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33

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 198337

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.		4. Date
Supplemental [ ] Direct Revision [X] Change ECN [ ] Temporary [ ] Standby [ ] Supersedure [ ] Cancel/Void [ ]	D. R. Herman Laundry Ops S2-66 373-4069		7-6-93
	5. Project Title/No./Work Order No. 2724-W Laundry Wastewater Sampling & Analysis Plan	6. Bldg./Sys./Fac. No. 2724-W	7. Impact Level 3, E, Q
	8. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-LL-PLN-001 REV 2	9. Related ECN No(s). NA	10. Related PO No. NA

11a. Modification Work	11b. Work Package No.	11c. Modification Work Complete	11d. Restored to Original Condition (Temp. or Standby ECN only)
[ ] Yes (fill out Blk. 11b) [X] No (NA Blks. 11b, 11c, 11d)	NA	NA Cog. Engineer Signature & Date	NA Cog. Engineer Signature & Date

12. Description of Change

1. Revisied Analyte table

13a. Justification (mark one)							
		Criteria Change	[ ]	Design Improvement	[ ]	Environmental	[X]
As-Found	[ ]	Facilitate Const.	[ ]	Const. Error/Omission	[ ]	Design Error/Omission	[ ]

13b. Justification Details

1. Methods changed to conform with QAPP and availability of contracted labs.

14. Distribution (include name, MSIN, and no. of copies)

See Attached Distribution sheet.

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DATE JUL 09 1993 STA. 4

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A-7900-013-2 (06/92) GEF095

9313089.1935

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1) 1978337 (BM)

15. Design Verification Required	16. Cost Impact						17. Schedule Impact (days)	
	ENGINEERING			CONSTRUCTION				
[] Yes	Additional	[]	SD	Additional	[]	SD	Improvement	[]
[X] No	Savings	[]	SD	Savings	[]	SD	Delay	[]

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	[]	Seismic/Stress Analysis	[]	Tank Calibration Manual	[]
Functional Design Criteria	[]	Stress/Design Report	[]	Health Physics Procedure	[]
Operating Specification	[]	Interface Control Drawing	[]	Spares Multiple Unit Listing	[]
Criticality Specification	[]	Calibration Procedure	[]	Test Procedures/Specification	[]
Conceptual Design Report	[]	Installation Procedure	[]	Component Index	[]
Equipment Spec.	[]	Maintenance Procedure	[]	ASME Coded Item	[]
Const. Spec.	[]	Engineering Procedure	[]	Human Factor Consideration	[]
Procurement Spec.	[]	Operating Instruction	[]	Computer Software	[]
Vendor Information	[]	Operating Procedure	[]	Electric Circuit Schedule	[]
OM Manual	[]	Operational Safety Requirement	[]	ICRS Procedure	[]
FSAR/SAR	[]	IEFD Drawing	[]	Process Control Manual/Plan	[]
Safety Equipment List	[]	Cell Arrangement Drawing	[]	Process Flow Chart	[]
Radiation Work Permit	[]	Essential Material Specification	[]	Purchase Requisition	[]
Environmental Impact Statement	[]	Fac. Proc. Samp. Schedule	[]		[]
Environmental Report	[]	Inspection Plan	[]		[]
Environmental Permit	[]	Inventory Adjustment Request	[]		[]

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision

20. Approvals

Signature	Date	Signature	Date
OPERATIONS AND ENGINEERING		ARCHITECT-ENGINEER	
Cog Engineer, D. R. Herman DR Herman	7-6-93	PE	
Cog. Mgr., S. E. Albin S. E. Albin	7-7-93	QA	
QA, B. J. Reed QA	8 JULY 93	Safety	
Safety		Design	
Security		Environ.	
Environ., R. J. Boom RJ Boom	7-9-93	Other	
Projects/Programs, D. Speer D. Speer	7-7-93	C.D. Morrison-Beyer DL Edwards	7-9-93
Tank Waste Remediation System		M.S. Hendrix DR Herman per phone	7-7-93
Facilities Operations		DEPARTMENT OF ENERGY	
Restoration & Remediation		Signature or Letter No.	
Operations & Support Services			
IRM		ADDITIONAL	
Other			

9313089.1936

JUL 0 9 1993

Date Received: 7-6-93 KMB

INFORMATION RELEASE REQUEST

Reference: WHC-CM-3-4

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- [] Summary
- [] Abstract
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[] Poster Session
[] Videotape

[] Reference
[] Technical Report
[] Thesis or Dissertation
[] Manual
[] Brochure/Flier
[] Software/Database
[x] Controlled Document
[] Other

ID Number (include revision, volume, etc.): WHC-SD-LL-PLN-001 REV 2A

List attachments.: Page 18, WHC-SD-LL-PLN-001 REV 2A

Date Release Required: 7/10/93

Title: 2724-W Laundry Wastewater Sampling Analysis Plan

Unclassified Category: UC-

Impact Level: 3E Q

New or novel (patentable) subject matter? [X] No [] Yes
If "Yes", has disclosure been submitted by WHC or other company?
[] No [] Yes Disclosure No(s).

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Date(s) of Conference or Meeting

City/State

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Will material be handed out? [] Yes [] No

Title of Journal

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Review Required per WHC-CM-3-4	Yes	No	Reviewer - Signature Indicates Approval: Name (printed) / Signature / Date
Classification/Unclassified Controlled Nuclear Information	[]	[x]	
Patent - General Counsel	[]	[x]	OGC Memo 2/4/93
Legal - General Counsel	[]	[x]	OGC Memo 2/4/93
Applied Technology/Export Controlled Information or International Program	[]	[x]	
WHC Program/Project	[x]	[]	D. R. Speer R1-48 Douglas R Speer 7-7-93
Communications	[]	[x]	
RL Program/Project	[]	[x]	
Publication Services	[x]	[]	BG Lauzon BG Lauzon 7-9-93
Other Program/Project	[]	[x]	

Information conforms to all applicable requirements. The above information is certified to be correct.

	Yes	No
References Available to Intended Audience	[x]	[]
Transmit to DOE-HQ/Office of Scientific and Technical Information	[]	[x]

Author/Requestor (Printed/Signature): D.R. Herman DR Herman — Date 7-6-93

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

Responsible Manager (Printed/Signature): S. E. Albin S E Albin — Date 7-6-93

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Date Cancelled

Date Disapproved

9313089.1937

SUPPORTING DOCUMENT

1. Total Pages 12

2. Title	3. Number	4. Rev No.
2724-W LAUNDRY WASTEWATER SAMPLING & ANALYSIS PLAN	WHC-SD-LL-PLN-001, REV 2A	REV 2A

5. Key Words

SAP, TPA, LAUNDRY, PEDF, SAMPLING, ANALYSIS

APPROVED FOR PUBLIC RELEASE

KMB 7/9/93

6. Author

Name: D. R. HERMAN

DR Herman

Signature

Organization/Charge Code 55330/MJ000

7. Abstract

Page change as supplement to the Sampling and Analysis Plan (SAP) that establishes the guidelines for providing data to support a waste designation for the liquid effluent.

