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Operational Environmental Monitoring Program Quality Assurance Project Plan

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Assistant Secretary for Environment,
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OPERATIONAL ENVIRONMENTAL MONITORING PROGRAM
QUALITY ASSURANCE PROJECT PLAN

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QUALITY ASSURANCE PROGRAM PLAN

J. W. Schmidt

ABSTRACT

This Quality Assurance Project Plan is prepared to cover the environmental monitoring performed by Westinghouse Hanford Company (Westinghouse Hanford) as it implements the Operational Environmental Monitoring Program (OEMP). This plan applies to all sampling and monitoring activities performed by Westinghouse Hanford in implementing the OEMP at the Hanford Site.

This Quality Assurance Project Plan is required by U.S. Department of Energy (DOE) Order 5400.1 (DOE 1988a) as a part of the Environmental Monitoring Plan (EMP) (DOE-RL 1991) and is used to show:

- *Environmental measurement and sampling locations used to determine ambient environmental levels from facility operations*
- *Procedures and equipment needed to perform the measurement and sampling*
- *Frequency and analyses required for each measurement and sampling location*
- *Minimum detection level and accuracy*
- *Quality assurance components*
- *Investigation and alarm levels.*

The OEMP for the Hanford Site is conducted in accordance with the requirements of DOE Order 5400.1 (DOE 1988a), DOE Order 5400.5 (DOE 1990), DOE Order 5484.1 (DOE 1981), DOE Order 5820.2A (DOE 1988c), and DOE/EH-0173T (DOE 1991). It is Westinghouse Hanford's policy to manage and conduct activities at the Hanford Site in a cost-effective and environmentally responsible manner that is in compliance with the letter and spirit of these regulations and other environmental regulations, statutes, and standards.

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) Order 5400.1, General Environmental Protection Program (DOE 1988a), required DOE sites to prepare an Environmental Monitoring Plan (EMP) (DOE-RL 1991) by November 9, 1991. *Environmental Monitoring Plan*, DOE/RL 91-5, was issued on November 9, 1991, in response to this requirement.

According to the guidance provided in DOE Order 5400.1 (DOE 1988a), each DOE site, facility, or activity that uses, generates, releases, or manages significant quantities of hazardous materials shall provide a written EMP. This EMP must identify and discuss two major activities: (1) effluent monitoring and (2) environmental surveillance.

At the Hanford Site, the site-wide EMP contains the following elements:

- A conceptual plan addressing effluent monitoring and environmental surveillance
- Separate abstracts of the Facility Effluent Monitoring Plans (FEMP)
- Westinghouse Hanford Company (Westinghouse Hanford) effluent-related Operational Environmental Monitoring (near-field/near-facility) Program (OEMP)
- Pacific Northwest Laboratory (PNL) site-wide and offsite environmental surveillance activities.

This Quality Assurance Project Plan (QAPjP) addresses the quality assurance (QA) implementation of the OEMP as part of the overall EMP.

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2.0 PROJECT DESCRIPTION

2.1 GENERAL OBJECTIVES

The OEMP general objective is to comply with the following DOE environmental monitoring requirements:

1. Monitor and assess radioactive contamination and potential exposure to employees and the public (DOE Order 5400.5) (DOE 1990).

2. Monitor new and existing sites, processes, and facilities for potential impacts and releases (DOE Order 5484.1) (DOE 1981) and Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance, DOE/EH-0173T) (DOE 1991).

3. Determine the effectiveness of effluent treatment and controls in reducing effluents and emissions.

4. Detect and quantify unplanned releases.

5. Monitor all inactive, existing, and new low-level waste (LLW) disposal sites to assess both radiological and nonradiological hazards (DOE 1988c).

6. Monitor and maintain all surplus facilities before decontaminating or decommissioning (DOE 1988c).

It is Westinghouse Hanford's policy to manage and conduct activities at the Hanford Site in a cost-effective and environmentally responsible manner that is in compliance with the letter and spirit of applicable environmental statutes, regulations, and standards. Westinghouse Hanford also shall monitor and control fugitive emissions and diffuse sources from radioactively contaminated areas. In addition, Westinghouse Hanford shall ensure that activities are conducted to protect employees, the public, and government property.

This QAPjP describes the requirements and procedures used to implement the OEMP. Responsibilities are defined for those Westinghouse Hanford personnel involved in environmental monitoring. Westinghouse Hanford personnel shall use this QAPjP to ensure that the OEMP is performed in a consistent manner.

2.2 MONITORING ACTIVITIES DESCRIPTION

The specific OEMP monitoring activities performed by Westinghouse Hanford are defined in WHC-CM-7-5, *Environmental Compliance Manual*, (WHC 1988a) and WHC-CM-7-4, *Operational Environmental Monitoring*, (WHC 1988b) and generally fall into three categories:

- Monitoring of inactive and active waste and disposal sites as well as unplanned release sites

- Monitoring of operating or standby facilities
- Monitoring of facilities in the process of demolition or remediation.

The monitoring scope for these categories includes the collection of ambient air, water, sediment, aquatic vegetation, soil, biota, external radiation measurements, and radiological surveys.

