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Rev. 01

Sampling and Analysis Plan for the 183-H Solar Evaporation Basins—Phase II - Soil

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

Bechtel Hanford, Inc.
Richland, Washington

Approved for Public Release

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Sampling and Analysis Plan for the 183-H Solar Evaporation Basins—Phase II - Soil

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1.0 INTRODUCTION

This sampling and analysis plan describes how soil samples will be collected to verify the Resource Conservation and Recovery Act (RCRA) closure, what analyses to perform on those samples, and how the results will be reported for the 183-H Solar Evaporation Basins. This plan is based on the 183-H Solar Evaporation Basin Soils Data Quality Objective (DQO) Process Summary Report (Appendix A) and guidance from the Washington State Department of Ecology (Ecology) on cadmium and chromium as constituents of concern in the soils at 183-H Basins (Appendices B and C).

1.1 FACILITY DESCRIPTION

The 183-H Facility consists of four aboveground 1 130 m^2 (12,168 ft^2) concrete basins with flocculation and sedimentation reservoirs. The walls are 15 cm (6 in.) thick and the basin floor is 13 cm (5 in.) in minimum thickness.

From 1943 to 1964, the 183-H basins were used as flocculator/sedimentation basins for the 100-H water treatment plant. The basins were inactive until 1973, when they were designated for use as solar evaporation basins for storage and treatment of mixed waste solutions from the 300 Area Fuel Fabrication Facility. By the end of 1990, all bulk waste was removed from the basins. The concrete structure has been decontaminated and has been disposed of per regulations. Soils beneath the basins that were contaminated by basin leakage or spills are addressed in this sampling and analysis plan.

1.2 SOIL SCREENING/VERIFICATION

1.2.1 Uncontaminated Shallow Soils

A minimum of 13 field screening analyses for the constituents of concern (Table 1) will be collected randomly from within that part of the basin footprint which showed no contamination during the 1989 and 1991 sampling efforts. A minimum of five duplicates will be analyzed in an approved laboratory for verification of meeting cleanup limits. The Environmental Restoration Contractor (ERC) may treat this area as contaminated surface soil, remove it, and treat as shallow soil within the area of excavation (Section 6.1.3.2). This would eliminate the sampling for cadmium as required in Appendix B and for the full list of constituents of concern listed in Table 1. the area would be included with shallow soils within the area of excavation (Section 1.2.2).

Table 1. List of Contaminants.

CONSTITUENT OF CONCERN	ACTION* LEVEL (ppm)	89/91 DATA DETERMINATION	SHORT LIST?
Vanadium pentoxide	14.4	Nondetectable	No
Cyanide	20.0	Nondetectable	No
Formic acid (as formate)	3200	Nondetectable	No
Arsenic	6.41	> Site background	Yes
Barium	136	Indistinguishable from bkg	No
Beryllium	8.0	Indistinguishable from bkg	No
Cadmium	0.5	Indistinguishable from bkg	No
Chromium VI	8.0	> GW protection standard	Yes
Copper	59.2	> GW protection standard	Yes
Fluoride	96.0	> GW protection standard	Yes
Lead	250	< MTCA Method A	No
Nitrate	4400	>GW protection standard	Yes
Nickel	19.7	>Site background	Yes
Mercury	.48	Indistinguishable from bkg	No
Selenium	8.0	Indistinguishable from bkg	No
Silver	8.0	Indistinguishable from bkg	No
Sulfate	25000	< GW protection standard	No
Vanadium	86.5	Indistinguishable from bkg	No

*Model Toxics Control Act B Limits

1.2.2 Shallow soils within the Area of Excavation

A minimum of 11 samples for field screening will be randomly collected from the excavated area beneath the basins where contamination existed in the surface soil during 1989 and 1991 sampling efforts. Three duplicates of these samples will be sent to an approved laboratory for analysis to verify cleanup limits were met (short list of constituents of concern in Table 1). One of the three samples will be from beneath the area where the arsenic contamination was the highest. This will be based on either prior knowledge (1989 and 1991 sampling data) or as indicated by field screening data gathered during excavation. The other two sample sites will be randomly selected.

1.2.3 Vadose Zone Soils

A minimum of 11 samples will be randomly collected from the excavated area of the vadose zone beneath the basins where contamination was confirmed during the 1989 and 1991 sampling efforts. One duplicate sample will be collected beneath the area where the fluoride contamination was the highest unless field screening identifies a higher point source. Two other duplicates will be selected at random. The three duplicate samples will be sent to an approved laboratory to verify that cleanup limits were met.

1.3 SOIL VERIFICATION/WASTE DESIGNATION

One soil sample will be collected from the center of each berm soil pile for waste designation, or as verification of meeting closure requirements, if laboratory analyses show cleanup limits were met.

Three samples will be collected from the loading ramp for waste designation, or as verification of meeting closure requirements, if laboratory analyses show cleanup limits were met.

2.0 OVERALL SCOPE

Following decontamination of the basin concrete, the basin walls were demolished. The "footprint" slabs will be carefully removed to allow sampling and visual inspection of the underlying soils. The newly exposed soil, and the berm and ramp soil will undergo (1) visual inspection, (2) radiological and chemical field analysis, and (3) radiological and chemical laboratory analysis. The laboratory chemical and radiological analyses will be conducted as verification of RCRA closure and radiological release, respectively. These samples will be collected at biased and

random locations after any soil is removed. (It is assumed 30.5 to 61 cm [1 to 2 ft] of soil under approximately half the basin footprint will be removed initially due to nitrate contamination in the soil, Figure 1.) The decision to remove soil will be based on visual and/or field screening followed by laboratory analysis (verification samples). If laboratory data does not confirm the soil is clean, larger scale remediation will take place; further sampling and analysis will be conducted until the hazard is mitigated.

The boundary of the area of interest/verification is as follows:

- Soil beneath the footprint of the four basins.
- From basin 1, 4.5 m (15 ft) to the east.
- Soil beneath the loading ramp.
- The berm soil piles for waste designation or verification.
- Loading ramp soil for waste designation or verification.