8. PURPOSE AND USE OF DOCUMENT - This document was prepared for use within the U.S. Department of Energy and its contractors. It is to be used only to perform, direct, or integrate work under U.S. Department of Energy contracts. This document is not approved for public release until reviewed.

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9. Impact Level 3EQ

10. RELEASE STAMP

OFFICIAL RELEASE BY WHC 55

DATE JUL 09 1993 Sta. 4

9313089.1938

RECORD OF REVISION

(1) Document Number: WHC-SD-LL-PLN-001

(2) Title: 2724-W LAUNDRY WASTEWATER SAMPLING & ANALYSIS PLAN

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release (5) Cog. Engr.	(6) Cog. Mgr.	Date
0	EDT - 155716 1/16/92			
# 1 RS	(7) COMPLETE REWRITE REPLACE ENTIRE DOC.	L. H. Fowler	S. E. Ole	12-9-92
	PER ECN-187377			
2	INCORPORTE COMMENTS FROM EPA PER ECN			
	187378 replace entire doc.	L. H. Fowler	S. E. Ole	1/21/93
2A RS	Replace Page 18, added methods	Dr Herman	S. E. Ole	7-7-93
	per ECN #198337	7/6/93		7/7/93

Table 1. Analytes from Tables 8-1 and A-17 of WHC-SD-WM-QAPP-011 REV 3.

Analyte	Method
ICP Spectroscopy	6010
Hg	7470
VOA	8240
Semi-VOA	8270
PCB/Pesticides	8080
Anions (IC) (F, Cl, NO_2, NO_3, PO_4, SO_4)	300.0
TOC	415.2/9060
Phosphorous (total)	365.2/365.3
Ammonia	350.1/350.2/350.3
NO_2 - NO_3	353.1/353.2/353.3
Alkalinity	310.1/310.2
TDS	160.1
Pesticides	8140
Herbicides	8150
Gross alpha	(a)
Gross beta	(a)
Strontium 89/90	(a)
Gamma scan determination	(a)
Total Uranium	(a)
Plutonium-238, 239, 240, 242	(a)
Cesium-137	(a)
Cobalt-60	(a)
Americium-241	(a)
Radium-228	(a)
Lead-210	(a)
Total Activity	LA-548-111 LA-508-121

(a) Radionuclides will be analyzed by methods that meet or exceed EPA or Nuclear Regulatory Commission guidelines. Methods and requirements shall be defined by the laboratory prior to analysis.

9313089.1940

Date Received: 1-25-93	**INFORMATION RELEASE REQUEST**	Reference: WHC-CM-3-4

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[] Speech or Presentation
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- [] Abstract
- [] Visual Aid

[] Speakers Bureau
[] Poster Session
[] Videotape

(Check only one suffix)

[] Reference
[X] Technical Report
[] Thesis or Dissertation
[] Manual
[] Brochure/Flier
[] Software/Database
[] Controlled Document
[] Other

ID Number (include revision, volume, etc.)
WHC-SD-LL-PLN-001 REV 2

List attachments.

Date Release Required
1-28-93

Title 2724-W Laundry Wastewater Sampling Analysis Plan

Unclassified Category UC-

Impact Level 3E Q

New or novel (patentable) subject matter? [X] No [] Yes
If "Yes", has disclosure been submitted by WHC or other company?
[] No [] Yes Disclosure No(s).

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[X] No [] Yes (Identify)

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Group or Society Sponsoring

Date(s) of Conference or Meeting

City/State

Will proceedings be published? [] Yes [] No
Will material be handed out? [] Yes [] No

Title of Journal

CHECKLIST FOR SIGNATORIES

Review Required per WHC-CM-3-4	Yes	No	Reviewer - Signature Indicates Approval: Name (printed)	Signature	Date
Classification/Unclassified Controlled Nuclear Information	[]	[x]	G. H. Lavey	G. H. Lavey	1-22-93
Patent - General Counsel	[x]	[]	S. W. Berglin	PER TEL S. W. Berglin	1-22-93
Legal - General Counsel	[x]	[]	S. W. Berglin	CON	
Applied Technology/Export Controlled Information or International Program	[]	[x]			
WHC Program/Project	[x]	[]	D. R. Speer	Dwayne R. Speer	1/21/93
Communications	[]	[x]			
RL Program/Project	[x]	[]	L. S. Mamiya	Lance S. Mamiya	1/28/93
Publication Services	[x]	[]	~~J. D. Hudspeth~~ MR KOCHICK	MR Kochick	1/22/93
Other Program/Project	[x]	[]	N. G. Thomas	Nelson G. Thomas	1/28/93

Information conforms to all applicable requirements. The above information is certified to be correct.

	Yes	No
References Available to Intended Audience	[x]	[]
Transmit to DOE-HQ/Office of Scientific and Technical Information	[]	[x]

Author/Requestor (Printed/Signature) Date
G. H. Lavey George H. Lavey

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

Responsible Manager (Printed/Signature) Date
S. E. Albin S. E. Albin 1/21/93

INFORMATION RELEASE ADMINISTRATION APPROVAL STAMP

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CW
Date 1-28-93

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Date Disapproved

9313083.1941

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 187378

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.		4. Date
Supplemental []	George H. lavey Laundry Ops T1-06 3-4260		01-14-93
Direct Revision [x]	5. Project Title/No./Work Order No.	6. Bldg./Sys./Fac. No.	7. Impact Level
Change ECN []	2724-W Laundry Wastewater Sampling & Analysis Plan	2724-W	3, E, Q
Temporary []			
Standby []			
Supersedure []			
Cancel/Void []	8. Document Numbers Changed by this ECN (includes sheet no. and rev.)	9. Related ECN No(s).	10. Related PO No.
	WHC-SD-LL-PLN-001 REV 1	N/A	N/A

11a. Modification Work	11b. Work Package No.	11c. Modification Work Complete	11d. Restored to Original Condition (Temp. or Standby ECN only)
[] Yes (fill out Blk. 11b) [X] No (NA Blks. 11b, 11c, 11d)	N/A	N/A Cog. Engineer Signature & Date	N/A Cog. Engineer Signature & Date

12. Description of Change

1. Added two sample points.
2. Changed sampling objectives.
3. Added information on routine sampling andanalysis.
4. Revisied Analyte table to conform with latest QAPP. (WHC-SD-WM-QAPP-011 Rev.3)

13a. Justification (mark one)							
		Criteria Change	[]	Design Improvement	]	Environmental	[X]
As-Found	[]	Facilitate Const.	[]	Const. Error/Omission	[]	Design Error/Omission	[]

13b. Justification Details

To address the comments from EPA.

