0042031

3/28/95 Sta. 37 START 9513303.0986

ENGINEERING DATA TRANSMITTAL

1. EDT № 612829

2. To: (Receiving Organization) DISTRIBUTION	3. From: (Originating Organization) WHC RCRA Unit Closures	4. Related EDT No.: n/a
5. Proj./Prog./Dept./Div.: 304 Facility Closure	6. Cog. Engr.: J. G. Adler	7. Purchase Order No.: n/a
8. Originator Remarks: ~~None~~ Approval and Release		9. Equip./Component No.: n/a
		10. System/Bldg./Facility: n/a
11. Receiver Remarks:		12. Major Assm. Dwg. No.: n/a
		13. Permit/Permit Application No.: n/a
		14. Required Response Date: n/a

SEP 1995 RECEIVED EDMC

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	WHC-SD-EN-TI-301	n/a	0	304 Concretion Facility Closure Activities and Data Evaluation Report	E	1,2	1	

16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)

(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.
1	1	Cog.Eng. J. G. Adler	J G Adler	9/22/95	H6-23						
1	1	Cog. Mgr. F. A. Ruck III	F A Ruck III	9/22/95	H6-23						
		QA									
		Safety									
1	1	Env. F. A. Ruck III	F G Ruck III	9/22/95	H6-23						
1	1	I. L. Metcalf	I L Metcalf	8/23/95	L6-26						
1	1	J. A. Remaize	John A Remaize	8-23-95	L6-26						

18.	19.	20.	21. DOE APPROVAL (if required)
J. G. Adler J G Adler 8/22/95 Signature of EDT Originator / Date	n/a Authorized Representative for Receiving Organization / Date	F. A. Ruck III F G Ruck III 8/22/95 Cognizant Manager / Date	Ctrl. No. [ ] Approved [ ] Approved w/comments [ ] Disapproved w/comments

BD-7400-172-2 (04/94) GEF097

BD-7400-172-1

9513383.0987

SUPPORTING DOCUMENT

1. Total Pages	169 ~~172~~

2. Title	3. Number	4. Rev No.
304 CONCRETION FACILITY CLOSURE ACTIVITIES AND DATA EVALUATION REPORT	WHC-SD-EN-TI-301	0

5. Key Words	6. Author
304 Concretion Facility sampling analysis data validation data evaluation clean closure	Name: J. G. Adler Signature: Jason G. Adler Organization/Charge Code 01821 TCPN: K345B

7. Abstract

Evaluates the decontamination activities, sampling activities, sample analysis, and sample data associated with the closure activities at the 304 Concretion Facility. The evaluation compares these activities and data to the regulatory requirements for meeting clean closure. The report then concludes that clean closure can be obtained.

8. RELEASE STAMP

OFFICIAL RELEASE
BY WHC
DATE 8/28/95
Sta. 37 35

A-6400-073 (08/94) WEF124

9513383.0988

WHC-SD-EN-TI-301
Revision 0

304 Concretion Facility Closure Activities and Data Evaluation Report

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

Westinghouse
Hanford Company Richland, Washington

Management and Operations Contractor for the
U.S. Department of Energy under Contract DE-AC06-87RL10930

Approved for Public Release

RELEASE AUTHORIZATION

Document Number:	WHC-SD-EN-TI-301, Rev. 0
Document Title:	304 Concretion Facility Closure Activities and Data Evaluation Report
Release Date:	August 28, 1995

This document was reviewed following the procedures described in WHC-CM-3-4 and is:

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

T.L. Ontiveros — August 28, 1995

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304 CONCRETION FACILITY CLOSURE ACTIVITIES AND DATA EVALUATION REPORT

EXECUTIVE SUMMARY

This report summarizes and evaluates the decontamination activities, sampling activities, and sample analysis performed in support of the closure of the 304 Concretion Facility. The evaluation assesses the dangerous waste contamination for the purpose of clean closing the 304 Concretion Facility as described in the *304 Concretion Facility Closure Plan*, DOE/RL-90-03 (DOE-RL 1995a). The conclusion reached is that the 304 Concretion Facility can be clean closed.

The introduction outlines the regulatory background, provides general information about the 304 Concretion Facility, and outlines the closure strategy. The dangerous waste decontamination process then is discussed with the problem areas identified. The sampling section outlines the chronology, identifies the sample locations, discusses how the samples were collected, and identifies the one deviation from the closure plan. The numerical performance standards for the cleanup are identified and the background documents are discussed. The laboratory analysis identifies the sample types and constituents of concern, the analytical methods used on the various sample types, and discusses any limitations on those methods. The data validation of the analytical data is discussed and any discrepancies are addressed. The data sets used for the statistical analysis are identified along with which data sets were excluded. Rationale is provided for both the inclusion and exclusion of the data sets.

The data evaluation divides the 304 Concretion Facility into four components. Each component is examined relative to the inorganic and organic constituents of concern. An area of localized contamination that is below the numerical cleanup performance standards is identified. One anomalous value for lead also is identified and discussed. The evaluation concludes that the constituents of concern are either not present (organics) or are present but below the numerical cleanup performance standards (inorganics). The evaluation leads to the conclusion that the 304 Concretion Facility can be clean closed.

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GLOSSARY

CERCLA	Comprehensive Environmental Response and Liability Act
CFR	Code of Federal Regulations
COC	chain-of-custody
DOE	U.S. Department of Energy
DQO	Data Quality Objective
Ecology	Washington State Department of Ecology
EII	Environmental Investigation Instruction
EPA	U.S. Environmental Protection Agency
GC/MS	gas chromatography/mass spectroscopy
HEPA	high-efficiency particulate air
IRIS	Integrated Risk Information System
LATA	Los Alamos Technical Associates
LOQ	limit of quantitation
MDL	method detection limit
MTCA	Model Toxics Control Act
RCRA	Resource Conservation and Recovery Act
TIC	tentatively identified compound
Tri-Party Agreement	Hanford Federal Facility Agreement and Consent Order
TSD	treatment, storage, and/or disposal
VOA	Volatile Organic Analysis
WAC	Washington Administrative Code

304 CONCRETION FACILITY CLOSURE ACTIVITIES AND DATA EVALUATION REPORT

1.0 INTRODUCTION

This report summarizes and evaluates the decontamination activities, sampling activities, and sample analysis performed in support of the closure of the 304 Concretion Facility. The evaluation is based on the validated data included in the data validation package (DOE-RL 1995b) for the 304 Concretion Facility. The results of this evaluation will be used in assessing contamination for the purpose of closing the 304 Concretion Facility as described in the *304 Concretion Facility Closure Plan*, DOE/RL-90-03 (DOE-RL 1995a). Based on the evaluation of the decontamination activities, sampling activities, and sample data, it is recommended that the 304 Concretion Facility be clean closed.

The evaluation starts by discussing the dangerous waste decontamination process and identifying the problem areas. The sampling section outlines the chronology, identifies the sample locations, discusses how the samples were collected, and identifies the one deviation from the closure plan. The numerical performance standards for the cleanup are identified and the background documents are discussed. The laboratory analysis identifies the sample types and constituents of concern, the analytical methods used on the various sample types, and discusses any limitations on those methods. The data validation of the analytical data is discussed and any discrepancies are addressed. The data sets used for the statistical analysis are identified along with which data sets were excluded. Rationale is provided for both the inclusion and exclusion of the data sets.

The data evaluation divides the 304 Concretion Facility into four components. Each component is examined relative to the inorganic and organic constituents of concern. An area of localized contamination that is below the numerical cleanup performance standards is identified. One anomalous value for lead also is identified and discussed. The evaluation concludes that the constituents of concern are either not present (organics) or are present but below the numerical cleanup performance standards (inorganics). The evaluation leads to the conclusion that the 304 Concretion Facility can be clean closed.

1.1 REGULATORY BACKGROUND

The U.S. Environmental Protection Agency (EPA) and Washington State Department of Ecology (Ecology) jointly administer the *Resource Conservation and Recovery Act* (RCRA) *of 1976* in the state of Washington. The EPA retains oversight authority while delegating to Ecology enforcement of a state program that is consistent with or more stringent than the corresponding federal program. The implementing regulations are found in Title 40, *Code of Federal Regulations* (CFR), Parts 260-270 and the *Washington Administrative Code* (WAC) 173-303, "Dangerous Waste Regulations." Ecology's authorization includes administering closure of dangerous waste treatment, storage, and/or disposal (TSD) units.

The U.S. Department of Energy (DOE), the EPA, and Ecology have entered into an agreement called the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1995). This agreement affects environmental regulation on the Hanford Facility. One purpose of this agreement is to ensure that environmental impacts associated with past activities are investigated and appropriate response actions taken, as necessary, to protect human health and the environment. The agreement seeks to promote this goal, in part, by identifying TSD units, identifying which units will undergo closure, and promoting compliance with relevant RCRA permitting requirements.

1.2 TREATMENT/STORAGE UNIT INFORMATION

The 304 Concretion Facility is classified as a RCRA treatment and storage unit. A fully detailed description of the unit and its history are included in the *304 Concretion Facility Closure Plan*.

1.2.1 TSD Unit Location

The 304 Concretion Facility is situated in the northeast corner of the 300 Area near the 314 Building, 303-K Building, and 313 Building, and is located between the 303-A Building and 303-B Building, as shown in Figures 1-1 and 1-2.

1.2.2 Facility Description

The boundary of the 304 Concretion Facility is defined as being 3.05 meters (10 feet) from the exterior wall of the 304 Building. The unit consists of a sheet metal building (the 304 Building) with attached changeroom. The 304 Building rests on a concrete floor that contains an integral sump and integral trench. The 304 Building was constructed in 1952 and the changeroom was added in 1972. There are external concrete pads in-line with the building doors. An asphalt overlay has been placed around the building to fix potential radioactive soil contamination.

1.2.3 Operation as a Treatment, Storage, and/or Disposal Unit

The 304 Concretion Facility was used for various industrial purposes from 1952 until 1972. It began treating dangerous waste in 1972. The last waste treatment run occurred in the spring of 1994. The treatment activity at the 304 Concretion Facility was the concretion of pyrophoric chips and fines generated during uranium nuclear fuel fabrication operations. The concretion treatment process mixed the pyrophoric chips and fines with cement, then the mixture was cast into billets. The billets were stored in the 304 Concretion Facility until the concrete cured. After curing, the billets were either moved to other units for storage and ultimate disposal or sent offsite for recycling and recovery of the uranium. The material treated at the 304 Concretion Facility was radioactively contaminated dangerous waste and, thus, the unit was a mixed waste storage and treatment unit.

One additional waste management activity was performed at the unit during 1988. Spent solvents from the fuel fabrication process and the supporting paint shop were repackaged in the 304 Concretion Facility for disposal elsewhere.

1.2.4 Potentially Contaminated Media

Potentially contaminated media at the 304 Concretion Facility includes concrete, asphalt, the steel building structure, and the underlying soil down to 1 meter (3 feet). The concrete structures at the 304 Concretion Facility include the building foundation pad (with an integral sump and an integral trench) and the concrete pad portion of the external storage pads. The asphalt includes the asphalt pad portion of the external storage pads and the asphalt pads laid around the 304 Building to fix radiological contamination in the soil. The steel building structure includes the interior building walls and interior roof girders. To facilitate closure, the 304 Concretion Facility has been subdivided into four components: the metal building interior, the concrete floor (including the sump and trench), the external storage pad (concrete and asphalt), and the soil. These four components will be evaluated separately for closure.

1.3 CLOSURE STRATEGY

The closure strategy for the 304 Concretion Facility is to decontaminate the interior of the 304 Building to remove known or suspected contamination, then to sample for the constituents of concern, and then to perform data analysis, with an evaluation to determine the required actions to meet closure criteria. The closure criteria for the 304 Concretion Facility is that the concentrations of potentially dangerous constituents treated, stored, or used are not present above the regulatory cleanup levels.

If the potentially dangerous constituents are above action levels, then the evaluation will determine the actions required. This evaluation may consider (1) the type and extent to which the action levels are exceeded and (2) an assessment of health-based risk. Health-based risk standards for toxicity and carcinogenicity will be scientifically and technically defensible, and criteria guidance such as WAC 173-340, "Model Toxics Control Act Cleanup Regulation;" the EPA *Integrated Risk Information System (IRIS)* database (EPA 1995); and the *Risk Assessment Guidance for Superfund: Human Health Evaluation Manual* (EPA 1989); and any other appropriate information will be used. Generally, if the decontamination for dangerous consitituents is not effective, the appropriate section (building, floor, or pad) will be removed and properly disposed of as mixed waste (because of the presence of radiological contamination). However, other means of addressing the presence of dangerous waste constituents of concern above the action levels also may be addressed.

If dangerous constituents are identified in the soil in concentrations above action levels, closure for the soil will take place during the remediation of the 300-FF-3 Operable Unit under the *Comprehensive Environmental Response and Liability Act* (CERCLA) *of 1980* remedial action process. With the exception of imminent hazards, all soil remediation will take place under the CERCLA remedial action process for the 300-FF-3 Operable Unit.

The radiological contamination at the 304 Concretion Facility is not addressed by the closure strategy. The Tri-Party Agreement allows for the closing of TSD units even when radiological contamination is present. Radiological contamination and uranium are not regulated under RCRA. The information on uranium has been included for information purposes only.

1.3.1 Definition of Action Levels

Action levels are concentrations of constituents of concern that prompt an action, such as removal/disposal, treatment, or further evaluation. Initial action levels will be the greater of two levels: sitewide soil background or limit of quantitation (LOQ). The sitewide soil background concentrations are defined in *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes* (DOE-RL 1994a). The limits of quantitation have been provided by laboratories performing the sample analysis. If concentrations of the constituents of concern exceed initial action levels, then the requirements of WAC 173-304-610 will be invoked to assess the action levels.

1.3.2 Closure Activities for the 304 Concretion Facility

The closure activities were divided into several phases. The closure strategy has allowed for extra decontamination and sampling steps. The extra steps allow for a limited area to be re-decontaminated and re-sampled if this was required by the data evaluation of the original sampling. The closure activities were divided into the following phases:

<u>Phase I Decontamination</u>: Vacuuming to remove any loose contamination. This phase also addressed concerns on worker exposure to any loose surface radiological contamination.

<u>Phase II Decontamination</u>: Damp-wipe decontamination with a detergent solution to remove surface contamination.

Note that Phase I and Phase II occurred concurrently. An area within the reach of a worker was vacuumed and then immediately damp-wipe decontaminated.

<u>Phase I Sampling</u>: Sampling of the 304 Concretion Facility to determine the effectiveness of the decontamination.

<u>Phase I Analysis</u>: Analysis of the samples from the 304 Concretion Facility to determine concentrations of the constituents of concern.

Phase I Data Evaluation: Evaluation of the Phase I sampling data. Data evaluation is expected to result in three possible outcomes: (1) the 304 Concretion Facility can be clean closed; (2) additional spot decontamination is necessary; or (3) gross contamination is found that requires a reevaluation of the closure strategy at this unit. The evaluation of the unvalidated data indicated that Outcome 1, clean closure of the unit, was possible. No additional work was required.

Phase III Decontamination (not required): The re-decontamination of a limited area.

Phase II Sampling (not required): Re-sampling of a limited area.

Phase II Analysis (not required): Analysis of the Phase II samples.

Phase II Data Evaluation (not required): Evaluation of the data from re-sampling.

1.4 SAMPLING AND ANALYSIS PLAN

There are two locations in the *304 Concretion Facility Closure Plan* (Revision 2A, issued March 1995) that identify and discuss sampling and analysis: Section 7 and Appendix G.

The primary location for sampling and analysis information is presented in Appendix G of the closure plan. Appendix G of the closure plan is the Ecology-approved sampling and analysis plan for the closure activities at the 304 Concretion Facility. This appendix was added to the closure plan as part of Revision 2A page changes issued in March 1995.

The other location is in Section 7 and on Table 7-1 of the closure plan. This represents the recommended sampling and analysis approach from the now obsolete November 1993, Revision 2, of the closure plan. This information was considered to be the best recommendation at the time of publication in November 1993.

Appendix G of the closure plan supersedes the information in Section 7 of the closure plan. Appendix G will be used as the basis for establishing the sampling and analysis plan in this report.

Appendix G of the closure plan is based on the data quality objective (DQO) meetings held between DOE and Ecology on May 31, 1994 to June 1, 1994 and on August 25, 1994, and on the discussions held during the May 1994 to November 1994 Unit Managers Meetings. Ecology provided verbal approval of the sampling and analysis plan on November 22, 1994. Written approval was issued on January 12, 1995. The approved sampling and analysis plan was incorporated into the *304 Concretion Facility Closure Plan* as part of the Revision 2A page changes issued in March 1995.

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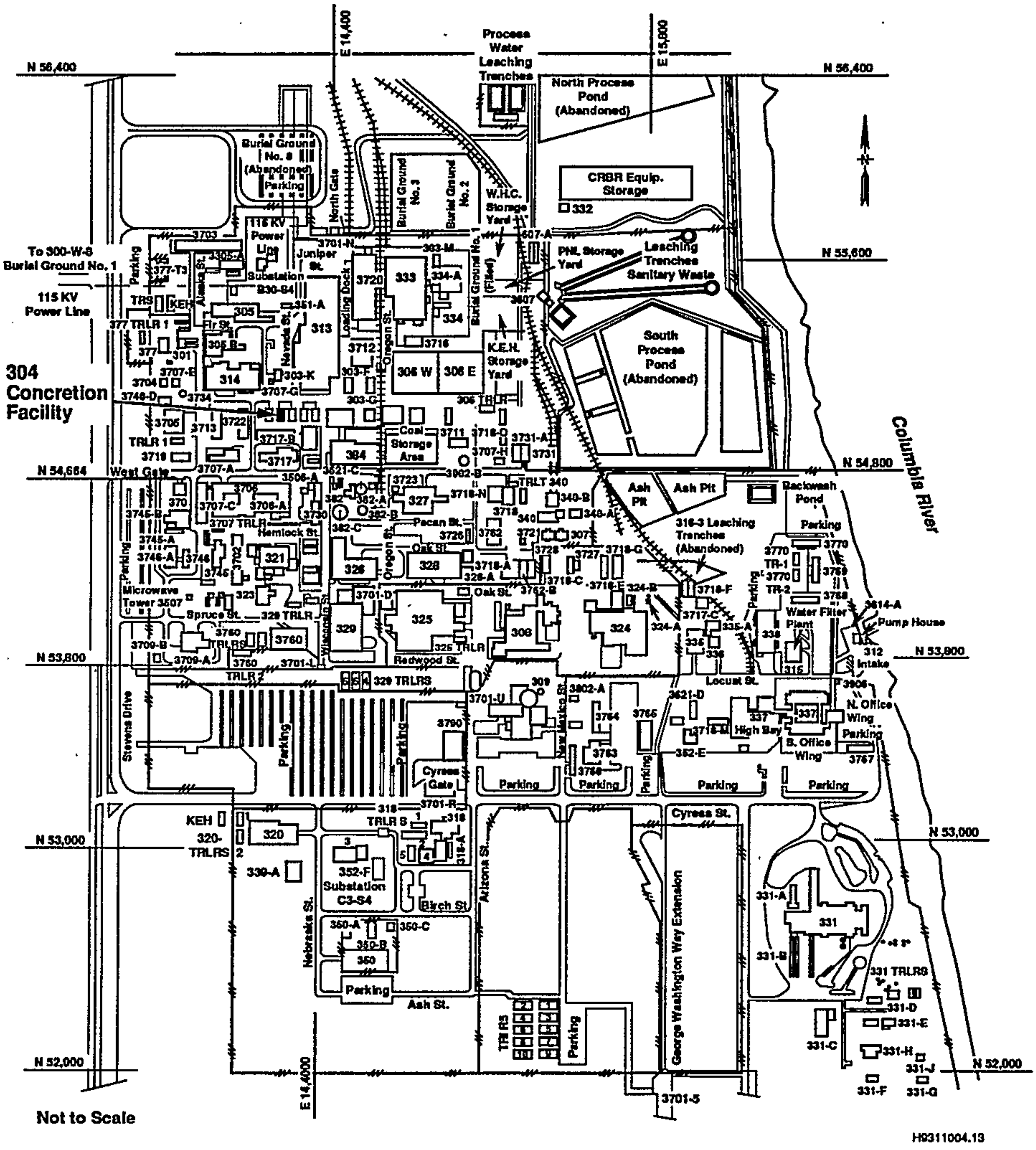

1 Figure 1-1. Hanford 300 Area.

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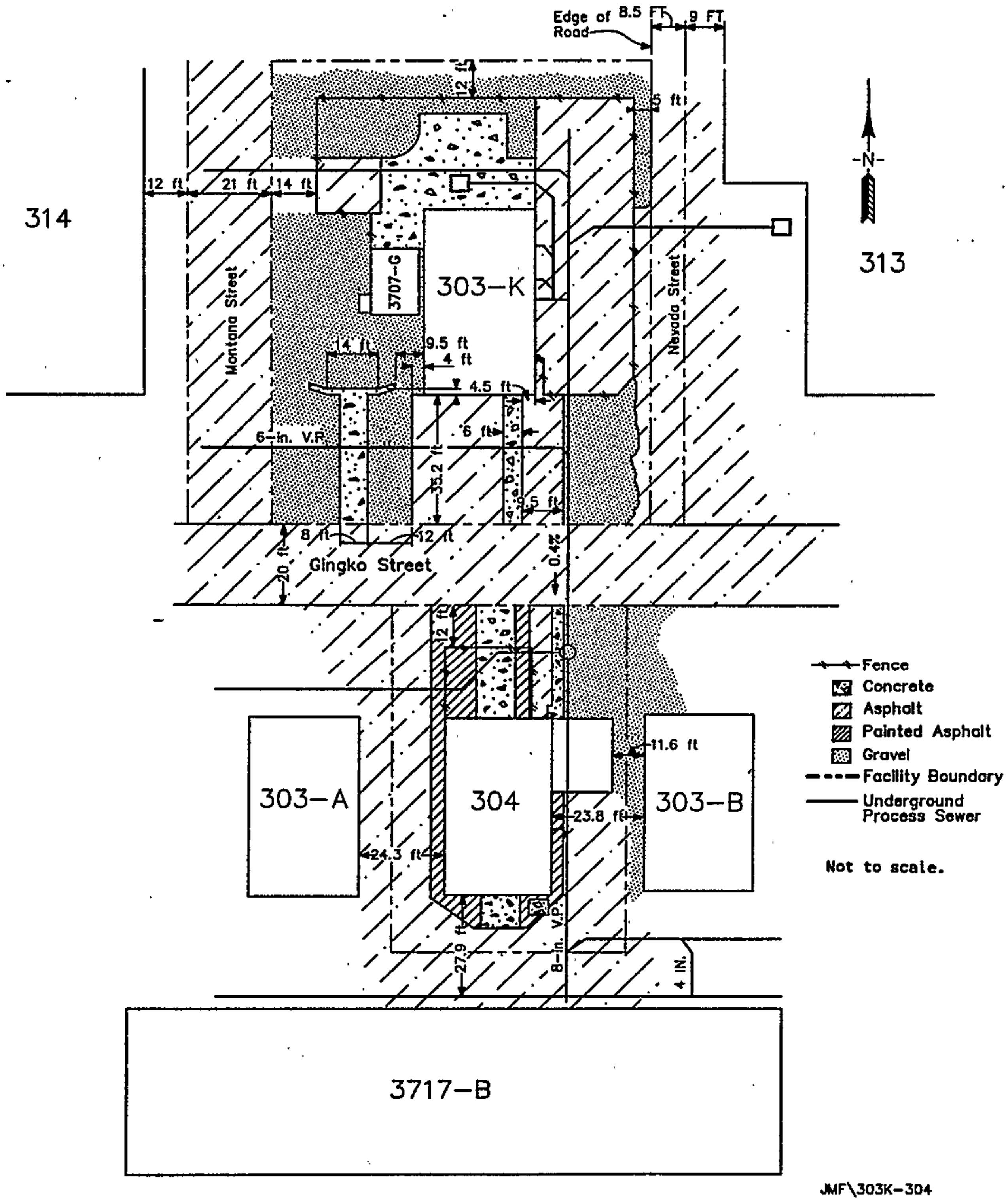

1 Figure 1-2. Plan View of 304 Concretion Facility Surrounding Area.

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2.0 DECONTAMINATION

The decontamination effort followed the requirements of the *304 Concretion Facility Closure Plan* (DOE-RL 1995a). The decontamination effort at the 304 Concretion Facility was directed at addressing only the dangerous waste constituents. The radiological contamination is not being addressed by this decontamination or closure effort. Decontamination refers to dangerous waste decontamination unless specifically identified as 'radiological decontamination.'

2.1 DANGEROUS WASTE DECONTAMINATION

Decontamination for dangerous waste constituents was performed between August 3, 1994, and September 30, 1994. Dangerous waste decontamination consisted of two steps: vacuuming, followed by damp-wipe decontamination. Vacuuming and the damp wipe-down occurred concurrently. After an area was vacuumed, the operators immediately damp-wipe decontaminated that area. As indicated by the closure plan, areas excluded from decontamination were the changeroom interior, all exterior surfaces of the 304 building, and the exterior concrete and asphalt pads.

2.1.1 HEPA Vacuuming

The initial decontamination step for the 304 Concretion Facility was to vacuum the interior of the 304 Building. The vacuum used was equipped with a high-efficiency particulate air (HEPA) filter to capture any fine particulates. The purpose of the vacuuming was to remove any loose surface materials to allow for a more effective damp-wipe decontamination. Use of the HEPA vacuum addresses a radiological safety concern as well because vacuuming also removed any loose radiological surface contamination. All interior surfaces of the 304 Concretion Facility were vacuumed. No unusual incidents occurred.

2.1.2 Damp-Wipe Decontamination

The final decontamination step at the 304 Concretion Facility was a damp wipe-down of the interior of the 304 Building. Damp-wipe decontamination was accomplished using rags and a detergent-and-water solution. Damp-wipe decontamination was considered to be the most cost-effective method for dealing with any surface contamination at the 304 Concretion Facility.

There were two areas that could not be decontaminated successfully. The first area was the sump and the other was the trench (see Figure 3-1). In both areas, the concrete on the sides and floor crumbled as it was wiped. The crumbling of the concrete prevented effective decontamination. Both the sump and the trench were HEPA vacuumed. Both the sump and the trench contained sampling points that will be used to determine if any of the constituents of concern are present.

2.1.3 Sump Material

During the decontamination of the sump, it was expected that there would be a thin layer (25 millimeters [1-inch] or less) of concrete powder and sand at the bottom of the sump. The intention was to remove this thin layer using the HEPA vacuum. When the sump was entered to start decontamination, the amount of material present was much greater than expected. The operators discovered that there was about 75 millimeters (3-inches) of cement dust, sand, and chunks of semi-consolidated cement. At this point, decontamination was suspended until the sump conditions could be evaluated and an appropriate course of action could be established.

The source of the sump material is the past concretion operations. Water was used to wash metallic fines and lose cement powder into the sump where the fines settled out. The end result is a layer of semi-consolidated cement, cement powder, and sand in the bottom of the sump.

The evaluation found no new or different worker health or safety concerns except for requiring extra dust suppression requirements. The sump material was handled as required by Section 7.3 of the *304 Concretion Facility Closure Plan*. The sump material was removed by wetting it down to prevent dust emission and then shoveling the material into a waste drum. Once the sump material was removed, the decontamination process continued.

The sump material was included as part of the waste generated in the decontamination and sampling of the 304 Concretion Facility. This report does not address the sampling, designation, or disposal of that waste.

3.0 SAMPLING

The first samples were collected at the 304 Concretion Facility on December 13, 1994. The last samples were collected on February 2, 1995. Sampling was conducted in accordance with the sampling and analysis plan (Appendix G of the *304 Concretion Facility Closure Plan* [DOE-RL 1995a]). There were 20 sampling locations, including both authoritatively and randomly selected locations. Samples types collected were wipe, concrete core inorganic, concrete core organic, concrete chip, asphalt core, and soil (both organic and inorganic). Some sample locations produced several different types of samples. The soil samples were taken at three intervals from underneath the overlying concrete and asphalt. A total of 92 samples were collected (64 routine samples and 28 quality control samples).

3.1 SAMPLING CHRONOLOGY

The following lists the chronology of critical events associated with the sampling at the 304 Concretion Facility:

Nov 22, 1994	Sampling and Analysis Plan (SAP), Rev. 1 issued
Nov 22, 1994	Ecology grants verbal approval of SAP
Dec 13, 1994	Wipe sampling started and completed
Jan 12, 1995	Ecology provides written approval of SAP
Jan 19, 1995	Restart of sampling (asphalt cores and soil)
Jan 23, 1995	Sampling (concrete cores and soil)
Jan 25, 1995	Sampling (concrete cores and soil)
Jan 26, 1995	Sampling (concrete chip)
Jan 30, 1995	Sampling (concrete core)
Jan 31, 1995	Sampling (concrete core and soil)
Feb 1, 1995	Sampling (concrete core and soil)
Feb 2, 1995	Sampling completed (concrete core and soil).

3.2 SAMPLE LOCATIONS

The sample locations at the 304 Concretion Facility were finalized during the DQO meetings held between Ecology and DOE on May 31, 1994 to June 1, 1994 and on August 25, 1994. Additionally, Ecology reduced the number of concrete organic samples before approving the sampling and analysis plan.

Figures 3-1 through 3-6 and Tables 3-1 through 3-6 provide a summary of the sample locations, sample types, and sample numbers. Table 3-7 provides a numerical listing of sample numbers to allow for the correlation with location, sample media, and sampling date and time.

3.2.1 Building Floor Sample Locations

There are 12 sample locations (4 authoritative and 8 random) on the floor of the 304 Building and the attached changeroom (Figure 3-1). These 12 locations generated inorganic concrete core, organic concrete core, and concrete chip samples. The locations, types of samples, and sample numbers are summarized on Table 3-1. No location changes were made to building floor sampling locations during sample collection.

3.2.2 Metal Building Interior Sample Locations

There are 11 wipe sample locations (10 random and 1 authoritative) on the metal building interior surfaces of the 304 Building. These locations consist of 10 random wipe samples from the 4 walls and 1 authoritative wipe sample from the girder. Figures 3-2 through 3-5 document the sample locations from the interior building walls. One sample was taken from a girder located at the south end of the 304 Building. The locations, type of samples, and sample numbers are summarized on Table 3-2.

