bet; Alq): 3.01E+00	Sa): 1.36E-04	Lig): 1.36E+02	± 2.5E+01		3.7E-01		
BHI	B0H6Y6		2/27/96 12:00:00 PM	QUAD22A	2/27/96 3:41:50 PM	B0H6Y6	30	5	0.11166667	80	1.6679167
		SOLID		Bkg:	2/27/96 4:23:03 AM	BKG	800	44	0.055	799	0.99875
Anl Date: 2/27/96		Tot Sa, Alq: 5.00E+02	, 7.69E+01	Alp; (Dpm/ 5.72E-01	(uCi/ 1.68E-03	(pCi/ 3.35E+00	± 5.5E+00	CAT I	1.5E+01	Lab Alq Lig	
Ppt mg: 76.9		Units: g	, mg	Bet; Alq): 3.45E+00	Sa): 1.01E-02	Lig): 2.02E+01	± 3.7E+00		4.9E+00		

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BHI-00932
Rev. 0

E-99

0012

(R3) 2/27/96

CLIENT CODE ID	MATRIX	RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTS A	NET CPM A	CNTS B	NET CPM B
BHI B0H6Y7		2/27/96 12:00.00 PM	QUAD22B	2/27/96 3:41:50 PM	B0H6Y7	30	12	0 3475	100	2 3958333
	SOLID		Bkg:	2/27/96 4:23:03 AM	BKG	800	42	0.0525	750	0 9375
Anl Date: 2/27/96	Tot Sa, Alq: 5.00E+02	, 1.06E+02	Alp; (Dpm/ 2.26E+00	(uCi/ 4.81E-03	(pCi/ 9.63E+00	± 5 0E+00	CAT I	5.2E+00	Lab Alq Ug	
Ppt mg: 105.8	Units: g	, mg	Bet; Alq): 5.10E+00	Sa): 1.09E-02	Ug): 2.17E+01	± 3.1E+00		4 6E+00		
BHI B0H6Y8		2/27/96 12:00:00 PM	QUAD22C	2/27/96 3:41:50 PM	B0H6Y8	30	5	0.12791667	72	1.48
	SOLID		Bkg:	2/27/96 4:23:03 AM	BKG	800	31	0 03875	736	0 92
Anl Date: 2/27/96	Tot Sa, Alq: 5.00E+02	, 6.21E+01	Alp; (Dpm/ 6.04E-01	(uCi/ 2.19E-03	(pCi/ 4.38E+00	± 6.0E+00	CAT I	1.1E+01	Lab Alq Ug	
Ppt mg: 62.1	Units: g	, mg	Bet; Alq): 3.06E+00	Sa): 1.11E-02	Ug): 2.22E+01	± 4.3E+00		4 5E+00		
BHI B0H6Y9		2/27/96 12:00:00 PM	QUAD22D	2/27/96 3:41:50 PM	B0H6Y9	30	6	0.13125	99	2 405
	SOLID		Bkg:	2/27/96 4:23:03 AM	BKG	800	55	0 06875	716	0 895
Anl Date: 2/27/96	Tot Sa, Alq: 5.00E+02	, 1.06E+02	Alp; (Dpm/ 7.48E-01	(uCi/ 1.59E-03	(pCi/ 3.18E+00	± 4.5E+00	CAT I	1.6E+01	Lab Alq Ug	
Ppt mg: 105.9	Units: g	, mg	Bet; Alq): 5.25E+00	Sa): 1.12E-02	Ug): 2.23E+01	± 3.1E+00		4 5E+00		
BHI B0H721		2/27/96	QUAD23A	2/27/96 3:46:56 PM	B0H721	30	197	6.49916667	1612	52.789583
	LIQUID		Bkg:	2/27/96 4:23:12 AM	BKG	800	54	0.0675	755	0 94375
Anl Date: 12/30/99	Tot Sa, Alq: 1.00E+00	, 1.00E+01	Alp; (Dpm/ 2.06E+01	(uCi/ 9.30E-04	(pCi/ 9.30E+02	± 6.4E+01	CAT I	2.7E-02	Lab Alq Ug	
Ppt mg: 11.7	Units: L	, ml	Bet; Alq): 9.86E+01	Sa): 4 44E-03	Ug): 4.44E+03	± 1.1E+02		1.1E-02		
BHI B0H725		2/27/96 12:00:00 PM	QUAD23B	2/27/96 3:46.56 PM	B0H725	30	245	8 12666667	6736	223 51208
	LIQUID		Bkg:	2/27/96 4:23:12 AM	BKG	800	32	0.04	801	1 00125
Anl Date: 2/27/96	Tot Sa, Alq: 1.00E+00	, 1.00E+01	Alp; (Dpm/ 2.66E+01	(uCi/ 1.20E-03	(pCi/ 1.20E+03	± 8.2E+01	CAT I	2 1E-02	Lab Alq Ug	
Ppt mg: 29.1	Units: L	, ml	Bet; Alq): 4.48E+02	Sa): 2.02E-02	Ug): 2.02E+04	± 2.5E+02		2.5E-03		
BHI B0H731		2/27/96 12:00:00 PM	QUAD23D	2/27/96 3:46:56 PM	B0H731	30	397	13.1733333	2555	84 247917
	LIQUID		Bkg:	2/27/96 4:23:12 AM	BKG	800	48	0 06	735	0 91875
Anl Date: 2/27/96	Tot Sa, Alq: 1.00E+00	, 1.00E+01	Alp; (Dpm/ 4.93E+01	(uCi/ 2.22E-03	(pCi/ 2.22E+03	± 1.0E+02	CAT I	1 1E-02	Lab Alq Ug	
Ppt mg: 24.4	Units: L	, ml	Bet; Alq): 1.60E+02	Sa): 7.22E-03	Ug): 7.22E+03	± 1.5E+02		6 9E-03		

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Quanterra
Environmental Services

BHI-00932
Rev. 0

C.O.C. and C.O.C.
PIED TO: Bulwe
TE: 2-28-96
TI E: 1130
BY: 2m

Login No.: 10447

Condition Upon Receipt Variance Report
St. Louis Laboratory

Client: TT-Richland
Date: 2-28-96 **Time:** 09:20
Project No: 550.122
Initiated by: 2nd m Mitchell
Shipper/No: Fed Ex 227 7612 057
RFA/COC Numbers: 54251

Condition/Variance (Check all that apply):

1. ☐ Sample received broken/leaking.
2. ☐ Sample received without proper preservative.
   - ☐ Cooler temperature not within 4°C ± 2°C
   - Record temperature: _____
   - ☐ pH _____
   - ☐ other: _____
3. ☐ Sample received in improper container.
4. ☐ Sample received without proper paperwork. Explain: _____
5. ☐ Paperwork received without sample.
6. ☐ No sample ID on sample container.
7. ☐ Custody tape disturbed/broken/missing.
8. ☐ Sample ID on container does not match sample ID on paperwork. Explain: _____
9. ☐ All coolers on airbill not received with shipment.

Other (explain below):

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☑ No variances were noted during sample receipt. **Cooler Temperature Upon Receipt:** 2°C

Notes:

Corrective Action:

☐ Client's Name: _____ Informed verbally on: _____ By: _____

☐ Client's Name: _____ Informed in writing on: _____ By: _____

☐ Sample(s) processed "as is".