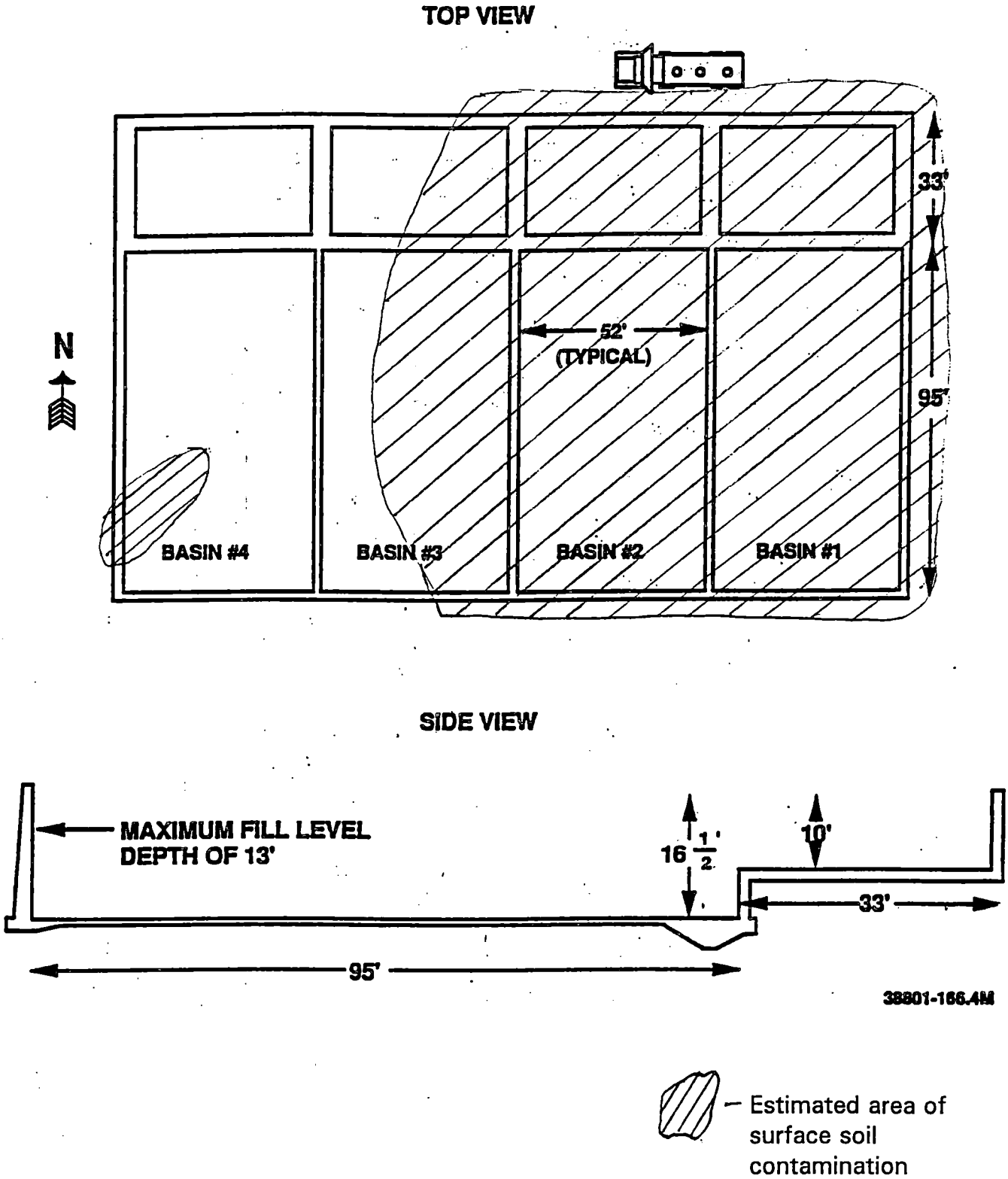
The basin area, berm soil piles, and ramp (asphalt will be removed) will be restored to the appearance of the surrounding area through grading and revegetation with natural plant species.

Laboratory analysis of soil is called for in the preceding steps. The purpose of this is three-fold. First, the soil must be evaluated in order to determine the final disposition of the soil or the need for further remediation of the soil. Secondly, the position of the final closure decision must be strengthened. The soil data, if consistent with previously acquired data, offers a measure of validation of the entire soil data set. Lastly, closure requirements need to be verified. No further analytical work should be required unless the data does not meet the closure criteria of this proposal. If data is not consistent with clean closure, further remediation will be conducted, or a modified closure will be certified in accordance with condition II.K.3 of the Hanford Facility RCRA Permit. If additional remediation is necessary, additional sampling and analysis will be required to verify closure.

3.0 DELIVERABLES

The final analysis report will be the major deliverable. Point of contact (POC) inspection of the completed work will be required before acceptance.

Figure 1. Dimensions of the 183-H Solar Evaporation Basins.



3.1 RESPONSIBILITIES

3.1.1 Environmental Restoration Contractor Sample Management

- Arrange for laboratory analysis of samples.
- Provide Sample Authorization Form (SAF) to field personnel.
- Receive data packages from the laboratory.
- Arrange for validation of laboratory data by an independent contractor.
- Provide Hanford Environmental Information System (HEIS) numbers for sample identification, as necessary.

3.1.2 Environmental Restoration Contractor Field Sampling Team or Field Assessment Services Team

- Obtain samples and document sampling activities in a controlled log book.
- Transport samples to the laboratory or shipping center.
- Initiate chain of custody documentation for samples.
- Package samples for shipping.
- Conduct onsite analysis as appropriate.
- Provide trained scientist(s) and technicians for all field screening and assessment activities for designation/characterization.
- Document results in a controlled logbook.
- Generate a data report detailing analytical results, analytical methods used, quality control samples, and any observations and waste designation suggestions which may be helpful to the cognizant project lead.

3.1.3 Environmental Restoration Contractor Team

- Provide Field Service support to the sampling team.
- Provide coordination with other site organizations (Rad Control, Safety, etc.) to support sampling team.

