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Project Title/Work Order Sampling & Analysis Plan For Plutonium Uranium Extraction (PUREX) Plant Canyon Vessel Flushing		EDT No. N/A ECN No. 619317

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ENGINEERING CHANGE NOTICE

1. ECN No 619317

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2. ECN Category (mark one) Supplemental <input type="checkbox"/> Direct Revision <input checked="" type="checkbox"/> Change ECN <input type="checkbox"/> Temporary <input type="checkbox"/> Standby <input type="checkbox"/> Supersedeure <input type="checkbox"/> Cancel/Void <input type="checkbox"/>	3. Originator's Name, Organization, MSIN, and Telephone No. C.N. Villalobos, PUREX Regulatory Compliance, S6-19 373-4753	3a. USQ Required? [] Yes <input checked="" type="checkbox"/> No	4. Date February 7, 1995	
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11a. Modification Work [] Yes (fill out Blk. 11b) [X] No (NA Blks. 11b, 11c, 11d)	11b. Work Package No. N/A	11c. Modification Work Complete N/A Cog. Engineer Signature & Date	11d. Restored to Original Condition (Temp. or Standby ECN only) N/A Cog. Engineer Signature & Date
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12. Description of Change

- Change reference to 12 loops (systems) designated for PUREX flushing to 15 loops. Previously two loops were not added and G&R cell vessels flushing consist of 2 loops instead of 1. (See Section 2).
- Re-phrased first paragraph of Section 3.0 and referenced DQO document.
- Removed Acceptance Services from Section 4.0, listed responsibilities for Program Management & Integration, 222-S Environmental Group, Laboratory Administration, and Waste Acceptance Services.
- Listed additional responsibilities expected from PUREX Regulatory Compliance and Sampling and Mobile Laboratories in satisfying this sampling effort. (See Section 4.0).
- Added Table 3 to specify PUREX Canyon & Vault Sample locations as referenced in Section 5.1

13a. Justification (mark one)

Criteria Change <input type="checkbox"/>	Design Improvement <input type="checkbox"/>	Environmental <input type="checkbox"/>	Facility Deactivation <input type="checkbox"/>
As-Found <input checked="" type="checkbox"/>	Facilitate Const <input type="checkbox"/>	Const. Error/Omission <input type="checkbox"/>	Design Error/Omission <input type="checkbox"/>

13b. Justification Details

This ECN is required to clarify the sampling collecting handling, analytical and QA/QC needs to successfully meet commitments with regulators in deactivation of the PUREX facility vessels without delays.

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JRE 3/1/95
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Date 02/07/95

6. Added to Section 5.4 "The minimum volumes requested by the approved laboratory will be met, but in multiple 20 mL vials" to describe how sampling equipment limitations & high radiation dose rates would be addressed.
7. Added a description to Section 5.5 to clarify laboratory selection criteria, sample handling by the approved laboratory, and corrective action for not meeting holding times or preservation.
8. Rephrased Section 6.2.1.
9. Changed 6.2.2 "Blanks" to "Quality Control" to provide descriptions and reasoning for QC protocol.
10. Deleted Section 6.2.3 and referenced Selection of Analytical Methods for Mixed Waste Analysis at the Hanford Site, DOE/RL-94-97 for deviations of SW-846.
11. Added Section 6.2.3 to describe the data reporting documentation to be submitted by the performing laboratory per RCRA sample.
12. Deleted the requirement for data validation because as defined by CERCLA, data validation would not be necessary.
13. Added Table 1 to Section 6.2.4 to summarize QA/QC Requirements for the onsite and offsite laboratories.
14. Rewrote Section 6.2.4. Precision & Accuracy to read Quality Assurance to address quality assurance objectives.
15. Added references to Section 7.0.
16. Modified Table of Contents.

RELEASE AUTHORIZATION

Document Number: WHC-SD-CP-PLN-027, REV 1

Document Title: Sampling and Analysis Plan for PUREX Canyon Vessel Flushing

Release Date: 3/1/95

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

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March 1, 1995

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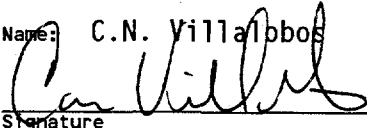
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SUPPORTING DOCUMENT

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7. Abstract

A sampling and analysis plan is necessary to provide direction for the sampling and analytical activities determined by the data quality objectives. This document defines the sampling and analysis necessary to support the deactivation of the Plutonium-Uranium Extraction (PUREX) facility vessels that are regulated pursuant to Washington Administrative Code 173-303.

