



December 17, 1992



Robert K. Stewart  
U.S. Department of Energy  
P.O. Box 550, A5-19  
Richland, Washington 99352

Re: White Bluffs Pickling Acid Crib ERA Split Sampling QA Plan

Dear Mr. Stewart:

Enclosed is a copy of the White Bluffs Pickling Acid Crib Split Sampling Quality Assurance Project Plan prepared for the U.S. Environmental Protection Agency (EPA) by PRC Environmental Management, Inc (PRC).

PRC participated in the sampling of the Pickling Acid Crib from November 30 to December 4, 1992. The Project Plan describes the procedures followed by the sampling team in taking split samples from Westinghouse Hanford Company (WHC).

If you have any questions or concerns regarding the plan, please contact me at (509) 376-4919.

Sincerely,

Pamela S. Innis  
Unit Manager

Enclosure

cc: D.R. Jansen, Ecology  
D.C. Teel, Ecology  
B.A. Austin, WHC  
W.L. Johnson, WHC  
Administrative Record (Pickling Acid Crib ERA)



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WHITE BLUFFS PICKLING ACID CRIB  
U.S. DEPARTMENT OF ENERGY  
HANFORD FACILITY

SPLIT SAMPLING  
FINAL QUALITY ASSURANCE PROJECT PLAN

Revision 1

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY  
Office of Waste Programs Enforcement  
Washington, D.C. 20460

Work Assignment No. : C10002  
EPA Region : 10  
Date Prepared : December 14, 1992  
Contract No. : 68-W9-0009  
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U.S. DEPARTMENT OF ENERGY  
HANFORD FACILITY

SPLIT SAMPLING  
FINAL QUALITY ASSURANCE PROJECT PLAN

Revision 1

December 14, 1992

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY  
Region 10  
Seattle, Washington

Prepared by

PRC Environmental Management, Inc.

Approvals:

\_\_\_\_\_  
Pamela Innis  
U.S. EPA Region 10 Work Assignment Manager

\_\_\_\_\_  
Date

\_\_\_\_\_  
Barry Towns  
U.S. EPA Region 10 Quality Assurance Officer

\_\_\_\_\_  
Date

*Audree De Angeles*  
\_\_\_\_\_  
Audree DeAngeles  
PRC Project Manager

*12-14-92*  
\_\_\_\_\_  
Date

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## 1.0 PROJECT DESCRIPTION

The U.S. Environmental Protection Agency (EPA) requested that PRC Environmental Management, Inc. (PRC) perform oversight and split sampling activities at the White Bluffs Pickling Acid Crib at the U.S. Department of Energy Hanford Site during an expedited response action (ERA).

PRC prepared this quality assurance project plan (QAPjP) to satisfy EPA quality assurance and quality control (QA/QC) requirements for receiving and analyzing split soil samples at the White Bluffs Pickling Acid Crib. The QAPjP discusses data quality objectives (DQO) and outlines QA/QC procedures for split sampling and analytical determination of hazardous waste constituents in the soil at the White Bluffs Pickling Acid Crib.

### 1.1 SITE DESCRIPTION AND HISTORY

The site description and history are reproduced from the White Bluffs Pickling Acid Crib ERA project plan (Frain and Mitchell 1992) submitted for regulatory review.

The White Bluffs Pickling Acid Crib is the only waste site identified in the 100-IU-5 operable unit (Figure 1-1). It is located south of the White Bluffs town site, which is in the 600 Area of the Hanford Site. The White Bluffs area was the location of construction activities during the early days at the Hanford Site. After construction, most of the facilities at the White Bluffs site were torn down. Little is known about the activities conducted at the site in its early years. It is believed that the cribs were fed by waste streams (primarily acid etch solutions) from a pipe fabrication facility operating sometime between 1943 and 1959. Also, since it is known that the White Bluffs area was used as a receiving area for construction activities, it is also possible that oils and solvents may have been used during routine maintenance activities and sent through the drain to the cribs.

No documentation has been found to indicate which facility released material to the cribs. The Hanford Waste Information Data System and other supporting documentation indicate the

presence of one crib, 50 by 30 by 10 ft. However, a visual inspection of the site indicates the presence of two cribs located side by side, each approximately 200 by 50 ft. Each crib contains three evenly spaced rows of vent pipes, 7 to 9 ft apart, which protrude from the surface and run the length of each crib. A riser pipe, approximately 36 in. in diameter, protrudes from the northern end of the west crib. A pipe, 3 to 6 in. in diameter, runs into this culvert from the north and may have been the source of influent to the crib. Geophysical investigation techniques have indicated pipes leading north from both cribs. The ERA investigation will include the pipes as a source to the facility. A depression on the southeastern corner of the eastern crib may have been an overflow and will also be investigated.

Geophysical and radiation surveys have been conducted at the site. Site radiological surveys have not detected any levels of surface radioactivity above background levels. It is known that the area was restricted from receiving radioactive materials during operations and is not suspected to contain subsurface radioactive contamination.

The geophysical surveys conducted at the site provided an initial look at the boundaries of the cribs, subsurface piping layout, and the feeder pipes. This information was used to prepare the Hanford Site soil sampling plan used to identify potential sampling locations.

According to historical records, nitric acid and hydrofluoric acid were disposed of to the crib. Other contaminants that could potentially be by-products of the pickling process and the crib leaching process are chromium and lead. Routine maintenance activities may also have resulted in the release of small quantities of organic constituents.

## 1.2 OBJECTIVES OF THE ERA AND SPLIT SAMPLING ACTIVITIES

The objective of this ERA is to determine whether any environmental hazards exist at the White Bluffs Pickling Acid Crib and to determine the nature and extent of these hazards. The objective of the split sampling task is to evaluate the representativeness and comparability of the samples collected and analyzed during the ERA. Also, field work performed by the Hanford Site contractor will be monitored by PRC during the ERA. PRC will accomplish these objectives by

evaluating whether sampling activities follow the requirements of the sampling and analysis plan provided in the White Bluffs Pickling Acid Crib ERA project plan (Frain and Mitchell 1992) and the soil sampling procedures specified in the Westinghouse Hanford Company (WHC) standard operating procedures (WHC 1988). Any inconsistencies or deficiencies observed in the soil sampling locations or in the sampling procedures will be documented.

PRC will evaluate the adequacy and performance of the facility's analytical program by receiving split soil samples for analysis. Approximately 20 percent of the 35 total samples collected by WHC for the ERA will be split for comparison. PRC will receive approximately 7 split soil samples from sampling locations designated at the White Bluffs Pickling Acid Crib at the discretion of PRC personnel (Figure 1-2). The split samples will be analyzed by either the EPA Region 10 Manchester laboratory or a Contract Laboratory Program (CLP) laboratory, and the analytical methods for the analysis of split samples will be as specified by EPA for total metals (1990b), volatile organic compounds (VOC) (1990a), semivolatile organic compounds (SV) (1990a). Additional analyses will also be performed as determined by EPA (Section 3.0) (1983, 1990c), Washington Department of Ecology (WDOE) (1992), and as listed on the special analytical services (SAS) forms developed by EPA Region 10 Quality Assurance office (Appendix A). Preparation of soil samples for nitrite/nitrate, ammonia, and anions will be accomplished per procedures provided by WHC in Appendix B. Collection and analysis for total activity and gamma will not be performed by PRC per discussions with the EPA work assignment manager, Pamela Innis.

1.3 SCHEDULE OF PROJECT ACTIVITIES

The anticipated project schedule follows:

<u>Activity</u>	<u>Dates</u>
<b>Sampling and Analysis</b>	
Field split sampling	November 30 through December 4, 1992

9 1 2 0 4 0 1 5 3 3

Revision: 1  
Date: December 14, 1992

Sample analysis  
(by EPA Region 10  
Manchester laboratory  
or CLP laboratory)

Week of November 30, 1992

**Deliverables**

Final QAPjP	December 23, 1992
Draft oversight report	January 4, 1993
Final oversight report	60 days after receipt of EPA and CLP analytical data

**1.4 DATA USAGE**

Split soil samples are being received for the ERA to evaluate the representativeness and comparability of the samples collected at the White Bluffs Pickling Acid Crib. The split sampling evaluation will be used to determine the quality of sample collection and laboratory analysis. The split soil sample analytical data will be used to evaluate the adequacy and performance of the facility's analytical program.