3.1.4 Radiation Control Technicians

- Provide radiation control coverage for the sampling team.
- Provide dose rate data for sample shipping.
- Recommend as low as reasonably achievable (ALARA) actions where necessary.
- Provide the radiological work permit(s) (RWP) when necessary.

3.1.5 Industrial Safety

- Provide industrial safety support (confined space monitoring) and monitoring for the sampling team.
- Provide the approved Activity Hazard Analysis (AHA).

4.0 SAFETY

The personal protective equipment (PPE) to be worn during sampling shall be listed on the job-specific AHA and RWP as required.

5.0 MEETINGS, REPORTS, AND ACTIVITIES

Prior to each day's sampling effort, pre-job meetings shall be conducted to discuss the work to be performed, the AHA, the RWP (if applicable), and PPE requirements. This meeting should be documented by the ERC representative with a roster of the attendees.

6.0 SAMPLING

Field screening and/or onsite analysis will be used by the ERC to determine the extent of soil removal necessary to meet RCRA closure. When field screening/

onsite analysis indicates that the soil is below RCRA closure limits, biased verification samples will be obtained from those areas most suspect, followed by random verification samples to confirm RCRA closure limits.

6.1 SAMPLE LOCATIONS

6.1.1 Berm Soil Piles

One sample, using a sample thief, auger, core borer or equivalent sampling device, cleaned to RCRA protocol, will be obtained from the center of each berm soil pile. The sample tool should enter the top fourth of the soil pile, pass through the approximate center of the pile, and stop at the opposite lower fourth of the pile from where it entered.

NOTE: Each soil pile is expected to be homogeneous due to the excavation method used to make the pile. There are three soil piles which will be sampled.

6.1.2 Ramp Soil

A minimum of three soil samples will be obtained from the ramp. One sample will be obtained on the west side of the ramp north of basin 4, one will be obtained north of basins 2 and 3, and one sample will be obtained on the east side of the ramp north of basin 1 and east of where borehole BH-5 was drilled during vadose zone sampling conducted in 1991. Samples will be obtained using a trowel, scoop, or equivalent sampling device cleaned to RCRA protocol. Each sample will be taken at a depth of approximately 15 cm (6 in.). If, after asphalt removal, there are signs of stains or spills, additional samples shall be obtained from these areas.

6.1.3 Soil Beneath the Basins

6.1.3.1. Uncontaminated Shallow Soils. Any soil that is uncontaminated, based on results of the 1989 and 1991 sampling efforts, will be verified that closure limits are met, based on a minimum of thirteen field screen samples, of which five duplicates will be sent for laboratory analysis. These five duplicate samples will be analyzed for the full list of contaminants (Table 1). If all contaminants are below Model Toxic Control Act (MTCA) B limits, no further actions are required. If any of the analytes cannot be done by field screening methods, laboratory analysis will be required for those analytes for all thirteen samples. The ERC may elect to excavate this soil and treat it as contaminated shallow soil to comply with the cadmium cleanup requirements listed in Appendix B.

6.1.3.2. Shallow Soils within the Area of Excavation. Shallow soil remaining within the excavated boundary of 183-H will be verified that it meets closure limits with a minimum of 11 field screen samples of which three duplicates will be

analyzed in a laboratory. One duplicate will be a biased sample taken from where the arsenic plume had the highest concentration prior to excavation. The other two duplicates will be random samples. Samples will be analyzed for arsenic, copper, nickel, nitrates, fluoride, and hexavalent chromium. If analytes are below MTCA B limits no further action is required. Other analytes are not a concern based on the results of 1989 and 1991 sampling efforts. Soil removed will be disposed at a landfill designed to manage low levels of radiologically and chemically contaminated soils.

6.1.3.3. Vadose Zone Soils. Soil remaining within the excavated vadose zone will be verified that it meets closure limits with a minimum of 11 field screen samples of which three duplicates will be analyzed in a laboratory. One duplicate will be a biased sample taken from where the fluoride contamination was the highest prior to excavation, or as determined during field screening. The other two duplicates will be random samples from within the vadose zone excavation. Samples will be analyzed for fluoride and chromium VI. If fluoride and chromium VI are below MTCA B limits, no further action is required. Other analytes are not a concern based on the results of 1989 and 1991 sampling efforts. Soil removed will be disposed at a landfill designed to manage low levels of radiologically and chemically contaminated soils.

All samples will be obtained at a depth of approximately 15 cm (6 in.) beneath the surface using a trowel, spoon, or equivalent sampling device cleaned to RCRA protocol.

6.1.4 Radiological Samples

All samples that will be analyzed in a laboratory, will be radiologically analyzed for: gamma energy analysis (GEA), gross alpha, gross beta, uranium-234, -235, -238, technetium-99, and total uranium. Also, all soil that will be disposed will be radiologically characterized for the same isotopes, previous radiological data (1989 and 1991 samples) may be used if the soil is disposed as radioactive.

6.2 SAMPLE IDENTIFICATION

Sample labels for samples shall be furnished by the sampling team. The labels will require the following information to be recorded by a member from the sampling team.

- Identification of the person collecting the sample
- A unique sample identification number
- Date, time, and location where the sample was collected

- The type of preservative added to the sample bottle or "no preservative."

The unique sample number shall be obtained from the HEIS group, assigned in accordance with an ERC sample identification method. In addition, each bottle shall be identified with a bar code sticker attached to the bottle by the bottle manufacturer. The bar code shall identify the bottle lot number and individual bottle number.

6.3 SAMPLING EQUIPMENT

All sampling equipment that is to come in contact with the sample (i.e., scissors, scoops, spoons, trowels, pliers, forceps, tongs, etc.) will meet SW-846 protocols (EPA 1992).

6.3.1 Sample Bottles

Soil samples shall be collected in commercially available, individually certified, pre-cleaned bottles. The certification of the pre-cleaned condition shall be maintained on file by the sampling team.

The type of containers, required sample volumes, and preservatives required shall be specified by the laboratory performing the analysis.