☐ Sample(s) on hold until: _____ If released, notify: _____

le Control Supervisor Review: (or designee) 2nd Mitchell Date: 2-28-96

Project Management Review: [illegible] Date: 2/28/96

SIGNED ORIGINAL MUST BE RETAINED IN THE PROJECT FILE

SL-ADMIN-0004, Revised 11/24/95

0014

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METALS

Quanterra Environmental Services

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352

Project: 550.122

Category: As EPA 7060
Method: EPA 7060
Matrix: SOLID

Sample Date : 02/26/96
Receipt Date : 02/27/96
Report Date : 03/08/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil
B0H6Y6	10447-001	Arsenic	7440-38-2	QCBLK92910-1	02/29/96	02/29/96	1.1	MG/KG		1.0	1
B0H6Y6	10447-001MS	Arsenic	7440-38-2	QCBLK92910-1	02/29/96	02/29/96	87	%REC			1
B0H6Y6	10447-001MSD	Arsenic	7440-38-2	QCBLK92910-1	02/29/96	02/29/96	84	%REC			1
B0H6Y7	10447-002	Arsenic	7440-38-2	QCBLK92910-1	02/29/96	02/29/96	1.1	MG/KG		1.0	1
B0H6Y8	10447-003	Arsenic	7440-38-2	QCBLK92910-1	02/29/96	02/29/96	1.1	MG/KG		1.0	1
B0H6Y9	10447-004	Arsenic	7440-38-2	QCBLK92910-1	02/29/96	02/29/96	11.7	MG/KG		2.1	2
NA	QCBLK92910-1	Arsenic	7440-38-2	QCBLK92910-1	02/29/96	02/29/96	-0.17	MG/KG	B	1.0	1
NA	QCLCS92910-1	Arsenic	7440-38-2	QCBLK92910-1	02/29/96	02/29/96	122	%REC			20

9713540.2542

BHI-00932
Rev. 0

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H6Y6

Lab Name: QUANTERRA_MO Contract: 550.122
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0915
Matrix (soil/water): SOIL Lab Sample ID: 10447-001
Level (low/med): LOW Date Received: 02/27/96
% Solids: 97.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	1.1			F

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

SW-846

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H6Y7

Lab Name: QUANTERRA_MO Contract: 550.122
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0915
Matrix (soil/water): SOIL Lab Sample ID: 10447-002
Level (low/med): LOW Date Received: 02/27/96
% Solids: 97.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	1.1			F

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

SW-846

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BHI-00932
Rev. 0

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H6Y8

Lab Name: QUANTERRA_MO Contract: 550.122
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0915
Matrix (soil/water): SOIL Lab Sample ID: 10447-003
Level (low/med): LOW Date Received: 02/27/96
% Solids: 97.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	1.1			F

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

SW-846

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H6Y9

Lab Name: QUANTERRA_MO Contract: 550.122
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0915
Matrix (soil/water): SOIL Lab Sample ID: 10447-004
Level (low/med): LOW Date Received: 02/27/96
% Solids: 94.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	11.7			F

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

SW-846

U.S. EPA - CLP

3
BLANKS

Lab Name: QUANTERRA_MO Contract: 550.122

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W0915

Preparation Blank Matrix (soil/water): SOIL

Preparation Blank Concentration Units (ug/L or mg/kg): MG/KG

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Arsenic	-1.1	B	-1.7	B	-1.4	B			-0.172	B	F

FORM III - IN

SW-846

U.S. EPA - CLP

3
BLANKS

Lab Name: QUANTERRA_MO Contract: 550.122

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W0915

Preparation Blank Matrix (soil/water): _____

Preparation Blank Concentration Units (ug/L or mg/kg): _____

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Arsenic	1.0	U	1.0	U	1.0	U					F

FORM III - IN

SW-846

9713540.2545

BHI-00932
Rev. 0

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

B0H6Y6S

Lab Name: QUANTERRA_MO Contract: 550.122

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W0915

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids for Sample: 97.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Arsenic	80-120	4.7067		1.1282		4.10	87.3		F

Comments:

FORM V (Part 1) - IN SW-846

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

B0H6Y6SD

Lab Name: QUANTERRA_MO Contract: 550.122

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W0915

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids for Sample: 97.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Arsenic	80-120	4.5744		1.1282		4.10	84.1		F

Comments:

FORM V (Part 1) - IN SW-846

9713540.2546

U.S. EPA - CLP

6A
MATRIX SPIKE DUPLICATES

BHI-00932
Rev. 0

EPA SAMPLE NO.

B0H6Y6S

Lab Name: QUANTERRA MO Contract: 550.122

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0915

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids: 97.5

Percent recoveries:

Analyte	Control Limit	Matrix Spike (S		Matrix Spike Duplicate (SD)		RPD	Q	M
As	20%	87.30		84.10		3.7		F

FORM VI - IN

U.S. EPA - CLP

7
LABORATORY CONTROL SAMPLE

Lab Name: QUANTERRA_MO Contract: 550.122

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W0915

Solid LCS Source: ERA

Aqueous LCS Source: _____

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Arsenic				65.1	79.5		31.9	97.0	122.1

FORM VII - IN

SW-846

9713540.2547

Chromium VI

000266A

Quanterra Environmental Services

SAF B96-060

CHAIN-OF-CUSTODY FORM

ANALYSIS: CR +6 **CLIENT:** BHI **DATE DUE:** 3-13-96

SAMPLE DELIVERY GROUP: W0915 **BATCH NO.:** 02-352

LABORATORY ID	CLIENT ID	COMMENTS
60235201	BCH646	
02	647	
03	648	
04	649	

	INITIALS	DATE	SOP#
COC INITIATED	[illegible]	2/27/96	NA
SAMPLE PREPARATION	[illegible]	2-27-96	RICHWC500S
SAMPLE ANALYSIS	[illegible]	2-29-96	RICHWC500S
DATA REVIEW			

Form No.: RC-075, 1/96, Rev. 2

HEXAVALENT CHROMIUM DATA SUMMARY

SDG: W0915

ANALYSIS DATE: 2/29/96

MATRIX: SOIL

MDL: 0.57 mg/kg

SAMPLE LAB. ID	CLIENT ID	SAMPLE RESULT	UNITS	SPIKE ADDED	UNITS	SPIKE RECOVERED	UNITS	PERCENT RECOVERY
Preparation Blank		0.029	mg/L					
LCS		0.9	mg/L	1.000	mg/L	0.9	mg/L	90.0
60235201	B0H6Y6	<0.57	mg/kg					
60235201 duplicate	B0H6Y6	<0.57	mg/kg					
60235201 MS	B0H6Y6	36.68	mg/kg	40.76	mg/kg	36.68	mg/kg	90.0
60235201 PbCrO4	B0H6Y7	921.28	mg/kg	970.66	mg/kg	921.28	mg/kg	94.9
60235202	B0H6Y7	<0.57	mg/kg					
60235203	B0H6Y8	<0.57	mg/kg					
60235204	B0H6Y9	<0.57	mg/kg					

COMMENTS:

Preparation blank is > MDL of 0.57 mg/kg, but all sample results are < MDL so data was reported.

To convert preparation blank in mg/L to mg/kg: mg/kg = (mg/L * 0.1 L) / 0.01 kg

(R) 3/4/96

Form No.:CG-196, 8/95, Rev. 0

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WET CHEMISTRY

Quanterra Environmental Services

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352

Project: 550.122

Category: Fluoride
Method: EPA 300.0
Matrix: SOLID

Sample Date : 02/26/96
Receipt Date : 02/27/96
Report Date : 03/08/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit
B0H6Y6	10447-001	Fluoride	16984-48-8	QCBLK92906-1	02/28/96	02/28/96	0.98	UG/G	U	0.98
B0H6Y6	10447-001DUP	Fluoride	16984-48-8	QCBLK92906-1	02/28/96	02/28/96	1.22	UG/G		0.98
B0H6Y6	10447-001MS	Fluoride	16984-48-8	QCBLK92906-1	02/28/96	02/28/96	100	%REC		
B0H6Y7	10447-002	Fluoride	16984-48-8	QCBLK92906-1	02/28/96	02/28/96	3.31	UG/G		0.96
B0H6Y8	10447-003	Fluoride	16984-48-8	QCBLK92906-1	02/28/96	02/28/96	3.64	UG/G		1.01
B0H6Y9	10447-004	Fluoride	16984-48-8	QCBLK92906-1	02/28/96	02/28/96	1.04	UG/G	U	1.04
NA	QCBLK92906-1	Fluoride	16984-48-8	QCBLK92906-1	02/28/96	02/28/96	1.00	UG/G	U	1.00
NA	QCLCS92906-1	Fluoride	16984-48-8	QCBLK92906-1	02/28/96	02/28/96	99	%REC		

