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# 303-K Storage Facility Sampling and Analysis Plan

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Assistant Secretary of Environmental Management
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Approved for Public Release

# 303-K STORAGE FACILITY SAMPLING AND ANALYSIS PLAN

**J. G. Adler**
Waste Management Federal Services of Handford, Inc., Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

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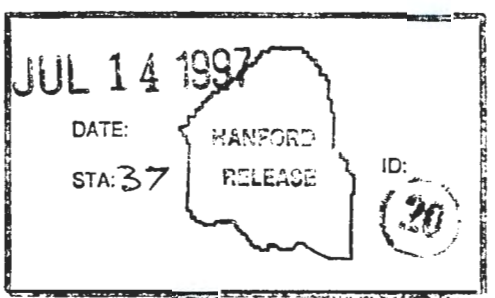
Abstract: This plan identifies the cleanup, sampling, and analysis activities required for clean closure of the 303-K Storage Facility.



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# GLOSSARY

| | |
|---|---|
| CERCLA | *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* |
| Closure Plan | *303-K Storage Facility Closure Plan* |
| DOE | U.S. Department of Energy |
| DQO | Data Quality Objectives |
| Ecology | Washington State Department of Ecology |
| EII | environmental investigations instruction |
| EPA | U.S. Environmental Protection Agency |
| RCRA | *Resource Conservation and Recovery Act of 1976* |
| TSD | treatment, storage, and disposal |
| VOC | volatile organic compounds |
| WAC | *Washington Administrative Code* |

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## 1.0 PURPOSE

This document describes the cleanup, sampling, and analysis activities associated with the closure of the 303-K Storage Facility under the *Washington Administrative Code* (WAC) 173-303-610, "Dangerous Waste Regulations." This document is a supplement to the *303-K Storage Facility Closure Plan* (DOE-RL 1995a) (Closure Plan).

The objective of these activities is to support clean closure of the 303-K Storage Facility. This document defines the information and activities needed to meet this objective, including: constituents of concern, cleanup performance standards, cleanup activities, sampling locations and methods, field screening locations and methods, field quality control requirements, laboratory analytical methods, and data validation methodology. This document supersedes the Closure Plan if the two conflict.

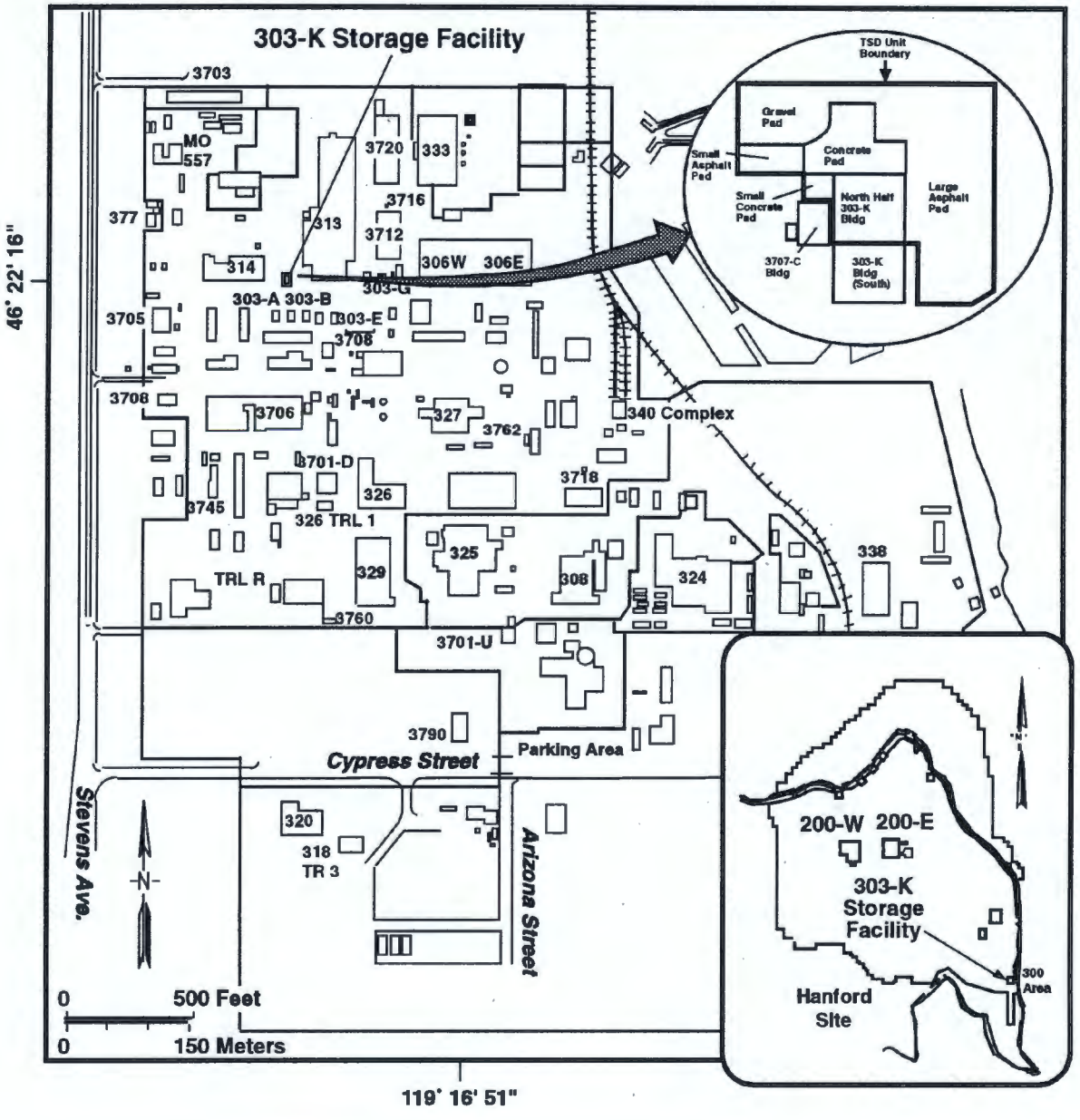
## 2.0 SITE DESCRIPTION AND BACKGROUND

The 303-K Storage Facility is located in the northwest corner of the 300 Area. The location of the unit is shown in Figure 1. The layout of the unit is shown in Figure 2. The unit consists of the north half of the 303-K Building and an external storage area. The building is concrete block with a poured concrete floor and roof. The floor of the north half of the 303-K Building contains a roughly H-shaped drainage trench. The storage area consists of several concrete and asphalt pads and a gravel pad. One of the concrete pads has a berm.

The 303-K Storage Facility has performed a variety of functions. Full details are presented in the Closure Plan. From completion of construction in 1943 until 1953, the building was used for storage of uranium metal and nuclear fuel elements. In 1953, the building was remodeled by dividing it into two rooms and adding drainage trenches in the north room. From 1953 until 1986, parts of the 303-K Storage Facility were used for radiological decontamination. From 1953 until 1996, the 303-K Storage Facility was used for the storage of radioactive waste generated during the fabrication of nuclear fuel. From 1977 to 1982, it was used to store concreted billets of recyclable uranium chips and fines. From January 1986 until 1995, the unit was used for the storage of mixed waste.

## 3.0 DATA QUALITY OBJECTIVES PROCESS

The Data Quality Objectives (DQO) process examined the basic approach used to reach closure of the 303-K Storage Facility. The goal of the DQO process was to determine the most effective and defensible means to reach