6.4 SAMPLE HANDLING

The collection, handling, and preparation of samples shall comply with the protocol of Test Methods for Evaluating Solid Waste Physical/Chemical Methods, SW-846. The chain of custody shall comply with BHI-EE-01, *Environmental Investigations Procedures*, Volume 2, Section 3.0, or equivalent procedure, approved by Bechtel Hanford, Inc. (BHI). A chain of custody form will be filled out at the time of sampling and shall accompany each sample. A sample may consist of several containers. The chain of custody will account for each container. Preparation of samples for shipment shall comply with BHI-EE-01, EIP 3.1, "Sample Packaging and Shipping," or equivalent, approved by BHI. Chain of custody and physical control of samples shall follow SW-846 protocol.

7.0 SAMPLE ANALYSIS

Field screening and duplicate samples sent for laboratory analysis will be used to verify soil cleanup levels have been met and to designate removed soil for waste

disposal. Offsite laboratories will be used for quality assurance samples. The sample analysis methods are listed in Table 2. The U.S. Environmental Protection Agency (EPA) approved methods shall be used whenever possible.

Cadmium and chromium (VI) were two constituents of concern whose cleanup levels were not fully resolved at the time of the DQO Summary Report. The U.S. Department of Energy, Richland Operations Office (RL) and the ERC have since received directions from Ecology on these two constituents. The ERC will meet the cleanup limits if they meet the requirements established by Ecology for cadmium as listed in Appendix B and chromium (VI) as stated in Appendix C. For cadmium, as long as the surface soil is removed, no additional soil testing will be required for RCRA closure. For chromium, the following steps shall be followed for all verification samples:

1. Ecology shall be notified 30 days prior to sampling so that Ecology can prepare for collecting and analyzing split samples and verification of the sampling event.

2. Use of SW-846 proposed Method 3060A to extract soil samples with the modification of limiting holding time to 96 hours, and use of either the Pacific Northwest Laboratory (PNL) Stripping Analytical method or an approved SW-846 method for analysis of the extract.

3. Soil samples should be immediately (within 10 minutes) placed under refrigeration and held at 4°C, or less, at all times. A record of the sample's temperature should be initiated at the time each sample is taken and maintained throughout analysis.

4. Complete quality assurance (QA)/quality control (QC) of the entire analytical process with the expectation that resampling and reanalysis will be required for any failure to follow written procedures or those listed above.

Verification samples will be analyzed for the following.

7.1 SOIL BENEATH THE BASINS

7.1.1 Uncontaminated Shallow Soils

Soil that is not excavated will be analyzed for the full list of contaminants (Table 1). If all contaminants are below MTCA B limits (Table 1 column 2), no further actions are required. Samples will be radiologically analyzed for: GEA, gross alpha, gross beta, uranium-234, -235, -238, technetium-99, and total uranium.

Table 2. Analytical Procedure Reference.

ANALYSIS	SW-846 METHOD CROSS REFERENCE	FAST PROCEDURE REFERENCE**
TCLP	1311	3.48
Total Metals Digestion	3050***	3.40
ICP METALS	6010A	3.45
Hg COLD VAPOR AA	7470	3.43
CYANIDE	9010	3.18
SULFIDE	9030	3.30
ANIONS F, Cl, NO2, NO3, PO4, SO4	300.0	3.29
HEXAVALENT CHROMIUM	218.4	3.33
XRF	N/A	3.44
NITROGEN, AMMONIA N	350.3	3.36
WATER LEACH OF SOLID SAMPLES FOR ANION ANALYSIS		3.23
SAMPLE RECEIVING RETURN AND CUSTODIANSHIP	SW-846 SECTION 1, QUALITY ASSURANCE	1.1
QUALITY CONTROL OF THE REVERSE OSMOSIS DEIONIZED WATER SYSTEM	SW-846 SECTION 1, QUALITY ASSURANCE	2.1
SAMPLE STORAGE UNIT TEMPERATURE MONITORING		2.8
SOLID WASTE ASSESSMENT TEAM MANUAL	N/A	5.0
FAST QUALITY ASSURANCE PLAN		2.0
LOGKEEPING PRACTICES	WHC-IP-1128	1.6

**Onsite laboratory
***3050A shall be used for chromium VI as per Appendix C

7.1.2 Shallow Soils within Area of Excavation

Shallow soil within the excavated boundary of 183-H will be analyzed for arsenic, copper, nickel, nitrates, fluoride, and hexavalent chromium. If analytes are below MTCA B limits (Table 1 column 2) no further action is required. Samples will be radiologically analyzed for: GEA, gross alpha, gross beta, uranium-234, -235, -238, technetium-99, and total uranium.

7.1.3 Vadose Zone Soils

Soil within the excavated vadose zone will be analyzed for fluoride and chromium (VI). If fluoride and chromium (VI) are below MTCA B limits, no further action is required. Samples will be radiologically analyzed for: GEA, gross alpha, gross beta, uranium-234, -235, -238, technetium-99, and total uranium.

7.2 BERM PILES

- Samples shall be radiologically tested for GEA, gross alpha, gross beta, uranium-234, -235, -238, technetium-99, and total uranium.

- Samples shall be chemically evaluated for total metals or toxicity characteristic leaching procedure (TCLP) metals, hexavalent chromium, pH, cyanide, sulfide, and anions (to include fluoride, chloride, NO_3, NO_2, SO_4, and PO_4). TCLP metals will be performed if total metals concentration limits, accounting for the 1 to 20 dilution factor, are above the verification release levels.

7.3 LOADING RAMP

- Samples shall be radiologically tested for GEA, gross alpha, gross beta, uranium-234, -235, -238, technetium-99, and total uranium.

- Samples shall be chemically evaluated for total metals or TCLP metals, hexavalent chromium (chromium VI), pH, cyanide, sulfide, and anions (to include fluoride, chloride, NO_3, NO_2, SO_4, and PO_4). TCLP metals will be performed if total metals concentration limits, accounting for the 1 to 20 dilution factor, are above the verification release levels.

8.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

Surveillances and assessments will be performed by the Projects Quality Assurance Department as required by BHI-QA-01, *ERC Quality Program*.