14. Distribution (include name, MSIN, and no. of copies)

G.H. LAVEY T1-06
L.P. DIEDIKER T1-30
B.R. POWELL,JR. T3-29

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DATE FEB 09 1993
Sta #4

A-7900-013-2 (06/92) GEF095

A-7900-013-1 (11/88)

9313089.1942

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1): 187378

15. Design Verification Required	16. Cost Impact				17. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
[] Yes	Additional	[] $0	Additional	[] $0	Improvement	[] 0
[X] No	Savings	[] $0	Savings	[] $0	Delay	[] 0

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	[]	Seismic/Stress Analysis	[]	Tank Calibration Manual	[]
Functional Design Criteria	[]	Stress/Design Report	[]	Health Physics Procedure	[]
Operating Specification	[]	Interface Control Drawing	[]	Spares Multiple Unit Listing	[]
Criticality Specification	[]	Calibration Procedure	[]	Test Procedures/Specification	[]
Conceptual Design Report	[]	Installation Procedure	[]	Component Index	[]
Equipment Spec.	[]	Maintenance Procedure	[]	ASME Coded Item	[]
Const. Spec.	[]	Engineering Procedure	[]	Human Factor Consideration	[]
Procurement Spec.	[]	Operating Instruction	[]	Computer Software	[]
Vendor Information	[]	Operating Procedure	[]	Electric Circuit Schedule	[]
OM Manual	[]	Operational Safety Requirement	[]	ICRS Procedure	[]
FSAR/SAR	[]	IEFD Drawing	[]	Process Control Manual/Plan	[]
Safety Equipment List	[]	Cell Arrangement Drawing	[]	Process Flow Chart	[]
Radiation Work Permit	[]	Essential Material Specification	[]	Purchase Requisition	[]
Environmental Impact Statement	[]	Fac. Proc. Samp. Schedule	[]		[]
Environmental Report	[]	Inspection Plan	[]		[]
Environmental Permit	[]	Inventory Adjustment Request	[]	N/A	[]

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision
N/A		

20. Approvals

	Signature	Date		Signature	Date
OPERATIONS AND ENGINEERING			ARCHITECT-ENGINEER		
Cog Engineer	George H. Fancy	1-22-93	PE n/a		
Cog. Mgr.	S. F. Alb	1/22/93 S F Alb	QA n/a	S&A 1/22/93	S&A 1/22/93
QA	Bill Pulliam	22 Jan 93	Safety n/a		
OSM(HAGM)	Michelle Hendrix	1/22/93	Design n/a		
S&ML	D. Marvin Beyer	1/25/93	Environ. n/a		
Environ.	RJ Boom	1/22/93	Other n/a		
Projects/Programs	[illegible] for DRB	1/25/93	n/a		
TEDF W-049	[illegible]	1/26/93			
Facilities Operations n/a			DEPARTMENT OF ENERGY n/a		
Restoration & Remediation n/a			Signature or Letter No. n/a		
Operations & Support Services n/a					
IRM n/a			ADDITIONAL n/a		
Other					

9313089.1943

JKE 2/9/93

SUPPORTING DOCUMENT

1. Total Pages ~~22~~ 23

2. Title	3. Number	4. Rev No.
2724-W LAUNDRY WASTEWATER SAMPLING &ANALYSIS PLAN	WHC-SD-LL-PLN-001	2

5. Key Words

SAP, TPA, LAUNDRY, PEDF, SAMPLING, ANALYSIS

6. Author

Name: G. H. LAVEY

Signature: George H. Lavey

Organization/Charge Code 55330/MJ000

7. Abstract

This sampling and analysis plan (SAP) establishes the guidelines for providing confirmatory data to support nondangerous waste stream proposed designation. The plan establishes the level of monitoring required to confirm that the stream characteristics do not change until it is discontinued before 1995.

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9. Impact Level 3, E, Q

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9313089.1945

RECORD OF REVISION

(1) Document Number: WHC-SD-LL-PLN-001

Page 1

(2) Title: 2724-W LAUNDRY WASTEWATER SAMPLING & ANALYSIS PLAN

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release (5) Cog. Engr.	(6) Cog. Mgr.	Date
0	EDT - 155716 1/16/92			
# 1 RS	(7) COMPLETE REWRITE REPLACE ENTIRE DOC.	L. H. Lowry	D. E. Ale	12-9-92
	PER ECN-187377			
2 RS	INCORPORTE COMMENTS FROM EPA PER ECN			
	187378 replace entire doc.	L. H. Lowry	D. E. Ale	1/21/93

9313089.1946

A-7320-005 (08/91) (EF) WEF168

ACRONYMS

BAT	best available technology
GEA	gamma energy analysis
HEIS	Hanford Environmental Information System
HVAC	heating, ventilation, and air conditioning
HASM	Hanford Analytical Services Management
ICP	inductively coupled plasma
PCB	polychorinated biphenyls
QAPP	quality assurance program plan
SAP	sampling and analysis plan
TDS	total dissolved solids
TEDF	treated effluent disposal facility
TOC	total organic carbon
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
VOA	volatile organic analysis
WAC	*Washington Administrative Code*
WHC	Westinghouse Hanford Company

9513080.1947

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A.2 SAMPLING OBJECTIVES 5
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9313089.1949

2724-W LAUNDRY WASTEWATER SAMPLING AND ANALYSIS PLAN

A. SAMPLING OBJECTIVES

A.1 INTRODUCTION

This plan establishes the guidelines for the sampling and analysis of the 2724-W Laundry wastewater. The plan also identifies procedures and protocols that provide monitoring until the stream is discontinued before 1995. The information obtained will be used to provide evidence of regulatory compliance. All sampling and analysis will be performed in accordance with approved written procedures and all applicable state and federal regulations. The procedures will comply with the requirements of EPA SW-846, *Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods*, latest revision,(EPA). Analysis of the samples will be done according to SW-846 procedures unless otherwise specified.

Quality assurance objectives for the sampling activities are described in the *Liquid Effluent Sampling Quality Assurance Project Plan* (WHC 1992).

The *2724-W Laundry Wastewater Sampling and Analysis Plan* (SAP) will be edited as necessary to ensure its accuracy and completeness. All changes to this document shall be considered Class 3 changes to the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1989). This SAP is a supporting document and adheres to Westinghouse Hanford Company (WHC) *Standard Engineering Practices* (EP-1.12) (WHC-CM-6-1) for revision and accountability.