Quanterra
Environmental Services

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352

Project: 550.122

Category: Nitrate
Method: EPA 300.0
Matrix: SOLID

Sample Date : 02/26/96
Receipt Date : 02/27/96
Report Date : 03/08/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BOH6Y6	10447-001	Nitrate	NO3-N	QCBLK92906-1	02/28/96	02/28/96	9.85	UG/G		0.39	2
BOH6Y6	10447-001DUP	Nitrate	NO3-N	QCBLK92906-1	02/28/96	02/28/96	12.0	UG/G		0.39	2
BOH6Y6	10447-001MS	Nitrate	NO3-N	QCBLK92906-1	02/28/96	02/28/96	103	%REC			5
BOH6Y7	10447-002	Nitrate	NO3-N	QCBLK92975-1	02/29/96	02/29/96	491	UG/G		40.0	200
BOH6Y8	10447-003	Nitrate	NO3-N	QCBLK92975-1	02/29/96	02/29/96	458	UG/G		38.0	200
BOH6Y9	10447-004	Nitrate	NO3-N	QCBLK92906-1	02/28/96	02/28/96	25.9	UG/G		1.04	5
NA	QCBLK92906-1	Nitrate	NO3-N	QCBLK92906-1	02/28/96	02/28/96	0.20	UG/G	U	0.20	1
NA	QCBLK92975-1	Nitrate	NO3-N	QCBLK92975-1	02/29/96	02/29/96	0.20	UG/G	U	0.20	1
NA	QCLCS92906-1	Nitrate	NO3-N	QCBLK92906-1	02/28/96	02/28/96	96	%REC			1
NA	QCLCS92975-1	Nitrate	NO3-N	QCBLK92975-1	02/29/96	02/29/96	105	%REC			1
NA	QCLCS92975-2	Nitrate	NO3-N	QCBLK92975-1	02/29/96	02/29/96	102	%REC			1

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APPENDIX F

VADOSE SOIL SAMPLE VALIDATION REPORT

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APPENDIX F -- CONTENTS

INORGANIC DATA VALIDATION SUMMARY FOR DATA PACKAGE
W0924-QES (943-1610.126 924INO.HB) F-5
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Attachment 2: Summary of Data Qualifications F-9
Attachment 3: Qualified Data Summary and Annotated Laboratory Reports F-11
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GENERAL CHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE
W0924-QES (943-1610.126 924GEN.HB) F-35
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Attachment 2: Summary of Data Qualifications F-39
Attachment 3: Qualified Data Summary and Annotated Laboratory Reports F-41
Attachment 4: Laboratory Narrative and Chain-of-Custody Documentation F-47
Attachment 5: Data Validation Supporting Documentation F-53

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MEMORANDUM

TO: 183-H Basin, Verification of Soil Cleanup Project QA Record May 15, 1996

FR: Heidi Gregerson, Golder Associates Inc. HRG

RE: INORGANIC DATA VALIDATION SUMMARY FOR DATA PACKAGE W0924-QES (943-1610.126 924INO.HB)

MAY 1996
RECEIVED
Validation
Log In

INTRODUCTION

This memo presents the results of data validation for the analysis specified below on data package W0924-QES prepared by Quanterra Environmental Services. Sample information is provided in the following table.

SAMPLE ID	COMMENTS	ANALYSIS	MEDIA
B0H6Q8	FIELD SPLIT	INORGANICS	SOIL
B0H6Q9	FIELD SPLIT		SOIL
B0H6R0	FIELD SPLIT	SEE ATTACHMENT 4	SOIL
B0H6R1	FIELD DUPLICATE		SOIL
B0H6R2	FIELD SPLIT		SOIL

Data validation was conducted to level C in accordance with the WHC statement of work (WHC 1994) and validation procedures (WHC 1993). Attachments 1 through 5 provide the following information as indicated below:

Attachment 1. Glossary of Data Reporting Qualifiers
Attachment 2. Summary of Data Qualifications
Attachment 3. Qualified Data Summary and Annotated Laboratory Reports
Attachment 4. Laboratory Narrative and Chain-of-Custody Documentation
Attachment 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

This section presents a summary of the data quality in terms of the referenced validation criteria.

Precision. Goals for precision were met.

Accuracy. Goals for accuracy were met, with the exception of those deficiencies listed below.

Detection Limits. Detection limit goals were met for all sample results.

Completeness. The data package was complete for all requested analyses. A total of five samples were validated in this data package with a total of 20 determinations reported, all of which were deemed valid. This results in a completeness of 100%, which meets the 90% objective of the work plan.

MAJOR DEFICIENCIES

No major deficiencies were identified during data validation which required qualification of data as unusable.

MINOR DEFICIENCIES

The following minor deficiencies were identified during data validation which required qualification of data:

Spike Sample

- The percent recovery for arsenic was outside the control limit and associated samples were qualified. Attachments 2 and 5 provide a summary of samples affected, data qualifications applied and supporting documentation.

Blank

- Arsenic was detected in the preparation blank at a negative concentration and associated samples were qualified. Attachments 2 and 5 provide a summary of samples affected, data qualifications applied and supporting documentation.

FIELD QC

- Sample B0H6R1 was identified as a field duplicate of sample B0H6R0. The RPDs were evaluated and determined to be acceptable.

- Samples B0H6Q8, B0H6Q9, B0H6R0, and B0H6R2 were identified as field split samples. The associated samples were not in this SDG, therefore RPDs were not evaluated.

REFERENCES

WHC 1993, Data Validation Procedures for Chemical Analyses, WHC-SD-EN-SPP-002, Rev. 2, 1993. Westinghouse Hanford Company, Richland, Washington.

WHC 1994, Environmental and Waste Characterization Analytical Data Validation. Purchase Order MSH-SWV-315905; Validation Statement of Work, Revision 1.0, September 7, 1994; Westinghouse Hanford Company, Richland, Washington.

ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

Glossary of Inorganic Data Reporting Qualifiers.

B - Indicates the constituent was analyzed for and detected. The concentration reported is less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). The associated data should be considered usable for decision making purposes.

U - Indicates the constituent was analyzed for and not detected. The concentration reported is the sample detection limit corrected for aliquot size, dilution and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.

UJ - Indicates the constituent was analyzed for and not detected. Due to a minor quality control deficiency identified during data validation the concentration may not accurately reflect the sample detection limit. The associated data have been qualified as estimated but should be considered usable for decision making purposes.

BJ - Indicates the constituent was analyzed for and detected at a concentration less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.

J - Indicates the constituent was analyzed for and detected. Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.

UR - Indicates the constituent was analyzed for and not detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.

R - Indicates the constituent was analyzed for and detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.

ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

WHC-SD-EN-SPP-002, REV.2

DATA QUALIFICATION SUMMARY - FORM B-7

SDG: W0924-QES	REVIEWER: H. Gregerson	DATE: 5-13-96	PAGE 1 OF 1
COMMENTS: INORGANICS			
COMPOUND/ANALYTE	QUALIFIER	SAMPLES AFFECTED	REASON
ARSENIC	J/BJ	ALL SAMPLES	DETECTED IN BLANK
ARSENIC	J/BJ	ALL SAMPLES	MS RECOVERY WAS OUTSIDE THE CONTROL LIMIT

ATTACHMENT 3

QUALIFIED DATA SUMMARY and ANNOTATED LABORATORY REPORTS

Validated Data Summary, Data Package: W0924-QES

	Sample #	B0H6Q8		B0H6Q9		B0H6R0		B0H6R1		B0H6R2	
	Date	3/4/96		3/4/96		3/4/96		3/4/96		3/4/96	
	Location										
	Depth			-11 ft		-11 ft		-11 ft		-11 ft	
	Type	Soil		Soil		Soil		Soil		Soil	
	Comments	Field Split		Field Split		Field Split		Field Duplicate		Field Split	
Parameter	Units	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
ARSENIC	MG/KG	0.300	BJ	1.100	J	0.660	BJ	0.720	BJ	0.960	BJ
CHROMIUM	MG/KG	0.600	B	7.100		7.000		10.000		9.100	
COPPER	MG/KG	0.890	B	10.800		13.000		10.900		15.100	
NICKEL	MG/KG	1.600	U	8.400		6.400		8.900		8.600	

The decimal places shown do not reflect the precision reported by the laboratory.

