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ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT 602494

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5. Proj./Prog./Dept./Div.: Miscellaneous Streams	6. Cog. Engr.: S. J. Skurla	7. Purchase Order No.:
8. Originator Remarks: Please sign for approval for the attached Sampling and Analysis Plan for Miscellaneous Streams, WHC-SD-WM-PLN-069. All comments from the review have been dispositioned.		9. Equip./Component No.:
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16. KEY

Impact Level (F)	Reason for Transmittal (G)	Disposition (H) & (I)
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1	1	Cog.Eng. S.J. Skurla	S.J. Skurla	12/14/93	H6-25	J.D. Williams			R1-48	1	1
1	1	Cog. Mgr. J.J. Luke	J.J. Luke	12-14-93	H6-25					1	1
1	1	Env. QA M.J. Warn	M.J. Warn		H4-16	EPIC ~~(2)~~ (1)			H6-08	3	
1	1	B.P. Atencio			H6-25	Central Files (2)			L8-04	3	
1	1	C.D. Morrison-Beyer			S3-90						
1	1	M.S. Hendrix	Michelle Hendrix	12/15/93	H4-23						
1	1	D.R. Speer	D.R. Speer	12/16/93	R1-48						

18.	19.	20.	21. DOE APPROVAL (if required)
S.J. Skurla 12/14/93 Signature of EDT Originator Date	Authorized Representative for Receiving Organization Date	J.J. Luke 12-14-93 Cognizant/Project Engineer's Manager Date	Ltr. No. [] Approved [] Approved w/comments [] Disapproved w/comments

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Intended Audience: [] Internal [] Sponsor [X] External

Responsible Manager (Printed/Signature) Date: J. J. Luke, JJLuke, 11-2-93

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1. Total Pages 125

2. Title	3. Number	4. Rev No.
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7. Abstract

This SAP will give guidance and quality assurance for providing sample data to support permits given by Ecology for various miscellaneous streams at the Hanford Site.

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SAMPLING AND ANALYSIS PLAN FOR MISCELLANEOUS STREAMS

December 13, 1993

Prepared For:

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WHC Contract No. MJK-SVV-315924
Task Order 010

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FORWARD

This Sampling and Analysis Plan (SAP) consists of a Field Sampling Plan (FSP) and a Quality Assurance Project Plan (QAPjP). The FSP and QAPjP are contained in Part I and Part II, respectively, of this document. In accordance with the generally used format, the FSP describes the field activities to be performed during liquid effluent sampling, characterization, in addition to such items as sampling designation, and identifies sample analyses to be performed. The QAPjP further defines analytical methods, procedures, and documentation requirements. The QAPjP details all quality assurance/quality control procedures to be followed to ensure that usable and defensible data are collected during the liquid effluent characterization work.

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Part I

Field Sampling Plan (FSP)
for
Miscellaneous Streams

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ACRONYMS

BAT/AKART	Best Available Technology/All Known, Available, and Reasonable Technologies
BOD	Biological Oxygen Demand
CDF	Chemical Drain Field
CEL	Chemical Engineering Laboratory
CERCLA	Comprehensive Environmental Restoration, Compensation and Liability Act
COC	Chain of Custody
COD	Chemical Oxygen Demand
DOE	Department of Energy
DQO	Data Quality Objectives
Ecology	Washington State Department of Ecology
EERF	Eastern Environmental Radiation Facility
EII	Environmental Investigation Instruction
EMSL	Environment Monitoring and Standards Laboratory
EPA	Environmental Protection Agency
EPCRA	Emergency Plan and Community Right-to-Know Act
EPIC	Environmental Restoration (ER) Program Information Center
ETP	Effluent Treatment Programs
gpm	gallons per minute
HASM	Hanford Analytical Services Management
HEIS	Hanford Environmental Information System
HH	Halogenated Hydrocarbons
HPT	Health Physics Technician
ICP	Inductively Coupled Plasma
mg/L	milligrams per liter
NPDES	National Pollutant Discharge Elimination System
PAH	Polycyclic Aromatic Hydrocarbons
pCi/L	picocuries per liter
POC	Point of Compliance
QA	Quality Assurance
QAPjP	Quality Assurance Project Plan
QAPP	Quality Assurance Program Plan
QC	Quality Control
QR	Quality Requirement
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
S&ML	Sampling and Mobile Laboratory
SAF	Sampling Authorization Form
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SVOA	Semi-Volatile Organics Analysis
SWDP	State Waste Discharge Permit

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TBD	To Be Determined
TDS	Total Dissolved Solids
THM	trihalomethanes
TIC	Tentatively Identified Compound
TKN	Total Kjeldahl Nitrogen
TOC	Total Organic Carbon
TOX	Total Organic Halide
TSS	Total Suspended Solids
VOA	Volatile Organics Analysis
WAC	Washington Administrative Code
WHC	Westinghouse Hanford Company
μg/L	micro grams per liter
μS	micro Siemens

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FIELD SAMPLING PLAN (FSP) FOR MISCELLANEOUS STREAMS

1.0 INTRODUCTION

This Field Sampling Plan (FSP) has been developed in accordance with the Liquid Effluent Sampling Quality Assurance Program Plan (QAPP) and program objectives and guidance (WHC 1992). The QAPjP (Part II of this document) is intended to ensure that procedures, plans, and instructions are implemented and are appropriate for the control of sampling activities that satisfy SWDP permitting requirements. The FSP provides a method for obtaining a representative sample of the constituents of the effluent streams listed in Table 1-1. The method considers the fluctuation of constituent concentration, flow rate, raw water characteristics, and process knowledge. All known or suspected constituents associated with the effluent stream have been identified. The FSP also includes an implementation schedule that addresses the frequency of sampling as well as the specific quality assurance (QA) details regarding sample collection, transport, analysis, and data reporting required for this project.

This FSP supports efforts to characterize and designate the constituents of the waste water effluent. The objectives of the sampling program are given in Section 2.0. Process knowledge and facility descriptions are presented in Section 3.0. The rest of the report, Sections 4.0 through 8.0, specifies the sampling schedules and protocols that make up the sampling program.

Table 1-1. Ecology Consent Order Table 4 Miscellaneous Streams Addressed in this FSP

Effluent Stream	Current Disposal Site
100-N Sanitary Sewer System	100-N Sewage Lagoon
300 Area Sanitary Sewer System	300 Area Sanitary Sewer
183-N Filter Backwash	183-N Backwash Discharge Pond
272-E, 2703-E Buildings Waste Water	200-E Chemical Drain Field
200-W Powerhouse Ash Waste Water	200-W Powerhouse Ash Pit
200-E Powerhouse Ash Waste Water	200-E Powerhouse Ash Pit
400 Area Sanitary Waste Water	400 Area Septic System

2.0 SAMPLING OBJECTIVES

2.1 FIELD SAMPLING PLAN OBJECTIVES

This sampling and analysis plan for the Table 4 Miscellaneous Streams has been prepared to provide well documented data suitable for inclusion in an SWDP application. To this end, the FSP has the following objectives:

- Document the methods and frequency of sampling and the requirements for analysis to determine the constituents of the liquid effluent stream.
- Provide quality assurance requirements not covered by the Liquid Effluent QA Program Plan that are specific to these liquid effluent streams.
- Provide data to confirm process knowledge and previously measured analytes.
- Provide sufficient data on chemical and radiological constituents to accurately calculate loading and rate of migration to support the assessment of impacts of continued discharge.

The purpose of the sample results will be to provide supporting data for the SWDP Application. The results of the initial sampling will be evaluated and subsequent sampling may be determined by the monitoring requirements imposed by Ecology during the permit writing process.

2.2 RATIONALE FOR SAMPLING OBJECTIVES

The Miscellaneous Streams consist of relatively innocuous liquid discharges. At present, the principal contributors to the effluent streams are steam condensate, cooling water, and storm water drainage. These contributors (described in Section 3.2) are expected to contain no added radioactive and/or hazardous materials. In addition, administrative procedures and engineering barriers have been adopted at the various facilities to limit the entry of these materials into the effluent streams.

Section 9 of the 216 Consent Order, "Sampling and Analysis Plans," provides specific guidance on the selection of appropriate analytes of interest. The 216 Consent Order states that during SAP preparation, "the contaminant analysis requirements shall consider operational practices, raw water characteristics, process chemical additions, process knowledge, and all known or suspected constituents associated with each waste water stream." The major objective of the analyses is to provide data to support Section E of the SWDP Application. The data will confirm that the liquid effluents currently disposed to the various sites do not constitute a dangerous waste according to the classifications of WAC 173-303, specifically WAC 173-303-140, "Land Disposal Restrictions." In addition, the data generated by the SAP will support engineering evaluations of Best Available Technology/All

Known and Reasonable Treatment (BAT/AKART) for Ecology's consideration during SWDP writing.

Many of the analytes of interest for the individual streams have been determined based primarily on documented process knowledge (WHC 1993a) and inventories of chemical wastes regulated under the Superfund Amendments and Reauthorization Act (SARA). Selection of the analytes of interest is described in detail in Section 8.1 of this report. Although stream-specific data or data from similar streams (WHC 1993a) has been located for all seven of the streams listed in Table 1-1, determination of the analytes of interest and other sampling parameters for the Table 4 Miscellaneous Streams has not been based solely on this data. A positive indication of a contaminant as presented in the data was considered justification for the contaminant to be included on the list of analytes of interest. Other considerations, as outlined below, were also accounted for in the list of analytes.

WAC 173-200, WAC 173-216, WAC 173-221, and WAC 173-303 were used as the main regulatory references for inclusion of a constituent parameter of interest. The screening analyses presented in this SAP are in accordance with the applicable regulations and will be adequate to ensure identification of potential contaminants. Analytes of interest have been selected that:

- Have been detected previously
- Are considered a potential contributor based on process knowledge and are of regulatory concern
- Are included in a chemical inventory and stored or used in a manner such that they could routinely enter the wastewater stream
- Could provide information for calculation of soil loading or migration.

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3.0 SITE AND STREAM BACKGROUND

A specific description of each of the sites and streams listed in Table 3-1 may be found in Sections 3.0 through 8.0 of the characterization report for Miscellaneous Streams (WHC 1993a).

Table 3-1. Location of Site and Stream Background Information

Effluent Stream	Current Disposal Site	Characterization Report Reference Location
100-N Sanitary Sewer System	100-N Sewage Lagoon	Section 3.0
300 Area Sanitary Sewer System	300 Area Sanitary Sewer	Section 4.0
183-N Filter Backwash	183-N Backwash Discharge Pond	Section 5.0
272-E, 2703-E Buildings Waste Water	200-E Chemical Drain Field	Section 6.0
200-W Powerhouse Ash Waste Water	200-W Powerhouse Ash Pit	Section 7.0
200-E Powerhouse Ash Waste Water	200-E Powerhouse Ash Pit	Section 7.0
400 Area Sanitary Waste Water	400 Area Septic System	Section 8.0

4.0 RESPONSIBILITIES

WHC Effluent Treatment Programs (ETP) will manage the overall sampling project and act as a liaison between the facilities and the regulators. The appropriate facility manager is responsible for the sampling and analysis of the waste water generated by the facility. In this regard, the facility manager (or designee) is responsible for:

- Accuracy of this SAP (FSP and QAPjP)
- Proper execution of the SAP.

The following assignments are made to assist the facility manager in the execution of his or her responsibilities.

The appropriate facility manager (or designee) will act as the Sampling Task Leader as defined in WHC-SD-WM-QAPP-011 and is responsible for the following tasks:

- Evaluating final data packages against data quality objectives (DQO) set for these samples
- Overseeing the sampling activities, including: ensuring the correct sample point is used; assisting sampling team; ensuring facility safety guidelines are not compromised; arranging for appropriate equipment; providing trained personnel for sampling; and coordinating all field activities with established procedures
- Assisting with the waste water stream designation process
- Ensuring data results are appropriately reported and a data file containing the SAP, sampling logs, waste water flow records, analytical data packages, and resulting reports is maintained
- Requesting systems audits
- Developing, initiating, and tracking corrective actions (if needed).

Hanford Analytical Services Management (HASM) or ETP designee (HASM/ designee) is responsible for the following tasks:

- Identifying and approving the contract laboratory to perform chemical analysis for this sampling and analysis plan
- Monitoring the contract laboratory for quality performance
- Acting as an interface between the facility manager and the contract laboratory

- Receiving laboratory data packages
- Verifying that all laboratory results requested are received to ensure they are complete
- Validating contract laboratory data packages
- Supporting SWDP Applications by providing required data from the sample results.

The Resource Conservation and Recovery Act/Comprehensive Environmental Restoration Compensation and Liability Act (RCRA/CERCLA) sampling team is responsible for the following tasks:

- Supplying pre-printed labels
- Ensuring samples are representative
- Taking adequate blanks and other quality control samples as defined by SW-846, Chapter 1 (EPA 1986), and the specific details found in each analytical procedure
- Maintaining accurate and complete sampling logs
- Initiating a proper chain of custody (COC) for each sample
- Ensuring samples are properly packaged and shipped.

The Sampling Task Leader shall be responsible for scheduling operators and health physics technicians (HPTs) to support the sampling team; reviewing data logs and sampling; surveilling chain of custody of samples and data; and ensuring analytical data is filed with the Environmental Restoration (ER) Program Information Center (EPIC). The Sampling Task Leader shall prepare a data file on weekly composites in their offices and shall be responsible for maintenance of the file as quality records. The data in the file will include sampling logs, process flow records, analytical results, and calculations.

Sampling team members that perform protocol sampling shall have training in environmental sampling as discussed in WHC-CM-5-4, Section 4.0 (WHC 1993b). The sample collector shall make a written record of the sampling as required by procedure EII 1.5, WHC-CM-7-7 (WHC 1989). The data shall include the sample number, time, date, location, flow information, and observations as a minimum. Copies of the written record shall be submitted to the Sampling Task Leader. Originals will remain in controlled notebooks assigned to the sampling personnel.

The COC for protocol samples shall be maintained per QI 13.4, WHC-CM-4-2 (WHC 1988c) or equivalent, by the original sampler or member of the sampling team to the

laboratory or point of shipping. A copy of the shipping papers and COC form are provided to HASM/designee within 24 hours after shipping the sample. When the contracted laboratory's custodian receives the samples, he/she will complete the WHC COC form and provide a copy to HASM/designee with the data package. Completed chain of custody forms for protocol samples will be held by the HASM/designee. HASM/designee personnel will arrange for an approved onsite or offsite laboratory to do the analysis. This laboratory must meet the criteria of this FSP and QAPjP. Validation of protocol samples will be performed by HASM/designee to "Level B" in accordance with Section 2.0, "Data Validation for RCRA Analyses," of WHC-CM-5-3, Sample Management and Administration (WHC 1990a), or by another qualified organization using the same or equivalent procedures. HASM/designee will forward a copy of the data to the Sampling Task Leader and will be responsible for ensuring the data are properly prepared for public release and transmitted to the EPIC.

RCRA/CERCLA sampling team personnel will take responsibility for all phases of sampling for the samples they have drawn, including sample preservation, collection, storage, and shipment to the pre-arranged laboratory for analysis.

Facility operational health physics technicians will survey and release the sample containers per WHC-CM-4-10, Section 11.0 (WHC 1988a). RCRA/CERCLA sampling team personnel will deliver the radionuclide screening samples, taken at each sampling point to classify the total activity of the samples for shipping purposes, to the 222-S Laboratory. Sampling personnel are responsible for packaging the samples correctly, preparing papers to ship the samples to the analytical laboratory, and delivering the samples to Westinghouse Hanford shipping after total activity screening has been completed by 222-S Laboratory personnel. The laboratory will use an internal method, LA-548-111, to measure total alpha and beta activity in the sample. The results will be compared to release limits in WHC-CM-4-10, Section 11.0, "Control and Storage of Radioactive Materials and Equipment." Handling and shipping of the samples will be performed in compliance with the requirements of WHC-CM-2-14, "Hazardous Material Packaging and Shipping" (WHC 1991a).

5.0 SAMPLING LOCATION, FREQUENCY, AND SCHEDULE

5.1 SAMPLING LOCATION

Sampling locations were chosen as the most downstream location accessible in order to most accurately reflect the waste stream as it reaches the disposal site. Table 5-1 provides a list of the Miscellaneous Streams disposal sites, and individual sampling locations are found in Appendices A-1 through A-6.

5.2 SAMPLING FREQUENCY AND SCHEDULE

The sampling scheme is designed to ensure representative samples by following SW-846 (EPA 1986) sampling protocol. This protocol requires that a sufficient number of samples be taken over a sufficient time period to characterize the variability or uniformity of the stream. Process knowledge was relied on to determine the potential variability in the effluent streams. The frequency of sampling was adjusted in order to obtain a representative sample. Wherever possible, grab samples will be collected on a random basis, and the selection of a sampling date will be performed by randomly choosing one of the available workdays of the period to be sampled. Details for each individual stream are found in Appendix A.

Field duplicate samples, field blanks, trip blanks, and equipment blanks and other Quality Control (QC) samples will be taken during each sampling event as defined in the referenced procedures and Section 10 of the Miscellaneous Streams QAPjP (Part II of this document). A sample of the sanitary and/or raw water supply (the major components of the effluent streams) also will be taken during each sampling event and analyzed for the full set of analytes listed in the appropriate appendix. The duplicate samples, blanks, and other QC samples will be evaluated per Section 2.0 of WHC-CM-5-3 (WHC 1990a), or by another qualified organization using the same or equivalent procedures. Sanitary or raw water samples (as appropriate to the stream) are to be taken and will provide information on initial water quality for water used in the various processes and allow more accurate assessment of the impact of facility uses on the water quality.

Due to the inconsistent nature of the flow rate of some of the liquid effluents from some of the facilities, the flow may at times diminish to a level insufficient for sampling. In this case, adherence to the above described sampling frequency and schedule may not be possible. Modifications to the sampling frequency and schedule may be made to insure the availability and representativeness of the effluent stream during the sampling event.

Table 5-1. Consent Order DE 91NM-177 Table 4 Miscellaneous Streams Addressed in this SAP

Effluent Stream	Current Disposal Site
100-N Sanitary Sewer System	100-N Sewage Lagoon
300 Area Sanitary Sewer System	300 Area Sanitary Sewer
183-N Filter Backwash	183-N Backwash Discharge Pond
272-E, 2703-E Buildings Waste Water	200-E Chemical Drain Field
200-W Powerhouse Ash Waste Water	200-W Powerhouse Ash Pit
200-E Powerhouse Ash Waste Water	200-E Powerhouse Ash Pit
400 Area Sanitary Waste Water	400 Area Septic System

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6.0 SAMPLE DESIGNATION

6.1 PROTOCOL SAMPLE LABELING

Labels for protocol samples shall be furnished by the RCRA/CERCLA sampling team. The labels will require the following information to be recorded by a member from the sampling team: identification of the sampler; a unique sample identification number; date and time the sample was collected; the place the sample was collected; preservative type if added; and analyses to be performed on the aliquot. In addition, each bottle shall be identified with the bottle lot number and individual bottle number. Sample numbers will be assigned by HASM/designee using the Hanford Environmental Information System (HEIS).

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7.0 SAMPLING EQUIPMENT AND PROCEDURES

7.1 PROTOCOL SAMPLES

A. Equipment

Samples may be obtained at the discharge location by using a dipper or other apparatus as described in Volume 2, Chapter 9 of SW-846 (EPA 1986).

Preventive maintenance on protocol sampling equipment will be performed by S&ML personnel as required. Preventive maintenance will consist of the following tasks:

- Keeping on hand the appropriate bottles and sampling apparatus (dipper, etc.) to obtain the samples discussed below and in Section 8.0

- Ensuring that sampling equipment has been prepared according to EII 5.5, "1706 KE Laboratory Decontamination of RCRA/CERCLA Sampling Equipment," WHC-CM-7-7 (WHC 1989) or equivalent.

Sample bottles shall be new, commercially available, certified precleaned glass or plastic bottles as appropriate. The exact sample volumes and number of containers are prescribed by the contract analytical laboratory and are subject to change; however, representative examples for the analytes of interest are provided in Section 8.0

B. Procedures

The protocol sampling procedures have been discussed in Section 4.0 and are summarized in Table 7-1. These documents are based on recommended practices found in SW-846, Volume 2, Chapter 9.

Corrective Action requirements are those identified in Section 14.0, "Corrective Actions" of the Liquid Effluent Sampling QAPP (WHC 1992). Document control will meet the requirements of WHC-CM-4-2, "Quality Assurance Manual," Section Quality Requirement (QR) 6.0 (WHC 1988c).

Table 7-1. Supporting Procedures for Field Sampling Plan Activities

	Procedure/Section Number	Source Document
Field Logbooks	1.5	WHC-CM-7-7
Indoctrination, Training & Qualification	4.0	WHC-CM-5-4
Administration of Radiation Surveys	2.3	WHC-CM-7-7
Chain of Custody	QI 13.4	WHC-CM-4-2
Field Documentation of Drilling, Well Development, and Sampling Equipment	5.4	WHC-CM-7-7
1706 KE Laboratory Decontamination of RCRA/CERCLA Sampling Equipment	5.5	WHC-CM-7-7
Onsite Packaging Systems	II2.7	WHC-CM-2-14
Offsite Packaging Systems	II2.8	WHC-CM-2-14
Onsite Routine Radioactive Shipments	IV1.4	WHC-CM-2-14
Offsite Shipping Procedures	IV3.0	WHC-CM-2-14
Data Validation for RCRA Analysis	2.0	WHC-CM-5-3
Control and Storage of Radioactive Materials and Equipment	11.0	WHC-CM-4-10

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8.0 SAMPLE ANALYSIS AND HANDLING

8.1 SAMPLE ANALYSIS

Samples for each stream will be analyzed for the constituents identified in Appendices B through G. The analytes and screening analyses chosen were based on constituents known or suspected to be associated with the waste water stream and were determined after review of constituents detected during past characterization activities (including sampling results), assessment of process knowledge, and evaluation of chemicals stored in the plant (WHC 1993a). Based on the process knowledge discussed in the previous chapters, it was decided that some of the waste characterization tests discussed in WAC 173-303 would not be required for these Table 4 Miscellaneous Streams. These include ignitability and reactivity, % Halogenated Hydrocarbons (HH), and % Polycyclic Aromatic Hydrocarbons (PAH).

