DOE/RL-95-29
Revision 0

RCRA Closure Data Evaluation Report: 183-H Solar Evaporation Basins Soil and Concrete

United States
Department of Energy
Richland, Washington

This report has been reproduced from the best available copy.
Available in paper copy and microfiche.

Available to the U.S. Department of Energy
and its contractors from
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831
(615) 576-8401

Available to the public from the U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
(703) 487-4650

Printed in the United States of America

DISCLM-5.CHP (8-91)

DOE/RL-95-29
Revision 0

RCRA Closure Data Evaluation Report: 183-H Solar Evaporation Basins Soil and Concrete

D. P. Butcher
Bechtel Hanford, Inc.

M. J. Galbraith
Bechtel Hanford, Inc.

Date Published
October 1995

United States
Department of Energy
P.O. Box 550
Richland, Washington 99352

THIS PAGE INTENTIONALLY
LEFT BLANK

CONTENTS

CONTENTS (Continued)

APPENDICES:

FIGURES:

TABLES:

ACRONYMS

BDL	below detection limit
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CFR	*Code of Federal Regulations*
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DWP	decommissioning work plan
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
MCL	maximum contaminant level
MTCA	*Model Toxics Control Act of 1988*
PNL	Pacific Northwest Laboratory
ppm	parts per million
QA	quality assurance
QC	quality control
RCRA	*Resource Conservation and Recovery Act of 1976*
RL	U.S. Department of Energy, Richland Operations Office
RPD	relative percent difference
TCLP	Toxicity Characteristic Leaching Procedure
TMA	Thermal Analytical
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TSD	treatment, storage, and/or disposal
WAC	*Washington Administrative Code*

1.0 INTRODUCTION

The purpose of this data evaluation report is to provide the basis for developing a remediation strategy for the deactivated 183-H Solar Evaporation Basins, a hazardous waste management unit located on the Hanford Site in southeastern Washington State. Available options may include decontamination, removal, or burial of structures and soil at the facility, or no action. To this end, soil and concrete at the basins are evaluated for the presence of harmful levels of chemical contamination (Ecology 1991).

Sampling and analysis of the 183-H soil and concrete has taken place over a 5-year period. During this time, different laboratories were used, quality assurance (QA) and quality control (QC) measures were evolving, and environmental regulations and guidance changed. Contract laboratory QA/QC deliverables were less stringent in the earlier analyses. Data useability questions have arisen from uncertainties regarding sample volumes, holding times, QA/QC documentation, and even laboratory reliability. The earliest data and associated documentation were locked in vaults during court dispute and are still virtually unavailable. This report assesses data quality and useability in terms of environmental regulations applicable to the 183-H.

Radioactivity data are provided in this report to assist the reader in understanding potential hazards at the facility. However, the focus of this report is on the nonradioactive waste materials pursuant to *Washington Administrative Code* (WAC) 173-303, "Dangerous Waste Regulations" and the Hanford Facility *Resource Conservation and Recovery Act of 1976* (RCRA) Permit.

1.1 REGULATORY BACKGROUND

The U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology (Ecology) jointly administer the RCRA regulations in Washington State. The EPA retains oversight authority while delegating to Ecology the administration of a state program that is consistent with, or more stringent than, the corresponding federal program. The regulations can be found in the WAC 173-303, "Dangerous Waste Regulations," and Title 40, *Code of Federal Regulations* (CFR), Parts 260 through 270. Ecology's authorization includes administering the closure of treatment, storage, and/or disposal (TSD) units.

The U.S. Department of Energy (DOE), Richland Operations Office (RL), the EPA, and Ecology have entered into an agreement called the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1994). Some goals of this agreement are to list TSD units, identify which units will undergo closure, schedule cleanup milestones, and integrate regulatory requirements.

The 183-H is an interim-status TSD unit under RCRA, which are currently undergoing closure pursuant to WAC 173-303. The 183-H TSD unit is part of the 100-HR-1 Operable Unit, a *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) area designated for remedial investigation. The closure performance standards discussed in this report are intended to be consistent with RCRA and CERCLA, as required by the Tri-Party Agreement. A RCRA closure plan has been submitted to Ecology and is in review. During this time, closure activities have been conducted and applicable regulations and permits have been revised. The evaluation presented in this report is based on current regulations, the draft Hanford Facility RCRA

Permit (Ecology 1994), and regulatory negotiations for this and other units (Unit Manager Meetings, as prescribed by the Tri-Party Agreement).

1.2 FACILITY INFORMATION

This section describes the history and location of the 183-H, and describes closure activities.

1.2.1 Facility Description

The 183-H TSD unit is part of the 100-H Area, located in the northern part of the Hanford Site along the Columbia River (Figures 1 and 2). The 100-H Area comprised a nuclear defense production reactor facility operational from October 1949 to April 1965 (Figure 3). The 183-H (aboveground concrete structures) are four sedimentation and flocculation basins remaining from operation of the 183-H Water Treatment Facility. The 183-H Water Treatment Facility provided water treatment and reservoir capacity for the reactor process water system. This filter plant operated concurrently with the start-up and shutdown of the 105-H Reactor.

The 183-H Water Treatment Facility consisted of a head house and chemical building, a filter building and clean water storage vaults (clear wells), a pump room, and sixteen basins each made up of a shallow flocculation basin and a deeper sedimentation basin. Most of the facility was demolished in 1974. Demolition rubble was used as backfill in the nearby clear wells. Four basins were left intact and designated for use as a solar evaporation facility for chemical waste. The adjacent clear wells were also left intact for future use as a clean-debris disposal site.

Each of the four basins consists of a flocculation and a sedimentation reservoir. Basin dimensions are illustrated in Figure 4. The width of the concrete basin walls is uniformly 15 cm (6 in) and the basin floor is 13 cm (5 in.) in minimum thickness.

1.2.2 Operation as a Resource Conservation and Recovery Act Treatment, Storage, and/or Disposal Unit

Beginning in 1973, Basin 1 (basins are numbered 1 through 4 from east to west) was used for disposal of neutralized acid etching solutions from N Reactor fuel fabrication facilities in the 300 Area of the Hanford Site as well as for miscellaneous used and unused chemicals. A total of 9,462 kL (2.5 Mgal) of a caustic solution were discharged to the basins during the period of waste operations. The solution consisted primarily of sodium nitrate with trace amounts of miscellaneous chemicals, including uranium and technetium-99. The solution was designated mixed waste as defined in Ecology et al. (1994) (waste containing both dangerous waste as defined by WAC 173-303 and low-level radioactive waste as defined by the *Atomic Energy Act*).

Waste deposited in the basins underwent volume reduction through evaporation. The use of Basin 1 to dispose of spent fuel fabrication waste continued until the detection of nitrates in monitoring well 199-H4-3 indicated that possible spill or leak material was reaching the groundwater. Use of Basin 1 was discontinued in 1978. Spray-on polyurethane liners had been installed in Basins 2 and 3, and the

Figure 1. The Hanford Site.

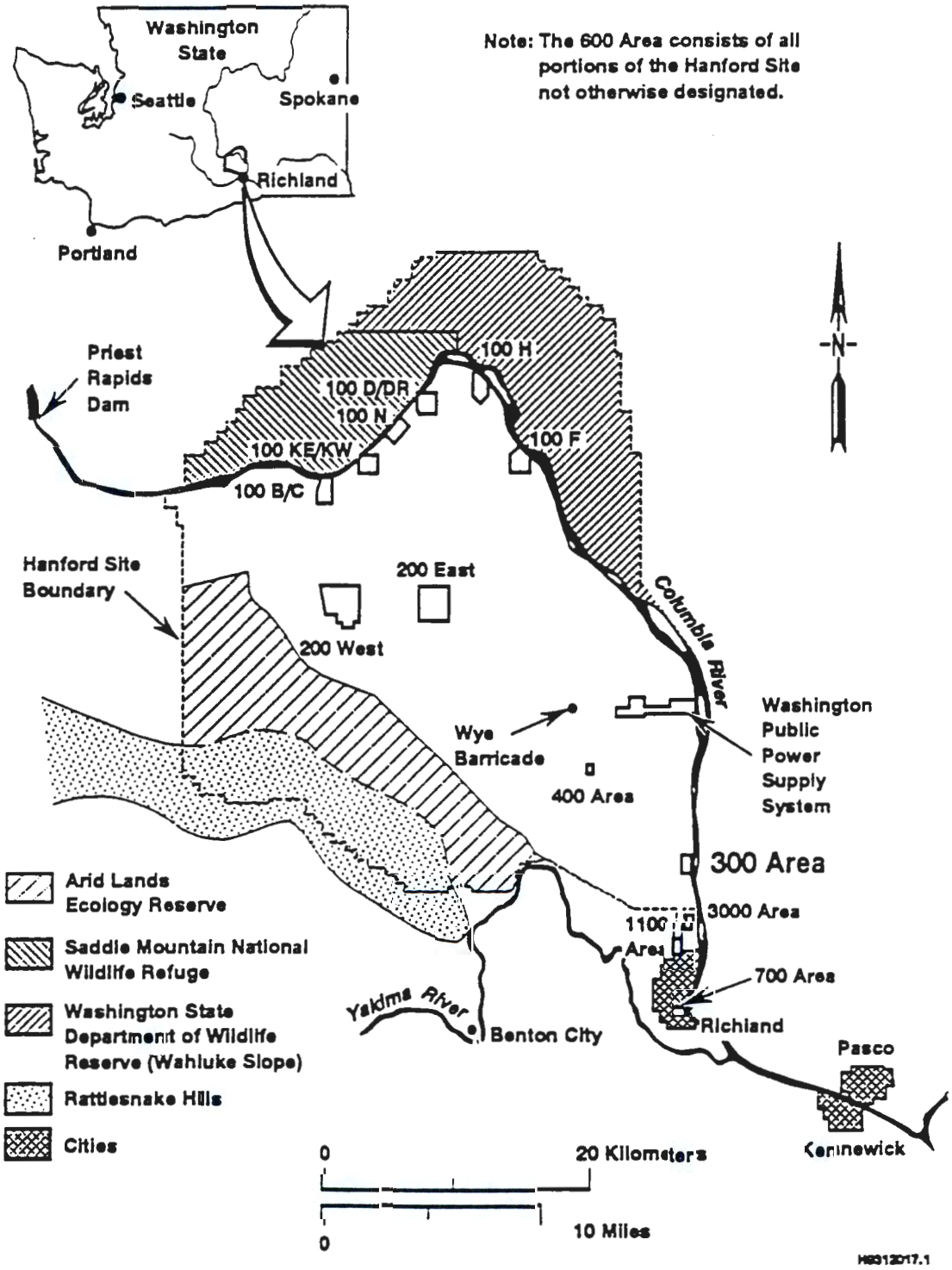


Figure 2. The 100-H Area.

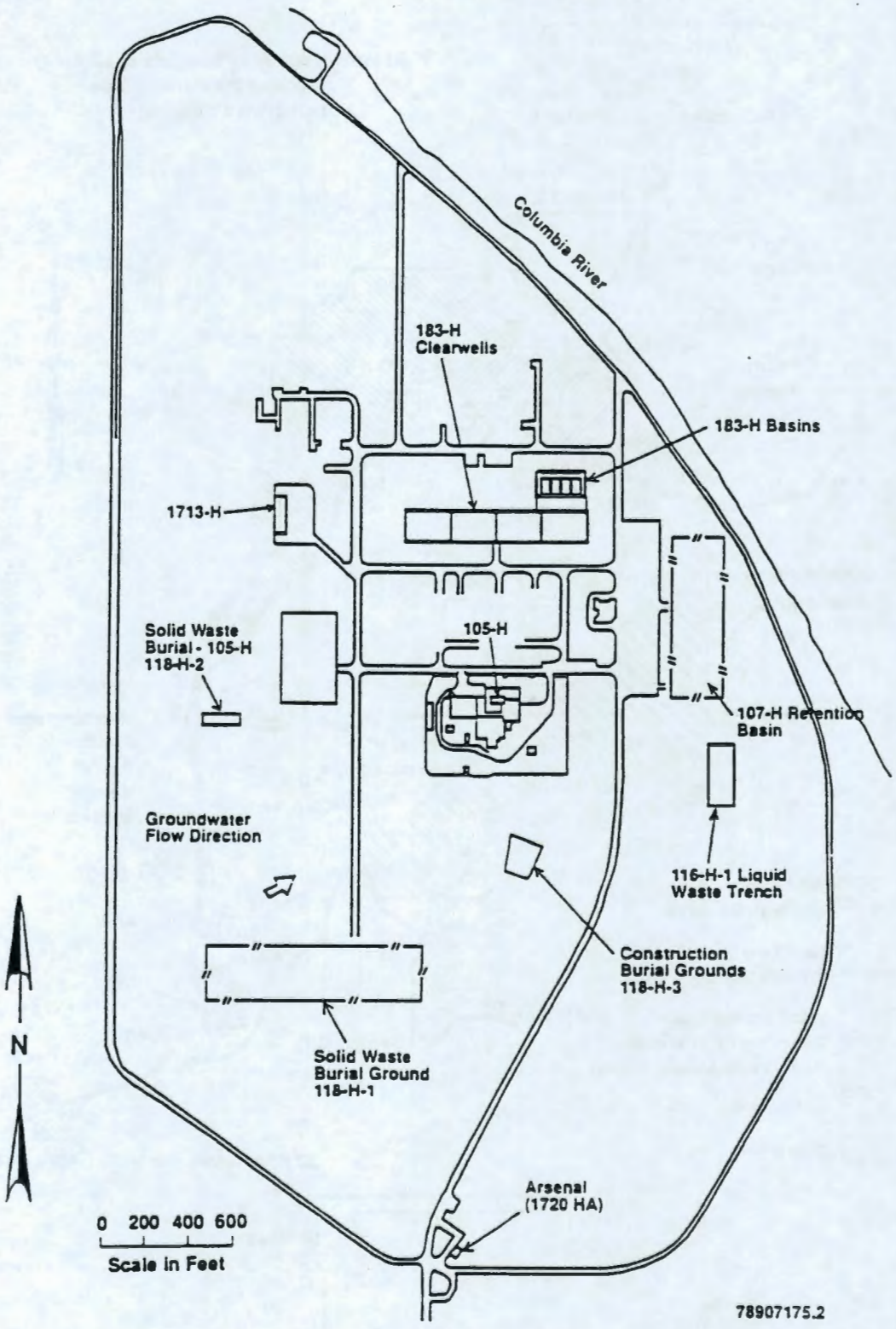


Figure 3. View of 100-H Area With Operating Facilities, 1964.

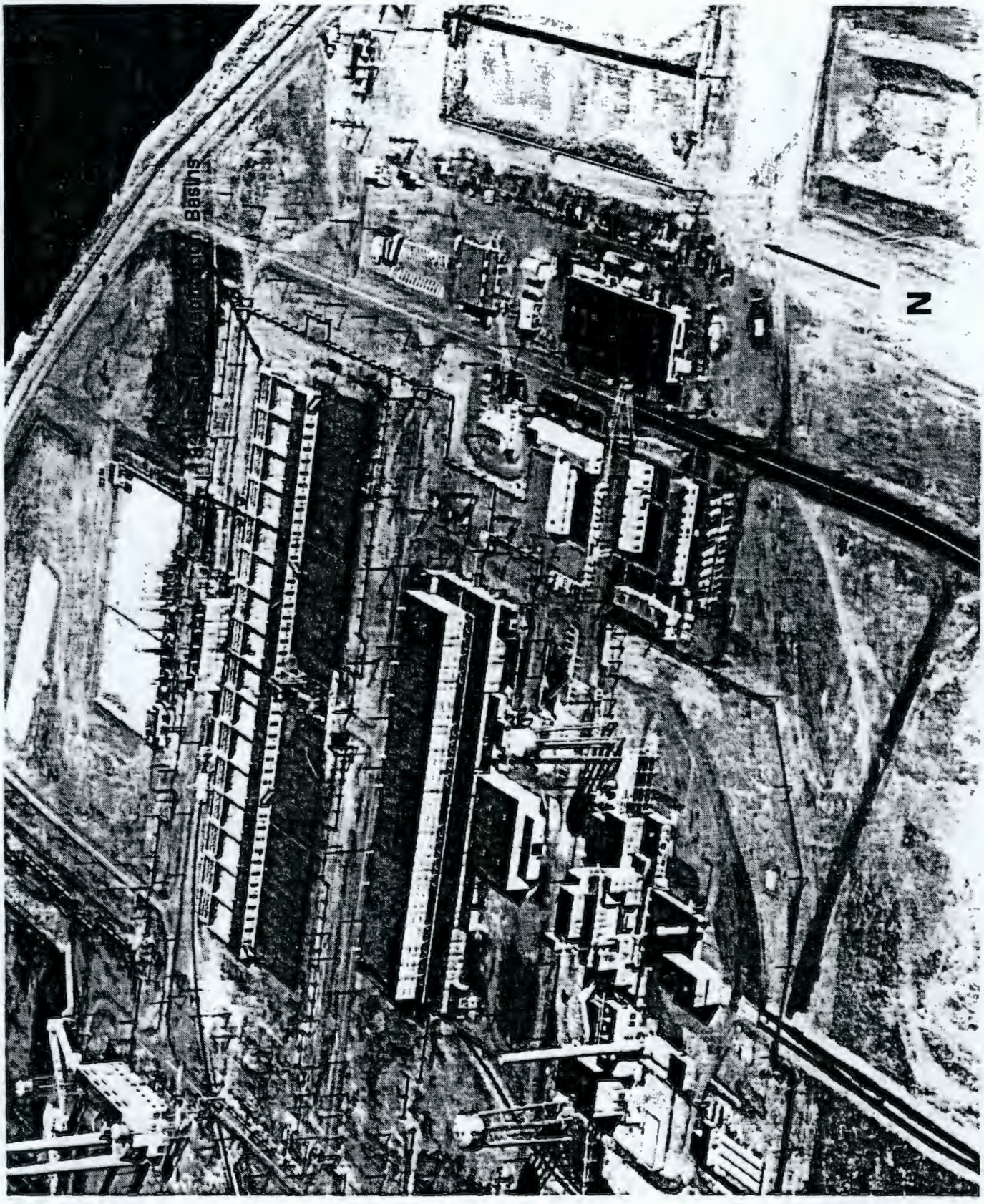
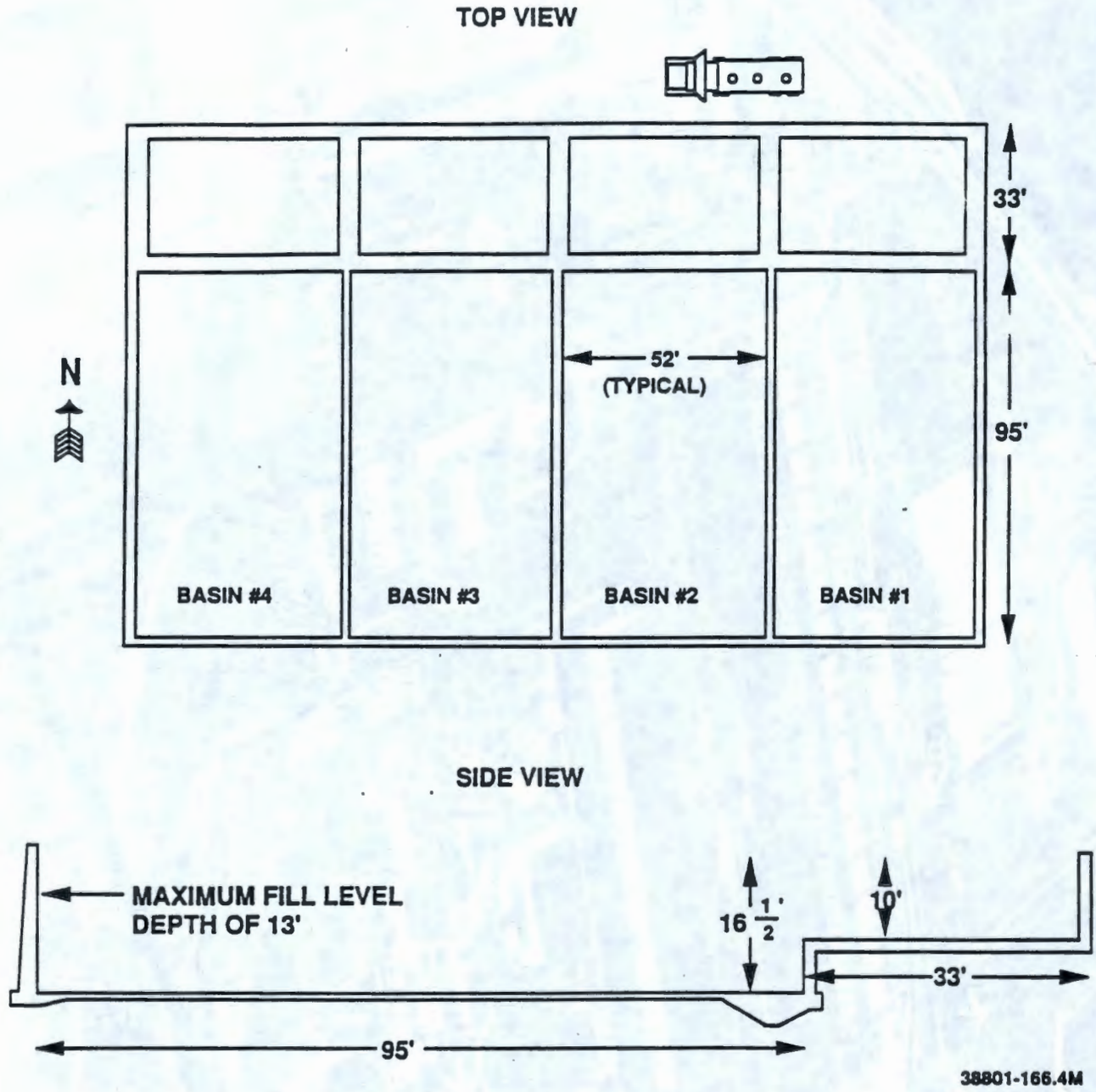


Figure 4. Dimensions of the 183-H Solar Evaporation Basins.



liquid waste from Basin 1 was transferred into Basin 3 in 1978 (Basin 1 solids and sludges were removed in 1985 and stored). Basin 2 first managed waste in 1979. Shortly before its use in 1982, Basin 4 was lined with a spray-on white butyl/hypalon (a registered trademark of E.I. Du Pont de Nemours and Company) liner after it was observed that the spray-on polyurethane coating in Basins 2 and 3 showed degradation from sunlight. The last shipment of waste to the basins occurred in November 1985.

The liquid content of Basin 2 was transferred to Basins 3 and 4; Basin 2 solids and sludges were removed in 1986.

In 1986, a high-density polyethylene liner was installed in Basin 2. The liner was field seamed and 100% vacuum tested to ensure a leak-tight installation and the accessible liquid waste (from Basins 3 and 4) was transferred into Basin 2 (Figure 5).

1.2.3 Closure Activities -- Removal of Post-Operation Waste

Before the implementation of initial closure activities in 1986, Basins 2, 3, and 4 held waste consisting of three distinct layers: (1) a basal crystalline layer, (2) a sludge layer, and (3) a liquid layer on the top. Using Sorbond LPC-II (a registered trademark of the American Colloid Company) colloidal cement, the liquid waste was solidified inside lined U.S. Department of Transportation (DOT)-approved 17-H, 55-gal drums. The sludge and crystalline layers were removed by manually shovelling and/or scooping the material into lined DOT-approved 17-H, 55-gal drums.

Basins 1 and 4 were subsequently cleaned by wet sandblasting (Figure 6). Waste generated during sandblasting was packaged as were the solids and sludges described previously. The drums containing the liquids, solids, sludges, and sandblast waste were sealed and taken to the Hanford Site Central Waste Complex Retrievable Waste Storage Unit. By the end of 1990, all bulk waste was removed from the 183-H (Figure 7).

Berm soils (920 m^3 [1,200 yd^3]) along the east and west sides of the basins were sampled, removed, placed on plastic just south of the 183-H, and sprayed with Arrowspray 70 (a registered trademark of the American Cyanamid Company) (a clear soil binder) to minimize wind dispersal and erosion (WHC 1991b). Following removal of the waste managed at the 183-H, concrete and soil sampling was performed to evaluate the possibility of residual contamination at the site.

Figure 5. Liquid Waste in Lined Basin 2 of the 183-H Solar Evaporation Basins, 1988.

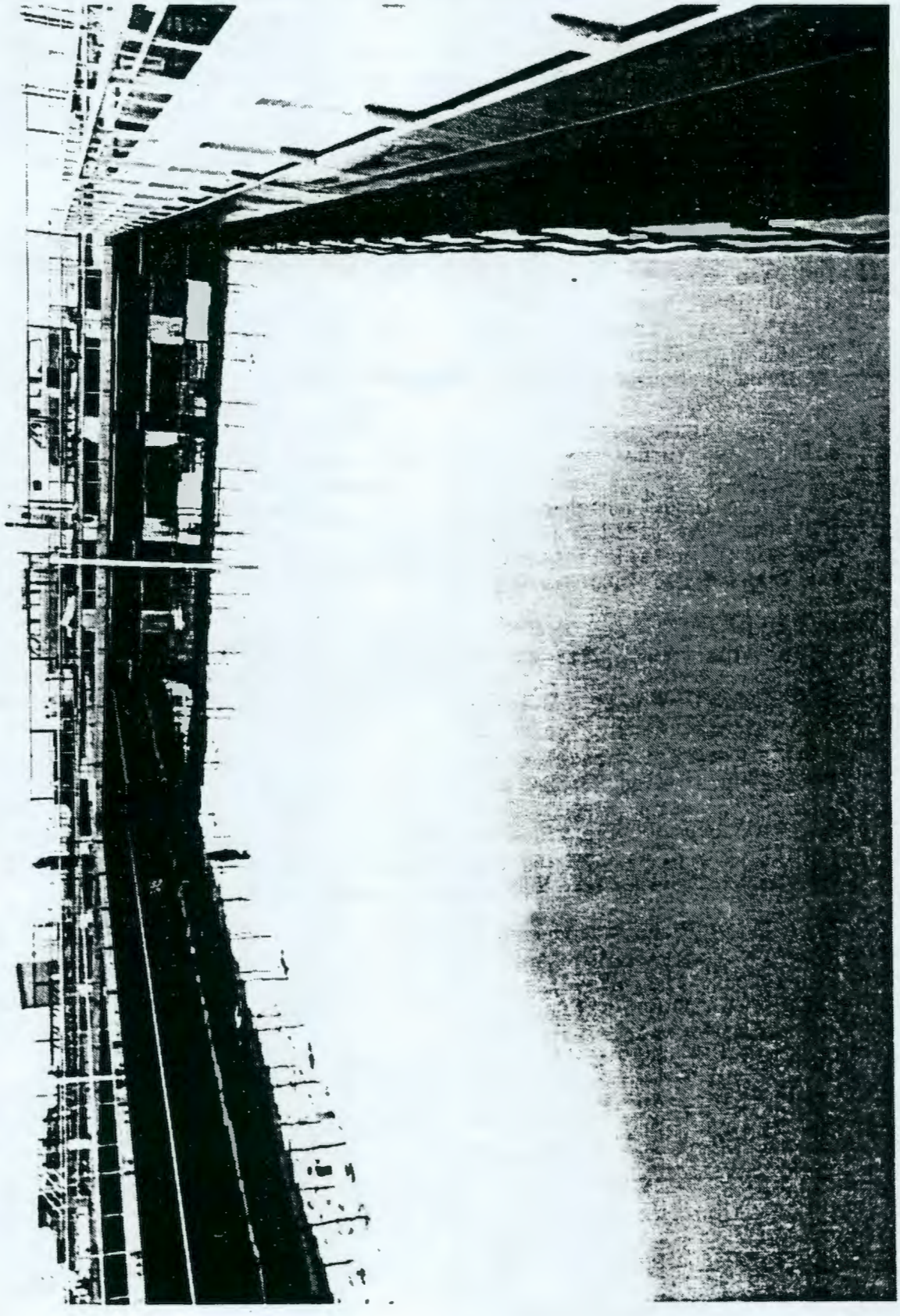


Figure 6. Decontaminating the 183-H Concrete Surface by Wet Sandblasting.

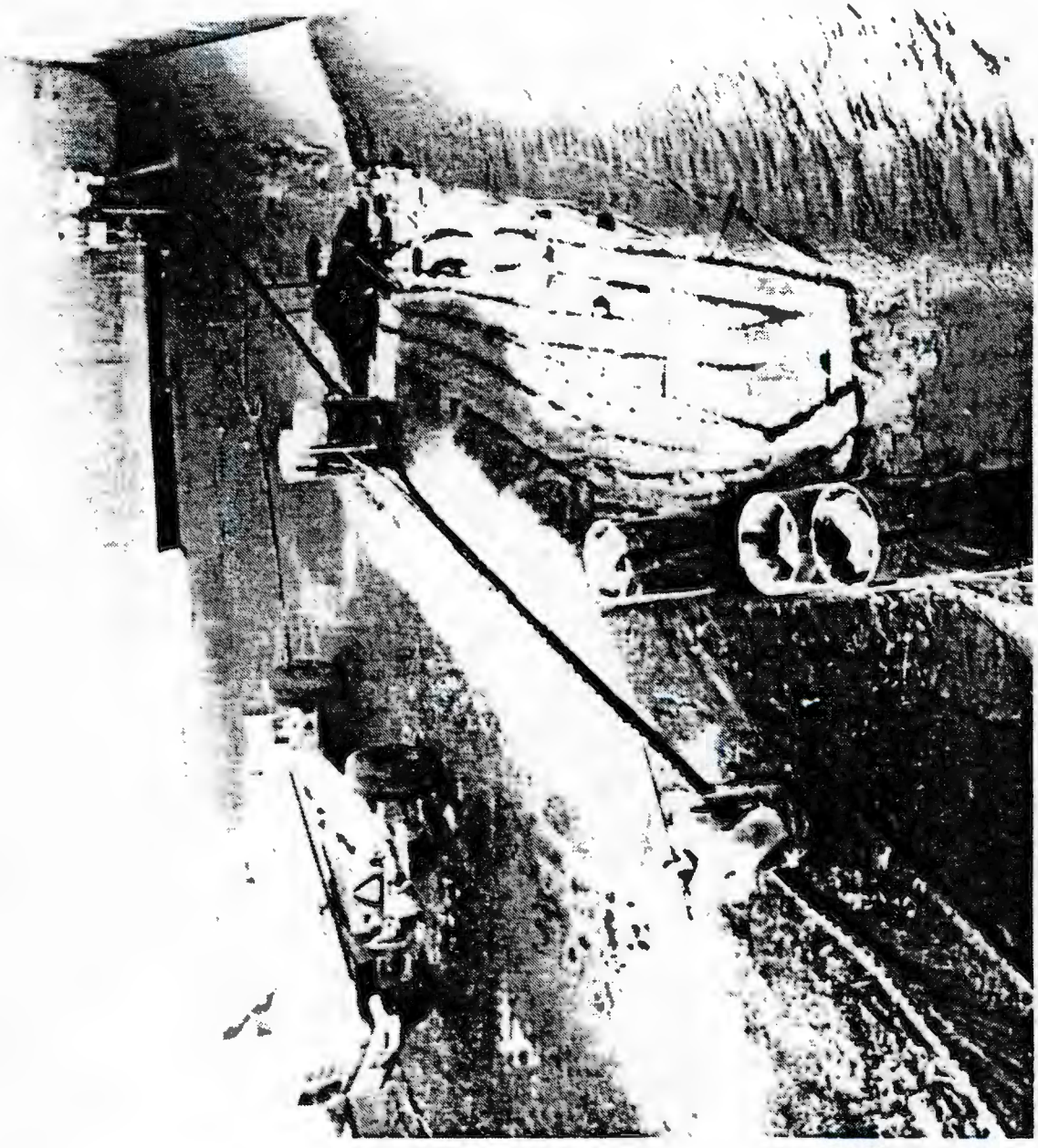
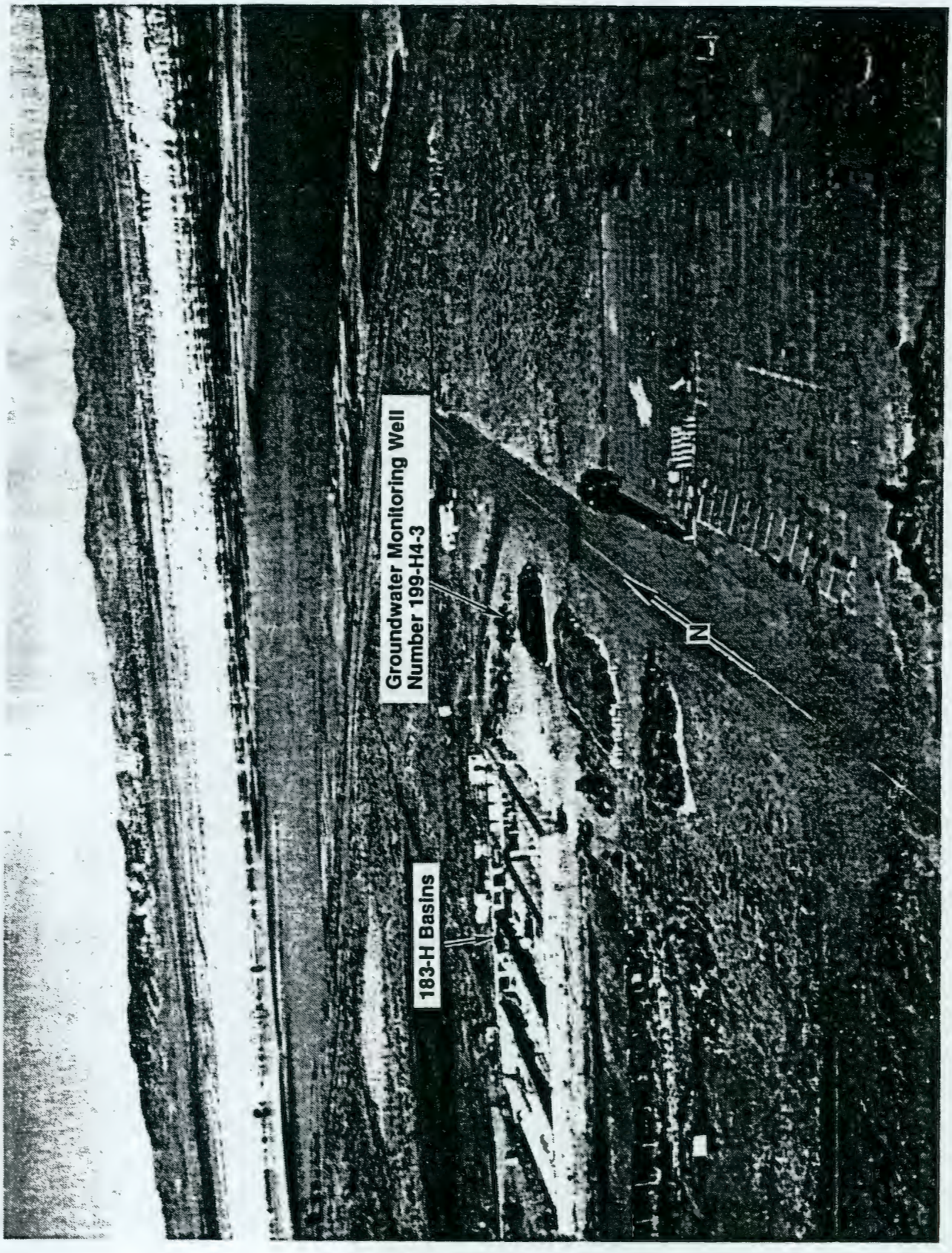


Figure 7. View of the 183-H, Fall 1991.



2.0 SAMPLING AND ANALYSIS

This chapter addresses sampling and analytical procedures, and associated QA/QC. The term "routine sample" as used in this text, is used to differentiate this sample from those collected for formate analysis, background characterization, and/or QA/QC purposes, depending on the context.

2.1 SAMPLING ACTIVITIES

Characterization of the 183-H concrete and surrounding soil was accomplished via the analysis of three principal sample groups. The first group includes samples of the shallow soil beneath and around the 183-H. The second group involved sampling of the concrete comprising the structure. The third group consists of samples of the deeper soil from 0.6 m (2 ft) below the ground surface to near the top of the water table (the vadose zone). The sample sets will be referred to as "shallow soil," "concrete," and "vadose zone" samples, respectively, in this report. In addition to routine sampling, uncontaminated concrete and soil were sampled in order to establish local background levels.

All sampling and tool decontamination was performed in accordance with the requirements of *Environmental Investigations and Site Characterization Manual* (WHC 1988). Random sample locations are based on random number generator selection of intersections on a numbered grid. All samples were handled using Westinghouse Hanford Company chain-of-custody control procedures. A decommissioning work plan (DWP), a sampling plan within a closure plan, or separate sampling plan, was written and used for each phase of sampling.

Field QA/QC measures were used to assess sampling precision. QA/QC samples for this project include field duplicates (soil) or sample-adjacent cores (concrete), split samples, and blank samples. Duplicates are separate samples from the same sample location, and split samples are the result of division of a sample after it has been collected. Split samples are normally submitted to separate laboratories.

Duplicates and silica sand blanks were generally collected for every 20 samples or one set per batch. Three types of blanks were used to check for contamination. The first type was a field blank that consisted of silica sand in a sample container; the container was opened in the field for the typical sampling duration. The second type was an equipment blank that consisted of clean silica sand poured over the sampling tool after the tool was decontaminated before each sample was collected. The third type was a trip blank that consisted of clean silica sand in a sample container not opened during sampling.

The concrete was core drilled to enable concrete and soil sampling. In order to maintain basin integrity, all holes were sealed after sampling.

The following sections address the date of sampling, location of samples, and the field QA/QC. The number of samples collected is given in Sections 2.1.1 through 2.1.3, excluding samples that were not analyzed (sample characteristics, or decisions by project team members, may have disqualified some samples).

2.1.1 Shallow Soil Sampling

The shallow soil sampling consisted of: (1) drilling through the concrete basin floors to sample the shallow soil under the basins, and (2) sampling the berm soil along the east and west side of the basins, including sample collection from an exploration trench dug along the east side of Basin 1 and from surface soil along the southern margin of the basins.

In addition, later surface samples were taken at selected locations in the general vicinity of the basins (Appendix A [Figure A-1] shows sample locations).

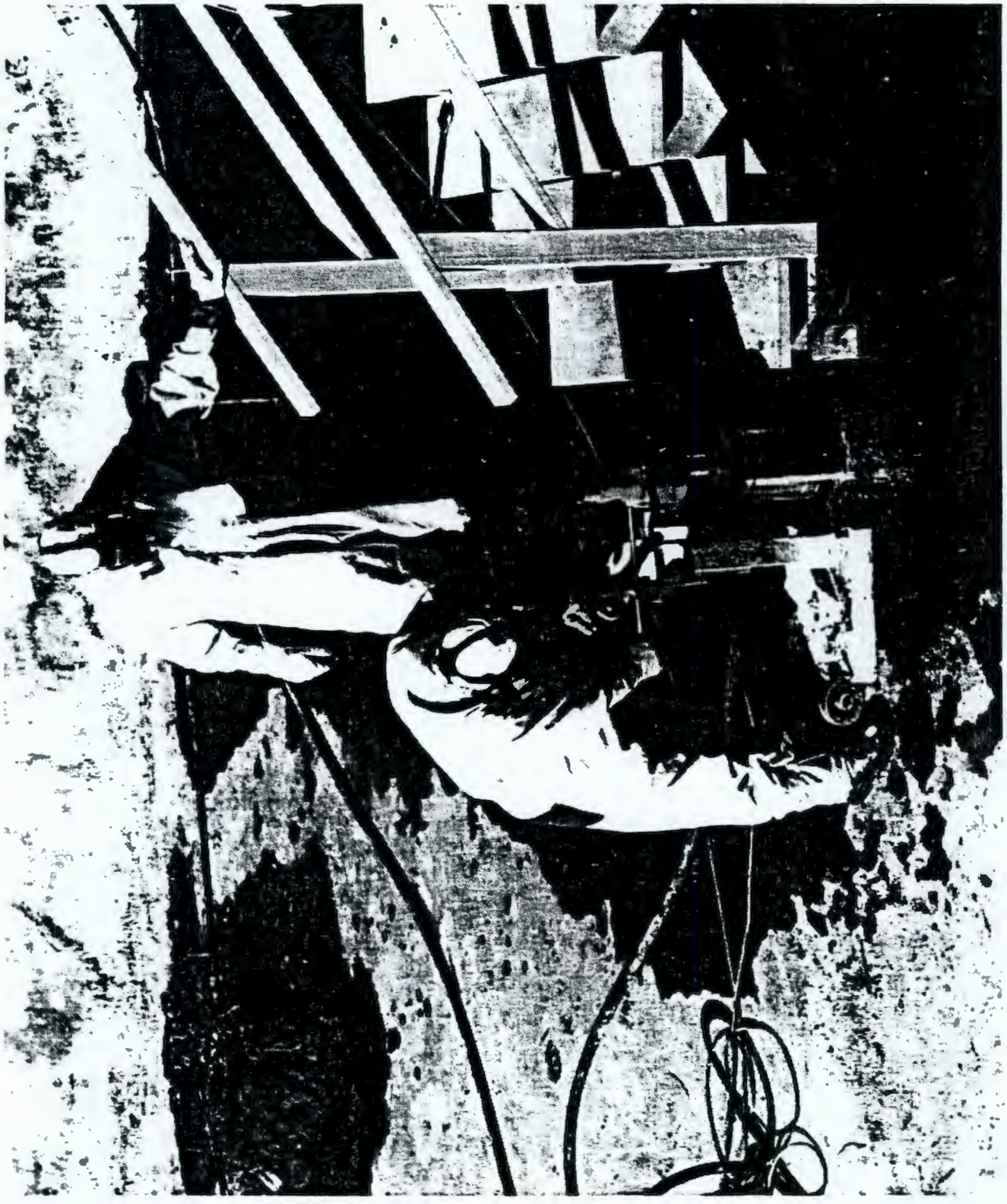
2.1.1.1 Subconcrete Soil. The shallow soil beneath the 183-H concrete was sampled during two separate periods. The soil beneath Basins 1 and 4 was sampled during the fall of 1989. Twenty-three routine soil samples were collected by drilling and removing a 5-cm (2-in.)-diameter concrete plug and collecting a sample from the underlying soil. All but one sample were randomly located. An authoritative sample was collected at the low point of Basin 4. The sample depth was approximately 15 cm (6 in.) below the base of the concrete. Five additional samples were collected in duplicate, including one duplicate of a background sample. Six field blanks, six equipment blanks, and six trip blanks (each consisting of reagent-grade silica sand) were collected throughout the sampling effort (one set on each day of sampling). After work was completed, 17 of the 23 soil samples were found to be potentially contaminated with concrete chips from drilling and removing the core plugs (records do not state which of the 23 samples were affected).

Eight randomly located samples and one field duplicate were collected from within a local background sampling area. This area was chosen (DOE-RL 1990) because it is nearby and had not been used for Hanford Site operations. These samples were collected 2 ft below grade, to avoid vegetative and wind-blown contamination. Maps of sample locations are included in Appendix B (Figure B-1 shows basin samples, Figure B-2 shows background samples). The 1989 sampling effort was based on the closure plan for this facility (DOE-RL 1990). No other sampling plan or work plan was prepared.

During April through May 1991, the shallow soil beneath Basins 2 and 3 was sampled. Twenty-two routine soil samples were collected from beneath the basins by drilling and removing a 30.5-cm (12-in.)-diameter plug and collecting a sample of the underlying soil (Figure 8). All but four were randomly located; the remainder were taken at low points, joints, or cracks. The samples were collected at approximately 15 cm (6 in.) below the base of the concrete. The sampling field team leader took measures to ensure that no concrete chips contaminated any of the samples. Each sample was collected with a stainless-steel trowel and homogenized in a stainless-steel mixing bowl. Three duplicate soil samples were collected. Two field blanks, two equipment blanks, and two trip blanks, each consisting of reagent-grade silica sand, were taken throughout the sampling effort. All field work and sampling were performed per work plan DWP-H-080-00005 (WHC 1991d). A map of the sampling locations is included in Appendix B.

2.1.1.2 Perimeter Soil Sampling (Berms, Southern Margin, and Trench). Two berms of soil, one against the west outer wall of the basins and a larger one along the east outer wall, were sampled (19 routine samples) and removed in February 1991 (WHC 1991b). This work included collection of an additional nine routine samples along the southern margin of the basins (there was no berm along the south wall; a paved ramp abuts the northern wall). Two field duplicates were collected. A map of sample locations is included in Appendix C.

Figure 8. Core Drilling the Concrete Plugs for Shallow Soil Sampling, 1989.



The exploration trench (0.8 m [2.5 ft] deep, 6.1 m [20 ft] long) was dug in February 1991. The trench is located between monitoring well 199-H4-3 and Basin 1. The trench location was chosen for detection of spilled or leaked basin waste residue in the soil near the monitoring well. After collecting nine routine samples, the excavated soil was returned to the trench. Samples were collected at depths of 15 and 60 cm (0.5 and 2.0 ft). One sample was split for QA/QC purposes. A map of sample locations in Appendix C shows the location of the trench.

In all, the perimeter soil sampling resulted in 37 routine samples, two field duplicates and one field split. In addition, one equipment blank, two field blanks, and one trip blank, all consisting of reagent-grade silica sand, were collected. Each sample was collected with a stainless-steel trowel and homogenized in a stainless-steel mixing bowl. The perimeter sampling work is addressed in WHC (1991b).

2.1.2 Concrete Sampling

The concrete comprising the structure was core drilled to obtain cylindrical samples. In addition, random chip samples were taken from a 3-m by 3-m (10-ft by 10-ft) area in Basin 2 to determine the relative depth of waste absorption into the concrete.

2.1.2.1 Concrete Core Drill Samples. From April through June 1991, the basin concrete was sampled using core drilling equipment. 5-cm (2-in.)-diameter by 13-cm (5-in.)-long cylindrical cores were collected at random locations inside the basins (18 to 23 cores from each of the four basins for routine analysis) to determine the extent of waste contamination in the structure. In addition, one sample was taken at a construction seam in Basin 2, one sample was taken at the low point of Basin 1 and one sample was taken at the low point of Basin 3. Basin liner material was generally not removed from the samples.

The south exterior wall of the basins was chosen as the location for obtaining ten background concrete core samples. This wall is physically separated from the waste and any past disposal activities.

Co-located sample cores were drilled adjacent to existing holes as field duplicates and to provide samples for formate analysis. The duplicate samples were collected in Basin 1 (2 samples), Basin 3 (3 samples), Basin 4 (2 samples), and from the background wall (3 samples). Ten basin interior samples including two duplicates were cored for formate analysis. In addition, three samples were obtained at background locations for formate analysis. Four field blanks and three equipment blanks also were produced. Each blank consisted of reagent-grade silica sand.

Maps of all sampling locations are presented in Appendix D. All field work and sampling were performed per written work plan DWP-H-080-00001 (WHC 1991c).

2.1.2.2 Concrete Chip Samples. The location of this test area (in the southwest corner of Basin 2) was chosen such that chemical and radioactive contamination (as estimated with portable instruments) would be pervasive enough to ensure that contaminants would be sampled. In addition, this area was relatively free of cracks and construction joints, which must be considered separately from a uniform concrete surface.

The entire test area was scabbled (i.e., the surface removed with a portable "scabbler," an instrument that chip-hammers the surface, removing a layer of concrete). The scabbler removed approximately

1/16th of an inch (0.2 cm) of concrete with each pass, producing particles that were approximately the size of coarse sand. Three randomly located 50-g samples of the loosened material were obtained at the original surface, and three more at each successive scabble depth of 0.6, 1.0, and 1.3 cm (1/4, 3/8, and 1/2 in.), respectively. Each sample was divided into two portions, one for nitrate/nitrite analysis and one for total radioactivity (Appendix A).

All field work and sampling took place in August of 1992, and were performed per written work plan DWP-H-080-00003 (WHC 1992).

2.1.3 Vadose Zone Soil Sampling

From July to September 1991, the vadose zone soil was sampled using cable tool drilling rigs with split spoon sampling tools to collect the soil. Before soil drilling, 30-cm (12-in.) holes were drilled in the concrete to allow cable tool entry. Fifty-seven soil samples were collected from eight boreholes beneath and around the basins. One borehole was drilled inside each basin (Figure 9). Four boreholes were drilled outside the basins, adjacent to the 183-H (Figures 10 and 11). Upon completion of drilling, each borehole was backfilled with bentonite chips per WHC-CM-7-7 (EII 7.6) (WHC 1988) to prevent infiltration of rainwater.

In September 1991 a ninth borehole, from which ten samples were collected, was drilled approximately 0.8 km (0.5 mi) west-southwest of the basins (Appendix E [Figure E-2]). This location is identified in the *183-H Solar Evaporation Basins Closure/Post-closure Plan* (DOE-RL 1990) as the site for local background sampling because it was not impacted by 100-H activities. Upon completion of drilling and sampling, this borehole was used for the installation of a RCRA groundwater monitoring well.

Five of the 57 samples were split, and five field duplicates were collected. The five splits were sent to a different laboratory for analysis. Five equipment blanks, four field blanks, and one trip blank each consisting of reagent-grade silica sand also were collected throughout the drilling and sampling. All drilling and sampling were performed per work plan WHC-SD-EN-AP-056 (WHC 1991a).

Sampling depths and dates are summarized, and maps of the borehole locations with sample numbers are included in Appendix E.

2.2 SAMPLE ANALYSIS

Table 1 lists analyses routinely performed and the analytical method used for each sample addressed in the report, with the following exceptions: the concrete chip samples, the concrete core samples collected for formate analysis, and selected outlying surface samples. Also, fluoride data are unavailable for many of the vadose zone samples. Along with formate, cyanide and uranium, the constituents of Table 1 were selected by comparing known basin waste to regulatory lists showing contaminants of concern (DOE-RL 1990). Formate and cyanide analyses were conducted on approximately 10% of the concrete samples (Section 2.2.3 discusses analytical methods). Uranium analyses were performed by radiochemical and nonradiochemical (fluorometric--U.S. Testing Laboratory Procedure Number 20-U-03) methods.