1 Figure 1. 303-K Storage Facility Site Plan.

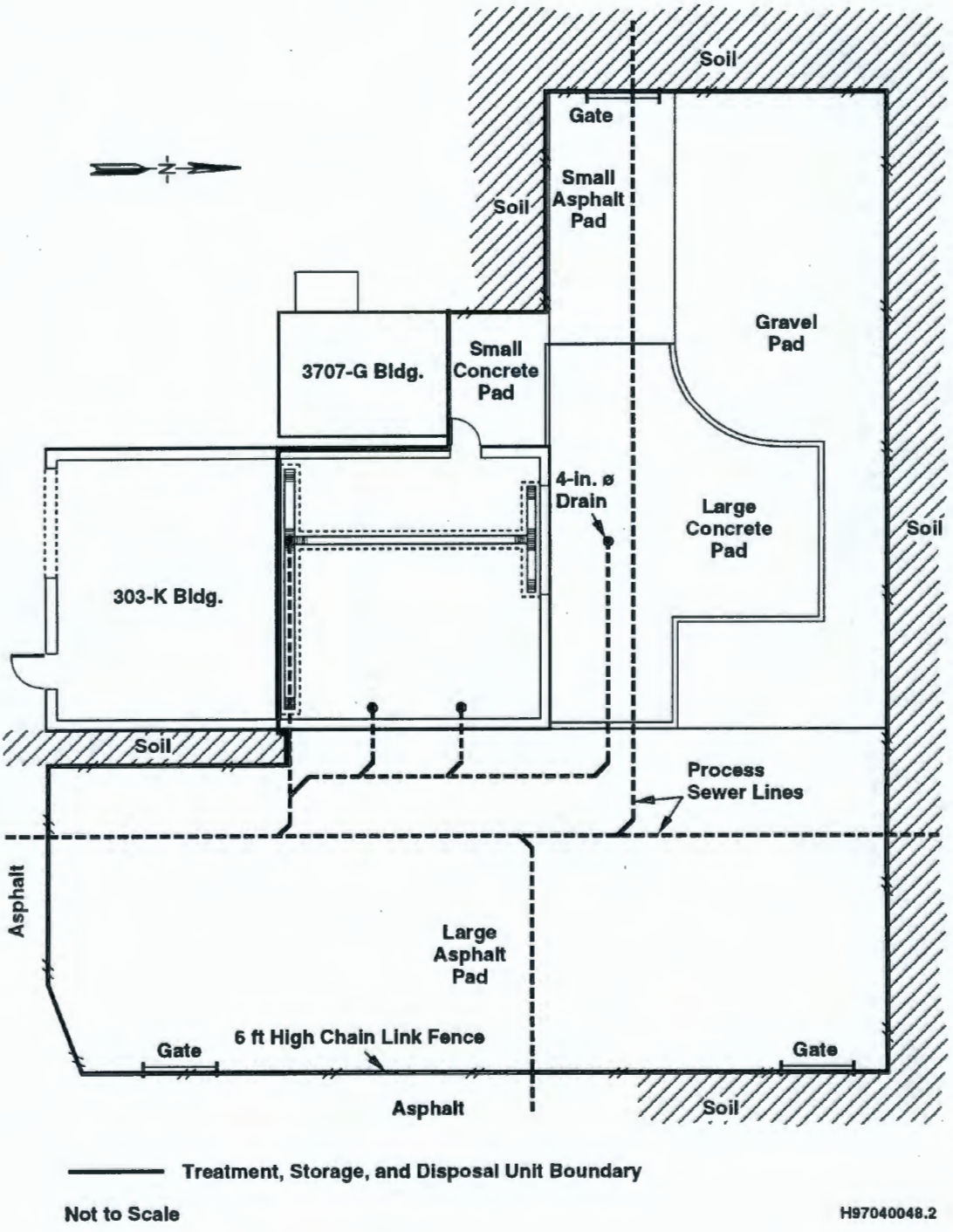



Figure 2. Layout of the 303-K Storage Facility.

clean closure that was mutually acceptable to the U.S. Department of Energy (DOE) and to the Washington State Department of Ecology (Ecology). The DQO process also was used to evaluate and incorporate the knowledge from past closure experience into the closure of the 303-K Storage Facility. The DQO Meetings were held on November 15, 1996, January 15, 1997; February 12, 1997; February 27, 1997; April 1, 1997; April 10, 1997; and April 22, 1997. Also relevant were the Unit Manager Meetings held on November 1, 1996, and December 17, 1996. The agreements reach are documented in "Summary of Agreements Reached at the 303-K DQO Meetings" (Appendix A).

## 4.0 CONSTITUENTS OF CONCERN

The original *303-K Storage Facility Closure Plan* identified 23 constituents of concern, including 9 volatile organic compounds (VOC). The DQO process determined that the VOCs could be excluded from sampling and analysis for all sampling media. The basis for this decision was the sampling and analysis of both concrete and soils for VOCs that has been completed at other TSD units. These efforts (especially at the 300 Area Solvent Evaporator) have confirmed that, if spilled, VOCs will evaporate and are not retained in soil or in concrete. The specific VOCs identified in the Closure Plan, but being excluded from the sampling and analysis for the 303-K Storage Facility closure are: trichloroethylene, 1,1,1-trichloroethane, cis-1,2-dichloroethylene, trans-1,2-dichloroethylene, toluene, tetrachloroethylene, ethyl acetate, methyl ethyl ketone, and vinyl chloride.

With the VOCs excluded, there are 14 constituents of concern at the 303-K Storage Facility. For analytical purposes, they can be divided into 3 general categories: metals, inorganic anions, and the semivolatile organic. The metals constituents of concern are the following:

- Arsenic
- Barium
- Beryllium
- Cadmium
- Chromium
- Lead
- Mercury
- Nickel
- Silver
- Uranium.

The inorganic anion constituents of concern are the following:

- Chloride ion
- Nitrate ion
- Nitrite ion.

The semivolatile organic constituent of concern is:

- Pentachlorophenol.

# 5.0 CLEANUP PERFORMANCE STANDARD

The specific cleanup performance standards to be used for the closure of the 303-K Storage Facility are identified below. The performance standards are summarized in Table 1.

## 5.1 CLEANUP PERFORMANCE STANDARDS FOR SOILS

The performance standards for the soils will follow the requirements of the Hanford Facility *Resource Conservation and Recovery Act of 1976* (RCRA) Permit, Permit Conditions II.K.2. This section references the use of parts of WAC 173-340, "Model Toxics Control Act Cleanup Regulations," to define the numerical cleanup standards for soil. Also, Permit Condition II.K.2 allows the use of soil background values in addition to the health-based values. The soil background values on the Hanford Site are defined in the *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes*, DOE/RL-92-24 (DOE 1994).

The higher of either the WAC 173-340 Method B health-based value or the Hanford Site soil background will be used as the cleanup performance standard. However, if the Method B value is a choice between a carcinogen value and a non-carcinogen value, then the lower (carcinogen) value will be compared to the Hanford site soil background.

## 5.2 CLEANUP PERFORMANCE STANDARDS FOR CONCRETE

There are no pre-defined performance standards with which to evaluate concrete. Therefore, based on the requirements of WAC 173-303-610(2)(b)(ii) and on Ecology's publication *Guidance for Clean Closure of Dangerous Waste Facilities* (Ecology 1994), the soil cleanup levels based on WAC 173-340 are used. The concrete will use the same cleanup performance standards as do the soils (i.e., the higher of either the WAC 173-340 health-based value or the Hanford site soil background).

# 6.0 CLEANUP ACTIVITIES

Cleanup activities will be limited to the interior of the 303-K Storage Facility (the north half of the 303-K Building). Cleanup activities can include, but are not limited to, removal of any loose material, sweeping, mopping, and general cleaning of the interior surfaces of the 303-K Storage Facility. The cleanup effort will concentrate on the floor and on the trenches, but may include the walls and ceiling. The material collected during the cleanup will be sampled and analyzed, as appropriate, for waste designation purposes only.

Table 1. Cleanup Levels for the 303-K Storage Facility.

| Constituent of Concern | CAS Number | **CLEAN-UP LEVEL (mg/kg)** | METHOD B[1] Carcinogen (mg/kg) | METHOD B[1] Non Carcinogen (mg/kg) | Hanford Site Background[2] (mg/kg) |
|---|---|---|---|---|---|
| Arsenic | 7440-38-2 | **9.18** | 1.67 | 60[3] | 9.18 |
| Barium | 7440-39-3 | **5600** | | 5600 | 166.3 |
| Beryllium | 7440-41-7 | **1.81** | 0.233 | 400[3] | 1.81 |
| Cadmium | 7440-43-9 | **80** | | 80 | <0.79[4] |
| Chromium | 7440-47-3 | **400** | | 400[5] | 27.32 |
| Lead | 7439-92-1 | **14.47** | n/a | n/a | 14.47 |
| Mercury | 7439-97-6 | **24** | | 24 | 1.49 |
| Nickel (as soluble salts) | 7440-02-0 | **1600** | | 1600 | 23.95 |
| Silver | 7440-22-4 | **400** | | 400 | 2.36 |
| Uranium | 7440-61-1 | **n/a** | n/a | n/a | n/a |
| Chloride ion ($Cl^-$) | n/a | **541.2** | n/a | n/a | 541.2 |
| Nitrate ion ($NO_3^-$) | 14797-55-8 | **128000** | | 128000 | 234.9 |
| Nitrite ion ($NO_2^-$) | 14797-65-0 | **8000** | | 8000 | n/a |
| Pentachlorophenol | 87-86-5 | **8.33** | 8.33 | 2400[3] | below detectable |

[1]*Model Toxics Control Act Cleanup Levels and Risk Calculation (CLARC II) Update*, Publication # 94-145, Washington Department of Ecology, January 1996. From the Method B Table.

[2]*Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes*, DOE/RL-92-24, Rev 3, DOE 1994. From page xiii, Summary Table 2, Weibull Distribution at a 95% Upper Confidence Limit.

[3]Value not used, see Section 5.0 for more information.

[4]Limit of quantitation.

[5]Value for hexavalent chromium.

n/a not applicable or not available
mg/kg milligrams per kilogram
CAS Chemical Abstract Service

# 7.0 SAMPLING ACTIVITIES

The DQO process determined that 15 sample locations would provide sufficient verification that no dangerous waste constituents of concern would be present in quantities that could be a threat to human health or the environment. Three sample locations (Figures 3 and 4) will be used for verification that the concrete inside the north half of the 303-K Building is clean. Twelve locations (Figure 5) will be used for verification that the soil at the 303-K Storage Facility is clean. The sample locations, number of samples, type of samples, and analytical methods are summarized in Tables 2 through 4.

## 7.1 GENERAL PROCEDURES

The sampling and analysis activities will be conducted in accordance with the following environmental investigations instruction (EII) procedures (WHC 1988):

- EII 1.1, Hazardous Waste Site Entry Requirements
- EII 1.5, Field Logbooks
- EII 1.13, Environmental Readiness Review
- EII 5.1, Chain of Custody
- EII 5.2, Soil and Sediment Sampling
- EII 5.4, Field Cleaning and/or Decontamination of Equipment
- EII 5.5, Laboratory Cleaning of RCRA/CERCLA Sampling Equipment
- EII 5.10, Obtaining Sample Identification Numbers and Accessing Hanford Environmental Information System Data
- EII 5.11, Sample Packaging and Shipping
- EII 14.1, Analytical Laboratory Data Management.

