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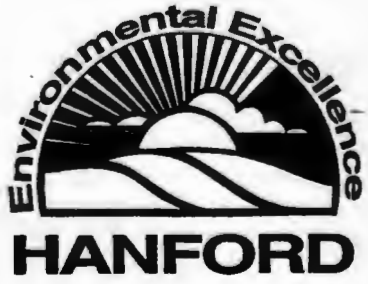
SECTION 1

BHI-00922
Rev. 0

1995 Phase I Concrete Sampling at the Decontaminated 183-H Basins



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

Bechtel Hanford, Inc.
Richland, Washington

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Author(s): C. D. Kramer

Approval: J. J. McGuire, Decontamination and Decommissioning Project Manager

Signature

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Date

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1995 Phase I Concrete Sampling at the Decontaminated 183-H Basins

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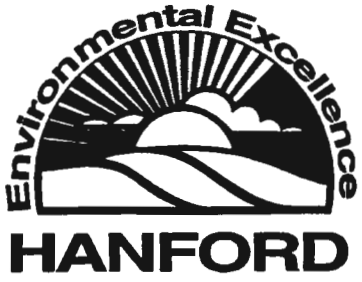

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Richland, Washington

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 non-metric 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

BHI	Bechtel Hanford, Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
cm	centimeters
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
FAST	Field Assessment Services Team
ft^2	square feet
GEA	gamma energy analysis
HEIS	Hanford Environmental Information System
in.	inches
m^2	square meters
mm	millimeters
pCi/g	picocuries per gram
QES	Quanterra Environmental Services
RCRA	Resource Conservation and Recovery Act of 1976
RPD	relative percent difference
SAF	Sample Authorization Form
SDG	sample delivery group
SML	Sampling and Mobile Laboratory
^{99}Tc	technetium-99
TCLP	Toxicity Characteristic Leaching Procedure
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TSD	treatment, storage, and disposal facility
^{234}U	uranium-234
^{235}U	uranium-235
^{238}U	uranium-238
WHC	Westinghouse Hanford Company
WSCF	Waste Sampling and Characterization Facility

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1.0 INTRODUCTION

This report provides a consolidated reference for 1995 concrete sampling data associated with the Hanford Site's 183-H Solar Evaporation Basins. Previous site data have been reported in *RCRA Closure Data Evaluation Report: 183-H Solar Evaporation Basins Soil and Concrete* (DOE-RL, 1995a). In 1995, the 183-H Basins were decontaminated and dismantled. Sampling efforts began after completion of concrete decontamination efforts. Concrete structures (walls and floors) and drummed waste were sampled between August 24 and November 1, 1995. One soil sample from the east berm outside Basin No. 1 was collected concurrently with concrete sampling. Additionally, one water sample was collected during this period to disposition rainwater that accumulated before sampling the decontaminated basin floors. Sampling is described in chronological order. Radiological release surveys of the decontaminated basin walls and floors have been included for completeness.

1.1 BASIN HISTORY AND REGULATORY STATUS

The 183-H Solar Evaporation Basins were located in the 100 Area of the Hanford Site, north of the retired 105-H Reactor (Figure 1-1). They consisted of four adjoining concrete basins. 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-1960s (BHI, 1995a). Most of the water treatment structures, including 12 additional adjoining basins, were demolished in 1974 (DOE-RL, 1995b). 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, hence the name "183-H Solar Evaporation Basins." The last shipment of waste to the 183-H Basins took place in November 1985 (DOE-RL, 1995b).

The contiguous basins have been designated an interim-status storage, treatment, and/or disposal facility (TSD) unit under the Resource and Conservation 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., 1996) and by requirements of the Hanford Site RCRA permitting process.

The 183-H Solar Evaporation Basins stored and treated RCRA listed wast as well as characteristic and criteria-regulated waste. A "contained-in" determination was made by DOE-RL in order to remove the listed waste designation from the concrete. The determination concluded that listed waste designations could be removed from the concrete if analysis proved that dangerous waste constituents did not exceed Model Toxics Control Act Method C industrial standards and if concrete scabbling residue would be disposed at a disposal unit within the Hanford Site's 200 Area Plateau. This determination is consistent with the Washington State Department of Ecology's (Ecology) contained-in policy for contingent management. Scabbled concrete was determined to be releasable as nondangerous waste after analytical determination that the concrete was not characteristic or criteria-regulated dangerous waste.

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 have been assigned to the 100-HR-1 source operable unit. (The groundwater operable unit beneath this source is the 100-HR-3 unit.) The U.S. Environmental Protection Agency (EPA) oversees all Hanford CERCLA activities.

1.2 BASIN STRUCTURE RELATIVE TO SAMPLING

Understanding the basins' structure and general site characteristics is helpful to understand sampling described in this report. Sampling was primarily concerned with basin cement surfaces formerly in contact with regulated mixed wastes. This consisted of interior basin surfaces. Facility dimensions and layout are shown in Figures 1-2 and 1-3. (Dimensions are shown in both feet and metric equivalents because supporting data in the appendices was recorded in feet.)

The four open basins were aligned in series as a single, partially above-ground structure. Each 650-square meter (m^2) concrete basin consists of an upper flocculation reservoir on the north side and a deeper sedimentation reservoir on the south. The basin walls are about 15 centimeters (cm) thick and the floor is at least 13 cm thick (Rasmussen, 1995). Interior walls are sloped at the bottom where the walls join the floor. Decontamination (scabbling) of interior walls removed contaminated concrete surfaces; approximately 6 millimeters (mm) of surface material were removed and transferred to waste drums. Radiological surveying and decontamination processes of the lower portions of the interior basin surfaces (those potentially exposed to the former basin wastes) were delineated in 0.6-meter (m) by 2.4-m (2-ft by 8-ft) sections and numbered with paint.

Sampling was performed between August and November 1995 to support demolition activities. Site samples described in this report can be classified into three basic groups: concrete structure, waste drum, and environmental media samples. Concrete structure samples were collected from suspected clean concrete surfaces. Waste drum samples were collected from drums of basin decontamination wastes. Both structure and waste samples consisted of fine, pulverized concrete generated by the scabbling process. Environmental media samples were incidental soil and water samples collected during concrete sampling.

Initial sampling in August 1995 began on the decontaminated interior basin walls, an overflow flume, and an exterior soil berm. The overflow flume was located above the south end of the sedimentation basins and served the four basins in common. (Refer to Figure 2 cross section.) Waste was never known to be present at depths that would have caused waste to contact (and contaminate) the overflow flume. A low point in the overflow flume occurred adjacent to Basin No. 1.

Soil was bermed against the lower portion of the exterior walls at the facility. Previous site work included soil sample collection and analysis (DOE, 1995a). One additional soil sample was collected from the berm east of Basin No. 1 during the August 1995 sampling.

Decontamination of the interior walls and floors generated drummed wastes which were stored on site. Waste drums were sampled for characterization in September and October.

Decontaminated basin floors were sampled last. This final phase of sampling took place in October and November. Though the climate of the region is dry, there was some accumulation of precipitation in the basins after decontamination but before floor sampling was completed in the fall of 1995. Precipitation was pumped to Basin No. 2. After collection and analysis of the accumulated precipitation, sampling of the interior floor surfaces was completed.

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

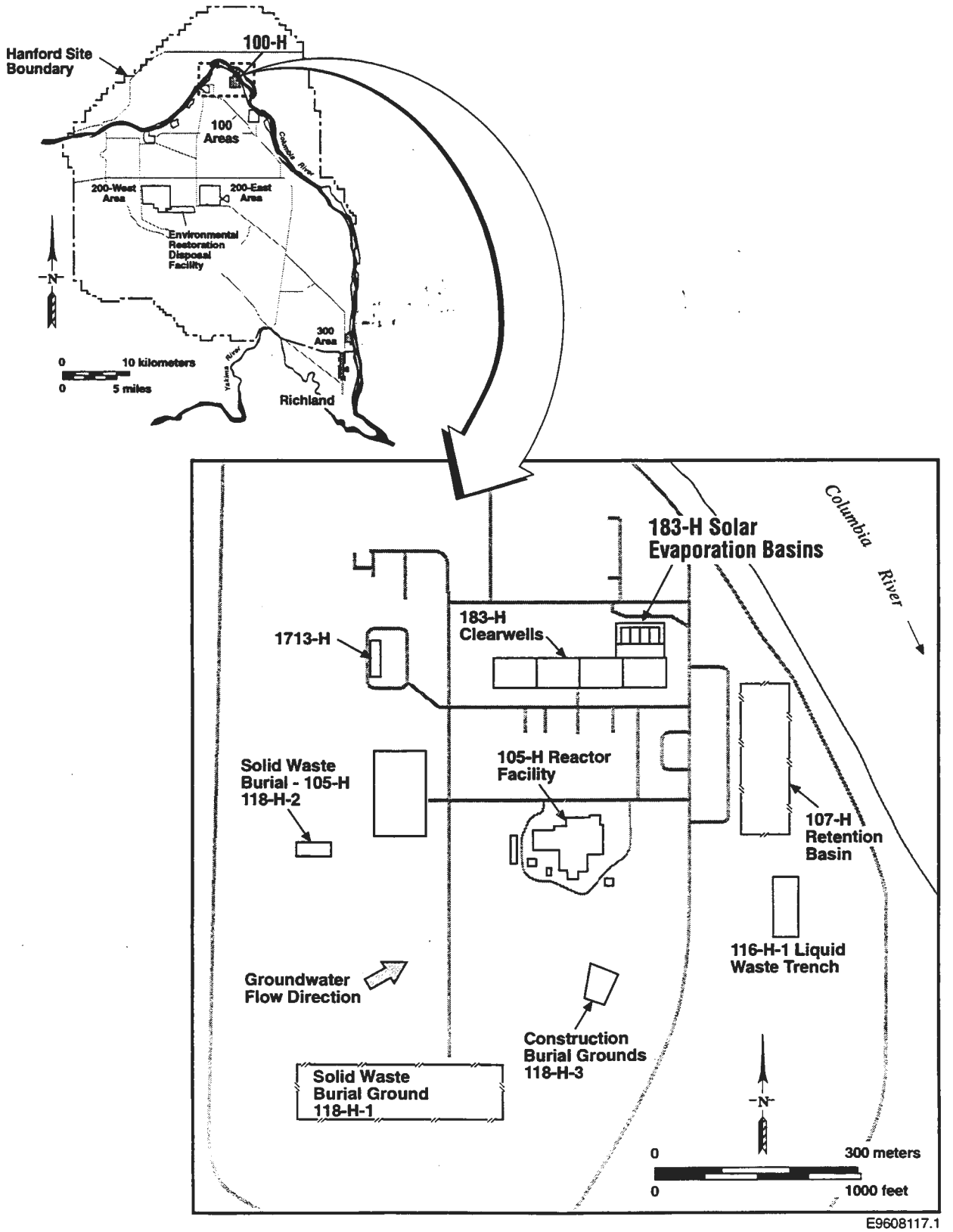

Figure 1-2. Details of the 183-H Solar Evaporation Basins

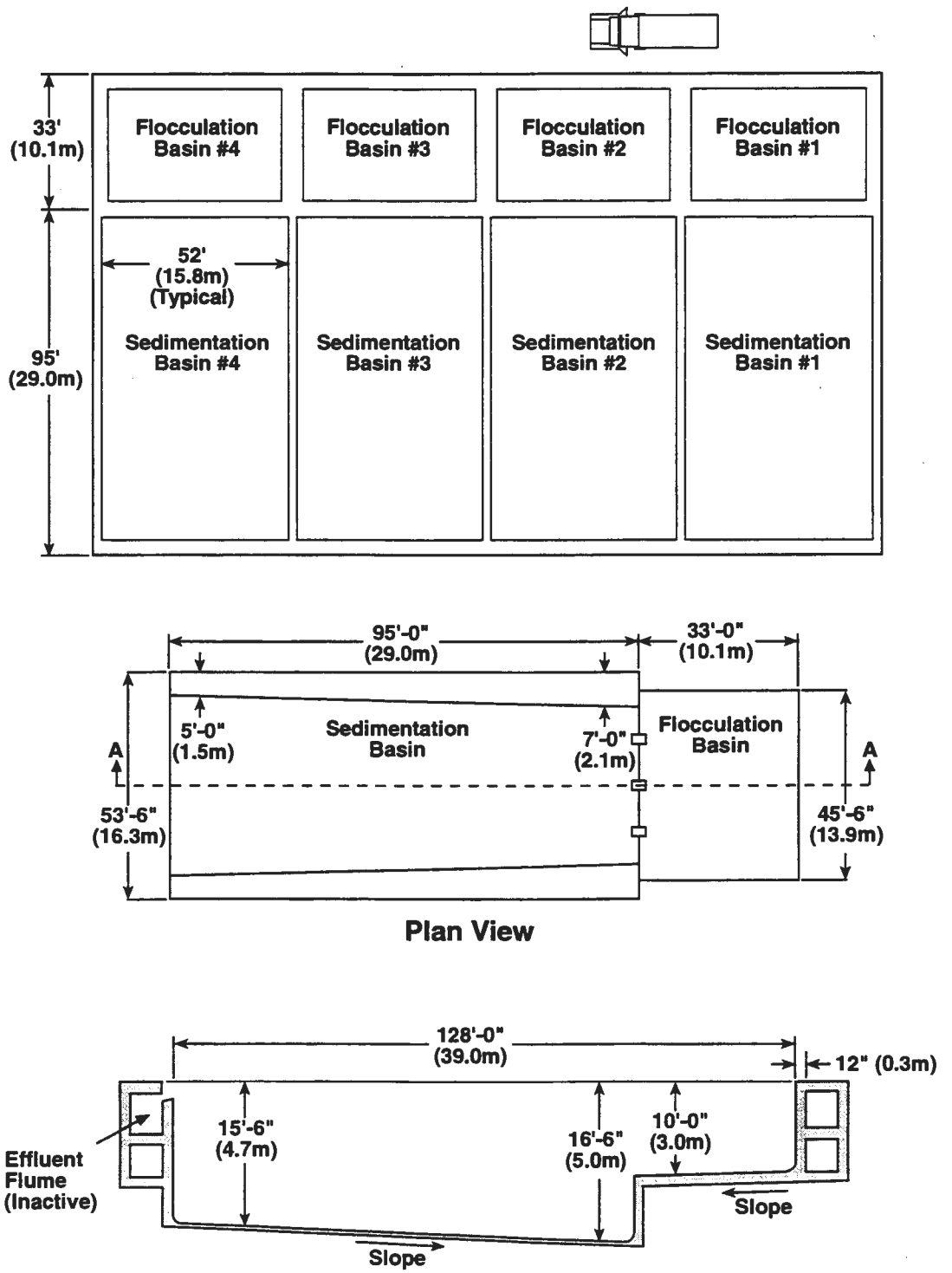

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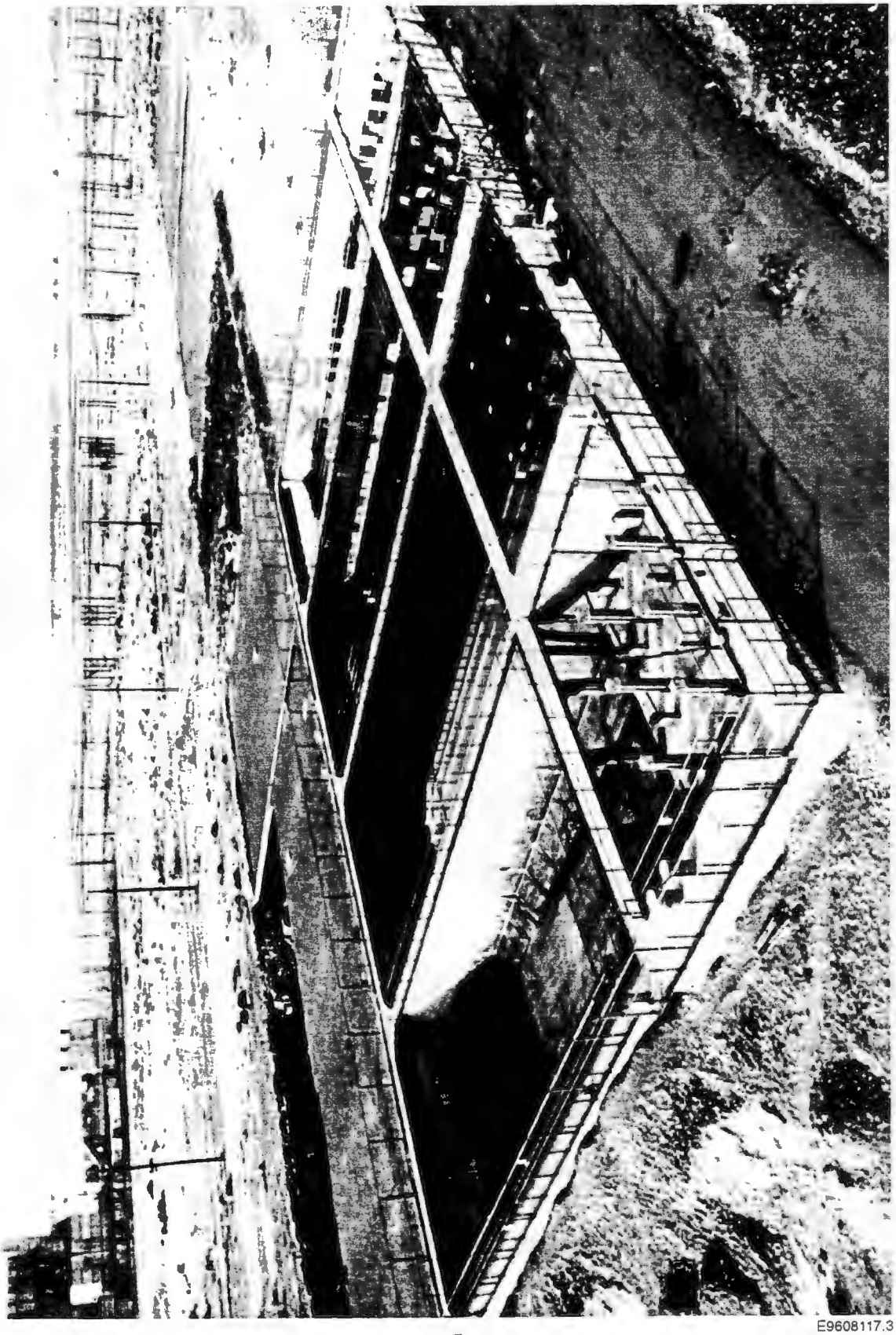
Figure 1-3. 1990 Aerial of the 183-H Solar Evaporation Basins



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2.0 FIELD SAMPLING

Concrete sampling field work (Phase I sampling) began August 24, 1995, after basin surface decontamination. Phase I work consisted of sampling the decontaminated structure and the drummed, segregated, decontamination wastes. The objective was to characterize material that had been removed from the 183-H basin surfaces during the decontamination process to (1) ensure the that remaining concrete had been adequately decontaminated and to (2) verify that a flume in the basin's southern wall had never been contaminated by regulated wastes. A sampling and analysis plan was developed by the Environmental Restoration Contractor (ERC) in consultation with the Washington State Department of Ecology (Ecology), EPA, and the U.S. Department of Energy (DOE) (Rasmussen, 1995). The written sampling and analysis plan was augmented with additional concrete wall and drum sampling during implementation.

Samples were collected by Westinghouse Hanford Company's (WHC) Sampling and Mobile Laboratories (SML) personnel on August 24 and 25, September 14, October 23, and November 1, 1995. The work was performed for the DOE under the direction of the ERC. Samples were collected using a clean, air-driven rotohammer to grind off surface concrete from predetermined locations inside the 183-H Basins. Sample wall material was collected in plastic bags that were taped to the wall below the sample sites. Sample floor material was simply accumulated adjacent to the area from which sample was ground. The sample media was then transferred to clean sample bottles for transport and subsequent analysis. The SML personnel referenced the wall sample locations by using the same numbered grids established for radiological survey purposes.

Waste drum sampling of pulverized surface concrete collected by the decontamination process was conducted by ERC personnel on September 29, October 2, and October 3, 1995. Samples were collected using clean stainless-steel spoons.

Table 2-1 is a consolidated Phase 1 sample key. The table provides a list of all field samples associated with this report.

2.1 BASIN STRUCTURES--AUGUST 1995

Basins No. 1 and No. 4 were sampled August 24, 1995, by SML personnel. Sampling was completed August 25 on a flume area. (Basins are numbered from east to west. Number 1 is the furthest east.) Samples were collected in multiple jars to meet analytical needs. Aliquots were assigned Field Assessment Services Team (FAST) sample identification numbers (S-series) or Hanford Site 222-S laboratory sample numbers (N-series).

Two representative locations on the decontaminated Basin No. 1 walls were sampled. Samples from the south wall, 1.5 m above the basin floor were numbered S5060-01 and N5850. Samples from the east wall, 1.2 m above the basin floor were numbered S5060-02 and N5851.

Additionally, on August 25, samples S5060-05 and N5855 were collected from a single untreated 0.4 m^2 location on the floor of the flume adjacent to Basin No. 1.

Likewise, two locations on the Basin No. 4 walls were sampled. Samples from the south wall location, 0.9 m down below the top of the scabbled area, were numbered S5060-03 and N5852. Samples from the west wall location, also 0.9 m below the top of the scabbled area, were numbered S5060-04 and N5854. (Author's Note: Samplers occasionally referenced sample locations from the edge of the dark area where the basin liner had not been removed. Based upon ERC Radiological Survey Records, this upper reference line would have been more than 2.4 m above the sedimentation basin's floor.)

Samples were delivered to the WHC FAST, the Hanford Site 222-S Laboratory, and the ERC's Environmental Analytical Laboratory (EAL) for analysis. Analyses and results are discussed in subsequent chapters.

The scope of work assigned to WHC included preparation of a letter report documenting their sampling work. Appendix A contains the report for the WHC August work, including a confirmatory soil sample collected with a clean stainless-steel spoon from outside basin No. 1's east wall.

2.2 BASIN STRUCTURES--SEPTEMBER 1995

The walls of Basins No. 2 and No. 3 were sampled September 14, 1995, by SML personnel. Aliquots were again assigned FAST sample identification numbers (S-series) or Hanford Site 222-S Laboratory sample numbers (N-series). Sampling was supported by the same Sample Authorization Form (SAF), S5-060 used for the August work.

Sample locations were selected at random from basin walls. The south wall of Basin No. 2 was sampled at a representative location 0.3 m below the top of the scabbled area. Samples from Basin No. 2 were numbered S5060-07 and N5937. Basin No. 3 was also sampled along the south wall, 4.9 m from the east side and 0.6 m from the basin floor. Samples from Basin No. 3 were numbered S5060-08 and N5936.

Samples were delivered to the FAST, the 222-S Laboratory, and EAL for analysis. Analyses and results are discussed in subsequent chapters.

The scope of work assigned to WHC included preparation of a letter report documenting their sampling work. Appendix B contains the report for the September work.

2.3 WASTE DRUMS--SEPTEMBER/OCTOBER 1995

Surface concrete removed from the 183-H Basin walls had been placed in waste barrels during decontamination work. Sampling was performed September 29, October 2 and 3, 1995, by ERC personnel to verify chemical and radiologic waste drum contents for waste disposal purposes. This sampling was supported by SAF B95-106.

Five drums from each basin were selected for sampling. In addition, a duplicate sample was collected from a Basin No. 2 drum. Samples were collected using clean stainless- steel spoons then were placed in multiple new, vendor-cleaned sample containers. Media for the duplicate and associated regular sample were mixed in a clean stainless-steel bowl before being allocated to sample containers. Separate clean spoons were used for each drum sampled, and samples were assigned a unique Hanford Environmental Information System (HEIS) numbers. Aliquots destined for analysis at 222-S Laboratory were assigned 222-S numbers.

2.4 BASIN FLOOR STRUCTURES--OCTOBER 1995

On October 6, a sample (B0GTS1) of rainwater was collected by ERC samplers from Basin No. 2. The purpose was to confirm radiological characterization for appropriate disposal of the water. Sampling was supported by ERC SAF B96-002. Recently accumulated basin rainwater was pumped to Basin No. 2, before sampling, for consolidation. The basins had been decontaminated, but the process not completed to release the structure from radiological controls. Aliquots were collected by filling a 500-milliliter, pre-cleaned glass sample bottle and pouring into seven plastic containers for shipment to the analytical facilities. Hydrochloric acid was mixed with the water for technetium-99 (^{99}Tc) analysis. Nitric acid was mixed with water for gross alpha, gross beta, total uranium, and gamma spectral analyses. No preservative was mixed with the water for total activity analyses. Aliquots were delivered to 222-S and to Quanterra for quick-turnaround analysis.

Basin floor concrete sampling in Basins No. 2, No. 3 and No. 4 took place on October 23, 1995. Sampling was again performed by WHC SML personnel under the direction of the ERC. Sampling was supported by ERC SAF B96-026.

Based upon the sampling plan (Rasmussen, 1995), two locations, one random and one authoritative, were sampled in each basin. Multiple containers were filled at each sample location. Following are the random locations that were sampled:

- Basin No. 2: 4.6 m south of the north flocculation basin wall, 1.5 m from the east wall (sample BOGRK3)
- Basin No. 3: 12.2 m north of the south basin wall and 3.0 m from the west wall (sample B0GRK6)

- Basin No. 4: 12.2 m south of the flocculation basin and 3.0 m from the west wall (sample B0GRK8).

  Note: The Basin No. 2 random floor sample came from the (upper) flocculation basin area while remaining samples were taken from (lower) sedimentation basin areas.

The authoritative locations sampled follow:

- Basin No. 2: 10.1 m south of the flocculation basin wall at the base of the west wall, (sample B0GRK4)

- Basin No. 3: 0.9 m south of the flocculation basin and 7.6 m from the east wall, (sample B0GRK5)

- Basin No. 4: 0.9 m south of the flocculation basin and 9.1 m from the west wall, (sample B0GRK7).

Before using the rotohammer, silica sand was poured over the clean tool head and collected as an equipment blank (sample B0GRK0). Samplers supplied the sand. The tool was field decontaminated following WHC procedures (WHC 7-7, EII 5.4) (WHC, 1988) between samples. A duplicate and split sample were also taken from the randomly selected Basin No. 4 location. The split sample, B0GRL0, was shipped for independent off-site analysis by Quanterra, Inc. Remaining basin structure samples were shipped to on-site laboratories. Results were reported directly to the ERC from the off-site laboratory.

On October 23, 1995, Basins No. 1 and No. 4 had standing water over areas planned as sampling points–temporarily delaying sampling. Basin No. 1 was pumped and the concrete floor sampled that same day. The floor was reported moist at the time of sampling (Appendix C). Samples were assigned HEIS sample numbers, except aliquots destined for 222-S, which were assigned 222-S numbers. Samples were delivered to 222-S, FAST, EAL and Quanterra for analysis. Analyses and results are discussed in subsequent chapters.

The scope of work assigned to WHC included preparation of a letter report documenting their work. Appendix C contains the report for WHC's October and November 1995 work.

2.5 BASIN FLOORS STRUCTURES--NOVEMBER 1995

Floor sampling for Basin No. 1 took place on November 1, 1995. This was an extension of October 1995 sampling of the other basin floors. Sampling was performed by WHC SML personnel under the direction of the ERC. Sampling was again supported by ERC SAF B96-026.

Based upon the sampling plan (Rasmussen, 1995), two locations in the basin were sampled. Multiple containers were filled with material from each sample location. The randomly selected location was 15.2 m south of the flocculation basin and 6.1 m from the east wall, (sample

B0GRK2). The authoritatively selected location sampled was 4.6 m south of the flocculation basin and 1.5 m from the east wall (sample B0GRK1).

Samples were assigned HEIS sample numbers, except aliquots destined for 222-S, which were assigned 222-S numbers. Samples were delivered to 222-S, FAST, EAL and an off-site laboratory (Quanterra) for analysis.

The scope of work assigned to WHC included preparation of a letter report documenting their work. Appendix C contains the report for the October and November 1995 sampling and chemical analyses. It does not include radiological results from aliquots delivered to EAL, 222-S Laboratory or Quanterra.

Table 2-1. Phase I Field Sample Key (Page 1 of 2)

Date Sampled	Primary Sample ID	Alias	Matching 222-S ID	Basin	Location	Media
8/24/95	S5060-01	FT5040-01	N 5850	1	South interior wall	Concrete
8/24/95	S5060-02	FT5040-02	N 5851	1	East interior wall	Concrete
8/24/95	S5060-03	FT5040-03	N 5852	4	South interior wall	Concrete
8/24/95	S5060-04	FT5040-04	N 5854	4	West interior wall	Concrete
8/25/95	S5060-05	FT5040-05	N 5855	1	Basin No. 1 flume floor	Concrete
8/24/95	S5060-06	FT5040-06	N 5856	NA	Outside Basin No. 1, east berm	Soil
9/14/95	S5060-07	FT5040-13	N 5937	2	South interior wall	Concrete
9/14/95	S5060-08	FT5040-14	N 5936	3	South interior wall	Concrete
9/29/95	B0GNX2	----	N 5985	3	Drum 198	Concrete
9/29/95	B0GNX3	----	N 5986	3	Drum 210	Concrete
9/29/95	B0GNX4	----	N 5987	3	Drum 200	Concrete
9/29/95	B0GNX5	----	N 5988	1	Drum 41	Concrete
9/29/95	B0GNX6	----	N 5987	1	Drum 38	Concrete
9/29/95	B0GNX7	----	N 5990	1	Drum 39	Concrete
9/29/95	B0GNX8	----	N 5991	1	Drum 40	Concrete
10/2/95	B0GNX9	----	N 5992	2	Drum 135	Concrete
9/29/95	B0GNY0	----	N 5993	4	Drum 47	Concrete
9/29/95	B0GNY1	----	N 5994	4	Drum 48	Concrete
9/29/95	B0GNY2	----	N 5995	4	Drum 51	Concrete
10/2/95	B0GNY3	----	N 5996	4	Drum 46	Concrete
10/2/95	B0GNY4	----	N 5997	2	Drum 130	Concrete
10/2/95	B0GNY5	----	N 5998	2	Drum 83	Concrete
10/2/95	B0GNY6	----	N 5999	2	Drum 83 (Duplicate)	Concrete
10/2/95	B0GNY7	----	N 6000	4	Drum 52	Concrete
10/2/95	B0GNY8	----	N 6001	3	Drum 217	Concrete
10/2/95	B0GNY9	----	N 6002	2	Drum 111	Concrete
10/3/95	B0GNZ0	----	N 6003	3	Drum 231	Concrete
10/3/95	B0GNZ1	----	N 6004	1	Drum 44	Concrete
10/3/95	B0GNZ2	----	N 6005	2	Drum 78	Concrete
10/6/95	B0GTS1	----	N 6026	2	Sed. basin floor	Water

Table 2-1. Phase I Field Sample Key (Page 2 of 2)

Date Sampled	Primary Sample ID	Alias	Matching 222-S ID	Basin	Location	Media
10/23/95	B0GRK0	FT5124-01	N 6067	NA	Sand equipment blank	Silica sand
10/23/95	B0GRK3	FT5124-02	N 6070	2	Floc. basin floor	Concrete
10/23/95	B0GRK4	FT5124-03	N 6071	2	Sed. basin floor	Concrete
10/23/95	B0GRK5	FT5124-04	N 6072	3	Sed. basin floor	Concrete
10/23/95	B0GRK6	FT5124-05	N 6073	3	Sed. basin floor	Concrete
10/23/95	B0GRK7	FT5124-06	N 6074	4	Sed. basin floor	Concrete
10/23/95	B0GRK8	FT5124-07	N 6075	4	Sed. basin floor	Concrete
10/23/95	B0GRK9	FT5124-08	N 6075	4	Sed. basin floor (Duplicate of B0GRK8)	Concrete
10/23/95	B0GRL0	---	N 6075	4	Sed. basin floor (Split of B0GRK8)	Concrete
11/1/95	B0GRK1	FT5124-09	N 6068	1	Sed. basin floor	Concrete
11/1/95	B0GRK2	FT5124-10	N 6069	1	Sed. basin floor	Concrete

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3.0 ANALYSIS AND VALIDATION

Sample aliquots were submitted to on-site or to off-site laboratories for chemical and/or radiological analysis. No field analysis, other than radiation surveys, were performed during Phase I concrete sampling. This section briefly discusses the analyses and analytical groups for Phase I sampling.

Off-site analysis was used for drummed waste concrete samples, a basin concrete structure split sample, and the rainwater sample. On-site analysis was used for the cement structure samples and the soil berm sample. All samples, whether destined for subsequent on-site or off-site analysis, were supported by a 222-S Laboratory radiological, total activity analysis.

3.1 ON-SITE LABORATORIES

Results were reported via one of three on-site analytical groups (222-S Laboratory, FAST, or EAL). The 222-S Laboratory and EAL were used for radiological analyses. The FAST was used for chemical characterization.

3.1.1 222-S Laboratory

The 222-S Laboratory is operated for the DOE by WHC. All sample aliquots assigned N-series numbers were submitted to the 222-S Laboratory for a radiological total activity analysis. This analysis was performed to ensure associated samples would be shipped and controlled in compliance with applicable radiological requirements. It is a scintillation-based radiological method. All samples were reported at the minimum laboratory-reported concentration of <50 picocuries per gram (ρCi/g).

3.1.2 Field Assessment Services Team

FAST-reported samples were analyzed according to WHC internal procedures (WHC internal laboratory-specific procedures are identified in Appendices A, B, and C). These project samples have "FTxxx-xx" alias sample identifications in the Phase 1 Field Sample Key (Table 2-1). Table 3-1 lists EPA methods referenced by FAST. Method references have been corrected from those appearing in the initial letter reports based on personal communication with WHC Special Analytical Studies personnel (Appendix D).

Aliquots from the August and September 1995 samples were submitted for "Total metals TCLP (Toxicity Characteristic Leachate Procedure), ANIONS (EPA 300.0), F, Cl, NO2, NO3, SO4, PO4, chromium +6, pH, cyanides, sulfide, and formate" (Appendices A and B). Chemical characterization was performed by FAST. No formate analyses were reported by FAST.

August sample digestions for metals analyses were performed by FAST and the extracts shipped to the WHC Waste Sampling and Characterization Facility (WSCF) laboratory for concentration measurements. Measurements from WSCF were reported by FAST (Appendix A).

All FAST-reported sampling results for arsenic, barium, cadmium, chromium (total), lead, selenium, and silver, reference EPA Method 3051 (EPA, 1986). This method is a preparatory digestion method that was performed in lieu of a TCLP preparation. The sample analysis requests for "Total metals TCLP" were interpreted as routine total analyses (incorporating Method 3051) for the TCLP metal analytes listed above.

Similar chemical analyses were performed on the October and November 1995 basin wall and/or floor samples. Split sample B0GRL0 was the only basin structure (wall or floor) sample not analyzed by FAST. This quality control sample was shipped off site for analysis, and the results were reported directly to ERC from the off-site laboratory.

3.1.3 Bechtel Hanford Inc., Environmental Analytical Laboratory

Aliquots of all samples characterized by FAST were submitted to the EAL for the following radiological determinations: gamma energy analysis (GEA), gross alpha, gross beta, uranium-234 (^{234}U), uranium-235 (^{235}U), uranium-238 (^{238}U), total uranium, and ^{99}Tc. BHI internal, laboratory-specific procedures were used. A spectral GEA was used to measure gamma-emitting radionuclides. Gross alpha and gross beta were ascertained by scintillation methods. Technetium-99 concentrations were derived using residual beta estimates.

Waste drum samples were not analyzed by the EAL. Waste drum samples were sent to off-site laboratories for both radiological and chemical analysis. Lower constituent detection limits were a factor in this decision.

3.2 OFF-SITE LABORATORIES

Analyses were performed by one off-site laboratory contractor at its multiple facilities. Quanterra Environmental Services (QES) performed the analyses. Samples were delivered to the QES Richland Laboratory, then transferred as necessary to the QES St. Louis, Missouri, facilities for chemical analysis. Established protocols were followed for off-site analysis and reporting. Off-site analyses were coordinated through the ERC's Sample Management organization.

Aliquots of all drummed waste concrete samples, the concrete structure split sample from the basin floor, and the water sample were shipped for off-site analysis. Radiological analysis was performed at the QES Richland Laboratory; chemical analysis was performed at the QES St. Louis facility. Only radiological analyses were required for water sample B0GTS1.

Sample aliquots were submitted for the following radiological determinations: GEA, gross alpha, gross beta, ^{234}U, ^{235}U, ^{238}U, total uranium, and ^{99}Tc. Total uranium was requested for water sample B0GTS1 whereas the uranium isotopic analysis was requested for the waste drum samples. Both total and isotopic uranium analyses were performed on the concrete structure sample. Radionuclide results reported by QES use "DA" when activity of a daughter was used to estimate a parent nuclide concentration. One nuclide, ^{238}U, was also reported with the suffix "DLP." This indicates that a more closely related, but lower yielding (less sensitive), daughter was used than in the "DA" estimate.

Chemical analyses requested by off-site laboratories are listed by reference method in Table 3-2. Requested chemical analytes for the solid matrices were identical except for vanadium, formate and hexavalent chromium. Formate and vanadium analyses were requested only on the waste samples. Hexavalent chromium was requested only on concrete structure split samples. Additionally, arsenic, lead, selenium, and thallium analysis was requested using the atomic absorption methods (EPA 7000 series) for the split sample.

Laboratory instructions were revised in early November 1995. A TCLP metals analysis was requested on four samples held by the laboratory: B0GNX7, B0GNY0, B0GNY2, and B0GNY4. Project needs dictated adding TCLP analysis primarily for additional chromium and lead information.

3.3 VALIDATION

All chemical and radionuclide project data packages from QES were validated by Golder Associates, Inc., under subcontract to the ERC, with one exception: rainwater data. The validation was conducted at level C in accordance with validation procedures (WHC 1993a, 1993b). The validation reports and their supporting data appear in Appendices G through I and K. Additional laboratory quality control data are available and are contained in original records received from the off-site laboratories; however, they are not routinely included in validation packages nor routinely delivered to project leads.

Data packages from FAST were validated by WHC. FAST reported validation for about half of the samples analyzed, (see data validation sections of Appendix A and B). While data qualifiers have been discussed, WHC did not include qualifiers in the summary data tables of the respective WHC reports. Data validation was not reported for samples shown in Appendix C, which consists primarily of sedimentation basin floor samples.

Analytical results from the 222-S Laboratory and the EAL were not independently validated. Both laboratories performed only radiological analyses.

Table 3-1. On-site Analytical Chemistry Methods

Determination	Referenced EPA Method	Comment
Metals: arsenic, barium, cadmium, chromium, lead, selenium, silver	3051/6010	3051 is a microwave digestion procedure, not equivalent to a TCLP extraction.
Anions: fluoride, chloride, nitrite, nitrate, sulfate, phosphate	300.0	
Mercury	7471	October/November narrative inaccurately reports mercury as an inductively-coupled plasma metal and also references EPA method 7470. Method reference number corrected per Appendix D.
Cyanide	9010	
Sulfide	9030	
Hexavalent chromium	7196A	
pH	9045	

EPA = U.S. Environmental Protection Agency
TCLP = Toxicity Characteristic Leachate Procedure

Table 3-2. Off-site Analytical Chemistry Methods

Determination	Referenced EPA Method	Requested for Concrete Structure Split Sample?	Requested for Waste Drummed Concrete?
Metals--			
ICP Target Analyte List[a]	6010A	Yes	Yes
Vanadium	6010A	No	Yes
Arsenic	7060	Yes	No
Lead	7421	Yes	No
Selenium	7740	Yes	No
Thallium	7841	Yes	No
Anions--			
Fluoride	300.0	Yes	Yes
Chloride	300.0	Yes	Yes
Nitrite	300.0	Yes	Yes
Nitrate	300.0	Yes	Yes
Sulfate	300.0	Yes	Yes
Phosphate	300.0	Yes	Yes
Formate	300.0	No	Yes
TCLP--	1311/6010A	No	Yes[b]
Arsenic			
Barium			
Cadmium			
Chromium			
Lead			
Selenium			
Silver			
TCLP--Mercury	1311/7470	No	Yes[b]
Cyanide	335.2	Yes	Yes
Sulfide	9030	Yes	Yes
Hexavalent Chromium	7195	Yes	No
pH	9045	Yes	Yes

EPA = U.S. Environmental Protection Agency
ICP = inductively coupled plasma spectroscopy
TCLP = Toxicity Characteristic Leaching Procedure
[a]Routine list includes aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, sodium, thallium, and zinc.
[b]Requested October 31, 1995, on B0GNX7, B0GNY0, B0GNY2, and B0GNY4 only.

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4.0 SAMPLING AND ANALYSIS RESULTS

The five tables presented in this section to summarize the data are based on the routine samples and do not include field blank, duplicate, or split sample results (those results are presented and discussed in the Section 5.0). Supporting data, including the results for any particular sample, can be found in the appendices.

Appendices A through D present supporting information about the concrete structure samples, sand equipment blank, and soil sample analyzed by FAST. Appendix E provides reproductions of all 222-S Laboratory sample reporting. Appendix F provides two ERC memorandums containing all EAL sample results for the concrete structure samples, sand equipment blank, and soil sample.

Samples shipped off site for analysis are grouped into sample delivery groups (SDG) for laboratory analysis and reporting. Waste drum samples were divided into three SDGs containing the following samples:

W0747-QES	W0751-QES	W0755-QES
B0GNX2	B0GNX9	B0GNZ0
B0GNX3	B0GNY3	B0GNZ1
B0GNX4	B0GNY4	B0GNZ2
B0GNX5	B0GNY5	
B0GNX6	B0GNY6	
B0GNX7	B0GNY7	
B0GNX8	B0GNY8	
B0GNY0	B0GNY9	
B0GNY1		
B0GNY2		

Selected information from the sampling, off-site analysis, and validation processes is combined in data validation packages. Data validation packages are typically organized by SDG and include separate sections for inorganics, radiochemistry, and general chemistry. Appendix G contains the validation package for SDG W0747-QES, and data associated with the October 31, 1995, special request for TCLP analysis on selected samples. Appendices H and I contain results and supporting documentation for W0751-QES and W0755-QES, respectively.

Appendix J reports the water sampling results. Appendix K reports the QES results of the concrete-structure split sample collected concurrently with samples reported by FAST. Appendix L reports radiation field surveys.

Data from off-site laboratories is reported to the ERC in both a hard-copy and an electronic format. The electronic format often reports data with greater precision (i.e., more displayed digits than does the printed copy). Summary tables that include off-site analyses were derived from the electronic data, and the results can be confirmed using the HEIS.

4.1 CHEMICAL CONSTITUENTS OF BASIN CONCRETE STRUCTURES

Table 4-1 summarizes the chemical constituents of the basin concrete structures. Samples of the basin floors and walls were analyzed by FAST. Supporting documentation can be found in Appendices A, B, C, and D.

The summary table lists the number of routine sample results and how many of these were nondetects. The "R"-qualified results were not included in the count of routine results but are noted in the endnotes. The numerical minimum and maximum concentrations have been reported, (despite the fact the values may be a qualified). Some nondetected values were reported variously as "ND" or "<" values in FAST reports but have been consistently flagged with "U" in Table 4-1. Other data qualifiers correspond to those discussed in the respective data validation sections of the appendices. An average and sample standard deviation concentration has been provided when samples were reported with numerous detected values. Table 4-1 is based on the routine samples and does not include blank, duplicate, or split sample results.

