DOE/RL-97-03

UC-630

Hanford Facility Dangerous Waste Permit Application, Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility

Date Published
July 1997

United States
Department of Energy
P.O. Box 550
Richland, Washington 99352

Date Received by IRA
8-14-97 cw

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(Print and Sign) Date

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Chris Willingham

8/14/97

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Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

JUL 25 1997

97-EAP-576

Mr. Moses N. Jaraysi
Program Manager
Nuclear Waste Program
State of Washington
Department of Ecology
1315 West Fourth Avenue
Kennewick, Washington 99336-6018

Dear Mr. Jaraysi:

CERTIFICATION OF THE HANFORD FACILITY DANGEROUS WASTE PART B PERMIT APPLICATION DOCUMENTATION, 242-A EVAPORATOR AND LIQUID EFFLUENT RETENTION FACILITY/200 AREA EFFLUENT TREATMENT FACILITY (WA7890008967) (TSD: T-2-6 AND S-2-8/T-2-8, RESPECTIVELY)

Enclosed is the Hanford Facility Dangerous Waste Permit Application documentation (Part B, Revision 1) for the 242-A Evaporator (Enclosure 1), and (Part B, Revision 0) for the Liquid Effluent Retention Facility/200 Area Effluent Treatment Facility (LERF/ETF) (Enclosure 2). The 242-A Evaporator and LERF/ETF Part Bs have been prepared for incorporation into the Hanford Facility Resource Conservation and Recovery Act Permit during Modification C.

If you have any questions, please contact Tony McKarns, U.S. Department of Energy, Richland Operations Office, on 376-9333.

Sincerely,

James E Rasmussen

James E. Rasmussen, Director
Environmental Assurance, Permits,
and Policy Division
DOE Richland Operations Office

EAP:ACM

S. M. Price for

William D. Adair, Director
Environmental Protection
Responsible Party for
Fluor Daniel Hanford, Inc.

Enclosures: 2

cc w/encls:
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D. Powaukee, NPT
J. Wilkinson, CTUIR

cc w/o encls:
W. Adair, FDH
J. Coenenberg, WMH

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HANFORD FACILITY DANGEROUS WASTE PERMIT APPLICATION, LIQUID EFFLUENT RETENTION FACILITY AND 200 AREA EFFLUENT TREATMENT FACILITY

FOREWORD

The *Hanford Facility Dangerous Waste Permit Application* is considered to be a single application organized into a General Information Portion (document number DOE/RL-91-28) and a Unit-Specific Portion. The scope of the Unit-Specific Portion is limited to Part B permit application documentation submitted for individual, 'operating' treatment, storage, and/or disposal units, such as the Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility (this document, DOE/RL-97-03).

Both the General Information and Unit-Specific portions of the *Hanford Facility Dangerous Waste Permit Application* address the content of the Part B permit application guidance prepared by the Washington State Department of Ecology (Ecology 1987 and 1996) and the U.S. Environmental Protection Agency (40 Code of Federal Regulations 270), with additional information needs defined by the *Hazardous and Solid Waste Amendments* and revisions of Washington Administrative Code 173-303. For ease of reference, the Washington State Department of Ecology alpha-numeric section identifiers from the permit application guidance documentation (Ecology 1996) follow, in brackets, the chapter headings and subheadings. A checklist indicating where information is contained in the Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility permit application documentation, in relation to the Washington State Department of Ecology guidance, is located in the Contents Section.

Documentation contained in the General Information Portion is broader in nature and could be used by multiple treatment, storage, and/or disposal units (e.g., the glossary provided in the General Information Portion). Wherever appropriate, the Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility permit application documentation makes cross-reference to the General Information Portion, rather than duplicating text.

Information provided in this Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility permit application documentation is current as of June 1, 1997.

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DOCUMENT CONTENTS

APPENDICES

APPENDICES (cont)

METRIC CONVERSION CHART

Into metric units			Out of metric units		
If you know	Multiply by	To get	If you know	Multiply by	To get
Length			**Length**		
inches	25.40	millimeters	millimeters	0.0393	inches
inches	2.54	centimeters	centimeters	0.393	inches
feet	0.3048	meters	meters	3.2808	feet
yards	0.914	meters	meters	1.09	yards
miles	1.609	kilometers	kilometers	0.62	miles
Area			**Area**		
square inches	6.4516	square centimeters	square centimeters	0.155	square inches
square feet	0.092	square meters	square meters	10.7639	square feet
square yards	0.836	square meters	square meters	1.20	square yards
square miles	2.59	square kilometers	square kilometers	0.39	square miles
acres	0.404	hectares	hectares	2.471	acres
Mass (weight)			**Mass (weight)**		
ounces	28.35	grams	grams	0.0352	ounces
pounds	0.453	kilograms	kilograms	2.2046	pounds
short ton	0.907	metric ton	metric ton	1.10	short ton
Volume			**Volume**		
fluid ounces	29.57	milliliters	milliliters	0.03	fluid ounces
quarts	0.95	liters	liters	1.057	quarts
gallons	3.79	liters	liters	0.26	gallons
cubic feet	0.03	cubic meters	cubic meters	35.3147	cubic feet
cubic yards	0.76456	cubic meters	cubic meters	1.308	cubic yards
Temperature			**Temperature**		
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius	Celsius	multiply by 9/5ths, then add 32	Fahrenheit
Force			**Force**		
pounds per square inch	6.895	kilopascals	kilopascals	1.4504 x 10^{-4}	pounds per square inch

Source: *Engineering Unit Conversions*, M. R. Lindeburg, PE., Second Ed., 1990, Professional Publications, Inc., Belmont, California.

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Facility name Liquid Effluent Retention Facility/
200 Area Effluent Treatment Facility
(DOE/RL-97-03, Rev. 0)

Date Application Received ______________________

State of Washington
Part B Permit Application Review Checklist for Treatment and Storage in Tanks and Containers

		Technically Adequate?	Location in Application
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B-1(a)	Facility Description		2.1.1, 2.1.2
B-1(b)	Construction Schedule		2.1.4
B-2	Topographic Map		2.2
B-2a	General Requirements		2.2
B-2b	Additional Requirements for Land Disposal Facilities	Not Applicable	Not Applicable
B-3	Seismic Consideration		Not Applicable
B-4	Traffic Information		2.3
C.	Waste Analysis		Chapter 3.0
C-1	Chemical, Biological and Physical Analyses		3.1
C-1a C-1b C-1c	Waste In Piles Landfilled Wastes Wastes Incinerated and Wastes Used in Performance Tests	Not Applicable	Not Applicable
C-2	Waste Analysis Plan		Appendix 3A
C-2a	Detailed Chemical, Physical, and/or Biological Analysis		Appendix 3A

	Technically Adequate?	Location in Application
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C-2a(2) Analytical Methods		Appendix 3A
C-2a(3) Generator-Supplied Analyses		Appendix 3A
C-2b Additional Requirements for Wastes Generated Off-site		Appendix 3A
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C-2b(2) Analytical Methods to Confirm Identity of Off-site Waste		Appendix 3A
C-2b(3) Representative Sampling of Incoming Off-site Wastes		Appendix 3A
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C-2d Frequency of Analyses		Appendix 3A
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C-3b Response to Significant Discrepancies		Appendix 3A
C-3c Provisions for Non-acceptance of Shipment		Appendix 3A
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C-3c(2) Activation of Contingency Plan for Damaged Shipment		Appendix 3A
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D-1 Containers		4.3
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	Technically Adequate?	Location in Application
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D-1d(1)(d) Control of Run-on		4.3.4.1.3
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D-1f Prevention of Reaction of Ignitable, Reactive, and Incompatible Wastes in Containers		4.3.4.3
D-1f(1) Management of Certain Reactive Wastes in Containers		4.3.4.3
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D-1f(3) Design of Areas to Manage Incompatible Wastes		4.3.4.3
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	Technically Adequate?	Location in Application
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D-2a(3) Additional Requirements for Existing Tanks		4.4.3
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D-2a(5) Additional Requirements for New On-ground or Underground Tanks		Not Applicable
D-2b Secondary Containment and Release Detection for Tank Systems		4.4.4
D-2b(1) Requirements for All Tank Systems		4.4.4.1
D-2b(2) Additional Requirements for Specific Types of Systems		4.4.4.2
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D-4 Surface Impoundments [173-303-806-(4)(d)]		4.5
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		Technically Adequate?	Location in Application
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D-8a(1)(b)	Process Vents Not Subject to Subpart AA Standards		Not Applicable

		Technically Adequate?	Location in Application
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D-8b(1)(a)	Equipment Subject to Subpart BB		Not Applicable
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D-8b(2)(b)	Demonstrating Compliance with D-8b(1)(a) and (2)(a) Procedures		Not Applicable
D-8b(2)(c)	Closed Vent Systems or Control Devices: Showing Compliance with Emission Reduction Standards		Not Applicable
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		Technically Adequate?	Location in Application
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E-1	Solid Waste Management Units and Known and Suspected Releases of Dangerous Wastes or Constituents		Not Applicable
E-1a	Solid Waste Management Units		Not Applicable
E-1b	Releases		Not Applicable
E-2	Corrective Actions Implemented		Not Applicable
F.	Procedures to Prevent Hazards		Chapter 6.0
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	Technically Adequate?	Location in Application
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F-2d(4)(a) Process Vents		Not Applicable
F-2d(4)(b) Equipment Leaks		Not Applicable
F-2d(4)(c) Tanks and Containers		Not Applicable
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		Technically Adequate?	Location in Application
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G-4b	Identification of Dangerous Materials		Appendix 7A
G-4c	Hazard Assessment and Report		Appendix 7A
G-4d	Prevention of Recurrence or Spread of Fires, Explosions, or Releases		Appendix 7A
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G-5	Emergency Equipment		Appendix 7A
G-6	Coordination Agreements		Appendix 7A
G-7	Evacuation Plan		Appendix 7A
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G-8a	Requirements for Tank Systems		Appendix 7A
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		Technically Adequate?	Location in Application
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I-1b(2)	Removing Dangerous Wastes		11.3.3
I-1b(3)	Decontaminating Structures, Equipment, and Soil		11.3.4
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I-1b(5)	Other Activities		Not Applicable
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I-1f	Schedule for Closure		11.6, General Information Portion (DOE/RL-91-28)
I-1g	Extension for Closure Time		General Information Portion (DOE/RL-91-28)
I-1h	Closure Cost Estimate		General Information Portion (DOE/RL-91-28)

		Technically Adequate?	Location in Application
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I-2	Notice in Deed of Already Closed Disposal Units		Not Applicable
I-3	Post-Closure Plan		Not Applicable
I-4	Liability Requirements		Not Applicable
I-4a	Coverage for Sudden Accidental Occurrences		Not Applicable
I-4b	Coverage for Nonsudden Accidental Occurrences		Not Applicable
I-4c	Request for Variance		Not Applicable
J.	Other Federal and State Laws		Chapter 13.0
K.	Part B Certification		Chapter 14.0

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CONTENTS

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1.0 PART A [A]

The following is a chronology of the regulatory history of the Liquid Effluent Retention Facility (LERF) and 200 Area Effluent Treatment Facility (ETF).

LERF:

- On February 26, 1990, the original Hanford Facility Dangerous Waste Part A Permit Application (Part A), Form 3, Revision 0, was submitted to the Washington State Department of Ecology (Ecology).
- On June 26, 1991, the Part A, Form 3, Revision 1, added nonspecific source Dangerous Waste Number F005 to corresponded with the dangerous waste numbers from the Double-Shell Tank (DST) System and 242-A Evaporator.
- On May 17, 1993, the Part A, Form 3, Revision 2, added nonspecific source Dangerous Waste Numbers F001, F002, and F004 to corresponded with the dangerous waste numbers from the DST System and 242-A Evaporator.
- On November 4, 1994, the Part A, Form 3, Revision 3, added nonspecific source Dangerous Waste Number F003 to corresponded with the dangerous waste numbers from the DST System and 242-A Evaporator.
- On February 9, 1996, the Part A, Form 3, Revision 4, added treatment capability (for treatment of dilute aqueous waste streams from other Hanford Facility generators) pursuant to treatment surface impoundment exemption located in Title 40 Code of Federal Regulations Part 268.4
- On October 1, 1996, the Part A, Form 3, Revision 5, supported the transition of this treatment, storage,and/or disposal (TSD) unit to the new Project Hanford Management Contractor.

ETF:

- On June 26, 1991, the original Hanford Facility Dangerous Waste Part A, Form 3, Revision 0, was submitted to Ecology.
- On August 25, 1993, the Part A, Form 3, Revision 1, added three 2,536,000-liter verification tanks for greater-than-90 day storage and a greater-than-90 day container storage area. Also added six new dangerous waste numbers to reflect the waste that could be stored in the verification tanks and 32 new dangerous waste numbers that could be stored in the container storage area.
- On October 1, 1996, the Part A, Form 3, Revision 2, was revised to support the transition of this TSD unit to the new Project Hanford Management Contractor. Also added Dangerous Waste Number F039

(multi-source leachate). Dangerous Waste Number F039 was added to support Low-Level Burial Grounds efforts to treat, store, and/or disposal of multi-source leachate from the mixed waste trenches and from other potential sources of leachate.

Please print or type in the unshaded areas only
(fill-in areas are spaced for elite type, i.e., 12 character/inch).

FORM

DANGEROUS WASTE PERMIT APPLICATION

1. EPA/STATE I.D. NUMBER

W	A	7	8	9	0	0	0	8	9	6	7

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED *(mo., day, & yr.)*	COMMENTS

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below (mark one box only) to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA/STATE I.D. Number, or if this is a revised application, enter your facility's EPA/STATE I.D. Number in Section I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

☐ 1. EXISTING FACILITY *(See instructions for definition of "existing" facility. Complete item below.)*

MO.	DAY	YR.
0 3	2 2	4 3

*FOR EXISTING FACILITIES, PROVIDE THE DATE *(mo., day, & yr.)* OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED *(use the boxes to the left)*

*The date construction of the Hanford Facility commenced.

☐ 2. NEW FACILITY *(Complete item below)*

MO.	DAY	YR.

FOR NEW FACILITIES, PROVIDE THE DATE *(mo., day, & yr)* OPERATION BEGAN OR IS EXPECTED TO BEGIN

B. REVISED APPLICATION *(place an "X" below and complete Section I above)*

☒ 1. FACILITY HAS AN INTERIM STATUS PERMIT

☒ 2. FACILITY HAS A FINAL PERMIT

III. PROCESSES - CODES AND CAPACITIES

A. PROCESS CODE - Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process *(including its design capacity)* in the space provided on the *(Section III-C)*.

B. PROCESS DESIGN CAPACITY - For each code entered in column A enter the capacity of the process.

1. AMOUNT - Enter the amount.

2. UNIT OF MEASURE - For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER (barrel, drum, etc)	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D80	GALLONS OR LITERS
LANDFILL	D81	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D82	*ACRES OR HECTARES*
OCEAN DISPOSAL	D83	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D84	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER (Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Section III-C.)	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
LITERS	L
CUBIC YARDS	Y
CUBIC METERS	C
GALLONS PER DAY	U

UNIT OF MEASURE	UNIT OF MEASURE CODE
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H

UNIT OF MEASURE	UNIT OF MEASURE CODE
ACRE-FEET	A
HECTARE-METER	F
ACRES	B
HECTARES	Q

EXAMPLE FOR COMPLETING SECTION III *(shown in line numbers X-1 and X-2 below): A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons.* The facility also has an incinerator that can burn up to 20 gallons per hour.

LINE NUMBER	A. PROCESS CODE *(from list above)*	B. PROCESS DESIGN CAPACITY 1. AMOUNT *(specify)*	2. UNIT OF MEASURE *(enter code)*	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE *(from list above)*	B. PROCESS DESIGN CAPACITY 1. AMOUNT *(specify)*	2. UNIT OF MEASURE *(enter code)*	FOR OFFICIAL USE ONLY
X-1	*S 0 2*	*600*	*G*		*5*				
X-2	*T 0 3*	*20*	*E*		*6*				
[illegible]	S 0 4	73,815,000	L		*7*				
2	T 0 2	73,815,000	L		*8*				
3					*9*				
4					*10*				

CONTINUE ON REVERSE

Continued from the front.

III. PROCESSES (continued)

C. SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESS (code "T04"). FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPAC

S04 T02

The Liquid Effluent Retention Facility (LERF) began waste management operations in April of 1994. The LERF was constructed under interim status in accordance with Washington Administrative Code (WAC) 173-303. The LERF provides interim storage and treatment of the 242-A Evaporator process condensate and dilute aqueous waste streams from other Hanford Facility generating units until further treatment is conducted at the 200 Area Effluent Treatment Facility (ETF).

The LERF is a retention basin consisting of three cells (surface impoundments) (S04). Treatment (T02), consisting of flow and pH equalization, takes place in accordance with the treatment surface impoundment exemption (Title 40 Code of Federal Regulations, Part 268.4). Each cell has a design capacity of 24,605,000 liters (6,500,000 gallons), with a total capacity of 73,815,000 liters (19,500,000 gallons).

IV. DESCRIPTION OF DANGEROUS WASTES

A. DANGEROUS WASTE NUMBER - Enter the four digit number from Chapter 173-303 WAC for each listed dangerous waste you will handle. If you handle dangerous wastes which are not listed in Chapter 173-303 WAC, enter the four digit number(s) that describes the characteristics and/or the toxic contaminants of those dangerous wastes.

B. ESTIMATED ANNUAL QUANTITY - For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.

C. UNIT OF MEASURE - For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed dangerous waste: For each listed dangerous waste entered in column A select the code(s) from the list of process codes contained in Section III to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed dangerous wastes: For each characteristic or toxic contaminant entered in Column A, select the code(s) from the list of process codes contained in Section III to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed dangerous wastes that possess that characteristic or toxic contaminant.

Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code(s).

2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: DANGEROUS WASTES DESCRIBED BY MORE THAN ONE DANGEROUS WASTE NUMBER - Dangerous wastes that can be described by more than one Waste Number shall be described on the form as follows:

1. Select one of the Dangerous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other Dangerous Waste Number that can be used to describe the waste. In column D(2) on that line enter "included with above" and make no other entries on that line.
3. Repeat step 2 for each other Dangerous Waste Number that can be used to describe the dangerous waste.

EXAMPLE FOR COMPLETING SECTION IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

LINE NO.	A. DANGEROUS WASTE NO. *(enter code)*				B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES				
							1. PROCESS CODES *(enter)*				2. PROCESS DESCRIPTION *(if a code is not entered in D(1))*
X-1	*K*	*0*	*5*	*4*	*900*	*P*	*T03*	*D80*			
X-2	*D*	*0*	*0*	*2*	*400*	*P*	*T03*	*D80*			
X-3	*D*	*0*	*0*	*1*	*100*	*P*	*T03*	*D80*			
X-4	*D*	*0*	*0*	*2*			*T03*	*D80*			*included with above*

CONTINUE ON PAGE 3

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

NUMBER *(entered from page 1)*

	7	8	9	0	0	0	8	9	6	7

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. *(enter code)*	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES 1. PROCESS CODES *(enter)*				D. PROCESSES 2. PROCESS DESCRIPTION *(if a code is not entered in D(1))*
1	D001	73,812,000	K	S04	T02			Storage/Treatment -
2	through							Surface Impoundment
3	D011							
4	D018							
5	D019							
6	D022							
7	D028							
8	through							
9	D030							
10	D033							
	through							
12	D036							
13	D038							
14	through							
15	D041							
16	D043							
17	F001							
18	through							
19	F005							
20	F039							
21	WT01							
22	WT02							Included With Above
23								
25								
26								

Continued from the front.

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

E. USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM SECTION D(1) ON PAGE 3.

The LERF stores and treats the 242-A Evaporator process condensate and dilute aqueous waste streams from other Hanford Facility generating units until further treatment is conducted at the ETF. A description of the dangerous waste managed at the LERF is as follows.

The 242-A Evaporator process condensate is regulated as a mixed waste because of the "derived from" rule from treating Double-Shell Tank System waste. Double-Shell Tank System waste is a listed waste due to the presence of spent halogenated and nonhalogenated solvents (F001, F002, F003, F004, and F005). The LERF also could receive other waste streams from onsite remediation and waste management activities, which could carry the F001 through F005 dangerous waste numbers, and have the potential presence of characteristic waste (D001 through D011, D018, D019, D022, D028 through D030, D033 through D036, D038 through D041, and D043). The LERF could receive multi-source leachate (F039), which is derived from nonspecific source waste F001 through F005. The process condensate and/or other influent waste streams also could display the state-only criteria of toxicity (WT01 or WT02).

The Estimated Annual Quantity of Dangerous Waste (Section IV.B.) of 73,812,000 kilograms (162,728,000 pounds) per year is based on approximately 73,815,000 liters (19,500,000 gallons) of waste, or the total capacity of the LERF.

V. FACILITY DRAWING Refer to attached drawing(s).

All existing facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail)*.

VI. PHOTOGRAPHS Refer to attached photograph(s).

All existing facilities must include photographs *(aerial or ground-level)* that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas *(see instructions for more detail)*.

VII. FACILITY GEOGRAPHIC LOCATION This information is provided on the attached drawing(s) and photograph(s).

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*

VIII. FACILITY OWNER

☒ A. If the facility owner is also the facility operator as listed in Section VII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	SIGNATURE	DATE SIGNED
John D. Wagoner, Manager U.S. Department of Energy Richland Operations Office	John D. Wagoner	9/26/96

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	SIGNATURE	DATE SIGNED
SEE ATTACHMENT		

CONTINUE ON PAGE 5

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

John D. Wagoner

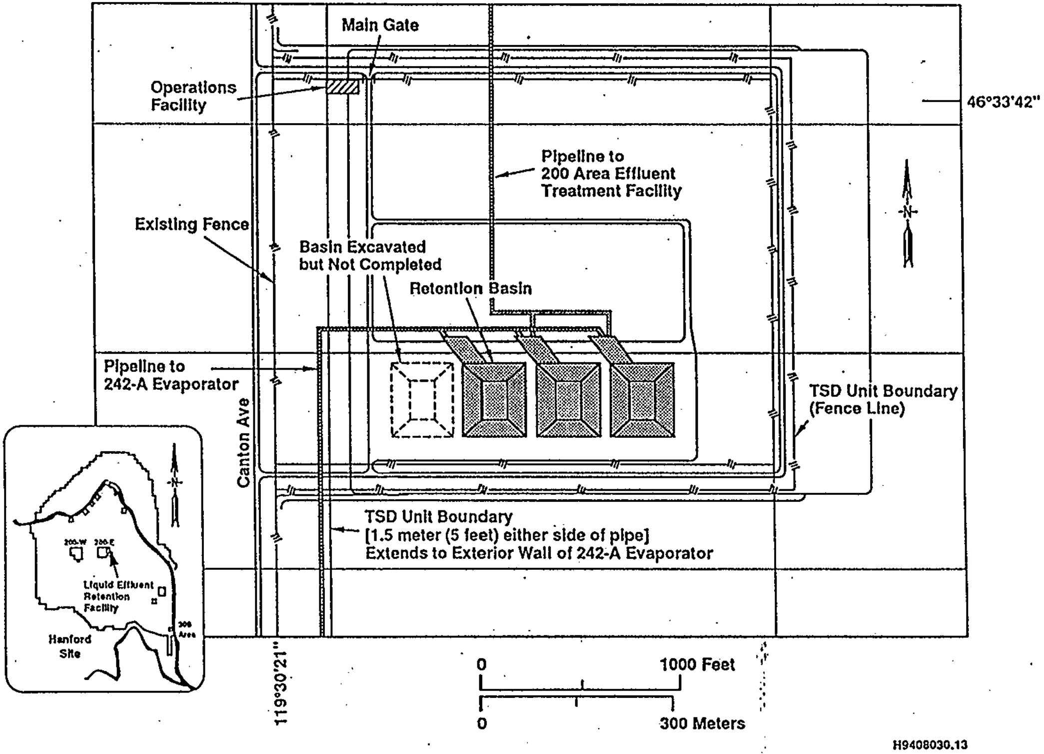
Owner/Operator
John D. Wagoner, Manager
U.S. Department of Energy
Richland Operations Office

9/26/96
Date

Co-operator
H. J. Hatch,
President and Chief Executive Officer
Fluor Daniel Hanford, Inc.

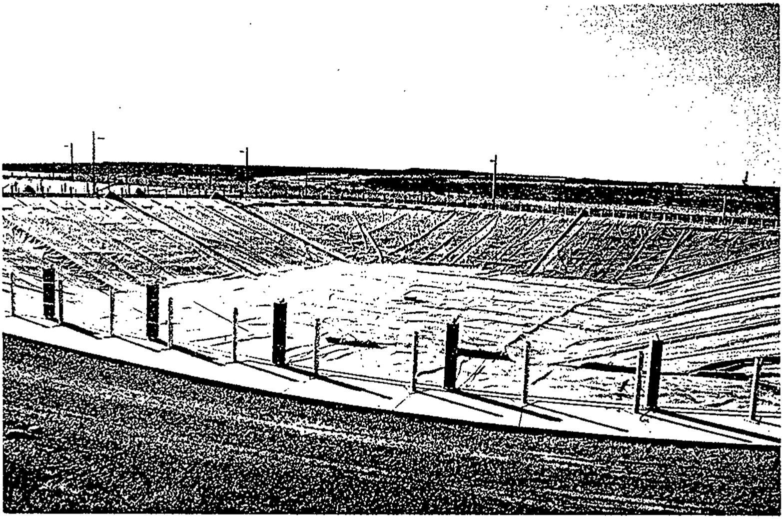
9/13/96
Date

Liquid Effluent Retention Facility
Site Plan



Note: To convert feet to meters, multiply by 0.3048.

LIQUID EFFLUENT RETENTION FACILITY



TYPICAL BASIN

46°33'42"	92081260-9CN
119°30'21"	(PHOTO TAKEN 1992)

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Please print or type in the unshaded areas only
(fill-in areas are spaced for elite type, i.e., 12 character/inch).

FORM

DANGEROUS WASTE PERMIT APPLICATION

1. EPA/STATE I.D. NUMBER

W A 7 8 9 0 0 0 8 9 6 7

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED *(mo., day, & yr.)*	COMMENTS

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below (mark one box only) to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA/STATE I.D. Number, or if this is a revised application, enter your facility's EPA/STATE I.D. Number in Section I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

☐ 1. EXISTING FACILITY *(See instructions for definition of "existing" facility. Complete item below.)*

MO.	DAY	YR.
0 3	2 2	4 3

* FOR EXISTING FACILITIES, PROVIDE THE DATE *(mo., day, & yr.)* OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED *(use the boxes to the left)*

*The date construction of the Hanford Facility commenced.

☐ 2. NEW FACILITY *(Complete item below)*

MO.	DAY	YR.

FOR NEW FACILITIES, PROVIDE THE DATE, *(mo., day, & yr)* OPERATION BEGAN OR IS EXPECTED TO BEGIN

B. REVISED APPLICATION *(place an "X" below and complete Section I above)*

☒ 1. FACILITY HAS AN INTERIM STATUS PERMIT

☒ 2. FACILITY HAS A FINAL PERMIT

III. PROCESSES - CODES AND CAPACITIES

A. PROCESS CODE - Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process *(including its design capacity)* in the space provided on the *(Section III-C)*.

B. PROCESS DESIGN CAPACITY - For each code entered in column A enter the capacity of the process.

1. AMOUNT - Enter the amount.

2. UNIT OF MEASURE - For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER (barrel, drum, etc)	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D80	GALLONS OR LITERS
LANDFILL	D81	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D82	*ACRES OR HECTARES*
OCEAN DISPOSAL	D83	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D84	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER (Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Section III-C.)	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
LITERS	L
CUBIC YARDS	Y
CUBIC METERS	C
GALLONS PER DAY	U
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H
ACRE-FEET	A
HECTARE-METER	F
ACRES	B
HECTARES	Q

EXAMPLE FOR COMPLETING SECTION III *(shown in line numbers X-1 and X-2 below): A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons.* The facility also has an incinerator that can burn up to 20 gallons per hour.

LINE NUMBER	A. PROCESS CODE *(from list above)*	B. PROCESS DESIGN CAPACITY 1. AMOUNT *(specify)*	2. UNIT OF MEASURE *(enter code)*	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE *(from list above)*	B. PROCESS DESIGN CAPACITY 1. AMOUNT *(specify)*	2. UNIT OF MEASURE *(enter code)*	FOR OFFICIAL USE ONLY
X-1	*S 0 2*	*600*	*G*		*5*				
X-2	*T 0 3*	*20*	*E*		*6*				
1	T 0 1	817,646	V		*7*				
2	S 0 2	7,608,654	L		*8*				
3	S 0 1	147,630	L		*9*				
4					*10*				

Continued from the front.

III. PROCESSES (continued)

C. SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESS (code "T04"). FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPACI

T01, S02

The 200 Area Effluent Treatment Facility (ETF) began waste management operations in November of 1995. The ETF was constructed to treat and store process condensate from the 242-A Evaporator and the Liquid Effluent Retention Facility, and other Hanford Facility waste streams. The ETF is located in the northeast corner of the 200 East Area. The treatment process includes filtration, pH adjustment, ultraviolet oxidation, hydrogen peroxide decomposition, degasification, reverse osmosis, ion exchange, effluent quality verification in tanks, evaporation, concentration, and thin film drying (T01). The treated effluent is stored in three verification tanks (S02) and sampled to determine if the effluent meets required discharge standards. When the effluent meets the discharge standards as established by the regulations, the effluent will be discharged to the soil. If the sample analysis of the effluent in the verification tanks does not meet the discharge standards, the effluent will be sent back through the system for further treatment.

The maximum process design capacity for tank treatment is 568 liters (150 gallons) per minute or 817,646 liters (216,000 gallons) per day. The maximum process design capacity for tank storage is 7,608,654 liters (2,010,000 gallons).

S01

A secondary waste is generated during operation of the ETF. This secondary waste is concentrated into a powder, containerized, and transferred to the Central Waste Complex for storage or to the Low-Level Burial Grounds or the Environmental Restoration Disposal Facility for disposal (as appropriate). Other mixed waste generated and containerized during the operation of the ETF includes dewatered spent bead resin, spent membranes, spent high-efficiency particulate air cartridges, spent filter elements, spent activated carbon cartridges, and spent ultraviolet lamps. Nonradioactive dangerous waste includes chemicals used in the various processes. This nonradioactive dangerous waste is containerized and transferred to an onsite treatment, storage, and/or disposal (TSD) unit or shipped offsite to a TSD facility.

The maximum process design capacity for container storage is 147,630 liters (39,600 gallons).

IV. DESCRIPTION OF DANGEROUS WASTES

A. DANGEROUS WASTE NUMBER - Enter the four digit number from Chapter 173-303 WAC for each listed dangerous waste you will handle. If you handle dangerous wastes which are not listed in Chapter 173-303 WAC, enter the four digit number(s) that describes the characteristics and/or the toxic contaminants of those dangerous wastes.

B. ESTIMATED ANNUAL QUANTITY - For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.

C. UNIT OF MEASURE - For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed dangerous waste: For each listed dangerous waste entered in column A select the code(s) from the list of process codes contained in Section III to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed dangerous wastes: For each characteristic or toxic contaminant entered in Column A, select the code(s) from the list of process codes contained in Section III to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed dangerous wastes that possess that characteristic or toxic contaminant.

Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code(s).

2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: DANGEROUS WASTES DESCRIBED BY MORE THAN ONE DANGEROUS WASTE NUMBER - Dangerous wastes that can be described by more than one Waste Number shall be described on the form as follows:

1. Select one of the Dangerous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other Dangerous Waste Number that can be used to describe the waste. In column D(2) on that line enter "included with above" and make no other entries on that line.
3. Repeat step 2 for each other Dangerous Waste Number that can be used to describe the dangerous waste.

EXAMPLE FOR COMPLETING SECTION IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

LINE NO.	A. DANGEROUS WASTE NO. *(enter code)*	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES 1. PROCESS CODES *(enter)*	D. PROCESSES 2. PROCESS DESCRIPTION *(if a code is not entered in D(1))*
X-1	*K 0 5 4*	*900*	*P*	*T 0 3 D 8 0*	
X-2	*D 0 0 2*	*400*	*P*	*T 0 3 D 8 0*	
X-3	*D 0 0 1*	*100*	*P*	*T 0 3 D 8 0*	
X-4	*D 0 0 2*			*T 0 3 D 8 0*	*included with above*

CONTINUE ON PAGE 3

Continued from page 2.

NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

I.D. NUMBER *(entered from page 1)*: [illegible] 7 8 9 0 0 0 8 9 6 7

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. *(enter code)*	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES 1. PROCESS CODES *(enter)*	D. PROCESSES 2. PROCESS DESCRIPTION *(if a code is not entered in D(1))*
1	D001	298,434,296	K	T01	Treatment-Tank
2	through				
3	D011				
4	D018				
5	D019				
6	D022				
7	D028				
8	through				
9	D030				
10	D033				
11	through				
12	D036				
13	D038				
14	through				
15	D041				
16	D043				
17	F001				
18	through				
19	F005				
20	F039				
21	WT01				
22	WT02				Included With Above
23	D001	30,433,326	K	S02	Storage-Tank
2[illegible]	[illegible]rough				
25	D011				
26	D018				

(enter "A", "B", "C", etc. behind the "3" to identify photo copied pages)

Continued from page 2.

NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

I.D. NUMBER *(entered from page 1)*

W A 7 8 9 0 0 0 8 9 6 7

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. *(enter code)*	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES 1. PROCESS CODES *(enter)*				D. PROCESSES 2. PROCESS DESCRIPTION *(if a code is not entered in D(1))*
1	D019		K	S02				Storage-Tank (Cont.)
2	D022							
3	D028							
4	through							
5	D030							
6	D033							
7	through							
8	D036							
9	D038							
10	through							
11	D041							
12	D043							
13	F001							
14	through							
15	F005							
16	F039							
17	WT01							
18	WT02							Included With Above
19	D001	1,986,735	K	S01				Storage-Container
20	through							
21	D011							
22	D018							
23	D019							
24	D022							
25								
26								

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

UMBER *(entered from page 1)*

W A 7 8 9 0 0 0 8 9 6 7

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. *(enter code)*	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES 1. PROCESS CODES *(enter)*	D. PROCESSES 2. PROCESS DESCRIPTION *(if a code is not entered in D(1))*
1	D028		K	S01	Storage-Container (Cont.)
2	through				
3	D030				
4	D033				
5	through				
6	D036				
7	D038				
8	through				
9	D041				
[illegible]	[illegible]043				
11	F001				
12	through				
13	F005				
14	F039				
15	WT01				
16	WT02				Included With Above
17					
18					
19					
20					
21					
22					
23					
[illegible]					
25					
26					

Continued from the front.

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

E. USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM SECTION D(1) ON PAGE 3.

The ETF stores and treats the 242-A Evaporator process condensate and other dilute, aqueous waste streams from the Hanford Facility. A description of the dangerous and/or mixed waste managed at the ETF is as follows.

The 242-A Evaporator process condensate is regulated as a mixed waste because of the "derived from" rule from treating Double-Shell Tank (DST) System waste. The DST System waste is a listed waste due to the presence of spent halogenated and nonhalogenated solvents (F001, F002, F003, F004, and F005). The ETF also could treat other waste streams from onsite remediation and waste management activities, which could carry the F001 through F005 dangerous waste numbers; the waste stream also could have the potential presence of characteristic waste (D001 through D011, D018, D019, D022, D028 through D030, D033 through D036, D038 through D041, and D043). The ETF could treat multi-source leachate (F039) that is derived from nonspecific source waste F001 through F005. The process condensate and/or other influent waste streams also could display the state-only criteria of toxicity (WT01 or WT02).

The secondary waste stream also could be regulated as a dangerous waste because of the "derived from" rule for listed waste (F001 through F005, and F039 derived from F001 through F005), and because of the potential presence of characteristic waste (D001 through D011, D018, D019, D022, D028 through D030, D033 through D036, D038 through D041, and D043), and could display the state-only criteria for toxicity (WT01 or WT02).

The 'Estimated Annual Quantity of Waste' listed under Section I.V.B. was based on an operating schedule of 365 days a year. This basis was used to provide a maximum estimated annual quantity of waste that could be treated and stored by the ETF.

V. FACILITY DRAWING Refer to attached drawing(s).

All existing facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail)*.

VI. PHOTOGRAPHS Refer to attached photograph(s).

All existing facilities must include photographs *(aerial or ground-level)* that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas *(see instructions for more detail)*.

VII. FACILITY GEOGRAPHIC LOCATION This information is provided on the attached drawing(s) and photograph(s).

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*

VIII. FACILITY OWNER

☒ A. If the facility owner is also the facility operator as listed in Section VII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	SIGNATURE	DATE SIGNED
John D. Wagoner, Manager U.S. Department of Energy Richland Operations Office	John D. Wagoner	9/26/96

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	SIGNATURE	DATE SIGNED
SEE ATTACHMENT		

CONTINUE ON PAGE 5

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

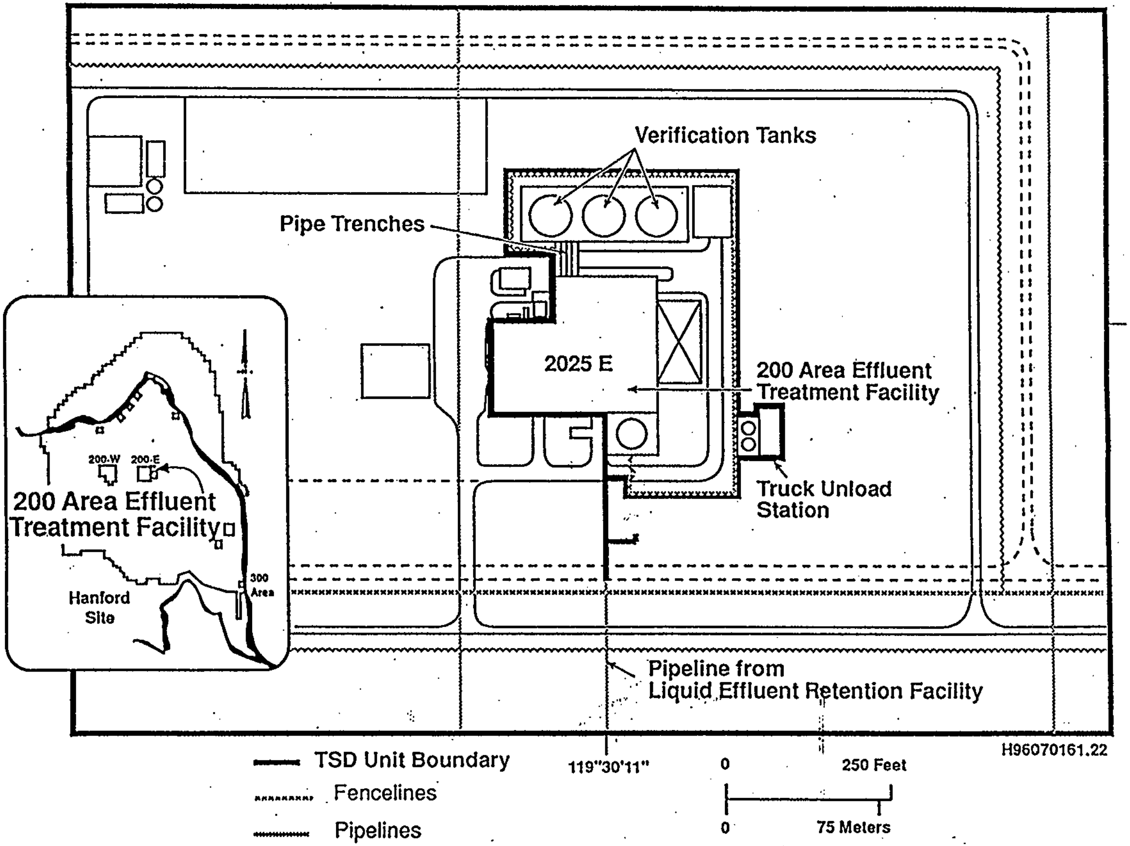
John D. Wagoner 9/26/96

Owner/Operator Date
John D. Wagoner, Manager
U.S. Department of Energy
Richland Operations Office

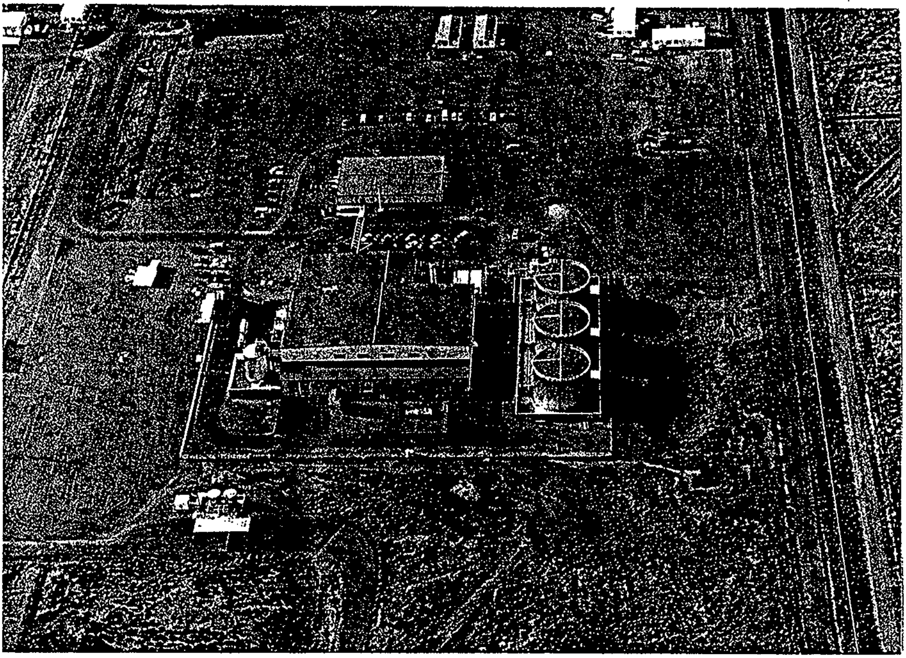
9/13/96

Co-operator Date
H. J. Hatch,
President and Chief Executive Officer
Fluor Daniel Hanford, Inc.

200 Area Effluent Treatment Facility Site Plan



200 AREA EFFLUENT TREATMENT FACILITY



46°33'59"
119°30'11"

95110502-9CN
(PHOTO TAKEN 1995)

CONTENTS

APPENDIX

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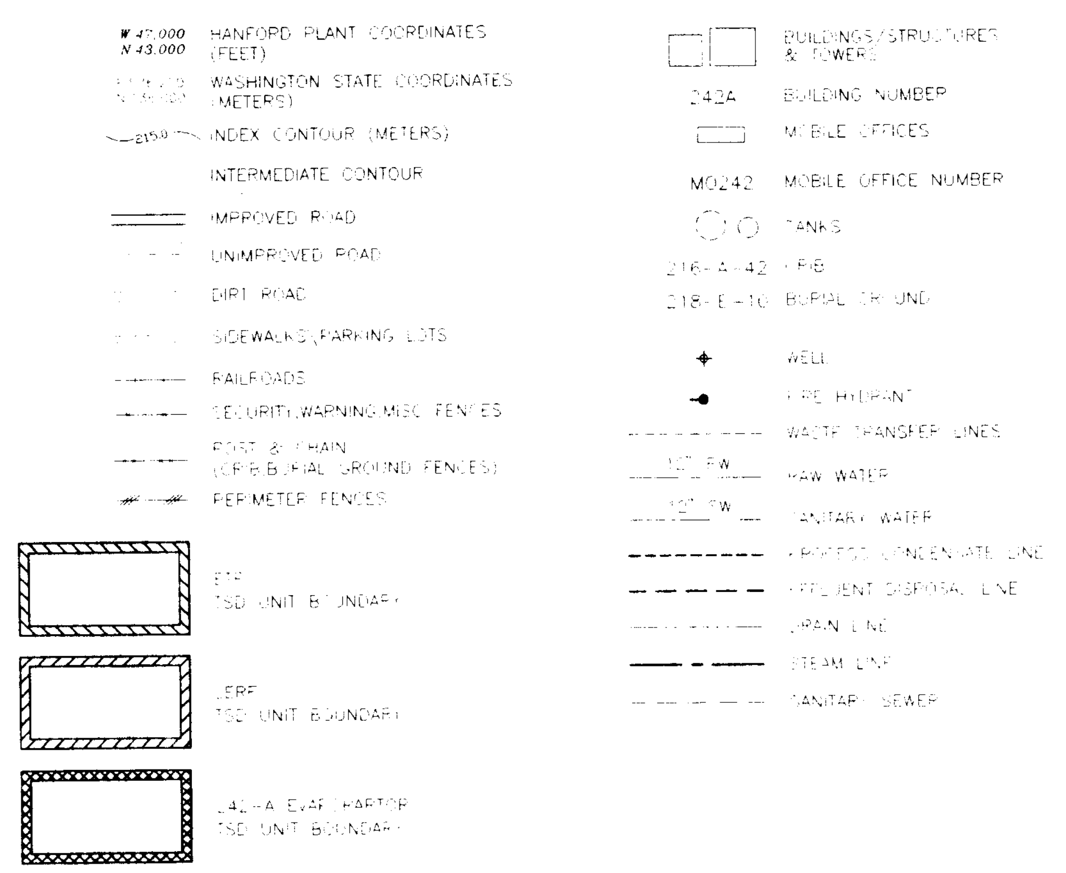
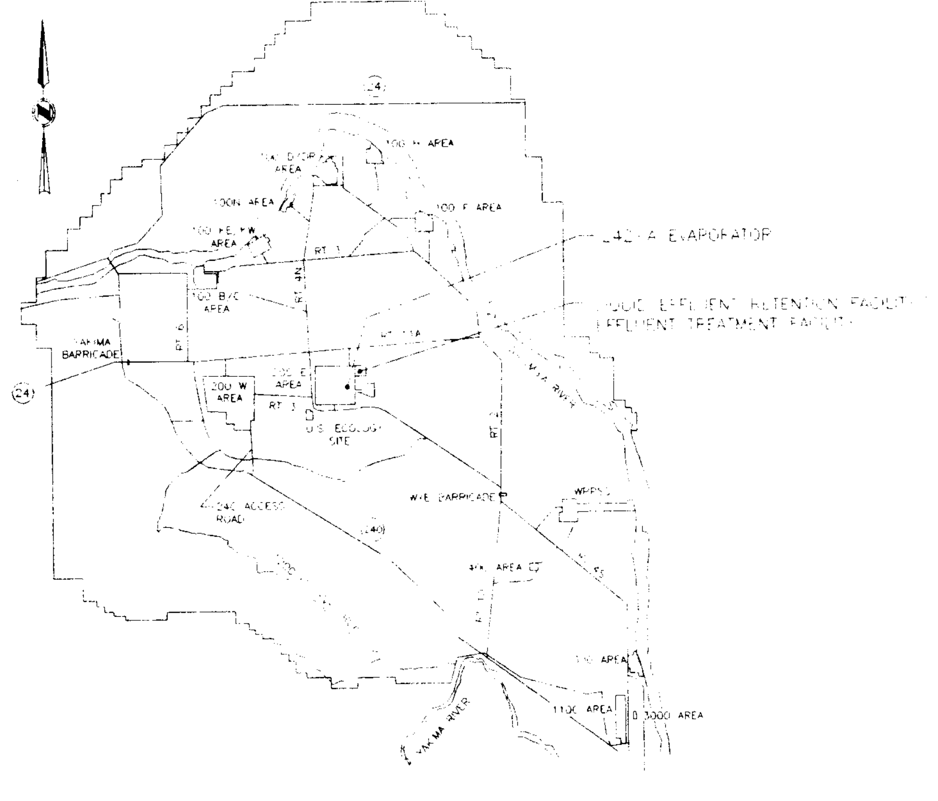
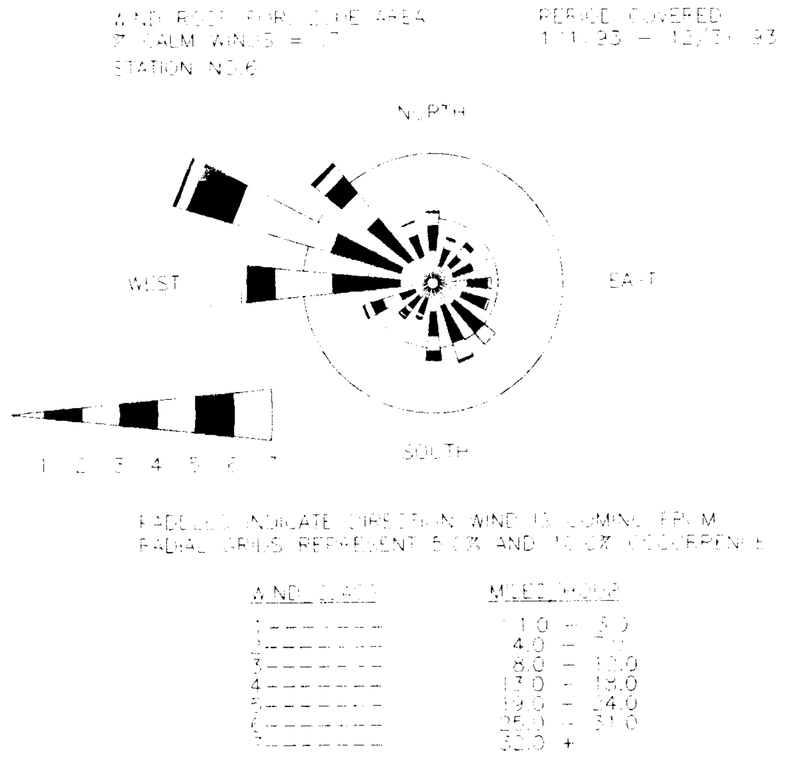
LEGEND





KEY PLAN

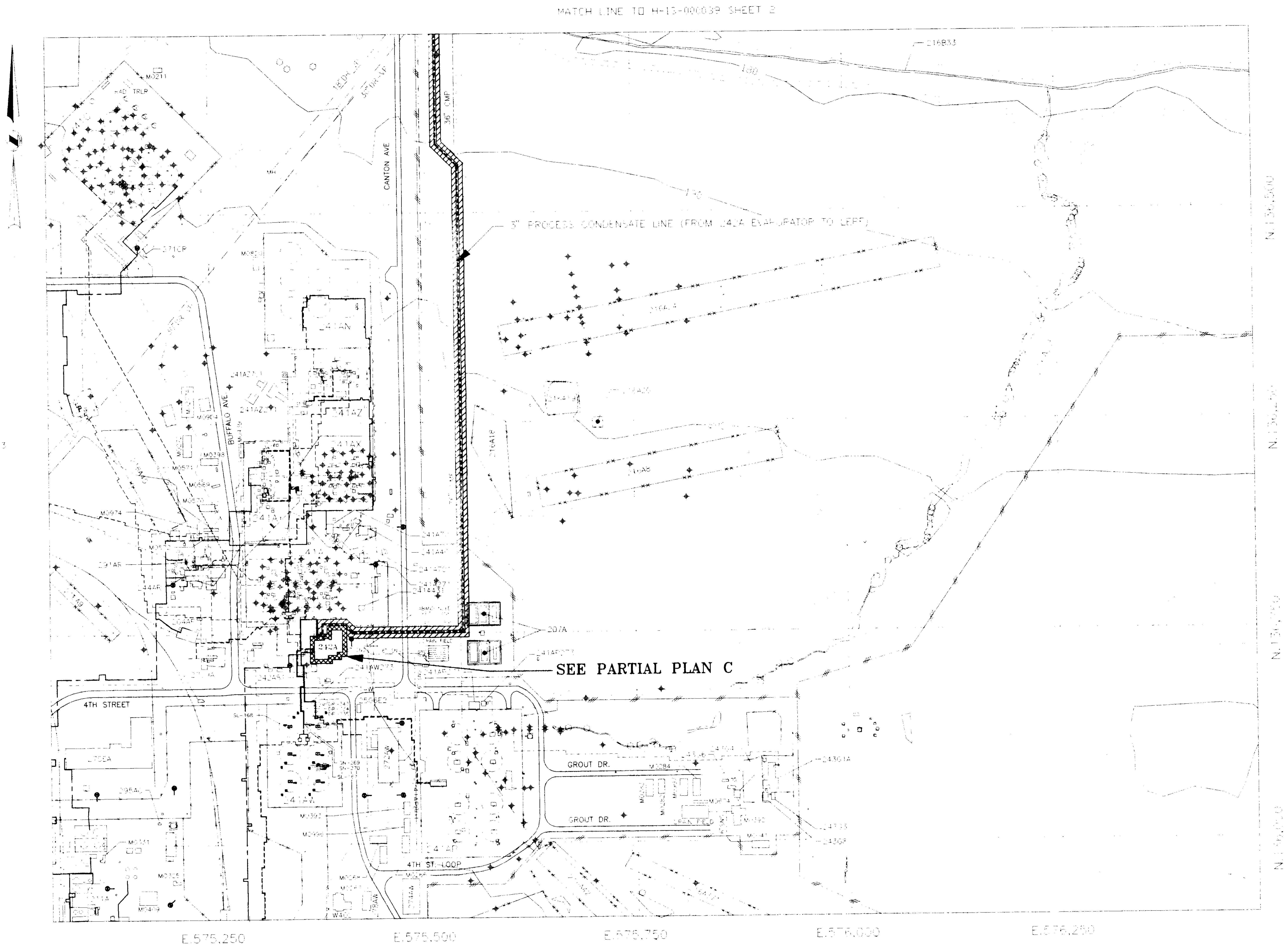
SCALE: NONE



RADIALS INDICATE DIRECTION WIND IS COMING FROM
RADIAL GRIDS REPRESENT 5.0% AND 10.0% OCCURRENCE

WIND CLASS	MILES/HOUR
1	1.0 – 3.0
2	4.0 – 7.0
3	8.0 – 12.0
4	13.0 – 18.0
5	19.0 – 24.0
6	25.0 – 31.0
7	32.0 +

WIND ROSE



SITE PLAN

SCALE: 1:2500

1 cm = 25 meters

GENERAL NOTES

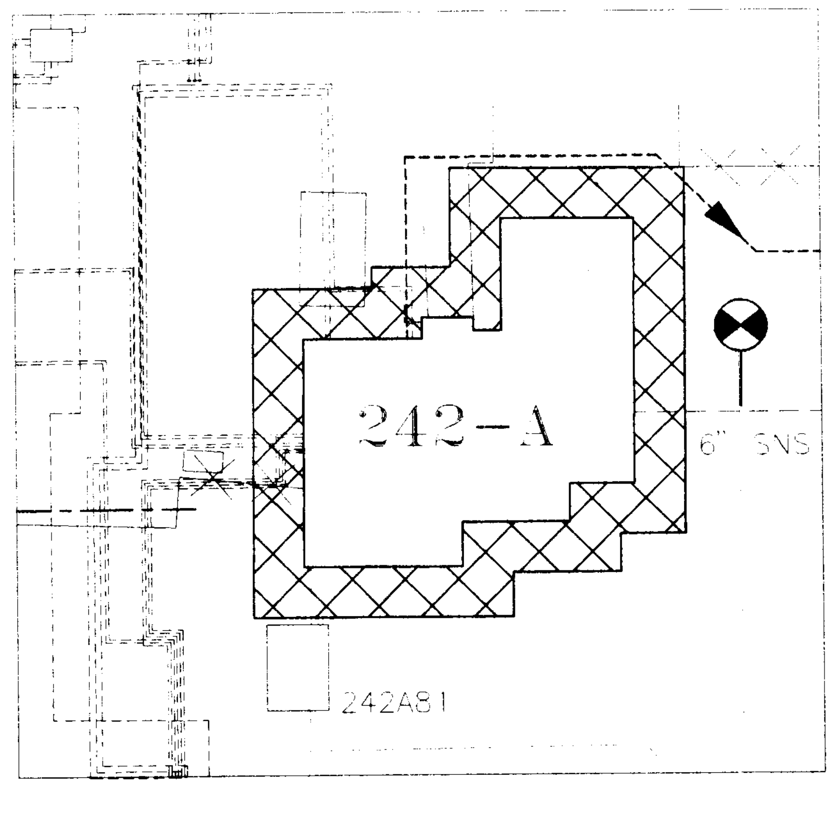
1. THIS MAP IS BASED ON AERIAL PHOTOGRAPHY FLOWN ON 6-24-89. THE ORIGINAL TOPOGRAPHIC MAP WAS PREPARED BY MERRICK & COMPANY AND CERTIFIED TO MEET NATIONAL MAP ACCURACY STANDARDS. OFFICIAL COPIES OF THE MERRICK MAPS THAT SHOW THE CERTIFICATE ARE LOCATED IN THE LOCKHEED MARTIN ENGINEERING FILES AS DRAWING NUMBERS H-2-79476 SHEET 1 AND H-2-79477 SHEET 1 THRU 37. NAMES OF ADDITIONAL FEATURES AND THE TITLE BLOCK WERE ADDED BY WESTINGHOUSE HANFORD COMPANY.

2. WASHINGTON STATE PLANE COORDINATE SYSTEM: THE OFFICIAL COORDINATE SYSTEM AS DEFINED BY THE REVISED CODE OF WASHINGTON (RCW). THE HANFORD SITE LIES WITHIN THE WASHINGTON COORDINATE SYSTEM, SOUTH ZONE. THIS GRID COVERS THE ENTIRE SITE AND USES X (EASTINGS) AND Y (NORTHINGS) COORDINATES.

   HORIZONTAL DATUM: NAD-83 LAMBERT PROJECTION. WASHINGTON STATE PLANE COORDINATES ARE SHOWN IN METERS.

   CONTOUR INTERVAL: 1.5 METERS.

3. HANFORD PLANT GRID: A LOCAL GRID SYSTEM WITH ITS INITIAL POINT NORTHEAST OF THE 400 AREA. IT COVERS 200 EAST AND 200 WEST AREA AS WELL AS GENERAL SITE WORK SUCH AS WELLS AND BURIAL GROUNDS. HANFORD COORDINATES ARE SHOWN IN FEET.



PARTIAL PLAN C

SCALE: 1:10000

0 100 200 400

1 cm = 100 meters

"SUPERSEDES DRAWING H-2-81570 REV.0, PER ECN 603879"

THIS MAP IS TO BE USED FOR REFERENCE PURPOSES ONLY
DO NOT USE THIS MAP FOR CONSTRUCTION PURPOSES

DWG NO	TITLE
DRAWING TRACEABILITY LIST	

REF NUMBER	TITLE
H-13-000215	200 AREA TOPOGRAPHIC MAP
H-13-000223	200 AREA TOPOGRAPHIC MAP

REFERENCES

NEXT USED ON | END ITEM

MFD	REV NO	DESCRIPTION	REV BY DATE	CHK BY DATE	DFTG APVD DATE	COG ENGR	OTHER	OTHER
	1	PER ECN 640639	RBT 4-29 1997			MWB 5-1-97	JGC 5-1-97	

REVISIONS

CADFILE N000039A | CADCODE DOS:6.0:ACD2:12.0:SS

		DATE
DRAWN	JW VOSAHLO RB TORRES	5-24-94
CHECKED		
DFTG APVD		
COG ENGR		
APVD		
APVD		
APVD		
APVD		
APVD		
APVD		

U.S. DEPARTMENT OF ENERGY
Richland Operations Office
Lockheed Martin Hanford Company

TOPOGRAPHIC MAP 200 AREA
LIQUID WASTE PROCESSING FACILITIES,
242-A EVAPORATOR, LIQUID EFFLUENT RETENTION
FACILITY, EFFLUENT TREATMENT FACILITY

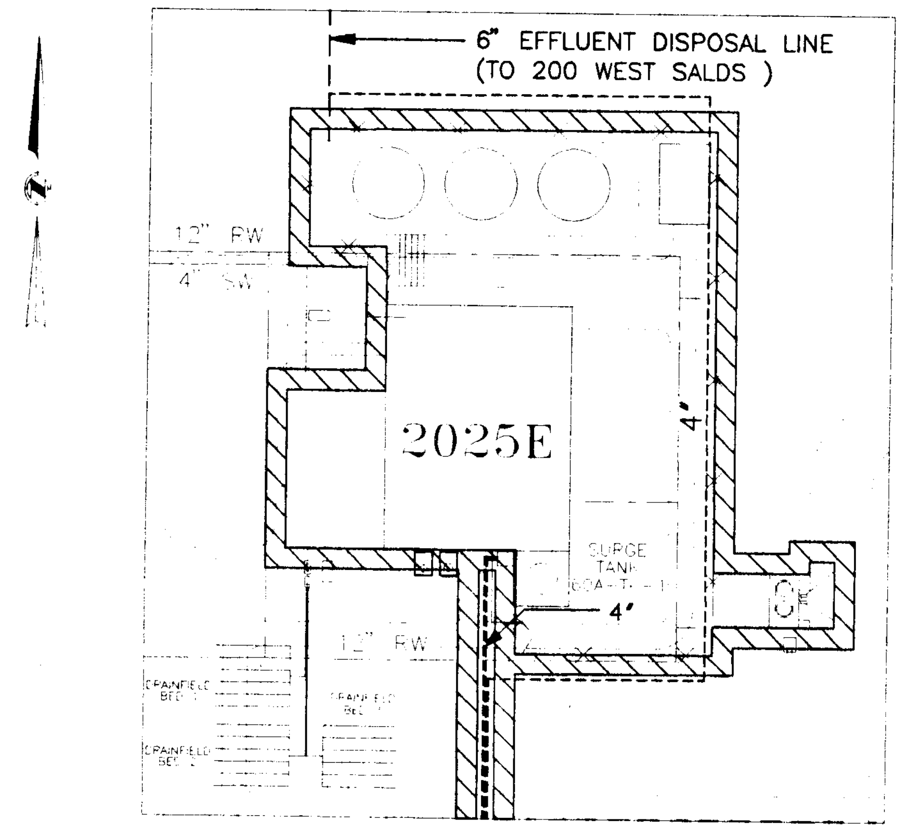
SIZE	BLDG NO	INDEX NO	DWG NO	REV
F	2025-E 242-AL11 242-A	0103	H-13-000039	1

SCALE 1:AS SHOWN | ECN 609845 | SHEET 1 OF 2

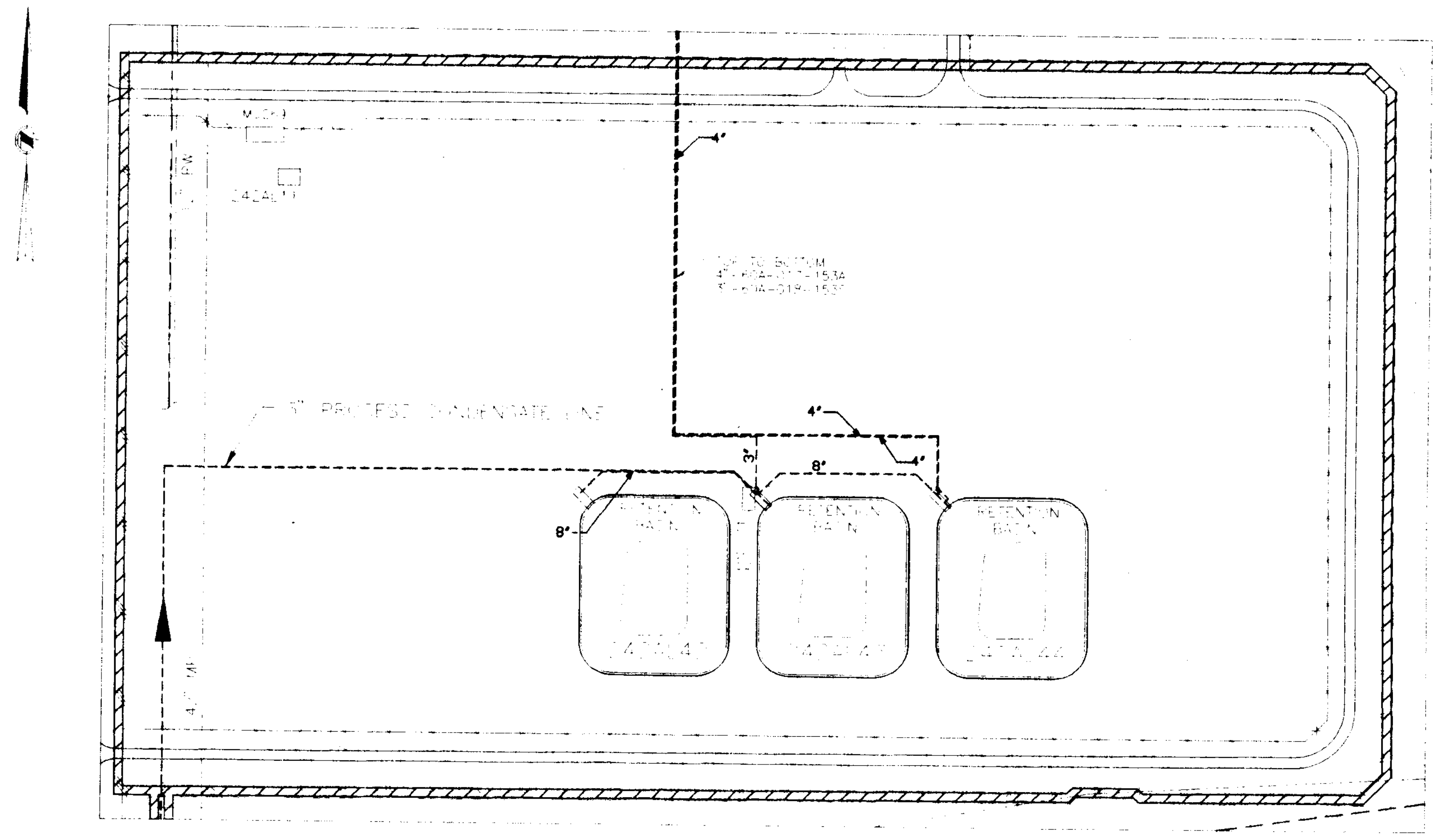
CHK PRINT ☐ DATE | COMMENT PRINT ☐ DATE

H-13-000039 1 of 2 1

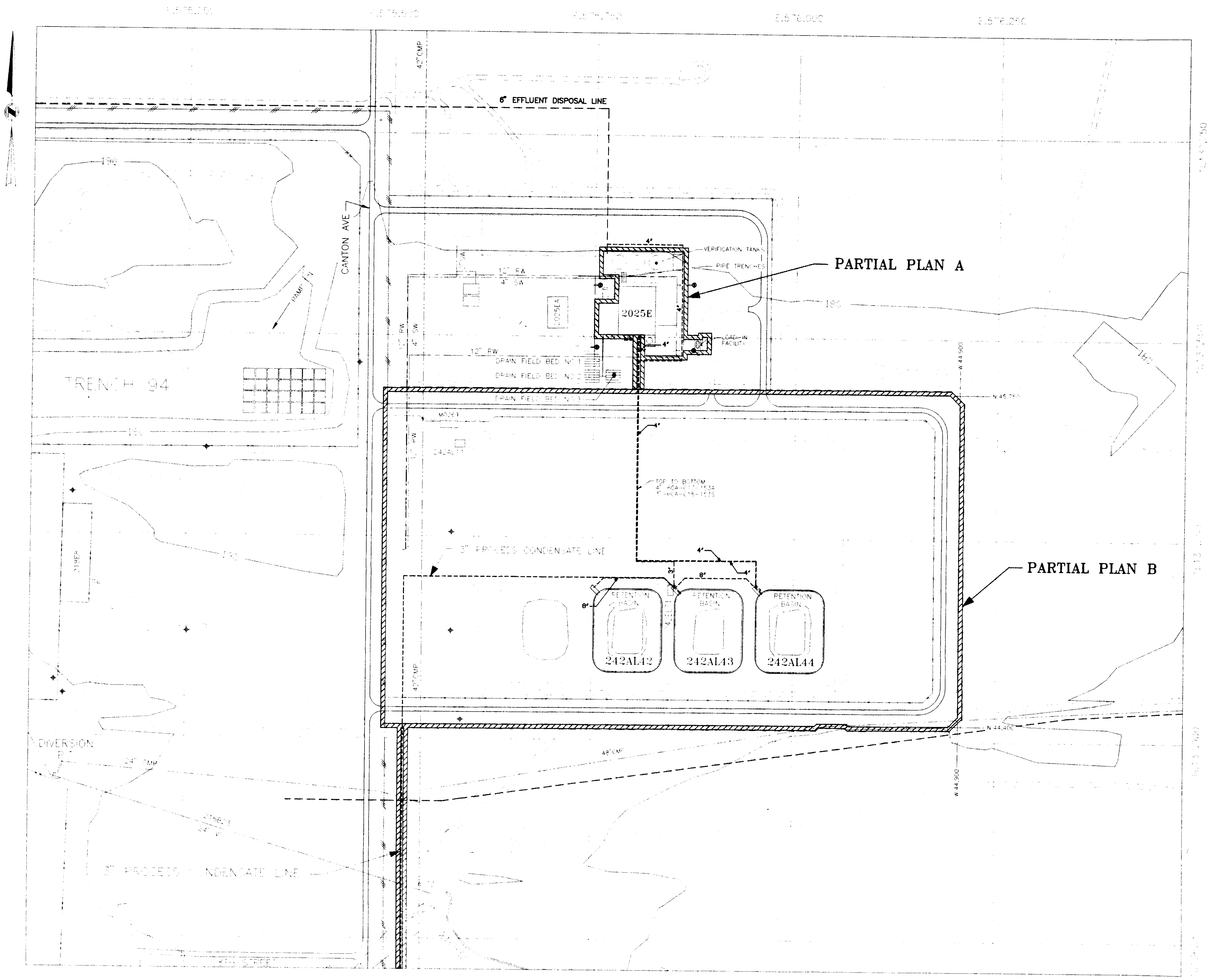
54-6000-027(5/89)



PARTIAL PLAN A



PARTIAL PLAN B



SITE PLAN

GENERAL NOTES (SHEET 1)

4. THE PARTIAL PLAN "B" SHOWS THE UNDERGROUND PIPING (3 INCH PROCESS CONDENSATE) TO THE LIQUID EFFLUENT RETENTION FACILITY FROM THE 242-A EVAPORATOR AND THE 3 AND 4 INCH AQUEOUS WASTE LINES FROM THE LIQUID EFFLUENT RETENTION FACILITY TO THE 200 AREA EFFLUENT TREATMENT FACILITY.