All samples will be placed in new, EPA-approved, pre-cleaned polyethylene or plastic sample containers. The specific sample sizes are specified on the Sample Authoriztion Form (SAF) based on the contractural arrangements with the analytical laboratory conducting the analysis. It is expected that a sample size of about 500 grams will be required. The appropriate sample preservation requirements are also specified on the SAF. The SAF will be prepared prior (normally one to several weeks) to sampling.

Each sample container will receive a unique sample number per the Hanford Environmental Information System. The appropriate (i.e., compatible) containers and lids will be used for the concrete samples. Specific container

requirements for each type of analysis are driven by the off-site laboratory performing the analysis and will be finalized prior to sampling.

## 7.2 INTERIOR SAMPLING

Interior (concrete) sampling activities are identified in Tables 2 and 3 and in Figures 3 and 4.

### 7.2.1 Interior Sampling DQO Process

The DQO process determined that the total number of interior samples required by the *303-K Storage Facility Closure Plan* was excessive. Interior samples at the 303-K Storage Facility are defined as being collected from inside the north half of the 303-K Building. Factors allowing for the reduction in sampling included the operating record, types of waste handled (i.e., containerized waste), and the presence of secondary containment.

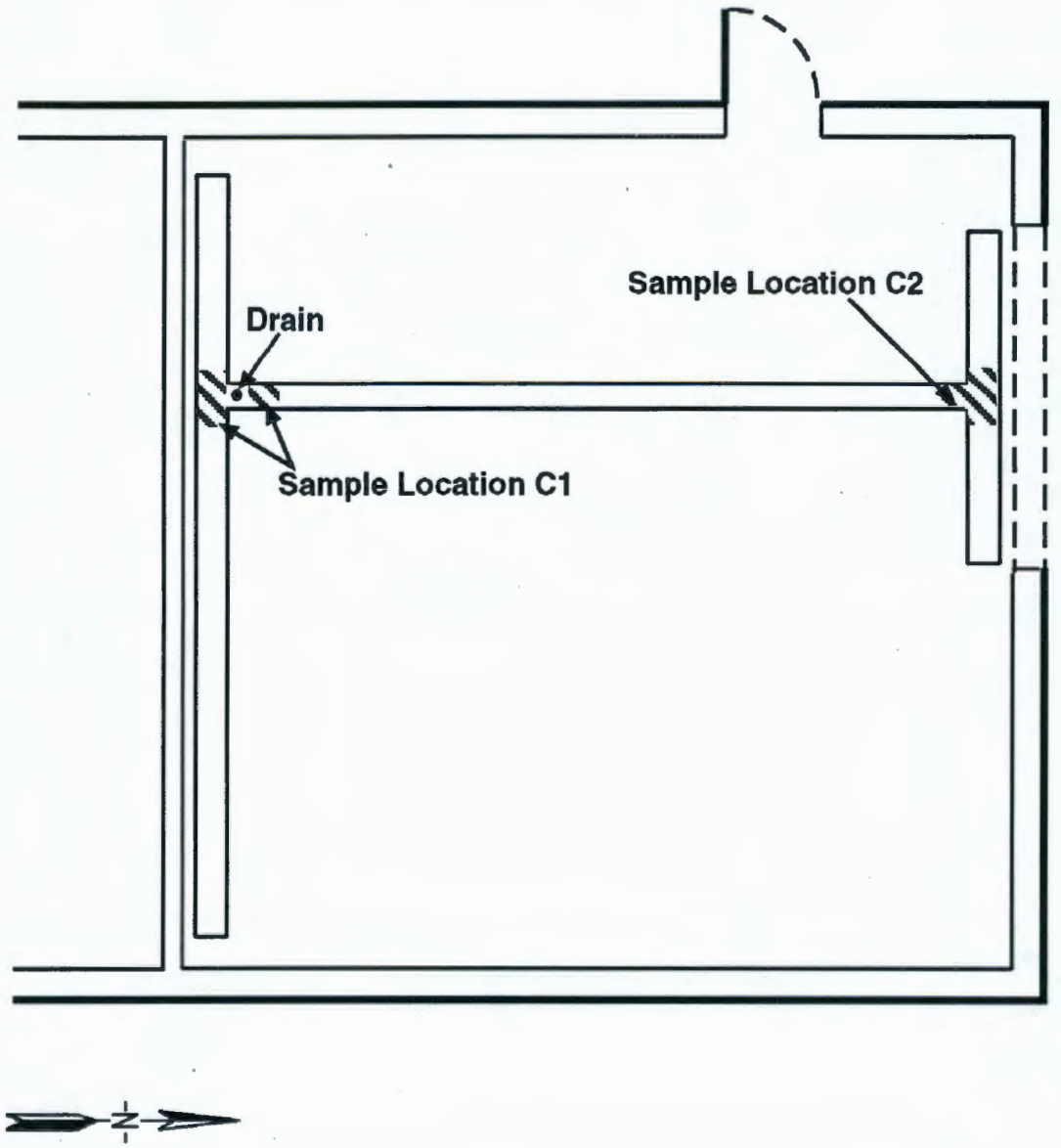
The DQO process determined that concrete samples collected from 3 interior locations are required to justify clean closure. Two of the samples will be taken from the bottom of the trench (Table 2 and Figure 3). The third sample will be collected from the concrete ceiling (Table 2 and Figure 4). Also, to provide additional protection, the DQO process identified the following Decision Rule:

> If any of the concrete samples [which are collected after the initial cleanup of the interior (Section 6.0)] shows any one of the inorganic metal constituents of concern above the performance standard, then the entire interior must be re-evaluated for appropriate levels of sampling and decontamination.

### 7.2.2 Interior Sample Collection Methodology

The concrete samples will be collected by chiseling or drilling into the concrete. Up to 6.5 millimeters (1/4-inches) of material below the surface of the concrete will be removed. The concrete material is expected to vary in size from chips less than 15 millimeters (0.59 inches) in size down to dust. A sufficient volume of material will be removed from the concrete to fill all of the sample containers. The material removed will be homogenized in a stainless steel bowl prior to filling the sample containers. Note that sample collection for field screening must occur immediately after homogenization is completed. For the sample collected from the ceiling, plastic sheets and/or bags may be used to catch the concrete and prevent it from falling onto the floor.

A powered, hand-held drill or chisel, with a tungsten carbide bit or chisel, will be used to break material from the concrete. Stainless steel cannot be used in this application since it lacks sufficient hardness for drilling or chiseling concrete. All other sampling equipment (bowls, scoops, etc.) will be made of stainless steel. All equipment will be pre-cleaned to EII 5.5 (see Section 7.1) standards.