8.1 FIELD LOGBOOK

All sampling activities associated with the 183-H basin soil will be documented in controlled field logbooks that are maintained by the sampling team personnel. Field logbooks shall include, but are not limited to, the following:

- Names of all Sampling team, Operations, ERC, and Health Physics personnel participating in the sampling and their responsibilities.
- Photographs and/or sample location diagram(s).
- Date and time the sample was collected.
- Photocopies of the chain-of-custody, shipping papers, and sample analysis request forms.
- Table correlating sample identification numbers to sample locations and any QC samples.
- Lot number(s) of the bottles used to collect samples.
- Any pre-job meetings held for the sampling event(s).
- The procedure(s) used for field screening at each sample location.
- Photocopies of the log sheets (including calibration data) of the data collected during field screening for each sample location.
- Sampling methods and procedures used.
- Equipment identification numbers.
- Field problems, solutions, corrective actions.
- Audits/surveillances conducted during the sampling event.
- Markings/labels on any containers sampled (if applicable).

- Any declared waste components and/or concentrations.

The logbook entries shall be reviewed and signed off by the sampling teams cognizant scientist prior to submittal. Photocopies of the field logbook entries shall be forwarded to, the 183-H Lead Engineer, upon completion of the sampling event.

8.2 QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

8.2.1 Equipment Blanks

A minimum of one equipment blank shall be collected for each sampling technique, then equipment blanks shall be collected on every 20 samples. The equipment blank shall be collected from sampling equipment by following SW-846 protocol (EPA 1992).

The equipment blank bottle(s) shall be labeled in the same manner as the sample collection bottles, but shall have a unique identification number different from the actual samples.

8.2.2 Duplicate Samples and Split Samples

One duplicate (located adjacent to the routine verification sample) shall be collected for every 20 actual samples (or every 5% of the time). At a minimum, one duplicate shall be obtained with a verification sample from each of the three verification areas listed in Section 7.0 above (uncontaminated soil, shallow soil within area of excavation, and vadose zone soil).

Split samples will be collected at the same time from a homogenized routine sample. Split samples will be obtained at the discretion of Ecology. These shall be analyzed for the same constituents as the routine sample. At least one split sample should be collected from the fluoride excavation area beneath the basins.

The duplicate and split sample bottles shall be labeled identically to the actual sample, but will be assigned a unique identification number.

The field logbook shall identify the duplicate and split sample locations. This information shall not be indicated on the label, the chain of custody, or any other documents that accompany the sample to the laboratory. This is done to ensure that the laboratory cannot ascertain the existence of a duplicate.

8.3 QUALITY ASSURANCE/QUALITY CONTROL SAMPLE ANALYSIS

An EPA method or equivalent method shall be used whenever possible. If an EPA method cannot be followed for radiological or ALARA purposes, it shall be documented and explained in the analytical results. If sample sizes are reduced, ratios between sample size and reagents shall be maintained.

QC standards shall be analyzed prior to the analysis of collected samples. The results of QC standards shall be documented on the data report. At a minimum, one out of every twenty analysis samples shall be performed in duplicate. If a total metals analysis is above the designating limits (accounting for dilution factor 1:20) of *Washington Administrative Code* (WAC) 173-303, then TCLP (metals) analysis shall be performed on the sample.

9.0 REPORTING

9.1 ANALYTICAL RESULTS

Initial analytical results shall be verbally communicated to, the 183-H Lead Engineer, once the analysis has been completed. A data report containing sample analysis results and QC sample results validated to level C per BHI-EE-01, Volume 1, EIP 2.5, "Data Package Validation Process," shall be forwarded to the 183-H Lead Engineer after they have been reviewed and validated.

The offsite analytical laboratory shall provide the 183-H Lead Engineer a case narrative of the sample analyzed. This case narrative shall include the following:

- Sample Identification Number
- Results of the analysis
- How the sample was analyzed
- Any anomalies encountered during sample analysis.

10.0 WASTE GENERATION

If dangerous waste is generated on this project it shall be handled according to waste handling procedures of BHI-FS-01, *Field Support Administration*, Section 4.0,

"Waste Management." Upon completion of analysis, remaining portions of samples, as well as waste that contacted the samples, will be returned to 183-H and disposed with the miscellaneous waste stream (i.e., PPE, plastic, paper, etc.).

11.0 SCHEDULE

The Sampling Team is directed to begin this effort on approval of this plan and conclude with the final analytical report within 30 days of collection of the last sample.

12.0 PROCUREMENT

Material procurement for this project is not needed.

13.0 PERMITS

The 183-H facility is a currently radiologically controlled facility. During the soil sampling activities, a RWP may be required.

14.0 SPECIAL INSTRUCTIONS

The POC, safety personnel, and facility representative, or their assignee, shall have stop-work authority if unsafe operation or other conditions are observed. The release from a stop-work condition shall be documented and rectified.

15.0 TASK MANAGEMENT

Mr. J. P. Pizzarella is the ERC 183-H Field Services Representative, and his number is 373-7595. The primary ERC POC for this work will be Mr. L. (Rex) Miller at 373-9592.

16.0 REFERENCES

AEC, 1974, "Termination of Operating Licenses for Nuclear Reactors," Regulatory Guide 1.86, U.S. Atomic Energy Commission, Washington, D.C.

BHI-EE-01, *Environmental Investigation Procedures*, Bechtel Hanford, Inc., Richland, Washington.

BHI-FS-01, *Field Support Administration*, Bechtel Hanford, Inc., Richland, Washington.

BHI-QA-01, *ERC Quality Program*, Bechtel Hanford, Inc., Richland, Washington.

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

EPA, 1992, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3RD Edition*, U.S. Environmental Protection Agency, Washington, D.C.

WAC 173-303, 1989, *Dangerous Waste Regulations*, *Washington Administrative Code*, as amended.