This report does not compare the 1995 results to any specific criteria. Included here as an aid to the reader are chemical analyte ranges from the 1991 183-H exterior wall background concrete sampling (DOE, 1995a). Qualitative comparisons may be useful, but readers should note historical collection methodology, analytical facilities, and sometimes methods differed between studies.

4.2 CHEMICAL CONSTITUENTS OF DRUMMED WASTE CONCRETE

Table 4-2 presents a summary of chemical constituents of the drummed waste concrete. Samples of the drums were analyzed by QES. Supporting documentation can be found in Appendices G, H, and I. Table 4-2 lists the number of routine sample results and shows how many of these were nondetects. The R-qualified results were not included in the count of routine results but have been noted in the endnotes. The numerical minimum and maximum concentrations have been reported (despite the fact the values may be qualified). Data qualification flags have been included for individual sample results. An average and a sample standard deviation concentration has been provided when samples were reported with numerous detected values. Table 4-2 has been based on the routine samples and does not include blank, duplicate, or split sample results.

This report does not compare the 1995 results to any specific criteria. As an aid to the reader, chemical analyte ranges from the 1991 183-H exterior wall background concrete sampling have been included here (DOE-RL, 1995a). Qualitative comparisons may be useful, but readers should note historical collection methodology, analytical facilities, and sometimes methods differed from newer samples.

4.3 RADIOLOGICAL CONSTITUENTS OF BASIN CONCRETE STRUCTURES

Table 4-3 presents a summary of radiological constituents of the concrete structures. Samples were analyzed by the 222-S Laboratory and the EAL. Supporting documentation can be found in Appendices E and F.

The summary table lists the number of routine sample results and shows how many of these were nondetected. Differences in number of results reported for certain radioisotopes have been based on reporting differences between the two batches of samples. Values reported by the laboratory as "<x" have been summarized as nondetected. The numerical minimum and maximum concentrations have been reported. An average and sample standard deviation concentration has been provided when samples were reported with numerous detected values. Table 4-3 has been based upon the routine samples and does not include blank, duplicate, or split sample results.

Two less sample aliquots were analyzed at the EAL than at the 222-S Laboratory. The final two basin floor samples, B0GRK1 and B0GRK2, were mistakenly not analyzed and reported by the EAL, which has now closed.

4.4 RADIOLOGICAL CONSTITUENTS OF DRUMMED WASTE CONCRETE

Table 4-4 presents a summary of radiological constituents of the drummed waste concrete. Samples of the drums were analyzed by the 222-S Laboratory and QES in Richland. Supporting documentation can be found in Appendices E, G, H, and I.

The summary table lists the number of routine sample results and shows how many of those were nondetects. Data qualification flags have been included for individual sample results. Values qualified as undetected or reported by the laboratory as "<x" have been summarized as nondetected. The R-qualified results were not included in the count of routine results but have been noted in the endnotes. The numerical minimum and maximum concentrations have been reported (despite the fact the values may be a qualified). An average and sample standard deviation concentration has been provided when samples were reported with numerous detected values. Table 4-4 has been based on the routine samples and does not include blank, duplicate, or split sample results.

4.5 SAMPLE RESULTS FOR OTHER MEDIA

Table 4-5 summarizes the soil and water sample collected during the sampling period. The summary table lists individual sample results for both radiological and chemical constituents.

Soil analyses were performed by the 222-S Laboratory, FAST, and the EAL. Supporting documentation for chemical analysis of the soil sample can be found in Appendices A and D. Radiological results for the soil sample can be found in Appendices E and F.

Water analyses were performed by the 222-S Laboratory and QES in Richland. Readers are reminded that the water data were not validated to the same standard as other data in this report. Supporting documentation for the water sample can be found in Appendices E and J.

Table 4-1. Chemical Constituents of Basin Concrete Structures

Analyte	Number of Results/ Nondetects	Minimum	Maximum	Average	Sample Standard Deviation	183-H Concrete Background Range[a]
Analyzed by WHC Field Assessment Services Team						
Method 3051/6010						
Arsenic (mg/kg)	15 / 15	7 U	13 UJ	NC	NC	42U - 50U
Barium	15 / 0	37 J	92.4	74.9	14	29 - 100
Cadmium	15 / 12	0.2 U	2.0	NC	NC	2.5U - 3U
Chromium	15 / 0	7.5	104	33.6	33	8.5U - 13
Lead	10 / 8[b]	4.7 U	12.9	NC	NC	42U - 50U
Selenium	10 / 10[b]	3.6 U	4.3 U	NC	NC	42U - 50U
Silver	15 / 15	0.9 U	4.8 U	NC	NC	5.1U- 5.9U
Method 300 Anions						
Chloride (ug/g)	15 / 5	11.68	129	[48.84]	[31.3]	20U - 20U
Fluoride	15 / 6	4 U	73.88	NC	NC	2U - 2U
Nitrate	15 / 2	275 U	11806.9	[3154]	[3221]	20U - 23
Nitrite	15 / 9	4.95 U	100 J	NC	NC	20U -20U
Phosphate	15 / 15	4 U	40 U	NC	NC	—
Sulfate	15 / 0	33.4	2110	517	609	204 - 399
Method 7471						
Mercury (mg/kg)	15 / 14	0.04 UJ	0.4 U	NC	NC	0.1U - 0.2
Method 9010						
Cyanide (mg/kg)	8 / 3[c]	0.05	0.1	NC	NC	1U
Method 9030						
Sulfide (mg/kg)	15 / 7	0.01 U	0.2	NC	NC	0.1U
Method 7196A						
Hexavalent						
Chromium (mg/kg)	15 / 14	0.1 U	0.5 U	NC	NC	—
Method 9045						
pH	15 / 0	9.8	12.3	11.0	0.89	11.2 - 12.2

NC = Not calculated.
U = Undetected. The associated value is the reported detection limit.
[ ] = Value computed using undetected values at reported detection limit.
[a]Range of all 183-H core-drilled, background samples reported in DOE-RL 1995a, Appendix D. (Historical methods may be slightly different from 1995 referenced methods.)
[b]Five undetected values were rejected (qualified "R") in the data validation process due to low matrix spike recovery.
[c]Seven undetected values (plus the soil sample) were rejected (qualified "R") in the data validation process due to low matrix spike recovery.
Rejected values were not used in developing this summary table.

Table 4-2. Chemical Constituents of Drummed Waste Concrete (Page 1 of 2)

Analyte	Number of Results/ Nondetects	Minimum	Maximum	Average	Sample Standard Deviation	183-H Concrete Background Range[a]
Analyzed by Quanterra / Validated by Golder Associates						
Method 6010A						
Aluminum (mg/Kg)	20 / 0	932	16100	7677	4533	2700 - 9600
Antimony	20 / 15+	13.8 U	69 U	NC	NC	42U - 50U
Arsenic	20 / 0	6.1	78	37.6	16.3	42U - 50U
Barium	20 / 0+	16.9 U	262	125.7	70.1	29 - 100
Beryllium	20 / 3+	0.45 U	1.9	[0.81]	[0.39]	0.3U - 0.3U
Cadmium[b]	18 / 4+	1.2 U	17.6 BJ	[6.9]	[4.7]	2.5U - 3U
Calcium	20 / 0	5310	125000	60206	38371	29000-11E4
Chromium	20 / 0	53.9	1490 J	583	448	8.5U - 13
Cobalt	20 / 0+	9.2 B	51.2 B	24.8	10.7	4.4U - 21
Copper	20 / 0	88.4	2520	534.8	530	16 - 40
Iron	20 / 0	26700	918000	358630	263826	4200 - 16E3
Lead	20 / 2	0.67 J	228	[31.95]	[58.8]	42U - 50U
Magnesium	20 / 0	1040	8170	4814	2188	1600 - 5000
Manganese	20 / 0	472	8910	3815	2669	62 - 250
Nickel	20 / 0	19.4	695	283	215	8.8U - 12
Potassium	20 / 1+	325 B	6680	[1527]	[1440]	530U - 1800
Selenium	20 / 13+	0.26 U	4.3 U	NC	NC	42U - 50U
Silver[c]	13 / 11+	3 U	15 U	NC	NC	5.1U- 5.9U
Sodium	20 / 0	486 J	10100	4526.6	2863	200 - 1100
Thallium	20 / 11	0.41 UJ	30.7	NC	NC	9.3U - 9.9U
Vanadium	15 / 6+	8.6 UJ	59.8 J	NC	NC	10 - 41
Zinc	20 / 0	66.2	328	147	60.8	41 -150
Method 300 Anions						
Bromide[d] (ug/g)	20 / 20	2.17 U	24.9 U	NC	NC	—
Chloride	20 / 0	3.96	142	32.6	32.6	20U - 20U
Fluoride	20 / 0	3.34	283	65.5	56.5	2U - 2U
Formate	20 / 4	4.96 U	51.2	[15.6]	[21.2]	—
Nitrite	20 / 0	0.91 J	381 J	90.5	33.1	20U - 20U
Nitrogen in Nitrate	20 / 0	40 J	910 J	249	380	20U -23
Phosphate[e]	1 / 0	NC	9.47	NC	NC	—
Sulfate	20 / 0	109	1010	268	405	204 - 399
Method 1311/7470 (TCLP/AA)						
Mercury (ug/L)	4 / 4	0.1 UJ	0.13 UJ	NC	NC	—
Method 1311/6010A (TCLP/ICP)						
Arsenic (ug/L)	4 / 4	151 U	260 U	NC	NC	—
Barium	4 / 0+	447 B	548 B	496	52.4	—
Cadmium	4 / 1+	9.2 U	18.9 B	[13.6]	[4.80]	—
Chromium	4 / 1	14.8 U	304	[181]	[144]	—
Lead	4 / 4	153 U	153 U	NC	NC	—
Selenium	4 / 3+	170 U	351 B	NC	NC	—
Silver	4 / 3+	24 U	32.2 B	NC	NC	—
Method 9010						
Cyanide (mg/kg)	20 / 5	0.49 U	2.83	[1.05]	[0.63]	1U
Method 9030						
Sulfide (mg/kg)	20 / 5	9.96 U	187	[44.7]	[41.0]	0.1U

Table 4-2. Chemical Constituents of Drummed Waste Concrete (Page 2 of 2)

Analyte	Number of Results/ Nondetects	Minimum	Maximum	Average	Sample Standard Deviation	183-H Concrete Background Range[a]
Method 9045 pH	20 / 0	9.55 J	12.19 J	11.3	0.74	11.2 - 12.2

B = The constituent was reported above an instrument detection limit, but below the contract required detection limit.
J = The concentration is qualified as estimated due to a minor associated quality control deficiency.
NC = Not calculated.
U = Undetected. The associated value is the sample detection limit corrected for aliquot size, dilution, etc.
+ = Additional values were reported above an instrument detection limit but below the contract required detection limit.
[ ] = Value computed using undetected values at reported detection limit.
[a]Range of all 183-H core-drilled, background samples reported in DOE-RL 1995a, Appendix D. (Historical methods may be slightly different from 1995 referenced methods.)
[b]Two undetected values were rejected (qualified "R") in the data validation process. Rejected values were not used in developing this summary table.
[c]Seven undetected values were rejected (qualified "R") in the data validation process. Rejected values were not used in developing this summary table.
[d]Bromide results reported by laboratory, however not a requested analyte nor in validation reports.
[e]19 undetected values were rejected in the data validation process. Rejected values were not used in developing this table.

Table 4-3. Radiological Constituents of Basin Concrete Structures

Analyte	Number of Results/ Nondetects	Minimum (pCi/g)	Maximum (pCi/g)	Average (pCi/g)	Sample Standard Deviation (pCi/g)
222-S Total Activity	15 / 15	<50	<50	NC	NC
Environmental Analytical Laboratory Gross Radionuclide Screening*					
Gross Alpha	13 / 0	2.9	19.4	9.4E+0	5.6E+0
Gross Beta	13 / 0	9.1	270	9.8E+1	7.5E+1
Strontium-90	6 / 4	4.6	<9.1	NC	NC
EAL Gamma Energy Analysis Screening					
Americium-241	6 / 6	<0.36	<0.45	NC	NC
Cerium-144	6 / 6	<0.51	<0.62	NC	NC
Cobalt-60	13 / 13	<0.18	<1.8	NC	NC
Cesium-134	6 / 6	<0.12	<0.14	NC	NC
Cesium-137	13 / 8	<0.1	<0.83	NC	NC
Europium-152	6 / 6	<0.3	<0.63	NC	NC
Europium-154	6 / 6	<0.31	<0.4	NC	NC
Europium-155	6 / 6	<0.29	<0.36	NC	NC
Potassium-40	13 / 0	10	31	1.8E+1	6.7E+0
Antimony125	6 / 6	<0.2	<0.28	NC	NC
Thorium-232dau	13 / 5	<0.32	<2.5	NC	NC
Uranium-235	13 / 9	0.17	<4.4	NC	NC
Uranium-238	13 / 13	<12	<78	NC	NC
Uranium-238dau	13 / 3	<0.31	2.1	[9.7E-1]	[7.1E-1]
Residual assigned to Technetium-99	13 / NC	<0 (-51)	239	NC	NC

U = Undetected by the laboratory. The associated value is the reported detection limit.
NC = Not Calculated
TH232dau is the activity of Ac228, Pb212 and Tl208, short-lived daughter products of Th232.
U238dau is the activity of Pb214 and Bi214, short-lived daughter products of U238.
[ ] = Value computed using undetected values at reported detection limit.
*The final two basin floor samples, B0GRK1 and B0GRK2, were mistakenly never analyzed and reported by the EAL.

Table 4-4. Radiological Constituents of Drummed Waste Concrete

Analyte	Number of Results/ Nondetects	Minimum (pCi/g)	Maximum (pCi/g)	Average (pCi/g)	Sample Standard Deviation (pCi/g)
222-S Total Activity	20 / 20	<50	<50	NC	NC
Quanterra High Resolution Gamma Spectroscopy					
Beryllium-7	6 / 0	8.19E-02	4.35E-01	2.00E-01	1.36E-01
Cesium-137DA	20 / 0	3.09E-02	3.10E+00	4.29E-01	7.04E-01
Cobalt-58	20 / 20	-8.81E-03 U	2.38E-02 U	NC	NC
Cobalt-60	20 / 13	-4.40E-04 U	1.21E-01	NC	NC
Europium-152	20 / 20	-4.04E-02 U	2.34E-02 U	NC	NC
Europium-154	20 / 20	-2.87E-02 U	2.00E-02 U	NC	NC
Europium-155	20 / 12	-1.55E-02 U	1.33E-01	NC	NC
Iron-59	20 / 20	-2.24E-02 U	1.11E-02 U	NC	NC
Potassium-40	20 / 0	6.44E-01	9.65E+00	4.84E+00	2.64E+00
Radium-224DA	20 / 0	2.28E-02	4.39E-01	2.11E-01	1.22E-01
Radium-226DA	20 / 0	3.23E-02	5.04E-01	2.33E-01	1.19E-01
Radium-228DA	18 / 0	3.14E-02	4.79E-01	2.25E-01	1.30E-01
Uranium-235	8 / 0	1.96E-02	1.20E+00	4.57E-01	4.70E-01
Uranium-238DLP	19 / 0	3.99E-01 J	2.28E+01 J	8.19E+00	7.25E+00
Quanterra Electroplate/ Alpha Spectroscopy					
Uranium-234	20 / 0	1.31E+00	4.58E+02	4.88E+01	9.88E+01
Uranium-235*	10 / 1	4.76E-02	5.30E+00	2.09E+00	2.09E+00
Uranium-238DA	20 / 0	1.07E+00	3.29E+02	3.81E+01	7.07E+01
Quanterra Direct/ Proportional Counting					
Gross Alpha	20 / 0	5.25E+00	1.59E+02	3.88E+01	3.64E+01
Gross Beta	20 / 0	2.04E+01	1.70E+02	6.44E+01	3.80E+01
Quanterra Chemical Separation/ Liquid Scintillation					
Technetium-99	20 / 0	1.91E+01	4.68E+02	1.18E+02	1.29E+02

U = Undetected above the minimum detectable activity. The associated value was reported by the laboratory.
J = The concentration is qualified as estimated due to a minor associated quality control deficiency.
NC = Not Calculated.
[ ] = Value computed using undetected values at reported concentrations.
*Ten additional detected values were rejected in the data validation process. Rejected values were not used in developing this summary table.

Table 4-5. Sample Results for Other Media

Soil sample S5060-06 Summary

Chemical	Result	Q
FAST Analyses		
pH	9.1	
Arsenic (mg/Kg)	13	UJ
Barium	49	J
Cadmium	0.2	U
Chloride	60	U
Chromium	7	J
Cyanide	0.01	UR
Fluoride	40	U
Hexavalent Cr	0.1	
Lead	13.5	UR
Mercury	0.04	UJ
Nitrate	946	
Nitrite	100	UJ
Phosphate	40	U
Selenium	13	UR
Silver	0.9	U
Sulfate	40	U
Sulfide	0.02	

Radiological	Result	
222-S Analysis		
Total Activity (ρCi/g)	<50	
EAL Analyses		+/-
K40 (ρCi/g)	2.8E+1	2.2E+0
Co60	<4.9E-1	
Cs137	<8.7E-2	
TH232dau	2.3E+0	2.6E-1
U235	8.3E-1	1.4E-1
U238	<1.8E+1	
U238dau	2.0E+0	2.1E-1
Alpha	1.9E+1	NR
Beta	9.8E+1	NR

Water sample B0GTS1 Summary

Radiological Constituent	Result	Q	Total Analytical Error	Counting Error	Minimum Detectable Activity
222-S Analysis					
Total Activity (ρCi/g)	<50		NR	NR	NR
Quanterra Analyses					
Cobalt-60 (ρCi/L)	-2.22	U	3.43	3.42	5.51
Iron-59	0.233	U	6.57	6.57	11.9
Europium-152	-0.153	U	6.25	6.25	10.9
Cobalt-58	2.83	U	2.04	2.02	4.64
Cesium-137	2.55	U	2.82	2.81	5.39
Europium-155	0.269	U	5.71	5.71	9.44
Europium-154	-7.13	U	11	11	18.3
Gross Beta	824		63	24.6	12.6
Gross Alpha	64.5		12.9	10.2	5.04
Technetium-99	2520		278	16.1	3.82
Uranium (ug/L)	92.6		20.6	NA	0.00323

± = 2-Sigma Error
NA = Not Applicable.
NR = Not Reported.
Q = Data qualifier.
<, U = Undetected.

5.0 QUALITY ASSESSMENT FIELD SAMPLES AND DISCUSSION OF RESULTS

Five tables are presented in this section to summarize the field duplicate, split, and silica sand blank samples. These results are useful in the data interpretation process.

This report uses the term "field duplicate" to indicate a field-equivalent sample attributed to a location in common with a routine sample. The field duplicate is submitted to the same analytical facility as the associated routine sample. The term "field split sample" is used to indicate a duplicate submitted to a second (independent) analytical facility for analyses similar to those being performed on the routine sample.

Sample variability is summarized by the relative percent difference (RPD) statistic. This value, expressed as a percent, is the absolute difference between two values divided by their mean. The term expresses variability relative to the size of the measurement--not in absolute terms. Table values showing comparisons between regular and split samples arbitrarily have a "+" (or "-") sign indicating the split results were higher (or lower) respectively.

Additional quality control laboratory samples were analyzed and considered in the validation process. Supporting data can be found in the appendices. Some additional laboratory quality control data is available. It is contained in original records received from the offsite laboratories. However it is not routinely included in validation summary packages nor routinely delivered to project leads.

Similar to the previous chapter, tables and statistics of Quanterra data were derived from electronic laboratory deliverables. These occasionally display more precise concentrations than the laboratory printed data reproduced in the respective validation reports (appendices).

Data users should weigh the relevance of individual quality assessment results. The applied data validation process does not automatically incorporate an understanding of field quality assessment sample results. Though very limited, results offer some insight into the inherent uncertainty of individual sample results.

5.1 CONCRETE STRUCTURE CHEMICAL RESULTS AND DISCUSSION

Table 5-1 summarizes field duplicate and split comparisons for the concrete structure chemical results. Based on the relative percent difference statistic, chromium showed the greatest variability between the regular sample (B0GRK8) and its duplicate (B0GRK9). Nitrate -- RPD 25.8 percent, and chloride -- RPD 20.2 percent, followed respectively. Remaining analytes were associated with RPDs of less than 11 percent or were undetected.

The anions (nitrate, chloride and fluoride) showed the highest variability between the regular sample (B0GRK8) and the split sample (B0GRL0). The split sample was much lower in nitrate than the regular sample, relative percent difference (RPD) 133 percent (168 J versus 828 μg/g).

Results for chloride showed an RPD of 53.5 percent with a moderately lower split sample concentration (10.4 versus 18 μg/g). Fluoride showed a slightly higher concentration in the split sample with an RPD of 21.1 percent. Absolute differences in the fluoride concentrations were small (6.08 J versus 4.92 μg/g). Split sample chromium results were very close to the mean value of sample B0GRK8 and its duplicate. Other routine analytes also had RPDs of <20 percent or were undetected.

Two split sample analytes, ortho-phosphate and selenium, were qualified as rejected in the data validation process. Both results are, however, numerically consistent with routine sample results.

The split sample was analyzed for additional analytes not reported in routine concrete structure samples. Refer to Appendix K for additional results.

5.2 DRUMMED WASTE CONCRETE CHEMICAL RESULTS AND DISCUSSION

Sample analysis of field duplicates showed some widely variable metals results (Table 5-2). Five elements (aluminum, barium, calcium, magnesium, and sodium) were associated with RPDs >100 percent. Chromium, cobalt, copper, iron, manganese, nickel, potassium, and thallium had RPDs ranging from about 48 to 78 percent. Arsenic and zinc had detected concentrations associated with RPDs of <5 percent. Remaining elements, including vanadium, had one or both determinations at nondetected concentrations. Anions, cyanide, sulfide, and pH were in general agreement with RPDs <16 percent.

Silver and ortho-phosphate were undetected but qualified "R" (rejected) in the data validation process. Numerous metallic analytes were reported at concentrations above an instrument detection limit, but they were below the contract detection limit in the duplicate sample. The duplicate sample had aluminum, barium, and magnesium concentrations at less than the routine sample minimum, but chromium, iron, manganese, nickel and thallium concentrations were near routine sample maximums. No waste drum split samples were taken for independent chemical analysis.

5.3 CONCRETE STRUCTURE RADIOLOGICAL RESULTS AND DISCUSSION

Radiological results of the regular sample (B0GRK8) and duplicate sample (B0GRK9) show derived ^{99}Tc had the highest RPD (105 percent) followed by gross beta and gross alpha determinations (Table 5-3). The ^{99}Tc derivation was dependent upon both the gross beta and gross alpha results. It was not a directly measured parameter. Uncertainty in the underlying factors was propagated to the derived value. Gross beta results had an RPD of 78.7 percent (47.9 versus 110 ρCi/g); gross alpha had an RPD of 30.8 percent (16.5 versus 12.1 ρCi/g).

The regular and duplicate sample had very comparable GEA measurements. Most of the reporting list of analytes were not detected in either the regular or duplicate sample. Those that

were detected were essentially equivalent considering the laboratory-reported uncertainties. For instance, ^{235}U was reported at positive concentrations with an RPD statistic of 24 percent. However, examination shows the values were essentially indistinguishable. Each value falls within the reported 2-sigma uncertainty of the other value.

Split sample results showed that the highest RPD was associated with the gross beta results. The EAL reported substantially higher gross beta results. The QES's values were more in line with the 222-S Laboratory total activity screening. Technetium-99 and gross alpha estimates again showed high RPDs of 62.6 percent and 51.1 percent respectively. The EAL derived higher results than the QES-analyzed split sample.

A measured parameter in the split sample was ^{99}Tc. The QES-reported result was 14.7 ρCi/g. This compares to 28.1 and 90.3 ρCi/g for the corresponding regular and duplicate derived ^{99}Tc values. Derivation of the ^{99}Tc values was dependent on the EAL's gross beta estimate.

A naturally occurring isotope, potassium-40 (^{40}K), is the dominant radionuclide reported in both the EAL and QES results.

5.4 DRUMMED WASTE CONCRETE RADIOLOGICAL RESULTS AND DISCUSSION

Table 5-4 summarizes field duplicate and split comparisons for the drummed waste radiological results. The field duplicate RPD is highest for ^{99}Tc (about 60 percent). The regular and duplicate sample at 181 and 97.5 ρCi/g, respectively, also exceed the reported gross beta concentrations. The gross beta concentrations of the regular sample (B0GNY5) and duplicate (B0GNY6) drum sample were 31.9 and 41.1 ρCi/g. These values each fall outside the reported 2-sigma uncertainty of the other value. The gross beta RPD was 25.2 percent, the second highest calculated for the sample pair. All other determinations had RPDs of about 20 percent or less when positive concentrations were reported.

Concentrations reported for ^{40}K, in both the regular sample and its duplicate, were <1 ρCi/g. The regular sample had the minimum reported ^{40}K concentration. The dominant radionuclide reported in the sample pair was ^{99}Tc.

All drum waste aliquots sent to the 222-S Laboratory were reported with total activities of <50 ρCi/g. Other waste drum split samples were not taken for independent radiological analysis.

5.5 SILICA SAND ANALYSIS AND DISCUSSION

Results of the clean silica-sand field equipment blank are shown in Table 5-5. Most constituents are near or below detectable concentrations. Sample analysis was performed by FAST and the

EAL in conjunction with other cement structure samples. (See description of October Basin Floor sampling.) The coarse sand was supplied by the sampling team.

The silica sand was poured over the scabbling tool but, according to field descriptions, was not subject to the grinding forces of actual sample collection. Contributions of the collection methodology itself have not been substantially assessed. At least two different types of scabbling tools were reportedly used during the decommissioning effort. The scabbling process could bias results and may contribute to observed differences between current results and other sampling.

Table 5-1. Basin Concrete Structure Field Duplicate and Split Samples--Chemical Comparisons

Analyte	Regular Sample B0GRK8	Duplicate Sample B0GRK9	Field Duplicate RPD (%)	Split Sample B0GRL0[a]	Signed Field Split RPD (%)
FAST Measurements				**Quanterra Measurements**	
Method 3051/6010					
Arsenic (mg/kg)	<7.8	<7.8	NC	36.5[b]	NC
Barium	92.4	101	8.89	112	+19.2
Cadmium	<1.8	<1.8	NC	0.24 U	NC
Chromium	13.5	20.1	39.3	15.8 J	+15.7
Lead	<5.8	<5.8	NC	6.1 J[c]	NC
Selenium	<4.3	<4.3	NC	0.1 UR[d]	NC
Silver	<3.4	<3.4	NC	0.86 B	NC
Method 300 Anions					
Chloride (ug/g)	18.	14.7	20.2	10.4	-53.5
Fluoride	4.92	4.42	10.7	6.08 J	+21.1
Nitrate	828.	639.	25.8	168 J	-133
Nitrite	<4.95	<4.95	NC	3.01 J	NC
Phosphate	<15.1	<15.1	NC	5.06 UR	NC
Sulfate	201	190	5.63	220	+9.03
Method 7471					
Mercury (mg/kg)	<0.4	0.4	NC	Not Requested	NC
Method 9010					
Cyanide (mg/kg)	<0.1	<0.1	NC	0.7[e]	NC
Method 9030					
Sulfide (mg/kg)	<0.1	<0.1	NC	10.7 U	NC
Method 7196A					
Hexavalent Chromium (mg/kg)	<0.25	<0.25	NC	0.15 UJ	NC
Method 9045					
pH	11.5	11.6	0.87	11.8 J	+2.58

RPD = Relative Percent Difference from B0GRK8, |(sample difference / mean)| *100.
[a]Additional analytes reported in supporting appendix K.
[b]Reference method EPA 7060.
[c]Reference method EPA 7421.
[d]Reference method EPA 7740.
[e]Reference method EPA 335.2.

Table 5-2. Drummed Waste Concrete Field Duplicate--Chemical Results

Analyte	Regular Drum 83 Sample B0GNY5	Duplicate Drum 83 Sample B0GNY6	Field Duplicate RPD (%)
Analyzed by Quanterra / Validated by Golder Associates			
Method 6010A			
Aluminum (mg/Kg)	3780	906	123
Antimony	55.2 U	55.2 U	NC
Barium	120	16.5 B	152
Beryllium	0.5 U	0.43 U	NC
Cadmium	4.6 UJ	13.3 BJ	NC
Calcium	32300	5400	142.7
Chromium	732	1410	63.3
Cobalt	30 B	48.7 B	47.5
Copper	467	836	56.6
Iron	449000 J	903000 J	67.16
Magnesium	3290	1010	106
Manganese	4650	8680	60.5
Nickel	389	637	48.3
Potassium	679	297 B	78.3
Silver	12 UR	12 UR	NC
Sodium	3350	943	112
Vanadium	8.6 UJ	8.6 UJ	NC
Zinc	104	99.6	4.32
Method 7060 Arsenic (mg/Kg)	28.6	29.7	3.77
Method 7421 Lead (mg/Kg)	4.9	3.8 U	NC
Method 7740 Selenium (mg/Kg)	4.3 U	4.3 U	NC
Method 7841 Thallium (mg/Kg)	17.6	29.9	51.8
Method 300 Anions			
Bromide* (ug/g)	2.47 U	2.5 U	NC
Chloride	3.96	4.3	8.23
Fluoride	38.6	42.7	10.09
Formate	10.1	10.3	1.96
Nitrite	1. J	1.1 J	9.52
Nitrogen in Nitrate	204 J	239. J	15.80
Phosphate	4.93 UR	5. UR	NC
Sulfate	144	165.	13.59
Method 335.2 --Cyanide (mg/kg)	0.56	0.5 U	NC
Method 9030 --Sulfide (mg/kg)	38.2	38.3	0.26
Method 9045 --pH	10.51 J	10.57 J	0.57

B = Constituent reported above an instrument detection limit but below the contract required detection limit.
J = The concentration is qualified as estimated due to a minor associated quality control deficiency.
NC = Not calculated.
R = Rejected in the data validation process due to a quality control deficiency.
RPD = Relative Percent Difference from B0GNY5, |(sample difference / mean)| *100.
U = Undetected. The associated value is the sample detection limit corrected for aliquot size, dilution, etc.
*Bromide results reported by laboratory, however not a requested analyte nor in validation reports.

Table 5-3. Basin Concrete Structure Field Duplicate and Split Samples--Radiological Comparisons

Analyte (ρCi/g)	Regular Sample B0GRK8 ± 2-Sigma Error	Duplicate Sample B0GRK9 ± 2-Sigma Error	Field Duplicate RPD (%)	Split Sample B0GRL0 & Total Error (Lab. 2 Sigma)	Signed Field Split RPD (%)
EAL Measurements				**Quanterra Measurements**	
Gross Alpha	16.5	12.1	30.8	9.78 ± 4.71	-51.1
Gross Beta	47.9	110	78.7	10.8 ± 2.78	-126
Total Activity	64.4 ± 29.6	122 ± 87.2	NC	NR	NC
SR-90	<8.8	<13.	NC	NR	NC
Gamma Energy Analysis Screening					
Am241	<0.36	<0.4	NC	NR	NC
Ce144	<0.51	<0.59	NC	NR	NC
Co60	<0.18	<0.22	NC	0.0011 U	NC
Cs134	<0.12	<0.11	NC	NR	NC
Cs137	<0.11	<0.11	NC	0.106 ± 0.0212	NC
Eu152	<0.54	<0.6	NC	-0.00045 U	NC
Eu154	<0.37	<0.34	NC	-0.0145 U	NC
Eu155	<0.33	<0.3	NC	0.0454 U	NC
K40	12. ± 1.4	11. ± 1.4	8.7	NR	NC
Sb125	<0.25	<0.23	NC	NR	NC
TH232dau	0.39 ± 0.15	0.32 ± 0.14	20	0.549 ± 0.0862[a]	+34
U235	0.18 ± 0.084	0.23 ± 0.085	24	0.196 ± 0.073[b]	+8.5
U238	<12.	<11.	NC	5.02 ± 0.942[c]	NC
U238dau	0.42 ± 0.13	0.38 ± 0.13	10	NR	NC
Residual assigned to Tc-99	28.1	90.3	105	14.7 ± 2.56	-62.6

<, U = Undetected.
NC = Not calculated.
NR = Not reported.
RPD = Relative Percent Difference from B0GRK8, |(sample difference / mean)| *100.
TH232dau is the activity of Ac228, Pb212 and Tl208, short-lived daughter products of Th232.
U238dau is the activity of Pb214 and Bi214, short-lived daughter products of U238..
[a]Concentration reported as Radium-228.
[b]Also measured by electroplate/alpha spectroscopy at 0.122 J ± 0.0596 ρCi/g.
[c]Measured by electroplate/alpha spectroscopy. Also reported by GEA at 2.21 ± 0.766 ρCi/g.

Table 5-4. Drummed Waste Concrete Field Duplicate--Radiological Results

Analyte	Regular Drum 83 Sample B0GNY5	Duplicate Drum 83 Sample B0GNY6	Field Duplicate RPD (%)
222-S Total Activity (ρCi/g)	<50	<50	NC
Quanterra High Resolution Gamma Spectroscopy			
Cesium-137DA (ρCi/g)	0.0322 ± 0.00557	0.0295 ± 0.00543	8.75
Cobalt-58	-0.000938 U	-0.000906 U	NC
Cobalt-60	8.64E-04 U	0.00159 U	NC
Europium-152	-0.00242 U	-0.00576 U	NC
Europium-154	0.0018 U	-0.00486 U	NC
Europium-155	-0.00231 U	-0.00345 U	NC
Iron-59	0.00238 U	-0.00305 U	NC
Potassium-40	0.644 ± 0.0941	0.685 ± 0.0988	6.17
Radium-224DA	0.0228 ± 0.00509	0.028 ± 0.00608	20.47
Radium-226DA	0.0323 ± 0.00696	NR	NC
Radium-228DA	0.0314 ± 0.0142	0.038 ± 0.0134	19.02
Uranium-235	0.0196 ± 0.0161	NR	NC
Quanterra Electroplate/ Alpha Spectroscopy			
Uranium-234	4.66 ± 0.941	3.9 ± 0.741	17.8
Uranium-235	0.536 ± 0.205	0.487 ± 0.164	9.58
Uranium-238DA	5.14 ± 1.02	5.01 ± 0.92	2.56
Quanterra Direct/ Proportional Counting			
Gross Alpha	8.97 ± 4.4	10.1 ± 4.6	11.9
Gross Beta	31.9 ± 4.52	41.1 ± 5.2	25.2
Quanterra Chemical Separation/ Liquid Scintillation			
Technetium-99	181 ± 22.5	97.5 ± 13.7	59.96

RPD = Relative Percent Difference from B0GNY5, |(sample difference / mean)| *100.
B = Constituent reported above an instrument detection limit but below the contract required detection limit.
J = The concentration is qualified as estimated due to a minor associated quality control deficiency.
NC = Not calculated.
R = Rejected in the data validation process due to a quality control deficiency.
U = Undetected. The associated value was reported by the lab.

Table 5-5. Sample Results for B0GRK0--Silica Sand Field Equipment "Blank"

Analyte	Sample B0GRK0	Analyte	Sample B0GRK0 ± 2-Sigma Error
FAST Chemical Measurements		**EAL Radiological Measurements (pCi/g)**	
Method 3051/6010		Gross Alpha	16.5
Arsenic (mg/kg)	<7.8	Gross Beta	47.9
Barium	0.05	Total Activity	64.4 ± 29.6
Cadmium	<1.8	SR-90	<8.8
Chromium	<1.3		
Lead	<5.8	Gamma Energy Analysis Screening	
Selenium	<4.3	Am241	<0.36
Silver	<3.4	Ce144	<0.51
		Co60	<0.18
Method 300 Anions		Cs134	<0.12
Chloride (ug/g)		Cs137	<0.11
Fluoride	<2.02	Eu152	<0.54
Nitrate	23.3	Eu154	<0.37
Nitrite	<4.95	Eu155	<0.33
Phosphate	<15.1	K40	12. ± 1.4
Sulfate	<15.1	Sb125	<0.25
		TH232dau	0.39 ± 0.15
Method 7471		U235	0.18 ± 0.084
Mercury (mg/kg)	<0.4	U238	<12.
		U238dau	0.42 ± 0.13
Method 9010			
Cyanide (mg/kg)	<0.1		
		222-S Total Activity	<50 pCi/g
Method 9030			
Sulfide (mg/kg)	<0.1		
Method 7196A			
Hexavalent			
Chromium (mg/kg)	<0.25		
Method 9045			
pH	7.8		

< Undetected. The associated value is the reported detection limit.

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6.0 RADIOLOGICAL SURVEYS

In addition to chemical analysis, radiologic field surveys were performed to monitor and control radiologic contamination at the 183-H Basins. Workers and equipment were surveyed during the course of the decontamination efforts. A final release survey was performed on those portions of the basins that met established criteria.

Surface surveys indicated whether radioactive contamination was below the surface release criteria of DOE Order 5400.5, *Radiation Protection of the Public and Environment,* which contains applicable requirements independent of the RCRA TSD closure activity. Cement structures or debris that did not meet the surface release criteria of the order will continue to be subject to radiologic controls. Most walls and floors of the four basins were sufficiently decontaminated to meet release criteria. Surface areas of the north wall and the sedimentation and flocculation floors of Basin No. 1 were not sufficiently decontaminated to achieve release standards as based on surface surveys.

Each survey has been identified by a survey number. Surveys were performed according to the *Radiological Release Plan for the 183-H Basins* (BHI, 1995b). Copies of release surveys for basin walls and floors have been included in Appendix L. Surveys are organized by survey number.

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7.0 REFERENCES

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APPENDIX A

PHASE I SAMPLING REPORT FOR AUGUST 1995

Appendix A includes the Westinghouse Hanford Company letter report for samples collected in August. Some information listed in Appendix A inadvertently pertains to the September 1995 sampling. This appendix does not contain results of samples delivered to the Environmental Restoration Contractor's Environmental Analytical Laboratory.

APPENDIX A -- CONTENTS

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Westinghouse
Hanford Company

Internal
Memo

From: Special Analytical Studies
Phone: 373-4771 S3-90
Date: September 27, 1995
Subject: 183H CONCRETE PROJECT - FT5040

SAS95-211

To: L. Miller X5-53
D. B. Encke X5-53

cc: D. J. Smith S3-90
FAST File

Attached is the analytical report in support of the 183H concrete project.

If you have any questions regarding analysis, please contact either Mr. D. J. Smith at 373-2482 or J. Y. Smith at 373-9171.

L. L. Lockrem
Manager

sir

Attachment

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BHI-00922
Rev. 0

ANALYTICAL REPORT

for

FAST PROJECT FT5040

prepared for

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

September 25, 1995

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Table of Contents

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Project Sampling and Analysis Case Narrative

INTRODUCTION

On August 25, 1995, Sampling and Mobile Labs (SML) sampled material from the 183-H Basins 1 and 4 to determine if decontamination of the concrete was sucessful. Samples were delivered to the Field Assessment Services Team (FAST) as well as the Environmental Analytical Laboratory (EAL)

SAMPLING AND ANALYSIS

Authoritative and random sampling, followed by onsite analysis, was used to confirm decontamination of the 183-H basin surfaces. An authoritative sample was taken to be used to verify the basins never leaked/overflowed into the flume at the south end of the basin. Seven concrete chip samples and one soil sample were obtained for characterizaton. One sample was authoritatively selected from each basin, based on the previous sampling/analytical results (DOE/RL-95-27) and one sample was randomly selected from each basin, based on the numbered grid of the basins. In addition, one concrete sample was obtained from the lowest point of the flume to confirm the absence of dangerous waste contamination.

An air driven rotohammer was used to grind off surface concrete from the predetermined locations. The concrete was collected as it fell into a plastic bag which was attached to the wall below the sample site. The sample media was then transferred too vender certified clean bottles with a cleaned spoon. A new bag was used at each sample point. The rotohammer was cleaned and rinsed with ASTM TYPE II water between each sample point.

The flume sample was taken by grinding up the surface of the flume floor in a two foot square. The ground concrete was then spooned into the sample bottles with a cleaned spoon.

The soil sample was taken from outside basin #1 six inches below the surface. The first six inches were removed with a shovel and the exposed soil was them mixed and put into vendor certified clean bottle.

All sampling equipment that came in contact with the sample was cleaned to meet SW-846 protocols for cleanliness. The samples were collected in commercially available, individually certified, pre-cleaned bottles.

ANALYSES REQUESTED

Samples were analyzed for the following as required by WAC 173-303 and WHC-EP-0063.

- Samples were radiologically characterized for gamma energy analysis (GEA), gross alpha, gross beta, uranium -234, -235, -238, technetium-99, and total uranium. Radiological characterization was performed by the BHI Environmental Analytical Laboratory (EAL).

- Samples were chemically characterized for total metals (RCRA metals and vanadium), chromium^{+6}, pH, cyanide, sulfide, and anions (including fluorine, chlorine, NO_3, NO_2, SO_4, and PO_4. Chemical characterization, with the exception of total metals, was performed by FAST. Total metals were determined by the WHC Waste Sampling and Characterization Facility (WSCF) laboratory on samples microwave digested by FAST.

ANALYSIS	SW-846 METHOD CROSSREFERENCE	FAST PROCEDURE REFERENCE
MICROWAVE DIGESTION	3051	3.5
ICP METALS As, Ba, Cd, Cr, Pb, Se, Ag	6010	WSCF Lab Specific
Hg COLD VAPOR AA	7470	3.43
CYANIDE	9010	3.18
SULFIDE	9030	
ANIONS F, Cl, NO2, NO3, PO4, SO4	300.0	3.29
SAMPLE RECIEVING RETURN AND CUSTODIANSHIP	WHC-CM-7-7, EII 5.1 & SW-846 SECTION	1.1
QUALITY CONTROL OF THE REVERSE OSMOSIS DEIONIZED WATER SYSTEM	SW-846 SECTION 1, QUALITY ASSURANCE	2.1
WATER LEACH OF SOLID SAMPLES FOR ANION ANALYSIS	N/A	3.23
SOLID WASTE ASSESSMENT TEAM MANUAL	N/A	5.0
FAST QUALITY ASSURANCE PLAN	HASQAP	2.0

REFERENCES

EPA July 1992, *Test Methods for Evaluating Solid Waste (SW-846)*, Third Edition; U.S. Environmental Protection Agency, Washington, D.C.

Ecology, 1989, *Dangerous Waste Regulations*, Washington Administrative Code 173-303, as amended, Washington State Department of Ecology, Olympia, Washington.

Willis, N. P., 1993, *Hanford Site Solid Waste Acceptance Criteria*, WHC-EP-0063, Westinghouse Hanford Company, Richland, Washington.