1 Figure 3. Concrete Sampling Location (trench).

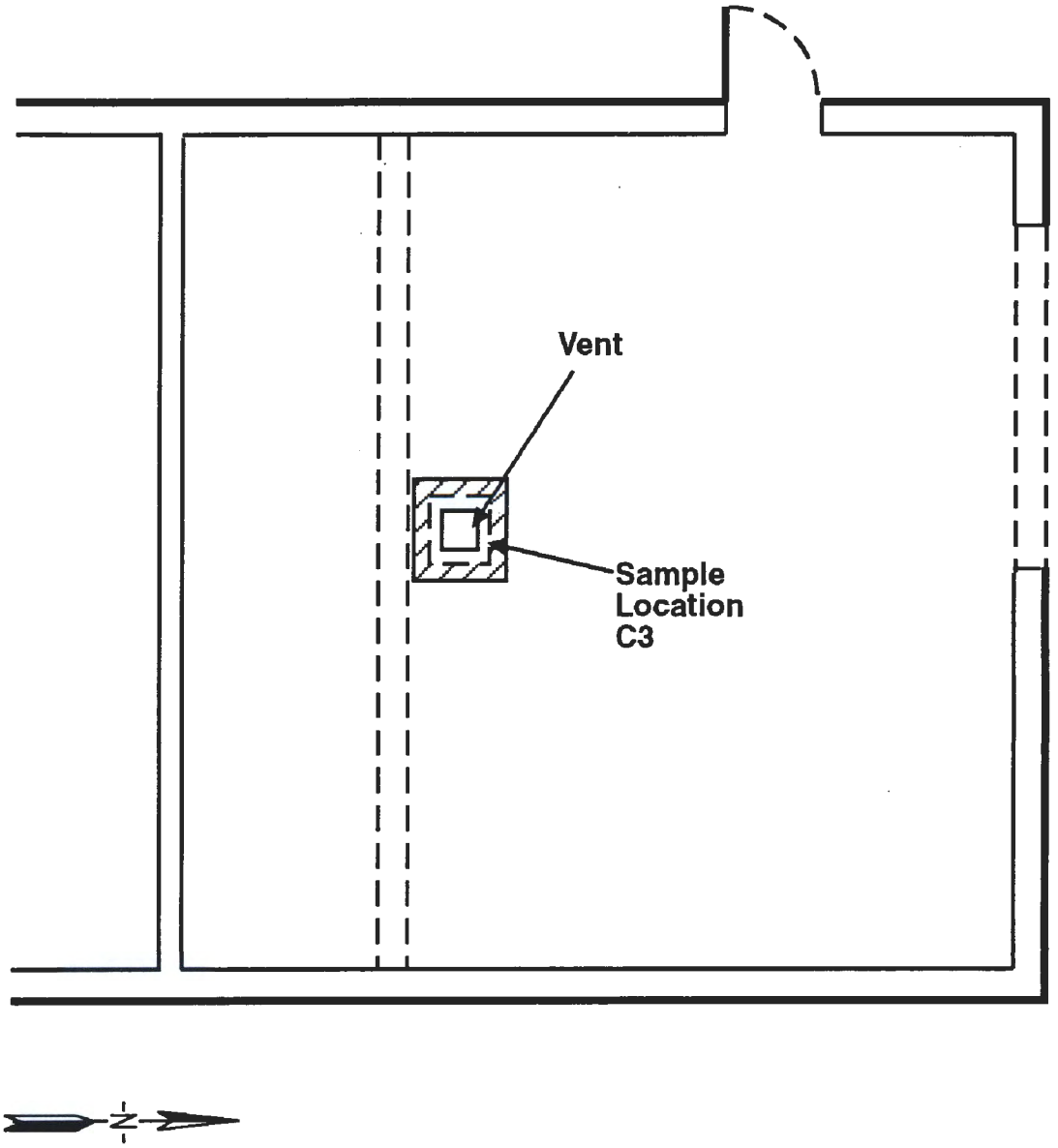
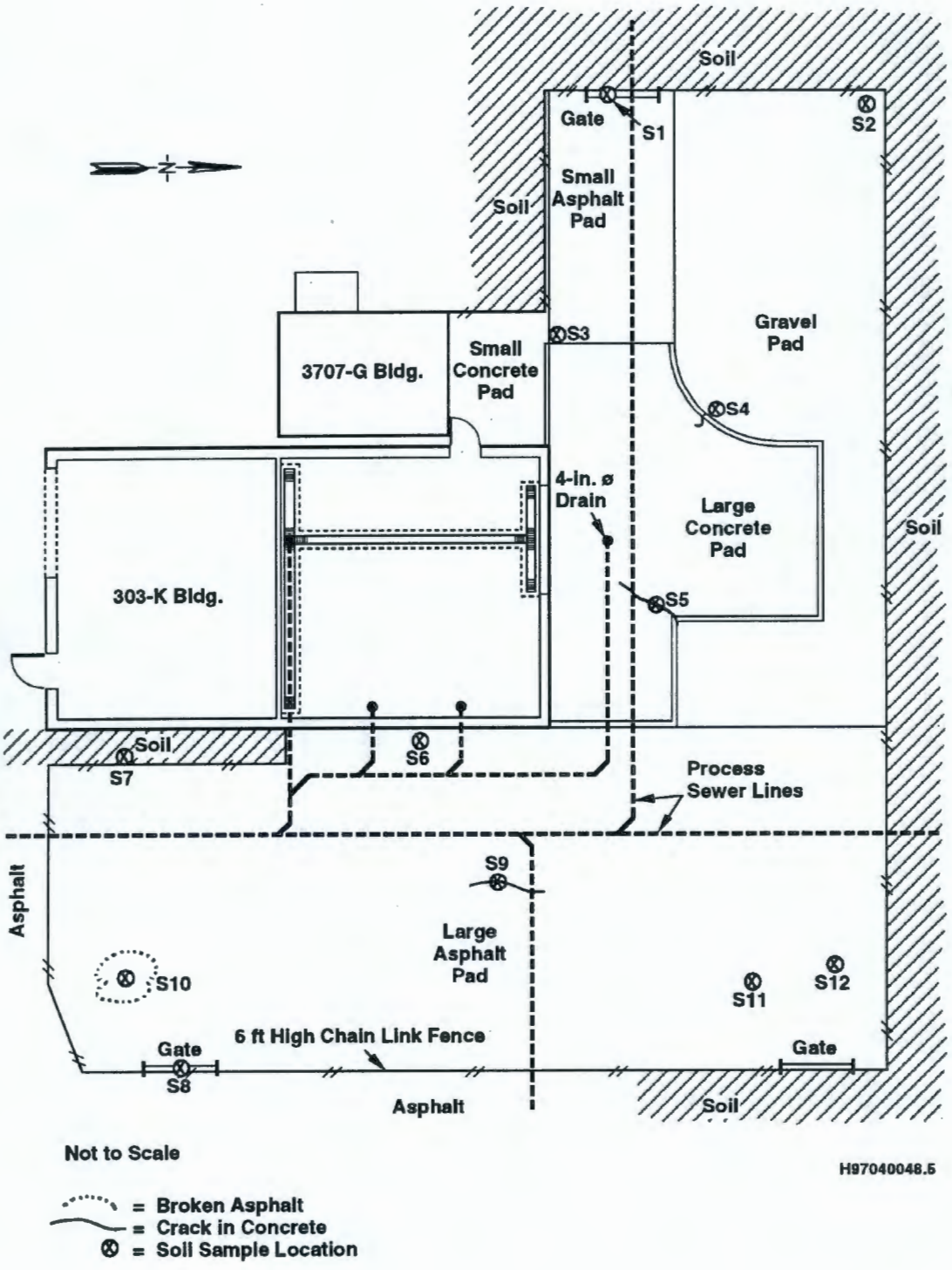



Figure 4. Concrete Sampling Location (ceiling).




1 Figure 5. Soil Sampling Locations.

Table 2. Sampling Locations.

| Sample Types | Sample Location | Description of the Sample Location |
|---|---|---|
| CONCRETE SAMPLES | C1 | South Trench Junction Near Drain |
| | C2 | North Trench Junction |
| | C3 | Ceiling Near Vent |
| SOIL SAMPLES | S1 | Center of west gate at the end of the Small Asphalt Pad |
| | S2 | North-west corner of the Gravel Pad, about 1 meter from each fence line |
| | S3 | North-west corner of the Small Asphalt Pad, about 0.3 meters from each edge |
| | S4 | On the Gravel Pad, adjacent to the large crack on the north-west curved berm of the Large Concrete Pad |
| | S5 | On the crack in the Large Concrete pad, north-east of the drain |
| | S6 | On the Large Asphalt Pad, adjacent to the 303-K Building and between the sink and wash-basin drains |
| | S7 | In the soil between the south-west edge of the Large Asphalt Pad and the south-half of the 303-K Building, with the sample location adjacent to the Large concrete pad and about 2 meters north of the south-west corner of the Large Asphalt Pad. |
| | S8 | On the edge of the Large Asphalt Pad and in the center of the south-east gate. |
| | S9 | On the Large Asphalt Pad, on a crack in the approximate center of the pad |
| | S10 | In the south-east quadrant of the Large Asphalt Pad and on the area of deteriorating asphalt |
| | S11 | In the north east quadrant of the Large Asphalt Pad, about 1 meter in from the north fence and about 5 meters in from the east fence. |
| | S12 | In the north east quadrant of the Large Asphalt Pad, about 3 meters in from the north fence and about 5 meters in from the east fence. |

Table 3. Sampling and Analysis Summary for Interior Samples.

| Sample Location | Matrix | Inorganic Metals Analysis | | Inorganic Anions Analysis[c] | Semivolatile Organic Field Screening[d] |
|---|---|---|---|---|---|
| | | SW-846 Methods[a] | LKPA[b] | | |
| C1 | Concrete | Yes | Yes | Yes | Yes |
| C2 | Concrete | Yes | Yes | Yes | No |
| C2 (duplicate) | Concrete | Yes | Yes | Yes | No |
| C3 | Concrete | Yes | Yes | Yes | No |
| Concrete Sampling Equipment Blank[e] | Deionized Water | Yes | No | No | No |

a - SW-846 Methods: 6010, 7421, 7761, 7060, and 7471
b - LKPA = Laser Kinetic Phosphorimetric Analysis
c - Inorganic Anions analysis includes U.S. Environmental Protection Method 300.0
d - Semivolatile Organic Analysis (for pentachlorophenol) by SW-846 Method 4010
e - 1 equipment blank per day of concrete sampling

Table 4. Sampling and Analysis Summary for Exterior Samples.

| Sample Location | Matrix | Sample Interval | | Inorganic Metals Analysis | | Semivolatile Organic Field Screening[c] |
|---|---|---|---|---|---|---|
| | | First (upper) Interval | Second (lower) Interval | SW-846 Methods[a] | LKPA[b] | |
| S1 | Soil | Yes | No | Yes | Yes | Yes |
| S2 | Soil | Yes | No | Yes | Yes | Yes |
| S3 | Soil | Yes | No | Yes | Yes | Yes |
| S4 | Soil | Yes | No | Yes | Yes | Yes |
| S5 | Soil | Yes | No | Yes | Yes | Yes |
| S6 | Soil | Yes | No | Yes | Yes | Yes |
| S6 (duplicate) | Soil | Yes | No | Yes | Yes | Yes |
| S7 | Soil | Yes | No | Yes | Yes | Yes |
| S8 | Soil | Yes | No | Yes | Yes | Yes |
| S8 (duplicate) | Soil | Yes | No | Yes | Yes | Yes |
| S9 | Soil | Yes | No | Yes | Yes | Yes |
| S10 | Soil | Yes | Yes | Yes | Yes | Yes |
| S11 | Soil | Yes | Yes | Yes | Yes | Yes |
| S11 (duplicate) | Soil | No | Yes | Yes | Yes | Yes |
| S12 | Soil | Yes | Yes | Yes | Yes | Yes |
| Soil Sampling Equipment Blank[d] | Deionized Water | n/a | n/a | Yes | No | No |

a - SW-846 Methods: 6010, 7421, 7761, 7060, and 7471
b - LKPA = Laser Kinetic Phosphorimetric Analysis
c - Semivolatile Organic Analysis (for pentachlorophenol) by SW-846 Method 4010
d - 1 equipment blank per day of soil sampling

## 7.3 EXTERIOR SAMPLING

Exterior (soil) sampling activities are identified in Tables 2 and 4 in and in Figure 5.