Figure 9. Cable Tool Drilling and Sampling Inside Basin 4.

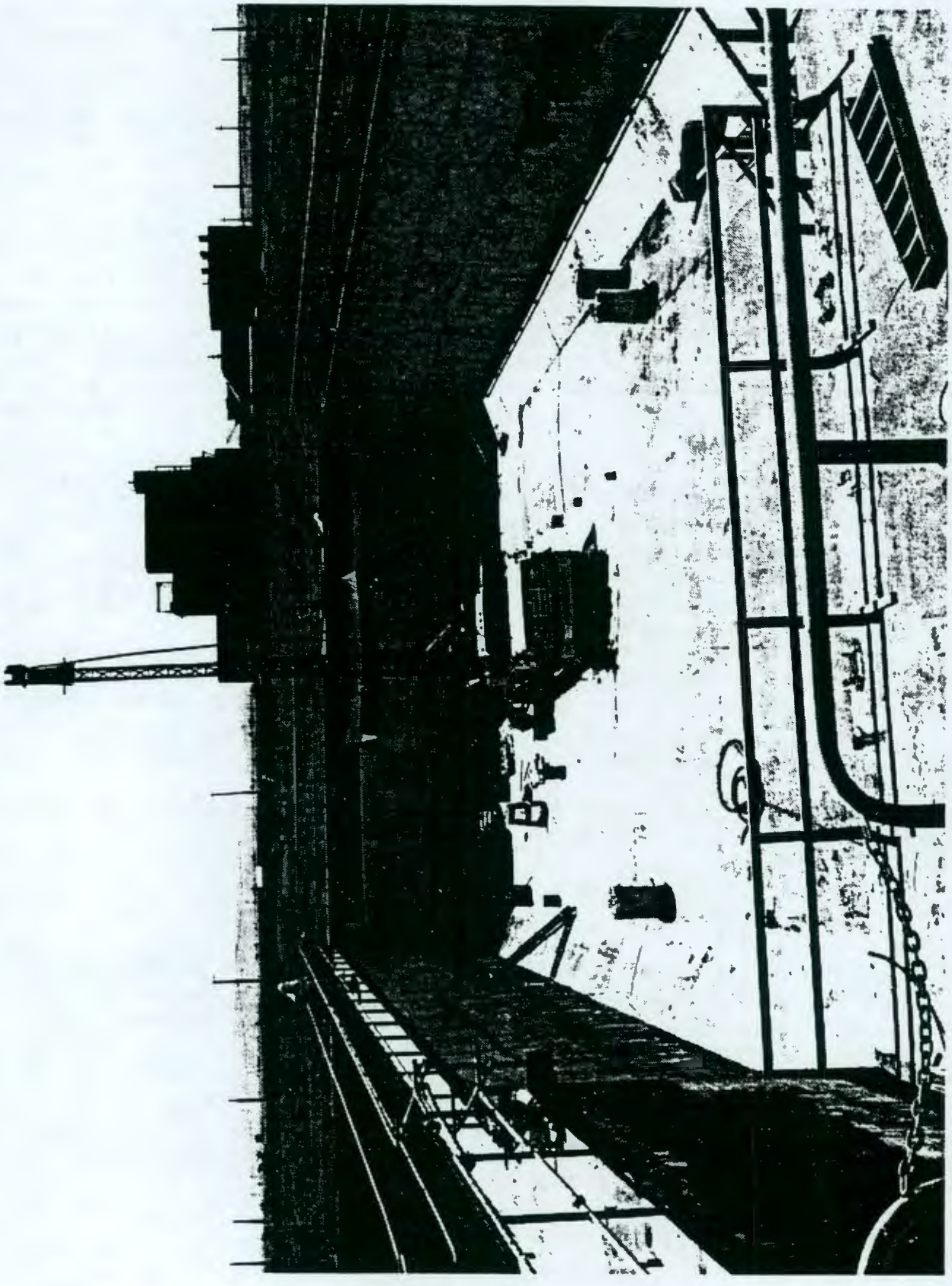


Figure 10. Cable Tool Drilling and Sampling Borehole 5 Outside the Northeast Corner of Basin 1.

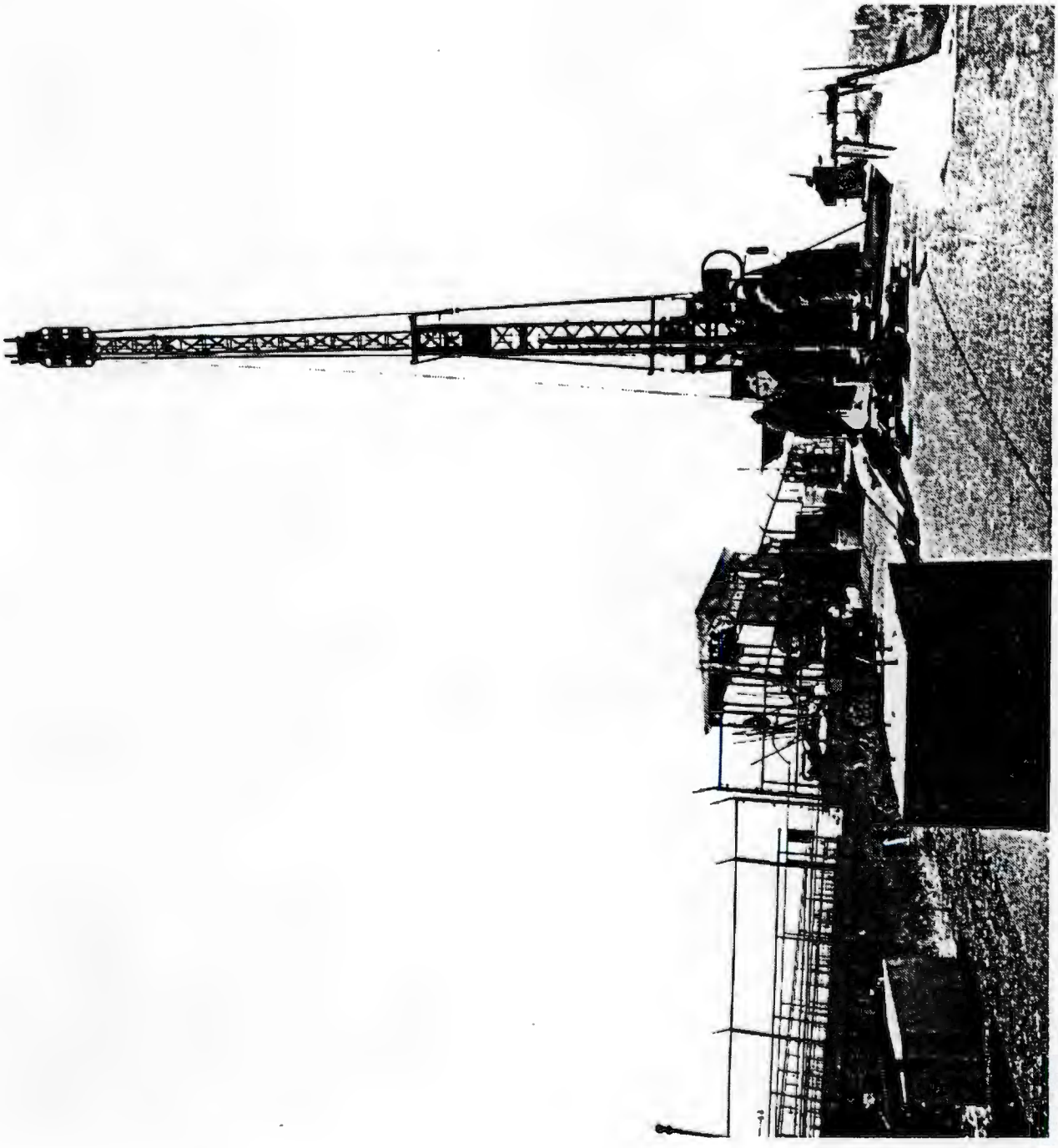


Figure 11. Cable Tool Drilling and Sampling Borehole 7 Outside East Wall of Basin 1.

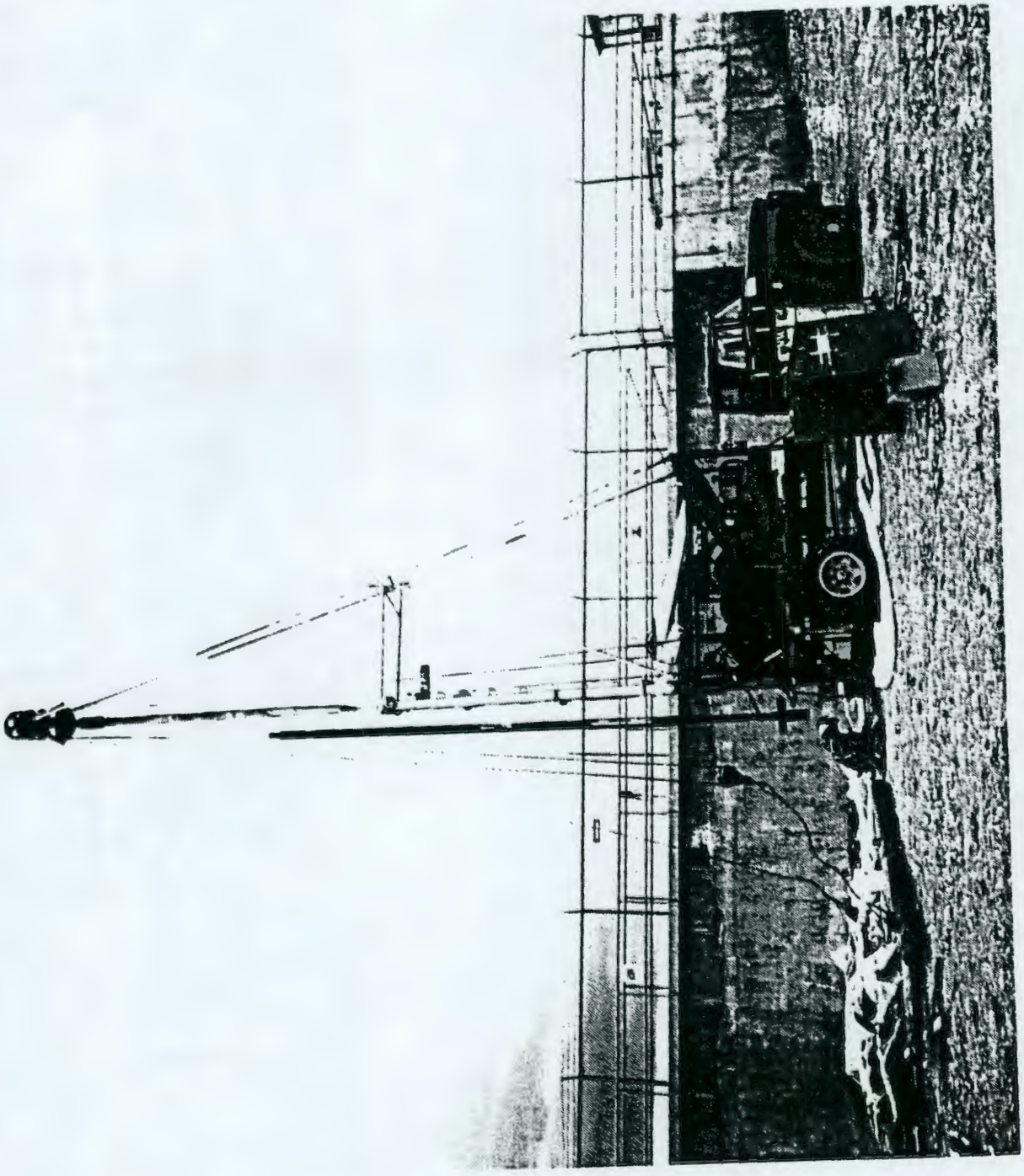


Table 1. Principal Constituents of Concern, 183-H Samples.

Constituent	Analytical Method	Constituent	Analytical Method
Arsenic	6010 (EPA 1986)	Silver	6010 (EPA 1986)
Barium	6010 (EPA 1986)	Vanadium	6010 (EPA 1986)
Beryllium	6010 (EPA 1986)	Zinc	6010 (EPA 1986)
Cadmium	6010 (EPA 1986)	Fluoride	340.2 (EPA 1983)
Chromium	6010 (EPA 1986)	Nitrite	300.0 (EPA 1983)
Copper	6010 (EPA 1986)	Nitrate	300.0 (EPA 1983)
Lead	6010 (EPA 1986)	Sulfate	9038 (EPA 1986)
Mercury	7470/7471 (EPA 1986)		
Nickel	6010 (EPA 1986)		
Selenium	6010 (EPA 1986)		

The laboratories generally analyzed for more analytes than requested; all available data are reported in the appendices. Additional analytes or methods were requested for some samples, such as formate and the Toxicity Characteristic Leaching Procedure (TCLP) (40 CFR Part 261, Appendix II); the application of these is addressed in the following sections.

Although not required for a RCRA closure, radiochemistry data are reported in the appendices for the three major sample sets (shallow soil, concrete, and vadose zone soil). These radiochemical and routine analyses were conducted at the same laboratories for each sample set.

2.2.1 Detection Limits

The laboratories were requested to provide analyses with detection/quantitation limit capabilities specified by the reference method. Typical contract required detection/quantitation limits are given in Tables 2, 3, and 4. Sample-specific detection limits are available for the K-25 (Martin Marietta Energy Systems, Inc.) and Thermal Analytical (TMA) Norcal Laboratory data. These values are listed with a "U" qualifier in the data tables of Appendices C, D, and E. In some data sets, the laboratories reported estimated concentrations less than the laboratory reporting detection/quantitation limit and greater than the instrument detection limit. These analyses are denoted with a "B" flag.

2.2.2 Shallow Soil Analysis

Analytical results for the 1989 samples taken from beneath the basin concrete and at the background location are tabulated in Appendix B. The analytical data for the 1991 subconcrete samples are given in Appendix C. Analyses for both samples sets include the constituents listed in Table 1 and were conducted at the K-25 Laboratory in Oak Ridge, Tennessee.

Table 2. Summary of the 183-H Solar Evaporation Basins Shallow Soil Maximum Analytical Results and Performance Standards (mg/kg).

Chemical Name	1989 Sampling, (subconcrete) Maximum Reported Concentration[b]	1991 Sampling, (subconcrete) Maximum Reported Concentration[b]	1991 Sampling, (surface[a]) Maximum Reported Concentration[b]	Typical Requested Limit of Detection	Sitewide Background Soil (95/95)[c]	Sitewide Background Soil Maximum[c]	Local Soil Background (95/95) (8 analyses)	WAC 173-340-740 (3)(a)(iii)		Comments
								Noncancer	Cancer	
Arsenic	16.5	5.7	49.8	0.2	9	27.7	3.11	--	1.4	1.0 to 40 ppm is a typical range for natural soils.[d]
Barium	118	119	150	20	175	480	102	5,600	--	
Beryllium	2.5	0.45	0.44	0.5	1.8	10	0.6	--	0.2	1.0 to 40 ppm is a typical range for natural soils.[d]
Cadmium	6.9	3	1.7	0.5	--	11	6.0	40	--	
Chromium	42.7	24.8	42.5	1.0	28	320	16.8	--	--	50 to 3,000 ppm is a typical range for natural soils.[d]
Chromium III	--	--	--	--	--	--	--	80,000	--	
Chromium VI	--	--	--	--	--	--	--	400	--	
Copper	1,140	95	51.5	2.5	30	61	22.3	2,960	--	
Fluoride	249	940	26	1.0	13	73.3	<1.0	4,800	--	30 to 300 ppm is a typical range for natural soils.[d]
Lead	128	30.2	234	0.1	14.9	74.1	7.6	--	--	U.S. Environmental Protection Agency cleanup level: 500 to 1,000 ppm total lead.[e]
Mercury	0.9	<0.11	0.79	0.2	1.3	3.8	<0.2	24	--	
Nickel	64.2	25.2	42	4.0	25	300	18.1	1,600	--	
Nitrate	28,300	40,352	1,850	1.0	208	906	20.3	568,000	--	Typical natural soils have 1,500 to 3,300 ppm nitrogen.[f,h]
Nitrite	11	<1,000	<20	1.0	--	36.5	<1.0	8,000	--	Typical natural soils have 1,500 to 3,300 ppm nitrogen.[f,g]
Selenium	--	<4.4	<0.44	0.5	--	6	<0.5	400	--	
Silver	1.1	<1.5	1.5	1.0	21	14.6	<1.0	400	--	
Sulfate	2,540	2,561	3,560	1.0	931	12,600	8	--	--	60 to 20,000 ppm is a typical range for natural soils.[d]
Vanadium	62.3	50.5	56.8	2.0	107	140	53.2	560	--	
Zinc	56.1	61.5	29.9	2.0	79	366	47.1	24,000	--	

[a]Combined set of berms, trench, and basin southern margin samples.
[b]The 1989 samples were analyzed by the U.S. Testing Laboratory (Appendix B); the 1991 samples were analyzed by the K-25 Laboratory (Appendix C).
[c]DOE-RL (1993).
[d]Dragun (1988).
[e]EPA (1989).
[f]Calculated from data in Stevenson (1982).
[g]Multiply the nitrogen concentration by 3.3 to obtain nitrite.
[h]Multiply the nitrogen concentration by 4.4 to obtain nitrate.

Table 3. Summary of the 183-H Solar Evaporation Basins Concrete Maximum Analytical Results and Performance Standards (mg/kg).

Chemical Name	Maximum Reported Concentration[a]	Typical Requested Limit of Detection	Sitewide Background Soil (95/95)[b] (Reference Only)	Sitewide Background Soil Maximum[b] (Reference Only)	Local Soil Background (95/95) (10 analyses)	WAC 173-340-740 (3)(a)(iii) (Reference Only)		Comments
						Noncancer	Cancer	
Arsenic	100	0.2	9	27.7	<47.1	--	1.4	
Barium	1,100	20	175	480	138	5,600	--	
Beryllium	3.2	0.5	1.8	10	0.32	--	0.2	
Cadmium	<30	0.5	--	11	<2.8	40	--	
Chromium	270	1.0	28	320	15.5	--	--	
Chromium III	--	--	--	--	--	80,000	--	
Chromium VI	--	--	--	--	--	400	--	
Copper	180	2.5	30	61	45.7	2,960	--	
Cyanide	4.4	--	--	--	<1.0	1,600	--	
Fluoride	300	1.0	13	73.3	<2.0	4,800	--	
Lead	140	0.1	14.9	74.1	<47.1	--	--	U.S. Environmental Protection Agency soil cleanup level: 500 to 1,000 ppm total lead.[c]
Mercury	0.16	0.2	1.3	3.8	<0.10	24	--	
Nickel	250	4.0	25	200	13.9	1,600	--	
Nitrate	63,980	1.0	208	906	22.0	568,000	--	
Nitrite	215	1.0	--	36.5	<20.0	8,000	--	
Selenium	<510	0.5	--	6	<47.1	400	--	
Silver	<61	1.0	2.1	14.6	<5.7	400	--	
Sulfate	1,540	1.0	931	12,600	472	--	--	
Vanadium	340	2.0	107	140	42.6	560	--	
Zinc	1,600	2.0	79	366	196	24,000	--	

[a]Refer to appropriate appendix for source data.
[b]DOE-RL (1993).
[c]EPA (1989).

Table 4. Summary of the 183-H Solar Evaporation Basins Vadose Zone Soil Maximum Analytical Results and Performance Standards (mg/kg).

Chemical Name	Maximum Reported Concentration[a]	Typical Requested Limit of Detection	Sitewide Background Soil (95/95)[b]	Sitewide Background Soil Maximum[b]	Local Soil Background (95/95) (8 analyses)	WAC 173-340-740 (3)(a)(iii)		Comments
						Noncancer	Cancer	
Arsenic	12.7	0.2	9	27.7	2.6	--	1.4	1.0 to 40 ppm is a typical range for natural soils.[c]
Barium	28.8	20	175	480	123	5,600	--	
Beryllium	2.1	0.5	1.8	10	0.3	--	0.2	1.0 to 40 ppm is a typical range for natural soils.[c]
Cadmium	4.5	0.5	--	11	<0.6	40	--	
Chromium	44.9	1.0	28	320	21	--	--	50 to 3,000 ppm is a typical range for natural soils.[c]
Chromium III	--	--	--	--	--	80,000	--	
Chromium VI	--	--	--	--	--	400	--	
Copper	815	2.5	30	61	23	2,960	--	
Fluoride	223	2.0	13	73.3	6.7	4,800	--	30 to 300 ppm is a typical range for natural soils.[c]
Lead	32.4	0.1	14.9	74.1	7.8	--	--	U.S. Environmental Protection Agency soil cleanup level: 500 to 1,000 ppm total lead.[d]
Mercury	0.7	0.2	1.3	3.8	<0.1	24	--	
Nickel	24.4	4.0	25	200	16	1,600	--	
Nitrate	6,200	1.0	208	906	9.1	568,000	--	Typical natural soils have 1,500 to 3,300 ppm nitrogen.[e,f]
Nitrite	15.6	1.0	--	36.5	<0.5	8,000	--	Typical natural soils have 1,500 to 3,300 ppm nitrogen.[e,g]
Selenium	2.5	0.5	--	6	<3.2	400	--	
Silver	12.9	1.0	2.1	14.6	<0.8	400	--	
Sulfate	7,564	1.0	931	12,600	48	--	--	60 to 20,000 ppm is a typical range for natural soils.[c]
Vanadium	62.3	2.0	107	140	51	560	--	
Zinc	81.8	2.0	79	366	40	24,000	--	

[a]Refer to appropriate appendix for source data.
[b]DOE-RL (1993).
[c]Dragun (1988).
[d]EPA (1989).
[e]Calculated from data in Stevenson (1982).
[f]Multiply the nitrogen concentration by 3.3 to obtain nitrite.
[g]Multiply the nitrogen concentration by 4.4 to obtain nitrate.

Samples from the berms, the southern margin, and the trench were analyzed at the K-25 Laboratory. In addition to the analyses listed in Table 1, four of the berm samples and five of the trench samples were extracted by TCLP and the extract analyzed for metals at the K-25 Laboratory. These results are reported in Appendix C.

The selected outlying surface samples addressed in Appendix A (Figure A-1 and Table A-1) were analyzed by standard EPA methods (EPA 1983 or EPA 1986). Analyses were conducted by Data Chem Laboratories (a Sorenson Company) in Salt Lake City, Utah and were limited to arsenic, chromium, and lead.

2.2.3 Concrete Analysis

The concrete cores (including background samples) were crushed and passed through a 9.5-mm (3/8-in.) stainless-steel sieve at the laboratory. All but the samples collected for formate analysis were analyzed for the constituents listed in Table 1 at the K-25 Laboratory. Thirteen routine samples, four background samples, and one duplicate sample were analyzed for cyanide using SW-846 Method 9010 (EPA 1986), also at the K-25 Laboratory. Thirteen of the co-located samples, as discussed previously (see Section 2.1.2), were sent to the Pacific Northwest Laboratory (PNL) in Richland, Washington for formate analysis. An ion chromatography procedure (#PNL-ALO-212) for formate was developed by PNL for this project. All analytical results are listed in Appendix D.

Three of the routine concrete core samples also underwent the TCLP extraction at the K-25 Laboratory. The extract was analyzed for arsenic, lead, selenium, and mercury. These results are reported in Appendix D (Table D-24).

The concrete chip samples from the scabbling test plot were analyzed for total nitrate/nitrite (Method 353.2 [EPA 1983]) at Roy F. Weston Laboratories, Incorporated, in Lionville, Pennsylvania, and for total radioactivity at the Hanford Site 222-S Laboratory. The results are presented in Appendix A.

The pH of the concrete was measured for approximately 40 of the samples at the K-25 Laboratory, with SW-846 Method 9045 (EPA 1986). The results are given in Appendix D (Table D-19).

2.2.4 Vadose Zone Soil Analysis

Vadose zone samples were analyzed for the constituents in Table 1. The analyses were conducted at the TMA Norcal Laboratory in Richmond, California, with the exception of the five splits that were analyzed at the K-25 Laboratory. In addition, the pH of the samples was measured. All analytical results are listed in Appendix E.

2.3 DATA QUALITY

With the following exceptions or qualifications, all of the analytical data discussed in this report were produced under standard protocol for sampling, analysis, field QA/QC, laboratory QA/QC, and data reporting (EPA 1983; EPA 1986; WHC 1988).

- Shallow Soil Data (1989 Sampling). These data (U.S. Testing Laboratory) were produced under standard protocol, however, the QA/QC program was not project-specific, and the following QA/QC and reporting documentation was not included with the data package from the laboratory: Calibration information, data from check samples, chemist bench sheets, and laboratory blank, duplicate, and matrix spike data. Records such as chain-of-custody forms and analysis request forms also are unavailable. Because of these deficiencies, data validation was not performed.

- Shallow Soil Data (1991 Sampling). These data (K-25 Laboratory) were produced under standard protocol, but are lacking in QA/QC deliverables. The documentation identified in the preceding paragraph generally was not included with the data package from the laboratory. As with the U.S. Testing package, data validation was not performed. However, the laboratory QA/QC program was project-specific; and data from laboratory check samples, spikes, and spike duplicates are available for this sample set.

- Concrete Formate Analyses. This analytical method and associated QA/QC procedures were developed by PNL. These data are considered to be of sound quality based on analysis of duplicates, spikes, laboratory blanks, and on the calibration frequency (Appendix D, Figure D-1).

- Concrete Chip Analysis. The quality of these data are supported by duplicate samples and data spatial trends. Rigorous QA/QC was not requested for this specialized study.

- Radiochemistry. Standard radiochemistry laboratory QA/QC protocol was employed.

Sample holding times, the time elapsed between sampling and analysis, have not been developed for soil and concrete samples, but are available for water samples. For the concrete samples, holding times were exceeded for the analysis of nitrate, nitrite, fluoride, sulfate, mercury, and pH. Holding times were generally exceeded for nitrate and nitrite analyses of the shallow and vadose zone soil and for TCLP samples. In the appendices, these data have qualifiers specifically indicating that holding times were exceeded, or the data are qualified as estimated values. However, the data are considered useable because inorganic chemical concentrations tend to be much more stable in solid samples than in dilute aqueous matrices.

Data qualifiers are reported with these data in Appendices B, C, D, and E. In Appendices B, C, and E, the qualifiers are as reported from the laboratory. The vadose zone analyses given in Appendix E have been validated and qualified accordingly (see Section 2.3.3).

Specific QA/QC measures are addressed in the following sections. SW-846 (EPA 1986) recommends comparing duplicate samples using relative percent difference (RPD) [RPD, $100*\{(X-Y)/((X+Y)/2)\}$, where X and Y are duplicate analytical results]. In standard laboratory procedures for soil samples, data are qualified if the RPD of laboratory duplicates exceeds 35%. Here, comparing field duplicates, 35% is used as a reference value. It is suggested that data objectives for this project are

consistent with a much less stringent exclusion criteria. Blank data will be considered satisfactory if below detection, or well below regulatory thresholds and typical minimum values for the data set. Laboratory data qualifiers, field blank data, and field duplicate data are reviewed for the constituents in Table 1.

2.3.1 Shallow Soil Data

2.3.1.1 Subconcrete Soil (1989 Sampling). The shallow soil samples taken in 1989 are assumed to be potentially contaminated with concrete chips from the basin floor (see Section 2.1.1). Based on this assumption, any reported concentrations that suggest contamination are questionable. The field team leader disqualified sample number AB-001. Also, as stated previously, this sampling and analytical effort is lacking in QA/QC and other supporting documentation. Despite this, the data offer useful characterization of soil compositions.

Data precision is supported by the analysis of four field duplicates; only one pair of values exceeded 35% RPD (sulfate, 58%). The blank data are considered satisfactory. The validity of these data is reinforced by their similarity to the subconcrete analyses of the samples collected from adjacent basins in 1991, and of the results for upper samples of the basin vadose zone boreholes.

The data for nitrate, sulfate, and low concentrations of fluoride are considered questionable because they are frequently accompanied by undefined qualifiers (Appendix B). However, these data and the data from the subconcrete samples collected in 1991 have similar distributions. The mean values, maximum values, and standard deviations are within a factor of 3, and these statistical values are lower in the earlier data set.

2.3.1.2 Subconcrete Soil (1991 Sampling). Comparison of data from the three field duplicates for the 1991 subconcrete sampling gives the following RPD values in excess of 35%: cadmium 128% and 50%, copper 45%, fluoride 84%, nitrate 126%, cobalt 135%, and nickel 63%. The blank data are considered satisfactory.

Approximately 30% of the lead data are qualified, indicating that duplicate analyses were not within control limits. Qualified values are less than or equal to 7.0 mg/kg. Virtually all of the zinc values are qualified as estimated because of the presence of an interference. Zinc and lead data accuracy at these levels are not strong concerns because both are regulated at much greater concentrations. One arsenic value was qualified because of insufficient spike recovery. Selenium detection limit data are qualified, indicating matrix spike recoveries outside of control limits.

2.3.1.3 Perimeter Soil Sampling. Comparison of one split and two field duplicate analyses, for the shallow subconcrete soil samples taken in 1991, yielded the following RPD that are greater than 35%: arsenic 54%, barium 46%, lead 49%, fluoride 190%, and copper 46%. No sample collection/ preparation problems are indicated in an analysis of the blank data.

Laboratory qualifiers indicate questionable accuracy for three arsenic results that are greater than detection limits. The mean value of arsenic is 9 parts per million (ppm), comparable to background, and close to the detection limit of 1 to 2 ppm. Selenium detection limit data are qualified, indicating matrix spike recoveries outside of control limits. The lead values are very questionable; all but one are qualified because of poor matrix spike recoveries or laboratory duplicate results. In addition, the

lead data distributions are dissimilar to other soil data sets; compare the mean value and standard deviation of perimeter soil data (39, 54 mg/kg) to those of the vadose zone (5, 6 mg/kg).

2.3.1.4 Other Surface Soil Sampling. The outlying surface soil sample analyses are consistent with good data quality based on a single duplicate and matrix spike.

2.3.2 Concrete Data

The concrete core analytical data set has high detection limits, relative to the other data groups. Of particular concern are the elevated detection limits of arsenic (typically 45 to 48 ppm) and lead (equal to that of arsenic). Five of the arsenic analyses are of no use, having detection limits ranging from 430 to 510 ppm, which is above regulatory thresholds. The remainder are less than or equal to 60 ppm. The five samples with very high arsenic detection limits have correspondingly high detection limits for cadmium, chromium, cobalt, nickel, selenium, and silver. Reported detection limits for other analytes of concern (see Table 1) are either well below health-based levels, or these analytes are rarely reported as below detection.

Of the concrete samples, including local background samples, eight sets of field duplicates and one triplicate were collected and analyzed. One of the samples of the triplicate, numbered B00GG5, will not be considered in evaluating the duplicate results, because it was contaminated with underlying soil. The following are the number of pairs having detectable concentrations exceeding 35 RPD: barium (1 of 9), cobalt (2 of 8), copper (3 of 9), nitrate (4 of 6), sulfate (4 of 9), vanadium (2 of 8), and zinc (4 of 8). Blank results are considered satisfactory.

Data qualifiers, other than for holding times and detection, are unavailable for the concrete data. A survey of qualifiers appended to the laboratory spike, spike duplicate, and check sample results reveals the following information: zinc, barium, and copper data are commonly qualified because of exceedance of spike or spike duplicate recovery limits. The maximum values for these analyses are well below health-based thresholds. Check sample results are generally within control limits.

2.3.3 Vadose Zone Soil Data

The vadose zone analytical data were validated by the Hanford Site Analytical Services Organization. Data validation activities were performed in accordance with the RCRA procedure (Level B) contained within the *Sample Management and Administration Manual* (WHC 1990). The data validation process included a review of the following QC elements performed by the laboratory and reported in the associated data deliverables:

- Holding times
- Blank analyses
- Matrix spikes
- Duplicates.

Data qualifier codes indicating estimated or rejected data occur with detection limit results for elements such as silver and selenium. The anion data are typically qualified with "J," as estimated values. This is because of the presumption of exceeded holding times. Approximately 30% of the

lead and 15% of the zinc data are qualified as estimated. A few chromium and copper values also are qualified as estimated. The lead, zinc, chromium, and copper data should be used with caution, but all are well below background soil concentrations or health-based levels.

2.3.4 Data Quality Summary

This report assumes all applicable data will be considered unless demonstrated to be flawed or inappropriate. The analytical data addressed in this report are accepted as generally useful, with the following qualifications.

- The shallow soil samples collected in 1989 (subconcrete) are potentially contaminated with other material and the associated data are lacking in QA and methodology documentation. The use of this data is therefore limited. However, the data are supported by their similarity to those of the samples collected in 1991.

- The remaining shallow soil analyses, though lacking in rigorous QA/QC documentation, offer characterization of the soil beneath Basins 2 and 4 and the soil surrounding the four basins. The lead data in the perimeter soils are questionable. Many perimeter soil arsenic values are of questionable accuracy, based on matrix spike recovery data.

- Five samples of the concrete core analytical data set have high detection limits relative to regulatory thresholds. The usefulness of the remaining concrete arsenic data will depend on the selection of a decisional threshold. It is suggested that there are a sufficient number of arsenic analyses with detection limits less than 50 to 60 ppm to support evaluation against a threshold greater than 50 to 60 ppm. A lower threshold may require resampling.

3.0 PERFORMANCE STANDARDS

This chapter identifies and discusses the various threshold concentrations that serve as RCRA closure criteria. Concentrations of constituents in media not contaminated with waste (i.e., background samples), laboratory limits of detection, and health-based levels are the three principal criteria for this evaluation. Each criterion is analyte- and media-specific. The regulatory basis for these standards resides in WAC 173-303-610(2)(b), WAC 173-340-700(4) and (6), and WAC 173-340-740. If more than one of the preceding standards are available, the greater will be used as a decisional threshold. Other standards may be employed, where appropriate (e.g., waste designation limits).

3.1 BACKGROUND

Background thresholds are specified by WAC 173-340-708(11) as a tolerance coefficient of 95%, and a coverage of 95% (i.e., there is a 95% confidence that 95% of background analyses will be below this threshold). Hanford Site soil background thresholds (DOE-RL 1993) and local soil background data are available for most of the constituents of concern at the 183-H (see Tables 2, 3, and 4). Local concrete background data are available as well. Local background data are of limited use because the number of background samples collected are less than or equal to the minimum of ten allowed by WAC 173-340-708(11) and a normal distribution has been assumed. It has been shown that other distributions (e.g., Lognormal) are more suitable for Hanford Site soils (DOE-RL 1993).

The sitewide approach to determining soil background levels was developed as an alternative to local unit-based soil background determinations at the Hanford Site. The Hanford Site background approach (DOE-RL 1993) is based on the premise that all of the waste management units exist on a common sequence of vadose zone sediments, and that the basic soil components that control the chemical composition of these sediments are similar throughout the Hanford Site. The range of natural soil compositions is used to establish a single set of soil background data.

Use of sitewide background for environmental restoration at the Hanford Site is technically preferable to the use of the unit-based background because it more accurately represents this range, and provides a more consistent, credible, and efficient basis for evaluating contamination in soil. Model assumptions and statistical calculations for this approach are described in the *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes* (DOE-RL 1993). A rigorous comparison of 183-H soil data with the sitewide background data set is presented in *Closure Proposal: 183-H Solar Evaporation Basins* (DOE-RL 1995).

The collection and analysis of local background samples are discussed in Chapters 2.0 and 3.0 of this report. The local background thresholds were calculated as prescribed in WAC 173-340, assuming normally distributed data, and are presented in Tables 2, 3, and 4. Local background has been assessed for shallow soil, deeper vadose zone soil, and basin concrete.

3.2 HEALTH-BASED THRESHOLDS

The health-based cleanup levels calculated in this report are from the equations, risk levels, and exposure assumptions found in the *Model Toxics Control Act* (MTCA), Method B, [WAC 173-340-740(3)(a)(iii)]. For noncarcinogens, the principal variable relating human health to

cleanup levels is the oral reference dose. The oral reference dose is defined as the level of daily human exposure at or below which no adverse effect is expected to occur during a lifetime. For carcinogens, the cancer slope factor is the basis for determining human health effects; it is a measurement of risk per unit dose. The oral reference dose and cancer slope factor are chemical specific and obtained from the *Integrated Risk Information System* database (EPA 1994), if available. Secondary sources for these toxicity values are also available from the EPA or Ecology. Health based thresholds, references, and calculations are reported in Appendix F.

Published slope factors and/or reference doses are not available for some of the constituents of concern. In those instances where one of these toxicity values is available and the other is not, the health-based threshold is based upon the available value. This approach does not assume that toxicity via the uncharacterized mechanism is negligible; only that information supporting this type of toxicity is lacking.

Though WAC 173-340 does not offer a method to determine concrete standards, soil values can be used to get a general sense of the risk posed by potentially contaminated concrete. Background sampling is a more direct test for contamination.

It is planned that the Debris Rule of the RCRA "Land Disposal Restriction" (40 CFR Part 268) will be applied at 183-H, obviating any health-based cleanup thresholds.

3.3 LIMIT OF DETECTION/QUANTITATION

As a performance standard, the limit of quantitation has greater preference than the limit of detection because of the large analytical uncertainty associated with near-detection values. In practice, the laboratory reporting limit is generally considered quantifiable, and detection and quantitation limits are not differentiated. Sample-specific detection/quantitation limits are available for the K-25 and TMA Norcal Laboratory data in Appendices C, D, and E (see Section 2.2).

4.0 DATA EVALUATION

4.1 CONCRETE

The basin concrete has greater waste constituent concentrations than the surrounding and underlying soils. Concrete contamination exceeds groundwater protection or background concrete values for the following constituents of concern identified in Table 1 (arsenic, barium, beryllium, cadmium, total chromium, nickel, and nitrate). All constituents of concern with the exception of arsenic are below either background concrete or MTCA Method C direct soil exposure values. Arsenic contamination does not exceed MTCA Method C direct soil exposure values for industrial sites. Extraction technologies intended for removal of the top 6-mm contaminated layer of the concrete should effectively remove the majority of this contamination.

4.2 CONSTITUENTS OF CONCERN IN SOIL ZONES

A number of constituents of concern identified in Table 1 are removed from consideration in all soil zones because they are indistinguishable from background (DOE-RL 1995). These constituents are barium, beryllium, selenium, silver, vanadium, and cyanide. Two constituents, lead and sulfate, are also removed as constituents of concern because they are found below MTCA action levels. No Method B or Method C groundwater protection or soil exposure values exist for lead. The lead action level has been set at 250 ppm as defined under MTCA Method A. The sulfate action level has been set at 25,000 ppm which is the secondary maximum contaminant level (MCL). As with lead, no Method B or Method C groundwater protection or soil exposure values exist for sulfates. Vanadium pentoxide and formate are removed as constituents of concern because they were found below the threshold of detection, which is also below respective action levels (14.4 ppm for vanadium pentoxide and 3,200 ppm as formic acid).

Remaining constituents of concern above action levels at 183-H are nickel, arsenic, copper, nitrates, chromium, and fluoride.

4.3 SHALLOW SOILS

Contamination above action levels for constituents of concern is evident in the shallow soil beneath and surrounding the 183-H. Shallow soil contamination from nitrates and fluoride account for the majority of surface area and is concentrated under Basin 2 with areas spreading to Basins 1 and 3. The action level for nitrate is 4,400 ppm based on the MCL. The action level for fluoride is 96.0 ppm based on the MTCA Method B groundwater protection level. In addition, contamination from nickel in the shallow soils is evident in a small surface area on the west end of Basin 4. The action level for nickel is 19.7 ppm based on natural background. Arsenic contamination extends past the east perimeter sampling area and will require further sampling in order to identify its extent. The arsenic action level is 6.41 based on natural background. Copper and mercury contamination (59.2 ppm and 0.29 ppm, respectively) is largely contained within the nitrate/fluoride extent of contamination in the shallow soil.

Chromium analyses contained in this report represent total chromium values. Further sampling and analysis must be performed to determine hexavalent chromium contamination in 183-H shallow soils.

Hexavalent chromium has an action level of 8.0 ppm based on MTCA Method B groundwater protection. The total chromium action level is set at the higher natural background value of 27.9 ppm.

4.4 VADOSE ZONE SOILS

Fluoride and cadmium contamination is evident in the vadose zone. The fluoride action level (96 ppm based on the MTCA Method B groundwater protection level) in vadose zone soils. All other constituents of concern are either below natural background or MTCA Method B groundwater protection levels. Fluoride contamination in the vadose zone is conjectured to be present down to the 11-ft level in Borehole 1. Cadmium contamination consists of two discrete data points, one at 4.0 ppm in Borehole 2 at the 24 to 24.5 ft depth and the other at 4.5 ppm in Borehole 6 at the 13 to 14 ft depth. The cadmium action level is 0.5 ppm based on the MCL.

5.0 DISCUSSION AND CONCLUSIONS

The data quality and completeness are considered acceptable for preliminary remediation decisions. Data quality is most assessable for the vadose zone soil, and least for the shallow subconcrete soil beneath Basins 1 and 4. Data precision for all data sets is acceptable, though more thoroughly documented for the vadose zone soils. Assessments of data accuracy, though not well documented for the shallow soil and concrete, are reinforced by the relatively narrow range of the data, and the similarity of the data distributions to sample sets such as that of the sitewide background study. The number of samples is considered sufficient and is based on negotiations with Ecology and the EPA (during the development of DOE-RL 1990).

Chemical dangerous waste components were intimately associated with radioactive species at the basins. Because concentrations of contaminants are greatest within 1 cm of the exposed concrete surface, decontamination, if performed, is likely to remove highly concentrated zones of radioactive and nonradioactive contamination.

6.0 REFERENCES

DOE-RL, 1990, *183-H Solar Evaporation Basins Closure/Post-closure Plan*, DOE/RL-88-04, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 1993, *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes*, DOE/RL-92-24, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 1995, *Closure Proposal: 183-H Solar Evaporation Basins*, DOE/RL-95-27, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Dragun, James, 1988, *The Soil Chemistry of Hazardous Materials*, Hazardous Materials Control Research Institute (Publisher).

Ecology, 1991, "Model Toxics Control Act," *Washington Administrative Code* 173-340, Washington State Department of Ecology, Olympia, Washington.

Ecology, 1994, *Dangerous Waste Portion of the Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste (Second Draft)*, Official Public Comment Version, February 2, 1994, Washington State Department of Ecology.

Ecology, EPA, and DOE, 1994, *Hanford Federal Facility Agreement and Consent Order*, 2 vols., as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

EPA, 1983, *Methods for Chemical Analysis of Water and Wastes*, Environmental Monitoring and Support Laboratory, EPA-600/4-79-020, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1986, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, SW-846, 3rd Edition, EPA-600/4-79-019, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1989, *Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites*, Directive No. 9355.4-02, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington D.C.

EPA, 1994, *Integrated Risk Information System*, (IRIS), U.S. Environmental Protection Agency, Washington, D.C.

Stevenson, Frank J. (ed.), 1982, *Nitrogen in Agricultural Soils*, American Society of Agronomy, Inc.

WHC, 1988, *Environmental Investigations and Site Characterization Manual*, WHC-CM-7-7, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990, *Sample Management and Administration Manual*, WHC-CM-5-3, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991a, *183-H Solar Evaporation Basins Vadose Zone Sampling Plan*, WHC-SD-EN-AP-056, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991b, *Berm Removal and Sampling for 183-H Solar Evaporation Basins*, DWP-H-026-00008, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991c, *Concrete Sampling - 183-H Solar Evaporation Basins*, DWP-H-080-00001, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991d, *Core Drill Sampling - 183-H Solar Evaporation Basins (Phase I)*, DWP-H-080-00005, Westinghouse Hanford Company, Richland, Washington.

WHC, 1992, *Interim Sampling of 183-H Solar Basin Structure*, DWP-H-080-00003, Westinghouse Hanford Company, Richland, Washington.

APPENDIX A

MISCELLANEOUS SAMPLING RESULTS

APPENDIX A

MISCELLANEOUS SAMPLING RESULTS

Appendix A contains analytical data (Table A-1) and sample locations (Figure A-1) for surface soil samples taken in the general vicinity of the 183-H basins. These samples were collected after the other shallow soil samples, to further characterize the arsenic, lead, and chromium composition of the area soil.

Also included are data and plots addressing depth of contaminant penetration in the basin concrete.

TEST SCABBLING PLOT RESULTS

To determine the relative depth of waste contamination in the concrete surface, test chip sampling was performed inside Basin 2. The southwest corner of Basin 2 was chosen as the location of the 3-m by 3-m (10-ft by 10-ft) test plot. The field radiological survey had indicated this region was approximately midrange of the survey's activity results. The random concrete chip sampling results indicate that all of the radioactivity and the majority of the chemical waste (Table A-2 and Figure A-2) is contained in the first 9.5 mm (3/8 in.) of the concrete surface.

Radiological analyses of surface samples (see Table A-2) yielded measurements greater than the detection limit of 50 pCi/g. The mean activity of the surface samples was 133 pCi/g with a standard deviation of 24. Radioactivity was not detectable in the subsurface samples. The subsurface samples were collected at depths of 1/4, 3/8, and 1/2 in.

Table A-1. Analytical Data (mg/kg) for Outlying Surface Soil Samples.

Sample Number	Analyte		
	Arsenic	Chromium	Lead
E2020	4.2	8.9	12.4
E2021	1.8	8.1	4.0
E2022	2.7	23.5	27.7
E2023	1.3	6.5	6.8
E2024	1.9	6.6	6.1
E2021 (Duplicate)	1.8	8.1	4.0
E2023 (Matrix Spike)	1.3	6.5	6.8

Table A-2. Basin 2 Concrete Test Scabbling Plot Analytical Data and Sample Description.

Sample Number	Total Activity (pCi/g)	Nitrate/Nitrite (mg/kg-N)	Sample Description
B07588	107.5	4,250	Random Surface Concrete Chip
B075B2	111.1	3,930	Duplicate of BO7588
B07589	159.1	3,580	Random Surface Concrete Chip
B07590	156.7	3,880	Random Surface Concrete Chip
B075B3	130.5	3,030	Duplicate of BO7590
B07591	50.0 U	1,170	Random 1/4-in. Depth Chip
B07592	50.0 U	1,030	Random 1/4-in. Depth Chip
B07587	50.0 U	942	Random 1/4-in. Depth Chip
B07593	50.0 U	739	Random 3/8-in. Depth Chip
B07594	50.0 U	700	Random 3/8-in. Depth Chip
B07595	50.0 U	711	Random 3/8-in. Depth Chip
B07596	50.0 U	486	Random 1/2-in. Depth Chip
B07597	50.0 U	328	Random 1/2-in. Depth Chip
B07598	50.0 U	353	Random 1/2-in. Depth Chip
B07599	50.0 U	3.7	Outside Surface Background Chip
B075B0	50.0 U	5.1	Outside Surface Background Chip
B075B1	50.0 U	2.4	Outside Surface Background Chip
B075B5	50.0 U	0.18 mg/L-N	Equipment Decontamination Check (Deionized Water for Cleaning)

Figure A-1. 183-H Solar Basins Selected Outlying Sampling Locations.