One of the sample locations (South Wall, coordinates: vertical axis 3 meters and horizontal axis 8 meters [V3-H8]) specified by Appendix G of the closure plan was blocked by some equipment. A field change was made to move the sampling location down the vertical axis to the next sampling grid. The actual location for sample collection was the South Wall, V4-H8. The corresponding sample number is BOD281.

One of the sample locations (East Wall, V1-H6) specified by Appendix G of the closure plan was on a section of wall covered by plywood. This section of the east wall divides the changeroom from the main part of the 304 Building. Since there were no metal surfaces on that wall section, the wipe sample was collected from the plywood surface at the original coordinates. The corresponding sample number is BOD286.

3.2.3 Exterior Storage Pad Sample Locations

There are 5 core sample locations (3 authoritative and 2 random) on the exterior concrete and asphalt pads at the 304 Concretion Facility (Figure 3-1). Two are from the concrete and asphalt storage pads at the north end of the 304 Building (one each of concrete and asphalt). Three cores are from the asphalt overlays that surround the exterior of the 304 Building. The locations, type of samples, and sample numbers are summarized on Table 3-2.

The location of the three samples on the asphalt overlays was determined before the samples were collected, as specified in Appendix G of the closure plan. The location chosen for the sample along the East Wall of the 304 Building was about 4.5 meters (15 feet) from the south end of the building and about 1 meter (3 feet) from the east wall. At the southwest corner of the 304 Building, the sample location was along the West Wall about 3 meters (10 feet) from the south end of the building and about 60 centimeters (2 feet) from the wall.

Full access to the exterior northwest corner was not possible because of a temporary radiation zone related to the installation of electrical utilities in the 300 Area. The electrical utility work is unrelated to the closure activities. The northwest sample location was located along the West Wall about 8 meters (26 feet) from the south end of the building and about 60 centimeters (2 feet) from the wall. This places the northwest corner sample location less than a meter (3 feet) from the center of the 304 Building's West Wall. While the ideal location would have been closer to the northwest corner of the 304 Building, this location does meet the requirements of the closure plan and Appendix G of the closure plan.

No changes had to be made in the locations of the samples from the concrete and asphalt pads at the north end of the 304 Building.

3.2.4 Soil Sample Locations

There are 9 sample locations (all authoritative) where soil samples were collected (Figure 3-6). At each location, soil samples were collected at 3 different intervals below the bottom of the concrete or asphalt layer. These intervals are 0 to 152 millimeters (6 inches), 152 millimeters (6 inches) to 457 millimeters (18 inches), and 457 millimeters (18 inches) to 610 millimeters (24 inches).

All soil samples required drilling through concrete or asphalt to access the soil layer. Seven sample locations were co-located with existing concrete or asphalt core samples. There were two sample locations associated with the joints in the external concrete pads at the north end of the 304 Building that required coring to access the soil. The locations, type of samples, and sample numbers for each sampling interval are summarized on Table 3-4.

3.3 SAMPLE COLLECTION

Before the start of sampling and during most of the sampling events, the sampling equipment was decontaminated in the 1706 KE Laboratory in accordance with Environmental Investigation Instruction (EII) 5.5, "1706 KE Laboratory Cleaning of RCRA/CERCLA Sampling Equipment" (WHC 1988). Only one instance of field decontamination occurred. The soil sampling equipment and core drills required field decontamination on January 31, 1995. With sampling occurring on consecutive days, there was insufficient time for the 1706 KE Laboratory to decontaminate the sampling equipment. Per the closure plan, EII 5.4, "Field Cleaning and/or Decontamination of Equipment" (WHC 1988) was used for the field decontamination.

3.3.1 Wipe Sample Collection

Wipe samples were collected using the methodology described in Appendix G of the closure plan. At each sampling location, one filter paper was used to wipe the wall surface from a 100-square-centimeter section within each sample grid. A disposable template was used on the walls to ensure adequate coverage. At each sampling location, the samplers used a new pair of gloves when handling the filter paper. Care was taken to wipe the surface only once throughout the sampling effort. The top of one steel girder was wipe sampled using the same technique.

After each sample area was wiped, the filter paper was folded with the exposed side in, and then folded over to form a 90-degree angle in the center of the filter. The filter then was returned to the original glass container, angle first, and immediately sealed and shipped to Lockheed Analytical Services in Las Vegas, Nevada. All samples were cooled to 4° Celsius for storage and transportation.

3.3.2 Inorganic Concrete Core and Asphalt Core Sample Collection

The inorganic concrete core and asphalt core samples were collected using an electric water-cooled concrete coring tool and a 102-millimeter (4-inch) core drill. To prevent contamination of the samples, demineralized water was used for cooling the drill. At any given sample location, the cores were adjacent to each other. None of the cores overlapped. For any given set of samples (inorganic concrete core and organic concrete core) at each sample location, the same core drill was used. When duplicate samples were collected, a different core drill was used to collect the duplicate samples. This technique also was used for the collection of the organic concrete core samples.

To provide sufficient material for analysis from a 102-millimeter (4-inch)-diameter core, a core length between 150 millimeters (6 inches) to 200 millimeters (8 inches) is required. This applies to the organic cores as well as the inorganic and asphalt cores. One core was sufficient for all sample locations except at the drain location. At the drain, the concrete was about 100 millimeters (4 inches) thick and required two cores for the inorganic sample. Core length ran from about 100 millimeters (4 inches) to about 330 millimeters (13 inches). Average core length was between 150 millimeters (6 inches) and 200 millimeters (8 inches).

The inorganic concrete core and asphalt core samples were placed into individual plastic bags and shipped to Lockheed Analytical Services in Las Vegas, Nevada. All samples were cooled to 4° Celsius for storage and transportation.

3.3.3 Concrete Chip Sample Collection

The concrete chip samples were collected using an electrically operated heavy-duty rotary hammer. Concrete dust and small chips were generated by drilling a series of small holes (about 9.5 millimeters [3/8 inches] in diameter) into the concrete pad in the changeroom. The dust and chips were collected in sample jars and shipped to Lockheed Analytical Service in Las Vegas, Nevada. All samples were cooled to 4 °Celsius for storage and transportation.

3.3.4 Organic Concrete Sample Collection

The organic concrete core samples were collected using the same core drilling technique that was used for the inorganic and asphalt cores. See

Section 3.3.2 for details. The discussion in Section 3.3.2 on core thickness also applies to the organic cores.

The organic concrete core samples had to be crushed in the field before the sample could be collected. This was done because the 222-S Laboratory does not have the ability to handle solid cores. The core (or cores) to be crushed was placed wrapped in a very large plastic bag, then wrapped in cloth to prevent pieces of concrete from flying out. The core (or cores) then was broken into pieces with a sledgehammer. In all cases, the plastic bag was penetrated when the core(s) was broken.

The concrete pieces for volatile organics analysis (VOA) were collected and placed into an amber glass (VOA) jar. The samplers tried to collect concrete from the center areas of the core. This approach was taken in an attempt to avoid any contamination when the core was crushed. This approach also avoided the outer surface of the core where drilling into the concrete could have affected the concentration of any organic constituents of concern. It is not possible to quantify what effect, if any, the sample collection method will have on the concentration of the organic constituents of concern. Care was taken to avoid aggregate and pieces of steel reinforcing wire from the concrete core itself and any small pieces of plastic from the plastic bag.

After packaging, the samples were shipped to the onsite 222-S Laboratory. All samples were cooled to 4° Celsius for storage and transportation.

3.3.5 Soil Sample Collection

Before the collection of the soil samples, the core drill (see Sections 3.3.2 and 3.3.4) was used to core through the concrete or asphalt to access the soil. Seven of the nine samples were co-located with existing concrete and asphalt sampling locations to minimize drilling. Two of the nine locations required coring holes through the external concrete pads to access the soil for sampling. See Section 3.2.4 for more information.

At each sample location, the soil samples were collected at 3 different intervals: 0 to 152 millimeters (6 inches), 152 millimeters (6 inches) to 457 millimeters (18 inches), and 457 millimeters (18 inches) to 610 millimeters (24 inches). Soil sampling depths were measured from the bottom of the overlying asphalt or concrete layer.

The soil samples were collected using the combination of a 76-millimeter (3-inch)-diameter hand auger and stainless steel sampling spoons. The hand auger was used to collect a plug of soil that was then placed in a clean, stainless steel bowl for transfer into the sample containers. Two factors made this a difficult task. First, the 'soil' at the 304 Concretion Facility is best described as sand and gravel. It is difficult to drive an auger through a gravelly soil and collect an intact plug of material. Second, there are rocks intermixed with the sand and gravel 'soil'.

The rocks prevented the auger from collecting sufficient material for a sample in a single plug of soil. Generally, at least two or three plugs of soil were needed at each interval. In several cases, rocks had to be removed by hand before the auger could collect sufficient material for a sample. The rocks ranged in size from 25 millimeters (1 inch) to 76 millimeters (3 inches) in size with some larger. Also, the sampler had to use the spoon to dig out sufficient material for a complete sample.

Of the 27 planned soil samples, only one sample could not be collected. This soil sample was to be collected from the trench authoritative sample locations (Figure 3-6), at a 457-millimeter (18-inch) to 610-millimeter (24-inch) sample interval. It was not possible for the auger to retrieve sufficient soil for a sample because of the presence of rocks. Concerns for sampler safety (radiation exposure and radiological skin contamination) prevented clearing of the rocks by hand or collecting the sample by hand using a spoon. With 26 of the 27 soil samples (plus duplicates) collected, adequate information should be available to evaluate clean closure of the unit.

The samplers did not mix or homogenize the soil when collecting the soil organic samples from the stainless steel bowls. This met the closure plan requirement of not mixing the sample before it is transferred into the VOA vials. The effects of not obtaining a single intact plug of soil or using the stainless steel bowls on the soil organic analysis is not known.

The samples collected from under the asphalt on the exterior of the building (East Wall, Southwest Corner, and Northwest Corner) were packaged with a separate sample number for both the organic and inorganic soil samples. The remainder of the samples used a single sample number for both organic and inorganic soil samples. The exception to this is when the duplicate samples were taken. Each duplicate, regardless of type, received an individual sample number.

The soil samples were collected in glass containers (amber glass was used for the organic soil samples) and shipped to Lockheed Analytical Service in Las Vegas, Nevada. All samples were cooled to 4° Celsius for storage and transportation.

3.4 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

There are two types of field quality assurance and quality control samples associated with sampling at the 304 Concretion Facility. These are equipment blanks and field blanks. Trip blanks were not used.

3.4.1 Equipment Blanks

The purpose of the equipment blanks is to check for sampling device cleanliness from the laboratory decontamination efforts. The equipment blanks for concrete core, concrete chip, asphalt core, and soil samples were collected using deionized water transported to the sampling site. At the site, the deionized water was poured over or through the sample collection device, collected, and sent to the offsite analytical laboratory for analysis. The equipment blanks for wipe samples consisted of filter paper saturated with TCLP extraction fluid number 2. They remain sealed while in the field and were sent to the offsite laboratory for analysis. Additional details on the equipment blanks are in Appendix G of the closure plan.

A total of 12 equipment blanks were collected and analyzed. This includes the following type and number of equipment blanks:

Wipe sampling equipment	1
Soil sampling equipment	6
Concrete coring equipment	3
Concrete chip sampling equipment	2

3.4.2 Field Blanks

The purpose of the field blanks was to check the effectiveness of the field decontamination procedures to determine if contamination originated in the sampling environment. Field blanks were taken only if field decontamination procedures were used. Field blanks for any field decontaminated equipment were collected by pouring deionized water over or through the sampling device. The sample then was shipped to the offsite laboratory for analysis. Additional details on the field blanks are in Appendix G of the closure plan.

Field blanks for the wipe samples were collected by removing the filter paper (saturated with TCLP extraction fluid number 2) from the container. The filter paper was exposed to air for the same amount of time required to collect a wipe sample, then returned to the original sample container. Additional details on the field blanks for wipe samples are in Appendix G of the closure plan.

A total of 3 field blanks were collected and analyzed. This includes the following type and number of equipment blanks:

Wipe sampling field blank	1
Concrete coring equipment field blank	1
Soil sampling equipment field blank	1

3.4.3 Identification of the Equipment Blanks and Field Blanks

Although the sampler's log does not clearly identify the field blanks, sufficient information was recorded to make a determination. For the wipe samples, the field and equipment blanks are not identified by sample number. However, the times at which the equipment and field blanks were taken are provided in the sampler's notes. These times show that the equipment blank was taken at or after 11:27 a.m. and the field blank was taken at or after 11:50 a.m. Correlating this information with the sample locations and sample numbers from the sample log, it can be concluded that the equipment blank is BOD282 and the field blank is BOD288.

The log identifies all coring and soil sampling blanks as equipment blanks. However, since field decontamination was performed on January 31, 1995, there should be field blanks for the decontaminated core drill and soil sampling equipment (i.e., the soil auger and sampling bowls). The two blanks that correspond with the January 31, 1995, date are BOD2D1 and BOD2D2.

The two blanks that correspond with the January 31, 1995, date are BOD2D1 and BOD2D2.

The log identifies BOD2D1 as "Equipment Blank done on an EII 5.4 cleaned concrete coring bit" with BOD2D2 being identified as "Equipment Blank done on an EII 5.5 cleaned soil auger and bowl." The EII 5.4 is the field equipment decontamination procedure and EII 5.5 is the K-East Laboratory equipment decontamination procedure. It also should be noted that none of the other blanks identify the decontamination procedure. Since blanks BOD2D1 and BOD2D2 correspond to the proper date and have additional logbook information on the cleaning procedure, it can be concluded that these are the field blanks associated with the field sampling equipment decontamination.

Table 3-5 and Table 5-8 have the correct identification of BOD282 as an equipment blank and BOD288, BOD2D1, and BOD2D2 as field blanks.

3.4.4 Trip Blanks

As stated in Appendix G of the closure plan, trip blanks were not included for the VOA samples. Appendix G of the closure plan stated that the trip blanks were excluded because:

- Neither sand nor deionized water is a suitable medium for a trip blank for soil. Sand has little to no affinity for adsorbing volatile organics. Water absorbs organics, whereas soil primarily adsorbs organics. Because the mechanism is different, water is not a suitable material for the trip blanks.

- The field and equipment blanks will 'trip' with the routine samples and will contain any volatile contamination that may be present.

950817.1243

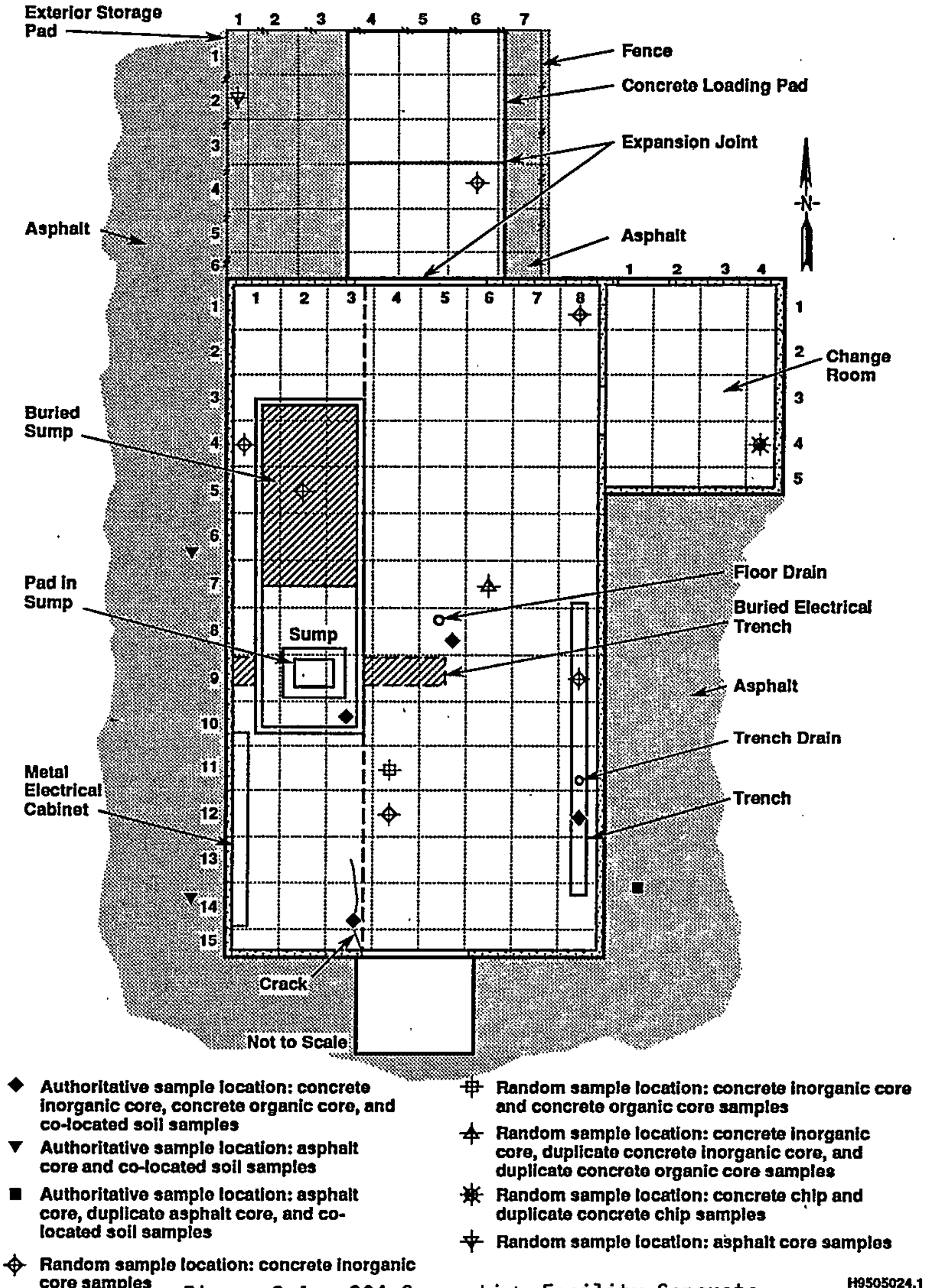
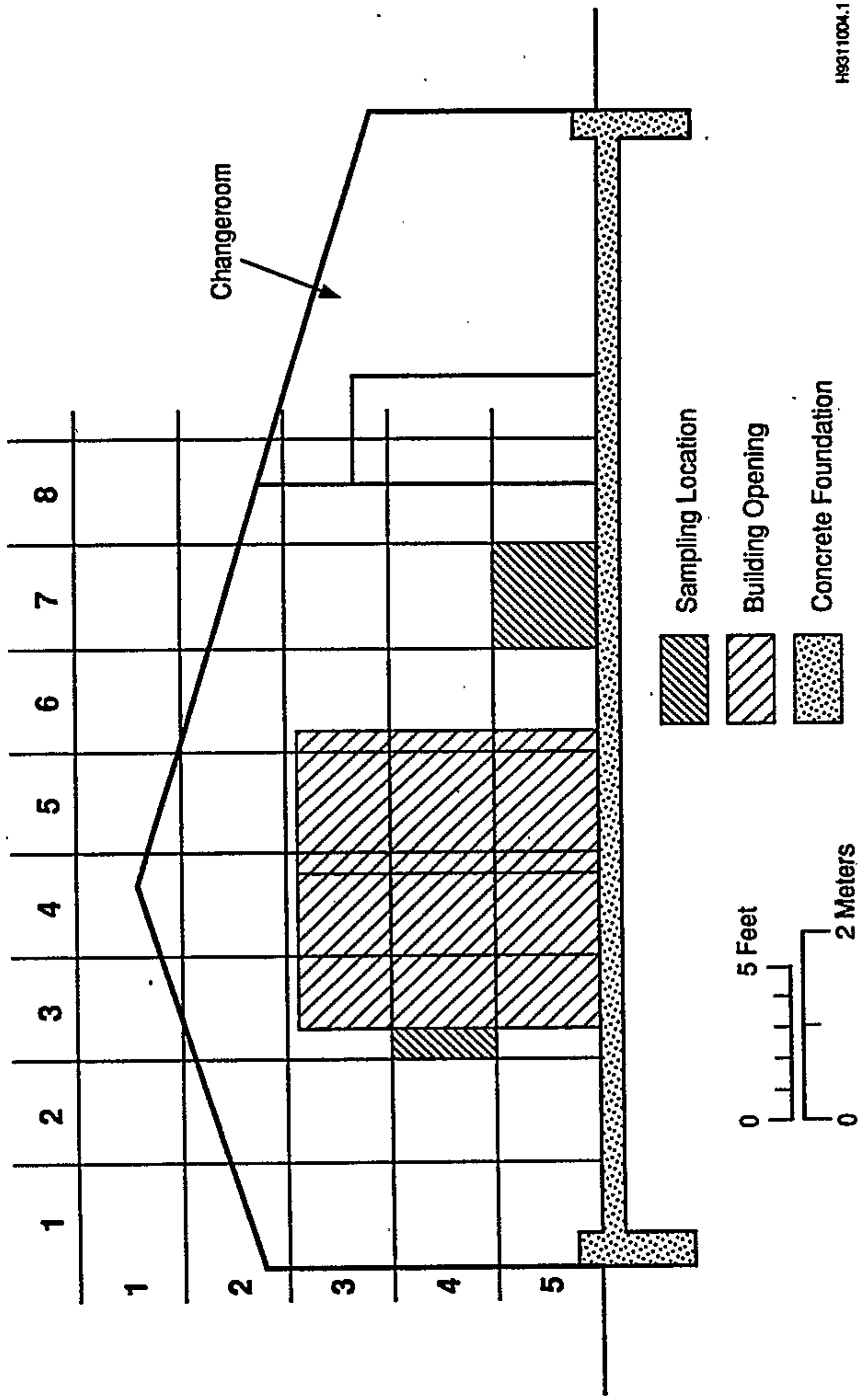
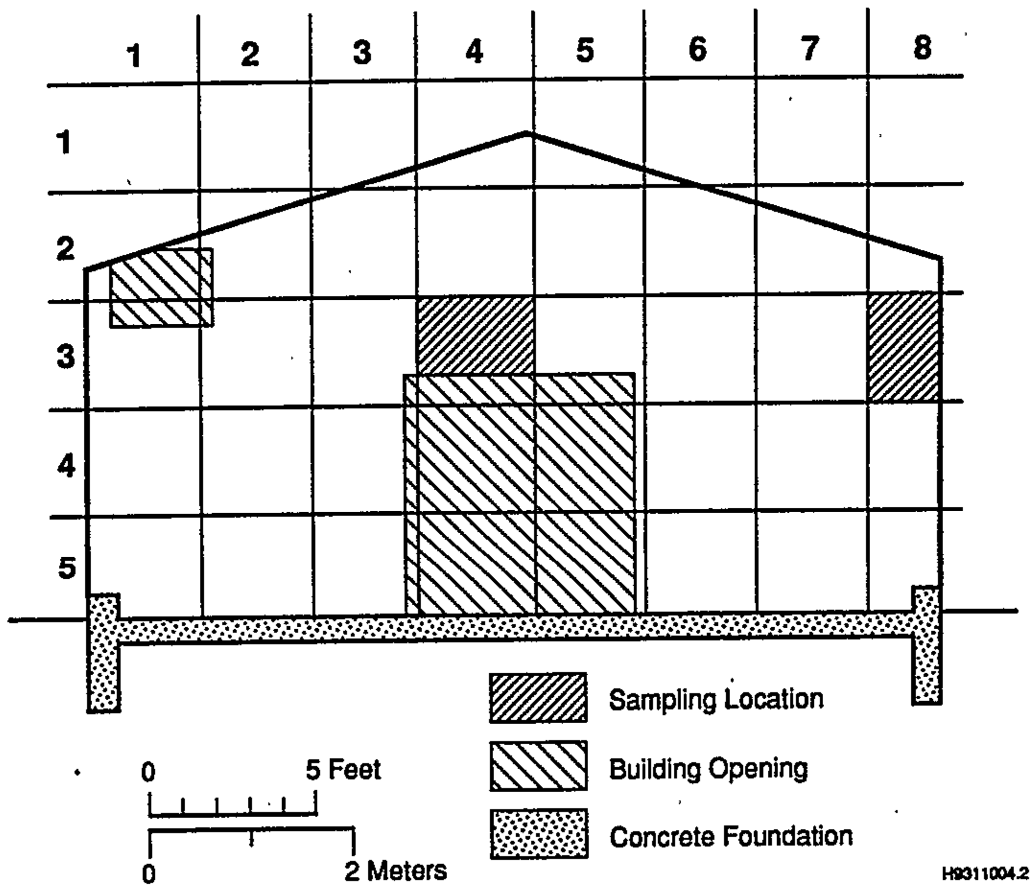


Figure 3-1. 304 Concretion Facility Concrete and Asphalt Sampling Locations.



1 Figure 3-2. 304 Concretion Facility, North Wall Wipe Sample Locations.



1 Figure 3-3. 304 Concretion Facility, South Wall Wipe Sample Locations.

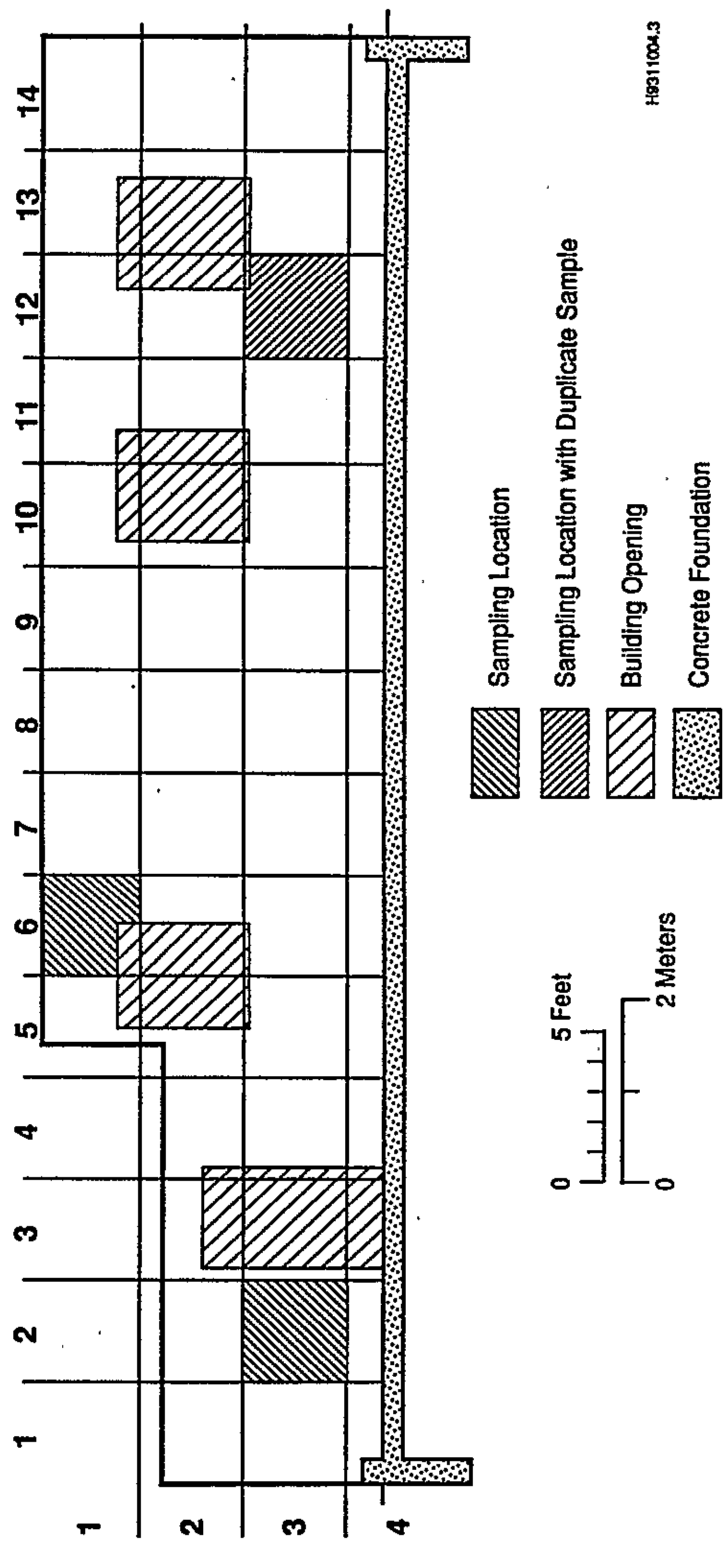


Figure 3-4. 304 Concretion Facility, East Wall Wipe Sample Locations.