### 7.3.1 Exterior Sampling DQO Process

The DQO process determined that sampling the exterior concrete pads and asphalt pads was not needed to clean close the 303-K Storage Facility. Factors affecting this determination include: the exterior concrete and asphalt storage pads of the 303-K Storage Facility stored only containerized waste, and the operating record shows that no spills or leaks of dangerous waste occurred at this unit. Also, if an unknown spill or release had occurred, the spilled material is most likely to have been gradually washed off the pad by rain and snow-melt. Therefore, the DQO process determined that the soil is the most likely location to find evidence of an unknown spill, not the pads themselves.

With the exterior pads being excluded, the DQO process realigned the exterior sampling to focus on the soil and on potential pathways to the soil. Potential pathways identified during the DQO process include the edges of the pads, pad joints, and cracks in the pads. The proposed soil sampling, based on potential pathways, allows for the verification that no dangerous waste constituents of concern are present without sampling the concrete and asphalt storage pads.

The DQO process determined that soil samples collected from 12 exterior locations are required to justify clean closure. The locations are shown in Table 2 and in Figure 5. Also, to provide additional protection, the DQO process identified the following Decision Rule:

> If the analysis for the constituents of concern provides data indicating that any one constituent is present above the performance standard (Section 5.0), then the appropriate level of sampling must be re-evaluated for the soil.

### 7.3.2 Soil Sample Collection Methodology

The soil samples will be collected from a volume of soil that is approximately cylindrical in shape. The dimensions of the nominal cylindrical volume are 75 millimeters to 120 millimeters (2.9-inches to 4.7-inches) in diameter. The top of this volume is defined as either the surface of the soil or, if covered by an asphalt or concrete pad, the bottom of the pad. The concrete or asphalt pads exist over some soil sample locations. At these locations, the pad will be penetrated to access the soil using a core drill or a pick.

Within the volume of soil, the first 25 to 50 millimeters (1 to 2-inches) will be removed and discarded. Note that the volume discarded may vary depending upon the conditions found during sampling. Below this discarded material, the first (upper) and the second (lower) sample intervals are each

150 millimeters (6-inches) deep (Figure 6). For soil sample locations S1 through S9, samples will be collected from the first interval only. For soil sample locations S10, S11, and S12, samples will be collected from both the first (upper) and second (lower) sample intervals.

Sufficient soil will be collected from each sample interval to fill the sample containers. If needed, additional material can be collected either by making a new auger hole adjacent to the original or by removing material from the sides of the original auger hole. The material from each sample interval will be homogenized prior to field screening or filling the sample container. Small rocks will be removed prior to homogenizing the samples. Note that sample collection for field screening must occur immediately after homogenization is completed. See Section 8.0 for additional information on field screening. During filling of the sample container, rocks and pebbles will be excluded as much as practical.

The samples will be collected using a stainless steel hand auger (about 75 millimeters to 120 millimeters [2.9 inches to 4.7 inches]) in diameter. Because of the high likelihood that large (greater than 25 millimeters [1 inch] in any one dimension) rocks will be present, a stainless steel shovel and/or stainless steel scoops may be used to ensure sufficient soil material is collected. All other equipment (bowls, etc.) will be made from stainless steel. All equipment will be pre-cleaned to EII 5.5 (see Section 7.1) standards.

### 7.4 SUPPORT FOR ECOLOGY DURING SAMPLING

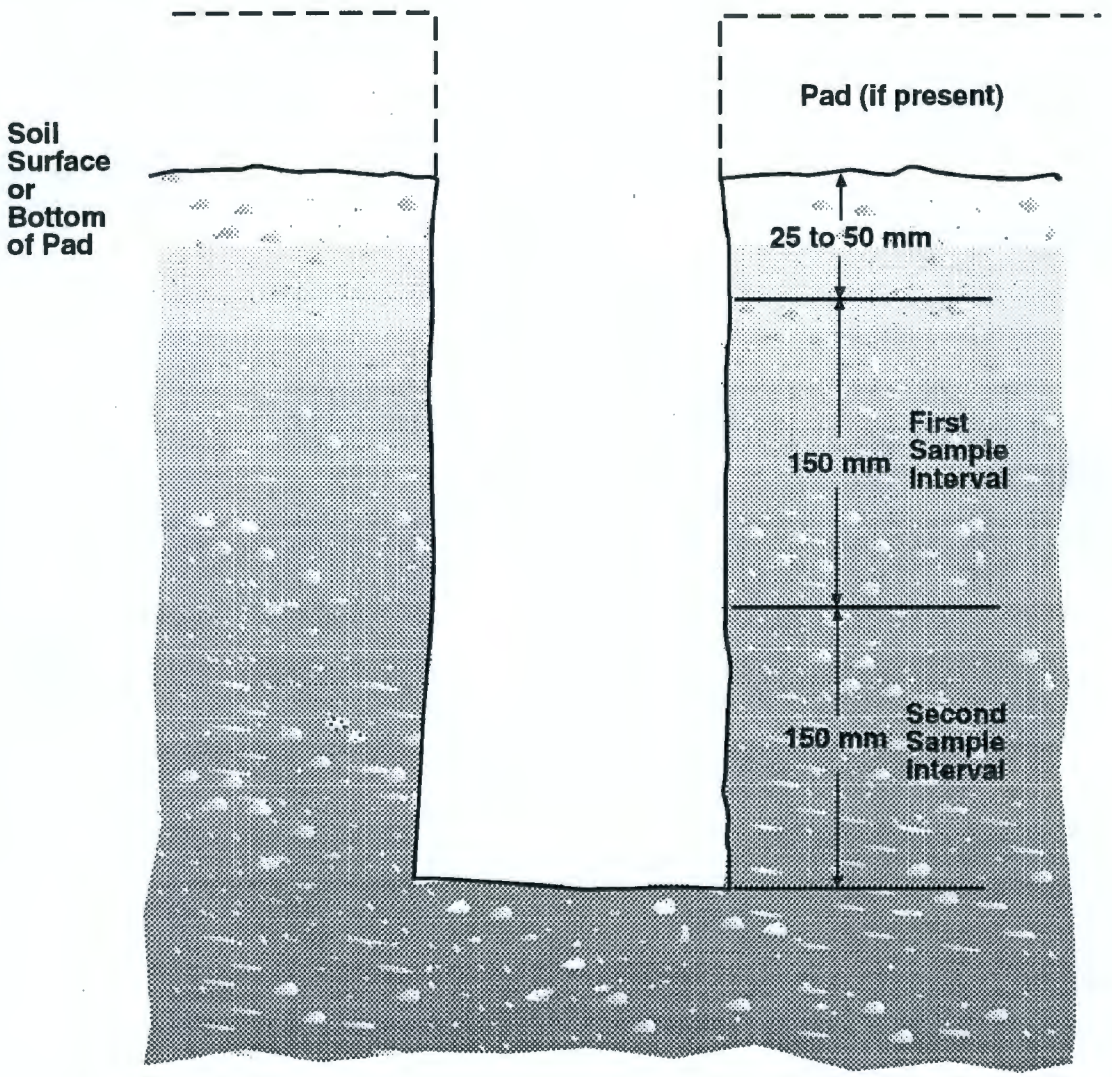
Ecology will be notified 5 days prior to any sampling events. Split samples of concrete and soil may be collected, if requested, for Ecology. If split samples for Ecology are collected as part of this sampling effort, then the requirements in Section 7.2 and Section 7.3 will be followed. Support for the Ecology split samples can include some or all of the following: sample collection, management and handling of the Ecology samples between the time they are collected until they are released for shipment off-site, and maintaining the chain-of-custody. The data generated by the split samples is intended for Ecology's use only and will not be used by the DOE, or its contractors or subcontractors.

## 8.0 FIELD SCREENING FOR PENTACHLOROPHENOL

Field screening activities are identified in Tables 3 and 4.

### 8.1 FIELD SCREENING DATA QUALITY OBJECTIVES PROCESS

The single semivolatile organic constituent of concern at the 303-K Storage Facility is pentachlorophenol. The DQO process determined that field screening using SW-846 Method 4010 "Screening for Pentachlorophenol by Immunoassay," would be sufficient to determine if pentachlorophenol was




1 Figure 6. Soil Sampling Methodology.

present. If pentachlorophenol was found to be present by the field screening, then a sample would be collected for semivolatile organics analysis using SW-846 Method 8270 "Semivolatile Organic Compounds by Gas Chromatograph/Mass Spectroscopy: Capillary Column Technique" at an offsite laboratory.

### 8.2 FIELD SCREENING PROCEDURE

The field screening kit must meet the requirements of SW-846 Method 4010 "Screening for Pentachlorophenol by Immunoassay." Any relevant information on the field screening kit will be included in the field logbook. This may include kit manufacture, lot number of the kit, and the expiration date of the kit. The field screening will be performed on the soil from all twelve soil sample locations, including both sample intervals at sample locations S10, S11, and S12 (Figure 5 and Table 4). Field screening on the concrete from sample location C1 (Figure 3 and Table 3). Sample collection will be performed as specified in Section 7.2.2 and Section 7.3.2, for concrete and soil, respectively. The results will be recorded in the sampler's logbook. If a result of the field screening is positive, then a sample for semivolatile organics analysis will be collected from that sample location. Collection of the samples for semivolatile organic analysis will follow the requirements of Section 7.3.2.