Any analyte that had been detected in previous sampling, was considered a potential routine contributor to the effluent stream, or was requested in Section E of the SWDP application, was further considered. Another group of analytes was chosen to assist in the objective of providing data for calculation of soil loading and potential ground water impacts. These analytes are those listed in Washington Ground Water Quality Standards (WAC 173-200). It is recognized that WAC 173-200 defines allowable constituent concentration levels at the groundwater as the Point of Compliance (POC). Although the WAC 173-200 limits are not directly applicable to these end-of-pipe waste water streams, they supply target concentration limits and an indication of the water quality being released. A third group of analytes has no regulatory reference, but these analytes have been detected in the effluent stream and are included for purposes of providing data for calculation of soil loading and detecting process upsets.

For each of the Table 4 Miscellaneous Streams, the data has been evaluated against two major lists. The first list of analytes are those listed in WAC 173-200 (Table 8-1). This list of analytes includes most of the analytes called out in Section E of the SWDP application as well as additional analytes such as selected radionuclides. The Groundwater Quality Standards will be the ultimate regulatory criteria against which these streams will be considered. The second list (Table 8-2) represents those analytes that are not part of the WAC 173-200 list, but that are listed in Part E of the SWDP application form, as well as miscellaneous laboratory screening analyses that are general in nature and provide data for detecting process upsets and unknown constituents.

In both tables there is a "Summary Data/Reference" column where available data is summarized and referenced, and an "Assessment" column where we have indicated decisions regarding sampling. The qualifiers A, S, P, and K were taken from the SWDP application form and are explained in the table footnotes. A "yes" in this column indicates that the constituent should be analyzed. The third table (Table 8-3) for each stream lists the suggested analyses that result from our evaluation of all available information.

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Table 8-1. Selected WAC 173-200 Ground Water Quality Criteria Compared to the Miscellaneous Stream Effluent

Parameter[1] / Regulatory Limit[2]	Summary[3] Data / Reference[4]	Assessment[5]
PRIMARY CONTAMINANTS		
Barium / E1 / 1.0		
Cadmium / E1 / 0.001		
Chromium / E1 / 0.05		
Lead / E1 / 0.05		
Mercury / E1 / 0.002		
Selenium / E1 / 0.01		
Silver / E1 / 0.05		
Fluoride / E1 / 4		
Nitrate (as N) / E1 / 10		
Total Coliform Bacteria / E1 / 1 in 100 ml (200-400 in 100 ml)[6]		
SECONDARY CONTAMINANTS		
Copper / E1 / 1.0		
Iron / E1 / 0.30		
Manganese / E1 / 0.05		
Zinc / E1 / 5.0		
Chloride / E1 / 250		
Sulfate / E1 / 250		
Total Dissolved Solids / E1 / 500		
Foaming Agents / 0.5		
pH / E1 / 6.5-8.5 (6-9)[6]		
Corrosivity / noncorrosive		
Color / 15 color units		
Odor / 3 threshold odor units		
RADIONUCLIDES[7]		
Gross Alpha Particle Activity / 15		
Gross Beta Particle Activity / 50		
Tritium / 20,000		
Strontium-90 / 8		
Radium 226 & 228 / 5		

Table 8-1. Selected WAC 173-200 Ground Water Quality Criteria Compared to the Miscellaneous Stream Effluent (cont.)

Parameter[1] / Regulatory Limit[2]	Summary[3] Data / Reference[4]	Assessment[5]
Radium-226 / 3		
CARCINOGENS[6]		
Acrylamide / 0.02		
Arsenic / 0.05		
Bromodichloromethane / 0.3		
Bromoform / 5		
Chlorodibromomethane / 0.5		
Chloroform / 7.0		

[1] There were no pesticides used in this process, so they were not included in the table. In order to conserve space, only the trihalomethanes and arsenic were routinely listed unless the specific waste stream analysis or process knowledge indicated the presence of additional compounds.
[2] mg/L unless otherwise noted. Notation / E1 / indicates the constituent is present in Section E of the SWDP application.
[3] The data was obtained from a previously published document (WHC 1993a).
[4] References refer to the specific table in the characterization document (WHC 1993a) or other references as noted.
[5] Similar qualifiers to those used in the SWDP application form (Section E) were used in this table in order to help indicate the reason for decisions to analyze or not. The qualifiers are:

A = The chemical is not likely to be in the waste stream because it is not used in the process or the site. Note: We have amplified this definition to include chemicals onsite but with no credible means to gain entry to the effluent stream.

S = The chemical is not used in the process, but is present and a credible mechanism for entry into the stream exists.

P = The chemical is likely to be present because it is used in the process or is part of the expected effluent for any reason.

K = The effluent has been tested for the parameter.

[6] Potentially applicable discharge standard from WAC 173-221-040.
[7] pCi/L unless otherwise noted.
[8] μg/L unless otherwise noted.

Table 8-2. Additional Water Quality Analyses from Part E of the SWDP Application and Screening Analyses[1]

Parameter / Regulatory Limit[2]	Summary Data[3] / Reference[4]	Decision[5]
PART E ANALYSES		
Conductivity (μS) / NA		
Total Suspended Solids (TSS) / 30-45[6]		
BOD (5 Day) / 30-45[6]		
COD / NA		
Ammonia-N / NA		
TKN-N / NA		
Orthophosphate-P / NA		
Total-Phosphorous-P / NA		
Total Oil and Grease / NA		
Calcium / NA		
Magnesium / NA		
Sodium / NA		
Potassium / NA		
SCREENING ANALYSES		
Total Organic Carbon (TOC) / NA		
Total Organic Halide (TOX) / NA		

[1] The additional analyses from Part E of the SWDP application are included as appropriate to help monitor the process and to detect upsets.
[2] mg/L unless otherwise noted.
[3] The data was obtained from a previously published characterization document (WHC 1993a).
[4] References refer to the specific table in the characterization document (WHC 1993a) or other references.
[5] Similar qualifiers to those used in the SWDP application form (Section E) were used in this table in order to help indicate the reason for decisions to analyze or not. The qualifiers are:

A = The chemical is not likely to be in the waste stream because it is not used in the process or the site. Note: We have amplified this definition to include chemicals onsite but with no credible means to gain entry to the effluent stream.

S = The chemical is not used in the process, but is present and a credible mechanism for entry into the stream exists.

P = The chemical is likely to be present because it is used in the process or is part of the expected effluent for any reason.

K = The effluent has been tested for the parameter.

[6] Potentially applicable discharge standard from WAC 173-221-040.

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Table 8-3. Analytes of Interest for the Selected Miscellaneous Stream

Analyte	Analytical Procedure[1]	Container[2]	Container Size (ml)	Suggested Preservatives[2]	Holding Time
ICP METALS					
As	200.7[3]/6010[4]	P,G	1000	HNO_3 to pH < 2	6 mo
Ba	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cd	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cr	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Pb	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Se	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Ag	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cu	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Fe	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Mn	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Zn	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Na	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Ca	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Mg	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
K	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
CV/AA METALS[3]					
Hg	245.1	P,G	500	HNO_3 to pH < 2	28 d
ANIONS[3,5]					
Fl^-	340.2	P,G	125	None	28 d
Cl^-	325.3	P,G	125	None	28 d
SO_4^{-2}	375.4	P,G	125	Cool to 4°C	28 d
NO_3^-	353.3	P,G	125	H_2SO_4 to pH < 2, Cool to 4°C	28 d
WASTE WATER[3]					
pH	150.1	P,G	25	None	ASAP
Conductivity	120.1	P,G	100	Cool to 4°C	28 d
TDS	160.1	P,G	100	Cool to 4°C	7 d
TSS	160.2	P,G	100	Cool to 4°C	7 d
BOD	405.1	P,G	1000	Cool to 4°C	48 hrs
COD	410.4	P,G	50	H_2SO_4 to pH < 2, Cool to 4°C	28 d
Ammonia (as N)	350.3	P,G	400	H_2SO_4 to pH < 2, Cool to 4°C	28 d

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Table 8-3. Analytes of Interest for the Selected Miscellaneous Stream (cont.)

Analyte	Analytical Procedure[1]	Container[2]	Container Size (ml)	Suggested Preservatives[2]	Holding Time
TKN (as N)	351.3/351.4	P,G	500	H_2SO_4 to pH < 2, Cool to 4°C	28 d
Orthophosphate (PO_4^{3-})	365.1,2,3	P,G	50	H_2SO_4 to pH < 2, Cool to 4°C	28 d
Total Phosphorous	365.2	P,G	50	H_2SO_4 to pH < 2, Cool to 4°C	28 d
Total Oil and Grease	413.2	G	1000	H_2SO_4 or HCl to pH < 2, Cool, 4° C	28 d
Fecal Coliform (total)	SM908[6]	P,G	100 (2 btls)	Cool 4°C	6 hr
CARCINOGENS					
Arsenic (see ICP metals)	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Acrylamide	8015	G	40	Cool 4°C, 0.008% $Na_2S_2O_3$	7 d/40 d[9]
PAHs	8310	G	1000	Cool 4°C, 0.008% $Na_2S_2O_3$	7 d/40 d[9]
VOA[10]	624/8240[10]	G	40	Cool 4°C, 0.008% $Na_2S_2O_3$	14 d
SVOA[10]	625/8250[10]	G	1000	Cool 4°C, 0.008% $Na_2S_2O_3$	7 d/40 d[9]
SCREENING					
TOC	9060	G	250	Cool to 4°C, HCl or H_2SO_4 to pH < 2	28 d
TOX	9020	G	250	Cool to 4°C, H_2SO_4 to pH < 2	7 d
RADIONUCLIDES[4,6,7,8]					
Gross alpha	9310/900.0	P,G	1000	HNO_3 to pH < 2	6 mo
Gross beta	9310/900.0	P,G	1000	HNO_3 to pH < 2	6 mo
^3H	WHC[7,8]	P,G	1000	HNO_3 to pH < 2	6 mo
Sr-90	WHC[7,8]	P,G	1000	HNO_3 to pH < 2	6 mo
Radium 226 & 228	9315/903.0	P,G	1000	HNO_3 to pH < 2	6 mo
Radium 226	9315/903.1	P,G	1000	HNO_3 to pH < 2	6 mo

[1] The analytical procedures listed are provided for illustration. Any of the procedures listed in the Liquid Effluent QAPP (WHC 1992a) are acceptable.
[2] P = Plastic; G = Glass; Preservatives may differ from those suggested, with concurrence of HASM.
[3] EPA-600/4-79-020, Methods for the Chemical Analysis of Water and Wastes, US EPA, EMSL, 1979.
[4] Test Methods for Evaluating Solid Wastes, SW-846, Third Edition, US EPA/Office of Solid Waste and Emergency Response, 1990.
[5] EPA-600/4-84-017, The Determination of Inorganic Anions in Water by Ion Chromatography, US EPA, 1984 (alternate method).

Table 8-3. Analytes of Interest for the Selected Miscellaneous Stream (cont.)

[6] APHA, 1989, Standard Methods for the Examination of Water and Waste Water, APHA-AWWA, WPCS, February 1989, 17th Edition.

[7] WHC Methods Equivalent to EPA-600/4-80-032, Prescribed Procedures for Measurement of Radioactivity in Drinking Water, US EPA, 1980.

[8] EPA-520/5-84-006, Eastern Environmental Radiation Facility (EERF) Radiochemistry Procedures Manual, US EPA, 1984.

[9] 7 days to extract, 40 days after extraction.

[10] When recommended for testing, the entire target compound list (TCL) of the SW-846 Methods for VOA and SVOA will be requested as well as tentatively identified compound (TIC) reporting.

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Appendices B through G contain these three tables for each stream as applicable. In addition, each appendix contains tables for each stream which include pertinent comparisons to source water, sanitary waste water (like streams), and ground water, as appropriate. These were used to formulate decisions as to which waste water constituents to analyze.

The analyses proposed for each stream are a subset of those in Tables 8-3, and provide a means to detect the individual constituents of interest. The inclusion of a number of screening analyses (pH, TOC, TDS, TOX) will also provide a warning if there were to be a failure of engineered or administrative barriers. In addition, samples submitted for semi-volatile (Method 8270) and volatile (Method 8240) testing will request a complete analysis of the target compound list (TCL) for the method, as well as Tentatively Identified Compound (TIC) reporting. It is anticipated that the analytes and analyses proposed in Table 8-2 will only be performed one time. If the results of the continuing analyses confirm their absence, or Ecology does not require them for monitoring as a permit condition, these analyses may be dropped.

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Detection limits for the various constituents and screening analyses shall be consistent with the limits given in each applicable reference procedure. The methods chosen and listed in Table 8-3 for protocol samples are those called out in the Table 4 Miscellaneous Streams QAPjP.

8.2 ALTERNATIVE SAMPLE ANALYSES

The discussion above led to an extensive analytical list for each of the Miscellaneous Streams. The analytical lists so generated are thought to have the best chance for regulatory acceptance, but would be costly and time consuming to implement. An alternative approach is discussed below.

The Table 4 Miscellaneous Streams by their very designation are thought to be free of regulated hazardous chemicals. The streams may be split into two large categories:

- Non-Sanitary Sewage Containing Wastewaters or Industrial Wastewater
- Sanitary Sewage Containing Wastewaters or Domestic Wastewater.

Table 8-4 lists the miscellaneous streams split into these two categories. The two categories could be sampled and analyzed for a standard suite of industrial or domestic wastewater analytes. Table 8-5 lists the recommended analyses/analytes if this alternative is chosen. The use of this SAP to sample and analyze the constituents listed in Table 8-5 would provide defensible data suitable for inclusion in SWDP applications, and may provide Ecology with adequate information on which to base subsequent routine monitoring required by the permit conditions.

Table 8-4. Categories of Table 4 Miscellaneous Streams

EFFLUENT STREAM GROUP	
Industrial Wastewater[1]	**Domestic Wastewater[1]**
• 183-N Filter Backwash • 272-E, 2703-E Buildings Wastewater • 200-E Powerhouse Ash Wastewater • 200-W Powerhouse Ash Wastewater	• 100-N Sanitary Sewer System • 300 Area Sanitary Sewer System • 400 Area Sanitary Wastewater

[1] Definitions of Industrial Wastewater and Domestic Wastewater taken from WAC 173-216.

Table 8-5. Analytes and Analyses Recommended for Miscellaneous Stream Alternative Analyses

Category	Constituent	Suggested Method[1]
Industrial Wastewater	Conductivity	120.1
	pH	150.1
	TDS	160.1
	TSS	160.2
	NO_3^-	353.3
	Total Phosphorous	365.1/365.2/365.3
	Chloride	325.3
	Sulfate	375.4
	TOC	9060
	Total Oil and Grease	413.2
Domestic Wastewater	All above	All above
	Fecal Coliform	SM908
	TKN	351.3/351.4
	BOD	405.1

[1] The analytical procedures listed are provided for illustration. Any of the procedures listed in the Liquid Effluent QAPP (WHC 1992a) are acceptable.

8.3 SAMPLE HANDLING

The handling and preparation of samples will comply with the procedures discussed in Section 4.0. A COC form will be filled out and will accompany each protocol sample. A sample may consist of several containers. The COC will account for each container. The preparation of either a single or a group of samples for shipment to a laboratory shall comply with the supporting procedures listed in Table 7-1, or equivalent.

A COC form will be filled out at the time of bottle preparation (preservative addition and pre-labeling) and will accompany each sample. Once the sample has been drawn, it must be in the physical control or view of the custodian, locked in an area where it cannot be

tampered with, or prepared for shipping with tamper-proof tape applied. Physical control includes being in the sight of the custodian, being in a room that will signal an alarm when entered, or locked in a cabinet. When more than one person is involved in sampling, one person shall be designated and only that person signs as sampler. This person is the custodian until the samples are transferred to another location, group, or sampler, and shall sign when releasing the samples to the designated receiver. A private carrier used to transport the samples and COC documentation should be bonded.

Field notes will be kept by sampling personnel that identify date, time, weather conditions, plant operational status, and any other relevant information from each sampling event. Field notes will be completed per guidance in Section 6.0 of the Liquid Effluent Sampling QAPP and EII 1.5, "Field Logbooks," WHC-CM-7-7 (WHC 1989) (Table 7-1).

The approved laboratory shall designate a sample custodian and a designated alternate responsible for receiving all samples. The sample custodian or his alternate shall sign and date all appropriate receiving documents at the time of receipt and at the same time 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.

Analytical procedures for protocol samples shall meet the quality assurance requirements of SW-846 (EPA 1986). The statement of work for completing the analysis shall require the approved laboratories to have existing standard operating procedures and to submit any changes in their procedures during the contract term to the HASM/designee for approval. The approved laboratory procedures shall describe quality control, calibration, data reduction, verification, and reporting in sufficient detail to ensure compliance with the Liquid Effluent Sampling QAPP.

The protocol samples will be routed to an approved WHC participant contractor or subcontractor laboratory for analysis consistent with SW-846 (EPA 1986) requirements. The data will be considered representative when at least 90 percent of the data points meet the established requirements in the laboratory contract for precision and accuracy. The established limits for accuracy and precision shall be consistent with SW-846 (or other applicable procedure) requirements. QC sample results will be reviewed against the laboratory or method specific acceptance criteria for accuracy and precision. Accuracy and precision acceptance criteria will be equal to or better than those specified by the QAPjP. Data which does not meet this objective will be reviewed to determine whether the data can be used or whether corrective action should be taken. If necessary, corrective action will consist of repeating the sampling and analysis activity. Corrective action methods are as discussed in Section 14.0 of the QAPjP. All data will be sent to the WHC EPIC. Data which is not acceptable should be flagged to identify its status.

All sampling and analytical data and field notes will be maintained by the Sampling Task Leader as quality records. Copies of the Sample Analysis Request Form, Chain of Custody, activity screening results, and shipping papers will be forwarded to HASM/ designee as discussed in Section 4.0. The original shipping papers accompany the sample. Copies of the Sample Analysis Request Form and Chain of Custody will be returned to HASM/designee

HASM/designee from the laboratory after the samples are received. The original shipping papers will be kept by the laboratory with the copies maintained by HASM/designee.

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9.0 REFERENCES

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Ecology, EPA, and DOE-RL, 1990, *Hanford Federal Facility Agreement and Consent Order*, First amendment, two volumes, 89-10 Rev. 1, Washington State Department of Ecology, Olympia, Washington, U.S. Environmental Protection Agency, Region X, Seattle, Washington, and U.S. Department of Energy, Richland Operations Office, Richland, Washington.

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EPA, 1987, *Land Disposal Restrictions*, Title 40, Code of Federal Regulations, Part 268 as amended, U. S. Environmental Protection Agency, Washington DC.

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APPENDIX A

SAMPLING LOCATION, FREQUENCY, AND SCHEDULE

Appendix A-1: 100-N Sanitary Sewer System

A duplicate sample is recommended to establish the effectiveness of the 100-N Sanitary Sewer System and demonstrate compliance with WAC 173-221, AKART Treatment Efficiency Guidelines. Influent samples can be obtained from Lift Station #1. Although WAC 173-221 does not exactly apply to this system, it is likely that Ecology would require a demonstration that the sewage treatment system is performing AKART. The discharge standards shown below provide an example of what may be required.

Table A-1. WAC 173-221-040, Domestic Wastewater Facility Discharge Standards[1]

Constituent	30-Day Average Limit	7-Day Average Limit
BOD	45 mg/L	65 mg/L
TSS	45 mg/L	65 mg/L
Fecal Coliform	200/100 ml	400/100 ml
pH	6-9	6-9

[1] In addition, the 30-day average BOD and TSS percent removal shall not be less than 85%.

It is recommended that at least one influent sample be taken for the constituents listed above in addition to the effluent sample recommended below.

An effluent sample will be taken of the effluent from the "stabilization pond" that flows into the final infiltration pond. This sample could either be taken at the end of the pipe leading into the infiltration pond or at a manhole between the stabilization pond and the infiltration pond. The pipe is on a hill in the infiltration pond surrounded by rocks and is difficult to access. The manhole would be easy to access with a pole and a bottle and is the recommended sampling point. There is enough flow so that effluent could flow into a dipper.

The flow into the infiltration pond varies markedly over 1 year's time. In the summer heat, the flow may decrease to zero, while in the winter the flow may increase to 8 gallons per minute (gpm). In order to obtain a representative sample, it is recommended that duplicate random samples be taken in the April-October timeframe and a duplicate random sample be taken in the November-March timeframe. This corresponds to a stratified random sampling methodology as discussed in SW-846, Chapter 9 (EPA 1986).

Appendix A-2: 300 Area Sanitary Sewer System

A duplicate sample is recommended to establish the effectiveness of the 300 Area Sanitary Sewer treatment system (septic tank and infiltration trenches) and demonstrate compliance with WAC 173-221, AKART Treatment Efficiency Guidelines. Although WAC 173-221 does not apply to this system, it is highly likely that Ecology would require a demonstration that the sewage treatment system is performing AKART. The discharge standards shown previously in Table A-1 provide an example of what may be required.