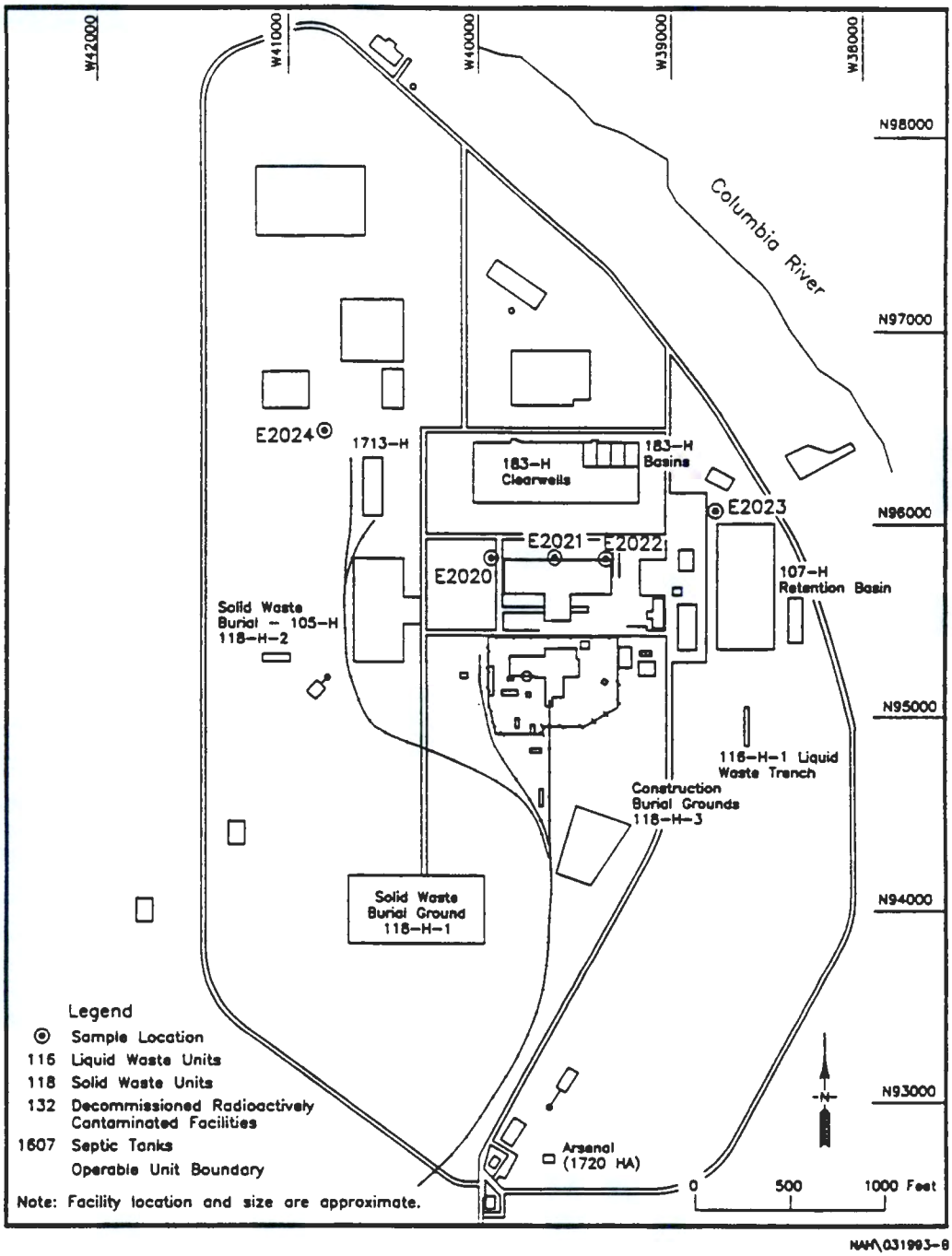
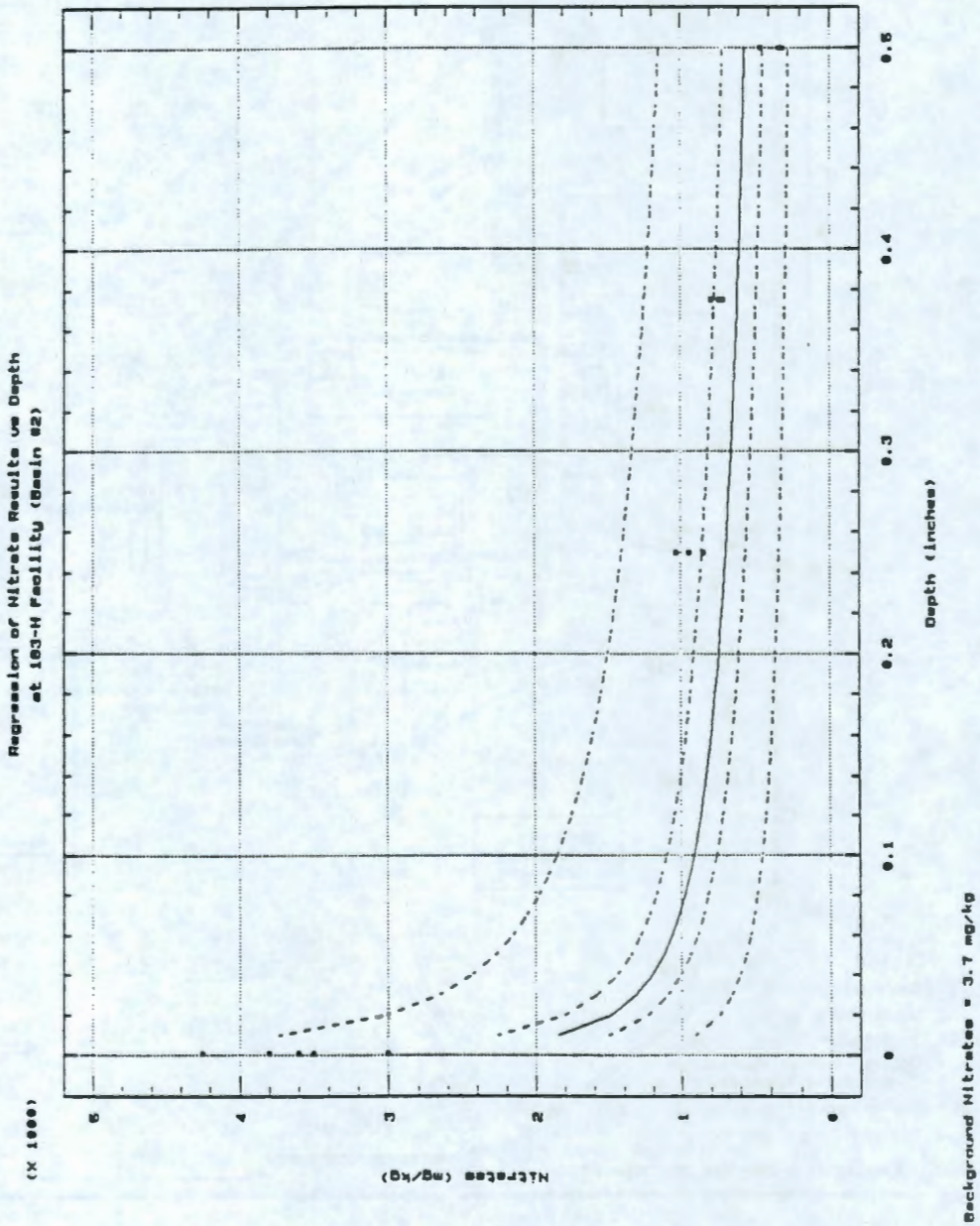


Figure A-2. Regression of Nitrate Results versus Depth at 183-H Facility (Solid Line). (Dashed lines represent 95% confidence [inner lines] and prediction [outer lines] intervals)



APPENDIX B

ANALYTICAL DATA FOR SHALLOW SOIL BENEATH BASINS 1 AND 4 AND FOR LOCAL SHALLOW SOIL BACKGROUND

(All analyses were performed by U.S. Testing Laboratory)

APPENDIX B

ANALYTICAL DATA FOR SHALLOW SOIL BENEATH BASINS 2 AND 3 AND FOR SURFACE SOIL SAMPLES

(All analyses were performed by U.S. Testing Laboratory)

Appendix B contains analytical data (Tables B-1 through B-10) and sample locations for the shallow soil samples (Figure B-1) taken beneath two of the 183-H basins and for local background shallow soil samples (Figure B-2). The data summary statistics (Table B-5) are based on all routine (as opposed to background or quality control [QC]) sample data except those qualified with a "below detection limit" (BDL).

These data did not undergo a validation process other than that of the QC checks and reviews performed by the laboratory.

Analytes that were either undetected or detected below the contractual detection limit are flagged as follows:

U The material was analyzed for, but was not detected. The associated value is the detection/quantitation limit

B Analyte found in blank.

For further information refer to Chapter 2.0. Detection limits in this appendix are not listed in the data columns because the detection/quanitation limits generally were not sample specific. Table B is a list of detection limits that apply to most of the data.

Table B. List of Detection Limits. (2 sheets)

Constituent	Detection Limit (mg/kg)
Aluminum	15.0
Antimony	10.0
Arsenic	0.5
Barium	0.6
Beryllium	0.5
Boron	1.0
Bromide	1.0
Cadmium	0.2
Calcium	5.0
Chloride	1.0
Chromium	1.0
Cobalt	2.0
Copper	1.0
Fluoride	1.0
Iron	5.0
Lead	0.5
Lithium	10.0
Magnesium	5.0
Manganese	0.5
Mercury	0.2
Molybdenum	4.0
Nickel	1.0
Nitrate	1.0
Nitrite	1.0
Phosphate	2.0
Potassium	10.0
Selenium	0.5
Silicon	2.0

Table B. List of Detection Limits. (2 sheets)

Constituent	Detection Limit (mg/kg)
Silver	1.0
Sodium	2.0
Strontium	1.0
Sulfate	1.0
Tin	3.0
Titanium	6.0
Vanadium	0.5
Zinc	0.5
Zirconium	5.0

Table B-1. Subconcrete Analytical Data, Flocculation Basin 1.
(mg/kg unless noted otherwise) (2 sheets)

Analyte	Sample Numbers									
	AB-001		AB-004		AB-005		AB-008		AB-009	
Aluminum	14,900		9,110		8,660		11,600		9,400	
Antimony		BDL		BDL		BDL		BDL		BDL
Arsenic	16.5		2.9		3.1		3.4		1.4	
Barium	11.1		69.8		69		94.2		79.4	
Beryllium	0.7			BDL		BDL	0.5			BDL
Beta (pCi/g)	22.3		20		20.2		23.2		20.6	
Boron		BDL		BDL		BDL		BDL		BDL
Bromide		BDL		BDL		BDL		BDL		BDL
Cadmium	6.9		4.4		4.1		4.6		4.1	
Calcium	8,650		9,380		8,060		7,450		10,400	
Chloride	1			BDL		BDL	1.2			BDL
Chromium	20.9		15		14.4		21.2		15.3	
Cobalt	16.6		56.4		102		30.2		255	
Copper	21.7		14.8		16.2		16.5		15.5	
Fluoride		BDL		BDL		BDL	9.1			BDL
Iron	30,400		18,700		18,200		21,000		18,900	
Lead	30.9		128		8.8		6		3	
Lithium	14.2			BDL		BDL	13.2			BDL
Lo-Alpha (pCi/g)	5.2		4.9		4.9		2.8		2.9	
Magnesium	7,560		5,190		5,360		6,210		5,870	
Manganese	451		281		280		310		267	
Mercury		BDL		BDL		BDL		BDL		BDL
Molybdenum		BDL		BDL		BDL		BDL		BDL
Nickel	21.2		17.2		20.4		20.6		20.9	
Nitrate	345		140		38.7		281		48.6	
Nitrite		BDL		BDL		BDL		BDL		BDL

Table B-1. Subconcrete Analytical Data, Flocculation Basin 1.
(mg/kg unless noted otherwise) (2 sheets)

Analyte	Sample Numbers									
	AB-001		AB-004		AB-005		AB-008		AB-009	
Phosphate		BDL		BDL		BDL	2.8			BDL
Potassium	2,270		1,360		1,250		1,520		1,180	
Selenium		BDL		BDL		BDL		BDL		BDL
Silicon	1,130		760		793		867		876	
Silver		BDL		BDL		BDL		BDL		BDL
Sodium	688		415		361		1,890		402	
Strontium	47.2		40.8		37.9		37.1		40.7	
Sulfate	35		30.1		30.3		319		33.8	
Technetium-99 (pCi/g)	9.7		7.7		7.8		10.5		7.7	
Tin	6.7		5.1		3.2		5.1		3.8	
Titanium	1,810		1,140		1,110		950		1,180	
Uranium (Chemical)	1.1		0.5		0.4		0.6		0.3	
Vanadium	62.3		41.8		40.9		41.8		40.4	
Zinc	53.6		36.9		36.1		42.9		38.9	
Zirconium	24.7		12.5		11.5		9.6		12.2	

Table B-2. Subconcrete Analytical Data, Sedimentation Basin 1.
(mg/kg unless noted otherwise) (2 sheets)

Analyte	Sample Numbers													
	AB-014		AB-015		AB-017		AB-037		AB-041		AB-042		AB-043	
Aluminum	10,600		13,400		13,000		12,300		11,400		11,600		12,300	
Antimony		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Arsenic	3.3		2.9		3.6		3.7		5.9		4.3		2.4	
Barium	83.4		98		115		115		96.7		110		65.9	
Beryllium		BDL	1.3			BDL	0.8			BDL		BDL	2.5	
Beta (pCi/g)	27.9		39.4		30.8		36		36.3		43		40.2	
Boron		BDL	3.5	B		BDL		BDL		BDL		BDL		BDL
Bromide		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Cadmium	5.6		4.8		5.5		4.8		4.5		4.7		4.2	
Calcium	15,500		10,500		14,800		13,200		12,600		14,800		12,700	
Chloride		BDL	2.7			BDL		BDL		BDL		BDL	2.2	
Chromium	21.2		33.7		23.1	B	20.2		19.8		26		42.7	
Cobalt	224		117		30.4		210		21.8		73		217	
Copper	32.9	B	691		21.3	B	19.5		21		24.4		1,140	
Fluoride		BDL	249			BDL		BDL		BDL		BDL	50 U	BDL
Iron	23,900		20,900		22,300		21,700		20,600		20,900		18,800	
Lead	7.2		20.3		7.3		14.6		7.8		9.2		5.7	
Lithium	11.5		13.2		14.7		14.5		13.3		13.8		13.7	
Lo-Alpha (pCi/g)	3.5		7.5		7.2		8		7.32		8		15.1	
Magnesium	6,660		6,830		8,320		7,550		7,220		7,570		6,550	
Manganese	284		289		319		296		299		285		307	
Mercury		BDL	0.9			BDL		BDL		BDL		BDL		BDL
Molybdenum		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Nickel	49.9		26.9		21.1		22		18.5		19.8		64.2	
Nitrate	11,500		472		7,270		11,500		24,200		28,300		240	
Nitrite		BDL	11			BDL		BDL		BDL		BDL	1.2	

Table B-2. Subconcrete Analytical Data, Sedimentation Basin 1.
(mg/kg unless noted otherwise) (2 sheets)

Analyte	Sample Numbers													
	AB-014		AB-015		AB-017		AB-037		AB-041		AB-042		AB-043	
Phosphate		BDL		BDL		BDL	634			BDL		BDL		BDL
Potassium	1,640		1,840		1,970		2,130		1,880		1,820		1,710	
Selenium		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Silicon	1,450		1,640		1,220		1,600		920		1,610		1,180	
Silver		BDL	1.1			BDL		BDL		BDL		BDL		BDL
Sodium	6,150		3,440		4,050		7,410		11,900		18,000		2,150	
Strontium	53.7		43.5		68.9		50.4		48.8		49.4		49.4	
Sulfate		BDL	68	B	211		923		1,240		2,540		54.5	
Technetium-99 (pCi/g)	52.4		12		66.3		88.2		86.2		147		44.1	
Tin	6.3	B	3.6	B	4	B	5.1	B	5.5	B	4.9	B	10.8	B
Titanium	965		1,140		1,000		1,020		1,010		1,000		1,060	
Uranium (Chemical)	1.4		49.5		18		2.6		0.8		9.2		35.9	
Vanadium	38.6		44.7		38.3		38.3		36.5		35.8		37.2	
Zinc	41.3		39.6		47.2		45.7		51.4		43.9		50.1	
Zirconium	10.2		1,730		12.1		12.9		13.1		13.4		3,920	

Table B-3. Subconcrete Analytical Data, Flocculation Basin 4.
(mg/kg unless noted otherwise) (2 sheets)

Analyte	Sample Numbers							
	AB-021		AB-022		AB-024		AB-025	
Aluminum	10,700		10,000		10,000		11,700	
Antimony		BDL		BDL		BDL		BDL
Arsenic	4.7		4.4		3.7		4	
Barium	84.9		84.1		74.8		97.2	
Beryllium		BDL		BDL		BDL		BDL
Beta (pCi/g)	20.7		22.7		19.9		27.3	
Boron		BDL		BDL		BDL		BDL
Bromide		BDL		BDL		BDL		BDL
Cadmium	5.9		5.8		5.4		5.4	
Calcium	10,100		7,460		7,830		20,200	
Chloride		BDL		BDL		BDL		BDL
Chromium	23.4		16.9		16.6		20.3	
Cobalt	79.2		11.4		25.1		54	
Copper	26	B	17	B	15.7	B	15.9	B
Fluoride		BDL		BDL		BDL		BDL
Iron	23,300		20,200		20,500		20,100	
Lead	83.8		14.6		10.2		28.4	
Lithium	11.2		10.2			BDL	12.2	
Lo-Alpha (pCi/g)	6.5		3.7		4.1		4.9	
Magnesium	5,950		5,940		5,360		6,960	
Manganese	302		283		281		284	
Mercury		BDL		BDL		BDL		BDL
Molybdenum		BDL		BDL		BDL		BDL
Nickel	22.5		15.3		15.1		20.9	
Nitrate	58.9		283		36.5		340	
Nitrite		BDL		BDL		BDL		BDL

Table B-3. Subconcrete Analytical Data, Flocculation Basin 4.
(mg/kg unless noted otherwise) (2 sheets)

Analyte	Sample Numbers							
	AB-021		AB-022		AB-024		AB-025	
Phosphate		BDL		BDL	2.1			BDL
Potassium	1,340		1,320		2,270		1,390	
Selenium		BDL		BDL		BDL		BDL
Silicon	1,300		1,130		1,050		1,390	
Silver		BDL		BDL		BDL		BDL
Sodium	472		458		1,190		491	
Strontium	44		37.4		41.5		55.6	
Sulfate	41.7		14		24.3		52	
Technetium-99 (pCi/g)	8.2		10.3		7.9		9.9	
Tin	4.9	B	4	B	4.5	B	3.6	B
Titanium	1,080		1,180		1,230		969	
Uranium (Chemical)	0.8		0.8		0.7		1	
Vanadium	41.8		44.3		44.5		38	
Zinc	40.6		39.6		38.5		43.4	
Zirconium	12.3		13.5		14.3		10.9	

Table B-4. Subconcrete Analytical Data, Sedimentation Basin 4.
(mg/kg unless noted otherwise) (2 sheets)

Analyte	Sample Numbers													
	AB-029		AB-031		AB-032		AB-033		AB-034		AB-035		AB-036	
Aluminum	12,300		11,500		12,200		11,700		11,900		10,700		12,300	
Antimony		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Arsenic	3.5		5.4		4.9		4.5		4		5.1		3.7	
Barium	93.6		118		113		104		105		99.6		105	
Beryllium		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Beta (pCi/g)	25.1		24.3		26.5		27.3		26.5		27.1		25.7	
Boron		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Bromide		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Cadmium	5.4		4.1		4.9		4.8		4.7		4.6		4.4	
Calcium	11,300		17,100		14,700		19,300		11,100		17,000		11,800	
Chloride	1.3		4.9		2.6		7		1.7		3.2		1.3	
Chromium	22.2		19.9		22.3		19		20.2		18.2		20	
Cobalt	13		41		215		80.4		68.9		210		33.1	
Copper	15.1	B	22.9		22.1		19.3		20.3		19.8		29.1	
Fluoride	1.1		8.3		1.5			BDL		BDL		BDL		BDL
Iron	21,000		20,800		21,900		20,800		21,300		20,100		21,500	
Lead	7.3		7.4		9		44.8		9.6		7.7		39	
Lithium	13.5		14.4		14.6		13.7		14.9		13.2		15.2	
Lo-Alpha (pCi/g)	6.6		5.3		6.1		2.4		1.8		7.1		4.7	
Magnesium	7,550		7,430		8,290		7,770		7,660		7,000		8,590	
Manganese	305		301		321		304		320		284		314	
Mercury		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Molybdenum		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Nickel	18.6		20.7		28.1		20.7		23.1		21.2		20.9	
Nitrate	33.8		19.1		349		2,160		66.1		3,020		51.5	
Nitrite		BDL		BDL		BDL		BDL		BDL		BDL		BDL

Table B-4. Subconcrete Analytical Data, Sedimentation Basin 4.
(mg/kg unless noted otherwise) (2 sheets)

Analyte	Sample Numbers													
	AB-029		AB-031		AB-032		AB-033		AB-034		AB-035		AB-036	
Phosphate		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Potassium	1,840		2,100		1,780		1,960		2,220		2,330		1,800	
Selenium		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Silicon	1,270		795		1,430		909		747		1,070		1,130	
Silver		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Sodium	1,300		2,500		1,570		1,360		1,320		2,600		1,180	
Strontium	55.6		64.5		60.8		60.5		54.9		54.5		55.2	
Sulfate	40.6		189		93.4		105		62.4		357		48.6	
Technetium-99 (pCi/g)	0.4		17		1.6		19.5		1.1		18.2		0.8	
Tin	3.4	B	6.1	B	4.8	B	4.7	B	5.2	B	5.5	B	4.6	B
Titanium	985		937		957		964		954		941		949	
Uranium (Chemical)	1.1		0.9		0.9		1.1		0.9		1.1		1	
Vanadium	41.4		37.3		38.6		37.3		38.3		34.4		38.7	
Zinc	45.8		56.1		46.4		46		48.8		46.6		45.6	
Zirconium	10.3		12.2		11.7		11.5		11		11.1		10.8	

Table B-5. Subconcrete Analytical Data, Basins 1 and 4 Summary Statistics. (2 sheets)

Analyte	Mean (mg/kg)	Standard Deviation (mg/kg)	Number of Detectable Results	Total Number of Analyses	Maximum (mg/kg)	Minimum (mg/kg)
Aluminum	11,446.5	1,437.4	23	23	14,900	8,660
Antimony			0	23		
Arsenic	4.4	2.8	23	23	16.5	1.4
Barium	90.7	23.3	23	23	118	65.9
Beryllium	1.2	0.8	5	23	2.5	0.5
Beta (pCi/g)	27.6	7.1	22	23	43	19.9
Boron	3.5		1	23	3.5	3.5
Bromide			0	23		
Cadmium	4.9	0.7	23	23	6.9	4.1
Calcium	12,431.7	3,734.6	23	23	20,200	7,450
Chloride	2.6	1.8	11	23	7	1.2
Chromium	21.4	6.2	23	23	42.7	14.4
Cobalt	95	82.2	23	23	255	11.4
Copper	98.2	266.7	23	23	1,140	14.8
Fluoride	53.8	109.2	5	23	249	1.1
Iron	21,208.7	2,426.5	23	23	30,400	18,200
Lead	22.2	29.3	23	23	128	3
Lithium	13.4	1.5	19	23	15.2	10.2
Lo-Alpha (pCi/g)	5.7	2.8	23	23	15.1	1.8
Magnesium	6,930	987.6	23	23	8,590	5,190
Manganese	303.9	35.2	22	23	451	267
Mercury	0.9		1	23	0.9	0.9
Molybdenum			0	23		
Nickel	23.9	11.1	23	23	64.2	15.1
Nitrate	3,945.8	7,863.6	23	23	28,300	19.1
Nitrite	6.1	6.9	2	23	11	1.2
Phosphate	213	364.6	3	23	634	2.1
Potassium	1,779.1	353.9	23	23	2,330	1,180
Selenium			0	23		

Table B-5. Subconcrete Analytical Data, Basins 1 and 4 Summary Statistics. (2 sheets)

Analyte	Mean (mg/kg)	Standard Deviation (mg/kg)	Number of Detectable Results	Total Number of Analyses	Maximum (mg/kg)	Minimum (mg/kg)
Silicon	1,142	283.9	23	23	1,640	747
Silver	1.1		1	23	1.1	1.1
Sodium	3,099.9	4,285.9	23	23	18,000	361
Strontium	50.1	8.9	23	23	68.9	37.1
Sulfate	296	588.3	22	23	2,540	14
Technetium-99 (pCi/g)	27.6	37.1	23	23	147	0.4
Tin	5	1.6	23	23	10.8	3.2
Titanium	1,066.6	185.1	23	23	1,810	937
Uranium (Chemical)	5.7	12.5	23	23	49.5	0.3
Vanadium	40.5	5.5	23	23	62.3	34.4
Zinc	44.6	5.3	23	23	56.1	36.1
Zirconium	257	875	23	23	3,920	9.6

Table B-6. Subconcrete Analytical Data, Basins 1 and 4 Duplicate Samples.
(mg/kg unless noted otherwise) (2 sheets)

Analyte	Sample Numbers									
	AB-006 (Duplicate of AB-005)		AB-016 (Duplicate of AB-015)		AB-023 (Duplicate of AB-022)		AB-030 (Duplicate of AB-029)		AB-045 (Duplicate of AB-044)	
Aluminum	8,730		13,400		11,200		11,700		10,900	
Antimony		BDL		BDL		BDL		BDL		BDL
Arsenic	3.1		2.1		4.4		3.8		2.5	
Barium	70.6		96.6		88.2		101		91.2	
Beryllium		BDL	1.3			BDL		BDL	0.6	
Beta (pCi/g)	20.7		38.4		24.6		23.3		20.3	
Boron		BDL	2	B		BDL		BDL		BDL
Bromide		BDL		BDL		BDL		BDL		BDL
Cadmium	4.5		4.8		5.5		4.6		5.1	
Calcium	8,710		9,550		7,900		10,100		3,620	
Chloride		BDL	2.3			BDL	1.3		1.4	
Chromium	14.5		34.1		20		20.2		11.2	
Cobalt	90.4		84.5		27.6		9.8		7.4	
Copper	15.7		683		15.9	B	16.9		13.1	
Fluoride		BDL	241			BDL	1.1			BDL
Iron	18,600		20,900		20,800		20,800		20,800	
Lead	8.3		25.7		22.2		7.4		5.1	
Lithium		BDL	13		12.1		14.7			BDL
Lo-Alpha (pCi/g)	3.9		8.3		3.1		1.6		9.6	
Magnesium	5,330		6,840		6,100		8,060		5,100	
Manganese	290		282				312		330	
Mercury		BDL	1.1			BDL		BDL		BDL
Molybdenum		BDL		BDL		BDL		BDL		BDL
Nickel	19.6		25.3		19.2		18.4		12.8	
Nitrate	40		463		331		33.3		7.9	
Nitrite		BDL	11.2			BDL		BDL		BDL

Table B-6. Subconcrete Analytical Data, Basins 1 and 4 Duplicate Samples.
(mg/kg unless noted otherwise) (2 sheets)

Analyte	Sample Numbers									
	AB-006 (Duplicate of AB-005)		AB-016 (Duplicate of AB-015)		AB-023 (Duplicate of AB-022)		AB-030 (Duplicate of AB-029)		AB-045 (Duplicate of AB-044)	
Phosphate		BDL		BDL		BDL		BDL		BDL
Potassium	1,300		1,820		1,460		1,940		2,320	
Selenium		BDL		BDL		BDL		BDL		BDL
Silicon	829		1,340		1,360		1,050		1,450	
Silver		BDL	1.1			BDL		BDL		BDL
Sodium	381		3,320		539		1,360		229	B
Strontium	38.6		42.9		42.2		55.4		28	
Sulfate	31.1		58		25.3		37.1		2.2	
Technetium-99 (pCi/g)	7.9		12.6		10.2		0.4		0.3	
Tin	4.6			BDL	3.8	B	4.3	B	5.6	B
Titanium	1,100		1,130		1,080		925		1,220	
Uranium (Chemical)	0.5		33.4		0.7		0.8		0.4	
Vanadium	42		44.3		42.6		38.7		39.2	
Zinc	39.8		38.8		42.3		45.3		36.2	
Zirconium	12.2		1,620		11.7		10.5		22.9	

Table B-7. Subconcrete Analytical Data, Basins 1 and 4 Equipment Blanks.
(mg/kg unless noted otherwise) (2 sheets)

Analyte	Sample Numbers											
	AB-007		AB-010		AB-020		AB-027		AB-038		AB-055	
Aluminum	203		226		204		216		163		162	
Antimony		BDL		BDL		BDL		BDL		BDL		BDL
Arsenic		BDL		BDL		BDL		BDL		BDL		BDL
Barium	2.2		2.8		2.5		4.2		1.8		2	
Beryllium		BDL		BDL		BDL		BDL		BDL		BDL
Beta (pCi/g)	19.8		12		9.4		11.9		10.1		17.5	
Boron		BDL	1.4	B	1.6		1.8	B		BDL	1.9	B
Bromide		BDL		BDL		BDL		BDL		BDL		BDL
Cadmium		BDL		BDL		BDL		BDL		BDL		BDL
Calcium	38.5		34.9		39.6		44.9		33.3	B	38.3	
Chloride	1.2		1.6		1.6		1.4		1.2		1.1	
Chromium		BDL		BDL		BDL		BDL		BDL		BDL
Cobalt		BDL		BDL		BDL		BDL		BDL		BDL
Copper	2.2			BDL		BDL		BDL	2.7			BDL
Fluoride		BDL		BDL		BDL		BDL		BDL		BDL
Iron	271		788		307		380		257		196	
Lead	0.6			BDL		BDL		BDL		BDL		BDL
Lithium		BDL		BDL		BDL		BDL		BDL		BDL
Lo-Alpha (pCi/g)	1.7		2.8		3.7		1.1		1.5		1.5	
Magnesium	22.1		28.2		28.1		25.2		18.3		19.9	
Manganese	5.8		10		6.6		5		3.7		5.8	
Mercury		BDL		BDL		BDL		BDL		BDL		BDL
Molybdenum		BDL		BDL		BDL		BDL		BDL		BDL
Nickel		BDL		BDL		BDL		BDL		BDL		BDL
Nitrate		BDL		BDL		BDL		BDL		BDL		BDL
Nitrite		BDL		BDL		BDL		BDL		BDL		BDL

Table B-7. Subconcrete Analytical Data, Basins 1 and 4 Equipment Blanks.
(mg/kg unless noted otherwise) (2 sheets)

Analyte	Sample Numbers											
	AB-007		AB-010		AB-020		AB-027		AB-038		AB-055	
Phosphate		BDL		BDL		BDL		BDL		BDL		BDL
Potassium	42.3		45.8		40.2		38.4		35.5		35.1	
Selenium		BDL		BDL		BDL		BDL		BDL		BDL
Silicon	166		153	B	135		137	B	120	B	111	
Silver		BDL		BDL		BDL		BDL		BDL		BDL
Sodium		BDL		BDL		BDL		BDL		BDL	28.6	B
Strontium		BDL		BDL		BDL		BDL		BDL		BDL
Sulfate	1.4		1.7		1.6		1.6		1.2			BDL
Technetium-99 (pCi/g)	7.7		7.7		7.5		0.3		0.2		1.3	
Tin	4.1		3	B	3.3			BDL	4.2	B	3.2	B
Titanium		BDL	7.7		7.3			BDL		BDL		BDL
Uranium (Chemical)	0.1		0.3		0.4		0.2		0.1		0.2	
Vanadium	0.5			BDL		BDL		BDL		BDL		BDL
Zinc	1		1.1		0.9		0.9		1.4		0.9	
Zirconium		BDL		BDL		BDL		BDL		BDL		BDL

Table B-8. Subconcrete Analytical Data, Basins 1 and 4 Field Blanks.
(mg/kg unless noted otherwise) (2 sheets)

Analyte	Sample Numbers											
	AB-002		AB-012		AB-019		AB-028		AB-039		AB-048	
Aluminum	140		163		164		253		184		211	
Antimony		BDL		BDL		BDL		BDL				BDL
Arsenic		BDL		BDL		BDL		BDL				BDL
Barium	1.6		1.7		1.9		2.6		1.8		3.5	
Beryllium		BDL		BDL		BDL		BDL		BDL		BDL
Beta (pCi/g)	6.2		9.6		8.5		12		21.4		17	
Boron		BDL	1.6	B		BDL	1.7	B		BDL	1.9	
Bromide		BDL		BDL		BDL		BDL		BDL		BDL
Cadmium		BDL		BDL		BDL		BDL		BDL		BDL
Calcium	27.7		30.3		30.2		46.6		33.2	B	43.8	
Chloride	1.1		1.2		1.3			BDL		BDL		BDL
Chromium		BDL		BDL		BDL		BDL		BDL		BDL
Cobalt		BDL		BDL		BDL		BDL		BDL		BDL
Copper		BDL	2.1	B	2.3	B	1.9	B	1.2			BDL
Fluoride		BDL		BDL		BDL		BDL		BDL		BDL
Iron	201		196		237		660		206		268	
Lead	0.7			BDL		BDL		BDL		BDL		BDL
Lithium		BDL		BDL		BDL		BDL		BDL		BDL
Lo-Alpha (pCi/g)	1.5		2.8		1.5		0.8		1.4		-0.3	
Magnesium	15.4		18.6		21.2		43.1		18.4		26.3	
Manganese	5.5		5.1		4.9		10.7		6.2		5.1	
Mercury		BDL		BDL		BDL		BDL		BDL		BDL
Molybdenum		BDL		BDL		BDL		BDL		BDL		BDL
Nickel		BDL		BDL		BDL		BDL		BDL		BDL
Nitrate		BDL		BDL		BDL		BDL		BDL		BDL
Nitrite		BDL		BDL		BDL		BDL		BDL		BDL

Table B-8. Subconcrete Analytical Data, Basins 1 and 4 Field Blanks.
(mg/kg unless noted otherwise) (2 sheets)

Analyte	Sample Numbers											
	AB-002		AB-012		AB-019		AB-028		AB-039		AB-048	
Phosphate		BDL		BDL		BDL		BDL		BDL		BDL
Potassium	33.6		38.7		34		47		41		42.7	
Selenium		BDL		BDL		BDL		BDL		BDL		BDL
Silicon	131		150	B	123	B	145	B	118	B	87.1	
Silver		BDL		BDL		BDL		BDL		BDL		BDL
Sodium		BDL		BDL		BDL		BDL		BDL	38.9	B
Strontium		BDL		BDL		BDL		BDL		BDL		BDL
Sulfate	1.7		1.6		1.9			BDL		BDL		BDL
Technetium-99 (pCi/g)	7.6		9.3		7.9		0.2		0.1		0.6	
Tin	4.1			BDL		BDL	3.2	B	4.4	B		BDL
Titanium		BDL		BDL	6.1			BDL		BDL		BDL
Uranium (Chemical)	0.4		0.4		0.5		0.1		0.2		0.1	
Vanadium		BDL		BDL		BDL	0.5			BDL		BDL
Zinc	0.9		0.9		0.7		1.8		1.1		1	
Zirconium		BDL		BDL		BDL		BDL		BDL		BDL

Table B-9. Subconcrete Analytical Data, Basins 1 and 4 Trip Blanks.
(mg/kg unless noted otherwise) (2 sheets)

Analyte	Sample Numbers											
	AB-003		AB-011		AB-018		AB-026		AB-040		AB-049	
Aluminum	168		166		172		154		209		164	
Antimony		BDL		BDL		BDL		BDL		BDL		BDL
Arsenic		BDL		BDL		BDL		BDL		BDL		BDL
Barium	1.9		1.6		1.8		1.6		2.5		1.9	
Beryllium		BDL		BDL		BDL		BDL		BDL		BDL
Beta (pCi/g)	16.1		11.5		11.3		13.2		14.3		19.2	
Boron		BDL	1.3	B	1.5		1	B		BDL	2.4	
Bromide		BDL		BDL		BDL		BDL		BDL		BDL
Cadmium		BDL		BDL		BDL		BDL		BDL		BDL
Calcium	29.4		26.8		29.1		30.4		34.8	B	33.9	
Chloride	1.2		1.6		1.3			BDL		BDL		BDL
Chromium		BDL		BDL		BDL		BDL		BDL		BDL
Cobalt		BDL		BDL		BDL		BDL		BDL		BDL
Copper	1			BDL	1.6	B	3	B	1.6		5.3	
Fluoride		BDL		BDL		BDL		BDL		BDL		BDL
Iron	210		212		222		197		279		190	
Lead		BDL		BDL	0.7			BDL		BDL		BDL
Lithium		BDL		BDL		BDL		BDL		BDL		BDL
Lo-Alpha (pCi/g)	3.3		2.1		3		2		2.9		2.5	
Magnesium	18.2		16.3		18.5		19.4		24.8		17.8	
Manganese	5.5		4.5		5.2		4.3		5.3		5.1	
Mercury		BDL		BDL		BDL		BDL		BDL		BDL
Molybdenum		BDL		BDL		BDL		BDL		BDL		BDL
Nickel		BDL		BDL		BDL		BDL		BDL		BDL
Nitrate		BDL		BDL		BDL		BDL		BDL		BDL
Nitrite		BDL		BDL		BDL		BDL		BDL		BDL

Table B-9. Subconcrete Analytical Data, Basins 1 and 4 Trip Blanks.
(mg/kg unless noted otherwise) (2 sheets)

Analyte	Sample Numbers											
	AB-003		AB-011		AB-018		AB-026		AB-040		AB-049	
Phosphate		BDL		BDL		BDL		BDL		BDL		BDL
Potassium	33.2		33.9		35.2		29.8		58.8		36.7	
Selenium		BDL		BDL		BDL		BDL		BDL		BDL
Silicon	160		134	B	144	B	118	B	124	B	103	
Silver		BDL		BDL		BDL		BDL		BDL		BDL
Sodium		BDL		BDL		BDL		BDL		BDL	34.9	B
Strontium		BDL		BDL		BDL		BDL		BDL		BDL
Sulfate	1.7		2		1.8			BDL	1			BDL
Technetium-99 (pCi/g)	7.5		7.5		7.4		0.3		0.4		0.3	
Tin	3.7			BDL		BDL		BDL	4.6	B	3.5	
Titanium		BDL		BDL		BDL		BDL	6.5			BDL
Uranium (Chemical)	0.1		0.4		2.1		0.1		0.2		0.2	B
Vanadium		BDL		BDL		BDL		BDL		BDL		BDL
Zinc	0.8		0.8		0.8		0.8		1.9		1	
Zirconium		BDL		BDL		BDL		BDL		BDL		BDL

Table B-10. Subconcrete Analytical Data, Background Samples.
(mg/kg unless noted otherwise) (2 sheets)

Analyte	Sample Numbers															
	AB-044		AB-046		AB-047		AB-050		AB-051		AB-052		AB-053		AB-054	
Aluminum	11,000		13,100		12,400		13,300		10,500		11,500		10,700		10,900	
Antimony		BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Arsenic	2.4		2.6		2.6		2.6		2.2		2		2.5		2.4	
Barium	97.7		93.5		94.5		96.3		90.2		89.8		89.5		87.7	
Beryllium		BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Beta (pCi/g)	22		19.2		25.2		21		22.6		23.3		22.1		23	
Boron		BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Bromide		BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Cadmium	5.2		5.7		5.7		6		5.9		5.9		4.7		5.1	
Calcium	3,290		4,100		3,860		4,000		4,730		3,980		3,430		3,500	
Chloride	1.5			BDL		BDL		BDL	2.4		2.3		6.8		10.6	
Chromium	11.9		14.1		13.1		14		10.5		13.6		11.5		11.8	
Cobalt	8.1		8.6		8.5		9.2		8.2		8.8		7.5		7.3	
Copper	16.9		17.4		16.1		18.2		19.8		16.5		15		14.7	
Fluoride		BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Iron	23,000		23,700		23,200		24,900		24,000		23,500		20,700		21,200	
Lead	4.4		6.1		4.9		6.3		4.2		4.2		4.7		5.2	
Lithium	10		10.6		10.2		10.3			BDL		BDL		BDL		BDL
Lo-Alpha (pCi/g)	6.4		9.6		6.9		8.4		7.1		8.4		6.8		7.5	
Magnesium	5,590		5,960		5,730		6,120		5,730		5,740		5,050		5,150	
Manganese	336		363		361		371		332		360		321		327	
Mercury		BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Molybdenum		BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Nickel	12.4		14.9		14.3		15.3		14		15.4		12.2		12.3	
Nitrate	8		7.7		7		11.8		4.2		2.3		13.9		10.3	
Nitrite		BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL

Table B-10. Subconcrete Analytical Data, Background Samples.
(mg/kg unless noted otherwise) (2 sheets)

Analyte	Sample Numbers															
	AB-044		AB-046		AB-047		AB-050		AB-051		AB-052		AB-053		AB-054	
Phosphate		BDL		BDL		BDL		BDL		BDL	2.1			BDL		BDL
Potassium	2,490		2,580		2,590		2,600		1,850		2,010		2,290		2,440	
Selenium		BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Silicon	1,510		1,590		1,740		1,580		1,460		1,390		1,310		1,350	
Silver		BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL
Sodium	187		238	B	221	B	225	B	246	B	212	B	210	B	229	B
Strontium	27.8		31.2		29.4		29.9		28.1		29.1		27.8		28.3	
Sulfate	2.2		3.3		4		3.7		3.8		5		5.4		5.9	
Technetium-99 (pCi/g)	0.3		0.4		0.6		0.4		0.9		0.5		0.9		0.9	
Tin	6.3	B	5.8	B	6.9	B	6.9	B	7.7	B	5.9	B	4.8	B	5.1	B
Titanium	1,150		1,350		1,290		1,410		1,680		1,420		1,150		1,220	
Uranium (Chemical)	0.7		0.5		0.8		0.7		0.6		0.7		0.5		0.6	
Vanadium	40.7		44.5		42.1		45		47.3		44.7		38		38.9	
Zinc	35.1		40.6		40.5		40.8		39.7		39.7		34.2		35.3	
Zirconium	22.2		26.4		24.9		27.6		30.4		26.7		21.5		21.5	

Figure B-1. Subconcrete Shallow Soil Sample Locations (1989 and 1991 Sampling). (1989 and 1991 sample numbers are prefixed with "AB" and "BO," respectively)

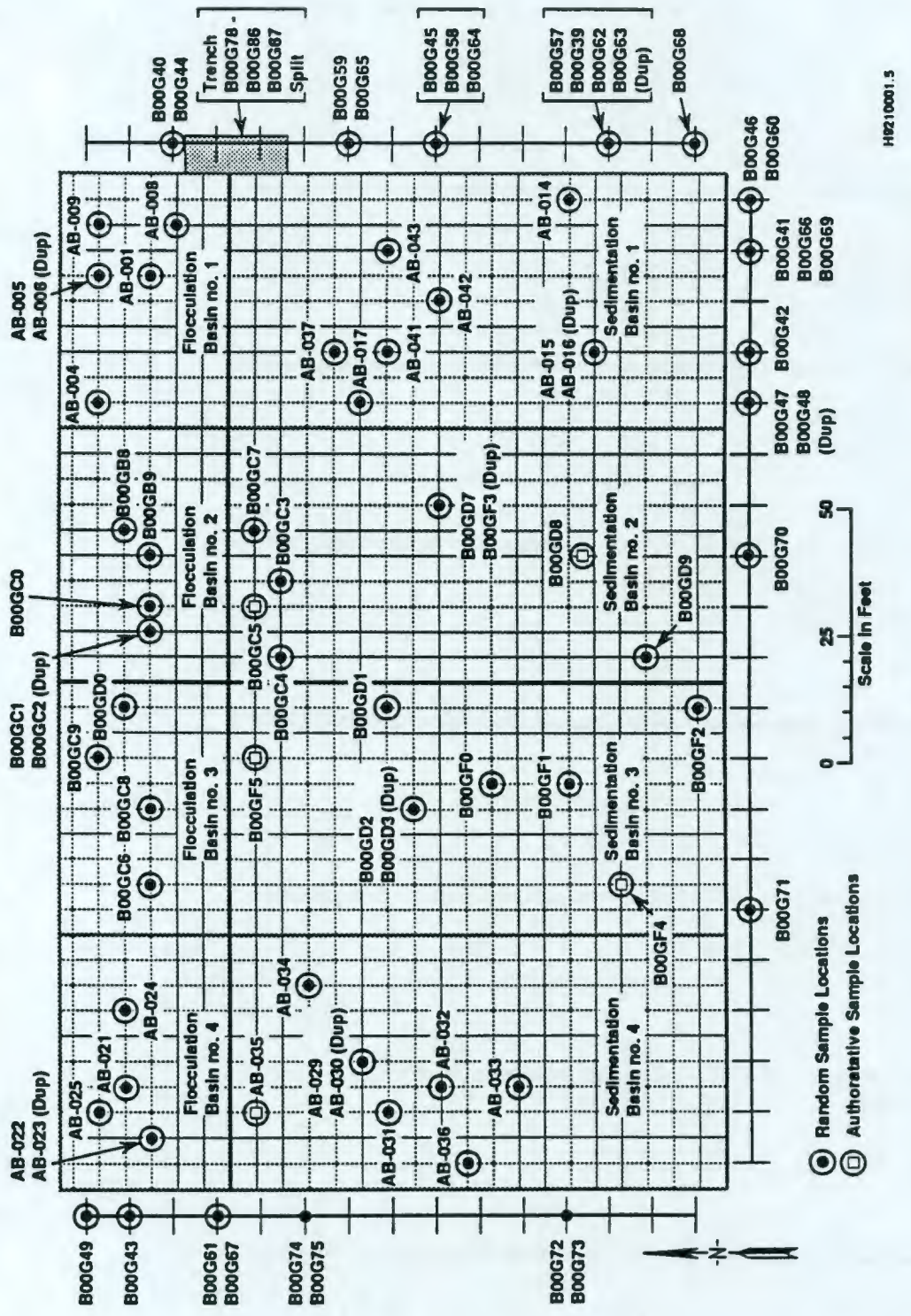
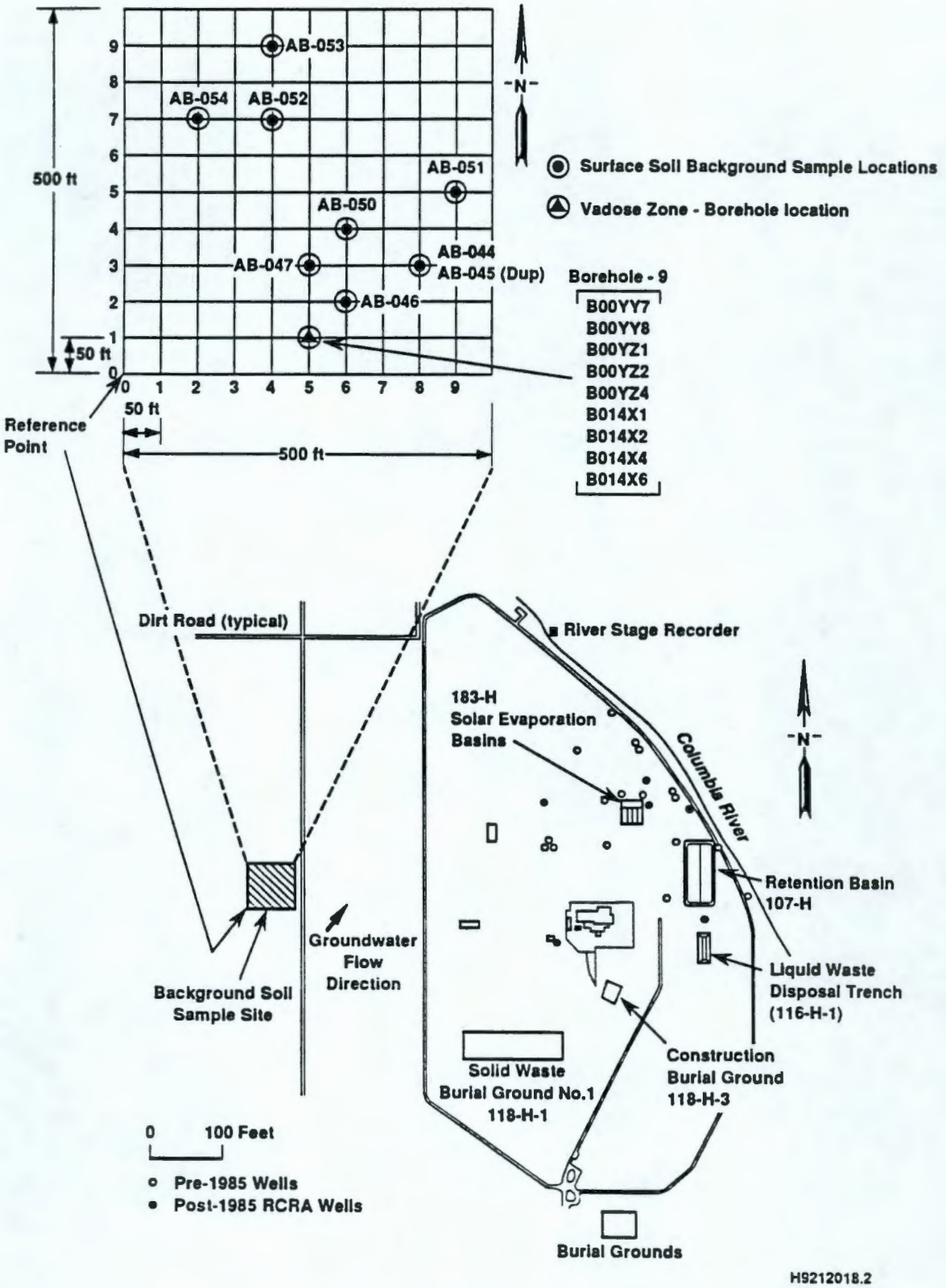


Figure B-2. Local Background Sample Locations, Shallow Soil.
(vadose zone local background borehole location shown also)



APPENDIX C

ANALYTICAL DATA FOR SHALLOW SOIL BENEATH BASINS 2 AND 3 AND FOR SURFACE SOIL SAMPLES

(All analyses were performed by K-25 Laboratory; Martin Marietta)

APPENDIX C

ANALYTICAL DATA FOR SHALLOW SOIL BENEATH BASINS 2 AND 3 AND FOR SURFACE SOIL SAMPLES

(All analyses were performed by K-25 Laboratory; Martin Marietta)

Appendix C contains analytical data (Tables C-1 through C-18) and sample locations for shallow soil samples (Figure C-1) beneath two of the 183-H basins, and from surface soil surrounding the basins. This data did not undergo a validation process other than that of the quality assurance checks and reviews performed by the laboratory.

The data summary statistics (Tables C-5 and C-14) are based on all routine (as opposed to background, radioactivity, or quality control) sample data except those qualified with a "U." Analytes that were either undetected or detected below the contractual detection limit are flagged as follows:

U The material was analyzed for, but was not detected. The associated value is the detection/quantitation limit

B Analyte concentration is less than the contractual detection/quantitation limit but greater than the instrument detection limit.

For further information refer to Chapter 2.0.

Table C-1. Subconcrete Analytical Data, Flocculation Basin 2 (mg/kg).

Analyte	Sample Numbers							
	B00GB8		B00GB9		B00GC0		B00GC1	
Aluminum	9,140		9,790		10,500		10,700	
Antimony	11.4	U	11.3	U	11.5	U	10.6	U
Arsenic	3.7		4.9		3.5		4.7	
Barium	82.5		83.5		90.1		102	
Beryllium	0.3	B	0.3	B	0.4	B	0.4	B
Cadmium	1.0	B	1.5		1.6		1.7	
Calcium	5,770		6,210		5,730		13,200	
Chloride	20	U	20	U	20	U	200	U
Chromium	13.2		24.8		16.9		16.7	
Cobalt	7.4	B	9	B	17.7		92.1	
Copper	11.8		13.4		15.3		25.7	
Fluoride	2	U	2	U	2	U	4.4	
Iron	16,100		18,100		17,800		19,600	
Lead	7.1		10.1		6.9		7.0	
Magnesium	4,930		7,040		5,340		5,520	
Manganese	270		298		304		301	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	6.6	B	21.7		10.0		19.2	
Nitrate	268		789		128		5,482	
Nitrite	20	U	20	U	20	U	200	U
Potassium	2,070		1,970		2,070		1,650	
Selenium	0.5	U	0.5	U	0.5	U	0.5	U
Silver	1.4	U	1.4	U	1.4	U	1.3	U
Sodium	673	B	748	B	713	B	4,190	
Sulfate	29		48		50		427	
Thallium	1.4	U	1.4	U	1.4	U	1.4	U
Vanadium	32.6		39.7		37.5		38.8	
Zinc	40.7		40.7		45.0		44.1	

Table C-2. Subconcrete Analytical Data, Sedimentation Basin 2 (mg/kg).