8. RELEASE STAMP

OFFICIAL RELEASE 

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RECORD OF REVISION

(1) Document Number

WHC-SD-CP-PLN-027

Page 1

(2) Title

Sampling & Analysis Plan (SAP) for Plutonium Uranium Extraction (PUREX) Plant Canyon Vessel Flushing.

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WHC-SD-CP-PLN-027 Rev. 1

**PUREX Plant
Sampling and Analysis Plan**

February 7, 1995

PUREX Regulatory Compliance

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Sampling and Analysis Plan (SAP) for
Plutonium Uranium Extraction (PUREX) Plant
Canyon Vessel Flushing

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1.0 INTRODUCTION

The purpose of this sampling effort is to obtain and analyze samples from flush solutions at the PUREX facility to confirm the solutions do not designate as dangerous waste per WAC 173-303. To meet commitments with the regulators, samples must be collected, handled, and analyzed according to SW-846 Protocol. This Sampling and Analysis Plan is written to provide direction for the sampling and analytical activities determined by the data quality objectives (section 3.0) for PUREX canyon and vault vessels. Another sampling and analysis plan will be prepared for vessels not located in the PUREX canyon and vaults.

2.0 FLUSHING DESCRIPTION

Flush solutions will be sampled from PUREX canyon and vault vessels. There are 15 loops (systems) designated for flushing (a total of 72 vessels). Flush solutions will be cascaded from one vessel to the next within each loop. Samples will be collected in a tank at the end of the flush loop.

For each loop containing a vessel identified in the PUREX Part A, process screening samples will be collected by PUREX Deactivation Engineering and analyzed by the PUREX laboratory during the course of flushing activities. Screening samples will be taken of each flush until laboratory results indicate the waste no longer exhibits dangerous waste characteristics. After screen sampling is complete, sampling will be conducted in accordance with this sampling and analysis plan.

Regulated dangerous waste constituents within the low level mixed waste vary by loop. Flush solutions may contain cadmium, chromium, lead, barium, silver, arsenic, selenium, mercury, nitric acid, or organics. Radioactive components of the mixed waste are attributed to past processing activities at PUREX.

Flushing will support a 1992 RL directive to deactivate the PUREX Plant. A vital part of deactivation is removing dangerous constituents from the PUREX process vessels (i.e. tanks, columns, concentrators, reboilers, towers, and centrifuges) by means of flushing.

3.0 DATA QUALITY OBJECTIVES

The data quality objectives (see WHC-SD-EN-TI-283, REV. 0) of this sampling effort define the sampling and analysis necessary to support the deactivation of the Plutonium-Uranium Extraction (PUREX) facility vessels that are regulated pursuant to Washington Administrative Code 173-303.

Technical discussions between the U.S. Environmental Protection Agency (EPA), the State of Washington Department of Ecology (Ecology), the Department of Energy, Richland Operations Office (RL), and Westinghouse Hanford Company (WHC) have concluded that the analytes listed in Table 1 will be evaluated for their presence on a loop-by-loop basis. When it can be demonstrated through a letter detailing the process knowledge that a contaminant is not present in a loop, laboratory analysis for that constituent will not be performed. The flush solution will be designated as a dangerous waste if concentrations of any analyte in the matrix are greater than the concentrations in Table 1. If the flush solution is designated as a dangerous waste, the system will be re-flushed and sampled until sample results indicate the flush solution no longer contains dangerous waste constituents in regulated concentrations.

To achieve this data quality objective, it is crucial that the analytical effort properly address the required analytical quantification limits. Targeted analytical quantification limits for the PUREX flush analytes are listed in Table 1. Quality Assurance/Quality Control procedures for performing analyses on waste samples will be equivalent to methods outlined in SW-846, "Test Methods for Evaluating Solid Waste". Handling and preparation of samples will use SW-846 as guidance for methods and protocols when preparing and executing waste sampling. Table 2 summarizes the methods and handling protocol. Deviations from this guidance are identified in section 5.5.1 of this document. Any other deviations must be done in accordance with the Hanford Analytical Services Quality Assurance Plan (DOE/RL-94-55) and the Selection of Analytical Methods for Mixed Waste Analysis at the Hanford Site (DOE/RL-94-97) and reported to Ecology.