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

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APPENDIX A

Data Quality Objective Process Summary Report

183-H SOLAR EVAPORATION BASIN SOILS DATA QUALITY OBJECTIVE PROCESS SUMMARY REPORT FOR THE AUGUST 11, 1995 MEETING

INTRODUCTION

This document is a summary of the Data Quality Objective (DQO) Process pertaining to the possible risks to the environment and the health and safety of the public associated with the 183-H Solar Evaporation Basin soils. The decision makers agreed to hold a meeting to address these issues on August 11, 1995. The agreements that the decision makers concurred with in this document are applicable only to the 183-H Basin Soils and do not set precedent for Hanford. The following were participants of this process:

Decision Makers

Robert Cordts	Ecology
Jeff Bruggeman	DOE*
Rex Miller	ERC

Technical Support

Alex Stone	Ecology
Ellen Mattlin	DOE
Rikki Harris	ERC
David Encke	ERC
Mark Wasemiller	ERC
Janet Badden	ERC
Stephanie Johansen	GSSC*
Gerry Hendricks	GSSC
Gregory Joyce	GSSC (facilitator)
Paul Day	GSSC

EPA was invited to the meeting but did not participate. EPA will be kept informed of all agreements.

* Did not attend the meeting on 8/11/95.

This document will serve as formal meeting agreements and also, decisions that have been reached between the decision makers outside the DQO process meeting forum.

Scope

The DQO decision makers agreed that the scope for this DQO process would entail the verification sampling to demonstrate that the risk from the constituents of concern had been removed from soils of the 183-H Basin TSD.

The handling of the concrete, waste designation sampling, waste acceptance

criteria for treatment and disposal, or operation and maintenances/post closure monitoring are not within the scope of this DQO process.

The radioactive portion of mixed waste is interpreted by the U.S. Department of Energy (DOE) to be regulated under the Atomic Energy Act of 1954. It is the position of Ecology that the radioactive portion poses a threat to human health and the environment, and is regulated under WAC 173-340. Both agencies acknowledge the others position and defer resolution of this issue to their respective management. Radiological data obtained during closure will be submitted to Ecology for their information. If Ecology has issues with the radiological data they will meet with DOE to resolve the issues.

BACKGROUND OF THE SITE

Description and History of 183-H Basins

Description

The 183-H Basins are part of the 100-H Area, located in the northern part of the Hanford Site along the Columbia River. The 100-H Area contained a nuclear-defense, production-reactor facility that operated from October 1949 to April 1965. The 183-H Basins structure consists of four basins (aboveground concrete structures) which remain from operation of the 183-H Water Treatment Facility. The 183-H Water Treatment Facility provided water treatment and reservoir capacity for the reactor process water system. This filter plant operated concurrently with the start-up and shutdown of the 105-H Reactor.

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

Operation As A RCRA TSD Unit

Beginning in 1973, Basin 1 (basins are numbered 1 through 4 from east to west) was used for treatment of neutralized acid-etching solutions from N Reactor fuel fabrication facilities in the 300 Area of the Hanford Site, as well as for miscellaneous used and unused chemicals. A total of 9,462 kiloliters (2.5 million gallons) of caustic solution was discharged to the basins during the period of waste operations. The solution consisted primarily of sodium nitrate with trace amounts of miscellaneous chemicals, including uranium and technetium-99. The waste stream included small amounts of listed waste constituents, as defined by WAC 173-303-080, including formic acid (U123), vanadium pentoxide (P120), and cyanide salts (P029, P030, P098, P106).

Waste deposited in the basins underwent volume reduction through evaporation. The use of Basin 1 to treat spent fuel fabrication waste continued until the detection of nitrates when well 199-H4-3 was monitored, and there was an indication that possible spill or leak material was reaching the groundwater. Use of Basin 1 was discontinued in 1978. Spray-on polyurethane liners had been installed in Basins 2 and 3, then the liquid waste from Basin 1 was transferred into Basin 3 in 1978. (Basin 1 solids and sludges were removed in 1985.) Basin 2 first managed waste in 1979. Shortly before its use in 1982, Basin 4 was lined with a spray-on white butyl/hypalon[1] liner after it was observed that the spray-on polyurethane coating in Basins 2 and 3 showed degradation from sunlight. The last shipment of waste to the basins occurred in November 1985.

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

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

Removal of Post-Operation Waste

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

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

Berm soils along the east and west sides of the basins were sampled, removed, placed on plastic just south of the 183-H, and sprayed with Arrowspray 70[3] (a clear soil binder) to minimize wind dispersal and erosion (WHC 1991a).

Following removal of the waste managed at the 183-H, concrete and soil sampling was performed to evaluate the possibility of residual contamination at the site.

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1 Hypalon is a trademark of E.I. Du Pont de Nemours and Company.

2 Sorbond LPC-II is a trademark of the American Colloid Company.

3 Arrospray 70 is a trademark of the American Cyanamid Company.

DISCUSSION

The decision makers and their technical support met several times prior to the DQO meeting to discuss issues pertaining to 183-H closure. ERC presented a modified closure strategy for 183-H using existing 1989 and 1991 soil data. This strategy uses the existing data to estimate the type and extent of contamination.

The decision makers agreed that MTCA method B would be used to establish action levels for the constituents of concern. Using the process information and the existing data the decision makers agreed to the constituents of concern as shown on Table 1.

Ecology agreed that the vadose zone data was of the quality necessary to make a decision concerning constituents of concern with the exception of the total chromium data and the statistical method used to determine Hg and Cd concentrations. Soil samples were analyzed for total Cr only. Total chromium exceeds acceptable levels if it is assumed to be in the hexavalent state. It was agreed that the PNL method would be acceptable for determining the CrVI levels and that a sampling plan for this determination would be developed outside this DQO. If this evaluation leads to the conclusion that CrVI action levels are exceeded to a depth greater than other contaminants of concern, DOE will reevaluate the unit closure options. Agreements made during the DQO meeting concerning the Cr issue are listed in Step 5. The final resolution for Cr, Hg and Cd will be decided later and is outside the scope of this summary report.

Ecology did not agree that the surface data was of the quality that would allow a no action position to be taken. They did agree however that the data was of sufficient quality to use for estimating extent and volume of contaminated soil for the purposes of soil excavation. Based on the available information (historical plus '89 & '91 data) the proposed remediation is anticipated to conclude with soil analyses to verify that C of C are below levels of concern for health and the environment. DOE proposes shallow excavation (roughly anticipated to be 1 foot) of the remainder of the area (contaminated portion) for the C of C, followed by verification (for the short list of the C of C). It is anticipated that fluoride contamination extends to a greater depth, and additional excavation will be required for this constituent. Verification for this additional excavation will be limited to fluoride.