Verified HRG
5/13/96

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BHI-00932
Rev. 0

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H6Q8

Lab Name: QUANTERRA_MO Contract: 550.126
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0924
Matrix (soil/water): SOIL Lab Sample ID: 10516-005
Level (low/med): LOW Date Received: 03/05/96
% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7440-38-2	Arsenic	0.30	~~B~~	N	F	BJ
7440-47-3	Chromium	0.60	B		P	
7440-50-8	Copper	0.89	B		P	
7440-02-0	Nickel	1.6	U		P	

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Comments:

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HRG 5/13/96

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U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H6Q9

Lab Name: QUANTERRA_MO Contract: 550.126
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0924
Matrix (soil/water): SOIL Lab Sample ID: 10516-001
Level (low/med): LOW Date Received: 03/05/96
% Solids: 98.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	1.1	L	N	F
7440-47-3	Chromium	7.1			P
7440-50-8	Copper	10.8			P
7440-02-0	Nickel	8.4			P

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HRG 5/13/96

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U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H6R0

Lab Name: QUANTERRA_MO
Lab Code: ITMO Case No.:
Matrix (soil/water): SOIL
Level (low/med): LOW
% Solids: 96.6

Contract: 550.126
SAS No.:
SDG No.: W0924
Lab Sample ID: 10516-002
Date Received: 03/05/96

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7440-38-2	Arsenic	0.66	B	N	F	BJ
7440-47-3	Chromium	7.0			P	
7440-50-8	Copper	13.0			P	
7440-02-0	Nickel	6.4			P	

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HRG 5/13/96

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H6R1

ab Name: QUANTERRA_MO Contract: 550.126
ab Code: ITMO Case No.: SAS No.: SDG No.: W0924
atrix (soil/water): SOIL Lab Sample ID: 10516-003
evel (low/med): LOW Date Received: 03/05/96
Solids: 97.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7440-38-2	Arsenic	0.72	B	N	F	BJ
7440-47-3	Chromium	10			P	
7440-50-8	Copper	10.9			P	
7440-02-0	Nickel	8.9			P	

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Rev. 0

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0H6R2

Lab Name: QUANTERRA_MO Contract: 550.126
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0924
Matrix (soil/water): SOIL Lab Sample ID: 10516-004
Level (low/med): LOW Date Received: 03/05/96
% Solids: 96.7

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7440-38-2	Arsenic	0.96	B	N	F	BJ
7440-47-3	Chromium	9.1			P	
7440-50-8	Copper	15.1			P	
7440-02-0	Nickel	8.6			P	

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HRG 5/13/96

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ATTACHMENT 4

LABORATORY NARRATIVE and CHAIN-OF-CUSTODY DOCUMENTATION

Quanterra Environmental Services

Quanterra Incorporated
13715 Rider Trail North
Earth City, Missouri 63045

314 298-8566 Telephone
314 298-8757 Fax

CERTIFICATE OF ANALYSIS

APR 1996
RECEIVED
Data
Log In

Bechtel Hanford Incorporated
3350 George Washington Way
Richland, Washington 99352

March 21, 1996

Attention: Joan Kessner

Project number	:	550.126
Date Received by Lab	:	March 5, 1996
Number of Samples	:	Five (5)
Sample Type	:	Soil
SDG Number	:	W0924
Data Deliverable	:	Summary

I. Introduction

On March 5, 1996, five (5) soil samples were received by Quanterra, Richland and transferred to Quanterra, St. Louis for chemical analysis. Upon receipt, the samples were given the following laboratory ID numbers to correspond with the specific client ID's:

St Louis ID	WHC ID	Richland ID	Matrix	Date of Receipt
10516-001	B0H6Q9	60304301	Soil	03/05/96
10516-002	B0H6R0	60304302	Soil	03/05/96
10516-003	B0H6R1	60304303	Soil	03/05/96
10516-004	B0H6R2	60304304	Soil	03/05/96
10516-005	B0H6Q8	60304305	Soil	03/05/96

II. Analytical Results/ Methodology

The analytical results for this report are presented by analytical test. Each set of data includes sample identification information, analytical results and the appropriate detection limits.

HLG 5/13/96

Bechtel Hanford Incorporated
March 21, 1996
Project Number: 550.126
SDG: W0924
Page 2

Analyses requested: Arsenic by EPA method 7060. Fluoride and Nitrate by EPA method 300.0. Nitrate by EPA method 353.1. Chromium, Copper, Nickel by EPA method 6010. Hexavalent Chromium by EPA method 7196 was performed by QTESRL. The data is included in this package.

III. Quality Control

A Laboratory Control Sample and Method Blank were analyzed with each preparation batch. Matrix Spike and Matrix Spike Duplicate or Sample Duplicate analyses were performed per the protocol for each analyte.

IV. Definitions

The following codes are used to denote laboratory quality control samples and can be found in the data summary section of this report:

QCBLK- Quality Control Blank, Method Blank
QCLCS- Quality Control Laboratory Control Sample, Blank Spike

V. Comments

Metals
The recoveries of the Matrix Spike (69.2%) and the Matrix Spike Duplicate (75.6%) for Arsenic were less than 80%, therefore all associated data was flagged with an " N ". See NCM # 2548.

Wet Chemistry
The Relative Percent Difference could not be calculated due to the values being below the detection limits for sample 10516-001 on the Fluoride analysis.

HRG 5/13/96

Bechtel Hanford Incorporated
March 21, 1996
Project Number: 550.126
SDG: W0924
Page 3

Integration shows a hit for Fluoride but the peak area is less than the lowest calibration standard and the values are reported as less than the detection limit for sample 10516-001 and 10516-001DUP and 10516-005.

The Matrix Spike recovery is outside of the suggested limits of 75 - 125% for the Nitrate analysis. but the sample concentration is four times greater than the spike amount. See NCM # SL-2546.

I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:

Wade H. Price
Project Manager
e:\\price5\abbydave\hanw0924.nar

017

HRG 5/13/96

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LOG #: 2548

BHI-00932
Rev. 0

LABORATORY NONCONFORMANCE MEMO (NCM)

Quanterra Incorporated

Project ID/Client: 550.126 HANFORD W0924

NCM Initiated by/Date: K. CLAY 03-11-96 Project Manager: W. Price

Sample Numbers/QC batch or lot numbers: 10516-001, 001S, 001SD, 002, 003, 004 + 005

Tests: As/7060

Analytical Area (check appropriate area):

- ☐ Sample control
- ☐ Organic preparation
- ☐ Inorganic preparation
- ☐ GC
- ☐ HPLC
- ☐ GC/MS
- ☐ Wet chemistry
- ☑ Metals
- ☐ Reporting
- ☐ Data review
- ☐ Radiochemistry
- ☐ _____

Nonconformance (check appropriate area): *To be completed by analyst*

Holding Time Violations (exceeded by _____ days)

Category I: Laboratory Independent

- ☐ 1. Holding time expired in transit
- ☐ 2. Sample rec'd > 48 hrs after sampling. or ½ holding time has expired
- ☐ 3. Test added by client after expiration

Category II: Laboratory Dependent

- ☐ 4. Instrument failure
- ☐ 5. Analyst error
- ☐ 6. Log-in error
- ☐ 7. Miscommunication
- ☐ 8. Other (explanation required) _____

Category III: Analysis Reruns (QA/QC)

- ☐ 9. Surrogates
- ☐ 10. Internal standards
- ☐ 11. Spike recoveries
- ☐ 12. Blank contamination

Category IV: Analysis Reruns (Confirmation)

- ☐ 13. Second column
- ☐ 14. Contamination check
- ☐ 15. Confirmation of matrix effects
- ☐ 16. Other (explanation required) _____

Category V: Analysis Reruns (Dilution)

- ☐ 17. Over calibration
- ☐ 18. Under calibration
- ☐ 19. Other (explanation required) _____

Quality Assurance/Quality Control

- ☑ 20. QC data reported outside of controls
- ☐ 21. Incorrect procedure used
- ☐ 22. SOP intentionally modified with QA and tech approval
- ☐ 23. Invalid instrument calibration
- ☐ 24. Received insufficient sample for proper analysis