It is recommended that at least one influent sample be taken for the constituents listed in Table A-1, in addition to the effluent sample recommended below. Influent samples can be obtained from the sanitary sewer manhole near the septic tank.

Effluent samples could be obtained from the distribution weir at the head of the two infiltration trenches. There does not appear to be any operational reasons for significant variation in sewer flow rate or composition over the calendar year. It would be expected that weekdays would be the times of highest use, thus it is recommended that a single duplicate sampling occur on a randomly picked weekday.

Appendix A-3: 183-N Filter Backwash

The discharge point for this waste stream is a 14-in. vertical pipe. The disposal site is located approximately 1/4 mile southeast of the 1324-N Facility. The disposal site consists of three adjoining portions: a rectangular portion, a neck, and a dry pond. At the north end of the rectangular portion is a vertical outlet pipe (14 in. in diameter) rising above the ground about 4 in. The outlet pipe is surrounded on four sides and above by a chain link fence. The sample could be taken at that point, but the 183-N Filter Backwash Sump may be a better place to sample because it is more accessible and is under cover.

While the various sumps discharge through the 183-N Backwash Sump, they do so on a variable basis. Table A-2 represents our current estimate of the frequency of discharge for the contributors to this waste stream. Also listed is the suggested frequency of sampling. Close coordination with operations personnel may allow the number of sampling events to be decreased. For example, if a number of the smaller sumps were pumped to the 183-N Filter Backwash Sump prior to pumping to the backwash pond, a pooled sample could be obtained.

Table A-2. Various Contributors to the 183-N Backwash Pond (WHC 1993a)

Contributing Sump/Trench	Number of Discharges per Month	Suggested Sampling Frequency
183-N Filter Backwash Sump	54	2 duplicate samples picked randomly from the 54 discharges in a month
163-N Demineralizer Sump	Intermittent	one duplicate sample
108-N Sump	Intermittent	one duplicate sample
163-N Trench	Intermittent	one duplicate sample
183-N Sludge Sump	Intermittent	annual

Appendix A-4: 272-E, 2703-E Building Waste

A process sewer line originates at the 272-E Building and runs north past the 2703-E Building. This sewer line carries waste water discharges from these buildings to the chemical drain field (CDF). Two sampling points have been identified for the

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characterization of this stream. The reasoning for choosing these two sampling points is given below.

There are four manholes along the process sewer line leading from the 272-E Building to the CDF. These are: MHP1E, MHP2E, MHP3E, and MHP4E. All four manholes are located prior to the process sewer line tie-in from the 2703-E Building. Therefore, the manholes cannot be used to sample the waste coming from the Chemical Engineering Laboratory (CEL), 2703-E.

In addition, there does not appear to be any waste water routinely being discharged from the process sewer line. This is indicated by the lack of green vegetation at the headwall. The headwall is also covered with sagebrush that has collected there, and access would be difficult. For these reasons, the approach for sampling the CDF stream will be to sample the discharges from the 272-E and 2703-E Buildings separately.

The 272-E Building houses a pipe and rotating equipment fabrication shop. Water from the hydrotesting of piping jumpers is the sole contributor from this facility to the stream. There is no sump inside the building that holds liquid so it cannot be easily sampled at that point. Manhole number MHP1E, a possible sampling point, is located just outside the building. This may be the best sampling point for the stream discharging from the 272-E Building because the flow of water from the building is not great, and will only decrease further down the line. A site visit in July 1993 showed that a small pool of water exists on one side of the manhole and a trickle of water leads out the other side.

There are two other manholes along this process sewer line: MHP3E and MHP4E. Both are located further down the process sewer line and before the 2703-E Building ties into the line. The tie-in from the 2703-E Building to the process sewer line is shown on drawing H-2-95405, sheet 1. These manholes will not be useful for sampling because of their distance from the 272-E Building and because of their location prior to the process sewer line tie-in from the 2703-E Building.

Effluents from the 2703-E Building are collected in trenches that act as sumps. The sumps are discharged once per week (usually Fridays) and the discharge is less than 350 gallons per sump. When a large project is running, the sumps may be discharged more often than once a week.

The best sampling location for the 2703-E process waste is at the sumps inside the 2703-E Building because of the difficulty in reaching the headwall at the beginning of the trench leading to the CDF and also because the flow will be light when it reaches the trench.

The recommended frequency of sampling is a single duplicate grab sample from manhole number MHP1E to represent the 272-E Building. The sample time should be picked from available days when hydrotesting water is being disposed. Similarly, a single duplicate grab sample from the sump in the 2703-E Building, randomly picked from available Fridays, is recommended.

Appendix A-5: 284-W and 284-E Powerhouse Ash Waste Water

Duplicate samples for these waste streams should be taken from the ash sluice stream from an average ash sluice cycle during routine operation. Two bulk 5-gallon samples should be obtained and allowed to settle undisturbed for 72 hours (±2 hours). At the end of 72 hours, approximately three gallons of liquid should be decanted from the settled ash. The decanted liquid from each bulk sample should then be aliquotted into an appropriate number of analysis bottles.

There is no reason to suspect any significant deviation in composition of the waste water stream, so a single duplicate sampling is appropriate. The sample data should be randomly selected from a list of available dates worked out with operations staff.

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Appendix A-6: 400 Area Sanitary Sewer System

A duplicate sample is recommended to establish the effectiveness of the 400 Area Sanitary Sewer treatment system to demonstrate compliance with WAC 173-221, AKART Treatment Efficiency Requirements. Although WAC 173-221 does not apply to this system, it is highly likely that Ecology would require a demonstration that the sewage treatment system is performing AKART. The discharge standards shown previously in Table A-1 provide an example of what may be required.

It is recommended that at least one influent sample be taken for the constituents listed above in addition to the effluent sample recommended below. Influent samples should be taken at the entrance to the septic tank.

There are two possible places for the effluent samples from the 400 Area Sanitary Sewer to be taken. The two options are (1) a manhole approximately 20 yards from the disposal site, and (2) the final chamber of the septic tank.

Currently, grab samples are taken from the final chamber of the septic tank, and that is the recommended sample location. There is no further treatment in the final chamber; therefore, the septic tank waste water is the same as the waste water entering the disposal pond. To take a sample, remove the cover of the final chamber of the septic tank. The final chamber is on the north side, or the side away from the 400 Area buildings.

The waste water flow will decrease on weekends and holidays, but is expected to remain relatively constant throughout the weekdays, and would not be expected to fluctuate as a function of season. Since the weekday usage will be the highest, a duplicate grab sample should be taken on a weekday chosen at random from the available days.

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APPENDIX B

SELECTED ANALYSES AND REFERENCE DATA FOR 100-N SANITARY SEWER SYSTEM EFFLUENT

Table B-1 Selected WAC 173-200 Ground Water Quality Criteria Compared to 100-N Sanitary Sewer System Effluent

Table B-2 Additional Water Quality Analyses from Part E of the SWDP Application and Screening Analyses

Table B-3 Analytes of Interest for the 100-N Sanitary Sewer System Effluent

Table B-4 Comparison of Columbia River Water Characterization Data to the 100-N Sanitary Sewer System Effluent

Table B-5 Comparison of Representative Data from Septic Tank Effluent to the 100-N Sanitary Sewer System Effluent

Table B-1. Selected WAC 173-200 Ground Water Quality Criteria Compared to the 100-N Sanitary Sewer System Effluent

Parameter[1] / Regulatory Limit[2]	Summary[3] Data / Reference[4]	Assessment[5]
PRIMARY CONTAMINANTS		
Barium / E1 / 1.0		P, yes
Cadmium / E1 / 0.001		P, yes
Chromium / E1 / 0.05		P, yes
Lead / E1 / 0.05		P, yes
Mercury / E1 / 0.002		P, yes
Selenium / E1 / 0.01		P, yes
Silver / E1 / 0.05		P, yes
Fluoride / E1 / 4		P, yes
Nitrate (as N) / E1 / 10		P, yes
Total Coliform Bacteria / E1 / 1 in 100 ml (200-400 in 100 ml)[6]	130, 330, ≤2000 / C-1 (units are MPN)	P, yes
SECONDARY CONTAMINANTS		
Copper / E1 / 1.0		P, yes
Iron / E1 / 0.30		P, yes
Manganese / E1 / 0.05		P, yes
Zinc / E1 / 5.0		P, yes
Chloride / E1 / 250		P, yes
Sulfate / E1 / 250		P, yes
Total Dissolved Solids / E1 / 500		P, yes
Foaming Agents / 0.5		A, no
pH / E1 / 6.5-8.5 (6-9)[6]		P, yes
Corrositivity / noncorrosive		A, no
Color / 15 color units		A, no
Odor / 3 threshold odor units		P, no
RADIONUCLIDES[7]		
Gross Alpha Particle Activity / 15		A, yes (screen)
Gross Beta Particle Activity / 50		A, yes (screen)
Tritium / 20,000		A, no
Strontium-90 / 8		A, no
Radium 226 & 228 / 5		A, no

Table B-1. Selected WAC 173-200 Ground Water Quality Criteria Compared to the 100-N Sanitary Sewer System Effluent (cont.)

Parameter[1] / Regulatory Limit[2]	Summary[3] Data / Reference[4]	Assessment[5]
Radium-226 / 3		A, no
CARCINOGENS[6]		
Acrylamide / 0.02		A, no
Arsenic / 0.05		P, yes
Bromodichloromethane / 0.3		A, no
Bromoform / 5		A, no
Chlorodibromomethane / 0.5		A, no
Chloroform / 7.0		A, no

[1] There were no pesticides used in this process, so they were not included in the table. In order to conserve space, only the trihalomethanes and arsenic were routinely listed unless the specific waste stream analysis or process knowledge indicated the presence of additional compounds.
[2] mg/L unless otherwise noted. Notation / E1 / indicates the constituent is present in Section E of the SWDP application.
[3] The data was obtained from a previously published characterization document (WHC 1993a).
[4] References refer to the specific table in the SWDP characterization document (WHC 1993a) or other references as noted.
[5] Similar qualifiers to those used in the SWDP application form (Section E) were used in this table in order to help indicate the reason for decisions to analyze or not. The qualifiers are:

A = The chemical is not likely to be in the waste stream because it is not used in the process or the site. Note: We have amplified this definition to include chemicals onsite but with no credible means to gain entry to the effluent stream.

S = The chemical is not used in the process, but is present and a credible mechanism for entry into the stream exists.

P = The chemical is likely to be present because it is used in the process or is part of the expected effluent for any reason.

K = The effluent has been tested for the parameter.

[6] Potentially applicable discharge standard from WAC 173-221-040.
[7] pCi/L unless otherwise noted.
[8] μg/L unless otherwise noted.

Table B-2. Additional Water Quality Analyses from Part E of the SWDP Application and Screening Analyses

Parameter[1] / Regulatory Limit[2]	Summary Data[3] / Reference[4]	Decision[5]
PART E ANALYSES		
Conductivity (μS) / NA		P, yes
Total Suspended Solids (TSS) / 30-45[6]	4 to 26 / C-1	K, yes
BOD (5 Day) / 30-45[6]	9 to 25 / C-1	K, yes
COD / NA		P, no
Ammonia-N / NA		P, no
TKN-N / NA		P, yes
Orthophosphate-P / NA		P, no
Total-Phosphorous-P / NA		P, yes
Total Oil and Grease / NA		P, yes
Calcium / NA		P, yes
Magnesium / NA		P, yes
Sodium / NA		P, yes
Potassium / NA		P, yes
SCREENING ANALYSES		
Total Organic Carbon (TOC) / NA		P, yes
Total Organic Halide (TOX) / NA		A, no

[1] The additional analyses from Part E of the SWDP application are included as appropriate to help monitor the process and to detect upsets.

[2] mg/L unless otherwise noted.

[3] The data was obtained from a previously published characterization document (WHC 1993a) and/or represents estimated waste water characteristics.

[4] References refer to the specific table in the characterization document (WHC 1993a) or other references.

[5] Similar qualifiers to those used in the SWDP application form (Section E) were used in this table in order to help indicate the reason for decisions to analyze or not. The qualifiers are:

A = The chemical is not likely to be in the waste stream because it is not used in the process or the site. Note: We have amplified this definition to include chemicals onsite but with no credible means to gain entry to the effluent stream.

S = The chemical is not used in the process, but is present and a credible mechanism for entry into the stream exists.

P = The chemical is likely to be present because it is used in the process or is part of the expected effluent for any reason.

K = The effluent has been tested for the parameter.

[6] Potentially applicable discharge standard from WAC 173-221-040.

Table B-3. Analytes of Interest for the 100-N Sanitary Sewer System Effluent

Analyte	Analytical Procedure[1]	Container[2]	Container Size (ml)	Suggested Preservatives[2]	Holding Time
ICP METALS					
As	200.7[3]/6010[4]	P,G	1000	HNO_3 to pH < 2	6 mo
Ba	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cd	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cr	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Pb	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Se	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Ag	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cu	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Fe	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Mn	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Zn	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Na	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Ca	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Mg	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
K	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
ANIONS[3,5]					
Fl^-	340.2	P,G	125	None	28 d
Cl^-	325.3	P,G	125	None	28 d
SO_4^{-2}	375.4	P,G	125	Cool to 4°C	28 d
NO_3^-	353.3	P,G	125	H_2SO_4 to pH < 2, Cool to 4° C	28 d
WASTE WATER[3]					
pH	150.1	P,G	25	None	ASAP
Conductivity	120.1	P,G	100	Cool to 4°C	28 d
TDS	160.1	P,G	100	Cool to 4°C	7 d
TSS	160.2	P,G	100	Cool to 4°C	7 d
BOD	405.1	P,G	1000	Cool to 4°C	48 hrs
Ammonia (as N)	350.3	P,G	400	H_2SO_4 to pH < 2, Cool to 4° C	28 d
TKN (as N)	351.3/351.4	P,G	500	H_2SO_4 to pH < 2, Cool to 4° C	28 d

Table B-3. Analytes of Interest for the 100-N Sanitary Sewer System Effluent (cont.)

Analyte	Analytical Procedure[1]	Container[2]	Container Size (ml)	Suggested Preservatives[2]	Holding Time
Total Phosphorous	365.2	P,G	50	H_2SO_4 to pH < 2, Cool to 4° C	28 d
Total Oil and Grease	413.2	G	1000	H_2SO_4 or HCl to pH < 2, Cool, 4° C	28 d
Fecal Coliform (total)	SM908[6]	P,G	100 (2 btls)	Cool 4°C	6 hr
CARCINOGENS					
Arsenic (see ICP metals)	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
SCREENING					
TOC	9060	G	250	Cool to 4°C, HCl or H_2SO_4 to pH < 2	28 d
TOX	9020	G	250	Cool to 4°C, H_2SO_4 to pH < 2	7 d
RADIONUCLIDES[4,6,7,8]					
Gross alpha	9310/900.0	P,G	1000	HNO_3 to pH < 2	6 mo
Gross beta	9310/900.0	P,G	1000	HNO_3 to pH < 2	6 mo

[1] The analytical procedures listed are provided for illustration. Any of the procedures listed in the Liquid Effluent QAPP (WHC 1992a) are acceptable.
[2] P = Plastic; G = Glass; Preservatives may differ from those suggested, with concurrence of HASM.
[3] EPA-600/4-79-020, Methods for the Chemical Analysis of Water and Wastes, US EPA, EMSL, 1979.
[4] Test Methods for Evaluating Solid Wastes, SW-846, Third Edition, US EPA/Office of Solid Waste and Emergency Response, 1990.
[5] EPA-600/4-84-017, The Determination of Inorganic Anions in Water by Ion Chromatography, US EPA, 1984 (alternate method).
[6] APHA, 1989, Standard Methods for the Examination of Water and Waste Water, APHA-AWWA, WPCS, February 1989, 17th Edition.
[7] WHC Methods Equivalent to EPA-600/4-80-032, Prescribed Procedures for Measurement of Radioactivity in Drinking Water, US EPA, 1980.
[8] EPA-520/5-84-006, Eastern Environmental Radiation Facility (EERF) Radiochemistry Procedures Manual, US EPA, 1984.

Table B-4. Comparison of Columbia River Water Characterization Data to the 100-N Sanitary Sewage Effluent

Parameter / Regulatory Limit[2]	Units	Detection Limit	Columbia River Data[1]			Miscellaneous Streams Data			Comments
			RM 388	RM 362	RM 346	Min	Max	Mean	
PRIMARY CONTAMINANTS									
Total Coliform Bacteria / E1 / 1/100	MPN/100 ml	2	68	153	207	130	≤2000	820	n=3[3]
PART E ANALYSES									
Total Suspended Solids (TSS) / 30-45[4]	mg/L	3.0	3.0	3.0	4.3	4	26	15	n=3
BOD (5 Day) / 30-45[4]	mg/L	2	<2	<2	<2	9	25	19	n=3

[1] WHC 1992b. Data were obtained from samples taken at three locations along the Columbia River: one location upstream of the Hanford Site at the Vernita Bridge, River Mile (RM) 388; one location adjacent to the 200 Areas (RM 362); and one location adjacent to the 300 Area (RM 346).
[2] Notation / E1 / indicates constituent is present in Section E of the SWDP application.
[3] n = the number of data points used to obtain the mean value.
[4] Potentially applicable discharge standard from WAC 173-221-040.

Table B-5. Comparison of Representative Data from Septic Tank Effluent to the 100-N Sanitary Sewer System Effluent

Parameter / Regulatory Limits	Units	No of Sample	Representative Data[1]			Miscellaneous Streams Data			Comments
			Min	Max	Mean	Min	Max	Mean	
PART E ANALYSES									
BOD (5 day) / 30-45[3]	mg/L	150	7	480	138	9	25	19	n=3[2]
Total Suspended Solids (TSS) / 30-45[3]	mg/L	148	10	695	49	4	26	15	n=3

[1] EPA 1980b.
[2] n = the number of data points used to obtain the mean value.
[3] Potentially applicable discharge standard from WAC 173-221-040.

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APPENDIX C

SELECTED ANALYSES AND REFERENCE DATA FOR THE 300 AREA SANITARY SEWER SYSTEM EFFLUENT

Table C-1 Selected WAC 173-200 Ground Water Quality Criteria Compared to the 300 Area Sanitary Sewer Influent

Table C-2 Additional Water Quality Analyses from Part E of the SWDP Application and Screening Analyses

Table C-3 Analytes of Interest for the 300 Area Sanitary Sewer Effluent

Table C-4 Comparison of Representative Untreated Domestic Wastewater Constituents to the 300 Area Sanitary Sewer Influent

Table C-5 Comparison of 300 Area Ground Water Analytical Results to the 300 Area Sanitary Sewer Influent

Table C-1. Selected WAC 173-200 Ground Water Quality Criteria Compared to the 300 Area Sanitary Sewer Influent

Parameter[1] / Regulatory Limit[2]	Summary[3] Data / Reference[4]	Assessment[5]
PRIMARY CONTAMINANTS		
Barium / E1 / 1.0	0.035 / D-3; 0.027B / D-5	K, yes
Cadmium / E1 / 0.001	0.002 / D-2; 0.004 / D-3; <0.005 / D-5	K, yes
Chromium / E1 / 0.05	0.21 / D-3; <0.006 / D-5	K, yes
Lead / E1 / 0.05	0.005 / D-2; 0.034 / D-3; <0.002 / D-5	K, yes
Mercury / E1 / 0.002	0.0002 / D-2; <0.0001 / D-3; 0.0002 / D-5	K, no
Selenium / E1 / 0.01	<0.005 / D-3; <0.004 / D-5	K, yes
Silver / E1 / 0.05	<0.010 / D-3; <0.006 / D-5	K, yes
Fluoride / E1 / 4	0.26 / D-2	K, yes
Nitrate (as N) / E1 / 10	4.0 / D-2	K, yes
Total Coliform Bacteria / E1 / 1 in 100 ml (200-400 in 100 ml)[6]		P, yes
SECONDARY CONTAMINANTS		
Copper / E1 / 1.0	0.045 / D-2; 0.028 / D-3; 0.006B / D-5	P, yes
Iron / E1 / 0.30	0.47 / D-3; <0.046 / D-5	K, yes
Manganese / E1 / 0.05	0.045 / D-3; 0.001B / D-5	K, yes
Zinc / E1 / 5.0	0.1 / D-2; 0.24 / D-3; 0.018B / D-5	K, yes
Chloride / E1 / 250		P, yes
Sulfate / E1 / 250		P, yes
Total Dissolved Solids / E1 / 500	203 / D-3	K, yes
Foaming Agents / 0.5		A, no
pH / E1 / 6.5-8.5 (6-9)[6]	7.1-7.7 / D-4	P, yes
Corrositivity / noncorrosive		A, no
Color / 15 color units		A, no
Odor / 3 threshold odor units		P, no
RADIONUCLIDES[7]		
Gross Alpha Particle Activity / 15	ND / D-3; <10-20 / D-4; <3.0 / D-6	K, yes (screen)
Gross Beta Particle Activity / 50	16 / D-3; <40 to 250 / D-4; <5.0 / D-6	K, yes (screen)
Tritium / 20,000	199 / D-3; 359 / D-6	K, no
Strontium-90 / 8	<1.6 / D-6	K, no
Radium 226 & 228 / 5		A, no

Table C-1. Selected WAC 173-200 Ground Water Quality Criteria Compared to the 300 Area Sanitary Sewer Influent (cont.)