A.2 OBJECTIVES

The objectives of the SAP follow:

- Confirm the data reported in the stream-specific report (WHC,1990) and to ensure the stream does not contain dangerous waste as defined in Washington Administrative Code (WAC) 173-303, "Dangerous Waste Regulations"

- Provide additional, high-quality data to support the assessment of potential impacts to the groundwaters from discharge to the 216-W-LC crib.

- Provide high-quality controlled data for the evaluation of routine process sampling methods and existing data.

A.3 APPROACH

This SAP has been prepared to describe a program for obtaining high-quality sampling data that will identify the types and quantities of contaminants found in the laundry wastewater. The data will come from liquid effluent samples that have quality controlled and verifiable methods for

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collecting the wastewater sample, transportation of the sample to the analytical laboratory, analysis of the sample, statistical evaluation of the analytical results, and the storage of sample records.

Chemical analytes that are not detected in 1 year will be eliminated from the list of analytes in future liquid effluent samples. Chemical analytes found in both the wastewater and sanitary (potable) water at equivalent concentration levels will also be eliminated from the list of analytes. The amended analyte list shall be a Class 3 change to the SAP in accordance with the Tri-Party Agreement, as stated in the Quality Assurance Program Plan (QAPP). A Class 3 change does not impact interim milestones and requires approval of the assigned DOE and lead regulatory agency unit managers. A more complete definition of a Class 3 change can be found in Section 12.2 of the Tri-Party Agreement (Ecology et al. 1989).

An important pool of historical data is available from the routine monitoring program. This data will provide information on soil column and process equipment solids loading for future remedial studies, treatment systems design, and permitting documentation. The data from the routine monitoring program will also be used to evaluate the cause of seasonal, climatic, and operational variations in the quality of the wastewater. The SAP describes the existing routine monitoring program, which allows the accumulation of historical information and provides a baseline data pool for comparing the reliability and validity of past data.

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All personnel associated with collection of liquid effluent samples, processing of the samples, processing of the data, and control of records shall comply with applicable WHC procedures and regulatory requirements. WHC personnel shall sign documents verifying that they have read and understand the procedures. The signed documents shall become part of the training records.

The liquid effluent samples are grab samples because some constituents (e.g., volatile organics, ammonia) are unstable with time. Grab samples are used to minimize the hold time from sample collection to laboratory analyses to prevent significant loss of these unstable analytes.

B. SITE BACKGROUND

B.1 2724-W FACILITY DESCRIPTION

The original laundry building is a wood and concrete structure that was constructed in 1952 and later expanded. The current laundry complex is a series of buildings connected together: 2724-W, 2724-WA, 2724-WB, and MO-406. This complex covers approximately 2,325 m^2 (25,000 ft^2). The major areas of the laundry complex are the radioactive washing and drying area, nonradioactive washing and drying area, radioactive storage areas, nonradioactive storage areas, folding and monitoring areas, change rooms, and adjacent lunchrooms and administrative offices. An aerial view of the laundry facility is shown in Figure 1.

The liquid effluent from the 2724-W Laundry is discharged to the soil column via the 216-W-LC crib. The 216-W-LC crib was installed in 1981 along with its associated influent piping. The first wastewater was received September 1982. A diagram of the crib is shown in Figure 1.

B.2 PROCESS DESCRIPTION

All soiled protective work clothing used on the Hanford Site is sent to the laundry for cleaning. The laundry handles approximately 1.5M kg (3.3M lb) of clothing per year; approximately two-thirds of this amount is radioactively contaminated clothing. Radioactively contaminated clothing is defined as special protective clothing that has been worn in radiation areas and has the potential of being contaminated. The remaining one-third of the clothing is nonradioactive, which includes standard coveralls and bath towels.

All clothing is delivered to the laundry in large canvas bags holding an average of 22 kg (50 lb), with a range from 13 to 50 kg (30 to 110 lb). These bags are transported by hand either to the radioactive or to the nonradioactive storage area, as appropriate.

Radioactive bags are withdrawn from the storage area and hand-loaded into one of the three 272-kg-capacity (600-lb) washing machines. The canvas bags are arranged in the washer to allow the clothing inside to fall from the bags when agitated by the washing action. The complete cycle takes approximately 23 to 42 min, depending on the level of cleaning needed to remove the radiological contamination (i.e., low, medium, or high).

B.3 WASTESTREAM DESCRIPTION

The facility operates on day shift for 5 days a week with about 10 percent overtime (24 days each month) to meet customer needs. The washers use approximately 757 L (200 gal) of water for each wash or rinse cycle for a total of about 3,028 L/load (800 gal/load). The process data sheets report an average of 33 loads each day, which corresponds to the average monthly flow of 2,615 kL (691,000 gal), including approximately 757 kL/month (200,000 gal/month) of steam condensate.

Laundry wastewater is the combination of effluents from many simultaneous activities. (See Figure 2.) During laundry operation, the washing machines are at different points in their respective wash and rinse cycles. The waste stream contributors are washing machines, dryers (steam condensate), heating, ventilation, and air conditioning systems (HVAC), a hydrostatic precipitator, hot-water-tank heating coils, the nonradioactive trench, the radioactive trench, and the hand-washing sink.

All of the facility wastewater is collected in a 2,195 L (580-gal) building sump before being pumped to the vibratory filter. Currently, the

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Figure 1. 2724-W Aerial View of the Laundry Facility.