## 9.0 QUALITY CONTROL SAMPLES

Two types of quality control samples will be collected: duplicate samples and equipment blanks. The DQO process determined that any other quality control samples are not required. The duplicate samples and equipment blanks are included on the sampling summaries in Tables 3 and 4.

### 9.1 DUPLICATE SAMPLES

The purpose of the duplicate samples is to indicate the precision of sampling and analysis. The duplicate soil samples will be collected for both field screening and for laboratory analysis. The duplicate concrete sample will be collected only for laboratory analysis. Duplicate samples will be collected from a location immediately adjacent to the original sample. The collection methods or techniques and the analysis are the same as a regular sample. The locations for collecting the duplicate samples are as follows:

- The concrete duplicate sample will be collected from the concrete sampling location C2, which is at the north trench junction (Section 7.2, Table 3, and Figure 3).

- The soil duplicate samples will be collected at 3 of the soil sampling locations: S6, S8, and from the second sample interval of sample location S11 (Section 7.3, Table 4, and Figure 5).

All field screening quality control data will be recorded in the field logbook.

### 9.2 EQUIPMENT BLANKS

The purpose of the equipment blanks is to verify that sampling devices are not contributing contamination to the samples. At the site, the deionized water is poured over or through the sample collection device, collected, and returned for analysis. The analysis will be limited to the metals, except that uranium will be excluded (Tables 3 and 4). The requirements for collecting the equipment blanks are as follows:

- One equipment blank will be collected for each day of concrete sampling. The sampling device to be used will be the drill or chisel.
- One equipment blank will be collected for each day of soil sampling. The sampling device (auger, shovel, etc.) used will be chosen in the field on a subjective basis by the sampling team leader at the time of sampling.

### 9.3 FIELD SCREENING DETECTION LIMIT VERIFICATION

The detection limit for the immunoassay field screening kit will be verified in the field. The detection limit verification will be conducted in accordance with the kit manufacture's instructions.

## 10.0 LABORATORY ANALYSIS

Laboratory analysis will be performed to determine the concentration of the constituents of concern in the soil and concrete samples that are collected from the 303-K Storage Facility. The SW-846 analytical methods (EPA 1986) will be used for the sample analysis whenever possible. The uranium analysis will be conducted using Laser Kinetic Phosphorimetric Analysis. The inorganic anion analysis will be conducted using the U.S. Environmental Protection Agency (EPA) Method 300.0 (EPA 1989). The EPA Method 300.0 is the same as SW-846 Method 9056 "Determination of Inorganic Anions by Ion Chromatography." The analytical methods and relevant constituents of concern are presented in Table 5. The relevant analysis for the different sample types and matrixes is summarized in Tables 3 and 4. The semivolatile organic analytical method (Method 8270) will be used only if the field screened samples test positive for pentachlorophenol.

Concrete and soil samples for metals analysis will be prepared using Method 3050A, "Acid Digestion of Sediments, Sludges, and Soils." Concrete and soil samples for semi-volatiles analysis (if required) will use one of three methods: Method 3540, "Soxhlet Extraction;" Method 3541, "Automated Soxhlet Extraction;" or Method 3550A, "Ultrasonic Extraction." If these methods are not availiable at the laboratory, then an equivilant method may be used.

Table 5. Analytical Methods and Constituents of Concern.

| Analytical Method[a] | | Constituents of Concern |
|---|---|---|
| Method 6010 | Inductively Coupled Plasma-Atomic Emission Spectroscopy (EPA 1986) | barium<br>beryllium<br>cadmium<br>chromium<br>nickel |
| Method 7060A | Atomic Absorption, Furnace Technique (EPA 1986) | arsenic |
| Method 7421 | Atomic Absorption, Furnace Technique (EPA 1986) | lead |
| Method 7471A | Manual Cold-Vapor Technique (EPA 1986) | mercury |
| Method 7761 | Atomic Absorption, Furnace Technique (EPA 1986) | silver |
| LKPA | Laser Kinetic Phosphorimetric Analysis | uranium |
| Method 300.0 | Determination of Inorganic Anions by Ion Chromatograph (EPA 1989) | chloride ion<br>nitrate ion<br>nitrite ion |
| Method 4010 | Screening for Pentachlorophenol by Immunoassay (EPA 1986) | pentachlorophenol |
| Method 8270 | Semivolatile Organic Compounds by Gas Chromatograph/Mass Spectroscopy: Capillary Column Technique (EPA 1986) | pentachlorophenol |

LKPA = Laser Kinetic Phosphorimetric Analysis

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

EPA, 1989, The Determination of Inorganic Anions in Water by Ion Chromatography - Method 300.0, U.S. Environmental Protection Agency, Washington, D.C.

[a] Method detection limits for each constituent can be found in Appendix A (Attachment 4, page 8 of 10.

## 11.0 DATA VALIDATION

Data validation will be conducted to Level D as defined in the *Data Validation Procedures For Radiological Analysis* (WHC 1993a) and *Data Validation Procedures For Chemical Analyses* (WHC 1993b), as appropriate. Level D validation consists of the following:

- verification of required deliverables
- verification of requested versus reported analyses
- verification of lack transcription errors
- evaluation and qualification of results based on analytical holding times
- matrix spikes
- laboratory control samples (radiological samples only)
- laboratory duplicates
- analytical method blanks
- chemical recoveries
- tracer recoveries
- surrogate recoveries
- initial and continuing instrument calibrations
- quench monitoring
- counting instrument resolution checks
- calculation checks.

There will be 100 percent validation of the data because of the small size of the sample set and because similar types of samples can be batch analyzed at the analytical laboratory.

## 12.0 REFERENCES

DOE-RL, Ecology, FDH, BWHC, RFSH, 1997, "Summary of Agreements Reached at the 303-K DQO Meetings," dated May 1, 1997, U.S Department of Energy, Washington State Department of Ecology, Fluor Daniel Hanford, Inc., B&W Hanford Company, Rust Federal Services Hanford, Richland, Washington.

DOE-RL, 1995a, *303-K Storage Facility Closure Plan*, DOE/RL-90-04 Rev. 2A, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 1995b, *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.

Ecology, 1994, *Guidance for Clean Closure of Dangerous Waste Facilities*, Publication #94-111, Washington State Department of Ecology, Olympia, Washington.

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

EPA, 1989, *The Determination of Inorganic Anions in Water by Ion Chromatography - Method 300.0*, U.S. Environmental Protection Agency, Washington, D.C.

WAC 173-303, "The Dangerous Waste Regulations," *Washington Administrative Code*, as amended.

WAC 173-340, "The Model Toxics Control Act Cleanup Regulations," *Washington Administrative Code*, as amended.

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

WHC, 1993a, *Data Validation Procedures For Radiological Analysis*, WHC-SD-EN-SPA-001, Westinghouse Hanford Company, Richland, Washington.

WHC, 1993b, *Data Validation Procedures For Chemical Analysis*, WHC-SD-EN-SPA-002, Westinghouse Hanford Company, Richland, Washington.

# APPENDIX A

## SUMMARY OF AGREEMENTS REACHED AT THE 303-K DQO MEETINGS

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## SUMMARY OF AGREEMENTS

These agreements were developed as part of the Data Quality Objectives (DQO) Process for closure of the 303-K Storage Facility. These agreements were developed during the DQO Meetings held on November 15, 1996; January 15, 1997; February 12, 1997; February 27, 1997; April 1, 1997; April 10, 1997; and April 22, 1997.

### DANGEROUS WASTE DECONTAMINATION OF THE 303-K BUILDING

- Limited to the inside of the north half of the 303-K Building.
- Sweep and clean-up inside of the north half of the 303-K Building, specifically the trench and floor.
- Material to be sampled for the designation/disposal, but will include the 303-K constituents of concern.
- No other dangerous waste decontamination to be performed inside the 303-K Building

### CONSTITUENTS OF CONCERN

- Closure Plan Table 7-1 accepted (see attachment 1)
- The misspellings of organics on Table 7-1 are corrected below
  1,1-Dichloroethylene
  cis-1,2-Dichloroethylene
  trans-1,2-Dichloroethylene
  Tetrachloroethylene

### SAMPLING INSIDE THE NORTH HALF OF THE 303-K BUILDING

- 3 concrete sample locations:
  * 1 from the south trench junction (near the drain) inside the building, plus 1 split sample for Ecology
  * 1 from the north trench junction, plus one duplicate sample
  * 1 from the ceiling, near the vent, within the smoke stained area, plus 1 split sample for Ecology
- Use a Hilte drill
- Analyze for inorganic metals and inorganic anions
- Replace pentachlorophenol analysis by field screening at the south trench junction sample locations (near the drain). If field screen is positive, then collect soil sample for analysis for semi-volatile organics.
- To depth of 1/4 inch
- Decision rule: if any of these samples are positive (ie, above the performance standards) for the constituents of concern, then the entire interior surface must be considered to be contaminated with dangerous waste and re-evaluated to determine what is needed to achieve closure.

## SUMMARY OF AGREEMENTS REACHED AT THE 303-K DQO MEETINGS

SOIL SAMPLING:

- 12 Sampling locations as marked (attachment 2).
- Duplicate samples to be collected from sample locations S6 (first interval), S8 (first interval), and S11 (lower interval only) (attachment 2).
- Soil Sampling Method: From either the soil surface or from the bottom of the concrete or asphalt pad, remove the first 25 cm to 50 cm. The first sample interval is 150 cm. The second sample interval (where applicable) is 150 cm below. See attachment 3.
- Collect samples from first sample interval: S1 to S9
- Collect samples from first and second interval: S10 to S12
- Analyze for inorganics.
- Conduct field screening for pentachlorophenol at all soil sample locations. If filed screen is positive, then collect soil sample for analysis for semi-volatile organics.