Parameter[1] / Regulatory Limit[2]	Summary[3] Data / Reference[4]	Assessment[5]
Radium-226 / 3		A, no
CARCINOGENS[6]		
Acrylamide / 0.02		A, no
Arsenic / 0.05	<5 / D-3; <4 / D-5	K, yes
Bis(2-ethylhexyl)phthalate / 6.0	31B / D-5	K, yes
Bromodichloromethane / 0.3	2J / D-5	K, yes
Bromoform / 5		A, no
Chlorodibromomethane / 0.5		A, no
Chloroform / 7.0	13 / D-5	K, yes
Methylene Chloride / 5	8J / D-5	K, yes

[1] There were no pesticides used in this process, so they were not included in the table. In order to conserve space, only the trihalomethanes and arsenic were routinely listed unless the specific waste stream analysis or process knowledge indicated the presence of additional compounds.
[2] mg/L unless otherwise noted. Notation / E1 / indicates the constituent is present in Section E of the SWDP application.
[3] The data was obtained from a previously published characterization document (WHC 1993a).
[4] References refer to the specific table in the characterization document (WHC 1993a) or other references as noted
[5] Similar qualifiers to those used in the SWDP application form (Section E) were used in this table in order to help indicate the reason for decisions to analyze or not. The qualifiers are:

A = The chemical is not likely to be in the waste stream because it is not used in the process or the site. Note: We have amplified this definition to include chemicals onsite but with no credible means to gain entry to the effluent stream.

S = The chemical is not used in the process, but is present and a credible mechanism for entry into the stream exists.

P = The chemical is likely to be present because it is used in the process or is part of the expected effluent for any reason.

K = The effluent has been tested for the parameter.

[6] Potentially applicable discharge standard from WAC 173-221-040.
[7] pCi/L unless otherwise noted.
[8] μg/L unless otherwise noted.

Table C-2. Additional Water Quality Analyses from Part E of the SWDP Application and Screening Analyses

Parameter[1] / Regulatory Limit[2]	Summary Data[3] / Reference[4]	Decision[5]
PART E ANALYSES		
Conductivity (μS) / NA		P, yes
Total Suspended Solids (TSS) / 30-45[6]	66 to 473 / D-1; 19 / D-3	P, yes
BOD (5 Day) / 30-45[6]	72 to 229 / D-1	P, yes
COD / NA	211 / D-3	P, no
Ammonia-N / NA	28 / D-3	P, no
TKN-N / NA		P, yes
Orthophosphate-P / NA		P, no
Total-Phosphorous-P / NA		P, yes
Total Oil and Grease / NA		P, yes
Calcium / NA	24 / D-3; 19 / D-5	P, yes
Magnesium / NA	5.8 / D-3; 4.5B / D-5	P, yes
Sodium / NA	31 / D-3; 6.7 / D-5	P, yes
Potassium / NA	17 / D-3; 1.3B / D-5	P, yes
SCREENING ANALYSES		
Total Organic Carbon (TOC) / NA	54 / D-3	K, yes
Total Organic Halide (TOX) / NA		A, no

[1] The additional analyses from Part E of the SWDP application are included as appropriate to help monitor the process and to detect upsets.
[2] mg/L unless otherwise noted.
[3] The data was obtained from a previously published characterization document (WHC 1993a) and/or represents estimated waste water characteristics.
[4] References refer to the specific table in the characterization document (WHC 1993a) or other references.
[5] Similar qualifiers to those used in the SWDP application form (Section E) were used in this table in order to help indicate the reason for decisions to analyze or not. The qualifiers are:

A = The chemical is not likely to be in the waste stream because it is not used in the process or the site. Note: We have amplified this definition to include chemicals onsite but with no credible means to gain entry to the effluent stream.

S = The chemical is not used in the process, but is present and a credible mechanism for entry into the stream exists.

P = The chemical is likely to be present because it is used in the process or is part of the expected effluent for any reason.

K = The effluent has been tested for the parameter.

[6] Potentially applicable discharge standard from WAC 173-221-040.

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Table C-3. Analytes of Interest for the 300 Area Sanitary Sewer Effluent

Analyte	Analytical Procedure[1]	Container[2]	Container Size (ml)	Suggested Preservatives[2]	Holding Time
ICP METALS					
As	200.7[3]/6010[4]	P,G	1000	HNO_3 to pH < 2	6 mo
Ba	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cd	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cr	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Pb	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Se	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Ag	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cu	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Fe	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Mn	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Zn	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Na	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Ca	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Mg	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
K	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
ANIONS[3,5]					
Fl^-	340.2	P,G	125	None	28 d
Cl^-	325.3	P,G	125	None	28 d
SO_4^{-2}	375.4	P,G	125	Cool to 4°C	28 d
NO_3^-	353.3	P,G	125	H_2SO_4 to pH < 2, Cool to 4° C	28 d
WASTE WATER[3]					
pH	150.1	P,G	25	None	ASAP
Conductivity	120.1	P,G	100	Cool to 4°C	28 d
TDS	160.1	P,G	100	Cool to 4°C	7 d
TSS	160.2	P,G	100	Cool to 4°C	7 d
BOD	405.1	P,G	1000	Cool to 4°C	48 hrs
TKN (as N)	351.3/351.4	P,G	500	H_2SO_4 to pH < 2, Cool to 4° C	28 d
Total Phosphorous	365.2	P,G	50	H_2SO_4 to pH < 2, Cool to 4° C	28 d

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Table C-3. Analytes of Interest for the 300 Area Sanitary Sewer Effluent (cont.)

Analyte	Analytical Procedure[1]	Container[2]	Container Size (ml)	Suggested Preservatives[2]	Holding Time
Total Oil and Grease	413.2	G	1000	H_2SO_4 or HCl to pH < 2, Cool, 4° C	28 d
Fecal Coliform (total)	SM908[6]		100 (2 btls)	Cool 4°C	6 hr
CARCINOGENS					
Arsenic (see ICP metals)	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Acrylamide	8015	G	40	Cool 4°C, 0.008% $Na_2S_2O_3$	7 d/40 d[9]
PAHs	8310	G	1000	Cool 4°C, 0.008% $Na_2S_2O_3$	7 d/40 d[9]
VOAs[10]	624/8240	G	40	Cool 4°C, 0.008% $Na_2S_2O_3$	14 d
SVOA[9,10]	625/8250	G	1000	Cool 4°C, 0.008% $Na_2S_2O_3$	7 d/40 d[9]
SCREENING					
TOC	9060	G	250	Cool to 4°C, HCl or H_2SO_4 to pH < 2	28 d
TOX	9020	G	250	Cool to 4°C, H_2SO_4 to pH < 2	7 d
RADIONUCLIDES[4,6,7,8]					
Gross alpha	9310/900.0	P,G	1000	HNO_3 to pH < 2	6 mo
Gross beta	9310/900.0	P,G	1000	HNO_3 to pH < 2	6 mo

[1] The analytical procedures listed are provided for illustration. Any of the procedures listed in the Liquid Effluent QAPP (WHC 1992a) are acceptable.
[2] P = Plastic; G = Glass; Preservatives may differ from those suggested, with concurrence of HASM.
[3] EPA-600/4-79-020, Methods for the Chemical Analysis of Water and Wastes, US EPA, EMSL, 1979.
[4] Test Methods for Evaluating Solid Wastes, SW-846, Third Edition, US EPA/Office of Solid Waste and Emergency Response, 1990.
[5] EPA-600/4-84-017, The Determination of Inorganic Anions in Water by Ion Chromatography, US EPA, 1984 (alternate method).
[6] APHA, 1989, Standard Methods for the Examination of Water and Waste Water, APHA-AWWA, WPCS, February 1989, 17th Edition.
[7] WHC Methods Equivalent to EPA-600/4-80-032, Prescribed Procedures for Measurement of Radioactivity in Drinking Water, US EPA, 1980.
[8] EPA-520/5-84-006, Eastern Environmental Radiation Facility (EERF) Radiochemistry Procedures Manual, US EPA, 1984.
[9] 7 days to extract, 40 days after extraction.
[10] The entire target compound list (TCL) of the SW-846 Methods for VOA and SVOA will be requested as well as tentatively identified compound (TIC) reporting.

Table C-4. Comparison of Representative Untreated Domestic Wastewater Constituents to the 300 Area Sanitary Sewer Influent

Parameter / Regulatory Limit[2]	Units	Untreated Domestic Wastewater[1] (Concentration)			Miscellaneous Streams Data			Comments
		Weak	Medium	Strong	Min	Max	Mean	
PRIMARY CONTAMINANTS								
Nitrate (as N) / E1 / 10	mg/L	0	0	0	4	4	4	n=1[3]
SECONDARY CONTAMINANTS								
Total Dissolved Solids (TDS) / E1 / 500	mg/L	250	500	850	198	207	203	n=2
PART E ANALYSES								
Total Suspended Solids (TSS) / 30-45[4]	mg/L	100	220	350	19	473	141	n=9
BOD (5 Day, 20°C) / 30-45[4]	mg/L	110	220	400	72	229	150	n=8
Chemical Oxygen Demand (COD) / NA	mg/L	250	500	1000	211	211	211	n=1
Ammonia-N / NA	mg/L	12	25	50	26.6	28.7	27.7	n=2
SCREENING ANALYSES								
Total Organic Carbon (TOC) / NA	mg/L	80	160	290	51.5	55.7	53.6	n=2
OTHER								
Alkalinity / NA	mg/L	50	100	200	145	159	152	n=2

[1] Metcalf and Eddy 1991.
[2] Notation / E1 / indicates constituent is present in Section E of the SWDP application.
[3] n = the number of data points used to obtain the mean value.
[4] Potentially applicable discharge standard from WAC 173-221-040.

Table C-5. Comparison of 300 Area Ground Water Analytical Results to the 300 Area Sanitary Sewer Influent

Parameter / Regulatory Limit[2]	Units	N	Ground Water Data[1]			Miscellaneous Streams Data			Comments
			Min	Max	Mean	Min	Max	Mean	
PRIMARY CONTAMINANTS									
Barium / E1 / 1.0	mg/L	331	0.011	0.129	0.038	0.027	0.037	0.032	n=3[3]
Cadmium / E1 / 0.001	mg/L	331	0	0.003	0.00004	<0.002	<0.005	<0.003	n=4
Chromium / E1 / 0.05	mg/L	331	0	0.064	0.003	<0.006	0.214	<0.08	n=3
Lead / E1 / 0.05	mg/L	320	0	0.008	0.0001	<0.002	0.060	<0.019	n=4
Mercury / E1 / 0.002	mg/L	318	0	0	0	<0.0001	0.0002	<0.0002	n=4
Selenium / E1 / 0.01	mg/L	320	0	0	0	<0.004	<0.005	<0.005	n=3
Silver / E1 / 0.05	mg/L	331	0	0	0	<0.006	0.010	<0.009	n=3
Fluoride / E1 / 4	mg/L	471	0	2.3	0.24	0.26	0.26	0.26	n=1
Nitrate (as N) / E1 / 10	mg/L	534	0	28.5	7.3	4.0	4.0	4.0	n=1
SECONDARY CONTAMINANTS									
Copper / E1 / 1.0	mg/L	331	0	0.062	0.004	0.006	0.045	0.027	n=4
Iron / E1 / 0.30	mg/L	331	0	8.3	0.16	<0.046	0.478	<0.33	n=3
Manganese / E1 / 0.05	mg/L	331	0	0.19	0.014	0.001	0.046	0.03	n=3
Zinc / E1 / 5.0	mg/L	36	0	0.26	0.04	0.018	0.306	0.151	n=4
Total Dissolved Solids / E1 / 500	mg/L	27	88	288	182	198	207	203	n=2

Table C-5. Comparison of 300 Area Ground Water Analytical Results to the 300 Area Sanitary Sewer Influent (cont.)

Parameter / Regulatory Limit[2]	Units	N	Ground Water Data[1]			Miscellaneous Streams Data			Comments
			Min	Max	Mean	Min	Max	Mean	
pH / E1 / 6.5-8.5	none	12	7	8.1	7.7	7.1	7.7	7.4	n=6
RADIONUCLIDES									
Gross Alpha Particle Activity / 15	pCi/L	329	0	208	17.6	0	20	<15.5	n=26, Two "not detected" samples were treated as zeros
Gross Beta Activity / 50	pCi/L	356	0	121	13.8	<5.0	250	<61.5	n=26
Tritium / 20, 0.000	pCi/L	36	0	7670	1260	74.9	359	252	n=3
Strontium-90 / 8	pCi/L	6	0	5.28	1.53	<1.6	<1.6	<1.6	n=1
CARCINOGENS									
Arsenic / 0.00005	mg/L	320	0	0.009	0.0005	<0.004	<0.005	<0.005	n=3
Bis(2-ethylhexyl) phthalate / 0.006	mg/L	64	0	0	0	0.031	0.031	0.031	n=1
Bromodichloromethane / 0.0003	mg/L	26	0	0	0	0.002	0.002	0.002	n=1
Chloroform / 0.007	mg/L	487	0	0.04	0.01	0.013	0.013	0.013	n=1
Methylene Chloride / 0.005	mg/L	36	0	3.0	0.22	0.008	0.008	0.008	n=1
PART E ANALYSES									
Ammonia-N / NA	mg/L	262	0	0.19	0.02	26.6	28.7	27.7	n=2
Calcium / NA	mg/L	331	9.0	69	27	19.2	24.3	22.1	n=3
Magnesium / NA	mg/L	331	3.4	15	6.4	4.45	5.80	5.31	n=3
Sodium / NA	mg/L	331	5.7	71	22.5	<0.2	30.5	12.5	n=3

Table C-5. Comparison of 300 Area Ground Water Analytical Results to the 300 Area Sanitary Sewer Influent (cont.)

Parameter / Regulatory Limit[2]	Units	N	Ground Water Data[1]			Miscellaneous Streams Data			Comments
			Min	Max	Mean	Min	Max	Mean	
Potassium / NA	mg/L	331	1.2	11	4.2	1.31	19.6	11.6	n=3

[1] WHC 1989a.
[2] Notation / E1 / indicates constituent is present in Section E of the SWDP application.
[3] n = the number of data points used to obtain the mean value.

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APPENDIX D

SELECTED ANALYSES AND REFERENCE DATA FOR THE 183-N FILTER BACKWASH EFFLUENT

Table D-1 Selected WAC 173-200 Ground Water Quality Criteria Compared to the 183-N Filter Backwash "Like" Data

Table D-2 Additional Water Quality Analyses from Part E of the SWDP Application and Screening Analyses

Table D-3 Analytes of Interest for the 183-N Filter Backwash Effluent

Table D-4 Comparison of Columbia River Water Characterization Data to the 183-N Filter Backwash Stream "Like" Data

Table D-5 Comparison of 300 Area Ground Water Analytical Results to the 183-N Filter Backwash Stream "Like" Data

Table D-1. Selected WAC 173-200 Ground Water Quality Criteria Compared to the 183-N Filter Backwash "Like" Data

Parameter[1] / Regulatory Limit[2]	Summary[3] Data / Reference[4]	Assessment[5]
PRIMARY CONTAMINANTS		
Barium / E1 / 1.0	0.12,0.16 / E-2A; 0.045 / E-3; 0.073 / E-4; 0.15 / E-5	K, yes
Cadmium / E1 / 0.001	0.003 / E-2A; <0.1 / E-3; <0.002 / E-4; <0.004 / E-5	K, yes
Chromium / E1 / 0.05	0.097,0.094 / E-2A; <0.048 / E-4; 0.087 / E-5	K, yes
Lead / E1 / 0.05	0.011,0.017 / E-2A; 0.01 / E-3; <0.023 / E-4; 0.027 / E-5	K, yes
Mercury / E1 / 0.002	<0.0007 / E-3; <0.0001 / E-4; <0.0001 / E-5	K, yes
Selenium / E1 / 0.01	<0.5 / E-3	K, yes
Silver / E1 / 0.05	<0.5 / E-3; <0.010 / E-4; <0.010 / E-5	K, yes
Fluoride / E1 / 4	0.19,0.19 / E-2A; 0.16 / E-3; <0.29 / E-4; <0.39 / E-5	K, yes
Nitrate (as N) / E1 / 10	0.8 / E-2A; <0.92 / E-4; <0.5 / E-5	K, yes
Total Coliform Bacteria / E1 / 1 in 100 ml (200-400 in 100 ml)[6]		A, no
SECONDARY CONTAMINANTS		
Copper / E1 / 1.0	0.31,0.25 / E-2A; <0.028 / E-4; 0.098 / E-5	K, yes
Iron / E1 / 0.30	3.1,3.3 / E-1; 8.1,14 / E-2A; 2.6 / E-3; 4.3 / E-4; 6.5 / E-5	K, yes
Manganese / E1 / 0.05	0.68,0.42 / E-2A; 0.082 / E-3; 1.2 / E-4; 7.6 / E-5	K, yes
Zinc / E1 / 5.0	0.38,0.28 / E-2A; 0.06 / E-3; 0.26 / E-4; 0.96 / E-5	K, yes
Chloride / E1 / 250	3.0,2.2 / E-2A; 3.0 / E-4; 2.9 / E-5	K, yes
Sulfate / E1 / 250	50,48 / E-1; 21,21 / E-2A; 17 / E-3; 17 / E-4; 17 / E-5	K, yes
Total Dissolved Solids / E1 / 500	83,188 / E-2A; 77 / E-3	K, yes
Foaming Agents / 0.5		A, no
pH / E1 / 6.5-8.5 (6-9)[6]	6.0 to 7.2 / E-2A; 7.0 / E-3; 5.3 / E-4; 5.3 / E-5	K, yes
Corrositivity / noncorrosive		A, no
Color / 15 color units		A, no
Odor / 3 threshold odor units		A, no
RADIONUCLIDES[7]		
Gross Alpha Particle Activity / 15	10 / E-2A; 3.9 / E-3; 18 / E-4; 8.4 / E-5	K, yes
Gross Beta Particle Activity / 50	4.8,3.9 / E-2A; 3.5 / E-3; 20 / E-4; 9.0 / E-5	K, yes
Tritium / 20,000		A, no
Strontium-90 / 8		A, no
Radium 226 & 228 / 5		A, no

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Table D-1. Selected WAC 173-200 Ground Water Quality Criteria Compared to the 183-N Filter Backwash "Like" Data (cont.)

Parameter[1] / Regulatory Limit[2]	Summary[3] Data / Reference[4]	Assessment[5]
Radium-226 / 3		A, no
CARCINOGENS[6]		
Acrylamide / 0.02		P, yes
Arsenic / 0.05	9 / E-3	K, yes
Bis(2-ethylhexyl)phthalate / 6.0		A, no
Bromodichloromethane / 0.3		P, yes
Bromoform / 5		P, yes
Chlorodibromomethane / 0.5		P, yes
Chloroform / 7.0	23,7 / E-24; 21 / E-3; 28 / E-4; 31 / E-5	K, yes

[1] There were no pesticides used in this process, so they were not included in the table. In order to conserve space, only the trihalomethanes and arsenic were routinely listed unless the specific waste stream analysis or process knowledge indicated the presence of additional compounds.
[2] mg/L unless otherwise noted. Notation / E1 / indicates the constituent is present in Section E of the SWDP application.
[3] The data was obtained from a previously published characterization document (WHC 1993a).
[4] References refer to the specific table in the characterization document (WHC 1993a) or other references as noted
[5] Similar qualifiers to those used in the SWDP application form (Section E) were used in this table in order to help indicate the reason for decisions to analyze or not. The qualifiers are:

A = The chemical is not likely to be in the waste stream because it is not used in the process or the site. Note: We have amplified this definition to include chemicals onsite but with no credible means to gain entry to the effluent stream.

S = The chemical is not used in the process, but is present and a credible mechanism for entry into the stream exists.

P = The chemical is likely to be present because it is used in the process or is part of the expected effluent for any reason.

K = The effluent has been tested for the parameter.

[6] Potentially applicable discharge standard from WAC 173-221-040.
[7] pCi/L unless otherwise noted.
[8] μg/L unless otherwise noted.

Table D-2. Additional Water Quality Analyses from Part E of the SWDP Application and Screening Analyses

Parameter[1] / Regulatory Limit[2]	Summary Data[3] / Reference[4]	Decision[5]
PART E ANALYSES		
Conductivity (μS) / NA	124 to 167 / E-2A; 147 / E-3; 125 / E-4; 113 / E-5	K, yes
Total Suspended Solids (TSS) / 30-45[6]	8.3,13 / E-1; 348,925 / E-2A; 64 / E-3	K, yes
BOD (5 Day) / 30-45[6]	<4, <6 / E-1	K, yes
COD / NA	<2.5,7.5 / E-1	K, no
Ammonia-N / NA	0.09,0.10 / E-1; 0.07 / E-3; <0.05 / E-4; <0.06 / E-5	K, no
TKN-N / NA		P, yes
Orthophosphate-P / NA	<1.0 / E-4; <1.0 / E-5	P, no
Total-Phosphorous-P / NA		P, yes
Total Oil and Grease / NA		A, no
Calcium / NA	29,28 / E-2A; 21 / E-3; 22 / E-4; 24 / E-5	K, yes
Magnesium / NA	8.2,9.3 / E-2A; 4.6 / E-3; 5.3 / E-4; 5.2 / E-5	K, yes
Sodium / NA	3.0,3.6 / E-2A; 2.3 / E-3; 2.3 / E-4; 2.1 / E-5	K, yes
Potassium / NA	1.9,3.2 / E-2A; 0.86 / E-3; 1.1 / E-4; 1.3 / E-5	K, yes
SCREENING ANALYSES		
Total Organic Carbon (TOC) / NA	2.8,2.9 / E-1; 2,4.3 / E-2A; 7.1 / E-3; 1.9 / E-4; 2.2 / E-5	K, yes
Total Organic Halide (TOX) / NA	0.28,0.11 / E-2A; 0.20 / E-3; 0.15 / E-4; 0.16 / E-5	K, yes
OTHER		
Acetone / NA	0.058 / E-2A	K, yes
2-Butanone (MEK) / NA	0.011 / E-3	K, yes

[1] The additional analyses from Part E of the SWDP application are included as appropriate to help monitor the process and to detect upsets.
[2] mg/L unless otherwise noted.
[3] The data was obtained from a previously published characterization document (WHC 1993a) and/or represents estimated waste water characteristics.
[4] References refer to the specific table in the characterization document (WHC 1993a) or other references.
[5] Similar qualifiers to those used in the SWDP application form (Section E) were used in this table in order to help indicate the reason for decisions to analyze or not. The qualifiers are:

A = The chemical is not likely to be in the waste stream because it is not used in the process or the site. Note: We have amplified this definition to include chemicals onsite but with no credible means to gain entry to the effluent stream.