2.3 APPLICABILITY TO WESTINGHOUSE HANFORD COMPANY QUALITY ASSURANCE PROGRAM

This QAPjP applies specifically to the sampling and analysis activities and monitoring performed for all OEMP activities conducted by Westinghouse Hanford.

This QAPjP is prepared in compliance with the guidance of *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*, QAMS-005/80 (EPA 1983), and "Quality Assurance Methods," 40 CFR 60, Appendix B, Method 114 (EPA 1989a). It describes the means selected to implement the overall QA program requirements defined in the *Quality Assurance Manual*, WHC-CM-4-2 (WHC 1989a). The implementing procedures, plans, and instructions are appropriate for the control of the OEMP, which requires compliance with DOE, Environmental Protection Agency (EPA), state, and local requirements.

The QAPjP uses a matrix of procedural resources from facility or Hanford Site manuals used in the OEMP. This QAPjP shall be reviewed and updated as required when changes are made in the OEMP. Distribution and revision control of this plan shall be in compliance with quality requirement (QR) 6.0, "Document Control," (WHC 1988a). Review/approval personnel indicated on the title page of the document and other individuals designated by Environmental Assurance (EA) shall have distribution and revision control. Plans and procedures referenced in the QAPjP are available on request for regulatory review.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

3.1 PROJECT MANAGEMENT

Westinghouse Hanford's EA function has the responsibility for specifying OEMP requirements. Responsibilities of key personnel are described below.

- **Environmental Assurance/Environmental Review and Integration**--The Environmental Review and Integration (ERI) group within EA has the responsibility to oversee and verify the OEMP at Westinghouse Hanford facilities, unplanned release sites, and associated active and inactive waste sites as required to assure compliance to environmental regulations.

  The ERI group acts as the technical liaison between the Westinghouse Hanford facilities, other DOE contractors, regulators, and other interested parties. The ERI group also provides technical support for operational environmental sampling and analysis. The ERI group prepares annual operational surveillance reports for distribution to Westinghouse Hanford facilities, DOE contractors, regulators, and other interested parties. The ERI group assigns sample numbers and identification numbers for each sample point. The ERI group maintains the permanent records of operational samples. The ERI group also is responsible for ensuring that the QAPjP and associated documentation is updated.

- **Operational Health and Safety/Environmental Site Surveillance**--The Environmental Site Surveillance group within Operational Health and Safety (OHS) has the responsibility to provide sampling and monitoring support as defined in the OEMP. In most cases OHS personnel collect the environmental samples for ERI.

3.2 SUPPORTING ORGANIZATIONS

- **Facility Manager**--The facility manager has the responsibility to maintain the facility in an environmentally safe condition, be responsive to environmental problems or concerns raised about the facility and provide corrective action to these problems or concerns.

- **Environmental Quality Assurance**--Environmental QA provides quality engineering support related to procurement control, document approval, surveillance, and auditing needs.

- **Environmental Protection**--The Enviromental Protection (EP) group acts as the technical liaison between the facilities and regulators on issues pertaining to the effluent monitoring program and provides guidance for implementing that program. The EP group also provides technical support for effluent sampling and analysis.

  The EP group prepares annual emission reports to DOE and the appropriate regulatory agencies. The EP group has the responsibility for assigning the unique electronic data processing

codes and identification numbers for each sample point at each facility. The EP group maintains the permanent records of releases of radioactivity in the effluents discharged from each Westinghouse Hanford facility.

- **Procurement**--The procurement organization obtains services and/or contracts in accordance with purchase requisitions, purchase orders, drawings, contracts, specifications, or instructions used to define requirements for a purchase.

- **Regulatory Analyses**--The Regulatory Analyses group provides guidance in interpretation of all regulations and coordination with pertinent regulatory agencies.

- **Facility Compliance**--The Facility Compliance group provides guidance to the facilities on interpretation of the regulations pertaining to facility-related operations.

- **Office of Sample Management**--The Office of Sample Management provides assistance in procurement and oversight of participant contractor or subcontractor laboratory services.

3.3 ANALYTICAL LABORATORIES

Analytical samples will be transported to an approved Westinghouse Hanford participant contractor or subcontractor laboratory for radiological and/or chemical analysis. For participant contractors or sub-contractors, applicable quality requirements of this QAPjP shall be invoked as part of the approved applicable work order or procurement document. Laboratories are to submit their analytical methods and internal QA Program for Westinghouse Hanford review and approval before use.

At the direction of EA, Westinghouse Hanford chemistry laboratories may be procured for split (performance audit) sample analysis. Participant contractor or sub-contractor laboratories will be subject to a source surveillance with Environmental QA participation, in compliance with QI 7.3, "Source Surveillance and Inspection" (WHC 1989a). Subsequent surveillance for systems audit purposes shall be in compliance with QI 10.4, "Surveillance" (WHC 1989a).

3.4 OTHER SUPPORT CONTRACTORS

The EA may order procurement of the services of other subcontractors to support any or all of the activities addressed by this QAPjP. Such activities shall be in compliance with Westinghouse-Hanford-approved QA plans and/or procedures, subject to the controls of QI 7.3, "Source Surveillance and Inspection" (WHC 1989a).