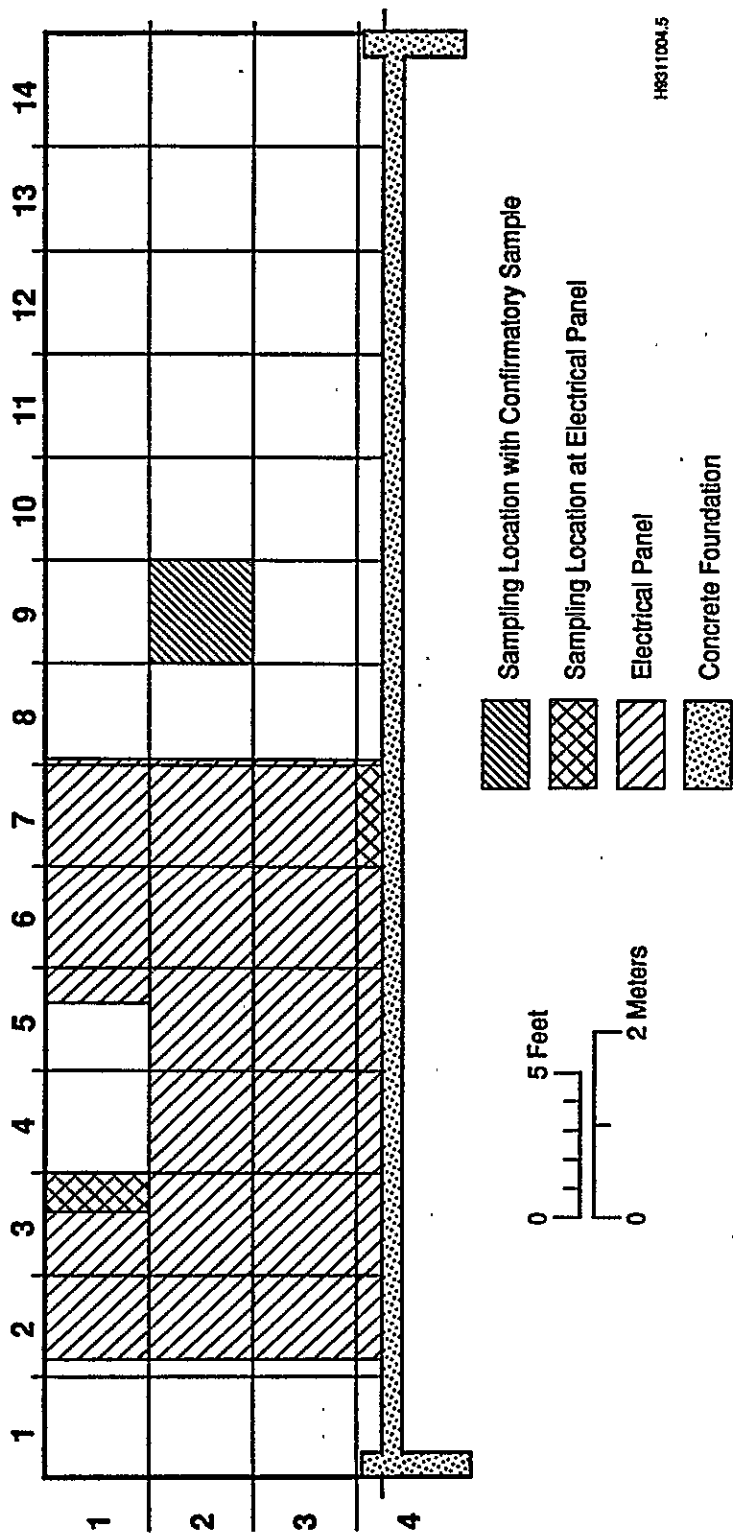
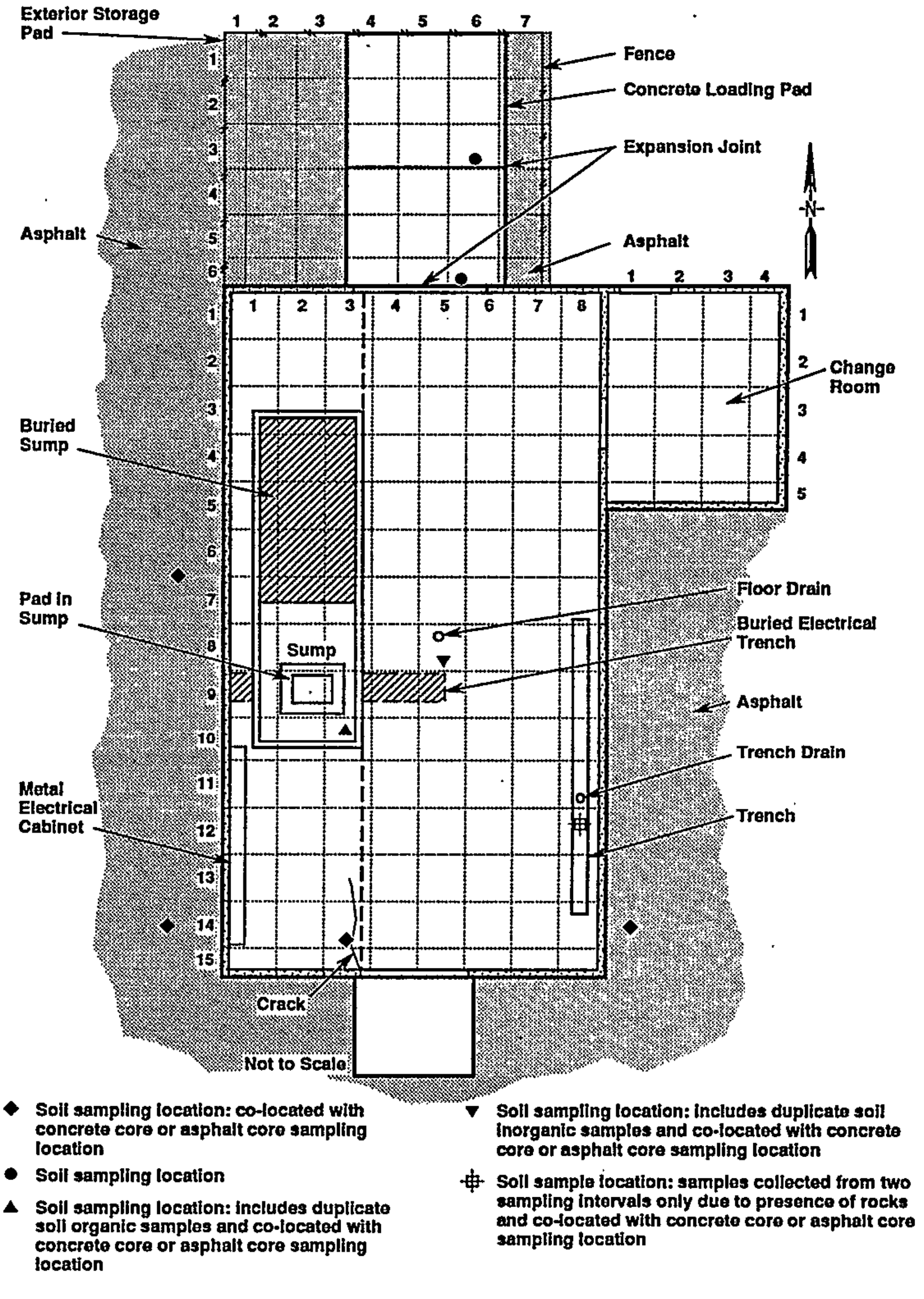


Figure 3-5. 304 Concretion Facility, West Wall Wipe Sample Locations.



1 Figure 3-6. 304 Concretion Facility Soil Sample Locations.

Table 3-1. 304 Concretion Facility: Building Floor Sampling Locations, Types, and Sample Numbers.

Location	Inorganic Concrete Core Sample No.	Organic Concrete Core Sample No.	Concrete Chip Sample No.
Crack	BOD2F9	BOD2G2	nr
Sump	BOD2B7	BOD2G9	nr
Floor Drain	BOD2H8	BOD2H9	nr
Trench	BOD2J7	BOD2J8	nr
Floor NS1-EW8	BOD2C0	nr	nr
Floor NS4-EW1	BOD2C5	nr	nr
Floor NS5-EW2	BOD2C6	nr	nr
Floor NS7-EW8	BOD2C8	BOD2D0[2]	nr
Floor NS9-EW8 (in Trench)	BOD2C7	nr	nr
Floor NS11-EW4	BOD2G6 BOD2G7[1]	BOD2G7	nr
Floor NS12-EW4	BOD2C1	nr	nr
Changeroom Floor CNS4-CEW8	nr	nr	BOD2G0 BOD2G1[3]

[1]Duplicate of BOD2C8
[2]Duplicate concrete core organic sample
[3]Duplicate of BOD2G0

NS = 304 Building north-south axis on Figure 3-1
EW = 304 Building east-west axis on Figure 3-1
CNS = Changeroom north-south axis on Figure 3-1
CEW = Changeroom east-west axis on Figure 3-1
nr = This sample type not required or not applicable at this location

Table 3-2. 304 Concretion Facility: Wipe Sample Locations and Sample Numbers.

Location	Wipe Sample No.
North Wall, Figure 3-2, V4-H3	BOD276
North Wall, Figure 3-2, V5-H7	BOD275
West Wall, Figure 3-5, V1-H3	BOD289
West Wall, Figure 3-5, V2-H9	BOD277 BOD278[1]
West Wall, Figure 3-5, V4-H7	BOD279
South Wall, Figure 3-3, V3-H4	BOD283
South Wall, Figure 3-3, V4-H8	BOD281
East Wall, Figure 3-4, V1-H6	BOD286
East Wall, Figure 3-4, V3-H2	BOD286
East Wall, Figure 3-4, V3-H12	BOD284 BOD285[2]
Girder	BOD289

[1]Confirmatory Wipe Sample of BOD277
[2]Duplicate of BOD284

V = Vertical axis on any wall (see referenced figure)
H = Horizonal axis on any wall (see referenced figure)

Table 3-3. 304 Concretion Facility: Exterior Storage Pad Sample Locations, Sample Types, and Sample Numbers.

Location	Inorganic Concrete Core Sample No.	Organic Concrete Core Sample No.	Asphalt Core Sample No.
East side of Bldg	nr	nr	BOD2D3 BOD2D4[1]
SW corner of Bldg	nr	nr	BOD2D5
NW corner of Bldg	nr	nr	BOD2D6
External Pad, NS2-EW1	nr	nr	BOD2D8
External Pad, NS4-EW6	BOD2J7	BOD2K9	nr

[1]Duplicate of BOD2D3

SW = southwest
NW = northwest
Bldg = 304 Building
NS = Fence line-based north-south axis on Figure 3-1
EW = Fence line-based east-west axis on Figure 3-1
nr = This sample type not required or not applicable at this location

Table 3-4. 304 Concretion Facility: Soil Sample Locations at the 0- to 152-millimeter Sample Interval, Sample Types, and Sample Numbers.

Location	Soil Sample No. (Inorganic and Organic Analysis)	Inorganic Soil Sample No.	Organic Soil Sample No.
Crack	BOD2G3	nr	nr
Sump	BOD2H0	nr	BOD2H3[1]
Floor Drain	BOD2J0	BOD2J1[2]	nr
Trench	BOD2J9	nr	nr
External Pad-Pad Joint	BOD2B1	nr	nr
External Pad-Bldg Joint	BOD2B9	nr	nr
East Side of Bldg	nr	BOD2F0	BOD290
SW corner of Bldg	nr	BOD2F3	BOD293
NW corner of Bldg	nr	BOD2F6	BOD296

[1]Duplicate organic sample of BOD2H0
[2]Duplicate inorganic sample of BOD2J0

SW = southwest
NW = northwest
Bldg = 304 Building
nr = This sample type not required or not applicable at this location

Note: Except for the external joint samples, all other samples are co-located with either asphalt core or concrete core samples.

Table 3-5. 304 Concretion Facility: Soil Sample Locations at the 152-millimeter to 457-millimeter Sample Interval, Sample Types, and Sample Numbers.

Location	Soil Sample No. (Inorganic and Organic Analysis)	Inorganic Soil Sample No.	Organic Soil Sample No.
Crack	BOD2G4	nr	nr
Sump	BOD2H1	nr	BOD2H4[1]
Floor Drain	BOD2J2	BOD2J3[2]	nr
Trench	BOD2K0	nr	nr
External Pad-Pad Joint	BOD2B2	nr	nr
External Pad-Bldg Joint	BOD2B8	nr	nr
East Side of Bldg	nr	BOD2F1	BOD291
SW corner of Bldg	nr	BOD2F4	BOD294
NW corner of Bldg	nr	BOD2F7	BOD297

[1]Duplicate organic sample of BOD2H1
[2]Duplicate organic sample of BOD2J2

SW = southwest
NW = northwest
Bldg = 304 Building
nr = This sample type not required or not applicable at this location

Note: Except for the external joint samples, all other samples are co-located with either asphalt core or concrete core samples.

Table 3-6. 304 Concretion Facility: Soil Sample Locations at the 457-millimeter to 640-millimeter Sample Interval, Sample Types, and Sample Numbers.

Location	Soil Sample No. (Inorganic and Organic Analysis)	Inorganic Soil Sample No.	Organic Soil Sample No.
Crack	BOD2G5	nr	nr
Sump	BOD2H2	nr	BOD2H2[1]
Floor Drain	BOD2J4	BOD2J5[2]	nr
Trench	Not collected	nr	nr
External Pad-Pad Joint	BOD2B3	nr	nr
External Pad-Bldg Joint	BOD2B5	nr	nr
East Side of Bldg	nr	BOD2F2	BOD292
NW corner of Bldg	nr	BOD2F5	BOD295
SW corner of Bldg	nr	BOD2F8	BOD298

[1]Duplicate organic sample of BOD2H2
[2]Duplicate organic sample of BOD2J4

SW = southwest
NW = northwest
Bldg = 304 Building
nr = This sample type not required or not applicable at this location

Note: Except for the external joint samples, all other samples are co-located with either asphalt core or concrete core samples.

Table 3-7. 304 Concretion Facility: Samples Numbers in Numerical Order. (3 sheets)

Sample Number	Date	Media/Type	Location	Comments
B0D275	12/13/94	Wipe Sample	North Wall, Fig 3-2, V5-H7	
B0D276	12/13/94	Wipe Sample	North Wall, Fig 3-2, V4-H3	
B0D277	12/13/94	Wipe Sample	West Wall, Fig 3-5, V2-H9	
B0D278	12/13/94	Wipe Sample	West Wall, Fig 3-5, V2-H9	Confirmatory Sample with B0D277
B0D279	12/13/94	Wipe Sample	West Wall, Fig 3-5, V4-H7	
B0D280	12/13/94	Wipe Sample	West Wall, Fig 3-5, V1-H3	
B0D281	12/13/94	Wipe Sample	South Wall, Fig 3-3, V4-H8	NOTE: B0D281 moved down 1 meter from V3-H8 location due to equipment obstructing sample location
B0D282	12/13/94	Equipment Blank	Wipe Sampling Equipment	
B0D283	12/13/94	Wipe Sample	South Wall, Fig 3-3, V3-H4	
B0D284	12/13/94	Wipe Sample	East Wall, Fig 3-4, V3-H12	
B0D285	12/13/94	Wipe Sample	East Wall, Fig 3-4, V3-H12	Dup of B0D284
B0D286	12/13/94	Wipe Sample	East Wall, Fig 3-4, V3-H2	
B0D287	12/13/94	Wipe Sample	East wall, Fig 3-4, V1-H6	NOTE: No steel surface available in grid, sample taken on plywood.
B0D288	12/13/94	Field Blank	For Wipe Sampling	
B0D289	12/13/94	Wipe Sample	girder	
B0D290	1/19/95	Org Soil, 0-6	East side of Bldg	
B0D291	1/19/95	Org Soil, 6-18	East side of Bldg	
B0D292	1/19/95	Org Soil, 18-24	East side of Bldg	
B0D293	1/19/95	Org Soil, 0-6	SW corner of Bldg	
B0D294	1/19/95	Org Soil, 6-18	SW corner of Bldg	
B0D295	1/19/95	Org Soil, 18-24	SW corner of Bldg	
B0D296	1/19/95	Org Soil, 0-6	NW corner of Bldg	
B0D297	1/19/95	Org Soil, 6-18	NW corner of Bldg	
B0D298	1/19/95	Org Soil, 18-24	NW corner of Bldg	
B0D299	1/10/95	Equip Blank	Soil Auger Equip	
B0D2B0	1/23/95	Equip Blank	Sampling Equip	
B0D2B1	1/23/95	Soil, 0-6	Pad-Pad Joint, Fig 3-7	
B0D2B2	1/23/95	Soil, 6-18	Pad-Pad Joint, Fig 3-7	
B0D2B3	1/23/95	Soil, 18-24	Pad-Pad Joint, Fig 3-7	
B0D2B4	1/25/95	Equip Blank	Coring Equip in Sump	
B0D2B5	1/25/95	Soil, 18-24	Pad-Bldg Joint, Fig 3-7	
B0D2B7	1/25/95	Inorg Conc Core	Sump, Fig 3-1	
B0D2B8	1/25/95	Soil, 6-18	Pad-Bldg Joint, Fig 3-7	
B0D2B9	1/25/95	Soil, 0-6	Pad-Bldg Joint, Fig 3-7	Corrected entry, sampler's logs identifies the sample interval as 152 to 457 millimeters (6 to 18 inches); correct value is 0 to 152 millimeters (0 to 6 inches).
B0D2C0	1/25/95	Inorg Conc Core	Floor, Fig 3-1, NS1-EW8	
B0D2C1	1/25/95	Inorg Conc Core	Floor, Fig 3-1, NS12-EW4	
B0D2C2	1/26/95	Equip Blank	Concrete Chip Sampling Equip	

Table 3-7. 304 Concretion Facility: Samples Numbers in Numerical Order. (3 sheets)

	Sample Number	Date	Media/Type	Location	Comments
1	B0D2C3	1/26/95	Equip Blank	Concrete Chip Sampling Equip	Dup of B0D2C2
2	B0D2C4	1/30/95	Equip Blank	Concrete Core Equip	
3	B0D2C5	1/30/95	Inorg Conc Core	Floor, Fig 3-1, NS4-EW1	
4	B0D2C6	1/30/95	Inorg Conc Core	Floor, Fig 3-1, NS5-EW2	
5	B0D2C7	1/30/95	Inorg Conc Core	Floor, Fig 3-1, NS9-EW8	In south end of trench
6	B0D2C8	1/30/95	Inorg Conc Core	Floor, Fig 3-1, NS7-EW6	
7	B0D2C9	1/30/95	Inorg Conc Core	Floor, Fig 3-1, NS7-EW6	Conc Inorg Dup Sample
8	B0D2D0	1/30/95	Org Conc Core	Floor, Fig 3-1, NS7-EW6	Conc Org Dup Sample
9	B0D2D1	1/31/95	Field Blank	Field Cleaned Conc Coring Bit	Corrected entry; samples logs identify this sample as an equipment blank; correct entry is as a field blank, see Section 3.4.3
10	B0D2D2	1/31/95	Field Blank	Field Cleaned Soil Auger & Sample Bowls	Corrected entry; samples logs identify this sample as an equipment blank; correct entry is as a field blank, see Section 3.4.3
11	B0D2D3	1/19/95	Asphalt Core	East side of Bldg	
12	B0D2D4	1/19/95	Asphalt Core	East side of Bldg	Dup of B0D2D3
13	B0D2D5	1/19/95	Asphalt Core	SW corner of Bldg	
14	B0D2D6	1/19/95	Asphalt core	NW corner of Bldg	
15	B0D2D7	1/19/95	Equip Blank	Asphalt Coring Equip	
16	B0D2D8	1/20/95	Asphalt Core	External Pad, Fig 3-6, NS2-EW1	
17	B0D2D9	1/20/95	Equip Blank	Asphalt Coring Equip	
18	B0D2F0	1/19/95	Inorg Soil, 0-6	East side of Bldg	
19	B0D2F1	1/19/95	Inorg Soil, 6-18	East side of Bldg	
20	B0D2F2	1/19/95	Inorg Soil 18-24	East side of Bldg	
21	B0D2F3	1/19/95	Inorg Soil, 0-6	SW corner of Bldg	
22	B0D2F4	1/19/95	Inorg Soil, 6-18	SW corner of Bldg	
23	B0D2F5	1/19/95	Inorg Soil, 18-24	SW corner of Bldg	
24	B0D2F6	1/19/95	Inorg Soil, 0-6	NW corner of Bldg	
25	B0D2F7	1/19/95	Inorg Soil, 6-18	NW corner of Bldg	
26	B0D2F8	1/19/95	Inorg Soil, 18-24	NW corner of Bldg	
27	B0D2F9	1/31/95	Inorg Conc Core	Floor Crack, Fig 3-1	
28	B0D2G0	1/26/95	Concrete Chip	Changeroom Floor, Fig 3-1, NS4-EW4	
29	B0D2G1	1/26/95	Concrete Chip	Changeroom Floor, Fig 3-1, NS4-EW4	Dup of B0D2G0
30	B0D2G2	1/31/95	Org Conc Core	Floor Crack, Fig 3-1	222-S R6890
31	B0D2G3	1/31/95	Soil, 0-6	Floor Crack, Fig 3-7	
32	B0D2G4	1/31/95	Soil, 6-18	Floor Crack, Fig 3-7	
33	B0D2G5	1/31/95	Soil, 18-24	Floor Crack, Fig 3-7	
34	B0D2G6	1/31/95	Inorg Conc Core	Floor, Fig 3-1, NS11-EW4	
35	B0D2G7	1/31/95	Org Conc Core	Floor, Fig 3-1, NS11-EW4	222-S R6891
36	B0D2G8	2/ 1/95	Equip Blank	Soil Augering Equip	

Table 3-7. 304 Concretion Facility: Samples Numbers in Numerical Order. (3 sheets)

Sample Number	Date	Media/Type	Location	Comments
B0D2G9	2/ 1/95	Org Conc Core	Floor Sump, Fig 3-1	222-S R6899
B0D2H0	2/ 1/95	Soil, 0-6	Floor Sump, Fig 3-7	
B0D2H1	2/ 1/95	Soil, 6-18	Floor Sump, Fig 3-7	
B0D2H2	2/ 1/95	Soil, 18-24	Floor Sump, Fig 3-7	
B0D2H3	2/ 1/95	Org Soil, 0-6	Floor Sump, Fig 3-7	Dup of Soil Org B0D2H0
B0D2H4	2/ 1/95	Org Soil, 6-18	Floor Sump, Fig 3-7	Dup of Soil Org B0D2H1
B0D2H5	2/ 1/95	Org Soil, 18-24	Floor Sump, Fig 3-7	Dup of Soil Org B0D2H2
B0D2H6	2/ 2/95	Equip Blank	Soil Sampling Equip	
B0D2H7	2/ 2/95	Equip Blank	Conc Coring Equip	
B0D2H8	2/ 2/95	Inorg Conc Core	Floor Drain, Fig 3-1	
B0D2H9	2/ 2/95	Org Conc Core	Floor Drain, Fig 3-1	222-S R6905
B0D2J0	2/ 2/95	Soil, 0-6	Floor Drain, Fig 3-7	
B0D2J1	2/ 2/95	Inorg Soil, 0-6	Floor Drain, Fig 3-7	Dup of Soil Inorg B0D2J0
B0D2J2	2/ 2/95	Soil, 6-18	Floor Drain, Fig 3-7	
B0D2J3	2/ 2/95	Inorg Soil, 6-18	Floor Drain, Fig 3-7	Dup of Soil Inorg B0D2J2
B0D2J4	2/ 2/95	Soil, 18-24	Floor Drain, Fig 3-7	
B0D2J5	2/ 2/95	Inorg Soil, 18-24	Floor Drain, Fig 3-7	Dup of Soil Inorg B0D2J4
B0D2J6	1/20/95	Inorg Conc Core	External Pad, Fig 3-6, NS4-EW6	
B0D2J7	2/ 2/95	Inorg Conc Core	Floor Trench, Fig 3-1	
B0D2J8	2/ 2/95	Org Conc Core	Floor Trench, Fig 3-1	222-S R6906
B0D2J9	2/ 2/95	Soil, 0-6	Floor Trench, Fig 3-7	
B0D2K0	2/ 2/95	Soil, 18-24	Floor Trench, Fig 3-7	
B0D2K9	1/23/95	Org Conc Core	External Pad, Fig 3-6, NS4-EW6	

Notes:
Inorg = inorganic
org = organic
0-6 = 0 to 152 millimeter (0-6 inch) sample interval
6-18 = 152 millimeter to 457 millimeter (6-18 inch) sample interval
18-24 = 457 millimeter to 610 millimeter (18-24 inch) sample interval
conc = concrete
equip = equipment
NSx = north-south axis of referenced figure
EWx = east-west axis of referenced figure
Bldg = building
Dup = duplicate
Vx = vertical axis of referenced figure
Hx = horizontal axis of referenced figure
SW = southwest
NW = northwest
Fig = figure
222-S
Rxxxx = Hanford 222-S Laboratory sample number of the org conc core samples

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4.0 PERFORMANCE STANDARDS

The performance standards for closure of the 304 Concretion Facility are defined in WAC 173-304-610(2)(b) "Dangerous Waste Regulations." The performance standards defined for the soils are the numeric cleanup levels calculated using residential exposure assumptions according to WAC 173-340, "Model Toxics Control Act Cleanup Regulation." The performance standards defined for structures, equipment, bases, liners, etc., are set on a case-by-case basis by Ecology.

4.1 PERFORMANCE STANDARDS FOR THE 304 CONCRETION FACILITY CLOSURE

The specific performance standards to be used for the closure of the 304 Concretion Facility are identified below. The performance standards for the inorganic constituents are summarized on Table 4-1 and the performance standards for the organic constituents are summarized on Table 4-2.

4.1.1 Performance Standards for Soils

The performance standards for the soils will follow the requirements of WAC 173-303-610(2)(b)(i). This section references the use of parts of WAC 173-340 to define the numerical cleanup performance standards for the soil at the 304 Concretion Facility. Also, WAC 173-340 allows the use of soil background values in addition to the health-based values. The sitewide soil background values on the Hanford Site are defined in the *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes* (DOE 1994a).

The higher of the WAC 173-340 health-based value or the sitewide soil background will be used to determine clean closure. A comparison among the Model Toxics Control Act (MTCA) cleanup values, the sitewide soil background values, and the proposed cleanup performance standards of the 304 Concretion Facility are presented on Tables 4-1 through 4-2. With the exception of beryllium, the MTCA values are higher and will be used as the cleanup performance standards for cadmium, chromium, lead, nickel, and all of the organics. The sitewide soil background values will be used as the cleanup performance standard for beryllium.

4.1.2 Performance Standards for Concrete and Asphalt

There are no predefined performance standards to evaluate contamination in concrete or asphalt. Therefore, based on Ecology's publication *Guidance for Clean Closure of Dangerous Waste Facilities* (Ecology 1994), soil cleanup levels based on WAC 173-340 are used. Therefore, concrete and asphalt will use the same cleanup performance standards as used for the soils (i.e., the higher of the WAC 173-340 health-based value or the sitewide soil background). These performance standards are presented on Tables 4-1 through 4-2.

4.1.3 Performance Standards for the Metal Walls and Girders

There are no predefined performance standards with which to evaluate the steel building structure. Wipe sampling data cannot generate the actual numerical value for the concentration of the constituents of concern. A health-based evaluation based on reference dose is not considered practicable. Also, EPA has not established reference dose for lead (EPA 1995).

For this evaluation, an estimated concentration will be developed for comparison to the MTCA cleanup values. This estimation will be developed by using the wipe sample data to estimate the total amount of constituent of concern present on the walls of the 304 Building. The estimate of total amount will be normalized against a nominal wall mass to produce an 'estimated concentration'. The estimated concentration then will be evaluated against the MTCA soils performance standards (Table 4-1). The estimated concentration equation is presented in Appendix D.

While it is not possible to generate an actual numerical concentration value, this method provides an indication of whether the cleanup performance standard can be met.

4.2 ACTION LEVELS

The term 'action level' was introduced before the adoption of numerical performance standards in WAC 173-304. Its use is continued here to maintain consistency with the existing closure plan. The *304 Concretion Facility Closure Plan* (DOE-RL 1995a) defines actions levels as the concentrations of constituents of concern that prompt an action, such as removal/disposal, treatment, or further evaluation.

The *304 Concretion Facility Closure Plan* identifies the numerical values for the initial action levels as the greater of two levels: background or LOQ. If concentrations exceed initial action levels, performance standards will be assessed to determine if the 304 Concretion Facility can be clean closed.

For the soil at the 304 Concretion Facility, the closure plan requires the use of the sitewide soil background as the initial action level. The sitewide soil background concentrations are defined in *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes* (DOE-RL 1994a).

For the building components, concrete floor, and the external concrete and asphalt pads, the closure plan requires the use of the LOQ as the initial action level. For each analyte, the LOQ is based on the analytical method and the analytical equipment.

4.3 MODEL TOXICS CONTROL ACT

The calculated health-based performance standards used in this data evaluation report are from the equations, risk levels, and exposure assumptions found in the MTCA Method B (WAC 173-340-740 [3][a][iii]). If no data were available under MTCA Method B, then MTCA Method A (WAC 173-340-740[2][a][ii]) performance standards were used.

For noncarcinogens, the principal variable 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 the risk per unit dose.

The oral reference dose and the cancer slope factor are chemical-specific and are obtained from the IRIS database (EPA 1995), if available. Secondary sources for these toxicity values are from EPA or Ecology. Health-based thresholds, references, and calculations are reported in Appendix A.

4.4 HANFORD SITE SOIL BACKGROUND

The *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes* (DOE-RL 1995) is a systemic, sitewide approach to determining background levels. This sitewide soil background approach was developed as an alternative to local unit-based background determinations. Using local soil backgrounds for each TSD unit can lead to different definitions of contamination and different assessments of remediation goals and risk for different TSD units. The sitewide soil background approach is based on the premise that: (1) all the waste management units are part of a common sequence of vadose zone sediments, and (2) the basic characteristics 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 the sitewide soil background for environmental restoration on the Hanford Site technically is preferable to the use of the unit-based background because the former more accurately represents the natural variability in soil composition. The sitewide soil background also provides a more consistent, credible, and efficient basis for evaluating contamination in soil.

The sitewide soil background threshold values are summarized in Appendix A. The background threshold is the concentration level defining the upper limit of the background population. Background thresholds are based on a tolerance interval approach. The calculated threshold levels depend on the confidence interval and percentile used in the calculation. The MTCA (WAC 173-340-708[11][d]) specifies a tolerance coefficient of 95 percent and a coverage of 95 percent. The sitewide soil background threshold values are based on this 95/95 confidence interval. Statistical calculations are described in the source document (DOE-RL 1994a).

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Table 4-1. Inorganic Closure Performance Standards for the 304 Concretion Facility.

Constituent of Concern		Hanford Site Background[a]	MTCA[b]	**Cleanup Performance Standard[c]**	Common Ranges in Soils[d]
Beryllium	mg/kg	1.8	0.23	**1.8**	0.1 - 40
Cadmium	mg/kg	<0.79[e]	40	**40**	0.01 - 7
Chromium	mg/kg	28.2	100	**100**	5 - 3000
Lead	mg/kg	14.9	250	**250**	2 - 200
Nickel	mg/kg	24.7	1,600	**1,600**	5 - 1000
Uranium	mg/kg	n/a	n/a	n/a	0.9 - 9, extreme 250

mg/kg = milligrams per kilogram (parts per million)
n/a = not applicable, there are no sitewide soil background values or MTCA performance standards for uranium.

[a] *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes*, DOE/RL-92-24, Rev. 2 (Appendix A) (DOE 1994a).

[b] WAC-173-303, "The Model Toxics Control Act Cleanup Regulation," (Ecology 1992). All values listed are from MTCA Method B soil, except for lead and chromium, which are from MTCA Method A soil table.

[c] The Cleanup Performance Standard is based on the higher value from either the Hanford Site Background or from MTCA.

[d] Adapted from *The Soil Chemistry of Hazardous Materials*, (Hazardous Material Research Institute 1988).

[e] This is the limit of quantitation for cadmium in *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes*.