THIS MAP IS TO BE USED FOR REFERENCE PURPOSES ONLY.
DO NOT USE THIS MAP FOR CONSTRUCTION PURPOSES.

DWG NO	TITLE
DRAWING TRACEABILITY LIST	

REF NUMBER	TITLE
H-13-000207	200 AREA TOPOGRAPHIC MAP
H-13-000208	200 AREA TOPOGRAPHIC MAP
H-13-000215	200 AREA TOPOGRAPHIC MAP
H-13-000216	200 AREA TOPOGRAPHIC MAP

REFERENCES

NEXT USED ON END ITEM

REV NO	DESCRIPTION	REV BY DATE	CHK BY DATE	DFTG APVD DATE	COG ENGR	OTHER	OTHER
1	PER ECN 640639	RBT 4-29 1997			mmB 5-1-97		

REVISIONS

CADFILE N000039B CADCODE DOS:6.0:AC02:12 0:SS

DRAWN JW VOSAHLO/RB TORRES	DATE 5-24-94
CHECKED	
DFTG APVD	
COG ENGR	
APVD	
APVD	
APVD	
APVD	
APVD	
APVD	

U.S. DEPARTMENT OF ENERGY
Richland Operations Office
Lockheed Martin Hanford Company

TOPOGRAPHIC MAP 200 AREA
LIQUID WASTE PROCESSING FACILITIES,
242-A EVAPORATOR, LIQUID EFFLUENT RETENTION
FACILITY, EFFLUENT TREATMENT FACILITY

SIZE	BLDG NO	INDEX NO	DWG NO	REV
F	2025-E 242-AL11 242-A	0103	H-13-000039	1

SCALE SHOWN EDT 609845 SHEET 2 OF 2

CHK PRINT ☐ DATE COMMENT PRINT ☐ DATE

2.0 FACILITY DESCRIPTION AND GENERAL PROVISIONS [B AND E]

The LERF and the ETF, located in the 200 East Area, are two units of an aqueous waste treatment system. Dangerous and mixed aqueous waste streams as well as nondangerous aqueous waste streams are stored and treated in the LERF and the ETF. Aqueous waste is generated from various Hanford Facility waste management and remediation activities. The term 'effluent' in this document refers to the treated aqueous waste that is discharged from the ETF.

2.1 DESCRIPTION OF THE LIQUID EFFLUENT RETENTION FACILITY AND 200 AREA EFFLUENT TREATMENT FACILITY

The following sections provide general description of the LERF and the ETF and their process components. A more detailed discussion of the waste types treated and stored and the identification of processes and equipment are provided in Chapters 3.0 and 4.0, respectively. Because dangerous waste does not include the source, special nuclear, and by-product material components of mixed waste, radionuclides are not within the scope of this permit application documentation. The information on radionuclides is provided only for general knowledge.

2.1.1 Liquid Effluent Retention Facility

The LERF is composed of three surface impoundments, or basins, with a nominal capacity of 24.6 million liters each (Chapter 1.0). The LERF provides interim storage and treatment until the waste is transferred to the ETF for final treatment. Treatment at the LERF consists of flow and pH equalization, consistent with the surface impoundment treatment exemption (40 CFR 268.4).

The LERF basins are provided with primary and secondary composite liners, a leachate collection and removal system between the liners, and a floating cover. The LERF also includes piping and pumping systems, utilities, and a basin operations structure. Aqueous waste from the LERF is transferred to the ETF via pipelines.

2.1.2 200 Area Effluent Treatment Facility

The ETF is a flexible treatment unit that destroys or removes contaminants in an aqueous waste. Aqueous waste is transferred to the ETF through pipelines connected to the LERF or from the load-in station, located just east of the ETF. The Load-In Station currently consists two 25,898 liter storage tanks and a transfer pipeline that connects to the LERF/ETF transfer pipeline.

The ETF consists of a series of treatment or process units that remove or destroy essentially all of the dangerous waste and radioactive constituents, except tritium. The treatment units are grouped into either the primary or secondary treatment train. The major treatment units are located in the primary treatment train. The primary treatment train consists of the following units:

- Surge tank
- Rough filter
- Ultraviolet light/oxidation (UV/OX)
- pH adjustment
- Hydrogen peroxide decomposer
- Fine filter
- Degasification
- Reverse osmosis (RO)
- Polisher [ion exchange (IX) column]
- Final pH adjustment and verification.

Contaminants are concentrated and dried to a powder in the secondary treatment train. The secondary treatment train includes the following units:

- Secondary waste receiving tanks
- ETF evaporator (forced circulation evaporator)
- Concentrate tank
- Thin film dryer
- Container handling
- Supporting systems.

The dry powder waste generated from the treatment process is containerized and transferred to the appropriate treatment, storage, and/or disposal (TSD) unit. The treatment process also generates a maintenance and operations waste stream that includes such waste as dewatered spent resin, spent filter media, RO membranes, and UV lamps. The maintenance and operations waste stream also is containerized and transported to the appropriate TSD unit.

The treated effluent is contained in verification tanks where the effluent is sampled and held until the analytical results confirm that the effluent meets the 'delisting' criteria. Under 40 CFR 261, Appendix IX, Table 2, the treated effluent from the ETF is a 'delisted' waste; that is, the treated effluent is no longer a dangerous or hazardous waste subject to the hazardous waste management requirements of the *Resource Conservation and Recovery Act* (RCRA) *of 1976*, as amended.

2.1.3 Other Environmental Permits

All environmental permits that are required to support operation of the LERF and ETF are identified in the *Annual Hanford Site Environmental Permitting Status Report* (e.g., DOE/RL-96-63).

2.1.4 Construction Schedule

Any proposed new construction will be managed as described in the Hanford Facility RCRA Permit.

2.2 TOPOGRAPHIC MAP [B-2]

Topographic map (Drawing H-13-00039) is located in Appendix 2A.

2.3 ROADWAY TRAFFIC TO LIQUID EFFLUENT RETENTION FACILITY AND 200 AREA EFFLUENT TREATMENT FACILITY [B-4]

General traffic information for the Hanford Facility is presented in the General Information Portion (DOE/RL-91-28).

Three 6.1-meter-wide roads were built for the LERF. An asphalt perimeter road circumscribes the LERF inside the operational security fence. A gravel road was constructed around the 200 East Area limited access perimeter fence. A second gravel service road running north and south through the area was constructed to connect with the perimeter service road. Vehicle access to the ETF is by a paved road running east from Canton Avenue. Traffic volume on these roads is light.

2.4 RELEASE FROM SOLID WASTE MANAGEMENT UNITS [E]

Information concerning releases from solid waste management units is discussed in the General Information Portion (DOE/RL-91-28). However, no known releases have been detected from the LERF since the installation of the groundwater monitoring network (refer to Chapter 5.0).

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CONTENTS

APPENDIX

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3.0 WASTE ANALYSIS [C]

This chapter provides information on the chemical, biological, and physical characteristics of the aqueous waste treated and stored at LERF and ETF. The information includes waste descriptions, designations, and a waste analysis plan (Appendix 3A) for the treatment and storage of waste.

3.1 CHEMICAL, BIOLOGICAL, AND PHYSICAL ANALYSIS [C-1]

This section describes the chemical, biological, and physical characteristics of the aqueous waste treated and stored at LERF and ETF, including the following:

- A description of the waste types
- A description of the dangerous and/or mixed waste characteristics and a basis for the designation of the waste as dangerous or mixed waste.

Information on sampling methods is provided in the waste analysis plan (Appendix 3A).

3.1.1 Characteristics of Waste Treated at the Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility

The LERF and ETF store and treat 242-A Evaporator process condensate and other aqueous waste streams from onsite waste management and remediation activities. A description of the waste types managed at the LERF and ETF is located in Chapter 1.0.

3.1.2 Characteristics of Waste Streams Generated at the 200 Area Effluent Treatment Facility

The ETF generates a treated effluent stream that is contained in verification tanks. The treated effluent is sampled and held in these tanks until analytical results verify that the effluent meets the 'delisting' criteria (40 CFR 261, Appendix IX, Table 2). Following verification, the treated effluent is released as a nondangerous waste to a disposal site in the 200 West Area.

Two nonaqueous waste streams are generated during the operation of ETF: a waste stream from the treatment process and a waste stream from maintenance and operations activities. The ETF treatment process removes contaminants from an aqueous waste. These contaminants and treatment by-products are concentrated into a powder, containerized, and transferred to the Central Waste Complex (CWC) for storage or to the Low-Level Burial Grounds (LLBG) or the Environmental Restoration Disposal Facility for disposal (as appropriate).

Waste generated from maintenance and operations activities could include, but is not limited to, dewatered spent bead resin, spent membranes, spent high-efficiency particulate air (HEPA) cartridges, spent filter elements, spent activated carbon cartridges, and spent ultraviolet lamps. Nonradioactive dangerous waste from maintenance and operations activities could include chemicals used in the various processes (Chapter 2.0). The maintenance and operations waste is containerized and transferred to an onsite TSD unit, or if nonradioactive, shipped offsite to a TSD facility.

3.2 WASTE ANALYSIS PLAN [C-2]

The *Waste Analysis Plan for Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility* is provided in Appendix 3A.

CONTENTS

CONTENTS (cont)

CONTENTS (cont)

APPENDICES

FIGURES

FIGURES (cont)

TABLES

4.0 PROCESS INFORMATION [D]

This chapter provides a detailed discussion of the LERF and ETF processes and equipment. The LERF and ETF comprise an aqueous waste treatment system located in the 200 East Area that provides storage and treatment for a variety of aqueous radioactive and/or mixed waste. This aqueous waste includes process condensate from the 242-A Evaporator and other aqueous waste generated from onsite remediation and waste management activities.

The LERF consists of three lined surface impoundments, or basins. Aqueous waste from LERF is pumped to the ETF for treatment in a series of process units, or systems, that remove or destroy essentially all of the dangerous waste and radioactive constituents except tritium. The treated effluent is discharged to a State-Approved Land Disposal Site (SALDS) north of the 200 West Area, under the authority of a Washington State Waste Discharge Permit (Ecology 1995a) and the Final Delisting (40 CFR 261, Appendix IX, Table 2).

4.1 LIQUID EFFLUENT RETENTION FACILITY PROCESS DESCRIPTION

Each of the three LERF basins has an operating capacity of 24.6-million liters. The LERF receives aqueous waste through several inlets including the following:

- A pipeline that connects LERF with the 242-A Evaporator
- A pipeline from the 200 West Area
- A pipeline that connects LERF to the Load-In Station at the ETF
- A series of sample ports located at each basin.

Figure 4-1 presents a general layout of LERF and associated pipelines. Engineering drawings for LERF are referenced in Section 4.5 and provided in Appendix 4A.

Aqueous waste from LERF is pumped to the ETF through one of two double-walled fiberglass transfer pipelines. Effluent from the ETF also can be transferred back to the LERF through one of these transfer pipelines. These pipelines are equipped with leak detection located in the annulus between the inner and outer pipes. In the event that these leak detectors are not in service, the pipelines are visually inspected during transfers for leakage by opening the secondary containment drain lines at the ETF end of the transfer pipelines.

Each basin is equipped with six available sample risers constructed of 6-inch perforated pipe. A seventh sample riser in each basin is dedicated to influent aqueous waste receipt piping (except for aqueous waste received from the 242-A Evaporator), and an eighth riser in each basin contains liquid level instrumentation. Each riser extends along the sides of each basin from the top to the bottom of the basin and allow samples to be collected from any depth. Personnel access to these sample ports is from the perimeter area of the basins.

A catch basin is provided at the northwest corner of each LERF basin for aboveground piping and manifolds for transfer pumps. Aqueous waste from the 242-A Evaporator is transferred through piping that ties into piping at the catch basins. Under routine operations, a submersible pump is used to transfer aqueous waste from a LERF basin to the ETF for processing or for basin-to-basin transfers. This pump is connected to a fixed manifold on one of four available risers.

Each basin consists of a multilayer liner system supported by a concrete anchor wall around the basin perimeter and a soil-bentonite clay underlayment. The multilayer liner system consists of a primary liner in contact with the aqueous waste, a layer of bentonite carpet, a geonet, a geotextile, a gravel layer, and a secondary liner that rests on the bentonite underlayment. Any aqueous waste leakage through the primary liner flows through the geonet to a leachate collection system. The leachate flows to a sump at the northwest corner of each basin, where the leachate is pumped up the sideslope and back into the basin above the primary liner. Each liner is constructed of high-density polyethylene. A floating cover made of very low-density polyethylene is stretched over each basin above the primary liner. These covers serve to keep unwanted material from entering the basins, and to minimize evaporation of the liquid contents.

4.2 EFFLUENT TREATMENT FACILITY PROCESS DESCRIPTION

The ETF is designed as a flexible treatment system that provides treatment for contaminants anticipated in process condensate and other onsite aqueous waste. The design influent flow rate into the ETF is approximately 570 liters per minute with planned outages for activities such as maintenance on the ETF systems. Maintenance outages typically are scheduled between treating a batch of aqueous waste, referred to as treatment campaigns. The effluent flow (or volume) is equivalent to the influent flow (or volume).

The ETF generally receives aqueous waste directly from the LERF. However, aqueous waste also can be transferred from the Load-In Station to the ETF. Aqueous waste is treated and stored in the ETF process area in a series of tank systems, referred to as process units. Within the ETF, waste also is stored in containers. Figure 4-1 provides the relative locations of the process and container storage areas within the ETF.

The process units are grouped in either the primary or the secondary treatment train. The primary treatment train provides for the removal or destruction of contaminants. Typically, the secondary treatment train processes the waste by-products from the primary treatment train by reducing the volume of waste. In the secondary treatment train, contaminants are concentrated and dried to a powder. The liquid fraction is routed to the primary treatment train. Figure 4-2 provides an overview of the layout of the ETF (2025E Building). Figure 4-3 presents the ETF floor plan, the relative locations of the individual process units and associated tanks within the ETF, and the location of the Load-In Station.

The dry powder waste and maintenance and operations waste are containerized and stored in the container storage area or in collection areas. Secondary containment is provided for all containers and tank systems (including ancillary equipment) housed within the ETF. The trenches and floor of the ETF comprise the secondary containment system. The floor includes approximately a 15.2-centimeter rise (berm) along the containing walls of the process and container storage areas. Any spilled or leaked material from within the process area or container storage area is collected into trenches that feed into either sump tank 1 or sump tank 2. From these sump tanks, the spilled or leaked material (i.e., waste) is fed to either the surge tank and processed in the primary treatment train or the secondary waste receiving tanks and processed in the secondary treatment train. All tank systems outside of the ETF are provided with a secondary containment system.

In the following sections, several figures are provided that present general illustrations of the treatment units and the relation to the process. Detailed drawings of the ETF are provided in Appendix 4B.

4.2.1 Load-In Station

The ETF receives aqueous waste from LERF or the Load-In Station. The ETF Load-In Station, located due east of the surge tank and outside of the perimeter fence (Figure 4-3), was designed and constructed to provide the capability to unload, store, and transfer aqueous waste to the ETF or LERF from tanker trucks, and potentially other containers (such as drums). The Load-In Station consists of two load-in tanks, transfer pumps, level instrumentation for tanker trucks, leak detection capabilities for the containment basin and transfer line, and an underground transfer line that connects to either the ETF or LERF.

Currently, tanker trucks are used to unload aqueous waste at the Load-In Station. A tanker truck is positioned on a truck pad, a 'load-in' transfer line is connected to the truck, and the tanker contents are pumped into one of the Load-In Station tanks or directly to the LERF. Any leaks at the Load-In Station drain to the sump. A leak detector in the sump alarms locally and in the ETF control room. Alternatively, leaks can be visually detected.

4.2.2 Effluent Treatment Facility Operating Configuration

Because the operating configuration of the ETF can be adjusted or modified, most aqueous waste streams can be effectively treated to below Delisting and Discharge Permit limits. The operating configuration of the ETF depends on the unique chemistry of an aqueous waste stream(s). Before an aqueous waste stream is accepted for treatment, the waste is characterized and evaluated. Information from the characterization is used to adjust the treatment process or change the configuration of the ETF process units, as necessary, to optimize the treatment process for a particular aqueous waste stream.

Typically, an aqueous waste is processed first in the primary treatment train, where the ETF is configured to process an aqueous waste through the UV/OX unit first, followed by the RO unit. However, under an alternate configuration, an aqueous waste could be processed in the RO unit first. For example, high concentrations of nitrates in an aqueous waste might interfere with the performance of the UV/OX. In this case, the ETF could be configured to process the waste in the RO unit before the UV/OX unit.

The flexibility of the ETF also allows for some aqueous waste to be processed in the secondary treatment train first. For example, for small volume aqueous waste with high concentrations of some anions and metals, the approach could be to first process the waste stream in the secondary treatment train. This approach would prevent premature fouling or scaling of the RO unit. The liquid portion (i.e., untreated overheads from the ETF evaporator and thin film dryer) would be sent to the primary treatment train.

Figures 4-4 and 4-5 provide example process flow diagrams for two different operating configurations.

4.2.3 Primary Treatment Train

The primary treatment train consists of the following units:

- Surge tank - inlet, surge capacity
- Filtration - for suspended solids removal
- UV/OX - organic destruction
- pH adjustment - waste neutralization
- Hydrogen peroxide decomposition - removal of excess hydrogen peroxide
- Degasification - removal of carbon dioxide
- RO - removal of dissolved solids and radionuclides
- IX - removal of dissolved solids and radionuclides
- Verification - holding tanks during verification.

Each of the primary treatment train process units and ancillary systems provides treatment for removal or destruction of various constituents. The primary treatment train units are operated as needed in different configurations, as determined by the characteristics of an aqueous waste stream, to protect ETF equipment and to meet discharge requirements.

Influent Receipt/Surge Tank. Depending on the configuration of the ETF, the surge tank is one inlet used to feed an aqueous waste into the ETF for treatment. In Configuration 1 (Figure 4-4), the surge tank is the first component downstream of the LERF. The surge tank provides a storage/surge volume for chemical pretreatment and controls feed flow rates from the LERF to the ETF. However, in Configuration 2 (Figure 4-5), aqueous waste from LERF is fed directly into the treatment units. In this configuration, the surge tank receives aqueous waste that has been processed in the RO units and provides the feed stream to the remaining downstream process units. In yet another configuration, some small volume aqueous waste could be received into the secondary treatment train first for processing. In this case, the aqueous waste would be received directly into the secondary waste receiving tanks. Finally, the surge tank also receives waste extracted from various systems within the primary and secondary treatment train while in operation.

The surge tank is located outside the ETF on the south side. In the surge tank (Figure 4-6), the pH of an aqueous waste is adjusted using the metered addition of sulfuric acid and sodium hydroxide, as necessary, to prepare the waste for treatment in downstream processes. In addition, hydrogen peroxide or biocides could be added to control biological growth in the surge tank. A pump recirculates the contents in the surge tank, mixing the chemical reagents with the waste to a uniform pH.

Filtration. Two primary filter systems remove suspended particles in an aqueous waste: a rough filter removes the larger particulates, while a fine filter removes the smaller particulates. The location of these filters depends on the configuration of the primary treatment train. However, the filters normally are located upstream of the RO units.

The solids accumulating on these filter elements are backwashed to the secondary waste receiving tanks with pulses of compressed air and water, forcing water back through the filter. The backwash operation is initiated either automatically by a rise in differential pressure across the filter or manually by an operator. The filters are cleaned chemically when the backwashing process does not facilitate acceptable filter performance.

Auxiliary fine and rough filters (e.g., disposable filters) have been installed to provide additional filtration capabilities. Depending on the configuration of the ETF, the auxiliary filters are operated either in series with the primary filters to provide additional filtration or in parallel, instead of the primary fine and rough filters, to allow cleaning of the primary fine and rough filters while the primary treatment train is in operation.

Ultraviolet Light/Oxidation. Organic compounds contained in an aqueous waste stream are destroyed in the UV/OX system (Figure 4-7). Hydrogen peroxide is mixed with the waste. The UV/OX system uses the photochemical reaction of UV light on hydrogen peroxide to form hydroxyl radicals and other reactive species oxidize the organic compounds. The final products of the complete reaction are carbon dioxide, water, and inorganic ions.

Organic destruction is accomplished in two UV/OX units operating in parallel. During the UV/OX process, the aqueous waste passes through reaction chambers where hydrogen peroxide is added. While in the UV/OX system, the temperature of an aqueous waste is monitored. Should the temperature of the waste exceed the upper limits for the UV/OX or RO systems, heat exchangers are used to reduce the temperature of the waste.

pH Adjustment. The pH of a waste stream is monitored and controlled at different points throughout the treatment process. Within the primary treatment train, the pH of a waste can be adjusted with sulfuric acid or sodium hydroxide to optimize operation of downstream treatment processes or adjusted before final discharge. For example, the pH of an aqueous waste would be adjusted in the pH adjustment tank after the UV/OX process and before the RO process. In this example, pH is adjusted to cause certain chemical species such as ammonia to form ammonium sulfate, thereby increasing the rejection rate of the RO.

Hydrogen Peroxide Decomposition. Typically, hydrogen peroxide added into the UV/OX system is not consumed completely by the system. Because hydrogen peroxide is a strong oxidizer, the residual hydrogen peroxide from the UV/OX system is removed to protect the downstream equipment. The hydrogen peroxide decomposer uses activated carbon to break down the hydrogen peroxide that is not consumed completely in the process of organic destruction. The aqueous waste is sent through a column of fluidized activated carbon that breaks down the hydrogen peroxide into water and oxygen. The gas generated by the decomposition of the hydrogen peroxide is vented to the vessel offgas system.

Degasification. The degasification column is used to purge dissolved carbon dioxide from the aqueous waste to reduce the carbonate loading to downstream dissolved solids removal processes within the ETF primary treatment train. The purged carbon dioxide is vented to the vessel offgas system.

Reverse Osmosis. The RO system (Figure 4-8) uses pressure to force clean water molecules through semi-permeable membranes while keeping the larger molecule contaminants, such as dissolved solids, radionuclides, and large molecular weight organic materials, in the membrane. The RO process uses a staged configuration to maximize water recovery. The process produces two separate streams, including a clean 'permeate' and a concentrate (or retentate), which are concentrated as much as possible to minimize the amount of secondary waste produced.

The RO process is divided into first and second stages. Aqueous waste is fed to the first RO stage from the RO feed tank. The secondary waste receiving tanks of the secondary treatment train receive the retentate removed from the first RO stage, while the second RO stage receives the permeate (i.e., 'treated' aqueous waste from the first RO stage). In the second RO stage, the retentate is sent to the first stage RO feed tank while the permeate is sent to the IX system or to the surge tank, depending on the configuration of the ETF.

Two support systems facilitate this process. An anti-scale system injects scale inhibitors as needed into the feed waste to prevent scale from forming on the membrane surface. A clean-in-place system using cleaning agents, such as descalants and surfactants, cleans the membrane pores of surface and subsurface deposits that have fouled the membranes.

Ion Exchange. Because the RO process removes most of the dissolved solids in an aqueous waste, the IX process (Figure 4-9) act as a polishing unit. The IX system consist of three columns containing beds of cation and/or anion resins. This system is designed to allow for regeneration of resins and maintenance of one column while the other two are in operation. Though the two columns generally are operated in series, the two columns also can be operated in parallel or individually.

Typically, the two columns in operation are arranged in a primary/secondary (lead/lag) configuration, and the third (regenerated) column is maintained in standby. When dissolved solids breakthrough the first IX column and are detected by a conductivity sensor, this column is removed from service for regeneration, and the second column replaces the first column and the third column is placed into service. The column normally is regenerated using sulfuric acid and sodium hydroxide. The resulting regeneration waste is collected in the secondary waste receiving tanks.

Should regeneration of the IX resins become inefficient, spent resins are transferred into a disposal container. The container is designed to provide dewatering with remote monitoring of the resin and water levels within the container. Displaced air from the vessels is exhausted through an entrainment separator (to remove water drops) and a high-efficiency particulate air filter and into the vessel offgas system. Free water is removed from the container and returned to the surge tank. Dewatered resins are transferred to a final storage/disposal point.

Verification. The three verification tanks (Figure 4-10) are used to hold the treated effluent while a determination is made that the effluent meets discharge limits. Should a treated effluent not meet Discharge Permit or Final Delisting requirements, the effluent can be returned to the primary treatment train for additional treatment or to the LERF.

The three verification tanks alternate between three operating modes: receiving treated effluent, holding treated effluent during laboratory analysis and verification, or discharging verified effluent. Treated effluent may also be returned to the ETF to provide 'clean' service water for operational and maintenance functions, e.g., for boiler water and for backwashing the filters. This recycling keeps the quantity of fresh water used to a minimum.

4.2.4 Secondary Treatment Train

The secondary treatment system typically receives and processes the following by-products generated from the primary treatment train: concentrate from the first RO stage, filter backwash, regeneration waste from the ion exchange system, and spillage or overflow received into the process sumps. Depending on the operating configuration, however, some aqueous waste could be processed in the secondary treatment train before the primary treatment train (refer to Figures 4-4 and 4-5 for example operating configurations).

The secondary treatment train provides the following processes:

- Secondary waste receiving - tank receiving

- Evaporation - concentrates secondary waste streams

- Concentrate staging - concentrate receipt and pH adjustment in concentrate tanks
- Thin film drying - dewatering of secondary waste streams
- Container handling - packaging of dewatered secondary waste.

Secondary Waste Receiving. Waste to be processed in the secondary treatment train is received into two secondary waste receiving tanks, where the pH can be adjusted with sulfuric acid or sodium hydroxide for optimum evaporator performance.

Evaporation. The ETF evaporator is fed alternately by the two secondary waste receiving tanks. One tank serves as a waste receiver while the other tank is operated as the feed tank. The ETF evaporator vessel (also referred to as the vapor body) is the principal component of the evaporation process (Figure 4-11).

Feed from the secondary waste receiving tanks is pumped through a heater to the recirculation loop of the ETF evaporator. In this loop, concentrated waste is recirculated from the ETF evaporator, to a heater, and back into the evaporator where vaporization occurs. As water leaves the evaporator system in the vapor phase, the concentration of the waste in the evaporator increases. When the concentration of the waste reaches the appropriate density, a portion of the concentrate is pumped to one of the concentrate tanks.

The vapor that is released from the ETF evaporator is routed to the entrainment separator, where water droplets and/or particulates are separated from the vapor. The 'cleaned' vapor is routed to the vapor compressor and heater. The steam from the vapor compressor/heater is used to heat the recirculating concentrate in the ETF evaporator. From the vapor compressor/heater, the steam is condensed and fed to the distillate flash tank, where the saturated condensate received from the heater drops to atmospheric pressure and cools to the normal boiling point through partial flashing (rapid vaporization caused by a pressure reduction). The resulting distillate is routed to the surge tank. Noncondensible vapors, such as air, are exhausted by a vacuum blower to the vessel offgas system.

Concentrate Staging. The concentrate tanks make up the head end of the thin film drying process. From the ETF evaporator, concentrate is pumped into two concentrate tanks and pH adjusted. The concentrate tanks function alternately between concentrate receiver and feed tank for the thin film dryer.

Thin Film Drying. From the concentrate tanks, feed is pumped through a preheater to the thin film dryer (Figure 4-12) that is heated by steam. As the concentrated waste flows down the length of the dryer, the waste is dried. The dried film, or powder, is scraped off the dryer cylinder by blades attached to a rotating shaft. The powder is funnelled through a cone-shaped powder hopper at the bottom of the dryer and into the Container Handling System.

Overhead vapor released by the drying of the concentrate is condensed in the distillate condenser. Excess heat is removed from the distillate by a water-cooled heat exchanger. Part of the distillate is circulated back to the condenser spray nozzles. The remaining distillate is pumped to the surge tank. Any noncondensible vapors and particulates from the spray condenser are exhausted to the vessel offgas system.

Container Handling. Before an empty container is moved into the Container Handling System (Figure 4-13), the lids are loosely placed on the containers and the container is placed on a conveyor. After the lid is removed, the containers are moved into the container filling area after passing through an air lock. The empty container is located under the thin film dryer, and raised into position. The container is sealed to the thin film dryer and a rotary valve begins the transfer of powder to the empty container. Air displaced from the container is vented to the entrainment separator attached to the ETF evaporator that exhausts to the vessel offgas system.

The container is filled to a predetermined level, recapped, and moved along the conveyor to the smear station airlock. At the smear station airlock, the container is moved onto the conveyor by remote control. The airlock is opened and the smear sample (surface wipe) is taken and the radionuclide contamination level counted. A 'C' ring is installed to secure the container lid. If the container has contaminated material on the outside, the container is moved to the washdown station and washed. The container wash water drains to sump tank 1. The washed container is air-dried and retested. Filled containers that pass the smear test are labeled, placed on pallets, and moved by forklift to the filled container storage area. Section 4.3 provides a more detailed discussion of container handling.

4.2.5 Other Effluent Treatment Facility Systems

The ETF is provided with support systems that facilitate treatment in the primary and secondary treatment trains and that provide for worker safety and environmental protection. An overview of the following systems is provided:

- Monitor and control system
- Vessel offgas system
- Sump collection system
- Chemical reagent feed system
- Utilities.

4.2.5.1 Monitor and Control System. The operation of the ETF is monitored and controlled by a centralized computer system (i.e., monitor and control system or MCS). The MCS continuously monitors data from various field indicators, such as pH, flow, tank level, temperature, pressure, conductivity, alarm status, and valve switch positions. Data gathered by the MCS enable operations and engineering personnel to document and adjust the operation of the ETF.

4.2.5.2 Vessel Offgas System. Ventilation for various tanks and vessels is provided through the vessel offgas system. The system includes a moisture separator, duct heater, pre-filter, high-efficiency particulate air filters, carbon adsorber, exhaust fans, and ductwork. Gasses ventilated from the tanks and vessels enter the exhaust system through the connected ductwork. The vessel offgas system draws vapors and gasses off the following tanks and treatment systems:

- Surge tank
- ETF evaporator
- pH adjustment tank
- Concentrate tanks
- Degasification system
- First and second RO stages
- Dry powder hopper
- Effluent pH adjustment tank
- Drum capping station
- Secondary waste receiving tanks
- Resin dewatering system
- Distillate condenser (off the thin film dryer)
- Sump tanks 1 and 2.

The vessel offgas system maintains a negative pressure with respect to the atmosphere, which produces a slight vacuum within tanks, vessels, and ancillary equipment for the containment of gas vapor. This system also provides for the collection, monitoring, and treatment of confined airborne in-vessel contaminants to preclude over-pressurization. The high-efficiency particulate air filters remove particulates and condensate from the air stream before these are discharged to the radiologically controlled heating, ventilation, and air conditioning system.

4.2.5.3 Sump Collection System. Sump tanks 1 and 2 compose the sump collection system that provides containment of waste streams and liquid overflow associated with the ETF processes. The process area floor is sloped to two separate trenches that each drain to a sump tank located under the floor of the ETF. One trench runs the length of the primary treatment train and drains to sump tank 2 located underneath the verification tank pump floor. The second trench collects spillage primarily from the secondary treatment train and flows to sump tank 1 located near the ETF evaporator. Sump tanks 1 and 2 are located below floor level (Figure 4-14). An eductor in these tanks prevents sludge from accumulating.

4.2.5.4 Chemical Injection Feed System. At several points within the primary and secondary treatment trains, sulfuric acid and sodium hydroxide (or dilute solutions of these reagents) are metered into specific process units to adjust the pH. For example, a dilute solution of 4 percent sulfuric acid and 4 percent sodium hydroxide could be added to the secondary waste receiving tanks to optimize the evaporation process.

4.2.5.5 Verification Tank Recycle System. To reduce the amount of water added to the process, verification tank water (i.e., verified effluent) is recycled throughout the ETF process. The following tanks and ancillary equipment use verification tank water:

- 4% H_2SO_4 solution tank and ancillary equipment
- 4% NaOH solution tank and ancillary equipment
- Clean-in-place tank and ancillary equipment
- ETF evaporator boiler and ancillary equipment
- Thin film dryer boiler and ancillary equipment.

4.2.5.6 Utilities. The ETF maintains the following utility supply systems required for the operation of the ETF:

- Cooling water system - removes heat from process water via heat exchangers and a cooling tower

- Compressed air system - provides air to process equipment and instrumentation

- Seal water system - provides cool, clean, pressurized water to process equipment for pump seal cooling and pump seal lubrication, and provides protection against failure and fluid leakage

- Demineralized water system - removes solids from raw water system to produce high-quality, low ion-content, water for steam boilers, and for the hydrogen peroxide feed system.

- Heating, ventilation, and air conditioning system - provides continuous heating, cooling, and air humidity control throughout the ETF.

The following utilities support ETF activities:

- Electrical power
- Sanitary water
- Communication systems
- Raw water.

4.3 CONTAINERS [D-1]

This section provides specific information on container storage operations at the ETF, including descriptions of containers, labeling, and secondary containment structures.

A list of dangerous and/or mixed waste stored in containers at the ETF is presented in Chapter 1.0. The types of dangerous and/or mixed waste managed in the container storage areas of the ETF may include the following secondary waste generated by the ETF processes:

- Dry powder waste generated from the treatment process

- Miscellaneous waste generated by operations and maintenance activities.

The secondary treatment train processes the waste by-products from the primary treatment train, which are concentrated and dried into a powder. Containers are filled with dry powder waste from the thin film dryer via a remotely controlled system. Miscellaneous waste generated from maintenance and operations activities also are stored at the ETF. The waste could include process waste, such as used filter elements; spent RO membranes; damaged equipment; and decontamination and maintenance waste, such as contaminated rags, gloves, and other personal protective equipment. Liquids generally are packaged with absorbents at a 2 to 1 ratio.

Several container collection areas could be located within the ETF process and container handling areas. These collection areas are used only to accumulate waste in containers. Once a container is filled, the container is transferred either to the container storage area (Figure 4-3) or to another TSD unit. The container storage area, a 22.9 x 8.5-meter room, is located adjacent to the ETF process area. The containers within the container storage area are clearly labelled, and access to these containers is limited by barriers and by administrative controls. The ETF floor provides secondary containment, and the ETF roof and walls protects all containers from exposure to the elements.

4.3.1 Description of Containers [D-1a]

The containers used to collect and store dry powder waste are 208-liter steel containers. Most of the maintenance and operation waste is stored in 208-liter steel containers; however, in a few cases, the size of the container could vary to accommodate the size of a particular waste. For example, some process waste, such as spent filters, might not fit into a 208-liter container. In the case of spent resin from the IX columns, the resin is dewatered and could be packaged in a special disposal container. In these few cases, specially sized containers could be required. In all cases, however, only approved container are used and are compatible with the associated waste.

Current operating practices indicate the use of new 208-liter containers that either have a polyethylene liner or a protective coating. Any reused or reconditioned container is inspected for container integrity before use. Overpack containers are available for use with damaged containers. Overpack containers typically are unlined steel or polyethylene. Per Chapter 1.0, a maximum of 147,630 liters of dangerous and/or mixed waste could be stored in containers in the ETF.

4.3.2 Container Management Practices [D-1b]

Before use, each container is checked for signs of damage such as dents, distortion, corrosion, or scratched coating. For dry powder loading, empty containers on pallets are raised by a forklift and manually placed on the conveyor that transports the containers to the automatic filling station in the container handling room (Figure 4-13). The container lids are removed and replaced automatically during the filling sequence. After filling, containers exit the container handling room via the filled drum conveyor. Locking rings are installed, the container label is affixed, and the container is moved by dolly or forklift to the container storage area.

Containers used for maintenance and operations secondary waste are labeled before being placed in the container storage area or in a collection area. Lids are secured on these containers when not being filled. When the containers in a collection area are full, the containers are transferred by dolly or forklift to the container storage area or to an appropriate TSD unit.

The filled containers in the container storage area are inventoried, checked for proper labeling, and placed on pallets. Each pallet is moved by forklifts. Within a container storage area, palletized containers are stacked no more then three pallets high and in rows no more than two containers wide. Rows are separated by unobstructed aisles with a minimum of 76-centimeter aisle space.

4.3.3 Container Labeling [D-1c]

Labels are affixed on containers used to store dry powder when the containers leave the container handling room. Labels are affixed on maintenance and operations waste containers before being placed in a container storage area. Every container is labeled with the date that the container was filled. Appropriate major risk labels, such as "corrosive", "toxic" or "F-listed", also are added. Each container also has a label with an identification number for tracking purposes.

4.3.4 Containment Requirements for Storing Containers [D-1d]

Secondary containment is provided in the container storage area and the collection areas, though the containers are not anticipated to contain appreciable liquids. The secondary containment provided for tank systems also serves the container storage area and the collection areas. This section describes the design and operation of the secondary containment structure for the container storage area and collection areas. Detailed drawings of the ETF secondary containment systems are presented in Appendix 4B.

4.3.4.1 Secondary Containment System Design [D-1d(1)(a)]. For the container storage area and the collection areas within the ETF, secondary containment is provided by the reinforced concrete floor and a 15.2-centimeter rise (berm) along the walls of the container storage areas of the ETF. The engineering assessment required for tanks (Mausshardt 1995) also describes the design and construction of the secondary containment provided for the ETF container storage areas. All systems were designed to national codes and standards (e.g., American Society for Testing Materials, American Concrete Institute standards).

The floor in composed of cast-in-place and pre-formed concrete slabs and has a minimum thickness of 15.2 centimeters. All slab joints and floor and wall joints have waterstops installed at the mid-depth of the slab. In addition, filler was applied to each joint. The floor and berms are coated with a chemically resistant, high-solids epoxy coating system consisting of primer, filler, and top coating. This coating material is compatible with the waste stored in containers and is an integral part of the secondary containment system for containers.

The floor is sloped to drain any solution in the container storage area to floor drains along the west wall. Each floor drain consists of a grating over an 20.3-centimeter drain port connected to a 4-inch stainless steel transfer pipe. The pipe passes under this wall and connects to a trench running along the east wall of the adjacent process area. This trench drains solution to sump tank 1.

The container storage area is separated from the process area by a common wall and a door for access to the two areas (Figure 4-2). These two areas also share a common floor and trenches that, with the 15.2-centimeter rise of the containing walls, form the secondary containment system for the process area and the container storage area.

4.3.4.1.1 Structural Integrity of Base [D-1d(1)(b)]. Engineering calculations were performed showing the floor of the container storage area is capable of supporting the weight of containers. These calculations were reviewed and certified by a professional engineer (Mausshardt 1995). The concrete was inspected for damage during construction. Cracks were identified and repaired to the satisfaction of the professional engineer. Documentation of these certifications is included in the engineering assessment (Mausshardt 1995) and a copy of the certification is provided in Appendix 4C.

4.3.4.1.2 Containment System Capacity [D-1d(1)(c)]. The container storage area is primarily used to store dry powder and maintenance and operation waste. Where appropriate, absorbents are added to fix any trace liquids present. Large volumes of liquid are not stored in the container storage area. The maximum volume of waste that can be stored in containers in the container storage area is 147,630 liters.

Both the process area and the container storage area are considered in the containment system capacity. The volume available for secondary containment in the process area is approximately 68,000 liters, as discussed in the engineering assessment (Mausshardt 1995). Using the dimensions of the container storage area (22.9 by 8.5 by 0.15 meters), and assuming that 50 percent of the floor area is occupied by containers, the volume of the container storage area is 14,900 liters. The combined volume of both the container storage and process areas available for secondary containment, therefore, is 82,900 liters. This volume is greater than 10 percent of the maximum total volume of containers allowed for storage in the ETF, as discussed previously.

4.3.4.1.3 Control of Run-on [D-1d(1)(d)]. The container storage area and collection areas are located within the ETF, which serves to prevent run-on of precipitation.

4.3.4.2 Removal of Liquids from Containment Systems [D-1d(2)]. The container storage area is equipped with drains that route solution to a trench in the process area which drains to sump tank 1. The sump tanks are equipped with alarms that notify operating personnel that a leak is occurring. The sump tanks also are equipped with pumps to transfer waste to the surge tank or the secondary treatment train.

4.3.4.3 Prevention of Ignitible, Reactive, and Incompatible Wastes in Containers [D-1f]. Individual waste types, i.e., ignitable, corrosive, and reactive, are stored in separate containers. A waste that could be incompatible with other wastes is separated and protected from the incompatible waste. For example, acidic and caustic wastes are stored in separate containers. Free liquids are absorbed in containers that hold incompatible waste at a 2 to 1 ratio. Additionally, ETF-specific packaging requirements for these types of waste provide extra containment with each individual container. For example, each item of acidic waste is individually bagged and sealed within a lined container.

4.4 TANK SYSTEMS [D-2]

This section provides specific information on tank systems, including a discussion on the types of waste to be managed in the tanks, tanks design information, integrity assessments, and additional information on the ETF tanks that treat and store dangerous and/or mixed waste. Detailed drawings of the ETF tank systems are provided in Appendix 4B.

The relative locations of the tanks in the ETF are presented in Figure 4-3. The major process units and tanks include:

- Load-In Station
- UV/OX
- RO
- IX/Polishers
- Verification tanks
- ETF evaporator
- Thin film dryer.

4.4.1 Design Requirements [D-2a(1)]

The following sections provide an overview of the design specifications for the tanks within the ETF. A separate discussion on the design of the process units also is provided. In accordance with the new tank system requirements of WAC 173-303-640(3), the following tank components and specifications were assessed:

- Dimensions, capacities, wall thicknesses, and pipe connections

- Materials of construction and linings and compatibility of materials with the waste being processed

- Materials of construction of foundations and structural supports

- Review of design codes and standards used in construction

- Review of structural design calculations, including seismic design basis

- Waste characteristics and the affects of waste on corrosion.

This assessment was documented in the *Final RCRA Information Needs Report* (Mausshardt 1995), the engineering assessment performed for the ETF tank systems by an independent professional engineer. A similar assessment of design requirements was performed for the load-in tanks and is documented in *200 Area Effluent BAT/AKART Implementation, ETF Truck Load-In Facility, Project W-291H Integrity Assessment Report* (KEH 1994).

The specifications for the preparation, design, and construction of the tanks systems at the ETF are documented in the *Design Construction Specification, Project C-018H, 242-A Evaporator/PUREX Plant Process Condensate Treatment Facility* (WHC 1992a). The preparation, design, and construction of the load-in tanks are provided in the construction specifications in *Project W-291, 200 Area Effluent BAT/AKART Implementation ETF Truck Load-in Facility* (KEH 1994).

Most of the tanks in the ETF are constructed of stainless steel. According to the design of the ETF, it was determined that stainless steel would provide adequate corrosion protection for these tanks. Exceptions include the verification tanks, which are constructed of carbon steel with an epoxy coating. The ETF evaporator/vapor body (and the internal surfaces of the thin film dryer) are constructed of a corrosion resistent alloy, known as alloy 625, to address the specific corrosion concerns in the secondary treatment train. Finally, the hydrogen peroxide decomposer vessels are constructed of carbon steel and coated with a vinyl ester lining.

The shell thicknesses of the tanks identified in this table represent a nominal thickness of a new tank when placed into operation. The tank capacities identified in this table represent the maximum operating volumes. For certain tanks (as indicated in the table), the maximum operating volume is also the nominal (routine) operating capacity. Nominal tank volumes represent the volume betwen the low-level and high-level shutoffs in a tank unit.

Dangerous and/or mixed waste that can be treated or stored in the ETF tanks is presented in Chapter 1.0. Aqueous waste, in addition to process condensate, that is treated and stored at the LERF and ETF includes, but is not limited to, the following: contaminated groundwater from pump-and-treat remediation activities such as groundwater from the 200-UP-1 Operable Unit; water from deactivation activities such as water from the spent fuel storage basins at deactivated reactors (e.g., N Reactor); laboratory aqueous waste from unused samples and sample analyses; and leachate from landfills, such as the Environmental Restoration Disposal Facility.

Before accepting a new aqueous waste stream at the LERF or ETF, an evaluation of the waste characteristics is performed to determine the treatability of the aqueous waste, including the potential to corrode the ETF tanks. This acceptance evaluation is discussed in the waste analysis plan (Appendix 3A). If the evaluation indicates a new aqueous waste stream would significantly increase corrosion rates, processing actions are initiated to reduce corrosion. These actions might include blending the aqueous waste with other aqueous waste or adjusting the pH of the aqueous waste to reduce corrosion.

4.4.1.1 Codes and Standards for Tank System Construction. Specific standards for the manufacture of tanks and process systems installed in the ETF are briefly discussed in the following sections. In addition to these codes and industrial standards, a seismic analysis for each tank and process system is required [WAC 173-303-806(4)(a)(xi)]. The seismic analysis is performed in accordance with UCRL-15910 *Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards*, Section 4 (UCRL 1987). The results of the seismic analyses are summarized in the engineering assessment of the ETF tank systems (Mausshardt 1995).

Storage and Treatment Tanks. The following tanks that store and/or treat aqueous waste at the ETF are maintained at or near atmospheric pressure.

Tank name	Tank number
Surge tank	2025E-60A-TK-1
pH adjustment tank	2025E-60C-TK-1
Effluent pH adjustment tank	2025E-60C-TK-2
First RO feed tank	2025E-60F-TK-1
Second RO feed tank	2025E-60F-TK-2
Verification tanks (three)	2025E-60H-TK-1A/1B/1
Secondary waste receiving tanks (two)	2025E-60I-TK-1A/1B
Concentrate tanks (two)	2025E-60J-TK-1A/1B
Sump tanks (two)	2025E-20B-TK-1/2
Distillate flash tank	2025E-60I-TK-2

The relative location of these tanks is presented in Figure 4-2. The codes and standards applicable to the design, construction, and testing of the above tanks and ancillary piping systems are as follows:

ASME - B31.3	Chemical Plant and Petroleum Refinery Piping (ASME 1990)
ASME Sect. VIII, Division I	Pressure Vessels (ASME 1992a)
AWS - D1.1	Structural Welding Code - Steel (AWS 1992)
ANSI - B16.5	Pipe Flanges and Flanged Fittings (ANSI 1992)
ASME Sect. IX	Welding and Brazing Qualifications (ASME 1992b)
API 620	Design and Construction of Large Welded Low Pressure Storage Tanks (API 1990)

AWWA - D100	Welded Steel Tanks for Water Storage (AWWA 1989)
AWWA - D103	Factory-Coated Bolted Steel Tanks for Water Storage (AWWA 1987)
AWWA - D120	Thermosetting Fiberglass-Reinforced Plastic Tanks (AWWA 1984).

The application of these standards to the construction of ETF tanks and independent verification of completed systems ensured that the tank and tank supports had sufficient structural strength and that seams and connections were adequate to ensure tank integrity. In addition, each tank met strict quality assurance requirements. Each tank constructed offsite was tested for integrity and leak tightness before shipment to the Hanford Facility. Following installation, the systems were inspected for damage to ensure against leakage and to verify proper operation. If a tank was damaged during shipment or installation, leak tightness testing was repeated onsite.

4.4.1.2 Design Information for Tanks Located Outside of Effluent Treatment Facility. The load-in tanks, surge tank, and verification tanks are located outside the ETF. These tanks are located within concrete structures that provide secondary containment.

Load-In Tanks and Ancillary Equipment. The load-in tanks are constructed of stainless steel, are heated, and have a nominal capacity of 37,900 liters. Ancillary equipment includes transfer pumps, a double-encased, fiberglass transfer pipeline, level instruments for tanker trucks, and leak detection equipment. From the Load-In Station, aqueous waste can be routed to the surge tank or to the LERF through a double-encased line. The load-in tanks, sump, pumps, and truck pad are all provided with secondary containment.

Surge Tank and Ancillary Equipment. The surge tank is constructed of stainless steel and has a nominal capacity of 379,000 liters. Ancillary equipment to the surge tank includes two underground double-encased (i.e., pipe-within-a-pipe) transfer lines connecting to LERF and three pumps for transferring aqueous waste to the primary treatment train. The surge tank is located at the south end of the ETF. The surge tank is insulated and the contents heated to prevent freezing. Eductors in the tank provide mixing.

Verification Tanks and Ancillary Equipment. The verification tanks are located north of the ETF. The verification tanks have a nominal capacity of 2,540,000 liters each. For support, the tanks have a center post with a webbing of beams that extend from the center post to the sides of the tank. The roof is constructed of epoxy covered carbon steel that is attached to the cross beams of the webbing. The tank floor also is constructed of epoxy covered carbon steel and is sloped. Eductors are installed in each tank to provide mixing.

Ancillary equipment includes a return pump that provides circulation of treated effluent through the eductors. The return pump also recycles effluent back to the ETF for retreatment and can provide service water for ETF functions. Two transfer pumps are used to discharge treated effluent to SALDS or back to the LERF.

4.4.1.3 Design Information for Tanks Located Inside the Effluent Treatment Facility Building. Most of the ETF tanks and ancillary equipment that store or treat dangerous and/or mixed waste are located within the ETF. The structure serves as secondary containment for the tank systems.

pH Adjustment Tank and Ancillary Equipment. The pH adjustment tank has a nominal capacity of 9,800 liters. Ancillary equipment for this tank includes overflow lines to a sump tank and pumps to transfer waste to other units in the main treatment train.

Effluent pH Adjustment Tank and Ancillary Equipment. The effluent pH adjustment tank has a nominal capacity of 9,500 liters. Ancillary equipment includes overflow lines to a sump tank and pumps to transfer waste to the verification tanks.

First and Second Reverse Osmosis Feed Tanks and Ancillary Equipment. The first RO feed tank is a vertical, stainless steel tank with a round bottom and has a nominal capacity of 11,400 liters. Conversely, the second RO feed tank is a rectangular vessel with the bottom of the tank sloping sharply to a single outlet in the bottom center. The second RO feed tank has a nominal capacity of 7,600 liters. Each RO tank has a pump to transfer waste to the RO arrays. Overflow lines are routed to a sump tank.

Secondary Waste Receiving Tanks and Ancillary Equipment. Two 57,000-liter secondary waste receiving tanks collect waste from the units in the main treatment train, such as reject solution (retentate) from the RO units and regeneration solution from the IX columns. These are vertical, cylindrical tanks with a semi-elliptical bottom and a flat top. Ancillary equipment includes overflow lines to a sump tank and pumps to transfer aqueous waste to the ETF evaporator.

Effluent Treatment Facility Evaporator and Ancillary Equipment. The ETF evaporator, the principal component of the evaporation process, is a cylindrical pressure vessel with a conical bottom. Aqueous waste is fed into the lower portion of the vessel. The top of the vessel is domed and the vapor outlet is configured to prevent carryover of liquid during the foaming or bumping (violent boiling) at the liquid surface. The ETF evaporator has a capacity of approximately 21,000 liters.

The ETF evaporator includes the following ancillary equipment:

- Preheater
- Recirculation pump
- Waste heater with steam level control tank
- Concentrate transfer pump
- Entrainment separator
- Vapor compressor with silencers
- Silencer drain pump.

Distillate Flash Tank and Ancillary Equipment. The distillate flash tank is a horizontal tank that has an nominal operating capacity of 570 liters.

Ancillary equipment includes a pump to transfer the distillate to the surge tank for reprocessing.

Concentrate Tanks and Ancillary Equipment. Each of the two concentrate tanks has an approximate capacity of 18,900 liters. Ancillary equipment includes overflow lines to a sump tank and pumps for recirculation and transfer.

Sump Tanks. Sump tanks 1 and 2 are located below floor level. Both sump tanks are double-walled, rectangular tanks, placed inside concrete vaults. Both tanks have a working volume of 3,000 liters each. The sump tanks are located in pits belowgrade to allow gravity drain of solutions to the tanks. Each sump tank has two vertical pumps for transfer of waste to the secondary waste receiving tanks or to the surge tank for reprocessing.

4.4.1.4 Design Information for Effluent Treatment Facility Process Units. As with the ETF tanks, process units that treat and/or store dangerous and/or mixed waste are maintained at or near atmospheric pressure. These units were constructed to meet a series of design standards, as discussed in the following sections. Table 4-2 presents the materials of construction and the ancillary equipment associated with these process units. All piping systems are designed to withstand the effects of internal pressure, weight, thermal expansion and contraction, and any pulsating flow. The design and integrity of these units are presented in the engineering assessment (Mausshardt 1995).

Filters. The fine and rough filter vessels (including the auxiliary filters) are designed to comply with the ASME Section VIII, Division I, Pressure Vessels (ASME 1992a). The application of these standards to the construction of the ETF filter system and independent inspection ensure that the filter and filter supports have sufficient structural strength and that the seams and connections are adequate to ensure the integrity of the filter vessels.

Ultraviolet Oxidation System. The UV/OX reaction chamber is designed to comply with manufacturers standards.

Degasification System. The codes and standards applicable to the design, fabrication, and testing of the degasification column are identified as follows:

ASME Section VIII, Division I, Pressure Vessels (ASME 1992a)
ASME - B31.3, Chemical Plant and Petroleum Refinery Piping (ASME 1990)
AWS - D1.1, Structural Welding Code - Steel (AWS 1992)
ANSI - B16.5, Pipe Flanges and Flanged Fittings (ANSI 1992).

Reverse Osmosis System. The pressure vessels in the RO unit are designed to comply with ASME Section VIII, Division I, Pressure Vessels (ASME 1992a), and applicable codes and standards.

Ion Exchange (Polishers). The IX columns are designed in accordance with ASME Section VIII, Division I, Pressure Vessels (ASME 1992a), and applicable codes and standards. Polisher piping is fabricated of type 304 stainless steel or polyvinyl chloride (PVC) and meets the requirements of ASME B31.3, Chemical Plant and Petroleum Refinery Piping (ASME 1990).

Effluent Treatment Facility Evaporator. The ETF evaporator is designed to meet the requirements of ASME Section VIII, Division I, Pressure Vessels (ASME 1992a), and applicable codes and standards. The ETF evaporator piping meets the requirements of ASME B31.3, Chemical Plant and Petroleum Refinery Piping (ASME 1990).

Thin Film Dryer System. The thin film dryer is designed to meet the requirements of ASME Section VIII, Division I, Pressure Vessels (ASME 1992a), and applicable codes and standards. The piping meets the requirements of ASME - B31.3, Chemical Plant and Petroleum Refinery Piping (ASME 1990).

4.4.2 Integrity Assessments [D-2a(2)]

The integrity assessment for ETF (Mausshardt 1995) attests to the adequacy of design and integrity of the tanks and ancillary equipment to ensure that the tanks and ancillary equipment will not collapse, rupture, or fail over the intended life considering intended uses. For the load-in tanks, a similar integrity assessment was performed (KEH 1995). Specifically, the assessment documents the following considerations:

- Adequacy of the standards used during design and construction of the facility

- Characteristics of the solution in each tank

- Adequacy of the materials of construction to provide corrosion protection from the solution in each tank

- Results of the leak tests and visual inspections.

The results of these assessments demonstrate that tanks and ancillary equipment have sufficient structural integrity and are acceptable for storing and treating dangerous and/or mixed waste. The assessments also state that the tanks and building were designed and constructed to withstand a design-basis earthquake. These tank assessments were certified by independent, qualified registered professional engineers.

The scope of the ETF tank integrity assessment was based on characterization data from process condensate. To assess the effect that other aqueous waste might have on the integrity of the ETF tanks, the chemistry of an aqueous waste will be evaluated for its potential to corrode a tank (e.g., chloride concentrations will be evaluated). The tank integrity assessment for the load-in tanks was based on characterization data from several aqueous waste streams. The chemistry of an aqueous waste stream not considered in the load-in tank integrity assessment also will be evaluated for the potential to corrode a load-in tank.

Consistent with the recommendations of the integrity assessment, a corrosion inspection program was developed. Periodic integrity assessments are scheduled for those tanks that are predicted to have the highest potential for corrosion. These inspections are scheduled annually or longer to follow the end of a treatment campaign. These 'indicator tanks' include the concentrate tanks, secondary waste receiving tanks, and verification tanks. One of each of these tanks will be inspected yearly to determine if corrosion or coating failure has occurred. Should significant corrosion or coating failure be found, an additional tank of the same type will be inspected during the same year. In the case of the verification tanks, if corrosion or coating failure is found in the second tank, the third tank also will be inspected. If significant corrosion is observed in all three sets of indicator tanks, the balance of the ETF tanks would be considered for inspection. For tanks predicted to have lower potential for corrosion, inspections also are performed nonroutinely as part of the corrective maintenance program.

4.4.3 Additional Requirements for New Tanks [D-2a(4)]

Procedures for proper installation of tanks, tank supports, piping, concrete, etc., are included in *Construction Specification, Project C-018H, 242-A Evaporator/PUREX Plant Process Condensate Treatment Facility* (WHC 1992a). For the load-in tanks, procedures are included in the construction specifications in *Project W-291, 200 Area Effluent BAT/AKART Implementation ETF Truck Load-in Facility* (KEH 1994). Following installation, the tanks and secondary containment were inspected by an independent, qualified, registered professional engineer. Deficiencies identified included damage to the surge tank, damage to the verification tank liners, and ETF secondary containment concrete surface cracking. All deficiencies were repaired to the satisfaction of the engineer. The tanks and ancillary equipment were leak tested as part of acceptance of the system from the construction contractor. Information on the inspections and leak tests are included in the engineering assessment (Mausshardt 1995). No deficiencies were identified during installation of the load-in tanks and ancillary equipment.

4.4.4 Secondary Containment and Release Detection for Tank Systems [D-2b]

This section describes the design and operation of secondary containment and leak detection systems at the ETF.

4.4.4.1 Secondary Containment Requirements for All Tank Systems [D-2b(1)]. The specifications for the preparation, design, and construction of the secondary containment systems at the ETF are documented (WHC 1992a). The preparation, design, and construction of the secondary containment for the load-in tanks are provided in the construction specifications (KEH 1994). All systems were designed to national codes and standards. Constructing the ETF per these specifications ensured that foundations are capable of supporting tank and secondary containment systems and that uneven settling and failures from pressure gradients should not occur.

4.4.4.1.1 Common Elements. The following text describes elements of secondary containment that are common to all ETF tank systems. Details on the secondary containment for specific tanks, including leak detection systems and liquids removal, are provided in Section 4.4.5.1.

Foundation and Construction. For the tanks within the ETF, except for the sump tanks, secondary containment is provided by a coated concrete floor and a 15.2-centimeter rise (berm) along the containing walls. The double-wall construction of the sump tanks provides secondary containment. Additionally, trenches are provided in the floor that also provide containment and drainage of any liquid to a sump pit. For tanks outside the ETF, secondary containment also is provided with coated concrete floors in a containment pit (load-in tanks) or surrounded by concrete dikes (the surge and verification tanks).

The transfer piping that carries aqueous waste into the ETF is pipe-within-a-pipe construction, and is buried approximately 1.2 meters below ground surface. The pipes between the verification tanks and the verification tank pumps within the ETF are located in a concrete pipe trench.

For the purpose of this discussion, there are five discrete secondary containment systems associated with the following tanks and ancillary equipment that treat or store dangerous and/or waste:

- Load-in tanks
- Surge tank
- Process area (including sump tanks)
- Verification tanks
- Transfer piping and pipe trenches.

All of the secondary containment systems are designed with reinforcing steel and base and berm thickness to minimize failure caused by pressure gradients, physical contact with the waste, and climatic conditions. Classical theories of structural analysis, soil mechanics, and concrete and structural steel design were used in the design calculations for the foundations and structures. These calculations are maintained at the ETF. In each of the analyses, the major design criteria from the following documents were included:

• V-C018HC1-001	Design Construction Specification, Project C-018H, 242A Evaporator/PUREX Plant Process Condensate Treatment Facility (WHC 1992a)
• DOE Order 6430.1A	General Design Criteria
• SDC-4.1	Standard Architectural-Civil Design Criteria, Design Loads for Facilities (DOE-RL 1988)
• UCRL-15910	Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards (UCRL 1987)
• UBC-91	Uniform Building Code, 1991 Edition (ICBO 1991).

The design and structural analysis calculations substantiate the structural designs in the referenced drawings. The conclusions drawn from these calculations indicate that the designs are sound and that the specified structural design criteria were met. This conclusion is verified in the independent design review that was part of the engineering assessment (Mausshardt 1995).

Containment Materials. The concrete floor consists of cast-in-place and preformed concrete slabs. All slab joints and floor and wall joints have waterstops installed at the mid-depth of the slab. In addition, filler was applied to each joint.

Except for the sump tank vaults, all of the concrete surfaces in the secondary containment system, including berms, trenches, and pits, are coated with a chemical-resistant, high-solids, epoxy coating that consists of a primer, filler, and a top coating. This coating material is compatible with the waste being treated, and with the sulfuric acid, sodium hydroxide, and hydrogen peroxide additives to the process. The coating protects the concrete from contact with any chemical materials that might be harmful to concrete and prevents the concrete from being in contact with waste material. Table 4-3 summarizes the specific types of filler, primer, second, and finish coats specified for the concrete and masonry surfaces in the ETF. The epoxy coating is considered integral to the secondary containment system for the tanks and ancillary equipment.

The concrete containment systems are maintained such that any cracks, gaps, holes, and other imperfections are repaired in a timely manner. Thus, the concrete containment systems do not allow spilled liquid to reach soil or groundwater. There are a number of personnel doorways and vehicle access points into the ETF process area. Releases of any spilled or leaked material to the environment from these access points are prevented by a 15.2-centimeter concrete curbs, sloped areas of the floor (e.g., truck ramp), or trenches.

Containment Capacity and Maintenance. Each of these containment areas is designed to contain more than 100 percent of the volume of the largest tank in each respective system. Secondary containment systems for the surge tank, and the verification tanks, which are outside the ETF, also are large enough to include the additional volume from a 100-year, 24-hour storm event; i.e., 5.3 centimeters of precipitation.

Sprinkler System. The sprinkler system within the ETF supplies fire water protection to the process area. This system is connected to a sitewide water supply system and has the capacity to supply at least 20 minutes of fire water. However, in the event of failure, the sprinkler system can be hooked up to another water source (e.g., tanker truck).