4.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENTS

The QA objectives for measurements generally applicable to the OEMP under the purview of this QAPjP primarily are related to the following:

- Defining appropriate methods for sampling and analysis for the required analytes of interest
- Defining quantitation limits and values for analytical precision and accuracy appropriate for the purposes of all operational environmental monitoring at the Hanford Site
- Defining data representativeness, completeness, and comparability in terms applicable to the OEMP at the Hanford Site.

Detailed discussions of the analytes of interest and analytical methods are provided in Table 4-1. Specific data quality needs for individual investigations shall be addressed at the time of the need. Other measurement considerations, accuracy requirements, units, and data recording/reporting protocols for instruments supporting operational environmental monitoring and other types of special monitoring investigations shall be specified in the applicable procedures discussed herein and listed in Table 4-2.

A matrix comparison of the QA requirements contained in ASME NQA-1 (ANSI et al. 1986) and EPA QAMS (1983) is contained in Table 4-3, which shows the applicable Westinghouse Hanford requirements (manuals or procedures).

4.1 ANALYTES OF INTEREST AND ANALYTICAL METHOD SELECTION

Table A-1 identifies potential analytes of interest and corresponding analytical reference methods for operational environmental sampling and monitoring at the Hanford Site. The list of analytes specify reference methods selected from the appropriate EPA and DOE guidance documents. [See notes (a), (d), (e), (f), (g), and (h) of Table 4-1.] Where options have been suggested or implied, the more reliable methods have been selected.

The 222-S Laboratory typically performs radiological analyses and analyses only on nonradioactive constituents in liquid effluents. The offsite contractor (currently International Technology Analytical Services) performs low-level analyses of operational environmental samples. The offsite laboratories are required to meet the contractual requirements established by Westinghouse Hanford and PNL.

4.2 CONTRACTUAL QUANTITATION LIMITS AND RANGES FOR ANALYTICAL PRECISION AND ACCURACY

The performance of the analytical laboratory or laboratories providing support to the OEMP shall be subject to EPA-established method- and analyte-specific quantitation limits and ranges for precision and accuracy (EPA 1972, EPA 1977). These parameters are presented in this QAPjP as target values that Westinghouse Hanford and the proposed laboratory must adjust and/or confirm and accept before the final approval of associated subcontracts or work

orders. These target values have been developed from the practical quantitation limits suggested by 40 CFR 264, Appendix IX (EPA 1988a), and Comprehensive Environmental Response Compensation and Liability Act (CERCLA)-reportable quantities (CERCLA 1980). The CERCLA-reportable quantities are historically achievable values based on those negotiated and approved in previous analytical subcontractors for similar levels that routinely can be expected for the indicated methods. These target values must be confirmed and/or adjusted to mutually satisfactory values and be approved by Westinghouse Hanford and the proposed analytical laboratory during subcontractor or work-order negotiation. Once the values are established as contractual requirements, Table 4-1 and this section of this QAPjP should be revised accordingly. ERI is responsible for ensuring that the QAPjP and the associated OEMP documentation are updated.

4.3 REPRESENTATIVENESS, COMPLETENESS, AND COMPARABILITY

The specifications of location and intervals in WHC-CM-7-4, "Operational Environmental Monitoring" (WHC 1988b) address qualitatively the goals for data representativeness. Completeness objectives for the OEMP shall require that the contractually or procedurally established requirements for the precision and accuracy be met for at least 90% of the requested determinations on an annual basis for each laboratory conducting analyses. This means that precision and accuracy for all operational environmental monitoring data shall be at least 90% effective, accurate, and precise overall.

Failure to meet this criteria shall be documented in data summary reports and shall be considered in validation process. Corrective action measures using specific procedures shall be initiated by ERI, OSM, or QA, as appropriate. Approved analytical procedures shall require the use of the reporting techniques and units consistent with the EPA reference methods listed in Table 4-1 to facilitate data-set comparability in terms of precision and accuracy.

Table 4-1. (3 sheets)

Analytical Category	Analyte of Interest	Standard EPA Reference Method	Analytical Method[d]	Contractual Quantitation Limit[cn]	
Ions/Anions	Nitrate	352.1[e]	b	.1 mg/L	
	Nitrite	354.1[e]	b	.01 mg/L	
	pH/Total Dissolved Solids (TSD)	9045[e]	b	N/A	
Radionuclides				Water µCi/mL	Air µCi/mL
	Gross Alpha[l]	9310[a]	b	3E-8	2E-14
	Gross Beta[k]	9310[a]	b	1E-6	9E-12
	Uranium (238,239,240)	00-07[g]	b	5E-7	1E-13
	Uranium 233,234	00-07[g]	b	5E-7	9E-14
	Uranium 235	00-07[g]	b	6E-7	1E-13
	Plutonium (238,239,240)[h]	00-07[f]	b	3E-8	2E-14
	Plutonium 241	00-07[f]	b	2E-6	1E-12
	Americium 241,243	AM-01[f]	b	3E-8	2E-14
	Strontium 89/90	SR-05[g]	b	1E-6	9E-12
	Tritium	707[i]	b	2E-3	1E-7
	Technetium 99	EC-186[j]	b	1E-4	2E-9

Table 4-1. (3 sheets)