4.0 RESPONSIBILITIES

The responsibilities and descriptions below are related to activities occurring with waste designation of vessel systems located within the PUREX canyon and vaults.

PUREX Field Deactivation

- Perform sampling activities, including operation of the sampling equipment and sample collection.
- Document sampling activities in the PUREX logbook.

PUREX System Deactivation Engineering

- Support the sampling effort by developing and revising sampling procedures and assuring that the documentation is in place for sampling.
- Provide engineering and technical support.

PUREX Health Physics

- Provide Health Physics Technicians for radiological surveys associated with sampling activities and shipping.

PUREX Regulatory Compliance

- Provide Program Management & Integration with information to complete the Sampling Authorization Form (SAF) and the required QA/QC requirements as specified in Section 6.2 at the beginning of the calendar year or upon changes.
- Provide the Sampling and Mobile Laboratories with the RCRA sample date and location.
- Transmit data package to Generator and Waste Acceptance Services for a Waste Predetermination Report.
- Transmit data package with QA/QC and the Waste Predetermination Report to the State of Washington Department of Ecology and the Department of Energy (RL) Office.

Sampling and Mobile Laboratories (SML)

- Provide PUREX Field Deactivation with certified precleaned sample containers for all sampling activities.
- Provide sample labels for samples specifying the required analysis.
- Document sampling activities in a controlled log book.
- Initiate a chain of custody (COC) and request for special analysis (RSA) documentation for samples with complete and specific instructions on sample handling, preservation, analytical methods, and holding times.
- Provide the approved laboratory and Ecology's laboratory of choice with the date on which a sample is expected to arrive for analysis upon receipt of the total activity screening sample results from the 222-S Environmental Group.

- Package samples for shipping using SW-846 guidelines.
- Transport samples to the approved laboratory or shipping center.

222-S Environmental Group

- Perform Screening Analyses to determine if a sample can be taken to an offsite laboratory.
- File and provide PUREX Regulatory Compliance with a copy of the Chain of Custody (COC) and Request for Special Analysis (RSA) for each total activity screening sample.

Program Management & Integration/Sample Data Laboratory Administration

- Select onsite and offsite laboratories and arrange for laboratory analysis of waste characterization samples.
- Provide justification for the chosen laboratory and determine the acceptance criteria for the selected laboratory.
- Provide SML and PUREX Regulatory Compliance with the appropriate analytical methods, sample volumes, preservation, and holding times for the constituents of concern. A Sample Authorization Form (SAF) for a sampling event will be prepared at the beginning of a calendar year or upon changes to laboratory requirements.
- File chain of custody (COC) and internal request for special analysis (RSA) documentation for each sampling.
- Transmit data to Environmental Data Management Center.
- Prepare an analysis report which includes analytical data, COC, internal RSA, QC analyses, and a case narrative indicating any deviations to SW-846 handling and analysis protocol.

Generator and Waste Acceptance Services

- Designate the PUREX Canyon and Vault flush solutions as non-dangerous waste upon review of data packages.
- Provide PUREX Regulatory Compliance with a Waste Predetermination Report per data package.

5.0 SAMPLING

All sampling will be performed in accordance with job specific Hazardous Waste Operating Permit, Radiation Work Permits A-027 and A-042, PUREX Plant Operating Procedure requirements, and SW-846 protocol. The requirements for personal protective equipment to be worn during sampling will be identified in these documents.

5.1 SAMPLE LOCATION

The vessels to be sampled are located at the end of the flushing loops in the PUREX Canyon and Vaults. Table 3 lists the PUREX Canyon Vessel flushing loops.

5.2 SAMPLE IDENTIFICATION

A sample number will be obtained from the Hanford Environmental Information System (HEIS). The sample labels will be provided by SML and will include the following:

- identification of the person collecting the sample;
- a HEIS sample number;
- date and time the sample was collected;
- vessel identification from which the sample was obtained;
- the analysis or analyses to be performed on the sample;
- type of preservation.

5.3 SAMPLING EQUIPMENT

Sample containers will meet SW-846 cleanliness requirements by using commercially available, individually certified, pre-cleaned containers. The certification of the pre-cleaned condition will be maintained on file by the Sampling and Mobile Laboratory Organization.