S = The chemical is not used in the process, but is present and a credible mechanism for entry into the stream exists.

P = The chemical is likely to be present because it is used in the process or is part of the expected effluent for any reason.

K = The effluent has been tested for the parameter.

[6] Potentially applicable discharge standard from WAC 173-221-040.

Table D-3. Analytes of Interest for the 183-N Filter Backwash Effluent

Analyte	Analytical Procedure[1]	Container[2]	Container Size (ml)	Suggested Preservatives[2]	Holding Time
ICP METALS					
As	200.7[3]/6010[4]	P,G	1000	HNO_3 to pH < 2	6 mo
Ba	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cd	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cr	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Pb	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Se	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Ag	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cu	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Fe	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Mn	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Zn	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Na	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Ca	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Mg	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
K	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
CVAA METALS[3]					
Hg	245.1	P,G	500	HNO_3 to pH < 2	28 d
ANIONS[3,5]					
Fl^-	340.2	P,G	125	None	28 d
Cl^-	325.3	P,G	125	None	28 d
SO_4^{-2}	375.4	P,G	125	Cool to 4°C	28 d
NO_3^-	353.3	P,G	125	H_2SO_4 to pH < 2, Cool to 4°C	28 d
WASTE WATER[3]					
pH	150.1	P,G	25	None	ASAP
Conductivity	120.1	P,G	100	Cool to 4°C	28 d
TDS	160.1	P,G	100	Cool to 4°C	7 d
TSS	160.2	P,G	100	Cool to 4°C	7 d
BOD	405.1	P,G	1000	Cool to 4°C	48 hrs
TKN (as N)	351.3/351.4	P,G	500	H_2SO_4 to pH < 2, Cool to 4° C	28 d

Table D-3. Analytes of Interest for the 183-N Filter Backwash Effluent (cont.)

Analyte	Analytical Procedure[1]	Container[2]	Container Size (ml)	Suggested Preservatives[2]	Holding Time
Total Phosphorous	365.2	P,G	50	H_2SO_4 to pH < 2, Cool to 4° C	28 d
CARCINOGENS					
Arsenic (see ICP metals)	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Acrylamide	8015	G	40	Cool 4°C, 0.008% $Na_2S_2O_3$	7 d/40 d[9]
VOAs[10]	624/8240	G	40	Cool 4°C, 0.008% $Na_2S_2O_3$	14 d
SCREENING					
TOC	9060	G	250	Cool to 4°C, HCl or H_2SO_4 to pH < 2	28 d
TOX	9020	G	250	Cool to 4°C, H_2SO_4 to pH < 2	7 d
RADIONUCLIDES[4,6,7,8]					
Gross alpha	9310/900.0	P,G	1000	HNO_3 to pH < 2	6 mo
Gross beta	9310/900.0	P,G	1000	HNO_3 to pH < 2	6 mo

[1] The analytical procedures listed are provided for illustration. Any of the procedures listed in the Liquid Effluent QAPP (WHC 1992a) are acceptable.
[2] P = Plastic; G = Glass; Preservatives may differ from those suggested, with concurrence of HASM.
[3] EPA-600/4-79-020, Methods for the Chemical Analysis of Water and Wastes, US EPA, EMSL, 1979.
[4] Test Methods for Evaluating Solid Wastes, SW-846, Third Edition, US EPA/Office of Solid Waste and Emergency Response, 1990.
[5] EPA-600/4-84-017, The Determination of Inorganic Anions in Water by Ion Chromatography, US EPA, 1984 (alternate method).
[6] APHA, 1989, Standard Methods for the Examination of Water and Waste Water, APHA-AWWA, WPCS, February 1989, 17th Edition.
[7] WHC Methods Equivalent to EPA-600/4-80-032, Prescribed Procedures for Measurement of Radioactivity in Drinking Water, US EPA, 1980.
[8] EPA-520/5-84-006, Eastern Environmental Radiation Facility (EERF) Radiochemistry Procedures Manual, US EPA, 1984.
[9] 7 days to extract, 40 days after extraction.
[10] The entire target compound list (TCL) of the SW-846 Methods for VOA will be requested as well as tentatively identified compound (TIC) reporting.

Table D-4. Comparison of Columbia River Water Characterization Data to the 183-N Filter Backwash Stream "Like" Data

Parameter / Regulatory Limit[2]	Units	Detection Limit	Columbia River Data[1]			Miscellaneous Streams Data			Comments
			RM 388	RM 362	RM 346	Min	Max	Mean	
PRIMARY CONTAMINANTS									
Barium / E1 / 1.0	mg/L	0.001	0.026	0.026	0.026	0.030	0.30	0.09	n=14[3]
Cadmium / E1 / 0.001	mg/L	0.0001	<0.0001	0.00012	0.0001	<0.002	<0.10	<0.033	n=13
Chromium / E1 / 0.05	mg/L	0.003	<0.003	<0.003	<0.003	<0.010	0.130	<0.056	n=14
Lead / E1 / 0.05	mg/L	0.0008	<0.0008	<0.0008	<0.0008	<0.005	0.050	<0.019	n=14
Mercury / E1 / 0.002	mg/L	0.0002	<0.0002	<0.0002	<0.0002	<0.0001	0.0016	<0.0003	n=12
Selenium / E1 / 0.01	mg/L	0.0008	<0.0008	<0.0008	<0.0008	<0.5	<0.5	<0.5	n=4
Silver / E1 / 0.05	mg/L	0.0002	<0.0002	<0.0002	<0.0002	<0.01	<0.5	<0.17	n=12
Fluoride / E1 / 4	mg/L	0.100	0.100	<0.100	0.105	<0.05	0.64	<0.31	n=14
Nitrate (as N) / E1 / 10	mg/L	0.030	<0.030	<0.030	0.033	0.5	1.8	<0.72	n=9
SECONDARY CONTAMINANTS									
Copper / E1 / 1.0	mg/L	0.002	<0.002	<0.002	0.002	<0.010	0.31	<0.097	n=14
Iron / E1 / 0.30	mg/L	0.010	0.049	0.041	0.069	0.21	14	5.1	n=16
Manganese / E1 / 0.05	mg/L	0.001	0.007	0.007	0.007	0.006	27	<2.6	n=14
Zinc / E1 / 5.0	mg/L	0.002	0.007	0.008	0.004	0.008	1.6	0.32	n=12
Chloride / E1 / 250	mg/L	1.8	2.0	1.8	1.8	1.5	4.3	2.9	n=14
Sulfate / E1 / 250	mg/L	1.0	9.8	9.8	10.2	13	50	22	n=16
Total Dissolved Solids / E1 / 500	mg/L	3.0	69.4	64.3	89.3	71	188	96	n=6

Table D-4. Comparison of Columbia River Water Characterization Data to the 183-N Filter Backwash Stream "Like" Data (cont.)

Parameter / Regulatory Limit[2]	Units	Detection Limit	Columbia River Data[1]			Miscellaneous Streams Data			Comments
			RM 388	RM 362	RM 346	Min	Max	Mean	
pH / E1 / 6.5-8.5	None	NA	8.3	8.4	8.4	5.1	7.4	5.9	n=14
RADIONUCLIDES									
Gross Alpha Particle Activity / 15	pCi/L	0.9-1.3	0.76	1.13	0.95	1.9	43	11	n=12
Gross Beta Particle Radioactivity / 50	pCi/L	2.2-2.9	0.72	0.50	0.40	<1.81	48	<10	n=13
CARCINOGENS									
Arsenic / 0.00005	mg/L	0.0008	0.001	<0.0008	0.0008	<0.005	0.013	<0.009	n=4
Chloroform / 0.007	mg/L	0.001-0.005	<0.001	<0.001	<0.001	0.007	0.053	0.025	n=14
PART E ANALYSES									
Conductivity / NA	µS	None	0.013	0.013	0.013	0.10	0.17	0.13	n=14, Data is for a field sample.
Total Suspended Solids (TSS) / 30-45[4]	mg/L	3.0	3.0	3.0	4.3	<8.0	925	<194	n=8
BOD[4] (5 Day) / 30-45	mg/L	2.0	<2.0	<2.0	<2.0	<4	<6	<5	n=2
COD / NA	mg/L	7.0	<7.0	9.0	8.2	<2.5	7.5	<5.0	n=2
Ammonia-N / NA	mg/L	0.040	0.060	0.050	0.043	<0.05	0.10	<0.065	n=11
Orthophosphate-P / NA	mg/L	0.010	<0.010	<0.010	<0.010	<1.0	1.0	<1.0	n=8
Calcium / NA	mg/L	None	15.8	15.8	15.8	18	30	23	n=14
Magnesium / NA	mg/L	0.025	3.5	3.5	3.6	4.4	9.3	5.5	n=14

Table D-4. Comparison of Columbia River Water Characterization Data to the 183-N Filter Backwash Stream "Like" Data (cont.)

Parameter / Regulatory Limit[2]	Units	Detection Limit	Columbia River Data[1]			Miscellaneous Streams Data			Comments
			RM 388	RM 362	RM 346	Min	Max	Mean	
Sodium / NA	mg/L	0.1	15.7	16.0	17.3	2.1	3.6	2.4	n=13
Potassium / NA	mg/L	0.30	0.73	0.75	0.70	0.80	3.2	1.3	n=14
SCREENING ANALYSES									
Total Organic Carbon (TOC) / NA	mg/L	1.0	1.7	1.7	1.7	1.1	18	3.5	n=16
Total Carbon (TC) / NA	mg/L	1.0	14.8	15.0	14.7	13.7	15.6	14.9	n=4
Total Organic Halide (TOX) / NA	mg/L	0.01	0.11	0.33	0.10	0.10	0.28	0.17	n=14

[1] WHC 1992b. Data were obtained from samples taken at three locations along the Columbia River: one location upstream of the Hanford Site at the Vernita Bridge, River Mile (RM) 388; one location adjacent to the 200 Areas (RM 362); and one location adjacent to the 300 Area (RM 346).
[2] Notation / E1 / indicates constituent is present in Section E of the SWDP application.
[3] n = the number of data points used to obtain the mean value.
[4] Potentially applicable discharge standard from WAC 173-221-040.

Table D-5. Comparison of 300 Area Ground Water Analytical Results to the 183-N Filter Backwash Stream "Like" Data

Parameter / Regulatory Limit[2]	Units	N	Ground Water Data[1]			Miscellaneous Streams Data			Comments
			Min	Max	Mean	Min	Max	Mean	
PRIMARY CONTAMINANTS									
Barium / E1 / 1.0	mg/L	331	0.011	0.129	0.038	0.030	0.30	0.09	n=14[3]
Cadmium / E1 / 0.001	mg/L	331	0	0.003	0.00004	<0.002	<0.10	<0.033	n=13
Chromium / E1 / 0.05	mg/L	331	0	0.064	0.003	<0.010	0.130	<0.056	n=14
Lead / E1 / 0.05	mg/L	320	0	0.008	0.0001	<0.005	0.050	<0.019	n=14
Mercury / E1 / 0.002	mg/L	318	0	0	0	<0.0001	0.0016	<0.0003	n=12
Selenium / E1 / 0.01	mg/L	320	0	0	0	<0.5	<0.5	<0.5	n=4
Silver / E1 / 0.05	mg/L	331	0	0	0	<0.01	<0.5	<0.17	n=12
Fluoride / E1 / 4	mg/L	471	0	2.3	0.24	<0.05	0.64	<0.31	n=14
Nitrate (as N) / E1 / 10	mg/L	534	0	28.5	7.3	<0.5	1.8	<0.72	n=9
SECONDARY CONTAMINANTS									
Copper / E1 / 1.0	mg/L	331	0	0.062	0.004	<0.010	0.31	<0.097	n=14
Iron / E1 / 0.30	mg/L	331	0	8.3	0.16	0.21	14	5.1	n=16
Manganese / E1 / 0.05	mg/L	331	0	0.19	0.014	0.006	27	2.6	n=14
Zinc / E1 / 5.0	mg/L	36	0	0.26	0.04	0.008	1.6	0.32	n=12
Chloride / E1 / 250	mg/L	471	3.3	122	15	1.5	4.3	2.9	n=14
Sulfate / E1 / 250	mg/L	471	0	56	20	13	50	22	n=16

Table D-5. Comparison of 300 Area Ground Water Analytical Results to the 183-N Filter Backwash Stream "Like" Data (cont.)

Parameter / Regulatory Limit[2]	Units	N	Ground Water Data[1]			Miscellaneous Streams Data			Comments
			Min	Max	Mean	Min	Max	Mean	
Total Dissolved Solids / E1 / 500	mg/L	27	88	288	182	71	188	96	n=6
pH / E1 / 6.5-8.5	None	12	7	8.1	7.7	5.1	7.4	5.9	n=14
RADIONUCLIDES									
Gross Alpha Particle Activity / 15	pCi/L	329	0	208	17.6	1.9	43	11	n=12
Gross Beta Particle Radioactivity / 50	pCi/L	356	0	121	13.8	<1.81	48	<10	n=13
CARCINOGENS									
Arsenic / 0.00005	mg/L	320	0	0.009	0.0005	<0.005	0.013	<0.009	n=4
Chloroform / 0.007	mg/L	487	0	0.04	0.10	0.007	0.053	0.025	n=14
PART E ANALYSES									
Ammonia-N / NA	mg/L	262	0	0.19	0.02	<0.05	0.10	<0.065	n=11
Orthophosphate-P / NA	mg/L					<1.0	1.0	<1.0	n=8
Calcium / NA	mg/L	331	9.0	69	27	18	30	23	n=14
Magnesium / NA	mg/L	331	3.4	15	6.4	4.4	9.3	5.5	n=14
Sodium / NA	mg/L	331	5.7	71	22.5	2.1	3.6	2.4	n=13
Potassium / NA	mg/L	403	1.2	11	4.2	0.80	3.2	1.3	n=14
SCREENING ANALYSES[6]									
Total Organic Carbon (TOC) / NA	mg/L	403	0	1.7	0.034	1.1	18	3.5	n=16
Total Carbon (TC) / NA	mg/L	36	13	50	26	13.7	15.6	14.9	n=4

Table D-5. Comparison of 300 Area Ground Water Analytical Results to the 183-N Filter Backwash Stream "Like" Data (cont.)

Parameter / Regulatory Limit[2]	Units	N	Ground Water Data[1]			Miscellaneous Streams Data			Comments
			Min	Max	Mean	Min	Max	Mean	
Total Organic Halide (TOX) / NA	mg/L	401	0	25	0.11	0.10	0.28	0.17	n=14

[1] WHC 1989a.
[2] Notation / E1 / indicates constituent is present in Section E of the SWDP application.
[3] n = the number of data points used to obtain the mean value.

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APPENDIX E

SELECTED ANALYSES FOR THE 272-E AND 2703-E BUILDING WASTE WATER EFFLUENT

Table E-1 272-E and 2703-E Building Waste Water Effluent

As of December 1992, the 272-E Building Emergency Planning and Community Right-to-Know Act (EPCRA) list included machine oil, soluble oil, Stoddard solvent, and liquid argon as the liquid chemicals stored in the facility. There were no stored solids listed as being present in the facility.

The 2703-E Building has an extensive list of chemicals stored within various areas of the facility. The list of pertinent chemicals that need to be considered in sampling the effluent stream was narrowed because of the manner in which they are stored. Some are stored in a conex box (large, portable, metal storage room) located outside of the facility; these are noted on the EPCRA listing as "2703E-CON." Flammable chemicals are stored in a fire-resistant cabinet. This area of storage is noted as "2703E-FLAM." Another area is noted as "2703E-CORR." This area is a storage cabinet that holds corrosive chemicals. There is also a storage cabinet for oxidizers. This is noted as "2703E-OXY" in the EPCRA listings. The "2703E-PAN" notation signifies a secondary containment structure that lies below a group of bulk chemicals stored in 55-gallon drums. Chemical waste is discharged directly to the drain after approval is received from the Solid Waste Engineering Group stating that the waste is non-regulated. The amount of chemical waste discharged in a year is small. It has varied between 0 and 1700 gallons per year since 1990. The RCRA regulated areas in the 2703-E Building are satellite waste accumulation pads. After regulated chemicals are used in the facility, the chemicals are placed in drums. When the drums are full, they are moved to the 90-day storage pad located outside the building. Two RCRA regulated areas exist inside the 2703-E Building -- one is for organic waste and the other is for inorganic waste. Each drum has a secondary containment. Due to the manner of storage and the presence of secondary containment in the cabinets, as well as he waste accumulation area, it was not considered necessary to test for specific chemicals stored in the 2703-E Building.

As a result of the considerations discussed above, the 272-E waste water should be sampled for the constituents listed in Table E-1. The 2703-E Building waste water should be sampled for the same constituents.

Table E-1. 272-E and 2703-E Building Waste Water Effluent

Analyte	Analytical Procedure[1]	Container[2]	Container Size (ml)	Suggested Preservatives[2]	Holding Time
ICP METALS					
As	200.7[3]/6010[4]	P,G	1000	HNO_3 to pH < 2	6 mo
Ba	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cd	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cr	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Pb	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Se	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Ag	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cu	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Fe	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Mn	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Zn	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Na	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Ca	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Mg	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
K	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
CVAA METALS[3]					
Hg	245.1	P,G	500	HNO_3 to pH < 2	28 d
ANIONS[3,5]					
Fl^-	340.2	P,G	125	None	28 d
Cl^-	325.3	P,G	125	None	28 d
SO_4^{-2}	375.4	P,G	125	Cool to 4°C	28 d
NO_3^-	353.3	P,G	125	H_2SO_4 to pH < 2, Cool to 4°C	28 d
WASTE WATER[3]					
pH	150.1	P,G	25	None	ASAP
Conductivity	120.1	P,G	100	Cool to 4°C	28 d
TDS	160.1	P,G	100	Cool to 4°C	7 d
TSS	160.2	P,G	100	Cool to 4°C	7 d
Total Phosphorous	365.2	P,G	50	H_2SO_4 to pH < 2, Cool to 4° C	28 d

Table E-1. 272-E and 2703-E Building Waste Water Effluent (cont.)

Analyte	Analytical Procedure[1]	Container[2]	Container Size (ml)	Suggested Preservatives[2]	Holding Time
Total Oil and Grease	413.2	G	1000	H_2SO_4 or HCl to pH < 2, Cool, 4° C	28 d
CARCINOGENS					
Arsenic (see ICP metals)	200.7/6010	P,G	1000	HNO_3 to pH <.2	6 mo
VOAs[10]	624/8240	G	40	Cool 4°C, 0.008% $Na_2S_2O_3$	14 d
SVOA[10]	625/8250	G	1000	Cool 4°C, 0.008% $Na_2S_2O_3$	7 d/40 d[9]
SCREENING					
TOC	9060	G	250	Cool to 4°C, HCl or H_2SO_4 to pH < 2	28 d
TOX	9020	G	250	Cool to 4°C, H_2SO_4 to pH < 2	7 d
RADIONUCLIDES[4,6,7,8]					
Gross alpha	9310/900.0	P,G	1000	HNO_3 to pH < 2	6 mo
Gross beta	9310/900.0	P,G	1000	HNO_3 to pH < 2	6 mo

[1] The analytical procedures listed are provided for illustration. Any of the procedures listed in the Liquid Effluent QAPP (WHC 1992a) are acceptable.
[2] P = Plastic; G = Glass; Preservatives may differ from those suggested, with concurrence of HASM.
[3] EPA-600/4-79-020, Methods for the Chemical Analysis of Water and Wastes, US EPA, EMSL, 1979.
[4] Test Methods for Evaluating Solid Wastes, SW-846, Third Edition, US EPA/Office of Solid Waste and Emergency Response, 1990.
[5] EPA-600/4-84-017, The Determination of Inorganic Anions in Water by Ion Chromatography, US EPA, 1984 (alternate method).
[6] APHA, 1989, Standard Methods for the Examination of Water and Waste Water, APHA-AWWA, WPCS, February 1989, 17th Edition.
[7] WHC Methods Equivalent to EPA-600/4-80-032, Prescribed Procedures for Measurement of Radioactivity in Drinking Water, US EPA, 1980.
[8] EPA-520/5-84-006, Eastern Environmental Radiation Facility (EERF) Radiochemistry Procedures Manual, US EPA, 1984.
[9] 7 days to extract, 40 days after extraction.
[10] The entire target compound list (TCL) of the SW-846 Methods for VOA and SVOA will be requested as well as tentatively identified compound (TIC) reporting.