Analytical Category	Analyte of Interest	Standard EPA Reference Method	Analytical Method[d]	Contractual Quantitation Limit[cn]	
Radionuclides (contd.)	Cesium 137		b	3E-6	4E-10
	Cesium 134	NA[n]	b	2E-6	2E-10
	Cesium 135	NA[n]	b	2E-5	3E-9
	Iodine 129	NA[n]	b	5E-7	7E-11
	Cerium	NA[n]	b	1E-3	3E-7
	Carbon 14	NA[n]	b	7E-5	6E-9
	Ruthenium 103	NA[n]	b	5E-5	2E-9
	Ruthenium 106	NA[n]	b	6E-6	3E-11
	Selenium	NA[n]	b	2E-5	1E-9
	Cobalt 60/58	NA[n]	b	5E-6	8E-11
	Zirconium 93/95	NA[n]	b	9E-5	4E-11
	Tin 124,125,126	NA[n]	b	9E-5	3E-8
	Nickel 63	NA[n]	b	3E-4	4E-9
	Neptunium 237	00-07[f]	b	3E-8	2E-14
	Thorium 230	00-07[g]	b	5E-7	1E-13
	Samarium 151	NA[n]	b	4E-4	4E-10
	Iron 59	NA[n]	b	2E-5	8E-10
	Lead 212/210	NA[n]	b	3E-6	8E-11
	Argon	NA[n]	b	---	1E-2

Table 4-1. (3 sheets)

Analytical Category	Analyte of Interest	Standard EPA Reference Method	Analytical Method[d]	Contractual Quantitation Limit[cn]	
Radionuclides (contd.)	Antimony 113	NA[n]	b	5E-5	1E-9
	Promethium 147	NA[n]	b	2E-3	4E-7
	Europium 154,155	NA[n]	b	2E-5 1E-4	5E-11 7E-10

[a] Standard EPA methods are from Test Methods for Evaluating Solid Waste (SW846) (EPA 1986).

[b] Analytical methods shall be Westinghouse Hanford or Westinghouse-approved participant contractor or subcontractor procedures based on the reference methods cited in column 3 of the table. All procedure reviews and approvals shall be in compliance with applicable Westinghouse Hanford procedure control or procurement procedures as noted in Section 4.2. Once laboratory methods are approved, this table shall be updated to provide contractual method references as applicable.

[c] Values for quantitation limits, are to be considered only as target values for initial procurement negotiations with the analytical laboratory. This table shall be updated to reflect negotiated contractual values as specified in final procurement documents or work orders.

[d] Analysis shall be performed by an approved Westinghouse Hanford, participant contractor, or subcontractor laboratory.

[e] Standard methods are from Methods for Chemical Analysis of Water and Waste (EPA 1979).

[f] Standard methods are from Prescribed Procedures for the Measurement of Radioactivity drinking Water (EPA 1982).

[g] Standard Methods are from Eastern Environmental Radiation Facility Radiochemistry Procedures Manual (EPA 1984).

[h] ^{241}Pu is calculated from ^{239}Pu; the cognizant facility personnel provides Environmental Assurance with the isotopic weight percent of plutonium 239, 240, and 241 produced: Activity ration is: [(weight percent ^{241}Pu)(103.2)]/[((weight percent ^{239}Pu)(0.0614))+((weight percent ^{240}Pu)(0.227))] where specific activities are:

^{239}Pu = 0.0614 Ci/g
^{240}Pu = 0.227 Ci/g
^{241}Pu = 103.2 Ci/g

Therefore, the quarterly concentration of ^{241}Pu is [(quarterly concentration of $^{239/240}Pu$ µCi/ml)(activity ratio)]

[i] Standard method is from Standard Methods for the Examination of Water and Waste Water (APHA 1985).

[j] Standard method is from The Environmental Survey Manual, Appendix D (DOE 1987).

[k] The Values shown for gross beta activity may be used when is known that ^{90}Sr is the most limiting beta emitter present.

[l] The values shown for gross alpha activity may be used when it is known that ^{239}Pu is the most limiting alpha emitter present.

[m] Precision is based on established contractual values. Accuracy is within ± 25%.

[n] Not Available; no reference method available at this time.

Table 4-2. Supporting Procedures for the Operational Environmental Monitoring Program.

Procedure	Procedure Number	Title
Chain of Custody and Sample Packaging and Shipping	WHC-CM-7-4 Section 4 WHC-IP-0692	Procedure Verification Various Titles
Sampling and Monitoring	WHC-CM-7-4 Section 5	Air Sampling
	Section 6	Soil Sampling
	Section 7	Vegetation Sampling
	Section 8	Animal Sampling
	Section 9	Surface Water Sampling
	Section 10	Groundwater Monitoring
	Section 11	Background Radiation
	Section 12	Radiological Surveys
	Section 13	Special and Emergency Sampling
	WHC-IP-0692	Various Titles
Calibration	WHC-IP-0692	Various Titles

Table 4-3. Quality Assurance Requirements - Comparison of U.S. Environmental Protection Agency and American Society of Mechanical Engineers NQA-1 Requirements (ANSI et al. 1986).