DOE has the option of closure for 183-H Basins and proposes to excavate soils based on the existing information assuming that the material will be accepted at ERDF and that the CrVI levels at depth do not exceed MTCA method B. If it is determined that either of these assumptions are wrong, DOE will revaluate their position.

The decision makers agreed that protection of groundwater would be obtained if soil contaminants at the TSD facility were below MTCA method B groundwater protection action levels (100 X groundwater cleanup levels). Any necessary groundwater monitoring or remediation will be deferred and addressed as a portion of the 100-HR-3 CERCLA Operable Unit remediation effort.

THE DQO SEVEN STEP PROCESS

STEP 1. STATEMENT OF PROBLEM

Soils at 183-H Basins are contaminated to the extent that they may pose a risk to groundwater, the environment or the health and safety of the public.

STEP 2. DECISIONS

The decision makers agreed that the following questions needed to be answered.

- What are the constituents of concern?
- Do constituents of concern exceed levels that require corrective action?
- What will determine the action levels?
- Do soil concentrations of CrVI exceed levels that will require a corrective action other than excavation of soil?
- Is existing data of the quantity and quality to determine no action for some soils within the TSD facility?

STEP 3. DECISION INPUTS

Existing Information

- Process knowledge of the materials discharged to the basins.
- Soil samples from the site taken in 1989 and 1991.

Information Needed

- Sampling to confirm the surface soil sample data results obtained in the 1989 and 1991 sampling activities.
- Data sampling activity to determine what part of the Cr in the soils at 183-H is in a hexavalent form, and do these concentrations exceed modified closure levels.
- Confirmation sampling activity that verifies that contaminated soils have been removed to a level that will allow a modified clean closure.

STEP 4. BOUNDARIES

During the meeting the decision makers agreed that the boundary of the corrective actions would be limited to the following:

The surface soils and vadose zone within the footprint of the existing TSD facility, including the north loading ramp, fenced berms 1, 2 and 3, and origin of the bermed material.

Groundwater will be addressed in the 100 HR Area OU.

STEP 5. DECISION RULES

The following decision rules were agreed to by the decision makers during the DQO meeting.

Determination of CrVI at Depth

To determine the speciation of Chromium at depth a sampling plan will be developed outside of the DQO process and will apply the following If/Then statements.

- If existing Cr concentrations found in the vadose zone are confirmed as CrVI above action levels at depths that preclude treatment, corrective action steps will be reevaluated.
- If existing Cr concentrations found in the vadose zone are confirmed as CrVI below action levels, then soil may be left in place.

Verification of Uncontaminated Areas

Verification sampling activities for surface soil that is believed not to be contaminated will use the following decision rule.

- If the full list of constituents of concern are below action levels, then no further action will be taken.
- If any of the full list of constituents are above action levels, then the extent of excavation will be increased to remove additional contaminated soil (or DOE will meet with Ecology to determine if it wishes to alter its decision as to closure).

Verification of Shallow Excavation

To determine removal of the short list of constituents of concern above action levels from the shallow excavation, the following decision rule will apply.

- If verification sampling confirms that the soil contamination from the C of C for the short list is below action levels, then excavation for those contaminants are complete.

Verification of Deep Excavation

To determine completion of soil contamination removal for the soils within the deep excavation that are above action levels the following decision rule applies.

- If verification sampling confirms that the soil contamination from Fluoride is below MTCA method B levels, then excavation is complete.

STEPS 6 AND 7 SAMPLING STRATEGY AND OPTIMIZATION

The decision makers agreed to the sampling criteria for verification samples that will be taken to demonstrate that the contaminant levels at the TSD are below action levels. This agreement included acceptable field screening results must equal or exceed 90 percent of the total of this group of samples evaluated. For duplicate samples sent in for laboratory analysis as confirmation of field screening, acceptable agreement will be paired results with values below the action level (i.e. any field screening and laboratory analysis that both show values below action levels). A laboratory value above an action level will indicate that additional excavation and reverification is required.

Listed below is the sampling criteria to which the decision rules will be applied:

Verification of Uncontaminated Soils

A minimum of 13 field screening analyses for the C of C (Table 1) will be randomly obtained from areas considered uncontaminated with a minimum of 5 duplicates to be sent for verification by laboratory analysis. Any constituent on the long list which cannot be analyzed using field screening methods must be submitted for laboratory analysis for all 13 sample sites. Duplicate sampling is not required when laboratory analysis is conducted because field screening could not be.

Verification of Shallow Soils Within the Area of Excavation

A minimum of 11 samples will be randomly chosen for field screening analysis for the short list of C of C (Table 1) with 3 duplicates (two randomly selected and one from the highest Arsenic concentration area) to be sent for verification by laboratory analysis. The highest area of concentration for Arsenic will be determined by the existing data unless field screening identifies a higher point source.

Verification of Vadose Zone Soils

A minimum of 11 samples will be randomly chosen for field screening analysis for the short list of C of C (Table 1) for fluoride analysis, with 3 duplicates (two randomly selected and one from the highest Fluoride concentration area) to be

sent for verification by laboratory analysis. The highest area of concentration for Fluoride will be determined by the existing data unless field screening identifies a higher point source.