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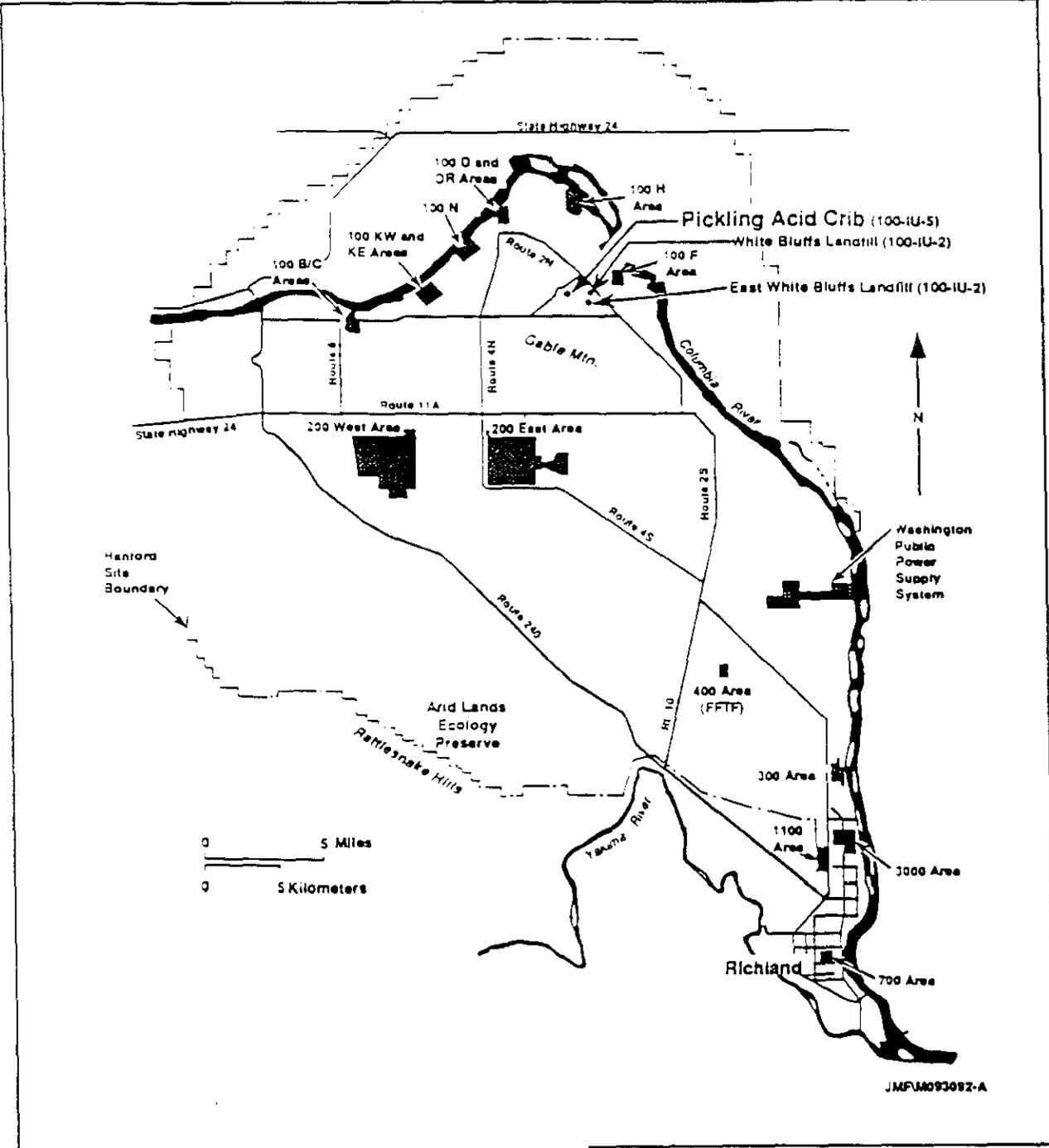
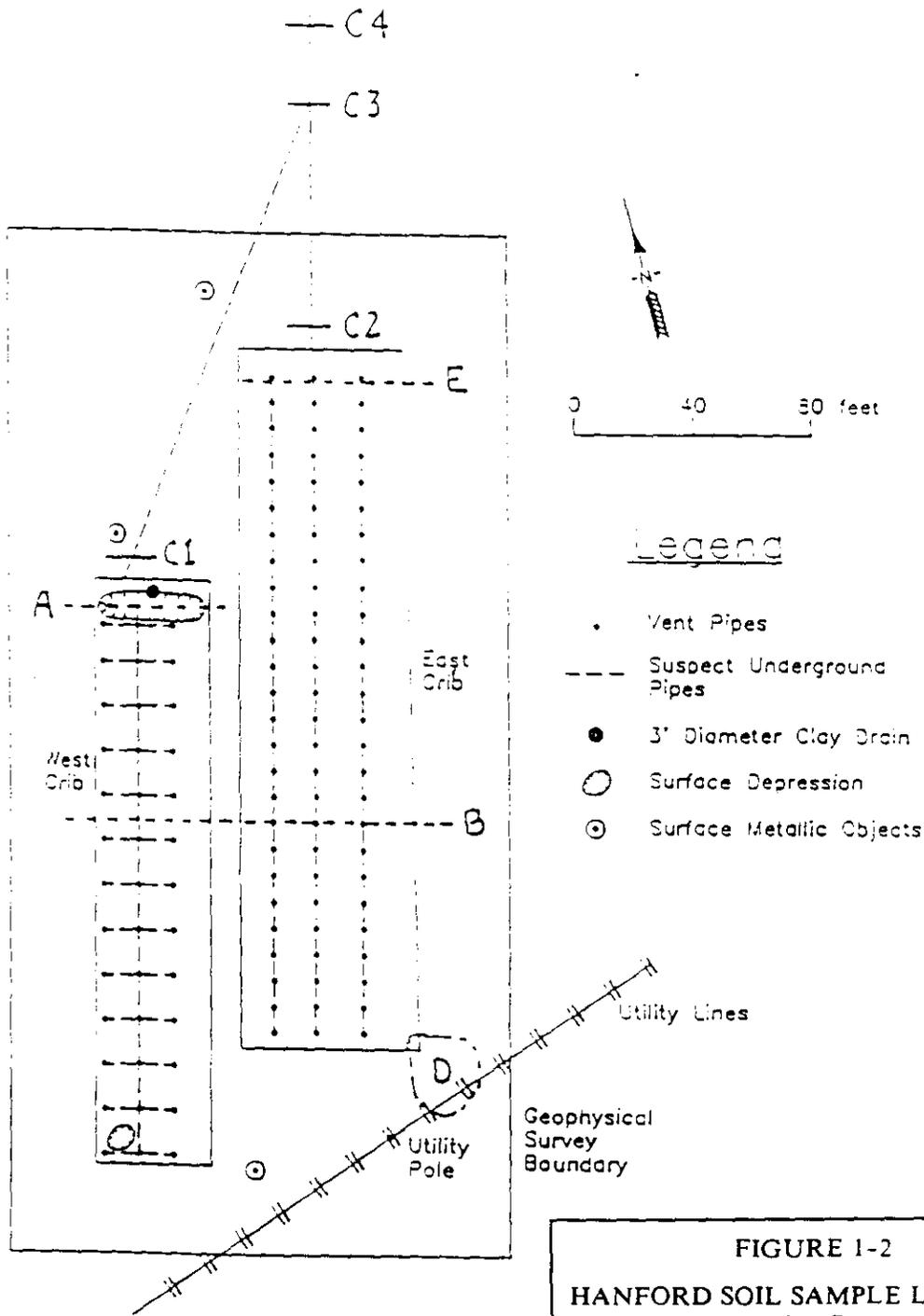


FIGURE 1-1  
WHITE BLUFFS PICKLING ACID  
CRIB LOCATION MAP

Source: Frain and Mitchell 1992.

*PRC* Environmental Management, Inc.

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Source: Frain and Mitchell 1992.

FIGURE 1-2  
HANFORD SOIL SAMPLE LOCATION  
MAP

*PRC* Environmental Management, Inc.

## 2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The EPA work assignment manager has primary management responsibility for the ERA. PRC is responsible for conducting field split sampling activities of on-site screening and reporting results. Figure 2-1 shows major quality assurance responsibilities.

The following sections outline the responsibilities and the individuals responsible for four separate aspects of the ERA: management, quality assurance, field operations, and laboratory services.

### 2.1 MANAGEMENT RESPONSIBILITIES

Responsibility for technical and administrative management is assigned as follows:

- EPA regional project officer (Peter Rubenstein)--overall management of Technical Enforcement Support (TES 12) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) work assignments
- EPA work assignment manager (Pamela Innis)--EPA management of the Hanford Site remedial investigation and feasibility study (RI/FS)
- PRC regional manager (Jim Pankanin)--overall management of all TES 12 work assignments in EPA Region 10
- PRC project manager (Audree DeAngeles)--PRC management of the Hanford Site RI/FS

### 2.2 QUALITY ASSURANCE RESPONSIBILITIES

The following organizations and individuals are responsible for quality assurance:

- EPA work assignment manager (Pamela Innis)--review and approval of QAPjP; review and approval of ERA report
- EPA Region 10 quality assurance officer (Barry Towns)--review and approval of QAPjP

9 6 1 2 3 5 8 1 6 3 7

- PRC TES 12 project quality assurance coordinator (Jerry Shuster)--overall quality assurance for work assignment
- PRC QAPjP technical reviewer (Sam Arumugan)--technical review of QAPjP
- PRC project manager (Audree DeAngeles)--approval of QAPjP