EPA[b]	NQA 1[a]																		
	1 Organization	2 QA Program	3 Design Control	4 Procurement Document Control	5 Instructions, Procedures, and Drawings	6 Document Control	7 Control of Purchased Items and Services	8 Identification and Control of Items	9 Control of Processes	10 Inspection	11. Test Control	12 Control of Measuring and Test Equipment	13 Handling, Storage, and Shipping	14 Inspection, Test and Operating Status	15 Control of Nonconforming Items	16 Corrective Actions	17 QA Records	18 Audits	No EPA Requirements
1 Title Page		CM-4-2																	
2. Table of Contents																			
3 Project Description		CM-4-2																	
4. Project Organization and Responsibilities	CM-1-2 CM-1-3	CM-7-4 CM-7-5																	
5 QA Objectives for Measurements		Site Specific																	
6 Sampling Procedures					CM-7-4 or equivalent procedure			CM-7-4 or equivalent procedure	CM-7-4 or equivalent procedure		CM-7-4 or equivalent procedure		CM-2-14 CM-7-4 CM-5-16 EP-0063						
7. Sample Custody									CM-7-4 or equivalent procedure					CM-7-4 or equivalent procedure					
8. Calibration Procedures												CM-7-4 PISCES or equivalent procedure							
9. Analytical Procedures									CM-4-2										
10. Data Reduction Validation Reporting									CM-4-2								CM-7-5 CM-4-2		
11. Internal Quality Control										CM-7-4 CM-7-5									
12. Performance and Systems Audits							-											CM-4-2	
13. Preventative Maintenance																			CM-7-4 or equivalent procedure
14. Data Assessment Procedures																			
15. Corrective Action																CM-4-2			
16. Quality Assurance Reports		CM-4-2														CM-4-2	CM-7-4 CM-7-6		
No EPA Requirements			a CM-1-3 CM-4-2	a d CM-1-3		CM-7-4 CM-3-4	d	CM-1-3 CM-4-2 CM-7-4 a						CM-7-4	CM-4-2				

NOTE: See Section 4.0 for references.

[a] Quality Assurance Requirements for Nuclear Facilities, ASME NQA-1-C-1989, American Society of Mechanical Engineers, New York, New York.

[b] Interim Guidelines and Specifications for Preparing Project Plans, QAMS 005/80, EPA 600/4-83-004 (February 1983), U.S. Environmental Protection Agency, Washington, D.C.

[c] Westinghouse Hanford standard engineering practices will be followed.

[d] Westinghouse Hanford standard procurement practices will be followed.

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5.0 SAMPLING PROCEDURES

5.1 SAMPLING PROCEDURES

Sampling activities, equipment, material, and containers will be subjected to field screening (i.e., radiological survey and quality control check of transportation documentation) for radioactivity. This screening shall be in compliance with the requirements governing radiation permits to ensure that samples are transported only to laboratories that are equipped and licensed appropriately for receiving radioactive materials and performing mixed waste analyses as required. All environmental monitoring sampling performed in support of the OEMP will be performed in a manner that provides representative concentration of radioactive materials in near-field environmental media from operations at the Hanford Site.

5.2 OTHER SUPPORTING PROCEDURES

Except for the analytical chemistry procedures specified in Table 4-1, procedures to be used to support OEMP activities directly are presented in Table 4-2, cross referenced to their source documents and the types of activities they typically will support.

5.3 PROCEDURE APPROVALS AND CONTROL

5.3.1 Westinghouse Hanford Procedures

The Westinghouse Hanford procedures that may be used to support the OEMP sampling and monitoring activities are referenced in Table 4-2. Latest approved versions of all referenced procedures shall apply in all cases. Selected manuals include WHC-CM-7-4, *Operational Environmental Monitoring* (WHC 1988b), WHC-IP-0692, *Westinghouse Health Physics Procedures Manual* (WHC 1991c), and WHC-CM-4-2, *Quality Assurance Manual* (WHC 1989a). All procedures are available for review on request at the direction of EA.

5.3.2 Participant Contractor/Subcontractor Procedures

As noted in Section 3.4, participant contractor and/or subcontractor services may be procured with the concurrence of the EA manager. Such procurements shall be subject to the applicable requirements of WHC-CM-4-2, *Quality Assurance Manual* (WHC 1989a).

Whenever such services require procedural controls, use of Westinghouse Hanford procedures, or submittal of contractor procedures for Westinghouse Hanford review and approval before use, such requirements shall be included in the procurement document or work order. In addition to submitting analytical procedures, analytical laboratories shall be required to submit the current version of their QA plans.

5.4 PROCEDURE ADDITIONS AND CHANGES

Additional procedures or changes to existing procedures that are necessary to accommodate unforseen field situations may be authorized in accordance with Section 4.0, "Procedure Verification" of the WHC-CM-7-4, *Operational Environmental Monitoring* (WHC 1988b).

5.5 SAMPLING SCHEDULE

The *Routine Environmental Surveillance Schedule*, WHC-SP-0098-X (WHC 1991b), is issued annually. It includes the schedule of radiation surveys and sampling to be performed and the intervals at which they are performed.

The ERI writes and approves the radiation survey and sampling schedules. The ERI shall approve any changes to the schedule, including temporary or one-time deviations, in accordance with WHC-CM-7-4, *Operational Environmental Monitoring* (WHC 1988b).