Analyte	Sample Numbers													
	B00GC3		B00GC4		B00GC5		B00GC7		B00GD7		B00GD8		B00GD9	
Aluminum	11,900		12,400		10,000		0,800		12,900		10,900		10,900	
Antimony	12.2	U	11.1	U	4.4	U	11.2	U	11.8	U	11.2	U	11.4	U
Arsenic	4.2		3.6		4.4	U	5.7		3.6		3.3		3.4	
Barium	105		101		71		96.5		113		89.8		93.9	
Beryllium	0.4	B	0.4	B	0.4		0.4	B	0.5	B	0.4	B	0.4	B
Cadmium	1.2		1.6		1.0		1.3		2.9		1.1		1.4	
Calcium	9,510		6,070		18,000		5,500		10,100		11,700		8,580	
Chloride	1,000	U	1,000	U	NR	NR	40	U	20	U	20	U	20	U
Chromium	19.0		19.7		1.3		21.1		23.0		21.6		19.7	
Cobalt	8.8	B	11.8		38		8.7	B	9.7	B	91		8.3	B
Copper	16.9		15.3		95		13.3		23.2		26.0		12.3	
Fluoride	180		190		664		150		180		56		2	U
Iron	18,300		19,500		14,000		8,500		20,800		18,100		18,500	
Lead	9.6		9.1		20		30.2		6.9		7.0		5.7	
Magnesium	6,440		5,930		5,800		5,800		7,240		6,080		6,270	
Manganese	323		312		250		310		363		353		307	
Mercury	0.1	U	0.1	U	0.1	U	0.11	U	0.1	U	0.1		0.1	U
Nickel	9.0	B	10.1		13		10.6		19.0		25.2		18.8	
Nitrate	40,352		37,800		20	U	1,463		2,756		118		20	U
Nitrite	1,000	U	1,000	U	27		40	U	20	U	20	U	20	U
Potassium	2,280		1,600		1,600		1,780		1,770		1,420		1,730	
Selenium	0.5	U	0.5	U	4.4	U	0.5	U	0.5	U	0.5	U	0.5	U
Silver	1.5	U	1.3	U	0.5	U	1.3	U	1.4	U	1.3	U	1.4	U
Sodium	21,100		18,100		1,700		4,070		3,930		1,760		669	B
Sulfate	1,757		2,561		147		132		53		32		20	U
Thallium	1.5	U	1.4	U	NR	NR	1.5	U	1.4	U	1.4	U	1.4	U
Vanadium	37.3		40.9		31		37.8		41.6		36.3		39.2	
Zinc	46.1		46.9		47		45.9		53.2		46.9		47.7	

Table C-3. Subconcrete Analytical Data, Flocculation Basin 3 (mg/kg).

Analyte	Sample Numbers							
	B00GC6		B00GC8		B00GC9		B00GD0	
Aluminum	7,900		9,720		11,200		12,000	
Antimony	9.7	U	10.8	U	11.2	U	10.8	U
Arsenic	5.3		3.9		3.6		3.9	
Barium	68.0		80.3		102		101	
Beryllium	0.3	B	0.4	B	0.4	B	0.5	B
Cadmium	1.0		2.0		1.8		1.8	
Calcium	6,500		6,760		10,600		11,600	
Chloride	40	U	100	U	200	U	100	U
Chromium	11.3		15.1		18.9		17.1	
Cobalt	8.9	B	9.6	B	9.0	B	131	
Copper	11.6		13.6		14.5		20.1	
Fluoride	2	U	2	U	43		940	
Iron	15,900		18,300		18,700		19,400	
Lead	17.2		12.1		8.0		14.4	
Magnesium	4,460		5,370		6,380		5,990	
Manganese	256		314		315		335	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	6.9	B	6.8	B	9.1		22.2	
Nitrate	1,268		2,600		12,082		1,568	
Nitrite	40	U	100	U	200	U	100	U
Potassium	1,380		1,950		1,890		2,260	
Selenium	0.5	U	0.4	U	0.5	U	0.4	U
Silver	1.2	U	1.3	U	1.3	U	1.3	U
Sodium	777	B	1,670		8,390		4,380	
Sulfate	93		380		883		289	
Thallium	1.4	U	1.3	U	1.4	U	1.3	U
Vanadium	34.3		41.5		40.6		50.5	
Zinc	35.1		42.9		47.0		44.4	

Table C-4. Subconcrete Analytical Data, Sedimentation Basin 3 (mg/kg).

Analyte	Sample Numbers													
	B00GD1		B00GD2		B00GF0		B00GF1		B00GF2		B00GF4		B00GF5	
Aluminum	12,800		11,100		12,400		12,500		12,000		12,100		12,700	
Antimony	11.5	U	11.2	U	11.6	U	11.5	U	11.6	U	10.8	U	11.9	U
Arsenic	3.7		3.8	B	3.4		1.5	B	4.1		3.3		3.6	
Barium	109		108		119		110		106		99		109	
Beryllium	0.4	B	0.4	B	0.4	B	0.4	B	0.4	B	0.4	B	0.4	B
Cadmium	1.1	B	3.0		1.4		1.5		0.8	B	1.6		1.4	
Calcium	8,580		12,800		21,100		11,200		8,130		9,110		8,430	
Chloride	100	U	100	U	100	U	100	U	100	U	100	U	100	U
Chromium	18.7		19.9		19.1		19.2		21.2		20.3		19.6	
Cobalt	21.2		9.3	B	14.2		9.2	B	9.4	B	9.6	B	10.8	B
Copper	14.8		16.6		18.5		15.8		14.8		39.1		18.1	
Fluoride	18		2	U	38		33		45		36		69	
Iron	19,700		20,300		19,100		19,400		19,100		18,900		21,500	
Lead	8.9		9.7		6.6		4.9		7.1		7.0		7.0	
Magnesium	6,560		6,890		7,660		7,700		6,710		6,940		6,880	
Manganese	343		347		341		336		321		317		341	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	11.6		11.3		20.1		19.5		20.1		17.5		18.0	
Nitrate	4,577		1,500		3,746		6,722		14,581		1,326		22,088	
Nitrite	100	U	100	U	100	U	100	U	100	U	100	U	100	U
Potassium	2,480		1,740		2,300		2,280		1,940		2,080		1,860	
Selenium	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Silver	1.4	U	1.3	U	1.4	U	1.4	U	1.4	U	1.3	U	1.4	U
Sodium	4,620		1,700		4,690		5,520		9,410		2,930		14,100	
Sulfate	257		186		162		271		206		100	U	677	
Thallium	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U
Vanadium	39.3		38.1		38.4		38.9		40.8		38.2		44.5	
Zinc	47.2		50.7		61.5		50.9		48.2		46.8		52.5	

Table C-5. Subconcrete Analytical Data Summary Statistics, Basins 2 and 3.

Analyte	Mean (mg/kg)	Standard Deviation (mg/kg)	Number of Detectable Results	Total Number of Analyses	Maximum (mg/kg)	Minimum (mg/kg)
Aluminum	11,197.8	1,291.4	23	23	12,900	7,900
Antimony			0	23	12.2	
Arsenic	3.9	0.8	22	23	5.7	1.5
Barium	97.4	13.2	23	23	119	68
Beryllium	0.4	0.1	23	23	0.5	0.3
Cadmium	1.6	0.5	23	23	3	0.8
Calcium	10,081.7	4,141	23	23	21,100	5,500
Chloride			0	23		
Chromium	18	4.7	23	23	24.8	1.3
Cobalt	24.1	33.3	23	23	131	7.4
Copper	21	17.3	23	23	95	11.6
Fluoride	165.6	261.4	16	23	940	2.4
Iron	18,604.4	1,612	23	23	21,500	14,000
Lead	10.1	5.7	23	23	30.2	4.9
Magnesium	6,274.4	826.5	23	23	7,700	4,460
Manganese	316.1	28.8	23	23	363	250
Mercury			0	23		
Nickel	14.6	5.8	23	23	25.2	6.6
Nitrate	7,738.9	11,796.4	21	23	40,352	118
Nitrite	27		1	23		
Potassium	1,910.9	289.6	23	23	2,480	1,380
Selenium			0	23		
Silver			0	23	1.5	0.5
Sodium	5,076.1	5,641.3	23	23	21,100	669
Sulfate	420.6	629.1	21	23	2,561	29
Thallium			0	22		
Vanadium	38.9	3.9	23	23	50.5	31
Zinc	47.2	5.4	23	23	61.5	35.1

Table C-6. Subconcrete Analytical Data, Basins 2 and 3 Duplicate Samples (mg/kg).

Analyte	Sample Numbers					
	B00GC2 (Duplicate of B00GC1)		B00GD3 (Duplicate of B00GD2)		B00GF3 (Duplicate of B00GD7)	
Aluminum	10,800		11,200		13,000	
Antimony	11.2	U	11.6	U	10.8	U
Arsenic	3.5		4.2	B	3.2	
Barium	92		100		115	
Beryllium	0.4	B	0.4	B	0.5	B
Cadmium	1.5		1.8		3.8	
Calcium	18,600		16,700		12,500	
Chloride	200	U	100	U	100	U
Chromium	19.7		16.5		22.0	
Cobalt	17.9		9.7	B	8.7	B
Copper	28.6		17.9		23.4	
Fluoride	4.2		2.4		110	
Iron	17,800		18,300		20,600	
Lead	5.9		8.9		8.4	
Magnesium	6,390		6,380		7,630	
Manganese	309		313		347	
Mercury	0.1	U	0.1	U	0.1	U
Nickel	10.0		8.9	B	18.7	
Nitrate	5,530		1,302		3,301	
Nitrite	200	U	100	U	100	U
Potassium	1,910		1,850		1,840	
Selenium	0.5	U	0.5	U	0.5	U
Silver	1.3	U	1.4	U	1.3	U
Sodium	4,080		1,940		4,470	
Sulfate	425		193		100	U
Thallium	1.3	U	1.4	U	1.4	U
Vanadium	35.3		37.8		40.2	
Zinc	55.6		55.5		58.6	

Table C-7. Subconcrete Analytical Data, Basins 2 and 3 Equipment Blanks (mg/kg).

Analyte	Sample Numbers			
	B00GD6		B00GF8	
Aluminum	405		396	
Antimony	9.9	U	10.0	U
Arsenic	0.8	U	0.8	U
Barium	14.1	B	5.2	B
Beryllium	0.1	U	0.1	B
Cadmium	0.6	U	0.6	U
Calcium	162	B	130	B
Chloride	20	U	20	U
Chromium	2.0	U	2.0	U
Cobalt	1.0	U	1.0	U
Copper	0.8	U	0.8	U
Fluoride	2	U	2	U
Iron	1,280		1,150	
Lead	0.7		0.9	
Magnesium	72.2	B	70.0	B
Manganese	69.9		19.2	
Mercury	0.1	U	0.1	U
Nickel	2.0	U	2.0	U
Nitrate	20	U	20	U
Nitrite	20	U	20	U
Potassium	119	U	120	U
Selenium	0.4	U	0.4	U
Silver	1.2	U	1.2	U
Sodium	39.9	B	29.2	B
Sulfate	20	U	20	U
Thallium	1.2	U	1.2	U
Vanadium	1.0	U	1.0	U
Zinc	6.5		3.1	B

Table C-8. Subconcrete Analytical Data, Basins 2 and 3 Field Blanks (mg/kg).

Analyte	Sample Numbers			
	B00GD4		B00GF7	
Aluminum	429		405	
Antimony	9.9	U	9.9	U
Arsenic	0.8	U	0.8	U
Barium	5.4	B	5.3	B
Beryllium	0.1	B	0.1	B
Cadmium	0.6	U	0.6	U
Calcium	157	B	114	B
Chloride	20	U	20	U
Chromium	2.0	U	2.0	U
Cobalt	1.0	U	1.0	U
Copper	0.8	U	0.8	U
Fluoride	2	U	2	U
Iron	1,230		1,520	
Lead	1		2.1	
Magnesium	58.7	B	60.8	B
Manganese	23.6		26.6	
Mercury	0.1	U	0.1	U
Nickel	2.0	U	2.0	U
Nitrate	20	U	20	U
Nitrite	20	U	20	U
Potassium	118	U	118	U
Selenium	0.4	U	0.4	U
Silver	1.2	U	1.2	U
Sodium	29.1	B	14.7	B
Sulfate	20	U	20	U
Thallium	1.2	U	1.2	U
Vanadium	1.0	U	1.0	U
Zinc	2.7	B	2.6	B

Table C-9. Subconcrete Analytical Data, Basins 2 and 3 Trip Blanks (mg/kg).

Analyte	Sample Numbers			
	B00GD5		B00GF6	
Aluminum	390		386	
Antimony	10.0	U	9.9	U
Arsenic	0.8	U	0.8	U
Barium	23.2	B	14.2	B
Beryllium	0.1	U	0.1	B
Cadmium	0.6	U	0.6	U
Calcium	131	B	88.3	B
Chloride	20	U	20	U
Chromium	2.0	U	2.0	U
Cobalt	1.0	U	1.0	U
Copper	0.8	U	0.8	U
Fluoride	2	U	2	U
Iron	1,450		1,080	
Lead	0.6		2.0	
Magnesium	57.1	B	50.4	B
Manganese	85.6		50.3	
Mercury	0.1	U	0.1	U
Nickel	2.0	U	2.0	U
Nitrate	20	U	20	U
Nitrite	20	U	20	U
Potassium	120	U	119	U
Selenium	0.4	U	0.4	U
Silver	1.2	U	1.2	U
Sodium	35.5	B	32.7	B
Sulfate	20	U	20	U
Thallium	1.2	U	1.2	U
Vanadium	1.1	B	1.0	U
Zinc	5.8		3.7	B

Table C-10. Surface Soil Analytical Data, West Wall Berm (mg/kg).

Analyte	Sample Numbers															
	B00G43		B00G49		B00G61		B00G67		B00G72		B00G73		B00G74		B00G75	
Aluminum	7,220		7,290		7,770		7,070		7,190		6,810		7,640		8,490	
Antimony	10.5	U	10.0	U	10.6	U	10.5	U	10.4	U	10.4	U	10.4	U	10.4	U
Arsenic	1.6	B	2.1	B	2.5		1.7	B	2.3		1.8		1.5	B	1.3	B
Barium	69.1		67.8		73.2		54.2		74.3		65.0		78.8		66.4	
Beryllium	0.3	B	0.3	B	0.3	B	0.3	B	0.3	B	0.3	B	0.4	B	0.4	B
Cadmium	1	B	1.1		1.1		1.3		1.2		0.6	U	1	B	0.8	B
Calcium	5,490		6,130		5,680		6,230		8,720		8,070		6,410		6,840	
Chloride	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
Chromium	1		9.2		8.5		8.6		8.3		10.1		8.4		10.6	
Cobalt	8.0	B	7.7	B	9.5	B	8.4	B	9.6	B	9.1	B	9.1	B	9.8	B
Copper	16.5		15.1		18.7		51.5		15.7		14.8		14.4		16.5	
Fluoride	4.0		4		2.4		1.8		4.2		2.6		2.8		2.2	
Iron	16,900		16,900		18,000		17,200		18,100		17,400		17,400		18,900	
Lead	6.0		13.0		4.4		5.1		6.7		5.6		4.0		6.4	
Magnesium	4,200		3,880		4,510		4,480		4,850		4,790		4,680		4,820	
Manganese	268		261		303		270		293		283		356		296	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	9.1		9.2		11.4		10.7		11.5		42.0		13.1		13.3	
Nitrate	75		35		20	U	20	U	20	U	20	U	100		21	
Nitrite	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
Potassium	1,670		1,290		1,200		993	B	1,120		945	B	1,140		1,180	B
Selenium	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.3	U	0.3	U	0.4	U
Silver	1.3	U	1.2	U	1.3	U	1.3	U	1.2	U	1.2	U	1.3	U	1.2	U
Sodium	235	B	257	B	333	B	290	B	388	B	333	B	265	B	354	B
Sulfate	20	U	20	U	20	U	20	U	377		126		49		25	
Thallium	1.1	U	1.1	U	1.2	U	1.1	U	1.1	U	0.9	U	1.0	U	1.2	U
Vanadium	44.8		43.8		49.0		47.4		46.7		48.0		47.0		51.5	
Zinc	39.5		45.1		39.0		42.4		40.9		38.4		36.5		39.1	

Table C-11. Surface Soil Analytical Data, South Wall (mg/kg).

Analyte	Sample Numbers																	
	B00G41		B00G42		B00G46		B00G47		B00G60		B00G66		B00G69		B00G70		B00G71	
Aluminum	5,360		7,110		7,050		7,280		6,340		5,740		10,800		6,500		6,870	
Antimony	9.3	U	10.1	U	9.9	U	10.2	U	9.9	U	10.0	U	11.3	U	10.8	U	10.1	U
Arsenic	1.4	U	1.3	B	1.9	B	2	B	2.1		2.3		4.6		9.0		17.9	
Barium	43.8		57.1		77.1		59		53.1		55.3		99.6		101		75.0	
Beryllium	0.2	B	0.3	B	0.3	B	0.3	B	0.3	B	0.2	B	0.4	B	0.2	B	0.2	B
Cadmium	0.7	B	0.8	B	1.5		0.8	B	1.0		0.6	U	1.2		0.7	B	1.5	
Calcium	5,810		7,150		6,580		6,270		6,670		6,500		5,650		24,900		27,700	
Chloride	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
Chromium	8.1		7.7		7.9		13.1		9.0		7.1		21.4		6.8		9.8	
Cobalt	6.6	B	9.2	B	9.6	B	8.5	B	8.5	B	7.9	B	8.9	B	7.0	B	8.9	B
Copper	14.9		17.0		16.7		14.6		15.5		13.5		16.6		18.8		23.5	
Fluoride	3.6		3.0		4.0		2.2		1.8		2.0		20		4.2		2.8	
Iron	14,200		17,800		19,100		18,400		17,500		14,900		19,600		9,940		12,900	
Lead	4.2		4.9		8.3		3.5		2.8		3		8.4		12.1		24.9	
Magnesium	3,800		4,140		3,980		4,120		4,440		4,210		6,180		2,850		3,350	
Manganese	225		254		260		262		255		226		336		205		226	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.8		0.5	
Nickel	11.7		9.7		9.1		9.6		10.4		9.0		20.3		14.1		13.8	
Nitrate	47		20	U	40		20	U	20	U	20	U	24		20	U	20	U
Nitrite	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
Potassium	797	B	975	B	1,080		1,160		797	B	832	B	1,600		1,000	B	649	B
Selenium	0.4	U	0.2	U	0.4	U	0.4	U	0.4	U	0.3	U	0.4	U	0.4	U	0.4	U
Silver	1.1	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.4	U	1.3	U	1.2	U
Sodium	206	B	412	B	465	B	478	B	349	B	431	B	1,460		455	B	563	B
Sulfate	20	U	20	U	20	U	20	U	20	U	154	U	20	U	3,560		757	
Thallium	1.1	U	0.6	U	1	U	1.1	U	1.0	U	0.9	U	1.2	U	1.4	B	1.1	U
Vanadium	37.5		49.5		55.5		49.1		54.7		44.0		45.2		22.3		30.5	
Zinc	36.8		41.6		90		39.4		39.1		39.3		48.8		73.4		85.2	

Table C-12. Surface Soil Analytical Data, East Wall Berm (mg/kg). (2 sheets)

Analyte	Sample Numbers											
	B00G39		B00G40		B00G44		B00G45		B00G57		B00G58	
Aluminum	6,380		6,860		6,790		8,260		8,420		7,960	
Antimony	9.3	U	10.2	U	10.1	U	10.4	U	10.5	U	9.7	U
Arsenic	1.3	U	1.3	U	1.6	B	13.0		13.6		15.9	
Barium	64.1		118		71.1		80.0		69.1		76.6	
Beryllium	0.3	B	0.3	B	0.3	B	0.3	B	0.3	B	0.4	B
Cadmium	1.7		1.2		0.7	B	1.7		1.2		1.0	
Calcium	6,180		7,810		6,120		19,400		6,130		5,880	
Chloride	20	U	20	U	20	U	20	U	20	U	20	U
Chromium	8.0		10.2		10.0		42.5		12.2		8.9	
Cobalt	10.6		8.3	B	8.8	B	8.4	B	8.4	B	8.3	B
Copper	16.3		15.0		14.9		19.5		13.7		21.7	
Fluoride	2.4		2	U	2.6		6.6		3.2		3.0	
Iron	21,100		17,000		18,300		17,300		18,300		17,300	
Lead	9.5		6.0		14.0		59.6		56.2		65.3	
Magnesium	4,470		4,850		3,920		5,040		4,250		4,610	
Manganese	290		280		260		277		296		284	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	11.1		12.3		10.5		20.0		12.0		12.1	
Nitrate	20	U	56		20	U	78		31		20	U
Nitrite	20	U	20	U	20	U	20	U	20	U	20	U
Potassium	753	B	982	B	815	B	1,600		1,390		1,330	
Selenium	0.4	U	0.3	U	0.3	U	0.3	U	0.4	U	0.4	U
Silver	1.1	U	1.2	U	1.2	U	1.3	U	1.5	B	1.2	U
Sodium	302	B	381	B	291	B	325	B	245	B	232	B
Sulfate	20	U	27		20	U	27		20	U	20	U
Thallium	1	U	1	U	1	U	0.8	U	1.0	U	1.1	U
Vanadium	53.9		48.6		49.6		37.5		41.0		39.2	
Zinc	76.4		43.1		39.3		299		46.4		43.8	

Table C-12. Surface Soil Analytical Data, East Wall Berm (mg/kg). (2 sheets)

Analyte	Sample Numbers											
	B00G59		B00G62		B00G64		B00G65		B00G68			
Aluminum	7,480		11,800		9,200		9,080		7,760			
Antimony	10.2	U	10.4	U	10.6	U	10.3	U	10.3	U		
Arsenic	12.7		8.6		19.0		23.1		4.7			
Barium	56.4		94.3		71.6		76.3		56.1			
Beryllium	0.3	B	0.4	B	0.4	B	0.4	B	0.3	B		
Cadmium	1	B	1.1		0.8	B	1.2		1.1			
Calcium	6,400		5,680		6,510		9,020		6,050			
Chloride	46		20	U	20	U	26		20	U		
Chromium	10.4		19.4		11.6		11.3		10.1			
Cobalt	7.9	B	9.0	B	9.2	B	9.0	B	9.1	B		
Copper	13.5		17.2		37.1		17.2		14.9			
Fluoride	2.4		26		3.8		3.0		2.6			
Iron	17,300		18,400		18,600		17,400		16,800			
Lead	115		17.7		53.4		81.0		12.8			
Magnesium	4,780		6,040		5,050		5,050		4,420			
Manganese	263		308		291		301		270			
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U		
Nickel	10.8		17.0		13.5		12.9		10.6			
Nitrate	325		1,810		20	U	1,850		23			
Nitrite	20	U	20	U	20	U	20	U	20	U		
Potassium	1,370	B	1,900		1,800	B	1,810		1,120			
Selenium	0.3	U	0.3	U	0.4	U	0.4	U	0.3	U		
Silver	1.2	U	1.3	U	1.3	U	1.2	U	1.2	U		
Sodium	369	B	3,500		385	B	802	B	244	B		
Sulfate	77		332		20	U	154		20	U		
Thallium	0.9	U	0.9	U	1.1	U	1.1	U	0.9	U		
Vanadium	39.7		43.3		46.4		42.0		45.4			
Zinc	48.9		44.7		42.5		47.6		36.7			

Table C-13. Surface Soil Analytical Data, Trench (Near East Wall) (mg/kg).

Analyte	Sample Numbers																	
	B00G78		B00G79		B00G80		B00G81		B00G82		B00G83		B00G84		B00G85		B00G86	
Aluminum	6,150		7,120		9,630		9,360		8,830		10,000		8,640		7,920		9,360	
Antimony	10.2	U	9.3	U	10.4	U	10.3	U	10.2	U	9.6	U	10.4	U	10.1	U	10.1	U
Arsenic	1.1	B	11.9		12.6		2.7		7.0		25.8		49.8		7.4		18.4	
Barium	55.5		60.4		150		86.9		74.4		78.8		76.7		69.0		74.5	
Beryllium	0.3	B	0.3	B	0.4	B	0.4	B	0.4	B	0.4	B	0.4	B	0.3	B	0.3	B
Cadmium	0.9	B	0.8	B	0.6	B	0.7	B	0.6	U	1.1		0.9	B	0.8	B	0.6	U
Calcium	6,340		7,390		7,630		8,990		7,590		6,130		6,550		7,160		6,550	
Chloride	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
Chromium	8.3		9.0		12.9		16.0		13.0		11.6		13.0		10.3		12.2	
Cobalt	10.0	B	8.1	B	9.8	B	9.9	B	8.8	B	11.0		10.3	B	9.2	B	10.0	B
Copper	14.5		12.4		15.6		14.8		13.1		16.1		15.5		13.8		15.6	
Fluoride	2.0		2.2		2.6		2.2		2.6		3.8		3.8		2.2		2.4	
Iron	18,100		16,900		20,200		20,300		18,700		21,800		19,900		18,200		20,100	
Lead	1.8		27.7		75.6		24.5		99.1		234		191		128		29.4	
Magnesium	4,750		4,580		5,320		5,980		5,350		5,550		5,150		5,060		5,420	
Manganese	258		280		319		323		295		358		329		291		313	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	13.9		11.5		15.5		18.1		16.5		14.7		13.9		13.0		15.4	
Nitrate	20	U	20	U	606		50		20	U	1,020		98		174		41	
Nitrite	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
Potassium	714	B	1,180		1,870		1,590		1,660		1,540		1,300		1,230		1,290	
Selenium	0.4	U	0.4	U	0.2	U	0.4	U	0.4	U	0.4	U	0.4	U	0.3	U	0.4	U
Silver	1.2	U	1.1	U	1.2	U	1.2	U	1.2	U	1.2	U	1.3	U	1.2	U	1.2	U
Sodium	265	B	270	B	632	B	441	B	400	B	385	B	244	B	292	B	328	B
Sulfate	20	U	20	U	131		29		20	U	77		40		20	U	20	U
Thallium	1.2	U	1.0	U	0.7	U	1.1	U	1.0	U	1.1	U	1.1	U	0.8	U	1.0	U
Vanadium	54.1		44.2		51.0		48.4		43.1		56.8		51.9		45.3		50.7	
Zinc	34.6		36.2		46.1		46.7		43.9		43.6		41.5		40.8		42.8	

Table C-14. Surface Soil Analytical Data Summary Statistics.

Analyte	Mean (mg/kg)	Standard Deviation (mg/kg)	Number of Detectable Results	Total Number of Analyses	Maximum (mg/kg)	Minimum (mg/kg)
Aluminum	7,825.1	1,398.6	37	37	11,800	5,360
Antimony			0	37		
Arsenic	9	10.1	34	37	49.8	1.1
Barium	73.8	19.7	37	37	150	43.8
Beryllium	0.3	0.1	37	37	0.4	0.2
Cadmium	1.1	0.3	33	37	1.7	0.6
Calcium	8,116.5	4,968.3	37	37	27,700	5,490
Chloride	36	14.1	2	37	46	26
Chromium	11.5	6.1	37	37	42.5	6.8
Cobalt	8.9	0.9	37	37	11	6.6
Copper	17.5	7.1	37	37	51.5	12.4
Fluoride	4.1	4.8	36	37	26	1.8
Iron	17,760.5	2,177.2	37	37	21,800	9,940
Lead	38.5	54.3	37	37	234	1.8
Magnesium	4,673.8	705.2	37	37	6,180	2,850
Manganese	282.9	34.5	37	37	358	205
Mercury	0.6	0.2	2	37	0.8	0.5
Nickel	13.6	5.6	37	37	42	9
Nitrate	325.2	570	20	37	1,850	21
Nitrite			0	37		
Potassium	1,234.4	349	37	37	1,900	649
Selenium			0	37		
Silver	1.5		1	37	1.5	1.5
Sodium	475.9	555	37	37	3,500	206
Sulfate	371.4	871.5	16	37	3,560	25
Thallium	1.3	0.2	2	37	1.4	1.1
Vanadium	45.9	6.9	37	37	56.8	22.3
Zinc	53	43.6	37	37	299	34.6

Table C-15. Surface Soil Analytical Data, Duplicate Samples (mg/kg).

Analyte	Sample Numbers					
	B00G48 (Duplicate of B00G47)		B00G63 (Duplicate of B00G62)		B00G87 (Split of B00G79)	
Aluminum	8,150		12,700		7,640	
Antimony	10.4	U	10.3	U	9.6	U
Arsenic	1.8	B	8.8		20.6	
Barium	70.9		99.3		96.1	
Beryllium	0.4	B	0.5	B	0.4	B
Cadmium	1.2		1.5		0.6	U
Calcium	6,480		6,160		7,140	
Chloride	20	U	20	U	20	U
Chromium	9.9		19.9		8.1	
Cobalt	9.5	B	9.0	B	9.4	B
Copper	14.3		27.4		13.5	
Fluoride	2		1,040		3.0	
Iron	20,000		19,200		18,100	
Lead	5.8		21.8		39.1	
Magnesium	4,060		6,090		4,390	
Manganese	292		317		300	
Mercury	0.1	U	0.1	U	0.1	U
Nickel	10.7		17.6		11.6	
Nitrate	20	U	1,810		20	U
Nitrite	20	U	20 U		20	U
Potassium	1,330		2,150		1,150	
Selenium	0.4	U	0.3	U	0.4	U
Silver	1.2	U	1.2	U	1.2	U
Sodium	560	B	4,420		296	B
Sulfate	20	U	402		22	
Thallium	1.1	U	1.0	U	1.1	U
Vanadium	53.1		45.5		45.8	
Zinc	39.2		46.1		41.1	

Table C-16. Surface Soil Analytical Data, Blanks (mg/kg).

Analyte	Sample Numbers							
	B00G88 (Field Blank)		B00G89 (Trip Blank)		B00G90 (Field Blank)		B00G91 (Equipment Blank)	
Aluminum	444		405		479		523	
Antimony	9.9	U	10.0	U	10	U	9.9	U
Arsenic	2.6	U	0.6	U	0.6	U	0.7	U
arium	18.8	B	4.6	B	44.3		5.8	B
Beryllium	0.2	B	0.1	B	0.2	B	0.1	B
Cadmium	0.6	U	0.6	U	0.6	U	0.6	U
Calcium	152	B	262	B	126	B	290	B
Chloride	20	U	20	U	20	U	20	U
Chromium	2.0	U	2.0	U	2.0	U	3.5	
Cobalt	1.0	U	1.0	U	2.3	B	1.0	U
Copper	0.8	U	2.2	B	1.1	B	1.5	B
Fluoride	2.0	U	2	U	2	U	2	U
Iron	1,530		1,120		1,510		1,650	
Lead	3.8		1.9		0.7		0.6	U
Magnesium	65.7	B	67.9	B	64.3	B	94.6	B
Manganese	72.5		20.3		209		41.2	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	2.0	U	2.0	U	2.0	U	17.9	
Nitrate	20	U	20	U	20	U	20	U
Nitrite	20	U	20	U	20	U	20	U
Potassium	119	U	120	U	120	U	119	U
Selenium	0.3	U	0.3	U	0.3	U	0.4	U
Silver	1.2	U	1.2	U	1.2	U	1.2	U
Sodium	42.7	B	33.5	B	10.6	B	22.3	B
Sulfate	20	U	20	U	20	U	20	U
Thallium	0.8	U	0.9	U	0.8	U	1.1	U
Vanadium	1.3	B	1.0	U	1.0	U	1.0	U
Zinc	3.0	B	4.3		2.8	B	2.6	B

Table C-17. Subconcrete Shallow Soil Radiochemistry Data, 1991 Samples. (2 sheets)

Sample Numbers	Alpha		Beta		Cesium-137		Protactium		Technetium-99		Thorium-234		Uranium-235		U-Alpha	
	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-
B00GB8	4.1	2.3	5.2	4	-0.1	0.2	9.1	32.8	-10.9	13.9	8.2	1.5	0.5	0.2	0.5	0.2
B00GB9	1.7	2	5.9	4.1	-0	0.2	23	32.4	14.4	14.7	8.8	1.1	0.5	0.2	0.6	0.2
B00GC0	5	2.4	5.1	4	0.2	0.2	13.1	28	16.7	14.7	-1.7	3.7			0.5	0.2
B00GC1	3.8	2.2	26.2	5.1	0	0.2	23.3	31.3	11.1	14.6	-1.9	2.4			0.7	0.3
B00GC2	2.5	2.1	31.4	5.3	0.2	0.2	5.1	32.3	18.7	14.8	9.8	1.7	0.4	0.2	0.3	0.2
B00GC3	2.4	2	40.1	5.7	-0.1	0.2	-0.3	30.5	43.2	15.4					0.3	0.2
B00GC4	2.4	2	35.7	5.5	0	0.2	2.2	37	31.9	15.1	7.7	1.8	0.4	0.3	1.6	0.4
B00GC6	0.7	1.8	16.7	4.6	0.2	0.2	6.3	32.4	17.5	14.8	-0.1	3.7			0.2	0.1
B00GC7	2.7	2.1	15.5	4.6	0.1	0.2	7.3	32.6	23.8	14.9	0.5	2.5			2.8	0.5
B00GC8	1.9	2	13.3	4.5	-0.1	0.2	-0.3	30.5	24.1	14.9					0.2	0.1
B00GC9	1.9	2	50.9	6.1	-0.1	0.2	5.1	35.8	65.6	16	0.3	3.3			0.2	0.1
B00GD0	3.1	2.1	17.6	4.7	-0.1	0.2	9	30.8	25.9	15	9.3	1.7			4.3	0.7
B00GD1	1.1	1.9	12.9	4.4	-0.1	0.2	-17.1	33.7	29.8	15.1			0.4	0.2	0.5	0.2
B00GD2	0.2	1.7	7.5	4.2	0	0.2	10.6	32.5	7.2	14.5	5.8	2	0.4	0.2	0.3	0.2
B00GD3	1.8	2.1	7.1	4.5	0	0.2	25.4	36.2	15.7	16.3	7.7	1.9			0.3	0.2
B00GD3D	2.9	2.3	6.7	4.5	0.4	0.2	15.1	30.6	20.8	16.4	-0.5	4.2			0.2	0.2
B00GD4[b]	1.9	1.7	1.3	3.9	0	0.2	50	32.6	4	14.1	0.5	3.8			0.2	0.1
B00GD5[c]	0.3	1.4	-0.9	3.7	0.1	0.2	3.1	30.2	-10.8	13.7			0.2	0.6	0.2	0.1
B00GD6[a]	1.4	1.6	0.1	3.8	0	0.2	-4.1	31.2	7.7	14.2					0.2	0.1
B00GD7	54.2	5.6	78.2	7			57.7	31.3	38	15.1	23.3	2	1.4	0.3	51.4	2.2
B00GD8	3.6	2	8	4.2	0.4	0.2	25.7	27.8	28.5	14.8			0.2	0.4	1.6	0.4
B00GD9	1.8	1.8	4	4.4	0	0.2	21.3	31.9	8.3	15.8					0.5	0.2
B00GD9D	5.4	2.3	4.7	4.4	0.1	0.2	25	33.2	13.6	15.9	5.6	1.3	0.5	0.2	0.6	0.3
B00GF0	1.3	1.6	12.7	4.5	0.2	0.2	12	29	29.3	14.8	1.1	37			0.8	0.3
B00GF1	3.2	1.9	17.2	4.7	0.2	0.2	7.9	31.1	27.7	14.8	-2.3	3.7			0.8	0.3
B00GF2	3.6	1.9	90	7.4	-0	0.2	24.8	32	0.1	7.4	-0.6	3.8			0.7	0.3
B00GF3	54.9	5.6	79.9	7.1	0.1	0.2	67.8	35.9	21.5	14.6	32.6	2	1.4	0.5	50.7	2.2
B00GF4	5.8	2.2	14.1	4.6	0.2	0.2	16.8	33.1	14.7	14.5					1.1	0.3
B00GF5	2.8	1.8	47.5	6	0	0.2	39.9	35	43.7	15.2	9.1	1.8			1.4	0.4

Table C-17. Subconcrete Shallow Soil Radiochemistry Data, 1991 Samples. (2 sheets)

Sample Numbers	Alpha		Beta		Cesium-137		Protactium		Technetium-99		Thorium-234		Uranium-235		U-Alpha	
	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-
B00GF6[a]	1.4	1.6	-0	3.8	0.1	0.2	-4.1	31.9	23.3	14.7	2.5	1.6			0.2	0.2
B00GF7[b]	0.9	1.5	-1.8	3.7	0.2	0.2	47.3	34.6	12.4	14.3	8.9	1.8			0.2	0.2
B00GF8[c]	2.2	1.7	1.5	3.9	0.3	0.2	-13.1	35.2	-1.9	13.9	0.1	3.7			0.3	0.2

[a]Equipment Blank.
[b]Field Blank.
[c]Trip Blank.

Table C-18. Surface Soil Radiochemistry Data, 1991 Samples. (2 sheets)

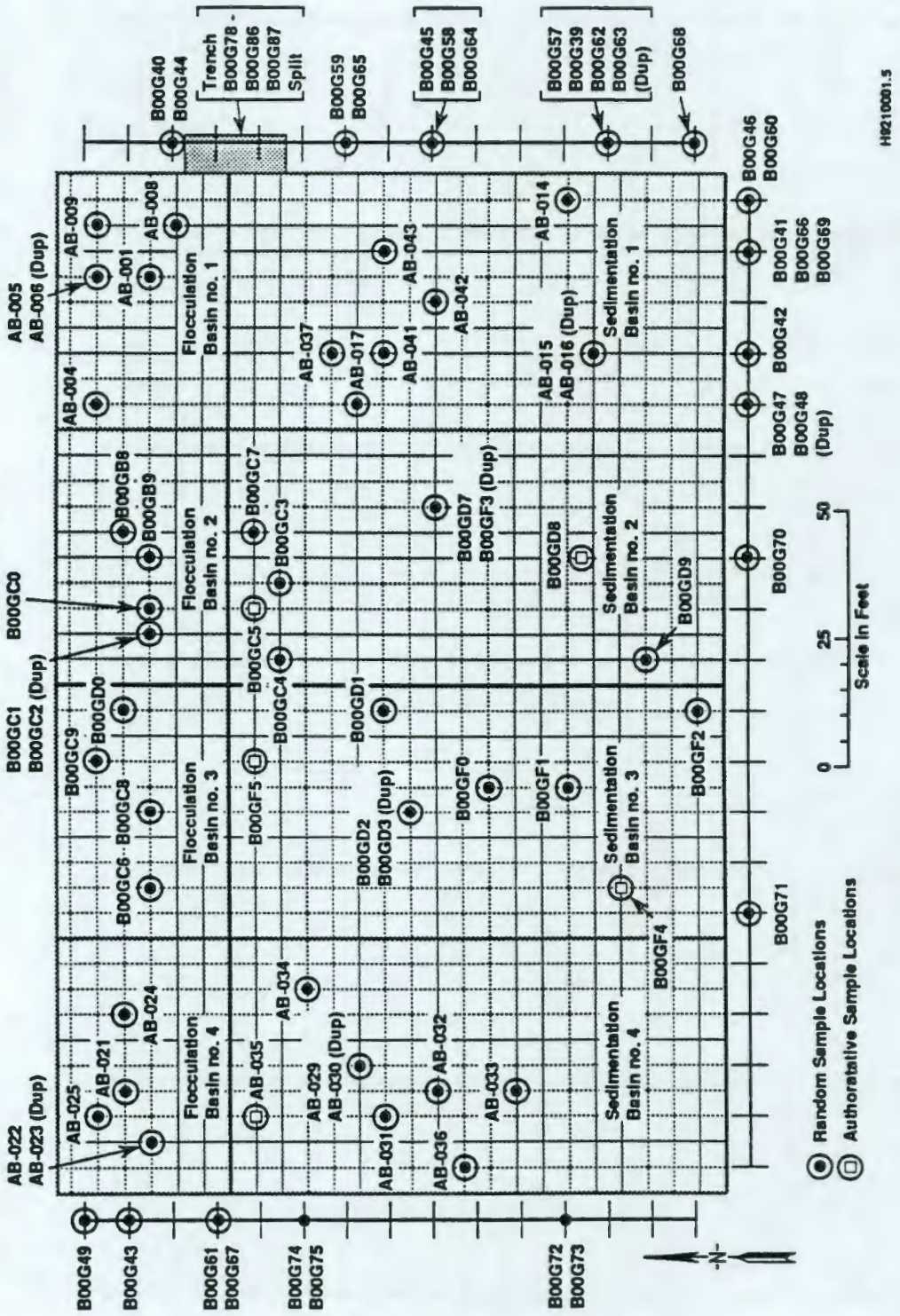
Sample Numbers	Alpha		Beta		Cesium-137		Protactium-234		Technetium-99		Thorium-234		U-Alpha	
	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-
B00G39	6	2.3	4.7	4.8	0.3	0.3	-25.4	49.3	-6.5	18.6	-0.8	6	0.6	0.3
B00G40	2.6	1.7	1.9	4.6	-0.1	0.2	-1.8	41	-25.1	18.3	-0.9	4.1	0.2	0.1
B00G41	3.2	1.9	6.9	4.9	0.2	0.3	4.7	49.6	0.6	18.8	1.4	6	0.3	0.1
B00G42	3.4	1.9	5.7	4.8	-0	0.2	38.5	37.4	-27.9	18.1	-0.2	5.2	0.2	0.1
B00G43	4.6	2.1	2.4	4.6	0.4	0.3	66.7	43.4	1.9	18.9	-1.7	5.9	0.2	0.1
B00G44	3.6	1.9	4.7	4.8	0.2	0.3	16	49.8	1.9	18.9	-3	9.8	0	0
B00G45	6	2.3	5.8	4.8	0.2	0.2	6	41.8	31.2	17.9	-0.2	5.2	0.2	0.1
B00G46	3.8	2	4.3	4.8	-0	0.3	8.8	44.5	-5	18.7	-1.8	5.3	0.1	0.1
B00G47	3.8	2	7.2	4.9	0.4	0.3	18	43.1	-3.5	18.7	-6.2	9.8	0.4	0.1
B00G48	3.4	1.9	2.5	4.7	0.4	0.3	56.7	44.9	8.6	19	-1	5.9	0.2	0.1
B00G49	5.4	2.2	3.6	4.7	0	0.2	28.3	37.9	-24	18.1	-1.4	4.1	0.3	0.1
B00G57	4.8	2.1	5.9	4.9	0	0.2	42.7	37.7	-11.9	18.5	-1	5.3	0.2	0.1
B00G58	4.2	2.2	8.3	5	0.3	0.3	18	49.2	-23.8	17.6	-0.4	6	0.3	0.1
B00G58D	3.6	2.2	6.2	4.9	0.3	0.3	28.5	44	-34.4	17.3	0.2	6	0.3	0.1
B00G59	3.2	1.9	7.5	4.9	-0	0.2	4.2	39.2	-28.9	18	-1.4	4.1	0.4	0.1
B00G60	3	1.8	4	4.7	0.3	0.2	15.4	49	-23.2	18.1	1.3	5.9	0.1	0
B00G61	2.8	1.8	6.7	4.9	-0.1	0.2	25	40.7	-10.4	18.5	-2.5	5.2	0.4	0.1
B00G62	3	2.1	15.1	5.4	-0	0.2	12.1	40.1	-19.6	18.2	0.1	5.3	0.3	0.1
B00G63	5.2	2.2	13.3	5.3	0.5	0.3	13.3	51	8.8	19.1	-1.2	6	0.3	0.1
B00G64	1.8	2	5.8	4.9	-0	0.2	21.3	41	-8.2	17.4	-2.6	5.2	0.5	0.3
B00G65	3.5	2.2	13.4	5.3	0.4	0.3	50	45.9	10.5	18	0.3	6	0.4	0.1
B00G66	2	2	5.5	4.8	-0	0.2	43.6	39.9	-9.5	17.4	-3.2	5.2	0.2	0.1
B00G67	2.2	2	7.1	5	0	0.2	16.7	37.4	7.2	17.9	-1.5	5.2	0.4	0.1
B00G68	3	2.1	-0.2	4.5	0.5	0.3	1.3	50	9.2	17.9	3.2	6	0.1	0.1
B00G69	7.1	2.7	5.9	4.9	0.4	0.3	36	49.2	-10	17.3	0	6	0.7	0.1
B00G70	3.8	2.3	9.2	5.1	0.3	0.2	2.8	38.3	-1.3	17.6	0.4	4.1	0.3	0.1
B00G71	1	1.8	6.8	4.9	0.7	0.3	22	45.8	1	17.7	1.2	6.8	0.3	0.1

Table C-18. Surface Soil Radiochemistry Data, 1991 Samples. (2 sheets)

Sample Numbers	Alpha		Beta		Cesium-137		Protactium-234		Technetium-99		Thorium-234		U-Alpha	
	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-
B00G72	0	2.4	0.1	5.2	0.1	0.2	48.7	36.8	5	19	-1.2	5.2	0.1	0.1
B00G72D	-1.6	2.8	-5.4	5.4	-0	0.2	37.6	41.6	5	19	-0.2	5.2	0.3	0.1
B00G73	4.6	2.4	5.2	4.8	0.2	0.3	13.3	48.8	-6.8	17.7	2.4	6	0.3	0.1
B00G74	1.6	1.9	7.4	5	0	0.2	43.4	39.9	4.6	17.8	-0.3	4.1	0.3	0.1
B00G75	5.2	2.5	6.7	4.9	0.6	0.3	-28	52.6	-26.9	16.8	-0.3	6	0.2	0.1
B00G78	3.6	2.2	2.4	4.7	0.5	0.3	2	48.6	20.5	18.2			0.2	0.1
B00G79	2.2	2	4.6	4.8	-0	0.2	17.6	37.7	11.8	18	-1.6	4.1	0.3	0.1
B00G80	5	2.4	9.3	5.1	0.2	0.3	25.3	49.8	13.1	18	-0.3	5.9	0.2	0.1
B00G81	6.7	2.6	4.6	4.8	0.2	0.2	7.4	39.2	-30.3	16.7	-0.9	4.1	0.5	0.1
B00G82	1.2	3.1	-3	5.6	0.4	0.3	-19.3	47.6	4.9	17.9			0.5	0.1
B00G83	3.2	2.2	5.3	4.8	-0	0.2	4.6	41.7	-12.6	18	-4.2	5.8	0.4	0.1
B00G84	3.4	2.1	2.3	4.9	0.5	0.3	16.6	48.4	-12.7	17.4	-4.4	9.8	-0.4	0.4
B00G85	0.8	1.6	2.5	4.9	-0	0.2	-19	40.1	5.3	17.9	-2.5	5.2	-0.6	0.2
B00G86	7.4	2.6	1.9	4.9	-0	0.2	5.6	39.4	-0.1	17.8	-1.8	5.2	-0.6	0.2
B00G87	4.2	2.2	4.3	5	0	0.2	-18.5	39.8	0.4	17.8	-4	5.2	-0.2	0.2
B00G88[b]	0	2.3	0.3	5.3	0.4	0.3	-9.4	50.6	-31.8	17.4	1.3	6	-0.6	0.2
B00G88D[b]	-1.7	2.8	-5.6	5.4	-0	0.3	8.1	50.6	-24.6	17.6	1.6	6	-0.7	0.2
B00G89[c]	1.7	1.8	5.6	5.1	-0	-0.2	51.4	38	4	17.9	-2.1	4.1	-0.8	0.2
B00G90[b]	3.1	2	1.2	4.8	0.5	0.3	30	42.5	-6.8	17.6	-1.4	5	-0.8	0.2
B00G91[a]	4.5	2.2	-1.8	4.7	-0.2	0.3	-19.5	43.2	-16.3	17.3	-0.9	3.3	-0.6	0.2

[a]Equipment Blank.
[b]Field Blank.
[c]Trip Blank.

Figure C-1. Subconcrete Shallow and Surface Soil Sample Locations,
(1989 and 1991 Sampling Locations).
(1989 and 1991 sample numbers are prefixed with "AB" and "BOO," respectively).



APPENDIX D

BASIN CONCRETE ANALYTICAL DATA

(Core Samples)

APPENDIX D

BASIN CONCRETE ANALYTICAL DATA

(Core Samples)

Appendix D contains analytical data (Tables D-1 through D-20) and sample locations (Figures D-1 through D-6) for the 183-H basin concrete samples. The data summary statistics (Table D-13) are based on all routine (as opposed to background, radioactivity, or quality control) sample data except those qualified with a "U."

These data did not undergo a validation process other than that of the quality control checks and reviews performed by the laboratory.

Analytes that were either undetected or detected below the contractual detection limit are flagged as follows:

U The material was analyzed for, but was not detected. The associated value is the detection/quantitation limit.

For further information refer to Chapter 2.0.

Figure D-7 gives the formate analysis laboratory report. Please note that the formate samples generally share sample numbers with the co-located samples taken for routine or background analysis. Sample numbers B00GN0, B00GN4, and B00GN5 are unique because these sample locations were not co-located.

Table D-1. Concrete Analytical Results, Flocculation Basin 1 Floor (mg/kg).