### 2.3 FIELD SAMPLING RESPONSIBILITIES

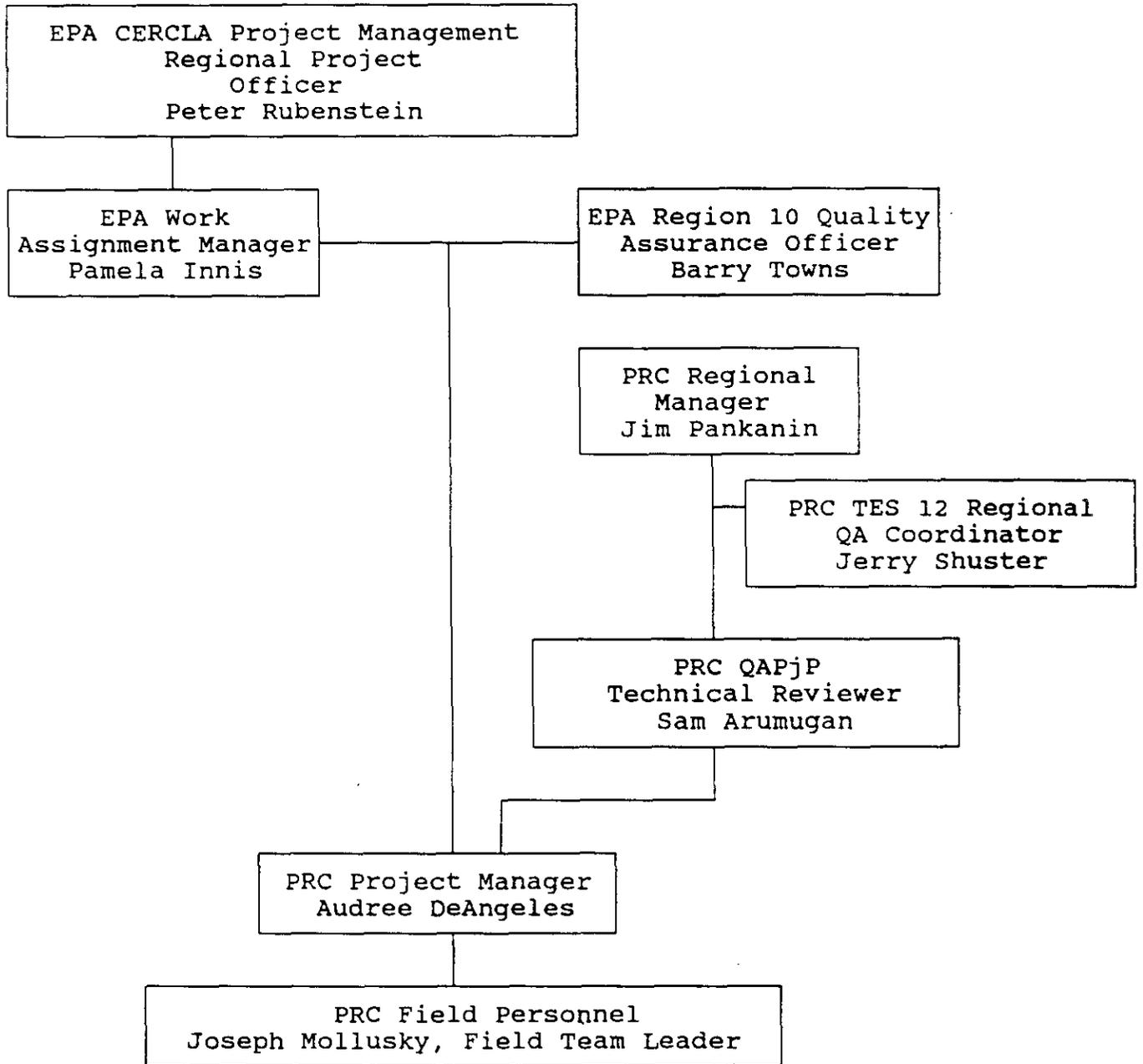
PRC is responsible for performing all specified field sampling activities under the direction of EPA. Specific field sampling responsibilities are as follows:

- EPA work assignment manager (Pamela Innis)--overall direction of field sampling
- PRC project manager (Audree DeAngeles)--technical direction of field sampling
- PRC field team leader (Joseph Mollusky)--direction and coordination of field sampling

### 2.4 LABORATORY RESPONSIBILITIES

Split soil samples will be analyzed through the EPA Region 10 Manchester laboratory or a CLP laboratory. The EPA quality assurance officer (Barry Towns) will coordinate and manage all EPA responsibilities for split soil samples.

FIGURE 2-1  
PROJECT ORGANIZATION



9 3 1 2 1 8 1 6 7 9

### 3.0 QUALITY ASSURANCE AND QUALITY CONTROL OBJECTIVES

This section addresses QA/QC objectives for completeness, representativeness, comparability, precision, and accuracy of data. The overall objective is to develop and implement procedures for field sampling activities, chain-of-custody, laboratory analysis, and reporting that will promote the high data quality. Sections 3.1, 3.2, and 3.3 discuss QA/QC objectives for completeness, representativeness, and comparability. Section 3.4 discusses QA/QC objectives for precision and accuracy for all analytical procedures.

#### 3.1 COMPLETENESS

Completeness is measured by the amount of valid analytical data obtained compared to the amount of analytical data expected under normal conditions. The amount of analytical data expected under normal conditions is defined as the total number of environmental and QA/QC samples planned to be received and analyzed during the ERA. For this project, the completeness criterion for both field and laboratory is 90 percent.

#### 3.2 REPRESENTATIVENESS

Representativeness is the degree to which sample data represent a characteristic of a population or an environmental condition. Sampling locations are selected to receive representative soil samples that will help to determine whether there is a release to the environment at the White Bluffs Pickling Acid Crib area.

Representativeness is enhanced when all samples from a particular medium are collected using the same technique. For this effort, split soil samples will be received according to sampling procedures outlined in Section 4.0.

9 8 1 2 9 6 3 7 6 4 0

### 3.3 COMPARABILITY

Comparability expresses the confidence with which one data set can be compared to another. To assure that soil sample results are comparable to future sample results, PRC will document all sampling locations, conditions, field sampling methods, and laboratory analysis methods.

### 3.4 PRECISION AND ACCURACY

Precision and accuracy are indicators of data quality. Generally, precision is a measure of the variability of a group of measurements compared to their mean value. Sampling and analytical precision is determined by analyzing duplicate samples. Accuracy is a measure of the bias in a measurement system. Sampling accuracy is assessed by analyzing trip blanks and field (transfer) blanks. Analytical accuracy is assessed by analyzing surrogate and matrix spike samples. The QA/QC samples to be received for determining precision and accuracy are described below and in Section 8.0. Precision and accuracy objectives for laboratory analyses of soil samples, which include the field duplicate and matrix spike and matrix spike duplicate (MS/MSD) samples, are described below and are summarized in Table 3-1. Precision and accuracy objectives for laboratory analyses of equipment rinsate blanks, trip blanks, and field (transfer) blanks are also described below and are summarized in Table 3-2.

#### 3.4.1 Types of Quality Assurance and Quality Control Samples

Five types of QA/QC samples will be received to determine precision and accuracy: field duplicates, equipment rinsate blanks, trip blanks, field (transfer) blanks, and MS/MSD samples. The QA/QC samples are described as follows:

- One duplicate sample will be received for every sample case. A sample case is defined as 20 environmental samples or samples submitted for laboratory analysis over a period of 14 days, whichever comes first. Duplicates will be used to determine sampling precision.

- One equipment rinsate blank will be received for the split samples. This blank will be submitted for laboratory analysis to check for cross contamination potentially occurring from soil sampling equipment and to check for thoroughness of decontamination procedures.
- One trip blank sample will be included in every cooler shipped to the laboratory that contains environmental samples for analysis of VOCs. The trip blanks will be analyzed for target compound list VOCs to check for contamination potentially occurring during shipping and handling (sampling accuracy).
- One field (transfer) blank will be prepared. The field (transfer) blank will be analyzed for target compound list VOCs to check for potential contamination from on-site ambient conditions (sampling accuracy).
- One MS/MSD sample for every sample case will be received during the split sampling. MS/MSD samples will be analyzed and used to determine analytical accuracy and precision. Percent recovery and relative percent difference values for these samples will be compared to acceptance criteria established by EPA (1988b, 1991).

**3.4.2 Analytical Methods Quality Assurance and Quality Control Objectives**

Precision and accuracy criteria defined by EPA (1990a,b) will serve as DQOs for VOCs, SVs, and total metals analyses. Method detection limits for the ERA will follow those set forth by EPA (1990a,b) for VOCs, SVs, and total metals. DQOs and method detection limits for additional analyses, listed in Tables 3-1 and Table 3-2, will be specified in the SAS request forms developed by the EPA Region 10 Quality Assurance office (Appendix A). Tables 3-1 and 3-2 summarize the QA/QC objectives for the analyses of the above listed parameters.

**3.4.3 Field Quality Assurance and Quality Control Objectives**

For health and safety reasons, PRC will monitor radiation emission with a radiation emission meter. Field measurement, calibration, and maintenance procedures for all health and safety monitoring equipment will accompany the monitoring equipment to be used at the White Bluffs Pickling Acid Crib site.

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TABLE 3-1

## DATA QUALITY OBJECTIVES FOR SOIL SAMPLES

SPLIT SAMPLING  
WHITE BLUFFS PICKLING ACID CRIB  
HANFORD SITE

Analytical Parameter	Method Detection Limit ( $\mu\text{g/L}$ )	Precision (Relative % Difference)	Accuracy (% Spike Recovery)	Completeness (%)	Analytical Method <sup>a</sup>
Total metals	CRDL	$\pm 35$	75-125 <sup>b</sup>	90	CLP-RAS Total Metals
VOCs	CRQL	c	c	90	CLP-RAS VOA
SVs	CRQL	c	c	90	CLP-RAS SVOA
pH	NA	NA	NA	90	SW-846 9040
Nitrite/Nitrate	1.25 mg/kg	$\pm 35$	75-125 <sup>b</sup>	90	EPA Method 353.2 <sup>d</sup>
Ammonia	NA	$\pm 35$	75-125	90	EPA Method 350.1/350.2 <sup>d</sup>
Anions:		$\pm 35$	75-125	90	EPA Method 300.0 <sup>d</sup>
fluoride	2.5 mg/kg				
sulfate	1.25 mg/kg				
chloride	1.25 mg/kg				
phosphate	1.25 mg/kg				
Total Petroleum Hydrocarbons	10 mg/kg	$\pm 35$	75-125	90	418.1 TPH-HCID/G/D <sup>e</sup>

## NOTES:

- a Analytical methods provided by EPA for VOCs and SVs (1990a), for total metals (1990b), for pH and total petroleum hydrocarbons (1990c), and for nitrite/nitrate, ammonia, and anions (1983). Analytical methods provided by WDOE for total petroleum hydrocarbons (1992). Collection and analysis for total activity and gamma will not be performed by PRC per discussions with the EPA work assignment manager, Pamela Innis.
- b This range presents the lowest acceptable percent for any of the matrix spike/matrix spike duplicate (MS/MSD) compounds to the highest acceptable percent recovery for any of the MS/MSD compounds (EPA 1983, 1990a,b,c and WDOE 1992).
- c Precision and accuracy for VOCs and SVs are as defined in the CLP statement of work (EPA 1990a).
- d Preparation of soil samples for nitrite/nitrate, ammonia, and anions will be accomplished per procedures provided by Westinghouse Hanford Company in Appendix B.
- e Qualitative hydrocarbon compound identification will be accomplished per method 418.1 TPH-HCID. Any hydrocarbon compounds qualitatively identified will then be quantitated by methods 418.1 TPH-G and 418.1 TPH-D, as appropriate (WDOE 1992).