Table 4-2. Organic Closure Performance Standards for the 304 Concretion Facility

Constituent of Concern		Hanford Site Background[a]	MTCA[b]	Cleanup Performance Standard[c]
Trichloroethene	mg/kg	below detectable	91	91
Tetrachloroethene (Perchloroethene)	mg/kg	below detectable	19	19
1,1,1-Trichloroethane	mg/kg	below detectable	7,200	7,200
1,1-Dichloroethene	mg/kg	below detectable	1.7	1.7
cis-1,2-Dichloroethene	mg/kg	below detectable	800	800
trans-1,2-Dichloroethene	mg/kg	below detectable	1,600	1,600
Ethyl Acetate	mg/kg	below detectable	72,000 (7.2 wt%)	72,000 (7.2 wt%)
Methyl Ethyl Ketone (2-Butanone)	mg/kg	below detectable	48,000 (4.8 wt%)	48,000 (4.8 wt%)

mg/kg = milligrams per kilogram (parts per million)
wt% = weight percent

[a]*Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes*, DOE/RL-92-24, Rev. 2 (Appendix A) (DOE 1994a).

[b]WAC-173-303, "The Model Toxics Control Act Cleanup Regulation," (Ecology 1992).

[c]The Cleanup Performance Standard is based on the higher value from either the Hanford Site Background or from MTCA.

5.0 ANALYSES

Samples from the 304 Concretion Facility were analyzed for both inorganic and organic constituents. There are five types of samples being analyzed for six inorganic constituents and two types of samples being analyzed for eight organic constituents. Whenever possible, analytical methods used were drawn from *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, SW-846 (EPA 1986). The analytical methods are summarized on Table 5-1.

The analysis of all inorganic samples occurred at an offsite laboratory, which is Lockheed Analytical Services in Las Vegas, Nevada. The analysis of the soil organic samples also was performed at Lockheed Analytical Services. The analysis of the concrete core organic samples was performed onsite by the Hanford 222-S Laboratory.

Appendix G of the *304 Concretion Facility Closure Plan* (DOE-RL 1995a) contains the Ecology-approved sampling and analysis requirements for the 304 Concretion Facility closure activities. The closure plan Appendix G analytical information supersedes the analytical information presented in Section 8 of the closure plan.

5.1 SAMPLE TYPES AND CONSTITUENTS OF CONCERN

The five inorganic samples types are as follows:

- Concrete core inorganic samples
- Concrete chip samples
- Soil inorganic samples
- Wipe samples
- Asphalt core samples.

The six inorganic constituents of concern are as follows:

- Beryllium
- Cadmium
- Chromium
- Lead
- Nickel
- Uranium.

The two types of organic samples types are as follows:

- Concrete core organic samples
- Soil organic samples.

The eight volatile organic constituents of concern are as follows:

- Trichloroethylene
- Tetrachloroethylene
- 1,1,1-Trichloroethane
- 1,1-Dichloroethylene
- cis-1,2-Dichloroethylene
- trans-1,2-Dichloroethylene
- Ethyl acetate
- Methyl ethyl ketone.

Table 5-1 also provides a summary of the sample types and constituents of concern.

5.2 INORGANIC ANALYSES

Samples were analyzed for inorganic analytes by the Lockheed Analytical Services in Las Vegas, Nevada. The SW-846 Method 6010 (inductively coupled plasma/atomic emission spectroscopy) was used to determine concentrations of beryllium, cadmium, chromium, and nickel. Although Method 6010 identifies additional metals, those metals were not identified as constituents of concern in the closure plan and, therefore, are not presented in this data evaluation report. Those validated results were transmitted to Ecology separately as part of the complete data validation package (DOE-RL 1995b). Lead was determined using SW-846 Method 7421, atomic absorption, furnace technique. Total uranium was determined using a laboratory-specific procedure, laser kinetic phosphorescence analysis.

The data from the inorganic sample analysis are summarized on Tables 5-2 through Table 5-8. The data validation is discussed in Section 6 and the data are evaluated in Section 8.

5.3 ORGANIC ANALYSES OF THE CONCRETE CORE SAMPLES

The concrete core organic samples were prepared and analyzed for volatile organic compounds (VOC) at the Hanford 222-S Laboratory.

5.3.1 Preparation of the Concrete Core Organic Samples

The concrete core organic samples were prepared for VOA using a procedure developed at the 222-S Laboratory (WHC 1994) in support of the closure of the 300 Area Solvent Evaporator. The sample preparation procedure uses sonification to desorb the volatile organics from the concrete into high-purity water. The water then is analyzed by gas chromatography/mass spectroscopy (GC/MS) using a procedure based on SW-846 Method 8260. The sonification procedure followed by the GC/MS analysis was found to have acceptable matrix spike recovery for most target analytes when the spike was added to water that was in contact with the concrete.

However, one part of the method development study shows that there might not be complete extraction of the VOCs from the concrete. When an attempt was made to spike dry concrete, recovery was as low as 20 percent. However, it is possible that the low recovery was a result of problems in concrete preparation and not a result of poor VOC extraction. Even when spiking dry concrete, the method could quantitatively detect the compounds when present at 1 part per million, which is sufficient for supporting closure of a TSD unit. If the detection limits were obtainable using the GC/MS method, concentrations of the constituents of concern for the 304 Concretion Facility closure would be detectable using this method.

Note that a limitation on the sonification procedure is that trichloroethene and 1,1-dichloroethene spike recoveries were high on standard tests of the procedure. It is believed that 1,1,2,2-tetrachlorethane and 1,1,2-trichloroethane react on the concrete surfaces to produce these two compounds. The high recoveries for trichloroethene and 1,1-dichloroethene are believed to be because of reactions of compounds on the concrete surfaces and not because of the determinative procedure.

5.3.2 Analysis of the Concrete Core Organic Samples

The VOCs requested were trichloroethene, tetrachloroethene (also known as perchloroethene), 1,1,1-trichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and ethyl acetate by Method 8260 and methyl ethyl ketone by Method 8240 (Table 5-1). These analytical methods also identify and report additional VOCs. However, those organics not identified as constituents of concern in the closure plan are not presented or discussed in this data evaluation report. Those validated results were transmitted to Ecology separately as part of the complete data validation package (DOE-RL 1995b).

Ethyl acetate is not a standard target analyte and, therefore, was treated as a library search compound. Ethyl acetate would be reported as a tentatively identified compound (TIC). The TICs in each sample (described in the validated data) underwent a computer-generated library search and mass spectral interpretation. The analytical results did not report ethyl acetate as being detected in any sample.

Equipment limitations in the 222-S Laboratory restricted the analysis to the use of only Method 8240. Method 8240 cannot provide sufficient separation of the cis and trans isomers of 1,2-dichloroethene. Therefore, the cis-1,2-dichloroethylene and trans-1,2-dichloroethylene were reported as total 1,2-dichloroethylene.

The data from the concrete organic sample analysis are summarized on Table 5-9. The data validation is discussed in Section 6 and the data are evaluated in Section 8.

5.4 ORGANIC ANALYSES OF THE SOIL SAMPLES

The soil organic samples were analyzed for VOCs at Lockheed Analytical Services in Las Vegas, Nevada. The analysis requested were trichloroethene, tetrachloroethene (also known as perchloroethene), 1,1,1-trichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and ethyl acetate by Method 8260 and methyl ethyl ketone by Method 8240 (Table 5-1). These analytical methods also identify and report additional VOCs. However, those organics not identified as constituents of concern in the closure plan are not presented or discussed in this data evaluation report. Those validated results were transmitted separately to Ecology as part of the complete data validation package (DOE-RL 1995b).

Ethyl acetate is not a standard target analyte of either Method 8240 or 8260. Therefore, ethyl acetate was treated as a library search compound. Ethyl acetate would be reported as a TIC. The TICs in each sample underwent a computer-generated library search and mass spectral interpretation. The analytical results did not report ethyl acetate as being detected in any sample.

The data from the concrete organic sample anaylsis are summarized on Tables 5-10 through 5-12. The data validation is discussed in Section 6 and the data are evaluated in Section 8.

Table 5-1. 304 Concretion Facility: Summary of Constituents of Concern, Sample Types, and Analytical Methods.

Constituents of Concern	Analytical Method for						
	Concrete Core Inorganic Samples	Concrete Chip Samples	Soil Inorganic Samples	Wipe Samples	Asphalt Samples	Concrete Core Organic Samples	Soil Organic Samples
Beryllium	SW-846[a] Method 6010	SW-846 Method 6010	SW-846 Method 6010	SW-846 Method 6010	SW-846 Method 6010	n/a	n/a
Cadmium	SW-846 Method 6010	SW-846 Method 6010	SW-846 Method 6010	SW-846 Method 6010	SW-846 Method 6010	na/	n/a
Chromium	SW-846 Method 6010	SW-846 Method 6010	SW-846 Method 6010	SW-846 Method 6010	SW-846 Method 6010	n/a	n/a
Lead	SW-846 Method 7421	SW-846 Method 7421	SW-846 Method 7421	SW-846 Method 7421	SW-846 Method 7421	n/a	n/a
Nickel	SW-846 Method 6010	SW-846 Method 6010	SW-846 Method 6010	SW-846 Method 6010	SW-846 Method 6010	n/a	n/a
Uranium	LKPA	LKPA	LKPA	LKPA	LKPA	LKPA	LKPA
Trichloroethene	n/a	n/a	n/a	n/a	n/a	SW-846 Method 8260	SW-846 Method 8260
Tetrachloroethene (Perchloroethene)	n/a	n/a	n/a	n/a	n/a	SW-846 Method 8260	SW-846 Method 8260
1,1,1-Trichloroethane	n/a	n/a	n/a	n/a	n/a	SW-846 Method 8260	SW-846 Method 8260
1,1-Dichloroethene	n/a	n/a	n/a	n/a	n/a	SW-846 Method 8260	SW-846 Method 8260
cis-1,2-dichloroethene	n/a	n/a	n/a	n/a	n/a	SW-846 Method 8260	SW-846 Method 8260
trans-1,2-dichloroethene	n/a	n/a	n/a	n/a	n/a	SW-846 Method 8260	SW-846 Method 8260
Ethyl Acetate	n/a	n/a	n/a	n/a	n/a	SW-846 Method 8260	SW-846 Method 8260
Methyl Ethyl Ketone	n/a	n/a	n/a	n/a	n/a	SW-846 Method 8240	SW-846 Method 8240

n/a = not applicable
EERF = Eastern Environmental Radiation Facility
LKPA = laser kinetic phosphorimetric analysis
SCINTREX is a trademark of SCINTREX, Inc.

[a] Test Methods for Evaluating of Solid Waste: Physical/Chemical Methods, SW-846 (EPA 1986).

Table 5-2. 304 Concretion Facility: Inorganic Data for the Floor. (2 sheets)

Sample Number	Notes	Beryllium mg/kg	Cadmium mg/kg	Chromium mg/kg	Lead mg/kg	Nickel mg/kg	Uranium μg/g
B0D2B7	c-core, Sump; AS	0.28 B	0.60 U	29.3	2.1	16.0	26600 J
B0D2C0	c-core, Floor, NS1-EW8; RS	0.33 B	0.63 U	36.4	2.4	22.8	13.40 J
B0D2C1	c-core, Floor, NS12-EW4; RS	0.25 B	0.60 U	24.5 J	2.6 J	12.8	2.60
B0D2C5	c-core, Floor, NS4-EW1; RS	0.33 B	0.60 U	25.1	5.6	14.9	99.6 J
B0D2C6	c-core, Floor, NS5-EW2; RS	0.28 B	0.60 U	9.1 U	3.6	11.0	13.01 J
B0D2C7	c-core, Trench, NS9-EW8; RS	0.50 B	0.75 B	43.9	12.9	43.2	336. J
B0D2C8	c-core, Floor, NS7-EW6; RS	0.20 B	0.59 U	17.0	41.6	10.1	38.9 J
B0D2C9	Duplicate sample of B0D2C8; c-core, Floor, NS7-EW6	0.37 B	0.62 U	13.4	10.0	38.9	20.4 J
B0D2F9	c-core, Crack; AS	0.27 B	0.64 U	22.5	2.6	15.6	8.71 J
B0D2G0	c-chip, CNS4-CEW4; RS	0.20 U	0.61 U	13.7 J	2.2	6.5 B	1.320
B0D2G1	Duplicate of B0D2G0; c-chip, CNS4-CEW4	0.25 B	0.61 U	27.7 J	2.7	5.3 B	1.364
B0D2G6	c-core, Floor, NS11-EW4; RS	0.35 B	0.64 U	21.1	4.1	21.8	5.42 J
B0D2H8	c-core, Drain; AS	0.34 B	0.65 U	22.4	4.5	17.1	3.97 J
B0D2J7	c-core, Trench; AS	0.31 B	0.61 U	30.7	6.4	20.2	5.91 J
COMPARISON VALUES							
Limit of Quantitation (Initial Action Level)		1.0	1.0	2.0	0.6	8.0	MDA = 0.1 μg/g
Cleanup Performance Standard		1.8	40	100	250	1,600	n/a
Hanford Site Background[a]		1.8	LOQ = 0.79	28.2	14.9	24.7	n/a
MTCA[b]		0.23	40	100	250	1,600	n/a
Common Ranges in Soils[c]		0.1 - 40	0.01 - 7	5 - 3000	2 - 200	5 - 1000	0.9 - 9, extreme 250

Table 5-2. 304 Concretion Facility: Inorganic Data for the Floor. (2 sheets)

mg/kg = milligrams per kilogram (parts per million)
μg/g = micrograms per gram (parts per million)
n/a = not available
LOQ = Limit of quantitation
c-core = concrete core sample from 304 Building Floor (includes sump and trench)
c-chip = concrete chip sample from changeroom floor
RS = Random sample
AS = Authoritative sample
NS = north-south axis on Figure 3-1
EW = east-west axis on Figure 3-1
CNS = Changeroom north-south axis on Figure 3-1
CEW = Changeroom east-west axis on Figure 3-3
MDA = Minimum detectable activity

Data Qualifiers
B = Analyte was detected in both the sample and the associated blank.
U = Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
J = Indicates that the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decision making purposes.

[a]Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes, DOE/RL-92-24, Rev. 2 (Appendix A) (DOE 1994a).

[b]WAC-173-303, "The Model Toxics Control Act Cleanup Regulation," (Ecology 1992). All values listed are from MTCA Method B soil, except for lead and chromium, which are from MTCA Method A soil table.

[c]Adapted from The Soil Chemistry of Hazardous Materials, (Hazardous Material Research Institute 1988).

Table 5-3. 304 Concretion Facility: Inorganic Data for the Exterior Surfaces. (2 sheets)

Sample Number	Comment	Beryllium mg/kg	Cadmium mg/kg	Chromium mg/kg	Lead mg/kg	Nickel mg/kg	Uranium µg/g
B0D2J6	c-core; external storage pad, Figure 3-1, PNS4-PEW6; RS	0.32 B	0.60 U	31.6 J	1.7 J	19.4	1.158
B0D2D3	a-core; East side of Bldg; AS	0.20 U	0.60 U	2.9 J	5.2 J	6.6 B	4.33
B0D2D4	a-core; Duplicate of B0D2D3; AS	0.20 U	0.84 B	6.4 J	10.2 J	8.0 B	6.92
B0D2D5	a-core; southwest corner of Bldg; AS	0.20 U	0.88 B	4.8 J	6.1 J	11.9	3.88
B0D2D6	a-core; northwest corner of Bldg; AS	0.28 B	0.62 B	10.1 U	5.9	24.7	108 J
B0D2D8	a-core; external storage pad, Figure 3-1, PNS2-PEW1; AS	0.37 B	0.70 U	4.5 U	3.8	33.2	18.6 J
COMPARISON VALUES							
Limit of Quantitation (Initial Action Level)		1.0	1.0	2.0	0.6	8.0	MDA = 0.1 µg/g
Cleanup Performance Standard		1.8	40	100	250	1,600	n/a
Hanford Site Background[a]		1.8	LOQ = 0.79	28.2	14.9	24.7	n/a
MTCA[b]		0.23	40	100	250	1,600	n/a
Common Ranges in Soils[c]		0.1 - 40	0.01 - 7	5 - 3000	2 - 200	5 - 1000	0.9 - 9, extreme 250

Table 5-3. 304 Concretion Facility: Inorganic Data for the Exterior Surfaces. (2 sheets)

RS = Random sample
AS = Authoritative sample
Bldg = 304 Building
PNS = north-south axis of external storage pad, north end of the 304 Building, on Figure 3-1.
PEW = east-west axis of the external storage pad, north end of the 304 Building, on Figure 3-1.
mg/kg = milligrams per kilogram (parts per million)
µg/g = micrograms per gram (parts per million)
n/a = not available
LOQ = Limit of quantitation
a-core = asphalt core sample
c-core = concrete core sample
MDA = Minimum detectable activity

Data Qualifiers
B = Analyte was detected in both the sample and the associated blank.
U = Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
J = Indicates that the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decision making purposes.

[a] Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes, DOE/RL-92-24, Rev. 2 (Appendix A) (DOE 1994).

[b] WAC-173-303, "The Model Toxics Control Act Cleanup Regulations," (Ecology 1992). All values listed are from MTCA Method B soil, except for lead and chromium, which are from MTCA Method A soil table.

[c] Adapted from The Soil Chemistry of Hazardous Materials, (Hazardous Material Research Institute 1988).

Table 5-4. 304 Concretion Facility: Inorganic Data for the Interior Metal Surfaces. (2 sheets)

Sample Number	Comments/Notes	Beryllium µg/wipe	Cadmium µg/wipe	Chromium µg/wipe	Lead µg/wipe	Nickel µg/wipe	Uranium µg/wipe
B0D275	North wall, V5-H7; RS	0.05 U	0.39	1.0 U	18.0	2.0	2.46
B0D276	North wall, V4-H3; RS	0.05 U	0.75	1.2 U	30.4	2.0	6.74
B0D277	West wall, V2-H9; RS	0.05 U	0.27	0.65 U	10.0	1.4 B	7.03
B0D278	West wall, V2-H9; Confirmatory Wipe Sample with B0D277; RS	0.05 U	0.44	0.40 U	12.0	1.2 B	25.3
B0D279	West wall, V4-H7; RS	0.05 U	0.24 B	0.54 U	17.5	0.80 B	35.6
B0D280	West wall, V1-H3; RS	0.05 U	0.74	0.97 U	23.4	1.5 B	10.40
B0D281	South wall, V4-H8; RS	0.05 U	0.19 B	0.65 U	6.4	0.60 U	9.78
B0D283	South wall, V3-H4; RS	0.05 U	0.63	0.46 U	25.4	1.7 B	65.8
B0D284	East wall, V3-H12; RS	0.11 B	0.46	0.15 U	15.6	1.1 B	57.1
B0D285	East wall, V3-H12; Duplicate of B0D284; RS	0.05 U	0.51	0.15 U	15.3	0.77 B	17.6
B0D286	East wall, V3-H2; RS	0.05 U	0.74	0.84 U	21.0	0.91 B	3.99
B0D287	East wall, V1-H6; painted plywood; RS	0.05 U	0.15 U	0.78 U	1.7	52.1	29.7
B0D289	Girder AS	0.06 B	0.75	1.10 U	7.5	1.9 B	89.3
Wipe Sampling Equipment and Field Blanks							
B0D282	Equipment Blank	0.05 U	0.15 U	0.18 U	0.10 U	0.60 U	0.0129 U[a]
B0D288	Wipe Sampling Field Blank	0.05 U	0.15 U	0.24 U	0.13 U	0.60 U	0.255

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Table 5-4. 304 Concretion Facility: Inorganic Data for the Interior Metal Surfaces. (2 sheets)

RS = Random sample
AS = Authoritative sample
μg/wipe = micrograms of the constituent of concern per 100 cm^2
mg/kg = milligrams per kilogram (parts per million)
n/a = not available
LOQ = Limit of quantitation
V = vertical axis; see Figures 3-2, 3-3, 3-4, and 3-5.
H = horizontal axis; see Figures 3-2, 3-3. 3-4, and 3-5

Data Qualifiers
B = Analyte was detected in both the sample and the associated blank.
U = Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

[a]The U qualifies is a laboratory concentration qualifier indicating that the result is less than the minimum detectable activity and was not added as a result validation.

Table 5-5. 304 Concretion Facility: Inorganic Data for the Soil Interval of 0 to 152 millimeters.

Sample Number	Notes	Beryllium mg/kg	Cadmium mg/kg	Chromium mg/kg	Lead mg/kg	Nickel mg/kg	Uranium µg/g
B002B1	Pad-pad Joint	0.38 B	1.3	19.8	19.0	89.5	256.
B002B9	Pad-Bldg Joint	0.37 B	0.90 B	12.8	108	60.3	23.2
B002G3	Floor Crack	0.26 U	0.79 U	8.1	4.4	9.1 B	5.43 J
B002H0	Sump	0.21 U	0.64 U	8.1	3.1	11.6	2.93 J
B002J0	Drain	0.27 U	0.82 U	8.3	4.2	9.7 B	20.1 J
B002J1	Duplicate of B002J0	0.26 B	0.76 U	7.6	4.1	11.6	13.74 J
B002J9	Trench	0.31 B	0.74 U	11.7	7.4	14.8	18.1 J
B002F0	East side of Bldg	0.28 B	1.0 B	9.5	20.4	45.5	6.00
B002F3	SW corner of Bldg	0.34 B	1.0 B	8.9	8.9	15.7	0.178
B002F6	NW Corner of Bldg	0.33 B	1.0 B	11.9	8.8	11.7	0.080
COMPARISON VALUES							
Cleanup Performance Standard		1.8	40	100	250	1,600	n/a
Hanford Site Background[a] (Initial Action Level)		1.8	LOQ = 0.79	28.2	14.9	24.7	n/a
MTCA[b]		0.23	40	100	250	1,600	n/a
Common Ranges in Soils[c]		0.1 - 40	0.01 - 7	5 - 3000	2 - 200	5 - 1000	0.9 - 9, extreme 250

mg/kg = milligrams per kilogram (parts per million)
µg/g = micrograms per gram (parts per million)
n/a = not available
LOQ = Limit of quantitation
Bldg = 304 Building
SW = southwest
NW = northwest

Data Qualifiers:
B = Analyte was detected in both the sample and the associated blank.
U = Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

[a]Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes, DOE/RL-92-24, Rev. 2 (Appendix A) (DOE 1994a).

[b]WAC-173-303, "The Model Toxics Control Act Cleanup Regulation," (Ecology 1992). All values listed are from MTCA Method B soil, except for lead and chromium, which are from MTCA Method A soil table.

[c]Adapted from The Soil Chemistry of Hazardous Materials, (Hazardous Material Research Institute 1988).

Table 5-6. 304 Concretion Facility: Inorganic Data for the Soil Interval of 152 millimeters 457 millimeters.

Sample Number	Notes	Beryllium mg/kg	Cadmium mg/kg	Chromium mg/kg	Lead mg/kg	Nickel mg/kg	Uranium µg/g
B02B2	Pad-Pad Joint	0.91 B	0.64 U	9.4	7.8 J	31.6	35.5
B02B8	Pad-Bldg Joint	0.38 B	0.65 U	11.3	10.8	15.3	14.0
B02G4	Crack	0.22 U	0.65 U	8.2	3.8	11.8	3.72 J
B02H1	Sump	0.25 B	0.64 U	8.2	2.7	10.7	5.97 J
B02J2	Drain	0.28 B	0.81 U	9.5	5.9	13.5	10.29 J
B02J3	Duplicate of B02J2	0.28 B	0.79 U	9.0	4.8	12.5	12.05 J
B02K0	Trench	0.29 B	0.68 U	9.8	863	16.2	33.3 J
B02F1	East Side of Bldg	0.33 B	0.73 U	9.8	5.5	13.8	0.163
B02F4	SW Corner of Bldg	0.33 B	0.67 U	10.2	5.4	14.2	0.0809
B02F7	NW Corner of Bldg	0.32 B	0.65 U	9.8	7.0	12.9	1.60
COMPARISON VALUES							
Cleanup Performance Standard		1.8	40	100	250	1,600	n/a
Hanford Site Background[a] (Initial Action Level)		1.8	LOQ = 0.79	28.2	14.9	24.7	n/a
MTCA[b]		0.23	40	100	250	1,600	n/a
Common Ranges in Soils[c]		0.1 - 40	0.01 - 7	5 - 3000	2 - 200	5 - 1000	0.9 - 9, extreme 250

mg/kg = milligrams per kilogram (parts per million)
µg/g = micrograms per gram (parts per million)
n/a = not available
LOQ = Limit of quantitation
Bldg = 304 Building
SW = southwest
NW = northwest

Data Qualifiers:
B = Analyte was detected in both the sample and the associated blank.
U = Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
J = Indicates that the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decision making purposes.

[a] Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes, DOE/RL-92-24, Rev. 2 (Appendix A) (DOE 1994a).

[b] WAC-173-303, "The Model Toxics Control Act Cleanup Regulation," (Ecology 1992). All values listed are from MTCA Method B soil, except for lead and chromium, which are from MTCA Method A soil table.

[c] Adapted from The Soil Chemistry of Hazardous Materials, (Hazardous Material Research Institute 1988).

Table 5-7. 304 Concretion Facility: Inorganic Data for the Soil Interval of 457 millimeters to 610 millimeters.

Sample Number	Notes	Beryllium mg/kg	Cadmium mg/kg	Chromium mg/kg	Lead mg/kg	Nickel mg/kg	Uranium µg/g
B0D2B3	Pad-Pad Joint	0.33 B	0.76 U	8.5	6.4	23.3	4.31
B0D2B5	Pad-Bldg Joint	0.40 B	0.69 B	12.4	7.5	17.8	83.4
B0D2G5	Crack	0.22 B	0.65 U	7.3	2.9	10.9	3.42 J
B0D2H2	Sump	0.25 B	0.65 U	8.2	3.5	10.8	4.36 J
B0D2J4	Drain	0.26 B	0.75 U	8.4	3.3	10.1	9.65 J
B0D2J5	Duplicate of B0D2J4	0.24 U	0.73 U	8.6	3.8	10.9	11.92 J
n/a	Trench						
B0D2F2	East side of Bldg	0.33 B	0.72 U	9.0	4.9	12.5	0.0187
B0D2F5	SW corner of Bldg	0.34 B	1.0 B	9.6	6.8	14.0	0.497
B0D2F8	NW corner of Bldg	0.38 B	0.68 U	10.6	6.8	11.8	3.28
COMPARISON VALUES							
Cleanup Performance Standard		1.8	40	100	250	1,600	n/a
Hanford Site Background[a] (Initial Action Level)		1.8	LOQ = 0.79	28.2	14.9	24.7	n/a
MTCA[b]		0.23	40	100	250	1,600	n/a
Common Ranges in Soils[c]		0.1 - 40	0.01 - 7	5 - 3000	2 - 200	5 - 1000	0.9 - 9, extreme 250

mg/kg = milligrams per kilogram (parts per million)
µg/g = micrograms per gram (parts per million)
n/a = not available
LOQ = Limit of quantitation
Bldg = 304 Building
SW = southwest
NW = northwest

Data Qualifiers:
B = Analyte was detected in both the sample and the associated blank.
U = Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

[a]Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes, DOE/RL-92-24, Rev. 2 (Appendix A) (DOE 1994a).

[b]WAC-173-303, "The Model Toxics Control Act Cleanup Regulation," (Ecology 1992). All values listed are from MTCA Method B soil, except for lead and chromium, which are from MTCA Method A soil table.

[c]Adapted from The Soil Chemistry of Hazardous Materials, (Hazardous Material Research Institute 1988).

Table 5-8. 304 Concretion Facility: Inorganic Data for the Concrete, Asphalt, and Soil Sampling Equipment Blanks. (2 sheets)

Sample Number	Notes	Beryllium mg/L	Cadmium mg/L	Chromium mg/L	Lead mg/L	Nickel mg/L	Uranium mg/L
B0D299	Equipment Blank, Soil Auger Equip, 1/10/95	0.0010 U	0.0030 U	0.0052 U	0.0020 U	0.0120 U	0.000063 U
B0D2B0	Equipment Blank, Sampling Equip, 1/23/95	0.0010 U	0.0030 U	0.0030 U	0.0020 U	0.0120 U	0.00 U
B0D2B4	Equipment Blank, Coring Equip in Sump, 1/25/95	0.0010 U	0.0030 U	0.0042 U	0.0020 U	0.0159 B	0.00 U
B0D2C2	Equipment Blank, Concrete Chip Sampling Equip, 1/26/95	0.0010 U	0.0030 U	0.0035 U	0.0020 U	0.0120 U	0.00 U
B0D2C3	Equipment Blank, Concrete Chip Sampling Equip, 1/26/95	0.0010 U	0.0030 U	0.0030 U	0.0020 U	0.0120 U	0.000334
B0D2C4	Equipment Blank, Concrete Coring Equip, 1/30/95	0.0010 U	0.0030 U	0.0031 B	0.0020 U	0.0120 U	0.00 U
B0D2D1	Field Blank, field cleaned concrete coring bit, 1/31/95	0.0010 U	0.0030 U	0.0030 U	0.0020 U	0.0120 U	0.207
B0D2D2	Field Blank, field cleaned soil auger and sampling bowls, 1/31/95	0.0010 U	0.0030 U	0.0030 U	0.0020 U	0.0120 U	0.517
B0D2D7	Equipment Blank, Asphalt Coring Equip, 1/19/95	0.0010 U	0.0030 U	0.0030 U	0.0020 U	0.0120 U	0.00 U
B0D2D9	Equipment Blank, Asphalt Coring Equip, 1/20/95	0.0010 U	0.0030 U	0.0030 U	0.0020 U	0.0120 U	0.00 U
B0D2G8	Equipment Blank, Soil Augering Equip, 2/1/95	0.0010 U	0.0030 U	0.0030 U	0.0020 U	0.0120 U	0.1178
B0D2H6	Equipment Blank, Soil Sampling Equip, 2/2/95	0.0010 U	0.0030 U	0.0030 U	0.0020 U	0.0120 U	0.794
B0D2H7	Equipment Blank, Soil Sampling Equip, 2/2/95	0.0010 U	0.0030 U	0.0030 U	0.0020 U	0.0120 U	0.315

Table 5-8. 304 Concretion Facility: Inorganic Data for the Concrete, Asphalt, and Soil Sampling Equipment Blanks. (2 sheets)

mg/L = micrograms per liter (parts per million)
mg/kg = milligrams per kilogram (parts per million)
n/a = not available
LOQ = Limit of quantitation
Equip = Equipment

Data Qualifiers:
B = Analyte was detected in both the sample and the associated blank.
U = Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

Table 5-9. 304 Concretion Facility: Organic Data for the Floor and External Pad.