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DATA SUMMARY TABLES

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Project FT5040 - 183H Basin Concrete Results

mg/Kg as-recieved basis

Sample No.	FT5040-01	FT5040-02	FT5040-03	FT5040-04	FT5040-05	FT5040-06	Detection Limit
Customer ID	S5060-01	S5060-02	S5060-03	S5060-04	S5060-05	S5060-06	
Location	#1 E. Wall	#1 S. Wall	#4 S. Wall	#4 W. Wall	#5 Basin Flume	E. Wall Soil #1	mg/kg
Date Sampled	8/24/95	8/24/95	8/24/95	8/24/95	8/25/95	8/25/95	
Time Sampled	1045	1320	1420	1520	950	1230	
Metals							
Arsenic	ND	ND	ND	ND	ND	ND	13.0
Barium	75	88	37	74	87	49	0.8
Cadmium	1	2	ND	ND	1	ND	0.2
Chromium	15	18	9	9	18	7	9.6
Lead	ND	ND	ND	ND	ND	ND	13.5
Selenium	ND	ND	ND	ND	ND	ND	13.0
Silver	ND	ND	ND	ND	ND	ND	0.9
Mercury	ND	ND	ND	ND	ND	ND	0.04
General Chemistry							
Fluoride	ND	ND	ND	ND	ND	ND	40
Chloride	ND	ND	ND	ND	ND	ND	60
Nitrite	ND	ND	ND	ND	ND	ND	100
Nitrate	8390	2250	ND	3800	ND	946	275
Phosphate	ND	ND	ND	ND	ND	ND	40
Sulfate	1150	1180	2110	400	650	ND	40
Sulfide	<0.01	<0.01	0.03	0.04	0.03	0.02	0.01
Cyanide	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Hexavalent Cr	<0.25	<0.1	<0.1	<0.2	<0.1	0.1	0.1
pH	9.9	10.8	9.8	10.4	9.8	9.1	

Entered by: JY Smith
Checked by: DJ Smith

Printed on: 9/27/95

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CHAIN-OF-CUSTODY INFORMATION

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Westinghouse Hanford Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C # 009505
		Page 1 of 1

Collector HULSE, KARL	Contact/Requestor ENCKE, DAVID B.	Tel. No. 373-3461 MSIN X5-53 FAX
SAF Number S5-060	Sample Origin 183-H	Purchase Order/Charge Code
Project Title Concrete sampling 183-H	Logbook # WHC-N-205 Pg 6	Ice Chest # 5XL-575 Temp.
Shipped To (Lab) FAST	Method of Shipment Gov. Vehicle	Bill of Lading/Air Bill No. N/A
Protocol RCRA	Data Turnaround REGULAR	Offsite Property No. N/A

Sample No.	Lab. ID	*	Date	Time	No/Type Container	Sample Analysis	Perservative
S5060-01	FF5040-01	SO	8/24/95	1143	(/) 125 P	Total Metals TCLP, ANIONS (EPA 300.0), F, Cl, NO2, NO3, SO4, PO4, Chromium +6, pH, Cyanides, Sulfide, Formate	
S5060-02	FF5040-02	SO	8/24/95	1320	(/) 125 P	Total Metals TCLP, ANIONS (EPA 300.0), F, Cl, NO2, NO3, SO4, PO4, Chromium +6, pH, Cyanides, Sulfide, Formate	
S5060-03	FF5040-03	SO	8/24/95	1410	(/) 125 P	Total Metals TCLP, ANIONS (EPA 300.0), F, Cl, NO2, NO3, SO4, PO4, Chromium +6, pH, Cyanides, Sulfide, Formate	
S5060-04	FF5040-04	SO	8/24/95	1520	(/) 125 P	Total Metals TCLP, ANIONS (EPA 300.0), F, Cl, NO2, NO3, SO4, PO4, Chromium +6, pH, Cyanides, Sulfide, Formate	
S5060-05	FF5040-05	SO	8/25/95	0950	(/) 125 P	Total Metals TCLP, ANIONS (EPA 300.0), F, Cl, NO2, NO3, SO4, PO4, Chromium +6, pH, Cyanides, Sulfide, Formate	
S5060-06	FF5040-06	SO	8/24/95	1232	(/) 125 P	Total Metals TCLP, ANIONS (EPA 300.0), F, Cl, NO2, NO3, SO4, PO4, Chromium +6, pH, Cyanides, Sulfide, Formate	

POSSIBLE SAMPLE HAZARDS/REMARKS List all known wastes.	MSDS Yes ~~No~~ No X	SPECIAL INSTRUCTIONS	Hold Time yes N. Nitrite + Formate 45 hrs

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
	K.V. Hulse	K.V. Hulse	8/25/95 1158		L.D. Lockard	L.D. Lockard	8/25/95 1158
Relinquished By			Date/Time	Received By			Date/Time
Relinquished By			Date/Time	Received By			Date/Time
Relinquished By			Date/Time	Received By			Date/Time

Matrix *

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

FINAL SAMPLE DISPOSITION	Disposal Method e.g. Return to customer, per lab procedure, used in process	Disposed By	Date/Time

All samples cor[illegible]raradous materials shall be picked up by requestor and returned to parent container or site of e

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Field Assessment Services Team
Special Analytical Services
Hanford Technical Services
Richland, WA. 99352
(509) 373-3798 FAX (509) 373-3193

Chain-of-Custody/ Sample Analysis Request

SAS # 6 0960

Date 8/31/95

Page 1 of

Project 1831I Job No. ET5040

Client FAST / SAS Telephone No. 372-2482

Project Location 100 Area

Sampler Larry Lockard Telephone No. 373-5544

Testing Parameters: RCRA Metals

Turnaround Time
- ☐ Standard
- ☑ Accelerated
- ☐ Other

Hold Time

FAST ID	Date	Time	*	No. of Containers	Observations/Comments	Customer ID
ET5040 - 00	8/31/95		L	1 100 ml	✓ ✓ 3051 Digestates	
ET5040 - 01			L	1 100 ml	✓ ✓ 3051 Digestates	
ET5040 - 02			L	1 100 ml	✓ ✓ 3051 Digestates	
ET5040 - 03			L	1 100 ml	✓ ✓ 3051 Digestates	
ET5040 - 04			L	1 100 ml	✓ ✓ 3051 Digestates	
ET5040 - 05			L	1 100 ml	✓ ✓ 3051 Digestates	
ET5040 - 06			L	1 100 ml	✓ ✓ 3051 Digestates	
ET5040 - 08			L	1 100 ml	✓ ✓ 3051 Digestates	
ET5040 - 10			L	1 100 ml	✓ ✓ 3051 Digestates	
ET5040 - 12	8/31/95		L	1 100 ml	✓ ✓ 3051 Digestates	

Special Shipment/Handling or Storage Requirements: SAMPLES TO USCT FOR METALS

Possible Sample Hazards/ Remarks: Radioactive

☑ Rad Screening
☐ Field Analysis

Relinquished By	Date/Time	Received By	Date/Time
Richard T Tiffany FAST	8/31/95 1230		

* Matrix

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

Final Sample Disposition | Disposal Method | Disposed By | Date/Time

Westi use Hanford Company FAX Results + Send hard copy to FAST

Westinghouse Hanford Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C.# 009507
		Page 1 of 1

Collector HULSE, KARL	Contact/Requestor ENCKE, DAVID B.	Tel. No. 373-3461 MSIN X5-53 FAX
SAF Number S5-060	Sample Origin 183-H Basin	Purchase Order/Charge Code
Project Title Concrete sampling 183-H	Logbook # WHC-N-305 # 96	Ice Chest # SML-395 Temp.
Shipped To (Lab) E.A.L.	Method of Shipment Gov. Vehicle	Bill of Lading/Air Bill No. N/A
Protocol RCRA	Data Turnaround REGULAR	Offsite Property No. N/A

Sample No.	Lab. ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
S5060-01		SO	8/24/95	1045	(1) 125 P	GEA (LAB SPECIFIC), Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Toral U	NONE
S5060-02		SO	8/24/95	1320	(1) 125 P	GEA (LAB SPECIFIC), Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Toral U	
S5060-03		SO	8/24/95	1420	(1) 125 P	GEA (LAB SPECIFIC), Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Toral U	
S5060-04		SO	8/24/95	1520	(1) 125 P	GEA (LAB SPECIFIC), Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Toral U	
S5060-05		SO	8/25/95	0950	(1) 125 P	GEA (LAB SPECIFIC), Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Toral U	
S5060-06		SO	8/24/95	1230	(1) 125 P	GEA (LAB SPECIFIC), Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Toral U	

POSSIBLE SAMPLE HAZARDS/REMARKS MSDS Yes ☐ No ☒
* all known wastes.

SPECIAL INSTRUCTIONS Hold Time
Single matrix concrete except for #6 (soil)

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
	K B Hulse	K B Hulse	8/25/95 1100	Charles H Burgess	Charles H Burgess		8/25/95 11:00
Relinquished By			Date/Time	Received By			Date/Time
Relinquished By			Date/Time	Received By			Date/Time
Relinquished By			Date/Time	Received By			Date/Time

Matrix *

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

FINAL SAMPLE DISPOSITION Disposal Method e.g. Return to customer, per lab procedure, used in process. Disposed By Date/Time

All samples con hazardous materials shall be picked up by requestor and returned to parent container or site of

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Rev. 0

Westinghouse Hanford Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	COC # 009525
		Page 1 of 1

Collector HULSE, KARL	Contact/Requestor ENCKE, DAVID B.	Tel. No. 373-3461 MSIN X5-53 FAX
SAF Number S5-060	Sample Origin 183-H	Purchase Order/Charge Code
Project Title Concrete sampling 183-H	Logbook # WHC-N-205 #47	Ice Chest # SML-244 Temp.
Shipped To (Lab) FAST	Method of Shipment Government Vehicle	Bill of Lading/Air Bill No. N/A
Protocol RCRA	Data Turnaround REGULAR	Offsite Property No. N/A

Sample No.	Lab. ID	*	Date	Time	No/Type Container	Sample Analysis	Perservative
S5060-07	FT5010-13	SO	9/14/95	1005	(/) 125 P	Total Metals TCLP, ANIONS (EPA 300.0), F, Cl, NO2, NO3, SO4, PO4, Chromium +6, pH, Cyanides, Sulfide, Formate	
S5060-08	FT5010-14	SO	9/14/95	0935	(/) 125 P	Total Metals TCLP, ANIONS (EPA 300.0), F, Cl, NO2, NO3, SO4, PO4, Chromium +6, pH, Cyanides, Sulfide, Formate	

POSSIBLE SAMPLE HAZARDS/REMARKS * List all known wastes.	MSDS Yes ☐ No ☒	SPECIAL INSTRUCTIONS	Hold Time Formate

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
	K B Hulse	K B Hulse	9/15/95 1115		Jay Smith		9/15 1115
Relinquished By			Date/Time	Received By			Date/Time
Relinquished By			Date/Time	Received By			Date/Time
Relinquished By			Date/Time	Received By			Date/Time

Matrix *

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

FINAL SAMPLE DISPOSITION	Disposal Method e g Return to customer, per lab procedure, used in process	Disposed By	Date/Time

All samples con' hazardous materials shall be picked up by requestor and returned to parent container or site of o

01-500 (07/95)

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Rev. 0

QC SUMMARY

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Project Ft5040 QC Summary

	Spike Recovery	Original Result	Duplicate Result	Relative % Difference
Metals				
Barium	158%	49	59	18.52
Cadmium	109%	0	1	200
Chromium	147%	7	9	25
Lead	0%	0	0	0
Selenium	0%	0	0	0
Mercury	37%	0	0	0
Hexavalent Chrome	95%	0.1	0.1	0
Sulfide	84%	0.03	0.02	40
	Matrix Spike	**Matrix Spike Duplicate**	**Relative % Difference**	
Anions				
Fluoride	3.4	3.29	3.29	
Chloride	5.04	4.97	1.4	
Nitrite	0	0	0	
Nitrate	18.11	18.08	0.17	
Phosphate	26.48	27.26	2.9	
Sulfate	26.94	27.33	1.44	
Cyanide	9	12	28.57	

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SUPPLEMENTAL INFORMATION

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Notebook No. WHC-N-205 47

PROJECT 183-H Concrete Field Screen Sampling

Continued From Page 3

RDF 9-15-95

S.A.F.#: S5--060 Sample Date: 8/24/95
PROJECT TITLE: 183-H CONCRETE FIELD SCREEN SAMPLING Shipment Date: 8/25/95
CHARGE CODE: E61772
TYPE OF PROTOCOL: Sampling was done to RCRA protocol.
CUSTOMER: R.C. Smith WHC 372-2537
FIELD CONTACTS: D.B. Encke
PERSONAL: Karl B. Hulse SML Lead Sampling Tech.
Robert R. Fox SML Sampling Tech.
Tom Brey HPT Support.
Julia Martin HPT Support.
Rex Miller (Lenny) Project Lead.
Nathan H. Taylor Operator (SIH)

PURPOSE: To determine if decontamination of the concrete was sucsessful and to verify an anilytical method on the soil.

LOCATION: 183-H Basins 1 and 4

REFERENCE DOCUMENTS: Sampling and Analysis Plan 013510.

SAMPLE POINT: Basin #1 East Wall quad. 118 four feet up (sample # S5060-01), Basin #1 South Wall quad. 24 five feet up (sample #S5060-02), Basin #4 quad. 45 three feet down (sample #S5060-03), Basin #4 quad. 14 three feet down (sample #S5060-04), Basin #1 flume (sample #S5060-05), Soil sample taken along the outside of Basin #1 East wall (sample # S5060-06).

SAMPLING METHOD: An air driven rotorhammer was used to grin off surface concrete from pre-determind locations in Basin #1 and Basin #4. The concrete was collected as it fell into a plastic bag which was attached to the wall below the sample site. The sample media was then transfered to vender certified clean bottles with an EII 5.5 cleaned spoon. A new bag was used at each sample point. The rotohammer was cleaned to EII 5.4 and rinsed with ASTM TYPE II water between each sample point.

The flume sample was taken by grinding up the surface of the flume floor in a two foot square. The ground concrete was then spooned into the sample bottles with an EII 5.5 cleaned spoon.

The soil sample was take from outside basin #1 east wall six inches below the surface. The first 6 inches of soil were removed with a shovel. The exposed soil was then mixed with an EII 5.5 cleaned spoon. The vender certified clean bottles were then filled using the cleaned spoon.

PPE: For the soil sample personal protective equipment included Safety Glasses, Safety Shoes, Surgeons Gloves and Blue Coveralls. Sampling in the basins were done under RWP PS-397 which required one set of anti-contamination coveralls, a hood, canvas booties, shoe covers, and two pair of golves.

WEATHER CONDITIONS: Sunny 90°F slight breeze 2 to 3 mph.

RDF 9-15-95 RDF 9-15-95 RDF 9-15-95

54-51-5 +12

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Continued on Page 4

Read and Understood By

RRFox	9-15-95		9/20/95
Signed	Date	Signed	Date

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4

Notebook No. WHC-N-205 47

PROJECT 183-H Concrete Field Screen Sampling

Continued From Page 3

RRF 9-15-95

FACING SOUTH

8-24-95 Sample # 2
Basin #1 South Wall
Quad #24 5' up From Bottom

FACING EAST

10:00AM 8-24-95 RR FOX
Basin #1 East Wall
Quad 118 4' up Sample #1

RRF 9-15-95

Soil Sample Site Basin #1

8/25/95
0960
KB Wilde

183-H Basin #1 Flume

RRF 9-15-95

FOUR Photo's ATTACHED THIS PAGE

Continued on Page 5

Read and Understood By

RR Fox
Signed

9-15-95
Date

Signed

9/20/95
Date

OCEC016

PROJECT / 183-H Contract Field Screen Sampling

Notebook No. WHC-N-205 47

Continued From Page 4

RLF 9-15-95

Sample Number	Date Collected	Time	Number and Type of Containers	Analysis (Method) and Preservation	Lot #	Serial
S5060-01	8/24/95	1045	(1) 125 ml Poly	Total Metals TCLP, Anions F, Cl, NO2, NO3, SO4, Chromium +6, pH, Cyanides, Sulfide, Formate	L/42301040	0004415
S5060-01	8/24/95	1045	(1) 125 ml Poly	GEA, Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Total U	L/42301040	0004441
N5850	8/24/95	1045	(1) 20 ml Poly	Total Actrivity (LAB SPECIFIC)	N/A	N/A
S5060-02	8/24/95	1320	(1) 125 ml Poly	Total Metals TCLP, Anions F, Cl, NO2, NO3, SO4, Chromium +6, pH, Cyanides, Sulfide, Formate	L/42301040	0004431
S5060-02	8/24/95	1320	(1) 125 ml Poly	GEA, Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Total U	L/42301040	0004407
N5851	8/24/95	1320	(1) 20 ml Poly	Total Actrivity (LAB SPECIFIC)	N/A	N/A
S5060-03	8/24/95	1420	(1) 125 ml Poly	Total Metals TCLP, Anions F, Cl, NO2, NO3, SO4, Chromium +6, pH, Cyanides, Sulfide, Formate	L/42301040	0004428
S5060-03	8/24/95	1420	(1) 125 ml Poly	GEA, Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Total U	L/42301040	0004435
N5852	8/24/95	1420	(1) 20 ml Poly	Total Actrivity (LAB SPECIFIC)	N/A	N/A
S5060-04	8/24/95	1520	(1) 125 ml Poly	Total Metals TCLP, Anions F, Cl, NO2, NO3, SO4, Chromium +6, pH, Cyanides, Sulfide, Formate	L/42301040	0004444
S5060-04	8/24/95	1520	(1) 125 ml Poly	GEA, Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Total U	L/42301040	0004463
N5854	8/24/95	1520	(1) 20 ml Poly	Total Actrivity (LAB SPECIFIC)	N/A	N/A
S5060-05	8/25/95	0950	(1) 125 ml Poly	Total Metals TCLP, Anions F, Cl, NO2, NO3, SO4, Chromium +6, pH, Cyanides, Sulfide, Formate	L/42301040	0004427
S5060-05	8/25/95	0950	(1) 125 ml Poly	GEA, Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Total U	L/42301040	0004421
N5855	8/25/95	0950	(1) 20 ml Poly	Total Actrivity (LAB SPECIFIC)	N/A	N/A
S5060-06	8/24/95	1230	(1) 125 ml Poly	Total Metals TCLP, Anions F, Cl, NO2, NO3, SO4, Chromium +6, pH, Cyanides, Sulfide, Formate	L/42301040	0004426
S5060-06	8/24/95	1230	(1) 125 ml Poly	GEA, Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Total U	L/42301040	00044137
N5856	8/24/95	1230	(1) 20 ml Poly	Total Actrivity (LAB SPECIFIC)	N/A	N/A

~~DESTINATION: USGS~~ ~~TRANSPORTATION Government Vehicle~~

~~OFFSITE PROPERTY NUMBER # N/A~~ ~~ATR SHIP # N/A~~ 9-15-95

~~G.O.C. # 008187~~ ~~COOLER # SWL-555~~

~~SAMPLE # L00152~~ ~~Date shipped 9/23/95~~

3651-5 H-8

ONE ATTACHMENT ON THIS PAGE

Continued on Page 6

Read and Understood By

RB Fox — Signed — 9-15-95 — Date

Signed — 9/20/95 — Date

RLF 9-15-95 35

RLF 9-15-95 3651-5 H-8

0000017

6 Notebook No. NHC-M-205 #47

PROJECT 183-H Concrete Field Screen Sampling Continued From Page 5

Shipping Information:

Samples going to 222-S Lab were shipped on COC # 009506 in cooler SML-595 in a Government Vehicle on 8/25/95

Samples going to EAL were shipped in a Government vehicle in cooler SML-595, on COC # 009507 on 8/25/95

Samples going to FAST were shipped in a Government vehicle in cooler SML-595 on COC # 009505 on 8/25/95

The Total Activity 20ml bottles all went to 222-S Lab

The 125 ml poly for Metals were all shipped to FAST

The 125 ml poly for GEA, Gross Alpha/Beta, U, Tc-99 were all shipped to EAL

KB Hulse 9-15-95

NOTE: This sampling was continued See page 7 of this Logbook KBH 9-15-95

Continued on Page NONE

Read and Understood By

KB Hulse KB Hulse 9-15-95 Signed Date

[signature] 9/20/95 Signed Date

0000018

PROJECT 183-H Concrete Field Screen Continued

Notebook No. WHC-N-205 #47 7

Continued From Page NONE

KRH 9-15-95

S.A.F.#: S5-060 Sample Date: 9/14/95
PROJECT TITLE: 183-H CONCRETE FIELD SCREEN SAMPLING Shipment Date: 9/15/95
CHARGE CODE: E61772
TYPE OF PROTOCOL: Sampling was done to RCRA protocol.
CUSTOMER: Don Smith (FSAT) WHC 372-2482
FIELD CONTACTS: O.B. Encke BIH
PERSONAL: Karl B. Hulse SML Lead Sampling Tech.
Kenneth J. Young SML Scientist
Tom E. Brey HPT Support.
Nathon H. Taylor Operator (BIH)

PURPOSE: To determine if decontamination of the concrete was successful. on the soil.

LOCATION: 183-H Basins 2 and 3

REFERENCE DOCUMENTS: Sampling and Analysis Plan 018510.

SAMPLE POINT: Basin #2 South Wall quad. 23 one foot down (sample # S5060-07), Basin #3 South Wall 16 feet from east wall and two feet up (sample #S5060-08).

SAMPLING METHOD: An air driven roto-hammer was used to grin off surface concrete from pre-determined locations in Basin #2 and Basin #3. The concrete was collected as it fell into a plastic bag which was attached to the wall below the sample site. The sample media was then transferred to vender certified clean bottles with an EII 5.5 cleaned spoon. A new bag was used at each sample point. The roto-hammer was cleaned to EII 5.4 and rinsed with ASTM TYPE II water between each sample point.

PPE: Sampling in the basins was done under RWP PS-397 which required one set of anti-contamination coveralls, a hood, canvas booties, shoe covers, and two pair of gloves.

WEATHER CONDITIONS: At 0935 Sunny, 69°F no wind.

KRH 9-15-95

This is a continuation of sampling on page 3 of this log book.

ONE ATTACHMENT ON THIS PAGE

Continued on Page 8

Read and Understood By

KB Hulse 9-15-95 — 9/20/95
Signed Date Signed Date

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8 Notebook No. WHC-N-205 #47

PROJECT 183-H Concrete Field Screen Continued Continued From Page 7

KBH 9-18-95

Sample Number	Date Collected	Time	Number and Type of Containers	Analysis (Method) and Preservation	Lot #	Serial#
S5060-07	9/14/95	1005	(1) 125 ml Poly	Total Metals TCLP, Anions F, Cl, NO2, NO3, SO4, Chromium +6, pH, Cyanides, Sulfide, Formate	L/42301040	0004414
S5060-07	9/14/95	1005	(1) 125 ml Poly	GEA, Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Total U	L/42301040	0004439
N5937	9/14/95	1005	(1) 20 ml Poly	Total Activity (LAB SPECIFIC)	N/A	N/A
S5060-08	9/14/95	0935	(1) 125 ml Poly	Total Metals TCLP, Anions F, Cl, NO2, NO3, SO4, Chromium +6, pH, Cyanides, Sulfide, Formate	L/42301040	0004415
S5060-08	9/14/95	0935	(1) 125 ml Poly	GEA, Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Total U	L/42301040	0004412
N5936	9/14/95	0935	(1) 20 ml Poly	Total Activity (LAB SPECIFIC)	N/A	N/A

KBH 9-18-95

KBH 9-18-95

DESTINATION: 222-S
C.O.C. # 009526
SAMPLE # S5060-07 N5937, S5060-08 N5936

TRANSPORTATION Government Vehicle
COOLER # SML-244
Date shipped 9/14/95

DESTINATION: EAL Lab
C.O.C. # 009528
SAMPLE # S5060-07, S5060-08 (Rad analysis)

TRANSPORTATION Government Vehicle
COOLER # SML-244
Date shipped 9/15/95

DESTINATION: FAST Lab
C.O.C. # 009525
SAMPLE # S5060-07, S5060-08 (Metals analysis)

TRANSPORTATION Government Vehicle
COOLER # SML-244
Date shipped 9/15/95

KBH 9-18-95

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KBH 9-18-95

Continued on Page 9

Read and Understood By

KB Hulse KB Hulse	9-18-95	DL Clements	9/20/95
Signed	Date	Signed	Date

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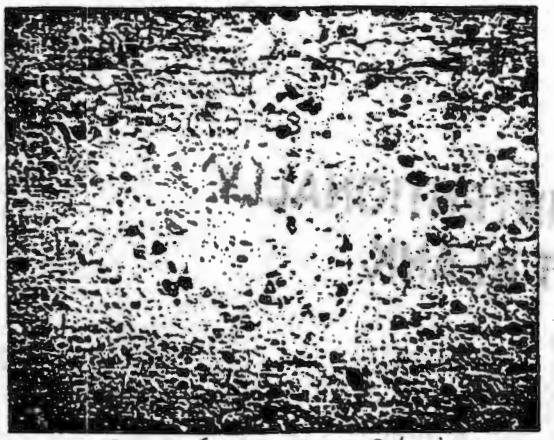
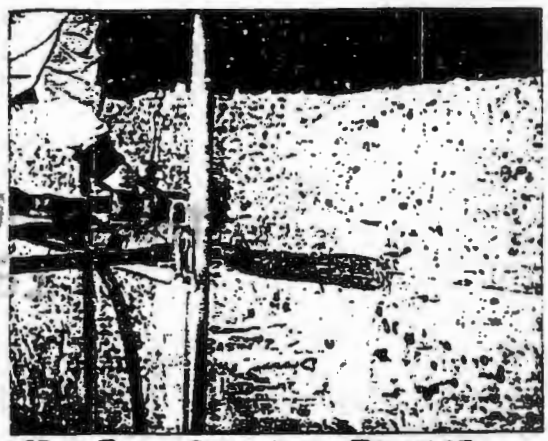
PROJECT 183-H Concrete Field Screen Condioned Notebook No. WHC-N-205 #97 9

Continued From Page 8

KBH 9-15-95



183-H Basin South Wall 09/14/95
0933 Basin #3 55060-08
KBH SAF 55-060



183-H Basin South Wall Block 23
1005 Basin #2 55060-07
KBH SAF 55-060

KBH 9-18-95

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KBH 9-18-95

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Read and understood By

KB Hulse KB Hulse 9-18-95 Signed Date

D L Edwards 9/20/95 Signed Date

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DATA VALIDATION

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183H Concrete Data Validation Summary

The data package was validated at level C as required by WHC-SD-EN-SPP-002. Parameters validated include RCRA metals, cyanide, sulfide, hexavalent chromium, pH, and anions.

Rejected Data (UR)

- Cyanide results were rejected due to low matrix spike recoveries (<30%). However, if a correction for spike recovery is applied, the worst case results would be significantly lower than the 250 mg/kg threshold for releasable cyanide.

- Lead and Selenium were rejected due to low matrix spike recoveries. However, if a correction for the spike recovery is applied, the worst case results would be significantly lower that the 100 mg/kg threshold for TCLP metals (total).

Estimated Data (J/UJ)

- Arsenic and nitrite were qualified estimated for no matrix spike. Barium and Chromium were qualified estimated for high matrix spike recoveries. Mercury was qualified as estimated due to a low matrix spike recovery (<75%).

All method blanks and duplicates were acceptable.

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

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: FAST PROJECT FT5040			DATA PACKAGE: N/A		
VALIDATOR: B MORRIS		LAB: FAST		DATE: 9-27-95	
CASE: N/A			SDG: N/A		
ANALYSES PERFORMED					
☐ CLP/ICP	☐ CLP/GFAA	☐ CLP/Hg	☐ CLP/Cyanide	☐	☐
☒ SW-846/ICP	☐ SW-846/GFAA	☒ SW-846/Hg	☒ SW-846 Cyanide	☐	☐
SAMPLES/MATRIX					
S5060-01, -02, -03, -04, -05 → Concrete					
S5060-06 → 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: _____

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

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 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:

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: Cyanide Spike < 30%. All Samples "UR".
Lead + Selenium spikes < 30%. All Samples "UR".
Arsenic No matrix Spike performed. All Samples "UJ".
Barium + Chromium spikes 97.7 & 125%. All Samples "J".
Mercury spike < 75%. All Samples "UJ".

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

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: Cyanide RPD is out, but no qualification necessary when samples are non-detect.

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:

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

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: Fast Project FT5040			DATA PACKAGE: N/A		
VALIDATOR: B Morris		LAB: FAST		DATE: 9-27-95	
CASE: N/A			SDG: N/A		

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	☒ Sulfide	☐
☐	☐	☐	☐	☐	☐

SAMPLES/MATRIX

S5060-01, -02, -03, -04, -05 => Concrete

S5060-06 => 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: _____

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

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: NO matrix spike performed for Nitrite. All samples "UJ"

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)

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

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:_____

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APPENDIX B

PHASE I SAMPLING REPORT FOR SEPTEMBER 1995

Appendix B includes the Westinghouse Hanford Company letter report for samples collected in September 1995. The "Sampling and Analysis" portion of the case narrative discuses the combined August and September sampling events. The remainder of the report addresses only the September samples. Results of samples delivered to the Environmental Restoration Contractor's Environmental Analytical Laboratory are not part of the letter report.

APPENDIX B -- CONTENTS

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Westinghouse
Hanford Company

Internal
Memo

SAS95-213

From: Special Analytical Studies
Phone: 373-4771 S3-90
Date: October 6, 1995
Subject: 183H CONCRETE PROJECT - FT5040 (A)

To: L. Miller X5-53
D. B. Encke X5-53

cc: D. J. Smith S3-90
FAST File

The attached analytical report completes the requested analysis for the 183H concrete project.

If you have any questions regarding analysis, please contact either Mr. D. J. Smith at 373-2482 or J. Y. Smith at 373-9171.

for
L. L. Lockrem
Manager

sir

Attachment

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Attachment

Analytical Report

for

Fast Project FT5040
183-H Concrete

consisting of
21 pages

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ANALYTICAL REPORT

for

FAST PROJECT FT5040
183H CONCRETE

prepared for

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

October 5, 1995

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Table of Contents

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Project Sampling and Analysis Case Narrative

INTRODUCTION

On September 14, 1995, Sampling and Mobile Labs (SML) sampled material from the 183-H Basins 2 and 3 to determine if decontamination of the concrete was sucessful. Samples were delivered to the Field Assessment Services Team (FAST) as well as the Environmental Analytical Laboratory (EAL)

SAMPLING AND ANALYSIS

Authoritative and random sampling, followed by onsite analysis, was used to confirm decontamination of the 183-H basin surfaces. An authoritative sample was taken to be used to verify the basins never leaked/overflowed into the flume at the south end of the basin. Seven concrete chip samples and one soil sample were obtained for characterizaton. One sample was authoritatively selected from each basin, based on the previous sampling/analytical results (DOE/RL-95-27) and one sample was randomly selected from each basin, based on the numbered grid of the basins. In addition, one concrete sample was obtained from the lowest point of the flume to confirm the absence of dangerous waste contamination.

An air driven rotohammer was used to grind off surface concrete from the predetermined locations in Basins #2 and #3. The concrete was collected as it fell into a plastic bag which was attached to the wall below the sample site. The sample media was then transferred too vender certified clean bottles with a cleaned spoon. A new bag was used at each sample point. The rotohammer was cleaned and rinsed with ASTM TYPE II water between each sample point.

All sampling equipment that came in contact with the sample was cleaned to meet SW-846 protocols for cleanliness. The samples were collected in commercially available, individually certified, pre-cleaned bottles.

ANALYSES REQUESTED

Samples were analyzed for the following as required by WAC 173-303 and WHC-EP-0063.

- Samples were radiologically characterized for gamma energy analysis (GEA), gross alpha, gross beta, uranium -234, -235, -238, technetium-99, and total uranium. Radiological characterization was performed by the BHI Environmental Analytical Laboratory (EAL).

- Samples were chemically characterized for total metals (RCRA metals and vanadium), chromium^{+6}, pH, cyanide, sulfide, and anions (including fluorine, chlorine, NO_3, NO_2, SO_4, and PO_4. Chemical characterization, with the exception of total metals, was performed by FAST. Total metals were determined by the WHC Field Assessment Services Team (FAST) laboratory.

ANALYSIS	SW-846 METHOD CROSSREFERENCE	FAST PROCEDURE REFERENCE
MICROWAVE DIGESTION	3051	3.5
ICP METALS As, Ba, Cd, Cr, Pb, Se, Ag	6010	3.55
Hg COLD VAPOR AA	7470	3.43
CYANIDE	9010	3.18
SULFIDE	9030	3.30
ANIONS F, Cl, NO2, NO3, PO4, SO4	300.0	3.29
SAMPLE RECIEVING RETURN AND CUSTODIANSHIP	WHC-CM-7-7, EII 5.1 & SW-846 SECTION	1.1
QUALITY CONTROL OF THE REVERSE OSMOSIS DEIONIZED WATER SYSTEM	SW-846 SECTION 1, QUALITY ASSURANCE	2.1
WATER LEACH OF SOLID SAMPLES FOR ANION ANALYSIS	N/A	3.23
SOLID WASTE ASSESSMENT TEAM MANUAL	N/A	5.0
FAST QUALITY ASSURANCE PLAN	HASQAP	2.0

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REFERENCES

EPA July 1992, *Test Methods for Evaluating Solid Waste (SW-846)*, Third Edition; U.S. Environmental Protection Agency, Washington, D.C.

Ecology, 1989, *Dangerous Waste Regulations*, Washington Administrative Code 173-303, as amended, Washington State Department of Ecology, Olympia, Washington.

Willis, N. P., 1993, *Hanford Site Solid Waste Acceptance Criteria*, WHC-EP-0063, Westinghouse Hanford Company, Richland, Washington.

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DATA SUMMARY TABLES

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Project Ft5040 - 183H Concrete Results

Sample No.	FT5040-13	FT5040-14	
Customer ID	S5060-07	S5060-08	
Location	#2 S. Wall	#3 S. Wall	
Date Sampled	9/14/95	9/14/95	
Time Sampled	1005	935	
Metals	mg/kg		MDL (mg/kg)
Arsenic	ND	ND	7.0
Barium	68	62	1.6
Cadmium	ND	ND	1.5
Chromium	67	89	1.4
Lead	ND	ND	4.7
Selenium	ND	ND	3.6
Silver	ND	ND	4.8
Mercury	ND	ND	0.4
General Chemistry	mg/kg		
Fluoride	<4.0	73.88	
Chloride	12.64	11.68	
Nitrite	17.25	6.19	
Nitrate	616.3	11806.9	
Phosphate	<4.0	<4.0	
Sulfate	167.04	1125.09	
Sulfide	0.025	<.010	
Cyanide	<0.01	<0.01	
Hexavalent Cr	<0.10	<0.10	
pH	10.3	10.3	
Radiochemistry			
Total Activity	<50 pCi/g	<50 pCi/g	
	ND= Not Detected		

Entered by: JY Smith
Checked by: DJ Smith

10/9/95

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CHAIN-OF-CUSTODY INFORMATION

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Westinghouse Hanford Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C # 009525
		Page 1 of 1

Collector HULSE, KARL	Contact/Requestor ENCKE, DAVID B.	Tel. No. 373-3461 MSIN X5-53 FAX
SAF Number S5-060	Sample Origin 183-H	Purchase Order/Charge Code
Project Title Concrete sampling 183-H	Logbook # WHC-N-205 #47	Ice Chest # SML-244 Temp.
Shipped To (Lab) FAST	Method of Shipment Government Vehicle	Bill of Lading/Air Bill No. N/A
Protocol RCRA	Data Turnaround REGULAR	Offsite Property No. N/A

Sample No.	Lab. ID	A	Date	Time	No/Type Container	Sample Analysis	Perservative
85060-07	FT5040-13 ~~07~~	SO	9/14/95	1005	(1) 125 P	Total Metals TCLP, ANIONS (EPA 300.0), F, Cl, NO2, NO3, SO4, PO4, Chromium +6, pH, Cyanides, Sulfide, Formate	
85060-08	FT5040-14 ~~08~~	SO	9/14/95	0935	(1) 125 P	Total Metals TCLP, ANIONS (EPA 300.0), F, Cl, NO2, NO3, SO4, PO4, Chromium +6, pH, Cyanides, Sulfide, Formate	

POSSIBLE SAMPLE HAZARDS/REMARKS * list all known wastes.	MSDS Yes ☐ No ☒	SPECIAL INSTRUCTIONS	Hold Time Foemate

Relinquished By Print	Sign	Date/Time	Received By Print	Sign	Date/Time
K B Hulse	K B Hulse	9/15/95 1115	Jay Smith		9/15 1115
Relinquished By		Date/Time	Received By		Date/Time
Relinquished By		Date/Time	Received By		Date/Time
Relinquished By		Date/Time	Received By		Date/Time

Matrix *

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

FINAL SAMPLE DISPOSITION	Disposal Method e.g. Return to customer, per lab procedure, used in process.	Disposed By	Date/Time

All samples containing hazardous materials shall be picked up by requestor and returned to parent container or site of origin.

A-6001-500 (07/95)

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QC SUMMARY

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FT5040 - Quality Control Summary

QC Test							
Matrix Spike	Sample ID	Analyte	Sample Result	Spiked Sample Result (SSR)	Spike Level	Recovery	Limit
	FT5040-13	Ag	NS	NS	NS	NS	
	FT5040-13	As	0	0.96	1	96	75-125%
	FT5040-13	Ba	0.68	9.63	10	90	75-125%
	FT5040-13	Cd	0	0.864	1	86	75-125%
	FT5040-13	Cr	0.089	0.924	1	84	75-125%
	FT5040-13	Pb	0.337	1.139	1	80	75-125%
	FT5040-13	Se	0	0.883	1	88	75-125%
	FT5040-13	Hg	0	0.907	1	91.00	75-125%
	Sample ID	Analyte	Found	Actual	%Recovery		
LCS							
	NIST 2710	Ag	39.9	35.3	113		80-120%
	NIST 2710	As	519	626	83		80-120%
	NIST 2710	Ba	289.4	707	41		80-120%
	NIST 2710	Cd	29.2	21.8	134		80-120%
	NIST 2710	Cr	17.4	39	45		80-120%
	NIST 2710	Pb	4551	5532	82		80-120%
	NIST 2710	Se	ND	Not given	ND		80-120%
	NIST 2710	Hg	42	32.6	129		80-120%

FT5040 - Quality Control Summary

Calibration Checks							
	Sample ID	Analyte	Found	Actual	%Recovery		
High Standard							
	SST-5	Ag	10.16	10	102		95-105%
	SST-5	As	10.1	10	101		95-105%
	SST-5	Ba	10.19	10	102		95-105%
	SST-5	Cd	10.31	10	103		95-105%
	SST-5	Cr	10.16	10	102		95-105%
	SST-5	Pb	10.14	10	101		95-105%
	SST-5	Se	9.979	10	100		95-105%
	SST-5	Hg	1.039	1	104		95-105%
ICV-1							
	SST-5	Ag	5.34	5	107		90-110%
	SST-5	As	5.35	5	107		90-110%
	SST-5	Ba	5.39	5	108		90-110%
	SST-5	Cd	5.569	5	111		90-110%
	SST-5	Cr	5.346	5	107		90-110%
	SST-5	Pb	5.408	5	108		90-110%
	SST-5	Se	5.196	5	104		90-110%
CCV-1							
	SST-5	Ag	5.264	5	105		90-110%
	SST-5	As	5.249	5	105		90-110%
	SST-5	Ba	5.357	5	107		90-110%
	SST-5	Cd	5.546	5	111		90-110%
	SST-5	Cr	5.309	5	106		90-110%
	SST-5	Pb	5.414	5	108		90-110%
	SST-5	Se	5.185	5	104		90-110%

FT5040 - Quality Control Summary

CCV-2							
	SST-5	Ag	5.252	5	105		90-110%
	SST-5	As	5.25	5	105		90-110%
	SST-5	Ba	5.275	5	106		90-110%
	SST-5	Cd	5.5	5	110		90-110%
	SST-5	Cr	5.262	5	105		90-110%
	SST-5	Pb	5.332	5	107		90-110%
	SST-5	Se	5.22	5	104		90-110%
CCV-3							
	SST-5	Ag	5.25	5	105		90-110%
	SST-5	As	5.279	5	106		90-110%
	SST-5	Ba	5.337	5	107		90-110%
	SST-5	Cd	5.37	5	107		90-110%
	SST-5	Cr	5.222	5	104		90-110%
	SST-5	Pb	5.356	5	107		90-110%
	SST-5	Se	5.064	5	101		90-110%
CCV-4							
	SST-5	Ag	5.15	5	103		90-110%
	SST-5	As	5.04	5	101		90-110%
	SST-5	Ba	5.13	5	103		90-110%
	SST-5	Cd	5.41	5	108		90-110%
	SST-5	Cr	5.15	5	103		90-110%
	SST-5	Pb	5.22	5	104		90-110%
	SST-5	Se	4.89	5	98		90-110%

FT5040 - Quality Control Summary

Duplicate Precison							
	Sample ID	**Analyte**	**Result 1**	**Result 2**	**%RPD**		
	Ft5040-13	Ag	1.1	1	9.52		
	Ft5040-13	As	ND	ND	ND		
	Ft5040-13	Ba	68.1	66.6	2.23		
	Ft5040-13	Cd	ND	ND	ND		
	Ft5040-13	Cr	6.75	6.48	4.08		
	Ft5040-13	Pb	33.8	34.5	-2.05		
	Ft5040-13	Se	ND	ND	ND		

SUPPLEMENTAL INFORMATION

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PROJECT 183-H Concrete Field Screen Continued

Notebook No. WHC-N-205 #47 7

Continued From Page None

KBH 9-18-95

S.A.F.#: S5-060 Sample Date: 9/14/95
PROJECT TITLE: 183-H CONCRETE FIELD SCREEN SAMPLING Shipment Date: 9/15/95
CHARGE CODE: E61772
TYPE OF PROTOCOL: Sampling was done to RCRA protocol.
CUSTOMER: Don Smith (FSAT) WHC 372-2482
FIELD CONTACTS: D.B. Encke BIH
PERSONAL: Karl B. Hulse SML Lead Sampling Tech.
Kenneth J. Young SML Scientist
Tom E. Brey HPT Support.
Nathon H. Taylor Operator (BIH)

PURPOSE: To determine if decontamination of the concrete was successful. on the soil.

LOCATION: 183-H Basins 2 and 3

REFERENCE DOCUMENTS: Sampling and Analysis Plan 018510.

SAMPLE POINT: Basin #2 South Wall quad. 23 one foot down (sample # S5060-07), Basin #3 South Wall 16 feet from east wall and two feet up (sample #S5060-08).

SAMPLING METHOD: An air driven roto-hammer was used to grin off surface concrete from pre-determined locations in Basin #2 and Basin #3. The concrete was collected as it fell into a plastic bag which was attached to the wall below the sample site. The sample media was then transferred to vender certified clean bottles with an EII 5.5 cleaned spoon. A new bag was used at each sample point. The roto-hammer was cleaned to EII 5.4 and rinsed with ASTM TYPE II water between each sample point.

PPE: Sampling in the basins was done under RWP PS-397 which required one set of anti-contamination coveralls, a hood, canvas booties, shoe covers, and two pair of gloves.

WEATHER CONDITIONS: At 0935 Sunny, 69°F no wind.

KBH 9-18-95

This is a continuation of sampling on page 3 of this Log book.