Incorrect or Incomplete Client Deliverable

- ☐ 25. Hardcopy deliverable error
- ☐ 26. Electronic deliverable error

Reported Detection Limits Elevated Due to:

- ☐ 27. Sample matrix: Does not include high analyte content
- ☐ 28. Insufficient sample volume
- ☐ 29. Other (explanation required)

Miscellaneous

- ☐ 30. Instrument/equipment Tag-out
- ☐ 31. Other (explanation required)

	MS	MSD	RPD
As	69.2	75.6	8.8

Notification (check appropriate area): ☐ Required ☐ Not Required *To be completed by project manager*

Client notified by (name and date): Ann 3/15/96

- ☑ In writing in case narrative
- ☐ By facsimile
- ☐ By telephone
- ☐ Other (explain)

Client's name and response:

- ☐ Process "as is"
- ☐ Re-sample
- ☐ On hold until _____
- ☐ Other (explain)

Project manager (signature and date): Abigail Wolf 3-15-96

PAGE 1 of 2

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~~00005~~ HCG 5/13/96

Corrective Action: *To be completed and reviewed by all associates involved*

Problem Description/Root Cause Author's initials and date: KRC 03/11/96

Poor MS-MSP recovery - matrix

Corrective Actions (Short Term) Author's initials and date: KRC 03-11-96

none

Corrective Actions to Prevent Reoccurrence (Long Term) none

Corrective Action approved by (Supervisor/Group Leader) and date: [signature] 3-11-96

Additional Comments:

Corrective Action to be completed by (if other than Supervisor/Group Leader):

Date Corrective Action is to be completed:

Quality Assurance Review *To be completed by a QA associate*

☒ Anomaly ☐ Deficiency ☐ Notified Ops/Sys Manager (Initials)

☐ Further action required:

Further action assigned to:

QA signature: [signature] Date: 3-11-96

Corrective Action Verification: *To be completed by a QA associate*

☐ Verification not required or requested

☐ Verified / CA completed on: by

☐ Cannot verify (specify reason)

Verified by: Date:

Nonconformance Memo Closure:

QA signature: Date:

The Office of Quality Assurance maintains a copy of this NCM indicating its final status.

Bechtel Han , Inc.

CHAIN OF CUSTODY/SA. LE ANALYSIS REQUEST

Pa. ___ of ___

Data Turnaround
X Priority
Normal

Collector Jon Fancher / David St. John	Company Contact L.R. Miller	Telephone 509-373-9592
Project Designation 183-H Basins Verification	Sampling Location 183-H basins soils	SAF No. B96-056
Ice Chest No. ER-17	Field Logbook No. EL-1287	Method of Shipment Hand carryion government vehicle
Shipped To Quanterra	Offsite Property No. N/A	Bill of Lading/Air Bill No. N/A

Possible Sample Hazards/Remarks

Special Handling and/or Storage

SAMPLE ANALYSIS 603043

	1	2	3	4	5					
Preservation	Cool	Cool	Cool	Cool	none					
Type of Container	P/G	P/G	P/G	P/G	P/G					
No. of Container(s)	1	1	1	1	1					
Volume	60ml	60ml	60ml	60ml	20ml					
	100%	100%	100%	603044						

Sample No.	Matrix*	Date Sampled	Time Sampled	1	2	3	4	5					
B0H6Q9 01	S	3/4/96	0910	X	X	X	X	X					
B0H6R0 02	S	3/4/96	0931	X	X	X	X	X					
B0H6R1 03	S	3/4/96	0931	X	X	X	X	X					
B0H6R2 04	S	3/4/96	1018	X	X	X	X	X					
B0H6Q8 05	S	3/4/96	1114	X	X	X	X	X					
				2mg	Recv	40	ml	6A	H2O	NO	Label		

F-25

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By	Date/Time	Received By	Date/Time
Dave St. John ERC	3-4-96 1305	Bechtel Brattle	3-4-96 1305
Relinquished By	Date/Time	Received By	Date/Time
Bechtel Brattle	3-5-96 1100	Karen Dallenbach	3-5-96 1100
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS
1 IC Anions, Fluoride, Nitrate
2 NO2/NO3
3 ICP Metals, Cr, Cu, Ni, As
4 Chromium 6
5 Activity Scan

SDG W0924

Matrix*
S = Soil
SE = Sediment
SO = Solid
SL = Sludge
W = Water
O = Oil
A = Air
DS = Drum Solids
DL = Drum Liquids
T = Tissue
WI = Wipe
L = Liquid
V = Vegetation
X = Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-00932
Rev. 0

~~00010~~

HLG 5/13/96

02

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ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

WHC-SD-EN-SPP-002, Rev. 2

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 183-H Basin ~~D&D~~ HKG 5/15/96			DATA PACKAGE: W0924-QES		
VALIDATOR: H. GREGERSON		LAB: QUANTERRA		DATE: 5/13/96	
CASE:			SDG:		
ANALYSES PERFORMED					
☐ CLP/ICP	☐ CLP/GFAA	☐ CLP/Hg	☐ CLP/Cyanide	☐	☐
☒ SW-846/ICP	☒ SW-846/GFAA	☐ SW-846/Hg	☐ SW-846 Cyanide	☐	☐
SAMPLES/MATRIX	BOH6Q8	BOH6Q9	BOH6R0	BOH6R1	
BOH6R2 / SOIL					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . (Yes) No N/A

Is a case narrative present? . . . . . (Yes) No N/A

Comments:

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments:

022

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

Were initial calibrations performed on all instruments? . . . . Yes No N/A
Are initial calibrations acceptable? . . . . . Yes No N/A
Are ICP interference checks acceptable? . . . . . Yes No N/A
Were ICV and CCV checks performed on all instruments? . . . . . Yes No N/A
Are ICV and CCV checks acceptable? . . . . . Yes No N/A

Comments:

4. BLANKS

Were ICB and CCB checks performed for all applicable analyses? Yes No N/A
Are ICB and CCB results acceptable? . . . . . Yes No N/A
Were preparation blanks analyzed? . . . . . Yes No 1. N/A
Are preparation blank results acceptable? . . . . . Yes No N/A
Were field/trip blanks analyzed? . . . . . Yes No N/A
Are field/trip blank results acceptable? . . . . . Yes No N/A

Comments:

1. As was detected at a negative concentration in the prep. blank and associated samples were qualified. See supporting documents.

5. ACCURACY

Were spike samples analyzed? . . . . . Yes No 1. N/A
Are spike sample recoveries acceptable? . . . . . Yes No N/A
Were laboratory control samples (LCS) analyzed? . . . . . Yes No N/A
Are LCS recoveries acceptable? . . . . . Yes No N/A

Comments:

1. The %R for As was outside the control limit and associated samples were qualified. See supporting document.

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

6. PRECISION

Were laboratory duplicates analyzed? . . . . . Yes No N/A

Are laboratory duplicate samples RPD values acceptable? . . . . Yes No N/A

Were ICP serial dilution samples analyzed? . . . . . Yes No N/A

Are ICP serial dilution %D values acceptable? . . . . . Yes No N/A

Are field duplicate RPD values acceptable? . . . . . Yes[1] No N/A

Are field split RPD values acceptable? . . . . . Yes No N/A[2]

Comments:

1. BOH6R1 is a field duplicate of BOH6R0, the RPDs were evaluated and determined to be acceptable.
2. BOH6Q8, BOH6Q9, BOH6R0, and BOH6R2 are splits, the associated samples are not in this SDG. ~~RPDs will be evaluated in the final summary report~~ HRG 5/13/91

7. FURNACE AA QUALITY CONTROL

Were duplicate injections performed as required? . . . . . Yes No N/A

Are duplicate injection %RSD values acceptable? . . . . . Yes No N/A

Were analytical spikes performed as required? . . . . . Yes No N/A

Are analytical spike recoveries acceptable? . . . . . Yes No N/A

Was MSA performed as required? . . . . . Yes No N/A

Are MSA results acceptable? . . . . . Yes No N/A

Comments: GFAA raw data was not supplied.