6.0 CHAIN OF CUSTODY

All samples obtained during the OEMP activities shall be controlled as required by Procedure Verification, Section 4, WHC-CM-7-4, *Operational Environmental Monitoring* (WHC 1988b). These requirements apply as soon as the sample is introduced to the sample container.

Other requirements for specific samples are given in the WHC-CM-7-4, *Operational Environmental Monitoring* (WHC 1988b). These requirements shall ensure the maintenance of sample integrity and identification from receipt through completion of the analytical process.

Requirements for returning residual sample materials after analysis shall be defined in the procurement documentation or work orders to subcontractor or participant contractor laboratories. Analysis results shall be traceable to original samples through unique sample numbers or identification codes. All analyses results shall be controlled as permanent project quality records, as required by QR 17.0, "Quality Assurance Records" (WHC 1989a), and OEM Section 4, "Procedure Verification" (WHC 1988b), Records Management System, WHC-3-5 (WHC 1988c), or equivalent Westinghouse Hanford procedures.

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7.0 CALIBRATION PROCEDURES

Calibration of all Westinghouse Hanford measuring and test equipment, whether in the existing inventory or purchased for operational environmental monitoring, shall be controlled as required by QR 12.0, "Control of Measuring and Test Equipment", and QI 12.2, "Measuring and Test Equipment Calibration by User" (WHC 1989a).

Routine operational checks for Westinghouse Hanford field equipment shall be as defined in WHC-IP-0692 (WHC 1991c) or other internal Westinghouse Hanford procedures; similar information shall be provided within Westinghouse-Hanford-approved participant contractor or subcontractor procedures. The WHC-CM-8-2, *Central Support Services*, Section 202.0, "Plant Instrumentation Surveillance, Calibration, and Evaluation System (PISCES)" (WHC 1991a) or another approved Westinghouse Hanford system controls the sampling and monitoring equipment used in this activity. Calibration and maintenance are the controlling factors in this system.

Calibration procedures can be made available on request under the direction of the EA manager.

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8.0 ANALYTICAL PROCEDURES

Analytical methods or procedures based on the reference methods identified in Section 4.0 shall be selected or developed and approved before use, in compliance with appropriate Westinghouse Hanford procedure, work order, and/or procurement control requirements (Section 5.3.2).

All participating contractors or subcontractors procedures, plans, and/or manuals should be retained as project quality records in compliance with QR 17.0, "Quality Assurance Records," and QI 17.1, "Quality Assurance Record Control" (WHC 1989a). All such documents will be made available for review upon request at EA's direction.

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9.0 MONITORING AND REPORTING CRITERIA

The criteria for OEMP sampling, monitoring, and reporting are identified in *Environmental Compliance*, WHC-CM-7-5 (WHC 1988a) and *Operational Environmental Monitoring*, WHC-CM-7-4 (WHC 1988b).

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10.0 DATA REDUCTION, VALIDATION, AND REPORTING

10.1 DATA REDUCTION AND DATA PACKAGE PREPARATION

Analytical laboratories shall be responsible for preparing a report summarizing the analysis results and a detailed data package. The data package shall include information necessary to perform data validation to the extent indicated by the minimum requirements.

Data reporting requirements and data package content shall comply with the appropriate requirements of Section 1.4 and 1.5 of *Test Methods for Evaluating Solid Wastes*, SW-846 (EPA 1986b), as modified by the proposed rule changes included in the *Federal Register*, Volume 54, No. 13 (EPA 1989c). These requirements shall be defined in work order or procurement documentation, subject to Westinghouse Hanford review and approval as noted in Section 4.2.

Data packages shall be prepared in legible, reproducible format; any changes must be made as single-line corrections in black, nonsoluble ink; changes must be initialed and dated. All laboratory data packages should include at minimum these items:

- Sample receipt and tracking documentation, including identification of the organization and individuals performing the analysis, the names and signatures of the responsible analysts, sample holding times, references to applicable chain of custody procedures, and the dates of sample receipt, extraction, and analysis

- Instrument calibration documentation, submitted monthly, including equipment type and model, with continuing calibration data for the time period in which the analysis was performed (PISCES, etc.)

- Internal quality control (QC) data., submitted monthly for the methods used, including matrix spike/matrix spike duplicate data, recovery percentages, precision data, laboratory blank data, and identification of any nonconformances that may have affected the laboratory's measurement system during the time period in which the analysis was performed

- The analytical results or data deliverables, including reduced data, reduction formulas or algorithms, and identification of data outliers or deficiencies.

Other supporting information (such as initial calibration data, reconstructed ion chromatographies, spectrograms, traffic reports, and raw data) need not be included in the submittal of individual data packages unless specifically requested by EA.

The analytical laboratory shall retain all sample data and make it available for system or program audits at the request of Westinghouse Hanford, EPA, DOE Richland Field Office (RL), or Washington State Department of Health (WDOH) representatives. The analytical laboratory shall retain such data through the duration of the authorization work order or period of their

contractual statement of work, when it shall be turned over to Westinghouse Hanford for archiving.