CLP contract laboratory program  
 RAS routine analytical services  
 VOC volatile organic compound  
 SV semivolatile organic compound  
 NA not applicable

VOA volatile organic analysis  
 SVOA semivolatile organic analysis  
 CRDL contract required detection limit  
 CRQL contract required quantitation limit  
 HCID hydrocarbon identification

TABLE 3-2

DATA QUALITY OBJECTIVES FOR  
EQUIPMENT RINSATE BLANKS, FIELD (TRANSFER) BLANKS, AND TRIP BLANKS

SPLIT SAMPLING  
WHITE BLUFFS PICKLING ACID CRIB  
HANFORD SITE

Analytical Parameter	Method Detection Limit (µg/L) or Quantitation Limit	Precision (Relative % Difference)	Accuracy (% Spike Recovery)	Completeness (%)	Analytical Method <sup>a</sup>
<b><u>EQUIPMENT RINSATE BLANK</u></b>					
Total metals	per method <sup>b</sup>	<20	75-125 <sup>d</sup>	90	CLP-RAS Total Metals
VOC's	10 <sup>c</sup>	<11-14	61-145 <sup>d</sup> (76-115) <sup>e</sup>	90	CLP-RAS VOA
SVs	10-50 <sup>c</sup>	±28-50	9-127 <sup>d</sup> (10-141) <sup>e</sup>	90	CLP-RAS SVOA
Nitrite/Nitrate	1.25 mg/L	±35	75-125	90	EPA Method 353.2
Ammonia	NA	±35	75-125	90	EPA Method 350.1/350.2
Anions:		±35	75-125	90	EPA Method 300.0
fluoride	2.5 mg/L				
sulfate	1.25 mg/L				
chloride	1.25 mg/L				
phosphate	1.25 mg/L				
Total Petroleum Hydrocarbons	10 mg/L	±35	75-125	90	418.1 TPH-HCID/G/D <sup>f</sup>

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TABLE 3-2 (continued)

DATA QUALITY OBJECTIVES FOR  
EQUIPMENT RINSATE BLANKS, FIELD (TRANSFER) BLANKS, AND TRIP BLANKS

SPLIT SAMPLING  
WHITE BLUFFS PICKLING ACID CRIB  
HANFORD SITE

Analytical Parameter	Method Detection Limit (µg/L) or Quantitation Limit	Precision (Relative % Difference)	Accuracy (% Spike Recovery)	Completeness (%)	Analytical Method*
<b><u>TRIP BLANK AND FIELD (TRANSFER) BLANK</u></b>					
VOCs	10 <sup>c</sup>	<11-14	61-145 <sup>d</sup> (76-115) <sup>e</sup>	90	CLP-RAS VOA

NOTES:

- a Analytical methods provided by EPA for VOCs and SVs (1990a), for total metals (1990b), and for nitrite/nitrate, ammonia, and anions (1983). Collection and analysis for total activity and gamma will not be performed by PRC per discussions with the EPA work assignment manager, Pamela Innis.
- b The contract required detection limits are provided by EPA for analysis of total metals (1990b).
- c This value is the contract required quantitation limit (EPA 1990a).
- d This range presents the lowest acceptable percent for any of the matrix spike/matrix spike duplicate (MS/MSD) compounds to the highest acceptable percent recovery for any of the MS/MSD compounds (EPA 1990a,b).
- e This range presents the lowest acceptable percent recovery for any surrogate spike compounds to the highest percent recovery for any surrogate spike compounds (EPA 1990a,b).
- f Qualitative hydrocarbon compound identification will be accomplished per method 418.1 TPH-HCID. Any hydrocarbon compounds qualitatively identified will then be quantitated by methods 418.1 TPH-G and 418.1 TPH-D, as appropriate (WDOE 1992).

CLP contract laboratory program  
 RAS routine analytical services  
 VOC volatile organic compound  
 SV semivolatile organic compound  
 VOA volatile organic analysis  
 SVOA semivolatile organic analysis  
 HCID hydrocarbon identification

3-6

#### 4.0 SAMPLING PROCEDURES

PRC will receive split soil samples at the White Bluffs Pickling Acid Crib site as part of the ERA. PRC will also receive and submit appropriate QA/QC samples to the EPA Manchester laboratory or the CLP laboratory for chemical analysis. The QA/QC samples are discussed in sections 3.0 and 8.0 of this plan. The sampling program is summarized in Table 4-1.

##### 4.1 SPLIT SOIL SAMPLING

Approximately 20 percent of the 35 total samples collected for the ERA by WHC will be split sampled for sample comparison. Approximately 7 split soil samples will be received by PRC from the White Bluffs Pickling Acid Crib site during the ERA. PRC will also collect and analyze QA/QC samples including a field duplicate, an equipment rinsate blank, a trip blank, a field (transfer) blank, and MS/MSD samples (Table 4-2 and 4-3). QA/QC samples are discussed in detail in Section 8.0.

To receive split soil samples, PRC will provide the appropriate sample containers, shipping coolers, and miscellaneous field supplies, as listed in Table 4-2 and Table 4-3. PRC will receive a split sample for each analyte group listed on Table 3-1 immediately after the Hanford Site contractor collects a soil sample for an analyte group. For each analyte group listed on Table 3-1, Hanford Site and PRC containers will be filled alternately, one container at a time, until all containers are filled.

Blank VOC samples, as listed in Table 4-3, will be preserved before the volatile organic analysis (VOA) vials are filled. Blank and soil VOA vials will be filled leaving no headspace. The blank total metals samples will be preserved with nitric acid after collection. The blank nitrite/nitrate and ammonia samples will be preserved with sulfuric acid before the sample bottles are filled. All blank samples and soil samples will be placed in coolers with ice immediately after collection. Table 4-2 and Table 4-3 specify the holding times, preservatives, and containers required for the sampling event.

9 3 1 3 2 6 8 7 5 4 6

The split soil samples and QA/QC samples received will be analyzed by the EPA Region 10 Manchester laboratory or a CLP laboratory, depending on availability. The samples will be analyzed by methods specified by EPA (1983, 1990a, 1990b, 1990c) and WDOE (1992). Preparation of soil samples for nitrite/nitrate, ammonia, and anions will be accomplished per procedures provided by WHC in Appendix B. Table 3-1 and Table 3-2 summarize the specific analytical methods.

#### 4.2 DECONTAMINATION PROCEDURES

Sampling equipment will be decontaminated by the Hanford Site contractor according to the sampling and analysis plan (Frain and Mitchell 1992). Contaminated disposable items such as latex gloves and used (empty) collection containers will be placed in plastic garbage bags and disposed of by the Hanford Site contractor.

9 3 1 2 0 3 0 1 5 4 7

TABLE 4-1

SUMMARY OF SAMPLING PROGRAM

SPLIT SAMPLING  
WHITE BLUFFS PICKLING ACID CRIB  
HANFORD SITE

Sample <sup>a</sup>	Sample Matrix	Analytical Parameter	Environmental Sample	Environmental Field Duplicate <sup>b</sup>	Equipment Rinsate Blank <sup>c</sup>	Trip Blank <sup>d</sup>	Field (Transfer) Blank <sup>e</sup>
Seven samples to be determined	Soil (split grab sample)	Total Metals	7				
		VOCs	7				
		SVs	7				
		pH	7				
		Nitrite/Nitrate	7				
		Ammonia	7				
		Anions	7				
Total Petroleum Hydrocarbons	7						
MS/MSD <sup>f</sup>	Soil (split grab sample)	Total Metals	1				
		VOCs	1				
		SVs	1				
		pH	1				
		Nitrite/Nitrate	1				
		Ammonia	1				
		Anions	1				
Total Petroleum Hydrocarbons	1						
Duplicate	Soil (split grab sample)	Total Metals		1			
		VOCs		1			
		SVs		1			
		pH		1			
		Nitrite/Nitrate		1			
		Ammonia		1			
		Anions		1			
Total Petroleum Hydrocarbons		1					
Equipment Rinsate Blank	Water (blank)	Total Metals			1		
		VOCs			1		
		SVs			1		
		Nitrite/Nitrate			1		
		Ammonia			1		
		Anions			1		
		Total Petroleum Hydrocarbons			1		
Trip Blank	Water (blank)	VOCs				2	
Field (Transfer) Blank	Water (blank)	VOCs					1

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TABLE 4-1 (continued)

## SUMMARY OF SAMPLING PROGRAM

SPLIT SAMPLING  
WHITE BLUFFS PICKLING ACID CRIB  
HANFORD SITE

Sample <sup>a</sup>	Sample Matrix	Analytical Parameter <sup>d</sup>	Environmental Sample	Environmental Field Duplicate <sup>b</sup>	Equipment Rinsate Blank <sup>c</sup>	Trip Blank <sup>d</sup>	Field (Transfer) Blank <sup>e</sup>	
TOTAL SAMPLES	Soil	Total Metals	8	1				
		VOCs	8	1				
		SVs	8	1				
		pH	8	1				
		Nitrite/Nitrate	8	1				
		Ammonia	8	1				
		Anions	8	1				
		Total Petroleum Hydrocarbons	8	1				
	Water:	Total Metals				1		
		VOCs				1	2	1
		SVs				1		
		Nitrite/Nitrate				1		
		Ammonia				1		
		Anions				1		
Total Petroleum Hydrocarbons				1				

## NOTES:

- a Designated QA/QC samples and samples to be collected in locations chosen at the discretion of PRC personnel.
- b One field duplicate will be collected at a sample location chosen at the discretion of PRC personnel.
- c An equipment rinsate blank of carbon-free water will be collected for each of the listed analytical parameters.
- d Two trip blanks will be prepared and will consist of two 40-mL VOA vials each filled with carbon-free water by the EPA Manchester laboratory or PRC Environmental Management, Inc. (PRC) personnel. Trip blanks will be shipped with other samples for VOC analyses. One trip blank will be shipped with each cooler containing VOC samples.
- e The field (transfer) blank will consist of two 40-mL VOA vials filled with carbon-free water in the field by PRC personnel.
- f MS/MSD samples are required for all analyses.