TABLE 1
183-H CONSTITUENTS OF CONCERN

CONSTITUENT OF CONCERN	ACTION LEVEL (ppm)	89/91 DATA DETERMINATION	SHORT LIST?
Vanadium pentoxide	14.4	Nondetectable	No
Cyanide	20.0	Nondetectable	No
Formic acid (as formate)	3200	Nondetectable	No
Arsenic	6.41	> Site background	Yes
Barium	136	Indistinguishable from bkg	No
Beryllium	8.0	Indistinguishable from bkg	No
Cadmium	0.5	Indistinguishable from bkg	Still under consideration
Chromium (VI)	8.0	> GW protection standard	Yes
Copper	59.2	> GW protection standard	Yes
Fluoride	96.0	> GW protection standard	Yes
Lead	250	< MTCA Method A	No
Nitrate	4400	>GW protection standard	Yes
Nickel	19.7	>Site background	Yes
Mercury	.28	Indistinguishable from bkg	Still under consideration
Selenium	8.0	Indistinguishable from bkg	No
Silver	8.0	Indistinguishable from bkg	No
Sulfate	25000	< GW protection standard	No
Vanadium	86.5	Indistinguishable from bkg	No

REFERENCES

DOE-RL, 1991, *183-H Solar Evaporation Basins Closure/Post-Closure Plan*, DOE/RL 88-04, U.S. Department of Energy, Richland Field Office, Richland Washington

WHC, 1994, *RCRA Closure Data Evaluation Report: 183-H Solar Evaporation Basins Soil and Concrete*, Draft, WHC-SD-DD-TI-075, Westinghouse Hanford Company, Richland, Washington.

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

SIGNATURES

The undersigned have read and approve of the attached DQO Summary entitled "183-H SOLAR EVAPORATION BASIN SOILS DATA QUALITY OBJECTIVE PROCESS SUMMARY REPORT".

Robert E Cordts — 23 Sept 95

Robert Cordts — Date
Washington Department of Ecology

Jeffrey Bruggeman — 18 Sept 95

Jeffrey Bruggeman — Date
U.S. Department of Energy

18 Sept. 95

Larry Rex Miller — Date
Environmental Restoration Contractor

APPENDIX B

Letter from Ecology on Cadmium

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47600 • Olympia, Washington 98504-7600
(360) 407-6000 • TDD Only (Hearing Impaired) (360) 407-6006

November 30, 1995

Mr. J. M. Bruggeman
U. S. Department of Energy
Richland Operations Office
P. O. Box 550, MSIN H4-83
Richland, WA 99352

Dear Mr. Bruggeman:

CADMIUM AS A CONSTITUENT OF CONCERN AT THE 183-H SOLAR EVAPORATION BASINS (Your Letter of October 27, 1995, Control # 022895)

Unless surface soils remain in place, the Department of Ecology will not require additional testing of the soils of the 183-H Basins for cadmium prior to RCRA closure. The reasons are as follows:

- Groundwater monitoring will continue for the length of the compliance period under a final status compliance monitoring program. Cadmium is one of the constituents included in the monitoring. Results of ground water sampling conducted in the 100-H Area in 1994 showed cadmium at about one-tenth of the MCL.

- Two of fifty-six samples collected at eight boreholes in the vadose zone beneath the 183-H Basins (soil depth 0 to 45 feet) showed cadmium above action levels. No samples above or beneath the two positives (one of the two positives was the deepest sample collected from its borehole) demonstrated detectable cadmium. In fact, only one of the other fifty-four samples showed detectable cadmium. One equipment blank also demonstrated a detectable level of cadmium. Since monitoring is already required post-closure, the Department of Ecology will not compel the additional expense of a landfill closure just for the two non-plume positive results.

- Shallow (surface) soil sampling conducted in 1989 and 1991 were lacking in data validation, however, most of those samples showed cadmium above action levels. If surface soils are not removed as suggested in your letter, cadmium must be demonstrated to be below action levels in the confirmatory sampling which will be conducted for other surface soils constituents of concern.

If you have questions, please contact me at (360) 407-7142.

Sincerely,

Robert E Cordts

Robert E. Cordts
Unit Manager, 183-H Basins

cc: L. R. Miller, Bechtel
M. Janaskie, DOE, EM-442

9613470.1338

APPENDIX C

Letter from Ecology on Chromium

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47600 • Olympia, Washington 98504-7600
(360) 407-6000 • TDD Only (Hearing Impaired) (360) 407-6006

November 30, 1995

Mr. J. M. Bruggeman
U. S. Department of Energy
Richland Operations Office
P. O. Box 550, MSIN H4-83
Richland, WA 99352

Dear Mr. Bruggeman:

CHROMIUM CONTAMINATION AT THE 183-H SOLAR EVAPORATION BASINS (Your Letter of November 21, 1995, Control # 024300)

The Department of Ecology (Ecology) continues to require the quantification of the hexavalent form of chromium in the soils at the 183-H Basins. Your letter, referenced above, concentrates on total chrome and is correct in that aspect. However, hexavalent chrome (Chrome VI) is much more toxic and therefore has a much lower clean-up level. In on-going groundwater monitoring of the 100-H area, significant levels of chrome are being detected. Since total chrome in the soils at the 183-H Basins exceeds the allowable levels of Chrome VI, we must be assured that levels for Chrome VI are not being exceeded.

Ecology realizes that there is not a specifically approved method for the extraction of Chrome VI from soils. However, a soil extraction procedure (Method 3060A) is in the approval process for inclusion into the SW-846 series. With the one modification of limiting the sample holding time to 96 hours, we will allow the use of Method 3060A. Because Method 3060A is not yet an approved extraction procedure, this strategy will only be acceptable for the 183-H Basins.

To determine that Chrome VI is not a contaminant exceeding allowable levels in soils under the 183-H Basins, Ecology will expect the following:

- Thirty day notification prior to sampling so that Ecology can prepare for collecting and analyzing split samples and verification of the sampling event.
- Your use of Method 3060A to extract the samples, use of either the PNL Stripping Analytical method or an approved SW 846 method for analysis of the extract.
- Soil samples should be immediately (within 10 minutes) placed under refrigeration and held at 4° C, or less, at all times. A record of the sample's temperatures should be initiated at the time each sample is taken and maintained throughout analysis.

Mr. J. M. Bruggeman
Page 2
November 30, 1995

- Complete QA/QC of the entire analytical process with the expectation that resampling and reanalysis will be required for any failure to follow written procedures or those listed above.

If you have questions, please contact me at (360) 407-7142.

Sincerely,

Robert E Cordts

Robert E. Cordts
Unit Manager, 183-H Basins

cc: L. R. Miller, Bechtel
M. Janaskie, DOE, EM-442

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