5.4 SAMPLE COLLECTION

Samples will be collected per current applicable Plant Operating Procedures (PO-080-XXX) for each vessel. Due to limitations in the type of fixed sampling equipment installed in the vessel and high radiation dose rates, 20 mL volumes and containers will be used for each analyte. The minimum volumes requested by the approved laboratory will be met, but in multiple 20 mL vials.

5.5 SAMPLE HANDLING

A chain of custody (COC), request for special analysis (RSA), and any radiological documentation will be filled out thoroughly at the time of sampling and will accompany each sample. The chain of custody will comply with the most current revision of procedure LO-090-443, "Chain of Custody for RCRA/CERCLA Protocol Samples".

The preparation of a sample for shipment to a laboratory will comply with procedure EII 5.11 "Sample Packaging and Shipping" or an equivalent SML procedure. Collected samples will be sealed and stored at 4°C, plus or minus 2°C. The sample integrity will be maintained by SML through shipping.

A radiological screening (RAD) sample will be obtained per sampling event and analyzed by the onsite laboratory (222-S) prior to shipment. A Gamma Energy Analysis (GEA) will be performed to obtain additional isotopic information, if necessary. Should the RAD sample results not satisfy the WHC offsite laboratory acceptance criteria, the RCRA samples shall be analyzed by the onsite laboratory.

The approved laboratory, selected by AS/PM&I, will designate a sample custodian and a designated alternate responsible for receiving all samples. The sample custodian or an alternate will sign and date all appropriate receiving documents at the time of receipt and initiate an internal COC form using documented procedures. A continuous COC will be maintained from the time of sampling until final disposition of all samples.

The selected laboratory will store the collected samples for VOA, ICP metals, arsenic, selenium, and mercury at 4 degrees celsius until ready for analysis. Holding times and preservation for the collected samples will be observed as specified on the SAF. All samples are to be handled and analyzed per SW-846 or as specified on the SAF.

5.5.1 Deviations From SW-846

The SW-846 guidelines for sampling will be followed except for the protocols that cannot be met due to high radiation dose rates or sampling equipment limitations while collecting samples in the PUREX facility.

The deviations from these protocols are discussed below:

- Sample Dilutions: For samples with radiation dose rates exceeding safe levels (see Table 11, operating procedure PO-080-385), sample volumes may be limited to a maximum of 5 ml. For those samples exceeding the radiation dose limits, dilution of the sample may be required in order to obtain sufficient sample volume for the analysis and to reduce the dose rates to an acceptable level for handling. Several analytes may only be present in trace quantities. Due to this safety consideration, it is possible for their concentration to drop below the detectable limit after dilution. Quantification limits in Table 1 may not be met if sample dilution occurs. However, it is unlikely that the dose rate of flush solutions sampled will require dilution.
- Volatile Organic Analysis (VOA): The VOA requires for the sample vial to have zero headspace. This requirement may not be achieved while sampling the flush solution. Due to limitations of the existing sampling equipment and As Low As Reasonable Acceptable (ALARA) concerns, sufficient sample to achieve zero headspace may not be obtainable. However, every possible effort will be taken to achieve zero headspace.

Other deviations from SW-846 related to the sample collecting, handling, and analysis must be reported to Ecology. Analysis will be performed in accordance to Hanford Analytical Services Quality Assurance Plan (HASQAP) DOE/RL-94-55 and Selection of Analytical Methods for Mixed Waste Analysis at the Hanford Site, Section 3.0 (DOE/RL-94-97).

6.0 QA/QC REQUIREMENTS

6.1 FIELD LOGBOOK

All sampling activities associated with the PUREX canyon vessel flushing will be documented in field logbooks maintained by SML and in the PUREX facility. Field logbooks will be filled out by SML in accordance with EII 1.5 "Field Logbooks" or SML equivalent procedure, to ensure that a particular sampling situation can be reconstructed at some future time. Field logbooks which will be maintained at the PUREX facility will be filled out in accordance with plant operating procedure PO-080-385.