VOC volatile organic compound  
 SV semivolatile organic compound  
 MS/MSD matrix spike/matrix spike duplicate

SAMPLE HOLDING TIME, PRESERVATION, AND CONTAINER REQUIREMENTS

SPLIT SOIL SAMPLING  
WHITE BLUFFS PICKLING ACID CRIB  
HANFORD SITE

Analytical Parameters	Matrix	Holding Time	Preservation <sup>a</sup>	Container per Sample or MS/MSD <sup>b</sup>	Total Samples	Total Containers Required (Including MS/MSD) <sup>c</sup>
CLP-RAS Total Metals	Soil	6 months (28 days for Hg)	Cool to 4°C	One x 8 oz glass jar	9	9
CLP-RAS VOA	Soil	7 days	Cool to 4°C	One x 120 ml glass jar	9	9
CLP-RAS SVOA	Soil	14/40 days <sup>c</sup>	Cool to 4°C	One x 8 oz glass jar	9	9
SW-816 9040 pH	Soil	72 hours	Cool to 4°C	One x 8 oz glass jar	9	9
EPA 353.2 Nitrite/Nitrate	Soil	72 hours	Cool to 4°C	One x 8 oz glass jar	9	9
EPA 350.1/350.2 Ammonia	Soil	28 days	Cool to 4°C	One x 8 oz glass jar	9	9
EPA 300.0 Anions: fluoride sulfate chloride phosphate	Soil	28 days	Cool to 4°C	Two x 8 oz glass jar	9	18
418.1 TPH-HCID/G/D Total Petroleum Hydrocarbons	Soil	14/40 days <sup>c</sup>	Cool to 4°C	One x 8 oz glass jar	9	9

a EPA (1983, 1990a,b,c) and WDOE (1992)

b Matrix spike/matrix spike duplicate (MS/MSD) samples are required for contract laboratory program routine analytical services and special analytical services analyses. One set of MS/MSD samples will be collected for each split soil sample parameter.

c Holding times until extraction/analysis.

CLP Contract Laboratory Program  
RAS routine analytical services  
VOA volatile organic analysis  
SVOA semivolatile organic analysis  
HCID hydrocarbon identification

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TABLE 4-3

SAMPLE HOLDING TIME, PRESERVATION, AND CONTAINER REQUIREMENTS  
FOR EQUIPMENT RINSATE BLANK, FIELD (TRANSFER) BLANK, AND TRIP BLANK

SPLIT SAMPLING  
WHITE BLUFFS PICKLING ACID CRIB  
HANFORD SITE

Analytical Parameters	Matrix	Holding Time	Preservation <sup>a</sup>	Container per Blank	Total Blanks	Total Containers Required
<b><u>EQUIPMENT RINSATE BLANK</u></b>						
CLP-RAS Total Metals	Water	6 months (28 days for Hg)	HNO <sub>3</sub> to pH<2 Cool to 4°C	One x 1-L. polyethylene	1	1
CLP-RAS VOA	Water	7 days	Four drops concentrated HCl. Cool to 4°C	Two x 40-ml glass amber vials, Teflon-lined septum caps	1	2
CLP-RAS SVOA	Water	7/40 days <sup>b</sup>	Cool to 4°C	One x 80-oz amber glass	1	1
EPA 353.2 Nitrite/Nitrate	Water	72 hours	H <sub>2</sub> SO <sub>4</sub> to pH<2 Cool to 4°C	One x 1-L. polyethylene	1	1
EPA 350.1/350.2 ammonia	Water	72 hours	H <sub>2</sub> SO <sub>4</sub> to pH<2 Cool to 4°C	One x 1-L. polyethylene	1	1
EPA 300.0 Anions: fluoride sulfate chloride phosphate	Water	28 days	Cool to 4°C	One x 1-L. polyethylene	1	1
418.1 TPH-HCID/G/D Total Petroleum Hydrocarbons	Water	7/40 <sup>b</sup>	HCl to pH<2 Cool to 4°C	One x 80-oz glass amber	1	1
<b><u>FIELD (TRANSFER) BLANK</u></b>						
CLP-RAS VOA	Water	7 days	Four drops concentrated HCl. Cool to 4°C	Two x 40-ml. glass amber vials, Teflon-lined septum caps	1	2

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TABLE 4-3 (continued)

**SAMPLE HOLDING TIME, PRESERVATION, AND CONTAINER REQUIREMENTS  
FOR EQUIPMENT RINSATE BLANK, FIELD (TRANSFER) BLANK, AND TRIP BLANK**

**SPLIT SAMPLING  
WHITE BLUFFS PICKLING ACID CRIB  
HANFORD FACILITY**

Analytical Parameters	Matrix	Holding Time	Preservation <sup>a</sup>	Container per Blank	Total Blanks	Total Containers Required
<b><u>TRIP BLANK</u></b>						
CLP-RAS VOA	Water	7 days	Four drops concentrated HCl. Cool to 4°C	Two x 40-ml. glass amber vials, Teflon-lined septum caps	2	4

a EPA (1983, 1990a,b,c) and WDOE (1992)

b Holding times until extraction/analysis.

CLP Contract Laboratory Program  
 RAS routine analytical services  
 HNO<sub>3</sub> nitric acid  
 H<sub>2</sub>SO<sub>4</sub> sulfuric acid  
 HCl hydrochloric acid  
 VOA volatile organic analysis  
 SVOA semivolatile organic analysis  
 HCID hydrocarbon identification

## 5.0 SAMPLE DOCUMENTATION AND CUSTODY

The possession and handling of each sample will be properly documented to promote timely, correct, and complete analysis for all parameters requested. Each sample must be traceable from the point of collection (receipt of sample) through analysis and final disposition to promote sample integrity and to preclude any possible challenge of the analytical data during litigation or enforcement actions.

The CLP and EPA documentation system is used to identify, track, and monitor each sample. This system is discussed briefly in the following sections. EPA (1988b) provides further information concerning these procedures. Additional field records and control measures will be maintained according to EPA guidance (1988b). Whenever questions arise, the EPA regional sample control center (RSCC) will be consulted for direction and clarification.

### 5.1 FIELD DOCUMENTATION AND CONTROL MEASURES

The field records and CLP and EPA documentation control measures to be used when receiving, identifying, handling, and shipping samples include the following:

- Sample tags, as shown in Figure 5-1
- Custody seals, as shown in Figure 5-1
- EPA Region 10 Manchester laboratory analysis request forms for organic constituents and metals, as shown in Figures 5-2 and 5-3, respectively
- EPA Region 10 Manchester laboratory chain-of-custody record, as shown in Figure 5-4
- CLP routine analytical services (RAS) laboratory analysis request forms with chain-of-custody record for organic and inorganic constituents, as shown in Figures 5-5 and 5-6, respectively
- CLP SAS laboratory analysis request forms with chain-of-custody record for SAS analysis, as shown in Figure 5-7

All necessary CLP and EPA documentation forms, labels, seals, and other paperwork will be obtained from the EPA RSCC. The PRC project manager is responsible for obtaining these items and distributing them to field personnel. All paperwork will be completed using indelible ink.

### 5.1.1 Sample Labeling

PRC will use the official EPA and CLP sample numbers issued by the EPA RSCC for this split sampling event. In a bound logbook, the official EPA and CLP sample numbers will be recorded and cross-referenced to the corresponding PRC split sample location designations (see Section 5.1.2). The PRC split sample location designation system consists of the following:

- A one-character site description (PC for Pickling Acid Crib data)
- A one-character area designator (for example, B for area B)
- A two-character sample designator (S1 for a soil sample at location 1)
- A two-character depth of sample designator (06 for a sample collected 6 feet below ground surface)

Thus, the split soil sample from sample location 1 in area B, taken at a depth of 6 feet below ground surface, is designated PC-B-S1-06.

A sample tag and a label are attached to each sample container to provide proper sample identification. Figure 5-1 shows a typical sample tag. The information recorded on tags and labels includes the following:

- Project code--the number assigned by EPA to the sampling project
- Laboratory sample number--assigned by EPA RSCC
- CLP case number(s)--the unique number(s) for CLP analyses assigned by EPA RSCC to identify the sampling event (entered under "Remarks" heading)
- Station location--the split sampling location designation as specified in the QAPjP

9 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

- Station number--a two-digit number assigned by the field team leader
- Date--a six-digit number indicating the month, day, and year of receipt
- Time--a four-digit number indicating the military time of receipt
- Sample type--grab or composite sample
- Sampling personnel--signatures of sample receivers
- Remarks--case and CLP sample numbers, as well as any pertinent comments
- Label or tag number--a unique serial number preassigned and stamped on the label or tag

The tag and label also have appropriate spaces for indicating sample preservatives and analytical parameters. The completed sample tag and label are securely attached to the sample container.

PRC will consult EPA RSCC personnel for assistance regarding the analytical services to be used. Appropriate analysis requests and records will be used according to guidelines specified by EPA (1988b).