4.4.4.1.2 Specific Containment Systems. The following discussion presents a description of the individual containment systems associated with specific tank systems.

Load-In Tank Secondary Containment. The load-in tanks are mounted on a 46-centimeter-thick reinforced concrete slab (Drawing H-2-817970,

Appendix 4B). Secondary containment is provided by a pit with 30.5-centimeter-thick walls and a floor constructed of reinforced concrete. The load-in tank pit is sloped to drain solution to a sump. The depth of the pit varies with the slope of the floor, with an average thickness of about 1.1 meters. The volume of the secondary containment is about 79,000 liters, which is capable of containing the volume of at least one load-in tank (i.e., 37,800 liters). Leaks are detected by a leak detector that alarms locally and in the ETF control room and by visual inspection of the secondary containment.

Adjacent to the pit is a 25.4-centimeter-thick reinforced concrete pad that serves as secondary containment for the load-in tanker trucks and transfer pumps. The pad is 15.2 centimeters below grade with north and south walls gently sloped to allow truck access. The pad has drain pipes to route waste to the adjacent load-in tank pit.

Surge Tank Secondary Containment. The surge tank is mounted on a reinforced concrete ringwall. Inside the ringwall, the flat-bottomed tank is supported by a bed of compacted sand and gravel with a high-density polyethylene liner bonded to the ringwall. The liner prevents galvanic corrosion between the soil and the tank. The secondary containment is reinforced concrete with a 15.2-centimeter thick floor and a 20.3-centimeter thick dike. The secondary containment area shares part of the southern wall of the main process area. The dike extends up 2.9 meters to provide a containment volume of 740,000 liters for the 379,000 liter surge tank.

The floor of the secondary containment slopes to a sump in the northwest corner of the containment area. Leaks into the secondary containment are detected by level instrumentation in the sump, which alarms in the ETF control room, and/or by routine visual inspections. A sump pump is used to transfer solution in the secondary containment to a sump tank.

Process Area Secondary Containment. The process area contains the tanks and ancillary equipment of the primary and secondary treatment trains, and has a jointed, reinforced concrete slab floor. The concrete floor of the process area provides the secondary containment. This floor is a minimum of 15.2 centimeters thick. With door sills 15.2 centimeter high, the process area has a containment volume of 76,200 liters. The largest tanks in the process area are the secondary waste receiving tanks, which each have a maximum capacity of 56,800 liters.

The floor of the process area is sloped to drain liquids to two trenches that drain to a sump. Each trench is approximately 38.1 centimeters wide with a sloped trough varying from 39.4 to 76.2 centimeters deep. Leaks into the secondary containment are detected by routine visual inspections of the floor area near the tanks, ancillary equipment, and in the trenches.

The northwest corner of the process area consists of a pump pit containing the pumps and piping for transferring treated effluent from the verification tanks to SALDS. The pit is built 1.37 meters below the process area floor level and is sloped to drain to a trench built along its north wall that routes liquid to sump tank 1. Leaks into the secondary containment of the pump pit are detected by routine visual inspections.

Sump Tanks. The sump tanks support the secondary containment system, and collect waste from several sources, including:

- Process area drain trenches
- Tank overflows and drains
- Container washing water
- Resin dewatering solution
- Steam boiler blowdown
- Sampler system drains.

These double-contained tanks are located within unlined, concrete vaults. The sump tank levels are monitored by remote level indicators or through visual inspections from the sump covers. These indicators are connected to high- and low-level alarms that are monitored in the control room. When a high-level alarm is activated, a pump is activated and the sump tank contents usually are routed to the secondary treatment train for processing. The contents also could be routed to the surge tank for treatment in the primary treatment train. In the event of an abnormally high inflow rate, a second sump pump is initiated automatically.

Verification Tank Secondary Containment. The three verification tanks are each mounted on ringwalls with high-density polyethylene liners similar to the surge tank. The secondary containment for the three tanks is reinforced concrete with a 15.2-centimeter thick floor and a 20.3-centimeter thick dike. The dike extends up 2.6 meters to provide a containment of 110 percent of the capacity of a single tank (i.e., 2,800,000 liters).

The floor of the secondary containment slopes to a sump along the southern wall of the dike. Leaks into the secondary containment are detected by level instrumentation in the sump that alarms in the control room and/or by routine visual inspections. A sump pump is used to transfer solution in the secondary containment to a sump tank.

4.4.4.2 Additional Requirements for Specific Types of Systems [D-2b(2)].

This section addresses additional requirements in WAC 173-303-640 for double-walled tanks like the sump tanks and secondary containment for ancillary equipment and piping associated with the tank systems.

4.4.4.2.1 Double-Walled Tanks [D-2b(2)(b)]. The sump tanks are the only tanks in the ETF classified as 'double-walled' tanks. These tanks are located in unlined concrete vaults and support the secondary containment system for the process area. The sump tanks are equipped with a leak detector between the walls of the tanks that provide continuous monitoring for leaks. The leak detector provides immediate notification through an alarm in the control room. The inner tanks are contained completely within the outer shells. The tanks are contained completely within the concrete structure of the ETF so corrosion protection from external galvanic corrosion is not necessary.

4.4.4.2.2 Ancillary Equipment [D-2b(2)(c)]. The secondary containment provided for the tanks and process systems also serves as secondary containment for the ancillary equipment associated with these systems.

Ancillary Equipment. Section 4.4.5.1 describes the secondary containment systems that also serve most of the ancillary equipment within the ETF. Between the ETF and the verification tanks, a pipeline trench provides secondary containment for four pipelines connecting the transfer pumps (i.e., discharge and return pumps) in the ETF with the verification tanks (Figure 4-1). This concrete trench crosses under the road and extends from the verification tank pumps to the verification tanks. Treated effluent flows through these pipelines from the verification tank pumps to the verification tanks. The return pump is used to return effluent to the ETF for use as service water or for reprocessing.

For all of the ancillary equipment housed within the ETF, the concrete floor, trenches, and berms form the secondary containment system. For the ancillary equipment of the surge tank and the verification tanks, secondary containment is provided by the concrete floors and dikes associated with these tanks. The concrete floor and pit provide secondary containment for the ancillary equipment of the load-in tanks.

Transfer Piping and Pipe Trenches. The two buried transfer lines between LERF and the surge tank have secondary containment in a pipe-within-a-pipe arrangement. The 4-inch transfer line has an 8-inch outer pipe, while the 3-inch transfer line has a 6-inch outer pipe. The pipes are fiberglass and are sloped towards the surge tank. The outer piping ends with a drain valve in the surge tank secondary containment.

These pipelines are equipped with leak detection located in the annulus between the inner and outer pipes, which have the ability to continuously 'inspect' the pipelines during aqueous waste transfers. The alarms on the leak detection system are monitored in the control room. In the event that these leak detectors are not in service, the pipelines are inspected during transfers by opening a drain valve to check for solution in the annular space between the inner and outer pipe.

The 3-inch transfer line between the load-in tanks and the surge tank has a 6-inch outer pipe in a pipe-within-a-pipe arrangement. The piping is made of fiberglass reinforced plastic and slopes towards the load-in tank secondary containment pit. The drain valve and leak detection system for the load-in tank pipelines are operated similarly to the leak detection system for the LERF to ETF pipelines.

As previously indicated, there are four reinforced concrete pipe trenches that provide secondary containment for piping under the roadway between the ETF and the verification tanks. Each trench is 1.2 meters wide and 0.76 meter deep and slopes towards the sump containing the transfer pumps to SALDS. The floor of the trenches are 30.5 centimeters thick and the sides are 15.2 centimeters thick. The concrete trenches are coated with water sealant and covered with metal gratings at ground level to allow vehicle traffic on the roadway.

4.4.5 Tank Management Practices [D-2d]

When an aqueous waste stream is identified for treatment or storage at ETF, the generating unit is required to characterize the waste. Based on characterization data, the waste stream is evaluated to determine if the stream is acceptable for treatment or storage. Specific tank management practices are discussed in the following sections.

4.4.5.1 Rupture, Leakage, Corrosion Prevention. Most aqueous waste streams can be managed such that corrosion would not be a concern. For example, an aqueous waste stream with high concentrations of chloride might cause corrosion problems when concentrated in the secondary treatment train. One approach is to adjust the corrosion control measures in the secondary treatment train. An alternative might be to blend this aqueous waste in a LERF basin with another aqueous waste that has sufficient dissolved solids, such that the concentration of the chlorides in the secondary treatment train would not pose a corrosion concern.

Additionally, the materials of construction used in the tanks systems (Table 4-1) make it unlikely that a aqueous waste would corrode a tank. For more information on corrosion prevention, refer to the waste analysis plan (Appendix 3A).

When a leak in a tank system is discovered, the leak is immediately contained or stopped by isolating the leaking component. Following containment, the leaking tank system is evaluated by facility personnel to determine whether continued operation of affected system would jeopardize the safety of plant personnel, result in a release to the environment, or compromise facility equipment. If it is determined that a leak could have the aforementioned consequences, the affected system will be immediately removed from service until repairs can be implemented. If a leak would not result in the stated consequences, the tank system will be placed on a maintenance schedule for repair.

4.4.5.2 Overfilling Prevention. Operating practices and administrative controls used at the ETF to prevent overfilling a tank are discussed in the following paragraphs. The ETF process is controlled by the MCS. The MCS monitors liquid levels in the ETF tanks and has alarms that annunciate on high-liquid level to notify operators that actions must be taken to prevent overfilling of these vessels. As an additional precaution to prevent spills, many tanks are equipped with overflow lines that route solutions to sump tanks 1 and 2. These tanks include the pH adjustment tank, RO feed tanks, effluent pH adjustment tank, secondary waste receiving tanks, and concentrate tanks.

The following section discusses feed systems, safety cutoff devices, bypass systems, and pressure controls for specific tanks and process systems.

Tanks. All tanks are equipped with liquid level sensors that give a reading of the tank liquid volume. The surge tank, the verification tanks, the RO tanks, the secondary waste receiving tanks, and the concentrate tanks are equipped further with liquid level alarms that are actuated if the liquid volume is near the tank overflow capacity. In the actuation of the surge tank alarm, a liquid level switch trips, sending a signal to the valve actuator on the tank influent lines, causing the influent valves to close.

The operating mode for each verification tank, i.e., receiving, holding, or discharging, can be designated through the MCS; modes also switch automatically. When the high-level set point on the receiving verification tank is reached, the flow to this tank is diverted and another tank becomes the receiver. The full tank is switched into verification mode. The third tank is reserved for discharge mode.

The liquid levels in the first and second RO feed tanks are maintained within predetermined operating ranges. Should the second RO feed tank overflow, the excess waste is piped along with any leakage from the feed pump to a sump tank.

When waste in a secondary waste receiving tank reaches the high-level set point, the influent flow of waste is redirected to the second tank and the first tank becomes the feed tank for the ETF evaporator.

In a similar fashion, the concentrate tanks switch modes when the high-level set point of one tank is reached. The other tank switches from a discharging mode to a receiving mode and the first tank becomes the discharge tank feeding waste to the thin film dryer.

Filter Systems. Both the rough filter and fine filter are in leak-tight steel casings. A high differential pressure, which could damage the filter element, deactivates a valve that shuts off liquid flow to protect the filter element from possible damage. To prevent a high pressure situation, the filters are cleaned routinely with pulses of compressed air that force water back through the filter. Cleaning is terminated automatically by shutting off the compressed air supply if high pressure develops. The differential pressure across the auxiliary filters also is monitored. A high differential pressure in these filters would result in a system shutdown to allow the filters to be changed out.

Ultraviolet Light/Oxidation System and Decomposers. A rupture disk on the inlet piping to each of the UV/OX reaction vessels relieves to the pH adjustment tank in the event of excessive pressure developing in the piping system. Should the rupture disk fail, the aqueous waste would trip the moisture sensor, shut down the UV lamps, and close the surge tank feed valve. Also provided is a level sensor to protect UV lamps against the risk of exposure to air. Should those sensors be actuated, the UV lamps would be shut down immediately.

The piping and valving for the hydrogen peroxide decomposers are configured to split the waste flow: half flows to one decomposer and half flows to the other decomposer. Alternatively, the total flow of waste can be treated in one decomposer or both decomposers can be bypassed. A safety relief valve on each decomposer vessel can relieve excess system pressure to a sump tank.

Degasification System. The degasification column is typically supplied aqueous waste feed by the pH adjustment tank feed pump. This pump transfers waste solution through the hydrogen peroxide decomposer, the fine filter, and the degasification column to the first RO feed tank.

The degasification column is designed for operation at a partial vacuum. A pressure sensor in the column detects the column pressure. The vacuum in the column is regulated by the pressure controller that adjusts the opening of the air supply valve. The degasification column is exhausted to a blower connected to the vessel offgas system. If extremely low pressure is developed by the column blower, a situation that could compromise column integrity, a pressure relief safety valve is activated. The column liquid level is regulated by a flow control system with a high- and low-level alarm. A plate-type heat exchanger cools the waste solution fed to the degasification column.

Reverse Osmosis System. The flow through the first and second RO stages is controlled to maintain constant liquid levels in the first and second stage RO feed tanks.

Polisher. Typically, two of the three columns are in operation (lead/lag) and the third (regenerated) column is in standby. When the capacity of the resin in the first column is exceeded, as detected by an increase in the conductivity of the column effluent, the third column, containing freshly regenerated IX resin, is brought online. The first column is taken offline, and the waste is rerouted to the second column, and to the third. Liquid level instrumentation and automatically operated valves are provided in the IX system to prevent overfilling.

Effluent Treatment Facility Evaporator. Liquid level instrumentation in the secondary waste receiving tanks is designed to preclude a tank overflow. A liquid level switch actuated by a high-tank liquid level causes the valves to reposition, closing off flow to the secondary waste receiving tanks. Secondary containment for these tanks routes liquids to a sump tank.

Valves in the ETF evaporator feed line can be positioned to bypass the secondary waste around the ETF evaporator and to transfer the secondary waste to the concentrate tanks.

Thin Film Dryer. The two concentrate tanks alternately feed the thin film dryer. One tank serves as a concentrate waste receiver while the other tank serves as the dryer feed tank. Liquid level instrumentation prevents tank overflow by diverting the concentrate flow from the full concentrate tank to the other concentrate tank. Secondary containment for these tanks routes liquids to a sump tank.

An alternate route is provided from the concentrate receiver tank to the secondary waste receiving tanks. Dilute concentrate in the concentrate receiver tank can be reprocessed through the ETF evaporator by transferring the concentrate back to a secondary waste receiving tank.

4.4.6 Labels or Signs [D-2e]

Each piece of process equipment in the ETF is identified by a nameplate attached in a readily visible location. Equipment procured as a packaged unit also has a nameplate attached. Included on the nameplate are the equipment number, the equipment title, the manufacturer and the manufacturer's model number, a serial number, and a rating (i.e., capacity, revolutions per minute, torque, range, span, etc.).

Caution plates are used to show possible hazards and warn that precautions are necessary. Caution signs have a yellow background and black panel with yellow letters and bear the word "CAUTION". Danger signs show immediate danger and signify that special precautions are necessary. These signs are red, black, and white and bear the word "DANGER".

Tanks and vessels containing corrosive waste or corrosive chemicals are posted with black and white signs bearing the word "CORROSIVE". "DANGER - UNAUTHORIZED PERSONNEL KEEP OUT" signs are posted on all exterior doors of the ETF, and on each interior door leading into the process area. Tank ancillary piping is labeled "PROCESS WATER" to alert personnel which pipes in the process area contain dangerous and/or mixed waste.

4.4.7 Air Emissions [D-2f]

Tank systems that contain extremely hazardous waste that is acutely toxic by inhalation must be designed to prevent the escape of such vapors. To date, no extremely hazardous waste has been managed in ETF tanks and is not anticipated. However, the ETF tanks have forced ventilation that draws air from the tank vapor spaces to prevent exposure of operating personnel to any toxic vapors that might be present. The vapor passes through a charcoal filter and two sets of high-efficiency particulate air filters before discharge to the environment.

4.4.8 Management of Ignitible or Reactive Wastes in Tanks Systems [D-2g]

Although the ETF is permitted to accept waste that is designated ignitible or reactive, such waste would be treated or blended immediately after placement in the tank system so that the resulting waste mixture is no longer ignitible or reactive. Aqueous waste received does not meet the definition of a combustible or flammable liquid given in National Fire Protection Association (NFPA) code number 30 (NFPA 1996). The buffer zone requirements in NFPA-30, which require tanks containing combustible or flammable solutions be a safe distance from each other and from public way, are not applicable.

4.4.9 Management of Incompatible Wastes in Tanks Systems [D-2h]

The ETF manages dilute solutions that can be mixed without compatibility issues. The ETF is equipped with several systems that can adjust the pH of the waste for treatment activities. Sulfuric acid and sodium hydroxide are added to the process through the MCS for pH adjustment to ensure there will be no large pH fluctuations and adverse reactions in the tank systems.

4.5 SURFACE IMPOUNDMENTS [173-303-806-(4)(d)]

This section provides specific information on surface impoundment operations at the LERF, including descriptions of the liners and secondary containment structures, as required by WAC 173-303-650 and WAC 173-303-806(4)(d).

The LERF consists of three lined surface impoundments (basins) with a design capacity of 24.6 million liters each. The maximum capacity of each basin is 34 million liters. The dimensions of each basin at the anchor wall are approximately 103 meters by 85 meters. The typical top dimensions of the wetted area are approximately 89 meters by 71 meters, while the bottom dimensions are approximately 57 by 38 meters. Total depth from the top of the dike to the bottom of the basin is approximately 7 meters. The typical finished basin bottoms lie at about 4 meters below the initial grade and 175 meters above sea level. The dikes separating the basins have a typical height of 3 meters and typical top width of 11.6 meters around the perimeter of the impoundments.

4.5.1 List of Dangerous Waste [806(4)(d)(i)]

A list of dangerous and/or mixed aqueous waste that can be stored in LERF is presented in Chapter 1.0. The waste analysis plan for the LERF and ETF (Appendix 3A) also provides a discussion of the types of waste that are managed in the LERF.

4.5.2 Construction, Operation, and Maintenance of Liner System [806(4)(d)(ii)(A)]

General information concerning the liner system is presented in the following sections. Information regarding loads on the liner, liner coverage, UV light exposure prevention, and location relative to the water table also are discussed.

4.5.2.1 Liner Construction Materials [650(2)(a)(i)(A)]. The LERF employs a double-composite liner system with a leachate detection, collection, and removal system between the primary and secondary liners. Each basin is constructed with an upper or primary liner consisting of a high-density polyethylene geomembrane laid over a bentonite carpet liner. The lower or secondary liner in each basin is a composite of a geomembrane laid over a layer of soil/bentonite admixture with a hydraulic conductivity less than 10^{-7} centimeters per second. The synthetic liners extend up the dike wall to a concrete anchor wall that completely surrounds the basin at the top of the dike. A batten system bolts the layers in place to the anchor wall (Figure 4-15).

Figure 4-16 is a schematic cross-section of the liner system. The liner components, listed from the top to the bottom of the liner system, are the following:

- Primary 1.5-millimeter high-density polyethylene geomembrane
- Bentonite carpet liner
- Geotextile
- Drainage gravel (bottom) and geonet (sides)
- Geotextile
- Secondary 1.5-millimeter high-density polyethylene geomembrane
- Soil/bentonite admixture (91 centimeters on the bottom, 107 centimeters on the sides)
- Geotextile.

The primary geomembrane, made of 1.5-millimeter high-density polyethylene, forms the basin surface that holds the aqueous waste. The secondary geomembrane, also 1.5-millimeter high-density polyethylene, forms a barrier surface for leachate that might penetrate the primary liner. The high-density polyethylene chemically is resistant to constituents in the aqueous waste and has a relatively high strength compared to other lining materials. The high-density polyethylene resin specified for the LERF contains carbon black, antioxidants, and heat stabilizers to enhance its resistance to the degrading effects of UV light. The approach to ensuring the compatibility of aqueous waste streams with the LERF liner materials and piping is discussed in the waste analysis plan (Appendix 3A).

Three geotextile layers are used in the LERF liner system. The layers are thin, nonwoven polypropylene fabric that chemically are resistant, highly permeable, and resistant to microbiological growth. The first two layers prevent fine soil particles from infiltrating and clogging the drainage layer. The second geotextile also provides limited protection for the secondary geomembrane from the drainage rock. The third geotextile layer prevents the mixing of the soil/bentonite admixture with the much more porous and granular foundation material.

A 30.5-centimeters-thick gravel drainage layer on the bottom of the basins between the primary and secondary liners provides a flow path for liquid to the leachate detection, collection, and removal system. A geonet (or drainage net) is located immediately above the secondary geomembrane on the basin sidewalls. The geonet functions as a preferential flow path for liquid between the liners, carrying liquid down to the gravel drainage layer and subsequently to the leachate sump. The geonet is a mesh made of high-density polyethylene, with approximately 13-millimeter openings.

The soil/bentonite layer is 97 centimeters thick on the bottom of the basins and 107 centimeters thick on the basin sidewalls; its permeability is less than 10^{-7} centimeters per second. This composite liner design, consisting of a geomembrane laid over essentially impermeable soil/bentonite, is considered best available technology for solid waste landfills and surface impoundments. The combination of synthetic and clay liners is reported in the literature to provide the maximum protection from waste migration (Forseth and Kmet 1983).

A number of laboratory tests were conducted to measure the engineering properties of the soil/bentonite admixture, in addition to extensive field tests performed on three test fills constructed near the LERF site. For the purpose of establishing an optimum ratio of bentonite to soil for the soil/bentonite admixture, mixtures of various ratios were tested to determine permeability and shear strength. A mixture of 12 percent bentonite was selected for the soil/bentonite liner and tests described in the following paragraphs demonstrated that the admixture meets the desired permeability of less than 10^{-7} centimeters per second. Detailed discussion of test procedures and results is provided in *Report of Geotechnical Investigation, 242-A Evaporation and PUREX Interim Storage Basins* (Chen-Northern 1990).

Direct shear tests were performed according to ASTM D3080 test procedures (ASTM 1990) on soil/bentonite samples of various ratios. Based on these results, the conservative minimum Mohr-Coulomb shear strength value of 30 degrees was estimated for a soil/bentonite admixture containing 12 percent bentonite.

The high degree of compaction of the soil/bentonite layer [92 percent per ASTM D1557 (ASTM 1991)] was expected to maximize the bonding forces between the clay particles, thereby minimizing moisture transport through the liner. With respect to particle movement ('piping'), estimated fluid velocities in this low-permeability material are too low to move the soil particles. Therefore, piping is not considered a problem.

For the soil/bentonite layer, three test fills were constructed to demonstrate that materials, methods, and procedures used would produce a soil/bentonite liner that meets the EPA permeability requirement of less than 10^{-7} centimeters per second. All test fills met the EPA requirements. A thorough discussion of construction procedures, testing, and results is provided in *Report of Permeability Testing, Soil-bentonite Test Fill* (Chen-Northern 1991a).

The aqueous waste stored in the LERF is typically a dilute mixture of organic and inorganic constituents. Though isolated instances of soil liner incompatibility have been documented in the literature (Forseth and Kmet 1983), these instances have occurred with concentrated solutions that were incompatible with the geomembrane liners in which the solutions were contained. Considering the dilute nature of the aqueous waste that is and will be stored in LERF and the moderate pH, and test results demonstrating the compatibility of the high-density polyethylene liners with the aqueous waste [*9090 Test Results* (WHC 1991)], gross failure of the soil/bentonite layer is not probable.

Each basin also is equipped with a floating very low-density polyethylene cover. The cover is anchored and tensioned at the concrete wall at the top of the dikes, using a patented mechanical tensioning system. Figure 4-15 depicts the tension mechanism and the anchor wall at the perimeter of each basin. Additional information on the cover system is provided in Section 4.5.2.5.

4.5.2.1.1 Material Specifications. Material specifications for the liner system and leachate collection system, including liners, drainage gravel, and drainage net are discussed in the following sections. Material specifications are documented in the *Final Specifications 242-A Evaporator and PUREX Interim Retention Basins* (KEH 1990a) and *Construction Specifications for 242-A Evaporator and PUREX Interim Retention Basins* (KEH 1990b).

Geomembrane Liners. The high-density polyethylene resin for geomembranes for the LERF meets the material specifications listed in Table 4-4. Key physical properties include thickness (1.5 millimeters [60 mil]) and impermeability (hydrostatic resistance of over 360,000 kilogram per square meter). Physical properties meet National Sanitation Foundation Standard 54 (NSF 1985). Testing to determine if the liner material is compatible with typical dilute waste solutions was performed and documented in *9090 Test Results* (WHC 1991).

Soil/Bentonite Liner. The soil/bentonite admixture consists of 11.5 to 14.5 percent bentonite mixed into well-graded silty sand with a maximum particle size of 4.75 millimeters (No. 4 sieve). Test fills were performed to confirm the soil/bentonite admixture applied at LERF has hydraulic conductivity less than 10^{-7} centimeters per second, as required by WAC 173-303-650(2)(j) for new surface impoundments.

Bentonite Carpet Liner. The bentonite carpet liner consists of bentonite (90 percent sodium montmorillonite clay) in a primary backing of woven polypropylene with nylon filler fiber, and a cover fabric of open weave spunlace polyester. The montmorillonite is anticipated to retard migration of solution through the liner, exhibiting a favorable cation exchange for adsorption of some constituents (such as ammonium). Based on composition of the bentonite carpet and of the type of aqueous waste stored at LERF, no chemical attack, dissolution, or degradation of the bentonite carpet liner is anticipated.

Geotextile. The nonwoven geotextile layers consist of long-chain polypropylene polymers containing stabilizers and inhibitors to make the filaments resistant to deterioration from UV light and heat exposure. The geotextile layers consist of continuous geotextile sheets held together by needle-punching. Edges of the fabric are sealed or otherwise finished to prevent outer material from pulling away from the fabric or ravelling.

Drainage Gravel. The drainage layer consists of thoroughly washed and screened, naturally occurring rock meeting the size specifications for Grading Number 5 in Washington State Department of Transportation construction specifications (WSDOT 1988). The specifications for the drainage layer are given in Table 4-5. Hydraulic conductivity tests (Chen-Northern 1992a, 1992b, 1992c) showed the drainage rock used at LERF met the sieve requirements and had a hydraulic conductivity of at least 1 centimeter per second, which exceeded the minimum of at least 0.1 centimeters per second required by WAC 173-303-650(2)(j) for new surface impoundments.

Geonet. The geonet is fabricated from two sets of parallel high-density polyethylene strands, spaced 1.3 centimeters center-to-center maximum to form a mesh with minimum two strands per 2.54 centimeter in each direction. The geonet is located between the liners on the sloping sidewalls to provide a preferential flow path for leachate to the drainage gravel and subsequently to the leachate sump.

Leachate Collection Sump. Materials used to line the 3.0-meter by 1.8-meter by 0.30-meter-deep leachate sump, at the bottom of each basin in the northwest corner, include [from top to bottom (Figure 4-17)]:

- 25 millimeter high-density polyethylene flat stock (supporting the leachate riser pipe)

- Geotextile

- 1.5-millimeter high-density polyethylene rub sheet

- Secondary composite liner:
  - 1.5-millimeter high-density polyethylene geomembrane
  - 91 centimeters of soil/bentonite admixture
  - Geotextile.

Specifications for these materials are identical to those discussed previously.

Leachate System Risers. Risers for the leachate system consist of 10-inch and 4-inch pipes from the leachate collection sump to the catch basin northwest of each basin (Figure 4-17). The risers lay below the primary liner in a gravel-filled trench which also extends from the sump to the concrete catch basin (Figure 4-18).

The risers are high-density polyethylene pipes fabricated to meet the requirements in ASTM D1248 (ASTM 1989). The 10-inch riser is perforated every 20.3 centimeters with 1.3-centimeter holes around the diameter. Level sensors and leachate pump are inserted in the 10-inch riser to monitor and remove leachate from the sump. To prevent clogging of the pump and piping with fine particulate, the end of the riser is encased in a gravel-filled box constructed of high-density polyethylene geonet and wrapped in geotextile. The 4-inch riser is perforated every 10.2 centimeters with 0.64-centimeter holes around the diameter. A level detector is inserted in the 4-inch riser.

Leachate Pump. A deep-well submersible pump, designed to deliver approximately 110 liters per minute, is installed in the 10-inch leachate riser in each basin. Wetted parts of the leachate pump are made of 316L stainless steel, providing both corrosion resistance and durability.

4.5.2.1.2 Loads on Liner System. The LERF liner system is subjected to the following types of stresses.

Stresses from Installation or Construction Operations. Contractors were required to submit construction quality control plans that included procedures, techniques, tools, and equipment used for the construction and care of liner and leachate system. Methods for installation of all components were screened to ensure that the stresses on the liner system were kept to a minimum.

Calculations were performed to estimate the risk of damage to the secondary high-density polyethylene liner during construction (*Calculations for LERF Part B Permit Application* [HNF 1997]). The greatest risk expected was from spreading the gravel layer over the geotextile layer and secondary geomembrane. The results of the calculations show that the strength of the geotextile was sufficiently high to withstand the stress of a small gravel spreader driving on a minimum of 15 centimeters of gravel over the geotextile and geomembrane. The likelihood of damage to the geomembrane lying under the geotextile was considered to be low.

To avoid driving heavy machinery directly on the secondary liner, a 28-meter conveyer was used to deliver the drainage gravel into the basins. The gravel was spread and consolidated by hand tools and a bulldozer. The bulldozer traveled on a minimum thickness of 30.5 centimeters of gravel. Where the conveyer assembly was placed on top of the liner, cribbing was placed to distribute the conveyer weight. No heavy equipment was allowed for use directly in contact with the geomembranes.

Additional calculations were performed to estimate the ability of the leachate riser pipe to withstand the static and dynamic loading imposed by lightweight construction equipment riding on the gravel layer (HNF 1997). Those calculations demonstrated that the pipe could buckle under the dynamic loading of small construction equipment; therefore, the pipe was avoided by equipment during spreading of the drainage gravel.

Installation of synthetic lining materials proceeded only when winds were less than 24 kilometers per hour, and not during precipitation. The minimum ambient air temperature for unfolding or unrolling the high-density polyethylene sheets was -10°C, and a minimum temperature of 0°C was required for seaming the high-density polyethylene sheets. Between shifts, geomembranes and geotextile were anchored with sandbags to prevent lifting by wind. Calculations were performed to determine the appropriate spacing of sandbags on the geomembrane to resist lifting caused by 130 kilometer per hour winds (HNF 1997). All of the synthetic components contain UV light inhibitors and no impairment of performance is anticipated from the short-term UV light exposure during construction. Section 4.5.2.5 provides further detail on exposure prevention.

During laying of the soil/bentonite layer and the overlying geomembrane, moisture content of the admixture was monitored and adjusted to ensure optimum compaction and to avoid development of cracks.

4.5.2.1.3 Static and Dynamic Loads and Stresses from the Maximum Quantity of Waste. When a LERF basin is full, liquid depth is approximately 6.4 meters. Static load on the primary liner is roughly 6,400 kilograms per square meter. Load on the secondary liner is slightly higher because of the weight of the gravel drainage layer. Assuming a density of 805 kilograms per square meter for the drainage gravel [conservative estimate based on specific gravity of 2.65 (Ambrose 1988)], the secondary high-density polyethylene carries approximately 7,200 kilograms per square meter when a basin is full.

Sideslope liner stresses were calculated for each of the layers in the basin sidewalls and for the pipe trench on the northwest corner of each basin (HNF 1997). Results of these calculations indicate factors of safety against shear were 1.5 or greater for the primary geomembrane, geotextile, geonet, and secondary geomembrane.

Because the LERF is not located in an area of seismic concern, as identified in Appendix VI of 40 CFR 264 and WAC 173-303-282(6)(a)(i), discussion and calculation of potential seismic events are not required.

4.5.2.1.4 Stresses Resulting from Settlement, Subsidence, or Uplift. Uplift stresses from natural sources are expected to have negligible impact on the liner. Groundwater lies approximately 62 meters below the LERF, average annual precipitation is only 16 centimeters, and the average unsaturated permeability of the soils near the basin bottoms is high, ranging from about 5.5×10^{-4} centimeters per second to about 1 centimeter per second (Chen-Northern 1991b). Therefore, no hydrostatic uplift forces are expected to develop in the soil underneath the basins. In addition, the soil under the basins consists primarily of gravel and sand, and contains few or no organic constituents. Therefore, uplift caused by gas production from organic degradation is not anticipated.

Based on the design of the soil-bentonite liner, no structural uplift stresses are present within the lining system (Chen-Northern 1991b).

Regional subsidence is not anticipated because neither petroleum nor extractable economic minerals are present in the strata underlying the LERF basins, nor is karst (erosive limestone) topography present.

Dike soils and soil/bentonite layers were compacted thoroughly and proof-rolled during construction. Calculation of settlement potential showed that combined settlement for the foundation and soil/bentonite layer is expected to be about 2.7 centimeters. Settlement impact on the liner and basin stability is expected to be minimal (Chen-Northern 1991b).

4.5.2.1.5 Internal and External Pressure Gradients. Pressure gradients across the liner system from groundwater are anticipated to be negligible. The LERF is about 62 meters above the seasonal high water table, which prevents buildup of water pressure below the liner. The native gravel foundation materials of the LERF are relatively permeable and free draining. The 2 percent slope of the secondary liner prevents the pooling of liquids on top of the secondary liner. Finally, the fill rate of the basins is slow enough (average 190 liters per minute) that the load of the liquid waste on the primary liner is gradually and evenly distributed.

To prevent the buildup of gas between the liners, each basin is equipped with 21 vents in the primary geomembrane that allow the reduction of any excess gas pressure. Gas passing through these vents exit through a single pipe that penetrates the anchor wall into a carbon adsorption filter. This filter extracts nearly all of the organic compounds, ensuring that emissions to the air from the basins are not toxic.

4.5.2.2 Liner System Location Relative to High-Water Table. The lowest point of each LERF basin is the northwest corner of the sump, where the typical subgrade elevation is 175 meters above mean sea level. Based on data collected from the groundwater monitoring wells at the LERF site, the seasonal high-water table is located approximately 62 meters or more below the lowest point of the basins. This substantial thickness of unsaturated strata beneath the LERF provides ample protection to the liner from hydrostatic pressure because of groundwater intrusion into the soil/bentonite layer. Further discussion of the unsaturated zone and site hydrogeology is provided in Chapter 5.0.

4.5.2.3 Liner System Foundation [650(2)(a)(i)(B)]. Foundation materials are primarily gravels and cobbles with some sand and silt. The native soils onsite are derived from unconsolidated Holocene sediments. These sediments are fluvial and glaciofluvial sands and gravels deposited during the most recent glacial and postglacial event. Grain-size distributions and shape analyses of the sediments indicate that deposition occurred in a high energy environment (Chen-Northern 1990).

Analysis of five soil borings from the LERF site was conducted to characterize the natural foundation materials and to determine the suitability of onsite soils for construction of the impoundment dikes and determine optimal design factors. Well-graded gravel containing varying amounts of silt, sand, and cobbles comprises the layer in which the basins were excavated. This gravel layer extends to depths of 10 to 11 meters below land surface (Chen-Northern 1990). The basins are constructed directly on the subgrade. Excavated soils were screened to remove oversize cobbles (greater than 15 centimeters in the largest dimension) and used to construct the dikes.

Settlement potential of the foundation material and soil/bentonite layer was found to be low. The foundation is comprised of undisturbed native soils. The bottom of the basin excavation lies within the well-graded gravel layer, and is dense to very dense. Below the gravel is a layer of dense to very dense poorly-graded and well-graded sand. Settlement was calculated for the gravel foundation soils and for the soil/bentonite layer, under the condition of hydrostatic loading from 6.4 meters of fluid depth. The combined settlement for the soils and the soil/bentonite layer is estimated to be about 2.7 centimeters. This amount of settlement is expected to have minimal impact on overall liner or basin stability (Chen-Northern 1991b). Settlement calculations are provided in *Calculations for Liquid Effluent Retention Facility Part B Permit Application* (HNF 1997).

The load bearing capacity of the foundation material, based on the soil analysis discussed previously, is estimated at about 48,800 kilograms per square meter [maximum advisable presumptive bearing capacity (Hough 1969)]. Anticipated static and dynamic loading from a full basin is estimated to be less than 9,000 kilograms per square meter (Section 4.5.2.1.3), which provides an ample factor of safety.

When the basins are empty, excess hydrostatic pressure in the foundation materials under the liner system theoretically could result in uplift and damage. However, because the native soil forming the foundations is unsaturated and relatively permeable, and because the water table is located at a considerable depth beneath the basins, any infiltration of surface water at the edge of the basin is expected to travel predominantly downward and away from the basins, rather than collecting under the excavation itself. No gas is expected in the foundation because gas-generating organic materials are not present.

Subsidence of undisturbed foundation materials is generally the result of fluid extraction (water or petroleum), mining, or karst topography. Neither petroleum, mineral resources, nor karst are believed to be present in the sediments overlying the Columbia River basalts. Potential groundwater resources do exist below the LERF. Even if these sediments were to consolidate from fluid withdrawal, their depth most likely would produce a broad, gently sloping area of subsidence that would not cause significant strains in the LERF liner system. Consequently, the potential for subsidence related failures is expected to be negligible.

Borings at the LERF site, and extensive additional borings in the 200 East Area, have not identified any significant quantities of soluble materials in the foundation soil or underlying sediments (Last et al. 1989). Consequently, the potential for sinkholes is considered negligible.

4.5.2.4 Liner System Exposure Prevention. Both primary and secondary geomembranes and the floating cover are stabilized with carbon black to prevent degradation from UV light. Furthermore, none of the liner layers experience long-term exposure to the elements. During construction, thin polyethylene sheeting was used to maintain optimum moisture content and provide protection from the wind for the soil/bentonite layer until the secondary geomembrane was laid in place. The secondary geomembrane was covered by the geonet and geotextile as soon as quality control testing was complete. Once the geotextile layer was completed, drainage material immediately was placed over the geotextile. The final (upper) geotextile layer was placed over the drainage gravel and immediately covered by the bentonite carpet liner. This was covered immediately, in turn, by the primary high-density polyethylene liner.

Both high-density polyethylene liners, geotextile layers, and geonet are anchored permanently to a concrete wall at the top of the basin berm. During construction, liners were held in place with many sandbags on both the basin bottoms and sideslopes to prevent wind from lifting and damaging the materials. Calculations were performed to determine the amount of fluid needed in a basin to prevent wind lift damage to the primary geomembrane.

Approximately 15 to 20 centimeters of solution are kept in each basin to minimize the potential for uplifting the primary liner (HNF 1997).

The entire lining system is covered by a very low-density polyethylene floating cover that is bolted to the concrete anchor wall. The floating cover prevents evaporation and intrusion from dust, precipitation, vegetation, animals, and birds. A patented tensioning system is employed to prevent wind from lifting the cover and to automatically accommodate changes in liquid level in the basins. The cover tension mechanism consists of a cable running from the flexible geosynthetic cover over a pulley on the tension tower (located on the concrete anchor wall) to a deadman anchor. These anchors (blocks) simply hang from the cables on the exterior side of the tension towers. The anchor wall also provides for solid attachment of the liner layers and the cover, using a 6.4-millimeter batten and neoprene gasket to bolt the layers to the concrete wall, effectively sealing the basin from the intrusion of light, precipitation, and airborne dust (Figure 4-15).

The floating cover, made of very low-density polyethylene with UV light inhibitors, is anticipated to experience no unacceptable degradation during the service life of the LERF. The very low-density polyethylene material contains carbon black for UV light protection, anti-oxidants to prevent heat degradation, and seaming enhancers to improve its ability to be welded. A typical manufacturer's limited warranty for weathering of very low-density polyethylene products is 20 years (Poly America, undated). This provides a margin of safety for the anticipated medium-term use of the LERF for aqueous waste storage.

The upper 3.4 to 4.6 meters of the sidewall liner also could experience stresses in response to temperature changes. Accommodation of thermal influences for the LERF geosynthetic layers is affected by inclusion of sufficient slack as the liners were installed. Calculations demonstrate that approximately 67 centimeters of slack is required in the long basin bottom dimension, 46 centimeters across the basin, and 34 centimeters from the bottom of the basin to the top of the basin wall (HNF 1997).

Thermal stresses also are experienced by the floating cover. As with the geomembranes, sufficient slack was included in the design to accommodate thermal contraction and expansion.

4.5.2.4.1 Liner Repairs During Operations. Should repair of a basin liner be required while the basin is in operation, the basin contents will be transferred to the ETF or another available basin. After the liner around the leaking section is cleaned, repairs to the geomembrane will be made by the application of a piece of high-density polyethylene sheeting, sufficient in size to extend approximately 8 to 15 centimeters beyond the damaged area, or as recommended by the vendor. A round or oval patch will be installed using the same type of equipment and criteria used for the initial field installations.

4.5.2.4.2 Control of Air Emissions. The floating covers limit evaporation of aqueous waste and releases of volatile organic compounds into the atmosphere. To accommodate volumetric changes in the air between the fluid in the basin and the cover, and to avoid problems related to 'sealing' the basins too tightly, each basin is equipped with a carbon filter breather vent system. Any air escaping from the basins must pass through this vent, consisting of a pipe that penetrates the anchor wall and extends into a carbon adsorption filter unit.

4.5.2.5 Liner Coverage [650(2)(a)(i)(C)]. The liner system covers all of the ground surface that underlies the retention basins. The primary liner extends up the sideslopes to a concrete anchor wall at the top of the dike encircling the entire basin (Figure 4-15).

4.5.3 Prevention of Overtopping [806(4)(d)(ii)(B)]

Overtopping prevention is accomplished through administrative controls and liquid-level instrumentation installed in each basin. The instrumentation includes local liquid-level indication as well as remote indication at the ETF. Before an aqueous waste is transferred into a basin, administrative controls are implemented to ensure overtopping will not occur during the transfer. The volume of feed to be transferred is compared to the available volume in the receiving basin. The transfer is not initiated unless there is sufficient volume available in the receiving basin or a cut-off level is established. The transfer into the basin would be stopped when this cut-off level is reached.

In the event of a 100-year, 24-hour storm event, precipitation would accumulate on the basin covers. Through the self-tensioning design of the basin covers and maintenance of adequate freeboard, all accumulated precipitation would be contained on the covers and none would flow over the dikes or anchor walls. The 100-year, 24-hour storm is expected to deliver 5.3 centimeters of rain or approximately 61 centimeters of snow. Cover specifications include the requirement that the covers be able to withstand the load from this amount of precipitation. Because the cover floats on the surface of the fluid in the basin, the fluid itself provides the primary support for the weight of the accumulated precipitation. Through the cover self-tensioning mechanism, there is ample 'give' to accommodate the overlying load without overstressing the anchor and attachment points.

Rain water and snow evaporate readily from the cover, particularly in the arid Hanford Facility climate, where evaporation rates exceed precipitation rates for most months of the year. The black color of the cover further enhances evaporation. Thus, the floating cover prevents the intrusion of precipitation into the basin and provides for evaporation of accumulated rain or snow.

4.5.3.1 Freeboard. Under current operating conditions, 1.3 meters of freeboard is maintained at each LERF basin, which corresponds to an operating level of 6.1 meters, or 24.6 million liters.

4.5.3.2 Immediate Flow Shutoff. The mechanism for transferring aqueous waste is either through pump transfers with on/off switches or through gravity transfers with isolation valves. These methods provide positive ability to shut off transfers immediately in the event of overtopping. Overtopping a basin during a transfer is very unlikely because the low flow rates into the basin provides long response times. At a flow rate of 284 liters per minute, approximately 22 days would be required to fill a LERF basin from the 6.1 meter operating level (i.e., 1.3 meters of freeboard) to maximum capacity of 33 million liters (i.e., the 7.4-meter level).

4.5.3.3 Outflow Destination. Aqueous waste in the LERF is transferred routinely to ETF for treatment. However, should it be necessary to immediately empty a basin, the aqueous waste either would be transferred to the ETF for treatment or transferred to another basin (or basins), whichever is faster. If the waste is transferred to another LERF basin, the single pump for normal operation can be removed, and four submersible pumps can be installed using an emergency pump manifold. This portable piping and pumping system is capable of pumping 2,700 liters per minute. Not including set-up time, it would take approximately 7 days to pump the contents of a full basin at this pumping rate.

4.5.4 Structural Integrity of Dikes [806(4)(d)(ii)(C)]

Written certification attesting to the structural integrity of the dikes, signed by a qualified, registered professional engineer, is included in Appendix 4D.

4.5.4.1 Dike Design, Construction, and Maintenance [650(2)(f), (g), and (h)]. The dikes of the LERF are constructed of onsite native soils, generally consisting of cobbles and gravels. Well-graded mixtures were specified, with cobbles up to 15 centimeters in the largest dimension, but not constituting more than 20 percent of the volume of the fill. The dikes are designed with a 3:1 (3 units horizontal to 1 unit vertical) slope on the basin side, and 2.25:1 on the exterior side. The dikes are approximately 8.2 meters high from the bottom of the basin, and 3 meters abovegrade.

Calculations were performed to verify the structural integrity of the dikes (HNF 1997). The calculations demonstrate that the structural strength of the dikes is such that, without dependence on any lining system, the sides of the basins can withstand the pressure exerted by the maximum quantity of fluid in the impoundment. The dikes have a factor of safety greater than 3 against failure by sliding.

4.5.4.2 Dike Stability and Protection. In the following paragraphs, various aspects of stability for the LERF dikes and the concrete anchor wall are presented, including slope failure, hydrostatic pressure, and protection from the environment.

Failure in Dike/Impoundment Cut Slopes. A slope stability analysis was performed to determine the factor of safety against slope failure. The computer program 'PCSTABL5' from Purdue University, using the modified Janbu Method, was employed to evaluate slope stability under both static and seismic loading cases. One hundred surfaces per run were generated and analyzed. The assumptions used were as follows (Chen-Northern 1991b):

- Weight of gravel: 2,160 kilograms per cubic meter
- Maximum dry density of gravel: 2,315 kilograms per cubic meter
- Mohr-Coulomb shear strength angle for gravel: minimum 33 degrees
- Weight of soil/bentonite: 1,600 kilograms per cubic meter
- Mohr-Coulomb shear strength angle for soil/bentonite: minimum 30 degrees
- Slope: 3 horizontal:1 vertical
- No fluid in impoundment (worst case for stability)
- Soils at in-place moisture (not saturated conditions).

Results of the static stability analysis showed that the dike slopes were stable with a minimum factor of safety of 1.77 (Chen-Northern 1991b).

The standard horizontal acceleration required in the *Hanford Plant Standards*, "Standard Architectural-Civil Design Criteria, Design Loads for Facilities" (DOE-RL 1988), for structures on the Hanford Site is 0.12 g. Adequate factors of safety for cut slopes in units of this type generally are considered to be 1.5 for static conditions and 1.1 for dynamic stability (Golder 1989). Results of the stability analysis showed that the LERF basin slopes were stable under horizontal accelerations of 0.10 and 0.15 g, with minimum factors of safety of 1.32 and 1.17, respectively (Chen-Northern 1991b). Printouts from the PCSTABL5 program are provided in *Calculations for Liquid Effluent Retention Facility Part B Permit Application* (HNF 1997).

Hydrostatic Pressure. Failure of the dikes due to buildup of hydrostatic pressure, caused by failure of the leachate system or liners, is very unlikely. The liner system is constructed with two essentially impermeable layers consisting of a synthetic layer overlying a soil layer with very low-hydraulic conductivity. It would require a catastrophic failure of both liners to cause hydrostatic pressures that could endanger dike integrity. Routine inspections of the leachate detection system, indicating quantities of leachate removed from the basins, provide an early warning of leakage or operational problems that could lead to excessive hydrostatic pressure. A significant precipitation event (e.g., a 100-year, 24-hour storm) will not create a hydrostatic problem because the interior sidewalls of the basins are covered completely by the liners. The covers can accommodate this volume of precipitation without overtopping the dike (Section 4.5.3), and the coarse nature of the dike and foundation materials on the exterior walls provides for rapid drainage of precipitation away from the basins.

Protection from Root Systems. Risk to structural integrity of the dikes as a result of penetrating root systems is minimal. Excavation and construction removed all vegetation on and around the impoundments, and native plants (such as sagebrush) grow very slowly. The large grain size of the cobbles and gravel used as dike construction material do not provide an advantageous germination medium for native plants. Should plants with extending roots become apparent on the dike walls, the plants will be controlled with appropriate herbicide application.

Protection from Burrowing Mammals. The cobble size materials that make up the dike construction material and the exposed nature of the dike sidewalls do not offer an advantageous habitat for burrowing mammals. Lack of vegetation on the LERF site discourages foraging. The risk to structural integrity of the dikes from burrowing mammals is therefore minimal. Periodic visual inspections of the dikes provide observations of any animals present. Should burrowing mammals be noted onsite, appropriate pest control methods such as trapping or application of rodenticides will be employed.

Protective Cover. Approximately 7.6 centimeters of crushed gravel serve as the cover of the exterior dike walls. This coarse material is inherently resistant to the effect of wind because of its large grain size. Total annual precipitation is low (16 centimeters) and a significant storm event (e.g., a 100-year, 24-hour storm) could result in about 5.3 centimeters of precipitation in a 24-hour period. The absorbent capacity of the soil exceeds this precipitation rate; therefore, the impact of wind and precipitation run-on to the exterior dike walls will be minimal.

4.5.5 Piping Systems

Aqueous waste from the 242-A Evaporator is transferred to the LERF using a pump located in the 242-A Evaporator and approximately 1,500 meters of pipe, consisting of a 3-inch carrier pipe within a 6-inch outer containment pipeline. Flow through the pump is controlled through a valve at flow rates from 150 to 300 liters per minute.

The pipeline exits the 242-A Evaporator belowgrade and remains belowgrade at a minimum 1.2-meter depth for freeze protection, until the pipeline emerges at the LERF catch basin, at the corner of each basin. All piping at the catch basin that is less than 1.2 meters belowgrade is wrapped with electric heat tracing tape and insulated for protection from freezing.

The transfer line from the 242-A Evaporator is centrifugally cast, fiberglass-reinforced epoxy thermoset resin pressure pipe fabricated to meet the requirements of ASME D2997 (ASME 1984). The 3-inch carrier piping is centered and supported within 6-inch containment piping. Pipe supports are fabricated of the same material as the pipe, and meet the strength requirements of ANSI B31.3 (ANSI 1987) for dead weight, thermal, and seismic loads.

A catch basin is provided at the northwest corner of each basin where piping extend from the basin to allow for basin-to-basin and basin-to-ETF liquid transfers. Drawings H-2-88766, sheets 1 through 4, in Appendix 4A, provide schematic diagrams of the piping system at LERF. Drawing H-2-79604, Appendix 4A, provides details of the piping from the 242-A Evaporator to LERF.

4.5.5.1 Secondary Containment System for Piping. The 6-inch containment piping encases the 3-inch carrier pipe from the 242-A Evaporator to the LERF. All of the piping and fittings that are not directly over a catch basin or a basin liner are of this pipe-within-a-pipe construction. A catch basin is provided at the northwest corner of each basin where the inlet pipes, leachate risers, and transfer pipe risers emerge from the basin. The catch basin consists of a 20-centimeter-thick concrete pad at the top of the dike. The perimeter of the catch basin has a 20-centimeter-high curb, and the concrete is coated with a chemical resistant epoxy sealant. The concrete pad is sloped so that any leaks or spills from the piping or pipe connections will drain into the basin. The catch basin provides an access point for inspecting, servicing, and operating various systems such as transfer valving, leachate level instrumentation and leachate pump. Drawing H-2-79593 (Appendix 4A) provides a schematic diagram of the catch basins.

4.5.5.2 Leak Detection System. Single-point electronic leak detection elements are installed along the transfer line at 305-meter intervals. The leak detection elements are located in the bottom of specially designed test risers. Each sensor element employs a conductivity sensor, which is connected to a cable leading back to the 242-A Evaporator control room. If a leak develops in the carrier pipe, fluid will travel down the exterior surface of the carrier pipe or the interior of the containment pipe. As moisture contacts a sensor unit, the alarm sounds in the 242-A Evaporator control room and the zone of the leak is indicated on the digital display. The pump located in the 242-A Evaporator is shut down, stopping the flow of aqueous waste through the transfer line.

The catch basins have conductivity leak detectors that alarm in the 242-A Evaporator control room. Leaks into the catch basins drain back to the basin through a 5.1-centimeter drain on the floor of the catch basin.

4.5.5.3 Certification. Although an integrity assessment is not required for piping associated with surface impoundments, an assessment of the transfer liner was performed, including a hydrostatic leak/pressure test at 10.5 kilograms per square centimeter gauge. A statement by an independent, qualified, registered professional engineer attesting to the integrity of the piping system is included in *Integrity Assessment Report for the 242-A Evaporator/LERF Waste Transfer Piping, Project W105* (WHC 1993), along with the results of the leak/pressure test.

4.5.6 Double Liner and Leak Detection, Collection, and Removal System [806(4)(d)(ii)(D) and 650(2)(j)(iii)]

The double-liner system for LERF is discussed in Section 4.5.2. The leachate detection, collection, and removal system (Figures 4-17 and 4-18) was designed and constructed to remove leachate that might permeate the primary liner. System components for each basin include:

- 30.5-centimeter layer of drainage gravel below the primary liner at the bottom of the basin

- Geonet below the primary liner on the sidewalls to direct leachate to the gravel layer

- 3.0-meter by 1.8-meter by 0.30-meter-deep leachate collection sump consisting of a 25 millimeter high-density polyethylene flat stock, geotextile to trap large particles in the leachate, and 1.5-millimeter high-density polyethylene rub sheet set on the secondary liner

- 10-inch and 4-inch perforated leachate high-density polyethylene riser pipes from the leachate collection sump to the catch basin northwest of the basin

- Leachate collection sump level instrumentation installed in the 4-inch riser

- Level sensors, submersible leachate pump, and 1.5-inch fiberglass-reinforced epoxy thermoset resin pressure piping installed in the 10-inch riser

- Piping at the catch basin to route the leachate through 1.5-inch high-density polyethylene pipe back to the basins.

The bottom of the basins have a 2 percent slope to allow gravity flow of leachate to the leachate collection sump. This exceeds the minimum of 1 percent slope required by WAC 173-303-650(j) for new surface impoundments. Material specifications for the leachate collection system are given in Section 4.5.2.1.1.

Calculations demonstrate that fluid from a small hole (2 millimeter) (EPA 1989, p. 122) at the furthest end of the basin, under a low head situation, would travel to the sump in less than 24 hours (HNF 1997). Additional calculations in indicate the capacity of the pump to remove leachate is sufficient to allow time to readily identify a leak and activate emergency procedures (HNF 1997).

Automated controls maintain the fluid level in each leachate sump below 33 centimeters to prevent significant liquid backup into the drainage layer. The leachate pump is activated when the liquid level in the sump reaches about 28 centimeters, and is shut off when the sump liquid level reaches about 18 centimeters. This operation prevents the leachate pump from cycling with no fluid, which could damage the pump. Liquid level control is accomplished with conductivity probes that trigger relays selected specifically for application to submersible pumps and leachate fluids. A flowmeter/totalizer on the leachate return pipe measures fluid volumes pumped and pumping rate from the leachate collection sumps, and indicates volume and flow rate on local readouts. Other instrumentation provided is real-time continuous level monitoring with a readout at the catch basin and the 242-A Evaporator control room. A sampling port is provided in the leachate piping system at the catch basin. Leak detection is provided through inspections of the leachate flow totalizer readings. For more information on inspections, refer to Chapter 6.0.

The stainless steel leachate pump is designed to deliver 110 liters per minute. The leachate pump returns draws liquid from the sump via 1.5-inch pipe and discharges into the basin through 1.5-inch high-density polyethylene pipe.

4.5.7 Construction Quality Assurance [806(4)(d)(ii)(F)]

The construction quality assurance plan and complete report of construction quality assurance inspection and testing results are provided in *242-A Evaporator Interim Retention Basin Construction Quality Assurance Plan* (KEH 1991). A general description of construction quality assurance procedures is outlined in the following paragraphs.

For excavation of the basins and construction of the dikes, regular inspections were conducted to ensure compliance with procedures and drawings, and compaction tests were performed on the dike soils.

For the soil/bentonite layer, test fills were first conducted in accordance with EPA guidance to demonstrate compaction procedures and to confirm compaction and permeability requirements can be met. The ratio of bentonite to soil and moisture content was monitored; lifts did not exceed 15 centimeters before compaction, and specific compaction procedures were followed. Laboratory and field tests of soil properties were performed for each lift and for the completed test fill. The same suite of tests was conducted for each lift during the laying of the soil/bentonite admixture in the basins.

Geotextiles and geomembranes were laid in accordance with detailed procedures and quality assurance programs provided by the manufacturers and installers. These included destructive and nondestructive tests on the geomembrane seams, and documentation of field test results and repairs.

4.5.8 Proposed Action Leakage Rate and Response Action Plan [806(4)(d)(ii)(G)]

An action leakage rate limit is established where action must be taken due to excessive leakage from the primary liner. The action leak rate is based on the maximum design flow rate the leak detection system can remove without the fluid head on the bottom liner exceeding 30 centimeters. The limiting factor in the leachate removal rate is the hydraulic conductivity of the drainage gravel. An action leakage rate (also called the rapid or large leak rate) of 20,000 liters per hectare per day was calculated for each basin (WHC 1992b).

When it is determined that the action leakage rate has been exceeded, the response action plan will follow the actions in WAC 173-303-650(11)(b) and (c), which includes notification of Ecology in writing within 7 days, assessing possible causes of the leak, and determining whether waste receipt should be curtailed and/or the basin emptied.

4.5.9 Dike Structural Integrity Engineering Certification [806(4)(d)(v)]

Written certification attesting to the structural integrity of the dikes, signed by a qualified, registered professional engineer, is included in Appendix 4D.

4.5.10 Management of Ignitible, Reactive, or Incompatible Wastes [806(4)(d)(viii and ix)]

Although ignitible or reactive aqueous waste might be received in small quantities at LERF, such aqueous waste is with dilute solutions in the basins, removing the ignitable or reactive characteristics. For compatibility requirements with the LERF liner, refer to the waste analysis plan (Appendix 3A).

4.6 AIR EMISSIONS CONTROL [D-8 and D-8a]

This section addresses the ETF requirements of Air Emission Standards for Process Vents, under 40 CFR 264, Subpart AA (incorporated by reference in WAC 173-303-690) and Subpart CC. The requirements of 40 CFR 264, Subpart BB (WAC 173-303-691) are not applicable because aqueous waste with 10 percent or greater organic concentration would not be acceptable for processing at the ETF.

4.6.1 Applicability of Subpart AA Standards [D-8a(1)]

The ETF evaporator and thin film dryer perform operations that specifically require evaluation for applicability of WAC 173-303-690. Aqueous waste in these units routinely contains greater than 10 parts per million concentrations of organic compounds and are, therefore, subject to air emission requirements under WAC 173-303-690. Organic emissions from all affected process vents on the Hanford Facility must be less than 1.4 kilograms per hour and 2.8 megagrams per year, or control devices must be installed to reduce organic emissions by 95 percent.

The vessel offgas system provides a process vent system. This system provides a slight vacuum on the ETF process vessels and tanks (refer to Section 4.2.5.2). Two vessel vent header pipes combine and enter the vessel offgas system filter unit consisting of a demister, electric heater, prefilter, high-efficiency particulate air filters, activated carbon adsorber, and two exhaust fans (one fan in service while the other is backup). The vessel offgas system filter unit is located in the high-efficiency particulate air filter room west of the process area. The vessel offgas system exhaust discharges into the larger building ventilation system, with the exhaust fans and stack located outside and immediately west of the ETF. The exhaust stack discharge point is 15.5 meters above ground level.

The annual average flow rate for the ETF stack (which is the combined vessel offgas and building exhaust flow rates) is provided in *Radionuclide Air*

Emissions Report for the Hanford Site - Calendar Year 1995 (DOE-RL 1996) as 220 cubic meters per minute with a total annual flow of approximately 1.2 E+08 cubic meters. During waste processing, the airflow through just the vessel offgas system is about 23 standard cubic meters per minute.

Organic emissions occur during waste processing, which occurs less than 310 days each year (i.e., 85 percent operating efficiency). This operating efficiency represents the maximum annual operating time for the ETF, as shutdowns are required during the year for planned maintenance outages and for reconfiguring the ETF to accommodate different aqueous waste.

4.6.2 Process Vents - Demonstrating Compliance [D-8a(2)]

This section outlines how the ETF complies with the requirements and includes a discussion of the basis for meeting the organic emissions limits, calculations demonstrating compliance, and conditions for re-evaluation.

4.6.2.1 Basis for Meeting Limits/Reductions [D-8a(2)(a)]. The 242-A Evaporator and the 200 Area ETF are currently the only operating TSD units that contribute to the Hanford Facility volatile organic emissions under 40 CFR 264, Subpart AA. The combined release rate is currently well below the threshold of 1.4 kilograms per hour or 2,800 kilograms per year of volatile organic compounds [General Information Portion (DOE/RL-91-28)]. As a result, the ETF meets these standards without the use of air pollution control devices.

The amount of organic emissions could change as waste streams are changed, or TSD units are brought online or are deactivated. The organic air emissions summation will be re-evaluated periodically as condition warrants. Operations of the TSD units operating under 40 CFR 264, Subpart AA, will be controlled to maintain Hanford Facility emissions below the threshold limits or pollution control device(s) will be added, as necessary, to achieve the reduction standards specified under 40 CFR 264, Subpart AA.

4.6.2.2 Demonstrating Compliance [D-8a(2)(b)]. Calculations to determine organic emissions are performed using the following assumptions:

- Maximum flow rate from LERF to ETF is 568 liters per minute.

- Emissions of organics from tanks and vessels upstream of the UV/OX process are determined from flow and transfer rates given in *Clean Air Act Requirements, WAC 173-400, As-built Documentation, Project C-018H, 242-A Evaporator/PUREX Plant Process Condensate Treatment Facility* (Adtechs 1995).

- UV/OX reaction rate constants and residence times are used to determine the amount of organics which are destroyed in the UV/OX process. These constants are given in *200 Area Effluent Treatment Facility Delisting Petition* (DOE/RL 1992).

- All organic compounds that are not destroyed in the UV/OX process are assumed to be emitted from the tanks and vessels into the vessel offgas system.

- No credit for removal of organic compounds in the vessel offgas system carbon adsorber unit is taken.

The calculation to determine organic emissions consists of the following steps:

1. Determine the quantity of organics emitted from the tanks or vessels upstream of the UV/OX process, using transfer rate values

2. Determine the concentration of organics in the waste after the UV/OX process using UV/OX reaction rates and residence times. If the ETF is configured such that the UV/OX process is not used, a residence time of zero is used in the calculations (i.e., none of the organics are destroyed)

3. Assuming all the remaining organics are emitted, determine the rate which the organics are emitted using the feed flow rate and the concentrations of organics after the UV/OX process

4. The amount of organics emitted from the vessel offgas system is the sum of the amount calculated in steps 1 and 3.

The organic emission rates and quantity of organics emitted during processing are determined using these calculations and are included in the ETF operating record. The Hanford Facility has a system to ensure organic emissions from units subject to 40 CFR 264, Subpart AA are less than the limits of 1.4 kilograms per hour and 2.8 megagrams per year. Records documenting total organic emissions are available for Ecology review on request.

4.6.2.3 Reevaluating Compliance with Subpart AA Standards [D-8a(2)(d)]. Calculations to determine compliance with Subpart AA will be reviewed when any of the following conditions occur at the ETF:

- Changes in the maximum feed rate to the ETF (i.e., greater than the 568 liters per minute flow rate)

- Changes in the configuration or operation of the ETF that would modify the assumptions given in Section 4.6.2.2 (e.g., taking credit for the carbon adsorbers as a control device)

- Annual operating time exceeds 310 days.

4.6.3 Applicability of Subpart CC Standards [D-8c]

The air emission standards of 40 CFR 264, Subpart CC apply to tank, surface impoundment, and container storage units that manage wastes with average volatile organic concentrations equal to or exceeding 500 parts per million by weight, based on the hazardous waste composition at the point of origination (61 FR 59972). However, TSD units that are used solely for management of mixed waste are exempt. Mixed waste is managed at the ETF and LERF and dangerous waste also could be treated and stored at these TSD units.

TSD owner/operators are not required to determine the concentration of volatile organic compounds in a hazardous waste if the wastes are placed in waste management units that employ air emission controls that are in compliance with the Subpart CC standards. Therefore, the approach to Subpart CC compliance at the ETF and LERF is to demonstrate that the ETF and LERF meet the Subpart CC control standards (40 CFR 264.1084 - 264.1086).

4.6.3.1 Demonstrating Compliance with Subpart CC for Tanks. Since the ETF tanks already have process vents regulated under 40 CFR 264, Subpart AA (WAC 173-303-690), they are exempt from Subpart CC [40 CFR 264.1080(b)(8)].

4.6.3.2 Demonstrating Compliance with Subpart CC for Containers. Container Level 1 and Level 2 standards are met at the ETF by managing all dangerous and/or mixed wastes in U.S. Department of Transportation containers [40 CFR 264.1086(f)]. Level 1 containers are those that store more than 0.1 cubic meters and less than or equal to 0.46 cubic meters. Level 2 containers are used to store more than 0.46 cubic meters of waste which are in "light material service". Light material service is defined where a waste in the container has one or more organic constituents with a vapor pressure greater than 0.3 kilopascals at 20°C, and the total concentration of such constituents is greater than or equal to 20 percent by weight.

The monitoring requirements for Level 1 and Level 2 containers include a visual inspection when the container is received at the ETF and when the waste is initially placed in the container. Additionally, at least once every 12 months when stored onsite for 1 year or more, these containers must be inspected.