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APPENDIX F

SELECTED ANALYSES AND REFERENCE DATA FOR THE 284-E/W POWERHOUSE ASH WASTE WATER EFFLUENTS

Table F-1	Selected WAC 173-200 Ground Water Quality Criteria Compared to the 284-E/W Powerhouse Ash Waste Water
Table F-2	Additional Water Quality Analyses from Part E of the SWDP Application and Screening Analyses
Table F-3	Analytes of Interest for the 284-E/W Powerhouse Ash Waste Water Effluent
Table F-4	Comparison of Columbia River Water Characterization Data to the 284-E/W Powerhouse Ash Waste Water Effluent
Table F-5	Comparison of 200 Area Ground Water Analytical Results to the 284-E/W Powerhouse Ash Waste Water Effluent

Table F-1. Selected WAC 173-200 Ground Water Quality Criteria Compared to the 284-E/W Powerhouse Ash Waste Water

Parameter[1] / Regulatory Limit[2]	Summary[3] Data / Reference[4]	Assessment[5]
PRIMARY CONTAMINANTS		
Barium / E1 / 1.0	0.07 / F-1; 0.06 / F-2; 0.17 / F-3	K, yes
Cadmium / E1 / 0.001	<1.0 / F-2; <0.003 / F-3	K, yes
Chromium / E1 / 0.05	0.061 / F-2; 0.037 / F-3	K, yes
Lead / E1 / 0.05	<0.05 / F-1; 0.009 / F-2; <0.05 / F-3	K, yes
Mercury / E1 / 0.002	<0.0002 / F-1; <0.020 / F-2; <0.002 / F-3	K, yes
Selenium / E1 / 0.01	<5.0 / F-2; <0.050 / F-3	K, yes
Silver / E1 / 0.05	<5.0 / F-2; <0.01 / F-3	K, yes
Fluoride / E1 / 4	0.46 / F-2; 19 / F-3	K, yes
Nitrate (as N) / E1 / 10	2280 / F-3	K, yes
Total Coliform Bacteria / E1 / 1 in 100 ml (200-400 in 100 ml)[6]		A, no
SECONDARY CONTAMINANTS		
Copper / E1 / 1.0	0.29 / F-2	K, yes
Iron / E1 / 0.30	0.10 / F-1; 2.6 / F-2	K, yes
Manganese / E1 / 0.05	0.53 / F-2	K, yes
Zinc / E1 / 5.0	0.22 / F-2	K, yes
Chloride / E1 / 250	3.4 / F-2; 200 / F-3	K, yes
Sulfate / E1 / 250	18 / F-2; <100 / F-3	K, yes
Total Dissolved Solids / E1 / 500	66 / F-2	K, yes
Foaming Agents / 0.5		A, no
pH / E1 / 6.5-8.5 (6-9)[6]	7.2 / F-2; 8.1 / F-3	K, yes
Corrositivity / noncorrosive		A, no
Color / 15 color units		A, no
Odor / 3 threshold odor units		A, no
RADIONUCLIDES[7]		
Gross Alpha Particle Activity / 15	16 / F-2	K, yes
Gross Beta Particle Activity / 50	7.9 / F-2	K, yes
Tritium / 20,000		A, no
Strontium-90 / 8		A, no
Radium 226 & 228 / 5		A, no

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Table F-1. Selected WAC 173-200 Ground Water Quality Criteria Compared to the 284-E/W Powerhouse Ash Waste Water (cont.)

Parameter[1] / Regulatory Limit[2]	Summary[3] Data / Reference[4]	Assessment[5]
Radium-226 / 3		A, no
CARCINOGENS[6]		
Acrylamide / 0.02		A, no
Arsenic / 0.05	<5000 / F-2; <50 / F-3	K, yes
Bromodichloromethane / 0.3		
Bromoform / 5		
Chlorodibromomethane / 0.5		
Chloroform / 7	46 / F-2	K, yes
PAH / 0.01		P, yes

[1] There were no pesticides used in this process, so they were not included in the table. In order to conserve space, only the trihalomethanes and arsenic were routinely listed unless the specific waste stream analysis or process knowledge indicated the presence of additional compounds.
[2] mg/L unless otherwise noted. Notation / E1 / indicates the constituent is present in Section E of the SWDP application.
[3] The data was obtained from a previously published characterization document (WHC 1993a).
[4] References refer to the specific table in the characterization document (WHC 1993a) or other references as noted.
[5] Similar qualifiers to those used in the SWDP application form (Section E) were used in this table in order to help indicate the reason for decisions to analyze or not. The qualifiers are:

A = The chemical is not likely to be in the waste stream because it is not used in the process or the site. Note: We have amplified this definition to include chemicals onsite but with no credible means to gain entry to the effluent stream.

S = The chemical is not used in the process, but is present and a credible mechanism for entry into the stream exists.

P = The chemical is likely to be present because it is used in the process or is part of the expected effluent for any reason.

K = The effluent has been tested for the parameter.

[6] Potentially applicable discharge standard from WAC 173-221-040.
[7] pCi/L unless otherwise noted.
[8] μg/L unless otherwise noted.

Table F-2. Additional Water Quality Analyses from Part E of the SWDP Application and Screening Analyses

Parameter[1] / Regulatory Limit[1]	Summary Data[3]	Decision
PART E ANALYSES		
Conductivity (μS) / NA	167 / F-2	P, yes
Total Suspended Solids (TSS) / 30-45[6]	2 / F-1; 73 / F-2	P, yes
BOD (5 Day) / 30-45[6]	<4.0 / F-1	K, no
COD / NA	6.7 / F-1	K, no
Ammonia-N / NA	<0.04 / F-1	K, no
TKN-N / NA		A, no
Orthophosphate-P / NA		A, no
Total-Phosphorous-P / NA		P, yes
Total Oil and Grease / NA		A, no
Calcium / NA	20 / F-2	P, yes
Magnesium / NA	5.1 / F-2	P, yes
Sodium / NA	3.1 / F-2	P, yes
Potassium / NA	1.1 / F-2	P, yes
SCREENING ANALYSES		
Total Organic Carbon (TOC) / NA	2.2 / F-1; 37 / F-2	K, yes
Total Organic Halide (TOX) / NA	0.003 / F-2	K, yes

[1] The additional analyses from Part E of the SWDP application are included as appropriate to help monitor the process and to detect upsets.
[2] mg/L unless otherwise noted.
[3] The data was obtained from a previously published characterization document (WHC 1993a) and/or represents estimated waste water characteristics.
[4] References refer to the specific table in the characterization document (WHC 1993a) or other references.
[5] Similar qualifiers to those used in the SWDP application form (Section E2) were used in this table in order to help indicate the reason for decisions to analyze or not. The qualifiers are:

A = The chemical is not likely to be in the waste stream because it is not used in the process or the site. Note: We have amplified this definition to include chemicals onsite but with no credible means to gain entry to the effluent stream.

S = The chemical is not used in the process, but is present and a credible mechanism for entry into the stream exists.

P = The chemical is likely to be present because it is used in the process or is part of the expected effluent for any reason.

K = The effluent has been tested for the parameter.

[6] Potentially applicable discharge standard from WAC 173-221-040.

Table F-3. Analytes of Interest for the 284-E/W Powerhouse Ash Waste Water Effluent

Analyte	Analytical Procedure[1]	Container[2]	Container Size (ml)	Suggested Preservatives[2]	Holding Time
ICP METALS					
As	200.7[3]/6010[4]	P,G	1000	HNO_3 to pH < 2	6 mo
Ba	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cd	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cr	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Pb	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Se	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Ag	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cu	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Fe	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Mn	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Zn	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Na	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Ca	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Mg	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
K	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
CVAA METALS[3]					
Hg	245.1	P,G	500	HNO_3 to pH < 2	28 d
ANIONS[3,5]					
Fl^-	340.2	P,G	125	None	28 d
Cl^-	325.3	P,G	125	None	28 d
SO_4^{-2}	375.4	P,G	125	Cool to 4°C	28 d
NO_3^-	353.3	P,G	125	H_2SO_4 to pH < 2, Cool to 4°C	28 d
WASTE WATER[3]					
pH	150.1	P,G	25	None	ASAP
Conductivity	120.1	P,G	100	Cool to 4°C	28 d
TDS	160.1	P,G	100	Cool to 4°C	7 d
TSS	160.2	P,G	100	Cool to 4°C	7 d
BOD	405.1	P,G	1000	Cool to 4°C	48 hrs
Ammonia (as N)	351.3/351.4	P,G	500	H_2SO_4 to pH < 2, Cool to 4° C	28 d

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Table F-3. Analytes of Interest for the 284-E/W Powerhouse Ash Waste Water Effluent (cont.)

Analyte	Analytical Procedure[1]	Container[2]	Container Size (ml)	Suggested Preservatives[2]	Holding Time
Total Phosphorous	365.2	P,G	50	H_2SO_4 to pH < 2, Cool to 4° C	28 d
CARCINOGENS					
Arsenic (see ICP metals)	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
PAHs	8310	G	1000	Cool 4°C, 0.008% $Na_2S_2O_3$	7 d, 40 d[9]
VOAs[10]	624/8240	G	40	Cool 4°C, 0.008% $Na_2S_2O_3$	14 d
SCREENING					
TOC	9060	G	250	Cool to 4°C, HCl or H_2SO_4 to pH < 2	28 d
TOX	9020	G	250	Cool to 4°C, H_2SO_4 to pH < 2	7 d
RADIONUCLIDES[4,6,7,8]					
Gross alpha	9310/900.0	P,G	1000	HNO_3 to pH < 2	6 mo
Gross beta	9310/900.0	P,G	1000	HNO_3 to pH < 2	6 mo

[1] The analytical procedures listed are provided for illustration. Any of the procedures listed in the Liquid Effluent QAPP (WHC 1992a) are acceptable.
[2] P = Plastic; G = Glass; Preservatives may differ from those suggested, with concurrence of HASM.
[3] EPA-600/4-79-020, Methods for the Chemical Analysis of Water and Wastes, US EPA, EMSL, 1979.
[4] Test Methods for Evaluating Solid Wastes, SW-846, Third Edition, US EPA/Office of Solid Waste and Emergency Response, 1990.
[5] EPA-600/4-84-017, The Determination of Inorganic Anions in Water by Ion Chromatography, US EPA, 1984 (alternate method).
[6] APHA, 1989, Standard Methods for the Examination of Water and Waste Water, APHA-AWWA, WPCS, February 1989, 17th Edition.
[7] WHC Methods Equivalent to EPA-600/4-80-032, Prescribed Procedures for Measurement of Radioactivity in Drinking Water, US EPA, 1980.
[8] EPA-520/5-84-006, Eastern Environmental Radiation Facility (EERF) Radiochemistry Procedures Manual, US EPA, 1984.
[9] 7 days to extract, 40 days after extraction.
[10] The entire target compound list (TCL) of the SW-846 Methods for VOA will be requested as well as tentatively identified compound (TIC) reporting.

Table F-4. Comparison of Columbia River Water Characterization Data to the 284-E/W Powerhouse Ash Waste Water Effluent

Parameter / Regulatory Limit[2]	Units	Detection Limit	Columbia River Data[1]			Miscellaneous Streams Data			Comments
			RM 388	RM 362	RM 346	Min	Max	Mean	
PRIMARY CONTAMINANTS									
Barium / E1 / 1.0	mg/L	0.001	0.026	0.026	0.026	0.062	0.17	<0.099	n=3[5]
Cadmium / E1 / 0.001	mg/L	0.0001	<0.0001	0.00012	0.0001	<0.003	<1.0	<0.50	n=2
Chromium / E1 / 0.05	mg/L	0.003	<0.003	<0.003	<0.003	0.037	0.061	0.049	n=2
Lead / E1 / 0.05	mg/L	0.0008	<0.0008	<0.0008	<0.0008	0.009	<0.05	<0.036	n=3
Mercury / E1 / 0.002	mg/L	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.002	<0.001	n=2
Selenium / E1 / 0.01	mg/L	0.0008	<0.0008	<0.0008	<0.0008	<0.05	<0.05	<0.05	n=1
Silver / E1 / 0.05	mg/L	0.0002	<0.0002	<0.0002	<0.0002	<0.01	<0.01	<0.01	n=1
Fluoride / E1 / 4	mg/L	0.100	0.100	<0.100	0.105	0.019	0.46	0.24	n=2
Nitrate (as N) / E1 / 10	mg/L	0.030	<0.030	<0.030	0.033	2280	2280	2280	n=1
SECONDARY CONTAMINANTS									
Copper / E1 / 1.0	mg/L	0.002	<0.002	<0.002	0.002	0.29	0.29	0.29	n=1
Iron / E1 / 0.30	mg/L	0.010	0.049	0.041	0.069	0.10	2.6	1.3	n=2
Manganese / E1 / 0.05	mg/L	0.001	0.007	0.007	0.007	0.53	0.53	0.53	n=1
Zinc / E1 / 5.0	mg/L	0.002	0.007	0.008	0.004	0.22	0.22	0.22	n=1
Chloride / E1 / 250	mg/L	1.8	2.0	1.8	1.8	3.4	200	102	n=2
Sulfate / E1 / 250	mg/L	1.0	9.8	9.8	10.2	18	<100	<59	n=2
Total Dissolved Solids / E1 / 500	mg/L	3.0	69.4	64.3	89.3	66,000	66,000	66,000	n=1

Table F-4. Comparison of Columbia River Water Characterization Data to the 284-E/W Powerhouse Ash Waste Water Effluent (cont.)

Parameter / Regulatory Limit[2]	Units	Detection Limit	Columbia River Data[1]			Miscellaneous Streams Data			Comments
			RM 388	RM 362	RM 346	Min	Max	Mean	
pH / EI / 6.5-8.5	none		8.3	8.4	8.4	7.2	8.1	7.6	n=2
RADIONUCLIDES									
Gross Alpha Particle Activity / 15	pCi/L	0.9-1.3	0.76	1.13	0.95	16	16	16	n=1
Gross Beta Activity / 50	pCi/L	2.2-2.9	0.72	0.50	0.40	7.9	7.9	7.9	n=1
CARCINOGENS[4]									
Arsenic / 0.05	mg/L	0.0008	0.001	<0.0008	0.0008	<0.05	<0.05	<0.05	n=1
PART E ANALYSES									
Conductivity / NA	µS	none	0.013	0.013	0.013	167	167	167	n=1
Total Suspended Solids (TSS) / 30-45[4]	mg/L	3.0	3.0	3.0	4.3	2	73,000	36,500	n=2
BOD (5 Day) / 30-45[4]	mg/L	2.0	<2.0	<2.0	<2.0	<4.0	<4.0	<4.0	n=1
COD / NA	mg/L	7.0	<7.0	9.0	8.2	6.7	6.7	6.7	n=1
Ammonia-N / NA	mg/L	0.040	0.060	0.050	0.043	<0.04	<0.04	<0.04	n=1
Calcium / NA	mg/L	none	15.8	15.8	15.8	20	20	20	n=1
Magnesium / NA	mg/L	0.025	3.5	3.5	3.6	5.1	5.1	5.1	n=1
Sodium / NA	mg/L	0.10	15.7	16.0	17.3	3.1	3.1	3.1	n=1
Potassium / NA	mg/L	0.30	0.73	0.75	0.70	1.1	1.1	1.1	n=1
SCREENING ANALYSES[4]									
Total Organic Carbon (TOC) / NA	mg/L	1.0	1.7	1.7	1.7	2.2	37,000	18,500	n=2

Table F-4. Comparison of Columbia River Water Characterization Data to the 284-E/W Powerhouse Ash Waste Water Effluent (cont.)

Parameter / Regulatory Limit[2]	Units	Detection Limit	Columbia River Data[1]			Miscellaneous Streams Data			Comments
			RM 388	RM 362	RM 346	Min	Max	Mean	
Total Organic Halide (TOX) / NA	mg/L	0.01	0.11	0.33	0.10	0.31	0.31	0.31	n=1

[1] WHC 1992b. Data were obtained from samples taken at three locations along the Columbia River: one location upstream of the Hanford Site at the Vernita Bridge, River Mile (RM) 388; one location adjacent to the 200 Areas (RM 362); and one location adjacent to the 300 Area (RM 346).
[2] Notation / E1 / indicates constituent is present in Section E of the SWDP application.
[3] n = number of data points used to obtain the mean value.
[4] Potentially applicable discharge standard from WAC 173-221-040.

Table F-5. Comparison of 200 Area Ground Water Analytical Result to the 284-E/W Powerhouse Ash Waste Water Effluent

Parameter / Regulatory Limit[2]	Units	N	Ground Water Data[1]			Miscellaneous Streams Data			Comments
			Min	Max	Mean	Min	Max	Mean	
PRIMARY CONTAMINANTS									
Barium / E1 / 1.0	mg/L	37	0.006	0.26	0.054	0.062	0.17	<0.099	n=3[3]
Cadmium / E1 / 0.001	mg/L	37	0	0.014	0.00057	<0.003	<1.0	<0.50	n=2
Chromium / E1 / 0.05	mg/L	37	0	0.23	0.047	<0.037	0.061	0.049	n=2
Lead / E1 / 0.05	mg/L	37	0	0.032	0.0029	<0.009	<0.05	<0.036	n=3
Mercury / E1 / 0.002	mg/L	37	0	0	0	<0.0002	<0.002	<0.001	n=2
Selenium / E1 / 0.01	mg/L	37	0	0.049	0.0029	<0.05	<0.05	<0.05	n=1
Silver / E1 / 0.05	mg/L	37	0	0	0	<0.01	<0.01	<0.01	n=1
Fluoride / E1 / 4	mg/L	42	0	1.9	0.52	<0.019	0.46	0.24	n=2
Nitrate (as N) / E1 / 10	mg/L	54	0.5	2810	230	2280	2280	2280	n=1
SECONDARY CONTAMINANTS									
Copper / E1 / 1.0	mg/L	37	0	0.069	0.0079	0.29	0.29	0.29	n=1
Iron / E1 / 0.30	mg/L	37	0.035	121	6.5	0.10	2.6	1.3	n=2
Manganese / E1 / 0.05	mg/L	37	0	1.4	0.08	0.53	0.53	0.53	n=1
Zinc / E1 / 5.0	mg/L	37	0	0.79	0.064	0.22	0.22	0.22	n=1
Chloride / E1 / 250	mg/L	42	1.1	33	8.0	3.4	200	102	n=2
Sulfate / E1 / 250	mg/L	42	7.2	1280	84	18	<100	<59	n=2
Total Dissolved Solids / E1 / 500	mg/L	2	140	146	143	66,000	66,000	66,000	n=1
pH / E1 / 6.5-8.5	None	41	7.6	8.7	8.0	7.2	8.1	7.6	n=2

Table F-5. Comparison of 200 Area Ground Water Analytical Results to the 284-E/W Powerhouse Ash Waste Water Effluent (cont.)

Parameter / Regulatory Limit[2]	Units	N	Ground Water Data[1]			Miscellaneous Streams Data			Comments
			Min	Max	Mean	Min	Max	Mean	
RADIONUCLIDES[3]									
Gross Alpha Particle Activity / 15	pCi/L	55	0	594	49.5	16	16	16	n=1
Gross Beta Activity / 50	pCi/L	55	4.0	5110	371	7.9	7.9	7.9	n=1
CARCINOGENS[4]									
Arsenic / 0.05	mg/L	37	0	0.051	0.009	<0.05	<0.05	<0.05	n=2
PART E ANALYSES									
Conductivity / NA	µS	22	168	736	373	167	167	167	n=1
Ammonia-N / NA	mg/L	41	0	0.89	0.047	<0.04	<0.04	<0.04	n=1
Calcium / NA	mg/L	37	13	321	53	20	20	20	n=1
Magnesium / NA	mg/L	37	4.3	98	16	5.1	5.1	5.1	n=1
Sodium / NA	mg/L	37	4.4	53	23	3.1	3.1	3.1	n=1
Potassium / NA	mg/L	37	2.9	12	6.2	1.1	1.1	1.1	n=1
SCREENING ANALYSES									
Total Organic Carbon (TOC) / NA	mg/L	42	0	3.9	0.44	2.2	37,000	18,500	n=2
Total Organic Halide (TOX) / NA	mg/L	42	0	19	0.81	0.31	0.31	0.31	n=1

[1] WHC 1989a.
[2] Notation / E1 / indicates constituent is present in Section E of the SWDP application.
[3] n = the number of data points used to obtain the mean value.