Sample Number	Notes	Trichloroethene mg/kg	Tetrachloroethene mg/kg	1,1,1-Trichloroethane mg/kg	1,1-Dichloroethene mg/kg	combined cis- and trans-1,2-Dichloroethene mg/kg	Ethyl Acetate mg/kg	Methyl Ethyl Ketone mg/g
B0D2D0	Floor; Duplicate Concrete Organic Sample	0.017 U	0.017 U	0.017 U	0.017 U	0.017 U	NR	0.017 U
B0D2G2	Floor	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	NR	0.018 U
B0D2G7	Floor	0.017 U	0.017 U	0.017 U	0.017 U	0.017 U	NR	0.017 U
B0D2G9	Floor	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	NR	0.018 U
B0D2H9	Floor	0.017 U	0.017 U	0.017 U	0.017 U	0.017 U	NR	0.017 U
B0D2J8	Floor	0.017 U	0.017 U	0.017 U	0.017 U	0.017 U	NR	0.003 J
B0D2K9	External Pad	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	NR	0.004 J
COMPARISON VALUES								
Limit of Quantitation (Initial Action Level)		0.0050	0.0050	0.0050	0.0050	cis: 0.0050 trans: 0.0050	n/a	0.010
Cleanup Performance Standard		91	19	7,200	1.7	cis: 800 trans: 1,600	72,000	48,000
Hanford Site Background[a]		Below detectable	Below Detectable	Below Detectable	Below Detectable	Below Detectable	Below Detectable	Below Detectable
MTCA[b]		91	19	7,200	1.7	cis: 800 trans: 1,600	72,000 (7.2 wt%)	48,000 (4.8 wt%)

mg/kg = milligrams per kilogram (parts per million)
n/a = not available
LOQ = Limit of quantitation
NR = not reported

Data Qualifiers:
J = Indicates the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are useable for decision making purposes.
U = Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

[a]Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes, DOE/RL-92-24, Rev. 2 (Appendix A) (DOE 1994a).

[b]WAC-173-303, "The Model Toxics Control Act Cleanup Regulation," (Ecology 1992). All values listed are from MTCA Method B soil, except for lead, which is from MTCA Method A soil table.

Table 5-10. 304 Concretion Facility: Organic Data for the Soil Interval of 0 to 152 millimeters. (2 sheets)

Sample Number	Notes	Trichloro-ethene mg/kg	Tetrachloro-ethene mg/kg	1,1,1-Trichloroethane mg/kg	1,1-Dichloroethene mg/kg	cis-1,2-Dichloroethene mg/kg	trans-1,2-Dichloroethene mg/kg	Ethyl Acetate mg/kg	Methyl Ethyl Ketone mg/kg
B0D2B1	Pad-Pad Joint	0.0056 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U	NRT	0.011 U
B0D2B9	Pad-Bldg Joint	0.0056 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U	NRT	0.011 U
B0D2G3	Floor Crack	0.0061 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U	NRT	0.013 U
B0D2H0	Floor Sump	0.0053 U	0.0053 U	0.0053 U	0.0053 U	0.0053 U	0.0053 U	NRT	0.011 U
B0D2H3	Floor Sump Duplicate of B0D2H0	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U	NRT	0.0099 U
B0D2J0	Floor Drain	0.0063 U	0.0063 U	0.0063 U	0.0063 U	0.0063 U	0.0063 U	NRT	0.013 U
B0D2J9	Floor Trench	0.0060 U	0.0060 U	0.0060 U	0.0060 U	0.0060 U	0.0060 U	NRT	0.012 U
B0D290	East Bldg exterior	0.0060 U	0.0060 U	0.0060 U	0.0060 U	0.0060 U	0.0060 U	NRT	0.012 U
B0D293	SW corner of Bldg exterior	0.0055 U	0.0055 U	0.0055 U	0.0055 U	0.0055 U	0.0055 U	NRT	0.011 U
B0D296	NW corner of Bldg exterior	0.0056 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U	NRT	0.011 U
COMPARISON VALUES									
Limit of Quantitation		0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	n/a	0.010
Closure Performance Standard		91	19	7,200	1.7	800	1,600	72,000	48,000
Hanford Site Background[a] (Initial Action Level)		Below detectable	Below Detectable	Below Detectable	Below Detectable	Below Detectable	Below Detectable	Below Detectable	Below Detectable
HTCA[b]		91	19	7,200	1.7	800	1,600	72,000 (7.2 wt%)	48,000 (4.8 wt%)

Table 5-10. 304 Concretion Facility: Organic Data for the Soil Interval of 0 to 152 millimeters. (2 sheets)

mg/kg = micrograms per kilogram (parts per million)
n/a = not available
LOQ = Limit of quantitation
NRT = Not reported as a Tentatively Identified Compound (TIC)
wt% = weight percent
Bldg = 304 Building
NW = northwest
SW = southwest

Data Qualifiers:
U = Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

[a]Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes, DOE/RL-92-24, Rev. 2 (Appendix A) (DOE 1994a).

[b]WAC-173-303, "The Model Toxics Control Act Cleanup Regulation," (Ecology 1992). All values listed are from MTCA Method B soil, except for lead, which is from MTCA Method A soil table.

Table 5-11. 304 Concretion Facility: Organic Data for the Soil Interval of 152 millimeters to 457 millimeters. (2 sheets)

Sample Number	Notes	Trichloro-ethene mg/kg	Tetrachloro-ethene mg/kg	1,1,1-Trichloroethane mg/kg	1,1-Dichloroethene mg/kg	cis-1,2-Dichloroethene mg/kg	trans-1,2-Dichloroethene mg/kg	Ethyl Acetate mg/kg	Methyl Ethyl Ketone mg/kg
B0D2B2	Pad-Pad Joint	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U	NRT	0.011 U
B0D2B8	Pad-Bldg Joint	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U	NRT	0.011 U
B0D2G4	Floor Crack	0.0052 U	0.0052 U	0.0052 U	0.0052 U	0.0052 U	0.0052	NRT	0.011 U
B0D2H1	Floor Sump	0.0053 U	0.0053 U	0.0053 U	0.0053 U	0.0053 U	0.0053 U	NRT	0.011 U
B0D2H4	Floor Sump, Duplicate, Soil samples of B0D2H1	0.0053 U	0.0053 U	0.0053 U	0.0053 U	0.0053 U	0.0053 U	NRT	0.010 U
B0D2J2	Floor Drain	0.0067 U	0.0067 U	0.0067 U	0.0067 U	0.0067 U	0.0067 U	NRT	0.014 U
B0D2K0	Floor Trench	0.0056 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U	NRT	0.011 U
B0D291	East Bldg exterior	0.0061 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U	NRT	0.012 U
B0D294	SW corner of Bldg	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U	NRT	0.011 U
B0D297	NW corner of Bldg	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U	NRT	0.011 U
COMPARISON VALUES									
Limit of Quantitation		0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	n/a	0.010
Closure Performance Standard		91	19	7,200	1.7	800	1,600	72,000	48,000
Hanford Site Background[a] (Initial Action Level)		Below detectable	Below Detectable	Below Detectable	Below Detectable	Below Detectable	Below Detectable	Below Detectable	Below Detectable
MTCA[b]		91	19	7,200	1.7	800	1,600	72,000 (7.2 wt%)	48,000 (4.8 wt%)

Table 5-11. 304 Concretion Facility: Organic Data for the Soil Interval of 152 millimeters to 457 millimeters. (2 sheets)

mg/kg = milligrams per kilogram (parts per million)
n/a = not available
LOQ = Limit of quantitation
NRT = Not reported as a Tentatively Identified Compound (TIC)
wt% = weight percent
Bldg = 304 Building
NW = northwest
SW = southwest

Data Qualifiers
U = Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

[a] Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes, DOE/RL-92-24, Rev. 2 (Appendix A) (DOE 1994a).

[b] WAC-173-303, "The Model Toxics Control Act Cleanup Regulation," (Ecology 1992). All values listed are from MTCA Method B soil, except for lead, which is from MTCA Method A soil table.

Table 5-12. 304 Concretion Facility: Organic Data for the Soil Interval of 457 millimeters to 610 millimeters. (2 sheets)

Sample Number	Notes	Trichloro-ethene mg/kg	Tetrachloro-ethene mg/kg	1,1,1-Trichloroethane mg/kg	1,1-Dichloroethene mg/kg	cis-1,2-Dichloroethene mg/kg	trans-1,2-Dichloroethene mg/kg	Ethyl Acetate mg/kg	Methyl Ethyl Ketone mg/kg
B0D2B3	Pad-Pad Joint	0.0063 U	0.0063 U	0.0063 U	0.0063 U	0.0063 U	0.0063 U	NRT	0.013 U
B0D2B5	Pad-Bldg Joint	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U	NRT	0.011 U
B0D2G5	Floor Crack	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U	NRT	0.011 U
B0D2H2	Floor Sump	0.0053 U	0.0053 U	0.0053 U	0.0053 U	0.0053 U	0.0053 U	NRT	0.011 U
B0D2H5	Floor Sump, Duplicate Soil Sample for B0D2H2	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U	NRT	0.010 U
B0D2J4	Floor Drain	0.0063 U	0.0063 U	0.0063 U	0.0063 U	0.0063 U	0.0063 U	NRT	0.013 U
Sample not collected	Floor Trench	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B0D292	East Bldg exterior	0.0058 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U	NRT	0.012 U
B0D295	SW corner of Bldg exterior	0.0060 U	0.0060 U	0.0060 U	0.0060 U	0.0060 U	0.0060 U	NRT	0.012 U
B0D298	NW corner of Bldg, exterior	0.0056 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U	NRT	0.011 U
COMPARISON VALUES									
Limit of Quantitation		0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	n/a	0.010
Closure Performance Standard		91	19	7,200	1.7	800	1,600	72,000	48,000
Hanford Site Background[a] (Initial Action Levels)		Below detectable	Below Detectable	Below Detectable	Below Detectable	Below Detectable	Below Detectable	Below Detectable	Below Detectable
MTCA[b]		91	19	7,200	1.7	800	1,600	72,000 (7.2 wt%)	48,000 (4.8 wt%)

Table 5-12. 304 Concretion Facility: Organic Data for the Soil Interval of 457 millimeters to 610 millimeters. (2 sheets)

mg/kg = milligrams per kilogram (parts per million)
n/a = not available
LOQ = Limit of quantitation
NRT = Not reported as a Tentatively Identified Compound (TIC)
wt% = weight percent
Bldg = 304 Building
NW = northwest
SW = southwest

Data Qualifiers:
U = Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

[a]Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes, DOE/RL-92-24, Rev. 2 (Appendix A) (DOE 1994a).

[b]WAC-173-303, "The Model Toxics Control Act Cleanup Regulation," (Ecology 1992). All values listed are from MTCA Method B soil, except for lead, which is from MTCA Method A soil table.

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6.0 DATA VALIDATION

Data validation was performed by Los Alamos Technical Associates (LATA), in accordance with Level D as defined in *Data Validation Procedures for Chemical Analysis* (WHC 1993b) and *Data Validation Procedures for Radiochemical Analysis* (WHC 1993a). Level D validation includes evaluation and qualification of results based on analytical holding times, method blank results, matrix spikes and duplicates, surrogate recoveries, and analytical method blanks. The results of the data validation are part of the data validation package (DOE-RL 1995b).

6.1 DATA QUALIFIERS

The data validation procedure establishes the following qualifiers and definitions to describe the data associated with the constituents of concern:

U Indicates that the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content.

J Indicates that the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decision making purposes.

B For inorganic data, indicates that the analyte concentration is less than the contract required detection limit, but greater than the instrument detection limits.

6.2 EXPLANATION OF QUALIFIED DATA

Table 6-1 identifies all data that were qualified by the data validation process. The table is limited to the data qualifications for the constituents of concern and the analysis specified in Section 5. All data qualifiers were considered to be minor since they do not impact the data. The qualifiers on Table 6-1 are included with the analytical data on Tables 5-2 through 5-8. Additional information is available in the data validation package (DOE-RL 1995b). Any data qualifiers not listed on Table 6-1 were assigned by the laboratory doing the analysis.

The data validation process identified one systemic problem. The chain-of-custody (COC) form used for shipping the 304 Concretion Facility samples had recently been revised. The COC form no longer included an entry for the temperature of the cooler. It was not possible to determine which coolers arrived at which temperature. The data qualification process determined that this did not compromise this data set. Corrective actions have been initiated to prevent this problem from occurring again.

6.3 ASSESSMENT OF DATA VALIDATION

For both the VOA and the inorganic analyses, no major deficiencies were identified during the data validation process that would have qualified the data as unusable. All results were deemed valid. Minor deficiencies were identified during both the VOA and inorganic analyses validation process that resulted in the associated data being qualified as estimated (J) or in some cases as not detected (U). The data qualifiers are noted in the data tables (Tables 5-2 through 5-12). Information on the data validation is provided in more detail in the data validation package (DOE-RL 1995b).

Table 6-1. 304 Concretion Facility: Data Qualifications Summary Table.

Sample Data Group	Constituent of Concern	Type	Qualifier added to Data	Samples Affected	Data Quality Objective	Reason
LK3689-LAS-023	Chromium	MINOR	U	B0D275 B0D276 B0D277 B0D278 B0D279 B0D280 B0D281 B0D282 B0D283 B0D286 B0D287 B0D288 B0D289	BLANKS	Calibration blank value(s) are positive and outside acceptance criteria
LK3689-LAS-023	Lead	MINOR	U	B0D288	BLANKS	Calibration blank value(s) are positive and outside acceptance criteria
LK3723-LAS-025	Chromium	MINOR	U	B0D299 B0D2B4 B0D2C2 B0D2C3 B0D2C4 B0D2D7	BLANKS	Calibration blank value(s) are positive and outside acceptance criteria
LK3723-LAS-025	Nickel	FIELD QC	None	B0D2B4	EQUIPMENT BLANK	Contamination of Equipment Blank
LK3723-LAS-025	Cadmium	FIELD QC	None	B0D2C4	EQUIPMENT BLANK	Contamination of Equipment Blank.
LK3723-LAS-025	Uranium	FIELD QC	None	B0D2C2 B0D2C3	PRECISION	The difference between the duplicate results was greater than the required detection limit.
LK3748-LAS-032	Lead	MINOR	J	B0D2B2 B0D2C1 B0D2D3 B0D2D4 B0D2D5 B0D2J6	ACCURACY	Matrix spike recoveries are outside acceptance criteria
LK3748-LAS-032	Chromium	MINOR	U	B0D2C6 B0D2D6 B0D2D8	BLANKS	Calibration blank value is positive and outside acceptance criteria
LK3748-LAS-032	Chromium	MINOR	J	B0D2C1 B0D2D3 B0D2D4 B0D2D5 B0D2G0 B0D2G1 B0D2J6	PRECISION	Duplicate precision is outside acceptance criteria
LK3748-LAS-032	Lead	MINOR	J	B0D2B2 B0D2C1 B0D2D3 B0D2D4 B0D2D5 B0D2J6	PRECISION	Duplicate precision is outside acceptance criteria
LK3748-LAS-032	Total Uranium	MINOR	J	B0D2B7 B0D2C0 B0D2C5 B0D2C6 B0D2C7 B0D2C8 B0D2C9 B0D2D6 B0D2D8 B0D2F9 B0D2G6 B0D2H8 B0D2J7	ACCURACY	Matrix spike recovery is outside the acceptance criteria
LK3764-LAS-028	Cadmium	MINOR	U	B0D2J9	BLANKS	Calibration blank value(s) are positive and outside acceptance criteria
LK3764-LAS-028	Total Uranium	MINOR	J	B0D2G3 B0D2J1 B0D2G4 B0D2J2 B0D2G5 B0D2J3 B0D2H0 B0D2J4 B0D2H1 B0D2J5 B0D2H2 B0D2J9 B0D2J0 B0D2K0	ACCURACY	Matrix spike recovery is outside acceptance criteria

Table 6-1. 304 Concretion Facility: Data Qualifications Summary Table.

LK3689-LAS-023 = Identifier for the sample data group in the data validation package (DOE-RL, 1995).
LK3723-LAS-025 = Identifier for the sample data group in the data validation package.
LK3748-LAS-032 = Identifier for the sample data group in the data validation package.
LK3764-LAS-028 = Identifier for the sample data group in the data validation package.

U = Indicates that the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content.
J = Indicates that the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decision making purposes.

NOTE: For more information, see the data validation package (DOE-RL, 1995).

DOE-RL, 1995, Letter J. E. Rasmussen, RL, to D. R. Sherwood, EPA, and J. J. Witzak, Ecology, "Submittal of Validated Data for the 304 Concretion Facility Sampling," dated June 20, 1995, 95-PCA-395, U. S. Department of Energy, Richland Operations Office, Richland, Washington.

7.0 STATISTICAL ANALYSIS

Section 7.2.4 of the *304 Concretion Facility Closure Plan* requires a statistical analysis of the analytical data. All data collected are analyzed and tabulated for evaluation using the methods described in SW-846 (EPA 1986) and Appendix F (Quality Assurance Project Plan for Sampling and Analysis for the 304 Concretion Facility) of the closure plan. Data for individual constituents are summarized and include the following information:

- Method detection limit
- Limit of quantitation
- Total number of samples
- Number of less-than-detection-limit samples
- Mean
- Standard deviation
- Coefficient of variation
- Method precision
- Method accuracy
- Minimum value
- Maximum value
- Median value.

7.1 DATA SETS FOR STATISTICAL ANALYSIS

The analytical data are divided into the following sets for statistical analysis:

- Concrete inorganic data
- Soil inorganic data.

The selection of these sets of data was based on the guidance of a qualified statistician and the guidance provided in the *Hanford Site Background Data Applications Guide: Part 1, Soil*, DOE/RL 94-71 (DOE-RL 1994b). The mathematical equations used in the statistical analysis are included in Appendix C.

The statistical analysis of the concrete inorganic data is limited to the randomly located concrete samples. This includes the random concrete core samples from the interior building floor, the one random concrete core sample from the exterior storage pads, and the random concrete chip sample from the changeroom. The random concrete inorganic statistical analysis is presented on Table 7-1.

The statistical analysis of the concrete inorganic data has excluded the data from 4 authoritative samples locations (trench, drain, sump, and crack). These data have been excluded because they have the potential for biasing the randomly collected data. Also, the small number of sample locations (4) is not large enough to provide statistically useful data.

The statistical analysis of the soil inorganic data includes all inorganic soil samples. While the soil samples are all authoritative, there are a sufficient total number of samples to conduct a statistical analysis of the data. The soil inorganic statistical guidance is presented on Table 7-2.

7.2 DATA SETS EXCLUDED FROM STATISTICAL ANALYSIS

The following data sets will be excluded from statistical analysis:

- Concrete organic data
- Soil organic data
- Asphalt inorganic data
- Wipe sampling data.

The exclusion of these sets of data was based on the guidance of a qualified statistician and the guidance provided in the *Hanford Site Background Data Applications Guide: Part 1, Soil*, DOE/RL 94-71 (DOE-RL 1994b).

The concrete organic data are being excluded because all but two data points are detection limit values. The two nondetection limit values are laboratory estimates that are below the LOQ action level. Also, with only 7 samples, there is an insufficient amount of data to conduct a statistical analysis.

The soil organic data are being excluded because all data points are detection limit values. This does not provide enough significant data to conduct a statistical analysis.

The asphalt inorganic data are being excluded because 3 of the 4 sample locations are authoritative sample locations. Also, with only 4 sample locations, there is an insufficient amount of data to conduct a statistical analysis.

The wipe sampling data are being excluded because wipe samples do not provide concentration data. They can only indicate the presence or absence of a constituent of concern.

7.3 DETECTION LIMIT VALUES

The analytical data report detection limit values as 'less than' a specific numerical value. The 'less-than-detection-limit' data are addressed in three ways: the upper limiting case, the MTCA case, and the lower limiting case. Each case is included as part of the statistical analysis presented on Tables 7-1 and 7-2.

The upper limiting case uses the numerical value from the less-than-detection-limit value for the statistical analysis. This provides an upper limit to the possible statistical analysis of the data.

The MTCA case is defined in the regulations. For detection limit values, WAC 173-340-740 (7)(g) requires that "...measurements below the method detection limit shall be assigned a value equal to one-half the method detection limit."

The lower limiting case assigns a value of zero as the numerical value for the less-than-detection-limit data. This provides a lower limit to the possible statistical analysis of the data.

7.4 METHOD ACCURACY

Method accuracy for the data is based on the data analysis of matrix spikes and matrix spike duplicates. The method accuracy calculations are done as part of the data validation package (DOE 1995b) and can involve constituents that are not included in the constituents of concern. For this reason, they are not being reported as part of the statistical analysis.

The data validation package reported that the goals for method accuracy on the constituents of concern were met except for lead in the following samples: BOD2B2, BOD2C1, BOD2D3, BOD2D4, BOD2D5, and BOD2J6. On these samples, the matrix spike recoveries were outside the acceptance criteria. These are identified as minor deficiencies by the data validation package and do not adversely affect the data. See Table 6-1 and the data validation package for additional information.

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Table 7-1. 304 Concretion Facility: Random Concrete Inorganic Data Statistical Treatment.

			Beryllium	Cadmium	Chromium	Lead	Nickel	Uranium
Method Detection Limit		mg/kg	0.2	0.8	0.6	0.4	2.4	MDA = 0.1 µg/g
Limit of Quantitation (also initial action level)		mg/kg	1.0	1.0	2.0	0.6	8.0	n/a
Total Number of Samples			10	10	10	10	10	10
Number of less than detection limit samples			1	9	1	0	0	0
Sufficient Number of Samples for Statistical Analysis?			yes	no	yes	yes	yes	yes
Mean	DL = 0	mg/kg	0.28	-	24.3	-	-	-
	DL = DL/2	mg/kg	0.29	-	24.7	-	-	-
	DL = DL	mg/kg	0.30	-	25.2	7.9	17.9	2,711
Standard deviation	DL = 0	mg/kg	0.13	-	12.4	-	-	-
	DL = DL/2	mg/kg	0.10	-	11.4	-	-	-
	DL = DL	mg/kg	0.09	-	10.6	23.3	10.3	8,394
Coefficient of Variation	DL = 0		0.46	-	0.51	-	-	-
	DL = DL/2		0.34	-	0.46	-	-	-
	DL = DL		0.30	-	0.42	1.6	0.58	3.1
Method Precision, Concrete Core Duplicate Samples, as RPD			59.6	-	23.7	122.5	117.6	62.4
Method Precision, Concrete Chip Duplicate Samples, as RPD			22.2	-	67.6	20.4	20.3	3.3
Method Accuracy[a]			-	-	-		-	-
Minimum Value	DL = 0	mg/kg	0.00	-	0.00	-	-	-
	DL = DL/2	mg/kg	0.10	-	4.6	-	-	-
	DL = DL	mg/kg	0.20	-	9.1	1.7	5.3	1.158
Maximum Value		mg/kg	0.50	-	43.9	41.6	43.2	26,600
Median Value		mg/kg	0.30	-	24.8	3.1	15.5	13.2
COMPARISON VALUES								
Cleanup Performance Standard		mg/kg	1.8	40	100	250	1,600	n/a

RPD = Relative percent difference
MDA = Minimum detectable activity
DL = Detection limit
mg/kg = milligrams per kilogram (parts per million)
µg/g = micrograms per gram (parts per million)
\- = No appropriate value or not applicable.

[a]See text, Section 7.4, for details.

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Table 7-2. 304 Concretion Facility: Soil Inorganic Data Statistical Treatment.

		Beryllium	Cadmium	Chromium	Lead	Nickel	Uranium
Method Detection Limit mg/kg		0.2	0.8	0.6	0.4	2.4	MDA = 0.1 µg/g
Limit of Quantitation mg/kg		1.0	1.0	2.0	0.6	8.0	n/a
Total Number of Samples		26	26	26	26	26	26
Number of less than detection limit samples		4	19	0	0	0	0
Sufficient Number of Samples for Statistical Analysis?		yes	no	yes	yes	yes	yes
Mean	DL = 0 mg/kg	0.29	-	-	-	-	-
	DL = DL/2 mg/kg	0.31	-	-	-	-	-
	DL = DL mg/kg	0.33	-	10.0	43.8	20.0	21.0
Standard deviation	DL = 0 mg/kg	0.18	-	-	-	-	-
	DL = DL/2 mg/kg	0.15	-	-	-	-	-
	DL = DL mg/kg	0.13	-	2.5	168	18.4	51.1
Coefficient of Variation	DL = 0	0.61	-	-	-	-	-
	DL = DL/2	0.48	-	-	-	-	-
	DL = DL	0.39	-	0.24	3.84	0.92	2.4
Method Precision, 0 to 152mm soil sampling interval, as RPD		3.8	-	8.8	2.4	17.8	37.6
Method Precision, 152mm to 457mm soil sampling interval, as RPD		0.0	-	5.4	20.6	7.7	15.8
Method Precision, 457mm to 610mm soil sampling interval, as RPD		8.0	-	2.4	14.1	7.6	21.0
Method Accuracy[a]		-	-	-	-	-	-
Minimum Value	DL = 0 mg/kg	0	-	-	-	-	-
	DL = DL/2 mg/kg	0.11	-	-	-	-	-
	DL = DL mg/kg	0.21	-	7.3	2.7	9.1	0.0187
Maximum Value mg/kg		0.91	-	19.8	863	89.5	256
Median Value mg/kg		0.33	-	9.6	6.8	13.9	5.7
COMPARISON VALUES							
Cleanup Performance Standard mg/kg		1.8	40	100	250	1,600	n/a

RPD = Relative percent difference
MDA = Minimum detectable activity
DL = Detection limit
µg/gm = micrograms per gram (parts per million)
mg/kg = milligrams per kilogram (parts per million)
\- = No appropriate value or not applicable.

[a]See text, Section 7.4, for details.

8.0 DATA EVALUATION

The *304 Concretion Facility Closure Plan* (DOE-RL 1995a) requires an evaluation of the analytical data to determine if the constituents of concern are above action levels. If any of the constituents of concern are above the action levels, then the evaluation will determine the actions required. If needed, this further evaluation would consider (1) the type and extent to which the action levels are exceeded and (2) an assessment of health-based risk.

8.1 EVALUATION GENERAL INFORMATION

The 304 Concretion Facility is divided into the following four components for the data evaluation:

- The concrete floor (including the sump and trench)
- The external storage pad (concrete and asphalt, including the asphalt overlays)
- The metal building interior
- The soil.

These four components are evaluated separately for closure. However, because of the limited amounts of data, the statistical grouping may be different in order to provide a useful statistical analysis.

8.1.1 Initial Action Levels

The data evaluation uses the following initial action levels for each type of media:

• Soil	Sitewide soil background
• Concrete	Limit of quantitation
• Asphalt	Limit of quantitation.

The sitewide soil background values are presented on Table 4-1. The limits of quantitation are constituent and analytical method specific and are presented as part of the data on Tables 5-2 through 5-12.

The closure plan requires the use of the limit of quantitation as the initial action level for the wipe samples. It is not possible for wipe sampling data to generate meaningful numerical values for the concentrations of the constituents of concern. Wipe samples can only detect the presence or absence of a constituent. The data for the metal building interior are in micrograms per wipe (μg/wipe). It is not possible to compare these data to the limit of quantitation values since these are in milligrams per kilogram (mg/kg). Instead, each constituent is evaluated using the estimate outlined in Section 4.1.3 and Appendix D.

8.2 EVALUATION OF THE CONCRETE FLOOR

The inorganic analytical data for the building floor are presented on Table 5-2. The organic analytical data for the building floor are presented on Table 5-9. The statistical analysis of the random concrete inorganic sampling data is presented on Table 7-1. There is no statistical analysis of the organic data since the data are either reported as being below-detection-limit values or are laboratory estimates below the LOQ.

8.2.1 Inorganics

For the concrete floor, the data on Table 5-2 show that the concentrations of beryllium and cadmium are below the LOQ initial action level. For beryllium, this is confirmed by the statistical analysis on Table 7-1. Both the mean and maximum values for beryllium are below the LOQ initial action level. A statistical analysis for the cadmium is not possible since 9 out of 10 values are reported as being below the detection limit. No additional evaluation is required for these two constituents.

The data on Table 5-2 show that the concentrations of the chromium, lead, and nickel are above the LOQ initial action level. From Table 7-1, the mean values for these constituents are also above the LOQ initial action levels. A comparison of the mean and maximum values to the cleanup performance standard shows that the concentrations of chromium, lead, and nickel are well below their respective cleanup performance standard. Since the cleanup performance standard is not exceeded, there are insufficient concentrations of chromium, lead, or nickel present to be a threat to human health or the environment.

The uranium data on Table 5-2 are provided for information purposes. Uranium is not regulated by WAC 173-303 and does not have a WAC 173-340 cleanup level. As expected, the uranium values vary depending on the degree of known radiological contamination on the floor of the 304 Building.

8.2.2 Organics

The organics data are presented on Table 5-9. For trichloroethene, tetrachloroethene, 1,1,1-trichloroethane, 1,1-dichloroethene, and the combined cis-1,2-dichloroethene and trans-1,2-dichloroethene, the data can be summarized as follows: the data are reported as below-detection-limit values. These below-detection-limit values are above the LOQ initial action levels. However, the below-detection-limit values are well below the cleanup performance standard. Since the data are reported as below-detection-limit values, it can be concluded that these organics are not present in the exterior storage pad.

For methyl ethyl ketone, 1 value is an estimated value below the LOQ initial action level and 5 values are below-detection-limit values. These below-detection-limit values are above the LOQ initial action level. However, the below-detection-limit values are well below the cleanup performance standard. It can be concluded that methyl ethyl ketone is not present in the exterior storage pad.

The data did not show any ethyl acetate present as a TIC in any of the analyses. In conjunction with the absence of any other organics, it can be concluded that there is no ethyl acetate present in the concrete floor.

8.2.3 Conclusion: Concrete Floor

Based on the information presented above, the inorganic constituents of concern in the concrete floor are below the cleanup performance standard and no organics constituents of concern are present.