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Continued on Page 8

Read and Understood By

KB Hulse 9-18-95 — Signed / Date
Signed 9/20/95 — Signed / Date

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8 Notebook No. WHC-N-205 #47

PROJECT 183-H Concrete Field Season Continued Continued From Page ... 7

KBH 9-18-95

Sample Number	Date Collected	Time	Number and Type of Containers	Analysis (Method) and Preservation	Lot #	Serial#
S5060-07	9/14/95	1005	(1) 125 ml Poly	Total Metals TCLP, Anions F, Cl, NO2, NO3, SO4, Chromium +6, pH, Cyanides, Sulfide, Formate	L/42301040	0004414
S5060-07	9/14/95	1005	(1) 125 ml Poly	GEA, Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Total U	L/42301040	0004439
N5937	9/14/95	1005	(1) 20 ml Poly	Total Activity (LAB SPECIFIC)	N/A	N/A
S5060-08	9/14/95	0935	(1) 125 ml Poly	Total Metals TCLP, Anions F, Cl, NO2, NO3, SO4, Chromium +6, pH, Cyanides, Sulfide, Formate	L/42301040	0004415
S5060-08	9/14/95	0935	(1) 125 ml Poly	GEA, Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Total U	L/42301040	0004412
N5936	9/14/95	0935	(1) 20 ml Poly	Total Activity (LAB SPECIFIC)	N/A	N/A

KBH 9-18-95

DESTINATION: 222-S
C.O.C. # 009526
SAMPLE # S5060-07 N5937, S5060-08 N5936

TRANSPORTATION Government Vehicle
COOLER # SML-244
Date shipped 9/14/95

DESTINATION: EAL Lab
C.O.C. # 009528
SAMPLE # S5060-07, S5060-08 (Rad analysis)

TRANSPORTATION Government Vehicle
COOLER # SML-244
Date shipped 9/15/95

DESTINATION: FAST Lab
C.O.C. # 009525
SAMPLE # S5060-07, S5060-08 (Metals analysis)

TRANSPORTATION Government Vehicle
COOLER # SML-244
Date shipped 9/15/95

KBH 9-18-95

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DLH 9-18-95

Continued on Page 9

Read and Understood By

KB Hulse KB Hulse — Signed
9-18-95 — Date
DL Clements — Signed
9/20/95 — Date

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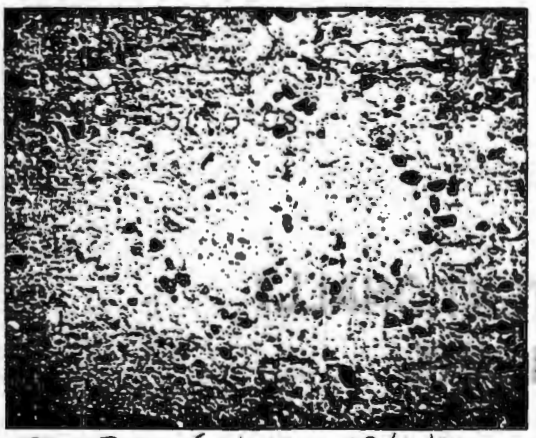
08/25/95 08:16 [illegible] P.A.S. 006

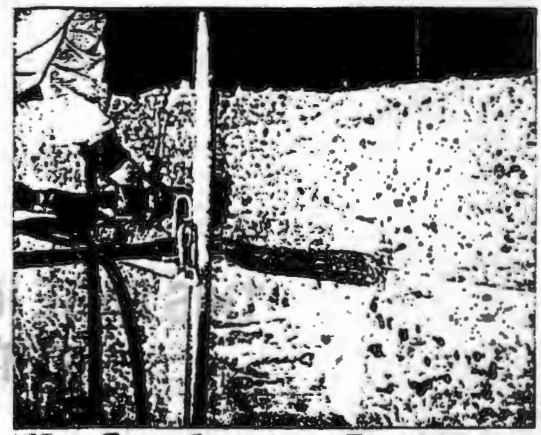
PROJECT 183-H Concrete Field Screen Conditioned Notebook No. WHC-N-205 #97 9

Continued From Page 8

KBH 9-15-95 COPY



183-H Basin South Wall GA/14/95
0935 Basin #3 S5060-08
KBH SAF 55-060



183-H Basin South Wall Block 23
1005 Basin #2 S5060-07
KBH SAF55-060

KBH 9-18-95

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KBH 9-18-95

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Read and Understood By

KB Hulse KB Hulse 9-18-95 — Signed / Date

D L Edwards 9/20/95 — Signed / Date

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DATA VALIDATION

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183H Concrete Data Validation Summary

This data package was validated at level C as specified in WHC-SD-EN-SPP-002. Parameters validated include RCRA metals and mercury. All other parameters were validated with the original sample group (samples 1-6).

Estimated Data (J/UJ)

Cadmium and mercury were qualified as estimated for a high recovery in the Laboratory Control Standard (LCS), NIST 2710. Barium and chromium were qualified as estimated (J) for low LCS recoveries. All matrix spike, duplicate, and calibration standards were within limits. All method blanks were acceptable.

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APPENDIX C

PHASE I SAMPLING REPORT FOR OCTOBER AND NOVEMBER 1995

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APPENDIX C -- CONTENTS

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Westinghouse Hanford Company **Internal Memo**

From: Special Analytical Studies SAS95-231
Phone: 373-4771 S3-90
Date: November 29, 1995
Subject: 183-H BASIN - FT5124

To: D. B. Encke X5-53
R. A. Harris X5-53
L. Miller X5-53

cc: D. J. Smith S3-90
FAST File

Attached is the analytical report in support of this project.

If you have any questions regarding analysis, please contact either Mr. Don Smith at 373-2482 or Ms. Joy Smith at 373-9171.

L. L. Lockrem
Manager

sir

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Attachment

ANALYTICAL REPORT

for

FAST PROJECT FT5124
183-H Basin

Consisting of
18 pages

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ANALYTICAL REPORT

for

FAST PROJECT FT5124
183-H Basin

prepared for

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

November 29, 1995

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Table of Contents

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Project Sampling and Analysis Case Narrative

INTRODUCTION

Personnel from Sampling and Mobile Labs (SML) obtained samples from the 183-H Basin on October 23, 1995 and again on November 1, 1995. Aliquots of the samples were delivered to Environmental Analytical Laboratory (EAL) for radiological analysis and Field Assessment Services Team (FAST) for chemical analysis. An aliquot was also delivered off-site for chemical and radiological analysis

SAMPLING AND ANALYSIS

An air driven roto-hammer was used to grind off surface concrete from pre-determined locations in basins one through four to determine if decontamination of the concrete was successful. The concrete was gathered to the side with surgical gloves until sufficient volume was collected. The sample media was then transferred to vendor certified clean containers with an EII 5.5 cleaned stainless steel spoon. The roto-hammer was cleaned to EII 5.4 and rinsed with ASTM TYPE II water between each sample point. A duplicate and a split were taken from basin #4 as the same location and time as BOGRK8. Before using the roto-hammer silica sand was poured over the head and then collected as an equipment blank.

Basins #4 and #1 has water standing over a sample point in each basin. Basin #4 was pumped on October, 23, 1995 and sampled the same day. The sample point was still moist at the time of sampling. Basin #1 was sampled on November 1, 1995 after the water had been pumped out.

SAMPLE POINTS

Basin #1
Sample BOGRK1 located 15' south of the Floc basin (upper level) and 5' from the east wall.
Sample BOGRK2 located 50' south of the Floc basin and 20' in from the east wall.

Basin #2
Sample BOGRK3 located 15' south of the north Floc basin wall and 3' in from the east wall.
Sample BOGRK4 located 33' south of the Floc basin and at the base of the west wall.

Basin #3
Sample BOGRK5 located 3' south of the Floc basin and 25' in from the east wall.
Sample BOGRK6 located 40' north of the south wall and 10' in from the west wall.

Basin #4
Sample BOGRK7 located 13' south of the Floc basin and 30' in from the west wall.
Sample BOGRK8 located 40' south of the Floc basin and 20' in from the west wall.

ANALYSES REQUESTED

FAST Sample ID	HEIS Number	Date Sampled	Analysis Requested	Procedure WHC-IP-1128
FT5124-01	BOGRK0	10/23/95	ICP Metals (Ag,As,Ba,Cd,Cr,Hg,Pb,Se), Cr6, pH, Cyanide, Sulfide, Anions	3.55, 3.1, 3.18, 3.30, 3.29, Hach 8023
FT5124-02	BOGRK3	10/23/95	ICP Metals (Ag,As,Ba,Cd,Cr,Hg,Pb,Se), Cr6, pH, Cyanide, Sulfide, Anions	3.55, 3.1, 3.18, 3.30, 3.29, Hach 8023
FT5124-03	BOGRK4	10/23/95	ICP Metals (Ag,As,Ba,Cd,Cr,Hg,Pb,Se), Cr6, pH, Cyanide, Sulfide, Anions	3.55, 3.1, 3.18, 3.30, 3.29, Hach 8023
FT5124-04	BOGRK5	10/23/95	ICP Metals (Ag,As,Ba,Cd,Cr,Hg,Pb,Se), Cr6, pH, Cyanide, Sulfide, Anions	3.55, 3.1, 3.18, 3.30, 3.29, Hach 8023
FT5124-05	BOGRK6	10/23/95	ICP Metals (Ag,As,Ba,Cd,Cr,Hg,Pb,Se), Cr6, pH, Cyanide, Sulfide, Anions	3.55, 3.1, 3.18, 3.30, 3.29, Hach 8023
FT5124-06	BOGRK7	10/23/95	ICP Metals (Ag,As,Ba,Cd,Cr,Hg,Pb,Se), Cr6, pH, Cyanide, Sulfide, Anions	3.55, 3.1, 3.18, 3.30, 3.29, Hach 8023
FT5124-07	BOGRK8	10/23/95	ICP Metals (Ag,As,Ba,Cd,Cr,Hg,Pb,Se), Cr6, pH, Cyanide, Sulfide, Anions	3.55, 3.1, 3.18, 3.30, 3.29, Hach 8023
FT5124-08	BOGRK9	10/23/95	ICP Metals (Ag,As,Ba,Cd,Cr,Hg,Pb,Se), Cr6, pH, Cyanide, Sulfide, Anions	3.55, 3.1, 3.18, 3.30, 3.29, Hach 8023
FT5124-09	BOGRK1	11/1/95	ICP Metals (Ag,As,Ba,Cd,Cr,Hg,Pb,Se), Cr6, pH, Cyanide, Sulfide, Anions	3.55, 3.1, 3.18, 3.30, 3.29, Hach 8023
FT5124-10	BOGRK2	11/1/95	ICP Metals (Ag,As,Ba,Cd,Cr,Hg,Pb,Se), Cr6, pH, Cyanide, Sulfide, Anions	3.55, 3.1, 3.18, 3.30, 3.29, Hach 8023

REFERENCES

EPA July 1992, Test Methods for Evaluating Solid Waste (SW-846), Third Edition; U.S. Environmental Protection Agency, Washington, D.C.

DATA SUMMARY TABLES

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Project FT5124 - 183H Basin Results

Sample ID		FT5124-01	FT5124-02	FT5124-03	FT5124-04	FT5124-05	FT5124-06	FT5124-07	FT5124-08	FT5124-09	FT5124-10
Customer ID		BOGRKO	BOGRK3	BOGRK4	BOGRK5	BOGRK6	BOGRK7	BOGRK8	BOGRK9	BOGRK1	BOGRK2
Date Sampled		10/23/95	10/23/95	10/23/95	10/23/95	10/23/95	10/23/95	10/23/95	10/23/95	11/1/95	11/1/95
Time Sampled		930	1100	1045	1330	1310	1450	1435	1435	1350	1410
Metals	**Units**										
Arsenic	mg/kg	<7.8	<7.8	<7.8	<7.8	<7.8	<7.8	<7.8	<7.8	<7.8	<7.8
Barium	mg/kg	0.05	87.5	71.5	80.9	82.6	84.5	92.4	101	66.2	67.2
Cadmium	mg/kg	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
Chromium	mg/kg	<1.3	76.8	17.3	11.9	7.5	12.8	13.5	20.1	35.6	104
Lead	mg/kg	<5.8	<5.8	10.4	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	12.9
Mercury	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4	0.2	<0.4	0.4	<0.2	<0.2
Selenium	mg/kg	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3
Silver	mg/kg	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4
General Chemistry											
Fluoride	ug/g	<2.02	4.35	4.60	49.1	5.87	4.33	4.92	4.42	6.07	6.46
Chloride	ug/g	7.50	13.6	81	129	25.1	56.0	18.0	14.7	36.8	48.8
Nitrite	ug/g	<4.95	<4.95	7.61	24.9	<4.95	<4.95	<4.95	<4.95	30.12	12.1
Nitrate	ug/g	23.3	2582	1775	3706	1861	700	828	639	4867	3576
Phosphate	ug/g	<15.1	<15.1	<15.1	<15.1	<15.1	<15.1	<15.1	<15.1	<15.1	<15.1
Sulfate	ug/g	<15.1	157	38.1	167	48.1	231	201	190	33.4	98
Hexavalent Cr	mg.kg	<0.25	0.25	<0.25	<0.50	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Sulfide	mg/kg	<0.1	<0.1	<0.1	0.1	0.1	0.1	<0.1	<0.1	0.2	<0.1
Cyanide (soluble)	mg/kg	<0.1	<0.1	<0.1	0.1	0.1	0.1	<0.1	<0.1	0.05	0.05
pH		7.8	11.4	12.0	11.5	11.9	11.6	11.5	11.6	12.3	12.1

Entered by: JY Smith
Checked by: DJ Smith

Printed on: 11/29/95

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CHAIN-OF-CUSTODY INFORMATION

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Westinghouse Hanford Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	COC# 009562
		Page 1 of 1

Collector HULSE, KARL	Contact/Requestor ENCKE, DAVID B.	Tel. No. 373-3461 MSIN X5-53 FAX
SAF Number B96-026	Sample Origin 183-H Basin	Purchase Order/Charge Code PV5AA
Project Title 183-H Basin D&D	Logbook # WHC-N-205 #47	Ice Chest # SML-528 Temp.
Shipped To (Lab) FAST FT924	Method of Shipment Government Vehicle	Bill of Lading/Air Bill No. N/A
Protocol RCRA	Data Turnaround PRIORITY	Offsite Property No. N/A

Sample No.	Lab. ID	*	Date	Time	No/Type Container	Sample Analysis	Perservative
B0GRK0	FT5124-01	X	10/23/95	0930	(1) 250 P	ICP METALS TAL (6010), Chromium+6, pH, cyanide, sulfide, anions (F,Cl,SO4,PO4,NO2, NO3)	Cool to 4 C
B0GRK3	FT5124-02	X	10/23/95	1100	(1) 250 P	ICP METALS TAL (6010), Chromium+6, pH, cyanide, sulfide, anions (F,Cl,SO4,PO4,NO2, NO3)	Cool to 4 C
B0GRK4	FT5124-03	X	10/23/95	1045	(1) 250 P	ICP METALS TAL (6010), Chromium+6, pH, cyanide, sulfide, anions (F,Cl,SO4,PO4,NO2, NO3)	Cool to 4 C
B0GRK5	FT5124-04	X	10/23/95	1330	(1) 250 P	ICP METALS TAL (6010), Chromium+6, pH, cyanide, sulfide, anions (F,Cl,SO4,PO4,NO2, NO3)	Cool to 4 C
B0GRK6	FT5124-05	X	10/23/95	1310	(1) 250 P	ICP METALS TAL (6010), Chromium+6, pH, cyanide, sulfide, anions (F,Cl,SO4,PO4,NO2, NO3)	Cool to 4 C
B0GRK7	FT5124-06	X	10/23/95	1450	(1) 250 P	ICP METALS TAL (6010), Chromium+6, pH, cyanide, sulfide, anions (F,Cl,SO4,PO4,NO2, NO3)	Cool to 4 C
B0GRK8	FT5124-07	X	10/23/95	1435	(1) 250 P	ICP METALS TAL (6010), Chromium+6, pH, cyanide, sulfide, anions (F,Cl,SO4,PO4,NO2, NO3)	Cool to 4 C
B0GRK9	FT5124-08	X	10/23/95	1435	(1) 250 P	ICP METALS TAL (6010), Chromium+6, pH, cyanide, sulfide, anions (F,Cl,SO4,PO4,NO2, NO3)	Cool to 4 C

POSSIBLE SAMPLE HAZARDS/REMARKS List all known wastes.	MSDS Yes ☐ No ☒	SPECIAL INSTRUCTIONS	Hold Time
Sample matrix concrete			

Relinquished By Print	Sign	Date/Time	Received By Print	Sign	Date/Time
KB Hulse	KB Hulse	10/24/95 1400	J.J. Smith		10/24/96 1400
Relinquished By		Date/Time	Received By		Date/Time
Relinquished By		Date/Time	Received By		Date/Time
Relinquished By		Date/Time	Received By		Date/Time

Matrix *

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

FINAL SAMPLE DISPOSITION	Disposal Method e.g. Return to customer, per lab procedure, used in process	Disposed By	Date/Time

All samples containing hazardous materials shall be picked up by requestor and returned to parent container or site of origin.

A-6001-500 (07/95)

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9/16/96 2:19

BHI-00922
Rev. 0

Westinghouse Hanford Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C # 009573
		Page 1 of 1

Collector HULSE, KARL	Contact/Requestor ENCKE, DAVID B.	Tel. No. 373-3461 MSIN X5-53 FAX
SAF Number B96-026	Sample Origin 183-H	Purchase Order/Charge Code PV5AA
Project Title 183-H Basin D&D	Logbook # WHC-N-205 #47	Ice Chest # GWS-120 Temp.
Shipped To (Lab) FAST	Method of Shipment Gov. Vehicle	Bill of Lading/Air Bill No. N/A
Protocol RCRA	Data Turnaround PRIORITY	Offsite Property No. N/A

Sample No.	Lab. ID	*	Date	Time	No/Type Container	Sample Analysis	Perservative
B0GRK1	FT5124-09	X	11/1/95	1350	(1) 250 P	ICP METALS TAL (6010), Chromium+6, pH, cyanide, sulfide, anions (F,Cl,SO4,PO4,NO2, NO3)	Cool to 4 C
B0GRK2	FT5124-10	X	11/1/95	1410	(1) 250 P	ICP METALS TAL (6010), Chromium+6, pH, cyanide, sulfide, anions (F,Cl,SO4,PO4,NO2, NO3)	Cool to 4 C

POSSIBLE SAMPLE HAZARDS/REMARKS	MSDS Yes ☐ No ☒	SPECIAL INSTRUCTIONS Hold Time
d all known wastes.		Sample analysis for nitrite, nitrate, and phosphate by EPA 300 0 and Chromium-VI by SW-846 7195 are being requested for Information Only. The ERC Contractor acknowledges the holding times will not be met.

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
K B Hulse K B Hulse	11-3-95 0845	K.J. Yancy K.J. Yancy	11-3-95 0845
K.J. Yancy K.J. Yancy	11-3-95 0946	R A Berkfeld R.A. Berkfeld	11-3-95 0946

Matrix *

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

FINAL SAMPLE DISPOSITION	Disposal Method e g Return to customer, per lab procedure, used in process.	Disposed By	Date/Time

All samples containir ...rardous materials shall be picked up by requestor and returned to parent container or site of origin

A-6 400 (07/95)

C-18

BHI-00922
Rev. 0

SUPPLEMENTAL INFORMATION

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PROJECT 183-H Basin D+D

Notebook No. WHC-N-205 #47 17

Continued From Page NONE

KBH 11-21-95

S.A.F.#: B96-026 **Sample Date:** 10/23/95 & 11/1/95
PROJECT TITLE: 183-H Basin D&D **Shipment Date:** 10/25/95 & 11/3/95
CHARGE CODE: PV5AA
TYPE OF PROTOCOL: Sampling was done to RCRA protocol.
CUSTOMER: Don Smith (FAST) WHC 372-2482
FIELD CONTACTS: D.B. Encke BIH
PERSONAL: Karl B. Hulse SML Lead Sampling Tech.
Kenneth J. Young SML Scientist
Robert R. Fox SML Sampler
operators D&D (BIH) Operations
HPT (BIH) HPT Group

PURPOSE: To determine if decontamination of the concrete was successful.

LOCATION: 183-H Basins 1 through 4 the floor.

REFERENCE DOCUMENTS: Sampling and Analysis Plan 018510. And prior sampling in Logbook WHC-N-205#47 page 3.

SAMPLE POINT: Basin #1; Sample B0GRK1 located 15' south of the Floc Basin (upper level) and 5' from the East Wall. Sample B0GRK2 located 50' south of the Floc Basin and 20' in from the East wall.
Basin #2; Sample B0GRK3 15' South of the north Floc Basin wall and 3' in from east wall. (This sample is on the "upper level" of basin #2). Sample B0GRK4 located 33' south of the Floc Basin and at the base of the West wall.
Basin #3; Sample B0GRK5 located 3' south of the Floc Basin and 25' in from the east wall. Sample B0GRK6 located 40' North of the South wall and 10' in from the West wall.
Basin #4; Sample B0GRK7 located 13' South of the Floc Basin and 30' in from the West Wall. Sample B0GRK8 located 40' South of the Floc Basin and 20' in from the West Wall.
QA Samples; Equipment Blank Sample B0GRK0 taken with silica sand. Duplicate Sample B0GRK9 and Split sample B0GRL0 were taken at sample B0GRK8.

KBH 11-21-95

SAMPLING METHOD: An air driven roto-hammer (squirrel gun) was used to grin off surface concrete from pre-determined locations on the Basins floor. The concrete was gathered to the side with surgical gloves until sufficient volume was collected. The sample media was then transferred to vender certified clean bottles with an EII 5.5 cleaned stainless spoon. The roto-hammer was cleaned to EII 5.4 and rinsed with ASTM TYPE II water between each sample point. A duplicate and a split were taken from basin #4 at the same location and time as sample B0GRK8. Before using the squirrel gun silica sand was poured over the head and the collected as a equipment blank.

PPE: Sampling in the basins was done under RWP PS-397 which required one set of anti-contamination coveralls, a hood, canvas booties, shoe covers, and two pair of gloves.

WEATHER CONDITIONS: 10-23-95 Cloudy, light and variable winds, high 54° F, 11-1-95 Clear, light and variable winds, high 48° F

COMMENTS: Basin #4 and #1 had water standing over a sample point in each basin. Basin #4 was pumped on 10-23-95 and sampled the same day. The sample point was still moist at the time of sampling. Basin #1 was sampled on 11-1-95 after the water had been pumped out.

KBH 11-21-95

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Continued on Page 18

Read and Understood By:

KB Hulse KB Hulse 11-21-95 _____ _____
Signed Date Signed Date

18

PROJECT 183-H Basin O&D

Notebook No. WHC-N-205 #47

KBH 11-21-95

Continued From Page 17

Sample Number	Date Collected	Time	Number and Type of Containers	Analysis (Method) and Preservation	Lot #	Serial#
B0GRK0	10/23/95	0930	(1) 250 ml Poly	Total Metals TCLP, Chromium +6, pH, Cyanides, Sulfide, Formate, Anions F, Cl, NO2, NO3, SO4, PO4	L/24052290	078711
B0GRK0	10/23/95	0930	(1) 250 ml Poly	GEA, Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Total U	L/23165060	A0389352
N6067	10/23/95	0930	(1) 20 ml Poly	Total Activity (LAB SPECIFIC)	N/A	N/A
B0GRK1	11/1/95	1350	(1) 250 ml Poly	Total Metals TCLP, Chromium +6, pH, Cyanides, Sulfide, Formate, Anions F, Cl, NO2, NO3, SO4, PO4	L/23165060	
B0GRK1	11/1/95	1350	(1) 250 ml Poly	GEA, Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Total U	L/23165060	
N6068	11/1/95	1350	(1) 20 ml Poly	Total Activity (LAB SPECIFIC)	N/A	N/A
B0GRK2	11/1/95	1410	(1) 250 ml Poly	Total Metals TCLP, Chromium +6, pH, Cyanides, Sulfide, Formate, Anions F, Cl, NO2, NO3, SO4, PO4	L/23165060	
B0GRK2	11/1/95	1410	(1) 250 ml Poly	GEA, Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Total U	L/23165060	
N6069	11/1/95	1410	(1) 20 ml Poly	Total Activity (LAB SPECIFIC)	N/A	N/A
B0GRK3	10/23/95	1100	(1) 250 ml Poly	Total Metals TCLP, Chromium +6, pH, Cyanides, Sulfide, Formate, Anions F, Cl, NO2, NO3, SO4, PO4	L/24052290	078702
B0GRK3	10/23/95	1100	(1) 250 ml Poly	GEA, Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Total U	L/23165060	A0389425
N6070	10/23/95	1100	(1) 20 ml Poly	Total Activity (LAB SPECIFIC)	N/A	N/A
B0GRK4	10/23/95	1045	(1) 250 ml Poly	Total Metals TCLP, Chromium +6, pH, Cyanides, Sulfide, Formate, Anions F, Cl, NO2, NO3, SO4, PO4	L/23165060	A0389473
B0GRK4	10/23/95	1045	(1) 250 ml Poly	GEA, Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Total U	L/23165060	A0389715
N6071	10/23/95	1045	(1) 20 ml Poly	Total Activity (LAB SPECIFIC)	N/A	N/A
B0GRK5	10/23/95	1330	(1) 250 ml Poly	Total Metals TCLP, Chromium +6, pH, Cyanides, Sulfide, Formate, Anions F, Cl, NO2, NO3, SO4, PO4	L/23165060	A0389710
B0GRK5	10/23/95	1330	(1) 250 ml Poly	GEA, Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Total U	L/23165060	A0389363
N6072	10/23/95	1330	(1) 20 ml Poly	Total Activity (LAB SPECIFIC)	N/A	N/A
B0GRK6	10/23/95	1310	(1) 250 ml Poly	Total Metals TCLP, Chromium +6, pH, Cyanides, Sulfide, Formate, Anions F, Cl, NO2, NO3, SO4, PO4	L/23165060	A0389709
B0GRK6	10/23/95	1310	(1) 250 ml Poly	GEA, Gross Alpha, Gross Beta, U-234,-235,-238, Technetium-99, Total U	L/23165060	A0389717
N6073	10/23/95	1310	(1) 20 ml Poly	Total Activity (LAB SPECIFIC)	N/A	N/A

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B0GRK7	10/23/95	1450	(1) 250 ml Poly	Total Metals TCLP. Chromium +6. pH. Cyanides. Sulfide. Formate. Anions F. Cl. NO2. NO3. SO4. PO4	L/23165060	A0389351
B0GRK7	10/23/95	1450	(1) 250 ml Poly	GEA. Gross Alpha. Gross Beta. U-234.-235.-238. Technetium-99. Total U	L/24052090	078701
N6074	10/23/95	1450	(1) 20 ml Poly	Total Activity (LAB SPECIFIC)	N/A	N/A
B0GRK8	10/23/95	1435	(1) 250 ml Poly	Total Metals TCLP. Chromium +6. pH. Cyanides. Sulfide. Formate. Anions F. Cl. NO2. NO3. SO4. PO4	L/23165060	A0389633
B0GRK8	10/23/95	1435	(1) 250 ml Poly	GEA. Gross Alpha. Gross Beta. U-234.-235.-238. Technetium-99. Total U	L/23165060	A0389441
N6075	10/23/95	1435	(1) 20 ml Poly	Total Activity (LAB SPECIFIC)	N/A	N/A
B0GRK9	10/23/95	1435	(1) 250 ml Poly	Total Metals TCLP. Chromium +6. pH. Cyanides. Sulfide. Formate. Anions F. Cl. NO2. NO3. SO4. PO4	L/23165060	A0389660
B0GRK9	10/23/95	1435	(1) 250 ml Poly	GEA. Gross Alpha. Gross Beta. U-234.-235.-238. Technetium-99. Total U	L/23165060	A0389453
B0GRL0	10/23/95	1435	(1) 20 ml Poly	Activity Scan (Lab Specific)	N/A	N/A
B0GRL0	10/23/95	1435	(1) 60 ml aG	Anions--IC (EPA 300.0). F. Cl. SO4. PO4. NO2. NO3. pH (9045)	I/23278060	A1665463
B0GRL0	10/23/95	1435	(1) 60 ml aG	Chromium (Hexavalent) (7195)	I/23278060	A1665517
B0GRL0	10/23/95	1435	(1) 250 ml P	Cyanide (EPA 335.2)	4052090	078696
B0GRL0	10/23/95	1435	(1) 1000 ml P	Gross Alpha/Beta (ITAS-RD-3222). U-234.-235.-238 ITAS-RD-3234). Tc-99 (ITAS-IT-RS-0001). Total U (ITAS-RD-4200). Gamma Spec (ITAS-RD-3219)	4194020	478304
B0GRL0	10/23/95	1435	(1) 60 ml aG	ICP Metals TAL (6010). Arsenic (7060). Lead (7421). Selenium (7740). Thallium (7841)	I/23278060	A1665464
B0GRL0	10/23/95	1435	(1) 60 ml aG	Sulfide (9030)	I/23278060	A1665442

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PROJECT 183-H Basin D&D

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DESTINATION: 222-S
C.O.C. # 009563
SAMPLE # B0GRK0 N6067, B0GRK3 N6070, B0GRK4 N6071, B0GRK5 N6072, B0GRK6 N6073, B0GRK7 N6074, B0GRK8 N6075
TRANSPORTATION Government Vehicle
COOLER # SML-528
Date shipped 10/24/95

DESTINATION: EAL Lab
C.O.C. # 009561
SAMPLE # B0GRK0, B0GRK3, B0GRK4, (Rad analysis) B0GRK5, B0GRK6, B0GRK7, B0GRK8, B0GRK9
TRANSPORTATION Government Vehicle
COOLER # SML-528
Date shipped 10/24/95

KB H 11-21-95

DESTINATION: FAST Lab
C.O.C. # 009525
SAMPLE # B0GRK0, B0GRK3, B0GRK4, (Metal analysis) B0GRK5, B0GRK6, B0GRK7, B0GRK8, B0GRK9
TRANSPORTATION Government Vehicle
COOLER # SML-528
Date shipped 10/24/95

DESTINATION: Quanterra Lab
C.O.C. # 009564
SAMPLE # B0GRL0
TRANSPORTATION Government Vehicle
COOLER # SML-528
Date shipped 10/25/95

DESTINATION: 222-S
C.O.C. # 009574
SAMPLE # B0GRK1 N6068, B0GRK2 N6069
TRANSPORTATION Government Vehicle
COOLER # GWS-120
Date shipped 11/1/95

DESTINATION: EAL Lab
C.O.C. # 009572
SAMPLE # B0GRK1, B0GRK2 (Rad analysis)
TRANSPORTATION Government Vehicle
COOLER # GWS-120
Date shipped 11/3/95

DESTINATION: FAST Lab
C.O.C. # 009573
SAMPLE # B0GRK1 B0GRK2 (Metal analysis)
TRANSPORTATION Government Vehicle
COOLER # GWS-120
Date shipped 11/3/95

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PROJECT 183-H Basin D+D

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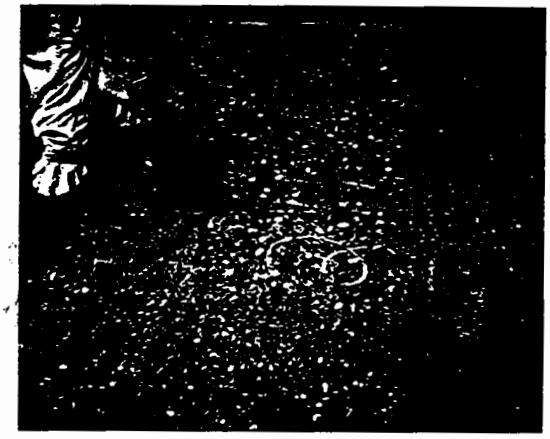
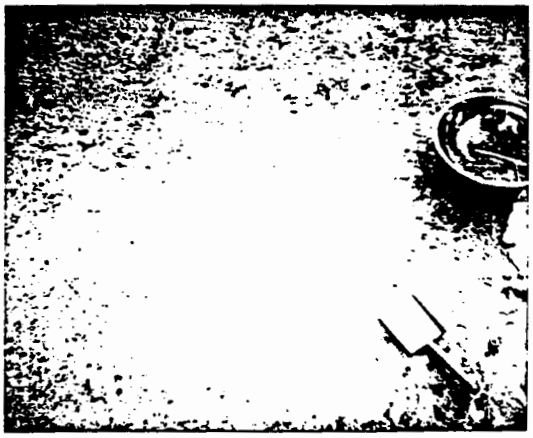
10-23-95 Sample B0GRK5
1320 Basin #3
KB Hulse



10-23-95 Sample B0GRK6
1305 Basin #3
KB Hulse

KBH 11-21-95

10-23-95 Sample B0GRK8
1050 Basin #2
KB Hulse



10-23-95 Sample B0GRK8 Basin #4
1440
KB Hulse

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QC SUMMARY

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Quality Control Summary

QC Test							
Matrix Spike	Sample ID	Analyte	Sample Result	Spiked Sample Result (SSR)	Spike Level	Recovery	Limit
	FT5124-10	Ag	0	79.76	200	39.88	75-125%
	FT5124-10	As	0	224	200	112.00	75-125%
	FT5124-10	Ba	101	264	200	81.50	75-125%
	FT5124-10	Cd	0	167.9	200	83.95	75-125%
	FT5124-10	Cr	20.1	182.7	200	81.30	75-125%
	FT5124-10	Pb	0	176.1	200	88.05	75-125%
	FT5124-10	Se	0	192.6	200	96.30	75-125%
	FT5124-08	Hg	0.020	0.095	0.100	75.00	75-125%
	Sample ID	Analyte	Found	Actual	%Recovery		
LCS							
	NIST 2710	Ag	25.23	35.3	71.47		80-120%
	NIST 2710	As	560	626	89.46		80-120%
	NIST 2710	Ba	281.3	707	39.79		80-120%
	NIST 2710	Cd	16.64	21.8	76.33		80-120%
	NIST 2710	Cr	14.62	39	37.49		80-120%
	NIST 2710	Pb	4669	5532	84.40		80-120%
	NIST 2710	Se	ND	Not given	NA		80-120%
	NIST 2710	Hg	28.2	32.6	86.50		80-120%
Calibration Checks							
	Sample ID	Analyte	Found	Actual	%Recovery		
ICV-1							
	Spex Spike 1	Ag	0.255	0.25	102		90-110%
	Spex Spike 1	As	10.3	10	103		90-110%
	Spex Spike 1	Ba	10.55	10	105.5		90-110%
	Spex Spike 1	Cd	0.264	0.25	105.6		90-110%
	Spex Spike 1	Cr	1.033	1	103.3		90-110%
	Spex Spike 1	Pb	2.605	2.5	104.2		90-110%
	Spex Spike 1	Se	10.47	10	104.7		90-110%
		Hg					

Quality Control Summary

CCV	Spex Spike 1	Ag	0.255	0.25	102		90-110%
	Spex Spike 1	As	10.3	10	103		90-110%
	Spex Spike 1	Ba	10.55	10	105.5		90-110%
	Spex Spike 1	Cd	0.264	0.25	105.6		90-110%
	Spex Spike 1	Cr	1.033	1	103.3		90-110%
	Spex Spike 1	Pb	2.605	2.5	104.2		90-110%
	Spex Spike 1	Se	10.47	10	104.7		90-110%
	Spex Spike 2	Hg	10.47	10	104.7		90-110%
Blanks							
	Initial Cal Blank	Ag	0.0016		Preparation Blank	Ag	0.38
	Initial Cal Blank	As	-0.0312		Preparation Blank	As	-0.19
	Initial Cal Blank	Ba	-0.0028		Preparation Blank	Ba	0.98
	Initial Cal Blank	Cd	-0.0003		Preparation Blank	Cd	0.28
	Initial Cal Blank	Cr	0.0013		Preparation Blank	Cr	-0.01
	Initial Cal Blank	Pb	-0.038		Preparation Blank	Pb	1.15
	Initial Cal Blank	Se	-0.0135		Preparation Blank	Se	2.54
	Initial Cal Blank	Hg	0.01		Preparation Blank	Hg	0.1
	Contin. Cal Blank	Ag	0.0016		Preparation Blank	Ag	.19
	Contin. Cal Blank	As	-0.0312		Preparation Blank	As	-2.5
	Contin. Cal Blank	Ba	-0.0028		Preparation Blank	Ba	0.7
	Contin. Cal Blank	Cd	-0.0003		Preparation Blank	Cd	0.8
	Contin. Cal Blank	Cr	0.0013		Preparation Blank	Cr	0.01
	Contin. Cal Blank	Pb	-0.038		Preparation Blank	Pb	0.03
	Contin. Cal Blank	Se	-0.0135		Preparation Blank	Se	0.14
	Contin. Cal Blank	Hg	NA		Preparation Blank	Hg	NA
	Initial Cal Blank	Ag	0.0002		Contin. Cal Blank	Ag	0.0031
	Initial Cal Blank	As	-0.0104		Contin. Cal Blank	As	0.0004
	Initial Cal Blank	Ba	-0.0009		Contin. Cal Blank	Ba	-0.001
	Initial Cal Blank	Cd	0.0001		Contin. Cal Blank	Cd	0.0002
	Initial Cal Blank	Cr	-0.0018		Contin. Cal Blank	Cr	0.0016
	Initial Cal Blank	Pb	-0.0028		Contin. Cal Blank	Pb	0.0014
	Initial Cal Blank	Se	0.0255		Contin. Cal Blank	Se	0.0204
	Initial Cal Blank	Hg	NA		Contin. Cal Blank	Hg	NA

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APPENDIX D

PERSONAL COMMUNICATION

This appendix contains communication regarding 183-H concrete sampling reports by Westinghouse Hanford Company. Answers correct and/or clarify details reported in Appendices A through C of this document.

Author: William S III Callaway at ~WHC121
Date: 6/20/96 12:45 PM
Priority: Normal
TO: Christopher D Kramer at ~WHC300
CC: Larry L Lockrem
CC: Donald J Smith
CC: Melanie L Myers
CC: William S III Callaway
Subject: Questions re 183-H Sample Analysis reporting
---------- Message Contents ----------

June 20, 1996

C. D. Kramer

I believe you may have received some somewhat confused responses to some of your questions regarding work done by SAS in support of the 183-H project. The following are accurate responses:

** The Cr-VI analyses were done by a 1,5-diphenylcarbohydrazide based colorimetric technique. The procedure is consistent with SW-846 7196A.

** The pH measurements were guided by SW-846 9045 "Soil pH". SW-846 9040 is also applicable but applies mainly to operation of pH meters.

** HASQAP represents the Hanford Analytical Services Quality Assurrance Plan (DOE/RL-94-55).

** ICP-AES Metals analyses for your samples:

S5060-01 through -06 (Collected 08/95)

were performed at WSCF. The ICP-AES analyses for your samples:

S5060-13 through -14 (Collected 08/95)
and
B0GRK0 through B0GRK9 (Collected 10/95)

were performed at the SAS facility.

** Contrary to what was implied in SAS95-231, Hg was analyzed for by Cold Vapor Atomic Absorption (SW-846 7471).

I am filling in for D. J. Smith while he is out on vacation and can usually be reached at 373-5703 should you have further questions. Sorry for the confusion.

W. S. Callaway
Special Analytical Studies

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APPENDIX E

222-S TOTAL ACTIVITY ANALYSES

This appendix contains reproductions of total activity reports issued by the Hanford Site 222-S Laboratory. All samples discussed in this report had an associated 222-S total activity analysis. Results were used in shipping and handling of samples. Results have been organized chronologically. (Readers may refer to the sample key in Section 2.0 of the main text for a complete list of sample identification numbers and associated 222-S sample numbers.)

```
SAMPLE STATUS REPORT FOR  N 5850. RAD SCREEN   S506001   TIME:  8/25/95   8:10
DISPATCHED:  8/25/95  12:50      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:    8/25/95  13:58

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                        N      Y    E61772

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5851. RAD SCREEN   S506002   TIME:  8/28/95   8:10
DISPATCHED:  8/25/95  12:50      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:    8/25/95  13:58

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                        N      Y    E61772

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5852. RAD SCREEN   S506003   TIME:  8/28/95   8:10
DISPATCHED:  8/25/95  12:50      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:    8/25/95  13:58

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                        N      Y    E61772

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5854. RAD SCREEN   S506004   TIME:  8/28/95   8:10
DISPATCHED:  8/25/95  12:50      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:    8/25/95  13:5B

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                        N      Y    E61772

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5855. RAD SCREEN   S506005   TIME:  8/28/95   8:10
DISPATCHED:  8/25/95  12:50      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:    8/25/95  13:58

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    E61772

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5856. RAD SCREEN   S506006   TIME:  8/28/95   8:10
DISPATCHED:  8/25/95  12:50      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:    8/25/95  13:58

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    E61772

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5937. RAD SCREEN   S5060-07  TIME:  9/15/95   7:48
DISPATCHED:  9/14/95  10: 9      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:    9/14/95  14:43

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    E61772

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5936. RAD SCREEN   S5060-08  TIME:  9/15/95   7:48
DISPATCHED:  9/14/95  10: 9      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:    9/14/95  14:42

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    E61772

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5985. RAD SCREEN   BOGNX2   TIME: 10/ 2/95   8:33
DISPATCHED:  9/29/95  13: 6      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:    9/29/95  16:50

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                        N      Y    X60051

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5986. RAD SCREEN   BOGNX3   TIME: 10/ 2/95   8:33
DISPATCHED:  9/29/95  13: 6      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:    9/29/95  16:50

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                        N      Y    X60051

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5987. RAD SCREEN   BOGNX4   TIME: 10/ 2/95   8:33
DISPATCHED:  9/29/95  13: 6      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:    9/29/95  16:50

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                        N      Y    X60051

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5988. RAD SCREEN   BOGNX5   TIME: 10/ 2/95   8:33
DISPATCHED:  9/29/95  13: 6      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:    9/29/95  16:50

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                        N      Y    X60051

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5989. RAD SCREEN   BOGNX6    TIME: 10/ 2/95   8:33
DISPATCHED:  9/29/95  13: 6      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:    9/29/95  16:50

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    X60051

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5990. RAD SCREEN   BOGNX7    TIME: 10/ 2/95   8:33
DISPATCHED:  9/29/95  13: 7      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:    9/29/95  16:50

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    X60051

          END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5991. RAD SCREEN   BOGNX8    TIME: 10/ 2/95   8:33
DISPATCHED:  9/29/95  13: 7      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:    9/29/95  16:50

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    X60051

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5992. RAD SCREEN   BOGNX9    TIME: 10/ 3/95 11: 8
DISPATCHED:  9/29/95  13: 7      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   10/ 2/95  16:15

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    X60051

          END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5993. RAD SCREEN   BOGNY0    TIME: 10/ 2/95   8:33
DISPATCHED:  9/29/95  13: 7      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:    9/29/95  16:50

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                        N      Y    X60051

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5994. RAD SCREEN   BOGNY1    TIME: 10/ 2/95  8:33
DISPATCHED:  9/29/95  13: 7      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:    9/29/95  16:50

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                        N      Y    X60051

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5995. RAD SCREEN   BOGNY2    TIME: 10/ 2/95  8:33
DISPATCHED:  9/29/95  13: 7      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:    9/29/95  16:50

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                        N      Y    X60051

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5996. RAD SCREEN   BOGNY3    TIME: 10/ 3/95  11: 8
DISPATCHED:  9/29/95  13: 7      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   10/ 2/95  16:15

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                        N      Y    X60051

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5997. RAD SCREEN   BOGNY4    TIME: 10/ 3/95  11: 8
DISPATCHED:  9/29/95  13: 7      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   10/ 2/95  16:15

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        *****  ***** ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    X60051

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5998. RAD SCREEN   BOGNY5    TIME: 10/ 3/95  11: 8
DISPATCHED:  9/29/95  13: 7      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   10/ 2/95  16:15

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        *****  ***** ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    X60051

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 5999. RAD SCREEN   BOGNY6    TIME: 10/ 3/95  11: 9
DISPATCHED:  9/29/95  13: 7      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   10/ 2/95  16:15

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        *****  ***** ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    X60051

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 6000. RAD SCREEN   BOGNY7    TIME: 10/ 3/95  11: 9
DISPATCHED:  9/29/95  13: 7      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   10/ 2/95  16:15

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        *****  ***** ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    X60051

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 6001  RAD SCREEN   B0GNY8    TIME: 10/ 3/95  11: 9
DISPATCHED:  9/29/95  13: 8      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   10/ 2/95  16:15

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************         ***   ***  ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N     Y   X60051

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 6002  RAD SCREEN   B0GNY9    TIME: 10/ 3/95  11: 9
DISPATCHED:  9/29/95  13: 8      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   10/ 2/95  16:15

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************         ***   ***  ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N     Y   X60051

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 6003  RAD SCREEN   B0GNZ0    TIME: 10/ 4/95  8:14
DISPATCHED:  9/29/95  13: 8      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   10/ 3/95  12:20

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************         ***   ***  ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N     Y   X60051

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 6004  RAD SCREEN   B0GNZ1    TIME: 10/ 4/95  8:14
DISPATCHED:  9/29/95  13: 8      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   10/ 3/95  12:20

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************         ***   ***  ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N     Y   X60051

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 6005. RAD SCREEN   BOGNZ2    TIME: 10/ 4/95  8:14
DISPATCHED:  9/29/95  13: 8      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   10/ 3/95  12:20

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        *****  ***** ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    X60051

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 6026. RAD SCREEN   BOGTS1    TIME: 10/ 9/95  7:52
DISPATCHED: 10/ 6/95  13:41      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   10/ 7/95   6:22

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        *****  ***** ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    X60051

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 6067. RAD SCREEN   BOGRK0   TIME:  8/25/95   8:10
DISPATCHED: 10/24/95   8:18      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   10/24/95  13:35

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        *****  ***** ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    PV5AA

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 6070. RAD SCREEN   BOGRK3   TIME: 10/25/95   8:22
DISPATCHED: 10/24/95   8:18      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   10/24/95  13:35

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        *****  ***** ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    PV5AA

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 6071. RAD SCREEN   BOGRK4    TIME: 10/25/95   8:22
DISPATCHED: 10/24/95   8:18      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   10/24/95  13:35

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    PV5AA

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 6072. RAD SCREEN   BOGRK5    TIME: 10/25/95   8:22
DISPATCHED: 10/24/95   8:18      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   10/24/95  13:35

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    PV5AA

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 6073. RAD SCREEN   BOGRK6    TIME: 10/25/95   8:22
DISPATCHED: 10/24/95   8:18      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   10/24/95  13:35

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    PV5AA

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 6074. RAD SCREEN   BOGRK7    TIME: 10/25/95   8:22
DISPATCHED: 10/24/95   8:18      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   10/24/95  13:35

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    PV5AA

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 6075. RAD SCREEN   BOGRK8    TIME: 10/25/95   8:22
DISPATCHED: 10/24/95   8:18      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   10/24/95  13:35

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    PV5AA

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 6068. RAD SCREEN   BOGRK1   TIME: 11/ 3/95   8: 5
DISPATCHED: 10/24/95   8:18      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   11/ 1/95  15: 0

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    PV5AA

         END OF REPORT
```

```
SAMPLE STATUS REPORT FOR  N 6069. RAD SCREEN   BOGRK2    TIME: 11/ 3/95   8: 5
DISPATCHED: 10/24/95   8:18      SAMPLE HAS NOT BEEN SLURPED
RECEIVED:   11/ 1/95  15: 0

                                                          OUT OF GOOD CHARGE
EXT.  DETER.    RESULTS OR STATUS                         RANGE? ANS?  CODE
****  ********  **********************************        ***    ***   ******
4271  TOT-ACT   < 5.00000E 01 pCi/G                         N      Y    PV5AA

         END OF REPORT
```

APPENDIX F

ENVIRONMENTAL ANALYTICAL LABORATORY RADIOLOGICAL RESULTS

Results of samples delivered to the Environmental Analytical Laboratory (EAL) were reported to project personnel through two memorandums. This appendix contains information reported by the EAL.