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses? . . . . . Yes No N/A

Are all results supported in the raw data? . . . . . Yes No N/A

Are results calculated properly? . . . . . Yes No N/A

Do results meet the CRDLs? . . . . . Yes No N/A

Comments:

HOLDING TIME SUMMARY

SDG: W0924-QES	VALIDATOR: HEIDI GREGERSON	DATE: 5/13/96	PAGE 1 OF 1

COMMENTS:

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
BOH6Q8	GFAA/ICP	3/4/96	3/8/96	3/8/96	4	4	none
BOH6Q9	GFAA/ICP	3/4/96	3/8/96	3/8/96	4	4	none
BOH6RO	GFAA/ICP	3/4/96	3/8/96	3/8/96	4	4	none
BOH6R1	GFAA/ICP	3/4/96	3/8/96	3/8/96	4	4	none
BOH6R2	GFAA/ICP	3/4/96	3/8/96	3/8/96	4	4	none

U.S. EPA - CLP

3
BLANKS

Lab Name: QUANTERRA_MO Contract: 550.126

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W0924

Preparation Blank Matrix (soil/water): SOIL

Preparation Blank Concentration Units (ug/L or mg/kg): MG/KG

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Arsenic	-4.8	B	-4.1	B	-2.7	B	1.5	B	-0.477	B	F
Chromium	4.8	B	4.4	U	4.4	U			0.440	U	P
Copper	6.2	U	6.2	U	6.4	B			0.620	U	P
Nickel	16.1	U	16.1	U	16.1	U			1.610	U	P

Samples Affected:
BOH6Q8
BOH6Q9
BOH6R0
BOH6R1
BOH6R2

FORM III - IN

SW-846

HRG 5/13/96
~~00035~~

U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

B0H6Q9S

Name: QUANTERRA_MO Contract: 550.126

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W0924

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids for Sample: 98.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Arsenic	80-120	3.8862		1.0701		4.07	69.2	N	F
Chromium	80-120	26.0274		7.1453		20.33	92.9		P
Copper	80-120	35.7937		10.7642		25.41	98.5		P
Nickel	80-120	56.7774		8.4096		50.81	95.2		P

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Comments:

Samples Affected:
B0H6Q8
B0H6Q9
B0H6R0
B0H6R1
B0H6R2

FORM V (Part 1) - IN

SW-846

HRG 5/13/96

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MAY 1996
RECEIVED

MEMORANDUM

TO: 183-H Basin, Verification of Soil Cleanup Project QA Record May 15, 1996

FR: Heidi Gregerson, Golder Associates Inc. HRG

RE: GENERAL CHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE W0924-QES (943-1610.126 924GEN.HB)

INTRODUCTION

This memo presents the results of data validation for the analysis indicated below on data package W0924-QES prepared by Quanterra Environmental Services. Sample information is provided in the following table.

SAMPLE ID	COMMENTS	ANALYSIS	MEDIA
B0H6Q8	FIELD SPLIT	GENERAL CHEMISTRY	SOIL
B0H6Q9	FIELD SPLIT		SOIL
B0H6R0	FIELD SPLIT	SEE ATTACHMENT 4	SOIL
B0H6R1	FIELD DUPLICATE		SOIL
B0H6R2	FIELD SPLIT		SOIL

Data validation was conducted to level C in accordance with the WHC statement of work (WHC 1994) and validation procedures (WHC 1993). Attachments 1 through 5 provide the following information as indicated below:

Attachment 1. Glossary of Data Reporting Qualifiers
Attachment 2. Summary of Data Qualifications
Attachment 3. Qualified Data Summary and Annotated Laboratory Reports
Attachment 4. Laboratory Narrative and Chain-of-Custody Documentation
Attachment 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

This section presents a summary of the data quality in terms of the referenced validation criteria.

Precision. Goals for precision were met.

Accuracy. Goals for accuracy were met.

Data Package ID: W0924-QES Analysis: GENERAL CHEMISTRY

Completeness. The data package was complete for all requested analyses. A total of five samples were validated in this data package with a total of 20 determinations reported, all of which were deemed valid. This results in a completeness of 100%, which meets the 90% objective of the work plan.

Detection Limits. Detection limit goals have been met for all sample results.

MAJOR DEFICIENCIES

No major deficiencies were identified during data validation which required qualification of data as unusable.

MINOR DEFICIENCIES

The following minor deficiencies were identified during data validation which required qualification of data:

Holding Times

- The holding times for nitrate and chromium VI exceeded the control limit. Attachments 2 and 5 provide a summary of data qualifications applied and supporting documentation.

DATA REPORTING

- Sample analysis and validation for nitrate by method EPA 300.0 was requested for informational purposes only as stated in the validation services request document.

- Sample results reported as less than or "<" by the laboratory have been qualified as undetected (U) on the laboratory results form. See Attachment 3.

REFERENCES

WHC 1993, Data Validation Procedures for Chemical Analyses, WHC-SD-EN-SPP-002, Rev. 2, 1993. Westinghouse Hanford Company, Richland, Washington.

WHC 1994, Environmental and Waste Characterization Analytical Data Validation, Purchase Order MSH-SWV-315905; Validation Statement of Work, Revision 1.0, September 7, 1994; Westinghouse Hanford Company, Richland, Washington.

002

ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

Glossary of Inorganic Data Reporting Qualifiers.

B - Indicates the constituent was analyzed for and detected. The concentration reported is less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). The associated data should be considered usable for decision making purposes.

U - Indicates the constituent was analyzed for and not detected. The concentration reported is the sample detection limit corrected for aliquot size, dilution and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.

UJ - Indicates the constituent was analyzed for and not detected. Due to a minor quality control deficiency identified during data validation the concentration may not accurately reflect the sample detection limit. The associated data have been qualified as estimated but should be considered usable for decision making purposes.

BJ - Indicates the constituent was analyzed for and detected at a concentration less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.

J - Indicates the constituent was analyzed for and detected. Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.

UR - Indicates the constituent was analyzed for and not detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.

R - Indicates the constituent was analyzed for and detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.

ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

WHC-SD-EN-SPP-002, REV.2

DATA QUALIFICATION SUMMARY - FORM B-7

SDG: W0924-QES	REVIEWER: Heidi Gregerson	DATE: 5-14-96	PAGE 1 OF 1
COMMENTS: GENERAL CHEMISTRY			
COMPOUND/ANALYTE	QUALIFIER	SAMPLES AFFECTED	REASON
NITRATE-N	J	ALL SAMPLES	HOLDING TIME EXCEEDED
CHROMIUM VI	J/UJ	ALL SAMPLES	HOLDING TIME EXCEEDED

ATTACHMENT 3

QUALIFIED DATA SUMMARY and ANNOTATED LABORATORY REPORTS

Validated Data Summary, Data Package: W0924-QES

	Sample #	B0H6Q9		B0H6R0		B0H6R1		B0H6R2		B0H6Q8	
	Date	3/4/96		3/4/96		3/4/96		3/4/96		3/4/96	
	Location										
	Depth	-11		-11		-11		-11			
	Type	Soil		Soil		Soil		Soil		Soil	
	Comments	Field Split		Field Split		Field Duplicate		Field Split		Field Split	
Parameter	Units	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
FLUORIDE	UG/G	0.990	U	1.020	U	1.010	U	116.000		0.970	U
NITRATE-N	UG/G	33.000	J	1810.000	J	1880.000	J	45.100	J	0.250	J
NITRATE/NITRITE-N	UG/G	26.900		882.000		931.000		33.600		0.500	U
CHROMIUM VI	MG/KG	0.570	UJ	0.673	J	0.570	UJ	0.570	UJ	0.570	UJ