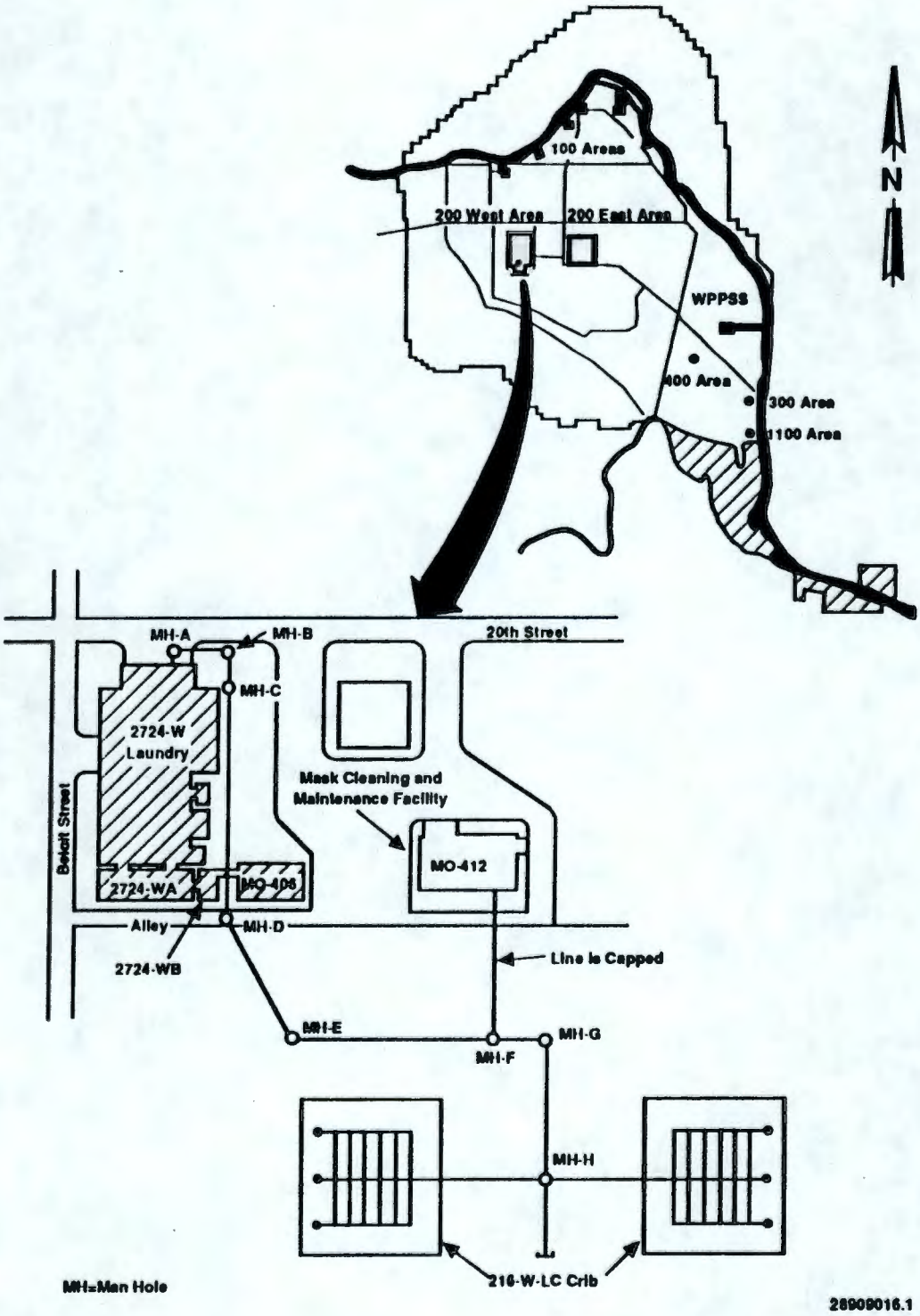

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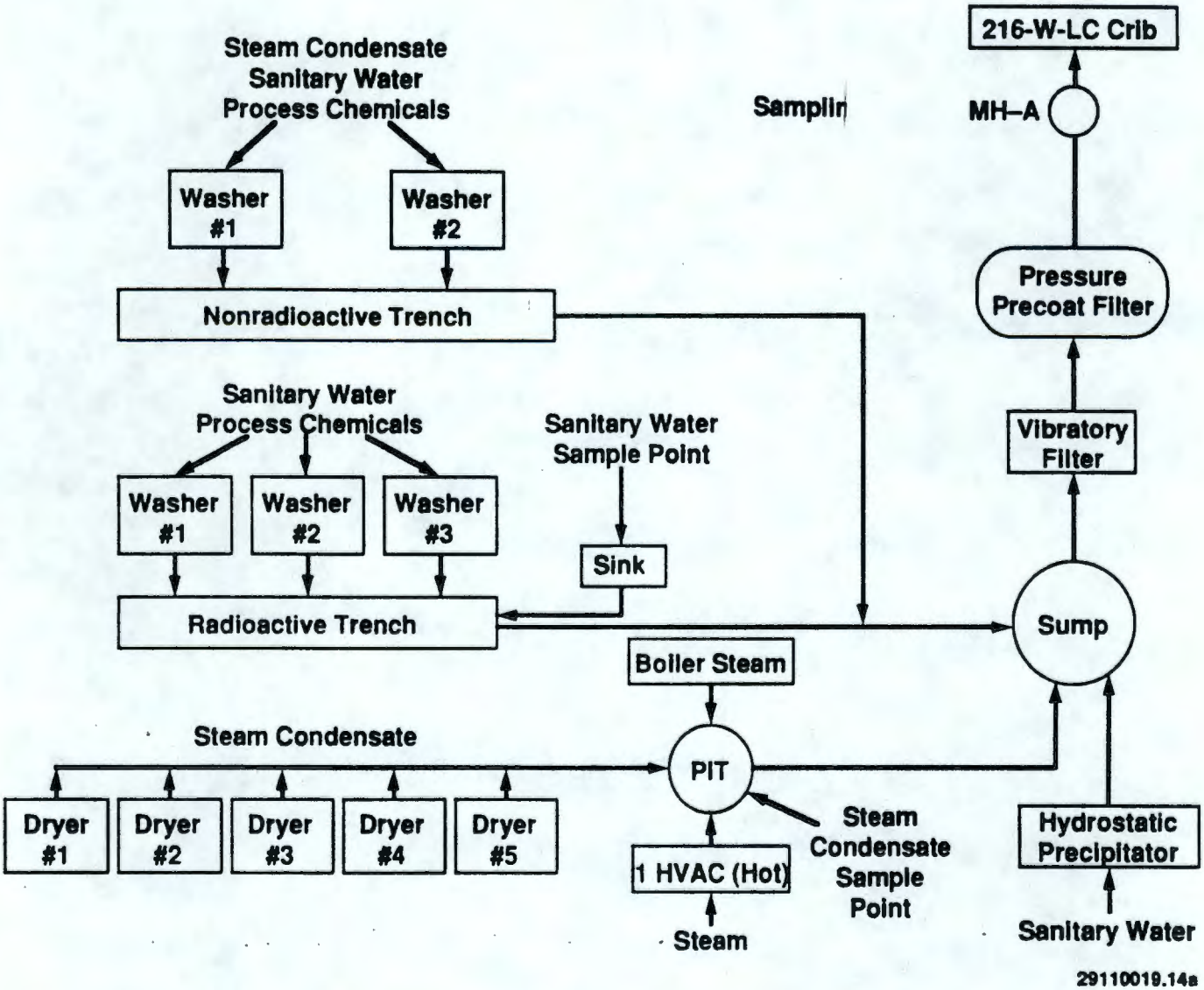
Figure 2. 2724-W Wastewater Contributors.



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effluent leaves the facility through the vibrating filter and gravity flows through eight manholes to the 216-W-LC crib. An upgrade project to add a pressure precoat filter will be discussed later.