The analytical laboratory's QA manager shall review and approved the completed data package before submittal for validation. The requirements of this section shall be included in procurement documentation or work orders, as appropriate, in compliance with the standard Westinghouse Hanford procurement control procedures referenced in Section 4.2.

It is apparent that the 222-S Laboratory currently does not prepare data packages for samples as required by EPA protocols. This analysis is not being performed because meeting this requirement would delay analysis reporting a minimum of 6 mo per package. The laboratory will begin satisfying this requirement in the near future.

10.2 VALIDATION

The EA shall verify completed data packages for radioactive operational environmental samples. The OSM shall validate the completed data packages for hazardous or nonradioactive operational environmental samples. Alternative sources shall be used as directed by ERI. Regardless of the source of validation services, validation requirements shall be defined with Westinghouse-Hanford-approved data validation procedures, which at a minimum shall require the following QC checks.

For organic analyses, validation reports shall be prepared documenting QC checks of the following areas as recommended in *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses* (EPA 1988c):

- Data summary narrative
- Sample holding times
- Gas chromatograph/mass spectrometer tuning and mass calibration requirements
- Continuing calibration requirements
- Method blank sample requirements
- Surrogate recovery requirements
- Matrix spike/matrix spike duplicate requirements
- Field duplicate requirements
- Internal standards performance requirements
- Target compound identification requirements
- Target compound quantitation requirements and reported detection limits

- Any tentatively identified compounds, library search, assessment, and quantitation requirements
- Overall data assessment requirements.

For inorganic analyses, validation reports shall be prepared documenting QC checks of the following areas, as recommended in *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses* (EPA 1988d):

- Data summary narrative
- Sample holding times
- Continuing calibration requirements
- Method blank sample requirements
- Inductively coupled plasma interference check sample requirements
- Laboratory control sample requirements
- Duplicate sample analysis
- Matrix spike sample requirements
- Atomic absorption quality control requirements
- Overall data assessment requirements
- Sample result verification.

Validation procedures for radionuclides and other types of analyses shall include requirements for QC checks with similar levels of detail.

The level of confidence in the data resulting from the radiological analyses shall be estimated by analyzing blanks and spiked pseudosamples (EPA-designated environmental measurement laboratory program) and by comparing the resulting concentration estimates to the known concentrations in those samples. The precision of radionuclide analytical results shall be reported as a range, a variance, a standard deviation, a standard error, and/or a confidence interval. When selecting the data to be considered, outliers shall be excluded from the data only after investigation confirms that an error has been made in the sample collection, preparation, measurement, or data analysis process. As new data are received, it shall be compared to earlier data.

10.3 FINAL REVIEW AND RECORDS MANAGEMENT CONSIDERATIONS

The EA will perform a final technical review of validation reports and supporting analytical data packages before submittal to DOE and WDOH or inclusion in reports or technical memoranda. Validation reports, data packages, and review comments shall be retained as permanent project quality records at locations specified by the facility in accordance with WHC-CM-7-5 (WHC 1988a) and shall be defined in procurement documentation or work orders. Records management practices shall comply with QR 17.0, "Quality Assurance Records" (WHC 1989a).

11.0 INTERNAL QUALITY CONTROL

In general, analytical samples shall be subject to in-process quality control measures in both the field and laboratory. The following minimum field quality control requirements apply samples taken for the routine operational environmental monitoring samples. These requirements are adapted from those recommended by the EPA Office of Enforcement, as well as those of the research and development contractor, where practical. Health Physics uses procedures described in WHC-IP-0692 (WHC 1991c).

11.1 FIELD SAMPLING

Collecting replicate samples and subsequent analyses is the primary means of assessing if variability is caused by sampling error.

Replicate samples shall be collected for all sampled media. At least one replicate sample shall be collected for each medium at the respective frequency.

11.2 LABORATORY ANALYSES

The OEMP is dependent upon the data received from analytical laboratories. A procedure verification program is vital to environmental sample analyses. This procedure verification effort consists of analytical standards, adherence to written sampling procedures, procedural audits, and record keeping.

The following companies whose services are controlled in accordance with procedures in WHC-CM-4-2 (WHC 1989a), QR 4.0, provide laboratory support to the OEMP sampling program:

1. Offsite Laboratory. This laboratory performs analyses of environmental soil, vegetation, feces, and air samples, as well as other selected samples.

2. Westinghouse Hanford Company. The analytical laboratories perform analyses of air filter samples and the sediment, water, and aquatic vegetation samples from the liquid disposal sites.

3. Radiation Standards and Engineering at Pacific Northwest Laboratory. The Calibration Laboratory at PNL reads, tests, calibrates, and packs the thermoluminescent dosimeters.

4. Internal Laboratory Quality Control Programs. All laboratories maintain internal quality control programs that address practices such as:

   a. Routine calibration of counting instruments
   b. Routine source and background counts
   c. Routine yield determination of radiochemical procedures

d. Replicate analyses to check precision
e. Analysis of quality control standards
f. Analysis of reagent blanks to verify chemical purity.

5. National Standards Program. The laboratories performing the environmental analyses use standards traceable to the National Institute of Standards and Technology, when available, to ensure the accuracy of radionuclide determinations.