If compliant containers are not used at the ETF, alternate container management practices are used that comply with the Level 1 standards. Specifically, the Level 1 standards allow for a "container equipped with a cover and closure devices that form a continuous barrier over the container openings such that when the cover and closure devices are secured in the closed position there are no visible holes, gaps, or other open spaces into the interior of the container. The cover may be a separate cover installed on the container...or may be an integral part of the container structural design...." [40 CFR 264.1086(c)(1)(ii)]. An organic-vapor-suppressing barrier, such as foam, may also be used [40 CFR 264.1086(c)(1)(iii)]. Section 4.3 provides detail on container management practices at the ETF.

Container Level 3 standards apply when a container is used for the "treatment of a hazardous waste by a waste stabilization process" [40 CFR 264.1086(2)]. Because treatment in containers is not provided at the ETF, these standards do not apply.

4.6.3.3 Demonstrating Compliance with Subpart CC for Surface Impoundments. The Subpart CC emission standards are met at LERF through the use of a floating membrane cover that is constructed of very-low-density polyethylene that forms a continuous barrier over the entire surface area [40 CFR 264.1085(c)]. This membrane has both organic permeability properties equivalent to a high-density polyethylene cover and chemical/physical properties that maintain the material integrity for the intended service life of the material. The additional requirements for the floating cover at the LERF have been met (Section 4.5.2.4).

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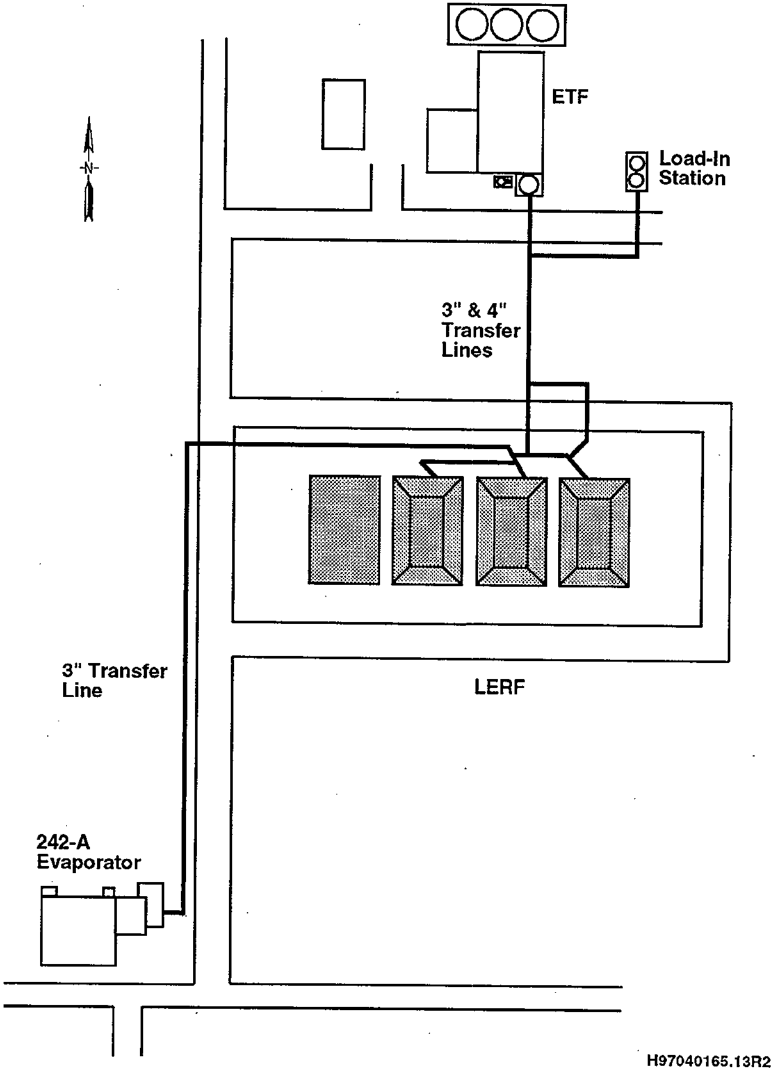

Figure 4-1. Liquid Effluent Retention Facility Layout.

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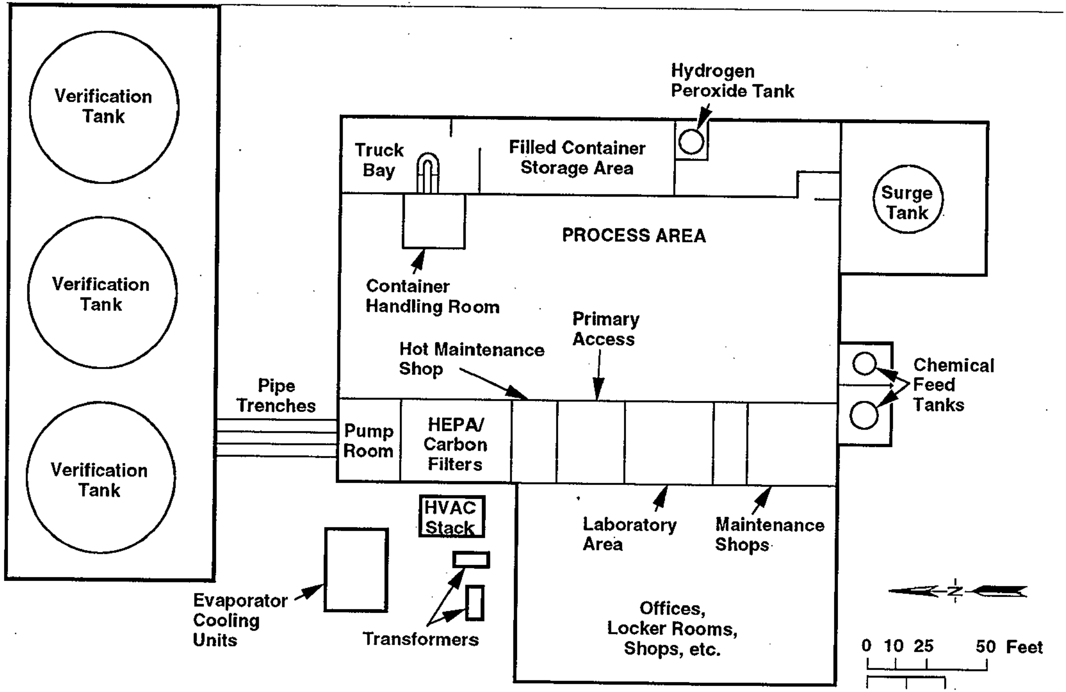

HEPA = High-efficiency particulate air
HVAC = Heating, ventilation, and air conditioning

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Figure 4-2. Plan View of the 200 Area Effluent Treatment Facility.

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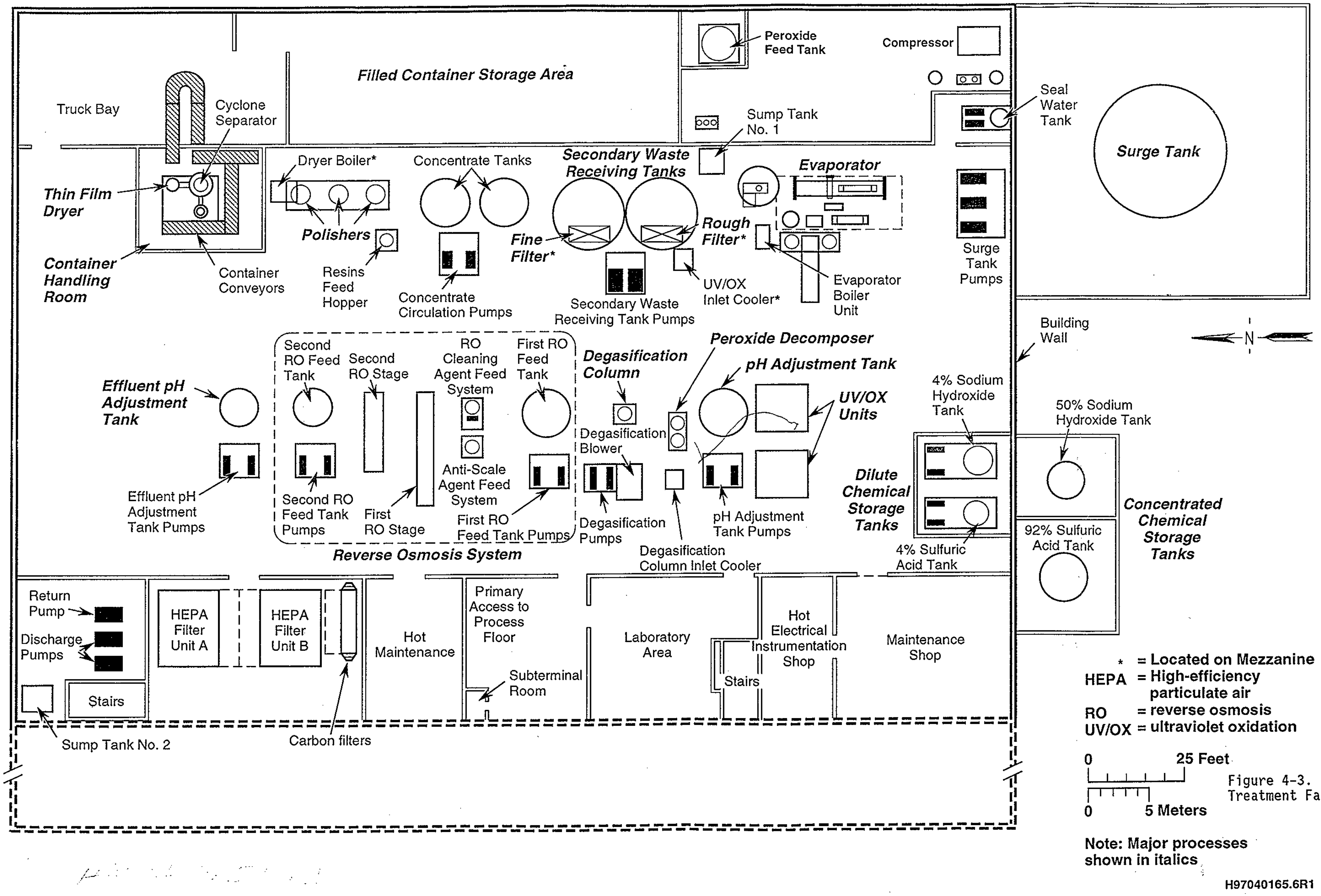


Figure 4-3. 200 Area Effluer Treatment Facility Layout.

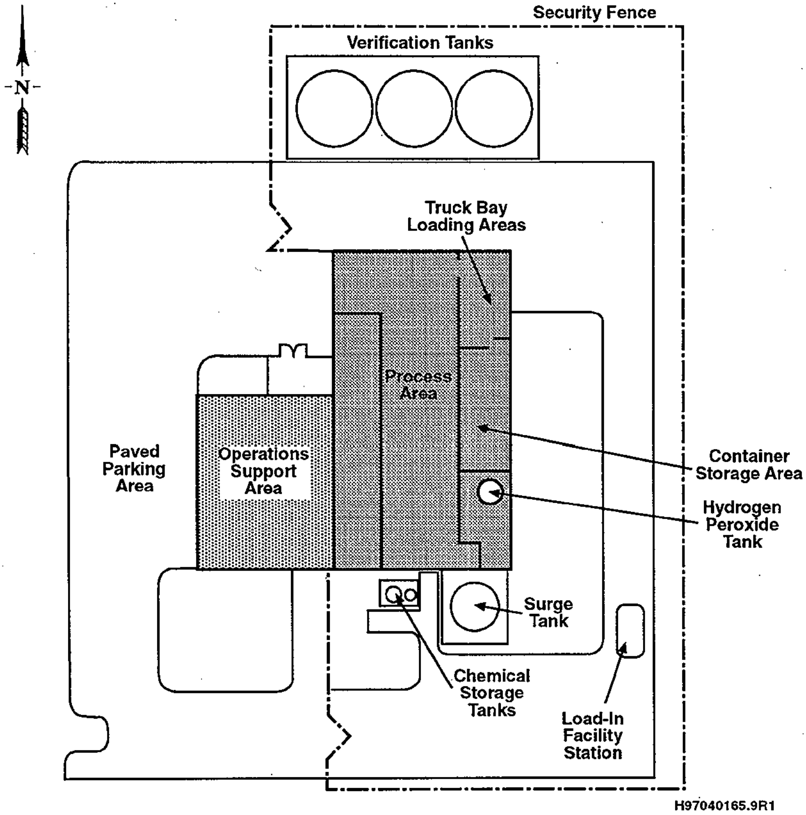
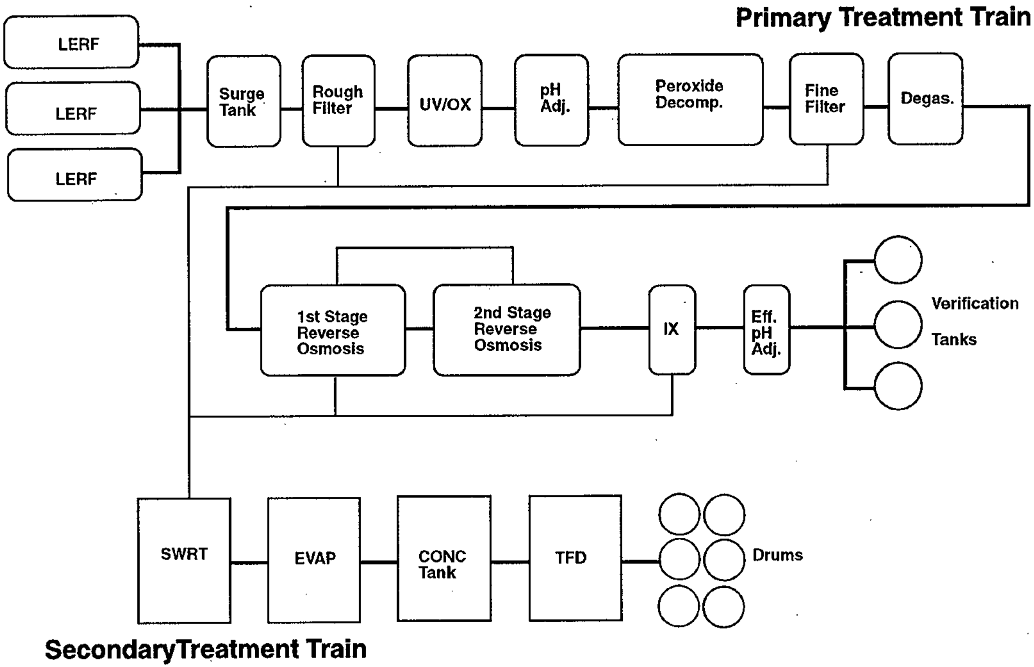


Figure 4-4. 200 Area Effluent Treatment Facility.



CONC Tank = Concentrate tank
Degas. = Degasification column
Eff. pH Adj. = Effluent pH adjustment tank
Evap = ETF evaporator
IX = Ion Exchange
pH Adj. = pH adjustment tank
SWRT = Secondary waste receiving tank
TFD = Thin film dryer

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Figure 4-5. Example - 200 Area Effluent Treatment Facility Configuration 1.

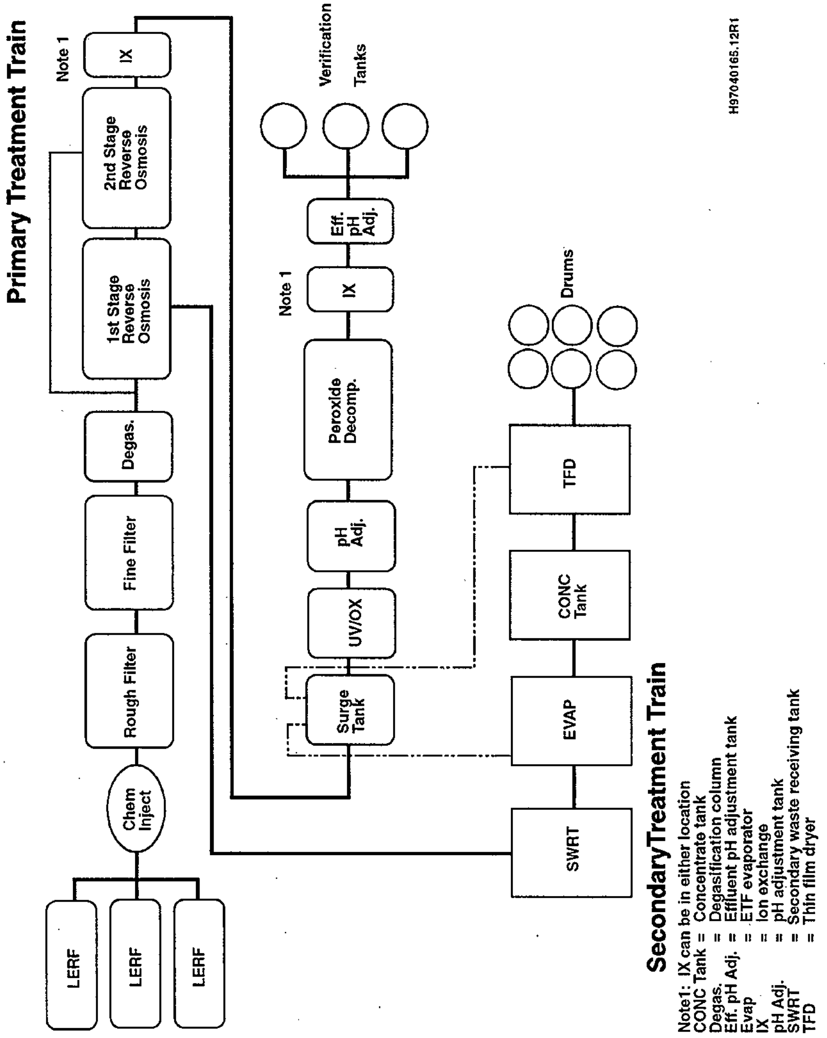

Figure 4-6. Example - 200 Area Effluent Treatment Facility Configuration 2.

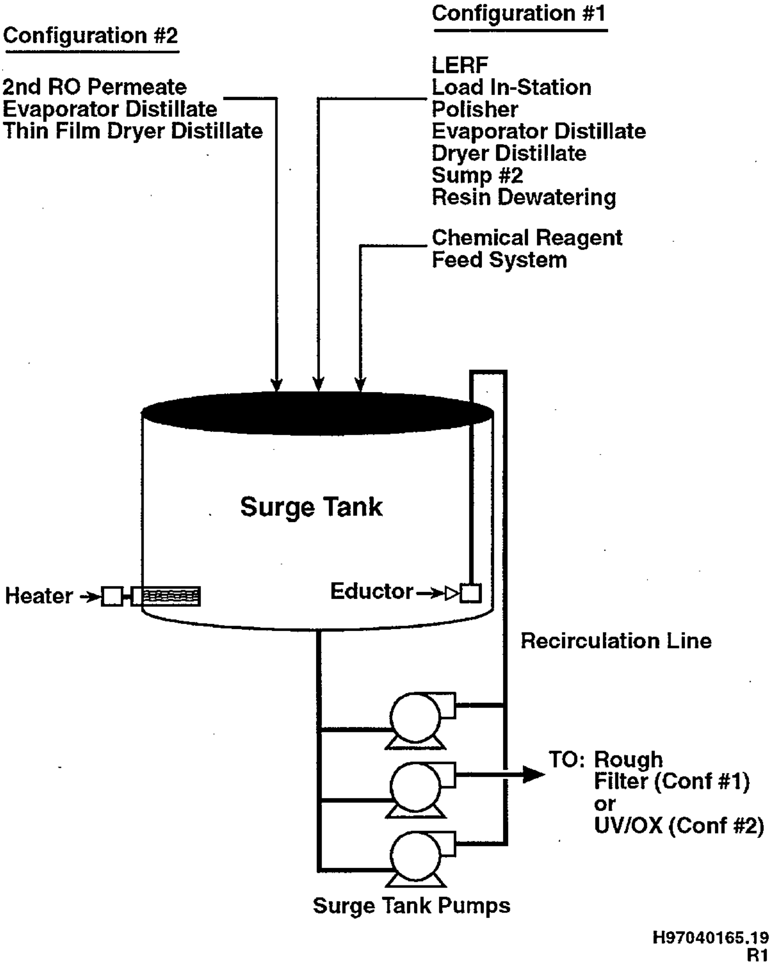

Figure 4-7. Surge Tank.

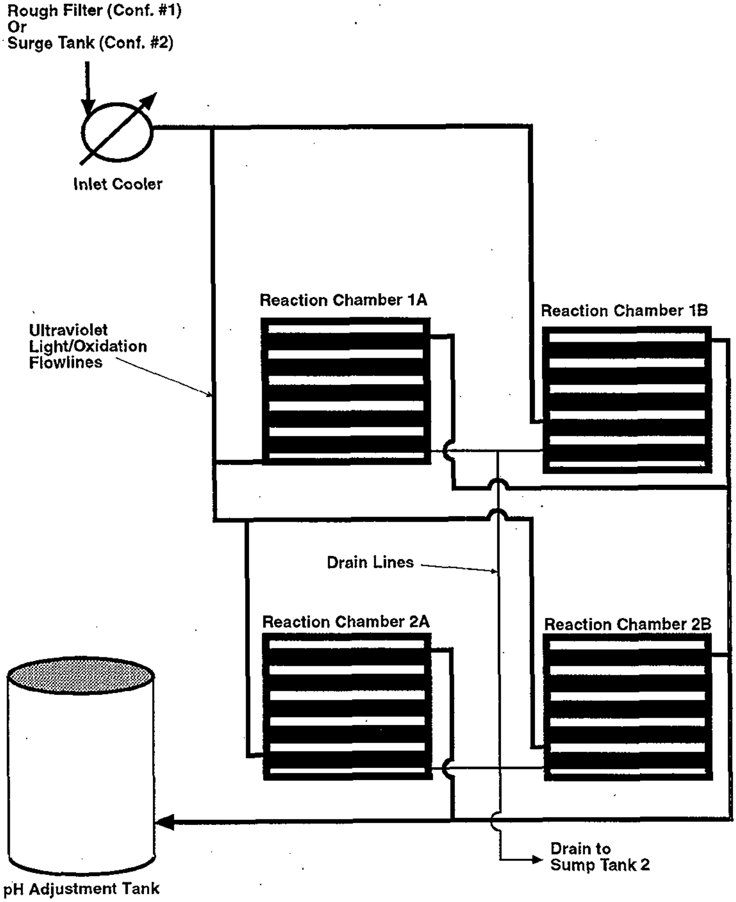

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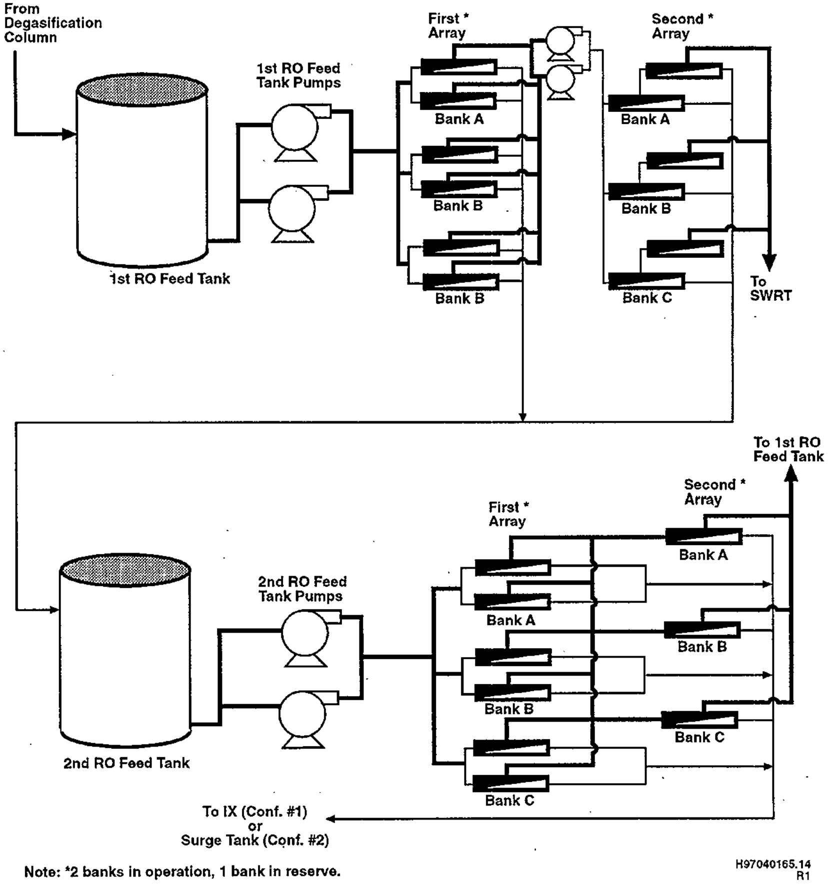
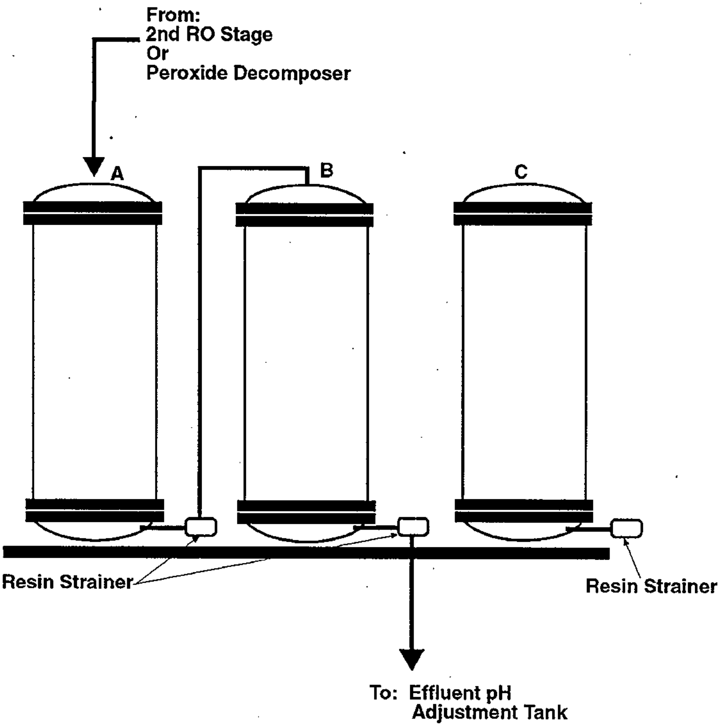
Figure 4-8. Ultraviolet Light/Oxidation Unit.



Note: *2 banks in operation, 1 bank in reserve.
SWRT = Secondarty Waste Recieiving Tanks
▬ = Retentate Line
— = Permeate Line

Figure 4-9. Reverse Osmosis Unit.



NOTE: Example Configuration- Column A and B in Operation, Column C in Standby Mode

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Figure 4-10. Ion Exchange Unit.

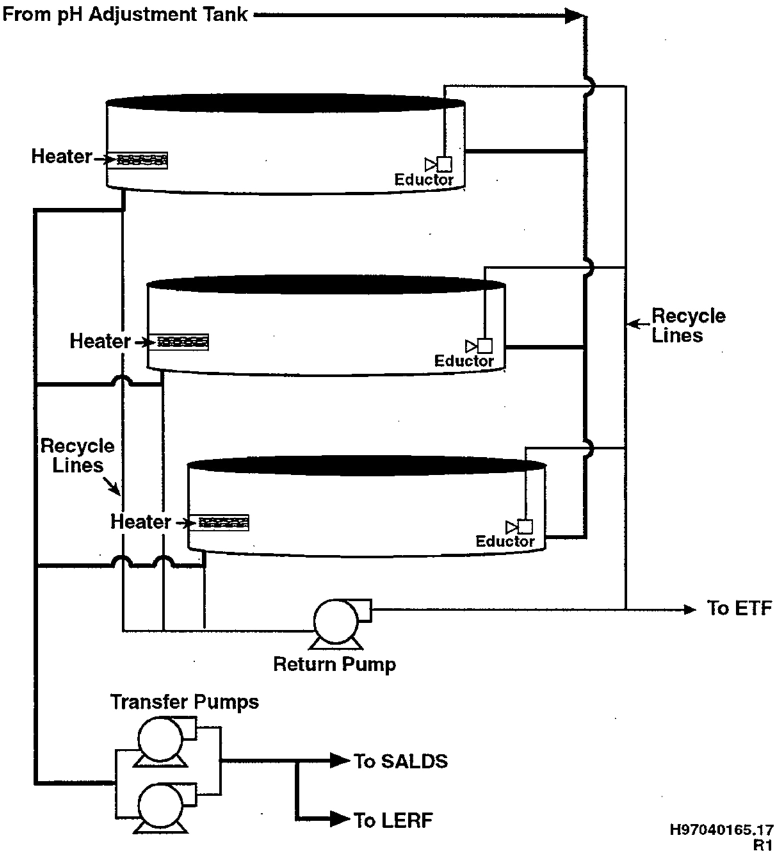


Figure 4-11. Verification Tanks.

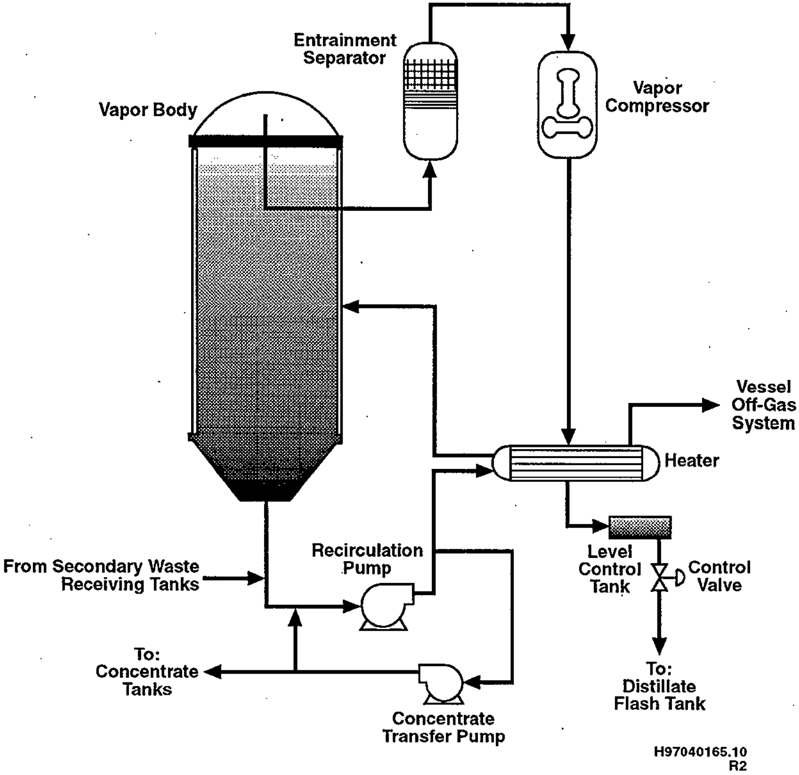


Figure 4-12. Effluent Treatment Facility Evaporator.

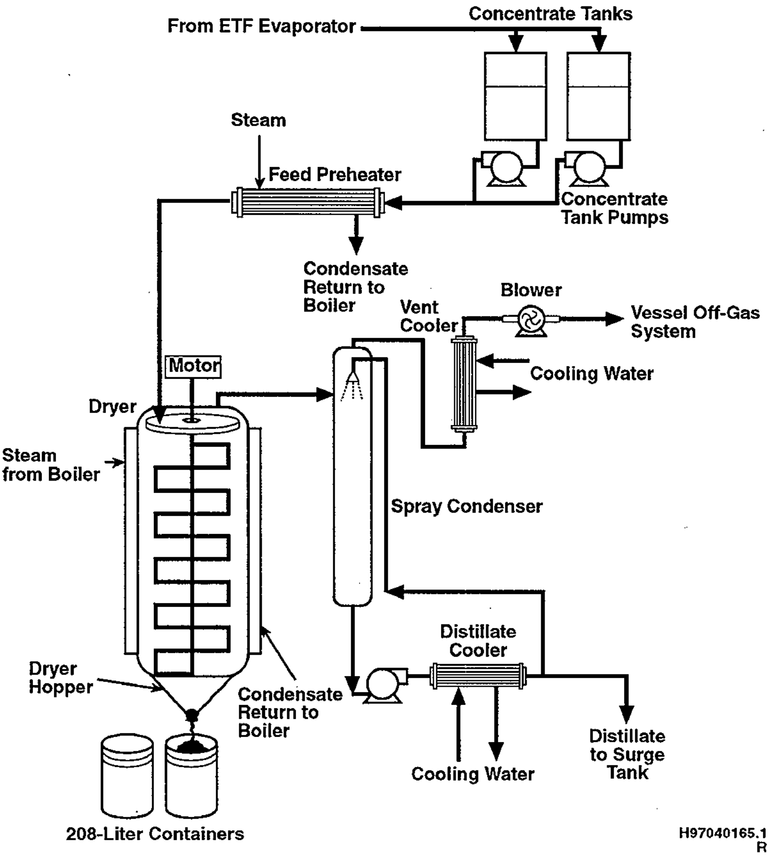


Figure 4-13. Thin Film Dryer.

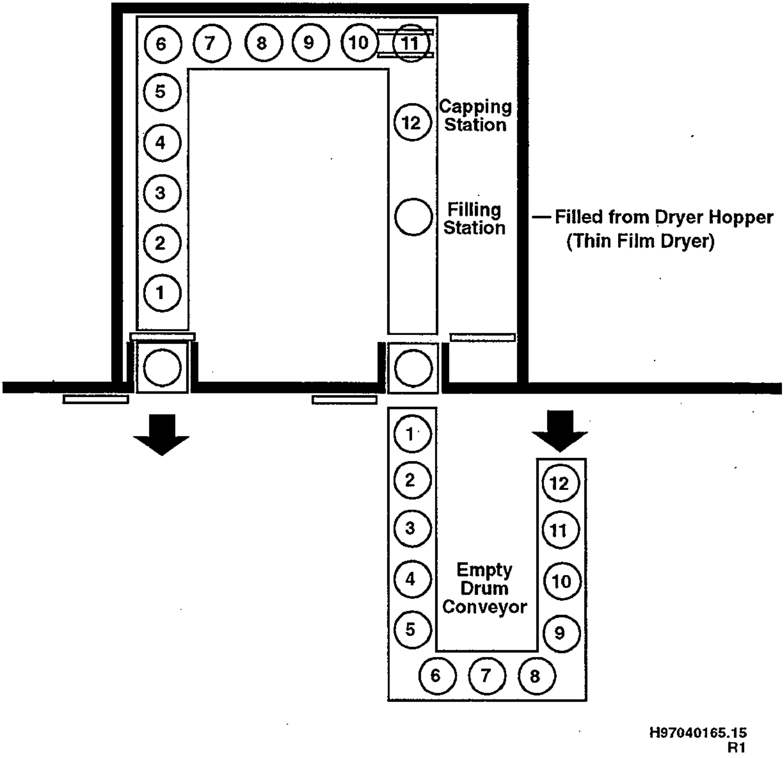


Figure 4-14. Container Handling System.

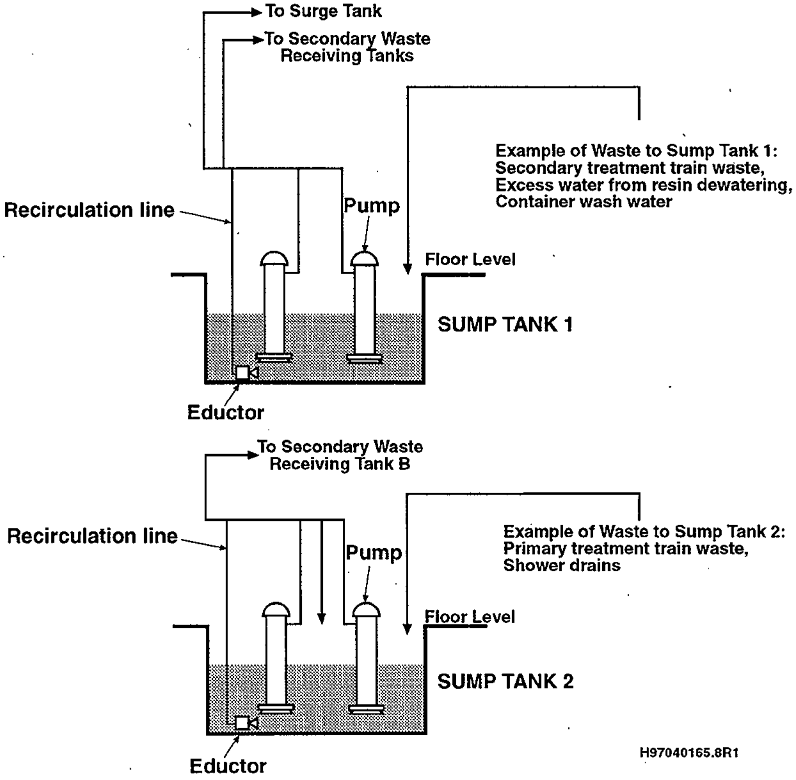
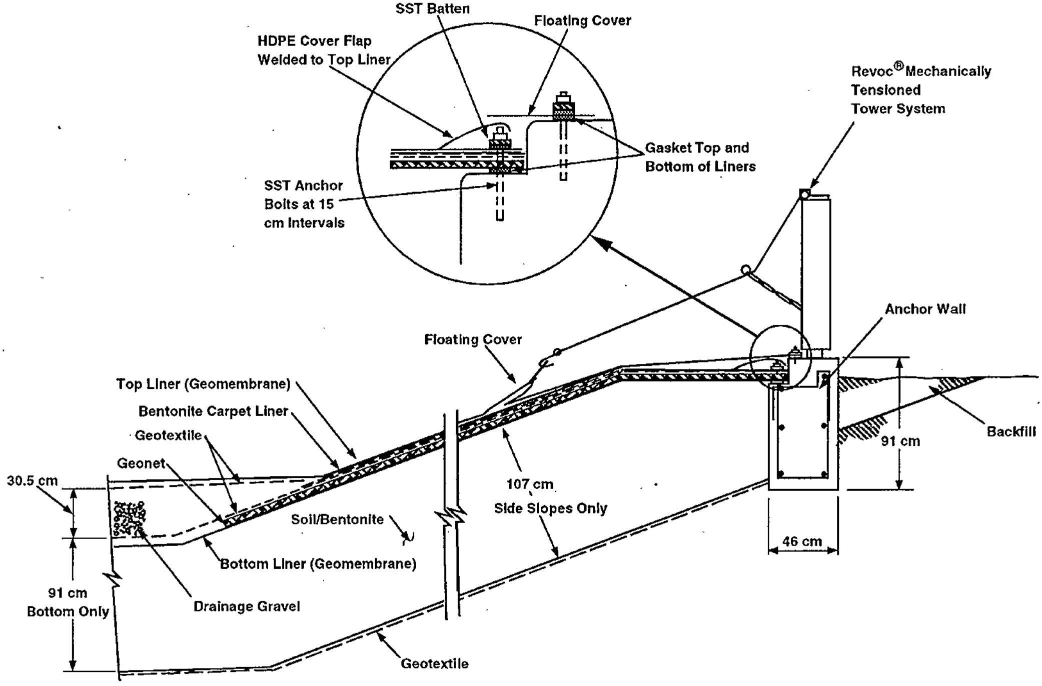


Figure 4-15. Effluent Treatment Facility Sump Tanks.



® = Patented and licensed by CW Neal Corp, Santee, CA

Not to Scale

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Figure 4-16. Liner Anchor Wall and Cover Tension System.

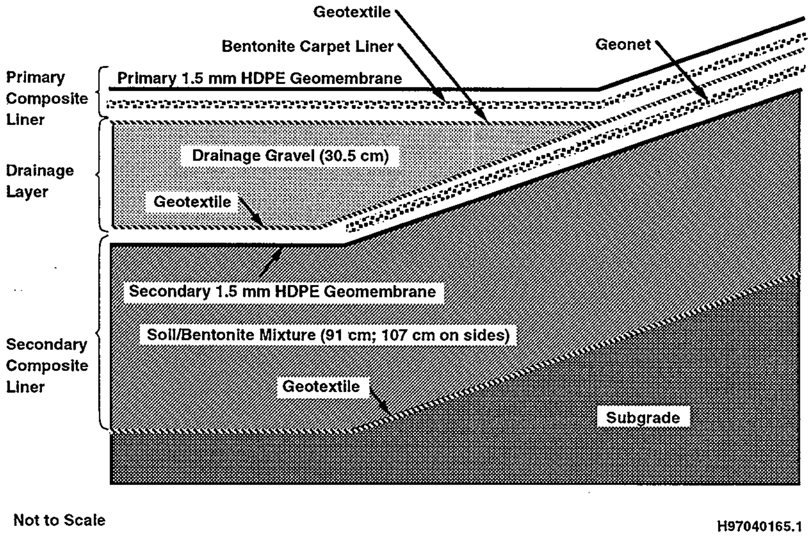
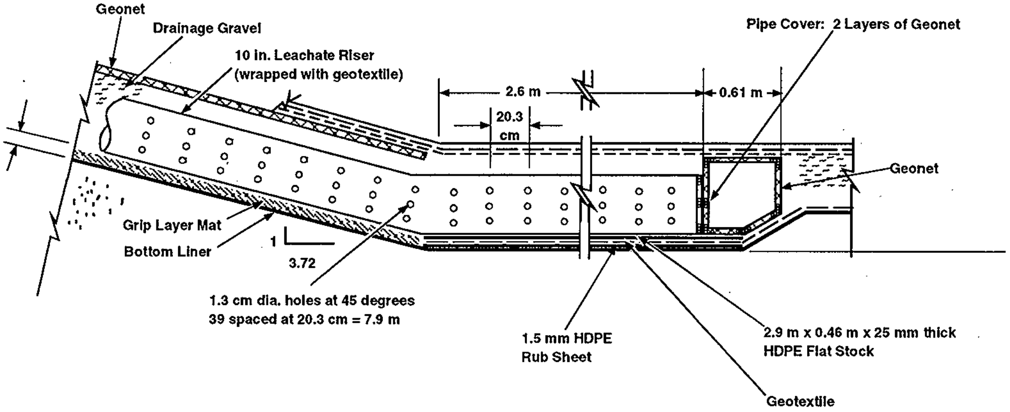


Figure 4-17. Liner System Schematic.



Section View

HDPE: High Density Polyethylene

Not to Scale

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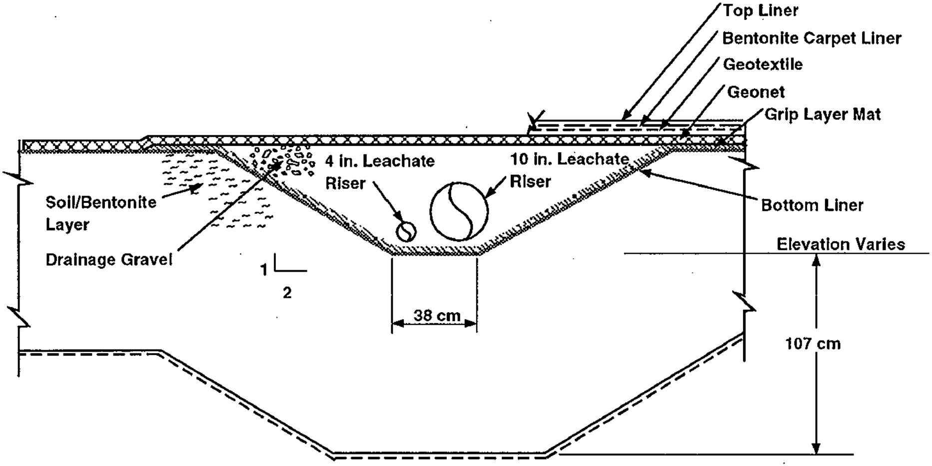
Figure 4-18. Detail of Leachate Collection Sump.



Section View
Not to Scale

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Figure 4-19. Detail of Leachate Riser Trench.

Table 4-1. 200 Area Effluent Treatment Facility Tank Systems Information.
(sheet 1 of 2)

Tank Description	Material of Construction	Maximum Tank Capacity[1] liters	Inner diameter meters	Height meters	Shell Thickness[2] centimeters	Corrosion Protection[3]
Load-in tanks (2)	304 SS	37,900	3.6	4.7	0.64	Type 304 SS
Surge tank	304 SS	461,820	7.9	9.2	0.48	Type 304 SS
pH adjustment tank	304 SS	16,660	3.0	2.5	0.64	Type 304 SS
First RO feed tank	304 SS	20,440	3.0	3.2	0.64	Type 304 SS
Second RO feed tank	304 SS	7,600	Nonround tank 3.0 m x 1.5 m	1.5	0.48 w/rib stiffeners	Type 304 SS
Effluent pH adjustment tank	304 SS	14,390	2.4	3.6	0.64	Type 304 SS
Verification tanks (3)	Carbon steel with epoxy lining	2,763,340	18.3	11.4	0.79	epoxy coating
Secondary waste receiving tanks (2)	304 SS	75,700	4.3	5.7	0.64	Type 304 SS
Concentrate tanks (2)	316L SS	24,980	3.0	3.8	0.64	Type 316 SS
ETF evaporator (Vapor Body)	Alloy 625	20,800	2.4	6.8	variable	Alloy 625
Distillate flash tank	304 SS	950	Horizontal tank 0.76	Length 2.2	0.7	304 SS
Sump tank 1	304 SS	4,160	1.5 x 1.5	3.4	3/16	304 SS
Sump tank 2	304 SS	4,160	1.5 x 1.5	3.4	3/16	304 SS

Table 4-1. 200 Area Effluent Treatment Facility Tank Systems Information.
(sheet 2 of 2)

Tank description	Liner materials	Pressure controls	Foundation materials	Structural support	Seams	Connections
Load-in tanks (2)	None	vent to atmosphere	concrete slab	SS skirt bolted to concrete	welded	flanged
Surge tank	None	pressure indicator/vacuum breaker valve	reinforced concrete ring plus concrete slab	structural steel on concrete base	welded	flanged
pH adjustment tank	None	pressure indicator/vent to VOG	concrete slab	carbon steel skirt	welded	flanged
First RO feed tank	None	pressure indicator/vent to VOG	concrete slab	carbon steel skirt	welded	flanged
Second RO feed tank	None	pressure indicator/vent to VOG	concrete slab	carbon steel frame	welded	flanged
Effluent pH adjustment tank	None	pressure indicator/vent to VOG	concrete slab	carbon steel skirt	welded	flanged
Verification tanks (3)	Epoxy	pressure indicator/filtered vent to atmosphere	reinforced concrete ring plus concrete slab	structural steel on concrete base	welded	flanged
Secondary waste receiving tanks (2)	None	pressure indicator/vent to VOG	concrete slab	carbon steel skirt	welded	flanged
Concentrate tanks (2)	None	pressure indicator/vent to VOG	concrete slab	carbon steel skirt	welded	flanged
ETF evaporator (vapor body)	None	pressure indicator/vapor vent - to DFT/VOG	concrete slab	carbon steel frame	welded	flanged
Distillate flash tank	None	vent to VOG	concrete slab	carbon steel I-beam and cradle	welded	flanged
Sump tank 1	None	vent to VOG	concrete containment	reinforced concrete containment basin	welded	flanged
Sump tank 2	None	vent to VOG	concrete containment	reinforced concrete containment basin	welded	flanged

[1] The maximum operating volume of the tanks is identified. For the load-in tanks and the second RO feed tank, the maximum operating volume is also the operating capacity.
[2] The nominal thickness of ETF tanks is represented.
[3] Type 304 SS, 304L, 316 SS and alloy 625 provide corrosion protection.
304 SS = stainless steel type 304 or 304L.
316L SS = stainless steel type 316L.
DFT = distillate flash tank.
VOG = vessel offgas system.

Table 4-2. Ancillary Equipment and Material Data. (sheet 1 of 2)

System	Ancillary equipment	Number	Material
Load-in tanks	Load-in/transfer pumps (2)	P-103A/-103B	316 SS
Surge tank	Surge tank pumps (3)	2025E-60A-P-1A/-1B/-1C	304 SS
Rough filter	Rough filter	2025E-60B-FL-1	304 SS
UV/OX	UV oxidation inlet cooler	2025E-60B-E-1	316 SS
	UV oxidizers (4)	2025E-60D-UV-1A/-1B/-2A/-2B	316 SS
pH adjustment	pH adjustment pumps (2)	2025E-60C-P-1A/-1B	304 SS
Peroxide decomposer	H_2O_2 decomposers (2)	2025E-60D-CO-1A/-1B	CS with epoxy coating
Fine filter	Fine filter	2025E-60B-FL-2	304 SS
Degasification	Degasification column inlet cooler	2025E-60E-E-1	316 SS
	Degasification column	2025E-60E-CO-1	FRP
	Degasification pumps (2)	2025E-60E-P-1A/-1B	316 SS
RO	Feed/booster pumps (6)	2025E-60F-P-1A/-1B/-2A/-2B/-3A/-3B	304 SS
	Reverse osmosis arrays (21)	2025E-60F-RO-01 through -21	Membranes: polyamide Outer piping: 304 SS
IX/Polishers	Polishers (3)	2025E-60G-IX-1A/-1B-1C	CS with epoxy coating
	Resins strainers (3)	2025E-60G-S-1A/-1B/-1C	304 SS
Effluent pH adjustment	Recirculation/transfer pumps (2)	2025E-60C-P-2A/-2B	304 SS/PVC
Verification tanks	Return pump	2025E-60H-P-1	304 SS
	Transfer pumps (2)	2025E-60H-P-2A/-2B	
Secondary waste receiving tanks	Secondary waste feed pumps (2)	2025E-60I-P-1A/-1B	304 SS

Table 4-2. Ancillary Equipment and Material Data. (sheet 2 of 2)

System	Ancillary equipment	Number	Material
ETF evaporator system	Feed/distillate heat exchanger	2025E-60I-E-02	Tubes: 316 SS Shell: 304 SS
	Heater (reboiler)	2025E-60I-E-01	Tubes: alloy 625 Shell: 304 SS
	Recirculation pump	2025E-60I-P-02	316 SS
	Concentrate transfer pump	2025E-60I-P-04	316 SS
	Entrainment separator	2025E-60I-DE-01	Top section: 316 SS Bottom section: alloy 625
	Vapor compressor (incl. silencers)	2025E-60I-C-01	304 SS
	Silencer drain pump	2025E-60I-P-06	316 SS
	Level control tank	2025E-60I-TK-5	304 SS
	Distillate flash tank pump	2025E-60I-P-03	316 SS
Concentrate tanks	Concentrate circulation pumps (2)	2025E-60J-P-1A/-1B	316 SS
Thin film dryer	Concentrate feed pump	2025E-60J-P-2	316 SS
	Dryer feed preheater	2025E-60J-E-3	316 SS
	Thin film dryer	2025E-60J-D-1	Interior surfaces: alloy 625 Rotor and blades: 316 SS
	Powder hopper	2025E-60J-H-1	316 SS
	Spray condenser	2025E-60J-DE-01	316 SS
	Distillate condenser	2025E-60J-CND-01	Tubes: 304 SS Shell: CS
	Dryer distillate pump	2025E-60J-P-3	316 SS
Resin dewatering	Dewatering pump	2025E-80E-P-1	

CS = carbon steel.
FRP = fiberglass reinforced plastic.
PVC = polyvinyl chloride.
RO = reverse osmosis.
UV = ultraviolet.
304 SS = stainless steel type 304 or 304L.
316 SS = stainless steel type 316 or 316L.

Table 4-3. Concrete and Masonry Coatings.

Coating	Minimum wet film thickness (mil)	Percentage of film forming solids per volume (%)	Minimum dry film thickness (mil)
Concrete and masonry			
Prime: Amercoat-187*	4.5	22.0	1.0
Second: Amercoat-33	6.4	23.46	1.5
Finish: Amercoat-33	6.4	23.46	1.5
or			
Prime: Amercoat-385	5-6	66	3-4
Topcoat: Amercoat-450HS	3-4	66	2-2.5
High traffic, container storage area			
Filler: Ameron Nu-Klad 114A**	--	100	--
Prime: Amercoat-105A	2-3	100	2-3
Topcoat: Amercoat-120	20-30	100	20-30

*Amercoat is a trademark of Ameron, Incorporation.
**Nu-Klad is a trademark of Ameron, Incorporation.

Table 4-4. Geomembrane Material Specifications.

Property	Value
Specific gravity	0.932 to 0.950
Melt flow index	1.0 g/10 min., maximum
Thickness (thickness of flow marks shall not exceed 200% of the nominal liner thickness)	60 mil ± 10% (1.5 mm ± 10%)
Carbon black content	1.8 to 3%, bottom liner 2 to 3%, top liner
Tensile properties (each direction)	
Tensile strength at yield	21.5 kgf/cm width, minimum
Tensile strength at break	32.2 kgf/cm width, minimum
Elongation at yield	10%, minimum
Elongation at break	500%, minimum
Tear resistance	13.6 kgf, minimum
Puncture resistance	31.3 kgf, minimum
Low temperature/brittleness	-40 °C, maximum
Dimensional stability (% change each direction)	±2%, maximum
Environmental stress crack	750 h, minimum
Water absorption	0.1 maximum and weight change
Hydrostatic resistance	316,000 kgf/m^2
Oxidation induction time (200 °C/1 atm. O_2)	90 min, minutes

Reference: Construction Specifications (KEH 1990b). Format uses NSF 54 table for high-density polyethylene as a guide (NSF 1985). However, RCRA values for dimensional stability and environmental stress crack have been added.

%	= percent	max	= maximum
g	= gram	kgf	= kilograms force
min	= minute	m	= meters
h	= hour	mm	= millimeters

Table 4-5. Drainage Gravel Specifications.

Property	Value
Sieve size	
25 millimeters	100 wt% passing
19 millimeters	80 - 100 wt% passing
9.5 millimeters	10 - 40 wt% passing
4.75 millimeters	0 - 4 wt% passing
Permeability	0.1 cm/sec, minimum

Reference: Sieve size is from WSDOT M41-10-88, Section 9.03.1(3)C for Grading No. 5 (WSDOT 1988). Permeability requirement is from WAC 173-303-650(2)(j) for new surface impoundments.

CONTENTS

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5.0 GROUNDWATER MONITORING [D-10]

5.1 EXEMPTION FROM GROUNDWATER PROTECTION REQUIREMENTS [D-10a]

A waiver from the groundwater monitoring requirements as allowed under WAC 173-303-645 is not requested. Therefore, the requirements of the Washington Administrate Code for groundwater monitoring are applicable to the LERF.

5.2 INTERIM STATUS PERIOD GROUNDWATER MONITORING DATA [D-10b]

Information on interim status groundwater monitoring activities is provided in *Interim Status Ground Water Monitoring Plan for the 200 East Area Liquid Effluent Retention Facility* (WHC 1991a), in *Hanford Site Groundwater Monitoring for Fiscal Year 1996* (PNNL 1997a), and in the Hanford Environmental Information System. There have been no significant detections of the indicator parameters that could be attributed to the LERF.

5.3 AQUIFER IDENTIFICATION [D-10c]

The characteristics of the uppermost aquifer beneath the LERF and the regional physiographic, geologic, and hydrogeologic setting of the LERF are summarized in Chapter 5.0 of the General Information Portion (DOE/RL-91-28).

5.4 CONTAMINANT PLUME DESCRIPTION [D-10d]

A description of the contaminant plumes existing beneath the 200 East Area and 200 West Area is provided in Chapter 5.0 of the General Information Portion (DOE/RL-91-28).

5.5 DETECTION MONITORING PROGRAM [D-10e]

Interim status groundwater monitoring will be continued until a final status groundwater monitoring plan is submitted by DOE and approved by Ecology. The approved final status groundwater monitoring plan will be implemented immediately on approval and will be submitted for incorporation as a modification to the LERF permit before the end of calendar year 1998. The ultimate goal is to develop a consolidated groundwater monitoring plan for the Hanford Site, which will supersede the LERF specific final status groundwater monitoring plan.

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CONTENTS

TABLES

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6.0 PROCEDURES TO PREVENT HAZARDS [F]

This chapter discusses security; inspection schedules; preparedness and prevention requirements; preventive procedures, structures, and equipment; and prevention of reaction of ignitable, reactive, and incompatible waste at LERF and ETF.

6.1 SECURITY [F-1]

The following sections describe the security measures, equipment, and warning signs used to control entry to LERF and ETF. Hanford Facility security measures are discussed in the General Information Portion (DOE/RL-91-28).

6.1.1 Security Procedures and Equipment [F-1a]

The following sections describe the 24-hour surveillance system, barriers, and warning signs used to provide security and to control access to LERF and ETF.

6.1.1.1 24-Hour Surveillance System. The entire Hanford Facility is a controlled-access area. For surveillance information, refer to General Information Portion (DOE/RL-91-28).

6.1.1.2 Barrier and Means to Control Entry. The LERF and ETF are protected by the 200 East Area fence. Visitors are required to be escorted. The LERF is surrounded in its entirety by a separate 2.1 meter chain link fence topped with 3 strands of barbed wire extended outward at a 45° angle (referred to as the operational security fence). Access to the LERF is gained through two locked vehicular gates off the perimeter road. Gate keys are retained at the 242-A Evaporator and ETF shift offices.

Persons desiring entry to ETF process area must notify the control room. These persons also must have the appropriate facility-specific training, as defined in the Dangerous Waste Training Plan (Appendix 8A). The ETF personnel monitor all persons entering ETF and notify the Hanford Patrol of any attempted unauthorized entry. Immediate response by protective force personnel maintains the necessary security at the LERF and ETF.

6.1.1.3 Warning Signs. Signs bearing the legend "DANGER--UNAUTHORIZED PERSONNEL KEEP OUT," or an equivalent legend, are posted around the perimeter of LERF and ETF. The signs are in English, legible from a distance of 7.6 meters, and are visible from all angles of approach. In addition to these signs, the fences around the 200 East Area are posted with signs, printed in English, warning against unauthorized entry. These signs also are visible from all angles of approach.

6.1.2 Waiver [F-1b]

Waiver of the security procedures and equipment requirements for LERF and ETF are not requested. Therefore, WAC 173-303-310(1)(a) and (b) are not applicable to LERF and ETF.

6.2 INSPECTION PLAN [F-2]

This section describes the method and schedule for inspections of LERF and ETF. The purpose of inspections is to help ensure that situations do not exist that might cause or lead to the release of dangerous and/or mixed waste that could pose a threat to human health and the environment. Abnormal conditions identified by an inspection will be corrected on a schedule that prevents hazards to workers, the public, and the environment.

6.2.1 General Inspection Requirements [F-2a and F-2a(4)]

The content and frequency of inspections are described in this section. Inspection records are retained at the ETF, or other approved locations, for a minimum of 5 years.

In radioactive areas of the ETF, many inspections are performed remotely. Monitoring instruments are connected to audible alarms and visual indicators track alarm status. The monitoring system provides trending of selected monitoring data, graphics, and equipment summary displays.

A preventive maintenance recall system is employed to direct preventive maintenance activities at the LERF and the ETF. Equipment requiring maintenance is checked as indicated by the maintenance history and the manufacturer's recommendations. The preventive maintenance of certain equipment might not be possible if the LERF or the ETF is in an operational mode. Thus, the preventive maintenance could be performed slightly earlier or later than planned to minimize impact on operations.

Instrumentation at ETF is calibrated regularly to ensure accuracy and reliability. All process control instrumentation is calibrated on a schedule depending on previous calibration experience. An instrument calibration and recall system is employed to manage calibrations.

6.2.1.1 Types of Problems. Key components of the LERF inspection program include the following areas:

- Structural integrity of the basins
- Catch basin secondary containment system integrity
- Evidence of release from basins
- Safety, communications, and emergency equipment.

Key components of the ETF inspection program include the following areas:

- Condition of tanks and ancillary piping
- Condition of containers
- Condition of the process control equipment
- Condition of emergency equipment
- Condition of secondary containment.

Tables 6-1 and 6-2 provide a description of ETF items to be inspected.

6.2.1.2 Frequency of Inspections [F-2a(3)]. The frequency of inspections is based on the rate of possible deterioration of equipment and the probability of a threat to human health or the environment.

While in operation, the LERF is inspected weekly. The LERF also is inspected for run-on, run-off, cover integrity, and erosion problems after significant precipitation events. The ETF is inspected as indicated in Tables 6-1 and 6-2.

6.2.2 Specific Process Inspection Requirements [F-2d].

The following sections describe the specific process inspections performed at LERF and ETF.

6.2.2.1 Container Inspections [F-2d(1)]. Containers are used at the ETF to store solidified secondary waste, such as the powder waste from the thin film dryer and maintenance and operations waste. When containers are being held in the container storage area, the following inspection schedule is maintained:

- Daily visual inspection of container storage area for leaks, spills, accumulated liquids, and open or improperly sealed containers

- Weekly visual inspection of container labels to ensure labels are not obscured, removed, or otherwise unreadable

- Weekly visual inspection for deterioration of containers, containment systems, or cracks in protective coating or foundations caused by corrosion, mishandling, or other factors.

Following the inspections, an inspection datasheet is signed and dated by the inspector and supervisor.

6.2.2.2 Tank Inspections [F-2d(2)]. A description of the tank systems and ancillary equipment at the ETF is given in Chapter 4.0. Inspections and frequencies are given in Tables 6-1 and 6-2. This section includes a brief discussion of the inspections.

6.2.2.2.1 Overfill Protection. Tanks that have the possibility of being overfilled have level instrumentation that alarms before the tanks reach overflow. High tank level alarms annunciate in the control room, allowing operating personnel to take immediate action to stop the vessels from overfilling. These alarms are monitored continuously in the control room during solution transfers.

6.2.2.2.2 Visual Inspections. Visual inspections of tanks and secondary containments are performed to check for leaks, signs of corrosion or damage, and malfunctioning equipment. Inspections are performed on tanks and the secondary containment within the ETF and the surge tank and verification tank and associated secondary containment.

6.2.2.2.3 Secondary Containment Leak Detectors. The surge tank and verification tank secondary containment systems have sloped floors that drain solution to sumps equipped with leak detectors that alarms in the control room. These alarms are inspected daily. If an alarm is activated, further investigation is performed to determine if the source is a tank leak or other solution (i.e., precipitation).

6.2.2.2.4 Integrity Assessments. The initial integrity assessment was issued in 1995 (Chapter 4.0). A program has been implemented to perform integrity inspections every 5 years beginning in 2000. Tanks believed to have the greatest potential for corrosion are inspected more frequently.

6.2.2.2.5 Effluent Treatment Facility Piping. The ETF employs an extensive piping system. During inspections at the ETF, any aboveground piping is inspected visually for signs of leakage and for general structural integrity. During the visual inspection, particular attention is paid to valves and fittings for signs of cracking, deformation, and leakage.

6.2.2.3 Surface Impoundments [F-2d(6)] and Condition Assessment [F-2d(6)(a)].

The following describes the surface impoundment inspections performed at LERF.

6.2.2.3.1 Overtopping Control [F-2d(6)(a)(1)]. Under current operating conditions, 1.34 meters of freeboard is maintained at each LERF basin, which corresponds to a normal operating level of 6.1 meters, or 24.6 million liters. Level indicators at each basin are monitored to confirm that this level is not exceeded.

Before an aqueous waste is transferred into a basin, administrative controls are implemented to ensure overtopping will not occur during the transfer. The volume of feed to be transferred is compared to the available volume in the receiving basin. The transfer is not initiated unless there is sufficient volume available in the receiving basin or a cut-off level is established. The transfer into the basin would be stopped when this cut-off level is reached.

The LERF basins also are provided with floating very low-density polyethylene covers that are designed and constructed to prevent overtopping by the introduction of precipitation and dust into the basins. Overtopping and flow control also are discussed in Chapter 4.0.

6.2.2.3.2 Impoundment Contents [F-2d(6)(a)(2)]. The LERF basins are inspected weekly to assess whether the contents are escaping from a basin.

Level indicators are inspected weekly to check for unaccountable change in the level of the basins.

6.2.2.3.3 Leak Detection [F-2d(6)(a)(3)]. The leachate detection, collection and removal system is described in Chapter 4.0. The leachate collection sump pump is activated automatically when the liquid level in the leachate sump reaches a preset level. A flowmeter and totalizer measure the amount of leachate removed. An inspection is performed weekly where the totalizer reading and basin level reading are used to determine the leak rate per wetted surface area. The leak rate is compared to previous rates to see if leakage has increased.

The LERF employs a double-walled transfer piping between 242-A Evaporator and LERF and between LERF and ETF. The WAC 173-303-650 regulations do not require a discussion of piping for surface impoundments. However, for the purposes of comprehensive coverage of the LERF, inspections and integrity assessments are performed on the piping system. Aqueous waste (e.g., process condensate) is transferred from the 242-A Evaporator to the LERF via a buried pipeline. Likewise, aqueous waste is transferred to the ETF via buried pipelines. At the LERF dikes, aboveground piping serves to transfer waste from one basin to another.

The buried pipelines are 'inspected' continuously during transfers by a leak detection system (Chapter 4.0). The alarms on the leak detection system are monitored in the 242-A Evaporator and ETF control rooms. The transfer lines from the LERF to the ETF also can be inspected during transfers by opening the secondary containment drain lines at the surge tank to inspect for leakage. During the routine inspections at LERF, the aboveground piping system is inspected for signs of leakage and for general structural integrity. During the visual inspection, particular attention is paid to valves and fittings for signs of cracking, deformation, and leakage.

6.2.2.3.4 Dike Erosion [F-2d(6)(a)(4)]. The LERF basins and dikes are visually inspected weekly and after storms for severe erosion or other signs of deterioration in the dikes from precipitation, wind, burrowing mammals, or vegetation.

6.2.2.3.5 Structural Integrity [F-2d(6)(b)]. A written certification attesting to the structural integrity of the basin dikes, signed by a qualified, registered professional engineer, is provided in Chapter 4.0.

6.2.2.3.6 Container Inspection [F-2b(1)]. Normal operation of the LERF does not involve the storage of dangerous waste in containers. Therefore, the inspection requirements of this section normally are not applicable to the LERF. Any containerized RCRA-regulated waste that might be generated at LERF will be brought to the ETF and managed in accordance with WAC 173-303-200(1) and is discussed in Section 6.2.2.1.