The hydrostatic precipitator generates approximately 7.57 kL/day (2,000 gal/day) water by scavenging lint from the air exhaust from the three radioactive clothes dryers. The steam condensate lines come into the sump from a concrete pit near the precipitator. This pit receives steam condensate from the five dryers, the boiler (hot water tank for the washing machines), and the hot side of the HVAC.

The three radioactive washers and two nonradioactive washers are discharged into separate trenches that drain to the sump. The trenches are made of concrete and are part of the floor. The trenches have the following dimensions: radioactive trench--.6 m wide, .3 m deep, and 23 m long (24 in. wide, 12 in. deep, and 75 ft long); and nonradioactive trench--.7 m wide, .3 m deep, and 15 m long (28 in. wide, 12 in. deep, and 50 ft long). The volumes of water used in the different types of washes range from .757 to 5.3 kL (200 gal to 1,400 gal) per load, depending on the wash type. The hand-washing sink discharges into the end of the radioactive trench.

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The individual contributor wastewater volumes cannot be measured because these streams do not have flow meters The total effluent volume is measured by a flow meter in MH-A. The flow to the crib ranges from 1,968 kL/month (520,000 gal/month) to 3,600 kL/month (951,000 gal/month), with an average of 2,615 kL/month (691,000 gal/month).

The essential chemicals used in the radioactive laundry are 2.25 to 5.5 kg (5 to 10 lb) of Turco[1] Aviation (sodium metasilicate pentahydrante 50%, disodium phosphate 30%, sodium tripolyphosphate 20%) and 0 to 2.25 kg (0 to 5 lb) of Turco Decontamination (ammonium bicarbonate 50%, sodium hexametaphosphate 45%) per wash load. The wash cycles range from zero to one prewash cycle, one to two wash cycles, and one to six rinse cycles. The total volume of wastewater generated in a cycle is from .757 to 5.3 kL (200 to 1,400 gal). On the average, the laundry processes 16 radioactive wash loads per day, with 8 to 10 laundry bags per load.

The nonradioactive laundry uses 0 to 1.4 kg (0 to 3 lb) of Olde Worlde[2] (ethylene glycol monobutyl ether - 5%) detergent or 1.4 to 2.25 kg (3 to 5 lb) of Turco Aviation per wash load of regular laundry. The bath towels receive 0 to 1.4 kg (0 to 3 lb) of Olde Worlde detergent or 1.4 to 2.25 kg (3 to 5 lb) of Turco Aviation, and 0 to 1.4 kg (0 to 3 lb) of Silver-Wyte[3] bleach (hypochlorous acid, lithium salt 45%) per load. The washing machines have one wash and two or three rinse cycles. The total volume of water generated on each cycle ranges from 2.27 to 3.4 kL (600 to 900 gal). On the average, the laundry processes 12 nonradioactive wash loads per day, with 4 to 13 laundry bags per load.

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[1]Turco is a trademark of TP Industrial, Inc.

[2]Olde Worlde is a trademark of Olde Worlde Products.

[3]Silver-Wyte is a trademark of Fabrilife Chemical Company.

Historical data (WHC,1990) and process knowledge indicate that there are no hazardous wastes present in the effluent stream.

B.4 STREAM HISTORY

The stream history was reviewed to evaluate the sample frequency. The laundry wastewater is the combination of effluents from many simultaneous activities that blend for an overall consistent water quality. As expected with a large number of small customers, the limited daily wash volume from each customer is insufficient to produce a noticeable change in the overall process.

A foundation of the historic daily samples taken from the sump and composited monthly for pH, total organic carbon (TOC), and radionuclides supports this observation. Although these manual grab samples were taken upstream of the lint filters, the sample results were similar to more recent studies discussed below.

The laundry wastewater analyses have been accomplished to support best available technology (BAT) documents and a stream-specific report:

- In 1989, a BAT (WHC 1991) was performed to support a new laundry facility design
- In 1990, a Stream-Specific Report (WHC 1990) was generated to identify a wastewater designation
- In 1991, a BAT revision was required to update the wastewater characterization information and to address new discharge requirements using treatability studies.

To support the new laundry facility, recent treatability studies were performed on typical and worst-case wastewater scenarios. The objective was to characterize the stream better and to identify various treatment technology performance data over the range of effluent qualities. The treatment goal was to meet the acceptance criteria for the Treated Effluent Discharge Facility (TEDF) W-049H.

The treatability test results were validated and were consistent with the historic radionuclide data. Specifically, the controlled typical and worst-case wash water compared favorably with historic data. In addition, these tests results compared as expected with previous wastewater stream-specific characterization analyses.

The recent studies of the filtration performance show that particulate filtration removes radioactive contamination. However, significant removal of these particles requires filtration to less than one-half micron. Ion exchange did improve the removal efficiency. To make the treatment cost effective, a BAT document has been drafted and is in the review and approval cycle.

Consequently, point-source sampling at the various machines provides information about discharges from a particular machine but does not characterize the composition of routine laundry wastewater adequately. For

this reason, samples will be taken at MH-A, which provides a representative sample of laundry wastewater.

B.5 STREAM FUTURE

This stream will be eliminated before 1995 when the laundry is shipped offsite to a private vendor for processing. To prevent lint from plugging the 216-W-LC laundry crib, the Project B-697, Laundry Effluent Treatment, system was designed and constructed. Justification for this system was based on the need to help extend the life of the 216-W-LC crib.

The system will provide back-up particulate filtration (vibratory filter), oil and grease removal (pressure precoat filter), sampler, and flow meter with strip chart installed in MH-A. A 22.7-Kl (6,000-gal) equalization tank will be used downstream of the sump to offset sump pump cycling because the pressure precoat filter requires constant effluent flow.

Because of the pressure precoat filter, there should be fewer organic chemicals and suspended solids over 20 microns. However, significant radionuclide filtration is not expected due to contamination particle sizes of less than 1 micron, which were discovered in the treatability tests. Although the filter discharge will be immediately upstream of the sample point, it is not the SAP's objective to demonstrate the effectiveness of the filter.

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B.6 216-W-LC CRIB DESCRIPTION

The 216-W-LC crib is not regulated under WAC 173-303. The crib was constructed in 1981 in two separate sections with butterfly valves to allow diversion from one section to the other. These valves were removed later and replaced with an effluent line access hole. The bottom of each section consists of six trenches. Each trench is 46 m long, 2.4 m wide, and 1.2 m deep (150 ft long, 8 ft wide, and 4 ft deep) and has a side slope of 1.5:1. The waste is discharged to the crib through a 4-in. (10.2-cm) perforated pipe located in the center of each trench. The trench is backfilled with 1.27 to 2.54 cm (.5- to 1-in.) gravel and covered with a polyethylene barrier. The bottom of the crib is about 6 m (20 ft) below grade.