The decimal places shown do not reflect the precision reported by the laboratory

Verified HRG
5/14/96

9713540.2572

BHI-00932
Rev. 0

Quanterra Environmental Services

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352

Project: 550.126

Analyte: Fluoride
Method: EPA 300.0
Matrix: SOLID

Sample Date : 03/04/96
Receipt Date : 03/05/96
Report Date : 03/12/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BOH6Q9	10516-001	Fluoride	16984-48-8	QCBLK93833-1	03/08/96	03/08/96	0.99	UG/G	U	0.99	1
BOH6Q9	10516-001DUP	Fluoride	16984-48-8	QCBLK93833-1	03/08/96	03/08/96	0.99	UG/G	U	0.99	1
BOH6Q9	10516-001MS	Fluoride	16984-48-8	QCBLK93833-1	03/08/96	03/08/96	111	%REC			1
BOH6R0	10516-002	Fluoride	16984-48-8	QCBLK93833-1	03/08/96	03/08/96	1.02	UG/G	U	1.02	1
BOH6R1	10516-003	Fluoride	16984-48-8	QCBLK93833-1	03/08/96	03/08/96	1.01	UG/G	U	1.01	1
BOH6R2	10516-004	Fluoride	16984-48-8	QCBLK93833-1	03/08/96	03/08/96	116	UG/G		5.12	5
BOH6Q8	10516-005	Fluoride	16984-48-8	QCBLK93833-1	03/08/96	03/08/96	0.97	UG/G	U	0.97	1
NA	QCBLK93833-1	Fluoride	16984-48-8	QCBLK93833-1	03/08/96	03/08/96	1.00	UG/G	U	1.00	1
NA	QCLCS93833-1	Fluoride	16984-48-8	QCBLK93833-1	03/08/96	03/08/96	96	%REC			1

009

RLG 5/14/96
~~00042~~

Quanterra Environmental Services

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352

Project: 550.126

Category: Nitrate
Method: EPA 300.0
Matrix: SOLID

Sample Date : 03/04/96
Receipt Date : 03/05/96
Report Date : 03/12/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
B0H6Q9	10516-001	Nitrate	NO3-N	QCBLK93833-1	03/08/96	03/08/96	33.0	UG/G	J	0.99	5
B0H6Q9	10516-001DUP	Nitrate	NO3-N	QCBLK93833-1	03/08/96	03/08/96	36.5	UG/G		0.99	5
B0H6Q9	10516-001MS	Nitrate	NO3-N	QCBLK93833-1	03/08/96	03/08/96	115	%REC			10
B0H6R0	10516-002	Nitrate	NO3-N	QCBLK93833-1	03/08/96	03/08/96	1810	UG/G	J	40.9	200
B0H6R1	10516-003	Nitrate	NO3-N	QCBLK93833-1	03/08/96	03/08/96	1880	UG/G	J	40.3	200
B0H6R2	10516-004	Nitrate	NO3-N	QCBLK93833-1	03/08/96	03/08/96	45.1	UG/G	J	1.02	5
B0H6Q8	10516-005	Nitrate	NO3-N	QCBLK93833-1	03/08/96	03/08/96	0.25	UG/G	J	0.19	1
NA	QCBLK93833-1	Nitrate	NO3-N	QCBLK93833-1	03/08/96	03/08/96	0.20	UG/G	U	0.20	1
NA	QCLCS93833-1	Nitrate	NO3-N	QCBLK93833-1	03/08/96	03/08/96	97	%REC			1

Quanterra
Environmental Services

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352

Project: 550.126

egory: NO2-NO3
ethod: EPA 353.1
Matrix: SOLID

Sample Date : 03/04/96
Receipt Date : 03/05/96
Report Date : 03/12/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
B0H6Q9	10516-001	Nitrate/Nitrite	NO2+NO3-N	QCBLK93695-1	03/07/96	03/08/96	26.9	UG/G		5.00	10
B0H6Q9	10516-001DUP	Nitrate/Nitrite	NO2+NO3-N	QCBLK93695-1	03/07/96	03/08/96	27.1	UG/G		5.04	10
B0H6Q9	10516-001MS	Nitrate/Nitrite	NO2+NO3-N	QCBLK93695-1	03/07/96	03/08/96	0	%REC			10
B0H6R0	10516-002	Nitrate/Nitrite	NO2+NO3-N	QCBLK93695-1	03/07/96	03/08/96	882	UG/G		102	200
B0H6R1	10516-003	Nitrate/Nitrite	NO2+NO3-N	QCBLK93695-1	03/07/96	03/08/96	931	UG/G		102	200
B0H6R2	10516-004	Nitrate/Nitrite	NO2+NO3-N	QCBLK93695-1	03/07/96	03/08/96	33.6	UG/G		5.10	10
B0H6Q8	10516-005	Nitrate/Nitrite	NO2+NO3-N	QCBLK93695-1	03/07/96	03/08/96	0.50	UG/G	U	0.50	1
NA	QCBLK93695-1	Nitrate/Nitrite	NO2+NO3-N	QCBLK93695-1	03/07/96	03/08/96	0.50	UG/G	U	0.50	1
NA	QCLCS93695-1	Nitrate/Nitrite	NO2+NO3-N	QCBLK93695-1	03/07/96	03/08/96	96	%REC			1

HRG 5/14/96

HEXAVALENT CHROMIUM DATA SUMMARY

SDG: W0924

ANALYSIS DATE: 3/6/96

MATRIX: SOIL

METHOD: RICHWC5005

MDL: 0.57 mg/kg

SAMPLE LAB. ID	CLIENT ID	SAMPLE RESULT	UNITS	SPIKE ADDED	UNITS	SPIKE RECOVERED	UNITS	PERCENT RECOVERY
Preparation blank		0.000	mg/L					
LCS		0.883	mg/L	1.000	mg/L	0.883	mg/L	88.3
60304401	B0H6Q9	<0.57 UJ	mg/kg					
60304402	B0H6R0	0.673 J	mg/kg					
60304402 DUP	B0H6R0	<0.57 U	mg/kg					
60304402 MS	B0H6R0	34.88	mg/kg	42.17	mg/kg	34.21	mg/kg	81.1
60304402 PbCrO4	B0H6R0	715.67	mg/kg	754.47	mg/kg	715.00	mg/kg	94.8
60304403	B0H6R1	<0.57 UJ	mg/kg					
60304404	B0H6R2	<0.57 UJ	mg/kg					
60304405	B0H6Q8	<0.57 UJ	mg/kg					

COMMENTS:

To convert preparation blank in mg/L to mg/kg: mg/kg = (mg/L * 0.1 L) / 0.0025 kg

Form No.: CG-196, 8/95, Rev. 0

012

HRG 5/14/96 ~~CCC/CC~~ 3-7-96

ATTACHMENT 4

LABORATORY NARRATIVE and CHAIN-OF-CUSTODY DOCUMENTATION

Quanterra Environmental Services

Quanterra Incorporated
13715 Rider Trail North
Earth City, Missouri 63045

314 298-8566 Telephone
314 298-8757 Fax

CERTIFICATE OF ANALYSIS

APR 1996
RECEIVED
Data
Log In

Bechtel Hanford Incorporated
3350 George Washington Way
Richland, Washington 99352

March 21, 1996

Attention: Joan Kessner

Project number	:	550.126
Date Received by Lab	:	March 5, 1996
Number of Samples	:	Five (5)
Sample Type	:	Soil
SDG Number	:	W0924
Data Deliverable	:	Summary

I. Introduction

On March 5, 1996, five (5) soil samples were received by Quanterra, Richland and transferred to Quanterra, St. Louis for chemical analysis. Upon receipt, the samples were given the following laboratory ID numbers to correspond with the specific client ID's:

St Louis ID	WHC ID	Richland ID	Matrix	Date of Receipt
10516-001	B0H6Q9	60304301	Soil	03/05/96
10516-002	B0H6R0	60304302	Soil	03/05/96
10516-003	B0H6R1	60304303	Soil	03/05/96
10516-004	B0H6R2	60304304	Soil	03/05/96
10516-005	B0H6Q8	60304305	Soil	03/05/96

II. Analytical Results/ Methodology

The analytical results for this report are presented by analytical test. Each set of data includes sample identification information, analytical results and the appropriate detection limits.

014

HLG 5/14/96

Analyses requested: Arsenic by EPA method 7060. Fluoride and Nitrate by EPA method 300.0. Nitrate by EPA method 353.1. Chromium, Copper, Nickel by EPA method 6010. Hexavalent Chromium by EPA method 7196 was performed by QTESRL. The data is included in this package.