6.2.3 Inspection Log [F-2b and 2c]

Observations made and deficiencies noted during an inspection are recorded on inspection log sheets (also called turnover sheets). On completion, the log sheet includes the inspector's printed name, signature, date, and time; the log sheet is submitted for review and approval by ETF/LERF management or their designee, as required by operating procedures. Once approved, the log sheet is kept in LERF and ETF files. Inspection records are retained at the ETF, or other approved locations, for a minimum of 5 years. The inspection records are used to help determine any necessary corrective actions. Problems identified during the inspections are prioritized and addressed in a timely fashion to mitigate health risks to workers, maintain integrity of the TSD units, and prevent hazards to public health and the environment.

If while performing an inspection, a leak or spill is discovered, facility management responds per the building emergency plan (Appendix 7A). Action is taken to stop the leak and determine the cause. The waste is removed from the secondary containment in a timely manner that prevents harm to human health and the environment.

6.2.4 Storage of Ignitable or Reactive Wastes [F-2d(3)]

The LERF could receive an aqueous waste that is designated reactive or ignitable. Any aqueous waste exhibiting these characteristics is managed (e.g., through blending in LERF) such that the waste no longer exhibits the reactive or ignitable characteristics.

Though unlikely, the ETF secondary waste might have the characteristics of being reactive or ignitable. The Hanford Fire Department performs annual fire inspections of the ETF using a checklist developed specifically for facilities that handle dangerous and/or mixed waste.

6.3 PREPAREDNESS AND PREVENTION REQUIREMENTS [F-3]

The following sections document the preparedness and prevention measures taken at LERF and ETF.

6.3.1 Equipment Requirements [F-3a]

The following sections describe the internal and external communications systems and the emergency equipment required.

6.3.1.1 Internal Communications. When operators are present at the LERF, the operators carry mobile (hand-held) two-way radios to maintain contact with 242-A Evaporator and ETF personnel. The operators at LERF are informed of emergency situations (e.g., building and/or area evacuations, take-cover events, high airborne contamination, fire, and/or explosion), and are provided with emergency instructions by several systems. These systems include the mobile two-way radios, and the telephone in the LERF instrument building.

The ETF is equipped with an internal communication system to provide immediate emergency instruction to personnel. The onsite communication system at the ETF includes telephones, mobile two-way radios, a public address system, and alarm systems. The telephone and radio systems provide for intraplant communication as well as external communication. Provisions are made to appropriately respond to various emergencies, including the following alarm-activated emergency situations: building evacuations, fire and/or explosion, loss of essential services, loss of ventilation, radioactive discharges, and high airborne contamination. Chapter 7.0 provides additional information on the response activities.

Immediate emergency instruction to personnel is provided by a public address system via speaker horns and ceiling-mounted speakers located throughout the building. The public address system is coupled to building telephone systems to provide telephone accessed voice paging. The ETF alarms are annunciated via elements of the public address system. The general telephone system, which carries various communication signals (e.g., telephone, crash alarm), is linked to the Hanford Site integrated voice data telecommunications system.

6.3.1.2 External Communications [F-3a(2)]. The LERF and its operators are equipped with devices for summoning emergency assistance from the Hanford Fire Department, the Hazardous Materials Response Team, and/or local emergency response teams, as necessary. External communication is made by either a telephone communication system or mobile two-way radios. The LERF telephone is available in the instrumentation building. Personnel assigned to emergency response organizations are reached in the following ways:

- Telephone number 911--is the contact point for the Hanford Site; on notification, the Hanford Patrol Operations Center notifies and/or dispatches required emergency responders

- Telephone number 373-3800--single point of contact for the emergency duty officer; this number can be dialed from any Hanford Site telephone

- Two-way radio system--consists of hand-held; the system accesses the Hanford Site emergency network and can summon the Hanford Fire Department, Hanford Patrol, and/or any other assistance needed to deal with emergencies.

The ETF is equipped with devices for summoning emergency assistance from the Hanford Fire Department and/or local emergency response teams as necessary. External communication is made via a telephone communication system or two-way radios.

Telephones are provided at numerous locations throughout the ETF. In addition, the following external communication systems are available for notifying persons assigned to emergency response organizations:

- Fire alarm pull boxes and fire sprinkler flow monitoring devices--connected to a system monitored around the clock by the Hanford Fire Department

- Telephone number 911--contact point for the Hanford Site; on notification, the Hanford Patrol Operations Center notifies and/or dispatches required emergency responders

- Telephone number 373-3800--single point of contact for the emergency duty officer; this number can be dialed from any Hanford Facility telephone

- Crash alarm telephone system--consists of selected telephones that automatically are disassociated from the regular system and connected to control stations

- Priority message system (Management Bulletin)--a network of telefax machines used to disseminate information to personnel

- The DOE-RL radio system--radio systems and frequencies available for emergency communications.

6.3.1.3 Emergency Equipment [F-3a(3)]. The LERF and ETF rely primarily on the Hanford Fire Department to respond to fires and other emergencies. The Hanford Fire Department is capable of providing rapid response to fires within the 200 East Area. All LERF and ETF operators are familiar with the LERF and ETF contingency plans (Chapter 7.0) and are trained in the use of emergency pumping, fire, and communications equipment. The Hanford Site maintains a sufficient inventory of heavy equipment (i.e., bulldozers, cranes, road graders) for emergency response.

Portable fire extinguishers, fire control equipment, spill control equipment, and decontamination equipment are available at various locations in the ETF.

Fire control equipment is available at the ETF and could include the following:

- Fire extinguishers (all-utility use, dry chemical), good for use on small fires

- Automatic fire suppression systems installed in the ETF control room and electrical room

- Fire alarm pull boxes

- A water spray system is installed in the operating and administrative portions of the ETF.

Respirators, hazardous material protective gear, and special work procedure clothing for ETF personnel are kept in the change room at the ETF. Safety showers are located in convenient locations in the ETF. Portable emergency eye washes are used at the ETF. Water for these devices is supplied from the ETF sanitary water system.

6.3.1.4 Water for Fire Control [F-3a(4)]. A water main is not provided to the LERF. Water for fire control is supplied by the Hanford Fire Department trucks for fires requiring high water volume and pressure. Each fire station normally has a truck equipped with a hydraulically operated aerial ladder, and one pumper (backup fire engine, without a boom, that is used if the aerial ladder is inoperable). Fire engines have a pumping capacity of at least 5,600 liters of water per minute. Other fire protection equipment uses chemicals rather than water as an extinguishing media.

The ETF is serviced by two 12-inch raw water lines that are tied into the 200 East Area raw water distribution grid. These lines provide a looped configuration that supplies two independent sources of raw water for fire protection and raw water uses. Connections from the ETF raw water system supply fire hydrants and the wet-pipe sprinkler system.

In the event that water pressure is lost, the Hanford Fire Department is equipped with fire engines to provide needed water.

6.3.2 Aisle Space Requirement [F-3b]

The operation of the LERF does not involve aisle space. Nevertheless, the LERF and the individual basins are easily accessible to emergency response personnel and vehicles. A 6.1-meter-wide service road runs along the base of the basin area on the east, south, and west sides within the operational security fence.

Aisle spacing at ETF is sufficient to allow the movement of personnel and fire protection equipment in and around the containers. This storage arrangement also meets the requirements of the National Fire Protection Association and the Life Safety Code (NFPA 1996) for the protection of personnel and the environment. A minimum 0.76-meter aisle space is maintained between rows of containers as required by WAC 173-303-630(5)(c).

6.4 PREVENTIVE PROCEDURES, STRUCTURES, AND EQUIPMENT [F-4]

The following sections describe preventive procedures, structures, and equipment.

6.4.1 Unloading Operations, Spill Prevention, and Control [F-4a]

Underground pipelines that transfer aqueous waste to and from the LERF are encased in a secondary pipe. If a leak is detected in a pipeline, flow in the pipeline will be stopped and the cause of the leak investigated and remediated.

If it is required to transfer aqueous waste from one LERF basin to another, submersible pumps are located in risers at the northwest corner of a basin. Valves are closed or opened depending on the direction of the fluid transfer. Pumps are started, providing a cumulative flow of between 2,000 and 3,000 liters per minute into another basin.

The ETF Load-In Station is monitored continuously during tank-filling operations and filling is stopped immediately if leaks occur. Care is taken to ensure that even minor leaks are cleaned up immediately and disposed of in accordance with approved management procedures. Any spill that is determined to be a dangerous waste will be managed according to the requirements of WAC 173-303.

6.4.2 Run-Off [F-4b]

The LERF is constructed and operated to ensure that all aqueous waste is contained within the basins. The basins are designed and operated to prevent overtopping (Section 6.2.2.3.1). Furthermore, the basins are provided with very low-density polyethylene floating covers to prevent the introduction of precipitation into the basins. The basins also are graded to ensure that all precipitation outside the basins is directed away from the surface impoundments.

The basins are constructed so that the top of the basin dikes are approximately 3 meters abovegrade. The exterior side slopes of the basins have a 2.25 (horizontal) to 1 (vertical) slope. Run-on of precipitation to the basins from the surrounding area is not possible because the surrounding area slopes away from the LERF.

Dangerous waste and hazardous chemical handling areas at the ETF are designed to contain spills, leaks, and wash water, thereby preventing run-off and subsequent releases. All dangerous and/or mixed waste loading and unloading areas are provided with secondary containment structures as described in Chapter 4.0.

6.4.3 Water Supplies [F-4c]

The LERF uses operating practices, structures, and equipment to prevent the contamination of natural water supplies (i.e., groundwater and surface water). The LERF is monitored closely during operation to detect abnormal conditions (e.g., leaks), and regularly inspected to detect equipment and structural deteriorations that could allow possible water supply contamination. The basins are provided with a leachate collection system that is designed to contain any leachate generated. These systems, in conjunction with the double-composite liner system and underlying low permeable clay liner, ensure that should a release occur, the release will be fully contained within the basin configuration and, therefore, water supplies will be protected. Appendix 7A provides information on procedures that are implemented if a release is detected at the LERF.

There are no drinking water wells near the ETF. Therefore, a release would not immediately contaminate drinking water supplies. The ETF uses operating practices, structures, and equipment to prevent the contamination of natural water supplies (i.e., groundwater and surface water). The ETF is monitored during operation to detect abnormal conditions, and is inspected regularly to detect equipment and structural deteriorations that could allow spills to the environment. Areas in contact with dangerous and/or mixed waste are monitored continuously during operation through a series of level and pressure indicators, leak detection alarms, equipment failure alarms, and control panel readouts. In addition, the ETF is inspected regularly for the presence of leaks or other offnormal conditions wherever possible (in all areas that can be safely entered).

In addition to detailed operating practices, structures and equipment are used at the ETF to prevent contamination of water supplies. The structures and equipment designed to prevent contamination of water supplies are the same as the structures and equipment used to prevent run-off from dangerous and/or mixed waste handling areas.

6.4.4 Equipment and Power Failure [F-4d]

The storage function of the LERF is not affected by loss of power and a temporary loss of power would not pose a threat to the environment. Loss of electrical power would not cause the storage of the waste to be jeopardized. For process condensate transferred from the 242-A Evaporator, appropriate valving procedures are followed to ensure a smooth restart of the flow to the LERF in the event of a power failure at the 242-A Evaporator. Pump equipment failure is addressed by operations personnel at the 242-A Evaporator.

The ETF does not have a standby power source. Power to selected lighting, computers, and process controls is configured with an uninterruptible power supply. During partial loss of normal power, the effected pumps and subsystems will be shut down. Complete loss of power to the ETF shuts down the entire ETF except for the instruments in the control room connected to the uninterruptible power supply. Redundant pumps allow the process to continue to operate when only one component is out of service.

When power at the ETF is lost, the valves assume a fail-safe position to allow the process to remain in a safe shutdown mode until restoration of power. This action allows the operators to perform equipment surveys during shutdown and to confirm that there are no safety issues because the ETF is shut down. Because a power failure would also shutoff flow into the ETF, there will not be any increase in volume in any of the holdup basins, tanks, or other systems.

A combination of reliability, redundancy, maintenance, and repair features are used in the ETF equipment and systems to minimize random failure of equipment. For crucial systems such as ventilation filters, redundant trains are provided to mitigate equipment and system failure. Spare parts are maintained for essential production and safety equipment.

6.4.5 Personnel Exposure [F-4e]

At the LERF and ETF, operating practices, structures, and equipment are used to prevent undue exposure of personnel to dangerous and/or mixed waste. Protective clothing and equipment are used by all personnel handling waste. All operations are conducted so that exposure to dangerous and/or mixed waste, and hazardous and radioactive materials are maintained ALARA.

Protective clothing and equipment are prescribed for personnel handling chemicals or dangerous waste. Before the start of any operation that could expose personnel to the risk of injury or illness, a review of the operation is performed to ensure that the nature of hazards that might be encountered is considered and appropriate protective gear is selected. Personnel are instructed to wear personal protective equipment in accordance with training, posting, and instructions.

A change trailer at LERF is located between basins 42 and 43. In addition, the change trailer has an operations office for working with procedures. Exits within the change trailer are clearly marked. A storage building is located within the perimeter fence, northwest of the basins. The LERF storage building also is provided with separate storage areas for clean and contaminated equipment. A decontamination shower and decontamination building is located at the 272-AW Building, approximately 1.6 kilometers from the LERF or at the ETF.

The ETF has eyewash stations and safety showers in convenient locations for use by personnel. The following structures and equipment were incorporated into the ETF design to minimize personnel exposure.

- Offices, control room, clean- and soiled-clothes storage areas, change rooms, and the lunchroom are situated to minimize casual exposure of personnel.

- Building exit pathways are located to provide rapid egress in emergency evacuations.

- Emergency lighting devices are located strategically throughout the ETF.

- Audio and/or visual alarms are provided for all room air samplers, area alarms, and liquid monitors. Visual readouts for these alarm systems are located in less contaminated areas to minimize exposure to personnel.

- Areas for decontaminating and maintaining equipment are provided in contaminated areas to limit the spread of contamination to uncontaminated areas such as the control room.

- Instrument interlock systems are provided that automatically return process operations to a safe condition if an unsafe condition should occur.

- The ETF ventilation systems are designed to provide air flow from uncontaminated zones to progressively more contaminated zones.

Whenever possible, exposures to hazards are controlled by accepted engineering and/or administrative controls. Protective gear is used where effective engineering or administrative controls are not feasible.

6.5 PREVENTION OF REACTION OF IGNITABLE, REACTIVE, AND INCOMPATIBLE WASTE [F-5 through F-5b]

Typically aqueous waste managed at the LERF or ETF does not display the characteristics of reactivity or ignitability. Any aqueous waste streams exhibiting these characteristics are blended or mixed at LERF to a concentration where the waste no longer exhibits reactive or ignitable characteristics.

No incompatible aqueous waste is expected to be stored or treated at the LERF or ETF (Chapter 3.0). Therefore, the requirements of WAC 173-303-806(4)(a) are not applicable.

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Table 6-1. Visual Inspection Schedule for the ETF.
(sheet 1 of 3)

Item	Inspection	Frequency	Inspected by
Main Treatment Train			
Surge tank system	Inspect area for leaks. Note any unusual noises or vibration from the system pumps. Inspect secondary containment system for signs of deterioration.	Daily	Process operator
Rough filter	Inspect for leaks.	Daily*	Process operator
Ultraviolet oxidation system	Inspect module for leaks. Inspect peroxide storage tank, ancillary equipment for leaks.	Daily*	Process operator
pH adjustment tank	Inspect tank and ancillary equipment for leaks.	Daily*	Process operator
H_2O_2 decomposer	Inspect tank and ancillary equipment for leaks.	Daily*	Process operator
Fine filter	Inspect module for leaks.	Daily*	Process operator
Degasification system	Inspect module for leaks. Note any unusual noises or vibration from the degasification blower.	Daily*	Process operator
Reverse osmosis system	Inspect tanks and ancillary equipment for leaks. Note any unusual noises or vibration from the system pumps.	Daily*	Process operator
Polishers	Inspect tanks and ancillary equipment for leaks. Inspect polishers for proper resin level and mixing.	Daily*	Process operator
Effluent pH adjustment tank	Inspect tank and ancillary equipment for leaks.	Daily*	Process operator

Table 6-1. Visual Inspection Schedule for the ETF.
(sheet 2 of 3)

Item	Inspection	Frequency	Inspected by
Verification tanks	Inspect tanks and ancillary equipment for leaks. Note any unusual noises or vibration from the system pumps. Inspect secondary containment system for signs of deterioration.	Daily	Process operator
Secondary Treatment Train			
Secondary waste receiving tank	Inspect tank and ancillary equipment for leaks.	Daily	Process operator
ETF evaporator	Inspect tank and equipment for leaks. Note any unusual noises or vibration from the system pumps or compressor.	Daily*	Process operator
Concentrate tank	Inspect tank and ancillary equipment for leaks.	Daily*	Process operator
Thin film dryer	Inspect tanks and ancillary equipment for leaks (viewed through window). Note any unusual noises or vibration form the system pumps or blower.	Daily*	Process operator
Container handling	Inspect area for spills, leaks, accumulated liquids.	Daily	Process operator
Container handling	Inspect for deterioration of containers and secondary containment, including corrosion and cracks in secondary containment foundation and coating. Inspect container labels to ensure that they are readable.	Weekly	Process operator
Resin dewatering	Inspect module for leaks. Note any unusual noises or vibration form the system pumps or blower.	Daily*	Process operator

Table 6-1. Visual Inspection Schedule for the ETF.
(sheet 3 of 3)

Item	Inspection	Frequency	Inspected by
	Support Systems		
Vessel ventilation system	Inspect filters (HEPA and pre-filters), check vessel off-gas pressures, system flow, and discharge temperatures.	Daily	Process operator
Sump tank system	Inspect sump trenches for leaks, spillage, and proper levels.	Daily	Process operator
	Safety Systems		
Eye wash stations	Check status; check for adequate pressure.	Monthly	Process operator
Safety showers	Check status; check for adequate pressure.	Monthly	Process operator
	Emergency Systems		
Fire extinguishers	Check for adequate charge.	Monthly	Process operator
Emergency lighting	Test operability.	Monthly	Process operator
	Processing Area		
Uninterruptible power supply	Check output voltage and visually inspect battery pack for corrosion and leakage. Check indicator lights for fault conditions.	Annually	Electrician/ process operator

* Stated inspection frequency to be performed only during ETF operations.

HEPA - High efficiency particulate air

Table 6-2. Inspection Plan for Instrumentation Monitoring. (sheet 1 of 2)

Item	Inspection	Frequency	Inspected by
Main Treatment Train			
Leak detector LAH-20B009	Monitor for leakage in the surge tank drainage sump.	Continuously	Computer Process Operator
Level alarm LAH-60A013	Monitor surge tank level to prevent overflow.	Continuously	Computer Process Operator
Level alarm LAHL-60C-111	Monitor liquid levels in the pH adjustment tank to prevent overflow.	Continuously	Computer Process Operator
Level alarm LAHL-60F-101	Monitor liquid levels in the first RO feed tank to prevent overflow.	Continuously	Computer Process Operator
Level alarm LAHL-60F-201	Monitor liquid levels in the second RO feed tank to prevent overflow.	Continuously	Computer Process Operator
Level alarms LAHL-60F-211	Monitor liquid levels in the effluent pH adjustment tank to prevent overflow.	Continuously	Computer Process Operator
Level transmitter LT-60H001A/B/C	Monitor liquid level in verification tanks to prevent overflow.	Continuously	Computer Process Operator
Leak detector LAH-20B010	Monitor for leakage in the verification tank drainage sump.	Continuously	Computer Process Operator
Secondary Treatment Train			
Level alarm LAHL-60I-001A/B	Monitor liquid levels in secondary waste receiver tanks A and B to prevent overflow.	Continuously	Computer Process Operator
Level alarm LAHL-60J-001A/B	Monitor liquid levels in concentrate tanks A and B to prevent overflow.	Continuously	Computer Process Operator
Level alarm LAHL-60I-107	Monitor liquid levels in the evaporator tank to prevent overflow.	Continuously	Computer Process Operator
Level alarm LAHL-60J-036	Monitor liquid levels in the spray condenser tank to prevent overflow.	Continuously	Computer Process Operator

Table 6-2. Inspection Plan for Instrumentation Monitoring. (sheet 2 of 2)

Item	Inspection	Frequency	Inspected by
Level alarm LAHL-60I-108	Monitor liquid levels in the distillate flash tank to prevent overflow.	Continuously	Computer Process Operator
Level alarm LAH-60I-119	Monitor liquid levels in the entrainment separator tank to prevent overflow.	Continuously	Computer Process Operator
Level transmitter LAH-20B001	Monitor liquid level in sump tank No. 1 to prevent overflow.	Continuously	Computer Process Operator
Level transmitter LAH-20B002	Monitor liquid level in sump tank No. 2 to prevent overflow.	Continuously	Computer Process Operator
Leak detector LAH-20B003	Monitor for leakage to sump No. 1.	Continuously*	Computer Process Operator
Leak detector LAH-20B005	Monitor for leakage to sump No. 2.	Continuously*	Computer Process Operator
Leak detector	Monitor for leakage from pipeline between ETF and load-in station.	Continuously*	Computer Process Operator
Leak detector	Monitor for leakage from pipeline between ETF and LERF.	Continuously*	Computer Process Operator
Leak detector	Monitor for leakage from pipeline between LERF and the 242-A Evaporator.	Continuously*	Computer Process Operator

* In the event of a malfunction of one of the electronic leak detectors, daily visual inspections will be performed while the facilities are in operation.

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APPENDIX

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7.0 CONTINGENCY PLAN [G]

The WAC 173-303 requirements for contingency plans are satisfied in the following documents: the *Building Emergency Plan for 200 Area Effluent Treatment Facility and Liquid Effluent Retention Facility*, (Appendix 7A) and the *Hanford Facility Contingency Plan* [Attachment 4 of the Hanford Facility RCRA Permit (DW Portion)].

The unit-specific building emergency plan also serves to satisfy a broad range of other requirements [e.g., Occupational Safety and Health Administration standards (29 CFR 1910) and U.S. Department of Energy Orders]. Therefore, revisions made to portions of this contingency plan document that are not governed by the requirements of WAC 173-303 will not be considered as a modification subject to review or approval by Ecology.

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APPENDIX

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8.0 PERSONNEL TRAINING [H]

The training plan provided in Appendix 8A discusses training requirements pertaining to 200 Area Liquid Effluent Facilities.

The training program is designed to be compliant with all applicable federal, state, and DOE-RL training requirements. The training program complies with requirements contained within WAC 173-303-330 for the development of a written dangerous waste training program. The training program is designed to prepare personnel to manage and maintain TSD units in a safe, effective, efficient, and environmentally sound manner. In addition to preparing employees to manage and maintain TSD units under normal conditions, the training program ensures that employees are prepared to respond in a prompt and effective manner should abnormal or emergency conditions occur.

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9.0 EXPOSURE INFORMATION REPORT

Exposure information for the LERF is discussed in the General Information Portion (DOE/RL-91-28).

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10.0 WASTE MINIMIZATION [D-9]

To fulfill the requirements of 40 CFR 264.73(b)(9), a certification form that the LERF and the ETF have a waste minimization/pollution prevention program in place will be entered, annually, into the LERF and the ETF operating record.

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11.0 CLOSURE AND FINANCIAL ASSURANCE [I]

This chapter describes the planned activities and performance standards for closing LERF and ETF.

11.1 CLOSURE PLAN/FINANCIAL ASSURANCE FOR CLOSURE [I-1]

The LERF and ETF will be clean closed with respect to dangerous waste contamination that resulted from operation as TSD units, with closure of LERF occurring first. To facilitate closure, the LERF retention basins are being viewed as consisting of seven components: the covers and primary liner, drainage layer system/bentonite carpet liner, secondary liner, soil bentonite, internal and/or external piping, ancillary equipment, and concrete basins. To facilitate closure of ETF, ETF is being viewed as consisting of six components: tanks, internal and/or external piping, ancillary equipment, concrete floors/dikes/encasements, structures, and soil directly beneath the structure. It is anticipated that closure of LERF and ETF will begin after the projected 30-year active life of LERF and ETF. If it is determined that clean closure is not possible, the closure plan will be modified to address required postclosure activities.

Uncontaminated structures either will be left for future use or disassembled, dismantled, and removed for disposal. Uncontaminated equipment and structures could include aqueous makeup, HVAC and piping, steam condensate and cooling water piping, and the control room and office areas.

Clean closure requires decontamination or removal and disposal of all dangerous waste, waste residues, contaminated equipment, soil, or other material established in accordance with the clean closure performance standards of WAC 173-303-610(2). This and future closure plan revisions will provide for compliance with these performance standards.

11.2 CLOSURE PERFORMANCE STANDARD [I-1a]

Clean closure, as provided for in this plan, and in accordance with WAC 173-303-610(2), will eliminate future maintenance and will be protective of human health and the environment by removing or reducing chemical contamination at LERF and ETF to levels that eliminate the threat of contaminant escape to the environment.

After closure, the appearance of the land where the LERF and ETF are located will be consistent with the appearance and future use of its surrounding land areas. This plan proposes to leave clean structures and equipment in place after closure for potential use in future operations. This need will be evaluated at the time of closure.

11.2.1 Closure Standards for Metal Surfaces, Rubber, Tanks, and Concrete

This closure plan proposes use of a 'clean debris surface' (defined in the following paragraph) as the clean closure performance standard for the metal surfaces, rubber (i.e., basin covers, liners, etc.), tanks, and concrete that will remain after closure. This approach is consistent with Ecology guidance (Ecology 1994a) for achievement of clean closure. Additionally, adherence to this guidance ensures that all residues have been removed as required by WAC 173-303-640 for clean closure of the ETF tank systems. The ETF verification tanks will be considered "clean" if the delisting limits were not exceeded for the effluent in the tanks. If the delisting limits were exceeded, closure activities will be as described in Section 11.3.4.3.

The clean debris surface standard is verified visually. "A clean debris surface means the surface, when viewed without magnification, shall be free of all visible contaminated soil and hazardous waste except residual staining from soil and waste consisting of light shadows, slight streaks, or minor discolorations and soil and waste in cracks, crevices, and pits may be present provided that such staining and waste and soil in cracks, crevices, and pits shall be limited to no more than 5% of each square inch of surface area" (40 CFR 268.45). When a physical extraction method is used on concrete, the performance standard is based on removal of the contaminated layer of debris. The physical extraction performance standard for concrete is removal of 0.6 centimeter of the surface layer and treatment to a clean debris surface. Inspections to verify achievement of a clean debris surface will be performed and documented.

11.2.2 Closure Standards for Internal and External Piping

The internal and external piping of both LERF and ETF will be flushed and drained as part of closure. The rinsate will be sampled and analyzed. Results less than designation limits for the constituents of concern will be accepted as indicating that the piping is clean with respect to dangerous waste or dangerous waste residues. If the rinsate designates as a dangerous waste, the piping will be flushed again. If it is not possible to meet the clean closure performance standard, the particular piping of concern will be removed an disposed of accordingly.

11.2.3 Closure Standards for Ancillary Equipment

Ancillary equipment is defined as pumps and other miscellaneous equipment not otherwise specified in this closure plan. Ancillary equipment will be removed and disposed.

11.2.4 Closure Standards for Underlying Soils

The LERF retention basins have a leachate collection system for leaks or spills that channels the liquid to drains or sumps. The collected liquid is pumped back into the basins, thereby preventing spills from reaching the soil.

The soil only could be contaminated if the secondary liner had failed. To determine if failure occurred, the primary liner will be inspected for leaks, holes, or punctures and the drainage gravel and bentonite carpet liner underneath the primary liner will be sampled and analyzed for contamination. If the drainage gravel analytical results determine that the constituents of concern are at or below agreed to regulatory cleanup levels (i.e., Hanford Site soil background levels (DOE-RL 1993) and/or residential exposure assumptions according to the Model Toxics Control Act), the gravel will be considered clean for closure. Only if contamination is found in the drainage gravel/bentonite carpet liner will the secondary liner surfaces be inspected for leaks, holes, or punctures, which (if existing) could have provided a pathway to soil for contamination (refer to Chapter 4.0, Figure 4-3 for basin diagram). If no leaks, holes, or punctures are found in the primary liner or if the drainage gravel/bentonite carpet liner is found not to be contaminated, the soil will be considered to be clean closed. However, if leaks, holes, or punctures are found in the primary liner or the gravel is contaminated, the secondary liner surfaces will be inspected. If no leaks, holes, or punctures are found in the secondary liner surfaces, the soil will be considered clean closed. If such leaks, holes, or punctures are identified, potential soil contamination will be investigated. Soil will be sampled and analyzed for constituents of concerns. If the soil analytical results determine that the constituents of concern are at or below agreed to regulatory cleanup levels, the soil will be considered clean closed.

Clean closure of soil under the ETF will be accomplished by demonstrating that the coated concrete floor kept contaminants from reaching the soil. The coated concrete floor provided secondary containment for all the tanks and process piping. Unless inspections identify potential through-thickness cracks indicating containment failure and a subsequent potential for soil contamination from TSD unit operations, the soil will be considered clean closed. However, if inspections identify such cracks and there have been documented spills in the vicinity, potential soil contamination will be investigated. Soils will be sampled and analyzed for constituents of concerns. If the soil analytical results determine that the constituents of concern are at or below agreed to regulatory clean up levels, the soil will be considered clean closed. Regulatory cleanup levels are defined by the Hanford Facility RCRA Permit (Condition II.K.). If verification sampling is required, a sampling analysis plan will be prepared before closure in a manner consistent with Ecology guidance (Ecology 1994a) for achievement of clean closure.

11.3 CLOSURE ACTIVITIES [I-1b]

The LERF and ETF were designed for a 30-year active life. At the time of closure, the closure plan will be modified as necessary to reflect current regulation or informational revisions. If it is determined that clean closure is not possible, the closure plan will be modified to address required postclosure activities.

11.3.1 General Closure Activities

The approach to LERF closure is to dispose of accumulated basin aqueous waste by processing the waste through ETF. Primary basin liners and covers will be decontaminated or disposed of as appropriate. Any remaining solids (residue) within basins will be removed, designated, and disposed of accordingly. Piping associated with LERF closure is intended to be decontaminated and left in place. Rinsate generated during decontamination also will be disposed of through ETF. Sampling will assess whether contamination beneath the primary liner has occurred. Contamination, if present, will be managed in compliance with regulatory requirements.

The approach to ETF closure is to process any aqueous waste through the effluent treatment system. Any containerized dangerous waste and/or mixed waste will be transferred to other TSD units. All structures and equipment will be decontaminated and/or disposed. Piping associated with ETF closure is intended to be decontaminated and left in place. Contamination, if present, will be managed in compliance with regulatory requirements.

Equipment or materials used in performing closure activities will be decontaminated or disposed at a permitted facility.

11.3.2 Constituents of Concern for Closure for the Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility

Using the list of dangerous waste numbers in the Part A, (Chapter 1.0) process knowledge and the risk to human health and the environment, the constituents of concern for closure will be determined at through the data quality objective process.

11.3.3 Removing Dangerous Waste [I-1b(2)]

At the start of LERF closure, aqueous waste will be transferred sequentially from each basin to ETF for treatment. At a treatment rate of about 284 liters per minute, it will take approximately 60 days to empty a full basin. Basin covers will remain in place to prevent possible wind dispersion of waste until all basin waste has been removed.

All of the aqueous waste inventory at the ETF will be processed before closure. Any residue remaining in piping, equipment, or the LERF liner will be removed to an appropriate disposal unit. All containerized waste will be dispositioned. All secondary waste in containers will be transferred to an appropriate TSD unit.

11.3.4 Decontaminating Structures, Equipment, and Soils [I-1b(3)]

This section discusses the activities necessary to implement a clean closure strategy for the LERF and ETF. Before closure activities begin, any waste inventory stored will be removed. After the waste inventory is removed, clean closure of the LERF covers and primary liner, drainage layer/leachate collection system/bentonite carpet liner, secondary liner, soil bentonite, the internal piping, ancillary equipment, and the concrete catch basins will be accomplished by decontaminating the components as necessary, and demonstrating that clean closure performance standards are met (Section 11.1.1). To facilitate closure of ETF, tanks, internal piping, external piping, ancillary equipment, concrete floors/dikes/encasements, structures, and soil directly beneath the structure will be decontaminated, as necessary, to demonstrate that the clean closure performance standards are met.

Removal and disposal of most of the components will be determined at time of closure. Clean closure of the soil will be accomplished by demonstrating that the concrete kept contaminants from reaching the soil.

11.3.4.1 Covers and Liners. After all pumpable waste has been removed from a given basin at LERF, the cover for that basin will be removed. The cover either will be decontaminated or disposed of appropriately. If the cover is disposed of, the cover will be cut up within the basin and loaded into a lined dump truck for transport and disposal. If the covers are to be reused, an initial decontamination effort will be made by spraying the underside of the cover while in place over a basin. The intent of preremoval spraying is to minimize subsequent decontamination efforts and to use the basin as a wash water catchment. Each cover will be inspected visually for physical damage in the same manner as the primary liners. Visible signs of damage to the cover will be repaired as specified by the cover manufacturer. The cover decontamination procedure will be to position a cover into its basin and wash the cover. Any openings, such as for vents, will be sealed temporarily so that rinsate cannot seep through. The method and degree of washing will be the same as necessary for the respective basin liner. The generated rinsate will be transferred from the basin to the ETF or appropriate TSD unit.

The primary liner will be inspected visually for physical damage and surveyed radiologically before any decontamination efforts. Physical damage will be defined as tears, holes, or punctures such that the liner would not hold water. A description and location of any physical damage found will be noted in a inspection record. Visible signs of damage to the liner will be repaired per procedures specified by the manufacturer before decontamination to prevent liquid solutions from driving potential contamination down into the drainage gravel. The purpose of the inspection will be twofold: to identify and map any physical damage in the primary liner that might have allowed contaminants a pathway to the drainage gravel below; and to identify areas that potentially are contaminated with dangerous waste or dangerous waste residues. The inspection standard for the liner will be a clean debris surface as defined in Section 11.1.1.1. The inspection of the liner for a clean debris surface will be documented on an inspection record. Those areas already meeting the standard can be clean closed as is, based on Ecology acceptance of the completed record.

Those potentially contaminated areas will undergo decontamination to meet the clean closure standard of a clean debris surface. Plastic surfaces indicated by visual examination as being potentially contaminated will be decontaminated through use of physical extraction technologies such as high-pressure steam and water sprays coupled with a detergent wash.

Achievement of a clean debris surface will be documented on an inspection record. Decontamination rinsate will be transferred directly to the ETF or transferred to another basin before ultimate disposal. If it is not possible to meet the clean closure performance standard, or there is no further need for the liner, the primary liner could be removed, designated, and disposed of accordingly. The inspections for a clean debris surface will be documented on an inspection record.

11.3.4.2 Drainage Layer/Bentonite Carpet Liner/Secondary Liner. Assessment of contamination beneath the LERF's primary liner will be performed within each basin by sampling the drainage gravel. Biased rather than random location selection will be used to increase the probability of detecting leachate contamination. Sampling points will be chosen where physical damage was noted during the inspection of the primary liner or areas where the underlying material porosity and permeability and the hydraulic head would most likely drive any leachate. The leakage rate through the liner would increase toward the bottom of the liner as hydraulic head increases. Any leakage that did occur in the sloped sides could be expected to travel down slope through the geotextile between the primary and secondary liner until reaching the bottom of the liner. Therefore, the most likely area of contamination would be the drainage gravel.

Gravel samples will be collected by removing the bentonite carpet liner and making an incision in the geotextile. Sampling will be performed in accordance with existing procedures at the time of sampling. Special care will be needed in sampling for volatiles. To aid in ensuring sample integrity, the initial removal of gravel to create the gravel profile will not be done unless the samples can be collected immediately.

Sample collection will occur immediately after profile exposure. If no constituents of concern are found above soil closure performance standards (Section 11.1.1), no further analysis will be done. If the initial sample analysis indicates liner leakage, analysis of the bottom sample will be performed to determine the depth of contamination. Additional gravel samples from different locations will be taken to determine the spatial extent of contamination.

A visual assessment of the underlying basin integrity will be made at the bottom of each sampled location and wherever else gravel is removed. If the basin is perceived to be damaged such that leakage could have occurred beneath the secondary liner, an amendment to the closure plan will be submitted to allow time for additional sampling and possible gravel removal. Sampling beneath the secondary liner, if necessary, will be attempted in accordance with sampling procedures for beneath the primary liner. Sampling beneath the secondary liner has not been extensively addressed because of the remote probability of its occurrence. The drainage gravel will be the preferred flow path even if minor leaks exist in the secondary liner. The secondary liner is resting on a soil/bentonite bed, which would tend to seal any punctures in the secondary liner as hydraulic head built up.

Sampling and disposal objectives will be determined at the time of closure activities through the data quality objectives process.

11.3.4.3 Tanks. After all pumpable waste has been removed from the tanks at ETF, the interior of the tanks, including the internal components such as the agitator, will be washed down by adding or spraying with steam, a water-soluble cleaner, or other approved method. The tanks will be emptied and the interiors visually examined.

After rinsing, the tanks will be inspected visually for compliance with the performance standard. Because of possible radiation exposure, visual inspection might be made remotely using a camera or other device that allows verification of meeting the standard. If any areas are found to not meet the clean debris surface performance standard, these areas will be decontaminated in-place. Per the debris rule, only removal of contaminants from the surface layer is necessary for metal surfaces. Contamination will be removed from the surface layer using either high-pressure water blasting (a physical extraction method) or by hand or remote wiping, washing, brushing, or scrubbing using an approved cleaner, and rinsing with water or by other appropriate methods.

The outside of the tanks also will be inspected for compliance to the performance standard. Any areas found to not meet this performance standard will be decontaminated in-place. Contamination will be removed from the surface layer using any of the methods described for internal tank decontamination or another appropriate method. Before using decontamination solutions on the outside of the tanks, the floor will be inspected for cracks or other openings that could provide a pathway to soil. This inspection will be performed as described in Section 11.1.4.6 in conjunction with mapping of potential through-thickness cracks. Any such cracks will be mapped. The cracks will be sealed before beginning treatment or other engineered containment devices (e.g., portable catch basins, liners) will be used to collect and contain solutions.

Decontamination residues will be collected, designated, and managed as appropriate. If it is not possible to meet the clean closure performance standard, contaminated portions of the tanks could be removed, designated, and disposed of accordingly. The inspections for a clean debris surface will be documented on an inspection record.

11.3.4.4 Internal and External Piping and Ancillary Equipment. The internal piping for both LERF and ETF will be rinsed and the rinsate will be sampled and analyzed for constituents of concern. The rinsate will be designated and disposed of appropriately. If the rinsate does not designate based on the concentrations of the constituents of concern, the internal piping will be blanked to ensure that the tanks are isolated and the piping will be considered clean with respect to RCRA. If the rinsate designates as a dangerous waste, the piping will be flushed again. If necessary the piping will be rinsed with a decontamination solution before sampling and analyses. If it is not possible to meet the clean closure standard, portions of the internal piping will be removed, designated, and disposed of accordingly. The ancillary equipment will be removed, designated, and disposed of accordingly.

External piping (transfer lines) between the 242-A Evaporator and LERF and between LERF and ETF will be flushed and the rinsate analyzed for constituents of concern. If the rinsate designates as a dangerous waste, the piping will be flushed again. If necessary the piping will be rinsed with a decontamination solution before sampling and analyses. If it is not possible to meet the clean closure standard, the piping will be removed and disposed of accordingly. If the rinsate does not designate, the piping will be considered clean and will remain in place.

If the rinsate designates as dangerous waste, rinsate from the external piping and LERF internal piping will be processed through ETF. Rinsate from ETF will be transferred to another TSD unit.

11.3.4.5 Concrete. At LERF, the concrete catch basins are located at the northeast corner of each retention basin, where inlet pipes, leachate risers, and transfer pipe risers emerge for the basin. The concrete catch basin is curbed, and coated with a chemical resistant epoxy sealant. The concrete catch basin is sloped so that any leaks or spills from the piping or connections will drain into the basin. At the ETF, the coated concrete floor and berm provides secondary containment for all the tanks and process piping.

At LERF and ETF, all concrete will be inspected visually and surveyed radiologically before any decontamination. The purpose of the inspection will be twofold: to identify and map any cracks in the concrete that might have allowed contaminants a pathway to the soil below (Section 11.1.2.3.); and to identify areas that potentially are contaminated with dangerous waste or dangerous waste residues. The inspection standard will be a clean debris surface as defined in Section 11.1.1. The inspection of the concrete for a clean debris surface will be documented on an inspection record. Those areas already meeting the standard can be clean closed as is.

Those potentially contaminated areas will undergo decontamination to meet the clean closure standard of a clean debris surface. The concrete will be washed down, the rinsate collected, designated, and disposed of accordingly. The concrete will be reinspected for a clean debris surface. Concrete surfaces indicated by visual examination as still being potentially contaminated will have the surface layer removed to a depth of 0.6 centimeter by scabbling or other approved methods. This will not threaten the environment, even if potential through-thickness cracks had been found during the inspection, because concrete decontamination (scabbling) will not employ liquid solutions that could enter cracks and because scabbling residues will be vacuumed away from cracks as any residue is generated.

Achievement of a clean debris surface will be documented on an inspection record. Decontamination residues will be collected, designated, and managed as appropriate.

11.3.4.6 Structures. If contaminated with either dangerous or mixed waste constituents, the ETF structures will be decontaminated and/or disassembled, if necessary, packaged, and disposed of in accordance with existing land disposal restrictions (WAC 173-303-140).

Closure steps could include the following activities.

- Containerize (as necessary and practicable) and remove any remaining waste.

- Review operating records for spillage incidents and visually inspect storage area surfaces for evidence of contamination or for cracks that could harbor contamination or allow the escape of decontamination solutions. Inspect storage area surfaces for visible evidence of contamination (e.g., discoloration, material degradation, wetness, odor). If contamination is evident, the affected area(s) will be decontaminated.

- Decontaminate ETF walls and floors to minimize the potential for loose contamination and facilitate any required radiation surveys and/or chemical field screening. The structures could be cleaned by water rinse or high-pressure, low-volume steam cleaning coupled with a detergent wash. After decontamination, the walls and floors will be compared to closure performance standards.

- Collect rinsate and manage as dangerous waste for appropriate disposal.

- Secure (lock) personnel entries into building and post doors with appropriate warning signs.

Clean closure of structures will occur in accordance with WAC 173-303-610. Remediation of soil contamination beneath or around containment buildings will be performed in conjunction soil closure requirements.

11.3.4.7 Underlying Soils. Clean closure of soil under LERF's secondary liner will be accomplished by demonstrating that the liners and leak detection system kept contaminants from reaching the soil. The secondary liner provided secondary containment for the LERF basins. Unless inspections identify potential leaks, punctures, cracks, or tears indicating containment failure and a subsequent potential for soil contamination from TSD unit operations, the soil will be considered clean closed. However, if inspections identify such leaks, punctures, etc., potential soil contamination will be investigated.

Clean closure of soil under ETF will be accomplished by demonstrating that the coated concrete floor kept contaminants from reaching the soil. The coated concrete floor and bermed area provided secondary containment for all the tanks and process piping. Unless inspections identify potential through-thickness cracks indicating containment failure and a subsequent potential for soil contamination from TSD unit operations, the soil will be considered clean closed. However, if inspections identify such cracks and there have been documented spills in the vicinity, potential soil contamination will be investigated.

Where it is possible to visually inspect directly beneath the tanks, a visual inspection will be performed. Where it is not possible to visually inspect beneath the tanks, an evaluation of the tank integrity will be made. The condition of the tank will be evaluated to determine if there was any potential for leakage. If no cracks, severe corrosion, or evidence of leaks are observed, it will be reasoned that mixed or dangerous waste solutions could not have penetrated to the soil directly below the tank.

External piping (transfer lines) between the 242-A Evaporator and LERF and LERF and ETF are double-lined with a leak detection system. If records indicate that no leaks from the primary piping occurred, the soil will be considered clean with respect to RCRA closure.

11.4 MAXIMUM WASTE INVENTORY [I-1c]

Each LERF basin is designed to store 24,605,000 liters. The maximum aqueous waste inventory for the three basins is 73,815,000 liters.

The ETF is constructed to treat and store aqueous waste streams. The treated effluent is stored in three verification tanks until it is determined if the effluent meets required standards. The summation of the three verification tanks is 7,608,654 liters. A secondary waste is generated during operation of the ETF. This secondary waste consists of mixed waste generated and containerized during the operation of the ETF and nonradioactive dangerous waste such as chemicals used in the various processes. The maximum waste inventory for the container storage of the secondary waste is 147,630 liters.

11.5 CLOSURE OF CONTAINERS, TANKS, AND SURFACE IMPOUNDMENTS [I-1d]

The following sections cover closure of containers, closure of tanks, and closure of surface impoundments.

11.5.1 Closure of Containers [I-1d(1)]

Containers at ETF will be used to contain dangerous waste in the event of a spill, unexpected release, or equipment failure. Containers will be used to accumulate nonradioactive dangerous waste and/or mixed waste. Any containers used to contain dangerous and/or mixed waste at the ETF will be disposed of in the appropriate manner. Containers of dangerous and/or mixed waste will not be left in the ETF after closure.

11.5.2 Closure of Tanks [I-1d(2)]

Clean closure of ETF will consist of the removal and disposal of all dangerous waste and the decontamination and/or removal and disposal of contaminated equipment, including tanks. The ETF was designed to incorporate removable components. This design facilitates closure by allowing complete removal of equipment contaminated with dangerous and mixed waste.

11.5.3 Closure of Surface Impoundments [I-1d(4)]

At closure, all of LERF that received regulated waste will be closed in accordance with the requirements of WAC 173-303-650(6)(a)(i). All equipment, structures, and other material associated with closure of LERF will be decontaminated or removed in accordance with WAC 173-303-610(2). All basin waste and decontamination rinsate will be transferred to ETF. Sampling and testing will be conducted.

11.6 SCHEDULE FOR CLOSURE [I-1f]

Closure of LERF and ETF is not anticipated to occur within the next 30 years. The actual year of closure will depend on the time required for current waste to be processed and what role the LERF and ETF will play in processing additional waste generated during future activities in the 200 Areas. Other factors affecting the year of closure include changes in operational requirements, lifetime extension upgrades, and unforseen factors. When a definite closure date is established, a revised closure plan will be submitted to Ecology.

The activities required to complete closure are planned to be accomplished within 180 days. Should a modified schedule be necessary, a revised schedule will be presented and agreed to before closure.

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12.0 REPORTING AND RECORDKEEPING

Reporting and recordkeeping requirements that could be applicable to the Hanford Facility are described in Chapter 12.0 of the General Information Portion (DOE/RL-91-28). Not all of these requirements and associated reports and records identified in Chapter 12.0 of the General Information Portion are applicable to the LERF and the ETF. Those reporting and recordkeeping requirements determined to be applicable to the LERF and the ETF are summarized as follows:

- Hanford Facility Contingency Plan and incident records (as identified in the General Information Portion):
  - Immediate reporting
  - Written reporting
  - Shipping paper discrepancy reports.

- Unit-specific Part B permit application documentation and associated plans

- Personnel training records

- Groundwater monitoring records

- Inspection records (unit)

- Onsite transportation documentation

- Land disposal restriction records

- Waste minimization and pollution prevention.

In addition, the following reports prepared for the Hanford Facility will contain input, when appropriate, from the LERF and the ETF:

- Quarterly Hanford Facility RCRA Permit modification report
- Anticipated noncompliance
- Required annual reports.

Annual reports updating projections of anticipated costs for closure and postclosure will be submitted when the LERF and the ETF closure plan is submitted to Ecology (Chapter 11.0).

The LERF and the ETF Operating Record 'records contact' is kept on file in the General Information file of the Hanford Facility Operating Record (refer to DOE/RL-91-28, Chapter 12.0).

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13.0 OTHER FEDERAL AND STATE LAWS [J]

Applicable federal, state, and local laws applicable to the LERF and the ETF are discussed in Chapter 13.0 of the General Information Portion (DOE/RL-91-28). Generally, the laws applicable to the LERF and the ETF include, but might not be limited to, the following:

Atomic Energy Act of 1954
Federal Facility Compliance Act of 1992
Clean Air Act of 1977
Safe Drinking Water Act of 1974
Emergency Planning and Community Right-to-Know Act of 1986
Toxic Substances Control Act of 1976
National Historic Preservation Act of 1966
Endangered Species Act of 1973
Fish and Wildlife Coordination Act of 1934
Federal Insecticide, Fungicide, and Rodenticide Act of 1975
Hazardous Materials Transportation Act of 1975
National Environmental Policy Act of 1969
Washington Clean Air Act of 1967
Washington Water Pollution Control Act of 1945
Washington Pesticide Control Act of 1971
New Source Construction Permits
Model Toxics Control Act
Benton Clean Air Authority Regulation 1
State Environmental Policy Act of 1971.

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14.0 PART B CERTIFICATION [K]

The following certification, required by WAC 173-303-810(13), for all applications and reports submitted to Ecology is hereby included:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Owner/Operator
John D. Wagoner, Manager
U.S. Department of Energy,
Richland Operations Office

Date 7/25/97

Michael R. Yates
Co-operator*
H. J. Hatch,
President and Chief Executive Officer
Fluor Daniel Hanford, Inc.

Date 7/24/97

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* Fluor Daniel Hanford, Inc. is responsible for information presented in Chapters 1.0 through 4.0 and 6.0 through 15.0, including the associated appendices.

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Owner/Operator
John D. Wagoner, Manager
U.S. Department of Energy,
Richland Operations Office

Date 7/25/97

Co-operator*
W. J. Madia, Director
Pacific Northwest National Laboratory

Date 24 July 1997

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* Pacific Northwest National Laboratory is responsible for information presented in Chapter 5.0, including any associated appendices.

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APPENDICES

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APPENDIX 2A

TOPOGRAPHIC MAP

APPENDIX 2A

H-13-000039, Rev. 1	Topographic Map 200 Area Liquid Waste Processing Facilities, 242-A Evaporator, Liquid Effluent Retention Facility, Effluent Treatment Facility

APPENDIX 3A

WASTE ANALYSIS PLAN FOR LIQUID EFFLUENT RETENTION FACILITY AND 200 AREA EFFLUENT TREATMENT FACILITY

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METRIC CONVERSION CHART

Into metric units | Out of metric units

If you know	Multiply by	To get	If you know	Multiply by	To get
Length			**Length**		
inches	25.40	millimeters	millimeters	0.0393	inches
inches	2.54	centimeters	centimeters	0.393	inches
feet	0.3048	meters	meters	3.2808	feet
yards	0.914	meters	meters	1.09	yards
miles	1.609	kilometers	kilometers	0.62	miles
Area			**Area**		
square inches	6.4516	square centimeters	square centimeters	0.155	square inches
square feet	0.092	square meters	square meters	10.7639	square feet
square yards	0.836	square meters	square meters	1.20	square yards
square miles	2.59	square kilometers	square kilometers	0.39	square miles
acres	0.404	hectares	hectares	2.471	acres
Mass (weight)			**Mass (weight)**		
ounces	28.35	grams	grams	0.0352	ounces
pounds	0.453	kilograms	kilograms	2.2046	pounds
short ton	0.907	metric ton	metric ton	1.10	short ton
Volume			**Volume**		
fluid ounces	29.57	milliliters	milliliters	0.03	fluid ounces
quarts	0.95	liters	liters	1.057	quarts
gallons	3.79	liters	liters	0.26	gallons
cubic feet	0.03	cubic meters	cubic meters	35.3147	cubic feet
cubic yards	0.76456	cubic meters	cubic meters	1.308	cubic yards
Temperature			**Temperature**		
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius	Celsius	multiply by 9/5ths, then add 32	Fahrenheit
Force			**Force**		
pounds per square inch	6.895	kilopascals	kilopascals	1.4504 x 10^{-4}	pounds per square inch

Source: *Engineering Unit Conversions*, M. R. Lindeburg, PE., Second Ed., 1990, Professional Publications, Inc., Belmont, California.

1.0 INTRODUCTION

In accordance with the federal and state regulations set forth in 40 Code of Federal Regulations (CFR) 264.13 and in Washington State Department of Ecology (Ecology) *Dangerous Waste Regulations*, Washington Administrative Code (WAC) 173-303-300, this waste analysis plan (WAP) has been prepared for operation of the Liquid Effluent Retention Facility (LERF) and the 200 Area Effluent Treatment Facility (ETF) located in the 200 East Area on the Hanford Site, Richland, Washington.

The purpose of this WAP is to document the sampling and analytical methods, and describe the procedures which are utilized for all dangerous wastes that are managed in the specific treatment storage, and disposal (TSD) units identified in the Part A, Form 3, permit application for the LERF and the ETF (DOE/RL-97-03). This WAP also documents the requirements for generators of aqueous wastes that will be sent to the LERF or ETF for treatment. Throughout this WAP, the term generator includes any Hanford Site unit, including TSD units, whose process produces an aqueous waste.

The TSD units include a surface impoundment (LERF) which provides treatment and storage, a tank system at the ETF which provides treatment and storage, and a container management area at the ETF which provides drum storage. Additionally, this WAP discusses the sampling and analytical methods the treated effluent (treated aqueous waste) that is discharged from the ETF as a non-dangerous, delisted waste to the State-Approved Land Disposal Site (SALDS). Specifically, the WAP delineates the following:

- Influent Waste Acceptance Process - determines the acceptability of a particular aqueous waste at the LERF or ETF pursuant to applicable permit conditions, regulatory requirements, and operating capabilities prior to acceptance of the waste at the LERF or ETF for treatment or storage. See Section 2.0.

- Special Management Requirements - identifies the special management requirements for aqueous wastes managed in the LERF or ETF. See Section 3.0.

- Influent Aqueous Waste Sampling and Analysis - describes influent sampling and analyses used to characterize an influent aqueous waste to ensure proper management of the waste and for compliance with the special management requirements. Also includes rationale for analyses. See Section 4.0.

- Treated Effluent Sampling and Analysis - describes sampling and analyses of treated effluent (i.e., treated aqueous waste) for compliance with State Waste Discharge Permit (Ecology 1995a) and Final Delisting [40 CFR 261, Appendix IX, Table 2 (EPA, 1995)] limits. Also includes rationale for analyses. See Section 5.0.

- ETF Secondary Waste Sampling and Analysis - describes the sampling analyses used to characterize the secondary waste streams generated within the ETF and stored in drums. Also includes rationale for analyses. See Section 6.0.

- Quality Assurance and Quality Control - ensures the accuracy and precision of sampling and analysis activities. See Section 7.0.

This WAP is designed to meet the specific requirements of the following:

- Land Disposal Restrictions Treatment Exemption for the LERF under 40 CFR 268.4, U.S. Environmental Protection Agency, December 6, 1994 (Appendix C)

- Final Delisting for the ETF, 40 CFR 261, Appendix IX, Table 2 (EPA 1995)

- Washington State Waste Discharge Permit, No. ST 4500, as amended, (Ecology 1995a)

- *Dangerous Waste Portion of the Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste*, Hanford Facility Permit WA7890008967, September 28, 1994 (Ecology 1994).

This plan also was designed to include the specific elements of a WAP, as identified in the *Dangerous Waste Permit Application Requirements* (Ecology 1996a). Groundwater monitoring is addressed in separate plans. A copy of this WAP will be available at the ETF at all times.

Throughout this WAP, reference is made to radioactive waste. Although the treatment and storage of radioactive waste (i.e., source, special nuclear, and by-product materials as defined by the *Atomic Energy Act of 1954*) are not within the scope of the *Resource Conservation and Recovery Act* (RCRA) *of 1976*, as amended or WAC 173-303, information is provided for general knowledge where appropriate. Additionally, the conditions of the Washington State Discharge Permit, No. ST 4500 (Discharge Permit) are included in this WAP for completeness, though they also are not within the scope of RCRA or WAC 173-303. Therefore, revisions of this WAP that are not governed by the requirements of WAC 173-303 will not be considered as a modification subject to review or approval by Ecology.

1.1 LIQUID EFFLUENT RETENTION FACILITY AND EFFLUENT TREATMENT FACILITY DESCRIPTION

The LERF and ETF comprise an aqueous waste treatment system located in the 200 East Area (Figure 1-1). Both LERF and the ETF may receive aqueous waste through several inlets. The ETF generally receives aqueous waste directly from the LERF. However, aqueous waste also can be transferred from the Load-In Station to the ETF. The Load-In Station is located just east of the ETF and currently consists of two 37,854-liter storage tanks and a pipeline that connects to either LERF or the ETF through fiberglass pipelines with secondary containment.

The LERF can receive access waste through four inlets. First, aqueous waste can be transferred to LERF through a pipeline from the 200 West Area. Second, aqueous waste can be transferred through a pipeline that connects LERF with the 242-A Evaporator. Third, aqueous waste also can be transferred to LERF from a pipeline that connects LERF to the Load-In Station at the ETF. Finally, aqueous waste can be transferred into LERF through a series of sample ports located at each basin.

The LERF consists of three lined surface impoundments with a nominal capacity of 24.6 million liters each. Aqueous waste from LERF is pumped to the ETF through a double-walled fiberglass pipeline. The pipeline is equipped with leak detection located in the annulus between the inner and outer pipes. Each basin is equipped with six available sample risers constructed of 6-inch perforated pipe. A seventh sample riser in each basin is dedicated to influent waste receipt piping, and an eighth riser in each basin contains liquid level instrumentation. Each riser extends along the sides of each basin from the top to the bottom of the basin. Detailed information on the construction and operation of the LERF is provided in Chapter 4.0 of the *Hanford Facility Dangerous Waste Permit Application, Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility* (DOE/RL-97-03).

The ETF was designed to treat the contaminants anticipated in process condensate (PC) from the 242-A Evaporator and other aqueous wastes from the Hanford Site. Section 1.2 provides more information on the sources of these wastes.

The capabilities of the ETF were confirmed through pilot plant testing. A pilot plant was used to test surrogate solutions that contained constituents of concern anticipated in aqueous wastes on the Hanford Site. The pilot plant testing served as the basis for a demonstration of the treatment capabilities of the ETF in the *200 Area Effluent Treatment Facility Delisting Petition* (DOE/RL-92-72). The pilot plant test data also were used to establish that the ETF provides 'best available treatment and all known, available, and reasonable methods of treatment' (BAT/AKART), as required in the permitting of the ETF under the state water quality and wastewater discharge permit regulations (WAC 173-200 and WAC 173-216, respectively).

The ETF consists of a primary and a secondary treatment train (Figure 1-2). The primary treatment train removes or destroys dangerous and mixed waste components from the aqueous waste. In the secondary treatment train, the mixed waste components are concentrated and dried into a powder. The powder waste is containerized, and transferred to a waste treatment, storage, and/or disposal (TSD) unit.

Each treatment train consists of a series of operations. The primary treatment train includes the following:

- Surge tank
- Rough filter
- Ultraviolet light oxidation (UV/OX)

- pH adjustment
- Hydrogen peroxide decomposer
- Fine filter
- Degasification
- Reverse osmosis (RO)
- Polisher [ion exchange (IX) column]
- Final pH adjustment and verification.

The secondary treatment train uses the following systems:

- Secondary waste receiving tanks
- Evaporator (mechanical vapor recompression)
- Concentrate tank
- Thin film dryer
- Container handling
- Supporting systems.

A dry powder waste is generated from the secondary treatment train, from the treatment of an aqueous waste. The secondary waste treatment system typically receives and processes by-products generated from the primary treatment train. However, in an alternate operating scenario, some aqueous wastes may be fed to the secondary treatment train before the primary treatment train. Detailed information on the treatment trains and the unit operations is provided in Chapter 4.0 of the dangerous waste permit application for the LERF and ETF (DOE/RL-97-03).

The treated effluent is contained in verification tanks where the effluent is sampled and analyzed, and held until the analytical results confirm that the effluent meets the 'delisting' criteria. Under 40 CFR 261, Appendix IX, Table 2, the treated effluent from the ETF is considered a delisted waste; that is, the treated effluent is no longer a dangerous or hazardous waste subject to the hazardous waste management requirements of RCRA. The treated effluent is discharged under the Discharge Permit as a nondangerous, delisted waste to the SALDS, located in the 600 Area, north of the 200 West Area (Figure 1-1).

1.2 SOURCES OF AQUEOUS WASTE

The ETF was intended and designed to treat a variety of radioactive and/or aqueous mixed wastes. However, during the initial phases of developing the dangerous waste permit application for the LERF and ETF, PC from the 242-A Evaporator was the only mixed waste identified for storage and treatment in the LERF and the ETF. As cleanup activities at Hanford progress, many of the aqueous wastes generated from site remediation and waste management activities will be sent to the LERF and ETF for treatment and storage.

The PC is a dangerous waste because it is derived from a listed, dangerous waste stored in the Double-Shell Tank (DST) System and because of the ammonia content. The DST waste is transferred to the 242-A Evaporator where the waste is concentrated through an evaporation process. The concentrated slurry waste is returned to the DST System, and the evaporated portion of the waste is recondensed, collected, and transferred as PC to the LERF.

Other aqueous wastes that will be treated and stored at the LERF and ETF include, but are not limited to the following Hanford wastes: contaminated groundwater from pump-and-treat remediation activities such as groundwater from the 200-UP-1 Operable Unit; water from deactivation activities such as water from the spent fuel storage basins at deactivated reactors (e.g., N Reactor); laboratory aqueous waste from unused samples and sample analyses; and leachate from landfills, such as the Environmental Restoration Disposal Facility.

Most of these aqueous wastes will be accumulated in batches in a LERF basin for interim storage and treatment through pH and flow equalization before final treatment in the ETF. However, some aqueous wastes, such as 200-UP-1 Groundwater, may flow through LERF en route to the ETF for final treatment. The constituents in these aqueous wastes are common to the Hanford Site and were considered in pilot plant testing or in vendor tests, either as a constituent or as a family of constituents.

Some of the aqueous wastes could contain tritium, a radioactive isotope of hydrogen. Because there is no economically, viable treatment technology available to remove tritium, tritium is not reduced in the treated effluent discharged to the SALDS.

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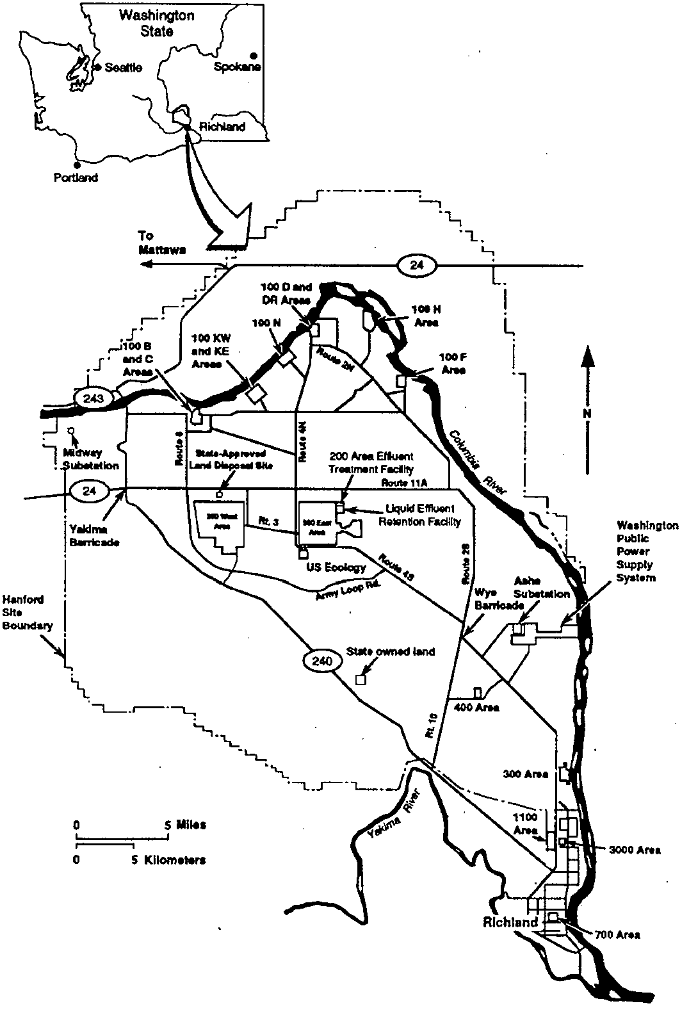

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Figure 1-1. Location of the Liquid Effluent Retention Facility, the 200 Area Effluent Treatment Facility, and the State-Approved Land Disposal Site.

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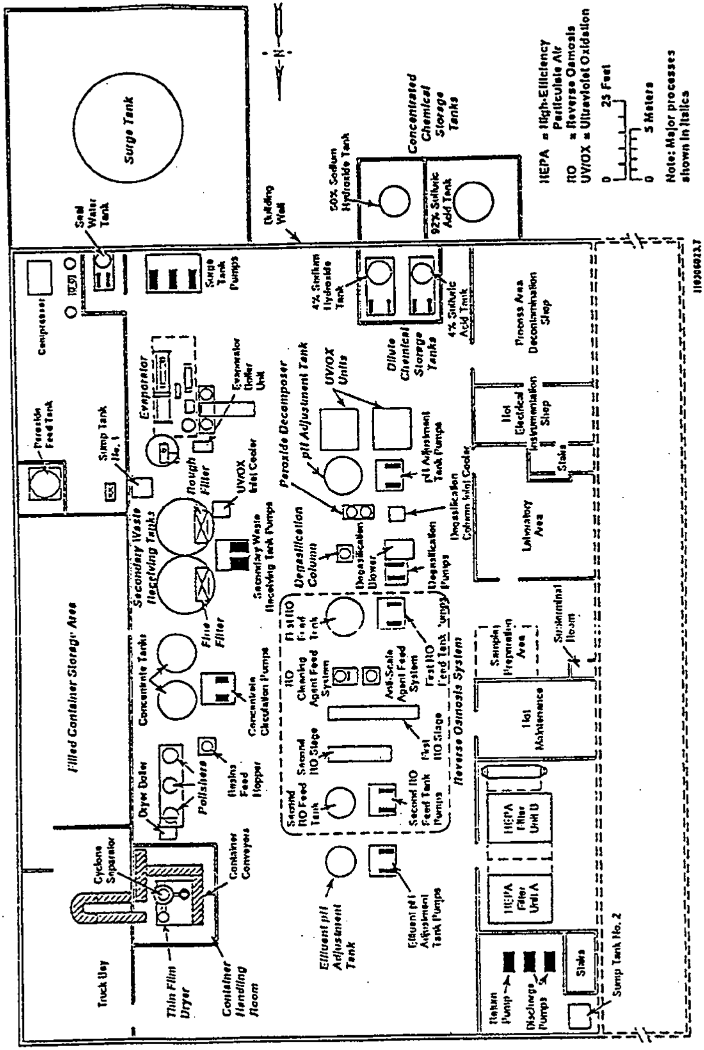

Figure 1-2. 200 Area Effluent Treatment Facility Floor Plan.