APPENDIX F -- CONTENTS

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Environmental Restoration Contractor **ERC Team**

Interoffice Memorandum

021849
Job No. 22192
Written Response Required? NO
Closes CCN: N/A
OU: N/A
TSD: N/A
ERA: N/A
Subject Code: 8600

TO: Dave Encke, X5-53 DATE: October 05, 1995

COPIES: Document Control H4-79, w/a
Project File H4-79, w/a

FROM: Dennis R. Jordan
Analytical Services
X2-10/372-2058

SUBJECT: SAMPLE ANALYSIS

The Environmental Analytical Laboratory (EAL) received samples S5060-01 through S5060-08 from 183-H Basin on August 28, 1995. They were assigned EAL identification numbers EAL00684-EAL00689 and EAL00818-EAL00819.

Please see attached results. If further infromation is needed please call Al Davis 373-9731.

AID:ksb

Attachment: results

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021849

To: D. Encke

From: A. I. Davis

Subject: Sample Set S-5060 Technetium Evaluation

Date: 4 October, 1995

Analysis was completed for beta emitters not identified with gamma emitters found in the gamma scan of the samples. The results are as follows:

Sample 5060-01:

Beta total	270	pCi/g	Alpha total	2.9	pCi/g
^{40}K	22	pCi/g	Calculated beta component from		
Residual beta	248	pCi/g	alpha	9	pCi/g
Nat. beta	9	pCi/g			
Assigned ^{99}Tc	239	pCi/g			

Sample 5060-02:

Beta total	27	pCi/g	Alpha total	3.3	pCi/g
^{40}K	23	pCi/g	Calculated beta component from		
Residual beta	4	pCi/g	alpha	11	pCi/g
Nat. beta	11	pCi/g			
Unassigned	- 7	pCi/g			

Sample 5060-03:

Beta total	33	pCi/g	Alpha total	8.8	pCi/g
^{40}K	31	pCi/g	Calculated beta component from		
Residual beta	2	pCi/g	alpha	29	pCi/g
Nat. beta	29	pCi/g			
Unassigned	-27	pCi/g			

Sample 5060-04:

Beta total	9	pCi/g	Alpha total	12	pCi/g
^{40}K	21	pCi/g	Calculated beta component from		
Residual beta	-12	pCi/g	alpha	39	pCi/g
Nat. beta	39	pCi/g			
Unassigned	-51	pCi/g			

021849

Sample 5060-05:					
Beta total	36	pCi/g	Alpha total	3.8	pCi/g
^{40}K	21	pCi/g	Calculated beta component from		
Residual beta	17	pCi/g	alpha	12	pCi/g
Nat. beta	12	pCi/g			
Unassigned	5	pCi/g			
Sample 5060-06:					
Beta total	98	pCi/g	Alpha total	19	pCi/g
^{40}K	28	pCi/g	Calculated beta component from		
Residual beta	70	pCi/g	alpha	62	pCi/g
Nat. beta	62	pCi/g			
Unassigned	8	pCi/g			
Sample 5060-07:					
Beta total	86	pCi/g	Alpha total	15	pCi/g
^{40}K	27	pCi/g	Calculated beta component from		
Residual beta	59	pCi/g	alpha	49	pCi/g
Nat. beta	49	pCi/g			
Unassigned	10	pCi/g			
Sample 5060-08:					
Beta total	120	pCi/g	Alpha total	12	pCi/g
^{40}K	21	pCi/g	Calculated beta component from		
Residual beta	99	pCi/g	alpha	39	pCi/g
Nat. beta	39	pCi/g			
Assigned ^{99}Tc	60	pCi/g			

I used the alpha activity to calculate the expected bets activity due to the natural decay chain components with the assumption that the material had no treatment to alter the equilibrium decay chain. Only two samples had any activity sufficient to assign to ^{99}Tc, numbers 1 and 8. If you have any questions, please call. Thank you.

021849

GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: S5060-01
EAL ID Number: EAL00684

Isotope		Activity, pCi/g on 28 August, 1995		
K40		2.2e+01	+/-	2.9e+00
Co60	<	7.8e-01		
Cs137	<	4.1e-01		
Th32dau	<	1.3e+00		
U235	<	2.8e+00		
U238	<	4.1e+01		
U238dau	<	8.7e-01		

Definitions:

All errors reported at 2 standard deviations

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. Equillibrium between parent and daughter products probably does not exist

Th32dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products products of Th232. Equillibrium between parent and daughter products may not exist

Albert I. Davis 09-18-95
Rad Ctg Mgr

Dennis R. Jordan 9/18/95
EAL Manager
Date

021849

GROSS RADIONUCLIDE SCREENING SAMPLE ANALYSIS REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

		SOILS	
Customer ID:	S 5060-01	Pass screen	( )
EAL ID:	EAL00684	Fail screen	(X)
		Other's at 50 pCi limit	
		Pass screen	( )
		Fail screen	(X)

2.7E+02	Calculated Beta Total Activity (pCi/g)
2.9E+00	Calculated Alpha Total Activity (pCi/g)
2.7E+02	Calculated total activity pCi/g
1.2E+01	Calculated total activity error
1.7E+01	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.

Albert I. Davis
Rad Ctg Mgr

03-Oct-95

Dennis R. Jordan
Manager

10-05-95
Date

021849

GROSS RADIONUCLIDE SCREENING SAMPLE ANALYSIS REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

		SOILS	
Customer ID:	S 5060-02	Pass screen	(X)
EAL ID:	EAL00685	Fail screen	( )
		Other's at 50 pCi limit	
		Pass screen	( )
		Fail screen	(X)

2.7E+01	Calculated Beta Total Activity (pCi/g)
3.3E+00	Calculated Alpha Total Activity (pCi/g)
3.0E+01	Calculated total activity pCi/g
5.8E+00	Calculated total activity error
1.2E+01	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.

Albert I. Davis
Rad Ctg Mgr

03-Oct-95

DR Jordan 10-05-95

Dennis R. Jordan
Manager

Date

021849

GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: S5060-02
EAL ID Number: EAL00685

Isotope		Activity, pCi/g on 12 September, 1995		
K40		2.3e+01	+/-	2.2e+00
Co60	<	6.4e-01		
Cs137	<	1.4e-01		
Th32dau		1.8e+00	+/-	4.3e-01
U235	<	1.3e+00		
U238	<	2.1e+01		
U238dau		1.1e+00	+/-	3.6e-01

Definitions:

All errors reported at 2 standard deviations

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. Equillibrium between parent and daughter products probably does not exist

Th32dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products products of Th232. Equillibrium between parent and daughter products may not exist

Albert I. Davis 09-18-95
Albert I. Davis
Rad Ctg Mgr

Dennis R. Jordan 9/18/95
Dennis R. Jordan
EAL Manager
Date

021849

GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: S5060-03
EAL ID Number: EAL00686

Isotope		Activity, pCi/g on 12 September, 1995		
K40		3.1e+01	+/-	5.8e+00
Co60	<	1.8e+00		
Cs137	<	8.3e-01		
Th32dau	<	2.5e+00		
U235	<	4.4e+00		
U238	<	7.8e+01		
U238dau	<	1.9e+00		

Definitions:

All errors reported at 2 standard deviations

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. Equillibrium between parent and daughter products probably does not exist

Th32dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products products of Th232. Equillibrium between parent and daughter products may not exist

Albert I. Davis 09-18-95
Albert I. Davis
Rad Ctg Mgr

Dennis R. Jordan 9/18/95
Dennis R. Jordan
EAL Manager
Date

021849

GROSS RADIONUCLIDE SCREENING SAMPLE ANALYSIS REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID: S 5060-03
EAL ID: EAL00686

SOILS
Pass screen (X)
Fail screen ( )

Other's at 50 pCi limit
Pass screen ( )
Fail screen (X)

3.3E+01	Calculated Beta Total Activity (pCi/g)
8.8E+00	Calculated Alpha Total Activity (pCi/g)
4.2E+01	Calculated total activity pCi/g
6.1E+00	Calculated total activity error
1.2E+01	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.

Albert I. Davis
Rad Ctg Mgr

03-Oct-95

DR Jordan 10-05-95
Dennis R. Jordan
Manager

Date

021849

GROSS RADIONUCLIDE SCREENING SAMPLE ANALYSIS REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

		SOILS	
Customer ID:	S 5060-04	Pass screen	(X)
EAL ID:	EAL00687	Fail screen	( )
		Other's at 50 pCi limit	
		Pass screen	( )
		Fail screen	(X)

9.1E+00	Calculated Beta Total Activity (pCi/g)
1.2E+01	Calculated Alpha Total Activity (pCi/g)
2.2E+01	Calculated total activity pCi/g
1.3E+01	Calculated total activity error
4.3E+01	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.

Albert I. Davis — Rad Ctg Mgr — 03-Oct-95

D R Jordan — 10-05-95

Dennis R. Jordan — Manager — Date

021849

GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: S5060-04
EAL ID Number: EAL00687

Isotope		Activity, pCi/g on 13 September, 1995		
K40		2.1e+01	+/-	1.9e+00
Co60	<	7.0e-01		
Cs137	<	2.3e-01		
Th32dau		2.1e+00	+/-	3.8e-01
U235	<	1.1e+00		
U238	<	2.0e+01		
U238dau		1.7e+00	+/-	3.3e-01

Definitions:

All errors reported at 2 standard deviations

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

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

Albert I. Davis
Rad Ctg Mgr

09-18-95

Dennis R. Jordan
EAL Manager

9/18/95
Date

021849

GROSS RADIONUCLIDE SCREENING SAMPLE ANALYSIS REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

		SOILS	
Customer ID:	S 5060-05	Pass screen	(X)
EAL ID:	EAL00688	Fail screen	( )
		Other's at 50 pCi limit	
		Pass screen	( )
		Fail screen	(X)

3.4E+01	Calculated Beta Total Activity (pCi/g)
3.8E+00	Calculated Alpha Total Activity (pCi/g)
3.8E+01	Calculated total activity pCi/g
1.1E+01	Calculated total activity error
1.7E+01	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.

Albert I. Davis — 03-Oct-95
Rad Ctg Mgr

Dennis R. Jordan — 10-05-95 — Date
Manager

021849

GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: S5060-05
EAL ID Number: EAL00688

Isotope		Activity, pCi/g on 14 September, 1995		
K40		2.1e+01	+/-	2.1e+00
Co60	<	6.2e-01		
Cs137		2.9e-01	+/-	1.4e-01
Th32dau		2.0e+00	+/-	5.8e-01
U235	<	1.7e+00		
U238	<	2.4e+01		
U238dau	<	8.6e-01		

Definitions:

All errors reported at 2 standard deviations

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. Equillibrium between parent and daughter products probably does not exist

Th32dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products products of Th232. Equillibrium between parent and daughter products may not exist

Albert I. Davis
Rad Ctg Mgr

09-18-95

Dennis R. Jordan
EAL Manager

9/20/95
Date

021849

GROSS RADIONUCLIDE SCREENING SAMPLE ANALYSIS REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

		SOILS	
Customer ID:	S 5060-06	Pass screen	( )
EAL ID:	EAL00689	Fail screen	(X)
		Other's at 50 pCi limit	
		Pass screen	( )
		Fail screen	(X)

9.8E+01	Calculated Beta Total Activity (pCi/g)
1.9E+01	Calculated Alpha Total Activity (pCi/g)
1.2E+02	Calculated total activity pCi/g
1.5E+01	Calculated total activity error
2.4E+01	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 Henford soil, tritium, and Carbon-14 are not included in the screening meesurement.

Albert I. Davis
Rad Ctg Mgr

03-Oct-95

Dennis R. Jordan
Manager

10-05-95
Date

021849

GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: S5060-06
EAL ID Number: EAL00689

Isotope		Activity, pCi/g on 14 September, 1995		
K40		2.8e+01	+/-	2.2e+00
Co60	<	4.9e-01		
Cs137	<	8.7e-02		
Th32dau		2.3e+00	+/-	2.6e-01
U235		8.3e-01	+/-	1.4e-01
U238	<	1.8e+01		
U238dau		2.0e+00	+/-	2.1e-01

Definitions:

All errors reported at 2 standard deviations

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

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

Albert I. Davis 09-18-95
Albert I. Davis
Rad Ctg Mgr

Dennis R. Jordan 9/18/95
Dennis R. Jordan Date
EAL Manager

GROSS RADIONUCLIDE SCREENING SAMPLE ANALYSIS REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

		SOILS	
Customer ID:	S 5060-07	Pass screen	(X)
EAL ID:	EAL00818	Fail screen	( )
		Other's at 50 pCi limit	
		Pass screen	( )
		Fail screen	(X)

8.6E+01	Calculated Beta Total Activity (pCi/g)
1.5E+01	Calculated Alpha Total Activity (pCi/g)
1.0E+02	Calculated total activity pCi/g
1.7E+01	Calculated total activity error
4.5E+01	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.

Albert I. Davis
Rad Ctg Mgr

04-Oct-95

Dennis R. Jordan
Manager

10-05-95
Date

021849

GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: S5060-07
EAL ID Number: EAL00818

Isotope		Activity, pCi/g on 16 September, 1995		
K40		2.7e+01	+/-	2.6e+00
Co60	<	5.5e-01		
Cs137	<	1.8e-01		
Th32dau		2.4e+00	+/-	4.7e-01
U235	<	1.5e+00		
U238	<	2.1e+01		
U238dau		2.0e+00	+/-	4.6e-01

Definitions:

All errors reported at 2 standard deviations

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. Equillibrium between parent and daughter products probably does not exist

Th32dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products products of Th232. Equillibrium between parent and daughter products may not exist

Albert I. Davis
Rad Ctg Mgr

09-18-95

Dennis R. Jordan
EAL Manager

9/18/95
Date

GROSS RADIONUCLIDE SCREENING SAMPLE ANALYSIS REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

		SOILS	
Customer ID:	S 5060-08	Pass screen	(X)
EAL ID:	EAL00819	Fail screen	( )
		Other's at 50 pCi limit	
		Pass screen	( )
		Fail screen	(X)

1.2E+02	Calculated Beta Total Activity (pCi/g)
1.2E+01	Calculated Alpha Total Activity (pCi/g)
1.3E+02	Calculated total activity pCi/g
1.5E+01	Calculated total activity error
3.7E+01	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.

Albert I. Davis — 04-Oct-95
Rad Ctg Mgr

D R Jordan 10-05-95
Dennis R. Jordan — Date
Manager

021849

GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: S5060-08
EAL ID Number: EAL00819

Isotope		Activity, pCi/g on 16 September, 1995		
K40		2.1e+01	+/-	2.1e+00
Co60	<	5.8e-01		
Cs137		2.6e-01	+/-	1.2e-01
Th32dau		2.0e+00	+/-	4.6e-01
U235	<	1.6e+00		
U238	<	2.2e+01		
U238dau		2.1e+00	+/-	4.6e-01

Definitions:

All errors reported at 2 standard deviations

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

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

Albert I. Davis 09-18-95
Albert I. Davis
Rad Ctg Mgr

Dennis R. Jordan 9/18/95
Dennis R. Jordan Date
EAL Manager

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Environmental Restoration Contractor **ERC Team**

Interoffice Memorandum

Job No. 22192
Written Response Required? NO
Closes CCN: N/A
OU: N/A
TSD: N/A
ERA: N/A
Subject Code: 8600

To: Dave Encke
BHI D&D
X5-53/373-3461

DATE: 18 December, 1995

COPIES: M. David, B1-35
Document Control, H4-79, w/a
Project File, H4-79, w/a

FROM: Jeff A. Lerch Rob McCall for JAL
Sample Management
X2-10/372-9535

JAN 1996
Received
D.B. Encke

SUBJECT: Concrete analysis for 183-H

Attachment: Sample Results

Eight Concrete samples were analyzed for radioactive components with the following results:

Sample **B0GRK0**, EAL01216.	pCi/gm	Comments
Gamma Analysis	2.7	Seems low, normal is 10 for ^{40}K.
Strontium-90	<7.4	
Gross Beta analysis	22.6	
Beta from decay chains (naturals)	9.3	
Residual assigned to ^{99}Tc	10.6	
Gross Alpha	1.6	
Alpha Energy Analysis	10.1	No discernable peaks

Sample **B0GRK3**, EAL01217.	pCi/gm	Comments
Gamma Analysis	13.2	
Strontium-90	<6.6	
Gross Beta analysis	61.3	
Beta from decay chains (naturals)	7.2	
Residual assigned to ^{99}Tc	40.9	
Gross Alpha	4.8	
Alpha Energy Analysis	9.3	No discernable peaks

Sample **B0GRK4**, EAL01218.	pCi/gm	Comments

Gamma Analysis	13.0	
Strontium-90	<9.1	
Gross Beta analysis	195	
Beta from decay chains (naturals)	11.8	
Residual assigned to ^{99}Tc	83.2	
Gross Alpha	28.5	
Alpha Energy Analysis	15.2	No discernable peaks

Sample **B0GRK5**, EAL01219.	pCi/gm	Comments
Gamma Analysis	13	
Strontium-90	8.8	
Gross Beta analysis	195	
Beta from decay chains (naturals)	18.1	
Residual assigned to ^{99}Tc	155	
Gross Alpha	7.8	
Alpha Energy Analysis	23.4	Small ^{235}U

Sample **B0GRK6**, EAL01220.	pCi/gm	Comments
Gamma Analysis	10	
Strontium-90	4.6 ± 0.50	
Gross Beta analysis	143	
Beta from decay chains (naturals)	9.9	
Residual assigned to ^{99}Tc	118	
Gross Alpha	3.7	
Alpha Energy Analysis	12.8	No discernable peaks

Sample **B0GRK7**, EAL01221.	pCi/gm	Comments
Gamma Analysis	11.1	
Strontium-90	<7.5	
Gross Beta analysis	137	
Beta from decay chains (naturals)	8.8	
Residual assigned to ^{99}Tc	117	
Gross Alpha	11.9	
Alpha Energy Analysis	11.4	No discernable peaks

Sample **B0GRK8**, EAL01222.	pCi/gm	Comments

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Gamma Analysis	12.1	
Strontium-90	<8.8	
Gross Beta analysis	47.9	
Beta from decay chains (naturals)	7.7	
Residual assigned to ^{99}Tc	28.1	
Gross Alpha	16.5	
Alpha Energy Analysis	9.9	Small ^{228}Th peak

Sample **B0GRK9**, EAL01223.	pCi/gm	Comments
Gamma Analysis	11.	
Strontium-90	<12.7	
Gross Beta analysis	110	
Beta from decay chains (naturals)	8.7	
Residual assigned to ^{99}Tc	90.3	
Gross Alpha	12.1	
Alpha Energy Analysis	11.2	No discernable peaks

The one to two gram samples for the gross alpha and beta were 10 gram splits from the original sample. The alpha sample was a 0.5 gram split from the same source used for the gross analysis. The ^{90}Sr activity was based on the ^{90}Y that is in equilibrium with the Strontium.

The determination for the beta activity from the natural decay chain was made from the AEA analysis, the alpha analysis has less interference and better sensitivity. Alpha counts were observed, but the spectrum did not display any statistically significant alpha peaks.

If there are any questions, please call Al Davis at 373-9731, thank you.

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GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: B0GRK0 183-H Basin
EAL ID Number: EAL01216

Isotope		Activity, pCi/g on 1 November, 1995		
K40		2.7e+00	+/-	7.9e-01
Co60	<	1.9e-01		
Sb125	<	2.3e-01		
Cs134	<	1.4e+01		
Cs137	<	1.1e-01		
Ce144	<	4.5e-01		
Eu152	<	5.7e-01		
Eu154	<	3.4e-01		
Eu155	<	2.9e-01		
Th32dau	<	3.6e-01		
U235	<	1.0e-01		
U238	<	1.2e+01		
U238dau	<	1.6e-01		
Am241	<	3.7e-01		

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. Equillibrium 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. Equillibrium 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

Albert I. Davis 11-22-95
Radiological Manager Date

025807

GROSS RADIONUCLIDE SCREENING SAMPLE ANALYSIS REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

		SOILS	
Customer ID:	B0GRK0	Pass screen	(X)
EAL ID:	EAL01216	Fail screen	( )
	Concrete Sample		
		Other's at 50 pCi limit	
		Pass screen	( )
		Fail screen	(X)

2.26E+01	Calculated Beta Total Activity (pCi/g)
1.64E+00	Calculated Alpha Total Activity (pCi/g)
2.42E+01	Calculated total activity pCi/g
9.83E+00	Calculated total activity error
2.80E+01	Calculated total activity MDA

Screen sample based on (x) 99-Tc or ( ) 90-Sr for beta activity.

<7.4 90-Sr pCi/g sample

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.

L E Matthews by AKD	11-6-95	Albert I. Davis	12-06-95
Radiological Analyst	Date	Albert I. Davis Radiological Manager	Date

025807

GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT
Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: B0GRK3 183-H Basin
EAL ID Number: EAL01217

Isotope		Activity, pCi/g on 1 November, 1995		
K40		1.3e+01	+/-	1.6e+00
Co60	<	2.2e-01		
Sb125	<	2.5e-01		
Cs134	<	1.3e-01		
Cs137		1.8e-01	+/-	6.3e-02
Ce144	<	5.9e-01		
Eu152	<	6.3e-01		
Eu154	<	4.0e-01		
Eu155	<	3.4e-01		
Th32dau		5.9e-01	+/-	1.9e-01
U235		3.5e-01	+/-	9.6e-02
U238	<	1.4e+01		
U238dau		3.6e-01	+/-	1.4e-01
Am241	<	4.5e-01		

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. Equillibrium 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. Equillibrium 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 11-1-95

Albert I. Davis, Radiological Manager — Date 11-22-95

025807

GROSS RADIONUCLIDE SCREENING SAMPLE ANALYSIS REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

		SOILS	
Customer ID:	B0GRK3	Pass screen	(X)
EAL ID:	EAL01217	Fail screen	( )
	Concrete Sample		
		Other's at 50 pCi limit	
		Pass screen	( )
		Fail screen	(X)

6.13E+01	Calculated Beta Total Activity (pCi/g)
4.67E+00	Calculated Alpha Total Activity (pCi/g)
6.60E+01	Calculated total activity pCi/g
9.04E+00	Calculated total activity error
2.12E+01	Calculated total activity MDA

Screen sample based on (x) 99-Tc or ( ) 90-Sr for beta activity.

<6.6 90-Sr pCi/g sample

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	11-6-95 Date	Albert I. Davis Radiological Manager	12-06-95 Date

025807

GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT
Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: B0GRK4 183-H Basin
EAL ID Number: EAL01218

Isotope		Activity, pCi/g on 1 November, 1995		
K40		1.3e+01	+/-	1.5e+00
Co60	<	2.2e-01		
Sb125	<	2.0e-01		
Cs134	<	1.2e-01		
Cs137	<	1.0e-01		
Ce144	<	5.1e-01		
Eu152	<	4.9e-01		
Eu154	<	3.3e-01		
Eu155	<	2.9e-01		
Th32dau		5.7e-01	+/-	1.8e-01
U235		1.7e-01	+/-	7.9e-02
U238	<	1.3e+01		
U238dau		3.2e-01	+/-	1.3e-01
Am241	<	4.0e-01		

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. Equillibrium 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. Equillibrium 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

Albert I. Davis
Radiological Manager
11-22-95
Date

GROSS RADIONUCLIDE SCREENING SAMPLE ANALYSIS REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

		SOILS	
Customer ID:	B0GRK4	Pass screen	( )
EAL ID:	EAL01218	Fail screen	(X)
	Concrete Sample		
		Other's at 50 pCi limit	
		Pass screen	( )
		Fail screen	(X)

1.08E+02	Calculated Beta Total Activity (pCi/g)
1.94E+01	Calculated Alpha Total Activity (pCi/g)
1.27E+02	Calculated total activity pCi/g
2.85E+01	Calculated total activity error
6.19E+01	Calculated total activity MDA

Screen sample based on (x) 99-Tc or ( ) 90-Sr for beta activity.

<9.1 90-Sr pCi/g sample

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.

L E Matthews & Old
Radiological Analyst

11-6-95
Date

Albert I. Davis
Radiological Manager

12-06-95
Date

025807

GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT
Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: B0GRK5 183-H Basin
EAL ID Number: EAL01219

Isotope		Activity, pCi/g on 1 November, 1995		
K40		1.3e+01	+/-	1.5e+00
Co60	<	2.1e-01		
Sb125	<	2.6e-01		
Cs134	<	1.2e-01		
Cs137		2.9e-01	+/-	8.4e-02
Ce144	<	6.1e-01		
Eu152	<	5.1e-01		
Eu154	<	3.1e-01		
Eu155	<	3.6e-01		
Th32dau	<	3.3e-01		
U235		4.4e-01	+/-	9.6e-02
U238	<	1.4e+01		
U238dau		3.1e-01	+/-	1.4e-02
Am241	<	4.3e-01		

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. Equillibrium 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. Equillibrium 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

Albert I. Davis 11-22-95
Radiological Manager Date

025807

GROSS RADIONUCLIDE SCREENING SAMPLE ANALYSIS REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

		SOILS	
Customer ID:	B0GRK4	Pass screen	( )
EAL ID:	EAL01219	Fail screen	(X)
	Concrete Sample		
		Other's at 50 pCi limit	
		Pass screen	( )
		Fail screen	(X)

1.95E+02	Calculated Beta Total Activity (pCi/g)
7.75E+00	Calculated Alpha Total Activity (pCi/g)
2.03E+02	Calculated total activity pCi/g
1.40E+01	Calculated total activity error
2.10E+01	Calculated total activity MDA
	Screen sample based on (x) 99-Tc or ( ) 90-Sr for beta activity.
8.80E+00	90-Sr pCi/g sample

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.

S E Matthews by ORD — Radiological Analyst
11-6-95 — Date
Albert I. Davis — Radiological Manager
12-06-95 — Date

025807

GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: B0GRK6 183-H Basin
EAL ID Number: EAL01220

Isotope		Activity, pCi/g on 2 November, 1995		
K40		1.0e+01	+/-	1.3e+00
Co60	<	1.3e+00		
Sb125	<	2.8e-01		
Cs134	<	1.4e-01		
Cs137	<	1.2e-01		
Ce144	<	6.2e-01		
Eu152	<	3.0e-01		
Eu154	<	3.8e-01		
Eu155	<	3.4e-01		
Th32dau	<	4.4e-01		
U235	<	6.7e-01		
U238	<	1.5e+01		
U238dau		3.6e-01	+/-	1.4e-01
Am241	<	4.1e-01		

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. Equillibrium 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. Equillibrium 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

Albert I. Davis
Radiological Manager — 11-22-95 Date

025807

GROSS RADIONUCLIDE SCREENING SAMPLE ANALYSIS REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

		SOILS	
Customer ID:	B0GRK6	Pass screen	(X)
EAL ID:	EAL01220	Fail screen	( )
	Concrete Sample		
		Other's at 50 pCi limit	
		Pass screen	( )
		Fail screen	(X)

1.43E+02	Calculated Beta Total Activity (pCi/g)
3.68E+00	Calculated Alpha Total Activity (pCi/g)
1.47E+02	Calculated total activity pCi/g
2.69E+01	Calculated total activity error
5.09E+01	Calculated total activity MDA
	Screen sample based on (x) 99-Tc or ( ) 90-Sr for beta activity.
4.60E+00	90-Sr pCi/g sample

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.

L. J. Matthews by [illegible]	11-6-95	Albert I. Davis	12-06-95
Radiological Analyst	Date	Albert I. Davis Radiological Manager	Date

025807

GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT
Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: B0GRK7 183-H Basin
EAL ID Number: EAL01221

Isotope		Activity, pCi/g on 2 November, 1995		
K40		1.1e+01	+/-	1.4e-01
Co60	<	2.1e-01		
Sb125	<	2.5e-01		
Cs134	<	1.2e-01		
Cs137		1.1e-01	+/-	5.0e-02
Ce144	<	5.3e-01		
Eu152	<	6.0e-01		
Eu154	<	3.3e-01		
Eu155	<	3.1e-01		
Th32dau	<	3.2e-01		
U235	<	5.6e-01		
U238	<	1.3e+01		
U238dau		3.5e-01	+/-	1.3e-01
Am241	<	3.6e-01		

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. Equillibrium 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. Equillibrium 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

Albert I. Davis 11-22-95
Radiological Manager Date

025807

GROSS RADIONUCLIDE SCREENING SAMPLE ANALYSIS REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

		SOILS	
Customer ID:	B0GRK7	Pass screen	(X)
EAL ID:	EAL01221	Fail screen	( )
	Concrete Sample		
		Other's at 50 pCi limit	
		Pass screen	( )
		Fail screen	(X)

1.37E+02	Calculated Beta Total Activity (pCi/g)
1.19E+01	Calculated Alpha Total Activity (pCi/g)
1.48E+02	Calculated total activity pCi/g
2.74E+01	Calculated total activity error
5.30E+01	Calculated total activity MDA

Screen sample based on (x) 99-Tc or ( ) 90-Sr for beta activity.

<7.5 90-Sr pCi/g sample

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 redionuclides common to Hanford soil, tritium, and Carbon-14 are not included in the screening measurement.

L. J. Matthews by ans — Radiological Analyst

11-6-95 — Date

Albert I. Davis — Radiological Manager

12-06-95 — Date

025807

GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: B0GRK8 183-H Basin
EAL ID Number: EAL01222

Isotope		Activity, pCi/g on 2 November, 1995		
K40		1.2e+01	+/-	1.4e+00
Co60	<	1.8e-01		
Sb125	<	2.5e-01		
Cs134	<	1.2e-01		
Cs137	<	1.1e-01		
Ce144	<	5.1e-01		
Eu152	<	5.4e-01		
Eu154	<	3.7e-01		
Eu155	<	3.3e-01		
Th32dau		3.9e-01	+/-	1.5e-01
U235		1.8e-01	+/-	8.4e-02
U238	<	1.2e+01		
U238dau		4.2e-01	+/-	1.3e-01
Am241	<	3.6e-01		

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. Equillibrium 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. Equillibrium 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

Albert I. Davis 11-22-95
Radiological Manager Date

025807

GROSS RADIONUCLIDE SCREENING SAMPLE ANALYSIS REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

		SOILS	
Customer ID:	B0GRK8	Pass screen	( )
EAL ID:	EAL01222	Fail screen	(X)
	Concrete Sample		
		Other's at 50 pCi limit	
		Pass screen	( )
		Fail screen	(X)

4.79E+01	Calculated Beta Total Activity (pCi/g)
1.65E+01	Calculated Alpha Total Activity (pCi/g)
6.44E+01	Calculated total activity pCi/g
1.19E+01	Calculated total activity error
2.96E+01	Calculated total activity MDA

Screen sample based on (x) 99-Tc or ( ) 90-Sr for beta activity.

<8.8 90-Sr pCi/g sample

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.

L E Matthews by OBL
Radiological Analyst

11-6-95
Date

Albert L Davis
Albert I. Davis
Radiological Manager

12-06-95
Date

025807

GAMMA-RAY ENERGY ANALYSIS SCREENING REPORT
Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

Customer ID Number: B0GRK9 183-H Basin
EAL ID Number: EAL01223

Isotope		Activity, pCi/g on 2 November, 1995		
K40		1.1e+01	+/-	1.4e+00
Co60	<	2.2e-01		
Sb125	<	2.3e-01		
Cs134	<	1.1e-01		
Cs137	<	1.1e-01		
Ce144	<	5.9e-01		
Eu152	<	6.0e-01		
Eu154	<	3.4e-01		
Eu155	<	3.0e-01		
Th32dau		3.2e-01	+/-	1.4e-01
U235		2.3e-01	+/-	8.5e-02
U238	<	1.1e+01		
U238dau		3.8e-01	+/-	1.3e-01
Am241	<	4.0e-01		

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. Equillibrium 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. Equillibrium 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

Albert I. Davis 11-22-95
Radiological Manager Date

025867

GROSS RADIONUCLIDE SCREENING SAMPLE ANALYSIS REPORT

Radiometric Laboratory
Environmental Analytical Laboratory
IT Hanford Co.

		SOILS	
Customer ID:	B0GRK9	Pass screen	(X)
EAL ID:	EAL01223	Fail screen	( )
	Concrete Sample		
		Other's at 50 pCi limit	
		Pass screen	( )
		Fail screen	(X)

1.10E+02	Calculated Beta Total Activity (pCi/g)
1.21E+01	Calculated Alpha Total Activity (pCi/g)
1.22E+02	Calculated total activity pCi/g
3.88E+01	Calculated total activity error
8.72E+01	Calculated total activity MDA

Screen sample based on (x) 99-Tc or ( ) 90-Sr for beta activity.

<13 90-Sr pCi/g sample

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 — 11-6-95 Date

Albert I. Davis
Radiological Manager — 12-06-95 Date

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APPENDIX G

VALIDATION REPORT FOR SAMPLE DELIVERY GROUP W0747

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APPENDIX G – CONTENTS

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Sample Disposition Record for Addition of Analyses

(Supplementary Documentation Not Included in the Validation Report)

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Sample Disposition Record

Control #: 96-0012
Revision #: 0
Date Initiated: 11/02/95

Section 1 - BACKGROUND

SAF #: B95-106
OU: N/A
Project ID: 183-H Basin D&D
Task ID: 2
Sampling Event: SURFACE REMOVAL CHARACTERIZATION
Laboratory: Quanterra
Project Coordinator: JA Lerch
Task Manager: DB Encke

Section 2 - SAMPLE INFORMATION

Number of Samples: 4
ID Numbers: B0GNX7, B0GNY0, B0GNY2, B0GNY4
Matrix: Other--Ground Concrete
Collection Date: Approximately 10/06/95

Section 3 - ISSUE

Class: Lab Direction
NCR Number: N/A
Type: Revision of Direction
Description: Project needs dictate the addition of TCLP metals analysis for Cr and Pb.

N/A
NCR Validation (Print/Sign) Date

Section 4 - DISPOSITION

Type: REWORK
Description: Sample numbers B0GNX7, B0GNY0, B0GNY2, and B0GNY4 will be analyzed for TCLP Metals (Cr and Pb).

JA Lerch for JAL 11/02/95
Project Coordinator (Print/Sign) Date

DB Encke DB Encke 11/7/95
Task Manager (Print/Sign) Date

N/A
QA (Print/Sign) Date

Section 5 - INSPECTION (Issue Class: Nonconformance Only)

Inspection Number: N/A
Inspection Results: N/A

N/A
Inspector (Print/Sign) Date

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Golder Associates Inc.

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

Golder Associates

December 22, 1995

Our ref: 943-1610.111.0400
94-1610/O/422

CH2M Hill
1022 Lee Blvd.,
Richland, Washington 99352

ATTENTION: Ms. Jeldetta Duncan

RE: TRANSMITTAL OF DATA VALIDATION PACKAGE,
CONTRACT NO. MSH-SWV-315905

Dear Ms. Duncan:

This letter is to transmit the following data validation package:

Project	Data Package	Analyses
183 H-Basin D&D Surface Removal	W0747-QES	Inorganics, TCLP Metals, Radiochemistry, General Chemistry

Please call if you have any questions.

Sincerely,

GOLDER ASSOCIATES INC.

Thomas M. Stapp
Task Manager

Douglas Mather
Project Manager

Enclosures

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MEMORANDUM

TO: 183-H Basin D&D, Surface Removal Characterization Project QA Record — December 15, 1995

FR: Heidi Gregerson, Golder Associates Inc. HG

RE: INORGANIC DATA VALIDATION SUMMARY FOR DATA PACKAGE W0747-QES (943-1610.111 747INO.HB)

INTRODUCTION

This memo presents the results of data validation on data package W0747-QES prepared by Quanterra Environmental Services. Sample information is provided in the following table.

SAMPLE ID	COMMENTS	ANALYSIS	MEDIA
B0GNX2		INORGANICS	DRUM SOLIDS
B0GNX3			DRUM SOLIDS
B0GNX4		SEE ATTACHMENT 4	DRUM SOLIDS
B0GNX5			DRUM SOLIDS
B0GNX6			DRUM SOLIDS
B0GNX7			DRUM SOLIDS
B0GNX8			DRUM SOLIDS
B0GNY0			DRUM SOLIDS
B0GNY1			DRUM SOLIDS
B0GNY2			DRUM SOLIDS

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.

001

Data Package ID: W0747-QES Analysis: INORGANICS

Completeness. The data package was complete for all requested analyses. A total of ten samples were validated in this data package with a total of 220 determinations reported, 213 of which were deemed valid. This results in a completeness of 97%, which meets the 90% objective of the work plan.

MAJOR DEFICIENCIES

The following major deficiencies were identified during data validation which required qualification of data as unusable:

Spike Sample

- The percent recovery for cadmium and vanadium was less than 30% and associated samples were qualified. Attachments 2 and 5 provide a summary of samples affected, data qualifications applied and supporting documentation.

MINOR DEFICIENCIES

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

Spike Sample

- The percent recovery for antimony, cadmium, lead, thallium, and vanadium 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.

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.

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Revised HRG
1/5/96

ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

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

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.