6.2 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

6.2.1 Samples

A radiological screening sample and two sets of RCRA samples will be collected by SML per sampling event. Per Ecology's request, WHC will provide Ecology with one set of RCRA samples to be shipped to the laboratory of their choice. This laboratory's acceptance criteria will depend on its current capability to accept RAD samples without violating its dose rate limits permitted under their license.

Field blanks will be prepared for the analytes listed in Table 1 by SML. Clean containers will be filled with Reverse Osmosis/De-Ionized (RO/DI) type II water at the sampling site for each set of RCRA samples. The blanks are sealed and accompany the samples to the laboratory for analysis. All blanks will be assigned HEIS numbers.

6.2.2 Quality Control

The field blank is a sample of analyte-free media prepared at the sampling site and accompanies the sample to the laboratory. A field blank is used to document contamination attributable to field handling procedures and the sampling environment. This type of blank is useful in documenting contamination of volatile organics samples. All blanks will be assigned HEIS numbers.

A matrix spike is an aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

A matrix spike duplicate is an intralaboratory split samples spiked with identical concentrations of target analyte(s). The spiking occurs prior to sample preparation and analysis. They are used to document the precision and bias of a method in a given sample matrix.

A matrix spike and matrix spike duplicate will be prepared by the approved laboratory for Volatile Organic Analysis (VOA), ICP Metals, Arsenic, Selenium, and Mercury analysis. The Total Organic Carbon (TOC) sample will be run in triplicate.

Any QA/QC requirement deviations from SW-846 requirements will be in accordance to Selection of Analytical Methods for Mixed Waste Analysis at the Hanford Site Section 3.4.

6.2.3 Data Reporting and Validation

The laboratory summary data package will contain:

- 1) All Chain of Custody and Laboratory internal Request for Special Analysis (RSA) forms,
- 2) Analytical Data,
- 3) Case narrative from the screening and RCRA sample analysis (signed by a Laboratory representative) to identify any anomalies and the corresponding corrective action,
- 4) A reference table indicating which field sample number corresponds to the laboratory sample number, and
- 5) All QC analyses performed on the samples. A case narrative will explain the absence of QA/QC samples related to field collection.

Data validation as defined by CERCLA will not be necessary. However, quality control requirements for each method as specified in SW-846 will be satisfied.

6.2.4 Quality Assurance

Method specific quality control calibrations and blanks are found in the analytical procedures. Sample quality control duplicates, spikes, and standards are identified in Table 2. If no criteria are provided in Table 2, the performing laboratory will perform to its quality assurance plan. The method specific and quality control sample concentrations will be compared to the data requirements specified in Table 1. PUREX Regulatory Compliance will be notified, prior to data reporting, should the quality control data not conform with the data requirements specified.

For exceeded holding times or improper preservation, the regulatory levels and data reported shall be compared. In most cases, a resampling effort may not be required if sufficient process knowledge can support below regulatory threshold levels.

Table 1 - PUREX Plant Canyon Vessel Flushing Analytes

Analyte	Dangerous Waste Designation Threshold (mg/L)	Quantification Limit* (mg/L)
Cadmium	1.0	0.5
Chromium	5.0	2.5
Lead	5.0	2.5
Barium	100.0	50.0
Silver	5.0	2.5
Arsenic	5.0	2.5
Selenium	1.0	0.5
Mercury	0.2	0.1
pH	pH<2 or pH>12.5	NA
Total Organic Carbon (TOC)	100,000 (10wt% based upon designation limits for tri-butyl phosphate)	50,000
Benzene	0.5	0.25
Carbon Tetrachloride	0.5	0.25
Chlorobenzene	100	50
Chloroform	6.0	3.0
1,2-Dichloroethane	0.5	0.25
1,1 Dichloroethylene	0.7	0.35
Methyl Ethyl Ketone	200	100
Tetrachloroethylene	0.7	0.35
Trichloroethylene	0.5	0.25
Vinyl Chloride	0.2	0.1

* If the concentration of an analyte cannot be analytically quantified below the quantification limit, it will be expressed as a less than value.

TABLE 2 - QA/QC REQUIREMENTS

PARAMETER	PROCEDURE 222-S LAB	EPA METHOD OFF-SITE LAB	HOLDING TIME	TRIPLICATE	SPIKE	SPIKE DUPE
VOA	LA-523-405	8240	14 days		X	X
ICP	LA-505-151	6010	6 months		X	X
As, Se	LA-505-402	7060,7740	6 months		X	X
Hg	LA-325-104	7470	28 days		X	X
TOC	LA-344-105	9060	28 days	X		
pH	LA-212-102	9040	ASAP		X	X
RAD Screen	Lab Specific	222-S	ASAP			

* Refer to Sampling Authorization Form for additional lab requirements

Table 3. Flushing Loops for the PUREX Canyon and Vault System Deactivation.