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APPENDIX G

SELECTED ANALYSES AND REFERENCE DATA FOR THE 400 AREA SANITARY WASTE WATER

Table G-1 Selected WAC 173-200 Ground Water Quality Criteria Compared to the 400 Area Sanitary Waste Water Data

Table G-2 Additional Water Quality Analyses from Part E of the SWDP Application and Screening Analyses

Table G-3 Analytes of Interest for the 400 Area Sanitary Waste Water Effluent

Table G-4 Comparison of Representative Untreated Domestic Wastewater Constituents to the 400 Area Sanitary Sewer Septic Tank Influent and Effluent

Table G-5 Comparison of Representative Data from Domestic Septic Tank Effluents to the 400 Area Sanitary Sewer Septic Tank Effluent

Table G-6 Comparison of 400 Area Source Well Characterization Data to the 400 Area Sanitary Waste Water Effluent

Table G-1. Selected WAC 173-200 Ground Water Quality Criteria Compared to the 400 Area Sanitary Waste Water Data

Parameter[1] / Regulatory Limit[2]	Summary[3] Data / Reference[4]	Assessment[5]
PRIMARY CONTAMINANTS		
Barium / E1 / 1.0		P, yes
Cadmium / E1 / 0.001	<0.0006 / G-1	K, yes
Chromium / E1 / 0.05		P, yes
Lead / E1 / 0.05	<0.004 / G-1	K, yes
Mercury / E1 / 0.002	<0.0005 / G-1	K, no
Selenium / E1 / 0.01		P, yes
Silver / E1 / 0.05		P, yes
Fluoride / E1 / 4		P, yes
Nitrate (as N) / E1 / 10		P, yes
Total Coliform Bacteria / E1 / 1 in 100 ml (200-400 in 100 ml)[6]		P, yes
SECONDARY CONTAMINANTS		
Copper / E1 / 1.0		P, yes
Iron / E1 / 0.30		P, yes
Manganese / E1 / 0.05		P, yes
Zinc / E1 / 5.0	<0.21 / G-1	K, yes
Chloride / E1 / 250	41.2 / G-1	K, yes
Sulfate / E1 / 250		P, yes
Total Dissolved Solids / E1 / 500		P, yes
Foaming Agents / 0.5		A, no
pH / E1 / 6.5-8.5 (6-9)[6]	7.9 / G-1	K, yes
Corrositivity / noncorrosive		A, no
Color / 15 color units		A, no
Odor / 3 threshold odor units		P, no
RADIONUCLIDES[7]		
Gross Alpha Particle Activity / 15		P, yes
Gross Beta Particle Activity / 50		P, yes
Tritium / 20,000		P, yes
Strontium-90 / 8		P, yes
Radium 226 & 228 / 5		A, no

Table G-1. Selected WAC 173-200 Ground Water Quality Criteria Compared to the 400 Area Sanitary Waste Water Data (cont.)

Parameter[1] / Regulatory Limit[2]	Summary[3] Data / Reference[4]	Assessment[5]
Radium-226 / 3		A, no
CARCINOGENS[6]		
Acrylamide / 0.02		A, no
Arsenic / 0.05		P, yes
Bromodichloromethane / 0.3		A, no
Bromoform / 5		A, no
Chlorodibromomethane / 0.5		A, no
Chloroform / 7.0		A, no

[1] There were no pesticides used in this process, so they were not included in the table. In order to conserve space, only the trihalomethanes and arsenic were routinely listed unless the specific waste stream analysis or process knowledge indicated the presence of additional compounds.
[2] mg/L unless otherwise noted. Notation / E1 / indicates the constituent is present in Section E of the SWDP application.
[3] The data was obtained from a previously published characterization document (WHC 1993a).
[4] References refer to the specific table in the characterization document (WHC 1993a) or other references as noted.
[5] Similar qualifiers to those used in the SWDP application form (Section E) were used in this table in order to help indicate the reason for decisions to analyze or not. The qualifiers are:

A = The chemical is not likely to be in the waste stream because it is not used in the process or the site. Note: We have amplified this definition to include chemicals onsite but with no credible means to gain entry to the effluent stream.

S = The chemical is not used in the process, but is present and a credible mechanism for entry into the stream exists.

P = The chemical is likely to be present because it is used in the process or is part of the expected effluent for any reason.

K = The effluent has been tested for the parameter.

[6] Potentially applicable discharge standard from WAC 173-221-040.
[7] pCi/L unless otherwise noted.
[8] μg/L unless otherwise noted.

Table G-2. Additional Water Quality Analyses from Part E of the SWDP Application and Screening Analyses

Parameter[1] / Regulatory Limit[2]	Summary Data[3] / Reference[4]	Decision[5]
PART E ANALYSES		
Conductivity (μS) / NA		P, yes
Total Suspended Solids (TSS) / 30-45[6]	31,52 / G-2	K, yes
BOD (5 Day) / 30-45[6]	66,84 /G-2	K, yes
COD / NA		P, no
Ammonia-N / NA	52 / G-1	K, no
TKN-N / NA		P, yes
Orthophosphate-P / NA	<11.2 / G-1	K, no
Total-Phosphorous-P / NA		P, yes
Total Oil and Grease / NA		P, yes
Calcium / NA		P, yes
Magnesium / NA		P, yes
Sodium / NA		P, yes
Potassium / NA		P, yes
SCREENING ANALYSES		
Total Organic Carbon (TOC) / NA		P, yes
Total Organic Halide (TOX) / NA		P, no

[1] The additional analyses from Part E of the SWDP application are included as appropriate to help monitor the process and to detect upsets.
[2] mg/L unless otherwise noted.
[3] The data was obtained from a previously published characterization document (WHC 1993a) or other references. characteristics.
[4] References refer to the specific table in the characterization document (WHC 1993a) or other references.
[5] Similar qualifiers to those used in the SWDP application form (Section E) were used in this table in order to help indicate the reason for decisions to analyze or not. The qualifiers are:

A = The chemical is not likely to be in the waste stream because it is not used in the process or the site. Note: We have amplified this definition to include chemicals onsite but with no credible means to gain entry to the effluent stream.

S = The chemical is not used in the process, but is present and a credible mechanism for entry into the stream exists.

P = The chemical is likely to be present because it is used in the process or is part of the expected effluent for any reason.

K = The effluent has been tested for the parameter.

[6] Potentially applicable discharge standard from WAC 173-221-040

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Table G-3. Analytes of Interest for the 400 Area Sanitary Waste Water Effluent

Analyte	Analytical Procedure[1]	Container[2]	Container Size (ml)	Suggested Preservatives[2]	Holding Time
ICP METALS					
As	200.7[3]/6010[4]	P,G	1000	HNO_3 to pH < 2	6 mo
Ba	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cd	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cr	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Pb	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Se	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Ag	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Cu	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Fe	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Mn	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Zn	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Na	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Ca	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
Mg	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
K	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
ANIONS[3,5]					
Fl^-	340.2	P,G	125	None	28 d
Cl^-	325.3	P,G	125	None	28 d
SO_4^{-2}	375.4	P,G	125	Cool to 4°C	28 d
NO_3^-	353.3	P,G	125	H_2SO_4 to pH < 2, Cool to 4°C	28 d
WASTE WATER[3]					
pH	150.1	P,G	25	None	ASAP
Conductivity	120.1	P,G	100	Cool to 4°C	28 d
TDS	160.1	P,G	100	Cool to 4°C	7 d
TSS	160.2	P,G	100	Cool to 4°C	7 d
BOD	405.1	P,G	1000	Cool to 4°C	48 hrs
TKN (as N)	351.3/351.4	P,G	500	H_2SO_4 to pH < 2, Cool to 4°C	28 d
Total Phosphorous	365.2	P,G	50	H_2SO_4 to pH < 2, Cool to 4°C	28 d

Table G-3. Analytes of Interest for the 400 Area Sanitary Waste Water Effluent (cont.)

Analyte	Analytical Procedure[1]	Container[2]	Container Size (ml)	Suggested Preservatives[2]	Holding Time
Total Oil and Grease	413.2	G	1000	H_2SO_4 or HCl to pH < 2, Cool, 4° C	28 d
Fecal Coliform (total)	SM908[6]	G	100 (2 btls)	Cool 4°C	6 hrs
CARCINOGENS					
Arsenic (see ICP metals)	200.7/6010	P,G	1000	HNO_3 to pH < 2	6 mo
SCREENING					
TOC	9060	G	250	Cool to 4°C, HCl or H_2SO_4 to pH < 2	28 d
TOX	9020	G	250	Cool to 4°C, H_2SO_4 to pH < 2	7 d
RADIONUCLIDES[4,6,7,8]					
Gross alpha	9310/900.0	P,G	1000	HNO_3 to pH < 2	6 mo
Gross beta	9310/900.0	P,G	1000	HNO_3 to pH < 2	6 mo
^3H	WHC[7,8]	P,G	1000	HNO_3 to pH < 2	6 mo
Sr-90	WHC[7,8]	P,G	1000	HNO_3 to pH < 2	6 mo

[1] The analytical procedures listed are provided for illustration. Any of the procedures listed in the Liquid Effluent QAPP (WHC 1992a) are acceptable.
[2] P = Plastic; G = Glass; Preservatives may differ from those suggested, with concurrence of HASM.
[3] EPA-600/4-79-020, Methods for the Chemical Analysis of Water and Wastes, US EPA, EMSL, 1979.
[4] Test Methods for Evaluating Solid Wastes, SW-846, Third Edition, US EPA/Office of Solid Waste and Emergency Response, 1990.
[5] EPA-600/4-84-017, The Determination of Inorganic Anions in Water by Ion Chromatography, US EPA, 1984 (alternate method).
[6] APHA, 1989, Standard Methods for the Examination of Water and Waste Water, APHA-AWWA, WPCS, February 1989, 17th Edition.
[7] WHC Methods Equivalent to EPA-600/4-80-032, Prescribed Procedures for Measurement of Radioactivity in Drinking Water, US EPA, 1980.
[8] EPA-520/5-84-006, Eastern Environmental Radiation Facility (EERF) Radiochemistry Procedures Manual, US EPA, 1984.

Table G-4. Comparison of Representative Untreated Domestic Wastewater Constituents to the 400 Area Sanitary Sewer Septic Tank Influent and Effluent

Parameter / Regulatory Limit[2]	Units	Untreated Domestic Wastewater[1] (Concentration)			Miscellaneous Streams Data			Comments
		Weak	Medium	Strong	Min	Max	Mean	
Total Suspended Solids (TSS) / 30-45[5]	mg/L	100	220	350	275	589	432	n=2[4]; Septic tank influent data
	mg/L	100	220	350	31	52	41	n=2; Septic tank effluent data
BOD (5 Day, 20°C) / 30-45[5]	mg/L	110	220	400	221	547	384	n=2; Septic tank influent data
	mg/L	110	220	400	66	84	75	n=2; Septic tank effluent data
Ammonia-N / NA	mg/L	12	25	50	11	110	52	n=11; Septic tank effluent data
Chlorides[3] / NA	mg/L	30	50	100	19	61	41	n=12; Septic tank effluent data

[1] Metcalf and Eddy 1991.
[2] Notation / E1 / indicates constituent is present in Section E of the SWDP application.
[3] Values should be increased by amount present in domestic water supply.
[4] n = the number of data points used to obtain the mean value.
[5] Potentially applicable discharge standard from WAC 173-221-040.

Table G-5. Comparison of Representative Data from Domestic Septic Tank Effluents to the 400 Area Sanitary Sewer Septic Tank Effluent

Parameter / Regulatory Limits[2]	Units	No of Sample	Representative Data[1]			Miscellaneous Streams Data			Comments
			Min	Max	Mean	Min	Max	Mean	
BOD (5 day) / 30-45[3]	mg/L	150	7	480	138	66	84	75	n=2[2]
Total Suspended Solids (TSS) / 30-45[3]	mg/L	148	10	695	49	31	52	42	n=2

[1] EPA 1980b.
[2] n = the number of data points used to obtain the mean value.
[3] Potentially applicable discharge standard from WAC 173-221-040.

Table G-6. Comparison of 400 Area Source Well Characterization Data to the 400 Area Sanitary Waste Water Effluent

Parameter / Regulatory Limit[2]	Units	1988[1]	1989[1]	1990[1]		Miscellaneous Streams Data			Comments
				499-S1-8J Primary	499-S0-7 Backup	Min	Max	Mean	
PRIMARY CONTAMINANTS									
Cadmium / E1 / 0.001	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.001	<0.0006	n=12[3]
Lead / E1 / 0.05	mg/L	<0.005	<0.005	<0.005	<0.005	<0.002	0.008	<0.004	n=12
Mercury / E1 / 0.002	mg/L	<0.0005	<0.0004	<0.0004	<0.0004	<0.0003	<0.0007	<0.0005	n=12
SECONDARY CONTAMINANTS									
Zinc / E1 / 5.0	mg/L	<0.1	<0.1	<0.2	<0.2	<0.08	0.66	<0.205	n=12
Chloride / E1 / 250	mg/L	11.9	11.9	8.3	10.8	19	61	41.2	n=12

[1] WHC 1992c.
[2] Notation / E1 / indicates constituent is present in Section E of the SWDP application.
[3] n = the number of data points used to obtain the mean value.

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Part II

Quality Assurance Project Plan (QAPjP) for Sampling and Analysis of Miscellaneous Streams

ACRONYMS

CFR	Code of Federal Regulations
DOE	Department of Energy
DOE-RL	Department of Energy, Richland Field Office
DQO	Data Quality Objectives
Ecology	Washington State Department of Ecology
EII	Environmental Investigation Instruction
EPA	Environmental Protection Agency
EPIC	Environmental Restoration (ER) Program Information Center
ETP	Effluent Treatment Programs
FSP	Field Sampling Plan
HASM	Hanford Analytical Services Management
HEIS	Hanford Environmental Information System
HPT	Health Physics Technician
LEMIS	Liquid Effluent Monitoring Information System
NPDES	National Pollutant Discharge Elimination System
pCi/g	picocuries per gram
QA	Quality Assurance
QAPjP	Quality Assurance Project Plan
QAPI	Quality Assurance Program Index
QAPP	Quality Assurance Program Plan
QC	Quality Control
QI	Quality Instruction
QR	Quality Requirement
SAP	Sampling and Analysis Plan
SWDP	State Waste Discharge Permit
TCL	Target Compound List
VOA	Volatile Organics Analysis
WAC	Washington Administrative Code

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TABLES

2-1 Ecology Consent Order Table 4 Miscellaneous Streams Addressed in this QAPjP II-3

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1.0 INTRODUCTION

This QAPjP applies specifically to the field activities and laboratory analyses performed in support of Miscellaneous Stream sampling and analysis activities defined by the FSP. It is prepared in compliance with the requirements of the *Environmental Engineering, Technology, and Permitting Function Quality Assurance Program Plan*, WHC-EP-0383 (WHC 1990a).

The QAPjP is designed specifically to support the Table 4 Miscellaneous Stream FSP, which provides such details as specific sampling locations, required sampling intervals, stream-specific sample parameters, sample quantities, sampling frequency, and overall sampling schedules. This QAPjP supports and follows the "Hanford Site Liquid Effluent Characterization Program Quality Assurance Program Plan (WHC 1992). Distribution and revision control of all work-controlling documents will be performed in compliance with Quality Requirement (QR) 6.0, "Document Control" and other applicable procedures as identified in the QA Program Index (QAPI) included in WHC-EP-0383 (WHC 1990a).

The objectives of sampling activities conducted for Miscellaneous Streams on the Hanford Site are to acquire the analytical data necessary to support State of Washington Department of Ecology (Ecology) permits to discharge waste streams directly to the soil column, pursuant to the requirements of Washington Administrative Code (WAC) 173-216 and Washington State Department of Ecology Consent Order No. DE 91NM-177 (Ecology 1991).

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2.0 PROJECT DESCRIPTION

On December 23, 1991, the U.S. Department of Energy, Richland Field Office (DOE-RL) entered into an agreement with the Washington State Department of Ecology (Ecology) to adhere to provisions of the 216 Consent Order. The 216 Consent Order requires that liquid effluents at Hanford be subjected to certain regulatory milestones for complying with the state waste discharge permitting requirements in WAC 173-216 or WAC 173-218, where applicable (WAC 173-216/218).

Hanford liquid effluent streams discharging to the soil column have been categorized as follows:

- Phase I Streams
- Phase II Streams
- Miscellaneous Streams.

A group of eleven miscellaneous streams were specifically identified in the Consent Order in Table 4 and will hereafter be referred to as "Table 4 Miscellaneous Streams." The eleven streams were assigned dates from June 1994 to September 1994, at which time they were to have WAC-216/218 permit applications submitted. Subsequent decisions to reroute, discontinue, or permit under the National Pollutant Discharge Elimination System (NPDES), have removed four streams, leaving the remaining seven as listed in Table 1-1.

The purpose of the sampling project is to provide data that is documentable and suitable to support WAC-216 State Waste Discharge Permit (SWDP) applications for these seven Table 4 Miscellaneous Streams.

This QAPjP is intended to ensure that procedures, plans, and instructions are implemented and appropriate for the control of sampling and analysis activities to provide data for SWDP applications.

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Table 2-1. Ecology Consent Order Table 4 Miscellaneous Streams Addressed in this QAPjP

	Current Disposal Site
100-N Sanitary Sewer System	100-N Sewage Lagoon
300 Area Sanitary Sewer System	300 Area Sanitary Sewer
183-N Filter Backwash	183-N Backwash Discharge Pond
272-E, 2703-E Buildings Waste Water	200-E Chemical Drain Field
200-W Powerhouse Ash Waste Water	200-W Powerhouse Ash Pit
200-E Powerhouse Ash Waste Water	200-E Powerhouse Ash Pit
400 Area Sanitary Waste Water	400 Area Septic System

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3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The program organization for the Hanford Site liquid effluent characterization program is shown in Figure 3-1. The following have responsibilities for implementing the characterization program:

- Effluent Treatment Programs (ETP)
- Quality Assurance
- Facilities
- RCRA/CERCLA Sampling Team
- Hanford Analytical Services Management (HASM)
- Work Control and Data Management.

The responsibilities for these groups and/or functions are described in the following sections.

3.1 EFFLUENT TREATMENT PROGRAMS

The WHC ETP group has primary responsibilities for conducting this project. External participant contractors or subcontractors shall be evaluated and selected for certain portions of task activities at the direction of the project manager in compliance with procedures QR 4.0, "Procurement Document Control," QR 7.0, "Control of Purchased Items and Services" (WHC 1991a), and other procedures as identified under criteria 4 and 7 of the QAPI included in WHC-EP-0383 (WHC 1990a). All contractor or subcontractor plans and procedures shall be approved before their use, and shall be available for Ecology review after Westinghouse Hanford approval.

The ETP function has the following responsibilities for this characterization project:

- Provide a project manager to coordinate the overall program
- Act as liaison to DOE-RL
- Prepare and implement the SAP (FSP and QAPjP)
- Approve SAP
- Perform technical evaluations of validated data

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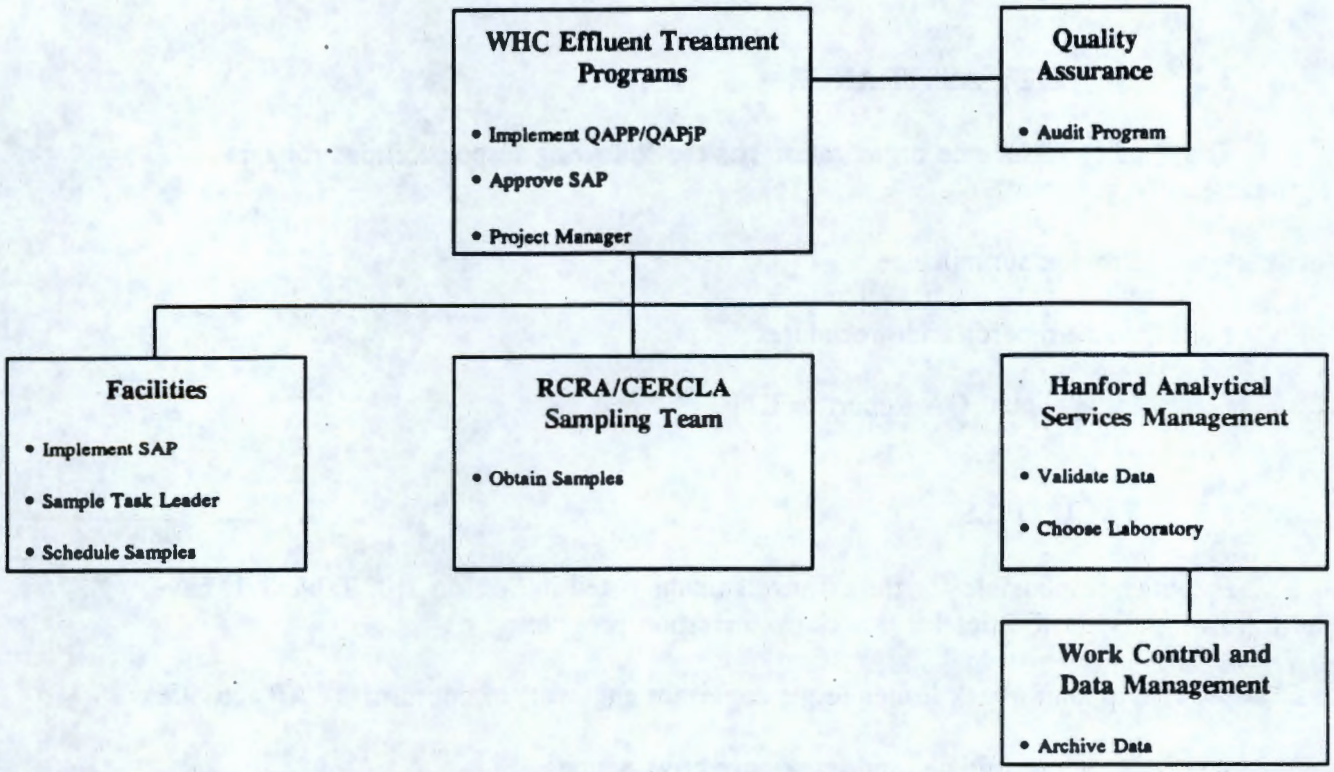

Figure 3-1. Project Organization for the Hanford Site Miscellaneous Streams Liquid Effluent Characterization Project

- Issue sampling schedule

- Manage input of validated data into the Liquid Effluent Monitoring Information System (LEMIS).

3.2 QUALITY ASSURANCE

The Quality Assurance organization has the following responsibilities for this characterization program:

- Provide surveillance

- Audit records and procedures

- Issue annual QA Report to ETP.