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ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

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

DATA QUALIFICATION SUMMARY - FORM B-7

SDG:W0747-QES	REVIEWER: H. Gregerson	DATE: 12-14-95	PAGE 1 OF 1
COMMENTS: INORGANICS			
COMPOUND/ANALYTE	QUALIFIER	SAMPLES AFFECTED	REASON
ANTIMONY	BJ	B0GNX4 B0GNX8 B0GNY2	MS RECOVERY WAS ABOVE THE CONTROL LIMIT
CADMIUM	BJ/UR	B0GNX2 B0GNX3 B0GNX5 B0GNX6 B0GNX7 B0GNX8 B0GNY0 B0GNY2 B0GNX4 B0GNY1	MS RECOVERY WAS LESS THAN 30%
LEAD	J	ALL SAMPLES	MS RECOVERY WAS BELOW THE CONTROL LIMIT
THALLIUM	UJ	ALL SAMPLES	MS RECOVERY WAS BELOW THE CONTROL LIMIT
VANADIUM	BJ/J/UR	B0GNX4 B0GNX6 B0GNX8 B0GNY1 B0GNY2 B0GNX2 B0GNX3 B0GNX5 B0GNX7 B0GNY0	MS RECOVERY WAS LESS THAN 30%

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Revised HRG
1/5/96

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ATTACHMENT 3

QUALIFIED DATA SUMMARY and ANNOTATED LABORATORY REPORTS

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Validated Data Summary, Data Package: W0747-QES

Parameter	Units	Samp# / Date / Location / Depth / Type / Comments	BOGNX2 9-29-95 --- DRUM SOLID Result	Q	BOGNX3 9-29-95 --- DRUM SOLID Result	Q	BOGNX4 9-29-95 --- DRUM SOLID Result	Q	BOGNX5 9-29-95 --- DRUM SOLID Result	Q	BOGNX6 9-29-95 --- DRUM SOLID Result	Q	BOGNX7 9-29-95 --- DRUM SOLID Result	Q
ALUMINUM	MG/KG		1480.000		1680.000		15500.000		6540.000		10900.000		7480.000	
ANTIMONY	MG/KG		69.000	U	69.000	U	16.700	BJ	69.000	U	69.000	U	69.000	U
ARSENIC	MG/KG		40.400		33.600		78.000		32.300		40.900		39.200	
BARIUM	MG/KG		24.600		60.800		150.000		67.600		111.000		79.800	
BERYLLIUM	MG/KG		0.580	B	0.540	B	0.970	B	1.600		1.000		1.100	
CADMIUM	MG/KG		17.600	BJ	12.600	BJ	1.200	UR	9.100	BJ	8.500	BJ	11.200	BJ
CALCIUM	MG/KG		12900.000		13100.000		124000.000		43100.000		64900.000		45500.000	
CHROMIUM	MG/KG		1490.000		1220.000		70.200		734.000		564.000		770.000	
COBALT	MG/KG		38.700	B	35.000	B	17.100	B	25.500	B	24.200	B	26.600	B
COPPER	MG/KG		818.000		687.000		158.000		817.000		504.000		622.000	
IRON	MG/KG		823000.000		674000.000		28300.000		535000.000		360000.000		457000.000	
LEAD	MG/KG		1.400	J	0.670	J	21.400	J	4.400	J	7.000	J	5.900	J
MAGNESIUM	MG/KG		1150.000		1680.000		8170.000		3560.000		5060.000		4320.000	
MANGANESE	MG/KG		8910.000		7410.000		472.000		5460.000		3920.000		5030.000	
NICKEL	MG/KG		695.000		652.000		35.800		361.000		251.000		313.000	
POTASSIUM	MG/KG		368.000	B	366.000	B	3230.000		1260.000		1700.000		6680.000	
SELENIUM	MG/KG		0.260	U	0.260	U	0.300	B	0.260	U	0.760		0.430	B
SILVER	MG/KG		15.000	U	15.000	U	3.200	B	15.000	U	15.000	U	15.000	U
SODIUM	MG/KG		486.000		1820.000		10100.000		3800.000		7470.000		4800.000	
THALLIUM	MG/KG		0.410	UJ	0.410	UJ	0.410	UJ	0.410	UJ	0.410	UJ	0.410	UJ
VANADIUM	MG/KG		10.800	UR	10.800	UR	59.800	J	10.800	UR	28.600	BJ	10.800	UR
ZINC	MG/KG		71.100		66.200		328.000		127.000		184.000		171.000	

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

Verified HRG 1/5/96

Revised 1/5/96 HRG

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Validated Data Summary, Data Package: W0747-QES

Parameter	Samp# / Date / Location / Depth / Type / Comments	Units	BOGNX8 9-29-95 --- DRUM SOLID Result	Q	BOGNY0 9-29-95 --- DRUM SOLID Result	Q	BOGNY1 9-29-95 --- DRUM SOLID Result	Q	BOGNY2 9-29-95 --- DRUM SOLID Result	Q
ALUMINUM		MG/KG	16100.000		5150.000		12200.000		10300.000	
ANTIMONY		MG/KG	37.400	BJ	69.000	U	13.800	U	48.900	BJ
ARSENIC		MG/KG	34.200		33.700		6.100		58.000	
BARIUM		MG/KG	190.000		62.200		129.000		256.000	
BERYLLIUM		MG/KG	1.200	B	0.570	B	1.900		0.740	
CADMIUM		MG/KG	3.400	BJ	8.200	BJ	1.200	UR	1.700	BJ
CALCIUM		MG/KG	118000.000		27900.000		74800.000		91600.000	
CHROMIUM		MG/KG	305.000		839.000		74.700		160.000	
COBALT		MG/KG	18.500	B	35.700	B	10.200	B	15.200	B
COPPER		MG/KG	301.000		518.000		262.000		229.000	
IRON		MG/KG	249000.000		473000.000		57100.000		99600.000	
LEAD		MG/KG	6.500	J	14.400	J	7.400	J	149.000	J
MAGNESIUM		MG/KG	6950.000		4650.000		7280.000		6230.000	
MANGANESE		MG/KG	2530.000		5240.000		691.000		1240.000	
NICKEL		MG/KG	159.000		380.000		44.300		92.600	
POTASSIUM		MG/KG	2560.000		792.000		2190.000		1270.000	
SELENIUM		MG/KG	1.100		3.100		1.000		1.800	
SILVER		MG/KG	3.000	U	15.000	U	6.300	B	3.000	U
SODIUM		MG/KG	6520.000		1050.000		5790.000		5920.000	
THALLIUM		MG/KG	0.410	UJ	0.410	UJ	0.410	UJ	0.410	UJ
VANADIUM		MG/KG	35.900	J	10.800	UR	58.800	J	40.700	J
ZINC		MG/KG	183.000		128.000		89.300		230.000	

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

Verified IHCG
1/5/96

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Revised IHCG
1/5/96

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
BOGNX2

Lab Name: QUANTERRA_MO_____ Contract: 550.105___
Lab Code: ITMO__ Case No.:_____ SAS No.:_____ SDG No.: W0747_____
Matrix (soil/water): SOIL_ Lab Sample ID: 9487-001
Level (low/med): LOW__ Date Received: 10/02/95
% Solids: 100.0

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

CAS No.	Analyte	Concentration	C	Q	M	Q
7429-90-5	Aluminum	1480			P	
7440-36-0	Antimony	69.0	U	N	P	
7440-38-2	Arsenic	40.4		E	P	
7440-39-3	Barium	24.6			P	
7440-41-7	Beryllium	0.58	B		P	
7440-43-9	Cadmium	17.6	~~B~~	N	P	BJ
7440-70-2	Calcium	12900		E	P	
7440-47-3	Chromium	1490	/		P	~~J~~ HG 1/9/96
7440-48-4	Cobalt	38.7	B		P	
7440-50-8	Copper	818		E	P	
7439-89-6	Iron	823000			P	
7439-92-1	Lead	1.4	/	N	P	J
7439-95-4	Magnesium	1150			P	
7439-96-5	Manganese	8910			P	
7440-02-0	Nickel	695		E	P	
7440-09-7	Potassium	368	B		P	
7782-49-2	Selenium	0.26	U		P	
7440-22-4	Silver	15.0	U	N	P	
7440-23-5	Sodium	486	/		P	~~J~~ HG 1/5/96
7440-28-0	Thallium	0.41	~~U~~	N	P	UJ
7440-62-2	Vanadium	10.8	~~U~~	N	P	UJ
7440-66-6	Zinc	71.1			P	

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

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HRG 12/15/95

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Revised HRG
1/5/96

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
B0GNX3

Lab Name: QUANTERRA_MO_____ Contract: 550.105___
Lab Code: ITMO___ Case No.:_____ SAS No.:_____ SDG No.: W0747_____
Matrix (soil/water): SOIL_ Lab Sample ID: 9487-002
Level (low/med): LOW__ Date Received: 10/02/95
% Solids: 100.0

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

CAS No.	Analyte	Concentration	C	Q	M	Q
7429-90-5	Aluminum	1680			P	
7440-36-0	Antimony	69.0	U	N	P	
7440-38-2	Arsenic	33.6		E	P	
7440-39-3	Barium	60.8			P	
7440-41-7	Beryllium	0.54	B		P	
7440-43-9	Cadmium	12.6	~~B~~	N	P	BJ
7440-70-2	Calcium	13100		E	P	
7440-47-3	Chromium	1220	~~/~~		P	~~B~~ HG 1/5/96
7440-48-4	Cobalt	35.0	B		P	
7440-50-8	Copper	687		E	P	
7439-89-6	Iron	674000			P	
7439-92-1	Lead	0.67	~~/~~	N	P	J
7439-95-4	Magnesium	1680			P	
7439-96-5	Manganese	7410			P	
7440-02-0	Nickel	652		E	P	
7440-09-7	Potassium	366	B		P	
7782-49-2	Selenium	0.26	U		P	
7440-22-4	Silver	15.0	U	N	P	
7440-23-5	Sodium	1820	~~/~~		P	~~B~~ HG 1/5/96
7440-28-0	Thallium	0.41	~~U~~	N	P	UJ
7440-62-2	Vanadium	10.8	~~U~~	N	P	UJ
7440-66-6	Zinc	66.2			P	

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

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Revised HG 1/5/96

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
B0GNX4

Lab Name: QUANTERRA_MO Contract: 550.105
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0747
Matrix (soil/water): SOIL Lab Sample ID: 9487-003
Level (low/med): LOW Date Received: 10/02/95
% Solids: 100.0

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

CAS No.	Analyte	Concentration	C	Q	M	Q
7429-90-5	Aluminum	15500			P	
7440-36-0	Antimony	16.7	B	N	P	BJ
7440-38-2	Arsenic	78.0		E	P	
7440-39-3	Barium	150			P	
7440-41-7	Beryllium	0.97	B		P	
7440-43-9	Cadmium	1.2	B	N	P	UR
7440-70-2	Calcium	124000		E	P	
7440-47-3	Chromium	70.2			P	J HG 1/16/96
7440-48-4	Cobalt	17.1	B		P	
7440-50-8	Copper	158		E	P	
7439-89-6	Iron	28300			P	
7439-92-1	Lead	21.4		N	P	J
7439-95-4	Magnesium	8170			P	
7439-96-5	Manganese	472			P	
7440-02-0	Nickel	35.8		E	P	
7440-09-7	Potassium	3230			P	
7782-49-2	Selenium	0.30	B		P	
7440-22-4	Silver	3.2	B	N	P	J HG 1/5/96
7440-23-5	Sodium	10100			P	
7440-28-0	Thallium	0.41	B	N	P	UJ
7440-62-2	Vanadium	59.8		N	P	J
7440-66-6	Zinc	328			P	

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

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1/5/96

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
B0GNX5

Lab Name: QUANTERRA_MO Contract: 550.105
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0747
Matrix (soil/water): SOIL Lab Sample ID: 9487-004
Level (low/med): LOW Date Received: 10/02/95
% Solids: 100.0

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

CAS No.	Analyte	Concentration	C	Q	M	Q
7429-90-5	Aluminum	6540			P	
7440-36-0	Antimony	69.0	U	N	P	
7440-38-2	Arsenic	32.3		E	P	
7440-39-3	Barium	67.6			P	
7440-41-7	Beryllium	1.6			P	
7440-43-9	Cadmium	9.1	B	N	P	BJ
7440-70-2	Calcium	43100		E	P	
7440-47-3	Chromium	734			P	J HRG 1/5/96
7440-48-4	Cobalt	25.5	B		P	
7440-50-8	Copper	817		E	P	
7439-89-6	Iron	535000			P	
7439-92-1	Lead	4.4		N	P	J
7439-95-4	Magnesium	3560			P	
7439-96-5	Manganese	5460			P	
7440-02-0	Nickel	361		E	P	
7440-09-7	Potassium	1260			P	
7782-49-2	Selenium	0.26	U		P	
7440-22-4	Silver	15.0	U	N	P	J HRG 1/5/96
7440-23-5	Sodium	3800			P	
7440-28-0	Thallium	0.41	U	N	P	UJ
7440-62-2	Vanadium	10.8	B	N	P	UR
7440-66-6	Zinc	127			P	

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
B0GNX6

Lab Name: QUANTERRA_MO Contract: 550.105
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0747
Matrix (soil/water): SOIL Lab Sample ID: 9487-005
Level (low/med): LOW Date Received: 10/02/95
% Solids: 100.0

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

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	10900			P	
7440-36-0	Antimony	69.0	U	N	P	
7440-38-2	Arsenic	40.9		E	P	
7440-39-3	Barium	111			P	
7440-41-7	Beryllium	1.0			P	
7440-43-9	Cadmium	8.5	B	N	P	BJ
7440-70-2	Calcium	64900		E	P	
7440-47-3	Chromium	564			P	HG 1/5/96
7440-48-4	Cobalt	24.2	B		P	
7440-50-8	Copper	504		E	P	
7439-89-6	Iron	360000			P	
7439-92-1	Lead	7.0		N	P	J
7439-95-4	Magnesium	5060			P	
7439-96-5	Manganese	3920			P	
7440-02-0	Nickel	251		E	P	
7440-09-7	Potassium	1700			P	
7782-49-2	Selenium	0.76			P	
7440-22-4	Silver	15.0	U	N	P	HG 1/5/96
7440-23-5	Sodium	7470			P	
7440-28-0	Thallium	0.41	B	N	P	UJ
7440-62-2	Vanadium	28.6	B	N	P	BJ
7440-66-6	Zinc	184			P	

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

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HRG 12/15/95
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Revised HRG
1/5/96

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
B0GNX7

Lab Name: QUANTERRA_MO Contract: 550.105
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0747
Matrix (soil/water): SOIL Lab Sample ID: 9487-006
Level (low/med): LOW Date Received: 10/02/95
% Solids: 100.0

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

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	7480			P	Q
7440-36-0	Antimony	69.0	U	N	P	
7440-38-2	Arsenic	39.2		E	P	
7440-39-3	Barium	79.8			P	
7440-41-7	Beryllium	1.1			P	
7440-43-9	Cadmium	11.2	B	N	P	BJ
7440-70-2	Calcium	45500		E	P	
7440-47-3	Chromium	770			P	B HG 1/5/96
7440-48-4	Cobalt	26.6	B		P	
7440-50-8	Copper	622		E	P	
7439-89-6	Iron	457000			P	
7439-92-1	Lead	5.9		N	P	J
7439-95-4	Magnesium	4320			P	
7439-96-5	Manganese	5030			P	
7440-02-0	Nickel	313		E	P	
7440-09-7	Potassium	6680			P	
7782-49-2	Selenium	0.43	B		P	
7440-22-4	Silver	15.0	U	N	P	
7440-23-5	Sodium	4800			P	B HG 1/5/96
7440-28-0	Thallium	0.41	B	N	P	UJ
7440-62-2	Vanadium	10.8	B	N	P	UR
7440-66-6	Zinc	171			P	

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

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HG 12/15/95
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Revised HRG
1/5/96

U.S. EPA - CLP

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
B0GNX8

Lab Name: QUANTERRA_MO_____ Contract: 550.105___
Lab Code: ITMO__ Case No.:_____ SAS No.:_____ SDG No.: W0747_____
Matrix (soil/water): SOIL_ Lab Sample ID: 9487-007
Level (low/med): LOW__ Date Received: 10/02/95
% Solids: 100.0

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

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	16100			P	Q
7440-36-0	Antimony	37.4	B	N	P	BJ
7440-38-2	Arsenic	34.2		E	P	
7440-39-3	Barium	190			P	
7440-41-7	Beryllium	1.2	B		P	
7440-43-9	Cadmium	3.4	B	N	P	BJ
7440-70-2	Calcium	118000		E	P	
7440-47-3	Chromium	305			P	HG 1/5/96
7440-48-4	Cobalt	18.5	B		P	
7440-50-8	Copper	301		E	P	
7439-89-6	Iron	249000			P	
7439-92-1	Lead	6.5		N	P	J
7439-95-4	Magnesium	6950			P	
7439-96-5	Manganese	2530			P	
7440-02-0	Nickel	159		E	P	
7440-09-7	Potassium	2560			P	
7782-49-2	Selenium	1.1			P	
7440-22-4	Silver	3.0	U	N	P	HG 1/5/96
7440-23-5	Sodium	6520			P	
7440-28-0	Thallium	0.41	B	N	P	UJ
7440-62-2	Vanadium	35.9		N	P	J
7440-66-6	Zinc	183			P	

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

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1/5/96

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
B0GNY0

Lab Name: QUANTERRA_MO_____ Contract: 550.105___
Lab Code: ITMO__ Case No.:_____ SAS No.:_____ SDG No.: W0747_____
Matrix (soil/water): SOIL_ Lab Sample ID: 9487-008
Level (low/med): LOW__ Date Received: 10/02/95
% Solids: 100.0

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

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	5150			P	Q
7440-36-0	Antimony	69.0	U	N	P	
7440-38-2	Arsenic	33.7		E	P	
7440-39-3	Barium	62.2			P	
7440-41-7	Beryllium	0.57	B		P	
7440-43-9	Cadmium	8.2	~~B~~	N	P	BJ
7440-70-2	Calcium	27900		E	P	
7440-47-3	Chromium	839	/		P	~~B~~ HG 1/5/96
7440-48-4	Cobalt	35.7	B		P	
7440-50-8	Copper	518		E	P	
7439-89-6	Iron	473000			P	
7439-92-1	Lead	14.4	/	N	P	J
7439-95-4	Magnesium	4650			P	
7439-96-5	Manganese	5240			P	
7440-02-0	Nickel	380		E	P	
7440-09-7	Potassium	792			P	
7782-49-2	Selenium	3.1			P	
7440-22-4	Silver	15.0	U	N	P	~~B~~ HG 1/5/96
7440-23-5	Sodium	1050	/		P	
7440-28-0	Thallium	0.41	~~U~~	N	P	UJ
7440-62-2	Vanadium	10.8	~~U~~	N	P	UR
7440-66-6	Zinc	128			P	

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

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HRG 12/5/95
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Revised HRG
1/5/96

U.S. EPA - CLP

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0GNY1

Lab Name: QUANTERRA_MO Contract: 550.105
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0747
Matrix (soil/water): SOIL Lab Sample ID: 9487-009
Level (low/med): LOW Date Received: 10/02/95
% Solids: 100.0

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

CAS No.	Analyte	Concentration	C	Q	M	Q
7429-90-5	Aluminum	12200			P	
7440-36-0	Antimony	13.8	U	N	P	
7440-38-2	Arsenic	6.1		E	P	
7440-39-3	Barium	129			P	
7440-41-7	Beryllium	1.9			P	
7440-43-9	Cadmium	1.2	B	N	P	UR.
7440-70-2	Calcium	74800		E	P	
7440-47-3	Chromium	74.7			P	J HG 1/5/96
7440-48-4	Cobalt	10.2	B		P	
7440-50-8	Copper	262		E	P	
7439-89-6	Iron	57100			P	
7439-92-1	Lead	7.4		N	P	J
7439-95-4	Magnesium	7280			P	
7439-96-5	Manganese	691			P	
7440-02-0	Nickel	44.3		E	P	
7440-09-7	Potassium	2190			P	
7782-49-2	Selenium	1.0			P	
7440-22-4	Silver	6.3	B	N	P	J HG 1/5/96
7440-23-5	Sodium	5790			P	
7440-28-0	Thallium	0.41	B	N	P	UJ
7440-62-2	Vanadium	58.8		N	P	J
7440-66-6	Zinc	89.3			P	

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
B0GNY2

Lab Name: QUANTERRA_MO_____ Contract: 550.105___
Lab Code: ITMO__ Case No.:_____ SAS No.:_____ SDG No.: W0747_____
Matrix (soil/water): SOIL_ Lab Sample ID: 9487-010
Level (low/med): LOW__ Date Received: 10/02/95
% Solids: 100.0

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

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	10300			P	J
7440-36-0	Antimony	48.9	B	N	P	BJ
7440-38-2	Arsenic	58.0		E	P	
7440-39-3	Barium	256			P	
7440-41-7	Beryllium	0.74			P	
7440-43-9	Cadmium	1.7	B	N	P	BJ
7440-70-2	Calcium	91600		E	P	
7440-47-3	Chromium	160	/		P	J HG 1/5/96
7440-48-4	Cobalt	15.2	B		P	
7440-50-8	Copper	229		E	P	
7439-89-6	Iron	99600			P	
7439-92-1	Lead	149	/	N	P	J
7439-95-4	Magnesium	6230			P	
7439-96-5	Manganese	1240			P	
7440-02-0	Nickel	92.6		E	P	
7440-09-7	Potassium	1270			P	
7782-49-2	Selenium	1.8			P	
7440-22-4	Silver	3.0	U	N	P	HG 1/5/96
7440-23-5	Sodium	5920	/		P	J
7440-28-0	Thallium	0.41	B	N	P	UJ
7440-62-2	Vanadium	40.7	/	N	P	J
7440-66-6	Zinc	230			P	

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

FORM I - IN

SW-846

019

HG 1/5/96
~~0000~~053-
Revised HRG
1/5/96

ATTACHMENT 4

LABORATORY NARRATIVE and CHAIN-OF-CUSTODY DOCUMENTATION

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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

November 14, 1995

Attention: Joan Kessner

Project number	:	550.105
Date Received by Lab	:	October 2, 1995
Number of Samples	:	Ten (10)
Sample Type	:	Solid
SDG Number	:	W0747
Data Deliverable	:	Summary

I. Introduction

On October 2, 1995, ten (10) water 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	BHI ID	Richland ID	Matrix	Date of Receipt
9487-001	B0GNX2	51001001	Solid	10/02/95
9487-002	B0GNX3	51001002	Solid	10/02/95
9487-003	B0GNX4	51001003	Solid	10/02/95
9487-004	B0GNX5	51001004	Solid	10/02/95
9487-005	B0GNX6	51001005	Solid	10/02/95
9487-006	B0GNX7	51001006	Solid	10/02/95
9487-007	B0GNX8	51001007	Solid	10/02/95
9487-008	B0GNY0	51001008	Solid	10/02/95
9487-009	B0GNY1	51001009	Solid	10/02/95
9487-010	B0GNY2	51001010	Solid	10/02/95

021

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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 Arsenic, Lead, Selenium, and Thallium by Trace. Formate, Bromide, Chloride, Fluoride, Nitrate, Phosphate, and Sulfate by EPA method 300.0. Sulfide by EPA method 9030. Cyanide by EPA method 9010. PH by EPA method 9045.

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. Sample Duplicate analysis was performed per the protocol for the pH analysis.

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

022

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Environmental
Services

V. Comments

Percent solids was not determined for the samples in SDG W0747. Due to software configuration, the CLP forms list solid sample result units as " dry weight" and % solids as " 100 ". The results on the forms are actually mg/Kg as is and are not corrected for percent solids. The figure of 100 was used as percent solids for calculation purposes only and does not represent measured solids content of the samples.

All the samples in SDG W0747 required dilution due to interelement interferences. The instrument software flagged the undiluted run with an error code indicating that an interferant, in this case Calcium for 9487-003 and 9487-007 and Iron for samples in the SDG except sample 9487-003, was interfering with the analysis of most of the elements requested. The samples were diluted and reanalyzed without interference errors.

The following list of elements had Matrix Spike and Matrix Spike Duplicate recoveries outside the 80% to 120% range.

	MS	MSD
Antimony	140.0	183.3
Cadmium	0	16.9
Lead	70.4	72.4
Silver	0	0
Thallium	71.6	71.5
Vanadium	0	25.3

The Relative Percent Difference for the serial dilution for Arsenic (21.1), Calcium (13.4), Copper (10.6) and Nickel was greater than 10 therefore all associated data was flagged with an " E ".

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Services

Bechtel Hanford Incorporated
November 14, 1995
Project Number: 550.105
SDG: W0747

The Matrix Spike recovery for the Cyanide analysis on sample 9487-001 was outside of the suggested limits of 75-125%.

The Relative Percent Difference could not be calculated due to the values being below the detection limits for sample 9487-001 and it's duplicate on the Cyanide analysis.

The Matrix Spike recovery for the Formate analysis on sample 9487-001 was outside of the suggested limits of 75-125%.

In order to clarify the Formate peaks from the Fluoride peaks, the entire batch was reprinted showing only the four minutes of run and reintegrated to even out the baseline.

The Relative Percent Difference could not be calculated due to the values being below the detection limits for sample 9487-001 and it's duplicate on the Phosphate and Bromide analyses.

The Matrix Spike recovery for the Nitrate, Nitrite and Phosphate analyses on sample 9487-001 were outside of the suggested limits of 75-125% due to the spike concentration exceeding the sample concentration by a factor of four or more.

The retention times were entered into the computer program incorrectly, so it failed to identify the peaks on the calibration curve. The correct retention times were then entered correctly and the data for the calibration curve was regenerated.

Sample 9487-001, it's duplicate and 9487-010 were manually integrated for Fluoride to level the baseline.

Samples, 9487-001, -001DUP, -002, -003, -005, -006, -007, -009, and -010 were diluted for Bromide to reduce the interfering Nitrate peak on the ion chromatogram, resulting in a higher detection limit.

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Environmental
Services

Bechtel Hanford Incorporated
November 14, 1995
Project Number: 550.105
SDG: W0747
Page 5

Due to the sample matrix, an extra 20 ml of $CaCl_2$ above the suggested amount of 20 ml per the protocol was used to determine the pH using the EPA method 9045 on sample 9487-006. See NCM # SL-94-2090.

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\hamw0747.nar

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Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 2

Date Turnaround: X Priority / Normal

Collector: P. Bowers, M. Highhurn, W. Thompson, P. St. John	Company Contact: Dave Encke	Telephone: 373-3461
Project Designation: Concrete Removal Characterization	Sampling Location: 183-H Solar Evaporation Basin Project	SAF No.: B95-106
Ice Chest No.: ER-9	Field Logbook No.: EFL-1133-1	Method of Shipment: Hand Deliver - Government Vehicle
Shipped To: Quanterra	Offsite Property No.	Bill of Lading/Air Bill No.
Possible Sample Hazards/Remarks		

SAMPLE ANALYSIS: 510010

SDG 100747

Preservation	Cool	Cool	Cool	Cool	None	None				
Type of Container	A G	A G	A G	A G	G	P				
No. of Container(s)	1	1	1	1	1	1				
Volume	40 ml.	60 ml.	60 ml.	60 ml.	1 Liter	20 ml.				
	100% ICP Metals Include Super-trace	100% Anions See Item 1 Below	100% Cyanide	100% Sulfide	510011 See Item 2 Below	Activity Scan				
Sample No.	Matrix*	Date Sampled	Time Sampled							
B0GNX2 01	DS	09-29-95	1345	X	X	X	X	X	X	
B0GNX3 02	DS	09-29-95	1404	X	X	X	X	X	X	
B0GNX4 03	DS	09-29-95	1420	X	X	X	X	X	X	
B0GNX5 04	DS	09-29-95	1437	X	X	X	X	X	X	
B0GNX6 05	DS	09-29-95	1455	X	X	X	X	X	X	
B0GNX7 06	DS	09-29-95	1459	X	X	X	X	X	X	

CHAIN OF POSSESSION

Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
Tony Downs	10-2-95/0905	ERC	0905
ERC Buckhan	10-2-95 1130	Buckhan	10-2-95
		Buckhan	10-2-95 1130
		Quanterra	10/2/95 1730
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

Item 1 - Anions - ICF -- F, Cl, SO4, PO4, NO2, NO3, formate and pH

Item 2 - Gross Alpha, Gross Beta; u-234, -235, -238; Tc-99; 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

Received By	Title		Date/Time
Disposal Method		Disposed By	Date/Time

G-39

026

4PG 12/5/95

0000015

BHI-00922
Rev. 0

9602.0425.16

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 2 of 2

Date Turnaround: X Priority / Normal

Collector: D. Bowers, M. Mahlhorn, W. Thompson, D. St. John	Company Contact: Dave Encke	Telephone: 373-3461
Project Designation: Concrete Removal Characterization	Sampling Location: 183-H Solar Evaporation Basin Project	SAF No.: B95-106
Ice Chest No.: 159	Field Logbook No.: EFL-1132-1	Method of Shipment: Hand Deliver - Government Vehicle
Shipped To: Quenterra	Offsite Property No.:	Bill of Lading/Air Bill No.:
Possible Sample Hazards/Remarks:		

SAMPLE ANALYSIS: 51CC1C

SIX 10/11/17

Preservation	Cool	Cool	Cool	Cool	None	None				
Type of Container	A G	A G	A G	A G	G	P				
No. of Container(s)	1	1	1	1	1	1				
Volume	40 ml.	60 ml.	60 ml.	60 ml.	1 Liter	20 ml.				
	ICP Metals Include Super-trace	Anions See Item 1 Below	Cyanide	Sulfide	51CC11 See Item 2 Below	Activity Scan				

Sample No.	Matrix*	Date Sampled	Time Sampled										
B06NX807	DS	09-29-95	1457	X	X	X	X	X	X				
~~B06NX9~~	9/29/95 DAS												
B06NY008	DS	09-29-95	1515	X	X	X	X	X	X				
B06NY1(X)	DS	09-29-95	1513	X	X	X	X	X	X				
B06NY210	DS	09-29-95	1515	X	X	X	X	X	X				
				100%	100%	100%	100%						

Sign/Print Names			
Relinquished By: Long Mowers	Date/Time: 10-2-95 / 0809	Received By: EAC Bechtel	Date/Time: 0805 10-2-95
Relinquished By: EAC Bechtel	Date/Time: 10-2-95 1130	Received By: [signature]	Date/Time: 10/2/95 1130
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

Item 1 - Anoins - ICF -- F, Cl, SO4, PO4, NO2, NO3, formate and pH

Item 2 - Gross Alpha, Gross Beta; u-234, -235, -238; Tc-99; 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: Received By | Title | Date/Time

DISPOSAL: Disposal Method | Disposed By | Date/Time

G-40

027

0000016

BHI-00922 Rev. 0

ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

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INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 183-H Basin D&D			DATA PACKAGE: W0747-QES		
VALIDATOR: H. GREGERSON		LAB: QUANTERRA		DATE: 12/14/95	
CASE:			SDG:		

HG 1/5/96

ANALYSES PERFORMED					
☒ CLP/ICP	☐ CLP/GFAA	☐ CLP/Hg	☐ CLP/Cyanide	☐	☐
☒ SW-846/ICP	☐ SW-846/GFAA	☐ SW-846/Hg	☐ SW-846 Cyanide	☐	☐

SAMPLES/MATRIX B0GNX2 B0GNX3 B0GNX4 B0GNX5
B0GNX6 B0GNX7 B0GNX8 B0GNY0 B0GNY1
B0GNY2 / DRUM SOLIDS

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: _____

029
Revised HRG
1/9/96

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 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:

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 HRG 1/5/96
Are LCS recoveries acceptable? . . . . . Yes No N/A
Comments:

1. The %R for Sb, Cd, Pb, Tl, V was outside the control limit and associated samples were qualified accordingly.
2. ~~The %R for Sb, Fe, and V/Ba was outside the control limit and associated samples were qualified accordingly.~~ HRG 1/5/96

030
Revised HRG 1/5/96

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

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:

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HOLDING TIME SUMMARY

SDG: 160747-DES	VALIDATOR: HEIDI GREGERSON	DATE: 12/13/95	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
BDGNX2	ICP Metals	9/29/95	10/10/95	10/11 / 10/12 Tl Ba Fe Pb Se	11	12 / 13 Tl Se As Fe Pb	none
BDGNX3	ICP Metals	|	|	|	|	|	|
BDGNX4	ICP Metals	|	|	|	|	|	|
BDGNX5	ICP Metals	|	|	|	|	|	|
BDGNX6	ICP Metals	|	|	|	|	|	|
BDGNX7	ICP Metals	|	|	|	|	|	|
BDGNX8	ICP Metals	|	|	|	|	|	|
BDGNY0	ICP Metals	|	|	|	|	|	|
BDGNY1	ICP Metals	|	|	|	|	|	|
BDGNY2	ICP Metals	✓	✓	✓	✓	✓	✓

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U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.
BOGNX2S

Lab Name: QUANTERRA_MO Contract: 550.105

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W0747

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids for Sample: 100.0

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
Aluminum									NR
Antimony	80-120	69.9850	B	69.0000	U	50.00	140.0	N	P
Arsenic	80-120	209.2710		40.3700		200.00	84.5		P
Barium	80-120	217.0530		24.5950		200.00	96.2		P
Beryllium	80-120	5.3390		0.5790	B	5.00	95.2		P
Cadmium	80-120	15.5225	B	17.6200	B	5.00	-42.0	N	P
Calcium									NR
Chromium		1419.7225		1488.2675		20.00	-342.7		P
Cobalt	80-120	80.3600	B	38.7125	B	50.00	83.3		P
Copper		814.1950		817.5950		25.00	-13.6		P
Iron									NR
Lead	80-120	36.5920		1.3780		50.00	70.4	N	P
Magnesium									NR
Manganese		8643.3750		8907.9950		50.00	-529.2		P
Nickel		743.2970		694.6250		50.00	97.3		P
Potassium									NR
Selenium	80-120	151.5040		0.2600	U	200.00	75.8		P
Silver	80-120	15.0000	U	15.0000	U	5.00	0.0	N	P
Sodium									NR
Thallium	80-120	143.1470		0.4100	U	200.00	71.6	N	P
Vanadium	80-120	10.7500	U	10.7500	U	50.00	0.0	N	P
Zinc	80-120	117.5330		71.0650		50.00	92.9		P

All samples affected

Comments:

U.S. EPA - CLP

7
LABORATORY CONTROL SAMPLE

Lab Name: QUANTERRA_MO_____ Contract: 550.105___

Lab Code: ITMO__ Case No.: _____ SAS No.: _____ SDG No.: W0747_____

Solid LCS Source: ERA_____

Aqueous LCS Source: _____

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum				6000.0	4980.7		3600.0	8400.0	83.0
Antimony				27.8	34.9		14.0	117.0	125.5
Arsenic				67.7	79.6		41.0	105.0	117.6
Barium				187.0	175.9		131.0	243.0	94.1
Beryllium				57.5	54.5		35.0	81.0	94.8
Cadmium				110.0	108.2		55.0	166.0	98.4
Calcium				2040.0	2055.4		1220.0	2860.0	100.8
Chromium				189.0	149.2		95.0	265.0	78.9
Cobalt				87.0	81.4		43.0	130.0	93.6
Copper				141.0	131.4		84.0	200.0	93.2
Iron				10800.0	8789.9		7020.0	15100.0	81.4
Lead				100.0	88.7		55.0	140.0	88.7
Magnesium				2050.0	1663.3		1200.0	3080.0	81.1
Manganese				294.0	266.8		206.0	383.0	90.7
Nickel				79.6	74.9		40.0	112.0	94.1
Potassium				2130.0	1907.2		1280.0	2770.0	89.5
Selenium				99.1	105.5		54.0	149.0	106.5
Silver				124.0	133.6		62.0	186.0	107.7
Sodium				2527.0	1473.0		2021.6	3032.4	58.3
Thallium				267.9	268.2		213.6	320.4	100.1
Vanadium				84.8	72.2		59.0	115.0	85.1
Zinc				197.0	184.8		98.0	280.0	93.8

Cr + Na All Samples affected.
Sb: BOGNY4, BOGNY5, and BOGNY2.

FORM VII - IN

SW-846

HCG 12/15/15

0000060

MEMORANDUM

TO: 183-H Basin D&D, Surface Removal Project QA Record December 21, 1995

FR: Heidi Gregerson, Golder Associates Inc.

RE: GENERAL CHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE W0747-QES (943-1610.111 747GEN.HB)

INTRODUCTION

This memo presents the results of data validation for the analysis indicated below on data package W0747-QES prepared by Quanterra Environmental Services. Sample information is provided in the following table.

SAMPLE ID	COMMENTS	ANALYSIS	MEDIA
B0GNX2		GENERAL CHEMISTRY SEE ATTACHMENT 4	DRUM SOLIDS
B0GNX3			DRUM SOLIDS
B0GNX4			DRUM SOLIDS
B0GNX5			DRUM SOLIDS
B0GNX6			DRUM SOLIDS
B0GNX7			DRUM SOLIDS
B0GNX8			DRUM SOLIDS
B0GNY0			DRUM SOLIDS
B0GNY1			DRUM SOLIDS
B0GNY2			DRUM SOLIDS

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 ten samples were validated in this data package with a total of 110 determinations reported, 101 of which were

001

Data Package ID: W0747-QES Analysis: GENERAL CHEMISTRY

deemed valid. This results in a completeness of 92 percent, which meets the 90% objective of the work plan.

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

MAJOR DEFICIENCIES

The following major deficiencies were identified during data validation which required qualification of data as unusable:

Holding Times

- The holding time for ortho-phosphate was exceeded for all samples by greater than twice the limit and associated samples were qualified accordingly. Attachments 2 and 5 provide a summary of data qualifications applied and supporting documentation.

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 by greater than twice the limit. 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

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

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.

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ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

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

DATA QUALIFICATION SUMMARY - FORM B-7

SDG: W0747-QES	REVIEWER: Heidi Gregerson	DATE: 12-15-95	PAGE 1 OF 1
COMMENTS: GENERAL CHEMISTRY			
COMPOUND/ANALYTE	QUALIFIER	SAMPLES AFFECTED	REASON
pH	J	ALL SAMPLES	HOLDING TIME EXCEEDED BY GREATER THAN TWICE THE LIMIT
NITRATE	J	ALL SAMPLES	HOLDING TIME EXCEEDED BY GREATER THAN TWICE THE LIMIT
NITRITE	J	ALL SAMPLES	HOLDING TIME EXCEEDED BY GREATER THAN TWICE THE LIMIT
ORTHO-PHOSPHATE	J	B0GNY0	HOLDING TIME EXCEEDED BY GREATER THAN TWICE THE LIMIT
ORTHO-PHOSPHATE	UR	B0GNX2 B0GNX3 B0GNX4 B0GNX5 B0GNX6 B0GNX7 B0GNX8 B0GNY1 B0GNY2	HOLDING TIME EXCEEDED BY GREATER THAN TWICE THE LIMIT

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ATTACHMENT 3

QUALIFIED DATA SUMMARY AND ANNOTATED LABORATORY REPORTS

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Validated Data Summary, Data Package: W0747-QES

	Sample #	B0GNX2		B0GNX3		B0GNX4		B0GNX5		B0GNX6		B0GNX7		B0GNX8	
	Date	9/29/95		9/29/95		9/29/95		9/29/95		9/29/95		9/29/95		9/29/95	
	Location														
	Depth														
	Type	Drum Solid		Drum Solid		Drum Solid		Drum Solid		Drum Solid		Drum Solid		Drum Solid	
	Comments														
Parameter	Units	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
NO3	UG/G	104	J	549	J	379	J	84	J	160	J	341	J	374	J
NO2	UG/G	6.04	J	9.45	J	10.9	J	4.39	J	2.19	J	10.9	J	5.15	J
ORTHO-PO4	UG/G	4.96	UR	4.93	UR	4.95	UR	4.96	UR	4.99	UR	4.95	UR	4.98	UR
SO4	UG/G	120		441		749		225		323		623		109	
CL	UG/G	11.7		8.59		48.8		21.6		8.91		33.7		4.77	
F	UG/G	3.34		62.3		91.5		83.7		158		283		80.9	
BR	UG/G	4.96	U	12.3	U	12.4	U	2.48	U	12.5	U	24.8	U	12.5	U
pH	pH	11.72	J	11.04	J	10.87	J	11.24	J	11.25	J	9.74	J	12.12	J
SULFIDE	UG/G	16.1		10.1	U	10.9	U	41.3		26		75.9		88.9	
FORMATE	UG/G	11.8		17.2		9.98	U	4.98	U	12		21.6		4.96	U
CN	UG/G	0.5	U	1.82		0.5	U	0.69		0.49	U	1.68		1.03	

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

Verified
HEG 12/21/95

TMS OK
12-21-95

Validated Data Summary, Data Package: W0747-QES

	Sample #	B0GNY0		B0GNY1		B0GNY2	
	Date	9/29/95		9/29/95		9/29/95	
	Location						
	Depth						
	Type	Drum Solid		Drum Solid		Drum Solid	
	Comments						
Parameter	Units	Results	Q	Results	Q	Results	Q
NO3	UG/G	40	J	431	J	689	J
NO2	UG/G	1.66	J	19.8	J	8.84	J
ORTHO-PO4	UG/G	9.47	J	4.99	UR	4.67	UR
SO4	UG/G	198		396		151	
CL	UG/G	22.7		58.2		59	
F	UG/G	28.8		76.2		20.6	
BR	UG/G	2.46	U	24.9	U	11.7	U
pH	pH	9.55	J	11.25	J	12.19	J
SULFIDE	UG/G	24.5		78.1		187	
FORMATE	UG/G	4.96	U	7.81		42.7	
CN	UG/G	0.49	U	0.5	U	1.05	

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

Verified
HRC 12/21/95

TMS OK.
12-21-95

009

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

Project: 550.105

Category: Bromide EPA 300.0
Method: EPA 300.0
Matrix: SOLID

Sample Date : 09/29/95
Receipt Date : 10/02/95
Report Date : 10/16/95

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BOGNX2	9487-001	Bromide	24959-67-9	QCBLK80428-2	10/12/95	10/12/95	4.96	UG/G	U	4.96	2
BOGNX2	9487-001DUP	Bromide	24959-67-9	QCBLK80428-2	10/12/95	10/12/95	4.99	UG/G	U	4.99	2
BOGNX2	9487-001MS	Bromide	24959-67-9	QCBLK80428-2	10/12/95	10/12/95	109	%REC			5
BOGNC3	9487-002	Bromide	24959-67-9	QCBLK80428-2	10/12/95	10/12/95	12.3	UG/G	U	12.3	5
BOGNX4	9487-003	Bromide	24959-67-9	QCBLK80428-2	10/12/95	10/12/95	12.4	UG/G	U	12.4	5
BOGNX5	9487-004	Bromide	24959-67-9	QCBLK80428-2	10/12/95	10/12/95	2.48	UG/G	U	2.48	1
BOGNX6	9487-005	Bromide	24959-67-9	QCBLK80428-2	10/12/95	10/12/95	12.5	UG/G	U	12.5	5
BOGNX7	9487-006	Bromide	24959-67-9	QCBLK80428-2	10/12/95	10/12/95	24.8	UG/G	U	24.8	10
BOGNX8	9487-007	Bromide	24959-67-9	QCBLK80428-2	10/12/95	10/12/95	12.5	UG/G	U	12.5	5
BOGNY0	9487-008	Bromide	24959-67-9	QCBLK80428-2	10/12/95	10/12/95	2.46	UG/G	U	2.46	1
BOGNY1	9487-009	Bromide	24959-67-9	QCBLK80428-2	10/12/95	10/12/95	24.9	UG/G	U	24.9	10
BOGNY2	9487-010	Bromide	24959-67-9	QCBLK80428-2	10/12/95	10/12/95	11.7	UG/G	U	11.7	5
NA	QCBLK80428-2	Bromide	24959-67-9	QCBLK80428-2	10/12/95	10/12/95	2.50	UG/G	U	2.50	1
NA	QCLCS80428-2	Bromide	24959-67-9	QCBLK80428-2	10/12/95	10/12/95	99	%REC			1

030 RKG 12/21/95

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Quanterra
Environmental Services

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

Project: 550.105

Category: CHLORIDE
Method: EPA 300.0
Matrix: SOLID

Sample Date : 09/29/95
Receipt Date : 10/02/95
Report Date : 10/16/95

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BOGNX2	9487-001	Chloride	16887-00-6	QCBLK80428-2	10/12/95	10/12/95	11.7	UG/G		1.99	1
BOGNX2	9487-001DUP	Chloride	16887-00-6	QCBLK80428-2	10/12/95	10/12/95	10.7	UG/G		2.00	1
BOGNX2	9487-001MS	Chloride	16887-00-6	QCBLK80428-2	10/12/95	10/12/95	100	%REC			5
BOGNX3	9487-002	Chloride	16887-00-6	QCBLK80428-2	10/12/95	10/12/95	8.59	UG/G		1.97	1
BOGNX4	9487-003	Chloride	16887-00-6	QCBLK80428-2	10/12/95	10/12/95	48.8	UG/G		1.98	1
BOGNX5	9487-004	Chloride	16887-00-6	QCBLK80428-2	10/12/95	10/12/95	21.6	UG/G		1.98	1
BOGNX6	9487-005	Chloride	16887-00-6	QCBLK80428-2	10/12/95	10/12/95	8.91	UG/G		2.00	1
BOGNX7	9487-006	Chloride	16887-00-6	QCBLK80428-2	10/12/95	10/12/95	33.7	UG/G		1.98	1
BOGNX8	9487-007	Chloride	16887-00-6	QCBLK80428-2	10/12/95	10/12/95	4.77	UG/G		1.99	1
BOGNY0	9487-008	Chloride	16887-00-6	QCBLK80428-2	10/12/95	10/12/95	22.7	UG/G		1.97	1
BOGNY1	9487-009	Chloride	16887-00-6	QCBLK80428-2	10/12/95	10/12/95	58.2	UG/G		20.0	10
BOGNY2	9487-010	Chloride	16887-00-6	QCBLK80428-2	10/12/95	10/12/95	59.0	UG/G		9.35	5
NA	QCBLK80428-2	Chloride	16887-00-6	QCBLK80428-2	10/12/95	10/12/95	2.00	UG/G	U	2.00	1
NA	QCLCS80428-2	Chloride	16887-00-6	QCBLK80428-2	10/12/95	10/12/95	98	%REC			1