Analyte	Sample Numbers							
	B00GM0		B00GM1		B00GM2		B00GM3	
Aluminum	12,000		10,000		11,000		11,000	
Antimony	48	U	48	U	45	U	47	U
Arsenic	48	U	48	U	45	U	47	U
Barium	150		130		160		100	
Beryllium	0.4		0.4		0.4		0.3	
Boron	9.7		6.6		4		3.8	U
Cadmium	2.9	U	2.9	U	2.7	U	2.8	U
Calcium	140,000		99,000		120,000		140,000	
Chloride	20	U	20	U	20	U	20	U
Chromium	18		13		270		9.4	U
Cobalt	8.8		13		12		14	
Copper	58		34		20		22	
Cyanide								
Fluoride	2	U	2	U	2	U	3	
Iron	13,000		12,000		13,000		10,000	
Lead	48	U	48	U	45	U	47	U
Magnesium	4,700		4,100		4,400		4,300	
Manganese	220		190		210		210	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U
Molybdenum	9.6	U	9.5	U	31		9.4	U
Nickel	13		9.5	U	250		9.4	U
Nitrate	1,150		252		274		20	U
Nitrite	20	U	20	U	20	U	20	U
Potassium	1,200		1,100		1,400		700	
Selenium	48	U	48	U	45	U	47	U
Silver	5.8	U	5.7	U	5.4	U	5.6	U
Sodium	1,300		1,300		1,200		830	
Sulfate	234		438		384		147	
Sulfide	20	U	66		66		48	
Technetium-99 (pCi/g)								
Thallium								
Uranium (Fluorometric)	1		2		2		2	
Vanadium	35		33		38		29	
Zinc	190		94		54		63	

Table D-2. Concrete Analytical Results, Sedimentation Basin 1 Floor (mg/kg).

Analyte	Sample Numbers													
	B00GL1		B00GL2		B00GL3		B00GL4		B00GM8 (Field Duplicate of B00GL4)		B00GM7 (Low Point)		B00GM9	
Aluminum	7,800		11,000		7,400		11,000		12,000		11,000		12,000	
Antimony	46	U	45	U	48	U	45	U	46	U	49	U	46	U
Arsenic	46	U	45	U	48	U	45	U	46	U	49	U	46	U
Barium	95		120		100		120		130		120		120	
Beryllium	0.27	U	0.3		0.3	U	0.3		0.3	U	0.4		0.3	U
Boron	4.1		5.1		3.8	U	6		10		3.9	U	6.2	
Cadmium	2.7	U	2.7	U	2.9	U	2.7	U	2.7	U	3	U	3.7	U
Calcium	87,000		120,000		66,000		100,000		140,000		120,000		120,000	
Chloride	20	U	200	U	200	U	200	U	50		20	U	200	U
Chromium	9.1	U	19		9.6	U	14		13		16		16	
Cobalt	4.8		6.9		11		8		8.6		7		13	
Copper	30		38		77		29		43		31		40	
Cyanide	1	U							1	U				
Fluoride	8	U	2	U	6	U	2	U	2		3		2	U
Iron	13,000		12,000		17,000		15,000		12,000		12,000		13,000	
Lead	46	U	45	U	48	U	45	U	46	U	49	U	46	U
Magnesium	4,500		4,800		5,000		4,400		4,900		4,500		4,000	
Manganese	200		220		220		240		260		210		240	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Molybdenum	9.1	U	9	U	9.6	U	8.9	U	9.1	U	9.9	U	9.2	U
Nickel	9.1	U	10		13		13		13		16		14	
Nitrate	5,120		10,900		693		10,400		27,000		5,740		247,000	
Nitrite	20	U	200	U	200	U	200	U	50		101		200	U
Potassium	1,200		780		1,900		1,100		940		1,100		1,100	
Selenium	46	U	45	U	48	U	45	U	46	U	49	U	46	U
Silver	5.5	U	5.4	U	5.7	U	5.3	U	5.5	U	5.9	U	5.5	U
Sodium	2,800		7,600		2,000		6,400		7,100		4,400		9,500	
Sulfate	214		1,540		281		254		227		446		1,217	
Sulfide	48		48		66		30		0.1	U	120		0.1	U
Technetium-99 (pCi/g)	38.7		69.4		50.9									
Thallium							30		3.9	U			3.9	U
Uranium (Fluorometric)	17		8		6				4		5		17	
Vanadium	27		31		23				35		34		37	
Zinc	76		110		66				120		110		120	

Table D-3. Concrete Analytical Results, Flocculation Basin 2 Floor (mg/kg unless otherwise noted).

Analyte	Sample Numbers							
	B00GK7		B00GK8		B00GK9		B00GL0	
Aluminum	10,000		8,500		11,000		12,000	
Antimony	50	U	43	U	47	U	48	U
Arsenic	50	U	52		47	U	48	U
Barium	180		100		150		170	
Beryllium	0.4		0.3		0.4		0.4	
Boron	5.6		7.5		5.7		3.9	U
Cadmium	3	U	2.6	U	2.8	U	2.9	U
Calcium	100,000		75,000		110,000		120,000	
Chloride	20	U	20	U	20	U	20	U
Chromium	12		19		12		15	
Cobalt	7.6		10		4.8		8.7	
Copper	53		57		15		14	
Cyanide	1							
Fluoride	3		2	U	2	U	2	U
Iron	12,000		12,000		11,000		12,000	
Lead	50	U	43	U	47	U	48	U
Magnesium	4,600		3,300		4,000		4,600	
Manganese	190		190		170		190	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U
Molybdenum	9.9	U	8.6	U	9.4	U	9.7	U
Nickel	12		24		9.4	U	23	
Nitrate	380		4,952		373		1,280	
Nitrite	20	U	20	U	20	U	20	U
Potassium	1,700		1,200		1,100		1,300	
Selenium	50	U	43	U	47	U	48	U
Silver	6	U	5.1	U	5.7	U	5.8	U
Sodium	3,100		2,800		790		1,500	
Sulfate	323		300		237		19.7	
Sulfide	32		32		20	U	48	
Technetium-99 (pCi/g)	66.8		123		73		-39.8	
Thallium								
Uranium (Fluorometric)	2		1		2		2	
Vanadium	28		28		32		33	
Zinc	95		190		54		43	

Table D-4. Concrete Analytical Results, Sedimentation Basin 2 Floor (mg/kg unless otherwise noted).

Analyte	Sample Numbers																	
	B00GJ1		B00GJ2		B00GJ3		B00GJ9		B00GK4		B00GK6		B00GN7 (Construction/ Joint 6000 DMP)		B00ZM1		B00ZM2	
Aluminum	12,000		11,000		10,000		9,900		12,000		9,300		2,400		5,700		6,600	
Antimony	50	U	48	U	48	U	47	U	49	U	48	U	4.8	U	44	U	49	U
Arsenic	50	U	48	U	48	U	47	U	49	U	48	U	4.8	U	44	U	49	U
Barium	100		98		90		130		110		83		24		80		84	
Beryllium	0.3		0.3	U	0.3		0.3		0.3		0.3	U	0.1		0.4		0.5	
Boron	53		99		52		3.8	U	10		35		3.1		8.6		8.9	
Cadmium	3	U	2.9	U	2.9	U	2.8	U	2.9	U	2.9	U	0.3	U	2.6	U	2.9	U
Calcium	140,000		150,000		120,000		130,000		110,000		110,000		23,000		73,000		89,000	
Chloride	20		20	U	20	U	20	U	20	U	74		87		20	U	20	U
Chromium	9.9	U	11		10		9.9		20		17		3.3		8.7	U	9.7	U
Cobalt	7.1		11		30		8.3		15		4.8	U	1.7		4.4	U	9	
Copper	24		30		25		41		43		15		8.3		14		17	
Cyanide													4.4					
Fluoride	5		7		2		10		3		24		120		2	U	2	U
Iron	15,000		14,000		15,000		15,000		15,000		13,000		3,200		10,000		17,000	
Lead	50	U	48	U	48	U	47	U	49	U	48	U	5.5		44	U	49	U
Magnesium	6,800		6,600		5,900		5,700		7,000		5,600		1,100		3,200		4,600	
Manganese	180		170		180		220		220		160		88		140		210	
Mecury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	
Molybdenum	9.9	U	9.6	U	9.7	U	9.5	U	9.7	U	9.6	U	1	U	8.7	U	9.7	U
Nickel	17		19		16		11		19		11		2.8		8.7	U	9.7	U
Nitrate	1,046		2,160		457		1,640		2,170		13,200		15,200		1,300		1,690	
Nitrite	20	U	20	U	20	U	20	U	20	U	215		74		20	U	20	U
Potassium	1,000		1,200		1,300		1,200		1,800		620		190		550		580	
Selenium	50	U	48	U	48	U	47	U	49	U	48	U	4.8	U	44	U	49	U
Silver	6	U	5.8	U	5.8	U	5.7	U	5.8	U	5.8	U	0.6	U	5.2	U	5.8	U
Sodium	1,500		1,500		1,200		2,100		2,100		3,300		2,600		850		1,700	
Sulfate	194		126		244		253		227		238		1,290		198		288	
Sulfide	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.8		20	U				
Technetium-99 (pCi/g)													504		51.7		387	
Thallium	4	U	4	U	3.4	U	3.8	U	3.9	U	3.9	U						
Uranium (Fluorometric)	5		3		6		14		5		33		91		17		3	
Vanadium	28		24		27		31		27		24		5.2		21		34	
Zinc	320		320		160		69		150		140		31		38		46	

Table D-5. Concrete Analytical Results, Flocculation Basin 3 Floor (mg/kg unless otherwise noted).

Analyte	Sample Numbers													
	B00GF9		B00GG0		B00GG2		B00GG3		B00ZL8		B00ZL9 (Field Duplicate of B00ZL8)		B00ZM0	
Aluminum	13,000		12,000		13,000		13,000		9,100		11,000		11,000	
Antimony	48	U	49	U	50	U	44	U	49	U	45	U	48	U
Arsenic	48	U	49	U	50	U	44	U	49	U	45	U	48	U
Barium	120		110		130		160		120		140		150	
Beryllium	0.4		0.4		0.4		0.4		0.5		0.6		0.4	
Boron	7.5		5.4		4	U	11		10		11		8.7	
Cadmium	2.9	U	2.9	U	3	U	2.6	U	2.9	U	2.7	U	2.9	U
Calcium	130,000		110,000		110,000		130,000		100,000		110,000		120,000	
Chloride	200	U	486		200	U	20	U	20	U	20	U	20	U
Chromium	15		12		17		15		15		14		16	
Cobalt	12		20		11		9.1		16		120		11	
Copper	45		43		36		38		60		65		42	
Cyanide									1	U				
Fluoride	10		2	U	2	U	2	U	2	U	2	U	2	U
Iron	15,000		15,000		17,000		15,000		11,000		16,000		14,000	
Lead	48	U	49	U	50	U	44	U	49	U	45	U	48	U
Magnesium	5,000		5,100		5,100		5,100		3,800		4,500		4,900	
Manganese	260		270		290		250		200		250		220	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1		0.1	
Molybdenum	9.6	U	9.8	U	10	U	8.8	U	9.7	U	9.1	U	9.5	U
Nickel	16		14		10		9.8		14		12		14	
Nitrate	6,410		4,250		3,470		2,580		3,990		1,370		3,450	
Nitrite	200	U	20	U	200	U	21		20	U	20	U	20.9	
Potassium	1,300		1,500		910		1,500		580	U	950		970	
Selenium	48	U	49	U	50	U	44	U	49	U	45	U	48	U
Silver	5.8	U	5.9	U	6	U	5.3	U	5.8	U	5.5	U	5.7	U
Sodium	3,300		3,100		4,800		1,500		2,900		2,500		2,800	
Sulfate	580		260		444		197		429		773		297	
Sulfide														
Technetium-99 (pCi/g)									155		93.5		239	
Thallium	5	U	5	U	5	U	5	U						
Uranium (Fluorometric)	44		36		16		2		6		1		3	
Vanadium	44		43		52		46		25		37		35	
Zinc	150		130		140		140		210		230		140	

Table D-6. Concrete Analytical Results, Sedimentation Basin 3 Floor (mg/kg unless otherwise noted). (2 sheets)

Analyte	Sample Numbers									
	B00GG5		B00GG6		B00GG9		B00GH0		B00GH1	
Aluminum	8,000		9,700		10,000		11,000		10,000	
Antimony	47	U	48	U	45	U	48	U	33	U
Arsenic	47	U	48	U	45	U	48	U	33	U
Barium	78		120		110		130		120	
Beryllium	0.3		0.4		0.4		0.4		0.3	
Boron	3.8	U	3.8	U	7.3		6.7		26	
Cadmium	2.8	U	2.9	U	2.7	U	2.9	U	2	U
Calcium	75,000		120,000		110,000		130,000		130,000	
Chloride	20	U	20	U	20	U	20	U	20	U
Chromium	9.4	U	9.6	U	9.7		17		9.5	
Cobalt	6.1		7.3		7.7		12		5.2	
Copper	22		19		16		22		16	
Cyanide			1	U						
Fluoride	2	U	2	U	2	U	2	U	2	U
Iron	9,600		15,000		15,000		23,000		12,000	
Lead	47	U	48	U	45	U	48	U	33	
Magnesium	3,000		4,800		5200		5,800		4,700	
Manganese	170		220		180		280		160	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.2	
Molybdenum	9.4	U	9.6	U	8.9	U	9.6	U	6.6	U
Nickel	9.4	U	9.6	U	8.9		13		9.2	
Nitrate	3,300		624		1,060		587		1,040	
Nitrite	20	U	20	U	20	U	20	U	20	U
Potassium	640		880		770		1,100		880	
Selenium	47	U	48	U	45	U	48	U	33	U
Silver	5.7	U	5.8	U	5.4	U	5.7	U	4	U
Sodium	1,700		1,300		950		1,300		900	
Sulfate	155		180		201		171		202	
Sulfide										
Technetium-99 (pCi/g)										
Thallium	5	U	5	U	5	U	5	U	4	U
Uranium (Fluorometric)	2		3		3		2		4	
Vanadium	26		36		38		73		26	
Zinc	92		82		73		93		120	

Table D-6. Concrete Analytical Results, Sedimentation Basin 3 Floor (mg/kg unless otherwise noted). (2 sheets)

Analyte	Sample Numbers									
	B00GJ0		B00GN1 (Low Point)		B00GN2 (Field Duplicate of B00GG5)		B00GN3 (Field Duplicate of B00GG5)		B00ZM5	
Aluminum	3,900		14,000		11,000		12,000		5,900	
Antimony	26	U	48	U	46	U	52	U	41	U
Arsenic	26	U	48	U	46	U	52	U	41	U
Barium	41		120		97		110		68	
Beryllium	0.2	U	0.45		0.3	U	0.3	U	0.4	
Boron	20		5.6		9.1		14		4.6	
Cadmium	1.6	U	2.9	U	2.8	U	3.1	U	2.5	U
Calcium	36,000		130,000		99,000		120,000		82,000	
Chloride	200	U	35		200	U	200	U	20	U
Chromium	5.2	U	24		12		12		8.2	U
Cobalt	4		14		23		12		5.6	
Copper	11		45		35		34		21	
Cyanide			1	U						
Fluoride	2		3		2	U	2	U	2	U
Iron	6,700		16,000		16,000		15,000		12,000	
Lead	26	U	48	U	46		52	U	41	U
Magnesium	1,900		5,300		4,300		4,700		3,400	
Manganese	110		300		260		280		150	
Mercury	0.1	U	0.10	U	0.1	U	0.1	U	0.1	U
Molybdenum	5.2	U	9.7	U	9.2	U	10	U	8.2	U
Nickel	6.7		37		14		18		8.2	U
Nitrate	6,830		11,700		4,870		8,876	U	2,210	
Nitrite	200	U	58		200	U	200	U	20	U
Potassium	440		1,400		1,000		910		490	U
Selenium	26	U	48	U	46	U	52	U	41	U
Silver	3.1	U	5.8	U	5.5	U	6.2	U	4.9	U
Sodium	760		4,300		2,500		3,400		1,200	
Sulfate	476		614		1,230		373		176	
Sulfide			84							
Technetium-99 (pCi/g)			312		0.1	U	0.1	U	244	
Thallium	3.9	U								
Uranium (Fluorometric)	8		4		3.9	U	3.9	U	2	
Vanadium	16		44		4		3		26	
Zinc	47		160		41		46		69	

Table D-7. Concrete Analytical Results, Flocculation Basin 4 Floor (mg/kg unless otherwise noted).

Analyte	Sample Numbers									
	B00ZK7		B00ZK8		B00ZL0		B00ZL1		B00ZL2	
Aluminum	9,300		11,000		6,600		13,000		12,000	
Antimony	42	U	48	U	41	U	430	U	52	U
Arsenic	42	U	48	U	41	U	430	U	52	U
Barium	82		110		85		230		170	
Beryllium	0.4		0.3		0.3		2.6	U	0.4	
Boron	23		46		20		130		25	
Cadmium	2.5	U	2.9	U	2.4	U	26	U	3.1	U
Calcium	110,000		120,000		57,000		140,000		120,000	
Chloride	20	U	20	U	20	U	20	U	20	U
Chromium	11		14		8.9		87	U	18	
Cobalt	8		10		4.1	U	43	U	11	
Copper	25		28		13		35	U	27	
Cyanide										
Fluoride	3		3		2	U	4		4	
Iron	12,000		14,000		8,200		16,000		15,000	
Lead	42	U	48	U	41	U	430	U	52	U
Magnesium	4,500		4,500		3,200		5,700		5,900	
Manganese	190		260		290		250		220	
Mercury	0.1	U	0.1	U	0.1		0.1	U	0.1	U
Molybdenum	8.4	U	9.6	U	8.1	U	87	U	10	U
Nickel	8.8		11		8.9		87	U	14	
Nitrate	364		78		612		446		476	
Nitrite	20	U	20	U	20	U	20	U	20	U
Potassium	1,200		1,100		1,000		5,200	U	1,400	
Selenium	42	U	48	U	41	U	430	U	52	U
Silver	5.1	U	5.8	U	4.9	U	52	U	6.2	U
Sodium	1,100		1,100		980		3,100		1,500	
Sulfate	222		191		304		399		523	
Sulfide										
Technetium-99 (pCi/g)	-42.1		152		28.5		99.1		43.1	
Thallium										
Uranium (Fluorometric)	3		2		3		2		5	
Vanadium	40		44		28		51		47	
Zinc	57		67		33		76		53	

Table D-8. Concrete Analytical Results, Sedimentation Basin 4 Floor (mg/kg unless otherwise noted).

Analyte	Sample Numbers																			
	B00ZK1		B00ZK2		B00ZK3		B00ZK4		B00ZK5		B00ZK6		B00ZL4 (Field Duplicate of B00ZK2)		B00ZL5 (Field Duplicate of B00ZK3)		B00ZL6	
Aluminum	16,000		13,000		15,000		11,000		11,000		13,000		10,000		11,000		9,500	
Antimony	510	U	48	U	49	U	470	U	46	U	47	U	52	U	48	U	48	U
Arsenic	510	U	60		54		470	U	46	U	52		52	U	48	U	48	U
Barium	170		140		150		150		98		140		130		130		110	
Beryllium	3	U	0.5		0.4		2.8	U	0.4		0.4		0.4		0.5		0.4	
Boron	120		27		26		120		33		31		38		13		10	
Cadmium	30	U	2.9	U	2.9	U	28	U	2.7	U	2.8	U	3.1	U	2.9	U	2.9	U
Calcium	150,000		120,000		140,000		150,000		98,000		110,000		86,000		130,000		100,000	
Chloride	20	U	20	U	20	U	20	U	20	U	29		20	U	20	U	20	U
Chromium	100	U	22		25		94	U	12		19		16		19		13	
Cobalt	51	U	16		16		47	U	93		13		14		14		9.9	
Copper	120		63		80		38	U	120		71		49		61		56	
Cyanide																		
Fluoride	2	U	2	U	2		2	U	2	U	6		2	U	2	U	2	U
Iron	20,000		16,000		20,000		17,000		17,000		21,000		17,000		15,000		13,000	
Lead	510	U	48	U	49	U	470	U	46	U	47	U	52	U	48	U	48	U
Magnesium	6,600		5,200		5,800		6,500		4,600		6,700		4,700		5,100		4,300	
Manganese	320		260		300		230		280		280		280		280		210	
Mercury	0.1	U	0.1	U	0.1	U	0.2		0.1	U	0.1	U	0.1		0.1		0.1	
Molybdenum	100	U	9.6	U	9.7	U	94	U	9.2	U	9.3	U	10	U	9.6	U	9.6	U
Nickel	100	U	14		16		94	U	13		20		11		14		10	
Nitrate	2,180		1,520		1,260		547		1,499		852		1,190		1,750		7,150	
Nitrite	20	U	20	U	20	U	20	U	20	U	39		20	U	20	U	60	
Potassium	6,100	U	1,700		1,300		5,600	U	1,400		930		1,700		1,100		580	
Selenium	510	U	48	U	49	U	470	U	46	U	47	U	52	U	48	U	48	U
Silver	61	U	5.8	U	5.8	U	56	U	5.5	U	5.6	U	6.2	U	5.8	U	5.8	U
Sodium	5,900		1,300		1,800		2,700		2,300		1,000		2,300		2,400		3,200	
Sulfate	336		209		460		344		350		809		367		347		421	
Sulfide																		
Technetium-99 (pCi/g)	406		276		193		17.8		63.2		110		45.3		64		-36.8	
Thallium																		
Uranium (Fluorometric)	1		1		1	U	2		2		1		4		9		11	
Vanadium	69		45		56		47		49		59		44		36		31	
Zinc	320		220		250		280		150		210		170		230		180	

Table D-9. Concrete Analytical Results, Basin 1 Interior Wall (mg/kg unless otherwise noted). (2 sheets)

Analyte	Sample Numbers									
	West Wall						North Wall			
	B00GL8		B00GL9		B00GN9 (Field Duplicate of B00GL9)		B00GL5		B00GL6	
Aluminum	11,000		9,000		9,400		8,700		10,000	
Antimony	45	U	50	U	44	U	48	U	46	U
Arsenic	79		50	U	44	U	52		56	
Barium	99		120		130		86		95	
Beryllium	0.3	U	0.3	U	0.4		0.3		0.4	
Boron	19		15		3.6		3.8	U	6	
Cadmium	2.7	U	3	U	2.6	U	2.9	U	2.7	U
Calcium	100,000		84,000		120,000		93,000		110,000	
Chloride	200	U	45		20	U	200	U	200	U
Chromium	12		13		14		10		21	
Cobalt	10		6.5		6.9		8.1		10	
Copper	60		30		19		46		57	
Cyanide			2.6							
Fluoride	2	U	2.4		2		10		18	
Iron	15,000		9,400		14,000		12,000		14,000	
Lead	45	U	50	U	44	U	48	U	46	U
Magnesium	5,400		3,500		5,300		3,700		4,000	
Manganese	270		170		180		220		230	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	
Molybdenum	9	U	10	U	8.8	U	9.6	U	9.1	U
Nickel	15		12		17		9.6	U	27	
Nitrate	2,670		21,060		82		3,160		2,180	
Nitrite	200	U	134		20	U	200	U	200	U
Potassium	1,500		1,100		1,100		770		1,000	
Selenium	45	U	50	U	44	U	48	U	46	U
Silver	5.4	U	6	U	6		5.7	U	5.5	U
Sodium	2,500		8,800		700		2,000		1,600	
Sulfate	200	U	356		155		201		203	
Sulfide	48		20	U	32		30		48	
Technetium-99 (pCi/g)	49.2		331		353		199		-18.7	
Thallium										
Uranium (Fluorometric)	1	U	11		1		3		3	
Vanadium	35		25		31		28		31	
Zinc	240		83		54		140		160	

Table D-9. Concrete Analytical Results, Basin 1 Interior Wall (mg/kg unless otherwise noted). (2 sheets)

Analyte	Sample Numbers									
	South Wall		East Wall							
	B00GN8		B00GL7		B00GM4		B00GP0		B00GP1	
Aluminum	11,000		8,600		6,900		4,300		11,000	
Antimony	50	U	47	U	46	U	9.5		47	U
Arsenic	85		47	U	46	U	13		47	U
Barium	110		110		70		44		110	
Beryllium	0.3	U	0.3		0.4		0.1		0.3	U
Boron	21		3.8	U	3.7	U	2		10	
Cadmium	3	U	2.8	U	2.8	U	0.2	U	2.8	U
Calcium	140,000		110,000		80,000		36,000		130,000	
Chloride	20	U	200	U	20	U	20	U	20	U
Chromium	25		16		9.5		5.2		11	
Cobalt	16		6.8		5.8		3.8		14	
Copper	88		23		11		17		18	
Cyanide										
Fluoride	2	U	24		2	U	2	U	2	U
Iron	16,000		15,000		12,000		6,600		17,000	
Lead	50	U	47	U	46	U	11		47	U
Magnesium	5,400		5,000		4,600		2,200		6,900	
Manganese	250		190		140		350		210	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Molybdenum	9.9	U	9.5	U	9.2	U	0.8	U	9.3	U
Nickel	16		22		24		5.7		10	
Nitrate	75		1,700		20	U	20	U	20	U
Nitrite	20	U	200	U	20	U	20	U	20	U
Potassium	1,200		1,800		870		710		1,400	
Selenium	50	U	47	U	46	U	3.8	U	47	U
Silver	5.9	U	5.7	U	5.5	U	0.5	U	5.6	U
Sodium	1,200		2,800		440		310		990	
Sulfate	265		200	U	237		194		216	
Sulfide	32		48		32		48		20	U
Technetium-99 (pCi/g)	243		100		205		401		334	
Thallium										
Uranium (Fluorometric)	2		2		1		1		1	
Vanadium	35		33		20		16		31	
Zinc	300		65		120		52		170	

Table D-10. Concrete Analytical Results, Basin 2 Interior Wall (mg/kg). (2 sheets)

Analyte	Sample Numbers									
	West Wall						North Wall			
	B00GJ7		B00GJ8		B00GK5		B00GK0		B00GK3	
Aluminum	1,200		1,100		10,000		10,000		9,800	
Antimony	5	U	5	U	50	U	50	U	45	U
Arsenic	5	U	5	U	100		54		53	
Barium	10		10		120		100		120	
Beryllium	0	U	0		0.3	U	0.3	U	0.3	
Boron	1.1		1.1		14		14		6.4	
Cadmium	0.3	U	0.3	U	3	U	3	U	2.7	U
Calcium	15,000		14,000		120,000		130,000		150,000	
Chloride	20	U	20	U	20	U	20	U	20	U
Chromium	1.2		1	U	21		17		21	
Cobalt	1.2		1.2		18		32		8.5	
Copper	5		5.6		110		59		55	
Cyanide							1			
Fluoride	2	U	2	U	64		2		2	U
Iron	1,700		1,600		17,000		12,000		13,000	
Lead	5	U	5	U	50	U	54		45	U
Magnesium	560		540		5,000		4,000		4,800	
Manganese	25		25		300		220		220	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Molybdenum	1	U	1	U	9.9	U	9.9	U	8.9	U
Nickel	1	U	1		15		17		17	
Nitrate	20	U	20	U	7,027		4,609		4,660	
Nitrite	20	U	20	U	23		20	U	20	U
Potassium	110		91		850		1,100		1,300	
Selenium	5	U	5	U	50	U	50	U	45	U
Silver	0.6	U	0.6	U	6	U	5.9	U	5.4	U
Sodium	57		58		4,200		3,100		2,600	
Sulfate	110		197		254		124		133	
Sulfide	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Technetium-99 (pCi/g)										
Thallium	4	U	4	U	3.9	U	3.5	U	3.9	U
Uranium (Fluorometric)	2		1		27		7		2	
Vanadium	4.1		3.5		39		28		29	
Zinc	19		22		320		160		160	

Table D-10. Concrete Analytical Results, Basin 2 Interior Wall (mg/kg). (2 sheets)

Analyte	Sample Numbers									
	East Wall									
	B00GJ4		B00GJ5		B00GJ6		B00GK1		B00GK2	
Aluminum	8,400		9,100		11,000		8,400		11,000	
Antimony	50	U	48	U	49	U	48	U	46	U
Arsenic	50	U	48	U	68		48	U	73	
Barium	100		120		100		110		100	
Beryllium	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
Boron	39		38		40		7.2		12	
Cadmium	3	U	2.9	U	3	U	2.9	U	2.8	U
Calcium	110,000		120,000		130,000		120,000		120,000	
Chloride	20	U	20	U	20	U	20	U	20	U
Chromium	10	U	11		14		10		17	
Cobalt	5	U	6.7		15		5.3		14	
Copper	24		22		76		19		71	
Cyanide										
Fluoride	2	U	6		2	U	3		3	
Iron	13,000		13,000		16,000		11,000		15,000	
Lead	50	U	48	U	49	U	48	U	46	U
Magnesium	4,400		5,400		5,200		4,400		5,200	
Manganese	170		170		270		150		280	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Molybdenum	10	U	9.6	U	9.8	U	9.7	U	9.2	U
Nickel	11		17		13		15		14	
Nitrate	937		3,380		20		551		6,650	
Nitrite	20	U	20	U	20	U	20	U	20	U
Potassium	860		1,300		880		1,200		1,500	
Selenium	50	U	48	U	49	U	48	U	46	U
Silver	6	U	5.8	U	5.9	U	5.8	U	5.5	U
Sodium	1,300		2,400		640		820		5,200	
Sulfate	212		244		172		186		154	
Sulfide	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Technetium-99 (pCi/g)										
Thallium	3.9	U	4	U	3.9	U	4	U	3.9	U
Uranium (Fluorometric)	5		1		2		2		3	
Vanadium	30		29		40		26		34	
Zinc	62		53		300		78		290	

Table D-11. Concrete Analytical Results, Basin 3 Interior Wall (mg/kg unless otherwise noted). (2 sheets)

Analyte	Sample Numbers											
	West Wall											
	B00GG1		B00GH4		B00GH5		B00GH6		B00GH7			
Aluminum	7,900		4,500		11,000		9,000		96,000			
Antimony	47	U	33	U	46	U	33	U	500	U		
Arsenic	47	U	33	U	46	U	33	U	500	U		
Barium	150		40		160		98		1,100			
Beryllium	0.3	U	0.2		0.3		0.3		3.2			
Boron	4.3		16		43		39		780			
Cadmium	2.8	U	2	U	2.8	U	2	U	30	U		
Calcium	63,000		46,000		120,000		110,000		1,220,000			
Chloride	485		20	U	20	U	20	U	20	U		
Chromium	9.5	U	6.5	U	27		9.4		140			
Cobalt	11		6.7		10		6.7		67			
Copper	65		25		56		33		180			
Cyanide	1	U	1	U								
Fluoride	2	U	2	U	2	U	2	U	2	U		
Iron	15,000		6,200		15,000		12,000		130,000			
Lead	47	U	33	U	46	U	33	U	500	U		
Magnesium	8,000		2,000		6,100		4,200		50,000			
Manganese	200		110		230		180		1,700			
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U		
Molybdenum	9.5	U	6.5	U	9.3	U	6.7	U	99	U		
Nickel	9.5	U	6.5	U	27		12		140			
Nitrate	4,250		794		806		20	U	552			
Nitrite	200	U	20	U	20	U	20	U	20	U		
Potassium	2,300		570		1,200		910		13,000			
Selenium	47	U	33	U	46	U	33	U	500	U		
Silver	5.7	U	3.9	U	5.6	U	4	U	59	U		
Sodium	3,600		780		2,000		780		13,000			
Sulfate	385		153		169		111		231			
Sulfide												
Technetium-99 (pCi/g)												
Thallium	5	U	4	U	4	U	4	U	4	U		
Uranium (Fluorometric)	2		1		2		1		1			
Vanadium	39		14		35		26		320			
Zinc	57		93		110		110		970			

Table D-11. Concrete Analytical Results, Basin 3 Interior Wall (mg/kg unless otherwise noted). (2 sheets)

Analyte	Sample Numbers											
	North Wall				East Wall		South Wall					
	B00GG4		B00ZM4		B00GH3		B00GH2		B00GH8		B00GH9	
Aluminum	8,400		6,800		3,800		2,300		100,000		10,000	
Antimony	48	U	44	U	11		4		470	U	49	U
Arsenic	48	U	44	U	24		7.6		470	U	49	U
Barium	73		76		61		28		96		97	
Beryllium	0.3		0.5		0.1		0.1		2.8	U	0.3	U
Boron	3.9	U	4.9		3.8		2.1		98		120	
Cadmium	2.9	U	2.6	U	0.2	U	0.2	U	28	U	2.9	U
Calcium	68,000		89,000		36,000		23,000		1,300,000		30,000	
Chloride	20	U	20	U	20	U	20	U	20	U	20	U
Chromium	9.7	U	12		5.5		5.4		100		15	
Cobalt	17		7.8		6.8		3.1		62		7.6	
Copper	39		41		29		18		170		21	
Cyanide			1	U								
Fluoride	2.8		4		300		7		2	U	2	U
Iron	21,000		12,000		6,600		5,300		170,000		15,000	
Lead	48	U	44	U	7.6		5		470	U	49	U
Magnesium	6,600		3,700		1,800		930		74,000		7,100	
Manganese	310		230		100		62		2,000		180	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Molybdenum	9.7	U	8.7	U	0.8	U	3.9		95	U	9.8	U
Nickel	9.7	U	11		5.3		4.7		95	U	19	
Nitrate	1,820		2,830		63,980		9,460		30		20	U
Nitrite	20	U	20	U	28		20		20	U	36	
Potassium	1,200		950		820		490		12,000		1,500	
Selenium	48	U	44	U	3.9	U	3.2	U	470	U	49	U
Silver	5.8	U	5.2	U	0.5	U	0.4	U	57	U	5.9	U
Sodium	2,300		2,900		2,300		1,800		7,000		880	
Sulfate	132		170		512		282		98		132	
Sulfide												
Technetium-99 (pCi/g)			0.6									
Thallium	5	U			4	U	3.9	U	3.9	U	4	U
Uranium (Fluorometric)	2		3		127		2		2		1	
Vanadium	46		29		12		7.6		340		31	
Zinc	130		150		81		38		1,600		390	

Table D-12. Concrete Analytical Results, Basin 4 Interior Wall (mg/kg unless otherwise noted). (2 sheets)

Analyte	Sample Numbers									
	West Wall									
	B00ZJ3		B00ZJ4		B00ZJ5		B00ZJ6		B00ZK0	
Aluminum	8,500		4,800		8,000		11,000		11,000	
Antimony	46	U	4.8	U	10	U	45	U	45	U
Arsenic	46	U	4.8	U	10	U	45	U	45	U
Barium	93		57		97		100		120	
Beryllium	0.3	U	0.2		0.3		0.3		0.4	
Boron	4.2		7.8		5.8		21		29	
Cadmium	2.8	U	0.3	U	0.6	U	2.7	U	2.7	U
Calcium	110,000		28,000		76,000		110,000		130,000	
Chloride	20	U	20	U	84		20	U	20	U
Chromium	11		6.1		11		17		15	
Cobalt	7.1		3.9		7.2		12		17	
Copper	19		14		16		40		43	
Cyanide	1	U							1	U
Fluoride	2	U	2	U	2	U	2	U	2	U
Iron	14,000		8,900		11,000		19,000		18,000	
Lead	46	U	4.8	U	10	U	45	U	140	
Magnesium	4,800		2,400		3,700		5,800		5,200	
Manganese	170		91		150		280		250	
Mercury	0.1	U	0.1		0.1	U	0.1	U	0.1	U
Molybdenum	9.3	U	1	U	2	U	8.9	U	8.9	U
Nickel	14		4.2		12		16		14	
Nitrate	20	U	20	U	103		4,260		1,610	
Nitrite	20	U	20	U	20	U	20	U	20	U
Potassium	560	U	1,500		1,000		1,500		1,400	
Selenium	46	U	4.8	U	10	U	45	U	45	U
Silver	5.6	U	0.6	U	1.2	U	5.3	U	5.3	U
Sodium	480		770		950		2,700		2,600	
Sulfate	247		220		998		288		244	
Sulfide										
Technetium-99 (pCi/g)	253		382		422		462		590	
Thallium										
Uranium (Fluorometric)	2		1		1		1		1	
Vanadium	42		25		28		53		47	
Zinc	37		19		30		140		150	

Table D-12. Concrete Analytical Results, Basin 4 Interior Wall (mg/kg unless otherwise noted). (2 sheets)

Analyte	Sample Numbers									
	South Wall		East Wall		North Wall					
	B00ZJ7		B00ZJ8		B00ZJ9		B00ZK9		B00ZL3	
Aluminum	11,000		12,000		11,000		9,100		9,300	
Antimony	48	U	45	U	42	U	48	U	45	U
Arsenic	48	U	57		44		48	U	45	U
Barium	130		120		89		88		89	
Beryllium	0.4		0.4		0.3		0.5		0.4	
Boron	30		26		30		13		19	
Cadmium	2.9	U	2.7	U	2.5	U	2.9	U	2.7	U
Calcium	130,000		120,000		110,000		130,000		100,000	
Chloride	20	U	20	U	20	U	20	U	20	U
Chromium	15		15		13		10		11	
Cobalt	12		24		11		8.3		11	
Copper	31		58		55		13		24	
Cyanide		N/a								
Fluoride	2	U	2	U	2	U	2	U	2	U
Iron	22,000		18,000		17,000		14,000		16,000	
Lead	48	U	45	U	42	U	48	U	45	U
Magnesium	9,100		5,400		4,900		5,800		5,600	
Manganese	250		290		270		180		180	
Mercury	0.1		0.1		0.1	U	0.2		0.1	U
Molybdenum	9.5	U	9.1	U	8.3	U	9.5	U	9.1	U
Nickel	17		12		12		9.5	U	17	
Nitrate	35		8,410		1,925		210		35	
Nitrite	20	U	20	U	20	U	20	U	20	U
Potassium	1,800		1,600		1,000		930		1,600	
Selenium	48	U	45	U	42	U	48	U	45	U
Silver	5.7	U	5.5	U	5	U	5.7	U	5.5	U
Sodium	890		5,000		2,600		580		1,200	
Sulfate	294		35		201		99		171	
Sulfide										
Technetium-99 (pCi/g)	359		382		602		50.7		38.7	
Thallium										
Uranium (Fluorometric)	1		1		1	U	1		1	
Vanadium	53		50		42		29		33	
Zinc	160		220		170		140		180	

Table D-13. Summary of Basin Routine Concrete Analytical Data.

Analyte	Mean (mg/kg)	Standard Deviation (mg/kg)	Number of Detectable Results	Number of Total Analyses	Maximum (mg/kg)	Minimum (mg/kg)
Aluminum	11,429.5	13,621.7	88	88	100,000	1,000
Antimony	8.3	3.8	3	88	11	4
Arsenic	57.7	21.8	15	88	100	13
Barium	128.4	143.6	88	88	1,100	10
Beryllium	0.4	0.4	62	88	3	0.1
Boron	33.7	91.1	77	88	780	1.1
Cadmium			0	88		
Calcium	129,294.3	176,910.8	88	88	1,300,000	8,900
Chloride	149.4	192	9	88	486	20
Chromium	20.6	35.6	70	88	270	1
Cobalt	12.6	13.5	81	88	93	1.2
Copper	40.9	32.1	86	88	180	5
Cyanide			4	13	4.4	1.1
Fluoride	19.7	54.3	34	88	300	2
Iron	16,636.4	21,067.9	88	88	170,000	1,600
Lead	37.2	53.8	6	88	140	5
Magnesium	6,008.3	8,909.1	88	88	74,000	540
Manganese	246.3	254.8	88	88	2,000	25
Molybdenum	17.5		2	88	31	3.9
Mercury	0.12	03	43	88	0.16	0.10
Nickel	18.9	32.2	71	88	250	1
Nitrate	4,118	8,216.7	78	88	63,980	20
Nitrite	63.8	57.2	13	88	215	20
Potassium	1,413.8	1,831.9	80	88	13,000	91
Selenium			0	88		
Silver			0	88		
Sodium	2,423.7	2,171.1	88	88	13,000	57
Sulfate	310.2	253.6	86	88	1,540	19.7
Sulfide	48	26.9	19	88	120	0.1
Technetium-99 (pCi/g)						
Thallium			0	88		
Uranium (Fluorometric)	7.9	18.2	84	88	127	1
Vanadium	40.6	46.5	87	88	340	3.5
Zinc	158.3	199.7	87	88	1,600	19

Table D-14. Concrete Analytical Results, South Exterior Wall Background (mg/kg unless otherwise noted). (2 sheets)

Analyte	Sample Numbers													
	B00ZN0		B00ZN1		B00ZN2		B00ZN3 (Field Duplicate of B00ZN2)		B00ZN4		B00ZN5 (Field Duplicate of B00ZN1)			
Aluminum	7,600		7,200		7,700		7,800		9,600		9,300			
Antimony	50	U	48	U	45	U	49	U	49	U	49	U		
Arsenic	50	U	48	U	45	U	49	U	49	U	49	U		
Barium	92		76		100		91		97		89			
Beryllium	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U		
Boron	4	U	3.8	U	3.6	U	3.9	U	3.9	U	3.9	U		
Cadmium	3	U	2.9	U	2.7	U	2.9	U	2.9	U	3	U		
Calcium	86,000		84,000		91,000		91,000		110,000		100,000			
Chloride	20	U	20	U	20	U	20	U	20	U	20	U		
Chromium	10		9.5	U	9	U	11		13		10			
Cobalt	7.1		10		9.2		7.1		8.4		8.1			
Copper	34		32		31		34		33		40			
Cyanide	1	U							1	U				
Fluoride	2	U	2	U	2	U	2	U	2	U	2	U		
Iron	13,000		16,000		13,000		14,000		15,000		16,000			
Lead	50	U	48	U	45	U	49	U	49	U	49	U		
Magnesium	4,100		4,100		5,000		4,300		5,000		5,000			
Manganese	220		240		180		200		230		250			
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.2		0.1			
Molybdenum	9.9	U	9.5	U	9	U	9.8	U	9.8	U	9.8	U		
Nickel	9.9	U	9.5	U	11		11		12		10			
Nitrate	20	U	20	U	20	U	20	U	20	U	20	U		
Nitrite	20	U	20	U	20	U	20	U	20	U	20	U		
Potassium	1,400		670		980		1,000		790		1,400			
Selenium	50	U	48	U	45	U	49	U	49	U	49	U		
Silver	5.9	U	5.7	U	5.4	U	5.9	U	5.9	U	5.9	U		
Sodium	620		550		590		590		550		550			
Sulfate	333		300		298		338		324		306			
Sulfide	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U		
Technetium-99 (pCi/g)	352		256		293		476		352		477			
Thallium	9.9	U	9.7	U	9.6	U	9.5	U	9.7	U	9.5	U		
Uranium (Fluorometric)	2		2		1	U	1		49		1			
Vanadium	34		34		31		36		41		38			
Zinc	120		120		110		100		110		140			

Table D-14. Concrete Analytical Results, South Exterior Wall Background (mg/kg unless otherwise noted). (2 sheets)

Analyte	Sample Numbers													
	B00ZP7		B00ZP8		B00ZP (Field Duplicate of B00ZP8)		B00ZQ0		B00ZQ1		B00ZQ2		B00ZQ3	
Aluminum	8,000		9,400		2,700		6,900		7,900		3,900		9,200	
Antimony	49	U	46	U	44	U	47	U	46	U	42	U	48	U
Arsenic	49	U	46	U	44	U	47	U	46	U	42	U	48	U
Barium	85		100		29		78		93		38		100	
Beryllium	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
Boron	3.9	U	4.4		3.5	U	3.8	U	3.7	U	3.4	U	7.2	
Cadmium	3	U	2.8	U	2.6	U	2.8	U	2.8	U	2.5	U	2.9	U
Calcium	87,000		110,000		31,000		73,000		89,000		29,000		110,000	
Chloride	20	U	20	U	20	U	20	U	20	U	20	U	20	U
Chromium	11		11		8.8	U	9.4	U	9.2	U	8.5	U	10	
Cobalt	9.2		6		4.4	U	11		7.1		6.5		21	
Copper	29		35		9.5		29		33		16		34	
Cyanide									1	U	1	U		
Fluoride	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Iron	15,000		14,000		4,200		15,000		12,000		11,000		15,000	
Lead	49	U	46	U	44	U	47	U	46	U	42	U	48	U
Magnesium	4,400		4,600		1,600		4,700		4,600		2,600		4,900	
Manganese	230		210		62		160		170		130		210	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Molybdenum	9.9	U	9.3	U	8.8	U	9.4	U	9.2	U	8.5	U	9.7	U
Nickel	9.9	U	9.5		8.8	U	9.4	U	10		10		11	
Nitrate	23		22		20	U	20	U	20	U	20	U	20	U
Nitrite	20	U	20	U	20	U	20	U	20	U	20	U	20	U
Potassium	1,800		1,000		530	U	1,300		1,700		620		630	
Selenium	49	U	46	U	44	U	47	U	46	U	42	U	48	U
Silver	5.9	U	5.6	U	5.3	U	5.6	U	5.5	U	5.1	U	5.8	U
Sodium	730		660		200		670		1,100		840		690	
Sulfate	399		321		359		379		343		250		204	
Sulfide	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Technetium-99 (pCi/g)	385		133		216		201		147		67.1		291	
Thallium	9.8	U	9.7	U	9.3	U	9.9	U	9.6	U	9.8	U	9.4	U
Uranium (Fluorometric)	1		1		1		1		2		1		1	
Vanadium	31		33		10		35		34		31		37	
Zinc	150		130		44		91		140		41		120	

Table D-15. Concrete Analytical Results, Blanks (mg/kg).

Analyte	B00GG7 (Field Blank)		B00GG8 (Equipment Blank)		B00GM5 (Field Blank)		B00GM6 (Equipment Blank)		B00ZL7 (Field Blank)		B00ZM8 (Field Blank)		B00ZM9 (Equipment Blank)	
Aluminum	500		490		450		480		450		390		460	
Antimony	4.9	U	4.7	U	5	U	4.9	U	5	U	5	U	4.8	U
Arsenic	4.9	U	4.7	U	5	U	4.9	U	5	U	5	U	4.8	U
Barium	9.2		9.9		9.1		8.8		31		6.9		7.7	
Beryllium	0.1		0.1		0.1		0.1		0.1		0.1		0.1	
Boron	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U
Cadmium	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
Calcium	160		75		150		94		430		130		77	
Chromium	1	U	0.9	U	1	U	1	U	1	U	1	U	1	U
Cobalt	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Copper	0.7		0.4		0.4	U	0.4	U	0.9		0.4	U	0.4	U
Cyanide														
Fluoride			2	U			2	U					2	U
Iron	1,500		1,400				1,600		1,200		1,100		1,200	
Lead	4.9	U	4.7	U	1,000		4.9	U	5	U	5	U	4.8	U
Magnesium	66		33		5	U	47		40		52		36	
Manganese	24		21		46		35		90		20		21	
Mercury			0.1	U	16		0.1	U	0	U			0.1	U
Molybdenum	1	U	0.9	U			1	U	1	U	1	U	1	U
Nickel	1	U	0.9	U	1	U	1	U	1	U	1	U	1	U
Nitrate			20	U			20	U					20	U
Nitrite			20	U			20	U					20	U
Potassium	280		310		1	U	300		330		180		250	
Selenium	4.9	U	4.7	U			4.9	U	5	U	5	U	4.8	U
Silver	0.6	U	0.6	U	320		0.6	U	0.6	U	0.6	U	0.6	U
Sodium	33		39		5	U	35		43		21		31	
Sulfate			20	U			20	U					20	U
Sulfide														
Technetium-99 (pCi/g)														
Thallium														
Uranium (Fluorometric)			1	U			1	U					1	U
Vanadium	0.8		0.9		1,000		0.9		0.7		0.8		0.7	
Zinc	7.7		1.1		0.6	U	1.3		1.9		2.2		1.3	

Table D-16. Concrete pH Data, Routine Samples (pH Units).

Sample Numbers	Result	Sample Numbers	Result	Sample Numbers	Result
B00GL3	11.3	B00ZL4	11.4	B00ZL2	11.1
B00GL4	9.7	B00ZL6 (Equipment Blank)	12	B00ZL3	10.8
B00GN1	11.1	B00GN7	10.4	B00ZL5	12
B00GP1	11.1	B00GL6	11.2	B00ZL8	11.8
B00GK9	10.3	B00GL7	11.5	B00ZL9	11.3
B00GL0	10.5	B00GL8	11.5	B00ZM0	11.4
B00GL1	12.1	B00GM0	10.5	B00GL2	9.6
B00GM7	10.9	B00GM1	11.7	B00ZM2	11.4

Table D-17. Concrete pH Data, Local Background Samples (pH Units).

Sample Numbers	Result
B00ZN0	11.4
B00ZN1	11.7
B00ZN3	12.2
B00ZN5	11.4
B00ZP7	11.3
B00ZP8	11.6
B00ZP9	12.2
B00ZQ0	11.2
B00ZQ1	12.1
B00ZQ2	11.8
B00ZQ3	11.2

Table D-18. Concrete Total and Toxic Characteristic Leaching Procedure Analyses Results (mg/kg/mg/L).

Sample Numbers	Arsenic	Lead	Selenium	Mercury
B00ZK1	<510/<0.5	<510/<0.5	<510/<0.5	<0.10/<0005
B00ZK4	<470/<0.5	<470/<0.5	<470/<0.5	0.16/<0005
B00ZL1	<430/<0.5	<430/<0.5	<430/<0.5	0.10/<0005

NOTE: Even though holding times had been exceeded, a TCLP extraction and arsenic, lead, and selenium analyses were requested on three available samples having elevated total metals detection limits. The TCLP results tentatively confirmed that the concrete did not designate as "Dangerous Waste" for these metals.