8.3 EVALUATION OF THE EXTERNAL STORAGE PAD

The inorganic analytical data for the exterior storage pad are presented on Table 5-3. Only one concrete organic analytical sample, BOD2K9, was collected. The data from BOD2K9 are presented on Table 5-9. The samples from the external storage pad consisted of 1 concrete core organics sample, 1 concrete core inorganic sample, 4 asphalt core (inorganic) samples, and 1 duplicate asphalt core sample. No statistical analysis was conducted because of an insufficient number of either organic or inorganic samples.

8.3.1 Inorganics

For the external storage pad, the data on Table 5-3 show that the concentrations of the beryllium and cadmium are below the LOQ initial action level. No additional evaluation is required for these two constituents.

The data on Table 5-3 show that the concentration of the chromium, lead, and nickel are above the LOQ initial action level. A comparison of the maximum values to the cleanup performance standard shows that the concentrations of chromium, lead, and nickel are well below the standard. Since the cleanup performance standard is not exceeded, there are insufficient concentrations of chromium, lead, or nickel present to be a threat to human health or the environment.

The uranium data on Tables 5-3 and 5-9 have been provided for information purposes. Uranium is not regulated by WAC 173-303 and does not have a WAC 173-340 cleanup level.

8.3.2 Organics

The organic data are presented on Table 5-9. For trichloroethene, tetrachloroethene, 1,1,1-trichloroethane, 1,1-dichloroethene, and the combined cis-1,2-dichloroethene and trans-1,2-dichloroethene, the data can be summarized as follows: the data are reported as below-detection-limit values. These below-detection-limit values are above the LOQ initial action levels. However, the below-detection-limit values are well below the cleanup performance standard. Since the data are reported as below-detection-limit values, it can be concluded that these organics are not present in the exterior storage pad.

For methyl ethyl ketone, the one value is an estimated concentration below the LOQ initial action level. No further evaluation is required. It can be concluded that methyl ethyl ketone is not present in the exterior storage pad.

The data did not show any ethyl acetate present as a TIC in the analyses of the concrete core sample. In conjunction with the absence of any other organics, it can be concluded that there is no ethyl acetate present in the concrete floor.

8.3.3 Conclusion: Exterior Storage Pads

Based on the information presented above, the inorganic constituents of concern in the exterior storage pad are below the cleanup performance standard and no organics constituents of concern are present.

8.4 EVALUATION OF THE METAL BUILDING INTERIOR

The analytical data for the metal building interior surfaces wipe sampling data are presented on Table 5-4. Note that for wipe sampling data, it is not possible to generate meaningful numerical values for the concentrations of the constituents of concern. Wipe samples can only detect the presence or absence of a constituent. The data for the metal building interior are in μg/wipe. It is not possible to compare these data to the limit of quantitation values since these are in mg/kg. Nor could a meaningful statistical analysis of the data be performed.

The cleanup performance standard for the metal building interior surfaces is an estimated concentration based on the information presented in Section 4.1.3 and Appendix D. Table 8-1 presents the estimated concentration information. Note that this information is not the actual concentrations of the constituents of concern. The actual concentrations are believed to be less than these values, but it is not possible to quantify the actual concentrations.

8.4.1 Inorganics by Concentration Estimate

The wipe sampling concentration estimates are presented on Table 8-1. The constituents of concern are treated individually because of the need to compare each constituent to the estimated concentration. The cadmium, lead, nickel, and uranium use estimates for both an average and a maximum concentration from all eleven data points.

Beryllium has only two values out of eleven reported as above-detection-limit values. The higher of the two values is used in the Appendix D calculation. Table 8-1 assumes that all the beryllium present is concentrated on a section of wall weighing 5 kilograms. The estimated concentration per Table 8-1 is less than the beryllium cleanup performance standard. If the estimated concentration on a 5-kilogram section of wall is below the cleanup performance standard, then the actual concentration of beryllium on all metal building interior surfaces must be below the cleanup performance standard.

The cadmium data were used to estimate an average and a maximum concentration. Table 8-1 assumes that all the cadmium present is concentrated on a section of wall weighing 5 kilograms. The estimated concentration per Table 8-1 is less than the cadmium cleanup performance standard. If the estimated concentration on a 5-kilogram section of wall is below the cleanup performance standard, then the actual concentration of cadmium on all metal building interior surfaces must be below the cleanup performance standard.

The chromium values are below the detection limit on all eleven samples. By analogy, the concentration of chromium on all the metal building interior surfaces must be below the cleanup performance standard.

The lead data were used to estimate both an average and a maximum concentration. Table 8-1 assumes all the lead present is concentrated on a section of wall weighing 5 kilograms. The estimated concentration per Table 8-1 is less than the lead cleanup performance standard. If the estimated concentration on a 5-kilogram section of wall is below the cleanup performance standard, then the actual concentration of lead on all metal building interior surfaces must be below the cleanup performance standard.

The nickel data were used to estimate both an average and a maximum concentration. Table 8-1 assumes all the nickel present is concentrated on a section of wall weighing 5 kilograms. The estimated concentration per Table 8-1 is less than the cadmium cleanup performance standard. If the estimated concentration on a 5-kilogram section of wall is below the cleanup performance standard, then the actual concentration of lead on all metal building interior surfaces must be below the cleanup performance standard.

The uranium data on Table 5-4 have been provided for information purposes. Uranium is not regulated by WAC 173-303 and does not have a WAC 173-340 cleanup level.

8.4.2 Evaluation of the Confirmatory Wipe Samples

One confirmatory wipe sample was collected and analyzed. The purpose of this sample was to determine if wipe samples are effective. This sample was taken only once during the sampling of the 304 Concretion Facility. The confirmatory sample BOD278 was collected from the same 100-square-centimeter area as wipe sample BOD277.

The analytical data for the confirmatory sample BOD278 and the original wipe sample BOD277 can be compared on Table 5-4. The beryllium values are reported as below-detection-limit for both samples. The cadmium value on the confirmatory sample is almost twice as high as the original sample. While for chromium, the original sample has a value higher than the confirmatory sample. The lead and nickel value are about the same for both samples. And the uranium value for the confirmatory sample is more than three times higher than the original sample. These data are best described as inconsistent. The expected result is for the confirmatory sample to have uniformly lower values than the original sample. This did not occur.

8.4.3 Evaluation of the Duplicate Wipe Sample

One duplicate wipe sample was collected during sampling. The duplicate sample BOD285 was collected from a 100-square-centimeter area adjacent to the 100-square-centimeter area that was used to collect the original sample BOD284.

The data from the duplicate sample BOD285 are consistent when compared with the data from the original sample BOD284. The beryllium and nickel values show the greatest degree of variation. The degree of variation for both is large enough for the evaluation to be subjective. The cadmium, chromium, and lead values are all consistent between the two samples. The uranium values show the greatest variation, with the original BOD284 value being three times as large as the duplicate BOD285.

These data suggest that the wipe samples are consistent from area to area. Also, these data suggest that the placement of the sampling template (used to define the 100-square-centimeter sampling area) does not affect the sample results.

8.4.4 Comparison of the Metal Building Interior Surfaces with the Concrete

Since the metal building interior surfaces do not have a well-defined cleanup performance standard, a comparison to the concrete floor can be useful. During normal industrial operations, a floor generally has a greater exposure to potential dangerous waste contamination than a wall. The concrete also would be expected to retain more dangerous waste because it is a porous material. However, the evaluation in Section 8.2 concluded that the concrete meet the appropriate cleanup performance standard. This was also true for the sump and trench, even though neither could be damp-wipe decontaminated.

By analogy, the metal building interior surfaces (walls and girder) should be cleaner than the concrete floor. The damp-wipe decontamination should have been more effective on the walls and girder than on the floor. The metal interior surfaces will not absorb material like the porous concrete. Therefore, the metal interior surfaces should have lower concentrations of the constituents of concern than the concrete floor. This conclusion is supported by the fact that the sump and trench, despite not being damp-wipe decontaminated, meet the appropriate cleanup standard.

Additional support comes from the areas of radiological contamination in the 304 Concretion Facility. The areas with the greatest radiological contamination are the sump and the trench. The floor has the next greatest radiological contamination, with considerable variation from location to location. The walls have less radiological contamination than the floors.

By analogy, the metal building interior surfaces should have lower concentrations of the constituents of concern than the concrete floor.

While not conclusive, this argument does suggest that the metal building interior surfaces are not coated with sufficient quantities of the constituents of concern to require further action.

8.4.5 Conclusion: Metal Building Interior

Wipe samples have nonquantitative units in μg/wipe. The wipe sample data cannot be expressed as a concentration. Nor can the wipe sample data be compared with the rest of the sampling. The confirmatory sample raises doubts about the general effectiveness of the wipe sample for the characterization of metal surfaces. All of these factors reduce the usefulness of wipe sampling.

However, based on the estimated concentration evaluation and the comparison with the floor presented above, it can be concluded that the inorganic constituents of concern on the metal building interior surfaces are not present in sufficient quantities to be a threat to human health and the environment. The presence of these constituents should not prevent clean closure of the 304 Concretion Facility.

8.5 EVALUATION OF THE SOIL

The inorganic analytical data for the soil at each sampling interval are presented on Tables 5-5 through 5-7. The organic analytical data for the building floor are presented on Tables 5-10 through 5-12. The statistical analysis of the random concrete inorganic sampling data is presented on Table 7-2. There is no statistical analysis of the organic data since all values are reported as below-detection-limit values.

8.5.1 Inorganics

The beryllium data on Tables 5-5 through 5-7 show that the concentration of beryllium is below the sitewide soil background initial action level. This is confirmed by the statistical analysis on Table 7-2. Both the mean and maximum values for beryllium are below the sitewide soil background initial action level. No additional evaluation is required.

The cadmium data on Tables 5-5 through 5-7 have only 8 values out of 26 that are reported as above-detection-limit values. Of these 8 values, 7 are above the sitewide soil background initial action level. However, these 7 values are all well below the cleanup performance standard. An examination of the data shows an area of localized contamination under the concrete pads at the north end of the 304 Building. This area is discussed further in Section 8.5.1.1. For the remaining balance of the unit, the cadmium in the soil is below the cleanup performance standard.

The chromium data on Tables 5-5 through 5-7 show that the concentration of chromium is below the sitewide soil background initial action level. This is confirmed by the statistical analysis on Table 7-2. Both the mean and maximum values for chromium are below the sitewide soil background initial action level. No additional evaluation is required.

The lead data on Tables 5-5 through 5-7 show 4 values of the 26 that are above the sitewide soil background initial action level. Of these 4 values, all but one are below the cleanup performance standard. An examination of these data show an area of localized contamination under the concrete pads at the north end of the 304 Building (at the pad-pad and pad-building sampling locations). This is evaluated in Section 8.5.1.1. The one lead sample (from the trench sampling location) that is above the cleanup performance standard is evaluated in Section 8.5.1.2. For the remaining balance of the unit, the lead levels are below the cleanup performance standard.

The nickel data on Tables 5-5 through 5-7 show 4 values out of 26 that are above the sitewide soil background initial action level. However, all of these nickel values are below the cleanup performance standard. An examination of the data shows an area of localized contamination under the concrete pads at the north end of the 304 Building. This area is discussed further in Section 8.5.1.1. For the balance of the unit, the nickel levels are below the cleanup performance standard.

The uranium data on Tables 5-5 through 5-7 are provided for information purposes. Uranium is not regulated by WAC 173-303 and does not have a WAC 173-340 cleanup level. The observed values correlate with the areas of known contamination and the area where uranium chips would collect when the building was washed out.

8.5.1.1 Area of Localized Contamination. Examination of the inorganic soil data shows an area of localized contamination under the exterior concrete storage pads on the north end of the 304 Building. There are elevated values for cadmium, lead, and nickel. Also, there is a single high value for beryllium.

This contamination was detected at the authoritative sample locations at the pad-pad expansion joint and at the building-pad expansion joint. These two sample locations are adjacent. All constituents have the highest concentrations at the 0- to 152-millimeter (6-inch) sample interval with the concentration decreasing with depth. These constituents (lead, cadmium, and nickel) are consistent with the past operations at the 304 Building (hot-dip lead canning and nickel electroplating of uranium fuel). However, in this area of localized contamination, the concentration of these constituents of concern (beryllium, cadmium, lead, and nickel) are below the cleanup performance standards.

8.5.1.2 Anomalous Lead Value. Of 29 soil samples (26 samples plus 3 duplicates) analyzed for lead, 28 were less than the lead cleanup performance standard. One sample, BOD2K0, exceeded the lead cleanup performance standard.

Sample BOD2KO is an authoritative sample collected from the trench (Figure 3-7) at the 152-millimeter (6-inch) to 457-millimeter (18-inch) sample interval. Sample BOD2KO had a lead value of 863 mg/kg. This value is considered to be an anomaly because it is not consistent with the other samples from this end of the 304 Concretion Facility. On the southern half of the 304 Concretion Facility, all but one of the samples were below the sitewide soil background level of 14.9 mg/kg. The highest value from the southern half of the unit was 20.4 mg/kg (Sample BOD2FO).

The anomalous lead value is unrelated to the area of localized contamination at the north end of the unit. The trench sample location and the pad-building expansion joint are over 9 meters (30 feet) apart. The drain sample location is between the two locations (see Figure 3-7). All the data for the constituents of concern at the drain sample location were below the sitewide soil background values.

When requested to confirm that the anomalous lead value for BOD2KO was a correct value, Lockhead Analytical Services reported a discrepancy in the data. The laboratory's verbal report was that the BOD2KO data from the SW-846 Method 7421 analysis was 'high'. However, a less accurate lead value also is generated as part of the SW-846 Method 6010 analysis. The offsite laboratory verbally reported that this value was 'low.' The verbal report did not include any numerical values.

A reanalysis of Sample BOD2KO then was conducted using Method 7241. Documentation on the reanalysis, including quality control information, is attached as Appendix E. The reanalysis result was a lead concentration of 6.6 mg/kg. The reanalysis value is much lower than the original value. The reanalysis is consistent with the data from the surrounding samples.

The reanalysis data are not part of the official data submittal to Ecology. Nor has the reanalysis data gone through a full data validation process. For these reasons, the reanalysis data are not included on the tables or as part of the statistical analysis.

The data are not complete for the trench authoritative sampling location. Because of rocks in the soil at the trench sample location, it was not possible to collect a soil sample at the 457-millimeter (18-inch) to 610-millimeter (24-inch) sample interval. No data are available for the soil below Sample BOD2KO. This was the only location at the 304 Concretion Facility where a soil sample could not be collected.

The following information can be drawn from the data:

- In the trench sample location, the anomalous lead value of 863 mg/kg was only in Sample BOD2KO

- When reanalyzed, the lead value for Sample BOD2KO was 6.6 mg/kg

- The sample (BOD2J9) directly above BOD2KO had a much lower lead value of 7.5 mg/kg

- In the sample locations adjacent to the trench, all the lead values are below, or close to, the lead sitewide soil background value

- No other analytes (either constituents of concern or other analytes from the standard analytical methods) show elevated values in either the trench sample location or in the adjacent sample locations

- The anomalous lead value is separated from the other area of localized contamination. The soil sample data from the drain sample location (located between the trench sample location and the localized contamination) are all below the sitewide soil background values.

An examination of the data on Tables 5-5 through 5-7 and the statistical analysis of the data on Table 7-2 does not show any clear patterns or trends. However, the information presented is sufficient to suggest that a 'hot spot' is not present. A potential source of the anomalous lead value is a lead pellet or nugget from the hot lead dipping operations in the 1950's.

There are two concerns on the anomalous lead values relative to meeting the WAC 173-303-610 clean closure requirements:

- The anomalous lead value of 863 mg/kg considerably exceeds the lead cleanup performance standard of 250 mg/kg

- The anomalous lead value of 863 mg/kg exceeds the MTCA limit of 3 times the MTCA clean-up standard (3 x 250 mg/kg or 750 mg/kg).

The lead at the 304 Concretion Facility originated from past production operations. The lead is not associated with any of the waste treatment or storage operations regulated by WAC 173-303. The lead, therefore, is not critical for the clean closure of the 304 Concretion Facility. This information may be used by the soil remediation effort for the 300-FF-3 Operable Unit.

8.5.1.3 Evaluation of the Lead Data. Based on the information presented above, the lead data can be divided into 3 groups: the anomalous high lead value, the area of localized contamination, and the balance of the unit. The evaluations for each group are the following:

- There is an anomalous high lead value that exceeds the closure performance standard. The high lead value also exceeds the MTCA limit of 3 times the closure performance standard for outliers. The origin or source is not known. The available information suggests that a hot spot is not present.

- The lead values in the area of localized contamination are below the lead cleanup performance standard value. This area of localized contamination would not prevent clean closure (per WAC 173-304-610) from occurring.

- The lead values for the balance of the unit are well below the lead cleanup performance standard.

This evaluation concludes that, except for the anomalous high lead value, the lead at this unit meets the cleanup performance standards.

8.5.2 Organics

The organic data for the soils are presented on Tables 5-10 through 5-12. For trichloroethene, tetrachloroethene, 1,1,1-trichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and methyl ethyl ketone, the data can be summarized as follows: the data are reported as the below-detection-limit values. These values are above the LOQ initial action levels. However, the below-detection-limit values are well below the cleanup performance standard. It can be concluded that these organics are not present in the soil.

The data did not show any ethyl acetate present as a TIC in the analyses. In conjunction with the absence of any other organics, it can be concluded that there is no ethyl acetate present in the soil.

8.5.3 Conclusion: Soil

Based on the information presented above, there are no inorganic constituents of concern present in the soil above the cleanup performance standards. There is one anomalous lead sample value for the soil that exceeds the cleanup performance standard. The available data do not indicate that a 'hot spot' is present. No organic constituents of concern are present in the soil.

8.6 EQUIPMENT AND FIELD BLANK ANALYTICAL RESULTS

The analytical data for the wipe sampling equipment blanks are presented on Table 5-4. The analytical data for the concrete and soil sampling equipment blanks are presented on Table 5-8. For all equipment blanks, the values for beryllium, cadmium, chromium, lead, and nickel are below-detection-limit values. However, very low levels of uranium were detected. When compared with the levels of radiological and uranium contamination known to be present in the 304 Concretion Facility, there would not be any adverse affects on the data. The two potential sources of the uranium in the blanks are insufficient cleaning of the equipment or laboratory contamination.

The analytical data for the wipe sampling field blank are presented on Table 5-4. The analytical data for the concrete and soil sampling field blanks are presented on Table 5-8. For all field blanks, the values for beryllium, cadmium, chromium, lead, and nickel are below-detection-limit values. However, very low levels of uranium were detected. When compared with the levels of radiological and uranium contamination known to be present in the 304 Concretion Facility, there would not be any adverse affects on the data. The two potential sources of the uranium in the blanks are insufficient cleaning of the equipment or laboratory contamination.

The data from the equipment and field blanks indicate that there is nothing that would adversely affect the 304 Concretion Facility sampling data or any conclusions drawn from that data.

8.7 SUMMARY

Based on the evaluation of the analytical data, the following can be concluded for the structures (interior building floor, exterior storage pads, and metal building interior surfaces) associated with the 304 Concretion Facility:

- The concentrations of the inorganic constituent of concern, when present, are well below the cleanup performance standards
- None of the organic constituents of concern are present.

Based on the evaluation of the analytical data, the following can be concluded for the soil associated with the 304 Concretion Facility:

- The concentrations of the inorganic constituent of concern are well below the cleanup performance standards
- There is one anomalous high lead value that is above the cleanup performance standard
- None of the organic constituents of concern are present.

Table 8-1. Estimated Concentrations Based on the Wipe Sampling Data.

	Beryllium	Cadmium	Chromium	Lead	Nickel	Uranium
WSC = MTCA case mean ug/wipe	n/a	0.45	LDL	16.4	5.48	22.6
Estimated concentration on a 5 kilogram piece of wall mg/kg	n/a	1.44	LDL	52.64	17.59	72.55
WSC = Maximum value ug/wipe	0.11	0.75	LDL	30.4	52.1	65.8
Estimated concentration on a 5 kilogram piece of wall mg/kg	0.35	2.51	LDL	97.58	167.24	211.22
Cleanup Performance Standard mg/kg	1.8	40	100	250	1,600	n/a

μg/wipe = micrograms per wipe sample
mg/kg = milligrams per kilogram
WSC = Wipe sampling case
DL = Detection limits
n/a = not applicable
LDL = All chromium values were less than the detection limit.

These values do not represent the actual concentrations of the constituents of concern on the interior metal surfaces. See Section 8.2, Section 4.1.3, and Appendix D for more information on the use of this table.

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9.0 CONCLUSIONS

The basic requirement for the clean closure of the 304 Concretion Facility is to have all the constituents of concern below the cleanup performance standards (Tables 4-1 and 4-2).

The analytical data show that this requirement has been met for the building floor and exterior storage pads associated with the 304 Concretion Facility. Any inorganic constituents of concern present are below the cleanup performance standards. No organic constituents of concern are present in these structures.

The metal building interior surfaces do not have a quantifiable performance standard. However, it is possible to evaluate the metal building interior surfaces using concentration estimate calculations and analogies to other structures in the 304 Concretion Facility. These evaluations suggest that the concentrations of the constituents of concern on the metal building interior surfaces are low enough that no further actions are required. The presence of these constituents should not prevent clean closure of the 304 Concretion Facility.

The analytical data suggest that the clean closure requirement has been met for the soil at the 304 Concretion Facility. No organic constituents of concern are present in the soil. For the soil as a whole, the inorganic constituents of concern present are below the action levels. The one exception is a single anomalous lead value that exceeds the cleanup performance standard.

Despite the presence of the single anomalous lead value, the soil at the 304 Concretion Facility can be clean closed for the following reasons:

1. The data suggest a single anomalous value instead of a hot spot or other localized area of contamination. The anomalous value does not appear to be characteristic of the 304 Concretion Facility.

2. The soil at the 304 Concretion Facility is part of the soil of the much larger 300-FF-2 Operable Unit. Remediation for operable unit will address the soil contamination. This has been the rationale for not including any soil cleanup (other than imminent hazard) in the *304 Concretion Facility Closure Plan*. If there is an undetected lead hot spot, the soil remediation for the operable unit would address it.

3. Any lead from the 304 Facility is not regulated by WAC 173-304 because it is associated with operations conducted before RCRA or WAC 173-304 came into effect. The information is most relevant for the soil remediation under CERCLA.

The conclusions that can be drawn from the 304 Concretion Facility Analytical data are that: (1) the inorganic constituents of concern present are below the cleanup performance standards, (2) the organic constituents of concern are not present, and (3) the data contained one anomalous lead value. Therefore, 304 Concretion Facility (both structures and soil) can be clean closed per WAC 173-304-610.

10.0 REFERENCES

10.1 DOCUMENTS

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10.2 CODE OF FEDERAL REGULATIONS

40 CFR 260, "Hazardous Waste Management System-General."

40 CFR 261, "Identification and Listing of Hazardous Waste."

40 CFR 262, "Standards Applicable to Generators of Hazardous Waste."

40 CFR 263, "Standards Applicable to Transporters of Hazardous Waste."

40 CFR 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities."

40 CFR 264, Subpart F (Sections 90 through 101), 1992, "Releases from Solid Waste Management Units."

40 CFR 264, Subpart X (Sections 600 through 603), "Miscellaneous Units."

40 CFR 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities."

40 CFR 266, "Standards for the Management of Specific Hazardous Wastes and Specific Hazardous Waste Management Facilities."

40 CFR 267, "Interim Standards for Owners and Operators of New Hazardous Waste Land Disposal Facilities."

40 CFR 268, "Land Disposal Restrictions."

40 CFR 270, "EPA Administered Permit Programs: The Hazardous Waste Permit Program."

10.3 FEDERAL AND STATE ACTS

Comprehensive Environmental Response and Liability Act of 1980, as amended, 42 USC 9601 et seq.

Resource Conservation and Recovery Act of 1976, as amended, 42 USC 6901 et seq.

10.4 REVISED CODE OF WASHINGTON AND WASHINGTON ADMINISTRATIVE CODE

WAC 173-303, *Dangerous Waste Regulations*, Washington State Department of Ecology, Olympia, Washington.

WAC 173-340, *The Model Toxics Control Act Cleanup Regulation*, Washington State Department of Ecology, Olympia, Washington.

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1 APPENDICES

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CONTENTS

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APPENDIX A

MODEL TOXICS CONTROL ACT CLEANUP STANDARDS FOR SPECIFIC ANALYTES

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APPENDIX A

MODEL TOXICS CONTROL ACT* CLEANUP STANDARDS FOR SPECIFIC ANALYTES. (2 sheets)

Compound	RfD[a]	Cleanup level[b] (mg/kg)	CPF[a]	Cleanup level[b] (mg/kg)	Carcinogenic class[a]
Tetrachloroethene (perchloroethene)	0.01	800	0.052[c]	19	NA
1,1,1-Trichloroethane	0.09[e]	7200	NA	NA	D
Trichloroethene	0.006[c]	480	0.011[e]	91	B2
Methyl Ethyl Ketone	0.61	48000	NA	NA	D
Ethyl Acetate	0.91	72000	NA	NA	NA
1,1-Dichloroethene	0.009	720	0.6	1.7	C
trans-1,2-Dichlorethene	0.02	1600	NA	NA	NA
cis-1,2-Dichloroethene	0.01	800	NA	NA	NA
Beryllium	0.005	400	4.3	0.23	B2
Cadmium	0.001	40	NA	NA	B1
Chromium	NA	100[d]	NA	NA	NA
Lead	NA	250[d]	NA	NA	B2
Nickel	0.02	1600	NA	NA	NA

NA = not available.

[*] WAC 173-340, 1992.

[a] Except where noted, information is taken from the Integrated Risk Information System (IRIS) database, U.S. Environmental Protection Agency, Washington, D.C. 1994.
RfD = Reference dose
CPF = Carcinogenic potency factor (cancer slope factor)
A = Human carcinogen.
B = Probable human carcinogen:
B1 indicates limited human evidence
B2 indicates sufficient evidence in animals and inadequate or no evidence in humans.
D = Not classifiable as to human carcinogenicity.

[b] Model Toxics Control Act Method B Soil Cleanup Levels Calculations:
for noncarcinogens:

$$\text{Soil Cleanup Level, mg/Kg,} = \frac{RFD \times ABW \times UCF \times HQ}{SIR \times AB1 \times FOC}$$

for carcinogens:

$$\text{Soil Cleanup Level, mg/Kg,} = \frac{RISK \times ABW \times LIFE \times UCF}{CPF \times SIR \times AB1 \times DUR \times FOC}$$

where:

RfD = Reference dose (mg/kg/day)
CPF = Carcinogenic potency factor (Cancer Slope Factor) (kg-day/mg)
ABW = Average body weight (16 kg)
UCF = Unit conversion factor ($1.0 \times 10^{+6}$ mg/kg)
SIR = Soil ingestion rate (200 mg/day)
AB1 = Gastrointestinal adsorption rate (1.0)
FOC = Frequency of contact (1.0)
HQ = Hazard quotient (1)
RISK = Acceptable cancer risk (1.0×10^{-6})
LIFE = Lifetime (75 years)
DUR = Duration of exposure (6 years).

[c] Values from the Superfund Technical Support Center, Environmental Protection Agency, Environmental Criteria Assessment Office, Washington, D.C.

[d] Cleanup Level is from Model Toxics Control Act Method A table. No data are available for calculation of MTCA Method B Level.

[e] Federal Register, Volume 55, Number 145, July 1990, "Proposed Rules."

APPENDIX B

MAXIMA AND 95/95 REFERENCE THRESHOLD VALUES FOR HANFORD SITE SOIL BACKGROUND

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APPENDIX B

MAXIMA AND 95/95 REFERENCE THRESHOLD VALUES FOR HANFORD SITE SOIL BACKGROUND*

Analyte	Limit of detection	Limit of quantitation	95/95 threshold (mg/kg)	Maximum concentration (mg/kg)	Sample with maximum concentration#
Beryllium	N/A	N/A	1.8	10	VOLCANIC ASH
Cadmium	0.24	0.79	NC	11	VOLCANIC ASH
Chromium	1.1	3	28.2	320	RINGGOLD FORMATION
Lead	N/A	N/A	14.9	74.1	TOPSOIL
Nickel	2.4	7.7	24.7	200	RINGGOLD FORMATION

mg/kg = milligrams per kilogram.
N/A = Not available.
NC = Not calculated.

*DOE-RL, 1994, Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes, DOE/RL-92-24, Rev. 2, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

The 95/95 thresholds values represent the upper 95% confidence interval of the 95th percentile of the distribution. Information on the statistics is provided in the source document.

= For further information refer to source document (DOE-RL 1994).

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APPENDIX C

EQUATIONS USED IN THE STATISTICAL ANALYSIS

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APPENDIX C

EQUATIONS USED IN THE STATISTICAL ANALYSIS

Calculation of the Mean:

$$\overline{x}=\frac{\sum_{i=1}^{n} x_i}{n}$$

$\overline{x}$ =*mean*
x_i=*constituent concentration*
n =*number of samples*

Calculation of the Standard Deviation:

$$s=\sqrt{\frac{\sum_{i=1}^{n} x_i^2-\frac{(\sum_{1=i}^{n} x_i)^2}{2}}{n-1}}$$

s =*standard deviation*
x_i=*constituent concentration*
n =*number of samples*

Calculation of the Coefficient of Variation:

$$CV=s/\overline{x}$$

CV=*Coefficient of Variation*
$\underline{s}$ =*standard deviation*
$\overline{x}$ =*mean*

Calculation of the Relative Percent:

$$RPD=\left|100\frac{x_{orig}-x_{dup}}{(x_{orig}+x_{dup})/2}\right|$$

RPD =*Relative Percent Differance*
x_{orig}=*concentration of original sample*
x_{dup} =*concentration of duplicate sample*

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APPENDIX D

ESTIMATED CONCENTRATION FROM WIPE SAMPLING

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ESTIMATED CONCENTRATION FROM WIPE SAMPLING

$$\text{Estimated concentration (mg/kg)} = \text{Total amount of constituent / nominal wall mass} = \frac{(WSC * A * CF1 * CF2) / AWS}{NWM}$$

WSC = wipe sample concentration in μg/wipe, from the data

AWS = area wipe sample = 100 cm^2/wipe (from sampling and analysis plan)

NWM = nominal wall mass = 5 kg (11 pounds)
dimensions of the NWM are not known

CF1 = conversion factor 1: 10,000 cm^2 / 1 square meter (m^2)

CF2 = conversion factor 2: 1 mg / 1000 μg

A = total area of the 304 Building walls
= 2 * [3.66 m * (14.33 m + 7.62 m)]
= 160.67 m^2
(304 Building internal dimensions: 14.33 meters (47 feet) long, 7.62 meters (25 feet) wide, 3.66 meters (12 feet) high

m = meters
m^2 = square meters
cm^2 = square centimeters
kg = kilograms
mg = milligrams
μg = micrograms

Table D-1. Estimated Concentrations Based on the Wipe Sampling Data

		Beryllium	Cadmium	Chromium	Lead	Nickel	Uranium
WSC = MTCA case mean	ug/wipe	n/a	0.45	LDL	16.4	5.48	22.6
Estimated concentration	mg/kg	n/a	1.44	LDL	52.64	17.59	72.55
WSC = Maximum value	ug/wipe	0.11	1.2	LDL	30.4	52.1	65.8
Estimated concentration	mg/kg	0.35	3.85	LDL	97.58	167.24	211.22
Cleanup Performance Standard	mg/kg	1.8	40	100	250	1,600	n/a

µg/wipe = micrograms per wipe sample
mg/kg = milligrams per kilogram
WSC = Wipe sampling case
DL = Detection limits
n/a = not applicable
LDL = All chromium values were less than the detection limit.
MTCA = Model Toxics Control Act

APPENDIX E

SAMPLE BOD2KO LEAD REANALYSIS DOCUMENTATION

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SAMPLE BOD2KO LEAD REANALYSIS DOCUMENTATION

The information in this appendix is extracted from the Lockheed Analytical Services revised submittal of Sample Data Group L3764, dated August 2, 1995. The attached documentation relates to the reanalysis of Sample BOD2KO. The appendix consists of the following pages from Sample Data Group L3764: 1-4, 69, 83, 88-97, 100, 103, 105, 113, 121, 130, 236, 307-319, and 339-341.