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2.0 INFLUENT WASTE ACCEPTANCE PROCESS

Throughout the acceptance process, there are certain criteria that must be met for an influent waste (i.e., aqueous waste) to be accepted. These criteria are identified in the following sections and summarized in Table 2-2. It should be noted that if an aqueous waste initially does not meet these criteria, it is not necessarily rejected. In many instances, the ETF process or the LERF and ETF permits can be modified to accommodate the treatment and storage of that waste. A discussion of the re-evaluation process is provided in Section 2.3.

The first step in the waste acceptance process is for the generator to provide information on the influent waste stream. At this stage, the generator will work with LERF/ETF personnel to define what information must be provided to determine the acceptability of an aqueous waste for the treatment, storage, or disposal at the LERF and the ETF. At a minimum, the information required by WAC 173-303-300(2) will be obtained, which includes sampling and analysis of the aqueous waste stream. The LERF/ETF management will evaluate, on a case-by-case basis, whether the aqueous waste stream is acceptable for storage and treatment. The waste acceptance process contains the following steps.

<u>Acceptance Process</u> is performed as follows.

- <u>Waste information</u>--the generator of an aqueous waste works with LERF/ETF personnel to provide detailed information on the waste stream, i.e., a waste characterization.

- <u>Waste management decision process</u>--LERF/ETF management decision is based on a case-by-case evaluation of whether an aqueous waste stream is acceptable for treatment or storage, or whether to reject a stream. In addition, any special management practices required for an accepted stream may be specified at this time. The evaluation is divided into two categories.

  - **Regulatory acceptability**--a review to determine if there are any regulatory concerns that would prohibit the storage or treatment of an aqueous waste in the LERF or ETF; e.g., treatment would meet permit conditions that would be in compliance with applicable regulations.

  - **Operational acceptability**--an evaluation to determine if there are any operational concerns that would prohibit the storage or treatment of an aqueous waste in the LERF or ETF; e.g., determine treatability and compatibility or safety considerations.

  Specific waste acceptance criteria are defined within the individual discussions on regulatory and operational acceptability.

<u>Re-evaluation Process</u> is performed to ensure the characterization is accurate and current. This process also provides a mechanism for

re-evaluating an aqueous waste stream that does not meet the waste acceptance criteria.

Record Information/Decision Process--provides that information used in the decision, the evaluation, and the decision are documented as part of the ETF Operating Record.

2.1 ACCEPTANCE PROCESS

When an aqueous waste stream is identified for treatment or storage in the LERF or ETF, the generator is required to characterize the waste and document the characterization on an aqueous waste profile sheet (WPS). This requirement is the first waste acceptance criterion. The LERF and the ETF personnel work with the generators to ensure that the necessary information is collected for the characterization of a waste stream (i.e., the appropriate analyses or adequate process knowledge), and that the information provided on the WPS is complete. The completed WPS is maintained at the ETF.

2.1.1 Waste Characterization

Because the constituents in the individual aqueous waste streams vary, each stream is characterized and evaluated for acceptability on a case-by-case basis. The generator is required to designate an aqueous waste which generally will be backed up by analytical data. However, a generator may use process knowledge to substantiate the waste designation, or for general characterization information. Examples of acceptable process knowledge include the following:

- Documented data or information on processes similar to that which generated the aqueous waste stream
- Information/documentation that dangerous waste constituents are from specific, well documented processes, e.g., F-listed wastes
- Information/documentation that sampling/analyzing a waste stream would pose health and safety risks to personnel
- Information/documentation that the waste does not lend itself to collecting a laboratory sample.

When a generator submits process knowledge for the characterization of a dangerous and/or mixed waste stream, the process knowledge is reviewed by LERF and ETF personnel as part of the waste acceptance process. Specifically, LERF and ETF personnel review the generator's processes to verify the integrity of the process knowledge, and determine whether the process knowledge is current and consistent with current regulations. The final decision on the adequacy of the process knowledge is determined by LERF/ETF management or their designee. The persons reviewing generator process knowledge and those making decisions on the adequacy of process knowledge are trained according to the requirements of the Dangerous Waste Training Plan [Chapter 8.0 of the dangerous waste permit application for the LERF and ETF (DOE/RL-97-03)].

The generator is also responsible for identifying those Land Disposal Restrictions (LDR) that would be applicable to the influent aqueous waste as part of the characterization, as require under 40 CFR 268.40 and WAC 173-303-140. Because the ETF is a Clean Water Act - equivalent TSD unit (40 CFR 268.37(a)), the generator is not required to identify the underlying hazardous constituents (40 CFR 286.48).

When analyzing an aqueous waste stream for characterization, a generator is required to use the target list of parameters identified in Table 4-1 (Section 4.0). The corresponding analytical methods are provided in Appendix B. The generator may use process knowledge in lieu of some analyses, as determined by LERF/ETF management or their designee, if the process knowledge is adequate (as described above). For example, if a generator provides information that the process generating an aqueous waste does not include or involve organic chemicals, analyses for organic compounds likely would not be required. Additional analyses could be required if historical information and/or process knowledge indicate that an aqueous waste contains constituents not included in the target list of parameters.

The LERF and ETF personnel will work with the generator to determine which analyses are appropriate for the characterization. This approach ensures that the waste analyses adequately characterize the aqueous waste and defines the constituents of concern in a cost effective manner. The characterization and historical information are documented in the WPS, which is discussed in the following section.

2.1.2 Aqueous Waste Profile Sheet

The WPS documents the characterization of each new aqueous waste stream. The profile includes a detailed description of the volume, source, regulatory history, and the chemical and physical nature of the aqueous waste. For an aqueous waste to be accepted for treatment or storage in the LERF or the ETF, each new waste stream generator is required to complete and provide this form to LERF and ETF. Each generator also is required to provide the analytical data and process knowledge used to designate the aqueous waste stream, and to determine the chemical and physical nature of the waste. An example of a typical WPS is provided in Appendix A. This form could be modified to accommodate changes in regulations, operational concerns at the LERF or ETF, Hanford Facility needs, or other needs. However, the basic elements of the example form (e.g., waste source information) will be maintained in any future revision.

The LERF and the ETF management determine whether the information on the WPS is sufficient. The LERF and ETF management use this information to evaluate the acceptability of the aqueous waste for storage and treatment in the LERF and the ETF, and to determine if the aqueous waste can be handled properly.

2.2 WASTE MANAGEMENT DECISION PROCESS

All aqueous waste under consideration for acceptance must be characterized using analytical data and process knowledge. This information is used to determine the acceptability of an aqueous waste stream. The LERF and ETF Facility Manager or their designee is responsible for making the decision to accept or reject an aqueous waste stream. The management decision to accept any aqueous waste stream is based on an evaluation of regulatory acceptability and operational acceptability. Each evaluation uses acceptance criteria, which were developed to ensure that an aqueous waste is managed in a safe, environmentally sound and compliant manner. The following sections provide detail on the acceptance evaluation and the acceptance criteria.

In many instances, an aqueous waste that does not meet one of the waste acceptance criteria is not necessarily rejected. Section 2.3 discusses the process for re-evaluating an aqueous waste that does not initially meet the waste acceptance criteria. However, the final decision to reject an aqueous waste is made by LERF and ETF management. An aqueous waste stream could be rejected for one of the following reasons:

- The paperwork and/or laboratory analyses from the generator are insufficient

- Discrepancies with the regulatory and operational acceptance criteria cannot be reconciled, including:

  - An aqueous waste is not allowed under the current Discharge Permit or Final Delisting, and LERF/ETF management elect not pursue an amendment, or the permit and Delisting cannot be amended (Section 2.2.1)

  - An aqueous waste is incompatible with LERF liner materials or with other aqueous waste in LERF and no other management method is available (2.2.2).

- Adequate storage or treatment capacity is not available.

2.2.1 Regulatory Acceptability

Each aqueous waste stream is evaluated on a case-by-case basis to determine if there is any regulatory concerns that would preclude the storage or treatment of a waste in the LERF or the ETF. Before an aqueous waste can be treated in either the LERF of the ETF, the regulatory history must be determined. Information on the regulatory history of an aqueous waste is documented in the WPS. This information is used to confirm that treating or storing the aqueous waste in the LERF or the ETF is allowed under and in compliance with WAC 173-303, dangerous waste permit application for the LERF and ETF, the Final Delisting for the ETF, and the Discharge Permit for the ETF.

2.2.1.1 Dangerous Waste Regulations/Permits. Before an aqueous waste stream is sent to the LERF or the ETF, the generator will characterize and designate the stream with the appropriate dangerous/hazardous waste numbers according to WAC 173-303-070. The Part A, Form 3, permit applications for the LERF and the ETF, and the Final Delisting for the ETF identify the specific waste numbers for dangerous/mixed waste that can be managed in the LERF and the ETF. Dangerous waste designated with waste numbers not specified in the Part A, Form 3, permit applications can not be treated or stored in the LERF or the ETF, until the Part A, Form 3, permit application is modified.

Additionally, aqueous wastes designated with listed waste numbers identified in the Final Delisting will be managed in accordance with the conditions of the delisting, or an amended delisting. Accordingly, the acceptance criteria in this evaluation are satisfied through compliance with the Part A, Form 3, permit applications and the Final Delisting.

2.2.1.2 State Waste Permit Regulations/Permit. Compliance with the Discharge Permit constitutes another waste acceptance criterion. In accordance with the conditions of the Discharge Permit, the constituents of concern in each new aqueous waste stream must be identified. The regulatory history and characterization data provided by the generator are used to identify these constituents. A constituent of concern, under the conditions of the Discharge Permit, in an aqueous waste stream is defined as any contaminant with a maximum concentration greater than one of the following:

- Any limit in the Discharge Permit (Ecology 1995a)

- Groundwater Quality Criteria (WAC 173-200)

- Final Delisting levels (EPA 1995)

- Background groundwater concentrations as measured at the ETF disposal site.

The conditions of the Discharge Permit also require a demonstration that the ETF can treat the constituents of concern to below discharge limits.

2.2.2 Operational Acceptability

Because the operating configuration or operating parameters at the LERF and ETF can be adjusted or modified, most aqueous waste streams generated on the Hanford Site can be effectively treated to below Delisting and Discharge Permit limits. Because of this flexibility, it would be impractical to define numerical acceptance or decision limits. Such limits would constrain the acceptance of appropriate aqueous waste streams for treatment at the LERF and ETF. The versatility of the LERF and ETF is better explained in the following examples:

- The typical operating configuration of the ETF is to process an aqueous waste through the UV/OX unit first, followed by the RO unit. However, high concentrations of nitrates may interfere with the performance of the UV/OX. In this case, the ETF could be configured to process the waste in the RO unit prior to the UV/OX unit.

- For a small volume aqueous waste with high concentrations of some anions and metals, the approach may be to first process the waste stream in the secondary treatment train. This approach would prevent premature fouling or scaling of the RO unit. The liquid portion (i.e., untreated overheads from the ETF evaporator and thin-film dryer) would be send to the primary treatment train.

- An aqueous waste with high concentrations of chlorides and fluorides may cause corrosion problems when concentrated in the secondary treatment train. One approach is to adjust the corrosion control measures in the secondary treatment train. An alternative may be to blend this aqueous waste in a LERF basin with another aqueous waste which has sufficient dissolved solids, such that the concentration of the chlorides in the secondary treatment train would not pose a corrosion concern.

- Some metal salts (e.g., barium sulfate) tend to scale the RO membranes. In this situation, descalants used in the treatment process may be increased.

- Any effluent that does not meet these limits in one pass through the ETF treatment process is recycled to the ETF for re-processing.

There are, however, some aqueous wastes whose chemical and physical properties would preclude that waste from being treated or stored at the LERF or ETF. Accordingly, an aqueous waste is evaluated to determine if it is treatable, if it would impair the efficiency or integrity of the LERF or ETF, and if it is compatible with materials in these units. This evaluation also determines if the aqueous waste is compatible with other aqueous wastes(s) managed in the LERF..

The waste acceptance criteria in this category focus on determining treatability of an aqueous waste stream, and on determining any operational concerns that would prohibit the storage or treatment of an aqueous waste stream in the LERF or the ETF. The chemical and physical properties of an aqueous waste stream are determined as part of the waste characterization, and are documented on the WPS and compared to the design of the units to determine whether an aqueous waste stream is appropriate for storage and treatment in the LERF and the ETF.

2.2.2.1 Treatability. The process of determining treatability involves two steps. The first step is to establish the treatment efficiencies for the constituents of concern in an influent aqueous waste. The treatment efficiencies must be sufficient such that the treated effluent will meet the Discharge Permit and Delisting limits. The pilot plant testing provided destruction and removal (i.e., treatment) efficiencies for most of the anticipated constituents in aqueous waste streams at the Hanford Site, and are documented in the *200 Area Effluent Treatment Facility Delisting Petition* (DOE/RL-92-72). Information or studies from the vendors of the individual treatment units studies may also be used on a case-by-case basis to develop treatment efficiencies for the ETF or for the individual treatment units. [Chapter 4.0 of the dangerous waste permit application for the LERF and ETF (DOE/RL-97-03) provides a detailed discussion of the individual treatment units.] Treatment efficiencies also may be determined or confirmed by ETF operating data.

The second step in determining treatability is to identify those physical and chemical properties in an aqueous waste that would interfere with, or foul the ETF treatment process. This step focuses on the potential of a waste stream to interfere with the destruction efficiency of organic compounds in the UV/OX system, rejection rates of the RO membranes, or foul the filtration systems. Generally, the operating parameters or operating configuration at the LERF or ETF can be adjusted or modified to accommodate these properties. However, in those cases where a treatment process or operating configuration cannot be modified, the aqueous waste stream will be excluded from treatment or storage at the LERF or ETF.

Additionally, an aqueous waste stream is evaluated for the potential to deposit solids in a LERF basin (i.e., an aqueous waste which contains sludge). This evaluation will also consider the whether blending or mixing two or more aqueous waste streams will result in the formation of a precipitate. However, because the waste streams managed in the LERF and ETF are generally dilute, the potential for mixing waste streams an forming a precipitate is low, no specific compatibility tests are performed. If necessary, filtration at the waste source could be required before acceptance into LERF.

To determine if an aqueous waste meets the criterion of treatability, specific information is required. Treatment efficiencies will be developed from characterization data provided by the generator. Generators will also provide characterization data to identify those physical and chemical properties that would interfere with, or foul the ETF treatment process. In some instances, process knowledge may be adequate to identify a chemical or physical property that would be of concern. For example, the generator could provide process knowledge that the stream has two phases (an oily phase and an aqueous phase). In this case, if the generator could not physically separate the two phases, the aqueous waste stream would be rejected because the oily phase could compromise some of the treatment equipment. Typically, analyses for the following parameters are required to evaluate treatability and operational concerns:

- total dissolved solids
- total organic carbon
- total suspended solids
- specific conductivity
- pH.

Data also are needed on what are typically the major components of an aqueous waste. These include calcium, magnesium, sodium, potassium, silica, barium, iron, nitrate, chloride, and sulfate. Finally, the following constituents also could affect the treatability of an aqueous waste and may be considered in the characterization: aluminum, manganese, phosphate, and bromide. These constituents are identified in Table 2-2.

2.2.2.2 Compatibility with Liquid Effluent Retention Facility Liner and Piping. As part of the acceptance process, the criteria of compatibility with the LERF liner materials is evaluated for each aqueous waste stream. The evaluation for liner compatibility is documented as part of the waste acceptance process. The chemical parameters or constituents considered for liner compatibility are identified in Table 2-1. The analytical methods for these parameters and constituents are provided in Appendix B.

The high-density polyethylene liners in the LERF basins potentially are vulnerable to the presence of certain constituents that might be present in some aqueous waste. Using EPA Method 9090 (EPA 1996), the liner materials were tested to evaluate compatibility between aqueous waste stored in the LERF and synthetic liner components. Based on the data from the compatibility test and vendor data on the liner materials, several constituents and parameters were identified as potentially harmful (at high concentrations) to the integrity of the liners. From these data and the application of safety factors, concentration limits in Table 2-1 were established.

Except for PC, the strategy for protecting the integrity of a LERF liner is to establish upfront that an aqueous waste is compatible before the waste is accepted into LERF. Characterization data on each new aqueous waste stream are compared to the limits outlined in Table 2-1 to ensure compatibility with the LERF liner material before acceptance into the LERF.

PC from each 242-A Evaporator campaign is sampled and analyzed, and the results compared to the limits in Table 2-1 to ensure continued compatibility with the liner. Additionally, before a waste stream is processed at the 242-A Evaporator, DST analytical data are reviewed and administrative and process controls developed and implemented to ensure that PC is compatible with the LERF liner. For flow-through aqueous wastes like the 200-UP-1 Groundwater, characterization data will be reviewed quarterly to ensure that liner compatibility is maintained.

In some instances, process knowledge may be adequate to determine that an aqueous waste is compatible with the LERF liner. In those instances where process knowledge is adequate, the waste characterization would likely not require analysis for these parameters and constituents.

2.2.2.3 Compatibility with Other Waste. Some aqueous wastes, especially small volumes, are accumulated in the LERF with other aqueous waste. Before acceptance into the LERF, the aqueous waste stream is evaluated for its compatibility with the resident aqueous waste(s). The evaluation focuses on the potential for an aqueous waste to react with another waste (40 CFR 264, Appendix V, "Examples of Potentially Incompatible Wastes"). Though the potential for problems associated with commingling aqueous wastes is very low, this evaluation confirms the compatibility of two or more aqueous wastes from different sources. No specific analytical test for compatibility is performed.

If it is determined that an aqueous waste stream is incompatible with other aqueous waste streams, alternate management scenarios are available. For example, another LERF basin that contains a compatible aqueous waste(s) might be used, or the aqueous waste stream might be fed directly into the ETF for treatment. In any case, potentially incompatible waste streams are not mixed, and all aqueous waste is managed in a way that precludes a reaction, degradation of the liner, or interference with the ETF treatment process.

2.3 RE-EVALUATION PROCESS

In accordance with 40 CFR 264.13 and WAC 173-303-300(4)(a), an influent aqueous waste will be re-evaluated as necessary to ensure that the characterization is accurate and current. At a minimum, an aqueous waste stream will be re-evaluated in the following situations.

- The LERF and the ETF management has been notified, or has reason to believe that the process generating the waste has changed.

- The LERF and the ETF management notes a increase or decrease in the concentration of a constituent in an aqueous waste stream, beyond the range of concentrations that was described or predicted in the waste characterization.

In these situations, LERF and ETF management will review the available information. If existing analytical information is not sufficient, the generator may be asked to review and update the current waste characterization, to supply a new WPS, or re-sample and re-analyze the aqueous waste, as necessary. Other situations that might require a re-evaluation of a waste stream are discussed in the following sections.

2.3.1 Re-Evaluation for Aqueous Wastes not Meeting Waste Acceptance Criteria

An aqueous waste that does not meet one of the acceptance criteria is not necessarily rejected. Several options are available in the event that an aqueous waste is not acceptable following an initial evaluation. For example, a more extensive evaluation could be required to determine if the ETF process can be modified to treat an aqueous waste to required discharge levels. Additionally, a more extensive evaluation might be required to determine if a modification of the Discharge Permit or the Final Delisting is required and is feasible (e.g., to treat waste with new listed waste numbers).

2.3.2 Re-Evaluation for Treated Effluent not Meeting 200 Area Effluent Treatment Facility Permit Limits

If the treated effluent does not meet the Discharge Permit and Delisting limits in one pass through the ETF treatment process, the acceptability of the influent aqueous waste would be re-evaluated. This situation generally would apply to large volumes of aqueous waste (such as 200-UP-1 Groundwater) or to aqueous waste that is sent to the LERF or the ETF in batches on some frequency (such as monthly transfers of an aqueous waste). Small volumes of aqueous waste generally would be reprocessed until permit limits are met.

2.3.3 Re-Evaluation Requirements for Flow-Through Aqueous Waste

Aqueous waste like the 200-UP-1 Groundwater is unique because of the constant-flow source, and because the waste is pumped into a LERF basin throughout the lifetime of the pump-and-treat remediation activity. Also, rather than being accumulated in the LERF in a batch mode, this aqueous waste will generally flow through the LERF to the ETF for final treatment. Though this aqueous waste has been characterized upfront for acceptability, special sampling and analysis requirements must be met during the pump-and-treat operation to ensure that it continues to meet acceptance criteria.

Accordingly, flow-through wastes like the 200-UP-1 Groundwater are, and will be sampled quarterly to update the initial characterization. This on-going characterization is monitored by the LERF and the ETF personnel. If the data from a sampling event suggest that contaminant concentrations have increased beyond that described in the initial characterization, the acceptability of the waste stream will be re-evaluated. Details on the sampling and analysis of flow-through aqueous waste, like the 200-UP-1 Groundwater, are provided in Section 4.0.

2.4 RECORD/INFORMATION AND DECISION

The information and data collected throughout the acceptance process, and the evaluation and decision on whether to accept an influent aqueous waste stream for treatment or storage in the LERF or the ETF are documented as part of the ETF Operating Record, which is maintained at the ETF. Specifically, the Operating Record contains the following components on a new influent aqueous waste stream:

- The signed WPS for each aqueous waste stream and analytical data

- Process knowledge used to characterize a dangerous/mixed waste (under WAC 173-303), and information supporting the adequacy of the process knowledge

- The evaluation on whether an aqueous waste stream meets the waste acceptance criteria, including:
  - The evaluation for regulatory acceptability including appropriate regulator approvals
  - the evaluation for liner compatibility and for compatibility with other aqueous waste.

Table 2-1. General Limits for Liner Compatibility.

Chemical Family	Constituent(s) or Parameter(s)[a]	Limit (mg/L)[b] (sum of constituent concentrations)
Alcohol/glycol	benzyl alcohol, 1-butanol	500,000
Alkanone[c]	acetone, 2-hexanone, methyl ethyl ketone, methyl isobutyl ketone, and 2-pentanone	200,000
Alkenone[d]	none targeted	NA
Aromatic/cyclic hydrocarbon	acetophenone, benzene, chlorobenzene, cresol, 1,4-dichlorobenzene, 2,4-dinitrotoluene, di-n-octyl phthalate, naphthalene, tetrahydrofuran, toluene, xylene	2000
Halogenated hydrocarbon	carbon tetrachloride, chloroform, 1,2-dichloroethane, 1,2-dichloroethene, 1,1-dichloroethylene, methylene chloride, tetrachloroethylene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethylene, vinyl chloride	2000
Aliphatic hydrocarbon	hexachloroethane	500,000
Ether	2-butoxyethanol	2000
Other hydrocarbons	dimethylnitrosamine, tributyl phosphate	2000
Oxidizers	none targeted	NA
Acids, Bases, Salts	ammonium	100,000
pH	pH	0.5 < pH < 13.0

[a] Analytical methods for the parameters and constituents are provided in Appendix B.

[b] Analytical data for a chemical family (as indicated) are summed using the following 'sum of the fraction technique'. The individual constituent concentration, sum concentration (for families), and pH values for a waste stream are then evaluated against the compatibility limit.

$$\sum_{n=1}^{i} \left(\frac{\mathrm{Conc}_n}{\mathrm{LIMIT}_n}\right) \le 1$$

where i is the number of organic constituents detected

[c] Ketone containing saturated alkyl group(s).

[d] Ketone containing unsaturated alkyl group(s).

mg/L = milligrams per liter.

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Table 2-2. Waste Acceptance Criteria.

General criteria category	Criteria description
1. Characterization	A. Each generator must provide an aqueous waste profile.
	B. Each generator must designate the aqueous waste stream.
	C. Each generator must provide analytical data and/or process knowledge.
2. Regulatory acceptability	A. The LERF and ETF can store and treat influent aqueous wastes with waste numbers identified in the Part A, Form 3, permit applications for the LERF and the ETF, and the Final Delisting for the ETF.
	B. The aqueous waste must in compliance with conditions of the Discharge Permit.
3. Operational acceptability	A. Determine whether an aqueous waste stream is treatable, considering: 1. Whether the removal and destruction efficiencies on the constituents of concern will be adequate to meet Discharge Permit and Delisting levels. 2. Other treatability concerns; analyses for this evaluation may include: total dissolved solids total organic carbon total suspended solids specific conductivity calcium magnesium manganese bromide silica potassium sodium barium nitrate chloride phosphate sulfate
	B. Determine whether an aqueous waste stream is compatible, considering: 1. Whether an aqueous waste stream is compatible with LERF liner materials, compare characterization data to the liner compatibility limits (Table 2-1). 2. Whether an aqueous waste stream is compatible with other aqueous waste(s). (A 40 CFR 264 Appendix V type of comparison will be employed).

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3.0 SPECIAL MANAGEMENT REQUIREMENTS

Special management requirements for aqueous wastes that are managed in the LERF or ETF are discussed in the following sections.

3.1 MONITORING THE VARIABILITY OF PROCESS CONDENSATE

The Discharge Permit (Ecology 1995a, Section S5) requires sampling of PC in the LERF basins until sufficient data are collected to adequately assess the variability of ammonia and total Kjeldahl nitrogen (TKN), strontium-90, and iodine-129. The PC will be analyzed for these parameters to assess the range of concentrations present in the PC and the results reported to Ecology. In addition, the 10 highest concentrations of tentatively identified compounds (TICs) will be reported from each PC sampling event, as required by the discharge permit. Tentatively identified compounds are non-targeted organic compounds or fragments of compounds with unique chromatographic spectra that are qualitatively identified by comparing them to standard databases of spectra. Because these compounds are identified qualitatively, their concentration only can be estimated.

Reports have been submitted to Ecology that included the results of ammonia and TKN analysis, detections of strontium-90 and iodine-129, and the 10 highest TICs. The data in these reports suggested that there is very little variability in the PC.

3.2 CONDITIONS ON PROCESS CONDENSATE FOR NEWLY IDENTIFIED WASTE NUMBERS

In January 1995, the U.S. Department of Energy, Richland Operations Office (DOE-RL) notified Ecology and the U.S. Environmental Protection Agency that small amounts of listed waste might have been introduced to the DST System, upstream of the LERF and the ETF. This listed waste previously had not been identified in the Dangerous Waste Part A, Form 3, permit applications for the DST System, LERF, or ETF. In a March 7, 1995 letter from Ecology to DOE-RL (Ecology 1995b), Ecology exercised its enforcement discretion with respect to the designation of this waste so long as several conditions are met. As long as these conditions are met, the waste numbers will not be included in the Part A, Form 3s, for the LERF or the ETF. These conditions only apply to PC. The constituents vanadium, formate, and cyanide will be analyzed in the PC to meet these conditions.

3.3 LAND DISPOSAL RESTRICTION COMPLIANCE AT LIQUID EFFLUENT RETENTION FACILITY

Because LERF provides treatment through flow and pH equalization, a surface impoundment treatment exemption from the land disposal restrictions was granted in accordance with 40 CFR 268.4 (EPA 1994 and Ecology 1996b). This treatment exemption is subject to several conditions, including a requirement that the WAP address the sampling and analysis of the treatment 'residue' [40 CFR 268.4(a)(2)(i) and WAC 173-303-300(5)(h)(i) and (ii)] to ensure it meets applicable treatment standards. Though the term 'residue' is not specifically defined, this condition further requires that sampling must be designed to represent the "sludge and the supernatant" indicating that a residue may have a sludge (solid) and supernatant (liquid) component.

Solid residue is not anticipated to accumulate in a LERF basin for the following reasons:

- Aqueous waste streams containing sludge would not be accepted into LERF under the acceptance criteria of treatability (Section 2.2.2.1)

- No solid residue was reported from PC discharged to LERF in 1995

- The LERF basins are covered and all incoming air first passes through a breather filter

- No precipitating or flocculating chemicals are used in flow and pH equalization.

Therefore, the residue component subject to this condition is the supernatant (liquid component). As indicated above, solids are not anticipated to accumulate in a LERF basin. Additionally, an aqueous waste stream is evaluated for the potential to deposit solids in a LERF basin (i.e., an aqueous waste which contains sludge). If necessary, filtration at the waste source could be required before acceptance into LERF. The contingency for removal of solids will be addressed during closure [as indicated in the Closure Plan, Chapter 11.0 of the dangerous waste permit application for LERF and ETF (DOE/RL-97-03)].

The conditions of the treatment exemption also require that treatment residues (i.e., aqueous wastes) which do not meet the LDR treatment standards "must be removed at least annually" [40 CFR 268.4(a)(2)(ii)]. To address the conditions of this exemption, an influent aqueous waste is sampled and analyzed and the LDR status of the aqueous waste is established as part of the acceptance process. The LERF basins are then managed such that any aqueous waste(s) which exceeds an LDR standard is removed annually from a LERF basin, except for a heel of approximately 1 meter. A heel is required to stabilize the LERF liner. The volume of the heel is approximately 1.9 million liters.

4.0 INFLUENT AQUEOUS WASTE SAMPLING AND ANALYSIS

The following sections provide a summary of the sampling procedures, frequencies, and analytical parameters that will be used in the characterization of influent aqueous waste (Section 2.0) and in support of the special management requirements for aqueous waste in the LERF (Section 3.0).

4.1 SAMPLING PROCEDURES

With a few exceptions, generators are responsible for the characterization, including sampling and analysis, of an influent aqueous waste. PC is either sampled at the 242-A Evaporator or accumulated in a LERF basin following a 242-A Evaporator campaign and sampled. Flow-through aqueous wastes, such as the 200-UP-1 Groundwater, will be characterized before acceptance; however, these aqueous wastes will also be sampled at LERF quarterly. Other exceptions will be handled on a case-by-case basis. The following section discusses the sampling locations, methodologies, and frequencies for these aqueous wastes. Aqueous waste generators are referred to WAC 173-303-110(2) (40 CFR 261, Appendix I) for the sampling procedures that are applicable to their waste. For samples collected at the LERF and ETF, specific sampling protocol is followed. The sample containers, preservation materials, and holding times for each analysis are listed in Appendix B.

4.1.1 Batch Samples

In those cases where PC is sampled in a LERF basin, samples are collected from four of the six available sample risers located in each basin, i.e., four separate samples. Though there are eight sample risers at each basin, one is dedicated to liquid level instrumentation and the other is dedicated as an influent port. Operating experience indicates that four samples adequately capture the variability of an aqueous waste stream. Specifically, sections of stainless steel tubing are inserted into the sample riser to an appropriate depth. Using a portable pump, the sample line is flushed with the aqueous waste and the sample collected. The sample containers are filled for volatile organic compounds (VOC) first, then semivolatile organic compounds (SVOC), and then the remainder of the bottles in any order.

Several sample ports are also located at the ETF, including a valve on the recirculation line at the ETF surge tank, and a sample valve on a tank discharge pump line at the ETF Load-In Station. All samples are obtained at the LERF or ETF are collected in a manner consistent with SW-846 procedures (EPA 1986).

4.1.2 Flow-Through Samples at the Liquid Effluent Retention Facility

Flow-through samples are collected from a valve located at a transfer pipeline connection to the LERF. Samples of flow-through aqueous wastes, such as 200-UP-1 Groundwater, are collected quarterly or more frequently if there is change in the source (e.g., a change in the well-head), or if it is determined that there is an increase in the concentration of contaminants beyond the range described in the initial characterization. For flow-through samples, VOC sample containers are filled first, followed by containers for SVOC samples, and containers for the remainder of other parameters.

4.2 ANALYTICAL RATIONALE

As stated previously, each generator is responsible for designating and characterizing an aqueous waste stream. Accordingly, each generator samples and analyzes an influent waste stream from the target list of parameters (Table 4-1) for the waste acceptance process. At the discretion of the LERF and ETF management, a generator may provide process knowledge in lieu of some analyses as discussed in Section 2.1.1. The LERF and ETF personnel will work with the generator to determine which parameters are appropriate for the characterization.

The analytical methods for these parameters are provided in Appendix B. All methods for nonradioactive parameters are EPA methods. Additional analyses may be required if historical information and process knowledge indicate that an influent aqueous waste contains constituents not included in the target list of parameters. For example, if process knowledge indicates that an aqueous waste contains a parameter that is regulated by the Groundwater Quality Criteria (WAC 173-200), that parameter(s) would be added to the suite of analyses required for that aqueous waste stream.

The analytical data for the parameters presented in Table 4-1, including VOC, SVOC, metals, anions, general chemistry parameters, and radionuclides are used to define the physical and chemical properties of the aqueous waste to:

- Set operating conditions in the LERF and ETF (e.g., to determine operating configuration - refer to Section 2.2.2)

- Identify concentrations of some constituents which may also interfere with, or foul the ETF treatment process (e.g., fouling of the RO membranes - refer to Section 2.2.2)

- Evaluate LERF liner and piping material compatibility

- Determine treatability to evaluate if applicable constituents in the treated effluent will meet Discharge Permit and Delisting limits

- Estimate concentrations of some constituents in the waste generated in the secondary treatment train (i.e., dry powder waste).

Some analyses also are required to address special conditions (Section 3.0) or for other specific purposes as indicated below:

- <u>Formate analysis</u> is required for compliance with special conditions for PC (refer to Section 3.2).

- Total Kjeldahl nitrogen (TKN) analysis required under the Discharge Permit to meet special conditions for PC (until discharge permit is modified, refer to Section 3.1).

- Total dissolved solids analysis to predict volume of powder waste from the secondary treatment train.

- Radionuclide analyses are used for inventorying radionuclides as necessary to demonstrate compliance with U.S. Department of Energy Orders (including DOE Orders 5480.5 and 5480.23) and monitoring for some radionuclides required for compliance with Discharge Permit.

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Table 4-1. Target Parameters for Influent Aqueous Waste Analyses.
(sheet 1 of 2)

VOLATILE ORGANIC COMPOUNDS
- Acetone
- Benzene
- 1-Butyl alcohol (1-Butanol)
- Carbon tetrachloride
- Chlorobenzene
- Chloroform
- 1,2-Dichloroethane (total)
- 1,1-Dichloroethylene
- 2-Hexanone
- Methyl ethyl ketone (2-Butanone)
- Methyl isobutyl ketone (Hexone, 4-Methyl-2-pentanone)
- 2-Pentanone
- Tetrachloroethylene
- Tetrahydrofuran
- Toluene
- 1,1,1-Trichloroethane
- 1,1,2-Trichloroethane
- Trichloroethylene
- Vinyl chloride

SEMIVOLATILE ORGANIC COMPOUNDS
- Acetophenone
- Benzyl alcohol
- 2-Butoxyethanol
- Cresol (o, p, m)
- 1,4-Dichlorobenzene
- Dimethylnitrosamine
- Di-n-octyl phthalate
- Hexachloroethane
- Naphthalene
- Tributyl phosphate

TOTAL METALS
- Aluminum
- Antimony
- Arsenic
- Barium
- Beryllium
- Cadmium
- Calcium
- Chromium
- Copper
- Iron
- Lead
- Magnesium
- Manganese
- Mercury
- Nickel
- Potassium
- Selenium
- Silicon
- Silver
- Sodium
- Uranium
- Vanadium
- Zinc

RADIONUCLIDES
- Gross alpha
- Gross beta
- Americium-241
- Antimony-125
- Carbon-14
- Cerium/Praseodymium-144
- Cesium-134
- Cesium-137
- Cobalt-60
- Curium-242
- Curium-244
- Europium-152
- Europium-154
- Europium-155
- Iodine-129
- Neptunium-237
- Niobium-94
- Plutonium-238
- Plutonium-239/240
- Radium-226
- Ruthenium-103
- Ruthenium-106
- Strontium-90
- Technicium-99
- Tin-113
- Tritium
- Zinc-65

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Table 4-1. Target Parameters for Influent Aqueous Waste Analyses.
(sheet 2 of 2)

ANIONS	GENERAL CHEMISTRY PARAMETERS
Bromide	Ammonia
Chloride	Total Kjeldahl nitrogen
Fluoride	Cyanide
Formate[1]	pH
Nitrate	Total suspended solids
Nitrite	Total dissolved solids
Phosphate	Total organic carbon
Sulfate	Specific conductivity

[1] - Parameter only required for 242-A Evaporator process condensate (refer to Section 3.2).

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5.0 TREATED EFFLUENT SAMPLING AND ANALYSIS

The treated aqueous waste, or effluent, from the ETF is collected in three 2,540,000-liter verification tanks before discharge to the SALDS. To determine whether the Discharge Permit early warning values and enforcement limits and the Delisting criteria are met, the effluent routinely is sampled at or before the verification tanks. The sampling and analyses performed are described in the following sections.

5.1 RATIONALE FOR EFFLUENT ANALYSIS PARAMETER SELECTION

The parameters measured in the treated effluent are required by the following regulatory documents:

- Delisting criteria from the Final Delisting (EPA 1995)
- Effluent limits from the State Waste Discharge Permit (Ecology 1995a)
- Early warning values from the State Waste Discharge Permit (Ecology 1995a).

If the concentration of any analyte is found to exceed a Discharge Permit enforcement limit or a Delisting criterion, the contents of the verification tank are reprocessed and re-analyzed. If the concentration of any analyte exceeds an early warning value, an early warning value report is prepared and submitted to Ecology.

5.2 EFFLUENT SAMPLING STRATEGY: METHODS, LOCATION, ANALYSES, AND FREQUENCY

Effluent sampling methods and locations, the analyses performed, and frequency of sampling are discussed in the following sections.

5.2.1 Effluent Sampling Method and Location

Samples of treated effluent are collected and analyzed to verify the treatment process using ETF-specific sampling protocol. These verification samples can be collected at two locations. At the first sampling location, a representative grab sample is collected from a sampling port on the verification tank recirculation line. The second sampler is located upstream of the verification tanks where flow proportional composite samples are collected for all analyses except VOC analysis. For VOCs, a zero-headspace, time proportional sampler capable of collecting a sample over a multiple-day period is used. Appendix B presents the sample containers, preservatives, and holding times for each parameter monitored in the effluent.

5.2.2 Analyses of Effluent

The parameters required by the current Discharge Permit and Delisting conditions are presented in Table 5-1. The analytical methods and PQLs associated with each parameter are provided in Appendix B. The methods and PQLs are equivalent to those used in the analysis of influent aqueous waste. With the exception of formic acid (analyzed as formate), analyses for the constituents associated with the newly listed waste numbers (Section 3.2) already are required analyses in the effluent. An analysis for formate is not required unless this constituent is identified in the influent aqueous waste.

5.2.3 Frequency of Sampling

Treated effluent is tested for all parameters listed in Table 5-1 on a frequency consistent with the conditions of the Discharge Permit and the Final Delisting. Analytical results are received from the laboratory and reviewed before the treated effluent is discharged. The minimum sample collection period typically is 72 hours, representing the amount of time to fill one verification tank at the design flow rate of 562 liters per minute.

During operation of the ETF, if one or more of the constituents exceeds a Delisting criterion, the Delisting conditions require the analysis of samples from two verification tanks (or equivalent volume) before effluent can be discharged. Treated effluent that does not meet Delisting criteria and Discharge Permit is not discharged to the SALDS and is recycled for further treatment.

Table 5-1. Rationale for Parameters to Be Monitored in Treated Effluent.
(sheet 1 of 3)

Parameter	Final Delisting[1]	Discharge Permit[2]	
		Enforcement Limit	Early Warning Value
VOLATILE ORGANIC COMPOUNDS			
Acetone	X		
Benzene	X		X
1-Butyl alcohol	X		
Carbon tetrachloride	X	X	
Chlorobenzene	X		
Chloroform	X		X
1,2-Dichloroethane	X		
1,1-Dichloroethylene	X		
Methyl ethyl ketone (2-Butanone)	X		
Methyl isobutyl ketone (4-methyl-2-Pentanone)	X		
Tetrachloroethylene	X	X	
Tetrahydrofuran			X
Toluene	X		
1,1,1-Trichloroethane	X		
1,1,2-Trichloroethane	X		X
Trichloroethylene	X		
Vinyl chloride	X		
SEMIVOLATILE ORGANIC COMPOUNDS			
Acetophenone			X
Benzyl alcohol	X		
Cresol (total)	X		
1,4-Dichlorobenzene	X		
Dimethylnitrosamine		X	

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Table 5-1. Rationale for Parameters to Be Monitored in Treated Effluent.
(sheet 2 of 3)

Parameter	Final Delisting[1]	Discharge Permit[2]	
		Enforcement Limit	Early Warning Value
Di-n-octyl phthalate	X		
Hexachloroethane	X		
Naphthalene	X		
Tributyl phosphate	X		
TOTAL METALS[3]			
Antimony	X		
Arsenic	X	X	
Barium	X		
Beryllium	X		X
Cadmium	X		X
Chromium	X	X	
Copper			X
Lead	X		X
Mercury	X		X
Nickel	X		
Selenium	X		
Silver	X		
Vanadium	X		
Zinc	X		
ANIONS			
Fluoride	X		
Nitrate (as N)		X	
Nitrite (as N)			X
Sulfate			X
OTHER ANALYSES			
Ammonia[4] (as N)	X		X

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Table 5-1. Rationale for Parameters to Be Monitored in Treated Effluent.
(sheet 3 of 3)

Parameter	Final Delisting[1]	Discharge Permit[2]	
		Enforcement Limit	Early Warning Value
Total Kjeldahl nitrogen (as N)			X
Cyanide	X		
Tritium			M
Strontium-90			M
Gross alpha			M
Gross beta			M
Total dissolved solids			X
Total organic carbon			X
Total suspended solids			X
Specific conductivity		M	

[1] Parameters required by the current conditions of the Final Delisting, 40 CFR 261, Appendix IX, Table 2 (EPA 1995).

[2] Parameters required by the current conditions of the State Waste Discharge Permit, No. ST 4500 (Ecology 1995a).

[3] Metals reported as total concentrations.

[4] Although the Final Delisting lists "ammonium" (NH_4^+), the standard analytical methods measure ammonia (NH_3). Ammonia is assumed to be the contaminant of concern.

X Rationale for measuring this parameter in treated effluent.

M Monitor only; no limit defined.

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6.0 EFFLUENT TREATMENT FACILITY SECONDARY WASTE SAMPLING AND ANALYSIS

The wastes discussed in this section are managed in the container storage areas of the ETF and include the secondary wastes generated by the ETF processes. This section describes the characterization of the following secondary waste streams generated within the ETF:

- Dry powder waste generated from the treatment process
- Waste generated by operations and maintenance activities
- Miscellaneous waste generated within the ETF.

For each waste stream, the waste is described, a characterization methodology and rationale are provided, and sampling requirements are addressed.

6.1 DRY POWDER WASTE

A dry powder waste is generated from the secondary treatment train, from the treatment of an aqueous waste. Waste is received in the secondary treatment train in waste receiving tanks where it fed into an evaporator. Concentrate waste from the evaporator is then fed to a concentrate tank. From these tanks, the waste is fed to a thin film dryer and dried into a powder, and collected into containers. The containers are filled via a remotely controlled system. The condensed overheads from the evaporator and thin film dryer are returned to the surge tank to be fed to the primary treatment train.

The secondary treatment system typically receives and processes the following by-products generated from the primary treatment train:

- Concentrate from the first RO stage
- Backwash from the rough and fine filters
- Regeneration waste from the ion exchange system
- Spillage or overflow collected in the process sumps.

In an alternate operating scenario, some aqueous wastes may be fed to the secondary treatment train before the primary treatment train. A more complete description of these processes can be found in Chapter 4.0 of the dangerous waste permit application for LERF and ETF (DOE/RL-97-03).

6.1.1 Rationale for Selection of Parameters for Analysis

Because of radiological and chemical exposure concerns associated with handling the dry powder waste, this waste stream is sampled from the concentrate tanks while in a slurry form and before the waste enters the thin film dryer. Additionally, because the concentrate tank contents are recirculated, a sample from the concentrate tanks is more representative of the secondary waste generated from treating an aqueous waste than a sample of dry powder from a drum.

Each sample will undergo a total solids analysis. The values from these analyses will be used to report the concentrations of other parameters on a dry weight basis. The dry weight concentration will provide a conservative representation of the concentration of the powder after the thin film dryer. The parameters for analysis of the concentrate tank waste (i.e., dry powder) and the rationale for selection are provided in Table 6-1. The specific analytical methods for these analyses are provided in Appendix B.

Parameters for analysis of the concentrate tank waste are selected to properly designate and determine if the dry powder waste meets LDR treatment standards. The data from the analysis of the powder waste are transmitted to the receiving TSD unit, as required for any LDR notifications and final documentation (see Section 6.1.4 for LDR discussion). Process knowledge and analytical data, from the initial characterization of an aqueous waste, also could be used to designate the dry waste powder.

The dry powder waste is anticipated to consist primarily of sulfate salts, radionuclides, and minor amounts of metals. VOCs and SVOCs are not expected. The F001 through F005 listed waste numbers apply to dry powder waste that is derived from the treatment of PC, a mixture of PC, or any dangerous waste with these listed waste numbers. In the case where the powder waste is listed, the waste is sampled for the listed waste constituents to confirm that the powder meets applicable LDR treatment standards.

Sampling and analyzing the concentrate tank waste to represent the dry powder waste is a conservative approach. In fact, in some instances this approach may over-estimate the concentrations of a constituent in the powder waste. Therefore, in those instances where the analytical results from the concentrate tank waste indicate that the dry powder waste exceeds an LDR treatment standard or that the powder would designate as a characteristic waste, the actual dry powder waste will be sampled and analyzed. In this situation, the data from the actual powder will be used for the designation and LDR determinations.

6.1.2 Sampling Methods

Concentrate tank waste samples are collected from recirculation lines, which provide mixing in the tank during pH adjustment and prevent caking. The protocol for concentrate tank sampling prescribes opening a sample port in the recirculation line to collect samples directly into sample containers. The sample port line is flushed before collecting a grab sample. The VOC sampling is performed first. Each VOC sample container will be filled such that cavitation at the sample valve is minimized and the container has no head space. The SVOC sample containers will be filled next followed by containers for the remainder of the analytes.

The dry powder will be sampled from containers using the principles presented in SW-846 (EPA 1986) and ASTM Methods (American Society for Testing Materials) D245-75, as referenced in WAC 173-303-110(2). The sample container requirements, sample preservation requirements, and maximum holding times for each of the parameters analyzed in either matrix are presented in Appendix B.

6.1.3 Sampling Frequency

On initiation of treatment of an aqueous waste(s), concentrate tank waste from the first three concentrate tanks or equivalent volume (i.e., 15,000 gallons of concentrate) will be sampled and analyzed for the parameters identified in Table 6-1. These samples and analytical results will be used to represent the powder waste generated from the treatment of that aqueous wastes(s). The concentrate tanks will be re-sampled in the following situations:

- The LERF and the ETF management has been notified, or has reason to believe that the process generating the waste has changed (for example, a change in the source such as a change in the well-head for groundwater)
- The LERF and the ETF management notes an increase or decrease in the concentration of a constituent in an aqueous waste stream, beyond the range of concentrations that was described or predicted in the waste characterization.

As indicated in Section 6.1.1, when the analytical results from the concentrate tank waste indicate that the dry powder waste exceeds an LDR treatment standard or that the powder would designate as a characteristic waste, the actual dry powder waste will be sampled and analyzed. In this case, the data from the actual powder will be used for the designation and LDR determinations.

6.1.4 Special Requirements Pertaining to Land Disposal Restrictions

Containers of the dry powder waste are transferred to a storage or final disposal unit, as appropriate (e.g., the Central Waste Complex or to the Environmental Restoration Disposal Facility). The ETF personnel provide the analytical characterization data and necessary process knowledge for the waste to be tracked by the receiving staff, and for the appropriate LDR documentation.

The following information on the dry powder waste is included on the LDR notification provided to the receiving unit:

- Dangerous waste numbers (as applicable)
- The corresponding treatment standards set forth in 40 CFR 268 (WAC 173-303-140) and all applicable constituents listed in 40 CFR 268.48 that is reasonably expected to be in the waste
- The waste tracking information associated with the transfer of waste
- Waste analysis results.

6.2 OPERATIONS AND MAINTENANCE WASTE GENERATED AT THE 200 AREA EFFLUENT TREATMENT FACILITY

Operation and maintenance of process and ancillary equipment generates additional routine waste. These waste materials are segregated to ensure proper handling and disposition, and to minimize the commingling of potentially dangerous waste with nondangerous waste. The following waste streams are anticipated to be generated during routine operation and maintenance of the ETF. This waste might or might not be dangerous waste, depending on the nature of the material and its exposure to a dangerous waste.

- Spent lubricating oils and paint waste from pumps, the dryer rotor, compressors, blowers, and general maintenance activities

- Spent filter media from coarse and fine filters

- Spent ion exchange resin

- HEPA filters

- UV light tubes

- RO membranes

- Equipment that cannot be returned to service

- Other miscellaneous waste that might contact a dangerous waste (e.g., plastic sheeting, glass, rags, paper, waste solvent or aerosol cans).

These waste streams are stored at the ETF before being transferred for final treatment, storage, or disposal as appropriate. This waste is characterized and designated using process knowledge (from previously determined influent aqueous waste composition information); analytical data; and material safety data sheets (MSDS) of the chemical products present in the waste or used (these data sheets are maintained at the ETF). Sampling of these waste streams is not anticipated; however, if an unidentified or unlabeled waste is discovered, that waste is sampled. This 'unknown' waste is sampled and analyzed for the parameters in Table 6-1 as appropriate, and will be designated according to Washington state regulatory requirements. The specific analytical methods for these analyses are provided in Appendix B.

6.3 OTHER WASTE GENERATED AT THE 200 AREA EFFLUENT TREATMENT FACILITY

There are two other potential sources of waste at the ETF: spills and/or overflows, and discarded chemical products. Spilled material that potentially might be dangerous waste generally is routed to the ETF sumps where the material is transferred to either the surge tank for treatment or to the secondary treatment train. A spilled material also could be containerized and transferred to another TSD unit. In most cases, process knowledge and the use of MSDSs is sufficient to designate the waste material. If the source of the spilled material is unknown and the material cannot be routed to the ETF sumps, a sample of the waste is collected and analyzed according to Table 6-1, as necessary, for appropriate characterization of the waste. Unknown wastes will be designated according to Washington state regulatory requirements. The specific analytical methods for these analyses are provided in Appendix B.

A discarded chemical product waste stream could be generated if process chemicals, cleaning agents, or maintenance products become contaminated or are otherwise rendered unusable. In all cases, these materials are appropriately containerized and designated. Sampling is performed, as appropriate, to determine the radioactivity of a waste or if required for waste designation.

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Table 6-1. 200 Area Effluent Treatment Facility Powder, Concentrate Tank, Maintenance and Operations, and Unknown Waste Sampling.

Parameter[1]	Rationale
Total Solids[2]	• Calculate dry weight concentrations
Volatile organic compounds	• LDR - verify treatment standards
Semivolatile organic compounds	• LDR - verify treatment standards
Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver)	• Waste designation • LDR - verify treatment standards
Nitrate	• Address receiving TSD waste acceptance requirements
pH	• Waste designation

[1] For concentrate tank samples, the total sample (solid plus liquid) is analyzed and the projected dry weight compared to the Toxicity Characteristic (TC) constituent limits (WAC 173-303-090(8)). If the TC limit is met or exceeded, the waste is designated accordingly. All measured parameters are compared against the corresponding treatment standards.

[2] Total solids is not determined for unknown waste samples and is only analyzed in maintenance waste samples, as appropriate (e.g., percent water is not required for such routine maintenance waste as aerosol cans, fluorescent tubes, waste oils, batteries, etc.).

LDR = land disposal restrictions.

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7.0 QUALITY ASSURANCE/QUALITY CONTROL

The following quality assurance/quality control (QA/QC) information for the ETF and LERF is provided as required by WAC 173-303-810(6). The sampling and analysis activities at the ETF and LERF conform to the requirements of a ETF/LERF-specific quality assurance project plan and are in accordance with the following EPA guidance documents:

- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Third Edition, as amended, U.S. Environmental Protection Agency, Washington, DC, July 1992, as referenced in WAC 173-303-110.
- *Methods for Chemical Analysis of Water and Wastes*, EPA-600/4-7-020, U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio, March 1993.

7.1 SAMPLING PROGRAM

Typically generators are responsible for the sampling and analysis of an influent aqueous. However, samples of influent aqueous waste can be collected at the LERF or the Load-In Station. Samples of treated effluent are collected at the verification tanks. The dry powder waste is typically sampled from the concentrate tanks while in a slurry form. Sampling of influent aqueous waste, treated effluent, and secondary waste is discussed in Sections 4.0, 5.0, and 6.0, respectively, of the WAP.

Specific information on sample holding times, preservatives, and sample containers is provided in Appendix B. The selection of the sample collection device depends on the type of sample, the sample container, the sampling location and the nature and distribution of the waste components. In general, the methodologies used for specific materials correspond to those referenced to WAC 173-303-110(2). The selection and use of the sampling device is supervised or performed by a person thoroughly familiar with the sampling requirements. Samples are collected according to ETF/LERF-specific sampling protocol.

Sampling equipment is constructed of nonreactive materials such as glass, PVC plastic, aluminum, or stainless steel, as indicated by the nature and matrix of the waste. Care is taken in the selection of the sampling device to prevent contamination of the sample and to ensure compatibility of materials. For example, plastic bottles are not used to collect some organic wastes.

7.2 ANALYTICAL PROGRAM

The onsite laboratory employed by the ETF and LERF organization is required to have a program of quality control practices and procedures to ensure that precision and accuracy are maintained. The quality control program of the onsite analytical laboratory is based on the Hanford Site analytical services quality assurance/quality control requirements. Offsite

7.2 ANALYTICAL PROGRAM

The onsite laboratory employed by the ETF and LERF organization is required to have a program of quality control practices and procedures to ensure that precision and accuracy are maintained. The quality control/quality assurance program of the onsite analytical laboratory is based on the Hanford Site analytical services quality assurance/quality control requirements. Offsite laboratories employed by the ETF and LERF must meet the same QA/QC requirements as onsite laboratories and must demonstrate quality control practices that are comparable to the onsite laboratory's program. A review of an offsite laboratory may be conducted to ensure that the quality control of ETF and LERF data is maintained. The SW-846 analytical methods are followed (as indicated in Appendix B). However, other methods may be substituted for a parameter if the PQL can be met.

The chemical parameters and associated analytical methods identified in Appendix B are used to characterize an influent aqueous waste, effluent waste, and ETF secondary waste. The analytical data on these parameters are also used to establish that key decision limits pertinent to proper waste management are met. These key decision limits are numerical thresholds which include:

- liner compatibility limits for an influent aqueous waste as managed in LERF (may include blending a waste with other wastes to meet these limits)

- the LDR status of the ETF secondary waste

- delisting limits for treated effluent.

Where analytical data are used in key decision making, the PQL of an analytical parameter (or sum of the PQLs, as indicated by the decision) must be at or below the key decision limit.

Good laboratory practices which encompass sampling, sample handling, housekeeping and safety are maintained at all laboratories. The following section describe the specific practices which are implemented at the onsite laboratory to maintain the precision and accuracy goal of ± 20 percent for quality control samples which include method blank, quality control check, matrix spike, and duplicate samples.

The decision to re-analyze if the stated precision and accuracy goals are not met will depend on the use of the analytical results. Generally, only analytical results used in key decisions would require re-analysis if precision and accuracy goals were not met. For example, if the precision and accuracy goals are not met in a liner compatibility analysis, the sample would generally be re-analyzed if the results were close to a compatibility limit. However, if the analytical results suggested that concentrations were an order of magnitude below a liner compatibility limit, generally re-analysis would not be required. The decision to re-analyze a waste in a key decision situation will be made on a case-by-case basis.

7.2.1 Contamination Evaluation

Method blank samples are prepared with each batch of samples (at least 1 in batch of 20) and analyzed to ensure sample contamination has not occurred.

7.2.2 Quality Control Check Sample

A quality control check sample is analyzed with each batch (at least 1 in batch of 20) for each analytical parameter determined. The results show that analytical procedures are properly performed and that calibration and standardization of instrumentation are within acceptable limits per the method.

7.2.3 Matrix Spike Analyses

Matrix spike samples are employed to monitor recoveries and demonstrate accuracy. Matrix spike samples are periodically analyzed to provide information about the effect of the sample matrix on the analyte in question. Typically a ratio of one spike for each analytical batch of samples, or 1 in 20, is maintained.

7.2.4 Duplicate Analyses

A laboratory sample duplicate or a matrix spike duplicate is analyzed to assess analytical precision in the laboratory. Typically, a ratio of one duplicate sample for each analytical batch of samples, or 1 in 20, is maintained.

7.3 CONCLUSION

The aforementioned sampling and analytical quality practices help ensure that the data obtained are precise and accurate for the waste stream being sampled. The analytical results are used by ETF and LERF management to decide whether or not to accept a particular waste stream and, upon acceptance, to determine the appropriate method of treatment, storage, and disposal. Results are also important to ensure that wastes are managed properly by the ETF and LERF and that incompatible wastes are not inadvertently combined. Just as these results are important, so is the quality of these results. Thus, the quality of the analytical data, the thoroughness and care with which the sampling and analyses are performed and reported, provides an important basis for day-to-day operational decisions.

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8.0 REFERENCES

DOE/RL-92-72, *200 Area Effluent Treatment Facility Delisting Petition*, Revision 1, 1993, U.S. Department of Energy-Richland Operations Office, Richland, Washington.

DOE/RL-97-03, *Hanford Facility Dangerous Waste Permit Application, Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Ecology, 1994, *Dangerous Waste Portion of the Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste*, Number WA7890008967, (Revision 3, December 1996), Washington State Department of Ecology, Olympia, Washington.

Ecology, 1995a, State Waste Discharge Permit No. ST 4500, as amended, for 200 Area Effluent Treatment Facility, Hanford Facility, Washington State Department of Ecology, Olympia, Washington, June 26, 1995.

Ecology, 1995b, "Listed Waste from Hanford Laboratories", letter from M. Wilson, Washington State Department of Ecology, to J. Rasmussen, U.S. Department of Energy, Richland Operations Office, March 7, 1995.

Ecology, 1996a, *Dangerous Waste Permit Application Permit Requirements*, #95-402, June 1996, Washington State Department of Ecology, Olympia, Washington.

Ecology, 1996b, "The Washington State Department of Ecology (Ecology) Regulatory Interpretation of the Liquid Effluent Retention Facility (LERF) Land Disposal Restriction Exemption", letter from Washington State Department of Ecology to T. Teynor, U.S. Department of Energy and A. DiLiberto, Westinghouse Hanford Company, September 9, 1996.

EPA, 1986, *Test Methods for Evaluating Solid Waste Physical/Chemical Methods, SW-846* (Third Edition, November 1986, as amended), U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

EPA, 1994, "Liquid Effluent Retention Facility (LERF) Land Disposal Restrictions Treatment Exemption - Regulatory Interpretation EPA/Ecology ID No: WA7890008967", letter from U.S. Environmental Protection Agency, Region 10 to J. Hennig, U.S. Department of Energy, December 6, 1994.

EPA, 1995, Final Delisting [Exclusion], issued to U.S. Department of Energy, 40 CFR 261, Appendix IX, Table 2 (60 FR 31115, June 13, 1995), U.S. Environmental Protection Agency, Washington, D.C.

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APPENDICES

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APPENDIX A

TYPICAL AQUEOUS WASTE PROFILE SHEET

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200 AREA LIQUID WASTE PROCESSING
AQUEOUS PROFILE SHEET

(Please carefully read the instructions before completing this form)

I. GENERATOR INFORMATION

Generating Facility/Location: ____________________

Facility Manager: ____________________

Technical Contact/Phone: ____________________

Environmental Compliance Officer/Phone: ____________________

DOE Point of Contact: ____________________

II. GENERAL WASTE INFORMATION

1. Description of Process Generating Aqueous Waste: ____________________

____

____

2. Is the aqueous from a CERCLA or state mandated cleanup? Yes____ No ____

Describe Cleanup Activity: ____________________

3. A. Is this a dangerous or hazardous waste (40 CFR Part 261 or WAC 173-303-070)? Yes____ No ____.

B. If yes, identify ALL hazardous/dangerous listed and characteristic waste code numbers (D,F,K,P,U): ____________________

____

C. State Waste Codes____________________. Explain designation for State waste codes: ____________________

____

III. SHIPPING/TRANSPORTATION INFORMATION

A. CONTAINMENT/PACKAGING: Bulk Liquid ___ Total Volume: __________Drum___ Number: _____Total Volume: ___________

Other ____________________

B. SHIPPING FREQUENCY: Units ______ Per: ___Month ___Qtr. __Year ___

One Time ___ Other ____________________

C. TRANSPORTATION:

1. Is this a DOT Hazardous Material? Yes____ No ____

2. Proper Shipping Name: ____________________

3. Hazard Class: ____________________

4. CERCLA Reportable Quantity (RQ) and unit (as applicable): ____________________

5. Transportation Method (e.g., direct pipeline, tanker): ____________________

GENERATOR'S CERTIFICATION

I hereby certify that all information submitted in this and all attached documents contains true and accurate descriptions of this waste. Any sample submitted is representative as defined in 40 CFR 261-Appendix 1 or by using an equivalent method. All relevant information regarding known or suspected hazards in the possession of the generator has been disclosed.