011

0000063

Quanterra
Environmental Services

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

Project: 550.105

Category: FLUORIDE
Method: EPA 300.0
Matrix: SOLID

Sample Date : 09/29/95
Receipt Date : 10/02/95
Report Date : 10/16/95

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BOGNX2	9487-001	Fluoride	16984-48-8	QCBLK80428-2	10/12/95	10/12/95	3.34	UG/G	J	0.99	1
BOGNX2	9487-001DUP	Fluoride	16984-48-8	QCBLK80428-2	10/12/95	10/12/95	3.58	UG/G		1.00	1
BOGNX2	9487-001MS	Fluoride	16984-48-8	QCBLK80428-2	10/12/95	10/12/95	129	%REC			1
BOGNX3	9487-002	Fluoride	16984-48-8	QCBLK80428-2	10/12/95	10/12/95	62.3	UG/G	J	9.86	10
BOGNX4	9487-003	Fluoride	16984-48-8	QCBLK80428-2	10/12/95	10/12/95	91.5	UG/G	J	4.95	5
BOGNX5	9487-004	Fluoride	16984-48-8	QCBLK80428-2	10/12/95	10/12/95	83.7	UG/G	J	1.98	2
BOGNX6	9487-005	Fluoride	16984-48-8	QCBLK80428-2	10/12/95	10/12/95	158	UG/G	J	4.99	5
BOGNX7	9487-006	Fluoride	16984-48-8	QCBLK80428-2	10/12/95	10/12/95	283	UG/G	J	9.90	10
BOGNX8	9487-007	Fluoride	16984-48-8	QCBLK80428-2	10/12/95	10/12/95	80.9	UG/G	J	4.98	5
BOGNY0	9487-008	Fluoride	16984-48-8	QCBLK80428-2	10/12/95	10/12/95	28.8	UG/G	J	0.99	1
BOGNY1	9487-009	Fluoride	16984-48-8	QCBLK80428-2	10/12/95	10/12/95	76.2	UG/G	J	9.98	10
BOGNY2	9487-010	Fluoride	16984-48-8	QCBLK80428-2	10/12/95	10/12/95	20.6	UG/G	J	4.67	5
NA	QCBLK80428-2	Fluoride	16984-48-8	QCBLK80428-2	10/12/95	10/12/95	1.00	UG/G	U	1.00	1
NA	QCLCS80428-2	Fluoride	16984-48-8	QCBLK80428-2	10/12/95	10/12/95	97	%REC			1

TMV 12-21-95

AEG 2/21/95

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Quanterra
Environmental Services

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

Project: 550.105

Category: Nitrate
Method: EPA 300.0
Matrix: SOLID

Sample Date : 09/29/95
Receipt Date : 10/02/95
Report Date : 10/16/95

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BOGNX2	9487-001	Nitrate-N	14797-55-8	QCBLK80428-2	10/12/95	10/12/95	104	UG/G	/	3.97	20
BOGNX2	9487-001DUP	Nitrate-N	14797-55-8	QCBLK80428-2	10/12/95	10/12/95	89.3	UG/G		3.99	20
BOGNX2	9487-001MS	Nitrate-N	14797-55-8	QCBLK80428-2	10/12/95	10/12/95	0	%REC			20
BOGNX3	9487-002	Nitrate-N	14797-55-8	QCBLK80428-2	10/12/95	10/12/95	549	UG/G	/	19.7	100
BOGNX4	9487-003	Nitrate-N	14797-55-8	QCBLK80428-2	10/12/95	10/12/95	379	UG/G	/	19.8	100
BOGNX5	9487-004	Nitrate-N	14797-55-8	QCBLK80428-2	10/12/95	10/12/95	84.0	UG/G	/	3.97	20
BOGNX6	9487-005	Nitrate-N	14797-55-8	QCBLK80428-2	10/12/95	10/12/95	160	UG/G	/	4.99	25
BOGNX7	9487-006	Nitrate-N	14797-55-8	QCBLK80428-2	10/12/95	10/12/95	341	UG/G	/	19.8	100
BOGNX8	9487-007	Nitrate-N	14797-55-8	QCBLK80428-2	10/12/95	10/12/95	374	UG/G	/	19.9	100
BOGNY0	9487-008	Nitrate-N	14797-55-8	QCBLK80428-2	10/12/95	10/12/95	40.0	UG/G	/	0.99	5
BOGNY1	9487-009	Nitrate-N	14797-55-8	QCBLK80505-2	10/13/95	10/13/95	431	UG/G	/	20.0	100
BOGNY2	9487-010	Nitrate-N	14797-55-8	QCBLK80428-2	10/12/95	10/12/95	689	UG/G	/	37.4	200
NA	QCBLK80428-2	Nitrate-N	14797-55-8	QCBLK80428-2	10/12/95	10/12/95	0.20	UG/G	U	0.20	1
NA	QCBLK80505-2	Nitrate-N	14797-55-8	QCBLK80505-2	10/13/95	10/13/95	0.20	UG/G	U	0.20	1
NA	QCLCS80428-2	Nitrate-N	14797-55-8	QCBLK80428-2	10/12/95	10/12/95	100	%REC			1
NA	QCLCS80505-2	Nitrate-N	14797-55-8	QCBLK80505-2	10/13/95	10/13/95	100	%REC			1

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Quanterra
Environmental Services

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

Project: 550.105

Category: Nitrite
Method: EPA 300.0
Matrix: SOLID

Sample Date : 09/29/95
Receipt Date : 10/02/95
Report Date : 10/16/95

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BOGNX2	9487-001	Nitrite-N	14797-65-0	QCBLK80428-2	10/12/95	10/12/95	6.04	UG/G	/	0.40	2
BOGNX2	9487-001DUP	Nitrite-N	14797-65-0	QCBLK80428-2	10/12/95	10/12/95	5.14	UG/G		0.40	2
BOGNX2	9487-001MS	Nitrite-N	14797-65-0	QCBLK80428-2	10/12/95	10/12/95	60	%REC			5
BOGNX3	9487-002	Nitrite-N	14797-65-0	QCBLK80428-2	10/12/95	10/12/95	9.45	UG/G	/	0.99	5
BOGNX4	9487-003	Nitrite-N	14797-65-0	QCBLK80428-2	10/12/95	10/12/95	10.9	UG/G	/	0.99	5
BOGNX5	9487-004	Nitrite-N	14797-65-0	QCBLK80428-2	10/12/95	10/12/95	4.39	UG/G	/	0.40	2
BOGNX6	9487-005	Nitrite-N	14797-65-0	QCBLK80428-2	10/12/95	10/12/95	2.19	UG/G	/	0.20	1
BOGNX7	9487-006	Nitrite-N	14797-65-0	QCBLK80428-2	10/12/95	10/12/95	10.9	UG/G	/	1.98	10
BOGNX8	9487-007	Nitrite-N	14797-65-0	QCBLK80428-2	10/12/95	10/12/95	5.15	UG/G	/	1.00	5
BOGNY0	9487-008	Nitrite-N	14797-65-0	QCBLK80428-2	10/12/95	10/12/95	1.66	UG/G	/	0.20	1
BOGNY1	9487-009	Nitrite-N	14797-65-0	QCBLK80428-2	10/12/95	10/12/95	19.8	UG/G	/	2.00	10
BOGNY2	9487-010	Nitrite-N	14797-65-0	QCBLK80428-2	10/12/95	10/12/95	8.84	UG/G	/	0.93	5
NA	QCBLK80428-2	Nitrite-N	14797-65-0	QCBLK80428-2	10/12/95	10/12/95	0.20	UG/G	U	0.20	1
NA	QCLCS80428-2	Nitrite-N	14797-65-0	QCBLK80428-2	10/12/95	10/12/95	106	%REC			1

014

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

Project: 550.105

Category: Orthophosphate
Method: EPA 300.0
Matrix: SOLID

Sample Date : 09/29/95
Receipt Date : 10/02/95
Report Date : 10/16/95

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BOGNX2	9487-001	Ortho-Phosphate	14265-44-2	QCBLK80428-2	10/12/95	10/12/95	4.96	UG/G	~~U~~ UR	4.96	1
BOGNX2	9487-001DUP	Ortho-Phosphate	14265-44-2	QCBLK80428-2	10/12/95	10/12/95	4.99	UG/G	U	4.99	1
BOGNX2	9487-001MS	Ortho-Phosphate	14265-44-2	QCBLK80428-2	10/12/95	10/12/95	0	%REC			1
BOGNX3	9487-002	Ortho-Phosphate	14265-44-2	QCBLK80428-2	10/12/95	10/12/95	4.93	UG/G	~~U~~ UR	4.93	1
BOGNX4	9487-003	Ortho-Phosphate	14265-44-2	QCBLK80428-2	10/12/95	10/12/95	4.95	UG/G	~~U~~ UR	4.95	1
BOGNX5	9487-004	Ortho-Phosphate	14265-44-2	QCBLK80428-2	10/12/95	10/12/95	4.96	UG/G	~~U~~ UR	4.96	1
BOGNX6	9487-005	Ortho-Phosphate	14265-44-2	QCBLK80428-2	10/12/95	10/12/95	4.99	UG/G	~~U~~ UR	4.99	1
BOGNX7	9487-006	Ortho-Phosphate	14265-44-2	QCBLK80428-2	10/12/95	10/12/95	4.95	UG/G	~~U~~ UR	4.95	1
BOGNX8	9487-007	Ortho-Phosphate	14265-44-2	QCBLK80428-2	10/12/95	10/12/95	4.98	UG/G	~~U~~ UR	4.98	1
BOGNY0	9487-008	Ortho-Phosphate	14265-44-2	QCBLK80428-2	10/12/95	10/12/95	9.47	UG/G	/ J	4.93	1
BOGNY1	9487-009	Ortho-Phosphate	14265-44-2	QCBLK80428-2	10/12/95	10/12/95	4.99	UG/G	~~U~~ UR	4.99	1
BOGNY2	9487-010	Ortho-Phosphate	14265-44-2	QCBLK80428-2	10/12/95	10/12/95	4.67	UG/G	~~U~~ UR	4.67	1
NA	QCBLK80428-2	Ortho-Phosphate	14265-44-2	QCBLK80428-2	10/12/95	10/12/95	5.00	UG/G	U	5.00	1
NA	QCLCS80428-2	Ortho-Phosphate	14265-44-2	QCBLK80428-2	10/12/95	10/12/95	103	%REC			1

LHG 12/21/95

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Quanterra
Environmental Services

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

Project: 550.105

Category: SULFATE
Method: EPA 300.0
Matrix: SOLID

Sample Date : 09/29/95
Receipt Date : 10/02/95
Report Date : 10/16/95

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BOGNX2	9487-001	Sulfate	14808-79-8	QCBLK80428-2	10/12/95	10/12/95	120	UG/G		4.96	1
BOGNX2	9487-001DUP	Sulfate	14808-79-8	QCBLK80428-2	10/12/95	10/12/95	118	UG/G		4.99	1
BOGNX2	9487-001MS	Sulfate	14808-79-8	QCBLK80428-2	10/12/95	10/12/95	75	%REC			5
BOGNX3	9487-002	Sulfate	14808-79-8	QCBLK80428-2	10/12/95	10/12/95	441	UG/G		24.7	5
BOGNX4	9487-003	Sulfate	14808-79-8	QCBLK80428-2	10/12/95	10/12/95	749	UG/G		24.7	5
BOGNX5	9487-004	Sulfate	14808-79-8	QCBLK80428-2	10/12/95	10/12/95	225	UG/G		9.91	2
BOGNX6	9487-005	Sulfate	14808-79-8	QCBLK80428-2	10/12/95	10/12/95	323	UG/G		24.9	5
BOGNX7	9487-006	Sulfate	14808-79-8	QCBLK80428-2	10/12/95	10/12/95	623	UG/G		49.5	10
BOGNX8	9487-007	Sulfate	14808-79-8	QCBLK80428-2	10/12/95	10/12/95	109	UG/G		4.98	1
BOGNY0	9487-008	Sulfate	14808-79-8	QCBLK80428-2	10/12/95	10/12/95	198	UG/G		24.6	5
BOGNY1	9487-009	Sulfate	14808-79-8	QCBLK80428-2	10/12/95	10/12/95	396	UG/G		49.9	10
BOGNY2	9487-010	Sulfate	14808-79-8	QCBLK80428-2	10/12/95	10/12/95	151	UG/G		23.4	5
NA	QCBLK80428-2	Sulfate	14808-79-8	QCBLK80428-2	10/12/95	10/12/95	5.00	UG/G	U	5.00	1
NA	QCLCS80428-2	Sulfate	14808-79-8	QCBLK80428-2	10/12/95	10/12/95	93	%REC			1

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Quanterra
Environmental Services

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

Project: 550.105

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

Sample Date : 09/29/95
Receipt Date : 10/02/95
Report Date : 10/16/95

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Q	Detection Limit	Dil.
B0GNX2	9487-001	pH	C-006	QCBLK80150-1	10/11/95	10/11/95	11.72	PH	/		J	1
B0GNX2	9487-001DUP	pH	C-006	QCBLK80150-1	10/11/95	10/11/95	11.68	PH				1
B0GNX3	9487-002	pH	C-006	QCBLK80150-1	10/11/95	10/11/95	11.04	PH	/		J	1
B0GNX4	9487-003	pH	C-006	QCBLK80150-1	10/11/95	10/11/95	10.87	PH	/		J	1
B0GNX5	9487-004	pH	C-006	QCBLK80150-1	10/11/95	10/11/95	11.24	PH	/		J	1
B0GNX6	9487-005	pH	C-006	QCBLK80150-1	10/11/95	10/11/95	11.25	PH	/		J	1
B0GNX7	9487-006	pH	C-006	QCBLK80150-1	10/11/95	10/11/95	9.74	PH	/		J	1
B0GNX8	9487-007	pH	C-006	QCBLK80150-1	10/11/95	10/11/95	12.12	PH	/		J	1
B0GNY0	9487-008	pH	C-006	QCBLK80150-1	10/11/95	10/11/95	9.55	PH	/		J	1
B0GNY1	9487-009	pH	C-006	QCBLK80150-1	10/11/95	10/11/95	11.25	PH	/		J	1
B0GNY2	9487-010	pH	C-006	QCBLK80150-1	10/11/95	10/11/95	12.19	PH	/		J	1
NA	QCBLK80150-1	pH	C-006	QCBLK80150-1	10/11/95	10/11/95	5.16	PH				1

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

Project: 550.105

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

Sample Date : 09/29/95
Receipt Date : 10/02/95
Report Date : 10/16/95

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
B0GNX2	9487-001	Sulfide	18496-25-8	QCBLK79821-1	10/06/95	10/06/95	16.1	UG/G		10.1	1
B0GNX2	9487-001DUP	Sulfide	18496-25-8	QCBLK79821-1	10/06/95	10/06/95	19.1	UG/G		10.0	1
B0GNX2	9487-001MS	Sulfide	18496-25-8	QCBLK79821-1	10/06/95	10/06/95	111	%REC			1
B0GNX3	9487-002	Sulfide	18496-25-8	QCBLK79821-1	10/06/95	10/06/95	10.1	UG/G	U	10.1	1
B0GNX4	9487-003	Sulfide	18496-25-8	QCBLK79821-1	10/06/95	10/06/95	10.9	UG/G	U	10.9	1
B0GNX5	9487-004	Sulfide	18496-25-8	QCBLK79821-1	10/06/95	10/06/95	41.3	UG/G		10.2	1
B0GNX6	9487-005	Sulfide	18496-25-8	QCBLK79821-1	10/06/95	10/06/95	26.0	UG/G		10.4	1
B0GNX7	9487-006	Sulfide	18496-25-8	QCBLK79821-1	10/06/95	10/06/95	75.9	UG/G		10.9	1
B0GNX8	9487-007	Sulfide	18496-25-8	QCBLK79821-1	10/06/95	10/06/95	88.9	UG/G		10.6	1
B0GNY0	9487-008	Sulfide	18496-25-8	QCBLK79821-1	10/06/95	10/06/95	24.5	UG/G		10.3	1
B0GNY1	9487-009	Sulfide	18496-25-8	QCBLK79821-1	10/06/95	10/06/95	78.1	UG/G		10.9	1
B0GNY2	9487-010	Sulfide	18496-25-8	QCBLK79821-1	10/06/95	10/06/95	187	UG/G		10.3	1
NA	QCBLK79821-1	Sulfide	18496-25-8	QCBLK79821-1	10/06/95	10/06/95	10.7	UG/G	U	10.7	1
NA	QCLCS79821-1	Sulfide	18496-25-8	QCBLK79821-1	10/06/95	10/06/95	99	%REC			1

12/21/95

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Quanterra
Environmental Services

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

Project: 550.105

Category: Formate EPA 300.0
Method: EPA 300.0
Matrix: SOLID

Sample Date : 09/29/95
Receipt Date : 10/02/95
Report Date : 10/16/95

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BOGNX2	9487-001	Formate	00-00-0	QCBLK80179-1	10/10/95	10/10/95	11.8	UG/G		4.95	1
BOGNX2	9487-001DUP	Formate	00-00-0	QCBLK80179-1	10/10/95	10/10/95	13.6	UG/G		5.00	1
BOGNX2	9487-001MS	Formate	00-00-0	QCBLK80179-1	10/10/95	10/10/95	126	%REC			1
BOGNX3	9487-002	Formate	00-00-0	QCBLK80179-1	10/10/95	10/10/95	17.2	UG/G		4.94	1
BOGNX4	9487-003	Formate	00-00-0	QCBLK80357-1	10/11/95	10/11/95	9.98	UG/G	U	9.98	2
BOGNX5	9487-004	Formate	00-00-0	QCBLK80179-1	10/10/95	10/10/95	4.98	UG/G	U	4.98	1
BOGNX6	9487-005	Formate	00-00-0	QCBLK80357-1	10/11/95	10/11/95	12.0	UG/G		9.73	2
BOGNX7	9487-006	Formate	00-00-0	QCBLK80357-1	10/11/95	10/11/95	21.6	UG/G		9.79	2
BOGNX8	9487-007	Formate	00-00-0	QCBLK80179-1	10/10/95	10/10/95	4.96	UG/G	U	4.96	1
BOGNY0	9487-008	Formate	00-00-0	QCBLK80179-1	10/10/95	10/10/95	4.96	UG/G	U	4.96	1
BOGNY1	9487-009	Formate	00-00-0	QCBLK80179-1	10/10/95	10/10/95	7.81	UG/G		4.96	1
BOGNY2	9487-010	Formate	00-00-0	QCBLK80179-1	10/10/95	10/10/95	42.7	UG/G		4.78	1
NA	QCBLK80179-1	Formate	00-00-0	QCBLK80179-1	10/10/95	10/10/95	5.00	UG/G	U	5.00	1
NA	QCBLK80357-1	Formate	00-00-0	QCBLK80357-1	10/11/95	10/11/95	5.00	UG/G	U	5.00	1
NA	QCLCS80179-1	Formate	00-00-0	QCBLK80179-1	10/10/95	10/10/95	110	%REC			1
NA	QCLCS80357-1	Formate	00-00-0	QCBLK80357-1	10/11/95	10/11/95	115	%REC			1

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Quanterra
Environmental Services

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

Project: 550.105

Category: Cyanide EPA 9010
Method: EPA 9010
Matrix: SOLID

Sample Date : 09/29/95
Receipt Date : 10/02/95
Report Date : 10/16/95

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BOGNX2	9487-001	Cyanide	57-12-5	QCBLK79945-1	10/09/95	10/11/95	0.50	UG/G	U	0.50	1
BOGNX2	9487-001DUP	Cyanide	57-12-5	QCBLK79945-1	10/09/95	10/11/95	0.49	UG/G	U	0.49	1
BOGNX2	9487-001MS	Cyanide	57-12-5	QCBLK79945-1	10/09/95	10/11/95	68	%REC			1
BOGNX3	9487-002	Cyanide	57-12-5	QCBLK79945-1	10/09/95	10/11/95	1.82	UG/G		0.49	1
BOGNX4	9487-003	Cyanide	57-12-5	QCBLK79945-1	10/09/95	10/11/95	0.50	UG/G	U	0.50	1
BOGNX5	9487-004	Cyanide	57-12-5	QCBLK79945-1	10/09/95	10/11/95	0.69	UG/G		0.50	1
BOGNX6	9487-005	Cyanide	57-12-5	QCBLK79945-1	10/09/95	10/11/95	0.49	UG/G	U	0.49	1
BOGNX7	9487-006	Cyanide	57-12-5	QCBLK79945-1	10/09/95	10/11/95	1.68	UG/G		0.50	1
BOGNX8	9487-007	Cyanide	57-12-5	QCBLK79945-1	10/09/95	10/11/95	1.03	UG/G		0.50	1
BOGNY0	9487-008	Cyanide	57-12-5	QCBLK79945-1	10/09/95	10/11/95	0.49	UG/G	U	0.49	1
BOGNY1	9487-009	Cyanide	57-12-5	QCBLK79945-1	10/09/95	10/11/95	0.50	UG/G	U	0.50	1
BOGNY2	9487-010	Cyanide	57-12-5	QCBLK79945-1	10/09/95	10/11/95	1.05	UG/G		0.50	1
NA	QCBLK79945-1	Cyanide	57-12-5	QCBLK79945-1	10/09/95	10/11/95	0.50	UG/G	U	0.50	1
NA	QCLCS79945-1	Cyanide	57-12-5	QCBLK79945-1	10/09/95	10/11/95	96	%REC			1

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ATTACHMENT 4

LABORATORY NARRATIVE and CHAIN-OF-CUSTODY DOCUMENTATION

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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

November 14, 1995

Attention: Joan Kessner

Project number:	:	550.105
Date Received by Lab	:	October 2, 1995
Number of Samples	:	Ten (10)
Sample Type	:	Solid
SDG Number	:	W0747
Data Deliverable	:	Summary

I. Introduction

On October 2, 1995, ten (10) water 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	BHI ID	Richland ID	Matrix	Date of Receipt
9487-001	B0GNX2	51001001	Solid	10/02/95
9487-002	B0GNX3	51001002	Solid	10/02/95
9487-003	B0GNX4	51001003	Solid	10/02/95
9487-004	B0GNX5	51001004	Solid	10/02/95
9487-005	B0GNX6	51001005	Solid	10/02/95
9487-006	B0GNX7	51001006	Solid	10/02/95
9487-007	B0GNX8	51001007	Solid	10/02/95
9487-008	B0GNY0	51001008	Solid	10/02/95
9487-009	B0GNY1	51001009	Solid	10/02/95
9487-010	B0GNY2	51001010	Solid	10/02/95

022

HRG 12/5/95

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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 Arsenic, Lead, Selenium, and Thallium by Trace. Formate, Bromide, Chloride, Fluoride, Nitrate, Phosphate, and Sulfate by EPA method 300.0. Sulfide by EPA method 9030. Cyanide by EPA method 9010. PH by EPA method 9045.

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. Sample Duplicate analysis was performed per the protocol for the pH analysis.

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

023

H26 12/15/95
A-2-00-3

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V. Comments

Percent solids was not determined for the samples in SDG W0747. Due to software configuration, the CLP forms list solid sample result units as " dry weight" and % solids as " 100 ". The results on the forms are actually mg/Kg as is and are not corrected for percent solids. The figure of 100 was used as percent solids for calculation purposes only and does not represent measured solids content of the samples.

All the samples in SDG W0747 required dilution due to interelement interferences. The instrument software flagged the undiluted run with an error code indicating that an interferant, in this case Calcium for 9487-003 and 9487-007 and Iron for samples in the SDG except sample 9487-003, was interfering with the analysis of most of the elements requested. The samples were diluted and reanalyzed without interference errors.

The following list of elements had Matrix Spike and Matrix Spike Duplicate recoveries outside the 80% to 120% range.

	MS	MSD
Antimony	140.0	183.3
Cadmium	0	16.9
Lead	70.4	72.4
Silver	0	0
Thallium	71.6	71.5
Vanadium	0	25.3

The Relative Percent Difference for the serial dilution for Arsenic (21.1), Calcium (13.4), Copper (10.6) and Nickel was greater than 10 therefore all associated data was flagged with an " E ".

024

DRG 12/15/95
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Services

Bechtel Hanford Incorporated
November 14, 1995
Project Number: 550.105
SDG: W0747

The Matrix Spike recovery for the Cyanide analysis on sample 9487-001 was outside of the suggested limits of 75-125%.

The Relative Percent Difference could not be calculated due to the values being below the detection limits for sample 9487-001 and it's duplicate on the Cyanide analysis.

The Matrix Spike recovery for the Formate analysis on sample 9487-001 was outside of the suggested limits of 75-125%.

In order to clarify the Formate peaks from the Fluoride peaks, the entire batch was reprinted showing only the four minutes of run and reintegrated to even out the baseline.

The Relative Percent Difference could not be calculated due to the values being below the detection limits for sample 9487-001 and it's duplicate on the Phosphate and Bromide analyses.

The Matrix Spike recovery for the Nitrate, Nitrite and Phosphate analyses on sample 9487-001 were outside of the suggested limits of 75-125% due to the spike concentration exceeding the sample concentration by a factor of four or more.

The retention times were entered into the computer program incorrectly, so it failed to identify the peaks on the calibration curve. The correct retention times were then entered correctly and the data for the calibration curve was regenerated.

Sample 9487-001, it's duplicate and 9487-010 were manually integrated for Fluoride to level the baseline.

Samples, 9487-001, -001DUP, -002, -003, -005, -006, -007, -009, and -010 were diluted for Bromide to reduce the interfering Nitrate peak on the ion chromatogram, resulting in a higher detection limit.

025

REG 12/15/95
0000005

Quanterra
Environmental
Services

Bechtel Hanford Incorporated
November 14, 1995
Project Number: 550.105
SDG: W0747
Page 5

Due to the sample matrix, an extra 20 ml of $CaCl_2$ above the suggested amount of 20 ml per the protocol was used to determine the pH using the EPA method 9045 on sample 9487-006. See NCM # SL-94-2090.

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
c:\\price$\abbydave\hanw0747.nar

026

HKG 12/15/95
A0000006

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Bechtel Hanford, Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	Page 1 of 2
		Date Turnaround: X Priority / Normal

Collector: P. Bowers; M. Richburn, W. Thompson, P. St. John	Company Contact: Dave Encke	Telephone: 373-3461
Project Designation: Concrete Removal Characterization	Sampling Location: 183-H Solar Evaporation Basin Project	SAF No.: B95-106
Ice Chest No.: ER-9	Field Logbook No.: EFL-1133-1	Method of Shipment: Hand Deliver - Government Vehicle
Shipped To: Quenterre	Offsite Property No.	Bill of Lading/Air Bill No.
Possible Sample Hazards/Remarks		

Preservation	Cool	Cool	Cool	Cool	None	None					
Type of Container	A G	A G	A G	A G	G	P					
No. of Container(s)	1	1	1	1	1	1					
Volume	40 ml.	60 ml.	60 ml.	60 ml.	1 Liter	20 ml.					
SAMPLE ANALYSIS 510010 SDL 10017417	100% ICP Metals include Super-trace	100% Anions See Item 1 Below	100% Cyanide	100% Sulfide	510011 See Item 2 Below	Activity Scan					

Sample No.	Matrix*	Date Sampled	Time Sampled									
B06NX2 01	DS	09-29-95	1345	X	X	X	X	X	X			
B06NX3 02	DS	09-29-95	1404	X	X	X	X	X	X			
B06NX4 03	DS	09-29-95	1420	X	X	X	X	X	X			
B06NX5 04	DS	09-29-95	1437	X	X	X	X	X	X			
B06NX6 05	DS	09-29-95	1455	X	X	X	X	X	X			
B06NX7 06	DS	09-29-95	1459	X	X	X	X	X	X			

CHAIN OF POSSESSION	Sign/Print Names	Date/Time
Relinquished By		10-2-95/0909
Received By	ERC Bechtel	10-2-95 0909
Relinquished By	Bechtel	10-2-95 1120
Received By		10/2/95 1130
Relinquished By		
Received By		
Relinquished By		
Received By		

SPECIAL INSTRUCTIONS
Item 1 - Anoins - ICF -- F, Cl, SO4, PO4, NO2, NO3, formate and pH
Item 2 - Gross Alpha, Gross Beta; u-234, -235, -238; Tc-99; Gamma Spec.

Matrix*: B = 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

Received By	Title		Date/Time
Disposal Method		Disposed By	Date/Time

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BHI-00922
Rev. 0

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 2 of 2

Date Turnaround: X Priority / Normal

Collector: D. Bowers, M. Mahlhorn, W. Thompson, D. St. John	Company Contact: Dave Encke	Telephone: 373-3481
Project Designation: Concrete Removal Characterization	Sampling Location: 183-H Solar Evaporation Basin Project	SAF No.: 895-106
Ice Chest No.: EB9	Field Logbook No.: EFL-1132-1	Method of Shipment: Hand Deliver - Government Vehicle
Shipped To: Quanterra	Offsite Property No.:	Bill of Lading/Air Bill No.:
Possible Sample Hazards/Remarks:	Special Handling and/or Storage: Cool Samples to 4 Degrees Celsius	

SAMPLE ANALYSIS: 51CC1C

SIX-WC 11/1/17

Sample No.	Matrix*	Date Sampled	Time Sampled	Preservation	Cool	Cool	Cool	Cool	None	None
				Type of Container	A G	A G	A G	A G	G	P
				No. of Container(s)	1	1	1	1	1	1
				Volume	40 ml.	60 ml.	60 ml.	60 ml.	1 Liter	20 ml.
					ICP Metals Include Super-trace	Anions See Item 1 Below	Cyanide	Sulfide	51CC11 See Item 2 Below	Activity Scan
B0BNX8 07	DS	09-29-95	1457		X	X	X	X	X	X
~~B0BNX9~~	9/29/95 DS									
B0BNY0 08	DS	09-29-95	1515		X	X	X	X	X	X
B0BNY1 (X)	DS	09-29-95	1513		X	X	X	X	X	X
B0BNY2 10	DS	09-29-95	1515		X	X	X	X	X	X
					100%	100%	100%	100%		

Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
Long Bowers	10-2-95 / 0908	[illegible] BHI-HA	10-2-95 0808
[illegible] BHI-HA	10-2-95 1130	[illegible]	10/2/95 1130
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

Item 1 - Anoins - ICF -- F, Cl, SO4, PO4, NO2, NO3, formate and pH

Item 2 - Gross Alpha, Gross Beta; u-234, -235, -238; Tc-99; 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

Received By	Title		Date/Time
Disposal Method		Disposed By	Date/Time

G-86

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9/29/95

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BHI-00922
Rev. 0

ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

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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: 20747-QES		
VALIDATOR: H. GREGERSON		LAB: QUANTERRA		DATE: 12/15/95	
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	☒ Formate	☒ FN
☐	☐	☐	☐	☐	☐

SAMPLES/MATRIX				
BOGNX2	BOGNX3	BOGNX4	BOGNX5	
BOGNX6	BOGNX7	BOGNX8	BOGNX9	BOGNY1
BOGNY2 / DRUM SOLIDS				

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 1.

Comments:

1. The holding time for pH, NO_3, NO_2, & FCy was exceeded by greater than twice the limit. Associated samples were qualified.

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: The spike %R for F, formate, and CN were outside the control limit, however the LCS %R for all sample results were acceptable, ~~and~~ therefore no qualification was applied.

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)

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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:_____

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HOLDING TIME SUMMARY

SDG: L00747-QES	VALIDATOR: HEIDI ERICKSON	DATE: 12/15/95	PAGE 1 OF 3
COMMENTS:			

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
BOGNX2	Anions SO_4 NO_3 NO_2 PO_4	9/29/95	10/12/95	10/12/95	13	13	PO_4 UR NO_2 J NO_3 J
	Formate		10/10/95	10/10/95	11	11	none
	CN		10/11/95	10/ /95	10	12	none
	pH		10/11/95	↓	12	12	J
↓	Sulfide		10/6/95	10/6/95	7	7	none
BOGNX3	Anions SO_4 NO_3 NO_2 PO_4		10/12/95	10/12/95	13	13	PO_4 UR NO_2 J NO_3 J
	Formate		10/10/95	10/10/95	11	11	none
	CN		10/11/95	10/11/95	10	12	none
	pH		10/11/95	↓	12	12	J
↓	Sulfide		10/6/95	10/6/95	7	7	none
BOGNX4	Anions SO_4 NO_3 NO_2 PO_4		10/12/95	10/12/95	13	13	PO_4 UR NO_2 J NO_3 J
	Formate		10/11/95	10/11/95	12	12	~~J~~ none
	CN		10/11/95	10/11/95	10	12	none
	pH		10/11/95	↓	12	12	J
↓	Sulfide		10/6/95	10/6/95	7	7	none
BOGNX5	Anions SO_4 NO_3 NO_2 PO_4		10/12/95	10/12/95	13	13	PO_4 UR NO_2 J NO_3 J
↓	Formate	↓	10/10/95	10/10/95	11	11	none

TMR 12-21-95

HOLDING TIME SUMMARY

SDG: W0747-QES	VALIDATOR: KEVIN GREGERSON	DATE: 12/15/95	PAGE 2 OF 3
COMMENTS:			

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
B0GNX5	CN	9/29/95	10/9/95	10/11/95	10	12	none
↓	PH	↓	10/11/95	↓	12	12	J
↓	Sulfide	↓	10/6/95	10/6/95	7	7	none
B0GNX6	Anions SO_4 NO_3 NO_2 PO_4	↓	10/12/95	10/12/95	13	13	PO_4 UR NO_2 J NO_3 J
↓	Formate	↓	10/11/95	10/11/95	12	12	none
↓	CN	↓	10/9/95	10/11/95	10	12	none.
↓	PH	↓	10/11/95	↓	12	12	J
↓	Sulfide	↓	10/6/95	10/6/95	7	7	none
B0GNX7	Anions SO_4 NO_3 NO_2 PO_4	↓	10/12/95	10/12/95	13	13	PO_4 UR NO_2 J NO_3 J
↓	Formate	↓	10/11/95	10/11/95	12	12	none
↓	CN	↓	10/9/95	10/11/95	10	12	none.
↓	PH	↓	10/11/95	↓	12	12	J
↓	Sulfide	↓	10/6/95	10/6/95	7	7	none
B0GNX8	Anions SO_4 NO_3 NO_2 PO_4	↓	10/12/95	10/12/95	13	13	PO_4 UR NO_2 J NO_3 J
↓	Formate	↓	10/10/95	10/10/95	11	11	none
↓	CN	↓	10/9/95	10/11/95	10	12	none
↓	PH	↓	10/11/95	↓	12	12	J

HOLDING TIME SUMMARY

SDG: U0747-QES	VALIDATOR: HEIDI GRUSENMEYER	DATE: 12/15/95	PAGE 3 OF 3
COMMENTS:			

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
EQGNX8	Sulfide	9/29/95	10/6/95	10/6/95	7	7	none
EQGNX0	Anions SO_4 NO_3 NO_2 PO_4		10/12/95	10/12/95	13	13	PO_4 J NO_2 J NO_3 J
	Formate		10/10/95	10/10/95	11	11	none
	CN		10/9/95	10/11/95	10	12	none
	pH		10/11/95	↓	12	12	J
↓	Sulfide		10/6/95	10/6/95	7	7	none
EQGNY1	Anions SO_4 NO_3 NO_2 PO_4		10/12/95	10/12/95	13	13	PO_4 UR NO_2 J NO_3 J
	Formate		10/10/95	10/10/95	11	11	none
	CN		10/9/95	10/11/95	10	12	none
	pH		10/11/95	↓	12	12	J
↓	Sulfide		10/6/95	10/6/95	7	7	none
EQGNY2	Anions SO_4 NO_3 NO_2 PO_4		10/12/95	10/12/95	13	13	PO_4 UR NO_2 J NO_3 J
	Formate		10/10/95	10/10/95	11	11	none
	CN		10/9/95	10/11/95	10	12	none
	pH		10/11/95	↓	12	12	J
↓	Sulfide	↓	10/6/95	10/6/95	7	7	none

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MEMORANDUM

TO: 183-H Basin D&D, Surface Removal Characterization Project QA Record — December 21, 1995

FR: Heidi Gregerson, Golder Associates Inc. HG

RE: TCLP METALS DATA VALIDATION SUMMARY FOR DATA PACKAGE W0747-QES (943-1610.111 747TCLP.HB)

INTRODUCTION

This memo presents the results of data validation for the analysis specified below on data package W0747-QES prepared by Quanterra Environmental Services. Sample information is provided in the following table.

SAMPLE ID	COMMENTS	ANALYSIS	MEDIA
B0GNX7		TCLP METALS	DRUM SOLIDS
B0GNY0			DRUM SOLIDS
B0GNY2		SEE ATTACHMENT 4	DRUM SOLIDS
B0GNY4			DRUM SOLIDS

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.

001

Data Package ID: W0747-QES Analysis: TCLP Metals

Completeness. The data package was complete for all requested analyses. A total of four samples were validated in this data package with a total of 32 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:

Holding Times

- The holding time for mercury was exceeded and associated samples were qualified. Attachments 2 and 5 provide a summary of samples affected, data qualifications applied and supporting documentation.

Blank Samples

- Arsenic and mercury were detected in the ICB and associated samples were qualified. 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.

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ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

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

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.

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ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

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

DATA QUALIFICATION SUMMARY - FORM B-7

SDG:W0747-QES	REVIEWER: H. Gregerson	DATE: 12-21-95	PAGE 1 OF 1
COMMENTS: TCLP METALS			
COMPOUND/ANALYTE	QUALIFIER	SAMPLES AFFECTED	REASON
ARSENIC	U	B0GNY0 B0GNY4	DETECTED IN ICB AT A POSITIVE CONCENTRATION
MERCURY	UJ	ALL SAMPLES	HOLDING TIME EXCEEDED AND DETECTED IN THE ICB AT A POSITIVE CONCENTRATION

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ATTACHMENT 3

QUALIFIED DATA SUMMARY and ANNOTATED LABORATORY REPORTS

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Validated Data Summary, Data Package: W0747-QES

	Sample #	B0GNX7		B0GNY0		B0GNY2		B0GNY4	
	Date	9/29/95		9/29/95		9/29/95		10/2/95	
	Location								
	Depth								
	Type	Drum Solid		Drum Solid		Drum Solid		Drum Solid	
	Comments	TCLP		TCLP		TCLP		TCLP	
Parameter	Units	Results	Q	Results	Q	Results	Q	Results	Q
ARSENIC	UG/L	151.000	U	202.000	U	151.000	U	260.000	U
BARIUM	UG/L	447.000	B	535.000	B	456.000	B	548.000	B
CADMIUM	UG/L	16.300	B	18.900	B	9.200	U	9.800	B
CHROMIUM	UG/L	106.000		298.000		14.800	U	304.000	
LEAD	UG/L	153.000	U	153.000	U	153.000	U	153.000	U
MERCURY	UG/L	0.100	UJ	0.130	UJ	0.120	UJ	0.110	UJ
SELENIUM	UG/L	170.000	U	351.000	B	170.000	U	170.000	U
SILVER	UG/L	24.000	U	24.000	U	32.200	B	24.000	U

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

Verified
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1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
B0GNX7

Lab Name: QUANTERRA_MO Contract: 550.105

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0790

Matrix (soil/water): WATER Lab Sample ID: P9487-006

Level (low/med): LOW Date Received: 10/02/95

% 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	151	U		P
7440-39-3	Barium	447	B		P
7440-43-9	Cadmium	16.3	B		P
7440-47-3	Chromium	106			P
7439-92-1	Lead	163	U		P
7439-97-6	Mercury	0.10	B		CV
7782-49-2	Selenium	170	U		P
7440-22-4	Silver	24.0	U		P

G

UJ

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Color After: Clarity After: Artifacts:

Comments:

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1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
B0GNY0

Lab Name: QUANTERRA_MO Contract: 550.105

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0790

Matrix (soil/water): WATER Lab Sample ID: P9487-008

Level (low/med): LOW Date Received: 10/02/95

% 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	202	B		P	G S
7440-39-3	Barium	535	B		P	
7440-43-9	Cadmium	18.9	B		P	
7440-47-3	Chromium	298			P	
7439-92-1	Lead	153	U		P	
7439-97-6	Mercury	0.13	B		CV	AJ
7782-49-2	Selenium	351	B		P	
7440-22-4	Silver	24.0	U		P	

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Comments:

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U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
B0GNY2

Lab Name: QUANTERRA_MO Contract: 550.105

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0790

Matrix (soil/water): WATER Lab Sample ID: P9487-010

Level (low/med): LOW Date Received: 10/02/95

% Solids: 0.0

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

CAS No.	Analyte	Concentration	C	Q	M	Q
7440-38-2	Arsenic	151	U		P	
7440-39-3	Barium	456	B		P	
7440-43-9	Cadmium	9.2	U		P	
7440-47-3	Chromium	14.8	U		P	
7439-92-1	Lead	153	U		P	
7439-97-6	Mercury	0.12	~~B~~		CV	UJ
7782-49-2	Selenium	170	U		P	
7440-22-4	Silver	32.2	B		P	

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Color After: Clarity After: Artifacts:

Comments:

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U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
B0GNY4

Lab Name: QUANTERRA_MO Contract: 550.105

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0790

Matrix (soil/water): WATER Lab Sample ID: P9491-003

Level (low/med): LOW Date Received: 10/03/95

% 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	260	B		P
7440-39-3	Barium	548	B		P
7440-43-9	Cadmium	9.8	B		P
7440-47-3	Chromium	304			P
7439-92-1	Lead	153	U		P
7439-97-6	Mercury	0.11	B		CV
7782-49-2	Selenium	170	U		P
7440-22-4	Silver	24.0	U		P

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Color After: Clarity After: Artifacts:

Comments:

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ATTACHMENT 4

LABORATORY NARRATIVE and CHAIN-OF-CUSTODY DOCUMENTATION

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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

November 16, 1995

Attention: Joan Kessner

Project number	:	550.105
Date Received by Lab	:	October 2 and 3, 1995
Number of Samples	:	Four (4)
Sample Type	:	Solid
SDG Number	:	W0790
Data Deliverable	:	Summary

I. Introduction

On October 31, 1995, additional analyses were requested on four (4) solid samples that were originally reported in two separate SDG's. The samples were identified with the following laboratory ID numbers corresponding to their specific client ID's:

St Louis ID	BHI ID	Richland ID	Matrix	Date of Receipt	Original SDG
9487-006	B0GNX7	51001006	Solid	10/02/95	W0747
9487-007	B0GNY0	51001008	Solid	10/02/95	W0747
9487-010	B0GNY2	51001010	Solid	10/02/95	W0747
9491-003	B0GNY4	51003403	Solid	10/03/95	W0751

This report contains only the data for the additional analyses.