### 5.1.2 Field Logbook

Daily field activities will be documented through journal entries in a bound field logbook dedicated to the site. The logbook is water-resistant, and all entries will be made in indelible ink. The logbook will contain all pertinent information about sampling activities, site conditions, field methods used, general observations, and any other pertinent technical information. Examples of typical logbook entries include the following:

- Daily temperature and other climatic conditions
- Field measurements, activities, and observations
- Referenced sampling location description (in relation to a stationary landmark)
- Media sampled

9 1 2 3 4 5 6 7 8 9

- Receiving methods and equipment, including decontamination measures
- Date and time of receipt
- Types of sample containers used
- Sample identification and cross-referencing
- Sample types and preservatives used
- Analytical parameters
- Sample receivers, distributors, and transporters
- Site sketches
- Instrument calibration procedures and frequency

The PRC field team leader or a designee is responsible for the daily maintenance of all field records. Each page of the logbook is numbered, dated, and signed by the person making the entry. Corrections to the logbook are made by drawing a single strike mark through the entry to be corrected, then recording and initialing the correct entry. The date of the correction is noted for corrections made at a later date.

Color photographs will be taken during the O&M inspection to document sampling locations, sampling activities, and site features, as necessary. The photographs are numbered to correspond to logbook entries. The name of the photographer, date, time, site location, and a brief description are entered sequentially as photographs are taken. Adequate logbook notations and receipts are retained to account for custody during film processing.

### 5.1.3 Chain-of-Custody Record

The chain-of-custody record, shown in Figure 5-4 for samples delivered to the EPA Manchester laboratory, and in Figures 5-5, 5-6, and 5-7 for samples delivered to the CLP laboratory, establishes the documentation necessary to trace sample possession from time of receipt through

sample analysis and disposition. A sample is in a person's custody if any of the following criteria are met:

- The sample is in a person's physical possession
- The sample is in a person's view after being in his or her physical possession
- The sample was in a person's physical possession and was then locked up or sealed to prevent tampering
- The sample is kept in a secured area

The sample receiver completes a chain-of-custody record to accompany each sample delivery container (cooler) and is responsible for shipping samples from the field to the laboratory. The sample receiver records the project number, the CLP case number, and the sample receiver's signature in the chain-of-custody record heading. A site's common name is not included on this form or other sample documentation, because CLP laboratories may perform analyses for responsible parties associated with the site. For each station number, the sample receiver indicates date, time, sample status (composite or grab sample), station location, number of containers, analytical parameters, EPA sample numbers, and CLP sample numbers. When shipping samples, the sample receiver signs the bottom of the form and enters the date and time (24-hour) that the samples were relinquished. The sample receiver enters the carrier name and air bill number on the form. The original signature copy of the chain-of-custody record is enclosed in a plastic bag (along with any other necessary CLP or EPA sample documentation) and is secured to the inside of the cooler lid. A copy of the chain-of-custody record is retained for PRC files.

Each cooler is secured for shipment by placing custody seals across all four sides of the cooler lid. Commercial carriers are not required to sign the chain-of-custody form, provided that the form is sealed inside the shipping cooler and the custody seals remain intact.

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## 5.2 LABORATORY CUSTODY PROCEDURES

The EPA Region 10 Manchester laboratory or the CLP laboratory performing the chemical analyses is responsible for following all CLP-required chain-of-custody procedures specified by EPA (1990a,b).

9 0 1 2 3 4 5 6 7 8 9

FIGURE 5-1  
 TYPICAL SAMPLE TAG AND CUSTODY SEAL

9 3 1 2 0 5 8 1 6 8 9

**Custody Seal**

Date \_\_\_\_\_  
 Signature \_\_\_\_\_




**Custody Seal**

Date \_\_\_\_\_  
 Signature \_\_\_\_\_

Project Code	Station No	Month/Day/Year	Time	Designate		Station Location	Preservative: Yes <input type="checkbox"/> No <input type="checkbox"/>
				Comp	Grab		
Samplers (Signatures)							<b>ANALYSES</b>
							BOD Anions
							Solids (TSS) (TDS) (SS)
							COD, TOC, Nutrients
							Phenolics
							Mercury
							Metals
							Cyanide
							Oil and Grease
							Organics GC/MS
							Priority Pollutants
							Volatile Organics
							Pesticides
							Mutagenicity
							Bacteriology
Remarks:							
						Tag No.	Lab Sample No.
						86637	







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**FIGURE 5-5**  
**CLP RAS ORGANIC TRAFFIC REPORT AND**  
**CHAIN-OF-CUSTODY RECORD**

		United States Environmental Protection Agency Office of Air Quality Programs, Sample Management Office 1000 Boylston Avenue, Alexandria, VA 22304 Tel: 557 2490 Fax: 557 2490			<b>Organic Traffic Report      &amp; Chain of Custody Record</b> (For Organic CLP Analysis)		SAS No. (Applicable)	Case No.			
Project Code	Account Code	Region No. / Sampling Co.	Date Shipped / Carrier		5. Preservative Enter in Column D)	7. Sample Description Enter in Column A)					
Regional Information		Sampler (Name)		Arbitr. Number							
Non-Superfund Program		Sampler Signature		5. Ship To							
Site Name		3. Type of Activity		Removal		1. HCl 2. HNO3 3. NaHSO4 4. H2SO4 5. Other (SAS) (Specify) 6. Ice only N. Not preserved					
City / State	Site Spill ID	<input type="checkbox"/> SF <input type="checkbox"/> PA <input type="checkbox"/> ST <input type="checkbox"/> FED <input type="checkbox"/> RIFS <input type="checkbox"/> RO <input type="checkbox"/> RA <input type="checkbox"/> O&M <input type="checkbox"/> NPLD <input type="checkbox"/> CLEM <input type="checkbox"/> REM <input type="checkbox"/> OIL <input type="checkbox"/> UST				7. Surface Water 8. Ground Water 9. Leachate 10. Rinseate 11. Soil/Sediment 12. Oil (SAS) 13. Waste (SAS) 14. Other (SAS) (Specify)					
CLP Sample Numbers (from labels)	A Enter from Box 7	B Conc Low / High	C Sample Type / Grab	D Preservative from Box 6	E RAS Analysis: VOA, BNA, Pests, PCB, TOX	F Regional Specific Tracking Number or Tag Numbers	G Station Location Number	H Mo/Day/Year/Time Sample Collection	I Sampler Initials	J Corresp. CLP Inorg. Samp. No.	K Designated Field QC
Shipment for Case (Sample 1 of N)		Page 1 of		Sample used for a spike and/or duplicate		Additional Sampler Signatures		Chain of Custody Seal Number			
<b>CHAIN OF CUSTODY RECORD</b>											
Relinquished by (Signature)			Date / Time		Received by (Signature)			Date / Time		Received by (Signature)	
Relinquished by (Signature)			Date / Time		Received by (Signature)			Date / Time		Received by (Signature)	
Received by (Signature)			Date / Time		Received for Laboratory by (Signature)			Date / Time		Remarks	
EPA Form 9110-2 (Rev. 5-91) Replaces EPA Form 12075-71, previous edition which may be used			DISTRIBUTION		Blue - Region Copy			Pink - SMD Copy		White - Lab Copy	
Yellow - Lab Copy for Return to SMD			Split Samples <input type="checkbox"/> Accepted (Signature)		<input type="checkbox"/> Declined						

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9 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50

**FIGURE 5-6  
 CLP RAS INORGANIC TRAFFIC REPORT AND  
 CHAIN-OF-CUSTODY RECORD**

United States Environmental Protection Agency Hazardous Waste Management and Emergency Response Division Office of Hazardous Waste Management 1215 Jefferson Davis Highway Arlington, VA 22202		<b>Inorganic Traffic Report                  &amp; Chain of Custody Record</b> For Inorganic CLP Analysis			SAS No. (400-02001)	Case No.					
		1. Project Code	2. Account Code	3. Region No.	4. Date Shipped (Carrier)	5. Preservation (Enter in Column D)	7. Sample Description (Enter in Column A)				
Regional Information		Sampler (Name)		Arbitr. Number		1. HCl 2. HNO <sub>3</sub> 3. NaOH 4. H <sub>2</sub> SO <sub>4</sub> 5. K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> 6. Ice only 7. Other (SAS) N Not preserved					
Non-Superfund Program		Sampler Signature		5. Ship To		1. Surface Water 2. Ground Water 3. Leachate 4. Rinseate 5. Soil/Sediment 6. Oil (SAS) 7. Waste (SAS) 8. Other (SAS) (Specify)					
Site Name		4. Type of Activity		Removal							
City, State		Site Soil ID		Removal							
		Lead <input type="checkbox"/> RIFS <input type="checkbox"/> CLEM <input type="checkbox"/> SF <input type="checkbox"/> RA <input type="checkbox"/> REMA <input type="checkbox"/> PPP <input type="checkbox"/> PA <input type="checkbox"/> RA <input type="checkbox"/> REM <input type="checkbox"/> ST <input type="checkbox"/> SSI <input type="checkbox"/> O&M <input type="checkbox"/> OIL <input type="checkbox"/> FED <input type="checkbox"/> SI <input type="checkbox"/> NPLD <input type="checkbox"/> UST <input type="checkbox"/>									
CLP Sample Numbers (from labels)	A Enter Conc. from Box 4	B Conc. Type	C Sample from Box 5	D Preservative from Box 6	E RAS Analysis	F Regional Specific Tracking Number or Tag Numbers	G Station Location Number	H Mo/Day/Year/Time Sample Collection	I Sampler Initials	J Corresp. CLP Org. Same No.	K Designated Field QC
					Metals: <input type="checkbox"/> Low Conc. <input type="checkbox"/> High Conc. Cyanide <input type="checkbox"/> Nitrate <input type="checkbox"/> Fluoride <input type="checkbox"/> pH <input type="checkbox"/> Conductivity <input type="checkbox"/>						
Shipment for Case (complete? Y/N)		Page 1 of _____	Sample used for a spike and/or duplicate		Additional Sampler Signatures		Chain of Custody Seal Number				
<b>CHAIN OF CUSTODY RECORD</b>											
Relinquished by (Signature)		Date / Time		Received by (Signature)		Relinquished by (Signature)		Date / Time		Received by (Signature)	
Relinquished by (Signature)		Date / Time		Received by (Signature)		Relinquished by (Signature)		Date / Time		Received by (Signature)	
Received by (Signature)		Date / Time		Received for Laboratory by (Signature)		Date / Time		Remarks		Is custody seal intact? Y/N/None	
EPA Form 910-1 (Rev. 5-91) Replaces EPA Form (2075-6), previous edition which may be used DISTRIBUTION Green - Region Copy    Pink - SMO Copy    White - Lab Copy    Yellow - Lab Copy for Return to SMO						Split Samples <input type="checkbox"/> Accepted (Signature) <input type="checkbox"/> Declined					