Before the crib was used, the liquid effluent from the 2724-W Laundry was discharged to the soil column via U-Pond via the U-14 Ditch. Since September 1982, the wastewater has been discharged to the soil via the 216-W-LC crib.

After six months of operation, the crib began having problems with water backing into the supply piping. The distribution laterals in the crib were found to be 40 to 50 percent plugged with a gelatinous sludge that blocked piping perforations, preventing distribution of the wastewater to the gravel within the crib. To reduce the organic loading, the nearby fabrication shop that drained into the waste stream at MH-B was blocked with a cement plug in 1983. Sludge was cleaned from the crib piping, and the crib has operated with a routine manual clean-out. To reduce oil and grease loadings further, the laundry quit washing shop rags and mops. Completion of Project B-697, Laundry Effluent Treatment, will provide further crib protection.

C. RESPONSIBILITIES

The 2724-W Facility Manager is responsible for the sampling and analysis of the wastewater generated by the facility. In this regard, the facility manager (or designee) is responsible for the following:

- Preparation of this SAP
- The completion and accuracy of this SAP
- Proper execution of the SAP
- Designating the 2724-W wastewater with the proper waste designation
- Overseeing the sampling activities. Specific tasks include ensuring the correct sample point is used, assisting and cooperating with the sampling team to ensure facility safety guidelines are met, ensuring appropriate equipment and skilled personnel are available for sampling, and ensuring all field work is done according to established procedures
- Maintaining data files containing this SAP, copy of sampling logs, wastewater flow records, analytical results, and resulting reports
- Requesting system audits
- Provide a health physics technician for radiation surveying of liquid effluent characterization sample packages
- Provide the radiation work permit instructions for radiation zone entry
- Verify radiation worker training requirements of sampling personnel
- Developing, initiating, and tracking corrective actions (if needed).

The Hanford Analytical Services Management (HASM) organization is responsible for the following:

- Identifying the contract laboratory(ies) to perform analysis for this SAP
- Monitoring the contract laboratory for quality performance
- Receiving and monitoring laboratory data packages to ensure they are complete
- Verification and validation of laboratory data packages
- Interfacing between the facility manager and the contract laboratory(ies).

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The Sampling and Mobile Laboratories organization is responsible for the following:

- Ensuring samples are representative
- Taking adequate blanks and other quality control indicators in accordance with WHC-SD-WM-QAPP (latest revision)
- Maintaining accurate and complete sampling logs
- Initiating a proper chain of custody for each sample
- Ensuring samples are packaged and shipped properly
- Provide trained samplers for liquid effluent sampling activities. At least one sampler shall have a WHC Certificate of Qualification from Sampling and Mobile Laboratories Group. A certificated sampler shall direct liquid effluent sampling, packaging, and shipping
- Prepare the laundry liquid effluent sampling procedure
- Transport liquid effluent samples to laboratory or shipping center
- Ensure copies of field logs and other sampling data sheets are filed with plant cognizant engineer and regulatory compliance.
- Maintaining site-specific sampling schedules

The Laundry Facility QA is responsible for the following:

- Provide surveillance of the liquid effluent characterization sampling program
- Audit records and procedures.

The Effluent Treatment Programs office is responsible for the following:

- Providing overall coordination between WHC organizations carrying out this SAP
- Providing adequate funding to fulfill the requirements of this SAP
- Reporting the analytical data gathered as a result of this SAP
- Reviewing field logs and sample techniques, adequacy, and compliance

D. SAMPLE LOCATION AND FREQUENCY

Two types of samples are collected for the 2724-W effluent:

- Full protocol samples, hereafter referred to merely as samples that are collected to gather detailed information about known and potential contaminants in the wastestream

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- Routine samples collected on a more frequent basis to monitor the stream consistency and to satisfy reporting requirements beyond those included in this SAP. The routine sampling is included herein for completeness.

D.1 SAMPLE LOCATION

The samples will be taken from MH-A, which is the closest point to the discharge that contains all effluent from the building and represents the total stream. This sampling point is also the location of the flow meter that records the amount of discharge to the crib. The sanitary water will be sampled at the sink next to the regulated washers (sample point). The steam condensate will be sampled at the condensate drain (sample point). See Figure 2 for locations.

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D.2 SAMPLE FREQUENCY

Semiannual samples shall be taken because operational history, including the results from past routine sampling, do not indicate significant fluctuations. Samples will begin to be taken within three months after document approval is received.

D.3 ROUTINE SAMPLES

Currently, composited samples are taken from the effluent pipe between the filter system and the flow meter with an automatic sampler, which draws a 100ml sample for every 1000 gal. that is discharged. A portion of this sample is sent to the laboratory on a weekly basis for analyses.

E. SAMPLE IDENTIFICATION

E.1 LIQUID EFFLUENT SAMPLE LABELING

Sample labels for liquid effluent samples shall be furnished by the sampling team from the Sampling and Mobile Laboratories. The labels will require the following information to be recorded by a member from the sampling team: identification of the person in charge of collecting the sample; unique sample identification number, date and time the sample was collected, the place the sample was collected, the stream identification, preservative added, and the analysis to be performed on the sample. The unique sample number shall be obtained from the Hanford Environmental Information System (HEIS). In addition, each bottle shall be identified with a bar code sticker attached to the bottle by the bottle manufacturer. The bar code shall identify the bottle lot number and individual bottle number.

E.2 ROUTINE SAMPLE LABELING

The liquid effluent sample tags and ID numbers for the routine sample are obtained from 222-S laboratory and put on each sample.

F. SAMPLING EQUIPMENT AND PROCEDURES

F.1 EQUIPMENT

No contaminant monitoring equipment has been used for this waste stream. Preventative maintenance or calibration procedures for the protocol sampling equipment are not necessary. Samples will be obtained by use of a weighted bottle, dipper, or bailer apparatus as described in the laundry's liquid effluent sampling procedure.

F.2 PROCEDURES

The laundry liquid effluent sampling procedure will identify laundry-specific sampling requirements, which include the following:

- Sample location
- A description of sampling equipment, containers, and reagents
- Safety precautions, including personnel protective equipment
- Specific steps for collecting the sample.

General Hanford Site sample handling and data management requirements will be in procedures as identified in Section 5.1 of the QAPP. Field logs will be completed in accordance with the *Environmental Investigations and Site Characterization Manual*, WHC-CM-7-7, procedure EII 1.5, "Field Logbooks," during the sampling event. The logbook shall contain information pertinent to the sampling. A cognizant QA person will perform random sampling surveillance. All applicable health and safety precautions shall be taken in accordance with the *Industrial Safety Manual* (WHC-CM-4-3).