Table D-19. Concrete Radiochemical Data, Routine Samples. (2 sheets)

Sample Numbers	Alpha		Beta		Cesium-137		Protactinium-234M		Thorium-234		Technetium-99	
	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-
B00GK7	3.1	2.7	7.7	3.9	0.2	0.4	25.6	74	-12.9	7.5	66.8	94
B00GK8	1.8	2.7	18.8	4.9	0.8	0.6	68.1	100	3.2	11	123	96
B00GK9	3	5.2	8.4	7.2	-1.6	2.4	-182	420	-21.4	32	73	97
B00GL0	4.5	3.7	10	4.6	0.4	0.6	29.2	110	-18.1	11	-39.8	100
B00GL1	9.7	6.2	24.9	8.1	1.1	1	64.8	160	8.7	18	38.7	93
B00GL2	6.3	5.5	23.7	8	1.3	1.7	136	290	-7.3	29	69.4	100
B00GL3	7.5	5.4	30.1	7.8	0.2	1.3	102	220	-8.1	19	50.9	89
B00GL4	4.4	5	45.4	8.9	0.4	1.6	138	280	-13.2	28	-29.7	92
B00GL5	3.3	4	14.9	6.2	0.9	2.3	425	340	-15.6	31	199	99
B00GL6	5	6.8	19	8.1	0.9	1.5	245	250	-15.6	22	-18.7	97
B00GL7	8.1	6.4	23.4	7.8	0	2.1	358	350	-66.4	33	100	90
B00GL8	4.9	5.5	32.5	8.5	0.5	1	180	200	18.1	30	49.2	100
B00GL9	17.1	5.3	155.5	10	-0	180	-1	3	1	0.2	331	97.6
B00GM0	6.1	5.6	42.2	8.5	0.8	0.9	-29.2	150	-2.7	20	136	98
B00GM1	2.7	5.3	11.2	7.4	0.2	1.7	471	290	-3.4	29	-22	91
B00GM2	1.5	5.2	9.1	7	0.4	1	6.3	180	-32.8	17	92	88
B00GM3	1	--	-1.9	4.4	0.6	1.4	180	230	8.3	21	257	110
B00GM4	0	7.1	0.7	10	-0.3	2.5	-244	4.2	-14.9	42	205	86
B00GM7	4.5	5.3	15.7	6.7	-0.7	1.1	47	200	46	11	345	130
B00GN1	9.8	5.1	25.7	6.1	0.1	0.7	72.9	122	3.6	12	312	100
B00GN7	52.2	8.4	187	12	0.5	0.8	173	140	36.2	10	504	85.2
B00GN8	1	4.5	-0.2	5	-0.2	0.6	66.1	120	31.9	6.9	243	98
B00GN9	2.1	4.6	2.5	5.3	0.5	1.2	3.5	200	2.1	21	353	140
B00GP0	-9	12	-13.1	20	-0.3	3.1	182	530	-939	52	401	160
B00GP1	2.1	4	-0.3	4.6	-0.4	0.9	69.4	160	40.8	8.9	334	140
B00ZL2	3.7	4.1	9.9	6.2	-0.4	1.3	23.2	220	5.4	20	4.3	80
B00ZL3	2.8	3.8	5.7	6.5	-0.1	1.5	119	250	3090	23	38.7	75
B00ZL4	5.2	5.7	2.4	8.6	-0.1	1.7	313	190	20.8	19	45.3	94
B00ZL5	4.4	4.9	11.5	8.5	0.2	1.2	278	200	11.5	12	64	90

Table D-19. Concrete Radiochemical Data, Routine Samples. (2 sheets)

Sample Numbers	Alpha		Beta		Cesium-137		Protactinium-234M		Thorium-234		Technetium-99	
	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-
B00ZL6	6.8	4.5	29.3	6.8	0.2	0.6	28.6	120	-17.5	10	-36.8	89
B00ZL8	6.7	5	58.6	9.4	-0.4	1.1	73.5	220	-2.6	21	155	87
B00ZL9	6.7	5.6	12.1	86	-0.2	1.2	0.2	270	-9.9	25.1	93.5	89
B00ZM0	5.4	3.9	51.8	7.9	-183	0.8	114	140	-5	120	239	90
B00ZM2	7.8	4.6	13	6.4	0.7	2	428	360	-2.9	26	387	130
B00ZM4	7.6	6.7	16	9.6	-0.2	2.6	38	460	13.2	42	0.6	140
B00ZM5	4.7	3.7	12.8	5.6	1.2	1.6	-52.1	260	15	24	244	130

Table D-20. Concrete Radiochemical Data, Local Background Samples.

Sample Numbers	Alpha		Beta		Cesium-137		Potassium-40		Protactinium-234M		Thorium-234		Technetium-99	
	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-	pCi/g	+/-
B00ZN0	3.4	5	14.9	9.5	0.3	0.9	9.9	26	29.1	160	35.4	8.7	352	118
B00ZN1	4.2	4.6	4.5	7.7	-0.2	0.6			170	95	-26.1	9.7	256	107
B00ZN2	1.5	6.9	3.4	13	0.6	1.6	25.4	49	-216	280	17.8	18	293	113
B00ZN3	-1.7	3.4	2.3	7.9	-0.7	0.8	10.1	24	39.9	140	33.7	7.8	476	153
B00ZN4	2.1	6.7	7.3	13	-0.5	1	16.9	36	239	170	-28.5	17	352	132
B00ZN5	2.2	5.3	4.9	9.8	1.6	150			32.1	250	7.7	17	477	169
B00ZN9	3.6	5.3	2.7	9.3	0.4	0.9			-23.8	170	29.6	7.8	216	103
B00ZP7	10.7	5.6	11.9	8.3	29.1	1.2			189	190	5.8	18	385	141
B00ZP8	4.6	5.5	4.5	8.5	0	190			103	190	-0.4	17	133	92.4
B00ZQ0	5.2	4.1	1.4	6.3	0	0.5			56.4	85	-15.2	8.1	201	87.1
B00ZQ1	11.2	8.4	3.3	13	-1.5	1.6			433	290	147	79.4	147	79.4
B00ZQ2	-0.9	7.7	5	14	0.5	1.5			-16.1	260	52.2	12	67.1	80.5
B00ZQ3	15	8.3	27	12	-0.6	1.7			395	310	-49.7	28	291	115

Figure D-1. Concrete Floor Sample Locations (Filled Circles and Triangles are Planned Primary and Secondary Sample Locations -- Samples Were Taken at Sites Labeled with Sample Numbers).

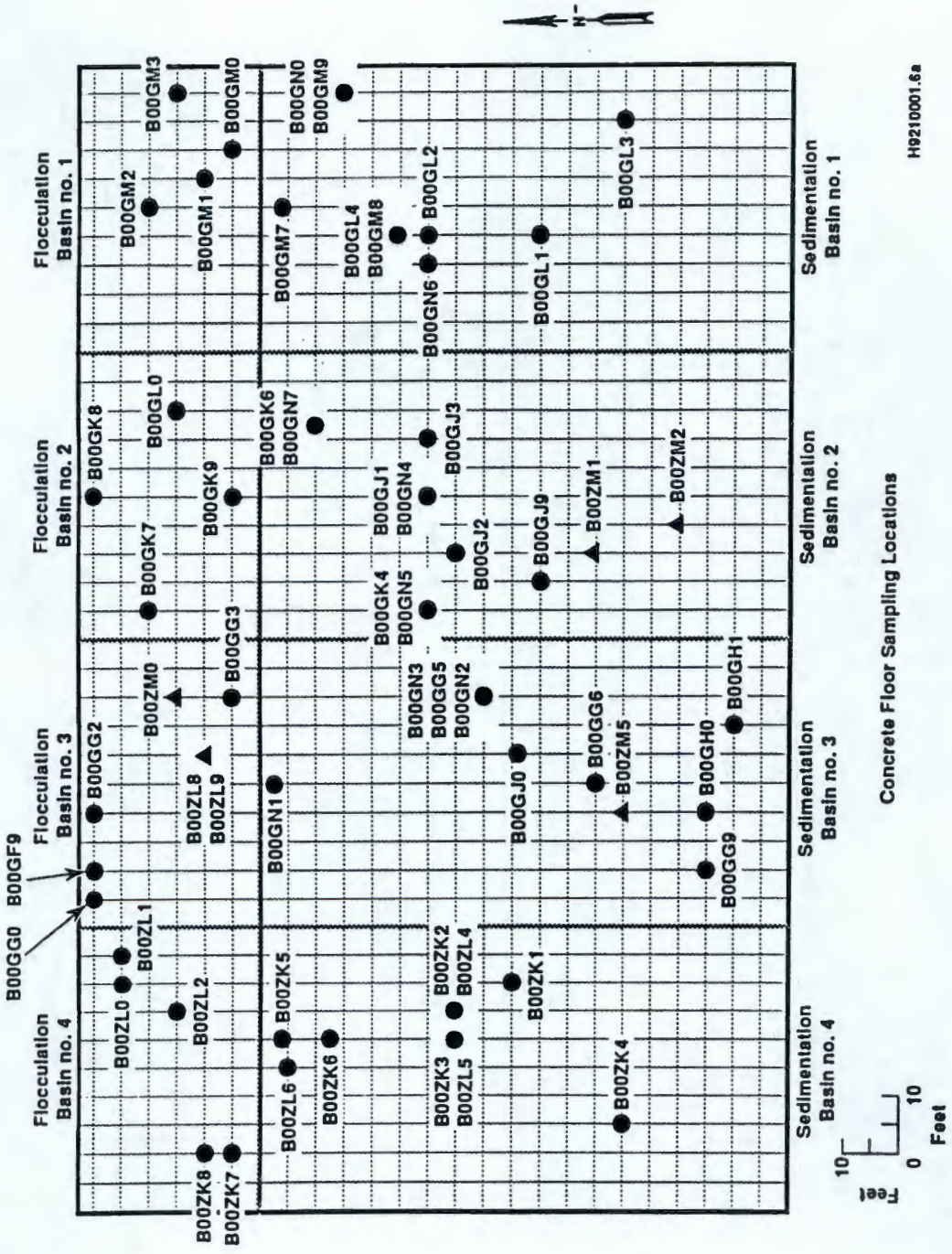


Figure D-2. Basin 1 Interior Wall Concrete Sample Locations
(Grid Squares are 2 ft on Edge).

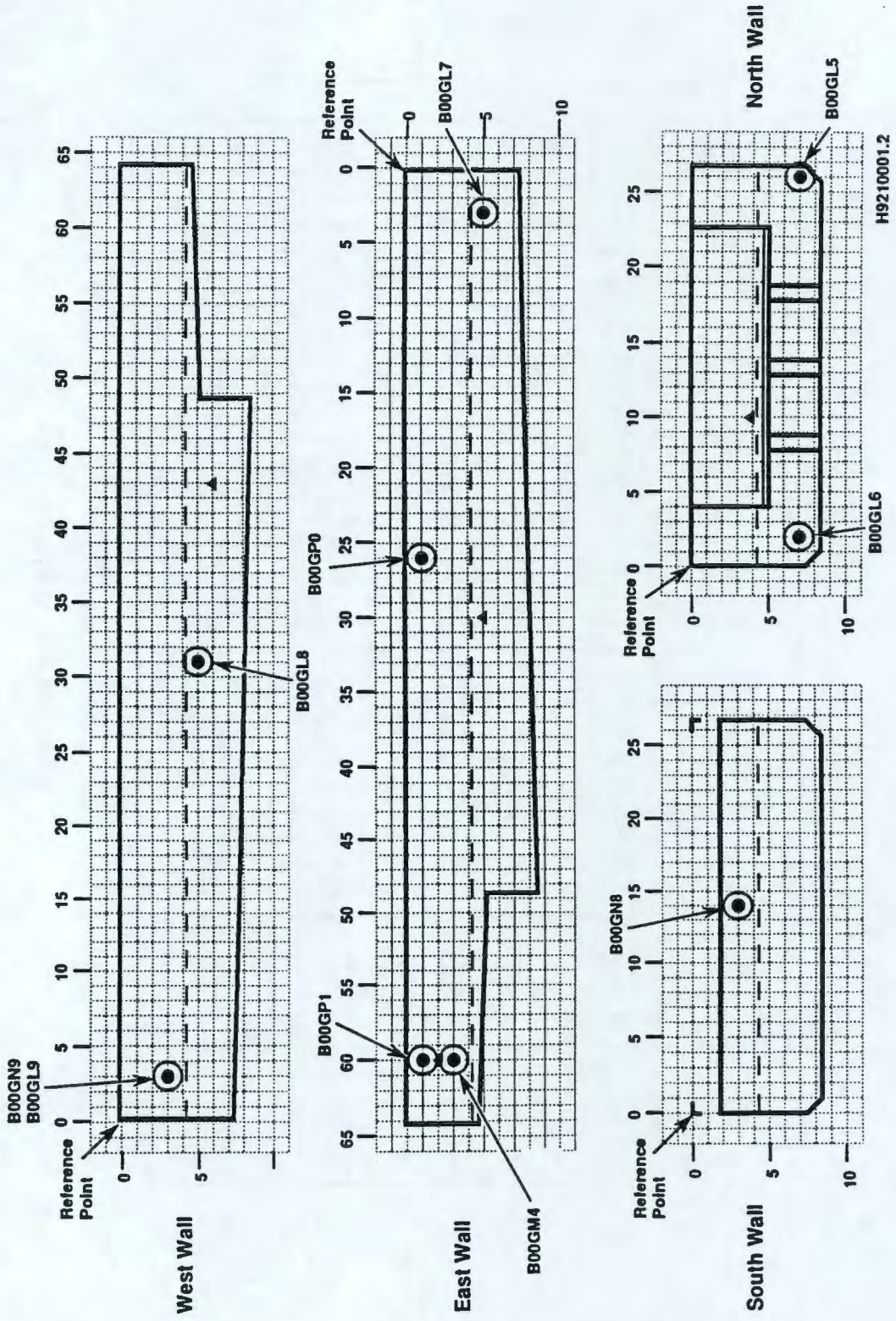


Figure D-3. Basin 2 Interior Wall Concrete Sample Locations
(Grid Squares are 2 ft on Edge).

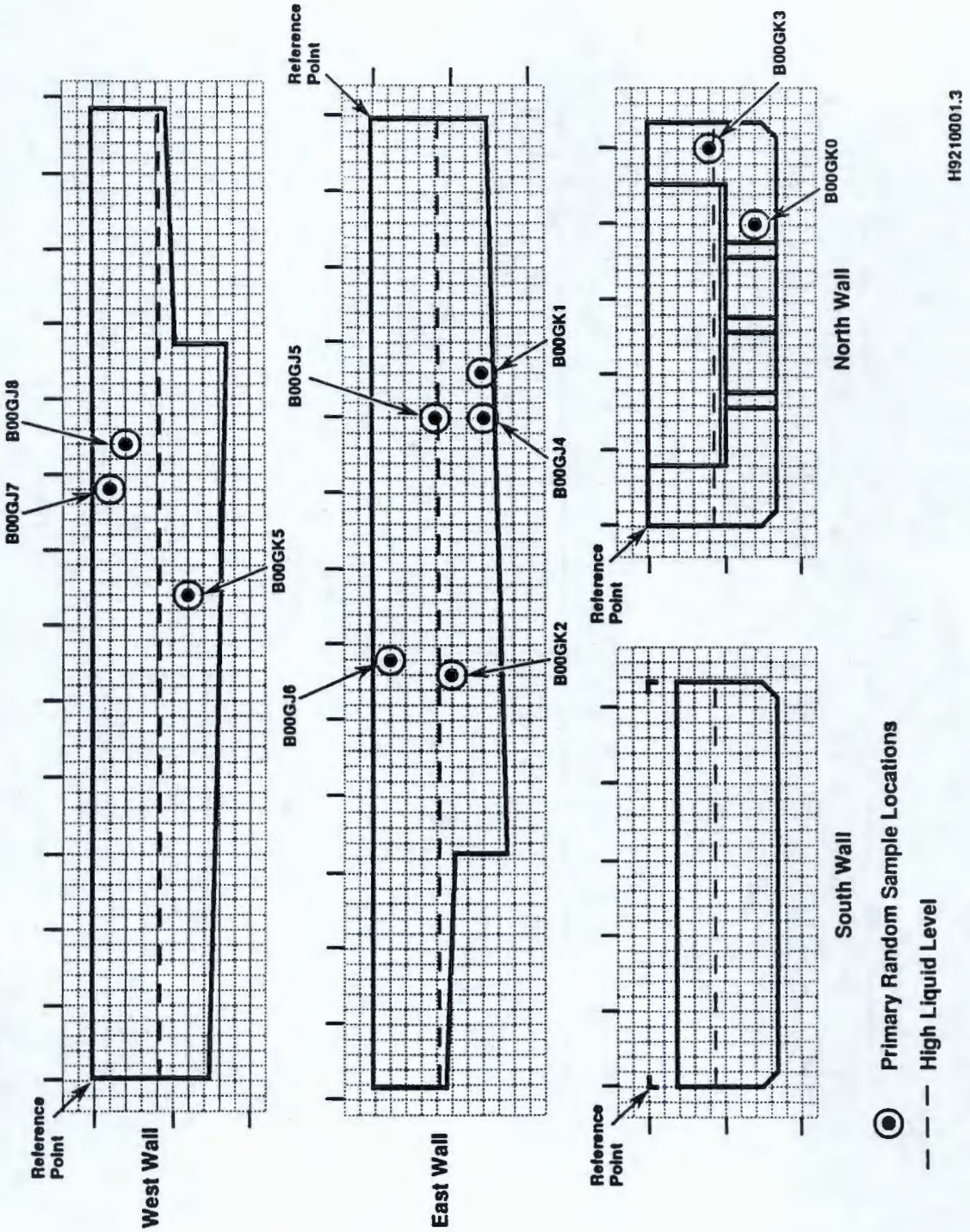


Figure D-4. Basin 3 Interior Wall Concrete Sample Locations
(Grid Squares are 2 ft on Edge).

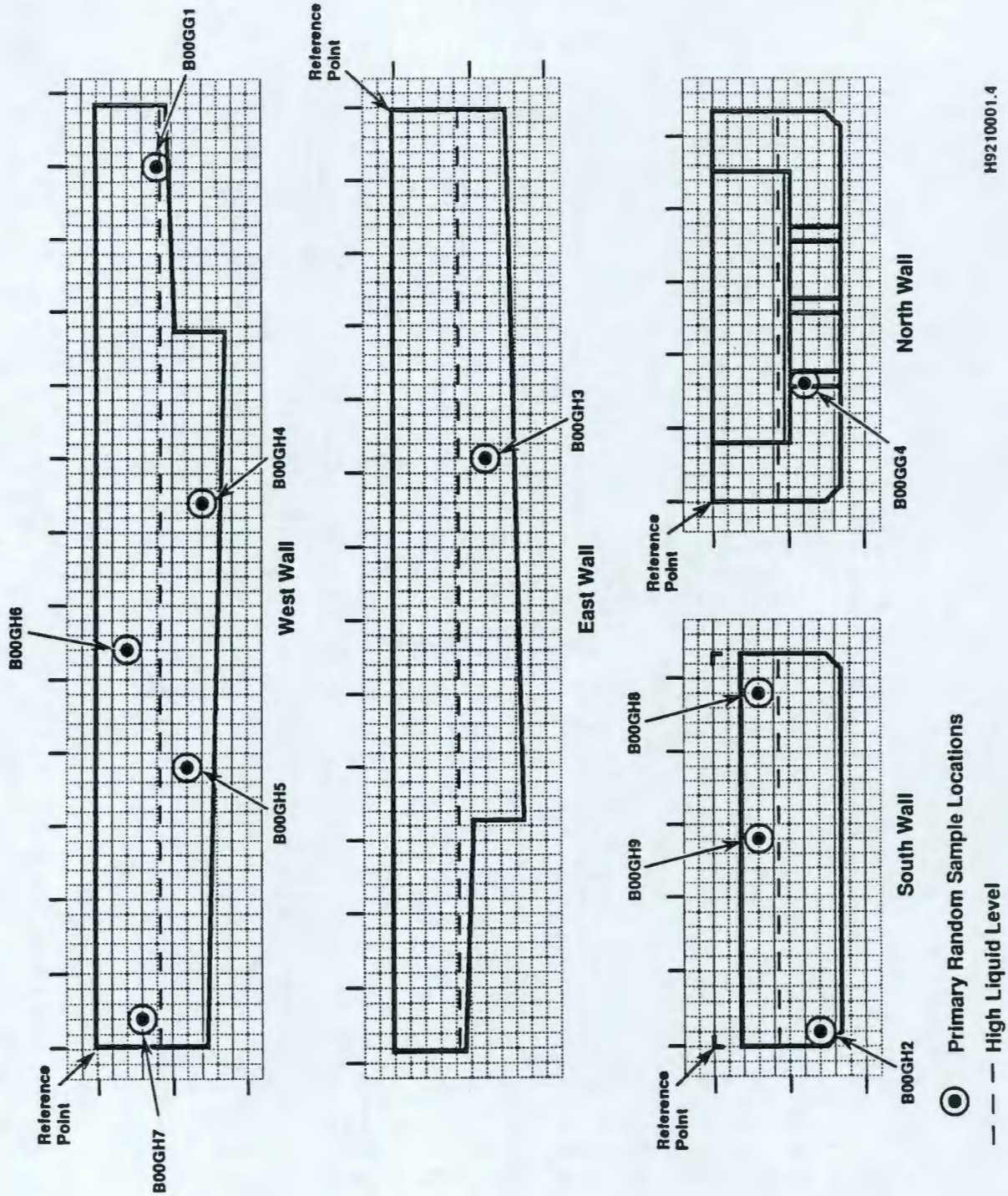


Figure D-5. Basin 4 Interior Wall Concrete Sample Locations
(Grid Squares are 2 ft on Edge).

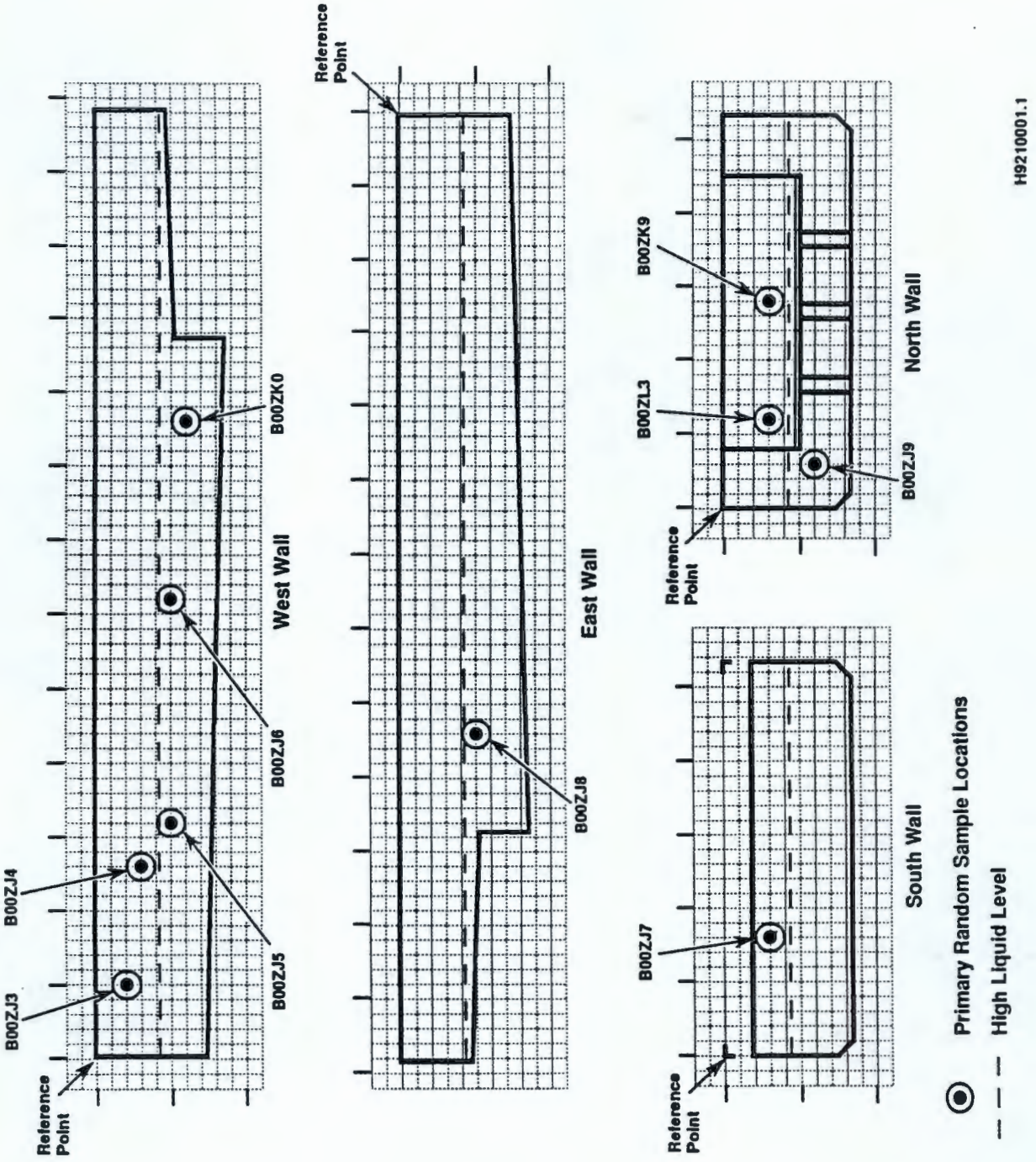


Figure D-6. Concrete Local Background Sample Locations, South Exterior Wall of Basins.

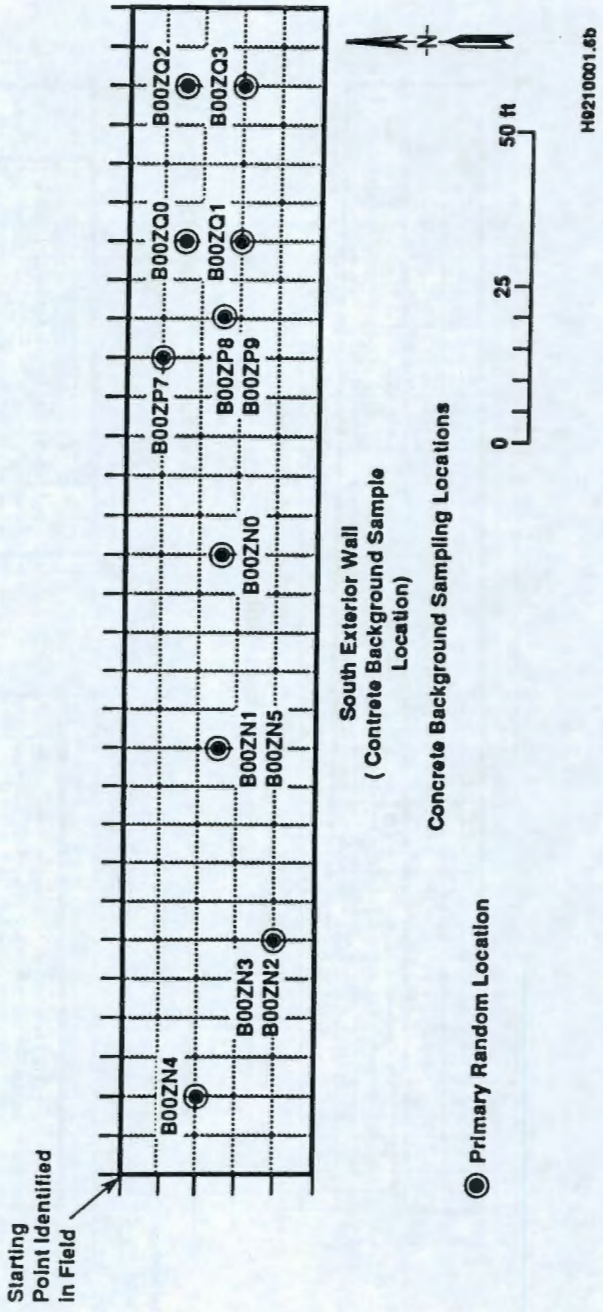


Figure D-7. Concrete Formate Analytical Data. (8 sheets)

Battelle
Pacific Northwest Laboratories
Battelle Boulevard
P O Box 999
Richland, Washington 99352
Telephone (509) 376-6193

November 27, 1991

Matthew J. Galbraith, R2-77
Westinghouse Hanford Company
P.O. Box 1970
Richland, Washington 99352

Dear Mr. Galbraith:

FINAL REPORT OF FORMATE ANALYSIS OF 183-H BASIN CONCRETE
(WESTINGHOUSE HANFORD COMPANY WORK ORDERS ED1462 AND ED2115)

Enclosed please find our final report on the analysis of formate in 183-H Basin concrete as described in my letter to Mark R. Morton on March 4, 1991 and funded through Work Orders ED1462 and ED2115. This transmittal of the final report completes our work under the scope of these work orders.

If you have any questions, please do not hesitate to call.

Sincerely,

Bruce A. Prentice
Project Manager
Analytical Laboratory Operations

Enclosure

BAP:pl

cc: (w/o attachment)
J. H. Kessner, WHC EA/PAL, T6-08
M. R. Morton, WHC RR/ENV, R2-77

Figure D-7. Concrete Formate Analytical Data. (8 sheets)

pk melethil: page 1 of 4

COMMENTS, FORMATE ANALYSES ON SYSTEM 1: 10/31/91 - 11/11/91

GENERAL INFORMATION

0.1511 gm of 99+ % A.C.S. regent grade sodium formate was dissolved to make 100 mls of 1000 ppm formate stock standard. This solution was stored in the refrigerator and taken out only when lower concentration working standards needed to be prepared.

The eluant in use is a 1:1 mixture of the standard anion eluant defined in PNL-ALO-212 and water. An isocratic elution program is being used to avoid the costs of developing a gradient elution program. The run times have been extended to reduce interferences if later eluting anions such as sulfate are extracted from the concrete. For the small number of samples being analyzed, the isocratic protocol appears to be the most cost-effective.

The calibration range for formate will extend from 0.25 to 10 ppm and the calibration curve will be generated using six standards at 0.25, 0.5, 1, 2.5, 5, and 10 ppm. Specific details of the method and the quantitative aspects of the calibration curve can be found in the copy of the method included with the data packet. A detection limit of 250 ppb (Calibration Standard 1) is stated for aqueous solutions.

SAMPLE PREPARATION & ANALYSIS

It should be noted that ACL/ALO advised the client that we would have preferred to receive a sample composed of either small granules or a powder since we do not have the facilities to adequately prepare the samples and to define errors in sampling. The samples contained from 50-90% rocks in the cores delivered and were prepared by manually crushing them using an iron mortar and pestle.

Since a large fraction of the sample was rock, it was difficult to separate the cement fraction of the sample from rocks and pebbles. An effort was made to remove some of the pebbles and rock fragments that survived the preliminary crushing step before continuing the crushing operation. Mechanical crushing/powdering devices like a Spex Ball mill were not used due to the possibility of volatalizing the analyte. All samples, both before crushing and after, were stored in a refrigerator and the extract was used soon after the leach operation.

Figure D-7. Concrete Formate Analytical Data. (8 sheets)

pk melethil: page 2 of 4

Approximately 2 gms of sample, predominantly a free flowing powder, with grains ranging from silt(> 90%) to salt in size, was weighed out into a 25 ml scintillation vial, in duplicate. The 2(+ 0.05) gm sample was leached using 20 mls of water and sonicated for 60 minutes. The leachate was filtered using a 0.45 um polysulfone syringe filter to remove particulates, and injected into the chromatograph. Specific quantitative aspects of this protocol will be found in the sample preparation / data review sheet.

A 1:1 dilution of the eluant identified in PNL-ALO-212 was used for the separation. An appropriate amount of 100x concentrate of the eluant was added to each vial to match the sample and standard matrix to the eluant used for the separation. The run time has been extended to about 15 min. to allow any late eluting anions to pass through the detector before initiating the next injection. A full description of the pump and detector controls has been included in the Method file listing.

QUALITY CONTROL

All stated analyte values are expected to be accurate to within 10%, though the error at the detection limit may be as high as 50%. Two verification standards, at 0.8 and 1.6 ppm, were analyzed after every 10 sample injections and were quantitated within the ±10% window defined in PNL-ALO-212. All calibration and verification standards were prepared on the day of the analysis. A couple of the samples were spiked at 5 ppm. As all the samples are being run in duplicate, the spikes are not run in duplicate. The spike recoveries are 84% for both samples.

A couple of method blanks have also been analyzed. These "samples" (H2O) were processed identically to the concrete samples. Water analytical blanks, identified by the run date(e.g. S91110811B1), have been analyzed at a frequency of 10% of the sample injections and were found to contain no formate.

DELAY IN PROCESSING INJECTIONS 79-88

The runs were initiated on Friday, 11/8/91. However, due to the large number of samples being processed, the autosampler shut itself down after its' storage area for post-injection cassettes was filled to capacity. This condition was noticed on Monday, 11/11/91, and the runs were reinitiated after a fresh set of verification standards (prepd.11/11/91) was analyzed and the calibration of 11/8/91 recertified to be valid.

Figure D-7. Concrete Formate Analytical Data. (8 sheets)

pk methhil: page 3 of 4

The final verification standards (injections 86-87), prepared on 11/8/91, appeared to have been unaffected by the delay in processing and so the affect on the sample data(MS 91-5844/BOOG N3, 91-6325/ BOOZ L9-1 & -2) is also considered to be minimal.

REVIEW AND POST-RUN DATA REINTEGRATION

A preliminary run of the formate/concrete matrix suggested that undiluted extracts may be too complex to allow the quantitation of formate. A 10-fold dilution of the leachate was used to help resolve the trace levels of formate above a large background of unknown composition. For most of the samples, the integration parameters had to be changed after the initial analysis to allow quantitation of the traces of formate detected after the 10-fold dilution.

Lowering the peak width and peak threshold values, required for quantitating the small peaks, does not significantly affect the quality of the data but is mentioned, for the record, for the purpose of evaluating the means by which the data below the nominal detection limit was recovered. Another aspect of the quantification of these trace levels that should be kept in mind is that the peak identification is tentative as it is based solely on peak retention time.

DETECTION LIMITS

The nominal detection limit for these samples has been set at 25 ug/g (ppm). This is accounted for by multiplying the nominal aqueous detection limit, 250 ng/ml (ppb), by the dilution required to remove matrix interferences (x10) and the dilution during the leaching process (x10).

Two assumptions have been made in this calculation. First, that the concrete sample is expected to contain 100 % solids. Second, during the extraction step, the formate has been assumed to partition completely into the aqueous phase. The bias from these assumptions is expected to increase the detection limit of formate in concrete by no more than 25% above the level cited in the previous paragraph. As a conservative estimate, the client can be sure that none of the samples contain above 30 ppm of formate in the concrete.

Figure D-7. Concrete Formate Analytical Data. (8 sheets)

pk melethil: page 4 of 4

PREPARATION OF STANDARDS

0.1511 gm of 99+ % Sodium Formate(PO # 132654 AAF, ALDRICH 12302AX) was diluted to 100 mls of 1000 ppm Formate using deionized water. (11/8/91)

0.2 mls of this standard was diluted to 20 mls (11/8/91) to yield a 10 ppm intermediate standard used to prepare 5 mls of the working calibration and verification standards.

STANDARD	VOL. OF 10 PPM STD USED(ml)
CAL 1, 0.25 PPM	0.125
CAL 2, 0.50 PPM	0.250
CAL 3, 1.00 PPM	0.500
CAL 4, 2.50 PPM	1.250
CAL 5, 5.00 PPM	2.500
CAL 6, 10.00 PPM	5.000
VER 1, 0.8 PPM	0.400
VER 2, 1.6 PPM	0.800

SAMPLE SPIKES

0.100 ml of the 1000 ppm stock standard was added to a vial containing 2 (+ 0.05) gm sample and 20 ml of deionized water. Following sonication for 60 minutes, the leachate was filtered and injected into the ion chromatograph. The effective spike was 5 ug/ml in the leachate and 50 ug/g in the solid.

comments saved as formate.wri by pk melethil

pk melethil 11/25/91

Figure D-7. Concrete Formate Analytical Data. (8 sheets)

IC-FRREP

9111081D.PRN

File:C:\DX\DATA\9111081 Formate Report/Review Form

File	Sample	Dil	Aqueous [HCOO]/Dil (ug/mL)	Aqueous [HCOO] (ug/mL)	Solids Sample Wt (g)	Solids Leach Vol (mL)	Solids % Solids (%)	Solids [HCOO] (ug/g)
D01	AUTOCAL1, 11/8/91	1	0.25	0.3				
D02	AUTOCAL2, 11/8/91	1	0.50	0.5				
D03	AUTOCAL3, 11/8/91	1	1.00	1.0				
D04	AUTOCAL4, 11/8/91	1	2.50	2.5				
D05	AUTOCAL5, 11/8/91	1	5.00	5.0				
D06	AUTOCAL6, 11/8/91	1	10.00	10.0				
D07	FORMATE-VER 1(11/8)	1	0.79	0.8				
D08	FORMATE-VER 2(11/8)	1	1.59	1.6				
D09	S9111081B1-FRMT	1	0.00	0.0				
D10	MET BLANK-1	1	~~0.00~~ 0.05	~~0.0~~ 0.1	—	20.00	—	—
D11	91-6320/B00Z N3-1	1	0.00	0.0	2.0360	"	100	(<30) MI
D12	91-6320/B00Z N3-1	10	0.06	0.6	"	NA	NA	<30
D13	91-5840/ B00G M8-2 ④	1	0.00	0.0	2.0076	20.00	100	MI
D14	91-5840/ B00G M8-2 ④	10	0.10	1.0	"	NA	NA	<30
D15	91-5841/B00G M9-1 ④	1	0.00	0.0	2.0370	20.00	100	MI
D16	91-5841/B00G M9-1 ④	10	0.12	1.2	"	NA	NA	<30
D17	91-5841/B00G M9-2 ④	1	0.00	0.0	1.9976	20.00	100	MI
D18	91-5841/B00G M9-2 ④	10	0.13	1.3	"	NA	NA	<30
D19	91-5842/B00G N0-1 ④	1	0.00	0.0	2.0211	20.00	100	MI
D20	FORMATE-VER 1(11/8)	1	0.79	0.8	—	—	—	—
D21	FORMATE-VER 2(11/8)	1	1.59	1.6	—	—	—	—
D22	S9111081B2-FRMT	1	0.00	0.0	—	—	—	—
D23	91-5842/B00G N0-1 ④	10	0.22	2.2	2.0211	NA	NA	<30
D24	91-5842/B00G N0-2 ④	1	0.00	0.0	2.0147	20.00	100	MI
D25	91-5842/B00G N0-2 ④	10	0.20	2.0	"	NA	NA	<30
D26	91-5843/B00G N2-1	1	0.00	0.0	1.9688	20.00	100	MI
D27	91-5843/B00G N2-1	10	0.12	1.2	"	NA	NA	<30
D28	91-5843/B00G N2-2	1	0.00	0.0	2.0155	20.00	100	MI
D29	91-5843/B00G N2-2	10	0.12	1.2	"	NA	NA	<30
D30	91-5844/B00G N3-1	1	0.00	0.0	2.0235	20.00	100	MI
D31	91-5844/B00G N3-1	10	0.22	2.2	"	NA	NA	<30

MI: MATRIX INTERFERENCE

(1) ④ SEE COMMENTS ON P. 3

4/21/92

File:C:\DX\DATA\9111081 Formate Report/Review Form

File	<<<<<<<<< Sample >>>>>>>>>>	Dil	Aqueous [HCOO]/Dil (ug/mL)	Aqueous [HCOO] (ug/mL)	Solids Sample Wt (g)	Solids Leach Vol (mL)	Solids % Solids (%)	Solids [HCOO] (ug/g)
D32	91-5844/B00G N3-2	1	0.00	0.0	1.9986	20.00	100	MI
D33	FORMATE-VER 1(11/8)	1	0.79	0.8	—	—	—	—
D34	FORMATE-VER 2(11/8)	1	1.60	1.6	—	—	—	—
D35	S9111081B3-FRMT	1	0.05	0.0	—	—	—	—
D36	91-5844/B00G N3-2	10	0.23	2.3	1.9986	NA	NA	<30
D37	91-5845/B00G N4-1	1	0.00	0.0	2.0280	20.00	100	MI
D38	91-5845/B00G N4-1	10	0.05	0.5	"	NA	NA	<30
D39	91-5845/B00G N4-2	1	0.00	0.0	2.0151	20.00	100	MI
D40	91-5845/B00G N4-2	10	0.00	0.0	"	NA	NA	<30
D41	91-5846/B00G N5-1	1	0.00	0.0	1.9663	20.00	100	MI
D42	91-5846/B00G N5-1	10	0.11	1.1	"	NA	NA	<30
D43	91-5846/B00G N5-2	1	0.00	0.0	1.9898	20.00	100	MI
D44	91-5846/B00G N5-2	10	0.00	0.0	"	NA	NA	<30
D45	MET BLANK-2	1	0.05	0.0	—	20.00	—	—
D46	FORMATE-VER 1(11/8)	1	0.80	0.8	—	—	—	—
D47	FORMATE-VER 2(11/8)	1	1.55	1.6	—	—	—	—
D48	S9111081B3-FRMT	1	0.00	0.0	—	—	—	—
D49	91-5840/ B00G M8-1 (4)	1	0.00	0.0	2.0168	20.00	100	MI
D50	91-5840/ B00G M8-1 (4)	10	0.10	1.0	"	NA	NA	<30
D51	91-6320/B00Z N3-2	1	0.00	0.0	2.0381	20.00	100	MI
D52	91-6320/B00Z N3-2	10	0.05	0.5	"	NA	NA	<30
D53	91-6321/B00Z N5-1	1	0.00	0.0	2.0484	20.00	100	MI
D54	91-6321/B00Z N5-1	10	0.05	0.5	"	NA	NA	<30
D55	91-6321/B00Z N5-2	1	0.00	0.0	2.0252	20.00	100	MI
D56	91-6321/B00Z N5-2	10	0.05	0.5	"	NA	NA	<30
D57	91-6322/B00Z P9-1 (5)	1	0.00	0.0	2.0391	20.00	100	MI
D58	91-6322/B00Z P9-1 (5)	10	0.24	2.4	"	NA	NA	<30
D59	MS91-6320/B00Z N3	1	4.70	4.7	2.0049	20.00	100	47 (84% REC)
D60	FORMATE-VER 1(11/8)	1	0.79	0.8	—	—	—	—
D61	FORMATE-VER 2(11/8)	1	1.51	1.5	—	—	—	—
D62	S9111081B4-FRMT	1	0.00	0.0	—	—	—	—

MI: MATRIX INTERFERENCE

(2) (4) SEE COMMENTS ON P.3

Figure D-7. Concrete Formate Analytical Data. (8 sheets)

File:C:\DX\DATA\9111081 ooooooooo Formate Report/Review Form ooooooooo

File	<<<<<<<<< Sample >>>>>>>>>>	Dil	Aqueous [HCOO]/Dil (ug/mL)	Aqueous [HCOO] (ug/mL)	Solids Sample Wt (g)	Solids Leach Vol (mL)	Solids % Solids (%)	Solids [HCOO] (ug/g)
D63	MS91-6320/B00Z N3	10	0.47	4.7	2.0049	NA 20.00mL	NA 100%	47 (94% Rec.)
D64	91-6322/B00Z P9-2 (*)	1	0.00	0.0	2.0354	20.00	100	MI
D65	91-6322/B00Z P9-2 (*)	10	0.24	2.4	"	NA	NA	<30
D66	91-6323/B00Z L4-1	1	0.00	0.0	1.9922	20.00	100	MI
D67	91-6323/B00Z L4-1	10	0.18	1.8	"	NA	NA	<30
D68	91-6323/B00Z L4-2	1	0.00	0.0	2.0391	20.00	100	MI
D69	91-6323/B00Z L4-2	10	0.18	1.8	"	NA	NA	<30
D70	91-6324/B00Z L5-1	1	0.00	0.0	2.0350	20.00	100	MI
D71	91-6324/B00Z L5-1	10	0.15	1.5	"	NA	NA	<30
D72	91-6324/B00Z L5-2	1	0.00	0.0	1.9820	20.00	100	MI
D73	91-6324/B00Z L5-2	10	0.15	1.5	"	NA	NA	<30
D74	FORMATE-VER 1(11/8)	1	0.82	0.8	—	—	—	—
D75	FORMATE-VER 2(11/8)	1	1.51	1.5	—	—	—	—
D76	S9111081B5FRMT	1	0.00	0.0	—	—	—	—
D77	MS91-5844/B00G N3	1	0.00	0.0	2.0040	20.00	100	MI
D78	MS91-5844/B00G N3	10	0.65	6.5	"	NA	NA	65 (84% Rec)
D79	FORMATE-VER1(11/11)	1	0.80	0.8	—	—	—	—
D80	FORMATE-VER2(11/11)	1	1.59	1.6	—	—	—	—
D81	S9111111B1-FRMT	1	0.00	0.0	—	—	—	—
D82	91-6325/B00Z L9-1 (*)	1	0.00	0.0	2.0214	20.00	100	MI
D83	91-6325/B00Z L9-1 (*)	10	0.22	2.2	"	NA	NA	<30
D84	91-6325/B00Z L9-2 (*)	1	0.00	0.0	1.9963	20.00	100	MI
D85	91-6325/B00Z L9-2 (*)	10	0.22	2.2	"	NA	NA 100mL	<30
D86	FORMATE-VER 1(11/8)	1	0.79	0.8	—	—	—	—
D87	FORMATE-VER 2(11/8)	1	1.54	1.5	—	—	—	—
D88	S9111111B2FRMT	1	0.00	0.0	—	—	—	—

MI: MATRIX INTERFERENCE

COMMENTS: DL (NOMINAL) — 0.25 PPM (CAL STD 1) × 10 (LEACH DILUTION) × 10 (MATRIX REDUCTION DILUTION) × 1.2 (CONTRIBUTIONS (POTENTIAL) FROM ASSUMPTIONS) = 30 PPM 11-21-91 D.Z.

ASSUMPTIONS: 1. SAMPLE IS 100% SOLIDS.
2. $HCOO^-$ PARTITIONS COMPLETELY INTO WATER DURING EXTRACTION.

(*) SAMPLE WEIGHTS ON 11/4.5 MAY HAVE BOTTLES 1 & 2 MIXED UP; THE EFFECT ON DATA QUALITY IS MINIMAL.

Figure D-7. Concrete Formate Analytical Data. (8 sheets)

APPENDIX E

VADOSE ZONE SOIL SAMPLE IDENTIFICATION AND ANALYTICAL DATA

APPENDIX E

VADOSE ZONE SOIL SAMPLE IDENTIFICATION AND ANALYTICAL DATA

Appendix E contains analytical data (Tables E-1 through E-12), sample information for the vadose zone soil samples (Tables E-13 through E-22), and sample locations for vadose zone borehole locations (Figures E-1 and E-2). The data summary statistics (Table E-10) are based on all routine (as opposed to background, radioactivity, or quality control samples) sample data, except those qualified with a "U" or an "R."

The data qualifiers are listed adjacent to the data and were initially reported with the data or added as a result of the validation process performed by the Hanford Analytical Services organization. The data qualifiers are defined as follows:

B Analyte found in blank

J The associated value is an estimated quantity

R The data are unusable

U The material was analyzed for, but was not detected. The associated value is the detection/quantitation limit

UJ The material was analyzed for, but was not detected. The associated value is an estimated quantity

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.

Analytical results may or may not be qualified through the validation process as a result of the attributes characterized by the data flags. For further information refer to Chapter 2.0.