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LOCKHEED MARTIN

Lockheed Analytical Services

Mr. Karl Pool
Westinghouse Hanford Company
345 Hill
Richland, WA 99352

REVISED ANALYTICAL DATA REPORT

FOR

METALS ON SOIL SAMPLES

LOG-IN NUMBER:	L3764
QUOTATION NUMBER:	Q400000
SAF:	94-402
DOCUMENT FILE NUMBER:	0204512
WHC DOCUMENT CONTROL NUMBER:	151
SDG NUMBER:	LK3764

Table of Contents

Sample Delivery Group No. LK3764

Lockheed Environmental Systems & Technologies Co.
Lockheed Analytical Services
975 Kelly Johnson Drive Las Vegas, Nevada 89119-3705
Telephone 702-361-0220 800-582-7605 Facsimile 702-361-8146

LOCKHEED MARTIN

August 2, 1995

Mr. Karl Pool H4-23
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352

RE:	Log-in No:	L3764
	Quotation No:	Q400000
	SAF:	94-402
	Document File No:	0204512
	WHC Document Control No:	151
	SDG Number:	LK3764

The attached data report contains the revised analytical results of soil samples that were submitted to Lockheed Analytical Services on 4 February 1995. The revised results include lead by GFAA which was rerun at the clients request on July 25, 1995.

The temperature of the coolers upon receipt were 2°C. Sample containers received agree with the chain-of-custody documentation. Sample containers were received intact. Samples were received in time to meet the analytical holding time requirements.

The case narratives included in the following attachments provide a detailed description of all events that occurred during sample preparation, analysis, and data review specific to the samples and analytical methods requested.

A list of data qualifiers, chain-of-custody forms, sample receiving checklist, and log-in report are also enclosed representing the samples received within this group.

If you have any questions concerning the analysis or the data please call Kathleen Hall at (509) 943-4423.

Lockheed Analytical Services

Log-in No.: L3764
Quotation No.: Q400000
SAF: 94-402
Document File No.: 0204512
WHC Document Control No.: 151
SDG No.: LK3764
Page 1

Release of this data report has been authorized by the Laboratory Director or the Director's designee as evidenced by the following signature.

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

Sincerely,

Kathleen M. Hall
Client Services Representative

cc: Client Services
Document Control

9513383.1054

CLP

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: LOCKHEED_ANALYTICAL_SVC__ Contract: HANFORD___

Lab Code: LOCK__ Case No.: 94-402 SAS No.: ______ SDG No.: LK3764

SOW No.: 3/90_

CLIENT ID NO.	Lab Sample ID
BOD2G3	L3764-25
BOD2G4	L3764-26
BOD2G5	L3764-27
BOD2H0	L3764-7
BOD2H0D	L3764-7D
BOD2H0S	L3764-7S
BOD2H1	L3764-8
BOD2H2	L3764-9
BOD2J0	L3764-51
BOD2J1	L3764-67
BOD2J2	L3764-52
BOD2J3	L3764-68
BOD2J4	L3764-53
BOD2J5	L3764-69
BOD2J9	L3764-43
BOD2K0	L3764-44

Were ICP interelement corrections applied ? Yes/No YES

Were ICP background corrections applied ? Yes/No YES
If yes - were raw data generated before application of background corrections ? Yes/No NO_

Comments:
____FOURTEEN_SOIL_SAMPLES_FOR_TOTAL_METALS_ANALYSIS._SAMPLE_BOD2H0___________
____(L3764-7)_WAS_USED_FOR_MATRIX_SPIKE_AND_DUPLICATE.________________________
____SAF_94-402_/_SDG_#_LK3764S.____
____LAS_BATCH_204WH2.____

Written by : N. Prabhakar Name: Nalini Prabhakar

Date: 8/2/95 Title: QC Coordinator.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Reviewed by: [signature] Name: YEE REN

Date: 8/2/95 Title: Scientist

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

BOD2K0

Lab Name: LOCKHEED_ANALYTICAL_SVC__ Contract: HANFORD___

Lab Code: LOCK__ Case No.: 94-402 SAS No.: ______ SDG No.: LK3764

Matrix (soil/water): SOIL_ Lab Sample ID: L3764-44__

Level (low/med): LOW__ Date Received: 02/04/95

% Solids: _88.1

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	6910	_		P_
7440-36-0	Antimony_	10.3	U	N	P_
7440-38-2	Arsenic__	5.4	_		F_
7440-39-3	Barium___	95.2	_		P_
7440-41-7	Beryllium	0.29	B		P_
7440-43-9	Cadmium__	0.68	U		P_
7440-70-2	Calcium__	5390	_		P_
7440-47-3	Chromium_	9.8	_		P_
7440-48-4	Cobalt___	16.6	_	N*	P_
7440-50-8	Copper___	23.6	_		P_
7439-89-6	Iron_____	21100	_	*	P_
7439-92-1	Lead_____	6.6	_		F_
7439-95-4	Magnesium	4520	_		P_
7439-96-5	Manganese	334	_		P_
7439-97-6	Mercury__	0.11	U		AV
7440-02-0	Nickel___	16.2	_		P_
7440-09-7	Potassium	1180	_		P_
7782-49-2	Selenium_	0.68	U		F_
7440-22-4	Silver___	0.91	U		P_
7440-23-5	Sodium___	480	B		P_
7440-28-0	Thallium_	0.91	U		F_
7440-62-2	Vanadium_	36.1	_		P_
7440-66-6	Zinc_____	90.4	_		P_

Color Before: BROWN____ Clarity Before: ______ Texture: MEDIUM

Color After: YELLOW___ Clarity After: ______ Artifacts: ______

Comments:

FORM I - IN

ILM03.0

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: LOCKHEED_ANALYTICAL_SVC__ Contract: HANFORD___

Lab Code: LOCK__ Case No.: 94-402 SAS No.: ______ SDG No.: LK3764

Initial Calibration Source: NIST________

Continuing Calibration Source: SPEX_______

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	%R(1)	Continuing Calibration True	Continuing Calibration Found	%R(1)	Found	%R(1)	M
Aluminum									NR
Antimony									NR
Arsenic									NR
Barium									NR
Beryllium									NR
Cadmium									NR
Calcium									NR
Chromium									NR
Cobalt									NR
Copper									NR
Iron									NR
Lead	100.0	106.30	106.3	100.0	103.00	103.0	105.00	105.0	F
Magnesium									NR
Manganese									NR
Mercury									NR
Nickel									NR
Potassium									NR
Selenium									NR
Silver									NR
Sodium									NR
Thallium									NR
Vanadium									NR
Zinc									NR

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

FORM II (PART 1) - IN

ILM03.0

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: LOCKHEED_ANALYTICAL_SVC__ Contract: HANFORD___

Lab Code: LOCK__ Case No.: 94-402 SAS No.: ______ SDG No.: LK3764

Initial Calibration Source: NIST________

Continuing Calibration Source: SPEX________

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	%R(1)	Continuing Calibration True	Continuing Calibration Found	%R(1)	Found	%R(1)	M
Aluminum									NR
Antimony									NR
Arsenic									NR
Barium									NR
Beryllium									NR
Cadmium									NR
Calcium									NR
Chromium									NR
Cobalt									NR
Copper									NR
Iron									NR
Lead				100.0	102.80	102.8			F
Magnesium									NR
Manganese									NR
Mercury									NR
Nickel									NR
Potassium									NR
Selenium									NR
Silver									NR
Sodium									NR
Thallium									NR
Vanadium									NR
Zinc									NR

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: L.A.S Contract: HAHFORD

Lab Code: LOCK Case No.: 94-402 SAS No.: SDG No.: LK3764

Initial Calibration Source: NIST

Continuing Calibration Source: I VENTURES

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum									NR
Antimony									NR
Arsenic									NR
Barium									NR
Beryllium									NR
Cadmium									NR
Calcium									NR
Chromium									NR
Cobalt									NR
Copper									NR
Iron									NR
Lead	100.0	103.50	103.5	100.0	100.20	100.2	103.60	103.6	F
Magnesium									NR
Manganese									NR
Molybdenu									NR
Nickel									NR
Potassium									NR
Silver									NR
Sodium									NR
Vanadium									NR
Zinc									NR
Mercury									NR

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

FORM II (PART 1) - IN

ILMO3.

09C

2B
CRDL STANDARD FOR AA AND ICP

Lab Name: LOCKHEED_ANALYTICAL_SVC__ Contract: HANFORD___

Lab Code: LOCK__ Case No.: 94-402 SAS No.: ______ SDG No.: LK3764

AA CRDL Standard Source: I.VENTURES__

ICP CRDL Standard Source: I.VENTURES__

Concentration Units: ug/L

Analyte	CRDL Standard for AA True	CRDL Standard for AA Found	CRDL Standard for AA %R	CRDL Standard for ICP True	ICP Initial Found	ICP Initial %R	ICP Final Found	ICP Final %R
Aluminum				400.0	405.67	101.4	394.04	98.5
Antimony				120.0	121.72	101.4	103.80	86.5
Arsenic	10.0	10.50	105.0					
Barium				400.0	411.83	103.0	420.70	105.2
Beryllium				10.0	9.35	93.5	9.43	94.3
Cadmium				10.0	11.73	117.3	11.18	111.8
Calcium								
Chromium				20.0	18.88	94.4	16.06	80.3
Cobalt				100.0	101.12	101.1	103.47	103.5
Copper				50.0	50.09	100.2	50.55	101.1
Iron				200.0	209.28	104.6	211.47	105.7
Lead	3.0	3.00	100.0					
Magnesium								
Manganese				30.0	29.88	99.6	30.47	101.6
Mercury								
Nickel				80.0	87.01	108.8	89.19	111.5
Potassium								
Selenium	5.0	4.20	84.0					
Silver				20.0	19.27	96.4	19.50	97.5
Sodium								
Thallium	10.0	10.70	107.0					
Vanadium				100.0	101.29	101.3	101.92	101.9
Zinc				40.0	39.63	99.1	40.31	100.8

2B
CRDL STANDARD FOR AA AND ICP

Lab Name: LOCKHEED_ANALYTICAL_SVC__ Contract: HANFORD___

Lab Code: LOCK__ Case No.: 94-402 SAS No.: ______ SDG No.: LK3764

AA CRDL Standard Source: I.VENTURES__

ICP CRDL Standard Source: ____________

Concentration Units: ug/L

Analyte	CRDL Standard for AA True	CRDL Standard for AA Found	CRDL Standard for AA %R	CRDL Standard for ICP True	CRDL Standard for ICP Initial Found	CRDL Standard for ICP %R	CRDL Standard for ICP Final Found	CRDL Standard for ICP %R
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium								
Calcium								
Chromium								
Cobalt								
Copper								
Iron								
Lead	3.0	3.60	120.0					
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium								
Silver								
Sodium								
Thallium								
Vanadium								
Zinc								

FORM II (PART 2) - IN

ILMO3.0

CLP

2B

CRDL STANDARD FOR AA AND ICP

Lab Name: L.A.S Contract: HAHFORD

Lab Code: LOCK Case No.: 94-402 SAS No.: SDG No.: LK3764

AA CRDL Standard Source: I VENTURES

ICP CRDL Standard Source:

Concentration Units: ug/L

Analyte	CRDL Standard for AA True	Found	%R	CRDL Standard for ICP True	Initial Found	%R	Final Found	%R
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium								
Calcium								
Chromium								
Cobalt								
Copper								
Iron								
Lead	3.0	2.80	93.3					
Magnesium								
Manganese								
Molybdenu								
Nickel								
Potassium								
Silver								
Sodium								
Vanadium								
Zinc								
Mercury								

FORM II (PART 2) - IN

ILMO3.0

9513383.1058

3
BLANKS

Lab Name: LOCKHEED_ANALYTICAL_SVC__ Contract: HANFORD___

Lab Code: LOCK__ Case No.: 94-402 SAS No.: ______ SDG No.: LK3764

Preparation Blank Matrix (soil/water): SOIL_

Preparation Blank Concentration Units (ug/L or mg/kg): MG/KG

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Preparation Blank	C	M
Aluminum	26.0	U	79.5	B	26.0	U	26.0	U	-5.808	B	P
Antimony	45.0	U	45.0	U	45.0	U	45.0	U	9.000	U	P
Arsenic	2.0	U	2.0	U	2.0	U	2.0	U	0.400	U	F
Barium	12.0	U	12.0	U	12.0	U	12.0	U	2.400	U	P
Beryllium	1.0	U	1.0	U	1.0	U	1.0	U	0.200	U	P
Cadmium	3.0	U	3.0	U	3.0	U	3.2	B	0.600	U	P
Calcium	20.0	U	76.4	B	20.0	U	20.0	U	4.000	U	P
Chromium	3.0	U	3.0	U	3.0	U	3.0	U	0.600	U	P
Cobalt	7.0	U	7.0	U	7.0	U	7.0	U	1.400	U	P
Copper	3.0	U	4.1	B	3.0	U	3.4	B	0.600	U	P
Iron	9.6	B	34.3	B	6.0	U	6.0	U	1.200	U	P
Lead	2.0	U	2.0	U	2.0	U	2.0	U	0.400	U	F
Magnesium	37.0	U	63.7	B	37.0	U	37.0	U	7.400	U	P
Manganese	1.0	U	4.6	B	2.5	B	2.7	B	0.200	U	P
Mercury	0.2	U	0.2	U	0.2	U	0.2	U	0.100	U	AV
Nickel	12.0	U	12.0	U	12.0	U	12.0	U	2.400	U	P
Potassium	680.0	U	680.0	U	680.0	U	680.0	U	136.000	U	P
Selenium	3.0	U	3.0	U	3.0	U	3.0	U	0.600	U	F
Silver	4.0	U	4.0	U	4.0	U	4.0	U	0.800	U	P
Sodium	23.0	U	24.9	B	23.0	U	23.0	U	-13.346	B	P
Thallium	4.0	U	4.0	U	4.0	U	4.0	U	0.800	U	F
Vanadium	3.0	U	4.1	B	3.0	U	3.2	B	0.600	U	P
Zinc	2.0	U	4.5	B	2.0	U	2.9	B	0.400	U	P

FORM III - IN

ILM03.0

3
BLANKS

Lab Name: LOCKHEED_ANALYTICAL_SVC__ Contract: HANFORD___

Lab Code: LOCK__ Case No.: 94-402 SAS No.: _______ SDG No.: LK3764

Preparation Blank Matrix (soil/water): _____

Preparation Blank Concentration Units (ug/L or mg/kg): _____

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Preparation Blank	C	M
Aluminum			26.0	U	45.2	B					P
Antimony			45.0	U	45.0	U					P
Arsenic			2.0	U	2.0	U					F
Barium			12.0	U	12.0	U					P
Beryllium			1.0	U	1.0	U					P
Cadmium			3.0	U	3.0	U					P
Calcium			20.0	U	57.2	B					P
Chromium			3.0	U	3.0	U					P
Cobalt			7.0	U	7.0	U					P
Copper			3.0	U	3.2	B					P
Iron			6.0	U	29.5	B					P
Lead			2.0	U	2.0	U					F
Magnesium			37.0	U	48.0	B					P
Manganese			2.2	B	3.8	B					P
Mercury			0.2	U	0.2	U	0.2	U			AV
Nickel			12.0	U	12.0	U					P
Potassium			680.0	U	680.0	U					P
Selenium			3.0	U	3.0	U					F
Silver			4.0	U	4.0	U					P
Sodium			23.0	U	23.0	U					P
Thallium			4.0	U	4.0	U					F
Vanadium			3.0	B	4.1	B					P
Zinc			2.2	B	3.2	B					P

FORM III - IN

ILM03.0

3
BLANKS

Lab Name: LOCKHEED_ANALYTICAL_SVC__ Contract: HANFORD___

Lab Code: LOCK__ Case No.: 94-402 SAS No.: ______ SDG No.: LK3764

Preparation Blank Matrix (soil/water): _____

Preparation Blank Concentration Units (ug/L or mg/kg): _____

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Preparation Blank	C	M
Aluminum											NR
Antimony											NR
Arsenic											NR
Barium											NR
Beryllium											NR
Cadmium											NR
Calcium											NR
Chromium											NR
Cobalt											NR
Copper											NR
Iron											NR
Lead	2.0	U	2.0	U	2.0	U	2.0	U			F
Magnesium											NR
Manganese											NR
Mercury			0.2	U							AV
Nickel											NR
Potassium											NR
Selenium											NR
Silver											NR
Sodium											NR
Thallium											NR
Vanadium											NR
Zinc											NR

FORM III - IN

ILM03.0

CLP

3
BLANKS

Lab Name: L.A.S Contract: HAHFORD

Lab Code: LOCK Case No.: 94-402 SAS No.: SDG No.: LK3764

Preparation Blank Matrix (soil/water): SOIL

Preparation Blank Concentration Units (ug/L or mg/kg): MG/KG

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Preparation Blank	C	M
Aluminum											NR
Antimony											NR
Arsenic											NR
Barium											NR
Beryllium											NR
Cadmium											NR
Calcium											NR
Chromium											NR
Cobalt											NR
Copper											NR
Iron											NR
Lead	2.0	U	2.0	U	2.0	U			0.400	U	F
Magnesium											NR
Manganese											NR
Molybdenu											NR
Nickel											NR
Potassium											NR
Silver											NR
Sodium											NR
Vanadium											NR
Zinc											NR
Mercury											NR

FORM III - IN

ILMO3.0

097

CLP

5A
SPIKE SAMPLE RECOVERY

CLIENT ID NO.

BOD2K0S

Lab Name: L.A.S Contract: HAHFORD

Lab Code: LOCK Case No.: 94-402 SAS No.: SDG No.: LK3764

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

% Solids for Sample: 88.1

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

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									NR
Antimony									NR
Arsenic									NR
Barium									NR
Beryllium									NR
Cadmium									NR
Calcium									NR
Chromium									NR
Cobalt									NR
Copper									NR
Iron									NR
Lead	75-125	10.8513		6.5607		4.54	94.5		F
Magnesium									NR
Manganese									NR
Molybdenu									NR
Nickel									NR
Potassium									NR
Silver									NR
Sodium									NR
Vanadium									NR
Zinc									NR
Mercury									NR

Comments:

FORM V (Part 1) - IN ILMO3.0

CLP

6
DUPLICATES

CLIENT ID NO.

BOD2K0D

Lab Name: L.A.S Contract: HAHFORD

Lab Code: LOCK Case No.: 94-402 SAS No.: SDG No.: LK3764

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

% Solids for Sample: 88.1 % Solids for Duplicate: 88.1

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

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								NR
Antimony								NR
Arsenic								NR
Barium								NR
Beryllium								NR
Cadmium								NR
Calcium								NR
Chromium								NR
Cobalt								NR
Copper								NR
Iron								NR
Lead		6.5607		7.0829		7.7		F
Magnesium								NR
Manganese								NR
Molybdenu								NR
Nickel								NR
Potassium								NR
Silver								NR
Sodium								NR
Vanadium								NR
Zinc								NR
Mercury								NR

FORM VI - IN

ILM03.0

CLP

7

LABORATORY CONTROL SAMPLE

Lab Name: L.A.S Contract: HAHFORD

Lab Code: LOCK Case No.: 94-402 SAS No.: SDG No.: LK3764

Solid LCS Source: ERA LOT#222

Aqueous LCS Source: IVENT/PCHEM

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium									
Calcium									
Chromium									
Cobalt									
Copper									
Iron									
Lead	20.0	18.80	94.0	52.4	48.0		27.8	74.4	91.6
Magnesium									
Manganese									
Molybdenu									
Nickel									
Potassium									
Silver									
Sodium									
Vanadium									
Zinc									
Mercury									

FORM VII - IN

ILM03.0

CLP

10
Instrument Detection Limits (Quarterly)

Lab Name: L.A.S Contract: HAHFORD

Lab Code: LOCK Case No.: 94-402 SAS No.: SDG No.: LK3764

ICP ID Number: Date: 07/02/95

Flame AA ID Number :

Furnace AA ID Number : 5100ZD

Analyte	Wave-length (nm)	Back-ground	RDL (ug/L)	IDL (ug/L)	M
Aluminum			200		NR
Antimony			60		NR
Arsenic			10		NR
Barium			200		NR
Beryllium			5		NR
Cadmium			5		NR
Calcium			5000		NR
Chromium			10		NR
Cobalt			50		NR
Copper			25		NR
Iron			100		NR
Lead	283.30	BZ	3	2.0	F
Magnesium			5000		NR
Manganese			15		NR
Molybdenu					NR
Nickel			40		NR
Potassium			5000		NR
Silver			10		NR
Sodium			5000		NR
Vanadium			50		NR
Zinc			20		NR
Mercury			0.2		NR

Comments:

FORM X - IN ILMO3.

CLP

13
PREPARATION LOG

Lab Name: L.A.S Contract: HAHFORD

Lab Code: LOCK Case No.: 94-402 SAS No.: SDG No.:LK3764S

Method: F

EPA Sample No.	Preparation Date	Weight (gram)	Volume (mL)
BOD2K0	07/24/95	1.25	250
BOD2K0D	07/24/95	1.25	250
BOD2K0S	07/24/95	1.25	250
LCSS	07/24/95	1.25	250
LCSW	07/24/95		250
PBS	07/24/95	1.25	250

FORM XIII - IN ILMO3.0

CLP

14
ANALYSIS RUN LOG

Lab Name: L.A.S
Contract: HAHFORD

Lab Code: LOCK
Case No.: 94-402
SAS No.:
SDG No.: LK3764

Instrument ID Number: 5100ZD
Method: F

Start Date: 07/25/95
End Date: 07/25/95

Client Sample No.	D/F	Time	% R	AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	MO	NI	K	AG	NA	V	ZN	HG
CAL BLANK	1.00	0924													X										
3 PPB STD	1.00	0927													X										
25 PPB STD	1.00	0930													X										
50 PPB STD	1.00	0933													X										
100 PPB STD	1.00	0936													X										
200 PPB STD	1.00	0939													X										
ICV	1.00	0943													X										
ICB	1.00	0946													X										
CRA	1.00	0949													X										
CCV	1.00	0952													X										
CCB	1.00	0955													X										
PBS	1.00	0959													X										
PBSA	1.00	1002	105.3												X										
LCSW	1.00	1005													X										
LCSS	5.00	1008													X										
L3764-44	1.00	1011													X										
L3764-44A	1.00	1014	102.8												X										
L3764-44D	1.00	1017													X										
L3764-44DA	1.00	1020	103.3												X										
L3764-44S	1.00	1023													X										
CCV	1.00	1027													X										
CCB	1.00	1030													X										

FORM XIV - IN

GFAA DATA

Lockheed Analytical Laboratory
Metals Analytical Data
Technical Review Checklist
(Analyst)

Analyst Name (Print) J Wood	Instrument: ZD - Pb	Method: 7000

Batch Number	Client Name	Code	Comments	Bench Sheet included Y/N	ACS updated Y/N
204 WH2R	Westinghouse Hanford		complete	Y	Y
712SAN2	General Eng. Lab	(13)	349, 09 complete	Y	Y
720 pg	Pacific gas elec		complete	N	N

CODE ANOMALY
10 Prep Blank data was not within criteria
11 Laboratory Control Sample was not within criteria
12 Duplicate Precision was not met
13 Matrix Spike recovery was not within criteria
00 Other

Description	Yes	No	Comments
Completeness Review 1. Were the standard operating procedures (SOP) followed?	✓		
2. Are all raw data available and labeled properly (e.g., methods used, units, sample IDs, dilution factors, reruns)?	✓		
3. Are all abnormalities in the raw data noted and/or explained?	✓		
4. Were all the client samples analyzed for all constituents and QC as specified on the LAL Bench Sheets?	✓		
Data Quality Assessment 5. Was the sample properly preserved and analyzed within the method-specified holding time?	✓		
6. Were the instrument calibration criteria met?	✓		
7. Are the initial and continuing calibration verification samples data bracketing the samples of interest within criteria?	✓		
8. Are the bracketing initial and continuing calibration blank data within criteria?	✓		
9. *For ICP Only:* Are the interference check standard recovery data within criteria?			

Notes and comments:

I certify, to the best of my knowledge, that the data are acceptable and in compliance with the laboratory policies and client requests, except as noted above.

J Wood 7-26-95
Analyst Signature/Date

[signature]
Secondary Reviewer Initials/Date

FURNACE RUN LOG
ZD

ANALYST: JMW
DATE: 7 25 95
CCV/CAL STD: 94364
CRA STD(3): 94291C
RUN START TIME: 9:24

ELEMENT: Pb
STD 3 (ABS): 0.123
INTEG. TIME 5 SEC
ICV STD(/10): 94353

BATCH No.
204 WHR
725 SN2
720 jg

DATA FILE: ZD95206A
POST SPIKE TRUE (µg/L) 40

CUP	SAMPLE	DF	COMMENTS	CUP	SAMPLE	DF	COMMENTS
001	Blank						
002	3						
003	25						
004	50						
005	100						
006	200						
007	ICV						
008	ICB						
009	CRA						
010	PBS204WHR						
011	LCSW204WHR		17.7				
012	LCS204WHR	Sx	48 g/kg				
013	L3764-44						
014	44A						
015	44S		95%				
016	PBS725SN2						
017	LCSW725SN2		19.2				
018	LCS725SN2	S	47.28				
019	LCS725SN2R	S	49.21 g/kg				
020	L4798-2						
021	2S		34%				
022	2SA		0%				
023	6						
024	10						
025	L4924-2						
026	PBW720jg						
027	LCSW720jg		20.4				
028	L4947-4						
029	6						
030	6A						
031	6S		94%				
032	16						
033	21						
034	26						
035							
036							
037							
038			JMW 7 26 95				
039							

ANALYST: JW DATE: 7 26 95 REVIEWER: ______ DATE: ______

LAL-95-LOG-0715

Element File: SW846PB.GEL Element: Pb Wavelength: 283.3
Date: 07/25/95 Time: 09:24 Slit: 0.7 L
Data File: ZD95206A.DAT ID/Wt File: 204WHR.IDW Lamp Current: 0
Technique: HGA Calib. Type: Nonlinear Energy: 59
Remark 1: CAL STD LOT # 94364
Remark 2: ICV STD LOT # 94353
Remark 3: CRA STD LOT # 94291C
Remark 4: CCV STD LOT # 94364

Pb ID: CAL BLANK Seq. No.: 00001 A/S Pos.: 1 Date: 07/25/95

Replicate 1 Time: 09:24
Peak Area (A-s): 0.001 Peak Height (A): 0.008
Background Pk Area (A-s): 0.092 Background Pk Height (A): 0.029
Blank Corrected Pk Area (A-s): 0.001

Auto-zero performed.