____________________ Signature

____________________ Printed (or typed) name and title

__________ Date

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APPENDIX B

ANALYTICAL METHODS, SAMPLE CONTAINERS, PRESERVATIVE METHODS, AND HOLDING TIMES

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Table B-1. Sample and Analysis Criteria for Influent Aqueous Waste and Treated Effluent. (sheet 1 of 6)

Parameter	Analytical method[a]	Method PQL[b]	Accuracy/Precision for Method[e] (percent)	Sample container[c]/ Preservative[c]/ Holding time[d]
VOLATILE ORGANIC COMPOUNDS				
Acetone	8260A	40	50-100	<u>Sample container</u> 2 x 40-mL amber glass with septum [f] <u>Preservative</u> 1:1 HCl to pH<2; 4°C [i] <u>Holding time</u> 14 days
Benzene		5	40-150	
1-Butyl alcohol (1-Butanol)		500	40-150	
Carbon tetrachloride		5	65-130	
Chlorobenzene		5	40-150	
Chloroform		5	50-130	
1,2-Dichloroethane		5	50-150	
1,2-Dichloroethene		5	50-150	
1,1-Dichloroethylene		5	60-130	
2-Hexanone		50	60-130	
Methylene chloride[f]		5	50-150	
Methyl ethyl ketone (2-Butanone)		100	65-130	
Methyl isobutyl ketone (Hexone, 4-Methyl-2-pentanone)		50	50-160	
2-Pentanone		10	50-160	
Tetrachloroethylene		5	65-140	
Tetrahydrofuran		100	47-150	
Toluene		5	50-160	
1,1,1-Trichloroethane		5	50-150	
1,1,2-Trichloroethane		5	50-150	
Trichloroethylene		5	70-155	
Xylene		5	50-150	
Vinyl chloride		10	40-130	

Table B-1. Sample and Analysis Criteria for Influent Aqueous Waste and Treated Effluent.
(sheet 2 of 6)

Parameter	Analytical method[a]	Method PQL[b]	Accuracy/Precision for Method[*] (percent)	Sample container[c]/ Preservative[c]/ Holding time[d]
SEMIVOLATILE ORGANIC COMPOUNDS				
Acetophenone	8270B	10	70-110	**Sample container** 4 x 1-liter amber glass **Preservative** 4°C **Holding time** 7 days for extraction; 40 days for analysis after extraction
Benzyl alcohol		20	70-120	
2-Butoxyethanol		1000	65-105	
Cresol (o, p, m)		10	55-115	
1,4-Dichlorobenzene		10	45-95	
Dimethylnitrosamine		10	50-120	
2,4-Dinitrotoluene		10	65-100	
Di-n-octyl phthalate		10	70-130	
Hexachloroethane		10	50-110	
Naphthalene		10	60-120	
Tributyl phosphate		100	75-125	

Table B-1. Sample and Analysis Criteria for Influent Aqueous Waste and Treated Effluent.
(sheet 3 of 6)

Parameter	Analytical method[a]	Method PQL[b]	Accuracy/Precision for Method[k] (percent)	Sample container[c]/ Preservative[c]/ Holding time[d]
TOTAL METALS				
Aluminum	6010A/EPA-600 200.7	450	75 - 125	Sample container 1 x 0.5-liter plastic/glass Preservative 1:1 HNO_3 to pH<2 Holding time 180 days; mercury 28 days
Antimony	EPA-600 200.8	30	75 - 125	
Arsenic	EPA-600 200.8	15	75 - 125	
Barium	6010A/EPA-600 200.7	20	75 - 125	
Beryllium	6010A/EPA-600 200.7	40	75 - 125	
Cadmium	EPA-600 200.8	5	75 - 125	
Calcium	6010A/EPA-600 200.7	100	75 - 125	
Chromium	7191/EPA-600 200.8	20	75 - 125	
Copper	6010A/EPA-600 200.7	70	75 - 125	
Iron	6010A/EPA-600 200.7	100	75 - 125	
Lead	EPA-600 200.8	10	75 - 125	
Magnesium	6010A/EPA-600 200.7	300	75 - 125	
Manganese	6010A/EPA-600 200.7	50	75 - 125	
Mercury	EPA 245.1/EPA-600 200.8	2	75 - 125	
Nickel	6010A/EPA-600 200.7	75	75 - 125	
Potassium	6010A/EPA-600 200.7	10,000	75 - 125	
Selenium	EPA-600 200.8	20	75 - 125	
Silicon	6010A/EPA-600 200.7	580	75 - 125	
Silver	6010A/EPA-600 200.7	70	75 - 125	
Sodium	6010A/EPA-600 200.7	290	75 - 125	
Uranium	EPA-600 200.8	5	75 - 125	
Vanadium	6010A/EPA-600 200.7	80	75 - 125	
Zinc	6010A/EPA-600 200.7	20	75 - 125	

Table B-1. Sample and Analysis Criteria for Influent Aqueous Waste and Treated Effluent. (sheet 4 of 6)

	Parameter	Analytical method[a]	Method PQL[b]	Accuracy/Precision for Method[f] (percent)	Sample container[c]/ Preservative[c]/ Holding time[d]
1	GENERAL CHEMISTRY				
2	Bromide	EPA-600 300.0	2000	75 - 125	Sample container 1 x 1-liter glass Preservative 4°C Holding time 28 days
3	Chloride		1000	75 - 125	
4	Fluoride		500	75 - 125	
5	Formate[i]		1250	75 - 125	
6	Nitrate		100	75 - 125	
7	Nitrite		100	75 - 125	
8	Sulfate		10,000	75 - 125	
9	Phosphate		1500	75 - 125	
10	Ammonia[e]	EPA-600 350.3/350.1	40	75 - 125	Sample container 250 mL glass Preservative H_2SO_4 to pH<2; 4°C Holding time 28 days
11	Total Kjeldahl nitrogen	EPA-600 351.2	600	75 - 125	
12	Cyanide	9010A/ EPA-600 335.3	100	75 - 125	Sample container 500 mL polyethylene Preservative 6M NaOH to pH>12; 4°C Holding time 14 days
13	Total dissolved solids	EPA-600 160.1	RL 10,000	75 - 125	Sample container 1 L glass Preservative None Holding time 7 days for pH - as soon as practical
14	Total suspended solids	EPA-600 160.2	RL 4,000	75 - 125	
15	Specific conductivity	EPA-600 120.1 (in lab)	RL 10[g]	75 - 125	
16	pH[h]	EPA-600 150.1/9040	RL +/- 0.1	75 - 125	
17	Total organic carbon	9060A	RL 1,000	75 - 125	Sample container 250 mL glass Preservative HCl or H_2SO_4 to pH<2; 4°C Holding time 28 days

Table B-1. Sample and Analysis Criteria for Influent Aqueous Waste and Treated Effluent.
(sheet 5 of 6)

Parameter	Analytical method[a]	Method PQL[b]	Accuracy/Precision for Method[k] (percent)	Sample container[c]/ Preservative[c]/ Holding time[d]
RADIONUCLIDES[j]				
Gross alpha	Laboratory specific	3 pCi/L	NA	<u>Sample container</u> 4 x 1-L glass <u>Preservative</u> HNO3 to pH < 2 <u>Holding time</u> 180 days
Gross beta	Laboratory specific	4 pCi/L	NA	
Americium-241	Laboratory specific	NA	NA	
Antimony-125	Laboratory specific	NA	NA	
Cerium-144	Laboratory specific	NA	NA	
Cesium-134	Laboratory specific	NA	NA	
Cesium-137	Laboratory specific	NA	NA	
Cobalt-60	Laboratory specific	NA	NA	
Curium-242	Laboratory specific	NA	NA	
Curium-244	Laboratory specific	NA	NA	
Europium-152	Laboratory specific	NA	NA	
Europium-154	Laboratory specific	NA	NA	
Europium-155	Laboratory specific	NA	NA	
Neptunium-237	Laboratory specific	NA	NA	
Niobium-94	Laboratory specific	NA	NA	
Plutonium-238	Laboratory specific	NA	NA	
Plutonium-239/240	Laboratory specific	NA	NA	
Radium-226	Laboratory specific	NA	NA	
Ruthenium-103	Laboratory specific	NA	NA	
Ruthenium-106	Laboratory specific	NA	NA	
Strontium-90	Laboratory specific	5 pCi/L	NA	
Tin-113	Laboratory specific	NA	NA	
Zinc-65	Laboratory specific	NA	NA	

Table B-1. Sample and Analysis Criteria for Influent Aqueous Waste and Treated Effluent. (sheet 6 of 6)

Parameter	Analytical method[a]	Method PQL[b]	Accuracy/Precision for Method[k] (percent)	Sample container[c]/ Preservative[c]/ Holding time[d]
Carbon-14	Laboratory specific	NA	NA	Sample container 1 x 1-L glass Preservative No preservative added Holding time 180 days
Iodine-129	Laboratory specific	NA	NA	
Technicium-99	Laboratory specific	NA	NA	
Tritium	Laboratory specific	460 pCi/L	NA	

[a] SW-846 methods are presented unless otherwise noted. Other methods might be substituted if the applicable PQL can be met.
[b] PQL is determined from method detection level (MDL), where PQL = 10 x MDL (for reagent-grade water); however, PQL is affected by sample matrix. PQL units are parts per billion unless otherwise noted.
[c] Sample volumes and preservatives may be adjusted per laboratory directions.
[d] Holding time = time between sampling and analysis.
[e] Although the Final Delisting lists "ammonium" (NH_4^+), the standard analytical methods measure ammonia (NH_3). Ammonia is assumed to be the contaminant of concern.
[f] Methylene chloride is not analyzed for treated effluent sampling.
[g] Conductivity reported in micromhos per centimeter
[h] pH monitored in influent aqueous waste only.
[i] Analysis for formate only required if detected in the influent aqueous waste.
[j] PQLs provided for those radionuclides which are monitored as part of the Discharge Permit.
[k] Accuracy/precision used to confirm or re-establish MDL.
[l] VOA refrigerated composite sampler with syringe requires no chemical preservative.

mL = milliliter.
RL = reporting limit.
pCi/L = picocuries per liter.
PQL = practical quantitation limit
NA = not applicable.
ND = not determined.
MDL = method detection level.

Table B-2. Sample Containers, Preservative Methods, and Holding Times for ETF Powder, Concentrate Tank, Maintenance and Operations, and Unknown Waste.

Parameter	Analytical Method[a]	PQL[b]	Accuracy/Precision for Method[c] (percent)	Container[d]	Preservative[e]	Holding time[f]
Total Solids	EPA-600 160.3	10,000	75 - 125	1-liter glass	None	180 days
pH	WAC 173-303-110 (3)(a)(ii)[g]/ EPA-600 150.1/9040	±0.1				as soon as practical
Nitrate	EPA-600 300.0/9056	see Table B-1				28 days
Volatile organic compounds (combined method target compound lists)	8240 or 8260A	see Table B-1	See Table B-1	2-40 ml amber glass W/septum	None	7 days
Semivolatile organic compounds (method target compound list)	8270B	see Table B-1	See Table B-1	4-1,000 ml amber glass	None	Extract within 7 days; analyze extract within 40 days
Mercury	EPA-600 200.8, 245.1/6020	see Table B-1	75 - 125	500 ml plastic/glass	None	Mercury 28 days; 6 months all others
Selenium	EPA-600 200.8/6020	see Table B-1				
Arsenic	EPA-600 200.8/6020	see Table B-1				
Cadmium	EPA-600 200.8/6020	see Table B-1				
Total metals (method target list)	EPA-600 200.8 6020/6010A/7000 Series	see Table B-1				
Toxicity Characteristic Leaching Procedure[h]	1311	NA	NA	NA	NA	NA

[a] SW-846 methods are presented unless otherwise noted. Other methods might be substituted if the applicable PQL can be met.

[b] PQL is determined from method detection level (MDL), where PQL = 10 x MDL (may vary depending on matrix). PQL units are parts per billion unless otherwise noted.

[c] Precision/accuracy used to confirm or re-establish MDL.

[d] Container size and type could be changed as directed by the laboratory, or as required by the analytical method.

[e] No preservatives are added to containers due to the anticipated high concentrations of salts.

[f] Holding time = time between sampling and analysis.

[g] For solid waste.

[h] Extraction procedure, as applicable; extract analyzed by referenced methods [WAC 173-303-110(3)(c)].

PQL = practical quantitation limit
MDL = method detection level
mL = milliliter.

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APPENDIX 4A

DETAILED DRAWINGS FOR THE LIQUID EFFLUENT RETENTION FACILITY

Drawings of the containment systems at the LERF are summarized in Table 4A-1. Because the failure of these containment systems at LERF could lead to the release of dangerous waste into the environment, Engineering Change Notices (ECNs) which affect these containment systems will be submitted to the Washington State Department of Ecology, as a Class 1, 2, or 3 permit modification, as required by WAC 173-303-830.

Table 4A-1. Liquid Effluent Retention Facility Containment System.

LERF System	Drawing Number	Outstanding ECNs	Drawing Title
Bottom Liner	H-2-79590, Rev. 3	None	Civil Plan, Sections and Details; Cell Basin Bottom Liner (Sheet 1)
Top Liner	H-2-79591, Rev. 3	None	Civil Plan, Sections and Details; Cell Basin Bottom Liner (Sheet 1)
Catch Basin	H-2-79593, Rev. 4	None	Civil Plan, Section and Details; Catch Basin (Sheet 1)

P&ID - piping and instrumentation diagram.

The drawings identified in Table 4A-2 illustrate the piping and instrumentation configuration within LERF, and of the transfer piping systems between the LERF and the 242-A Evaporator. These drawings are provided for general information and to demonstrate the adequacy of the design of the LERF as a surface impoundment. An update to these drawings and drawings identified in Table 4A-1 will be provided annually to the Washington State Department of Ecology.

Table 4A-2. Liquid Effluent Retention Facility Piping and Instrumentation.

LERF System	Drawing Number	Outstanding ECNs	Drawing Title
Transfer Piping to 242-A Evaporator	H-2-79604, Rev. 2	None	Piping Plot and Key Plans; 242-A Evaporator Condensate Stream (Sheet 1)
LERF Piping and Instrumentation	H-2-88766, Rev. 1	None	P&ID; LERF Basin and ETF Influent (Sheet 1)
LERF Piping and Instrumentation	H-2-88766, Rev. 1	None	P&ID; LERF Basin and ETF Influent (Sheet 2)
LERF Piping and Instrumentation	H-2-88766, Rev. 1	ECN-632885	P&ID; LERF Basin and ETF Influent (Sheet 3)
LERF Piping and Instrumentation	H-2-88766, Rev. 2	None	P&ID; LERF Basin and ETF Influent (Sheet 4)
	H-2-89351, Rev. 3	None	Piping & Instrumentation Diagram - Legend

P&ID - piping and instrumentation diagram.

ENGINEERING CHANGE NOTICE

13 actual pages
Page 1 of 8

1. ECN 632885
Proj. ECN

2. ECN Category (mark one)
Supplemental [X]
Direct Revision []
Change ECN []
Temporary []
Standby []
Supersedure []
Cancel/Void []

3. Originator's Name, Organization, MSIN, and Telephone No.
Richard N. Kyle, ICF KH, S2-01, 373-4546

3a. USQ Required?
☒ Yes ~~[X]~~ No

4. Date
June 14, 1996

5. Project Title/No./Work Order No.
LERF Piping Header Modification/E50221

6. Bldg./Sys./Fac. No.
Catch Basin 242AL-43

7. Approval Designator
SQ

8. Document Numbers Changed by this ECN (includes sheet no. and rev.)
SEE BLOCK 12

9. Related ECN No(s).
~~632886~~, 632887
MAM ~~NA~~

10. Related PO No.
NA

11a. Modification Work
☒ Yes (fill out Blk. 11b)
[] No (NA Blks. 11b, 11c, 11d)

11b. Work Package No.
EL-96-00685

11c. Modification Work Complete
Cog. Engineer Signature & Date

11d. Restored to Original Condition (Temp. or Standby ECN only)
NA
Cog. Engineer Signature & Date

12. Description of Change
Base Line Doc. YES

DOCUMENTS CHANGED

H-2-79634, SH 1, REV 2
H-2-88737, SH 1, REV 1
H-2-88766, SH 3, REV 1
H-2-88770, SH 1, REV 1
H-2-88772, SH 1, REV 1
H-2-88773, SH 1, REV 1

********** SEE PAGES 3-8 FOR DESCRIPTION OF CHANGES **********

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

13b. Justification Details
Perform modifications to Catch Basin 43 piping at the LERF, as described in Letter No. E31025-002, "Study for Combination of LERF Options #2, #4, and #5 - Option #13", March 20, 1996. Reference LOI 86230-96-IGP-0002, April 3, 1996.

14. Distribution (include name, MSIN, and no. of copies)
*MA McLEAN, G3-17 (1)
RN Kyle, S2-01 (1)
EC Ocoma, R4-05 (1)
AD Hjellum S2-53 (1)
*Construction Doc Control S2-53 (1)
I.G. Papp S6-71 (2)
L. L. Lin S6-71
St. 15 E6-12

RELEASE STAMP
AUG 1 4 1996
DATE:
STA: 34
HANFORD RELEASE
ID. 73

A-7900-013-2 (11/94) GEF095

A-7900-013-1

ENGINEERING CHANGE NOTICE

Page 2 of 8

1. ECN (use no. from pg. 1)
632885

15. Design Verification Required
☒ Yes
☐ No

16. Cost Impact

ENGINEERING N/A

Additional ☐ $
Savings ☐ $

CONSTRUCTION

Additional ☐ $N/A
Savings ☐ $

17. Schedule Impact (days)

N/A

Improvement ☐
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 ☐
Functional Design Criteria ☐
Operating Specification ☐
Criticality Specification ☐
Conceptual Design Report ☐
Equipment Spec. ☐
Const. Spec. ☐
Procurement Spec. ☐
Vendor Information ☐
OM Manual ☐
FSAR/SAR ☐
Safety Equipment List ☐
Radiation Work Permit ☐
Environmental Impact Statement ☐
Environmental Report ☐
Environmental Permit ☐

Seismic/Stress Analysis ☐
Stress/Design Report ☐
Interface Control Drawing ☐
Calibration Procedure ☐
Installation Procedure ☐
Maintenance Procedure ☐
Engineering Procedure ☐
Operating Instruction ☐
Operating Procedure ☒
Operational Safety Requirement ☐
IEFD Drawing ☐
Cell Arrangement Drawing ☐
Essential Material Specification ☐
Fac. Proc. Samp. Schedule ☐
Inspection Plan ☐
Inventory Adjustment Request ☐

Tank Calibration Manual ☐
Health Physics Procedure ☐
Spares Multiple Unit Listing ☐
Test Procedures/Specification ☐
Component Index ☒
ASME Coded Item ☐
Human Factor Consideration ☐
Computer Software ☐
Electric Circuit Schedule ☐
ICRS Procedure ☐
Process Control Manual/Plan ☐
Process Flow Chart ☐
Purchase Requisition ☐
Tickler File ☐
☐
☐

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. Eng. J.S. Papp	7-16-96	PE Russ Dwight	8/14/96
Design Auth ~~Cog. Mgr.~~ (informal review)	7-16-96	QA NA	
QA WC Hackenberg for MJ WARN	7-31-96	Safety NA	
Safety H. C. Stone	7/29/96	Design Agent: MA McLean	7-10-96
Environ.		Environ. NA	
Other JM Garrido (INFORMAL REVIEW)	7/29/96	Other: DESIGN VERIFICATION:	
ETF COG Engineer			
PC&D KC DOLKA, KC Dolka. 51-43	13AUG96	Civil Kevin O	7-10-96
		DEPARTMENT OF ENERGY	
		Signature or a Control Number that tracks the Approval Signature	
		ADDITIONAL	

ENGINEERING CHANGE NOTICE CONTINUATION SHEET

Page 3 of 8

ECN 632885

Date 6/14/96

DESCRIPTION OF CHANGES

1. H-2-88770, SH 1, REV 1

Revise piping plan, add section L, and add notes as shown on page 4 of this ECN.

2. H-2-88772, SH 1, REV 1

Add pipe sections F, G, H, J, and K as shown on page 5 of this ECN.

3. H-2-88773, SH 1, REV 1

Revise pipe support schedules as shown on page 6 of this ECN.

4. H-2-79634, SH 1, REV 2

Revise pipe support schedule as shown on page 7 of this ECN.

5. H-2-88766, SH 3, REV 1

Revise P&ID as shown on page 8 of this ECN.

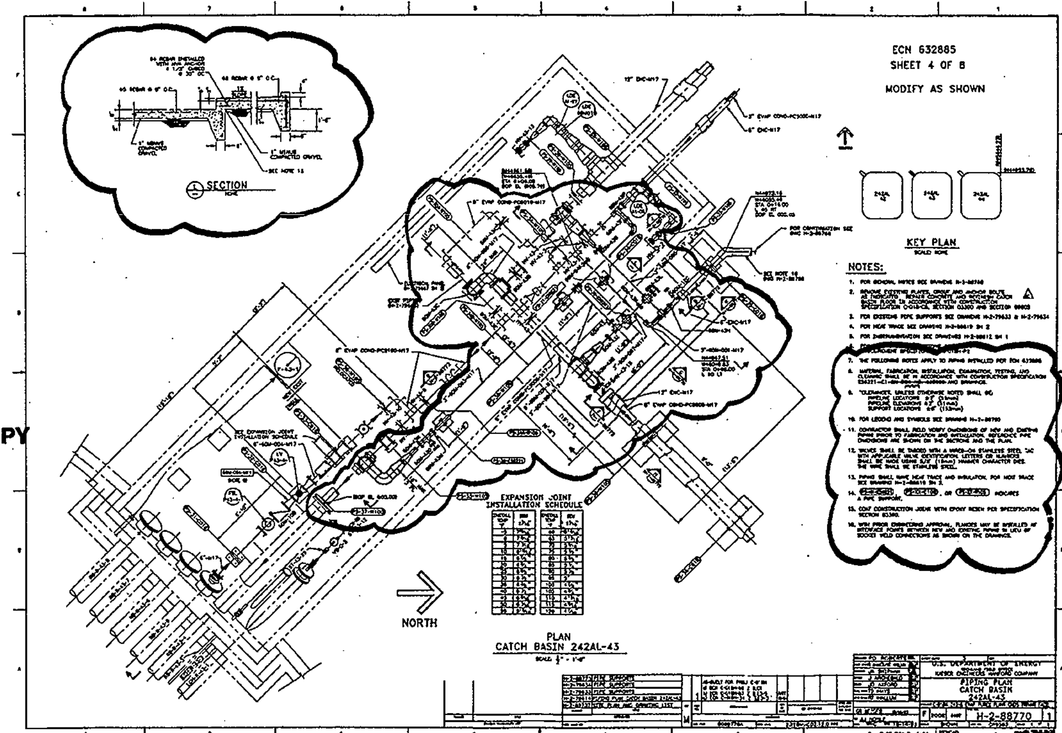
6. H-2-88737, SH 1, REV 1

At Zone A6, under CALCULATIONS, add:

E50221-M-1, PIPE STRESS ANALYSIS FOR LERF BASIN 242AL-43 PIPING MOD OPTION -- #13. THIS ANALYSIS SUPPLEMENTS SECTION 2 OF THE PIPING FLEXIBILITY ANALYSIS BY FIBERCAST COMPANY, SANDSPRINGS, OKLAHOMA, FOR BASIN 242AL-43 PIPING SYSTEM.

ECN 632885
SHEET 4 OF 8

MODIFY AS SHOWN



NOTES:

1. FOR GENERAL NOTES SEE DRAWING H-2-88768
2. REMOVE EXISTING PLATES, GROUT AND ANCHOR BOLTS AS INDICATED. REPAIR CONCRETE AND RESURFACE CATCH BASIN FLOOR IN ACCORDANCE WITH CONSTRUCTION SPECIFICATION C-018-C8, SECTION 03300 AND SECTION 09803
3. FOR EXISTING PIPE SUPPORTS SEE DRAWING H-2-79633 & H-2-79634
4. FOR HEAT TRACE SEE DRAWING H-2-88619 SH 2
5. FOR INSTRUMENTATION SEE DRAWING H-2-88612 SH 1
6. [illegible]
7. THE FOLLOWING NOTES APPLY TO PIPING INSTALLED PER ECN 632885
8. MATERIAL, FABRICATION, INSTALLATION, EXAMINATION, TESTING, AND CLEANING SHALL BE IN ACCORDANCE WITH CONSTRUCTION SPECIFICATION 224321-C1 AND DRAWINGS.
9. "TOLERANCES, UNLESS OTHERWISE NOTED SHALL BE:
   PIPELINE LOCATIONS ±2" (51mm)
   PIPELINE ELEVATIONS ±2" (51mm)
   SUPPORT LOCATIONS ±6" (152mm)
10. FOR LEGEND AND SYMBOLS SEE DRAWING H-2-88780
11. CONTRACTOR SHALL FIELD VERIFY DIMENSIONS OF NEW AND EXISTING PIPING PRIOR TO FABRICATION AND INSTALLATION. REFERENCE PIPE DIMENSIONS ARE SHOWN ON THE SECTIONS AND THE PLAN.
12. VALVES SHALL BE TAGGED WITH A WIRED-ON STAINLESS STEEL TAG WITH APPLICABLE VALVE IDENTIFICATION. LETTERS OR NUMBERS SHALL BE MADE USING 3/8" (10mm) HAMMER CHARACTER DIES. THE WIRE SHALL BE STAINLESS STEEL.
13. PIPING SHALL HAVE HEAT TRACE AND INSULATION. FOR HEAT TRACE SEE DRAWING H-2-88619 SH 2.
14. [illegible], [illegible], OR [illegible] INDICATES A PIPE SUPPORT.
15. COAT CONSTRUCTION JOINT WITH EPOXY RESIN PER SPECIFICATION SECTION 03300.
16. WITH PRIOR ENGINEERING APPROVAL, FLANGES MAY BE INSTALLED AT INTERFACE POINTS BETWEEN NEW AND EXISTING PIPING IN LIEU OF SOCKET WELD CONNECTIONS AS SHOWN ON THE DRAWINGS.

EXPANSION JOINT
INSTALLATION SCHEDULE

INSTALL TEMP °F	DIM	INSTALL TEMP °F	DIM
-5	[illegible]	60	[illegible]
0	[illegible]	65	[illegible]
5	[illegible]	70	[illegible]
10	[illegible]	75	[illegible]
15	[illegible]	80	[illegible]
20	[illegible]	85	[illegible]
25	[illegible]	90	[illegible]
30	[illegible]	95	3"
35	[illegible]	100	[illegible]
40	[illegible]	105	[illegible]
45	[illegible]	110	[illegible]
50	[illegible]	115	[illegible]
55	[illegible]	120	[illegible]

PLAN
CATCH BASIN 242AL-43
SCALE ½" = 1'-0"

U.S. DEPARTMENT OF ENERGY
KAISER ENGINEERS HANFORD COMPANY
PIPING PLAN
CATCH BASIN
242AL-43
F
H-2-88770
1

PLOT SCALE: 1-24

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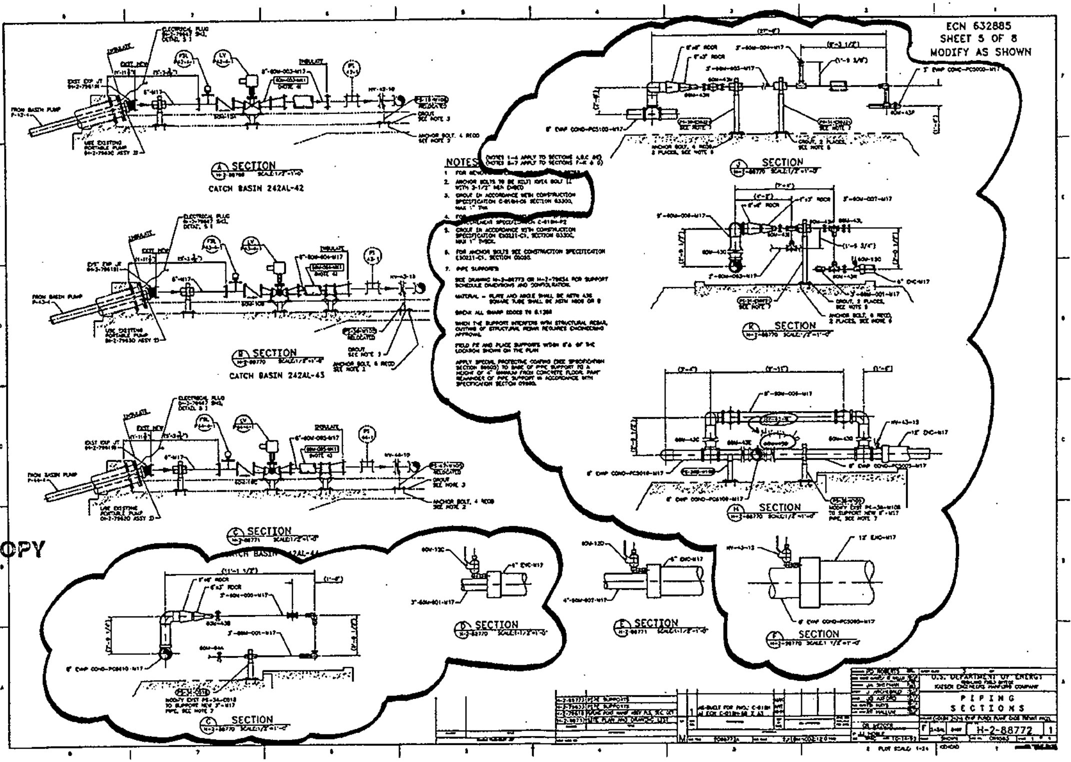
ECN 632885
SHEET 5 OF 8
MODIFY AS SHOWN



NOTES
(NOTES 1-4 APPLY TO SECTIONS A,B,C AND)
(NOTES 5-7 APPLY TO SECTIONS F-K & D)

1. FOR REMOV[illegible]
2. ANCHOR BOLTS TO BE HILTI KWIK BOLT II WITH 3-1/2" MIN EMBED
3. GROUT IN ACCORDANCE WITH CONSTRUCTION SPECIFICATION C-018H-C6 SECTION 03300, MAX 1" THK.
4. FOR [illegible] ACCORDANCE SPECIFICATION C-018H-P2
5. GROUT IN ACCORDANCE WITH CONSTRUCTION SPECIFICATION C30211-C1, SECTION 03300, MAX 1" THICK.
6. FOR ANCHOR BOLTS SEE CONSTRUCTION SPECIFICATION C30211-C1, SECTION 05050.
7. PIPE SUPPORTS

SEE DRAWING H-2-88773 OR H-2-79634 FOR SUPPORT SCHEDULE DIMENSIONS AND CONFIGURATION.

MATERIAL - PLATE AND ANGLE SHALL BE ASTM A36
SQUARE TUBE SHALL BE ASTM A500 OR B

BREAK ALL SHARP EDGES TO 0.12[illegible]

WHEN THE SUPPORT INTERFERES WITH STRUCTURAL REBAR, CUTTING OF STRUCTURAL REBAR REQUIRES ENGINEERING APPROVAL.

FIELD FIT AND PLACE SUPPORTS WITHIN 6"± OF THE LOCATION SHOWN ON THE PLAN

APPLY SPECIAL PROTECTIVE COATING (SEE SPECIFICATION SECTION 09900) TO BASE OF PIPE SUPPORT TO A HEIGHT OF 4" MINIMUM FROM CONCRETE FLOOR. PAINT REMAINDER OF PIPE SUPPORT IN ACCORDANCE WITH SPECIFICATION SECTION 09900.

H-2-88773	PIPE SUPPORTS
H-2-79633	PIPE SUPPORTS
H-2-79618	[illegible]
H-2-88771	SITE PLAN AND DRAWING LIST

1 AS-BUILT FOR PROJ. C-018H PER ECN C-018H-[illegible]

U.S. DEPARTMENT OF ENERGY
RICHLAND FIELD OFFICE
KAISER ENGINEERS HANFORD COMPANY

PIPING
SECTIONS

H-2-88772 1

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DWG H-2-88773

MODIFY AS SHOWN BELOW

ECN 632885
SHEET 6 OF 8

SUPPORT NO	LINE SIZE	A	B	C	D
PS-21-C018	6"	1'-1"	8"	8"	EXISTING CONCRETE BASE
PS-31-C018	6"	1'-1"	8"	8"	EXISTING CONCRETE BASE
PS-35-C018	6"	1'-1"	8"	8"	NEW CONCRETE BASE - SEE DET 2
PS-41-C018	6"	1'-1"	8"	8"	EXISTING CONCRETE BASE
PS-45-C018	8"	1'-4 7/8 "	10"	10"	NEW CONCRETE BASE - SEE DET 4
PS-46-C018	4"	10-3/8"	5-3/8"	5-3/8"	NEW CONCRETE BASE - SEE DET 4
PS-47-C018	4"	10-3/8"	5-3/8"	5-3/8"	NEW CONCRETE BASE - SEE DET 2
PS-48-C018	4"	10-3/8"	5-3/8"	5-3/8"	NEW CONCRETE BASE - SEE DET 5
PS-49-C018	4"	10-3/8"	5-3/8"	5-3/8"	NEW CONCRETE BASE - SEE DET 5
PS-34-C018	3"	9-5/16"	4-5/16"	4-5/16"	EXISTING CONCRETE BASE
PS-30-E50221	3"	9-5/16"	4-5/16"	4-5/16"	EXISTING CONCRETE BASE
PS-31-E50221	3"	9-5/16"	4-5/16"	4-5/16"	EXISTING CONCRETE BASE
PS-32-E50221	3"	9-5/16"	4-5/16"	4-5/16"	NEW CONCRETE BASE - SEE H-2-88770

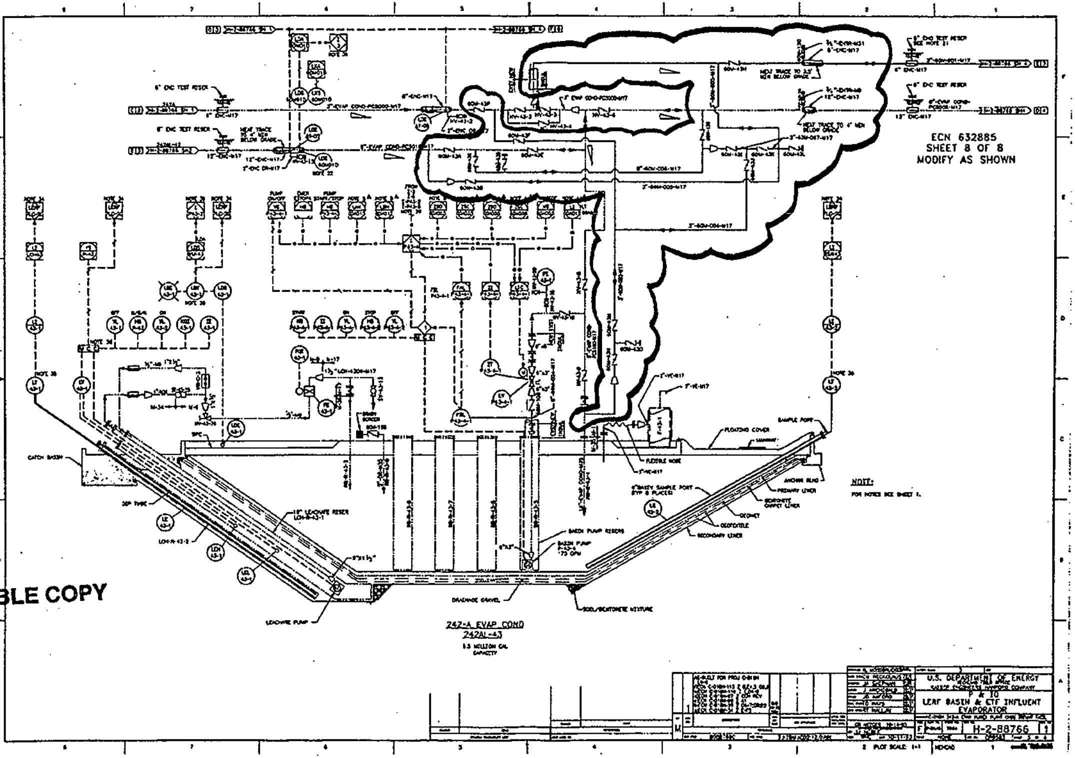
SUPPORT NO	LINE SIZE	A	B
PS-[illegible]-C018	12"	1'-6"	NEW CONCRETE BASE - SEE DET 2
PS-[illegible]6-C018	12"	1'-[illegible]"	NEW CONCRETE BASE - SEE DET 2
PS-44-C018	8"	1'-3"	EXISTING CONCRETE BASE

ECN 632885
SHEET 7 OF 8

DWG H-2-79634

MODIFY AS SHOWN BELOW

SUPPORT NO	LINE SIZE	DIM C	DIM D	DIM E	DIM (F)
PS-17-W105	8"	1'-4$\frac{7}{8}$"	11$\frac{7}{8}$"	10"	1'-6"
PS-21-W105	12"	1'-9$\frac{3}{16}$"	1'-4$\frac{3}{16}$"	1'-2$\frac{5}{16}$"	1'-4$\frac{1}{4}$"
PS-22-W105	12"	1'-7$\frac{5}{16}$"	1'-2$\frac{5}{16}$"	1'-2$\frac{5}{16}$"	1'-8$\frac{3}{8}$"
PS-23-W105	12"	1'-7$\frac{5}{16}$"	1'-2$\frac{5}{16}$"	1'-2$\frac{5}{16}$"	5$\frac{3}{4}$"
PS-27-W105	12"	1'-7$\frac{5}{16}$"	1'-2$\frac{5}{16}$"	1'-2$\frac{5}{16}$"	1'-6$\frac{3}{4}$"
PS-28-W105	12"	1'-7$\frac{5}{16}$"	1'-2$\frac{5}{16}$"	1'-2$\frac{5}{16}$"	11$\frac{5}{8}$"
PS-31-W105	6"	1'-1"	8"	8"	1'-5$\frac{1}{2}$"
PS-32-W105	6"	1'-1"	8"	8"	10$\frac{1}{4}$"
PS-38-W105	8"	1'-4$\frac{7}{8}$"	11$\frac{7}{8}$"	10"	AS REQD
PS-39-W105	12"	1'-7$\frac{5}{16}$"	1'-2$\frac{5}{16}$"	1'-2$\frac{5}{16}$"	2'-4$\frac{1}{8}$"
PS-43-W105	12"	1'-7$\frac{5}{16}$"	1'-2$\frac{5}{16}$"	1'-2$\frac{5}{16}$"	10$\frac{5}{8}$"
PS-30A-W105	8"	1'-4$\frac{7}{8}$"	11$\frac{7}{8}$"	10"	1'-3$\frac{1}{4}$"
PS-34B-W105	8"	1'-4$\frac{7}{8}$"	11$\frac{7}{8}$"	10"	1'-3$\frac{5}{8}$"
PS-45B-W105	8"	1'-4$\frac{7}{8}$"	11$\frac{7}{8}$"	10"	7$\frac{3}{16}$"



ECN 632885
SHEET 8 OF 8
MODIFY AS SHOWN

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U.S. DEPARTMENT OF ENERGY
P & ID
LERF BASIN & ETF INFLUENT
EVAPORATOR
H-2-88766
PLOT SCALE: 1=1

ECN 632885 Page 3a of 8

UNREVIEWED SAFETY QUESTION SCREENING/DETERMINATION FORM

(Per WHC-IP-0842)

Page 1 of 5

USQ Tracking No. TF-96-0532

Rev. 0

AREA: [X] East [] West [] General

Facility: [] 242-A [] DST [] SST [X] LERF
[] Aging Waste [] Other

ECN No. 632885/632887

PCA No.

Work Pkg No.

Other (Specify)

TITLE: LERF BASIN 43 SPOOL PIECE ADDITION

Description of the Proposed Activity/REPORTABLE OCCURRENCE or PIAB:
A SPOOL PIECE WILL BE ADDED TO THE LERF BASIN 242AL-43 INCLUDING EXTENDING THE CATCH BASIN AND INSTALLING HEAT TRACE FOR THE NEW LINE.

Introduction: A SPOOL PIECE WILL BE INSTALLED THAT WILL ADD A BYPASS SECTION OF PIPE BETWEEN VALVE 60M-43P TO JUST DOWNSTREAM OF VALVE HV-43-8. ANOTHER PIECE WILL BE ADDED JUST DOWNSTREAM OF VALVE 60M-43A OVER TO VALVE 60M-43L. THERE IS PIECE THAT WILL ADD A SECTION OF PIPE FROM VALVE HV-43-5 TO 3"-60M-001-M17, ALONG WITH A SECTION OF PIPE CONNECTING 8"- EVAP COND-PC5005-M17 TO 8"- EVAP COND-PC5010-M17. A FINAL PIECE ADDS A SECTION BETWEEN 60M-43L AND 8"-60M-006-M17. ALL THESE LINES ARE OVER EITHER THE EXISTING CATCH BASIN OR THE NEWLY CONSTRUCTED ADDITION TO THE CATCH BASIN. FOR FURTHER DETAILS ABOUT THE PIPING ARRANGEMENT PLEASE SEE ECN 632885. THE SPOOL PIECE ENABLES THE 242-A EVAPORATOR TO PUMP ITS PROCESS CONDENSATE DIRECTLY TO ANY OF THE THREE LERF BASINS WHILE THE EFFLUENT TREATMENT FACILITY IS ABLE TO PUMP PROCESS CONDENSATE FROM EITHER OF THE REMAINING TWO BASINS SIMULTANEOUSLY. THIS USQ IS BOUNDED BY THE BOUNDARY OF THE LERF FSAR WHICH STOPS AT THE TIE-IN FLANGES FROM THE ETF AT BOTH THE 242AL-43 AND 242AL-44 CATCH BASINS.

Scope: THIS USQ COVERS THE PHYSICAL MODIFICATIONS THAT ARE BEING MADE TO THE PIPING IN THE 242AL-43 CATCH BASIN INCLUDING ADDING ALL ASPECTS OF THE MODIFICATION, THE VALVES, PIPING, AND HEAT TRACE TO THE NEW SYSTEM.

Authorization Basis: LERF FSAR WHC-SD-W105-SAR-001 REV 0-D

Conclusion: This modification does not affect the Authorization Basis of the LERF as described in the LERF FSAR.

References None

USQ Screening:

ECN 632885 Page 8b of 8

UNREVIEWED SAFETY QUESTION SCREENING/DETERMINATION FORM (Continued)	Page 2 of 5
	USQ Tracking No. TF-96-0532
	Rev. 0

A. Does the PROPOSED ACTIVITY represent a change to the facility as described in the AUTHORIZATION BASIS?

[] No [X] Yes [] N/A

Basis: The addition of the spool piece that will be inserted into the catch basin of Basin 242AL-43 does represent a change to the facility as described in the Authorization Basis, WHC-SD-W105-SAR-001, REV 0-D Section 5.3.

B. Does the PROPOSED ACTIVITY represent a change to procedures as described in the AUTHORIZATION BASIS?

[X] No [] Yes [] N/A

Basis: The proposed change is a physical modification to the facility. There are no procedures for piping described in the LERF SAR.

C. Does the test or experiment represent a test or experiment not described in the AUTHORIZATION BASIS documentation?

[] No [] Yes [X] N/A

Basis: This modification does not represent a test or experiment. (see background)

D. Does the PROPOSED ACTIVITY or REPORTABLE OCCURRENCE, impact:

- OSRs or IOSRs?
- Approved IOSR Compliance Implementation Plan?

[X] No [] Yes [] N/A

Basis: There are no IOSR'S associated with the LERF. OSRs for the LERF facility deal strictly with the chemical composition and verification sampling and do not address piping. Therefore, no OSRs are impacted by this change. (see background)

E. Does the REPORTABLE OCCURRENCE or PIAB involve analytical errors, omissions, and/or deficiencies in the AUTHORIZATION BASIS?

[] No [] Yes [X] N/A

Basis: This is a proposed change and no reportable occurrences or PIABs are involved.

ECN 632885 Page 8C of 8

UNREVIEWED SAFETY QUESTION SCREENING/DETERMINATION FORM (Continued)	Page 3 of 5
	USQ Tracking No. TF-96-0532
	Rev. 0

USQE No. 1 Teresa A. Campbell
Print Name

Signature 7-26-96
Date

USQE No. 2 M A White
Print Name

Signature 7/26/96
Date

IF "YES", USQE CONTINUE WITH DETERMINATION BELOW

USQ DETERMINATION:

1. Could the PROPOSED ACTIVITY or USQ ISSUE significantly increase the frequency of occurrence of an accident previously evaluated in the AUTHORIZATION BASIS?

   [X] No [] Yes/Maybe

   Basis: The accidents that were evaluated in the Authorization basis include spray, spill, and splash occurrences. The above listed modifications will not affect the frequency of accidents evaluated in the authorization basis. The accident that bounds this change is the spray leak. Assumptions made for this accident analysis are discussed in sections 9.1.1, and the added piping will meet all of the requirements imposed on the initial system. Per Attachment J of WHC-IP-0842 Volume IV, Section 5.4, Rev. 9, "an increase in frequency exists if the proposed activity would result in 1) an increase in the predicted frequency of a reported accident to a higher frequency category ..., or, if a specific frequencies are reported in the AUTHORIZATION BASIS, 2) an increase in the predicted frequency with a change of greater than or equal to a factor of 15." The frequency of this accident is stated to be 10^{-3} event per year as stated in section 9.1 of the SAR. While the proposed change could increase the frequency slightly due to the additional pipe length, the increase is not substantial and could not result in an increase the frequency which would exceed a factor of 15. Therefore, no significant increase in frequency is possible.

2. Could the PROPOSED ACTIVITY or USQ Issue significantly increase the consequences of an accident previously evaluated in the AUTHORIZATION BASIS?

   [X] No [] Yes/Maybe

   Basis: The above listed facility modifications do not increase the consequences of any accident previously evaluated in the LERF SAR chapter 9. The SAR evaluates the consequences of a spill/splash, basin evaporation and spray leak. The applicable accident scenario relevant to the above modifications is the spray leak and adding approximately 20 feet of pipe will not affect the consequences associate with this accident.

ECN 632885 Page 3d of 8

UNREVIEWED SAFETY QUESTION SCREENING/DETERMINATION FORM (Continued)	Page 4 of 5
	USQ Tracking No. TF-96-0532
	Rev. 0

3. Could the PROPOSED ACTIVITY or USQ ISSUE significantly increase the frequency of occurrence of a malfunction of EQUIPMENT IMPORTANT TO SAFETY previously evaluated in the AUTHORIZATION BASIS?

   [X] No [] Yes/Maybe

   Basis: These modifications will in no way increase the frequency of occurrence of a malfunction of equipment previously evaluated in the Authorization Basis. The consequences of credible bounding accidents and abnormal occurrences have been evaluated and found to be within guideline values for non-safety class equipment. Therefore, no specific equipment or instrumentation is necessary. This means that there is no ITS equipment required at LERF (see section 4.3.3 of the LERF SAR).

4. Could the PROPOSED ACTIVITY or USQ ISSUE significantly increase the consequences of a malfunction of EQUIPMENT IMPORTANT TO SAFETY previously evaluated in the AUTHORIZATION BASIS?

   [X] No [] Yes/Maybe

   Basis: There is no safety class equipment at the LERF and thus, no ITS equipment or probabilities or consequences of accidents involving ITS equipment. (see section 4.3.3 of the LERF SAR).

5. Could the PROPOSED ACTIVITY or USQ ISSUE create the possibility of an accident of a different type than any previously evaluated in the AUTHORIZATION BASIS?

   [X] No [] Yes/Maybe

   Basis: By performing these modifications it is not possible to create an accident the has not been previously evaluated in the LERF SAR. The LERF SAR evaluates three types of credible accidents associated with the facility spills/splashes, basin evaporation and sprays. The applicable accident to the modification is the spray leak and it has already been evaluated. These are listed in the sections 9.3.1.5 and 9.4.1.5. The LERF SAR also examined several other types of accidents and deemed them incredible and therefore no analysis was performed. These accidents that were examined and deemed incredible are discussed in section 9.1 of the LERF SAR.

6. Could the PROPOSED ACTIVITY or USQ ISSUE create the possibility of a malfunction of EQUIPMENT IMPORTANT TO SAFETY of a different type than any previously evaluated in the AUTHORIZATION BASIS?

   [X] No [] Yes/Maybe

   Basis: As stated above, the LERF does not contain any ITS equipment. Therefore, no new scenarios are possible. (See section 4.3.3 of the LERF SAR).

ECN 632885 Page 8e of 8

UNREVIEWED SAFETY QUESTION SCREENING/DETERMINATION FORM **(Continued)**	Page 5 of 5
	USQ Tracking No. TF-96-0532
	Rev. 0

7. Could the PROPOSED ACTIVITY or USQ ISSUE reduce the margin of safety for any OSR/IOSR as defined in the AUTHORIZATION BASIS?

   [X] No [] Yes/Maybe

   Basis: The only LERF SAR OSR requirements are LCO 3.1.1, LERF Basin Concentration Limits and the associated surveillance requirement. The above modifications can not affect the radioactive constituent concentrations in the LERF basins. Therefore the margin of safety will not be reduced as defined in the SAR section 3.1.1.

8. Does the PROPOSED ACTIVITY or USQ ISSUE require a new or revised OSR/IOSR (including compensatory measures required by a Compliance Implementation Plan)?

   [X] No [] Yes/Maybe

   Basis: These modifications are within the boundary defined by the LERF SAR. There are no IOSRs or implementation plans associated with the LERF. Therefore a new or revised TSR/OSR is not required.

USQE No. 1 Teresa A Campbell
Print Name

USQE No. 2 M A White
Print Name

Signature Teresa A. Campbell Date 7-26-96

Signature Date 7/26/96

PRC REVIEW

Meeting No.: ______________ Date ______________

PRC Chairman Concurrence: ______________ Signature ______________ Date

A-6001-203 (06/96) GEF289

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APPENDIX 4B

DETAILED DRAWINGS FOR THE 200 AREA EFFLUENT TREATMENT FACILITY CONTAINER STORAGE AREA AND TANK SYSTEMS

Drawings of the secondary containment systems for the ETF containers, and tanks and process units, and for the Load-In Tanks are summarized in Table 4B-1. Because the failure of the secondary containment systems could lead to the release of dangerous waste into the environment, Engineering Change Notices (ECNs) which affect the secondary containment systems will be submitted to the Washington State Department of Ecology, as a Class 1, 2, or 3 permit modification, as required by WAC 173-303-830.

Table 4B-1. Drawing of Effluent Treatment Facility and Load-In Station Secondary Containment Systems

ETF Process Unit	Drawing Number	Outstanding ECNs	Drawing Title
Surge Tank, Process/Container Storage Areas and Trenches - Foundation and Containment	H-2-89063, Rev. 3	None	STRUCT - Foundation and Grade Beam Plan (Sheet 1)
Sump Tank Containment	H-2-89065, Rev. 3	None	STRUCT - Foundation, Sections and Detail (Sheet 1)
Verification Tank Foundation and Containment	H-2-89068, Rev. 3	None	STRUCT - Verification Tank Foundation (Sheet 1)
Load-In Facility Foundation and Containment	H-2-817970, Rev. 1	None	Structural - ETF Truck Load-in Facility Plans and Sections (Sheet 1)
Load-In Facility Foundation and Containment	H-2-817970, Rev. 1	None	Structural - ETF Truck Load-in Facility Sections and Details (Sheet 2)

P&ID - piping and instrumentation diagram.
STRUCT - architectural/structural diagram.

The drawings identified in Table 4B-2 provide an illustration of the piping and instrumentation configuration for the major process units and tanks at the ETF, and the Load-In Tanks. Drawings of the transfer piping systems between the LERF and ETF, and between the Load-In Station and the ETF also are presented in this table. These drawings are provided for general information and to demonstrate the adequacy of the design of the tank systems. An update to these drawings and drawings identified in Table 4B-1 will be provided annually to the Washington State Department of Ecology.

Table 4B-2. Drawings of Major Process Units and Tanks at the Effluent Treatment Facility and Load-In Station.

ETF Process Unit	Drawing Number	Outstanding ECNs	Drawing Title
Load-In Facility	H-2-817976, Rev. 1	None	P&ID - ETF Truck Load-In Facility (Sheet 1)
Surge Tank	H-2-89337, Rev. 6	ECN-636749	P&ID - Surge Tank System (Sheet 1)
UV/Oxidation	H-2-88976, Rev. 6	None	P&ID - UV Oxidizer Part 1 (Sheet 1)
UV/Oxidation	H-2-89342, Rev. 6	None	P&ID - UV Oxidizer Part 2 (Sheet 1)
Reverse Osmosis	H-2-88980, Rev. 6	None	P&ID - 1st RO Stage (Sheet 1)
Reverse Osmosis	H-2-88982, Rev. 5	ECN-636799 ECN-641721	P&ID - 2nd RO Stage (Sheet 1)
IX/Polishers	H-2-88983, Rev. 5	ECN-636799	P&ID - Polisher (Sheet 1)
Verification Tanks	H-2-88985, Rev. 7	None	P&ID - Verification Tank System (Sheet 1)
ETF Evaporator	H-2-89335, Rev. 7	None	P&ID - Evaporator (Sheet 1)
Thin Film Dryer	H-2-88989, Rev. 8	ECN-641718	P&ID - Thin Film Dryer (Sheet 1)
Transfer Piping from LERF to ETF	H-2-88768, Rev. 1	None	Piping Plan/Profile 4"-60M-002-M17 and 3"-60M-001-M17 (Sheet 1)
Transfer Piping from Load-In Facility to ETF	H-2-817969, Rev. 1	W291-015	Civil - ETF Truck Load-In Facility Site Plan (Sheet 1)

P&ID - piping and instrumentation diagram.
STRUCT - architectural/structural diagram.

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ENGINEERING CHANGE NOTICE **ESSENTIAL**

Page 1 of 6

1. ECN 636749

Proj. ECN

CPF 18

2. ECN Category (mark one) Supplemental [] Direct Revision [] Change ECN [] Temporary [] Standby [] Supersedure [X] Cancel/Void []	3. Originator's Name, Organization, MSIN, and Telephone No. L. L. Lin/32200/S6-72/372-2759	4. USQ Required? [] Yes [X] No	5. Date 01-13-97
	6. Project Title/No./Work Order No. H2O2 Delivery to Surge Tank and CIP Tank	7. Bldg./Sys./Fac. No. 2025E/60D, 60F & 60A	8. Approval Designator NA
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) H-2-89350, sh 1, rev 6 H-2-89343, sh1, rev 5 H-2-89337, sh1, rev 5	10. Related ECN No(s). 636717	11. Related PO No. None

12a. Modification Work [X] Yes (fill out Blk. 12b) [] No (NA Blks. 12b, 12c, 12d)	12b. Work Package No. EL-96-00424	12c. Modification Work Complete APR 28 1997 25 4-25-97 Design Authority/Cog. Engineer Signature & Date	12d. Restored to Original Condition (Temp. or Standby ECN only) NA Design Authority/Cog. Engineer Signature & Date

13a. Description of Change 13b. Design Baseline Document? [X] Yes [] No

This ECN supersedes ECN 636717 in its entirety.

Install new chemical injection pump to deliver H2O2 to Surge Tank and CIP tank. H2O2 will be used for biological control in the Surge Tank and for sanitizing solution makeup in the CIP tank.

Changes are depicted in the clouded portion of the attached ECN continuation pages.

(Continued on page 3)

14a. Justification (mark one)

Criteria Change	[]	Design Improvement	[X]	Environmental	[]	Facility Deactivation	[]
As-Found	[]	Facilitate Const	[]	Const. Error/Omission	[]	Design Error/Omission	[]

14b. Justification Details

Change is required to provide biological fouling control in the Surge Tank water and associated downstream piping and process components. It also provides a safe way of adding H2O2 to the CIP tank.

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

N. J. Sullivan, S6-72, 1
A. K. Yoakum, S6-71, 1
Ivan Papp, S6-72, 1
L. L. Lin, S6-72, 1
ETF Tech Library, S6-72, 1
Station 4, 1
Station 30, 1

E. A. McNamar, S6-72, 1
J. E. Geary, S6-71, 1

RELEASE STAMP
DATE: JAN 16 1997
HANFORD RELEASE
STA: 30
ID: 25

STA 3, 4, 5, 15, 16, 30

A-7900-013-2 (05/96) GEF095

A-7900-013-1

ENGINEERING CHANGE NOTICE

Page 2 of 6

1. ECN (use no. from pg. 1) 636749

16. Design Verification Required
[X] Yes
[] No

17. Cost Impact NA

ENGINEERING			CONSTRUCTION		
Additional	[]	$	Additional	[]	$
Savings	[]	$	Savings	[]	$

18. Schedule Impact (days) NA
Improvement [X] ZAL
Delay []

19. 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 13. Enter the affected document number in Block 20.

SDD/DD [NA]
Functional Design Criteria []
Operating Specification []
Criticality Specification []
Conceptual Design Report []
Equipment Spec. []
Const. Spec. []
Procurement Spec. []
Vendor Information []
OM Manual []
FSAR/SAR []
Safety Equipment List []
Radiation Work Permit []
Environmental Impact Statement []
Environmental Report []
Environmental Permit []

Seismic/Stress Analysis [NA]
Stress/Design Report []
Interface Control Drawing []
Calibration Procedure []
Installation Procedure []
Maintenance Procedure []
Engineering Procedure []
Operating Instruction []
Operating Procedure [X]
Operational Safety Requirement [NA]
IEFD Drawing [X]
Cell Arrangement Drawing [NA]
Essential Material Specification []
Fac. Proc. Samp. Schedule []
Inspection Plan []
Inventory Adjustment Request []

Tank Calibration Manual [NA]
Health Physics Procedure []
Spares Multiple Unit Listing []
Test Procedures/Specification []
Component Index [X]
ASME Coded Item [NA]
Human Factor Consideration []
Computer Software []
Electric Circuit Schedule []
ICRS Procedure []
Process Control Manual/Plan []
Process Flow Chart []
Purchase Requisition []
Tickler File []

20. 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
POP-60A-001 POP-60B-002		

21. Approvals

	Signature	Date		Signature	Date
Design Authority	L. L. Lin	12-19-96	Design Agent		
Cog. Eng.	L. L. Lin	12-19-96	PE		
Cog. Mgr.	N. J. Sullivan (informal review)	12-20-96	QA		
QA			Safety		
Safety			Design		
Environ.			Environ.		
Other	I. G. Papp	12-20-96	Other		
	A. K. Yoakum				

DEPARTMENT OF ENERGY

Signature or a Control Number that tracks the Approval Signature

ADDITIONAL

ENGINEERING CHANGE NOTICE CONTINUATION SHEET

Page 3 of 6

ECN 636749

Date 1/13/97

(Continued from page 1 of this ECN)

Install Pulsatron electronic metering pump, model LPH7-SA-ATS4, capacity 10 gph at 35 psi for 60D-P-3.

Check valve 60D-370 shall be 1/2", SS, 40 psi cracking pressure; check valve 60D-371 shall be 1/2", SS, 60 psi cracking pressure.

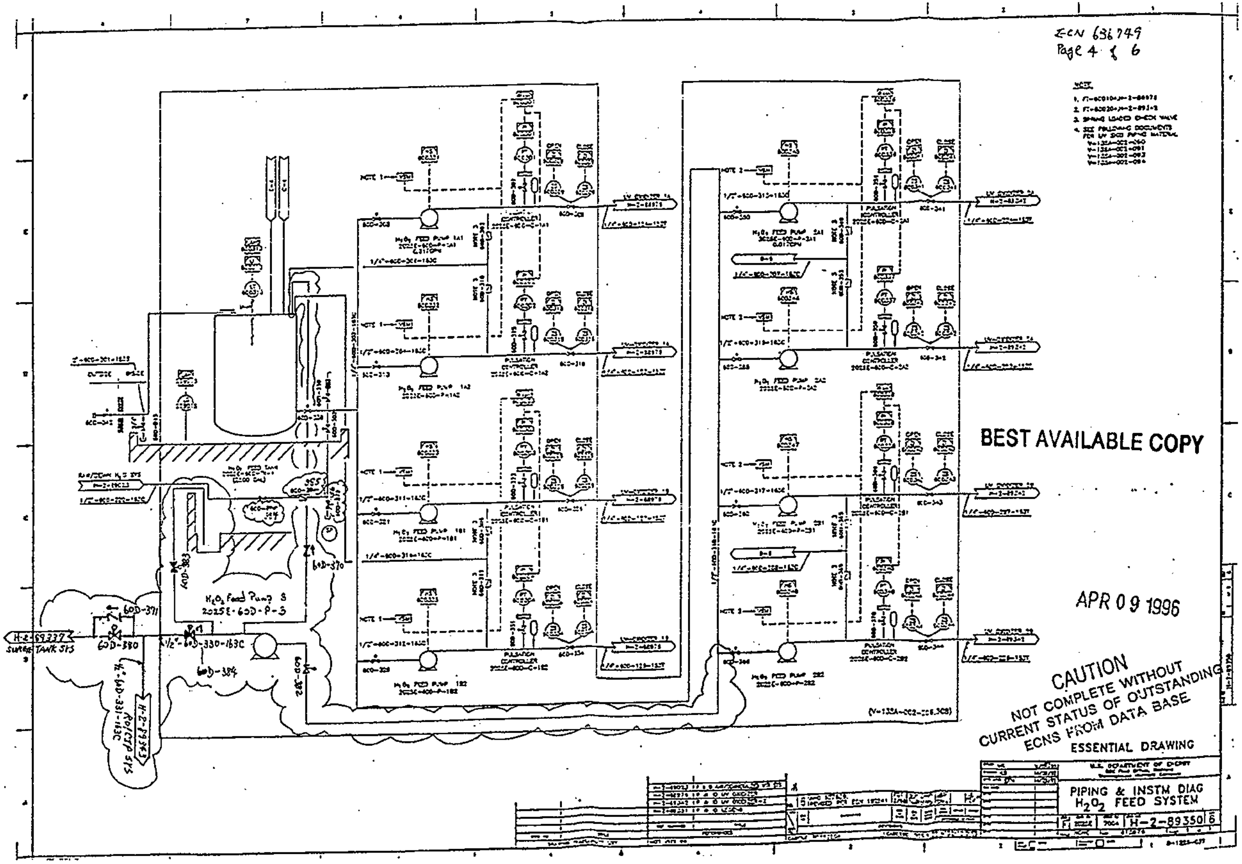
Piping shall be 1/2", SS (1/2"-60D-330-163C, 1/2"-60D-331-163C). Tubing run shall be sloped to avoid low point liquid traps.

All new valves shall be 1/2", SS, 150 psi, ball valves. Support valves as necessary.

Tubing penetration at 60F-TK-3 shall be within the NE quadrant on top of the tank.

Tubing penetrations at polyethylene tanks (60D-TK-1 and 60F-TK-3) shall be sealed with SS bulkhead connectors or Engineering approved equal.

E-CN 636749
Page 4 of 6



BEST AVAILABLE COPY

APR 09 1996

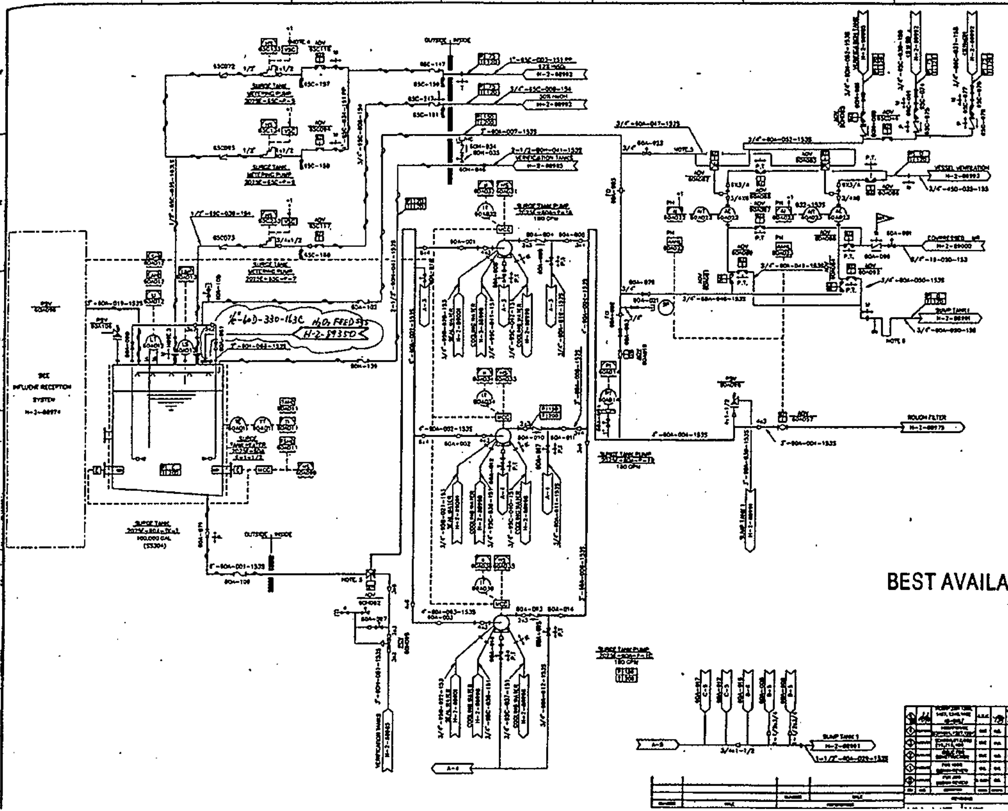
CAUTION
NOT COMPLETE WITHOUT
CURRENT STATUS OF OUTSTANDING
ECNS FROM DATA BASE

ESSENTIAL DRAWING

PIPING & INSTM DIAG
H_2O_2 FEED SYSTEM

H-2-89350 6

E[illegible] 749
Pa[illegible] 6



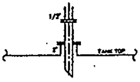
NOTES:

A. ALL REMOTELY OPERATED VALVES ARE FAILURE CLOSE (F.C.)

B. PIPING CATEGORY: ANSI B31.3 EXCEPT COMPRESSED AIR AND COOLING WATER PIPE

1. REAGENT FEEDING SYSTEMS WILL BE PLACED ON TANK TOP.

2. REAGENT INLET TO SURGE TANK WILL BE AS FOLLOWS:



4. VSC: VARIABLE STROKE CONTROL

5. POWER FAILURE POSITION IS AS FOLLOWS:
60A082 CHEMICAL FEED SIDE
60A083 CHEMICAL FEED SIDE
60H083 SURGE TANK SIDE

6. MINIMUM 20"

OFFICIAL RELEASE
BY WHC
DATE OCT 13 1995

PREVIOUS REVISIONS
SEE DRAWING IN THE
REVISION FILE

U.S. DEPARTMENT OF ENERGY

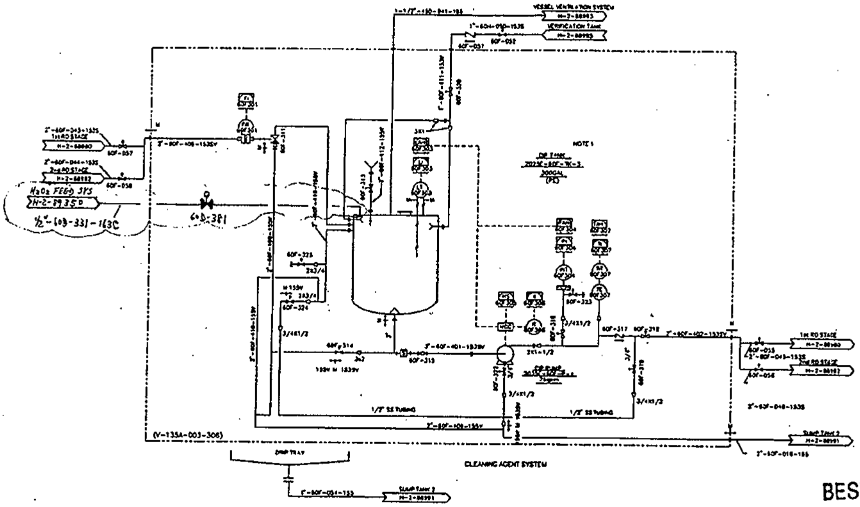
PIPING & INSTRUMENTATION DIAGRAM
SURGE TANK SYSTEM

H-2-89337

5

ECN 636749
Page 6 of 6

NOTE:
A. PIPING CATEGORY: ANSI 31.3
1. CIP : CLEAN IN PLACE
2. SEE FOLLOWING DOCUMENT FOR RO SKID PIPING MATERIAL
V-135A-003-023
V-133A-003-024
3. "V" ADDED TO VENDOR PIPE DESIGNATION FOR CLARITY



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OFFICIAL RELEASE
BY WHC
DATE OCT 11 1995

PREVIOUS REVISIONS EXIST ONLY IN THE SUBMITTAL FILE

U.S. DEPARTMENT OF ENERGY

PIPING & INSTRUMENTATION DIAGRAM
RO / CIP SYSTEM

F
H-2-89343
5

CPF#18
IPF 7

ESSENTIAL
ENGINEERING CHANGE NOTICE

Page 1 of 12

1. ECN 636799

Proj. ECN

2. ECN Category (mark one)
Supplemental []
Direct Revision []
Change ECN [x]
Temporary []
Standby []
Supersedure [x]
Cancel/Void []

3. Originator's Name, Organization, MSIN, and Telephone No.
LL Lin, 32200, S6-72, 372-2759

4. USQ Required?
[] Yes [X] No

5. Date
4/14/97

6. Project Title/No./Work Order No.
ETF GW Piping Mods

7. Bldg./Sys./Fac. No.
2025E

8. Approval Designator
NA

9. Document Numbers Changed by this ECN (includes sheet no. and rev.)
See Block 13

10. Related ECN No(s).
ECN-636760
ECN-636797
ECN-632910

11. Related PO No.
None

12a. Modification Work
[X] Yes (fill out Blk. 12b)
[] No (NA Blks. 12b, 12c, 12d)

12b. Work Package No.
E29277

12c. Modification Work Complete
Design Authority/Cog. Engineer Signature & Date

12d. Restored to Original Condition (Temp. or Standby ECN only)
NA
Design Authority/Cog. Engineer Signature & Date

13a. Description of Change
13b. Design Baseline Document? [X] Yes [] No

This ECN supersedes ECN-636760 and ECN-636797 in their entirety. This ECN also changes page 12 of ECN 632910.
Changes are depicted in the clouded portions of the attached continuation pages.
Affected drawings are:
- H-2-88974, Rev 7, sht 1, P&ID Influent Reception
- H-2-88975, Rev 5, sht 1, P&ID Rough Filter
- H-2-88978, Rev 5, sht 1, P&ID Fine Filter
- H-2-89332, Rev 6, sht 1, P&ID H2O2 Decomposer
- H-2-88982, Rev 5, sht 1, P&ID 2nd RO Stage
- H-2-88983, Rev 5, sht 1, Polisher. P&ID
- H-2-88984, Rev 6, sht 1, Effluent pH Adjustment, P&ID
- H-2-88991, Rev 5, sht 1, Sump Tank, P&ID
- H-2-88986, Rev 4, sht 1, Secondary Waste Receiving, P&ID
- H-2-89186, Rev 4, sht 1, Piping Arrangement Secs, Secondary Waste Tanks

14a. Justification (mark one)
Criteria Change [] Design Improvement [X] Environmental [] Facility Deactivation []
As-Found [] Facilitate Const [] Const. Error/Omission [] Design Error/Omission []

14b. Justification Details
Changes are required to accomodate processing Ground Water at the ETF. These changes resulted from findings of WHC-SD-OPS-PC-001, Rev. 0.