Table E-1. Summary of 183-H Vadose Zone Sample Information. (4 sheets)

Sample Numbers	Interval Sample (Depth in Feet)	Sample Type	Analysis	Sample Date	Ship Date	Laboratory
			BH-1			
B00YX4	0 - 2	SOIL	*	09/11/91	09/16/91	TMA
B00YX5	4 - 4.4	SOIL	*	09/11/91	09/16/91	TMA
B00YX9	9 - 9.6	SOIL	*	09/12/91	09/16/91	TMA
B00YY0	14.5 - 15.5	SOIL	*	09/13/91	09/17/91	TMA
B00YY3	19.4 - 20.6	SOIL	*	09/13/91	09/17/91	TMA
B00YY4	24.9 - 26.4	SOIL	*	09/13/91	09/17/91	TMA
			BH-2			
B00YV0	0 - 2	SPLIT	*	08/30/91	09/04/91	MM
B00YV1	0 - 2	SOIL	*	08/30/91	09/09/91	TMA
B00YV6	6.2 - 7	SOIL	*	09/03/91	09/09/91	TMA
B00YV7	6.2 - 7	DUP	*	09/03/91	09/09/91	TMA
B00YV8	9.5 - 10.3	SOIL	*	09/03/91	09/09/91	TMA
B00YW3	14 - 15.8	SOIL	*	09/04/91	09/11/91	TMA
B00YW5	19.25 - 20.15	SOIL	*	09/05/91	09/11/91	TMA
B00YW8	24 - 24.5	SOIL	*	09/05/91	09/11/91	TMA
			BH-3			
B00V55	0 - 2	SOIL	*	07/01/91	07/08/91	TMA
B00V56	4 - 6	SOIL	*	07/01/91	07/08/91	TMA
B00V57	10 - 11	SOIL	*	07/08/91	07/17/91	TMA
B00V58	N/A	EB	*	07/10/91	07/17/91	TMA
B00V59	14.5 - 15.5	SOIL	*	07/16/91	07/23/91	TMA
B00V60	N/A	FB	*	07/16/91	07/23/91	TMA
B00V61	19 - 20.2	SOIL	*	07/17/91	07/23/91	TMA
B00V62	24 - 25	SOIL	*	07/18/91	07/23/91	TMA
B00V63	24 - 25	DUP	*	07/18/91	07/23/91	TMA

* Analysis-Radiochemistry, Metals, and Anions
**Analysis-Radiochemistry only, because of poor sample volume
@Because of difficult drilling no 5-ft sample was attainable

EB = Silica Sand Equipment Blank
FB = Silica Sand Field Blank
MM = Martin Marietta (K-25) Laboratory
TB = Silica Sand Trip Blank
TMA = TMA/NORCAL Laboratory

Table E-1. Summary of 183-H Vadose Zone Sample Information. (4 sheets)

Sample Numbers	Interval Sample (Depth in Feet)	Sample Type	Analysis	Sample Date	Ship Date	Laboratory
BH-4						
B00V69	0 - 2	SPLIT	*	08/09/91	08/19/91	TMA
B00V70	0 - 2	SOIL	*	08/09/91	08/19/91	MM
B00V71	4 - 6	SOIL	*	08/12/91	08/29/91	TMA
B00V72	9 - 10.5	SOIL	*	08/21/91	08/29/91	TMA
B00V76	N/A	EB	*	08/21/91	08/29/91	TMA
B00V73	N/A	FB	*	08/21/91	08/29/91	TMA
B00V75	14 - 14.5	SOIL	*	08/22/91	08/29/91	TMA
B00YS7	19 - 20	SOIL	*	08/23/91	08/29/91	TMA
B00YT1	24.6 - 25.6	SOIL	*	08/26/91	08/29/91	TMA
BH-5						
B00YX2	0 - 2	SOIL	*	09/10/91	09/16/91	TMA
B00YX6	3.9 - 5.9	SOIL	*	09/11/91	09/16/91	TMA
B00YX8	10.5 - 12.5	SOIL	*	09/12/91	09/16/91	TMA
B00YY1	14.8 - 16.1	SOIL	*	09/13/91	09/17/91	TMA
B00YY5	19.9 - 21.1	SOIL	*	09/16/91	09/23/91	TMA
B00YY6	24 - 24.8	SOIL	*	09/17/91	09/23/91	TMA
B00YY9	29.5 - 31	SOIL	*	09/18/91	09/23/91	TMA
B00YZ0	34.7 - 35.6	SOIL	*	09/19/91	09/23/91	TMA
B00YZ3	39 - 40.2	SOIL	**	09/19/91	09/23/91	TMA
B00YZ5	44 - 45.2	SOIL	*	09/20/91	09/26/91	TMA
B014X3	49.8 - 51.8	SOIL	*	09/23/91	09/26/91	TMA
B014X5	55 - 56.9	SOIL	*	09/23/91	09/26/91	TMA

* Analysis-Radiochemistry, Metals, and Anions
**Analysis-Radiochemistry only, because of poor sample volume
@Because of difficult drilling no 5-ft sample was attainable

EB = Silica Sand Equipment Blank
FB = Silica Sand Field Blank
MM = Martin Marietta (K-25) Laboratory
TB = Silica Sand Trip Blank
TMA = TMA/NORCAL Laboratory

Table E-1. Summary of 183-H Vadose Zone Sample Information. (4 sheets)

Sample Numbers	Interval Sample (Depth in Feet)	Sample Type	Analysis	Sample Date	Ship Date	Laboratory
BH-6						
B00YV9	0 - 2	SOIL	*	09/04/91	09/11/91	TMA
B00YW1	0 - 2	SPLIT	*	09/04/92	09/11/91	MM
B00YW4	N/A	EB	*	09/04/91	09/11/91	TMA
B00YW6	10 - 11.5@	SOIL	*	09/05/91	09/11/91	TMA
B00YW7	10 - 11.5	DUP	*	09/05/91	09/11/91	TMA
B00YW9	13 - 14	SOIL	*	09/09/91	09/16/91	TMA
B00YX0	14.5 - 15.2	SOIL	*	09/09/91	09/16/91	TMA
B00YX1	19.25 - 20	SOIL	*	09/10/91	09/16/91	TMA
B00YX3	24 - 25	SOIL	*	09/11/91	09/16/91	TMA
B00YY2	N/A	EB	*	09/11/91	09/16/91	TMA
B00YX7	29 - 30	SOIL	*	09/11/91	09/16/91	TMA
BH-7						
B00V64	0 - 2	SOIL	*	08/04/91	08/13/91	TMA
B00V65	0 - 2	DUP	*	08/05/91	08/13/91	TMA
B00V66	4 - 6	SOIL	*	08/05/91	08/13/91	TMA
B00V67	9.5 - 11.5	SOIL	*	08/07/91	08/13/91	TMA
B00V68	9.5 - 11.5	SPLIT	*	08/07/91	08/13/91	MM
B00V74	14 - 15	SOIL	*	08/22/91	08/29/91	TMA
B00YT0	19 - 19.9	SOIL	*	08/23/91	08/29/91	TMA
B00YT3	24.5 - 25.5	SOIL	*	08/26/91	08/29/91	TMA
B00YT4	29.5 - 30.4	SOIL	*	08/27/91	08/29/91	TMA

* Analysis-Radiochemistry, Metals, and Anions
**Analysis-Radiochemistry only, because of poor sample volume
@Because of difficult drilling no 5-ft sample was attainable

EB = Silica Sand Equipment Blank
FB = Silica Sand Field Blank
MM = Martin Marietta (K-25) Laboratory
TB = Silica Sand Trip Blank
TMA = TMA/NORCAL Laboratory

Table E-1. Summary of 183-H Vadose Zone Sample Information. (4 sheets)

Sample Numbers	Interval Sample (Depth in Feet)	Sample Type	Analysis	Sample Date	Ship Date	Laboratory
			BH-8			
B00V77	0 - 2	DUP	*	08/23/91	08/29/91	TMA
B00YS6	0 - 2	SOIL	*	08/23/91	08/29/91	TMA
B00YS8	4 - 6	SOIL	*	08/23/91	08/29/91	TMA
B00YS9	4 - 6	SPLIT	*	08/23/91	08/29/91	MM
B00YT2	9.5 - 11.2	SOIL	*	08/26/91	08/29/91	TMA
B00YT6	N/A	FB	*	08/26/91	08/29/91	TMA
B00YT5	14 - 15.5	SOIL	*	08/27/91	08/29/91	TMA
B00YT8	19.4 - 19.9	SOIL	*	08/28/91	09/09/91	TMA
B00YT9	23.8 - 25.1	SOIL	*	08/29/91	09/09/91	TMA
B00YV4	29.8 - 31.3	SOIL	*	09/03/91	09/09/91	TMA
B00YV5	N/A	FB	*	09/03/91	09/09/91	TMA
B00YW0	N/A	EB	*	09/03/91	09/09/91	TMA
B00YT7	N/A	TB	*	09/03/91	09/09/91	TMA
			BH-9			
B00YY7	0 - 2	SOIL	*	09/17/91	09/23/91	TMA
B00YY8	4 - 6	SOIL	**	09/18/91	09/23/91	TMA
B00YZ1	9 - 11	SOIL	*	09/19/91	09/23/91	TMA
B00YZ2	14.25 - 16	SOIL	*	09/19/91	09/23/91	TMA
B00YZ4	19.5 - 21.8	SOIL	*	09/20/91	09/26/91	TMA
B014X1	24 - 26	SOIL	*	09/20/91	09/26/91	TMA
B014X2	30 - 32	SOIL	*	09/20/91	09/26/91	TMA
B014X4	34 - 35.75	SOIL	*	09/23/91	09/26/91	TMA
B014X6	39 - 41	SOIL	*	09/24/91	09/26/91	TMA

* Analysis-Radiochemistry, Metals, and Anions
**Analysis-Radiochemistry only, because of poor sample volume
@Because of difficult drilling no 5-ft sample was attainable

DUP = Duplicate
EB = Silica Sand Equipment Blank
FB = Silica Sand Field Blank
MM = Martin Marietta (K-25) Laboratory
TB = Silica Sand Trip Blank
TMA = TMA/NORCAL Laboratory

Table E-2. Borehole 1 Analytical Data (mg/kg).

Analyte	Sample Numbers											
	B00YX4 (0 to 2 ft)		B00YX5 (4 to 4.4 ft)		B00YX9 (9 to 9.6 ft)		B00YY0 (14.5 to 15.5 ft)		B00YY3 (19.4 to 20.6 ft)		B00YY4 (24.9 to 26.4 ft)	
Aluminum	9,680		6,000		5,160		6,530		4,920		5,070	
Antimony	13.9	J	13.7	J	11.1	J	9.3	UJ	11	J	9.1	UJ
Arsenic	3.6		1.6	U	1.2	U	1.4	B	1.4	B	1.8	B
Barium	79.3		48.6		52.7		74.8		59.3		56.3	
Beryllium	2.1		0.2	U	0.2	U	0.3	B	0.2	U	0.2	U
Cadmium	0.8	UJ	0.6	UJ	0.6	UJ	0.6	U	0.6	U	0.6	U
Calcium	7,250		6,440		5,550		6,470		4,640		4,890	
Chromium	44.9		17.5		15.3		15.1		14.8		13.8	
Cobalt	8.2	B	10.7		11.4		10.9		7.4	B	12.8	
Copper	815		164		24.7		18.9		13.5		16.3	
Fluoride	0.5	U	223		195		72.4		31.8		10.5	
Iron	16,400		17,800		18,000		18,400		13,500		19,100	
Lead	9.4		3		2		2.6		2.2		2.3	
Magnesium	5,690		4,050		3,330		4,480		3,260		4,230	
Manganese	299		263		246		264	J	230	J	259	J
Mercury	0.7		0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	15.6		7.8	B	8.9		10		9		10.3	
Nitrate	30.1	J	19.1	J	43	J	160	J	158	J	304	J
Nitrite	0.5	UJ	0.5	UJ	0.5	UJ	1.2	J	1.2	J	1.6	J
pH (pH units)	8.3		8.4		9.5		10.2		10.3		10.2	
Potassium	1,670		849	B	743	B	1,000		943		803	B
Selenium	0.9	UJ	0.8	UJ	0.8	U	0.8	UJ	0.8	UJ	0.8	UJ
Silver	12.9	J	0.8	UJ	0.8	UJ	0.8	U	0.8	U	0.8	U
Sodium	2,610		1,660		1,500		1,980		1,580		2,470	
Sulfate	82.4		74.5		85.8		119		113		156	
Thallium	0.2	R	0.2	R	0.2	R	0.2	R	0.2	R	0.2	R
Vanadium	33.7		51.4		54		51.5		38.7		52.4	
Zinc	51.5		33.6		34.2		39.2		31.7		33.7	

Table E-3. Borehole 2 Analytical Data (mg/kg).

Analyte	Sample Numbers															
	B00YV1 (0 to 2 ft)		B00YV6 (6.2 to 7 ft)		B00YV7 (Field Duplicate 6.2 to 7 ft)		B00YV8 (9.5 to 10.3 ft)		B00YW3 (14 to 15.8 ft)		B00YW5 (19.25 to 20.15 ft)		B00YW8 (24 to 24.5 ft)	
Aluminum	8,820	J	5,010	J	5,160	J	5,070	J	5,000		4,510		4,560	
Antimony	16.4	U	11.8	U	10.6	U	10.2	U	5.4	U	6.2	U	5.2	U
Arsenic	6.3		2.1		2.3		1.5	U	1.1	B	1.3	B	1	B
Barium	81.3		41.4		43.8		44.5		57.6		45		51	
Beryllium	0.5	B	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Cadmium	0.8	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	4	
Calcium	9,480		5,450		5,360		5,280		5,360		4,680		4,840	
Chromium	13.1		13.5		15.2		24.8		15.5	J	19.2	J	16.9	J
Cobalt	23.2		10.8	U	10.6	U	10.4	U	10.2		7.3	B	10.4	
Copper	16.1		17.8		14.6		19		12	J	10	J	20.1	J
Fluoride	2.4	J	2.9	J	3	J	2.7	J	2.1	J	2.4	J	1.6	J
Iron	17,400	J	15,500	J	15,800	J	17,900	J	15,900	J	19,800	J	15,900	J
Lead	17.4		2.6		2.4		2.5		2	J	2	J	4.8	J
Magnesium	6,460		3,740		4,070		3,930		3,770		3,420		3,440	
Manganese	282		233		246		242		230		245		210	
Mercury	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
Nickel	16.2		8.5		11.2		11.6		7.6	B	10.2		8.8	
Nitrate	227	J	15.1	J	17.8	J	6	J	5.6	J	5.4	J	5.6	J
Nitrite	1.1	J	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
pH (pH units)	9.8		8.9		8.6		9.2		9.4		9.4		9.2	
Potassium	2,210		566	B	650	B	755	B	748	B	620	B	665	B
Selenium	1	UJ	0.8	UJ	0.8	UJ	0.8	UJ	0.8	UJ	0.8	UJ	0.8	UJ
Silver	1	U	0.8	U	0.8	U	0.8	U	0.8	UJ	0.8	UJ	0.8	UJ
Sodium	990	B	364	B	352	B	459	B	435	B	367	B	381	B
Sulfate	68.4	J	32.4	J	32.4	J	35.2	J	32.6	J	30.9	J	60.7	J
Thallium	0.3	R	0.2	R	0.2	R	0.2	R	0.2	UJ	0.2	UJ	0.2	UJ
Vanadium	34.7		43.9		42.1		42.6		45.6		33.7		41.4	
Zinc	50.4		31.1		31.9		31.3		31		24		29.7	

Table E-4. Borehole 3 Analytical Data (mg/kg). (2 sheets)

Analyte	Sample Numbers									
	B00V55 (0 to 2 ft)		B00V56 (4 to 6 ft)		B00V57 (10 to 11 ft)		B00V58 (Equipment Blank)		B00V59 (14.5 to 15.5 ft)	
Aluminum	9,160		4,900		5,060		140		5,180	
Antimony	5.9	UJ	6.9	UJ	4.9	UJ	2.1	UJ	26.3	UJ
Arsenic	5.7		1.9	B	0.7	UJ	0.7	UJ	1.7	B
Barium	71.8		53.1		54		2.3	U	65.3	
Beryllium	0.3	B	0.2	U	0.2	U	0.2	U	0.2	U
Cadmium	0.2	U	0.2	U	0.2	U	0.2	U	0.6	U
Calcium	7,570		4,470		4,630		39.7	U	5,140	
Chromium	20.1		13.2		16.3		1	U	21.7	
Cobalt	7.9	B	9	B	9.6	B	0.4	U	12.5	
Copper	22.2		15.5		18.8	U	1.1	U	18.4	
Fluoride	130	J	90	J						
Iron	17,000		15,100		17,100		206		18,600	
Lead	6.7		2.7		2.1	J	0.5	J	10.7	J
Magnesium	6,680		3,800		3,680		30.4	U	3,720	
Manganese	300		231		233		4.3		248	
Mercury	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
Nickel	15.8		9.2		11.8		0.9	U	13.3	
Nitrate	6,200	J	151	J	37.3	J	30.6	J	15.8	J
Nitrite	15.6	J	0.4	J	0.1	UJ	0.1	J	1	UJ
pH (pH units)	9.1		9.7		9.3		7.4		9.2	
Potassium	1,900		845	B	766	B	35.9	U	762	B
Selenium	0.9	UJ	0.8	UJ	0.7	R	0.7	R	0.8	UJ
Silver	0.4	U	0.4	U	0.4	U	0.4	U	0.8	U
Sodium	12,600		581	B	566	B	89	U	580	B
Sulfate	4,420	J	370	J	108	J	76.9	J	54	J
Thallium	0.7	UJ	0.6	U	0.3	J	0.2	UJ	0.2	U
Vanadium	35.1		41.3		49.6		0.5	U	59.2	
Zinc	48.1		31.6		33.2		0.6	U	54.2	J

Table E-4. Borehole 3 Analytical Data (mg/kg). (2 sheets)

Analyte	Sample Numbers									
	B00V60 (Field Blank)		B00V61 (19 to 20.2 ft)		B00V62 (24 to 25 ft)		B00V63 DUP (24 to 25 ft)			
Aluminum	121		4,160		4,710		5,150			
Antimony	7.7	UJ	6.9	UJ	11.8	UJ	19.2	UJ		
Arsenic	0.4	U	0.8	J	0.7	B	0.9	J		
Barium	2.4	B	38.2	B	91		83.9			
Beryllium	0.2	U	0.2	U	0.2	U	0.2	U		
Cadmium	0.6	U	0.6	U	0.6	U	0.6	U		
Calcium	44.6	U	4,790		4,270		5,280			
Chromium	1.4	U	7.9		11.5		11.8			
Cobalt	0.8	U	7.5	B	8.9	B	11.6			
Copper	2.2	U	11.7		13.8		13.8			
Fluoride										
Iron	204		12,300		15,700		19,100			
Lead	0.2	B	1.5	J	2.9	J	4.9	J		
Magnesium	29.8	U	3,150		3,450		3,800			
Manganese	6.5		188		206		241			
Mercury	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ		
Nickel	1.2	U	6.9	B	8.1		8.5			
Nitrate	12.7	J	13.6	J	0.6	J	15.2	J		
Nitrite	5	UJ	5	UJ	5	UJ	5	UJ		
pH (pH units)	7.4		9.3		9.3		9			
Potassium	49.3	U	549	B	1,050		1,040			
Selenium	0.7	U	0.8	UJ	0.8	UJ	3.9	UJ		
Silver	0.8	U	0.8	U	0.8	U	0.8	U		
Sodium	25	U	245	B	430	B	474	B		
Sulfate	38.7	J	67.6	J	2	J	64.6	J		
Thallium	0.2	U	0.2	U	0.2	U	0.2	U		
Vanadium	0.6	U	30.8		43.3	B	55.6			
Zinc	1.6	UJ	25	J	31.8	J	31.4	J		

Table E-5. Borehole 4 Analytical Data (mg/kg).

Analyte	Sample Numbers															
	B00V70 (0 to 2 ft)		B00V71 (4 to 6 ft)		B00V72 (9 to 10.5 ft)		B00V73 (Field Blank)		B00V75 (14 to 14.5 ft)		B00V76 (Equipment Blank)		B00YS7 (19 to 20 ft)		B00YT1 24.6 - 25.6 ft	
Aluminum	8,280		7,830		178	J	3,180	J	5,770	J	121	J	5,370	J	4,630	J
Antimony	4.5	J	3.4	UJ	2.1	U	4.5	B	3.4	B	2.1	U	3.7	B	4.5	B
Arsenic	4		1.4	B	0.6	B	1	J	1.2	B	0.4	U	1.2	B	1.1	B
Barium	78		37.4	B	2.8	B	32.9	B	72.1		1.8	B	52.8		66.2	
Beryllium	0.3	B	0.2	U	0.2	U	0.2	U	0.3	B	0.2	U	0.2	U	0.2	U
Cadmium	0.7	U	0.6	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U
Calcium	7,190		6,860		54.9	U	3,930		5,340		38.5	U	6,380		4,510	
Chromium	16		9.9		0.4	U	4.9		15.4		0.4	U	12		10.2	
Cobalt	7.9	B	7.7	B	0.4	U	7.7	B	8	B	0.4	U	9.1	B	8.9	B
Copper	16.3	U	15.5	U	3	U	13.7		19.7		0.6	U	13.6		11.9	
Fluoride	NR	NR	NR	NR	1.5	J	0.5	UJ	3.1	J	4.7	J	2.4	J	1.6	J
Iron	15,900		13,600		274	J	16,900	J	20,000	J	172	J	17,300	J	16,800	J
Lead	7.3		2.6		0.6	B	2.1		4.8		0.5	B	2.5		2.4	
Magnesium	6,020		3,210		27.8	U	2,650		3,200		18.2	U	3,810		3,380	
Manganese	323	J	187	J	6.3	J	193	J	302	J	4.2	J	244	J	214	J
Mercury	0.1	UJ	0.1	J	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	16.7		8.6		0.8	U	6.4	B	8		0.8	U	10.3		8.8	
Nitrate	52.3	J	10.1	J	5.4	J	5.5	J	6.3	J	6	J	5.7	J	5.6	J
Nitrite	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
pH (pH units)	9		9.2	J	8.7		7.9		9.2		7.6		9.1		9	
Potassium	1,980		632	B	41.5	B	405	B	1,130		22.2	U	681	B	662	B
Selenium	0.9	U	0.8	U	2.5	R	0.8	UJ	0.8	UJ	0.8	UJ	0.8	UJ	0.9	UJ
Silver	0.9	U	0.8	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U
Sodium	585	B	572	B	35.3	U	286	B	549	B	16.4	U	442	B	371	B
Sulfate	56.5	J	52.4		26.6	J	20.1	J	33.1	J	21.3	J	29.9	J	30.4	J
Thallium	0.2	U	0.2	U	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ
Vanadium	31.2		38.7		0.6	U	33.7		38.8		0.6	U	51.1		45.1	
Zinc	46.9		28.2		2.6	U	24.3		45.9		1.8	U	34.9		33.6	

Table E-6. Borehole 5 Analytical Data (mg/kg). (2 sheets)

Analyte	Sample Numbers											
	B00YX2 (0 to 2 ft)		B00YX6 (3.9 to 5.9 ft)		B00YX8 (10.5 to 12.5 ft)		B00YY1 (14.8 to 16.1 ft)		B00YY5 (19.9 to 21.1 ft)		B00YY6 (24 to 24.8 ft)	
Aluminum	5,870		4,840		7,810		5,220		3,670		4,000	
Antimony	9.1	UJ	11.9	J	11.9	J	9.3	J	9.4	UJ	9.1	UJ
Arsenic	12.6		4.5		9.1		2.8		1.4	B	1.9	B
Barium	61.3		40.4		65.9		50.4		52.1		42	
Beryllium	0.4	U	0.2	U	0.2	U	0.2	B	0.2	U	0.2	U
Cadmium	0.6	UJ	0.6	UJ	0.7	UJ	0.7	B	0.8	U	0.6	U
Calcium	5,970		5,760		6,200		4,430		4,300		4,220	
Chromium	8.5		8.1		13.7		9		7.8	J	11.7	J
Cobalt	10.4		6.4	B	7.6	B	9	B	8.8	B	9	B
Copper	11		11.9		10.3		14.5		16.9		12.5	
Fluoride	1.8		1.6		1.4		2.7		1.7		2	
Iron	14,900		13,300		16,000		15,700		12,700		13,000	
Lead	17.7		6.1		25.2		3.5		1.6		2.1	
Magnesium	3,950		3,590		4,820		3,680		2,830		2,650	
Manganese	241		206		251		244	J	190		174	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ	0.1	UJ
Nickel	8.3		7.4	B	12.4		8.9		7.9	B	6.2	B
Nitrate	13.6	J	9.7	J	30.1	J	8.1	J	7	J	6.4	J
Nitrite	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
pH (pH units)	8.6		8.6		8.3		9.4		9.5		9.9	
Potassium	944	B	688	B	1,180		755	B	674	B	613	B
Selenium	0.8	UJ	0.7	U	0.9	UJ	0.8	UJ	0.8	UJ	4.1	UJ
Silver	0.8	UJ	0.8	UJ	0.9	UJ	0.8	U	0.8	U	0.8	U
Sodium	170	B	200	B	216	B	312	B	291	B	407	B
Sulfate	32.2		28.9		85.5		30.7		27.5		29.2	
Thallium	0.2	R	0.2	R	0.2	R	0.2	R	0.8	U	0.8	U
Vanadium	32.1		31.9		35.3		44.3		32.1		41.1	
Zinc	34.3		28.9		39		32.4		24.8		23.6	

Table E-6. Borehole 5 Analytical Data (mg/kg). (2 sheets)

Analyte	Sample Numbers											
	B00YY9 (29.5 to 31 ft)		B00YZ0 (34.7 to 35.6 ft)		B00YZ5 (44 to 45.2 ft)		B014X3 (49.8 to 51.8 ft)		B014X5 (55 to 56.9 ft)			
Aluminum	4,740		4,260		4,970		5,440		4,750			
Antimony	9.2	UJ	9.3	UJ	8.8	UJ	9	UJ	9.8	UJ		
Arsenic	1.1	B	0.9	B	1.1	B	1	B	0.7	B		
Barium	53.3		45.9		55		37.3	B	38.4	B		
Beryllium	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U		
Cadmium	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U		
Calcium	4,030		6,350		5,050		4,930		3,800			
Chromium	11.8	J	9.7	J	9.5		8		7.3			
Cobalt	7	B	7.5	B	7.9	B	7.6	B	7.2	B		
Copper	9.2		14.2		18.7		18.5		17.4			
Fluoride	1.9		2.1		1.7	J	0.5	UJ	0.5	UJ		
Iron	12,800		13,200		12,900		11,800		12,200			
Lead	2.3		2.1		2.1		2.5		1.9			
Magnesium	3,680		3,070		3,580		4,200		3,570			
Manganese	202		203		239		249		220			
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U		
Nickel	6.6	B	7.9	B	9.2		8.9		8	B		
Nitrate	6.2	J	7.4	J	6.1	J	5	J	4.8	J		
Nitrite	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ		
pH (pH units)	9.6		9.3		9.6		9.5		9.6			
Potassium	1,210		684	B	621	B	585	B	501	B		
Selenium	3.9	UJ	0.8	UJ	0.8	R	0.8	R	0.9	R		
Silver	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U		
Sodium	326	B	393	B	327	B	248	B	218	B		
Sulfate	27.9		36.9		24.5		13.4		13.9			
Thallium	0.8	U	0.8	U	0.2	U	0.2	U	0.2	U		
Vanadium	34.9		32.5		39.2		30.6		30.4			
Zinc	27.6		24.6		27		24.5		27.3			

Table E-7. Borehole 6 Analytical Data (mg/kg). (2 sheets)

Analyte	Sample Numbers									
	B00YV9 (0 to 2 ft)		B00YW4 (Equipment Blank)		B00YW6 (10 to 11.5 ft)		B00YW7 (Field Duplicate (10 to 11.5 ft)		B00YW9 (13 to 14 ft)	
Aluminum	8,930		110		7,540		7,840		8,280	
Antimony	25.3	J	3.3	UJ	10.6	U	3.8	UJ	10.7	UJ
Arsenic	12.7		0.4	U	3.2		2.9		3.4	U
Barium	288		2.4	U	73		70.2		58.8	
Beryllium	0.6	B	0.2	U	0.2	U	0.3	B	0.2	U
Cadmium	0.7	U	0.6	U	0.7	U	0.7	U	4.5	J
Calcium	52,500		49.8	B	6,570		6,300		9,390	
Chromium	13.7	J	1.4	UJ	16.8	J	18.5	J	18	
Cobalt	9	B	0.8	U	8.1	B	9.1	B	9.8	B
Copper	57	J	2.2	U	11.2	J	11	J	22.8	
Fluoride	48.8	J	0.5	UJ	2.8	J	2.7	J	2.1	
Iron	21,500	J	196	J	14,900	J	15,000	J	17,200	
Lead	9.8	J	0.4	UJ	5.5	J	2.4	J	4.3	
Magnesium	2,900		16.5	B	5,640		5,580		5,190	
Manganese	237		4.6		256		252		274	
Mercury	0.3	J	0.1	UJ	0.1	UJ	0.1	UJ	0.1	U
Nickel	24.4		1.2	U	14		15.2		11.2	
Nitrate	60.1	J	5.4	J	13.2	J	11.6	J	6.4	J
Nitrite	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
pH (pH units)	10.5		9.3		8.8		9.1		10.1	
Potassium	754	B	49.3	U	1,340		1,220		968	B
Selenium	0.9	UJ	0.8	UJ	0.8	UJ	0.9	UJ	0.9	U
Silver	0.9	UJ	0.8	UJ	0.9	UJ	0.9	UJ	0.9	UJ
Sodium	580	B	29.8	U	228	B	219	B	454	B
Sulfate	7,564	J	19.1	J	32	J	27.3	J	59.4	
Thallium	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	R
Vanadium	34.5		0.6	U	27.9		28.9		39.9	
Zinc	81.8		1.6	U	39.8		40		44.1	

Table E-7. Borehole 6 Analytical Data (mg/kg). (2 sheets)

Analyte	Sample Numbers									
	B00YX0 (14.5 to 15.2 ft)		B00YX1 (19.25 to 20 ft)		B00YX3 (24 to 25 ft)		B00YY2 (Equipment Blank)		B00YX7 (29 to 30 ft)	
Aluminum	4,400		5,170		5,530		141		4,910	
Antimony	12.6	J	18.1	J	16.9	J	10.5	UJ	16.3	J
Arsenic	2.1	U	1.6	U	1.6	U	0.5	U	1.5	U
Barium	42.6		70.1		50.8		2.7	U	43.8	
Beryllium	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Cadmium	0.6	UJ	0.7	J	0.6	UJ	0.7	UJ	0.6	UJ
Calcium	4,760		5,380		5,470		48.2	U	5,170	
Chromium	9.5		9.9		18.3		1.3	U	8.7	
Cobalt	9.7	B	13.3		7	B	1.8	U	7.9	B
Copper	10.3		12		13.1		1.1	U	10.8	
Fluoride	1		1		1.3		6.4		1	
Iron	15,300		18,300		16,200		376		14,700	
Lead	2.4		2.1		3.5		0.8		2.2	
Magnesium	3,300		4,440		3,650		26.2	U	3,940	
Manganese	206		240		221		5.2		201	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	7.9		7.6	B	7.9		2	U	8.8	
Nitrate	5.4	J	5.6	J	5.7	J	5.7	J	5.6	J
Nitrite	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
pH (pH units)	9.4		9.5		9.2		6.9		9.5	
Potassium	601	B	865	B	763	B	64.5	U	663	B
Selenium	0.8	U	0.9	B	0.8	U	0.9	UJ	0.8	UJ
Silver	0.8	UJ	0.8	UJ	0.8	UJ	0.9	UJ	0.8	UJ
Sodium	380	B	499	B	469	B	39.9	U	410	B
Sulfate	33.3		31.2		32.9		19.5		29.3	
Thallium	0.2	R	0.2	R	0.2	R	0.2	R	0.2	R
Vanadium	43.2		48		43.7		1.1	U	38.5	
Zinc	28.1		33		42.2		2.1	U	28.1	

Table E-8. Borehole 7 Analytical Data (mg/kg).

Analyte	Sample Numbers															
	B00V64 (0 to 2 ft)		B00V65 DUP (0 to 2 ft)		B00V66 (4 to 6 ft)		B00V67 (9.5 to 11.5 ft)		B00V74 (14 to 15 ft)		B00YT0 (19 to 19.9 ft)		B00YT3 (24.5 to 25.5 ft)		B00YT4 (29.5 to 30.4 ft)	
Aluminum	7,850		7,920		7,140		6,920		5,190	J	6,790	J	4,940	J	6,110	J
Antimony	9.2	J	15.1	J	12	J	4.9	J	4.7	B	2.6	B	4	B	3.7	B
Arsenic	5		7.4		8.2		2.8		1.1	B	1	B	0.9	B	1.1	B
Barium	75.5		73.7		64.4		60.5		45.5		53.3		57.9		105	
Beryllium	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.3	B	0.2	U
Cadmium	0.6	U	0.6	U	0.6	U	0.7	U	0.4	U	0.4	U	0.4	U	0.4	U
Calcium	5,100		5,480		6,220		5,850		5,590		6,400		5,250		5,610	
Chromium	9		10.9		8.7		12.4		9.2		24.3		14.6		14.4	
Cobalt	9.5		9.1	B	7.7	B	7.5	B	11.6		9	B	9.2	B	9.5	B
Copper	14.2	U	12.2	U	12.5	U	12.8	U	14.2		20.1		11.4		16.3	
Fluoride									3.5	J	2.8	J	3.4	J	4.2	J
Iron	17,700		17,900		16,400		15,700		21,200	J	15,300	J	16,600	J	17,900	J
Lead	6.2	J	32.9	J	32.4	J	8.1	J	2.1		2.4		3		11.9	
Magnesium	4,510		4,820		4,350		4,870		4,320		3,660		3,430		4,270	
Manganese	305	J	303	J	262	J	255	J	276	J	216	J	235	J	285	J
Mercury	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	11.1		13.4		11.2		13.9		9.4		14.2		7.8	B	13.6	
Nitrate	10.4	J	11.4	J	9.3	J	9.9	J	5.9	J	5.8	J	6.8	J	9.6	J
Nitrite	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
pH (pH units)	8.7		8.8		8.7		8.6		9		9.3		9.2		8.9	
Potassium	1,500		1,470		1,190		1,010	B	601	B	891	B	770	B	1,050	
Selenium	0.8	UJ	0.8	UJ	0.8	UJ	0.9	UJ	0.8	UJ	0.9	UJ	0.8	UJ	0.8	UJ
Silver	0.8	U	0.8	U	0.8	U	0.9	U	0.4	U	0.4	U	0.4	U	0.4	U
Sodium	182	U	181	U	206	U	252		697	B	611	B	479	B	521	B
Sulfate	28.6	J	29.1	J	31.4	J	127.4	J	45.8		29.5	J	44.4	J	55.2	J
Thallium	0.2	U	0.2	U	0.2	U	0.2	U	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ
Vanadium	40.6		39.7		36.9		34		50.1		43.3		43.4		43.1	
Zinc	37.2	U	38.1	U	35.7	U	32.8	U	38.5		32.8		36.8		36.8	

Table E-9. Borehole 8 Analytical Data (mg/kg). (2 sheets)

Analyte	Sample Numbers											
	B00V77 (Field Duplicate 0 to 2 ft)		B00YS6 (0 to 2 ft)		B00YS8 (4 to 6 ft)		B00YT2 (9.5 to 11.2 ft)		B00YT5 (14 to 15.5 ft)		B00YT6 (Field Blank)	
Aluminum	5,930	J	6,080	J	5,990	J	4,220	J	6,050	J	152	J
Antimony	4.3	B	2.1	U	3.4	B	3.8	B	5.1	B	2.2	U
Arsenic	2.3		1.8	B	2.1		1	B	1.4	B	0.6	B
Barium	53.5		55.4		56.5		34.1	B	64.4		2.5	B
Beryllium	0.2	B	0.2	B	0.2	B	0.2	U	0.2	B	0.2	U
Cadmium	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U
Calcium	6,160		7,510		6,040		4,870		5,960		55.3	U
Chromium	7.6		7		7.8		6.5		10.9		0.4	U
Cobalt	7.6	B	7.3	B	7.3	B	6.5	B	11.8		0.4	U
Copper	13.5		13.4		12.3		10.3		15.1		0.7	U
Fluoride	2.6	J	2.5	J	3.7	J	3.5	J	4.1	J	2.4	J
Iron	14,900	J	15,200	J	15,100	J	13,400	J	20,200	J	214	J
Lead	4.3		4.1		4.8		2.3		2.4		1.3	
Magnesium	3,970		3,920		3,850		2,990		4,120		29.4	B
Manganese	239	J	234	J	238	J	194	J	259	J	5.5	J
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	9.7		8.4		8.9		6.7	B	9.6		0.8	U
Nitrate	6.1	J	5.9	J	8	J	5.7	J	6	J	5.4	J
Nitrite	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
pH (pH units)	8.8		8.5		8.6		9.8		9.2		7.2	
Potassium	890	B	864	B	897	B	664	B	865	B	38.5	B
Selenium	0.9	UJ	0.8	UJ	0.8	UJ	0.8	UJ	0.8	UJ	0.9	UJ
Silver	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U
Sodium	190	B	197	B	224	B	369	B	687	B	20.7	U
Sulfate	40	J	41	J	88.3	J	31.4	J	52.8	J	19.5	J
Thallium	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ
Vanadium	33.8		34.2		32.7		29.6		62.3		0.6	U
Zinc	35.8		35.5		33.6		33.1		46		2.5	U

Table E-9. Borehole 8 Analytical Data (mg/kg). (2 sheets)

Analyte	Sample Numbers											
	B00YT7 (Trip Blank)		B00YT8 (19.4 to 19.9 ft)		B00YT9 (23.8 to 25.1 ft)		B00YV4 (29.8 to 31.3 ft)		B00YV5 (Field Blank)		B00YW0 (Equipment Blank)	
Aluminum	159	J	5,880	J	5,470	J	4,210	J	125	J	138	J
Antimony	7.3	U	12.2	U	15.5	U	11.5	U	3.1	U	3.4	U
Arsenic	0.4	UJ	1.1	U	0.8	U	0.9	U	0.4	U	0.4	U
Barium	2.6	B	67.3		57.2		44.4		1.5	B	1.9	B
Beryllium	0.2	U	0.2	U	0.3	B	0.2	U	0.2	U	0.2	U
Cadmium	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	B
Calcium	53.2	U	5,600		5,900		4,410		36	U	41.9	U
Chromium	1.3	U	12.6		5.1	U	6.4	U	1.3	U	1.3	U
Cobalt	1.9	U	12.1	U	12.7	U	9.8	U	1.6	U	1.7	U
Copper	3.9	B	14.4		22		13.1		2	U	2.1	U
Fluoride	2.2	J	3	J	3	J	2.6	J	2.5	J	2.3	J
Iron	246	J	16,000	J	18,300	J	13,600	J	146	J	180	J
Lead	0.6	B	2.7	J	11		2		0.4	B	0.5	B
Magnesium	35.9	B	3,610		4,100		2,980		15.8	B	16.5	B
Manganese	4.9		206		248		181		5.2		5.4	
Mercury	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
Nickel	1.1	U	9.7		5.4	B	5.8	B	1.1	U	1.1	U
Nitrate	5.4	J	5.4	J	5.4	J	5.6	J	5.3	J	5.2	J
Nitrite	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
pH (pH units)	8.1		8.6		9.2		9.1		7.5		7.9	
Potassium	70.3	B	1,110		881	B	557	B	45.7	U	47.8	U
Selenium	0.7	U	0.8	UJ	0.8	UJ	0.8	UJ	0.8	U	0.8	U
Silver	0.7	U	0.8	U	0.8	U	0.8	U	0.7	U	0.8	U
Sodium	35.8	U	680	B	697	B	321	B	38.6	U	39.7	U
Sulfate	16.9	J	119	J	46.6	J	29	J	17.6	J	16.8	J
Thallium	0.2	R	0.2	R	0.2	R	0.2	R	0.2	R	0.2	R
Vanadium	0.6	U	48.2		49.5		40.3		0.6	U	0.6	U
Zinc	2.9	B	29.6		35.5		26.3		1.5	U	1.9	B

Table E-10. Summary of Vadose Zone Soil Routine Analytical Data.

Analyte	Mean (mg/kg)	Standard Deviation (mg/kg)	Number of Detectable Results	Number of Total Analyses	Maximum (mg/kg)	Minimum (mg/kg)
Aluminum	5,691.6	1,618	56	56	9,680	178
Antimony	9.3	5.6	27	56	25.3	2.6
Arsenic	2.8	2.9	43	56	12.7	0.6
Barium	60.4	34.5	56	56	288	2.8
Beryllium	0.4	0.5	14	56	2.1	0
Cadmium	2.5	1.8	4	56	4.5	0.7
Calcium	6,474	6,368.7	55	56	52,500	3,800
Chromium	13.5	6.1	53	56	44.9	6.5
Cobalt	9.2	2.6	51	56	23.2	6.4
Copper	35	113.5	50	56	815	9.2
Iron	15,794.2	3,111.3	56	56	21,500	274
Lead	5.2	5.8	56	56	32.4	0.6
Magnesium	3,885.5	998.7	56	56	6,680	27.8
Manganese	234.5	45.3	56	56	323	6.3
Mercury	0.4	0.2	3	56	0.7	0.1
Nickel	10	3.3	55	56	24.4	5.4
Potassium	889.8	375.8	56	56	2,210	41.5
Selenium	1.7	0.8	2	56	2.5	0.9
Silver			1	56	12.9	
Sodium	810.3	1,688.9	55	56	12,600	170
Thallium	0.2	0.1	3	56	0.3	0
Vanadium	39.9	9.4	56	56	62.3	0
Zinc	35.2	9.6	55	56	81.8	23.6
Fluoride	19.7	48.2	45	46	223	0
Nitrite	3.5	5.4	6	56	15.6	0.3
Nitrate	139.1	819.3	56	56	6,200	0.6
Sulfate	267.2	1,142.3	56	56	7,564	1.9
pH	9.2	0.5	50	56	10.5	8.3

Table E-11. Borehole 9 (Background) Analytical Data (mg/kg).

Analyte	Sample Numbers															
	B00YY7 (0 to 2 ft)		B00YZ1 (9 to 11 ft)		B00YZ2 (14.25 to 16 ft)		B00YZ4 (19.5 to 21.8 ft)		B014X1 (24 to 26 ft)		B014X2 (30 to 32 ft)		B014X4 (34 to 34.75 ft)		B014X6 (39 to 41 ft)	
Aluminum	7,010		4,480		4,120		4,650		4,850		4,270		5,020		4,390	
Antimony	9.5	UJ	10.4	UJ	10.9	J	10.5	J	9.2	UJ	8.5	UJ	9.2	UJ	9.7	UJ
Arsenic	2	B	1.5	B	0.9	B	1.3	B	1.1	B	0.7	B	0.9	B	1.1	U
Barium	99.1		59.3		51.3		68.7		62.8		50.9		54.5		36.4	J
Beryllium	0.3	B	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Cadmium	0.6	U	0.7	U	0.6	U	0.6	U	0.6	U	0.5	U	0.6	U	0.6	U
Calcium	3,090		4,940		5,070		4,540		4,910		4,540		4,770		4,870	
Chromium	9	J	6.9	J	5.2	J	9.4		17.1		7		9.3		9.9	
Cobalt	7.6	B	8.3	B	8.5	B	8.4	B	9.7	B	8.1	B	8.8	B	5.7	B
Copper	10.5		12.8		12.9		18.2		16.4		14		16.6		11.4	
Fluoride	4.4		1.8		1.6		1.5	J	3.3	J	1.5	J	3.8	J	3.5	J
Iron	15,100		13,700		16,200		13,800		14,800		13,500		15,700		10,500	
Lead	6.4		2.9		3.5		2.2		2.9		2.4		2.5		2.4	
Magnesium	3,940		2,940		3,340		3,250		3,510		3,600		3,850		3,660	
Manganese	367		231		220		213		232		214		253		161	
Mercury	0.1	UJ	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	9.4		7.5	B	7.2	B	7.1	B	9.2		13.4		8.8		10.1	
Nitrate	7.8	J	6	J	5.6	J	5.7	J	5.8	J	6.6	J	5.1	J	4.8	J
Nitrite	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
pH (pH units)	9.3		9.1		9.4		9.7		9.6		9.5		9.5		9.2	
Potassium	2,250		939	B	673	B	788	B	788	B	708	B	628	B	672	B
Selenium	4.1	UJ	4.6	UJ	4	UJ	4	R	3.7	R	0.8	R	3.8	R	0.9	R
Silver	0.8	U	0.9	U	0.8	U	0.8	U	0.8	U	0.7	U	0.8	U	0.8	U
Sodium	111	B	195	B	266	B	327	B	359	B	228	B	254	B	155	B
Sulfate	29		28.9		27.7		25.8		32.9		25.2		15.1		14.3	
Thallium	0.8	U	0.9	U	0.8	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Vanadium	30.1		28.1		37.9		36.4		34.7		31.1		37.4		21.2	
Zinc	33.6		25.1		28		28.2		29		30.6		32.2		24	

Table E-12. Vadose Split Sample Analytical Data (mg/kg).