SAMPLING QA/QC: COLLECTION METHODS FOR DUPLICATES

- From location immediately adjacent to the original sample.

SAMPLING QA/QC: TRIP BLANKS

- No trip blanks required since there are no volatile organic samples

SAMPLING QA/QC: PENTACHLOROPHENOL FIELD SCREENING

- Same 3 locations as for soils
- Field verify detection limit

SAMPLING QA/QC: EQUIPMENT BLANKS

- 1 per day of concrete sample
- 1 per day of soil sampling
- Both to use de-ionized water
- Analyze for metals (except uranium), and for pentachlorophenol
- Will not analyze for anions

SAMPLING QA/QC: SPLITS

- Ecology to obtain split samples at their discretion

## SUMMARY OF AGREEMENTS REACHED AT THE 303-K DQO MEETINGS

### ANALYTICAL METHODS

- SW-846 Methods, inorganic metals
  - * Method 6010A for Barium, Beryllium, Cadmium, Chromium, Nickel
  - * Method 7060A for Arsenic
  - * Method 7421 for Lead
  - * Method 7471A for Mercury
  - * Method 7761 for Silver
- SW-846 Method, semivolatile organics
  - * Method 8270 for Pentachlorophenol
- EPA Method, anions
  - * Method 300.0, Determination of Inorganic Anions by Ion Chromatograph for nitrate, nitrite, and chloride ions.
- Other methods
  - * Laser Kinetic Phosphorimetric Analysis (LKPA) for Uranium
  - * Immunoassay kit: field screening for Pentachlorophenol
- Method Detection Limits (MDLs) as listed on attachment 4

### DATA VALIDATION

- Validate to Level D (per *Data Validation Procedures For Chemical Analyses*, WHC-SD-EN-SPA-002) consisting of:
  - * verification of required deliverables
  - * verification of requested versus reported analyses
  - * verification of transcription errors
  - * evaluation and qualification of results based on analytical holding times
  - * matrix spikes
  - * laboratory control samples (radiological samples only)
  - * laboratory duplicates
  - * analytical method blanks
  - * chemical recoveries
  - * tracer recoveries
  - * surrogate recoveries
  - * initial and continuing instrument calibrations
  - * quench monitoring
  - * counting instrument resolution checks
  - * calculation checks.
- 100 percent validation of the data
- Provide Ecology with a validated data Package
- Raw data to Ecology

## SUMMARY OF AGREEMENTS REACHED AT THE 303-K DQO MEETINGS

### CLEAN-UP LEVELS/PERFORMANCE STANDARD

- Higher of MTCA Method B or Sitewide Background (attachment 5)

### SUBMIT A SAMPLING AND ANALYSIS PLAN

- Includes justifications
- Includes decontamination/clean-up
- Includes sampling/analysis plan

SUMMARY OF AGREEMENTS REACHED AT THE 303-K DQO MEETINGS

Attachment 1

DOE/RL-90-04, Rev. 2A
06/22/95

Table 7-1*. Potential Compliance Constituents, Analytical Methods, and Action Levels for the 303-K Storage Facility.

| Constituent | Analytical Method | | | Initial Action Levels | | |
|---|---|---|---|---|---|---|
| | Soil | Concrete*,a | Asphalt*,a | Soil | Concrete | Asphalt |
| Arsenic | SW-846, 7060 | SW-846, 7060 | SW-846, 7060 | >SVB | LOQ | LOQ |
| Barium | SW-846, 6010 | SW-846, 6010 | SW-846, 6010 | >SVB | LOQ | LOQ |
| Beryllium | SW-846, 6010 | SW-846, 6010 | SW-846, 6010 | >SVB | LOQ | LOQ |
| Cadmium | SW-846, 6010 | SW-846, 6010 | SW-846, 6010 | >SVB | LOQ | LOQ |
| Chloride | SW-846, 9056 | SW-846, 9056 | SW-846, 9056 | >SVB | LOQ | LOQ |
| Chromium | SW-846, 6010 | SW-846, 6010 | SW-846, 6010 | >SVB | LOQ | LOQ |
| Lead | SW-846, 7421 | SW-846, 7421 | SW-846, 7421 | >SVB | LOQ | LOQ |
| Mercury | SW-846, 7471 | SW-846, 7471 | SW-846, 7471 | >SVB | LOQ | LOQ |
| Nickel | SW-846, 6010 | SW-846, 6010 | SW-846, 6010 | >SVB | LOQ | LOQ |
| Nitrate | SW-846, 9056 | SW-846, 9056 | SW-846, 9056 | >SVB | - | - |
| Nitrite | SW-846, 9056 | SW-846, 9056 | SW-846, 9056 | >SVB | - | - |
| Silver | SW-846, 7761 | SW-846, 7761 | SW-846, 7761 | >SVB | LOQ | LOQ |
| Uranium | LKPA | LKPA | LKPA | n/a | n/a | n/a |
| Trichloroethylene | SW-846, 8021 or 8240 | SW-846, 8021 or 8240 | SW-846, 8021 or 8240 | >SVB | LOQ | LOQ |
| 1,1,1-Trichloroethane | SW-846, 8021 or 8240 | SW-846, 8021 or 8240 | SW-846, 8021 or 8240 | >SVB | LOQ | LOQ |
| 1,1-Dichloroethane | SW-846, 8021 or 8240 | SW-846, 8021 or 8240 | SW-846, 8021 or 8240 | >SVB | LOQ | LOQ |
| cis-1,2-Dichloroethane | SW-846, 8021 | SW-846, 8021 | SW-846, 8021 | >SVB | LOQ | LOQ |
| trans-1,2-Dichloroethane | SW-846, 8021 | SW-846, 8021 | SW-846, 8021 | >SVB | LOQ | LOQ |
| Toluene | SW-846, 8021 or 8240 | SW-846, 8021 or 8240 | SW-846, 8021 or 8240 | >SVB | LOQ | LOQ |
| Tetrachloroethane (Perchloroethane) | SW-846, 8021 or 8240 | SW-846, 8021 or 8240 | SW-846, 8021 or 8240 | >SVB | LOQ | LOQ |
| Ethyl Acetate | TIC SW-846, 8240 | TIC SW-846, 8240 | TIC SW-846, 8240 | >SVB | n/a | n/a |
| Methyl Ethyl Ketone | SW-846, 8240 | SW-846, 8240 | SW-846, 8240 | >SVB | LOQ | LOQ |
| Pentachlorophenol | SW-846, 8250 | SW-846, 8250 | SW-846, 8250 | >SVB | LOQ | LOQ |
| Vinyl Chloride | SW-846, 8021 or 8240 | SW-846, 8021 or 8240 | SW-846, 8021 or 8240 | >SVB | LOQ | LOQ |

SW-846 = EPA, 1986, Test Methods for Evaluating Solid Waste - Physical/Chemical Methods, SW-846, U. S. Environmental Protection Agency, Washington, DC. NOTE: Each 4 digit number identifies a specific SW-846 method.
LKPA = Laser Kinetic Phosphorimetric Analysis
n/a = not applicable
TIC = Analyzed as Tentatively Identified Compound from SW-846 Methods 8240.
LOQ = Limit of quantitation
>SVB = greater than the Hanford site-wide soil background threshold

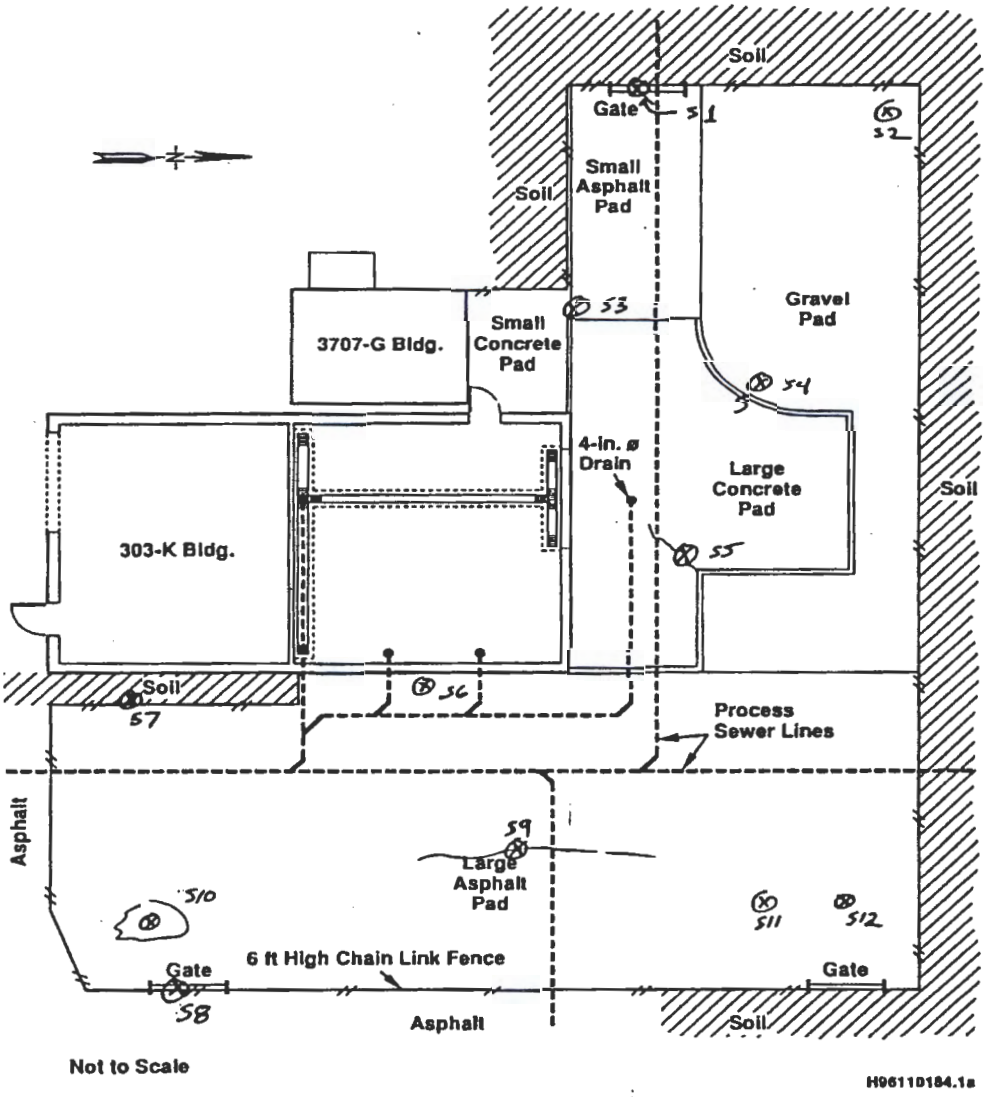
* Inorganic analysis uses extraction by concrete inorganic analysis methodology, see Section 7.2.9.1.