	System	No. of tanks	No. of columns	No. of misc. vessels
1	Flush K-Cell Vessels (T-J7, E-J8, TK-K1, T-K2, T-K3, E-K4, TK-K5, TK-K6)	3	3	2 concentrators
2	Flush L-Cell Vessels (T-J6, T-J4, TK-J5, T-L1, T-L2, TK-L3, T-L4, T-L5)	2	6	0
3	Flush Headend Feed Vessels and H1, H2 and F-Cell Vessels (TK-E1, TK-D4, TK-D3, TK-H1, T-H2, TK-F7, E-F6, TK-F26)	6	1	1 concentrator
4	Flush F and R Cell Vessels Part I (T-R1, TK-G1, T-G2, TK-G2, TK-G8)	4	1	0
5	Flush G and R Cell Vessels Part II (T-R2, TK-R2, TK-R8, TK-R5, D-R6, TK-R7, TK-G5, D-G6)	5	1	2 decanters
6	Flush Backcycle Waste and Neptunium Package Vessels (E-H4, TK-J1, TK-J21, T-J22, T-J23, TK-J3)	3	2	1 concentrator
7	Flush U-Cell Vessels (TK-U8, T-F5, TK-F3, TK-U5, E-U6-2, T-U6, TK-U4)	4	0	2 towers 1 reboiler
8	Flush Cladding Waste Vessels (TK-D2, TK-E3, G-E2, G-E4, and TK-E5)	4	0	2 centrifuges
9	Flush M1 Vessel	1	0	0
10	Flush J2 Vessel	1	0	0
11	Flush U3 Vessel	1	0	0
12	Flush D5, E6, F8, F13, F15, and F16 Vessels	6	0	0
13	Flush F11 System Vessels (TK-F10, E-F11, TK-F12, TK-F18)	3	0	1 concentrator
14	Flush Tank G7 (TK-G7, TK-G8)	2	0	0
15	Flush Tanks U1 and U2	2	0	0
	TOTAL VESSELS (72)			

7.0 REFERENCES

DOE/RL-94-55, Hanford Analytical Services Quality Assurance Plan, dated May 1994.

DOE/RL-94-97, Selection of Analytical Methods for Mixed Waste Analysis at the Hanford Site, dated September 1994.

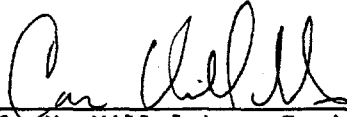
WHC-CM-1-6, Hanford Site Radiological Control Manual.

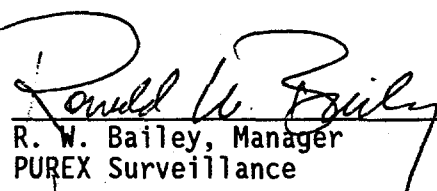
WHC-CM-4-3, Industrial Safety Manual, dated May 1988.


WHC-CM-7-7, Environmental Investigations and Site Characterization Manual, (latest revision).


EPA, Test Methods for Evaluating Solid Waste, 3rd Edition, EPA/Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C., (latest revision).


Document Title: Sampling and Analysis Plan for
Plutonium Uranium Extraction (PUREX) Plant Canyon Vessel
Flushing


Prepared by:  2-21-95
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PUREX Regulatory Compliance Date

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 2/27/95
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PUREX Deactivation Date

 2/22/95
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RCRA Compliance Support Date

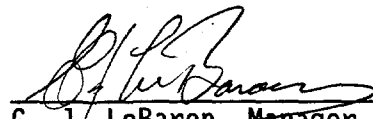
 2/22/95
J. R. Cooper, Program Manager
Program Management & Integration Date

Document Title: Sampling and Analysis Plan for
Plutonium Uranium Extraction (PUREX) Plant Canyon Vessel
Flushing



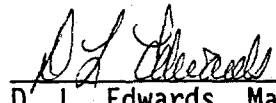
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