III. Quality Control

A Laboratory Control Sample and Method Blank were analyzed with each preparation batch. Matrix Spike and Matrix Spike Duplicate or Sample Duplicate analyses were performed per the protocol for each analyte.

IV. Definitions

The following codes are used to denote laboratory quality control samples and can be found in the data summary section of this report:

QCBLK- Quality Control Blank, Method Blank
QCLCS- Quality Control Laboratory Control Sample, Blank Spike

V. Comments

Metals
The recoveries of the Matrix Spike (69.2%) and the Matrix Spike Duplicate (75.6%) for Arsenic were less than 80%, therefore all associated data was flagged with an " N ". See NCM # 2548.

Wet Chemistry
The Relative Percent Difference could not be calculated due to the values being below the detection limits for sample 10516-001 on the Fluoride analysis.

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Quanterra Environmental Services

Bechtel Hanford Incorporated
March 21, 1996
Project Number: 550.126
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Integration shows a hit for Fluoride but the peak area is less than the lowest calibration standard and the values are reported as less than the detection limit for sample 10516-001 and 10516-001DUP and 10516-005.

The Matrix Spike recovery is outside of the suggested limits of 75 - 125% for the Nitrate analysis, but the sample concentration is four times greater than the spike amount. See NCM # SL-2546.

I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:

Wade H. Price
Project Manager
e:\\price$\abbydave\hanw0924.nar

HRG 5/14/96

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Pa. ___ of ___

Data Turnaround: X Priority / Normal

Collector: Jon Fancher / David St. John	Company Contact: L.R. Miller	Telephone: 509-373-9592
Project Designation: 183-H Basins Verification	Sampling Location: 183-H basins soils	SAF No.: B96-056
Ice Chest No.: ER-17	Field Logbook No.: EL-1287	Method of Shipment: Hand carryion government vehicle
Shipped To: Quanterra	Offsite Property No.: N/A	Bill of Lading/Air Bill No.: N/A
Possible Sample Hazards/Remarks		
Special Handling and/or Storage		

SAMPLE ANALYSIS 603043

Sample No.	Matrix*	Date Sampled	Time Sampled	1	2	3	4	5					
Preservation				Cool	Cool	Cool	Cool	none					
Type of Container				P/G	P/G	P/G	P/G	P/G					
No. of Container(s)				1	1	1	1	1					
Volume				60ml	60ml	60ml	60ml	20ml					
				100%	100%	100%	603044						
B0H6Q9 01	S	3/4/96	0910	X	X	X	X	X					
B0H6R0 02	S	3/4/96	0931	X	X	X	X	X					
B0H6R1 03	S	3/4/96	0931	X	X	X	X	X					
B0H6R2 04	S	3/4/96	1018	X	X	X	X	X					
B0H6Q8 05	S	3/4/96	1114	X	X	X	X	X					
				2mg	Recv	40	ml	6A	H2O	no	label		

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By	Date/Time	Received By	Date/Time
David St. John ERC	3-4-96 1305	Bechtel ERC	3-4-96 1305
Relinquished By	Date/Time	Received By	Date/Time
Bechtel ERC	3-5-96 1100	Karin Gallegos	3-5-96 1100
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

1 IC Anions, Fluoride, Nitrate
2 NO2/NO3
3 ICP Metals, Cr, Cu, Ni, As
4 Chromium 6
5 Activity Scan

SDG W0924

Matrix*: S = Soil; SE = Sediment; SO = Solid; SL = Sludge; W = Water; O = Oil; A = Air; DS = Drum Solids; DL = Drum Liquids; T = Tissue; WI = Wipe; L = Liquid; V = Vegetation; X = Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

HCG 5/14/96

~~00010~~

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Rev. 0

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ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

WHC-SD-EN-SPP-002, Rev. 2

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E

PROJECT: 183-H Basin ~~P&T~~ HG 5/15/96		DATA PACKAGE: W0924-QES
VALIDATOR: H. GREGERSON	LAB: QUANTERRA	DATE: 5/14/96
CASE:		SDG:

ANALYSES PERFORMED

☒ Anions/IC	☐ TOC	☐ TOX	☐ TPH-418.1	Oil and Grease	Alkalinity
☐ Ammonia	☐ BOD/COD	☐ Chloride	☒ Chromium-VI	☐ pH	☒ NO_3/NO_2
☐ Sulfate	☐ TDS	☐ TKN	☐ Phosphate	☐	☐
☐	☐	☐	☐	☐	☐

SAMPLES/MATRIX BOH60Q9 BOH60R0 BOH60R1 BOH60R2
BOH60Q8 / SOIL

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . Yes No N/A

Is a case narrative present? . . . . . Yes No N/A

Comments:

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . Yes No[1] N/A

Comments:

1. The holding time for nitrate and chromium 6 were exceeded and associated samples were qualified, see supporting documents.

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GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

3. INSTRUMENT CALIBRATION

Was initial calibration performed for all applicable analyses? Yes No N/A
Are initial calibration results acceptable? . . . . . Yes No N/A
Was a calibration check performed for all applicable analyses? Yes No N/A
Are calibration check results acceptable? . . . . . Yes No N/A
Comments:

4. BLANKS

Were laboratory blanks analyzed? . . . . . Yes No N/A
Are laboratory blank results acceptable? . . . . . Yes No N/A
Were field/trip blanks analyzed? . . . . . Yes No N/A
Are field/trip blank results acceptable? . . . . . Yes No N/A
Comments:

5. ACCURACY

Were spike samples analyzed at the required frequency? . . . . Yes No N/A
Are spike recoveries acceptable? . . . . . Yes No N/A
Were LCS analyses performed at the required frequency? . . . . Yes No N/A
Are LCS recoveries acceptable? . . . . . Yes No N/A
Comments:

6. PRECISION

Were laboratory duplicate samples analyzed
at the required frequency? . . . . . Yes No N/A
Are laboratory duplicate sample RPD values acceptable? . . . . Yes No N/A
Are field duplicate RPD values acceptable? . . . . . Yes No N/A
Are field split RPD values acceptable? . . . . . Yes No N/A

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

Comments:
1. B0H6R1 is a field duplicate of B0H6R0, the RPDs were evaluated and determined to be acceptable.
2. B0H6Q8, B0H6Q9, B0H6R0, and B0H6R2 are split samples. The associated samples are in another SDG, therefore RPDs were not evaluated.

7. ANALYTE QUANTITATION

Was analyte quantitation performed properly? . . . . . Yes No N/A

Comments:

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses? . . . . . Yes No N/A

Are results supported in the raw data? . . . . . Yes No N/A

Are results calculated properly? . . . . . Yes No N/A

Do results meet the CRDLs? . . . . . Yes No N/A

Comments:

HOLDING TIME SUMMARY

SDG: W0924-QES	VALIDATOR: HEIDI GREGERSON	DATE: 5/4/96	PAGE 1 OF 1

COMMENTS:

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
BOH6Q9	F, NO_3	3/4/96	3/8/96	3/8/96	4	4	NO_3 J
	NO_3/NO_2		3/7/96	3/8/96	3	4	none
	Cr 6		3/6/96	3/6/96	2	2	HG ~~NO_3~~ UJ
BOH6RO	F, NO_3		3/8/96	3/8/96	4	4	NO_3 J
	NO_3/NO_2		3/7/96	3/8/96	3	4	none
	Cr 6		3/6/96	3/6/96	2	2	HG ~~NO_3~~ J
BOH6R1	F, NO_3		3/8/96	3/8/96	4	4	NO_3 J
	NO_3/NO_2		3/7/96	3/8/96	3	4	none
	Cr 6		3/6/96	3/6/96	2	2	HG ~~NO_3~~ UJ
BOH6R2	F, NO_3		3/8/96	3/8/96	4	4	NO_3 J
	NO_3/NO_2		3/7/96	3/8/96	3	4	none
	Cr 6		3/6/96	3/6/96	2	2	UJ
BOH6Q8	F, NO_3		3/8/96	3/8/96	4	4	NO_3 J
	NO_3/NO_2		3/7/96	3/8/96	3	4	none
	Cr 6		3/6/96	3/6/96	2	2	UJ

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