* If required, organic analysis uses extraction by concrete organic analysis methodology, see Section 7.2.9.2.

* This is a complete rewrite, revision bars are not used.

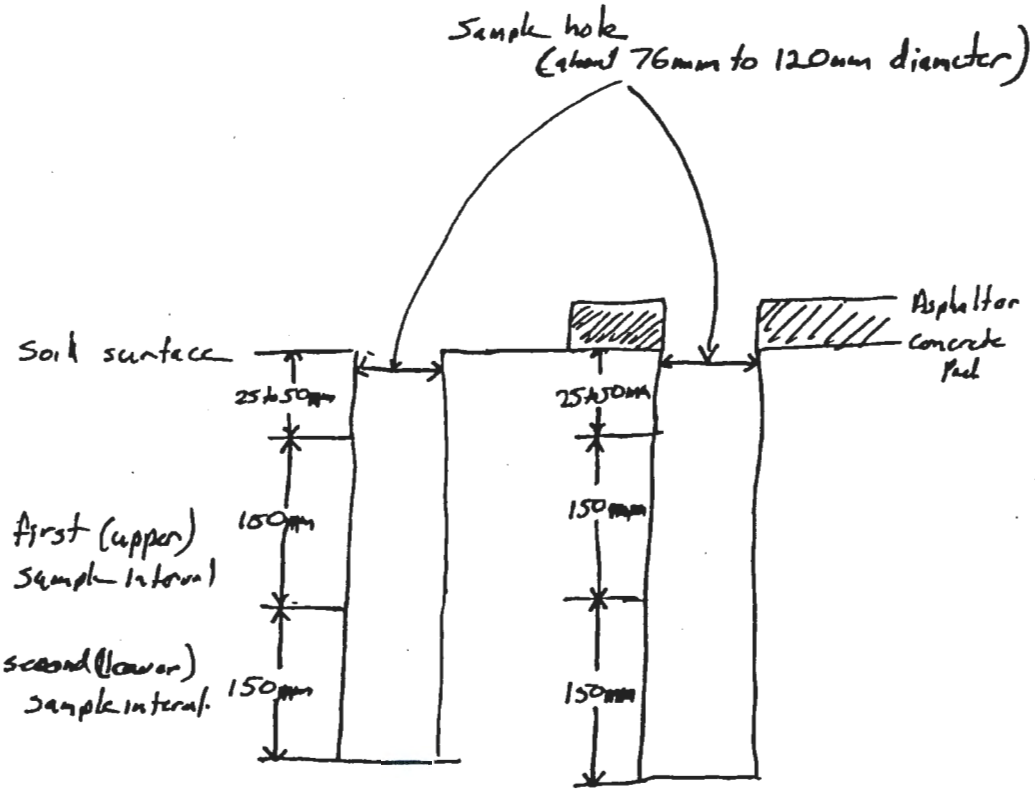
**SUMMARY OF AGREEMENTS REACHED AT THE 303-K DQO MEETINGS**

Attachment 2



**SUMMARY OF AGREEMENTS REACHED AT THE 303-K DQO MEETINGS**

Attachment 3



**SUMMARY OF AGREEMENTS REACHED AT THE 303-K DQO MEETINGS**

Attachment 4

Author: Jason G. Adler at ~WHC302
Date: 1/20/97 1:17 PM
Priority: Normal
Receipt Requested
Subject: 303-K CleanupConstituent MDL
---------- Message Contents ----------

Jerry,

As requested at the 1/15/97 303-K DQO meeting:

Listed below are the most current published soil MDL's for the contract labs. These were published in August of 1996 and are subject to change as new MDL studies are performed. The MDL's will vary between labs and with change in matrix.

| | | |
|---|---|---|
| Arsenic by | 7060 | 0.10 mg/Kg |
| Barium by | 6010 | 0.05 mg/Kg |
| Beryllium by | 6010 | 0.02 mg/Kg |
| Cadmium by | 6010 | 0.22 mg/Kg |
| Chromium by | 6010 | 0.35 mg/Kg |
| Lead by | 7421 | 0.14 mg/Kg |
| Mercury by | 7471 | 0.05 mg/Kg |
| Nickel by | 6010 | 1.00 mg/Kg |
| Silver by | 7761 | 0.63 mg/Kg |
| Uranium by | LKPA | not listed |
| Chloride ion by | 300.0 | 0.20 mg/Kg |
| Nitrate ion by | 300.0 | 0.04 mg/Kg |
| Nitrite ion by | 300.0 | 0.02 mg/Kg |
| Pentachlorophenol by | 8270 | 44.2 ug/Kg |

If you have any questions, please call me at 376-7513.

Jason

Attachment 5: PROPOSED CLEANUP LEVELS FOR THE 303-K STORAGE FACILITY

| Constituent of Concern | CAS Number | CLEAN-UP LEVEL (mg/kg) | METHOD B[1] Carcinogen (mg/kg) | METHOD B[1] Non Carcinogen (mg/kg) | Sitewide Background[2] (mg/kg) |
|---|---|---|---|---|---|
| Arsenic | 7440-38-2 | 9.18 | 1.67 | ~~60~~ | 9.18 |
| Barium | 7440-39-3 | 5600 | | 5600 | 166.3 |
| Beryllium | 7440-41-7 | 1.81 | 0.233 | ~~400~~ | 1.81 |
| Cadmium | 7440-43-9 | 80 | | 80 | <0.79[3] |
| Chromium | 7440-47-3 | 400 | | 400[4] | 27.32 |
| Lead | 7439-92-1 | 14.47 | n/a | n/a | 14.47 |
| Mercury | 7439-97-6 | 24 | | 24 | 1.49 |
| Nickel (as soluble salts) | 7440-02-0 | 1600 | | 1600 | 23.95 |
| Silver | 7440-22-4 | 400 | | 400 | 2.36 |
| Uranium | 7440-61-1 | n/a | n/a | n/a | n/a |
| Chloride ion ($Cl^-$) | n/a | 541.2 | n/a | n/a | 541.2 |
| Nitrate ion ($NO_3^-$) | 14797-55-8 | 128000 | | 128000 | 234.9 |
| Nitrite ion ($NO_2^-$) | 14797-65-0 | 8000 | | 8000 | n/a |
| Pentachlorophenol | 87-86-5 | 8.33 | 8.33 | ~~2400~~ | below detectable |

[1] *Model Toxics Control Act Cleanup Levels and Risk Calculation (CLARC II) Update*, Publication # 94-145, Washington Department of Ecology, January 1996. From the Method B Table.
[2] *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes*, DOE/RL-92-24, Rev 3, DOE 1994. From page xiii, Summary Table 2, Weibull Distribution at a 95% Upper Confidence Limit.
[3] Limit of quantitation.
[4] Value for hexavalent chromium.

n/a not applicable or not available
mg/kg milligrams per kilogram
CAS Chemical Abstract Service

**SUMMARY OF AGREEMENTS REACHED AT THE 303-K DQO MEETINGS**

SIGNATURES:

Ellen Mattlin Date: 5-1-97
Ellen M. Mattlin, Unit Manager, RL

Jeanne J Wallace for Date: 5/1/97
Clinton D. Stuart, Unit Manager, Washington State Department of Ecology

Jeanne J Wallace Date: 5/1/97
Jeanne J. Wallace, Project Manager, Washington State Department of Ecology

Fred A Ruck III Date: 5/1/97
Fred A. Ruck III, Contractor Representative, FDH, Environmental Integration

John A Remaize Date: 5-1-97
John A. Remaize, Contractor Representative, BWHC, Fuel Supply Shutdown

Jason G Alder Date: 5/1/97
Jason G. Alder, Contractor Representative, RFSH, Environmental Services

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