F.3 ROUTINE SAMPLES

Routine samples are collected by an automatic sampler in conjunction with approved tank farm procedures. Two full 1-liter polyethylene sample bottles (only new bottles from 272-WA store room are used) are sent to 222-S laboratory for analyses. No preservatives are used in the sample bottles.

G. SAMPLE HANDLING AND ANALYSIS

G.1 ANALYSIS

Table 1 presents the chemical analytical protocols and methods for characterizing the laundry's stream completely. Field test for Ph, Conductivity and Temperature will be conducted for each sample and recorded in the log book.

G.2 SAMPLE HANDLING

The samples shall be collected in new, commercially available, certified, precleaned glass or polyethylene bottles. The certification of the precleaned

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condition shall accompany the bottle. The analytical laboratory shall prescribe the sample volumes and number of containers, which are subject to change. All required preservatives shall be vendor supplied and added to the containers by Sampling and Mobile Labs.

Each sample or sample preparation shall be labeled with the HEIS or equivalent assigned sample number. Labels shall be affixed to sample containers and filled out at the time of sampling. The label information shall include the sample identification number and ownership (i.e., WHC).

A chain-of-custody form shall be completed at the time of sample collection. Section J of this plan contains further details on the custody procedures.

Once the sample is drawn, the cap shall be sealed to the container with a tamper-evident seal.

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Table 1. Analytes from Tables 8-1 and A-17 of WHC-SD-WM-QAPP-011 REV 3.

Analyte	Method
ICP Spectroscopy	6010
Hg	7470
VOA	8240
Semi-VOA	8270
PCB/Pesticides	8080
Anions (IC) (F, Cl, NO_2, NO_3, PO_4, SO_4)	300.0
TOC	415.1/9060
Phosphorus (total)	365.2/365.3
Nitrogen,Ammonia	350.1/350.2/350.3
Alkalinity	310.1/310.2
TDS	160.1
Pesticides	8140
Herbicides	8150
Gross alpha	(a)
Gross beta	(a)
Strontium 89/90	(a)
Gamma scan determination	(a)
Total Uranium	(a)
Plutonium-238, 239, 240, 242	(a)
Cesium-137	(a)
Cobalt-60	(a)
Americium-241	(a)
Radium-228	(a)
Lead-210	(a)

a) Radionuclides will be analyzed by methods that meet or exceed EPA or Nuclear Regulatory Commission guidelines. Methods and requirements shall be defined by the laboratory prior to analysis.

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The sample containers shall be cleaned and radiologically surveyed. The released sample containers then shall be packaged in accordance with the *Hazardous Material Packaging and Shipping Manual*, WHC-CM-2-14, and the *Radiation Protection Manual*, WHC-CM-4-11. The samples will be refrigerated or cooled with ice until ready to ship, when they will be placed in a cooler containing ice. The cooler shall become part of the sample packaging. A logbook containing information pertinent to the sampling shall be maintained.

Sampling personnel will keep field logbook notes that identify date, time, weather conditions, and any other relevant information from each sampling event. The minimum requirements for field notes are stated in Section 6.1 of the *Liquid Effluent Sampling Quality Assurance Program Plan* (WHC 1992).

The samples shall be routed to an approved WHC participant contractor or subcontractor laboratory for analysis consistent with the QAPP requirements.

G.3 ROUTINE SAMPLES

After routine samples are collected, they are officially transferred to a B Plant driver for delivery to 222-S Laboratory for analysis. The following analyses are done on the samples:

- gross alpha
- gross beta
- $Sr^{89/90}$
- $Pu^{239/240}$
- Am^{241}
- gross uranium
- Ph
- TOC
- gamma energy analysis (GEA) (typical minimum GEA analyses will be Cs^{137}, Ru^{103}, and $RuRh^{106}$

In addition any other gamma emitters that show a positive result are analyzed. The results are sent to Environmental Protection for DOE reporting.

H. STATISTICS

Quality Control sample results will be compared with the laboratory- or method-specific acceptance criteria for accuracy and precision. The HASM will validate laboratory data. Any data not meeting required QC specifications will be flagged as estimated. If necessary, corrective action will consist of repeating the sampling and analysis activity and documenting it with a nonconformance report in accordance with WHC-CM-4-2, procedure QI 15.1.

Specific data quality objectives and data assessment procedures are stated in the *Liquid Effluent Sampling Quality Assurance Project Plan* (WHC 1992).

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I. DATA VALIDATION AND QUALITY CONTROL

The analytical results received will be subjected to data reduction, validation and reporting in accordance with section 9.0 of the *Liquid Effluent Sampling Quality Assurance Program Plan* (WHC 1992). Internal quality control requirements are specified in section 10.0 of that same plan.

J. CHAIN-OF-CUSTODY PROCEDURES

When an analyses requires that a preservative be added to the sample bottle, the preservative is added in a clean laboratory environment prior to traveling to the sampling site.

At that time a bottle chain-of-custody is completed and follows that bottle into the field. The sample bottle is stored in a cooler sealed with tamper evident tape and all custody transfers are noted on the bottle chain-of -custody form.

When the bottle is used to collect a sample, a sample chain-of-custody form shall be initiated and will accompany each sample. A sample may consist of several containers, and the chain-of-custody form will account for each container. Once the sample has been drawn, it must be in the physical control or view of the custodian, locked in an area where it cannot be tampered with, or prepared for shipping with a tamper-proof seal. Physical control includes being in the sight of the custodian, a room that will signal an alarm when entered, or locked in a cabinet. Even when more than one person is involved in sampling, only one person shall be designated as sampler and only that person signs as sample collector. This person is the custodian until the samples are transferred to another location or group and shall sign when releasing the samples to the designated receiver. A private, bonded carrier shall be used to transport the samples and chain-of-custody document.

The approved laboratory shall designate a sample custodian and a designated alternate responsible for receiving all samples. The sample custodian or alternate shall sign and date all appropriate receiving documents at the time of receipt and, at the same time, initiate an internal chain-of-custody form using documented procedures.

The sampling team will forward copies of the chain-of-custody form to HASM. The laboratory will return copies of the chain-of-custody form to HASM after the samples are received.

K. DOCUMENTATION CONTROL

Validated data will be sent to the Environmental Data Management Center, and state and federal regulators will be notified that the data are available. The data will be part of the administrative record for the Tri-Party Agreement milestones.

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All sampling and analytical data and field notes will be maintained as quality records. The sampling team will forward copies of the sample analysis request form, chain-of-custody form, and activity screening results to OSM. The original shipping papers will accompany the sample. The laboratory will return copies of the sample analysis request form and chain-of-custody form to OSM after it receives the samples. The laboratory will keep the original shipping papers, and OSM will maintain the copies.

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