Pb ID: 3 PPB STD Seq. No.: 00002 A/S Pos.: 2 Date: 07/25/95

Replicate 1 Time: 09:27
Peak Area (A-s): 0.009 Peak Height (A): 0.015
Background Pk Area (A-s): 0.121 Background Pk Height (A): 0.041
Blank Corrected Pk Area (A-s): 0.008

Standard number 1 applied. [3.0]
Correlation coefficient: 1.00000 Slope: 0.0026

Pb ID: 25 PPB STD Seq. No.: 00003 A/S Pos.: 3 Date: 07/25/95

Replicate 1 Time: 09:30
Peak Area (A-s): 0.062 Peak Height (A): 0.090
Background Pk Area (A-s): 0.128 Background Pk Height (A): 0.038
Blank Corrected Pk Area (A-s): 0.062
Concentration (ug/L): 23.9

Standard number 2 applied. [25.0]
Correlation coefficient: 1.00000 Slope: 0.0026

Pb ID: 50 PPB STD Seq. No.: 00004 A/S Pos.: 4 Date: 07/25/95

Replicate 1 Time: 09:33
Peak Area (A-s): 0.124 Peak Height (A): 0.184
Background Pk Area (A-s): 0.138 Background Pk Height (A): 0.040
Blank Corrected Pk Area (A-s): 0.123
Concentration (ug/L): 52.7

S-shaped calibration curve detected. 2-coef. equation used.
Standard number 3 applied. [50.0]
Correlation coefficient: 0.99987 Slope: 0.0026

Pb ID: 100 PPB STD Seq. No.: 00005 A/S Pos.: 5 Date: 07/25/95

Lockheed Analytical Laboratory
ELEMENT Pb
Wavelength 283.3
Instrument ZDS10D
Batch No. 204WHR, 7125ON2 720PG
Date 7-25-95
Analyst JNW
Cont. from Calib. of ZD95206A

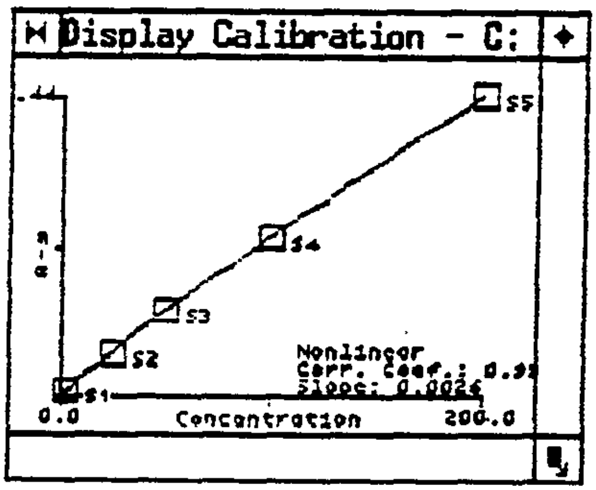
Replicate 1 Time: 09:36
Peak Area (A-s): 0.236 Peak Height (A): 0.353
Background Pk Area (A-s): 0.158 Background Pk Height (A): 0.066
Blank Corrected Pk Area (A-s): 0.235
Concentration (ug/L): 101.4

Standard number 4 applied. [100.0]
Correlation coefficient: 0.99998 Slope: 0.0026

Pb ID: 200 PPB STD Seq. No.: 00006 A/S Pos.: 6 Date: 07/25/95

Replicate 1 Time: 09:39
Peak Area (A-s): 0.441 Peak Height (A): 0.547
Background Pk Area (A-s): 0.186 Background Pk Height (A): 0.116
Blank Corrected Pk Area (A-s): 0.440
Concentration (ug/L): 196.9

Standard number 5 applied. [200.0]
Correlation coefficient: 0.99999 Slope: 0.0026



Pb ID: ICV Seq. No.: 00007 A/S Pos.: 7 Date: 07/25/95

Replicate 1 Time: 09:43
Peak Area (A-s): 0.243 Peak Height (A): 0.368
Background Pk Area (A-s): 0.157 Background Pk Height (A): 0.071
Blank Corrected Pk Area (A-s): 0.243
Concentration (ug/L): 103.5

1049o

Pb ID: ICB Seq. No.: 00008 A/S Pos.: 8 Date: 07/25/95

Replicate 1 Time: 09:46
Peak Area (A-s): 0.001 Peak Height (A): 0.007
Background Pk Area (A-s): 0.000 Background Pk Height (A): 0.024
Blank Corrected Pk Area (A-s): 0.000
Concentration (ug/L): 0.2

310

Pb ID: CRA Seq. No.: 00009 A/S Pos.: 9 Date: 07/25/95

Replicate 1 Time: 09:49
Peak Area (A-s): 0.008 Peak Height (A): 0.018
Background Pk Area (A-s): 0.101 Background Pk Height (A): 0.031
Blank Corrected Pk Area (A-s): 0.007
Concentration (ug/L): 2.8 93%

Pb ID: CCV Seq. No.: 00010 A/S Pos.: 5 Date: 07/25/95

Replicate 1 Time: 09:52
Peak Area (A-s): 0.236 Peak Height (A): 0.374
Background Pk Area (A-s): 0.138 Background Pk Height (A): 0.071
Blank Corrected Pk Area (A-s): 0.235
Concentration (ug/L): 100.2

QC sample is within range 80.0 - 120.0 100%

Pb ID: CCB Seq. No.: 00011 A/S Pos.: 8 Date: 07/25/95

Replicate 1 Time: 09:55
Peak Area (A-s): 0.002 Peak Height (A): 0.008
Background Pk Area (A-s): 0.043 Background Pk Height (A): 0.019
Blank Corrected Pk Area (A-s): 0.002
Concentration (ug/L): 0.6

QC sample is within range -3.0 - 3.0 ✓

Pb ID: PBS204WHR Seq. No.: 00012 A/S Pos.: 10 Date: 07/25/95

Replicate 1 Time: 09:59
Peak Area (A-s): -0.001 Peak Height (A): 0.006
Background Pk Area (A-s): 0.090 Background Pk Height (A): 0.029
Blank Corrected Pk Area (A-s): -0.002
Concentration (ug/L): -0.6 ND

Pb ID: PBS204WHR MA Seq. No.: 00013 A/S Pos.: 10 Date: 07/25/95

Replicate 1 Time: 10:02
Peak Area (A-s): 0.105 Peak Height (A): 0.182
Background Pk Area (A-s): 0.084 Background Pk Height (A): 0.036
Blank Corrected Pk Area (A-s): 0.104
Concentration (ug/L): 42.1

Recovery is 106.9%

Pb ID: LCSW204WHR Seq. No.: 00014 A/S Pos.: 11 Date: 07/25/95

Replicate 1 Time: 10:05
Peak Area (A-s): 0.048 Peak Height (A): 0.084
Background Pk Area (A-s): 0.091 Background Pk Height (A): 0.029
Blank Corrected Pk Area (A-s): 0.047
Concentration (ug/L): 18.8 94%

311

Pb ID: LCSS204WHR Sx Seq. No.: 00015 A/S Pos.: 12 Date: 07/25/95

Replicate 1 Time: 10:08
Peak Area (A-s): 0.119 Peak Height (A): 0.177
Background Pk Area (A-s): 0.122 Background Pk Height (A): 0.043
Blank Corrected Pk Area (A-s): 0.118
Concentration (ug/L): 48.1 Corrected Conc (ug/L): 240. Sx 48 mg/kg 9290

Pb ID: L3764-44R Seq. No.: 00016 A/S Pos.: 13 Date: 07/25/95

The background signal is changing during BOC measurement.
Replicate 1 Time: 10:11
Peak Area (A-s): 0.073 Peak Height (A): 0.090
Background Pk Area (A-s): 0.267 Background Pk Height (A): 0.110
Blank Corrected Pk Area (A-s): 0.072
Concentration (ug/L): 28.9

Pb ID: L3764-44R Seq. No.: 00017 A/S Pos.: 13 Date: 07/25/95

Replicate 1 Time: 10:14
Peak Area (A-s): 0.169 Peak Height (A): 0.205
Background Pk Area (A-s): 0.283 Background Pk Height (A): 0.124
Blank Corrected Pk Area (A-s): 0.168
Concentration (ug/L): 70.0

Recovery is 102.8%

Pb ID: L3764-44RD Seq. No.: 00018 A/S Pos.: 14 Date: 07/25/95

Replicate 1 Time: 10:17
Peak Area (A-s): 0.079 Peak Height (A): 0.101
Background Pk Area (A-s): 0.310 Background Pk Height (A): 0.128
Blank Corrected Pk Area (A-s): 0.078
Concentration (ug/L): 31.2

Pb ID: L3764-44RD Seq. No.: 00019 A/S Pos.: 14 Date: 07/25/95

Replicate 1 Time: 10:20
Peak Area (A-s): 0.175 Peak Height (A): 0.208
Background Pk Area (A-s): 0.317 Background Pk Height (A): 0.139
Blank Corrected Pk Area (A-s): 0.174
Concentration (ug/L): 72.5

Recovery is 103.2%

Pb ID: L3764-44RS Seq. No.: 00020 A/S Pos.: 15 Date: 07/25/95

Replicate 1 Time: 10:23
Peak Area (A-s): 0.118 Peak Height (A): 0.143
Background Pk Area (A-s): 0.341 Background Pk Height (A): 0.145
Blank Corrected Pk Area (A-s): 0.117
Concentration (ug/L): 47.8

9590

Pb ID: CCV Seq. No.: 00021 A/S Pos.: 5 Date: 07/25/95

Replicate 1 Time: 10:27
Peak Area (A-s): 0.244 Peak Height (A): 0.318
Background Pk Area (A-s): 0.201 Background Pk Height (A): 0.077
Blank Corrected Pk Area (A-s): 0.243
Concentration (ug/L): 103.6

QC sample is within range 80.0 - 120.0 104%

Pb ID: CCB Seq. No.: 00022 A/S Pos.: 3 Date: 07/25/95

Replicate 1 Time: 10:30
Peak Area (A-s): -0.000 Peak Height (A): 0.007
Background Pk Area (A-s): 0.163 Background Pk Height (A): 0.058
Blank Corrected Pk Area (A-s): -0.001
Concentration (ug/L): -0.4

QC sample is within range -3.0 - 3.0

Pb ID: PBS712SAN2 Seq. No.: 00023 A/S Pos.: 16 Date: 07/25/95

Replicate 1 Time: 10:40
Peak Area (A-s): 0.001 Peak Height (A): 0.005
Background Pk Area (A-s): 0.116 Background Pk Height (A): 0.038
Blank Corrected Pk Area (A-s): -0.000
Concentration (ug/L): -0.0

ND

Pb ID: PBS712SAN2 Seq. No.: 00024 A/S Pos.: 16 Date: 07/25/95

Replicate 1 Time: 10:43
Peak Area (A-s): 0.100 Peak Height (A): 0.176
Background Pk Area (A-s): 0.120 Background Pk Height (A): 0.047
Blank Corrected Pk Area (A-s): 0.100
Concentration (ug/L): 40.4

Recovery is 101.1%

Pb ID: LCSW712SAN2 Seq. No.: 00025 A/S Pos.: 17 Date: 07/25/95

Replicate 1 Time: 10:46
Peak Area (A-s): 0.049 Peak Height (A): 0.090
Background Pk Area (A-s): 0.129 Background Pk Height (A): 0.044
Blank Corrected Pk Area (A-s): 0.048
Concentration (ug/L): 19.2

96%

Pb ID: LCSS712SAN2 SX Seq. No.: 00026 A/S Pos.: 18 Date: 07/25/95

Replicate 1 Time: 10:49
Peak Area (A-s): 0.118 Peak Height (A): 0.172
Background Pk Area (A-s): 0.166 Background Pk Height (A): 0.058
Blank Corrected Pk Area (A-s): 0.117
Concentration (ug/L): 47.7 Corrected Conc (ug/L): 238. SX

47.22 mg/kg 90% 312

Pb ID: LCSS712SAN2D SX Seq. No.: 00027 A/S Pos.: 19 Date: 07/25/95

Replicate 1 Time: 10:52
Peak Area (A-s): 0.122 Peak Height (A): 0.176
Background Pk Area (A-s): 0.169 Background Pk Height (A): 0.057
Blank Corrected Pk Area (A-s): 0.121
Concentration (ug/L): 49.5 Corrected Conc (ug/Kg): 248. SX

49.21 mg/kg 94%

Pb ID: L4898-2 Seq. No.: 00028 A/S Pos.: 20 Date: 07/25/95

Replicate 1 Time: 10:55
Peak Area (A-s): 0.177 Peak Height (A): 0.191
Background Pk Area (A-s): 0.643 Background Pk Height (A): 0.248
Blank Corrected Pk Area (A-s): 0.176
Concentration (ug/L): 73.3

Pb ID: L4898-2 Seq. No.: 00029 A/S Pos.: 20 Date: 07/25/95

Replicate 1 Time: 10:58
Peak Area (A-s): 0.266 Peak Height (A): 0.304
Background Pk Area (A-s): 0.619 Background Pk Height (A): 0.243
Blank Corrected Pk Area (A-s): 0.265
Concentration (ug/L): 114.2

Recovery is 102.1%

Pb ID: L4898-2S Seq. No.: 00030 A/S Pos.: 21 Date: 07/25/95

Replicate 1 Time: 11:01
Peak Area (A-s): 0.192 Peak Height (A): 0.231
Background Pk Area (A-s): 0.882 Background Pk Height (A): 0.329
Blank Corrected Pk Area (A-s): 0.191
Concentration (ug/L): 80.1

34%

Pb ID: CCV Seq. No.: 00031 A/S Pos.: 5 Date: 07/25/95

Replicate 1 Time: 11:04
Peak Area (A-s): 0.250 Peak Height (A): 0.326
Background Pk Area (A-s): 0.262 Background Pk Height (A): 0.089
Blank Corrected Pk Area (A-s): 0.249
Concentration (ug/L): 106.6

QC sample is within range 80.0 - 120.0

107%

Pb ID: CCB Seq. No.: 00032 A/S Pos.: 8 Date: 07/25/95

Replicate 1 Time: 11:07
Peak Area (A-s): -0.000 Peak Height (A): 0.008
Background Pk Area (A-s): 0.202 Background Pk Height (A): 0.069
Blank Corrected Pk Area (A-s): -0.001
Concentration (ug/L): -0.4

QC sample is within range -3.0 - 3.0

Pb ID: L4898-2SD Seq. No.: 00033 A/S Pos.: 22 Date: 07/25/95

Replicate 1 Time: 11:10
Peak Area (A-s): 0.169 Peak Height (A): 0.195
Background Pk Area (A-s): 0.749 Background Pk Height (A): 0.286
Blank Corrected Pk Area (A-s): 0.169
Concentration (ug/L): 70.1

09

Pb ID: L4898-6 / Seq. No.: 00034 A/S Pos.: 23 Date: 07/25/95

Replicate 1 Time: 11:13
Peak Area (A-s): 0.139 Peak Height (A): 0.152
Background Pk Area (A-s): 0.733 Background Pk Height (A): 0.274
Blank Corrected Pk Area (A-s): 0.139
Concentration (ug/L): 57.0

Pb ID: L4898-6 A Seq. No.: 00035 A/S Pos.: 23 Date: 07/25/95

Replicate 1 Time: 11:17
Peak Area (A-s): 0.239 Peak Height (A): 0.266
Background Pk Area (A-s): 0.690 Background Pk Height (A): 0.254
Blank Corrected Pk Area (A-s): 0.238
Concentration (ug/L): 101.5

Recovery is 111.3%

Pb ID: L4898-10 Seq. No.: 00036 A/S Pos.: 24 Date: 07/25/95

Replicate 1 Time: 11:20
Peak Area (A-s): 0.168 Peak Height (A): 0.188
Background Pk Area (A-s): 0.942 Background Pk Height (A): 0.344
Blank Corrected Pk Area (A-s): 0.167
Concentration (ug/L): 69.3

Pb ID: L4898-10 A Seq. No.: 00037 A/S Pos.: 24 Date: 07/25/95

Replicate 1 Time: 11:23
Peak Area (A-s): 0.262 Peak Height (A): 0.300
Background Pk Area (A-s): 0.866 Background Pk Height (A): 0.318
Blank Corrected Pk Area (A-s): 0.261
Concentration (ug/L): 112.0

Recovery is 106.8%

Pb ID: L4924-2 Seq. No.: 00038 A/S Pos.: 25 Date: 07/25/95

Replicate 1 Time: 11:26
Peak Area (A-s): 0.101 Peak Height (A): 0.113
Background Pk Area (A-s): 0.621 Background Pk Height (A): 0.225
Blank Corrected Pk Area (A-s): 0.100
Concentration (ug/L): 40.4

Pb ID: L4924-2 Seq. No.: 00039 A/S Pos.: 25 Date: 07/25/95

Replicate 1 Time: 11:29
Peak Area (A-s): 0.198 Peak Height (A): 0.220
Background Pk Area (A-s): 0.553 Background Pk Height (A): 0.202
Blank Corrected Pk Area (A-s): 0.198
Concentration (ug/L): 83.0

Recovery is 106.4%

Pb ID: CCV Seq. No.: 00040 A/S Pos.: S Date: 07/25/95

Replicate 1 Time: 11:32
Peak Area (A-s): 0.248 Peak Height (A): 0.329
Background Pk Area (A-s): 0.313 Background Pk Height (A): 0.104
Blank Corrected Pk Area (A-s): 0.247
Concentration (ug/L): 105.7

QC sample is within range 80.0 - 120.0 106%

Pb ID: CCB Seq. No.: 00041 A/S Pos.: 8 Date: 07/25/95

Replicate 1 Time: 11:35
Peak Area (A-s): -0.000 Peak Height (A): 0.011
Background Pk Area (A-s): 0.260 Background Pk Height (A): 0.089
Blank Corrected Pk Area (A-s): -0.001
Concentration (ug/L): -0.4

QC sample is within range -3.0 - 3.0

Pb ID: PBW720PG Seq. No.: 00042 A/S Pos.: 26 Date: 07/25/95

Replicate 1 Time: 11:41
Peak Area (A-s): -0.001 Peak Height (A): 0.005
Background Pk Area (A-s): 0.225 Background Pk Height (A): 0.075
Blank Corrected Pk Area (A-s): -0.002
Concentration (ug/L): -0.8 ND

Pb ID: PBW720PG Seq. No.: 00043 A/S Pos.: 26 Date: 07/25/95

Replicate 1 Time: 11:44
Peak Area (A-s): 0.106 Peak Height (A): 0.156
Background Pk Area (A-s): 0.201 Background Pk Height (A): 0.065
Blank Corrected Pk Area (A-s): 0.105
Concentration (ug/L): 42.6

Recovery is 108.4%

Pb ID: LCSW720PG Seq. No.: 00044 A/S Pos.: 27 Date: 07/25/95

Replicate 1 Time: 11:47
Peak Area (A-s): 0.052 Peak Height (A): 0.077
Background Pk Area (A-s): 0.213 Background Pk Height (A): 0.072

31E

Blank Corrected Pk Area (A-s): 0.051
Concentration (ug/L): 20.4

10%

Pb ID: L4947-1 Seq. No.: 00045 A/S Pos.: 28 Date: 07/25/95

Replicate 1 Time: 11:50
Peak Area (A-s): -0.003 Peak Height (A): 0.006
Background Pk Area (A-s): 0.350 Background Pk Height (A): 0.128
Blank Corrected Pk Area (A-s): -0.004
Concentration (ug/L): -1.4 ND

Pb ID: L4947-1 Seq. No.: 00046 A/S Pos.: 28 Date: 07/25/95

Replicate 1 Time: 11:53
Peak Area (A-s): 0.104 Peak Height (A): 0.157
Background Pk Area (A-s): 0.321 Background Pk Height (A): 0.123
Blank Corrected Pk Area (A-s): 0.103
Concentration (ug/L): 41.9

Recovery is 108.3%

Pb ID: L4947-6 Seq. No.: 00047 A/S Pos.: 29 Date: 07/25/95

Replicate 1 Time: 11:56
Peak Area (A-s): -0.002 Peak Height (A): 0.007
Background Pk Area (A-s): 0.365 Background Pk Height (A): 0.135
Blank Corrected Pk Area (A-s): -0.002
Concentration (ug/L): -0.9 ND

Pb ID: L4947-6 Seq. No.: 00048 A/S Pos.: 29 Date: 07/25/95

Replicate 1 Time: 11:59
Peak Area (A-s): 0.103 Peak Height (A): 0.153
Background Pk Area (A-s): 0.323 Background Pk Height (A): 0.123
Blank Corrected Pk Area (A-s): 0.102
Concentration (ug/L): 41.6

Recovery is 106.3%

Pb ID: L4947-6D Seq. No.: 00049 A/S Pos.: 30 Date: 07/25/95

Replicate 1 Time: 12:02
Peak Area (A-s): -0.002 Peak Height (A): 0.007
Background Pk Area (A-s): 0.330 Background Pk Height (A): 0.121
Blank Corrected Pk Area (A-s): -0.003
Concentration (ug/L): -1.2 ND

Pb ID: L4947-6D Seq. No.: 00050 A/S Pos.: 30 Date: 07/25/95

Replicate 1 Time: 12:05
Peak Area (A-s): 0.105 Peak Height (A): 0.153
Background Pk Area (A-s): 0.326 Background Pk Height (A): 0.122
Blank Corrected Pk Area (A-s): 0.104

Concentration (ug/L): 42.4

Recovery is 108.9%

Pb ID: CCV Seq. No.: 00051 A/S Pos.: 5 Date: 07/25/95

Replicate 1 Time: 12:09
Peak Area (A-s): 0.247 Peak Height (A): 0.351
Background Pk Area (A-s): 0.272 Background Pk Height (A): 0.089
Blank Corrected Pk Area (A-s): 0.246
Concentration (ug/L): 105.2

QC sample is within range 80.0 - 120.0 105%

Pb ID: CCB Seq. No.: 00052 A/S Pos.: 8 Date: 07/25/95

Replicate 1 Time: 12:12
Peak Area (A-s): 0.001 Peak Height (A): 0.008
Background Pk Area (A-s): 0.215 Background Pk Height (A): 0.073
Blank Corrected Pk Area (A-s): -0.000
Concentration (ug/L): -0.1

QC sample is within range -3.0 - 3.0

Pb ID: L4947-6S Seq. No.: 00053 A/S Pos.: 31 Date: 07/25/95

Replicate 1 Time: 12:15
Peak Area (A-s): 0.048 Peak Height (A): 0.073
Background Pk Area (A-s): 0.384 Background Pk Height (A): 0.146
Blank Corrected Pk Area (A-s): 0.047
Concentration (ug/L): 18.8 94%

Pb ID: L4947-16 Seq. No.: 00054 A/S Pos.: 32 Date: 07/25/95

Replicate 1 Time: 12:18
Peak Area (A-s): -0.001 Peak Height (A): 0.005
Background Pk Area (A-s): 0.311 Background Pk Height (A): 0.118
Blank Corrected Pk Area (A-s): -0.002
Concentration (ug/L): -0.8 ND

Pb ID: L4947-16 Seq. No.: 00055 A/S Pos.: 32 Date: 07/25/95

Replicate 1 Time: 12:21
Peak Area (A-s): 0.105 Peak Height (A): 0.172
Background Pk Area (A-s): 0.289 Background Pk Height (A): 0.109
Blank Corrected Pk Area (A-s): 0.104
Concentration (ug/L): 42.2

Recovery is 107.4%

Pb ID: L4947-21 Seq. No.: 00056 A/S Pos.: 33 Date: 07/25/95

Replicate 1 Time: 12:24

Peak Area (A-s): -0.001 Peak Height (A): 0.006
Background Pk Area (A-s): 0.349 Background Pk Height (A): 0.130
Blank Corrected Pk Area (A-s): -0.002
Concentration (ug/L): -0.8

ND

Pb ID: L4947-21 Seq. No.: 00057 A/S Pos.: 33 Date: 07/25/95

Replicate 1 Time: 12:27
Peak Area (A-s): 0.104 Peak Height (A): 0.167
Background Pk Area (A-s): 0.343 Background Pk Height (A): 0.132
Blank Corrected Pk Area (A-s): 0.104
Concentration (ug/L): 42.0

Recovery is 107.1%

Pb ID: L4947-26 Seq. No.: 00058 A/S Pos.: 34 Date: 07/25/95

Replicate 1 Time: 12:30
Peak Area (A-s): 0.002 Peak Height (A): 0.006
Background Pk Area (A-s): 0.220 Background Pk Height (A): 0.078
Blank Corrected Pk Area (A-s): 0.001
Concentration (ug/L): 0.3

ND

Pb ID: L4947-26 Seq. No.: 00059 A/S Pos.: 34 Date: 07/25/95

Replicate 1 Time: 12:33
Peak Area (A-s): 0.107 Peak Height (A): 0.172
Background Pk Area (A-s): 0.190 Background Pk Height (A): 0.063
Blank Corrected Pk Area (A-s): 0.107
Concentration (ug/L): 43.3

Recovery is 107.5%

Pb ID: CCV Seq. No.: 00060 A/S Pos.: 5 Date: 07/25/95

Replicate 1 Time: 12:36
Peak Area (A-s): 0.252 Peak Height (A): 0.367
Background Pk Area (A-s): 0.250 Background Pk Height (A): 0.080
Blank Corrected Pk Area (A-s): 0.251
Concentration (ug/L): 107.3

QC sample is within range 80.0 - 120.0 107%

Pb ID: CCB Seq. No.: 00061 A/S Pos.: 8 Date: 07/25/95

Replicate 1 Time: 12:39
Peak Area (A-s): 0.001 Peak Height (A): 0.009
Background Pk Area (A-s): 0.190 Background Pk Height (A): 0.065
Blank Corrected Pk Area (A-s): -0.000
Concentration (ug/L): -0.1

QC sample is within range -3.0 - 3.0

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4FAA SOIL

LOCKHEED ANALYTICAL SERVICES / DIGESTION BENCH SHEET FOR SOIL SAMPLES / BSI01

WORKSHEET NUMBER: 7000 FURNACE METALS_19269

GFAA SPIKE

PWO : LAL
DATE ASSIGNED : 15-FEB-95
SUPERVISOR'S INITIALS : RC

ACCOUNT NAME : Westinghouse Hanford C
DATE DUE : ASAP
ASSIGNED ANALYST : TB

LAL BATCH NO. : 204-wh 2 Rerun
DATE COMPLETED : 24-JUL-95
ANALYST SIGNATURE : [signature]

MATRIX : SOIL
LCS SOURCE: NA
SPIKE SOURCE: 95118

DIGESTION TYPE : 7000 FURNACE METALS
SPIKE SOURCE: ——

HEATING METHOD : BLOCK X HOTPLATE ___ MICROWAVE ___ (TEMP AND TIME: 95°C for 2 hrs)
SPIKE SOURCE: ——

NO	QC	LAL ID	CLIENT ID		SAMPLE WEIGHT (G)	SPIKE VOLUME (mL)	ACID VOLUME (mL)	FINAL VOLUME (mL)	COLOR INITIAL	COLOR FINAL	SOLID TEXTURE	ARTIFACTS	COMMENTS (ARTIFACT DESC)
1	DUP	19269DUP	L3764-~~7~~ 44R (RC 7-24-95)		1.25		25.0	250	Brown	colorless	m		
2	LCS	19269LCSSR	LCSS204WH2		1.25		↓	↓	~~[lined out]~~ TB 7/24/95	↓	~~[lined out]~~ TB 7/24/95		
3	LCS	19269LCSWR	LCSW204WH2			2.5	↓	↓		↓			
4	MB	19269MB	PBS204WH2				↓	↓		↓			
5	MS	19269MS	L3764-~~7~~ 44R (RC 7-24-95)		1.25	2.5	↓	↓	Brown	↓	m		
6		~~L3764-7~~	~~B0D2H0~~										
7		L3764-8	B0D2H1										
8		~~L3764-9~~	~~B0D2H2~~										
9		L3764-25	B0D2G3										
10		L3764-26	B0D2G4										
11		L3764-27	B0D2G5										
12		~~L3764-43~~	~~B0D2J9~~										
13	*	L3764-44R	B0D2K0		1.25		25.0	250	Brown	colorless	m		
14		~~L3764-51~~	~~B0D2J0~~										
15		L3764-52	B0D2J2										
16		L3764-53	B0D2J4										
17		~~L3764-67~~	~~B0D2J1~~										
18		L3764-68	B0D2J3										
19		~~L3764-69~~	~~B0D2J5~~										

Rows 6–12 lined out: RC 7-24-95; TB 7/24/95. Rows 14–19 lined out: RC 7-24-95; TB 7/24/95.

COLOR CODES: BLACK, BROWN, BLUE, COLORLESS, GREY, GREEN, ORANGE, RED, VIOLET, WHITE, YELLOW
TEXTURE: FINE (POWDERY), MEDIUM (SANDY), COARSE (LARGE CRYSTALS OR ROCKS)

SPIKE SOURCE AND VOLUME VERIFIED BY: CA DATE: 7/24

REDIGESTION REQUIRED ? YES:___ NO:___ IF YES, WHY ? ______ 339

Lockheed Analytical Services
Analysis Tracking Sheet
7000 FURNACE METALS_19269

Account Name:	Westinghouse Hanford Co. * Richland, WA	**Date Assigned:**	2/15/95	**Supervisor's Initials:**	RC
LAL Batch No.	204-WH 2 RERUN	**Date Due:**	7/28/95	**Assigned Analyst:**	[illegible]
		Date Completed:	7/26/95	**Analyst Signature:**	[illegible]

Matrix: Soil

Product: 7000 FURNACE METALS

Spec Instructions: L3764-44 Pb only

CHAIN OF CUSTODY INFORMATION (DIGESTATES ONLY)

Relinquished by: [signature] Date: 7/24/95

Received by: [signature] Date: 7/25/95

No.	QC	LAL ID	CLIENT ID (RC 7-24-95)	As	Pb	Se	Tl
1	DUP	19269DUP	L3764-~~7~~ 44	1	1	1	1
2	LCS	19269LCSS	LCSS204WH2	1	1	1	1
3	LCS	19269LCSW	LCSW204WH2	1	1	1	1
4	MB	19269MB	PBS204WH2	1	1	1	1
5	MS	19269MS	L3764-~~7~~ 44	1	1	1	1
6		~~L3764-7~~	~~B0D2H0~~	~~1~~	~~1~~	~~1~~	~~1~~
7		L3764-8	B0D2H1	1	1	1	1
8		L3764-9	B0D2H2	1	1	1	1
9		L3764-25	B0D2G3	1	1	1	1
10		L3764-26	B0D2G4	1	1	1	1
11		L3764-27	B0D2G5	1	1	1	1
12		~~L3764-47~~	~~B0D2J9~~	~~1~~	~~1~~	~~1~~	~~1~~
13	*	L3764-44	B0D2K0	1	1	1	1
14		~~L3764-51~~	~~B0D2J0~~	~~1~~	~~1~~	~~1~~	~~1~~
15		L3764-52	B0D2J2	1	1	1	1
16		L3764-53	B0D2J4	1	1	1	1
17		L3764-67	B0D2J1	1	1	1	1
18		L3764-68	B0D2J3	1	1	1	1
19		~~L3764-69~~	~~B0D2J5~~	~~1~~	~~1~~	~~1~~	~~1~~
		LCSW (M/L)	LCSS (Mh)				
①	Pb	18.8	48	7-25-95			

Rows 6–11 and 14–19 lined through: RC 7-24-95

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LOCKHEED FORM TSI01X

LOCKHEED ANALYTICAL SERVICES

WORK GROUP REPORT (wk02)

Jul 24 1995, 10:37 am

Work Group: 7000 FURNACE METALS_19269 for Department: 9 Metal Prep.

Created: 15-FEB-95 Due: 11-MAR-95 Operator:

Page 1

Sample	Account Name	ClientID	C Product	Matrix	Stat UA Workdate	PR Location
19269DUP	DUP	L3764-7 44	S 7000 FURNACE METALS	Soil	DONE U 15-FEB-95	
19269LCSS	LCS	LCSS204WH2	S 7000 FURNACE METALS	Soil	DONE U 15-FEB-95	
19269LCSW	LCS	LCSW204WH2	S 7000 FURNACE METALS	Soil	DONE U 15-FEB-95	
19269MB	MB	PBS204WH2	S 7000 FURNACE METALS	Soil	DONE U 15-FEB-95	
19269MS	MS	L3764-7 44	S 7000 FURNACE METALS	Soil	DONE U 15-FEB-95	

TTS 7/24/95

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