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.

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HRG 12/21/95

Quanterra
Environmental
Services

Analyses requested: ICP metals by EPA method 6010 and Mercury by EPA method 7470 after TCLP extraction by EPA method 1311.

III. Quality Control

A Laboratory Control Sample and Method Blank were analyzed with each preparation batch.

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

Samples 9487-006, 9487-008, 9487-010 and 9491-003 required dilution due to interelement interferences. An interferant, in this case Calcium and Iron for samples 9487-006 and 9487-008 and Calcium only for 9487-010 and 9491-003, was interfering with the analysis of all the elements requested. The samples were diluted and reanalyzed without interference errors.

The TCLP protocol requires samples to be spiked before preservation. The Matrix Spike and Matrix Spike Duplicate for Mercury was prepped on a post preservation sample. See NCM # 94-SL-2116.

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Quanterra
Environmental
Services

Bechtel Hanford Incorporated
November 16, 1995
Project Number: 550.105
SDG: W0790
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
Quanterra Environmental Services, St. Louis
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CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 2

Date Turnaround: X Priority / Normal

Collector: D. Bowers, M. Hitchborn, W. Thompson, P. St. John	Company Contact: Dave Encke	Telephone: 373-3461
Project Designation: Concrete Removal Characterization	Sampling Location: 183-H Solar Evaporation Basin Project	SAF No.: B95-106
Ice Chest No.: ER-9	Field Logbook No.: EFL-1133-1	Method of Shipment: Hand Deliver - Government Vehicle
Shipped To: Quanterra	Offsite Property No.	Bill of Lading/Air Bill No.
Possible Sample Hazards/Remarks		

SAMPLE ANALYSIS: 510C10 — SDV 1001747

Sample No.	Matrix*	Date Sampled	Time Sampled	Preservation	Cool	Cool	Cool	Cool	None	None				
				Type of Container	A G	A G	A G	A G	G	P				
				No. of Container(s)	1	1	1	1	1	1				
Special Handling and/or Storage: Cool Samples to 4 Degrees Celsius				Volume	40 ml.	60 ml.	60 ml.	60 ml.	1 Liter	20 ml.				
					10% ICP Metals include Super-trace	100% Anions See Item 1 Below	100% Cyanide	100% Sulfide	510C01 See Item 2 Below	Activity Scan				
BOGNX2 01	DS	09-29-95	1345		X	X	X	X	X	X				
BOGNX3 02	DS	09-29-95	1404		X	X	X	X	X	X				
BOGNX4 03	DS	09-29-95	1420		X	X	X	X	X	X				
BOGNX5 04	DS	09-29-95	1437		X	X	X	X	X	X				
BOGNX6 05	DS	09-29-95	1455		X	X	X	X	X	X				
BOGNX7 06	DS	09-29-95	1459		X	X	X	X	X	X				

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
[signature]	10-2-95/0805	[signature] ER	0805
[signature] Bechtel 10-2-95	1130	[signature]	10/2/95 1130
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

Item 1 - Anions - ICF -- F, Cl, SO4, PO4, NO2, NO3, formate and pH

Item 2 - Gross Alpha, Gross Beta; u-234, -235, -238; Tc-99; 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 RECEIPT: Received By ____ Title ____ Date/Time ____

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

HKC 12/21/95

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BHI-00922 Rev. 0

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 2 of 2

Date Turnaround: X Priority / Normal

Collector: D. Bowers, M. Mahlhorn, W. Thompson, D. St. John	Company Contact: Dave Encke	Telephone: 373-3461
Project Designation: Concrete Removal Characterization	Sampling Location: 183-H Solar Evaporation Basin Project	SAF No.: B96-106
Ice Chest No.: 5R9	Field Logbook No.: EFL-1133-1	Method of Shipment: Hand Deliver - Government Vehicle
Shipped To: Quanterra	Offsite Property No.:	Bill of Lading/Air Bill No.:
Possible Sample Hazards/Remarks:	Special Handling and/or Storage: Cool Samples to 4 Degrees Celsius	

SAMPLE ANALYSIS: 51001C; 51001I; WC1111/17

Preservation	Cool	Cool	Cool	Cool	None	None				
Type of Container	AG	AG	AG	AG	G	P				
No. of Container(s)	1	1	1	1	1	1				
Volume	40 ml.	60 ml.	60 ml.	60 ml.	1 Liter	20 ml.				
SAMPLE ANALYSIS	ICP Metals Include Super-trace	Anions See Item 1 Below	Cyanide	Sulfide	51001I See Item 2 Below	Activity Scan				
Sample No. / Matrix* / Date Sampled / Time Sampled										
B06NX807 / DS / 09-29-95 / 1457	X	X	X	X	X	X				
B06NX9 / 9/29/95 DS										
B06NY008 / DS / 09-29-95 / 1515	X	X	X	X	X	X				
B06NY101 / DS / 09-29-95 / 1513	X	X	X	X	X	X				
B06NY210 / DS / 09-29-95 / 1515	X	X	X	X	X	X				
	100%	100%	100%	100%						

Relinquished By / Date/Time	Received By / Date/Time
J. Bowers 10-2-95 / 0809	[illegible] Bechtel 10-2-95
[illegible] Bechtel 10-2-95 1130	[illegible] 10/2/95 1130
Relinquished By / Date/Time	Received By / Date/Time
Relinquished By / Date/Time	Received By / Date/Time

SPECIAL INSTRUCTIONS

Item 1 - Anoins - ICF -- F, Cl, SO4, PO4, NO2, NO3, formate and pH

Item 2 - Gross Alpha, Gross Beta; u-234, -235, -238; Tc-99; 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 RECEIPT: Received By / Title / Date/Time

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

G-122

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HICG 12/21/95

-0000015

BHI-00922 Rev. 0

Bechtel Hanford, Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	Page 1 of 2
		Date Turnaround: X Priority / Normal

Collector: D Bauers, M. Mehlhorn	Company Contact: Dave Encke	Telephone: 373-3461
Project Designation: Concrete Removal Characterization	Sampling Location: 183-H Solar Evaporation Basin Project	SAF No.: 895-106
Ice Chest No.: EL-20	Field Logbook No.	Method of Shipment: Hand Deliver - 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: Cool Samples to 4 Degrees Celsius	

SAMPLE ANALYSIS	Preservation	Cool	Cool	Cool	Cool	None	None				
	Type of Container	A-G	A-G	A-G	A-G	G	P				
	No. of Container(s)	1	1	1	1	1	1				
	Volume	40 ml.	60 ml.	60 ml.	60 ml.	1 Liter	20 ml.				
		ICP Metals Include Super trace 5%	Anions See Item 1 Below 100% 5/100	Cyanide 100% 3	Sulfide 100%	See Item 2 Below 5/100	Activity Scan 35				
Sample No.	Matrix*	Date Sampled	Time Sampled								
B0GNX9	DS	10-2-95	1305	✓	✓	✓	✓	✓	✓	01	
B0GNN3	DS	10-2-95	1330	✓	✓	✓	✓	✓	✓	2	
B0GNY4	DS	10-2-95	1353	✓	✓	✓	✓	✓	✓	3	
B0GNY5	DS	10-2-95	1410	✓	✓	✓	✓	✓	✓	4	
B0GNY6	DS	10-2-95	1410	✓	✓	✓	✓	✓	✓	5	
B0GNY7	DS	10-2-95	1435	✓ ✓	✓ ✓	✓	✓ ✓	✓	✓	6	

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By: Mandy Mehlhorn Date/Time: 10-2-95 1700	Received By: D St. John ERC Date/Time: 10-2-95 1700		
Relinquished By: D St. John ERC Date/Time: 10-3-95 1140	Received By: ERC Date/Time: 1140		
Relinquished By: ERC Date/Time: 10-3-95 12:10	Received By: Date/Time: 10-3-95		
Relinquished By: Date/Time:	Received By: Date/Time:		

SPECIAL INSTRUCTIONS

Item 1 - Anoins - ICF -- F, Cl, SO4, PO4, NO2, NO3, formate and pH

Item 2 - Gross Alpha, Gross Beta; u-234, -235, -238; To-99; Gamma Spec.

SDG W0751

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

0000033
IRC 12/21/95

G-123

019

9713540.2138

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ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

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INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 183H Basin O & D			DATA PACKAGE: LW0747-QES		
VALIDATOR: H. GREGERSEN		LAB: QUANTERRA		DATE: 12/21/95	
CASE:			SDG:		
ANALYSES PERFORMED					
☐ CLP/ICP	☐ CLP/GFAA	☐ CLP/Hg	☐ CLP/Cyanide	☒ TCLP Metals	☐
☐ SW-846/ICP	☐ SW-846/GFAA	☐ SW-846/Hg	☐ SW-846 Cyanide	☐	☐
SAMPLES/MATRIX B0GNX7 B0GNY0 B0GNY2 B0GNY4					
~~WATER~~ B: DRUM SOLIDS					

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 1.

Comments:

1. The holding time for Hg was exceeded and associated samples J were qualified. See supporting documents.

021

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 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 and Hg were detected in the ICB and associated samples were qualified. See supporting documents.

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:

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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:_____

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HOLDING TIME SUMMARY

SDG: L00747-QE3	VALIDATOR: HEIDI EGGERSON	DATE: 12/21/95	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
BDGNX7	TCLP Metals	9/29/95	11/6/95	11/7/95	38	39	none
BDGNY0					38	39	none
BDGNY2					38	39	none
BDGNY4		10/2/95			35	36	none
BDGNX7	CN Hg	9/29/95			38	39	UJ
BDGNY0	CN Hg				38	39	UJ
BDGNY2	Hg CN				38	39	UJ
BDGNY4	CN Hg	10/2/95			35	36	UJ

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BHI-00922
Rev. 0

3
BLANKS

Lab Name: QUANTERRA_MO_____ Contract: 550.105___

Lab Code: ITMO__ Case No.: _____ SAS No.: _____ SDG No.: W0790_____

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L_

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Arsenic	57.7	B	45.4	B	37.7	U	37.7	U	37.700	U	P
Barium	0.8	U	0.8	U	0.9	B	0.9	B	0.800	U	P
Cadmium	2.3	U	2.3	U	2.8	B	2.3	U	2.300	U	P
Chromium	3.7	U	3.7	U	3.7	U	3.7	U	3.700	U	P
Lead	38.2	U	38.2	U	38.2	U	38.2	U	38.200	U	P
Mercury	0.1	B	0.1	B	0.1	U	0.1	U	0.100	B	CV
Selenium	42.6	U	42.6	U	42.6	U	42.6	U	42.600	U	P
Silver	6.0	U	6.0	U	6.0	U	6.0	U	6.000	U	P

As BOGNYO
BOGNY4

Hg All samples

FORM III - IN

TCLP

HCG 12/21/95

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MEMORANDUM

TO: 183-H Basin D&D, Surface Removal Characterization Project QA Record December 21, 1995

FR: Heidi Gregerson, Golder Associates Inc.

RE: RADIOCHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE W0747-QES (943-1610.111 747RAD.HB)

INTRODUCTION

This memo presents the results of data validation for the analysis specified below on data package W0747-QES prepared by Quanferra Environmental Services. Sample information is provided in the following table.

SAMPLE ID	COMMENTS	ANALYSIS	MEDIA
B0GNX2		RADIOCHEMISTRY	DRUM SOLID
B0GNX3			DRUM SOLID
B0GNX4		SEE ATTACHMENT 4	DRUM SOLID
B0GNX5			DRUM SOLID
B0GNX6			DRUM SOLID
B0GNX7			DRUM SOLID
B0GNX8			DRUM SOLID
B0GNY0			DRUM SOLID
B0GNY1			DRUM SOLID
B0GNY2			DRUM SOLID

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, with the exception of those deficiencies listed below.

001

Data Package ID: W0747-QES Analysis: RADIOCHEMISTRY

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 ten samples were validated in this data package with a total of 212 determinations reported, 202 of which were deemed valid. This results in a completeness of 95 percent, which meets the 90 percent objective of the work plan.

MAJOR DEFICIENCIES

The following major deficiencies were identified during data validation which required qualification of data as unusable:

Laboratory Control Sample

- The LCS percent recovery for uranium 235 (alpha spectroscopy) 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.

MINOR DEFICIENCIES

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

Laboratory Control Sample

- The LCS percent recovery for uranium 238DLP 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.

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).

002

Data Package ID: W0747-OES Analysis: RADIOCHEMISTRY

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.

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ATTACHMENT 1

GLOSSARY AND DATA REPORTING QUALIFIERS

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ATTACHMENT 1

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 sample 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 result reported may not accurately reflect the sample concentration. 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 not 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

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

DATA QUALIFICATION SUMMARY - FORM B-7

SDG: W0747-QES	REVIEWER: H. Gregerson	DATE: 12-21-95	PAGE 1 OF 1
COMMENTS: RADIOCHEMISTRY			
COMPOUND/ANALYTE	QUALIFIER	SAMPLES AFFECTED	REASON
U-235 (ALPHA SPEC)	R	ALL SAMPLES	LCS RECOVERY WAS BELOW THE CONTROL LIMIT
U-238DLR	J	ALL SAMPLES	LCS RECOVERY WAS ABOVE THE CONTROL LIMIT

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ATTACHMENT 3

QUALIFIED DATA SUMMARY and ANNOTATED LABORATORY REPORTS

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Validated Data Summary, Data Package: W0747-QES

	Sample #	B0GNX2		B0GNX3		B0GNX4		B0GNX5		B0GNX6		B0GNX7		B0GNX8	
	Date	9/29/95		9/29/95		9/29/95		9/29/95		9/29/95		9/29/95		9/29/95	
	Location														
	Depth														
	Type	Drum Solid		Drum Solid		Drum Solid		Drum Solid		Drum Solid		Drum Solid		Drum Solid	
	Comments														
Parameter	Units	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
URANIUM-235	pCi/G	2.500	R	1.240	R	3.360	R	45.800	R	5.010	R	5.720	R	5.670	R
URANIUM-234	pCi/G	19.900		9.570		28.700		458.000		63.100		54.200		55.900	
URANIUM-238DA	pCi/G	16.700		10.300		24.000		329.000		45.400		41.600		39.900	
BERYLLIUM-7	pCi/G					0.435				0.089				0.122	
COBALT-58	pCi/G	0.001	U	-0.001	U	-0.003	U	0.001	U	0.007	U	0.002	U	-0.001	U
COBALT-60	pCi/G	0.007		0.004	U	0.121		0.017		0.010	U	0.020		0.008	U
CESIUM-137DA	pCi/G	0.130		0.120		3.100		0.062		0.053		0.095		0.031	
EUROPIUM-152	pCi/G	0.000	U	0.004	U	-0.040	U	0.003	U	0.003	U	-0.012	U	-0.013	U
EUROPIUM-154	pCi/G	0.008	U	0.005	U	-0.029	U	-0.001	U	0.014	U	0.016	U	-0.012	U
EUROPIUM-155	pCi/G	0.014	U	0.008	U	0.094		0.134		0.055		0.019	U	0.094	
IRON-59	pCi/G	0.004	U	0.003	U	0.011	U	-0.011	U	0.006	U	-0.003	U	0.008	U
POTASSIUM-40	pCi/G	0.937		2.390		9.420		3.480		4.590		5.770		4.230	
RADIUM-224DA	pCi/G	0.038		0.102		0.437		0.169		0.222		0.154		0.223	
RADIUM-226DA	pCi/G	0.047		0.124		0.327		0.185		0.197		0.168		0.264	
RADIUM-228DA	pCi/G	0.038		0.124		0.404				0.211		0.153		0.211	
URANIUM-235	pCi/G	0.095		0.130		1.210		2.170		1.340		0.686		1.210	
URANIUM-238DLP	pCi/G	0.399	J	1.470	J	17.600	J	16.300	J	11.800	J	4.830	J	11.400	J
GROSS ALPHA	pCi/G	25.400		16.900		34.400		159.000		62.000		58.900		58.100	
GROSS BETA	pCi/G	39.500		72.000		63.000		170.000		76.000		65.500		63.700	
TECHNETIUM-99	pCi/G	39.700		440.000		93.500		25.600		24.600		56.100		19.100	

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

Verified
HBG 12/22/95

Validated Data Summary, Data Package: W0747-QES

	Sample #	B0GNY0		B0GNY1		B0GNY2	
	Date	9/29/95		9/29/95		9/29/95	
	Location						
	Depth						
	Type	Drum Solid		Drum Solid		Drum Solid	
	Comments						
Parameter	Units	Results	Q	Results	Q	Results	Q
URANIUM-235	pCi/G	0.536	R	6.290	R	1.810	R
URANIUM-234	pCi/G	5.930		65.600		16.900	
URANIUM-238DA	pCi/G	5.110		46.500		15.400	
BERYLLIUM-7	pCi/G	0.082					
COBALT-58	pCi/G	0.003	U	-0.007	U	0.005	U
COBALT-60	pCi/G	0.031		0.012	U	0.015	U
CESIUM-137DA	pCi/G	0.483		0.205		0.388	
EUROPIUM-152	pCi/G	-0.005	U	-0.011	U	-0.011	U
EUROPIUM-154	pCi/G	0.008	U	0.020	U	-0.016	U
EUROPIUM-155	pCi/G	0.028	U	0.121		0.059	
IRON-59	pCi/G	0.001	U	-0.015	U	-0.019	U
POTASSIUM-40	pCi/G	4.250		8.540		5.500	
RADIUM-224DA	pCi/G	0.198		0.412		0.253	
RADIUM-226DA	pCi/G	0.234		0.421		0.288	
RADIUM-228DA	pCi/G	0.225		0.420		0.264	
URANIUM-235	pCi/G	0.072		1.910		0.681	
URANIUM-238DLP	pCi/G	0.579	J	22.800	J	9.000	J
GROSS ALPHA	pCi/G	13.300		77.400		19.000	
GROSS BETA	pCi/G	22.000		86.200		58.100	
TECHNETIUM-99	pCi/G	34.900		25.100		199.000	

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

Verified
per specs

030

Quanterra
Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	**SDG:**	W0747
LAB SAMPLE ID:	51001101	**MATRIX:**	OTHER
CLIENT ID:	B0GNX2	**DATE RECEIVED:**	10/2/95 11:30:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
U-235	2.50E+00 R	N/A	5.8E-01	4.85E-02	pCi/g	45.90%	RD3234
U-234	1.99E+01	8.5E-01	4.1E+00	5.39E-02	pCi/g	45.90%	RD3234
U-238DA	1.67E+01	7.8E-01	3.4E+00	4.85E-02	pCi/g	45.90%	RD3234
CO-58	1.18E-03 U	2.2E-03	2.2E-03	4.09E-03	pCi/g	N/A	RD3219
CO-60	6.64E-03	2.8E-03	2.9E-03	6.15E-03	pCi/g	N/A	RD3219
CS-137DA	1.30E-01	9.1E-03	1.6E-02	N/A	pCi/g	N/A	RD3219
EU-152	3.72E-04 U	7.1E-03	7.1E-03	1.18E-02	pCi/g	N/A	RD3219
EU-154	7.82E-03 U	7.3E-03	7.3E-03	1.43E-02	pCi/g	N/A	RD3219
EU-155	1.42E-02 U	9.8E-03	9.8E-03	1.66E-02	pCi/g	N/A	RD3219
FE-59	3.73E-03 U	4.5E-03	4.5E-03	8.66E-03	pCi/g	N/A	RD3219
K-40	9.37E-01	9.2E-02	1.3E-01	N/A	pCi/g	N/A	RD3219
RA-224DA	3.83E-02	7.8E-03	8.7E-03	N/A	pCi/g	N/A	RD3219
RA-226DA	4.70E-02	1.0E-02	1.1E-02	N/A	pCi/g	N/A	RD3219
RA-228DA	3.75E-02	1.3E-02	1.3E-02	N/A	pCi/g	N/A	RD3219
U-235	9.54E-02	3.1E-02 R	3.3E-02	N/A	pCi/g	N/A	RD3219
U-238DLP	3.99E-01 J	1.9E-01 J	2.0E-01	N/A	pCi/g	N/A	RD3219
ALPHA	2.54E+01	7.0E+00	7.5E+00	4.75E+00	pCi/g	100.00%	RD3222
BETA	3.95E+01	4.4E+00	5.1E+00	3.70E+00	pCi/g	100.00%	RD3222
TC-99	3.97E+01	2.6E+00	8.0E+00	3.61E+00	pCi/g	95.10%	ITAS-IT-RS-0001

Number of Results: 19

011

HRG 12/27/95
~~C006~~

Quanterra
Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	**SDG:**	W0747
LAB SAMPLE ID:	51001102	**MATRIX:**	OTHER
CLIENT ID:	B0GNX3	**DATE RECEIVED:**	10/2/95 11:30:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
U-235	1.24E+00 R	N/A	4.0E-01	1.59E-01	pCi/g	69.70%	RD3234
U-234	9.57E+00	9.3E-01	1.9E+00	1.45E-01	pCi/g	69.70%	RD3234
U-238DA	1.03E+01	9.6E-01	2.0E+00	1.20E-01	pCi/g	69.70%	RD3234
CO-58	-1.26E-03 U	4.0E-03	4.0E-03	6.65E-03	pCi/g	N/A	RD3219
CO-60	3.87E-03 U	5.6E-03	5.6E-03	9.77E-03	pCi/g	N/A	RD3219
CS-137DA	1.20E-01	1.1E-02	1.6E-02	N/A	pCi/g	N/A	RD3219
EU-152	4.44E-03 U	1.2E-02	1.2E-02	1.84E-02	pCi/g	N/A	RD3219
EU-154	4.65E-03 U	1.4E-02	1.4E-02	2.45E-02	pCi/g	N/A	RD3219
EU-155	8.37E-03 U	1.7E-02	1.7E-02	2.60E-02	pCi/g	N/A	RD3219
FE-59	2.69E-03 U	9.5E-03	9.5E-03	1.61E-02	pCi/g	N/A	RD3219
K-40	2.39E+00	1.7E-01	2.9E-01	N/A	pCi/g	N/A	RD3219
RA-224DA	1.02E-01	1.1E-02	1.5E-02	N/A	pCi/g	N/A	RD3219
RA-226DA	1.24E-01	1.6E-02	2.0E-02	N/A	pCi/g	N/A	RD3219
RA-228DA	1.24E-01	2.8E-02	3.0E-02	N/A	pCi/g	N/A	RD3219
U-235	1.30E-01	4.0E-02 R	4.2E-02	N/A	pCi/g	N/A	RD3219
U-238DLP	1.47E+00 J	4.1E-01 R	4.3E-01	N/A	pCi/g	N/A	RD3219
ALPHA	1.69E+01	5.9E+00	6.1E+00	5.22E+00	pCi/g	100.00%	RD3222
BETA	7.20E+01	5.7E+00	7.4E+00	3.80E+00	pCi/g	100.00%	RD3222
TC-99	4.40E+02	7.0E+00	5.0E+01	3.61E+00	pCi/g	95.10%	ITAS-IT-RS-0001

Number of Results: 19

012

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Quanterra Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	**SDG:**	W0747
LAB SAMPLE ID:	51001103	**MATRIX:**	OTHER
CLIENT ID:	B0GNX4	**DATE RECEIVED:**	10/2/95 11:30:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
U-235	3.36E+00	N/A	7.0E-01	7.80E-02	pCi/g	73.40%	RD3234
U-234	2.87E+01	1.2E+00	4.9E+00	8.91E-02	pCi/g	73.40%	RD3234
U-238DA	2.40E+01	1.1E+00	4.2E+00	7.80E-02	pCi/g	73.40%	RD3234
BE-7	4.35E-01	2.3E-01	2.4E-01	N/A	pCi/g	N/A	RD3219
CO-58	-2.66E-03 U	1.2E-02	1.2E-02	1.99E-02	pCi/g	N/A	RD3219
CO-60	1.21E-01	2.3E-02	2.6E-02	N/A	pCi/g	N/A	RD3219
CS-137DA	3.10E+00	7.6E-02	3.2E-01	N/A	pCi/g	N/A	RD3219
EU-152	-4.04E-02 U	4.0E-02	4.0E-02	6.32E-02	pCi/g	N/A	RD3219
EU-154	-2.87E-02 U	3.8E-02	3.8E-02	6.04E-02	pCi/g	N/A	RD3219
EU-155	9.44E-02	5.2E-02	5.3E-02	8.73E-02	pCi/g	N/A	RD3219
FE-59	1.11E-02 U	2.7E-02	2.7E-02	4.79E-02	pCi/g	N/A	RD3219
K-40	9.42E+00	5.2E-01	1.1E+00	N/A	pCi/g	N/A	RD3219
RA-224DA	4.37E-01	4.1E-02	6.0E-02	N/A	pCi/g	N/A	RD3219
RA-226DA	3.27E-01	5.5E-02	6.4E-02	N/A	pCi/g	N/A	RD3219
RA-228DA	4.04E-01	8.9E-02	9.7E-02	N/A	pCi/g	N/A	RD3219
U-235	1.21E+00	1.5E-01	1.9E-01	N/A	pCi/g	N/A	RD3219
U-238DLP	1.76E+01 J	1.7E+00	2.4E+00	N/A	pCi/g	N/A	RD3219
ALPHA	3.44E+01	8.1E+00	8.9E+00	5.00E+00	pCi/g	100.00%	RD3222
BETA	6.30E+01	5.4E+00	6.8E+00	3.80E+00	pCi/g	100.00%	RD3222
TC-99	9.35E+01	3.5E+00	1.3E+01	3.61E+00	pCi/g	95.10%	ITAS-IT-RS-0001

Number of Results: 20

013

12/22/95

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Quanterra
Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	**SDG:**	W0747
LAB SAMPLE ID:	51001104	**MATRIX:**	OTHER
CLIENT ID:	B0GNX5	**DATE RECEIVED:**	10/2/95 11:30:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
U-235	4.58E+01	N/A	1.3E+01	5.00E-01	pCi/g	24.70%	RD3234
U-234	4.58E+02	1.3E+01	1.2E+02	5.00E-01	pCi/g	24.70%	RD3234
U-238DA	3.29E+02	1.1E+01	8.9E+01	5.00E-01	pCi/g	24.70%	RD3234
CO-58	8.54E-04 U	5.2E-03	5.2E-03	8.97E-03	pCi/g	N/A	RD3219
CO-60	1.68E-02	5.5E-03	5.8E-03	1.15E-02	pCi/g	N/A	RD3219
CS-137DA	6.24E-02	1.1E-02	1.3E-02	N/A	pCi/g	N/A	RD3219
EU-152	3.38E-03 U	1.6E-02	1.6E-02	2.61E-02	pCi/g	N/A	RD3219
EU-154	-9.50E-04 U	1.4E-02	1.4E-02	2.41E-02	pCi/g	N/A	RD3219
EU-155	1.34E-01	3.2E-02	3.5E-02	5.44E-02	pCi/g	N/A	RD3219
FE-59	-1.11E-02 U	1.1E-02	1.1E-02	1.70E-02	pCi/g	N/A	RD3219
K-40	3.48E+00	1.9E-01	4.0E-01	N/A	pCi/g	N/A	RD3219
RA-224DA	1.69E-01	1.8E-02	2.5E-02	N/A	pCi/g	N/A	RD3219
RA-226DA	1.85E-01	2.2E-02	2.9E-02	N/A	pCi/g	N/A	RD3219
U-235	2.17E+00	1.1E-01	2.4E-01	N/A	pCi/g	N/A	RD3219
U-238DLP	1.63E+01 U	6.6E-01	1.8E+00	N/A	pCi/g	N/A	RD3219
ALPHA	1.59E+02	1.7E+01	2.4E+01	4.20E+00	pCi/g	100.00%	RD3222
BETA	1.70E+02	8.6E+00	1.4E+01	3.71E+00	pCi/g	100.00%	RD3222
TC-99	2.56E+01	2.3E+00	6.6E+00	3.61E+00	pCi/g	95.10%	ITAS-IT-RS-0001

Number of Results: 18

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Quanterra
Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	**SDG:**	W0747
LAB SAMPLE ID:	51001105	**MATRIX:**	OTHER
CLIENT ID:	B0GNX6	**DATE RECEIVED:**	10/2/95 11:30:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
U-235	5.01E+00 R	N/A	1.0E+00	9.63E-02	pCi/g	72.20%	RD3234
U-234	6.31E+01	1.9E+00	1.1E+01	1.09E-01	pCi/g	72.20%	RD3234
U-238DA	4.54E+01	1.7E+00	7.9E+00	1.09E-01	pCi/g	72.20%	RD3234
BE-7	8.85E-02	6.2E-02	6.2E-02	N/A	pCi/g	N/A	RD3219
CO-58	-6.81E-03 U	6.0E-03	6.0E-03	9.50E-03	pCi/g	N/A	RD3219
CO-60	9.89E-03 U	7.5E-03	7.6E-03	1.37E-02	pCi/g	N/A	RD3219
CS-137DA	5.27E-02	1.2E-02	1.3E-02	N/A	pCi/g	N/A	RD3219
EU-152	-3.34E-03 U	1.6E-02	1.6E-02	2.73E-02	pCi/g	N/A	RD3219
EU-154	1.36E-02 U	1.9E-02	1.9E-02	3.36E-02	pCi/g	N/A	RD3219
EU-155	5.46E-02	3.0E-02	3.1E-02	5.09E-02	pCi/g	N/A	RD3219
FE-59	-6.06E-03 U	1.3E-02	1.3E-02	2.06E-02	pCi/g	N/A	RD3219
K-40	4.59E+00	2.4E-01	5.2E-01	N/A	pCi/g	N/A	RD3219
RA-224DA	2.22E-01	1.9E-02	2.9E-02	N/A	pCi/g	N/A	RD3219
RA-226DA	1.97E-01	2.5E-02	3.2E-02	N/A	pCi/g	N/A	RD3219
RA-228DA	2.11E-01	4.2E-02	4.7E-02	N/A	pCi/g	N/A	RD3219
U-235	1.34E+00 R	1.0E-01	1.7E-01	N/A	pCi/g	N/A	RD3219
U-238DLP	1.18E+01 J	7.9E-01	1.4E+00	N/A	pCi/g	N/A	RD3219
ALPHA	6.20E+01	1.1E+01	1.3E+01	4.87E+00	pCi/g	100.00%	RD3222
BETA	7.60E+01	5.9E+00	7.7E+00	3.96E+00	pCi/g	100.00%	RD3222
TC-99	2.46E+01	2.3E+00	6.5E+00	3.61E+00	pCi/g	95.10%	ITAS-IT-RS-0001

Number of Results: 20

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Quanterra
Environmental
Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	**SDG:**	W0747
LAB SAMPLE ID:	51001106	**MATRIX:**	OTHER
CLIENT ID:	B0GNX7	**DATE RECEIVED:**	10/2/95 11:30:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
U-235	5.72E+00	N/A	1.2E+00	9.09E-02	pCi/g	65.60%	RD3234
U-234	5.42E+01	1.9E+00	9.6E+00	1.11E-01	pCi/g	65.60%	RD3234
U-238DA	4.16E+01	1.6E+00	7.4E+00	8.02E-02	pCi/g	65.60%	RD3234
CO-58	2.24E-03 U	4.8E-03	4.8E-03	8.27E-03	pCi/g	N/A	RD3219
CO-60	1.96E-02	6.4E-03	6.7E-03	1.26E-02	pCi/g	N/A	RD3219
CS-137DA	9.49E-02	1.3E-02	1.6E-02	N/A	pCi/g	N/A	RD3219
EU-152	-1.16E-02 U	1.4E-02	1.4E-02	2.26E-02	pCi/g	N/A	RD3219
EU-154	1.60E-02 U	1.6E-02	1.6E-02	2.79E-02	pCi/g	N/A	RD3219
EU-155	1.85E-02 U	2.3E-02	2.3E-02	3.79E-02	pCi/g	N/A	RD3219
FE-59	-3.24E-03 U	1.2E-02	1.2E-02	1.98E-02	pCi/g	N/A	RD3219
K-40	5.77E+00	2.3E-01	6.2E-01	N/A	pCi/g	N/A	RD3219
RA-224DA	1.54E-01	1.5E-02	2.2E-02	N/A	pCi/g	N/A	RD3219
RA-226DA	1.68E-01	2.0E-02	2.6E-02	N/A	pCi/g	N/A	RD3219
RA-228DA	1.53E-01	3.9E-02	4.2E-02	N/A	pCi/g	N/A	RD3219
U-235	6.86E-01	6.4E-02	9.4E-02	N/A	pCi/g	N/A	RD3219
U-238DLP	4.83E+00 J	5.1E-01	7.1E-01	N/A	pCi/g	N/A	RD3219
ALPHA	5.89E+01	1.1E+01	1.2E+01	4.75E+00	pCi/g	100.00%	RD3222
BETA	6.55E+01	5.5E+00	7.0E+00	3.70E+00	pCi/g	100.00%	RD3222
TC-99	5.61E+01	2.9E+00	9.6E+00	3.61E+00	pCi/g	95.10%	ITAS-IT-RS-0001

Number of Results: 19

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Quanterra
Environmental
Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	**SDG:**	W0747
LAB SAMPLE ID:	51001107	**MATRIX:**	OTHER
CLIENT ID:	B0GNX8	**DATE RECEIVED:**	10/2/95 11:30:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
U-235	5.67E+00 R	N/A	1.2E+00	1.14E-01	pCi/g	64.20%	RD3234
U-234	5.59E+01	1.9E+00	1.0E+01	1.18E-01	pCi/g	64.20%	RD3234
U-238DA	3.99E+01	1.6E+00	7.2E+00	1.11E-01	pCi/g	64.20%	RD3234
BE-7	1.22E-01	9.4E-02	9.5E-02	N/A	pCi/g	N/A	RD3219
CO-58	-5.76E-04 U	6.8E-03	6.8E-03	1.15E-02	pCi/g	N/A	RD3219
CO-60	7.69E-03 U	5.4E-03	5.5E-03	1.09E-02	pCi/g	N/A	RD3219
CS-137DA	3.09E-02	9.4E-03	9.9E-03	N/A	pCi/g	N/A	RD3219
EU-152	-1.31E-02 U	1.8E-02	1.8E-02	2.81E-02	pCi/g	N/A	RD3219
EU-154	-1.23E-02 U	1.9E-02	1.9E-02	2.95E-02	pCi/g	N/A	RD3219
EU-155	9.36E-02	3.4E-02	3.5E-02	5.69E-02	pCi/g	N/A	RD3219
FE-59	7.82E-03 U	1.4E-02	1.4E-02	2.53E-02	pCi/g	N/A	RD3219
K-40	4.23E+00	2.6E-01	5.0E-01	N/A	pCi/g	N/A	RD3219
RA-224DA	2.23E-01	1.9E-02	3.0E-02	N/A	pCi/g	N/A	RD3219
RA-226DA	2.64E-01	2.9E-02	3.9E-02	N/A	pCi/g	N/A	RD3219
RA-228DA	2.11E-01	5.1E-02	5.5E-02	N/A	pCi/g	N/A	RD3219
U-235	1.21E+00 J	1.1E-01	1.7E-01	N/A	pCi/g	N/A	RD3219
U-238DLP	1.14E+01 J	9.8E-01	1.5E+00	N/A	pCi/g	N/A	RD3219
ALPHA	5.81E+01	1.0E+01	1.2E+01	3.71E+00	pCi/g	100.00%	RD3222
BETA	6.37E+01	5.4E+00	6.9E+00	3.92E+00	pCi/g	100.00%	RD3222
TC-99	1.91E+01	2.1E+00	6.0E+00	3.61E+00	pCi/g	95.10%	ITAS-IT-RS-0001

Number of Results: 20

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Quanterra
Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	**SDG:**	W0747
LAB SAMPLE ID:	51001108	**MATRIX:**	OTHER
CLIENT ID:	B0GNY0	**DATE RECEIVED:**	10/2/95 11:30:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
U-235	5.36E-01 R	N/A	1.6E-01	3.96E-02	pCi/g	59.50%	RD3234
U-234	5.93E+00	4.1E-01	1.1E+00	3.96E-02	pCi/g	59.50%	RD3234
U-238DA	5.11E+00	3.8E-01	9.9E-01	3.74E-02	pCi/g	59.50%	RD3234
BE-7	8.19E-02	6.8E-02	6.8E-02	N/A	pCi/g	N/A	RD3219
CO-58	3.29E-03 U	5.1E-03	5.1E-03	9.02E-03	pCi/g	N/A	RD3219
CO-60	3.07E-02	8.9E-03	9.4E-03	N/A	pCi/g	N/A	RD3219
CS-137DA	4.83E-01	1.9E-02	5.2E-02	N/A	pCi/g	N/A	RD3219
EU-152	-5.40E-03 U	1.6E-02	1.6E-02	2.51E-02	pCi/g	N/A	RD3219
EU-154	8.30E-03 U	1.9E-02	1.9E-02	3.09E-02	pCi/g	N/A	RD3219
EU-155	2.81E-02 U	1.9E-02	1.9E-02	2.93E-02	pCi/g	N/A	RD3219
FE-59	5.57E-04 U	1.2E-02	1.2E-02	2.06E-02	pCi/g	N/A	RD3219
K-40	4.25E+00	2.2E-01	4.8E-01	N/A	pCi/g	N/A	RD3219
RA-224DA	1.98E-01	1.4E-02	2.4E-02	N/A	pCi/g	N/A	RD3219
RA-226DA	2.34E-01	2.2E-02	3.2E-02	N/A	pCi/g	N/A	RD3219
RA-228DA	2.25E-01	3.7E-02	4.3E-02	N/A	pCi/g	N/A	RD3219
U-235	7.19E-02 R	4.5E-02	4.6E-02	N/A	pCi/g	N/A	RD3219
U-238DLP	5.79E-01 J	3.5E-01	3.5E-01	N/A	pCi/g	N/A	RD3219
ALPHA	1.33E+01	5.3E+00	5.5E+00	5.23E+00	pCi/g	100.00%	RD3222
BETA	2.20E+01	3.4E+00	3.7E+00	3.80E+00	pCi/g	100.00%	RD3222
TC-99	3.49E+01	2.5E+00	7.5E+00	3.61E+00	pCi/g	95.10%	ITAS-IT-RS-0001

Number of Results: 20

018

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Quanterra
Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	**SDG:**	W0747
LAB SAMPLE ID:	51001109	**MATRIX:**	OTHER
CLIENT ID:	B0GNY1	**DATE RECEIVED:**	10/2/95 11:30:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
U-235	6.29E+00 R	N/A	1.3E+00	1.33E-01	pCi/g	65.40%	RD3234
U-234	6.56E+01	2.6E+00	1.2E+01	1.61E-01	pCi/g	65.40%	RD3234
U-238DA	4.65E+01	2.2E+00	8.3E+00	1.48E-01	pCi/g	65.40%	RD3234
CO-58	-6.61E-03 U	8.3E-03	8.3E-03	1.34E-02	pCi/g	N/A	RD3219
CO-60	1.18E-02 U	8.3E-03	8.4E-03	1.57E-02	pCi/g	N/A	RD3219
CS-137DA	2.05E-01	1.7E-02	2.7E-02	N/A	pCi/g	N/A	RD3219
EU-152	-1.12E-02 U	2.2E-02	2.2E-02	3.52E-02	pCi/g	N/A	RD3219
EU-154	2.00E-02 U	2.6E-02	2.6E-02	4.51E-02	pCi/g	N/A	RD3219
EU-155	1.21E-01	3.8E-02	3.9E-02	6.47E-02	pCi/g	N/A	RD3219
FE-59	-1.51E-02 U	1.8E-02	1.8E-02	2.84E-02	pCi/g	N/A	RD3219
K-40	8.54E+00	3.5E-01	9.2E-01	N/A	pCi/g	N/A	RD3219
RA-224DA	4.12E-01	2.5E-02	4.8E-02	N/A	pCi/g	N/A	RD3219
RA-226DA	4.21E-01	3.3E-02	5.4E-02	N/A	pCi/g	N/A	RD3219
RA-228DA	4.20E-01	6.5E-02	7.7E-02	N/A	pCi/g	N/A	RD3219
U-235	1.91E+00 R	1.3E-01	2.3E-01	N/A	pCi/g	N/A	RD3219
U-238DLP	2.28E+01 J	1.0E+00	2.5E+00	N/A	pCi/g	N/A	RD3219
ALPHA	7.74E+01	1.2E+01	1.5E+01	5.00E+00	pCi/g	100.00%	RD3222
BETA	8.62E+01	6.2E+00	8.4E+00	3.81E+00	pCi/g	100.00%	RD3222
TC-99	2.51E+01	2.3E+00	6.6E+00	3.61E+00	pCi/g	95.10%	ITAS-IT-RS-0001

Number of Results: 19

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Quanterra
Environmental
Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	**SDG:**	W0747
LAB SAMPLE ID:	51001110	**MATRIX:**	OTHER
CLIENT ID:	B0GNY2	**DATE RECEIVED:**	10/2/95 11:30:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
U-235	1.81E+00	N/A	4.3E-01	6.64E-02	pCi/g	74.50%	RD3234
U-234	1.69E+01	9.5E-01	2.9E+00	7.11E-02	pCi/g	74.50%	RD3234
U-238DA	1.54E+01	9.1E-01	2.7E+00	7.11E-02	pCi/g	74.50%	RD3234
CO-58	5.30E-03 U	7.0E-03	7.0E-03	1.29E-02	pCi/g	N/A	RD3219
CO-60	1.46E-02 U	9.2E-03	9.3E-03	1.80E-02	pCi/g	N/A	RD3219
CS-137DA	3.88E-01	2.5E-02	4.6E-02	N/A	pCi/g	N/A	RD3219
EU-152	-1.06E-02 U	2.2E-02	2.2E-02	3.49E-02	pCi/g	N/A	RD3219
EU-154	-1.57E-02 U	2.6E-02	2.6E-02	4.13E-02	pCi/g	N/A	RD3219
EU-155	5.92E-02	3.3E-02	3.4E-02	5.59E-02	pCi/g	N/A	RD3219
FE-59	-1.94E-02 U	1.8E-02	1.8E-02	2.85E-02	pCi/g	N/A	RD3219
K-40	5.50E+00	3.4E-01	6.5E-01	N/A	pCi/g	N/A	RD3219
RA-224DA	2.53E-01	2.7E-02	3.7E-02	N/A	pCi/g	N/A	RD3219
RA-226DA	2.88E-01	4.3E-02	5.2E-02	N/A	pCi/g	N/A	RD3219
RA-228DA	2.64E-01	5.3E-02	5.9E-02	N/A	pCi/g	N/A	RD3219
U-235	6.81E-01	9.7E-02	1.2E-01	N/A	pCi/g	N/A	RD3219
U-238DLP	9.00E+00 U	1.1E+00	1.4E+00	N/A	pCi/g	N/A	RD3219
ALPHA	1.90E+01	6.0E+00	6.4E+00	4.21E+00	pCi/g	100.00%	RD3222
BETA	5.81E+01	5.2E+00	6.4E+00	3.71E+00	pCi/g	100.00%	RD3222
TC-99	1.99E+02	4.8E+00	2.5E+01	3.61E+00	pCi/g	95.10%	ITAS-IT-RS-0001

Number of Results: 19

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