Analyte	Sample Numbers									
	B00V68 (BH-7)		B00V69 (BH-4)		B00YS9 (BH-8)		B00YV0 (BH-2)		B00YW1 (BH-6)	
Aluminum	7,900		9,410		7,630		5,530		10,400	
Antimony	5	UR	10.6	UJ	10.1	UJ	9.3	UJ	11.5	B J
Arsenic	5	UJ	2.6	J	1.4	B	3.2		13.6	
Barium	70	J	99.2		63.3	J	45.7	J	356	J
Beryllium	0.3	J	0.4	B	0.3	B	0.2	B	0.5	B
Cadmium	0.55	J	0.6	U	0.6	U	0.6	U	0.6	U
Calcium	6,600	J	7,160		6,460		5,070		53,600	
Chromium	15	J	17.6		11.4	J	8.9	J	22.9	J
Cobalt	7.3	J	8.5	B	8.3	B	6.4	B	12	
Copper	44	J	17		16.3	J	10.6	J	104	J
Fluoride SIE	22	R	6	J	3	J	3	J	2	UJ
Iron	16,000	J	17,300		18,400	J	12,100	J	26,500	J
Lead	11	J	5.6		4		13.6		9.4	
Magnesium	4,800	J	6,170		4,460		3,890		3,020	
Manganese	260	J	335		277	J	210	J	319	J
Mercury	0.1	U	0.1	U	0.1	UJ	0.1	UJ	0.3	J
Nickel	14	J	16		11.6	J	10.2	J	41.6	J
Nitrate	20	R	147	J	20	UR	900	J	2,000	UR
Nitrite	20	R	1	UR	20	UR	20	UR	2,000	UR
pH (pH units)	8				8.6	J	8.9	J	9.2	J
Potassium	1,000	J	1,990		1,120		1,020		908	B
Selenium	5	UJ	0.7	U	0.6	U	0.7	U	0.7	U
Silver	0.6	UJ	1.3	U	1.2	U	1.1	U	1.3	U
Sodium	530	J	660	B	312	B J	635	B J	735	B J
Sulfate	20	UJ	38	J	52	J	49	J	290	J
Thallium			0.2	U	0.2	U	0.2	U	0.3	B
Vanadium	37		37.8		44.9		28.5		43.1	
Zinc	36		47.9		39.8		31.3		78.4	

Table E-13. Vadose Zone Soil Borehole 1. (2 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YX4 (0 to 2 ft depth)			
Gross alpha	25	±	7
Gross beta	47	±	4
99-Tc	39	±	1
234-U	7	±	0.5
235-U	0.8	±	0.1
238-U	5.3	±	0.4
40-K	14	±	2.2
51-Cr	77.8 U		
60-Co	0.2 U		
65-Zn	0.5 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.5	±	0.2
228-Th	1.1	±	0.2
232-Th	1.1	±	0.5
Sample Number B00YX5 (4 to 4.4 ft depth)			
Gross alpha	22	±	7
Gross beta	21	±	3
99-Tc	1.1	±	0.2
234-U	7.8	±	0.5
235-U	1	±	0.1
238-U	5.7	±	0.4
40-K	10.2	±	1.8
51-Cr	71.8 U		
60-Co	0.1 U		
65-Zn	0.5 U		
134-Cs	0.1 U		
137-Cs	0.1		
226-Ra	0.5	±	0.2
228-Th	0.7	±	0.2
232-Th	0.6		

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YX9 (9 to 9.6 ft depth)			
Gross alpha	12	±	5
Gross beta	19	±	3
99-Tc	1.2	±	0.2
234-U	6	±	0.3
235-U	0.5	±	0.1
238-U	4.5	±	0.2
40-K	9.1	±	1.6
51-Cr	72.6 U		
60-Co	0.1 U		
65-Zn	0.5 U		
134-Cs	0.2 U		
137-Cs	0.1 U		
226-Ra	0.4	±	0.2
228-Th	0.7	±	0.2
232-Th	0.6	±	0.4
Sample Number B00YY0 (14.5 to 15.5 ft depth)			
Gross alpha	9	±	4.7
Gross beta	15	±	2
99-Tc	3.1	±	0.2
234-U	2.8	±	0.2
235-U	0.2	±	0.1
238-U	2	±	0.2
40-K	8.6	±	1.6
51-Cr	58.7 U		
60-Co	0.1 U		
65-Zn	0.4 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.3	±	0.1
228-Th	0.6	±	0.2
232-Th	0.4		

Table E-13. Vadose Zone Soil Borehole 1. (2 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YY3 (19.4 to 20.6 ft depth)			
Gross alpha	4.2	±	4.4
Gross beta	20	±	3
99-Tc	4.6	±	0.6
234-U	2.1	±	0.2
235-U	16	±	5
238-U	1.7	±	0.2
40-K	12.6	±	1.9
51-Cr	61.2 U		
60-Co	0.1 U		
65-Zn	0.4 U		
134-Cs	0.1 U		
137-Cs	0.1		
226-Ra	0.4	±	0.2
228-Th	0.4	±	0.2
232-Th	0.5	±	0.3

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YY4 (24.9 to 26.4 ft depth)			
Gross alpha	7.6	±	4.6
Gross beta	17	±	2
99-Tc	6.6	±	0.3
234-U	2.5	±	0.2
235-U	0.3	±	0.1
238-U	2	±	0.2
40-K	9.1	±	1.6
51-Cr	56.4 U		
60-Co	0.1 U		
65-Zn	0.4 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.5	±	0.1
228-Th	0.5	±	0.1
232-Th	0.4	±	0.3

Table E-14. Vadose Zone Soil Borehole 2. (2 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YV1 (0 to 2 ft depth)			
Gross alpha	11	±	5
Gross beta	20	±	2
99-Tc	6.7	±	0.300
234-U	0.6	±	0.100
235-U	0	±	0.020
238-U	0.4	±	0.100
40-K	9.9	±	1.224
51-Cr	63.6 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.4	±	0.121
228-Th	0.7	±	0.118
232-Th	0.6	±	0.294
Sample Number B00YV6 (6.2 to 7 ft depth)			
Gross alpha	5	±	5
Gross beta	13	±	2
99-Tc	0.4	±	0.100
234-U	0.5	±	0.100
235-U	0	±	0.020
238-U	0.4	±	0.100
40-K	9	±	1.370
51-Cr	0.6 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.4	±	0.145
228-Th	0.5	±	0.126
232-Th	0.6	±	0.305

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YV7 (6.2 to 7 ft depth)			
Gross alpha	7	±	5
Gross beta	17	±	2
99-Tc	0.3	±	0.200
234-U	0.4	±	0.100
235-U	0	±	0.030
238-U	0.4	±	0.100
40-K	12	±	1.850
51-Cr	79.3 U		
60-Co	0.1 U		
65-Zn	0.4 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.4	±	0.157
228-Th	0.6	±	0.119
232-Th	0.4	±	0.267
Sample Number B00YV8 (9.5 to 10.3 ft depth)			
Gross alpha	4	±	4
Gross beta	13	±	2
99-Tc	0.8	±	0.300
234-U	0.4	±	0.100
235-U	0	±	0.030
238-U	0.5	±	0.100
40-K	10.3	±	1.530
51-Cr	58.4 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.4	±	0.145
228-Th	0.5	±	0.099
232-Th	0.9	±	0.308

Table E-14. Vadose Zone Soil Borehole 2. (2 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YW3 (14 to 15.8 ft depth)			
Gross alpha	1	±	4
Gross beta	13	±	3
99-Tc	0.3	±	0.4
234-U	0.6	±	0.1
235-U	0	±	0
238-U	0.5	±	0.1
40-K	10.4	±	1.7
51-Cr	61.2 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.3	±	0.1
228-Th	0.6	±	0.1
232-Th	0.5	±	0.3
Sample Number B00YW5 (19.25 to 20.15 ft depth)			
Gross alpha	2	±	4
Gross beta	16	±	3
99-Tc	0.3	±	0.2
234-U	0.4	±	0.1
235-U	0	±	0
238-U	0.4	±	0.1
40-K	11.3	±	1.6
51-Cr	61.7 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.3	±	0.1
228-Th	0.6	±	0.1
232-Th	0.5	±	0.3

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YW8 (24 to 24.5 ft depth)			
Gross alpha	4	±	4
Gross beta	14	±	2
99-Tc	1	±	1
234-U	0.5	±	0.1
235-U	0	±	0
238-U	0.5	±	0.1
40-K	10.6	±	1.8
51-Cr	69.2 U		
60-Co	0.2 U		
65-Zn	0.3 U		
134-Cs	0.2 U		
137-Cs	0.1 U		
226-Ra	0.3	±	0.2
228-Th	0.5	±	0.2
232-Th	0.5	±	0.4

Table E-15. Vadose Zone Soil Borehole 3. (3 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00V55 (0 to 2 ft depth)			
Gross alpha	10	±	5
Gross beta	52	±	3
99-Tc	176	±	9
234-U	1.6	±	0.2
235-U	0.2 U		
238-U	1.5	±	0.2
40-K	13.1	±	0.7
137-Cs	0 U		
226-Ra	0.5	±	0.1
228-Th	0.7	±	0
232-Th	0.7	±	0.1
Sample Number B00V56 (4 to 6 ft depth)			
Gross alpha	2	±	6
Gross beta	14	±	3
99-Tc	3.8	±	0.2
234-U	0.6	±	0.1
235-U	0.1 U		
238-U	0.8	±	0.1
40-K	9.2	±	0.7
137-Cs	0	±	0
226-Ra	0.3	±	0.1
228-Th	0.3	±	0
232-Th	0.5	±	0.1

Analyte	pCi/g		2 Standard Deviation
Sample Number B00V57 (10 to 11 ft depth)			
Gross alpha	3	±	4
Gross beta	15	±	2
99-Tc	0.5 U		
234-U	0.5	±	0.1
235-U	0.1 U		
238-U	0.5	±	0.1
40-K	8.3	±	0.7
137-Cs	0 U		
226-Ra	0.3	±	0.1
228-Th	0.4	±	0
232-Th	0.4	±	0.1
Sample Number B00V58 (Equipment Blank)			
Gross alpha	2	±	2
Gross beta	9	±	2
99-Tc	0.5 U		
234-U	0.3	±	0.1
235-U	0.1 U		
238-U	0.2	±	0.1
40-K	4.8	±	0.4
137-Cs	0		
226-Ra	0.1	±	0
228-Th	0.1	±	0
232-Th	0.1	±	0.1

Table E-15. Vadose Zone Soil Borehole 3. (3 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00V59 (14.5 to 15.5 ft depth)			
Gross alpha	7	±	6
Gross beta	12	±	3
99-Tc	0.2 U		
234-U	0.5	±	0.1
235-U	0.1 U		
238-U	0.4	±	0.1
40-K	7.6	±	0.7
137-Cs	0 U		
226-Ra	0.3	±	0.1
228-Th	0.3	±	0
232-Th	0.3	±	0.1
Sample Number B00V60 (Field Blank)			
Gross alpha	2	±	3
Gross beta	9	±	2
99-Tc	0.3		
234-U	2	±	1
235-U	1 U		
238-U	2 U		
40-K	6	±	0.6
137-Cs	0 U		
226-Ra	0.2	±	0.1
228-Th	0.2	±	0
232-Th	0.2	±	0.1

Analyte	pCi/g		2 Standard Deviation
Sample Number B00V61 (19 to 20.2 ft depth)			
Gross alpha	0	±	4
Gross beta	10	±	3
99-Tc	0.2 U		
234-U	0.4	±	0.1
235-U	0.1 U		
238-U	0.3	±	0.1
40-K	8.4	±	0.7
137-Cs	0 U		
226-Ra	0.3	±	0.1
228-Th	0.3	±	0
232-Th	0.3	±	0.1
Sample Number B00V62 (24 to 25 ft depth)			
Gross alpha	2	±	5
Gross beta	10	±	2
99-Tc	0.3 U		
234-U	0.4	±	0.1
235-U	0.1 U		
238-U	0.4	±	0.1
40-K	9.2	±	0.7
137-Cs	0 U		
226-Ra	0.3	±	0.6
228-Th	0.5	±	0
232-Th	0.4	±	0.1

Table E-15. Vadose Zone Soil Borehole 3. (3 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00V63 (24 to 25 ft depth)			
Gross alpha	3	±	6
Gross beta	14	±	3
99-Tc	0.5	±	0.1
234-U	0.5	±	0.1
235-U	0.1 U		
238-U	0.5	±	0.1
40-K	9	±	0.7
137-Cs	0 U		
226-Ra	0.3	±	0
228-Th	0.5	±	0.1
232-Th	0.5	±	0.2

Table E-16. Vadose Zone Soil Borehole 4. (2 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00V70 (0 to 2 ft depth)			
Gross alpha	7	±	2
Gross beta	16	±	2
99-Tc	2.8	±	0.5
234-U	0.8	±	0.2
235-U	0.1 U		
238-U	0.8	±	0.1
40-K	15.1	±	0.7
51-Cr	1.1 U		
60-Co	0 U		
65-Zn	0 U		
134-Cs	0 U		
137-Cs	0 U		
226-Ra	0.7	±	0.1
228-Th	1	±	0
232-Th	0.9	±	0.1
U-235	0.1	±	0.1
Sample Number B00V71 (4 to 6 ft depth)			
Gross alpha	7	±	3
Gross beta	15	±	2
99-Tc	0.4 U		
234-U	0.6	±	0.1
235-U	0.1 U		
238-U	0.6	±	0.1
40-K	9.4	±	0.6
51-Cr	1.2 U		
60-Co	0 U		
65-Zn	0.1 U		
134-Cs	0 U		
137-Cs	0 U		
226-Ra	0.343	±	0.1
228-Th	0.625	±	0.1
232-Th	0.417	±	0.1

Analyte	pCi/g		2 Standard Deviation
Sample Number B00V72 (9 to 10.5 ft depth)			
Gross alpha	0	±	4
Gross beta	14	±	2
99-Tc	0.2	±	0.1
234-U	0.4	±	0.1
235-U	0	±	0
238-U	0.5	±	0.1
40-K	9.4	±	0.7
51-Cr	29.9 U		
60-Co	0 U		
65-Zn	0.1 U		
134-Cs	0 U		
137-Cs	0 U		
226-Ra	0.4	±	0.1
228-Th	0.5	±	0.1
232-Th	0.5	±	0.2
Sample Number B00V73 (Field Blank)			
Gross alpha	2	±	3
Gross beta	7	±	2
99-Tc	0.4	±	0.2
234-U	0.2	±	0.1
235-U	0	±	0
238-U	0.2	±	0.1
40-K	6.3	±	0.7
51-Cr	32.8 U		
60-Co	0		
65-Zn	0.1 U		
134-Cs	0 U		
137-Cs	0 U		
226-Ra	0.2	±	0.1
228-Th	0.2	±	0.1
232-Th	0.1	±	0.1

Table E-16. Vadose Zone Soil Borehole 4. (2 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00V75 (14 to 14.5 ft depth)			
Gross alpha	6	±	5
Gross beta	16	±	2
99-Tc	0.2	±	0.1
234-U	0.5	±	0.1
235-U	0	±	0
238-U	0.5	±	0.1
40-K	10	±	0.7
51-Cr	27.7 U		
60-Co	0 U		
65-Zn	0.1 U		
134-Cs	0 U		
137-Cs	0 U		
226-Ra	0.3	±	0.1
228-Th	0.4	±	0
232-Th	0.5	±	0.2
Sample Number B00V76 (Equipment Blank)			
Gross alpha	0	±	4
Gross beta	8	±	2
99-Tc	0.2	±	0.3
234-U	0.3	±	0.1
235-U	0	±	0
238-U	0.3	±	0.1
40-K	4.8	±	0.7
51-Cr	41.4 U		
60-Co	0 U		
65-Zn	0.2 U		
134-Cs	0 U		
137-Cs	0 U		
226-Ra	0.1	±	0.1
228-Th	0.3	±	0.1
232-Th	0.2	±	0.2

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YS7 (19 to 20 ft depth)			
Gross alpha	4	±	4
Gross beta	15	±	3
99-Tc	0.4	±	0.2
234-U	0.3	±	0.1
235-U	0	±	0
238-U	0.4	±	0.1
40-K	10.5	±	0.9
51-Cr	37.5 U		
60-Co	0 U		
65-Zn	0.2 U		
134-Cs	0 U		
137-Cs	0 U		
226-Ra	0.4	±	0.1
228-Th	0.5	±	0.1
232-Th	0.3	±	0.2
Sample Number B00YT1 (24.6 to 25.6 ft depth)			
Gross alpha	6	±	4
Gross beta	15	±	2
99-Tc	0.2	±	0.1
234-U	0.4	±	0.1
235-U	0	±	0
238-U	0.4	±	0.1
40-K	10.7	±	0.9
51-Cr	32.8 U		
60-Co	0 U		
65-Zn	0.2 U		
134-Cs	0 U		
137-Cs	0 U		
226-Ra	0.3	±	0.1
228-Th	0.5	±	0.1
232-Th	0.4	±	0.2

Table E-17. Vadose Zone Soil Borehole 5. (3 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YX2 (0 to 2 ft depth)			
Gross alpha	3	±	5
Gross beta	17	±	2
99-Tc	0.2	±	0.1
234-U	0.5	±	0.1
235-U	0	±	0
238-U	0.4	±	0.1
40-K	10.5	±	2
51-Cr	83.9 U		
60-Co	0.1 U		
65-Zn	0.5 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.6	±	0.2
228-Th	0.9	±	
232-Th	0.8 U		
Sample Number B00YX6 (3.9 to 5.9 ft depth)			
Gross alpha	5	±	4
Gross beta	17	±	2
99-Tc	0.2	±	0.1
234-U	0.7	±	0.1
235-U	0	±	0
238-U	0.6	±	0.1
40-K	12.3	±	2
51-Cr	87 U		
60-Co	0.2 U		
65-Zn	0.5 U		
134-Cs	0.2 U		
137-Cs	0.1 U		
226-Ra	0.7	±	0.2
228-Th	0.7	±	0.1
232-Th	0.6	±	0.4

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YX8 (10.5 to 12.5 ft depth)			
Gross alpha	12	±	6
Gross beta	23	±	3
99-Tc	2	±	0.8
234-U	0.5	±	0.1
235-U	0	±	0
238-U	0.6	±	0.1
40-K	13.8	±	2
51-Cr	68.7 U		
60-Co	0.2 U		
65-Zn	0.5 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.7	±	0.2
228-Th	1	±	0.1
232-Th	1.1	±	0.4
Sample Number B00YY1 (14.8 to 16.1 ft depth)			
Gross alpha	6.8	±	4.7
Gross beta	15	±	2
99-Tc	0.1	±	0.2
234-U	0.5	±	0.1
235-U	0	±	0
238-U	0.6	±	0.1
40-K	8.4	±	1.4
51-Cr	47 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.3	±	0.1
228-Th	0.5	±	0.1
232-Th	0.5	±	0.3

Table E-17. Vadose Zone Soil Borehole 5. (3 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YY5 (19.9 to 21.1 ft depth)			
Gross alpha	4.8	±	4
Gross beta	16	±	2
99-Tc	0.3	±	2.3
234-U	0.4	±	0.1
235-U	0	±	0
238-U	0.5	±	0.1
40-K	11.2	±	1.8
51-Cr	56.6 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.3	±	0.1
228-Th	0.4	±	0.1
232-Th	0.7	±	0.3
Sample Number B00YY6 (24 to 24.8 ft depth)			
Gross alpha	3.8	±	3.9
Gross beta	15	±	2
99-Tc	0.1	±	0.1
234-U	0.4	±	0.1
235-U	0	±	0
238-U	0.4	±	0.1
40-K	9.3	±	1.8
51-Cr	55.6 U		
60-Co	0.1 U		
65-Zn	0.4 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.3	±	0.2
228-Th	0.7	±	0.2
232-Th	0.8	±	0.5

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YY9 (29.5 to 31 ft depth)			
Gross alpha	3.6	±	4.2
Gross beta	15	±	2
99-Tc	1.5	±	0.2
234-U	0.5	±	0.1
235-U	0	±	0
238-U	0.5	±	0.1
40-K	12.4	±	1.9
51-Cr	63.7 U		
60-Co	0.1 U		
65-Zn	0.4 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.5	±	0.2
228-Th	0.6	±	0.2
232-Th	0.5	±	0.4
Sample Number B00YZ0 (34.7 to 35.6 ft depth)			
Gross alpha	9	±	4.8
Gross beta	18	±	3
99-Tc	1.3	±	0.2
234-U	0.4	±	0.1
235-U	0	±	0
238-U	0.5	±	0.1
40-K	9.4	±	1.6
51-Cr	44.7 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0 U		
226-Ra	0.5	±	0.2
228-Th	0.6	±	0.1
232-Th	0.7	±	0.3

Table E-17. Vadose Zone Soil Borehole 5. (3 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YZ3 (39 to 40.2 ft depth)			
Gross alpha	3.9	±	3.7
Gross beta	14	±	2
99-Tc	1.3	±	0.2
234-U	0.3	±	0.1
235-U	0	±	0
238-U	0.5	±	0.1
40-K	10	±	0.8
51-Cr	20.4 U		
60-Co	0 U		
65-Zn	0.2 U		
134-Cs	0.1 U		
137-Cs	0 U		
226-Ra	0.4	±	0.1
228-Th	0.5	±	0.1
232-Th	0.5	±	0.2
Sample Number B00YZ5 (44 to 45.2 ft depth)			
Gross alpha	2.9	±	2.2
Gross beta	11.9	±	2
99-Tc	0.3	±	0.1
234-U	0.8	±	0.2
235-U	0	±	0
238-U	0.8	±	0.2
40-K	9.3	±	1.4
51-Cr	44.3 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.4	±	0.1
228-Th	0.4	±	0.1
232-Th	0.5	±	0.3

Analyte	pCi/g		2 Standard Deviation
Sample Number B014X3 (49.8 to 51.8 ft depth)			
Gross alpha	3	±	2.1
Gross beta	9.9	±	1.9
99-Tc	0.2	±	0.1
234-U	0.6	±	0.1
235-U	0	±	0
238-U	0.5	±	0.1
40-K	11.1	±	1.6
51-Cr	47.4 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.4	±	0.1
228-Th	0.5	±	0.1
232-Th	0.5 U		
Sample Number B014X5 (55 to 56.9 ft depth)			
Gross alpha	3.7	±	1.8
Gross beta	5.1	±	1.6
99-Tc	0.5	±	0.4
234-U	0.5	±	0.1
235-U	0	±	0
238-U	0.5	±	0.1
40-K	10.2	±	1.7
51-Cr	56.3 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.4	±	0.1
228-Th	0.6	±	0.1
232-Th	0.8	±	0.4

Table E-18. Vadose Zone Soil Borehole 6. (3 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YV9 (0 to 2 ft depth)			
Gross alpha	7	±	5
Gross beta	11	±	4
99-Tc	0.3	±	0.3
234-U	0.7	±	0.2
235-U	0	±	0.1
238-U	0.6	±	0.1
40-K	5.3	±	1.5
51-Cr	78.8 U		
60-Co	0.1 U		
65-Zn	0.4 U		
134-Cs	0.1 U		
137-Cs	0.2	±	0.1
226-Ra	0.6	±	0.2
228-Th	0.5	±	0.1
232-Th	0.8	±	0.3
Sample Number B00YW4 (Equipment Blank)			
Gross alpha	0	±	4
Gross beta	5	±	2
99-Tc	0.2	±	0.1
234-U	0.2	±	0.1
235-U	0	±	0
238-U	0.2	±	0.1
40-K	5.2	±	1.5
51-Cr	74.4 U		
60-Co	0.1 U		
65-Zn	0.4 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.2 U		
228-Th	0.2	±	0.1
232-Th	0.5	U	

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YW6 (10 to 11.5 ft depth)			
Gross alpha	10	±	5
Gross beta	2	±	2
99-Tc	0.2	±	0.1
234-U	0.7	±	0.1
235-U	0	±	0
238-U	0.7	±	0.1
40-K	14.7	±	2.2
51-Cr	96.6 U		
60-Co	0.1 U		
65-Zn	0.5 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.5	±	0.2
228-Th	1	±	0.2
232-Th	1.3	±	0.4
Sample Number B00YW7 (10 to 11.5 ft depth)			
Gross alpha	4	±	5
Gross beta	21	±	2
99-Tc (low chemical yield)	3	±	1.7
234-U	0.5	±	0.1
235-U	0.1	±	0.1
238-U	0.6	±	0.1
40-K	13.2	±	2.4
51-Cr	116.4 U		
60-Co	0.2 U		
65-Zn	0.7 U		
134-Cs	0.2 U		
137-Cs	0.1 U		
226-Ra	0.5	±	0.3
228-Th	1.3	±	0.3
232-Th	0.9 U		

Table E-18. Vadose Zone Soil Borehole 6. (3 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YW9 (13 to 14 ft depth)			
Gross alpha	2	±	4
Gross beta	18	±	2
99-Tc	0.7	±	0.4
234-U	0.6	±	0.1
235-U	0	±	0
238-U	0.5	±	0.1
40-K	11.2	±	1
51-Cr	30.6 U		
60-Co	0.1 U		
65-Zn	0.2 U		
134-Cs	0.1 U		
137-Ca	0.1 U		
226-Ra	0.5	±	0.1
228-Th	0.8	±	0.1
232-Th	0.8	±	0.3
Sample Number B00YX0 (14.5 to 15 ft depth)			
Gross alpha	6	±	5
Gross beta	14	±	2
99-Tc	0.5	±	0.5
234-U	0.4	±	0.1
235-U	0	±	0
238-U	0.4	±	0.1
40-K	9.3	±	1.5
51-Cr	63.7 U		
60-Co	0.1 U		
65-Zn	0.4 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.4	±	0.1
228-Th	0.4	±	0.1
232-Th	0.5	±	0.3

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YX1 (19.25 to 20 ft depth)			
Gross alpha	3	±	4
Gross beta	14	±	2
99-Tc	0.1	±	0.1
234-U	0.5	±	0.1
235-U	0	±	0
238-U	0.4	±	0.1
40-K	8.9	±	1.3
51-Cr	43.7 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Ca	0.1 U		
226-Ra	0.3	±	0.1
228-Th	0.5	±	0.1
232-Th	0.4	±	0.3
Sample Number B00YX3 (24 to 25 ft depth)			
Gross alpha	3	±	4
Gross beta	13	±	2
99-Tc	0.3	±	0.3
234-U	0.5	±	0.1
235-U	0	±	0
238-U	0.4	±	0.1
40-K	10.9	±	1.9
51-Cr	61.2 U		
60-Co	0.1 U		
65-Zn	0.4 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.4	±	0.2
228-Th	0.5	±	0.1
232-Th	0.6	±	0.3

Table E-18. Vadose Zone Soil Borehole 6. (3 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YX7 (29 to 30 ft depth)			
Gross alpha	5	±	4
Gross beta	14	±	2
99-Tc	0.2	±	0.1
234-U	0.4	±	0.1
235-U	0	±	0
238-U	0.4	±	0.1
40-K	9.9	±	1.7
51-Cr	52.4 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.3	±	0.1
228-Th	0.4	±	0.1
232-Th	0.6	±	0.3

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YY2 (Equipment Blank)			
Gross alpha	0	±	4
Gross beta	3	±	2
99-Tc	0.4	±	0.4
234-U	0.3	±	0.1
235-U	0	±	0
238-U	0.2	±	0.1
40-K	7.8	±	1.6
51-Cr	0.6 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.2	±	0.1
228-Th	0.2	±	0.1
232-Th	0.4	±	0.2

Table E-19. Vadose Zone Soil Borehole 7. (2 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00V64 (0 to 2 ft depth)			
Gross alpha	6	±	4
Gross beta	20	±	2
99-Tc	0.4 U		
234-U	0.6	±	0.1
235-U	0.1 U		
238-U	0.6	±	0.1
40-K	10.6	±	0.8
51-Cr	1.8 U		
60-Co	0 U		
65-Zn	0.1 U		
134-Cs	0 U		
137-Cs	0 U		
226-Ra	0.4	±	0.1
228-Th	0.6	±	0.1
232-Th	0.6	±	0.2
Sample Number B00V65 (0 to 2 ft depth)			
Gross alpha	6	±	3
Gross beta	18	±	2
99-Tc	0.4 U		
234-U	0.6	±	0.1
235-U	0.1 U		
238-U	0.5	±	0.1
40-K	9.8	±	0.9
51-Cr	2.1 U		
60-Co	0.1 U		
65-Zn	0.2 U		
134-Cs	0.1 U		
137-Cs	0 U		
226-Ra	0.5	±	0.1
228-Th	0.7	±	0.1
232-Th	0.6	±	0.2

Analyte	pCi/g		2 Standard Deviation
Sample Number B00V66 (4 to 6 ft depth)			
Gross alpha	4	±	3
Gross beta	17	±	2
99-Tc	0.5 U		
234-U	0.5	±	0.1
235-U	0.1 U		
238-U	0.5	±	0.1
40-K	8.9	±	0.7
51-Cr	1.6 U		
60-Co	0 U		
65-Zn	0.1 U		
134-Cs	0 U		
137-Cs	0 U		
226-Ra	0.3	±	0.1
228-Th	0.6	±	0.1
232-Th	0.5	±	0.2
Sample Number B00V67 (9.5 to 11.5 ft depth)			
Gross alpha	6	±	3
Gross beta	16	±	2
99-Tc	0.4 U		
234-U	0.5	±	0.1
235-U	0.1 U		
238-U	0.5	±	0.1
40-K	11.6	±	0
51-Cr	2.2 U		
60-Co	0 U		
65-Zn	0.2 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.6	±	0.1
228-Th	0.9	±	0.1
232-Th	0.6	±	0.2

Table E-19. Vadose Zone Soil Borehole 7. (2 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00V74 (14 to 15 ft depth)			
Gross alpha	3	±	4
Gross beta	13	±	2
99-Tc	0.2	±	0.2
234-U	0.4	±	0.1
235-U	0	±	0
238-U	0.4	±	0.1
40-K	10.4	±	0.9
51-Cr	35.3 U		
60-Co	0 U		
65-Zn	0.2 U		
134-Cs	0 U		
137-Cs	0 U		
226-Ra	0.3	±	0.1
228-Th	0.5	±	0.1
232-Th	0.6	±	0.2
Sample Number B00YT0 (19 to 19.9 ft depth)			
Gross alpha	5	±	4
Gross beta	12	±	2
99-Tc	0.2	±	0.4
234-U	0.4	±	0.1
235-U	0	±	0
238-U	0.4	±	0.1
40-K	11.6	±	1
51-Cr	37.8 U		
60-Co	0.1 U		
65-Zn	0.2 U		
134-Cs	0.1 U		
137-Cs	0 U		
226-Ra	0.4	±	0.1
228-Th	0.5	±	0.1
232-Th	0.4	±	0.2

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YT3 (24.5 to 25.5 ft depth)			
Gross alpha	3	±	4
Gross beta	16	±	2
99-Tc	0.4	±	0.1
234-U	0.4	±	0.1
235-U	0	±	0
238-U	0.5	±	0.1
40-K	11.3	±	0.8
51-Cr	33.2 U		
60-Co	0.1 U		
65-Zn	0.2 U		
134-Cs	0.1 U		
137-Cs	0 U		
226-Ra	0.4	±	0.1
228-Th	0.6	±	0.1
232-Th	0.6	±	0.1
Sample Number B00YT4 (29.5 to 30.4 ft depth)			
Gross alpha	7	±	5
Gross beta	14	±	2
99-Tc	0.4	±	0.2
234-U	0.5	±	0.1
235-U	0	±	0
238-U	0.5	±	0.1
40-K	9.9	±	0.8
51-Cr	28.3 U		
60-Co	0 U		
65-Zn	0.1 U		
134-Cs	0 U		
137-Cs	0 U		
226-Ra	0.4	±	0.1
228-Th	0.5	±	0
232-Th	0.4	±	0.1

Table E-20. Vadose Zone Soil Borehole 8. (3 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00V77 (0 to 2 ft depth)			
Gross alpha	8	±	4
Gross beta	19	±	3
99-Tc	0.4	±	0.5
234-U	0.5	±	0.1
235-U	0	±	0
238-U	0.5	±	0.1
40-K	10.3	±	0.7
51-Cr	32.1 U		
60-Co	0 U		
65-Zn	0.2 U		
134-Cs	0 U		
137-Cs	0 U		
226-Ra	0.4	±	0.1
228-Th	0.7	±	0.1
232-Th	0.1	±	0.2
Sample Number B00YS6 (0 to 2 ft depth)			
Gross alpha	6	±	5
Gross beta	18	±	2
99-Tc	0.6	±	0.3
234-U	0.4	±	0.1
235-U	0	±	0
238-U	0.4	±	0.1
40-K	9.9	±	0.7
51-Cr	30.6 U		
60-Co	0 U		
65-Zn	0.1 U		
134-Cs	0 U		
137-Cs	0 U		
226-Ra	0.4	±	0.1
228-Th	0.6	±	0.1
232-Th	0.6	±	0.1

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YS8 (4 to 6 ft depth)			
Gross alpha	5	±	4
Gross beta	16	±	3
99-Tc	0.4	±	0.1
234-U	0.5	±	0.1
235-U	0	±	0
238-U	0.5	±	0.1
40-K	11.4	±	0.9
51-Cr	38.3 U		
60-Co	0 U		
65-Zn	0.2 U		
134-Cs	0.1 U		
137-Cs	0 U		
226-Ra	0.4	±	0.1
228-Th	0.7	±	0.1
232-Th	0.7	±	0.2
Sample Number B00YT2 (9.5 to 11.2 ft depth)			
Gross alpha	6	±	4
Gross beta	19	±	2
99-Tc	0.2	±	0.1
234-U	0.4	±	0.1
235-U	0	±	0
238-U	0.4	±	0.1
40-K	16	±	1
51-Cr	37.2 U		
60-Co	0 U		
65-Zn	0.2 U		
134-Cs	0.1 U		
137-Cs	0 U		
226-Ra	0.5	±	0.1
228-Th	0.7	±	0.1
232-Th	0.7	±	0.2

Table E-20. Vadose Zone Soil Borehole 8. (3 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YT5 (14 to 15.5 ft depth)			
Gross alpha	2	±	4
Gross beta	10	±	2
99-Tc	0.2	±	0.2
234-U	0.4	±	0.1
235-U	0	±	0
238-U	0.4	±	0.1
40-K	11.1	±	0.8
51-Cr	31.9 U		
60-Co	0 U		
65-Zn	0.2 U		
134-Cs	0.1 U		
137-Cs	0 U		
226-Ra	0.4	±	0.1
228-Th	0.6	±	0.1
232-Th	0.6	±	0.2
Sample Number B00YT6 (Field Blank)			
Gross alpha	0	±	3
Gross beta	7	±	2
99-Tc	0.2	±	0.1
234-U	0.1	±	0.1
235-U	0	±	0
238-U	0.2	±	0.1
40-K	5.6	±	0.7
51-Cr	27.8 U		
60-Co	0 U		
65-Zn	0.2 U		
134-Cs	0 U		
137-Cs	0 U		
226-Ra	0.1	±	0.1
228-Th	0.2	±	0
232-Th	0.3	±	0.2

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YT7 (Trip Blank)			
Gross alpha	6	±	4
Gross beta	12	±	2
99-Tc	0.5	±	0.3
234-U	0.3	±	0.1
235-U	0	±	0
238-U	0.3	±	0.1
40-K	6	±	1.4
51-Cr	0.9 U		
60-Co	0.1 U		
65-Zn	0.4 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.2	±	0.2
228-Th	0.3	±	0.1
232-Th	0.6		
Sample Number B00YT8 (19.4 to 19.9 ft depth)			
Gross alpha	0	±	3
Gross beta	1	±	2
99-Tc	0.2	±	0.1
234-U	0.4	±	0.1
235-U	0	±	0
238-U	0.5	±	0.1
40-K	11.5	±	0.9
51-Cr	30.4 U		
60-Co	0.1 U		
65-Zn	0.2 U		
134-Cs	0.1 U		
137-Cs	0 U		
226-Ra	0.3	±	0.1
228-Th	0.6	±	0.1
232-Th	0.6	±	0.2

Table E-20. Vadose Zone Soil Borehole 8. (3 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YT9 (23.8 to 25.1 ft depth)			
Gross alpha	2	±	4
Gross beta	1	±	2
99-Tc	0.1	±	0.1
234-U	0.5	±	0.1
235-U	0	±	0
238-U	0.5	±	0.1
40-K	9.3	±	1.5
51-Cr	69.3 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0.8 U		
226-Ra	0.4	±	0.2
228-Th	0.6	±	0.2
232-Th	0.6	±	0.3
Sample Number B00YV4 (29.8 to 31.3 ft depth)			
Gross alpha	6	±	4
Gross beta	13	±	2
99-Tc	0.2	±	0.1
234-U	0.4	±	0.1
235-U	0	±	0.2
238-U	0.4	±	0.1
40-K	8.5	±	1.3
51-Cr	74.3 U		
60-Co	0.1 U		
65-Zn	0.4 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.3	±	0.1
228-Th	0.7	±	0.2
232-Th	0.6	±	0.4

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YV5 (Field Blank)			
Gross alpha	0	±	3
Gross beta	3	±	2
99-Tc	0.2	±	0.1
234-U	0.2	±	0.1
235-U	-0	±	0
238-U	0.2	±	0.1
40-K	6.5	±	1.4
51-Cr	59		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.2	±	0.1
228-Th	0.2	±	0.1
232-Th	0.3	±	0.3
Sample Number B00YW0 (Equipment Blank)			
Gross alpha	3	±	3
Gross beta	3	±	2
99-Tc	0.3	±	0.1
234-U	0.1	±	0.1
235-U	0	±	0
238-U	0.2	±	0.1
40-K	6.1	±	1.6
51-Cr	81 U		
60-Co	0.1 U		
65-Zn	0.4 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.2	±	0.2
228-Th	0.3	±	0.2
232-Th	0.5 U		

Table E-21. Vadose Zone Soil Borehole 9. (3 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YY7 (0 to 2 ft depth)			
Gross alpha	8.5	±	4.6
Gross beta	19	±	2
99-Tc	1.4	±	0.2
234-U	0.6	±	0.1
235-U	0	±	0
238-U	0.6	±	0.1
40-K	12.3	±	2.3
51-Cr	94.7		
60-C0	0.2 U		
65-Zn	0.6 U		
134-Cs	0.2 U		
137-Cs	0.2 U		
226-Ra	0.6	±	0.3
228-Th	1.3	±	0.3
232-Th	1.1	±	0.9
Sample Number B00YY8 (4 to 6 ft depth)			
Gross alpha	2.9	±	3.8
Gross beta	14	±	2
99-Tc	1.5	±	0.4
234-U	0.6	±	0.1
235-U	0	±	0
238-U	0.8	±	0.1
40-K	10.5	±	1.6
51-Cr	56.3 U		
60-Co	0.1 U		
65-Zn	0.4 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.5	±	0.1
228-Th	0.6	±	0.2
232-Th	0.4	±	0.3
(No chemical data. Radiological only)			

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YZ1 (9 to 11 ft depth)			
Gross alpha	8.5	±	4.7
Gross beta	16	±	2
99-Tc	1.5	±	0.2
234-U	0.5	±	0.1
235-U	0	±	0
238-U	0.5	±	0.1
40-K	10.6	±	1.6
51-Cr	55.6 U		
60-C0	0.1 U		
65-Zn	0.4 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.4	±	0.153
228-Th	0.7	±	0.2
232-Th	0.5	±	0.4
Sample Number B00YZ2 (14.25 to 116 ft depth)			
Gross alpha	4.3	±	4.5
Gross beta	13	±	2
99-Tc	0.1	±	0.1
234-U	0.6	±	0.1
235-U	0	±	0
238-U	0.5	±	0.1
40-K	10.3	±	1.6
51-Cr	43.1 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.4	±	0.1
228-Th	0.5	±	0.1
232-Th	0.4	±	0.3

Table E-21. Vadose Zone Soil Borehole 9. (3 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B00YZ4 (19.5 to 21.8 ft depth)			
Gross alpha	3.1	±	2.9
Gross beta	9.3	±	1.9
99-Tc	0.1	±	0.1
234-U	0.6	±	0.1
235-U	0.1	±	0
238-U	0.6	±	0.1
40-K	8.4	±	1.8
51-Cr	55.6 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.4	±	0.1
228-Th	0.7	±	0.2
232-Th	0.6	±	0.3
Sample Number B014X1 (24 to 26 ft depth)			
Gross alpha	6	±	3
Gross beta	14	±	2.1
99-Tc	0.1	±	0.1
234-U	0.6	±	0.1
235-U	0	±	0
238-U	0.7	±	0.1
40-K	8.8	±	1.4
51-Cr	51.9 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.4	±	0.2
228-Th	0.5	±	0.1
232-Th	0.4	±	0.3

Analyte	pCi/g		2 Standard Deviation
Sample Number B014X2 (30 to 32 ft depth)			
Gross alpha	2.9	±	2.4
Gross beta	14	±	2.2
99-Tc	0.1	±	0.2
234-U	0.5	±	0.1
235-U	0	±	0
238-U	0.6	±	0.1
40-K	11.1	±	1.7
51-Cr	51 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0 U		
226-Ra	0.3	±	0.
228-Th	0.5	±	0.2
232-Th	0.4	±	0.3
Sample Number B014X4 (34 to 34.75 ft depth)			
Gross alpha	5	±	2.9
Gross beta	11.3	±	2
99-Tc	0	±	0
234-U	1.4	±	0.2
235-U	0.1	±	0.1
238-U	1.8	±	0.2
40-K	10.2	±	1.5
51-Cr	50.4 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.3	±	0.1
228-Th	0.7	±	0.1
232-Th	0.6	±	0.3

Table E-21. Vadose Zone Soil Borehole 9. (3 sheets)

Analyte	pCi/g		2 Standard Deviation
Sample Number B014X6 (39 to 41 ft depth)			
Gross alpha	7.2	±	0.3
Gross beta	8.6	±	2
99-Tc	0.2	±	0.1
234-U	0.9	±	0.2
235-U	0.1	±	0
238-U	0.9	±	0.2
40-K	10.9	±	1.2
51-Cr	54 U		
60-Co	0.1 U		
65-Zn	0.3 U		
134-Cs	0.1 U		
137-Cs	0.1 U		
226-Ra	0.5	±	0.2
228-Th	1	±	0.2
232-Th	0.9	±	0.3
226-Ra	0.4		0.1
228-Th	0.7		0.3
232-Th	0.6		0.2

Table E-22. Split Sample Radiochemistry Data.

Sample Numbers	Alpha			Beta			Cesium-137			Protactium-234			Technetium-99			Thorium-234			U-Alpha		
	pCi/g	+/-		pCi/g	+/-		pCi/g	+/-		pCi/g	+/-		pCi/g	+/-		pCi/g	+/-		pCi/g	+/-	
B00V68	-3.4	20		0	32		-0.1	4.3	R	221	710	R	174 C	250		37.1	56	R			
B00V69	1.1	2.6		0	4.3		0.1	0.2		44.9	37		15.9	74		0.8	4.6		0.5	0.3	R
B00V69 (matrix spike)	45.4	6.9		112	8.8								9,170	212					31.1	2.1	R
B00V69 (matrix spike duplicate)	38	6.3		103	8.5								9,650	217					32	2	
B00YS9	-1	2.7	R	-11.8	4.2	R	0.2	0.2		-8.4	39		55	25		-6.2	3.8		0.2	0.2	R
B00YV0	-1.2	2.7	R	3.1	4.3	R	0.1	0.3		31.9	44		47.3	21.9		12.2	2.7		0.2	0.2	R
B00YV0 (matrix spike)	27	4.7	R	76.8	6.4	R	0.2	0.2		36.3	30		2,600	73		-2.6	3.2		19.8	1.4	R
B00YV0 (matrix spike duplicate)	32.1	5.6	R	96.6	7.7	R	-0.1	0.2		-5.8	42		2,600	65		8	1.75		19.8	1.5	R
B00YW1	-1.1	2.9	R	0.1	4.5	R	0.1	0.3		56.8	42		41	35		-6.2	4.1		-0	0.1	R
B00YW1 (matrix spike)	-3.4	4	R	-4.5	6	R	0.1	0.3		34.2	47		82	38		2.8	6.1		-0	0.2	R
B00YW1 (matrix spike duplicate)	0.5	3.8	R	-4.6	4.9	R	0.4	0.3		31.9	49		67.9	34.5		-2.7	4.8		0.2	0.2	

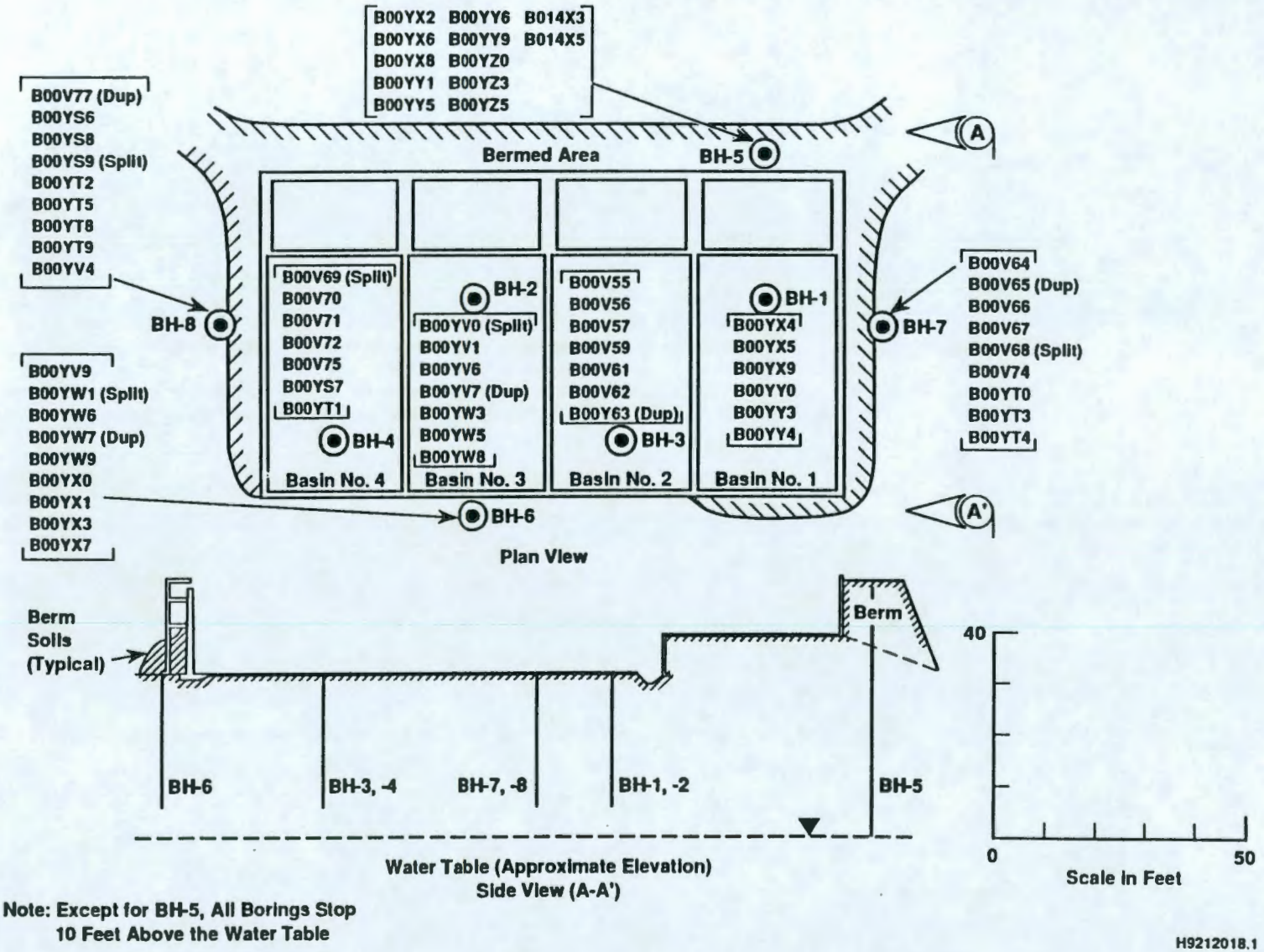
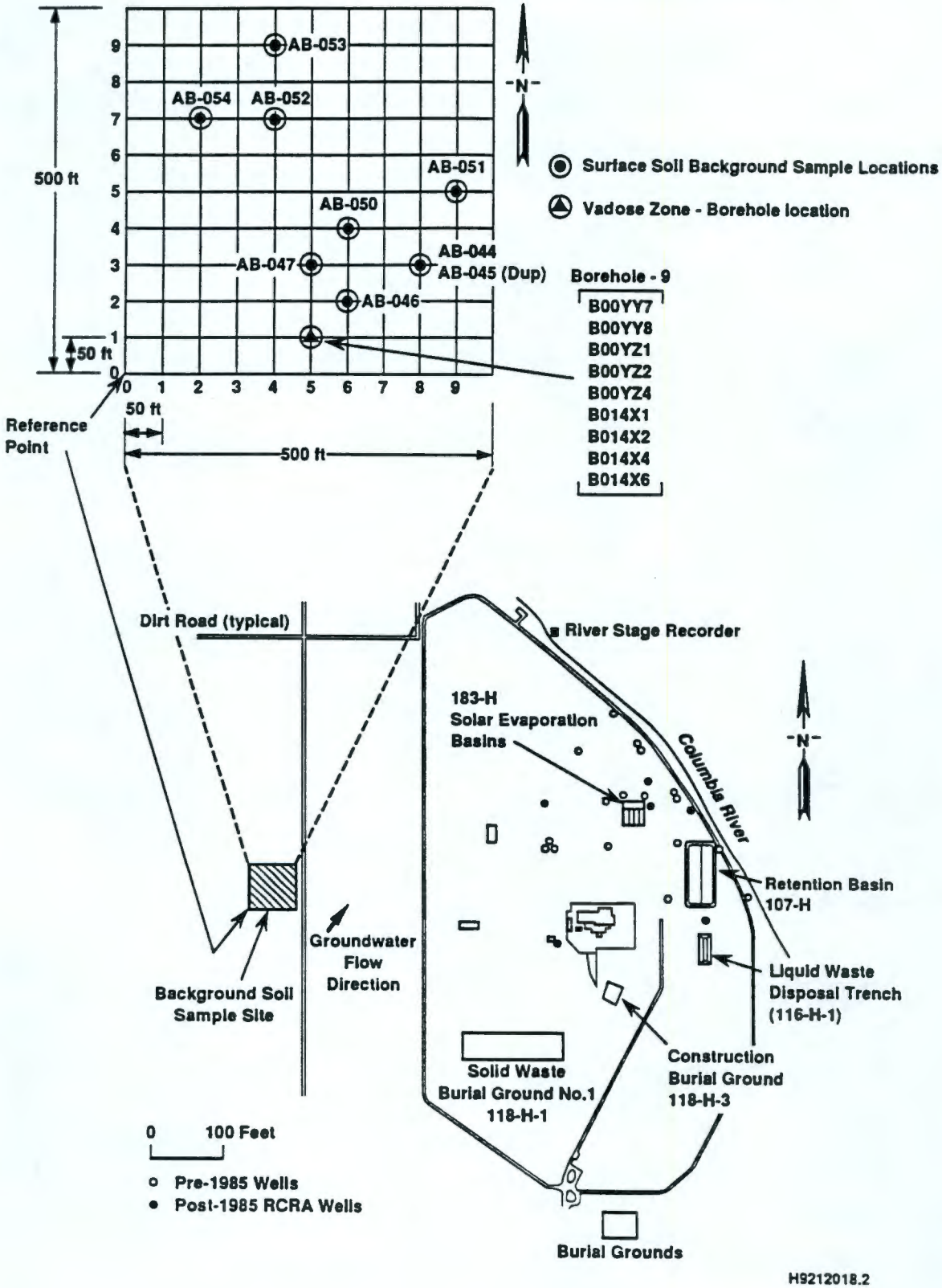


Figure E-1. Vadose Zone Borehole Locations with Sample Numbers.

Figure E-2. Local Background Sample Location, Vadose Zone Borehole.
(shallow soil local background sample locations are shown also)



APPENDIX F

CALCULATION OF *MODEL TOXICS CONTROL ACT OF 1988* SOIL CLEANUP LEVELS

(WAC 173-340-740[3][a][iii])

APPENDIX F

CALCULATION OF *MODEL TOXICS CONTROL ACT OF 1988* SOIL CLEANUP LEVELS

(WAC 173-340-740[3][a][iii])

Appendix F contains *Model Toxics Control Act* cleanup levels (Ecology 1991) and calculations. If available, oral reference doses and slope factors are obtained from the *Integrated Risk Information System* (EPA 1994). Other sources are referenced for toxicity values not in the *Integrated Risk Information System* (EPA 1994).

REFERENCES

Ecology, 1991, "Model Toxics Control Act," *Washington Administrative Code* 173-340, Washington State Department of Ecology, Olympia, Washington.

Ecology, 1994, *Dangerous Waste Portion of the Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste (Second Draft)*, Official Public Comment Version, February 2, 1994, Washington State Department of Ecology.

EPA, 1992, *Health Effects Assessment Summary Tables (HEAST)*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1994, *Integrated Risk Information System*, (IRIS), U.S. Environmental Protection Agency, Washington, D.C.

Toxicity Data and Model Toxics Control Act Soil Cleanup Levels for *Resource Conservation and Recovery Act of 1976* Closures, Nonradioactive Constituents.

Waste Identification		Toxicity Values			*Model Toxics Control Act* Cleanup Levels (mg/kg unless noted)		
Chemical Name	CAS Number[a]	Oral Chronic RfD mg/(kg*d)	Cancer Slope Factor (kg*d)/mg	RfD Updated/ Source	Method A Soil (Residential)	Method B Soil	
						Noncancer	Cancer
Copper Cyanide**	57-12-5	5.0 E-03		Mar-94[d]	250	400	
Fluorine (Soluble Fluoride)		6.0 E-02		Mar-94[d]		4,800	
Nitrite	14797-65-0	1.0 E-01		Mar-94[d]		8,000	
Nitrate		7.0 E+00		Mar-94		570,000	
Arsenic	7440-38-2	3.0 E-04	1, 8[c] 07/93	Mar-94[d]	20		1.4
Barium	7440-39-3	7.0 E-02		Mar-94[d]		5,600	
Beryllium	7440-41-7	5.0 E-03	4, 3[d] 03/94	Mar-94[d]			0.2
Cadmium	7440-43-9	5.0 E-04[b]		Mar-94[d]	2	40	
Chromium	7440-47-3			Mar-94	100		
Chromium III		1.0 E+00		Mar-94[d]		80,000	
Chromium VI		5.0 E-03		Mar-94[d]		400	
Copper	7440-50-8	3.7 E-02		Jul-93[c]		3,000	
Lead	7439-92-1				250		
Mercury	7439-97-6	3.0 E-04		Jan-92[e]	1	24	
Nickel (Soluble Salts)	7440-02-0	2.0 E-02		Jul-93[c]		1,600	
Selenium	7782-49-2	5.0 E-03		Mar-94[d]		400	
Silver	7440-22-4	5.0 E-03		Mar-94[d]		400	
Vanadium	7440-62-2	7.0 E-03		Jul-93[c]		560	
Zinc	7440-66-6	3.0 E-01		Mar-94[d]		24,000	

Equation Parameters***			
		Method B	
Parameters	Units	Noncancer	Cancer
Unit Conversion Factor (UCF)	mg/kg	1.00 E+06	1.00 E+06
Average body weight over period of exposure (ABW)	kg	16	16
Soil Ingestion Rate (SIR)	mg/day	200	200
Gastrointestinal absorption rate (ABI)		*	*
Frequency of contact (FOC)		1	1
Hazard Quotient (HQ)		1	
Lifetime (LIFE)	yrs		75
Duration of exposure (DUR)	yrs		6
Cancer risk level (RISK)			1.00 E-06

Model Toxics Control Act Equations
Noncancer Cleanup Level = RfD*(ABW * UCF * HQ)/(SIR * ABI * FOC) Cancer Cleanup Level = [(RISK * ABW * LIFE * UCF)/(SIR *ABI *BUR *FOC)]/Slope Factor
Notes
[a]CAS = Chemical Abstract System Registry Numbers, Chemical Abstract Service is a division of the American Chemical Society. [b]Based on ingestion of water. [c]Ecology (1994). [d]EPA (1994). [e]EPA (1992). * For arsenic AB1 = 0.4, for all other constituents AB1 = 1.0. ** The available oral RfD for copper cyanide is less than for the other cyanide having appropriate toxicity information. *** Ecology (1991).

DISTRIBUTION

Number of Copies

ONSITE

6	U.S. Department of Energy, Richland Operations Office	
	J. M. Bruggeman (3)	H4-83
	J. D. Goodenough	H4-83
	S. K. Johansen	B1-42
	E. M. Mattlin	A5-15
23	ERC Team	
	J. W. Badden	H4-79
	P. K. Jackson	X5-53
	T. E. Logan	H4-84
	B. W. Mathis	X5-53
	M. A. Mihalic	X5-53
	L. R. Miller (5)	X5-53
	M. A. Wasemiller (5)	H6-02
	D&D Project Files	X5-53
	BHI Document Control (3)	H4-79
	BHI Project File (3)	H4-79
	Environmental Resource Center	H6-07

THIS PAGE INTENTIONALLY
LEFT BLANK