Other requirements specific to laboratory analytical equipment calibration are included in Section 7.0. The minimum requirements of this section shall be invoked in procurement documents or work orders in compliance with standard Westinghouse Hanford procedures as noted in Section 5.3.2. The statement of work should be reviewed by OSM and the laboratory to ensure that the laboratory is capable of performing the work.

12.0 PERFORMANCE AND SYSTEM AUDITS

As noted in Section 2.4 and Table 4-3, audits shall be performed to verify the quality of operation of one or more elements of the total measurement system. In the sense intended by QAMS-005/80, audits may be of the following two types:

- Performance audits, in which quantitative data are obtained independently for comparison with data routinely obtained by the measurement system
- System audits, involving a qualitative onsite evaluation of laboratories (or other organizational elements of the measurement system) for compliance with established QA program and procedure requirements. This also includes audits of individual facility sampling programs against those requirements in the OEMP.

At a minimum, performance audit requirements shall be met for each laboratory (onsite or offsite) providing analysis of a least one blind or one split sample for each analytical method identified in Table 4-1 that is included in that laboratory's contract or work order. Blind samples shall not be identified as such to the investigated laboratory and may be made from traceable standards or from routine samples spiked with a known concentration of a known compound. An independent laboratory shall analyze split samples, in compliance with approved methods based on the same reference standards used for the primary laboratory. Westinghouse Hanford shall approve analytical procedures before being used as described in Section 4.2 of this plan.

The appropriate organization (i.e., QA, EQA, Environmental Compliance Verification) shall perform system audits at least annually; system audit requirements shall be implemented through the use of procedure QI 10.4, "Surveillance" (WHC 1989a). Additional performance or system audits shall be performed if specifically required by the OEMP, as a consequence of corrective action requirements, or if requested by EA, QA, RL, EPA, or WDOH.

Any discrepancies observed during the evaluation of performance audit results or during system audit surveillance activities that cannot be corrected immediately to the satisfaction of the investigator shall be documented on a surveillance report and resolved in compliance with procedure QI 10.4, "Surveillance" (WHC 1989a).

In addition, at the direction of the QA officer, all aspects of test activities also may be evaluated as part of the Westinghouse Hanford site-wide QA audits conducted in compliance with QR 18.0, "Audits"; QI 18.1, "Audit Programming and Scheduling" (WHC 1989a); QAI 18.1, "Planning, Performing, Reporting, and Follow-up and Closure of Quality Audits"; by auditors qualified in compliance with QAI 2.3, "Qualification of Quality Assurance Program Audit Personnel" (WHC 1990a).

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13.0 PREVENTIVE MAINTENANCE

Measurement and testing equipment used in the field and laboratory that directly affect the quality of the analytical data shall be subject to preventive maintenance measures that ensure minimization of measurement system downtime and ability to perform reliable measurements. Field equipment maintenance instructions shall be as defined by the approved procedures governing equipment use.

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 methods or in laboratory QA plans, subject to Westinghouse Hanford review and approval as noted in Sections 3.3 and 4.2. When samples are analyzed using methods based on the standards defined in Table 4-1, the requirements for preventive maintenance of laboratory analytical equipment defined by the appropriate reference method shall apply.

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14.0 DATA ASSESSMENT PROCEDURES

Data from environmental media sampling and monitoring shall be assessed as required by the OEMP and appropriate statistical evaluation techniques that may be referenced therein. The laboratory first shall compile the analytical data, and Westinghouse Hanford shall validate it in compliance with Westinghouse-Hanford-approved procedures meeting minimum requirements of Section 10.0.

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15.0 CORRECTIVE ACTION

Requests for corrective action required as a result of surveillance or audit activity shall be documented and dispositioned as required by QI 10.4, "Surveillance"; QR 15.0, "Control of Nonconforming Items"; QI 15.1, "Nonconforming Item Reporting"; QI 15.2, "Nonconformance Report Processing"; QR 16.0, "Corrective Action"; QI 16.1, "Trending/Trend Analysis"; 16.2, "Corrective Action Reporting" (WHC 1989a); QAI 18.1, "Planning, Performing, Reporting, Followup, and Closure of Quality Audits" (WHC 1990); and WHC-CM-7-4, *Operational Environmental Monitoring* (WHC 1988b).

Primary responsibilities for nonconformance resolution and corrective action are assigned to EA and QA. The EA's responsibilities for corrective action follow-up and resolution are contained in WHC-CM-7-4, (WHC 1988b). Other measurement systems, procedures, or plan corrections that may be required as a result of routine review processes shall be resolved as required by governing procedures or shall be referred to EA for resolution. Copies of all surveillance nonconformance, audit, and corrective action documentation shall be maintained on completion or closure. The project QA records location shall be specified by EA.

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16.0 QUALITY ASSURANCE REPORTS

As stated in Sections 11.0 and 12.0, OEMP activities shall be assessed regularly by surveillance and auditing processes. Surveillance, nonconformance, audit, and corrective action documentation shall be considered QA records and shall be documented and dispositioned as stated in Section 15.0. Records management requirements applicable to subcontractors or participant contractors shall be defined in applicable procurement documents or work orders as noted in Section 5.3.2.

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