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**FIGURE S-7  
 CLP SAS TRAFFIC REPORT AND  
 CHAIN-OF-CUSTODY RECORD**

9 3 1 2 8 3 3 7 6 6 5

United States Environmental Protection Agency Test Laboratory Program, Sample Management Division 1200 19th Avenue, NE Atlanta, Georgia 30346		<b>Special Analytical Service</b> Packing List Chain of Custody		SAS No.	
		Project Code: _____ Account Code: _____ Region No. (Name): _____		Date Shipped/Carrier: _____	
Region Information: _____ Sampler (Name): _____		Audit Number: _____		6. Sample Description Enter: a. Column A)	
Superfund Program: _____ Sampler Signature: _____		5. Ship To: _____		1. Surface Water 2. Ground Water 3. Leachate 4. Rinseate 5. Soil/Sediment 6. Oil 7. Waste 8. Other (Specify)	
Site Name: _____ Type of Activity: _____ (SF, SW, PA, RA, REM, ST, SS, OSM, OR, FEQ, etc.)		7. Preservative Enter in Column C)		1. HCl 2. HNO <sub>3</sub> 3. NaHSO <sub>4</sub> 4. H <sub>2</sub> SO <sub>4</sub> 5. NaOH 6. Other (SAS Specify) 7. Ice only 8. Not preserved	
Site Soil ID: _____		8. Sample Analysis: _____		9. Mo./Day/Year/Time Sample Collection	
Sample Numbers: _____	A. Matrix Enter from Box 6	B. Conc. Low Med High	C. Preservative Used from Box 7	D. Designated Field QC	
10. Sample Tracking Information: _____					
11. Signature for SAS (Sample): _____					
<b>CHAIN OF CUSTODY RECORD</b>					
Relinquished by: (Signature) _____	Date / Time: _____	Received by: (Signature) _____	Relinquished by: (Signature) _____	Date / Time: _____	Received by: (Signature) _____
Relinquished by: (Signature) _____	Date / Time: _____	Received by: (Signature) _____	Relinquished by: (Signature) _____	Date / Time: _____	Received by: (Signature) _____
Relinquished by: (Signature) _____	Date / Time: _____	Received for Laboratory by: (Signature) _____	Date / Time: _____	Remarks: _____	Is custody seal intact? Y/Phone
EPA Form			Split Samples: <input type="checkbox"/> Accepted (Signature) _____		
DISTRIBUTION White - Region Copy    Yellow - SMO Copy    Gold - Lab Copy    Pink - Lab Copy for Return to SMO			<input type="checkbox"/> Declined		

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## 6.0 CALIBRATION PROCEDURES AND FREQUENCY

Laboratory equipment must be calibrated regularly to assure the accuracy of analyses. EPA CLP laboratories and the EPA Region 10 Manchester laboratory will be responsible for calibration of all laboratory equipment. Required analytes, method detection limits, precision, accuracy, and completeness are shown on Tables 3-1 and 3-2. EPA laboratory calibration requirements will be accomplished in accordance with EPA guidance (1990a,b) for VOCs, SVs, and total metals analyses. Calibration requirements for additional analyses will be accomplished in accordance with EPA (1983, 1990c) and the SAS request forms developed by EPA Region 10 Quality Assurance office (Appendix A).

9 3 1 2 4 6 8 1 6 6 6

## 7.0 ANALYTICAL PROCEDURES

EPA CLP laboratories and the EPA Region 10 Manchester laboratory will provide analytical support. Methods for analysis for VOCs, SVs, and total metals analyses are specified by EPA (1990a,b). Methods for additional analyses will be accomplished in accordance with EPA guidance (1983, 1990c), WDOE (1992), and the SAS request forms developed by EPA Region 10 Quality Assurance office (Appendix A). Soil sample preparation procedures for nitrite/nitrate, ammonia, and anions analyses (EPA 1983) have been provided by the Hanford Site contractor and included in Appendix B.

9 7 1 2 3 4 5 6 7

## 8.0 INTERNAL QUALITY CONTROL CHECKS

An internal quality control system establishes a set of routine procedures designed to produce data that meet the QA/QC objectives (Section 3.0). Inherent in this control function is a parallel function of measurement and definition of the quality of the data. A well-designed internal quality control program must be capable of measuring and controlling the quality of the data in terms of precision and accuracy. The internal quality control measures described in the following sections are used to assure a high degree of data precision and accuracy.

### 8.1 FIELD QUALITY CONTROL CHECKS

As a quality control check on field sampling, PRC will receive field duplicate samples, an equipment rinsate blank, a trip blank, and a field (transfer) blank to be sent to the laboratory at the frequencies specified in Section 3.4.

#### 8.1.1 Field Duplicate Sample

A field duplicate sample is defined as one additional sample collected or received independently at a sampling location during a sampling event. Field duplicate sample containers are filled alternately between environmental samples (Section 4.1). The field duplicate sample will be analyzed for all parameters as listed in Table 3-1.

The field duplicate sample is identified so that the laboratory cannot distinguish it from other samples. For each sample matrix, one complete sample set is identified with a coded (false) identifier in the same format used for other identifiers for this sample matrix. Both the coded and true identifiers are recorded in the field logbook. On chain-of-custody forms, the coded identifier is used. The coded field duplicate sample is used to assess the representativeness of the sampling procedure, as well as laboratory analytical precision.



**8.2 LABORATORY QUALITY CONTROL CHECKS**

Quality control data are necessary to determine precision and accuracy of analyses and to demonstrate that interferences and contamination of glassware and reagents are absent. Laboratory analytical methods include the use of laboratory blanks, preparation blanks, MS/MSD samples, surrogate spikes, and other measures as specified by EPA (1990a,b). Quality control acceptance criteria for precision and accuracy will be provided by individual SAS request forms and EPA (1988b, 1991) guidance, as applicable.

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## 9.0 DATA REDUCTION, VALIDATION, AND REPORTING

The data reduction, validation, and reporting process includes all steps between the original instrument or visual reading through the final oversight report. Data reduction includes laboratory calculations for unit conversions, dilutions, and similar factors. To validate the data, someone other than the laboratory analyst reviews the data reduction procedures to determine the acceptability of the data and any necessary qualifiers. Reporting includes the interpretation of the data and the transcription of these validated data into a final report. Data reduction and data validation differ among analytical methods, but the reporting process is common to all data.

### 9.1 DATA REDUCTION

The EPA Region 10 Manchester laboratory or the CLP laboratory performing chemical analyses are required to follow data reduction procedures as established by EPA (1983, 1990a, 1990b, 1990c).

Field parameters such as volatile organic vapors are measured by direct instrument readings. Results are recorded directly into field logbooks; thus, no data reduction is required.

### 9.2 DATA VALIDATION

This section outlines data validation procedures for both field and laboratory measurements.

#### 9.2.1 Field Measurements

All field data will be generated by qualified field personnel and will be immediately entered into a field logbook. These data will be reviewed daily by the field team leader for completeness, consistency, and proper procedures (such as calibration).

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**9.2.2 Laboratory Measurements**

Validation of all data from EPA CLP laboratories received during the White Bluffs Pickling Acid Crib ERA will be performed by PRC in accordance with EPA guidance (1988b, 1991) and SAS request forms, as applicable. All data attained from analyses by the EPA Region 10 Manchester laboratory will be validated by that laboratory. PRC will determine the data usability based on the data validation package provided by the EPA Region 10 Manchester laboratory.

**9.3 DATA REPORTING**

If samples are analyzed by a CLP laboratory, all RAS and SAS data will be reported in standard CLP format and will be validated by PRC personnel. If samples are analyzed by the EPA Region 10 Manchester laboratory, all data will be reported in standard EPA Region 10 format (without raw data) and will be validated at the laboratory. All data generated in the field are collected in a project file at the PRC Seattle office. All laboratory reports and other data are also placed in this file, which is organized to allow ready identification and retrieval of any desired information. Each PRC report is reviewed before release by a technical editor, a technical reviewer, and a quality control coordinator.

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## 10.0 PERFORMANCE AND SYSTEM AUDITS

All field work conducted for the ERA is subject to performance and system audits. A performance audit checks the operation of a specific study component, such as a sampling method or an analytical procedure. A system audit is broader and includes a thorough evaluation of both laboratory and field QA/QC methods, such as data validation procedures, corrective action procedures, and sample custody procedures. Audits may be internal (conducted by PRC personnel within the organization being audited) or external (conducted by EPA or another outside agency).

Audits are randomly scheduled by QA/QC personnel and generally are not announced beforehand. If QA/QC personnel find an apparent systematic problem with a particular component of the sampling and analysis program, they normally audit related activities to identify and correct the problem. Audit results are incorporated into the project reporting system, typically in the monthly report.