3.3 FACILITIES

Facilities responsible for the effluent streams listed in Section 1.0, Table 1-1, have the following responsibilities for this characterization program:

- Appoint a task leader (e.g., cognizant engineer) to coordinate SAP activities

- Develop, initiate, and track corrective actions

- Implement SAP by accessing appropriate facility engineering, operations, health and safety, and quality assurance organizations (e.g., provide a trained operator for escort duties and assistance in moving samples through radiation zone barriers, a health physics technician (HPT) for radiation surveys of sample packages, Radiation Work Permit (RWP) instructions for zone entry, and verification of radiation worker training requirements for sampling personnel).

- Ensure that appropriate facility quality assurance organizations approve the SAP

- Prepare facility procedures to support the SAP

- Initiate sample scheduling with RCRA/CERCLA Sampling Team and ETP

- Approve site-specific sampling procedures developed by RCRA/CERCLA Sampling Team

- Overview of data management

- Interpret (e.g., significance test) and utilize validated data
- Provide administrative support for sampling activities
- Transmit validated data to Environmental Assurance for inclusion in the annual report of environmental releases, if requested.

3.4 RCRA/CERCLA SAMPLING TEAM

The RCRA/CERCLA Sampling Team has the following responsibilities for this characterization program:

- Follow Sampling Authorization Form and Field Sampling Requirements (SAF/FSR) Provided by HASM
- Obtain effluent samples
- Package effluent samples for shipment
- Perform field measurements (e.g., pH, conductivity)
- Transport effluent samples to the analytical laboratory or shipping center
- Document effluent sampling activities in a controlled log book
- Initiate "chain of custody" documentation for samples
- Store controlled field logs and other sampling data information
- Provide copies of controlled field logs and other sampling data information to the HASM and facility task leader responsible for effluent sampling
- Provide internal quality control samples to analytical laboratory.

3.5 HANFORD ANALYTICAL SERVICES MANAGEMENT

The HASM has the following responsibilities for this characterization program:

- Prepare statement of work and select contract laboratory
- Schedule and prioritize sample analyses requests
- Coordinate sampling and laboratory analysis schedule

- Provide SAF/FSR to RCRA/CERCLA Sampling Team

- Validate characterization data to Validation Level B per WHC-CM-5-3, *Sample Management and Administration*, Section 2.0, "Data Validation for RCRA Analyses" (WHC 1990d)

- Transmit validated data packages to the Environmental Restoration (ER) Program Information Center (EPIC). (The data packages include analytical results and validation report.)

- File "chain-of-custody" documentation received from samples

- Transmit (electronic and written) data summary and validation report to Facilities and ETP.

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3.6 WORK CONTROL AND DATA MANAGEMENT

Work Control and Data Management is responsible for archiving the validation in EDMC.

3.7 ON-SITE ANALYTICAL LABORATORIES

The WHC field sampling team will be responsible for screening all samples for radioactivity in compliance with Environmental Investigation Instruction (EII) 2.3, "Administration of Radiation Surveys to Support Environmental Characterization Work on the Hanford Site," WHC-CM-7-7 (WHC 1991b).

If the total activity of the sample is equal to or greater than 200 picocuries/gram (pCi/g), or if the alpha activity of the sample is equal to or greater than 60 pCi/g, samples shall be packaged and shipped in compliance with WHC-CM-2-14 (WHC 1991c) and routed to a Westinghouse Hanford or Hanford Site participant contractor or subcontractor laboratory equipped and qualified to handle the analysis of radioactive samples.

Samples that do not exceed either of the above criteria may be routed to any approved participant contractor or subcontractor analytical laboratory. All such laboratories shall be evaluated and selected in compliance with WHC-CM-4-2, QR 7.0, "Control of Purchased Items and Services" and Quality Instruction (QI) 7.2, "Supplier Evaluation" (WHC 1990a). Although not specifically required by WAC 173-216-125 until 1994, the accreditation status of waste water laboratories pursuant to WAC 173-50 shall be considered among the factors leading to supplier selection. Service procurement documents with the individual analytical laboratories shall require the preparation of Laboratory QAPjPs in compliance with Section 1.0 of SW-846, Test Methods for Evaluating Solid Waste (EPA 1986). Laboratory QAPjPs shall be submitted for internal review and approval prior to use.

All analyses shall be coordinated through HASM and shall be performed in compliance with standard EPA methods from 40 CFR 136 wherever available. Where 40 CFR 136 methods are not available for a particular parameter of interest, other EPA methods shall be specified, or alternate methods submitted for internal approval prior to use.

3.8 OTHER SUPPORT CONTRACTORS

Procurement of all other field services and supporting items, materials, or equipment shall comply with standard procurement procedures as discussed in Sections 2.1 and 4.1 of this QAPjP. All work shall comply with approved QA plans and/or procedures, and is subject to the controls of QI 10.4, "Surveillance" (WHC 1991a). Applicable quality requirements shall be invoked as part of the approved procurement documentation or work order as noted in Section 4.1.

4.0 DATA QUALITY OBJECTIVES FOR MEASUREMENTS

The data quality objectives (DQOs) for the Miscellaneous Streams are driven by the end uses of the sampling data, which are to support SWDP applications to discharge waste streams directly to the soil column. The analytical parameters that should be addressed in the permitting process are specifically defined in Section E of the permit application prescribed by Ecology [form ECY 040-179 (Rev. 4/92)]. Section E directs the use of the standard EPA methods identified in 40 CFR 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants," unless alternative procedures are approved. The methods specified in 40 CFR 136 correspond to Level 3 of the EPA DQO guidance (EPA 1987), and are appropriate for the end uses of the data (i.e., characterization of the stream or stream category for potential pollutants). The Section E parameters and additional parameters that may be analyzed on the basis of facility history and process knowledge are listed in the FSP (Part I of the SAP).

The DQOs for miscellaneous stream sampling are discussed in Section 7.0 of the Liquid Effluent QAPP (WHC 1992), and are summarized below:

- Detection/Quantitation Limits: Detection and quantitation limits have been defined and specified for each parameter.

- Precision: Maximum ranges for analytical precision have been defined and specified for each parameter.

- Accuracy: Maximum ranges for analytical accuracy have been defined and specified for each parameter.

- Representativeness: Sample representativeness will be achieved in the FSP by the specification of point locations for sample acquisition, specific sampling methods, and by the establishment of sampling frequencies that have appropriate relationships to the variables in the contributing processes and stream conditions.

- Completeness: Completeness goals have been set at 90%, since all samples can be readily collected in duplicate or triplicate, and resampling can be readily performed if sample integrity or representativeness were somehow to be compromised.

- Comparability: Comparability of analytical results shall be achieved by the use of standard 40 CFR 136 based analytical methods or equivalent alternates as specified in the Liquid Effluent QAPP (WHC 1992), and by the use of standard reporting protocols as defined in the specified analytical methods.

5.0 SAMPLING PROCEDURES

All stream sampling activities shall be performed in compliance with the Liquid Effluent QAPP, Section 5.0 (WHC 1992) at the locations and frequencies specified in applicable stream-specific SAP.

5.1 PARTICIPANT CONTRACTOR/SUBCONTRACTOR PROCEDURES

Participant contractor and/or subcontractor services shall be procured under the applicable requirements of QR 4.0, "Procurement Document Control," QR 7.0, "Control of Purchased Items and Services" (WHC 1991a), and other procedures as identified under criteria four and seven of the QAPI included in WHC-EP-0383 (WHC 1990a). Submittal requirements of procedures for review and approval before use shall be included in the procurement document or work order, as applicable, when such services require procedural controls. Analytical laboratories shall be required to submit the current version of their internal QA program plans, in addition to analytical procedures. All analytical laboratory plans and procedures shall be reviewed and approved before use by qualified personnel from the Analytical Laboratories organization, or other qualified personnel, as directed by the project manager. All reviewers shall be qualified under the requirements of Section 4 of WHC-CM-5-4 (WHC 1993). All participant contractor or subcontractor procedures, plans, and/or manuals shall be retained as project records in compliance with Section 9 of WHC-CM-3-5, "Document Control and Records Management Manual" (WHC 1990d). All such documents are available for regulatory review on request, at the direction of the project manager.

5.2 FIELD CHANGE CONTROL REQUIREMENTS

Should deviations from established procedures be required to accommodate unforeseen field situations, they may be authorized by the field team leader in accordance with the requirements specified in EII 1.4, "Deviation from Environmental Investigations Instructions" (WHC 1991b). Documentation, review, and disposition of instruction change authorization forms shall be defined by EII 1.4. Other types of procedure change requests shall be documented as required by QR 6.0, "Document Control" (WHC 1991b), or other procedures as identified under criterion six of the QAPI included in WHC-EP-0383 (WHC 1990a).

6.0 SAMPLE CUSTODY

All samples obtained during the course of this investigation shall be controlled per Section 6.0 of the Liquid Effluent QAPP (WHC 1992).

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7.0 CALIBRATION PROCEDURES

Calibration requirements for this project shall be in accordance with Section 7.0 of the Liquid Effluent QAPP (WHC 1992).

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8.0 ANALYTICAL PROCEDURES

The analytical methods that have been selected for this investigation are listed in Part I (FSP) of this document as well as Section 8 and Appendix A of the Liquid Effluent QAPP (WHC 1992). The Liquid Effluent QAPP cross-references the procedures to the parameters of interest and the required detection or quantitation limit values and maximum acceptable ranges for precision and accuracy.

All analytical procedures approved for use in this investigation shall require the use of the standard units specified by the analytical methods referenced above in order to facilitate the comparability of data sets in terms of precision and accuracy. All approved procedures shall be retained in the project quality records and shall be available for review on request.

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9.0 DATA REDUCTION, VALIDATION, AND REPORTING

9.1 DATA REDUCTION AND DATA PACKAGE PREPARATION

This QAPjP will adopt the guidance in Section 9.1 of the Liquid Effluent QAPP (WHC 1992).

9.2 VALIDATION

This QAPjP will adopt the validation criteria of Section 9.2 of the Liquid Effluent QAPP (WHC 1992) with the following exception:

Exception: Data for this project will be validated to Level B.

Validation of the completed data package will be performed by qualified HASM personnel or by a qualified independent participant contractor. Subcontracted validation responsibilities shall be defined in procurement documentation or work orders as appropriate. All validation shall be performed in compliance with *Sample Management Administration Manual*, WHC-CM-5-3 (WHC 1990b), Section 2.2, for organics analyses, Section 2.1 for inorganics analyses, and Sections 2.3 and 2.4 for radionuclide analysis. All data packages shall be verified; 10% shall receive full validation in compliance with WHC-CM-5-3 requirements. Data packages requiring full validation shall be specified by ETP.

All verification and validation reports and supporting analytical data packages shall be subject to a final technical review by a qualified reviewer at the direction of the project manager, before their submittal to regulatory agencies; prior to entry into the Hanford Environmental Information System (HEIS) in compliance with EII 14.1, "Analytical Laboratory Data Management" (WHC 1991b); or before inclusion in reports or technical memoranda. All verification and validation reports, data packages, and review comments shall be retained as permanent project quality records in compliance with Section 9 of WHC-CM-3-5 (WHC 1990d).

The analytical data flow and data management process is described in detail in EII 14.1, "Analytical Laboratory Data Management" (WHC 1990b). Data errors or procedural discrepancies related to laboratory analytical process shall prompt data requalification by the validator, requests for reanalysis, or other appropriate corrective action by the responsible laboratory as required by governing HASM or approved subcontractor data validation procedures. If sample holding time requirements are compromised, insufficient sample material is available for reanalysis, or any other condition prevents compliance with governing analytical methods and data validation protocols, the situation shall be formally documented as a nonconformance in compliance with QR 15.0, "Control of Nonconforming Items (WHC 1991a). A corrective action request shall be prepared in compliance with requirements of QR 16.0, "Corrective Action" (WHC 1991a), and brought to the immediate attention of the project manager and QA Coordinator for their appropriate action. If

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problems are observed with validated data, either as part of the data assessment process described in Section 12.0 of this QAPjP or if separately observed by any of the project participants, the data shall be documented as a nonconformance and corrective action initiated as previously noted; if the data have been entered in the HEIS, the HEIS Data Custodian shall be immediately notified in order that the data may be flagged [in compliance with EII 14.1 and WHC-EP-0372, the *HEIS User's Manual* (WHC 1990c)] as suspect, pending resolution of the nonconformance and completion of all required corrective actions.

9.3 REPORTING

Validated analytical data will be sent to the ETP Project Manager. The Project Manager may archive data as discussed in Section 9.3 of the Liquid Effluent QAPP (WHC 1992) if so desired.

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10.0 INTERNAL QUALITY CONTROL

All analytical samples shall be subject to in-process Quality Control (QC) measures in both the field and laboratory. Unless otherwise specified in the approved statements of work or work orders for sampling activities, or in applicable EIIs, the following minimum field quality control requirements specified in Section 10 of the Liquid Effluent QAPP (WHC 1992) shall apply to the QC samples listed below.

- Field duplicate samples
- Split samples
- Blind samples
- Field blanks
- Equipment blanks
- Trip blanks.

Unless otherwise specified in approved analytical methods, internal quality control checks performed by analytical laboratories shall meet the minimum requirements specified in the Liquid Effluent QAPP (WHC 1992) shall apply to the items below.

- Matrix-spike/matrix-spike duplicate samples
- Laboratory QC samples (e.g., blanks, surrogate spikes, matrix spikes, QC check samples, and duplicates)
- Analytical equipment and method calibration.

Other requirements specific to laboratory analytical equipment calibration are included in Section 7.0 of this QAPjP. The minimum requirements of this section shall be invoked in procurement documents or work orders in compliance with standard procedures as noted in Section 5.0 of this QAPjP.

11.0 PERFORMANCE AND SYSTEM AUDITS

Performance, system, and program audits are scheduled to begin early in the execution of this work plan and continue through work plan completion. Collectively the audits address quality affecting activities that include, but are not limited to, measurement system accuracy, intramural and extramural analytical laboratory services, field activities, and data collection, processing, validation, and management.

Performance audits of the accuracy of laboratory analysis are implemented in accordance with Standard Operating Procedure EII 1.12, "Laboratory Analysis Performance Audits" (WHC 1991b). System audit requirements are implemented in accordance with Standard Operating Procedure QI 10.4, "Surveillance" (WHC 1991a). Surveillances will be performed regulatory throughout the course of the work plan activities. Additional performance and system "surveillances" may be scheduled as a consequence of corrective action requirements, or may be performed upon request. All quality affecting activities are subject to surveillance.

All aspects of inter-operable unit activities will also be evaluated as part of routine environmental restoration program-wide QA audits under the Standard Operating Procedure requirements of WHC-CM-4-2 (WHC 1991a). Program audits shall be conducted in accordance with QR 18.0, "Audits," QI 18.1, "Audit Programming and Scheduling," and QI 18.2, "Planning, Performing, Reporting, and Follow-up of Quality Audits" by auditors qualified in accordance with QI 2.5, "Qualification of Quality Assurance personnel" (WHC 1991a).

12.0 PREVENTIVE MAINTENANCE

All measurement and testing equipment used in the field and laboratories that directly affect the quality of the field and analytical data shall be subject to preventive maintenance measures that ensure minimization of measurement system downtime and corresponding schedule delays. Laboratories shall be responsible for performing or managing the maintenance of their analytical equipment. Maintenance requirements, spare parts lists, and instructions shall be included in individual laboratory QA plans, subject to Westinghouse Hanford review and approval as noted in Sections 3.1, 3.2, and 5.2 of this QAPjP. When samples are analyzed using EPA reference methods, the preventative maintenance requirements for laboratory analytical equipment are as defined in the procured laboratory's QA plan(s). Westinghouse Hanford field equipment shall be drawn from inventories subject to standard preventive maintenance and calibration procedures as noted under criterion 12 of the QAPI included in WHC-EP-0383 (WHC 1990a). Any field procedures submitted for Westinghouse Hanford approval by participant contractors or subcontractors shall contain, as appropriate, provisions for preventive maintenance schedules and spare parts lists in order to ensure minimization of equipment downtime.

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13.0 DATA ASSESSMENT PROCEDURES

All analytical data shall be compiled, reduced, and reviewed by the laboratory prior to presentation to HASM or subcontractor personnel for validation as described in Section 9.0 of this QAPjP. Precision and accuracy will be calculated and reported per Section 13.0 of the Liquid Effluent QAPP (WHC 1992).

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14.0 CORRECTIVE ACTION

14.1 GENERAL REQUIREMENTS FOR CORRECTIVE ACTION

Corrective action requests required as a result of surveillance reports, nonconformance reports, program audit activities, or as a result of the specific request of the operable unit manager, shall be documented and dispositioned by the Westinghouse Hanford project manager and QA Coordinator as required by QR 16.0, "Corrective Action" (WHC 1991a). Corrective action reports prepared under QR 16.0 requirements shall identify the affected requirement, the probable cause of the deviation, any data which may have been affected by the deviation, and the corrective action required both to resolve the immediate situation and to reduce or preclude its recurrence. Corrections of plans or procedures related to the overall measurement system that do not constitute nonconformances, but may be required as a result of data validation, data assessment, or routine review processes, shall be resolved as required by their governing procedures or shall be referred to the project manager for resolution and appropriate management action. All documentation related to surveillances, audits, and corrective action shall be maintained in compliance with EII 1.6, "Records Management" (WHC 1991a) and routed to the project quality records upon completion or closure for retention in compliance with Section 9 of WHC-CM-3-5 (WHC 1990d), and shall be made available for operable unit manager review upon request through the project manager.

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14.2 CORRECTIVE ACTION REQUIREMENTS RELATED TO CALIBRATION ERRORS

Field measuring and test equipment found to be out of calibration shall be documented as a nonconformance in compliance with QR 15.0, "Control of Nonconforming Items" (WHC 1991a). Nonconforming items shall be tagged, removed from services, and segregated pending resolution of the nonconformance and initiation of appropriate corrective action in compliance with QR 16.0, "Corrective Action" (WHC 1991a). Calibration errors related to laboratory analytical processes that may be observed in the data validation activities described in Section 8.0 shall result in qualified/estimated analytical data. Results may be qualified as unusable at the discretion of the validator (WHC 1990b). If sample holding time requirements are compromised, insufficient sample material is available for reanalysis, or any other condition prevents compliance with governing analytical methods and data validation protocols, corrective action activities shall be initiated in compliance with the requirements of QR 16.0 and brought to the attention of the project manager and QA Coordinator for their appropriate action.

14.3 CORRECTIVE ACTION RELATED TO PROCEDURAL DEVIATIONS

Planned deviations from EII requirements shall be processed in compliance with EII 1.4, "Deviations from Environmental Investigations Instructions." Unplanned procedural

deviations observed during system audit, surveillance, or program audit activities shall be documented as nonconformances, findings, or observations in compliance with the procedures described in Section 11.0 of this QAPjP. Corrective action shall be initiated in compliance with QR 16.0, "Corrective Action" (WHC 1991a) as previously noted in Section 14.1.

14.4 CORRECTIVE ACTION REQUIREMENTS RELATED TO PURCHASED MATERIALS, ITEMS, OR EQUIPMENT

Purchased materials, items, and equipment found to be out of compliance with their governing procurement specifications shall be documented as a nonconformance in compliance with QR 15.0, "Control of Nonconforming Items" (WHC 1991a). Nonconforming items shall be tagged and segregated pending resolution of the nonconformance and initiation of appropriate corrective action in compliance with QR 16.0, "Corrective Action" (WHC 1991a).

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15.0 QUALITY ASSURANCE REPORTS

As previously stated in Sections 11.0 and 14.0, project activities shall be regularly assessed by performance and system audits, surveillances, and program audits. Surveillance, nonconformance, audit, and corrective action documentation shall be routed to the project quality records on completion or closure of the activity. A report summarizing corrective action and instruction change authorization activity (See Sections 5.0 and 14.0), as well as any associated corrective actions, shall be prepared for the project manager by the cognizant engineer at the completion of the field and laboratory investigations. The final report shall include an assessment of the overall adequacy of the total measurement system with regard to the data quality objectives of the investigation.

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16.0 REFERENCES

Ecology, 1991, *Consent Order No. DE 91NM-177*, Washington State Department of Ecology, Olympia, Washington.

Ecology, EPA, and DOE-RL, 1990, *Hanford Federal Facility Agreement and Consent Order*, First amendment, two volumes, 89-10 Rev. 1, Washington State Department of Ecology, Olympia, Washington, U.S. Environmental Protection Agency, Region X, Seattle, Washington, and U.S. Department of Energy, Richland Operations Office, Richland, Washington.

EPA, 1986, *Test Methods for Evaluating Solid Waste (SW-846)*, Latest Edition, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

EPA, 1987, *Data Quality Objectives for Remedial Response Activities*, EPA/540/6-87/003, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

WHC, 1990a, *Environmental Engineering, Technology, and Permitting Function Quality Assurance Program Plan*, WHC-EP-0383, Westinghouse Hanford Company, Richland, Washington.

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

WHC, 1990c, *HEIS User's Manual*, WHC-EP-0372, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990d, *Document Control and Records Management Manual*, WHC-CM-3-5, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991a, *Quality Assurance Manual*, WHC-CM-4-2, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991b, *Environmental Investigations and Site Characterization Manual*, WHC-CM-7-7, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991c, *Hazardous Material Packaging and Shipping*, WHC-CM-2-14, Westinghouse Hanford Company, Richland, Washington.

WHC, 1992, *Hanford Site Liquid Effluent Characterization Program Quality Assurance Program Plan*, Rev. 3, WHC-SD-WM-QAPP-011, Westinghouse Hanford Company, Richland, Washington.

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