### 10.1 FIELD AUDIT

Internal performance and system audits of all PRC field activities are coordinated by the PRC TES 12 quality assurance manager, Dave Liu, in accordance with TES 12 quality assurance program plan (PRC 1988) requirements. If a field audit is scheduled, a site-specific audit checklist is prepared (Figure 10-1). The checklist is based on information contained in the QAPJP and the health and safety plan. Using the checklist, auditors evaluate the compliance of field personnel with procedures specified in these plans, including the following:

- Initial and continuing equipment calibration
- Field measurements
- Sample collection (receipt of sample)
- Sample labeling, handling, and custody
- Data collection and recordkeeping

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- Health and safety monitoring
- Logbook completeness
- Photographic documentation
- Availability of documents used to evaluate Hanford's compliance

External field audits for this project are the responsibility of EPA Region 10.

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FIGURE 10-1  
AUDIT REPORT FORM

PRC Environmental Management, Inc.

Audit Report

QA/QC Level \_\_\_\_\_

Project/Contract No.: \_\_\_\_\_

Work Assignment No.: \_\_\_\_\_

Work Assignment Manager: \_\_\_\_\_

Region: \_\_\_\_\_

Firm: \_\_\_\_\_

Date of Audit: \_\_\_\_\_

Auditor: \_\_\_\_\_

Brief Description of Work Assignment:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Audit Summary

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Corrective Action Required:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Remarks:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Auditor Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Distribution: 1) Original to project file 2) Copy to QA/QC file 3) Copy to auditor

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## 11.0 PREVENTIVE MAINTENANCE

Preventive maintenance includes inspecting, repairing, and adjusting equipment and instruments before any deficiencies can have a significant effect on performance. These techniques are a necessary part of the procedures for carrying out a particular operation with a particular type of equipment.

### 11.1 LABORATORY EQUIPMENT

The EPA Region 10 Manchester laboratory or the CLP laboratory analyzing the soil samples will follow necessary preventive maintenance actions described in its internal standard operating procedures. These actions include (1) initial and continuing tuning and calibration of instruments, (2) use of internal standards, and (3) related activities such as corrective action.

### 11.2 FIELD EQUIPMENT

Maintenance procedures for field monitoring equipment will be provided with the field monitoring equipment.

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## 12.0 PROCEDURES FOR ASSESSING DATA PRECISION, ACCURACY, AND COMPLETENESS

The QA/QC objectives described in Section 3.0 must be met to satisfactorily complete the ERA. This section describes the process of assessing whether those objectives are met. The assessment is part of the data reduction and validation process discussed in Section 9.0.

### 12.1 LABORATORY RESULTS

The precision of laboratory results is determined primarily by calculating the relative percent difference (RPD) for duplicate samples, which include field duplicates, laboratory duplicates, and MS/MSD samples. The laboratory determines the accuracy of the results by calculating percent recovery values for MS/MSD samples. In addition, the laboratory uses laboratory blanks, calibration standards, and internal standards to establish the analytical accuracy, as specified by EPA (1983, 1990a,b,c). Completeness of all laboratory results is determined by comparing the number of validated, usable results to the number of samples planned.

### 12.2 CALCULATIONS

The primary statistic used for estimating precision for duplicate measurements is the RPD. RPD is calculated as follows:

$$RPD = \frac{|X_1 - X_2|}{(X_1 + X_2)/2} \times 100 \quad (12-1)$$

where  $X_1$  and  $X_2$  are the results of duplicate measurements and  $|X_1 - X_2|$  is the absolute value of the difference in the two measurements.

If there are three or more replicates, the relative standard deviation (RSD) is calculated as a measure of precision:

$$\text{RSD} = (\text{SD}/\bar{X}) \times 100 \quad (12-2)$$

where  $\bar{X}$  is the average of the data points ( $X_1, X_2, \dots, X_n$ ) and SD is the standard deviation of the individual measurements.

Accuracy can be estimated by calculating the percent difference (%D) between an instrument response and a known standard:

$$\%D = (S-X)/S \times 100 \quad (12-3)$$

where S is the concentration of a known standard and X is the measured instrument response. This determination of accuracy can be used for both laboratory and field measurements.

Alternatively, accuracy can be measured as the percent recovery (%R) from the analytical results of surrogate or analyte compounds spiked into a sample:

$$\%R = (M-N)/S \times 100 \quad (12-4)$$

where M is the measured analyte concentration in the spiked sample, N is the concentration of the analyte in the original sample, and S is the analyte concentration spiked into the original sample. This measurement of accuracy is most appropriate for laboratory results.

Percent completeness (%C) is a measure of (1) the number of samples received compared to the number of samples required for characterization or (2) the amount of valid data obtained compared to the amount of data expected under normal conditions. In most cases, the number of samples required for characterization and the amount of data expected under normal conditions are the same as the number of samples planned, n. Thus, percent completeness can be defined as follows:

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$$\%C = V/n \times 100 \quad (12-5)$$

where V is the number of valid results and n is the total number of samples planned.

Percent completeness also can be measured as the percent of samples planned that were actually received:

$$\%C = C/n \times 100 \quad (12-6)$$

where C is the number of samples received and n is the total number of samples planned.

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### 13.0 CORRECTIVE ACTION

Corrective action must be initiated whenever a system is not functioning properly. The need for corrective action may be identified during performance or system audits or by the analysts themselves. Corrective action may take place in the laboratory or in the field.

#### 13.1 LABORATORY CORRECTIVE ACTION

Quality control problems within EPA CLP laboratories and the EPA Region 10 Manchester laboratory will be handled by the laboratory, the CLP sample management office, and EPA Region 10. Frequently, analytical problems may result from matrix effects, making results questionable (estimates, qualified J) or unusable (rejected, qualified R). The EPA Region 10 work assignment manager, PRC project manager, and PRC quality assurance coordinator will jointly determine the acceptability of data and the appropriate corrective action. Corrective action may include the following tasks:

- Reanalyzing samples if holding time criteria permit
- Resampling and analyzing the samples
- Evaluating and amending sampling and analytical procedures
- Accepting data and acknowledging a level of uncertainty

#### 13.2 FIELD CORRECTIVE ACTION

During field investigations, any problem that affects samples or monitoring data is documented and recorded in the field logbook by the person identifying the problem. A serious problem that affects overall project objectives is brought to the attention of the PRC project manager who will notify the EPA work assignment manager. If necessary, a corrective action request form (Figure 13-1) will be completed, and the PRC regional quality assurance coordinator will be notified. The

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project manager or a designee is responsible for identifying the causes of the problem and for developing solutions.

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### FIGURE 13-1 CORRECTIVE ACTION REQUEST FORM

PRC Environmental Management, Inc.

Corrective Action Request Form

QA/QC Level \_\_\_\_\_

Project/Contract No \_\_\_\_\_

Work Assignment Number: \_\_\_\_\_

Site Location: \_\_\_\_\_

Firm: \_\_\_\_\_

To (Work Assignment Manager): \_\_\_\_\_

From (Reviewer): \_\_\_\_\_  
Signature

Date: \_\_\_\_\_

Description of Problem: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Corrective Action Requested: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

The above corrective action must be completed by: \_\_\_\_\_  
(Date)

Corrective Action Taken: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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**FIGURE 13-1 (Continued)**  
**CORRECTIVE ACTION REQUEST FORM**

QA/QC Level \_\_\_\_\_

Work Assignment Manager:

(Subcontractor QA Manager)

Acknowledgement of Receipt

Correction Action Completed

\_\_\_\_\_  
(Initial/Date)

\_\_\_\_\_  
(Initial/Date)

Reviewer:

Corrective Action is/is not satisfactory

Remarks

\_\_\_\_\_  
(Initial/Date)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

QA/QC Coordinators:

Corrective Action is/is not satisfactory

Remarks

\_\_\_\_\_  
(Initial/Date)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Distribution: 1) Original to project file 2) Copy to QA/QC file 3) Copy to reviewer

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#### 14.0 QUALITY ASSURANCE REPORTS

Effective management of environmental measurements requires the timely assessment and review of activities, which entails interaction among PRC personnel collecting the data, the PRC project manager, the PRC regional manager, the PRC TES 12 contract quality assurance coordinator, and EPA personnel. Written reports of field activities may be necessary to provide an ongoing evaluation of measurement data quality. These reports, produced as required, may include the following:

- QA/QC audit results and other inspection reports
- Summary of corrective action, including any unresolved problems or past-due corrective actions
- Summary of unscheduled equipment maintenance activities
- Summary of any QAPjP changes
- Summary of project QA/QC activities and status

Reports of this type are distributed to the PRC project manager, PRC regional manager, PRC TES 12 contract quality assurance coordinator, and EPA work assignment manager.

If appropriate, PRC will submit a report at the completion of the field work containing a separate QA/QC section summarizing data quality and identifying any significant QA/QC activities that occurred during the investigation.

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## 15.0 REFERENCES

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**APPENDIX A**  
**SPECIAL ANALYTICAL SERVICES REQUEST FORMS**

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**APPENDIX B  
SOIL SAMPLE PREPARATION PROCEDURES FOR  
ANIONS AND NITRITE/NITRATE ANALYSES**

(Personal conversation with Bill Stroben of WHC on 11/13/92)

**SOIL SAMPLE PREPARATION PROCEDURES FOR  
ANIONS AND NITRITE/NITRATE ANALYSES**

Procedure Steps:

- 1) Weigh 10g of soil in a plastic bottle
- 2) Add approximately 70mL of deionized water
- 3) Put in a rotator box and spin for approximately 2 hours
- 4) Filter the liquid
- 5) Bring the liquid to a volume of 100mL in a volumetric flask with deionized water

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# CORRESPONDENCE DISTRIBUTION COVERSHEET

Author: P. S. Innis, EPA                      Addressee: R. K. Stewart, RL                      Correspondence No.: Incoming: 9302128

Subject: WHITE BLUFFS PICKLING ACID CRIB ERA SPLIT SAMPLING QA PLAN

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