15. Distribution (include name, MSIN, and no. of copies) *Advanced
L. L. Lin, S6-72, 1* R. J. Huth, S6-72, 1
N. J. Sullivan, S6-72, 1 D. L. Flyckt, S6-72, 1
E. A. McNamar, S6-72, 1 A. F. Crane, S6-72, 1 sta 4 R1-29
R. N. Wagner, S6-72, 1 D. E. Scully, S6-72, 1 Sta 15 E6-2
D.P. Nelsen, S6-71, 1 D. I. Buckles, S2-54. 1 Sta 30 S6-72
A. K. Yoakum, S6-71, 1 H. L. Chang, G3-17, 1
Stations 4,30,5,3,15,16 M. A. Mclean, G3-17, 1

3,5,16

RELEASE STAMP
DATE: APR 17 1997
HANFORD RELEASE
STA: 16
ID: 16

A-7900-013-2 (05/96) GEF095

ENGINEERING CHANGE NOTICE	Page 2 of 12	1. ECN (use no. from pg. 1) 636799

16. Design Verification Required	17. Cost Impact N/A				18. Schedule Impact (days) N/A	
	ENGINEERING		CONSTRUCTION			
[X] Yes	Additional	[] $	Additional	[] $	Improvement	[]
[] No	Savings	[] $	Savings	[] $	Delay	[]

19. 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 13. Enter the affected document number in Block 20.

SDD/DD	[na]	Seismic/Stress Analysis	[na]	Tank Calibration Manual	[na]
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	[X]
Equipment Spec.	[]	Maintenance Procedure	[]	ASME Coded Item	[] NA
Const. Spec.	[]	Engineering Procedure	[]	Human Factor Consideration	[] NA
Procurement Spec.	[]	Operating Instruction	[]	Computer Software	[X]
Vendor Information	[X]	Operating Procedure	[X]	Electric Circuit Schedule	[] NA
OM Manual	[] NA	Operational Safety Requirement	[] NA	ICRS Procedure	[]
FSAR/SAR	[X]	IEFD Drawing	[X]	Process Control Manual/Plan	[]
Safety Equipment List	[] NA	Cell Arrangement Drawing	[] NA	Process Flow Chart	[]
Radiation Work Permit	[]	Essential Material Specification	[]	Purchase Requisition	[]
Environmental Impact Statement	[]	Fac. Proc. Samp. Schedule	[]	Tickler File	[]
Environmental Report	[]	Inspection Plan	[]		[]
Environmental Permit	[X]	Inventory Adjustment Request	[]		[]

20. 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
POP 60-002, POP 60B-001, POP-60F-001, POP 60D-001 WHC-SD-ETF-OCD-001, Rev2		

21. Approvals

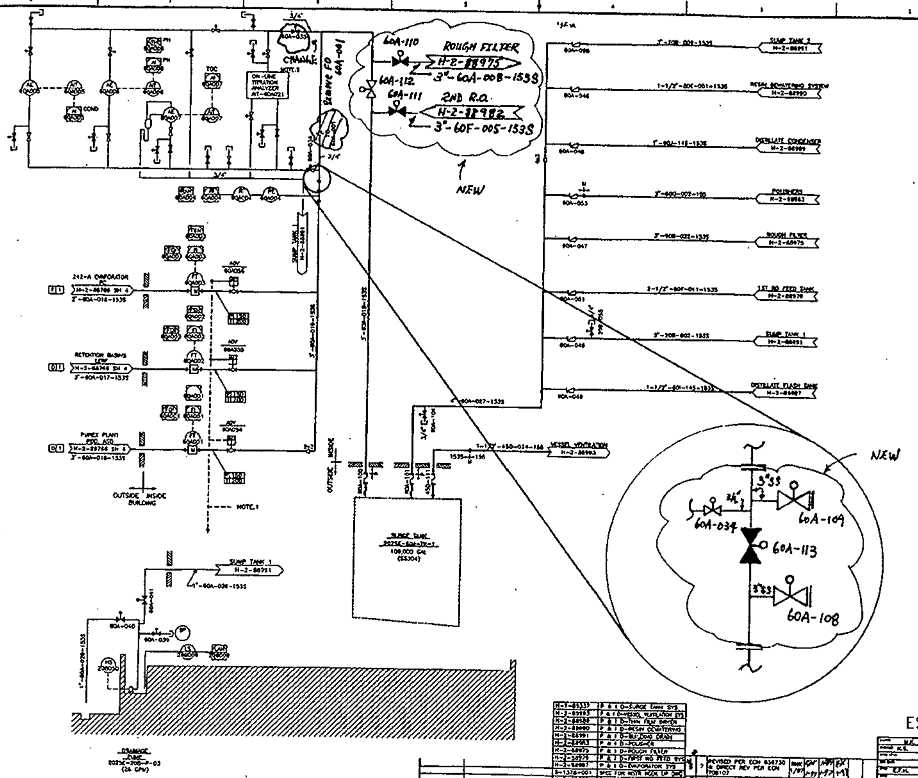
	Signature	Date		Signature	Date
Design Authority	L. L. Lin	4-15-97	Design Agent		
Cog. Eng.	L. L. Lin	4-15-97	PE		
Cog. Mgr.	N. J. Sullivan (informal review)	4-15-97	QA		
QA			Safety		
Safety			Design		
Environ.			Environ.		
Other	E. A. McNamar		Other		

DEPARTMENT OF ENERGY

Signature or a Control Number that tracks the Approval Signature

ADDITIONAL

ECN 636799
Page 3 of 12



NOTES:

A. ALL REMOTELY OPERATED VALVES ARE FAILURE CLOSE(F.C.)

B. PIPING CATEGORY: ANSI B31.3

1. LSH-60A012,H-2-89337

2. ON-LINE TITRATION ANALYZER IS USED TO DECIDE H_2SO_4 VOLUME FOR NEUTRALIZATION

3. SEE S-1378-001 (HOOK-UP DWG) FOR INSTRUMENT PIPING/VALVE DETAIL

H-2-89337	P & I D-SURGE TANK SYS
H-2-88993	P & I D-VESSEL VENTILATION SYS
H-2-88538	P & I D-THIN FILM DRYER
H-2-88990	P & I D-RESIN DEWATERING
H-2-88991	P & I D-BUILDING DRAIN
H-2-88983	P & I D-POLISHER
H-2-88975	P & I D-ROUGH FILTER
H-2-88979	P & I D-FIRST RO FEED SYS
H-2-88987	P & I D-EVAPORATOR SYS
S-1378-001	SPEC FOR INSTR HOOK UP DWG
H-2-89351	P & I D-LEGEND
REF NUMBER	TITLE
REFERENCES	

3	7	REVISED PER ECN 636730 & DIRECT REV PER ECN 708107	RWK 1/97	GM 1-97	HPS 1-97	EX 1-97
	REV	REVISIONS				

ESSENTIAL DRAWING

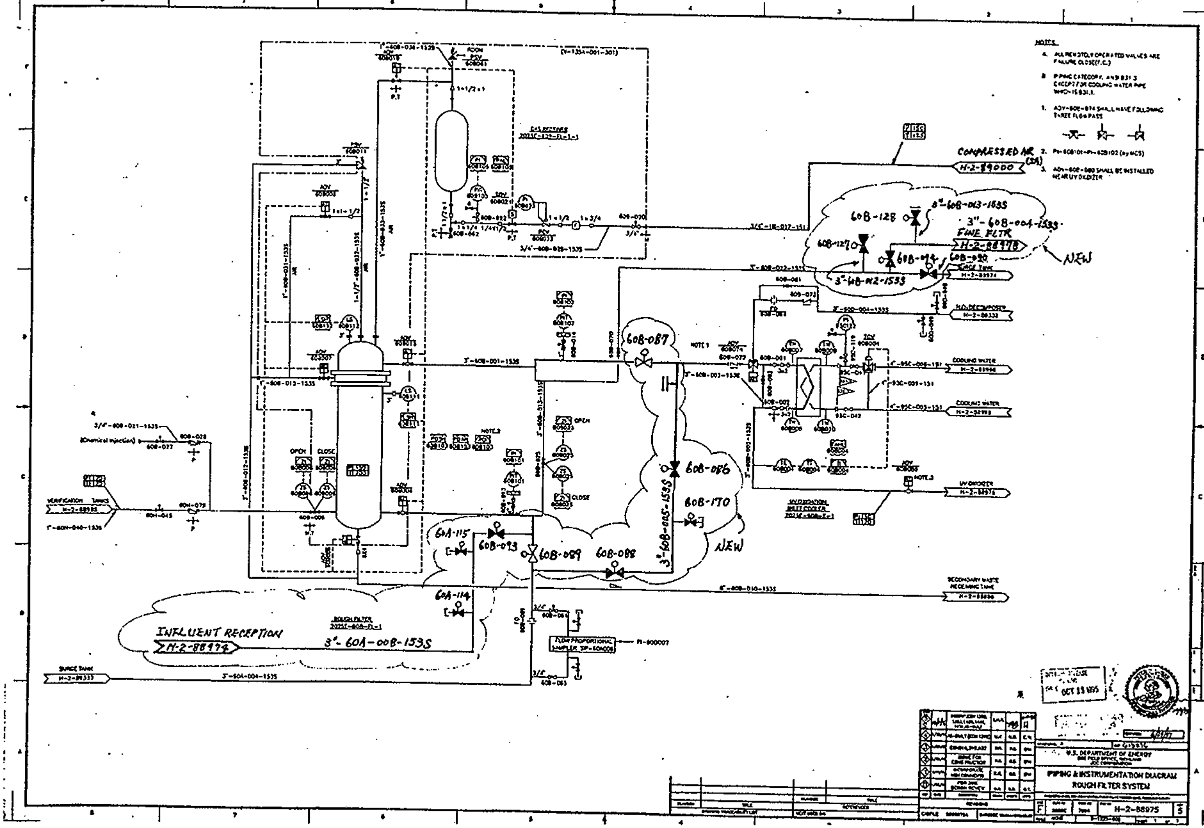
	M.K.	4/92
	K.S.	4/92
	E.F.H.	4/92

U.S. DEPARTMENT OF ENERGY
Richland Field Office, Richland
Westinghouse Hanford Company

PIPING & INSTM DIAG
INFLUENT RECEPTION
SYSTEM

F 2025E 7004 H-2-88974 3

ECN 636799
Page 4 of 12



NOTES

A. ALL REMOTELY OPERATED VALVES ARE FAILURE CLOSE (F.C.)

B. PIPING CATEGORY, ANSI B31.3 EXCEPT FOR COOLING WATER PIPE WHICH IS B31.1.

1. ADV-608-074 SHALL HAVE FOLLOWING THREE FLOW PASS

2. PI-608101~PI-608102 (by MCS)

3. ADV-608-080 SHALL BE INSTALLED NEAR UV OXIDIZER

OCT 13 1995

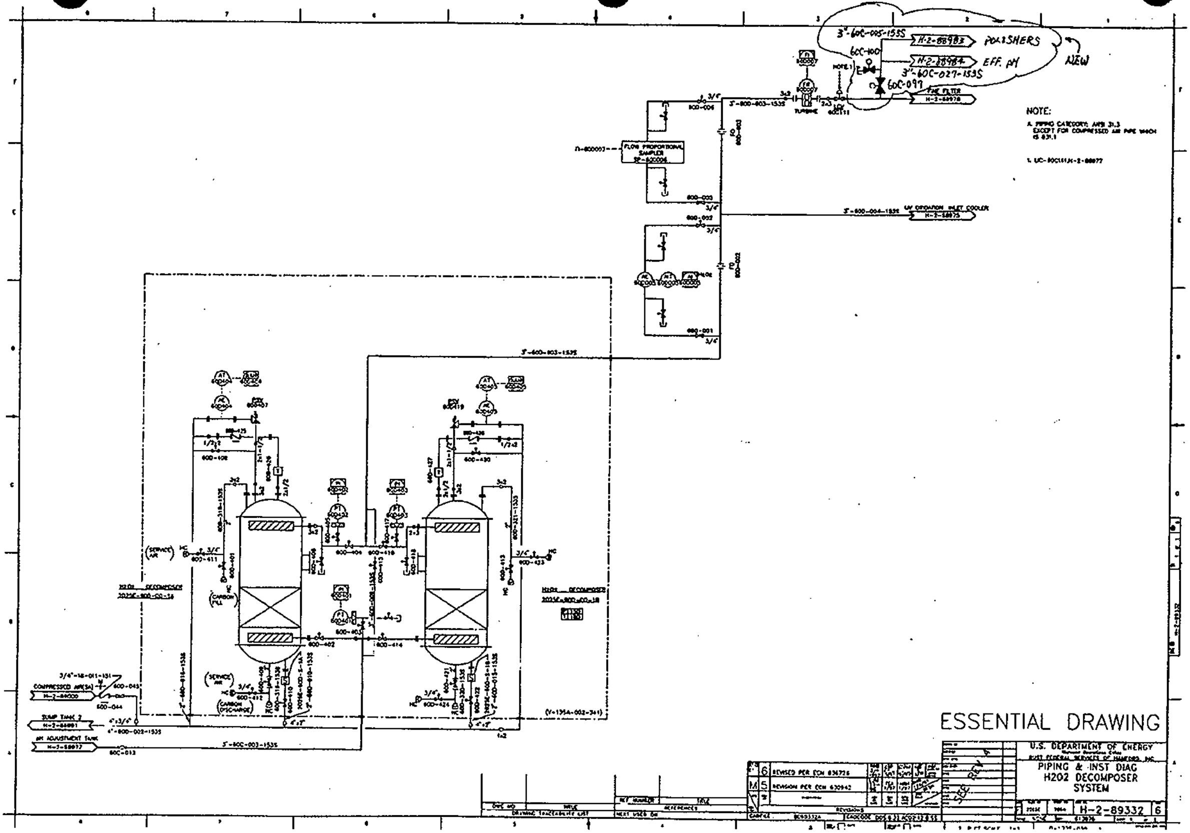
U.S. DEPARTMENT OF ENERGY

PIPING & INSTRUMENTATION DIAGRAM
ROUGH FILTER SYSTEM

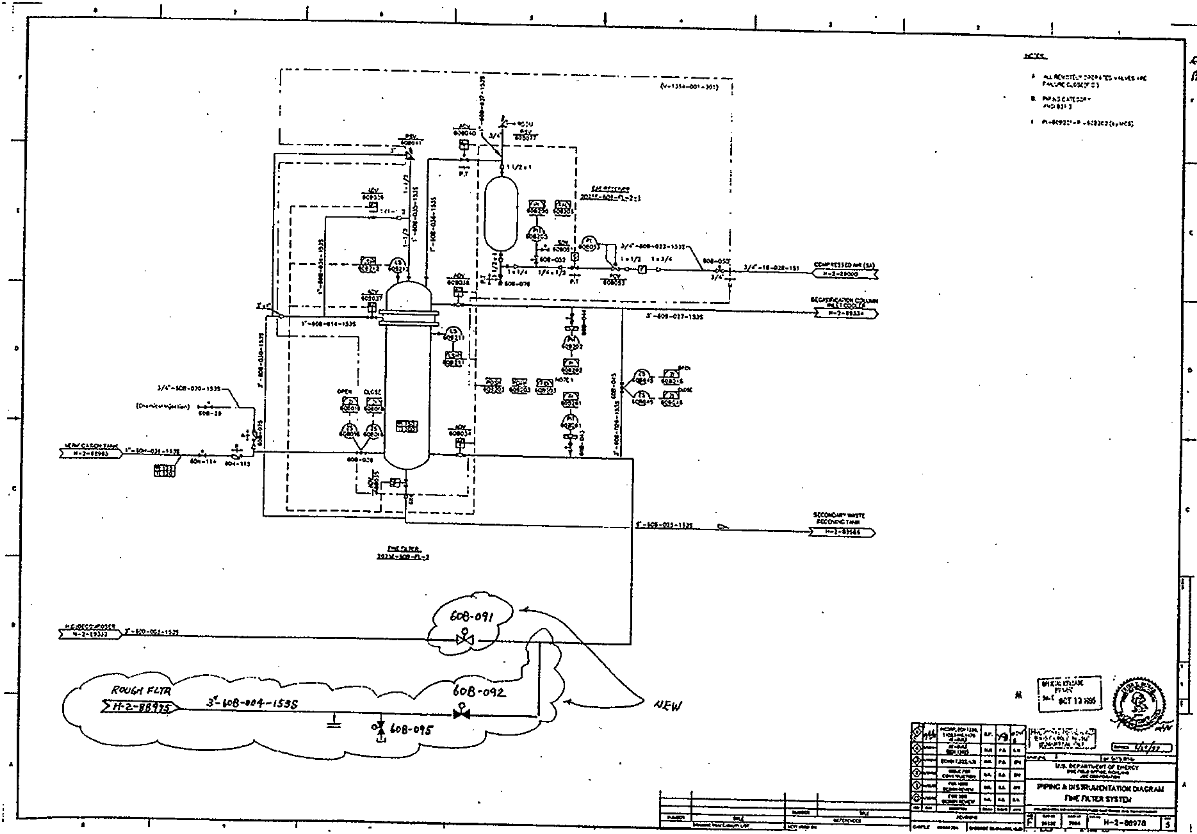
H-2-88975

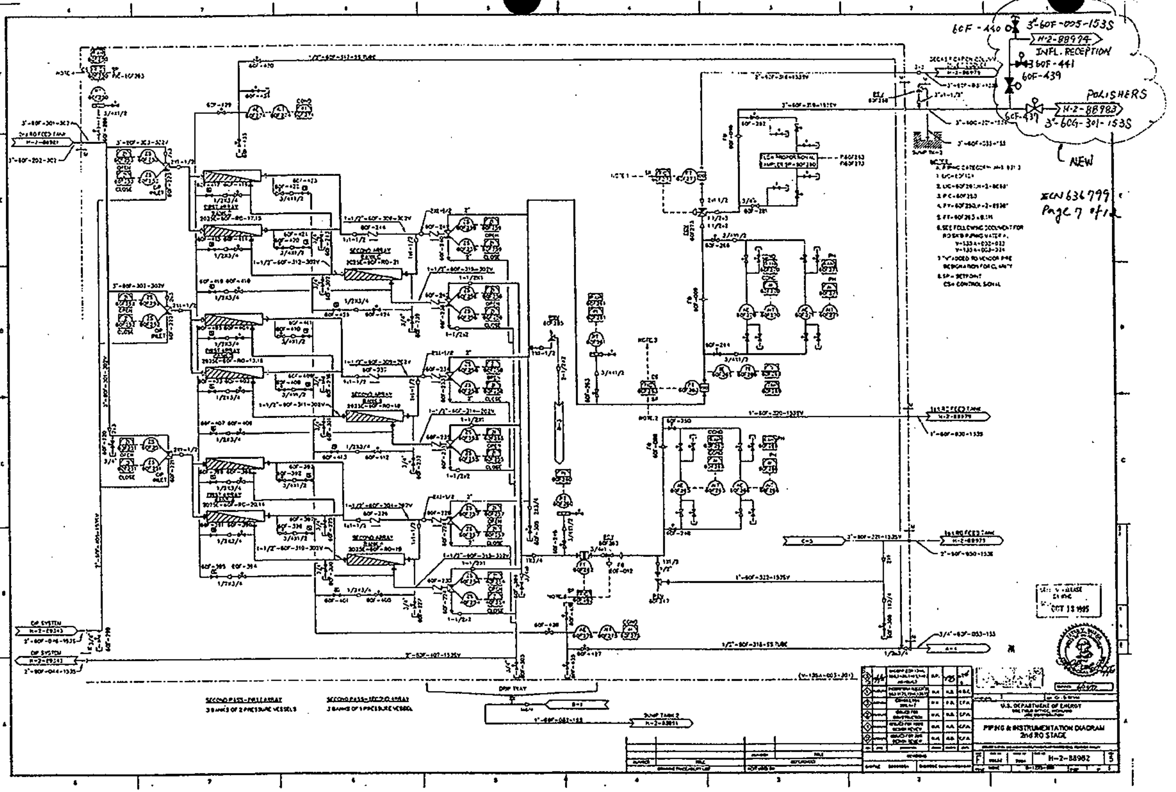
5

ECN 636799
Page 5 of 12



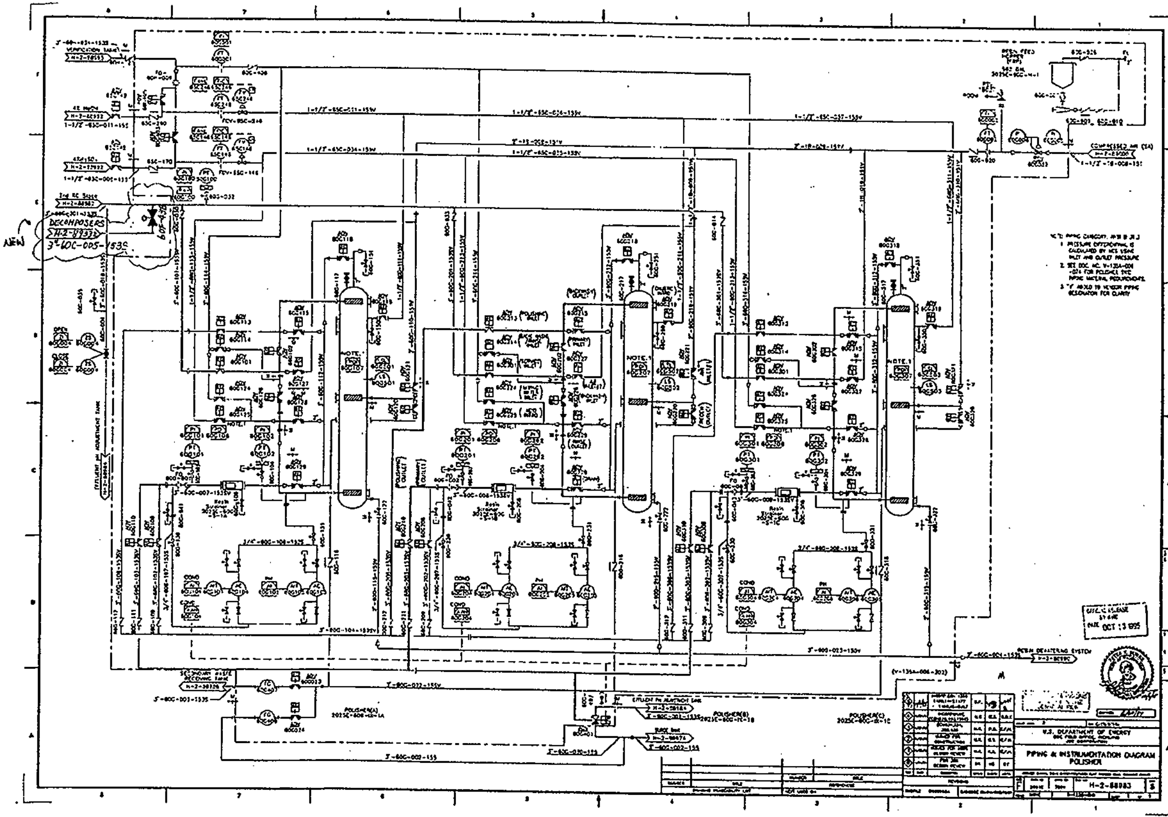
ECN 636799
Page 6 of 12



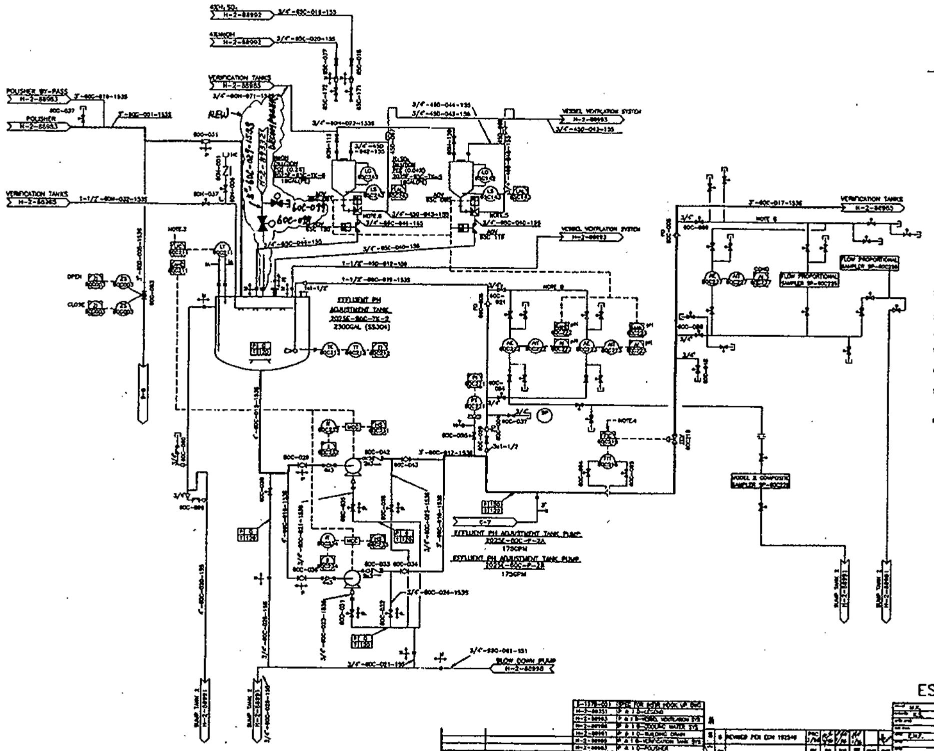


3"-60F-005-153S
H-2-88974
INFL. RECEPTION
60F-440
60F-441
60F-439
POLISHERS
H-2-88983
3"-60G-301-153S
60F-437
NEW
ECN 636799
Page 7 of 12
H-2-88979
H-2-88973
DRIP TRAY
SUMP TANK 2
H-2-88981
SECOND PASS-FIRST ARRAY
3 BANKS OF 2 PRESSURE VESSELS
SECOND PASS-SECOND ARRAY
3 BANKS OF 1 PRESSURE VESSEL
OP SYSTEM
FIRST ARRAY
SECOND ARRAY
CLOSE
OPEN
NOTES:
OCT 13 1995
U.S. DEPARTMENT OF ENERGY
PIPING & INSTRUMENTATION DIAGRAM
2nd RO STAGE
H-2-88982
3/4"-60F-053-153
1/2x3/4
F
5

ECN636799
Page 7 of 12



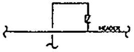
ZRL136799
Page 9 of 12.



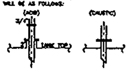
NOTES:

A. ALL REMOTELY OPERATED 2-WAY VALVES ARE FAILURE CLOSE(F.C.)

B. PIPING CATEGORY. ANSI B31.3



1. REAGENT INLET TO EFFLUENT pH ADJUSTMENT TANK WILL BE AS FOLLOWS:



2. REAGENT FEEDING SYSTEMS WILL BE PLACED ON TANK TOP.

3. FIC-80C218

4. LIC-80C211

5. VOLUME OF 0.04% H2SO4 BETWEEN VALVES AOV-85C080 & AOV-85C119 TO BE APPROXIMATELY 300ml

6. VOLUME OF 0.2% NaOH BETWEEN VALVES AOV-85C081 & AOV-85C120 TO BE APPROXIMATELY 300ml

7. POWER FAILURE POSITION IS AS FOLLOWS
85C080 VENT SIDE
85C081 VENT SIDE

8. SEE B-1378-001 (HOOK-UP SPEC) FOR INSTRUMENT PIPING/VALVE DETAIL.

B-1378-001	SPEC FOR INSTR HOOK UP DWG
H-2-88351	P & I D-LEGEND
H-2-88993	P & I D-VESSEL VENTILATION SYS
H-2-88996	P & I D-COOLING WATER SYS
H-2-88991	P & I D-BUILDING DRAIN
H-2-88965	P & I D-VERIFICATION TANK SYS
H-2-88963	P & I D-POLISHER
REF NUMBER	TITLE

REFERENCES

6 REVISED PER ECN 192346

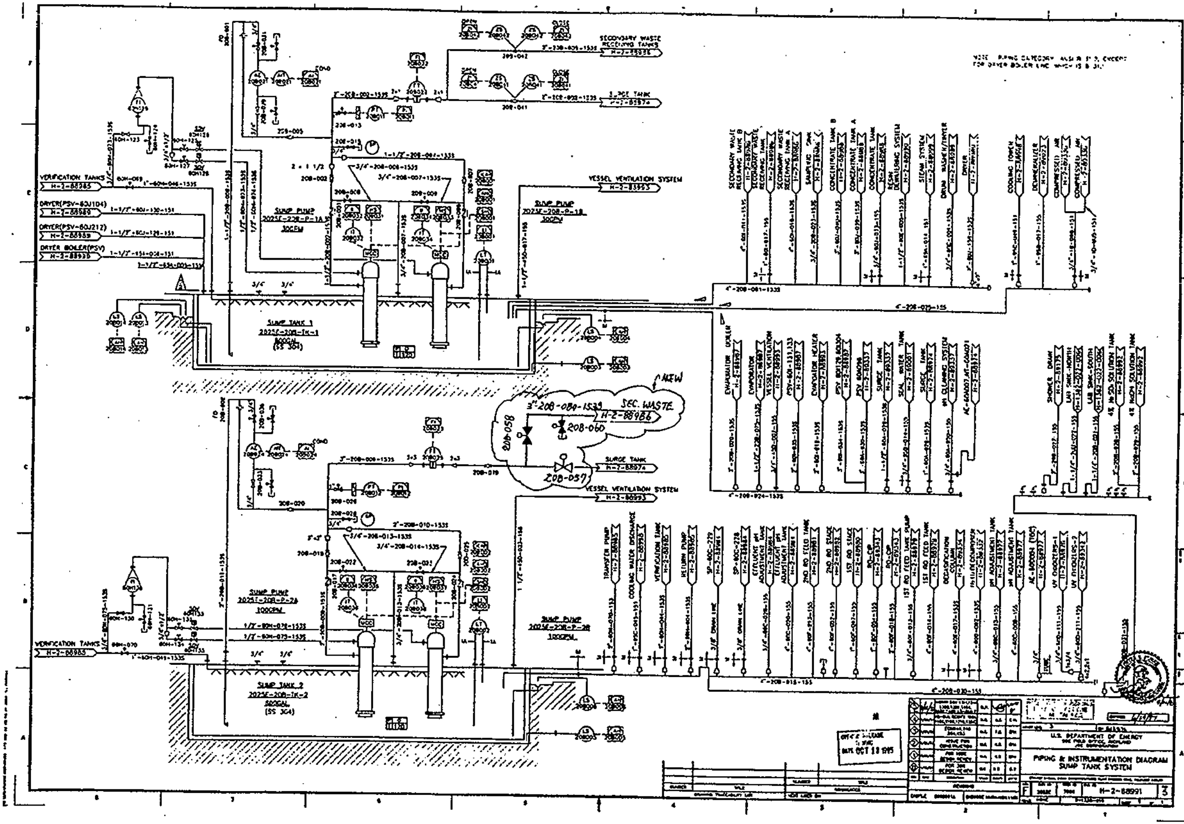
ESSENTIAL DRAWING

U.S. DEPARTMENT OF ENERGY
Westinghouse Hanford Company

PIPING & INSTM DIAG
EFFLUENT pH ADJUSTMENT
SYSTEM

F 2025E 7404 H-2-88984 6

ECN 636799
Page 10 of 12

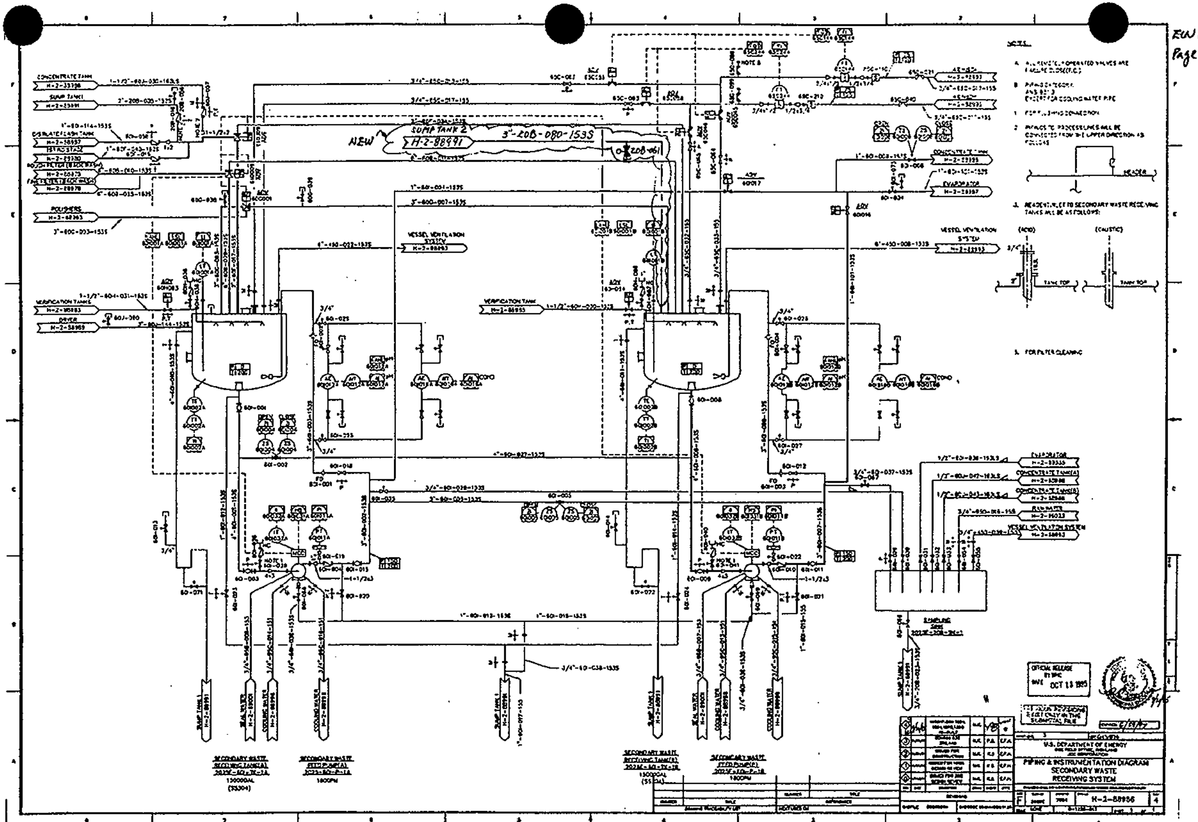


U.S. DEPARTMENT OF ENERGY

PIPING & INSTRUMENTATION DIAGRAM
SUMP TANK SYSTEM

H-2-88991 3

ECN 636799
Page 11 of 12.



NOTES:

A. ALL REMOTELY OPERATED VALVES ARE FAIL CLOSED (F.C.)

B. PIPING CATEGORY
ANSI B31.3
EXCEPT FOR COOLING WATER PIPE

1. FOR FLUSHING CONNECTION

2. BRANCHES TO PROCESS LINES WILL BE CONNECTED FROM THE UPPER DIRECTION AS FOLLOWS

3. READER INLET TO SECONDARY WASTE RECEIVING TANKS WILL BE AS FOLLOWS:

5. FOR FILTER CLEANING

OFFICIAL RELEASE
BY WHC
DATE OCT 13 1995

THE ABOVE REVISIONS EXIST ONLY IN THE SUBMITTAL FILE

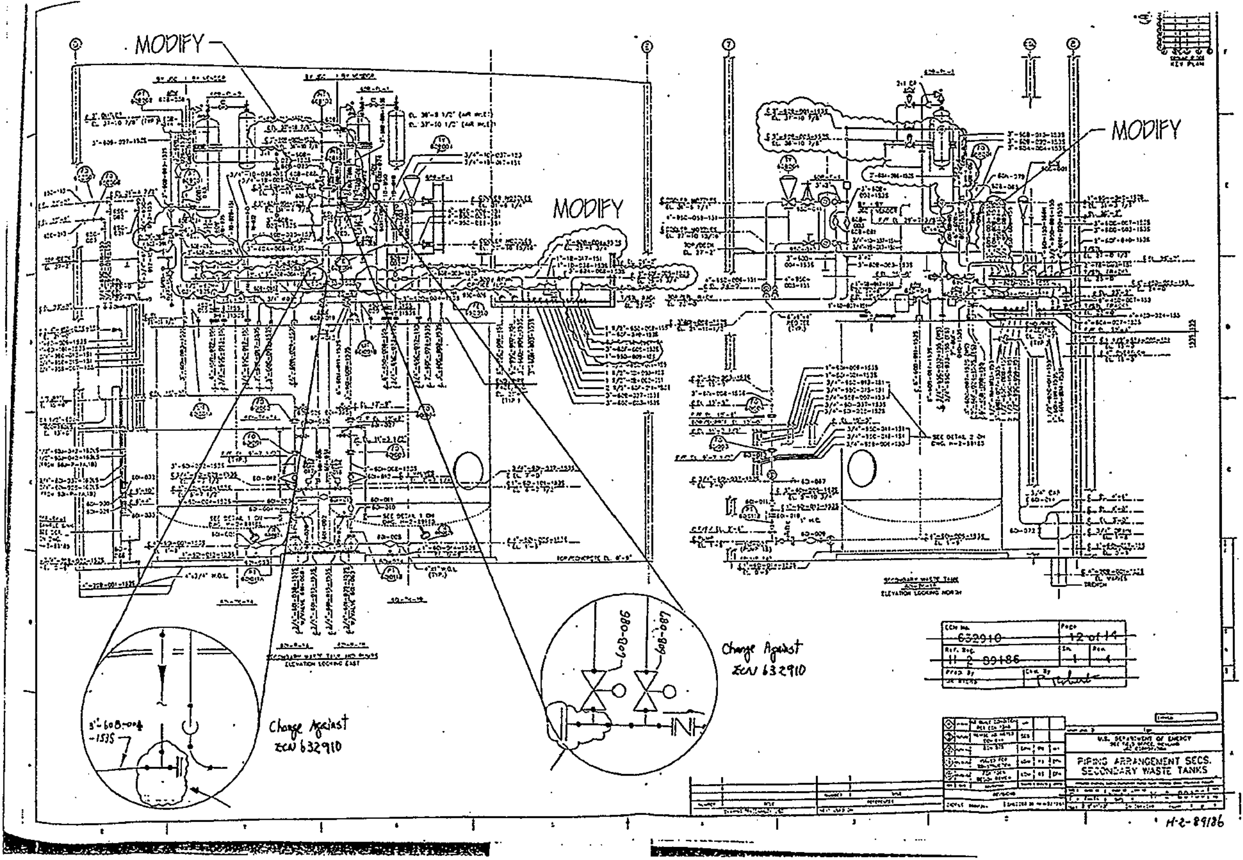
6/19/97

U.S. DEPARTMENT OF ENERGY

PIPING & INSTRUMENTATION DIAGRAM
SECONDARY WASTE
RECEIVING SYSTEM

F
H-2-88986
4

ECN636799
Page 12 of 12



FILE COPY

ESSENTIAL

ENGINEERING CHANGE NOTICE

Page 1 of 6

1. ECN 641718

Proj. ECN

CPF 18

2. ECN Category (mark one)
Supplemental ☒
Direct Revision ■
Change ECN ☐
Temporary ☐
Standby ☐
Supersedure ☐
Cancel/Void ☐

3. Originator's Name, Organization, MSIN, and Telephone No.
DE SCULLY/32230/S6-72/372-3592

4. USQ Required?
[] Yes [X] No

5. Date
05/29/97

6. Project Title/No./Work Order No.
CORRECT SOLENOID ACTUATION AND PRESS XMTR ISOL VALVE LOCATION

7. Bldg./Sys./Fac. No.
2025E/60J

8. Approval Designator
N/A

9. Document Numbers Changed by this ECN (includes sheet no. and rev.)
H-2-88989, R. 8, SHT 1

10. Related ECN No(s).
N/A

11. Related PO No.
N/A

12a. Modification Work
[] Yes (fill out Blk. 12b)
[X] No (NA Blks. 12b, 12c, 12d)

12b. Work Package No.
N/A

12c. Modification Work Complete
N/A
Design Authority/Cog. Engineer Signature & Date

12d. Restored to Original Condition (Temp. or Standby ECN only)
Design Authority/Cog. Engineer Signature & Date

13a. Description of Change

13b. Design Baseline Document? ☒ Yes ~~[X] No~~ DES 5/30/97

Valve 60J-145 was discovered to be an isolation valve to PT-60J007 rather than a bleed valve as previously indicated. Proper routing of MCS signals to the solenoid valves depicted.

SEE CLOUDED AREAS ON ATTACHED pp. 3 through 6.

14a. Justification (mark one)

Criteria Change	[]	Design Improvement	[]	Environmental	[]	Facility Deactivation	[]
As-Found	[X]	Facilitate Const	[]	Const. Error/Omission	[]	Design Error/Omission	[]

14b. Justification Details
This ECN corrects the P&ID to the "as-found" conditions.

15. Distribution (include name, MSIN, and no. of copies)
DE SCULLY, S6-72, 1
NJ SULLIVAN, S6-72,1
RJ HUTH, S6-72,1
SH CARMICHAEL, S6-74,1
DL TUBBS, S6-74,1
JL VIGUE, S6-74,1
JE GEARY, S6-72, 1
BS DARLING, S6-72,1
DP NELSEN, S6-72,1
DA VASQUEZ, S6-74,1
MC TEATS, S6-72,1

RELEASE STAMP
DATE: MAY 30 1997
HANFORD RELEASE
STA: 30
ID: 25

STA. 3, 4, 5, 16, 30

A-7900-013-2 (05/96) GEF095

ENGINEERING CHANGE NOTICE	Page 2 of 6	1. ECN (use no. from pg. 1) 641718

16. Design Verification Required	17. Cost Impact N/A		18. Schedule Impact (days)
	ENGINEERING	CONSTRUCTION	
☐ Yes	Additional ☐ $	Additional ☐ $	Improvement ☐
☒ No	Savings ☐ $	Savings ☐ $	Delay ☐

19. 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 13. Enter the affected document number in Block 20.

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

20. 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
POP-60I-001		

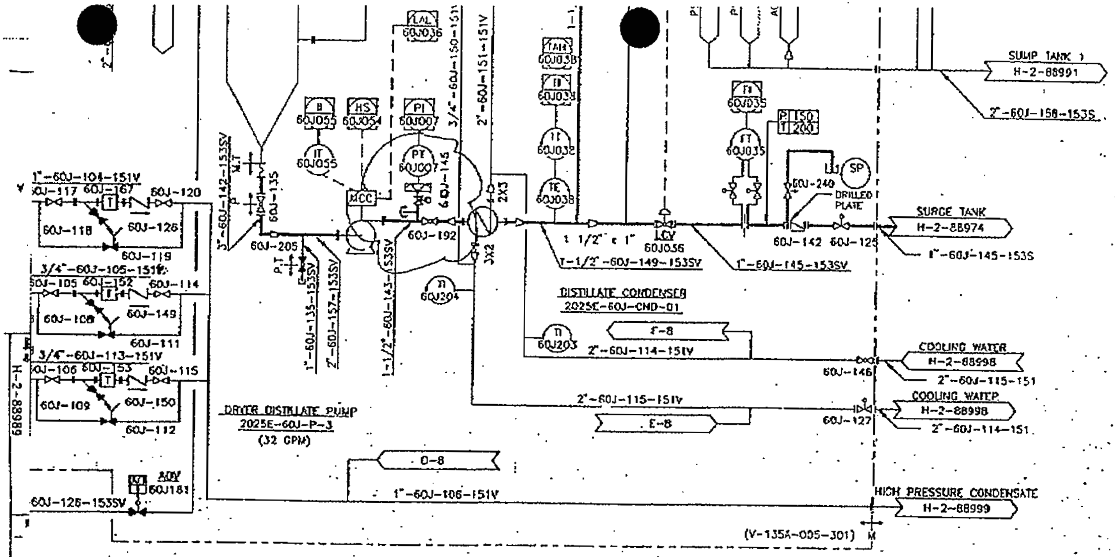
21. Approvals

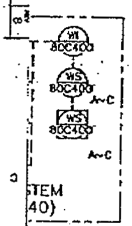
	Signature	Date		Signature	Date
Design Authority	DE Scully	5/29/97	Design Agent	SH Carmichael	5-29-97
Cog. Eng.	DE Scully	5/29/97	PE		
Cog. Mgr.	NJ Sullivan	5-30-97	QA		
QA			Safety		
Safety			Design		
Environ.			Environ.		
Other			Other		

DEPARTMENT OF ENERGY

Signature or a Control Number that tracks the Approval Signature

ADDITIONAL





p. 3 of 6

ECN 641718

IS NOW

ESSENTIAL DRAWING

REF NUMBER	TITLE
H-2-89000	P & I D-COMPRESSED AIR SYS (SA)
H-2-89023	P & I D-RAW WATER/DEMIN WATER
H-2-89336	P & I D-COMPRESSED AIR (IA)
H-2-89001	P & I D-SEAL WATER SYS
H-2-88999	P & I D-STEAM SYS
H-2-88998	P & I D-COOLING WATER SYS
H-2-88993	P & I D-VESSEL VENTILATION SYS
H-2-88991	P & I D-BUILDING DRAIN
H-2-88989	P & I D-CONCENTRATE RECEIVING SYS
H-2-88986	P & I D-SECONDARY WASTE RECEIVING SYS
H-2-88985	P & I D-VERIFICATION TANK SYS
H-2-88974	P & I D-INFLUENT RECEPTION SYS
H-2-89351	P & I D-LEGEND

REFERENCES

TITLE

EABILITY LIST

NEXT USED ON

REV NO	DESCRIPTION	REV BY DATE	CHK BY DATE	CITO APVD DATE	COG ENGR	OTHER	OTHER
8	AND ECN 630928 REVISED PER ECN 630954	BAN 4/21/93					

REVISIONS

CADFILE B088989A

CADCODE WIN95:ACD2:12.0.SS

DRAWN M.K. 4/92
CHECKED K.S. 4/92
CITO APVD
COG ENGR
APVD E.F.H. 4/92

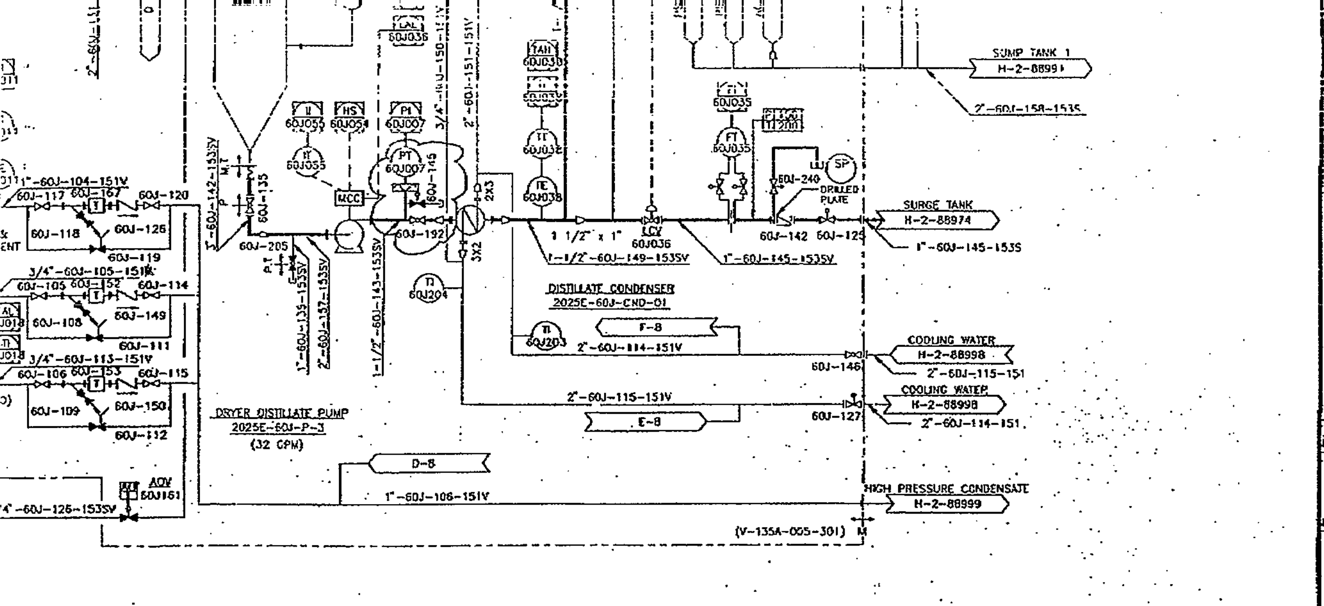
U.S. DEPARTMENT OF ENERGY
DOE Field Office, Richland
Westinghouse Hanford Company

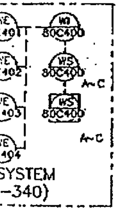
PIPING & INSTM DIAG
THIN FILM DRYER

SIZE F | BLDG NO 2025E | INDEX NO 7004 | DWG NO H-2-88989 | REV 8

SCALE NONE | EDS 613881 | SHEET 1

D-5225-GIK





p. 4 of 6

ECN 641718

WAS BEFORE

ESSENTIAL DRAWING

H-2-89000	P & I D-COMPRESSED AIR SYS (SA)
H-2-89023	P & I D-RAW WATER/DEMIN WATER
H-2-89336	P & I D-COMPRESSED AIR (IA)
H-2-89001	P & I D-SEAL WATER SYS
H-2-88999	P & I D-STEAM SYS
H-2-88998	P & I D-COOLING WATER SYS
H-2-88993	P & I D-VESSEL VENTILATION SYS
H-2-88991	P & I D-BUILDING DRAIN
H-2-88988	P & I D-CONCENTRATE RECEIVING SYS
H-2-88986	P & I D-SECONDARY WASTE RECEIVING SYS
H-2-88985	P & I D-VERIFICATION TANK SYS
H-2-88974	P & I D-INFLUENT RECEPTION SYS
H-2-89351	P & I D-LEGEND
REF NUMBER	TITLE
REFERENCES	

NEXT USED ON

TRACEABILITY LIST

TITLE

M	8	AND ECN 630928 REVISED PER ECN 630954	BAN 4/17/97	JAC 4/19/7	CDS 5/5/97	[illegible]			
	REV NO	DESCRIPTION	REV BY DATE	CHK BY DATE	DATE APVD DATE	COG ENGR	OTHER	OTHER	

REVISIONS

CADFILE B088989A

CADCODE WIN95:AC02:12.0:SS

DRAWN	M.K.	4/92
CHECKED	K.S.	4/92
DSTR APVD		
COG ENGR		
APVD	E.F.H.	4/92

U.S. DEPARTMENT OF ENERGY
DOE Field Office, Richland
Westinghouse Hanford Company

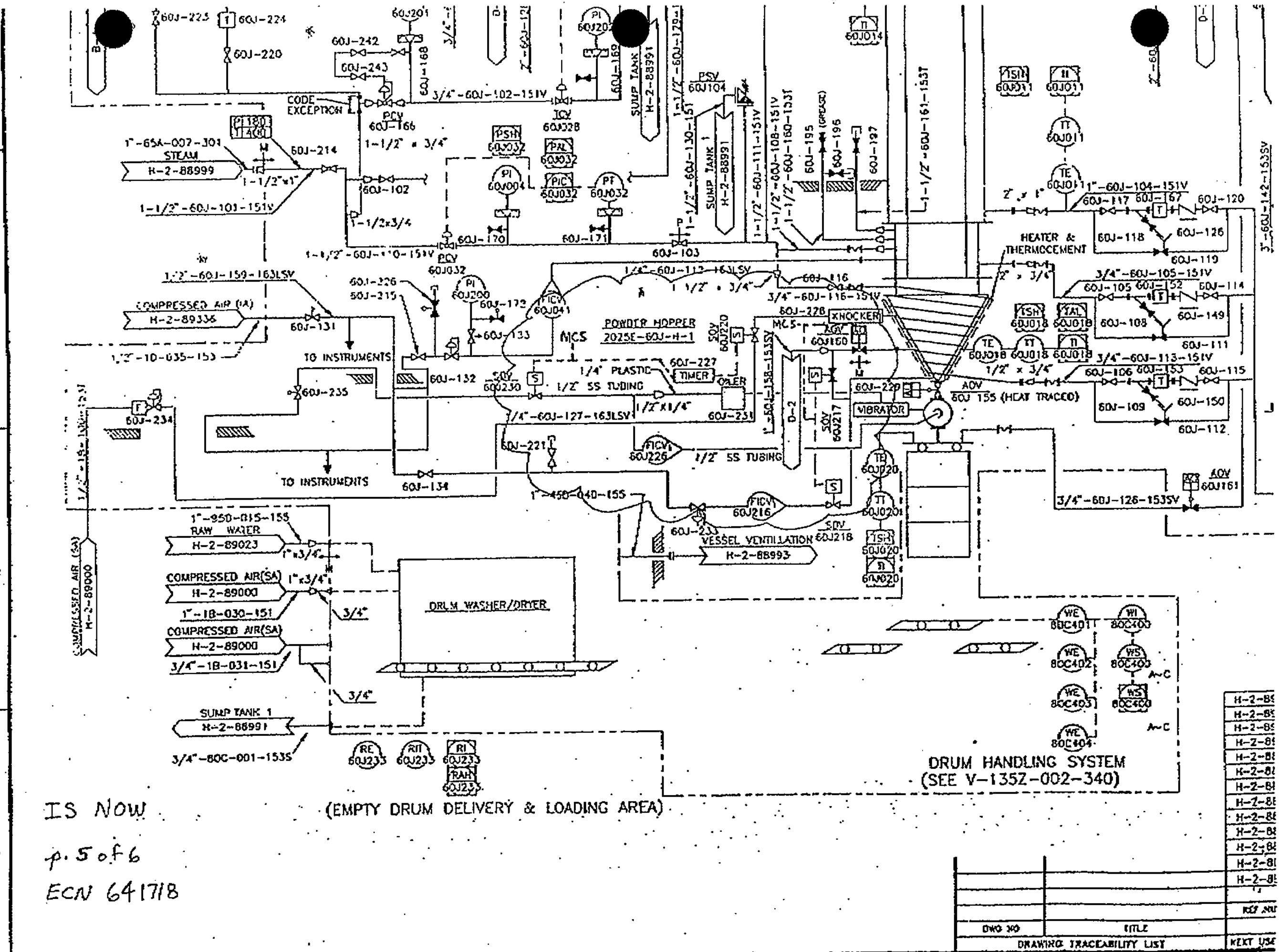
PIPING & INSTM DIAG
THIN FILM DRYER

SIZE	BLDG NO	INDEX NO	DWG NO	REV
F	2025E	7004	H-2-88989	8

SCALE NONE | CM 613881 | SHEET 1 of 1

D-1225-01A

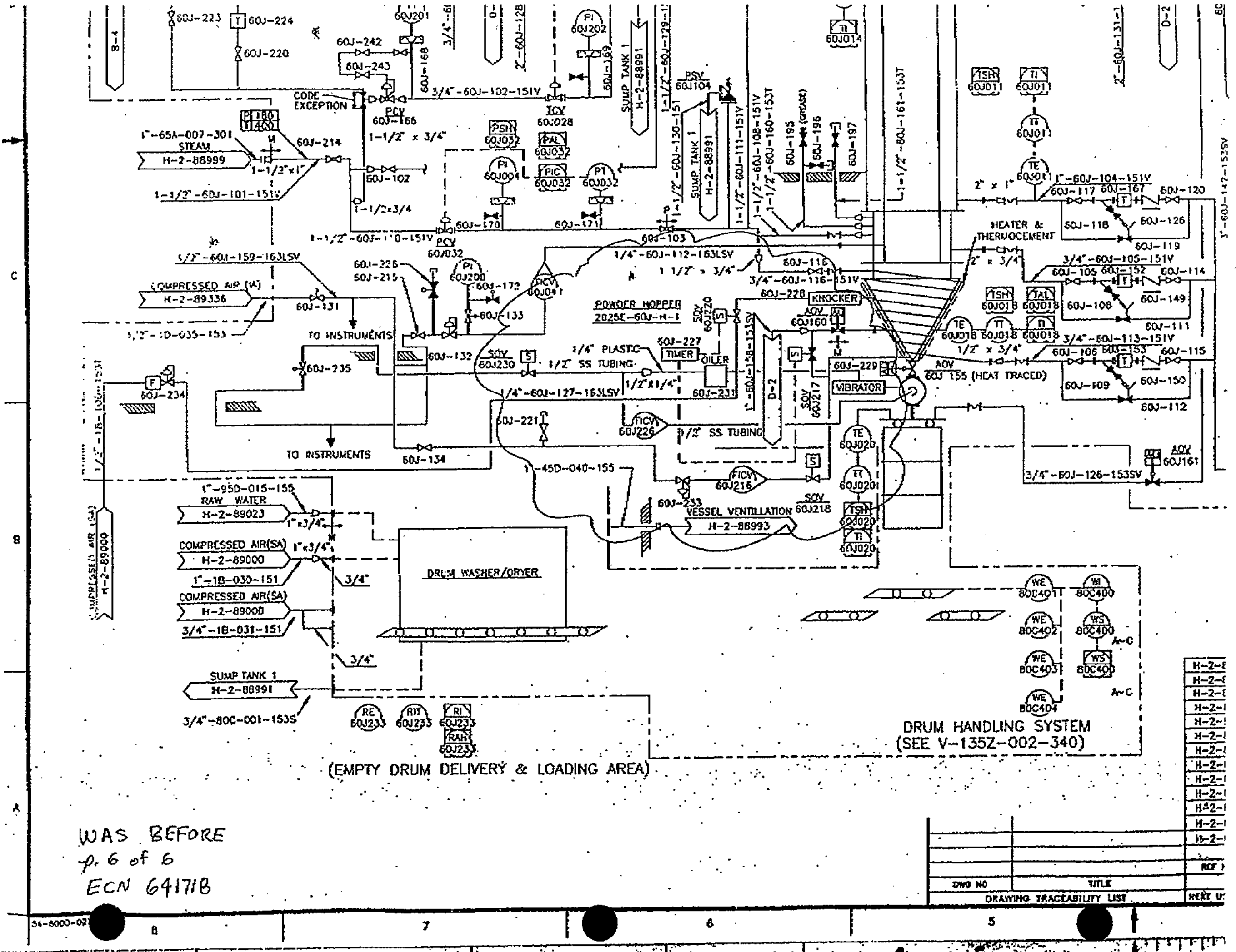
H-2-88989



IS NOW

p. 5 of 6

ECN 641718



WAS BEFORE
p. 6 of 6
ECN 641718

CPF 18

ESSENTIAL

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 641721

Proj. ECN

2. ECN Category (mark one)

Supplemental ☐
Direct Revision ☐
Change ECN ☒
Temporary ☐
Standby ☐
Supersedure ☐
Cancel/Void ☐

3. Originator's Name, Organization, MSIN, and Telephone No.
E. A. McNamar, 32230, S6-72, 373-3465

4. USQ Required?
☐ Yes ☒ No

5. Date
5-22-97

6. Project Title/No./Work Order No.
2nd RO Feed Orifices

7. Bldg./Sys./Fac. No.
2025E/60F

8. Approval Designator
N/A

9. Document Numbers Changed by this ECN (includes sheet no. and rev.)
H-2-88981, Sht 1, Rev. 5
H-2-88982, Sht 1, Rev. 5
H-2-89172, Sht 1, Rev. 4

10. Related ECN No(s).
641720

11. Related PO No.
N/A

12a. Modification Work
☒ Yes (fill out Blk. 12b)
☐ No (NA Blks. 12b, 12c, 12d)

12b. Work Package No.
EL-96-00505

12c. Modification Work Complete

Design Authority/Cog. Engineer Signature & Date

12d. Restored to Original Condition (Temp. or Standby ECN only)
N/A

Design Authority/Cog. Engineer Signature & Date

13a. Description of Change

13b. Design Baseline Document? ☒ Yes ☐ No

On page 3 of ECN 641720 change FO-60F-014* to FO-60F-012*, FO-60F-014A to FO-60F012A, FO-60F-014B to FO-60F012B, FO-60F-014C to FO-60F012C.

On page 4 of ECN 641720 change FO-60F-015 to FO-60F-012

On page 5 of ECN 641720 change FO-60F-014* to FO-60F-012*, FO-60F-014A to FO-60F012A, FO-60F-014B to FO-60F012B, FO-60F-014C to FO-60F012C and FO-60F-015 to FO-60F-012

14a. Justification (mark one)

Criteria Change ☒ Design Improvement ☐ Environmental ☐ Facility Deactivation ☐
As-Found ☐ Facilitate Const ☐ Const. Error/Omission ☐ Design Error/Omission ☐

14b. Justification Details

ECN 641720 assigned number 14 and 15 to new orifices. 14 and 15 had already been assigned to existing orifices.

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

L. L. Lin	S6-72	J. E. Geary	S6-71
E. A. McNamar	S6-72	STA. 3	S2-05
N. J. Sullivan	S6-72	STA. 4	R1-29
A. K. Yoakum	S6-71	STA. 5	T4-30
R. N. Wagner	S6-72	STA. 16	S5-00
		STA. 30	S6-72

RELEASE STAMP
MAY 23 1997
DATE:
HANFORD RELEASE
STA: 30
ID:
25

ENGINEERING CHANGE NOTICE	Page 2 of 2	1. ECN (use no. from pg. 1) 641721

16. Design Verification Required
☒ Yes
☐ No

17. Cost Impact
ENGINEERING N/A CONSTRUCTION

Additional	☐	$	Additional	☐	$
Savings	☐	$	Savings	☐	$

18. Schedule Impact (days)
N/A
Improvement ☐
Delay ☐

19. 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 13. Enter the affected document number in Block 20.

SDD/DD ☐
Functional Design Criteria ☐
Operating Specification ☐
Criticality Specification ☐
Conceptual Design Report ☐
Equipment Spec. ☐
Const. Spec. N/A ☐
Procurement Spec. ☐
Vendor Information ☐
OM Manual ☐
FSAR/SAR ☐
Safety Equipment List ☐
Radiation Work Permit ☐
Environmental Impact Statement ☐
Environmental Report ☐
Environmental Permit ☐

Seismic/Stress Analysis ☐
Stress/Design Report ☐
Interface Control Drawing ☐
Calibration Procedure ☐
Installation Procedure ☐
Maintenance Procedure ☐
Engineering Procedure ☐
Operating Instruction ☐
Operating Procedure ☐
Operational Safety Requirement ☐
IEFD Drawing ☐
Cell Arrangement Drawing ☐
Essential Material Specification ☐
Fac. Proc. Samp. Schedule ☐
Inspection Plan ☐
Inventory Adjustment Request ☐

Tank Calibration Manual ☐
Health Physics Procedure ☐
Spares Multiple Unit Listing ☐
Test Procedures/Specification ☐
Component Index ☐
ASME Coded Item ☐
Human Factor Consideration ☐
Computer Software ☐
Electric Circuit Schedule ☐
ICRS Procedure ☐
Process Control Manual/Plan ☐
Process Flow Chart ☐
Purchase Requisition ☐
Tickler File ☐
☐
☐

20. 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		

21. Approvals

	Signature	Date		Signature	Date
Design Authority	E. A. McNamar E. A. McNamar	5-22-97	Design Agent	E. A. McNamar	5-22-97
Cog. Eng.	E. A. McNamar E. A. McNamar	5-22-97	PE		
Cog. Mgr.	N. J. Sullivan NJSull	5-22-96	QA		
QA			Safety		
Safety			Design		
Environ.			Environ.		
Other			Other		

DEPARTMENT OF ENERGY

Signature or a Control Number that tracks the Approval Signature

ADDITIONAL

ENGINEERING CHANGE NOTICE

FILE COPY

Page 1 of 10

1. ECN ~~614443~~

Proj. ECN W-291H-~~0~~15
DSM/SIA 9/27/94

M

2. ECN Category (mark one)
Supplemental ☒
Direct Revision ☐
Change ECN ☐
Temporary ☐
Standby ☐
Supersedure ☐
Cancel/Void ☐

3. Originator's Name, Organization, MSIN, and Telephone No.
Joe Murphy, ICF KH, ER & SW, G3-17, 373-0867

4. Date
9-19-94

5. Project Title/No./Work Order No.
W-291H 200 AREA BAT/AKART IMPLEMENTATION

6. Bldg./Sys./Fac. No.
ETF TRUCK LOAD IN FACILITY

7. Approval Designator
N/A

8. Document Numbers Changed by this ECN (includes sheet no. and rev.)
DSM/SIA 9/27/94
H-2-817969 SHT 1,2,3,4,5
H-2-817975 SHT 1
Construction Spec. W-291H-C2
ALL REV 0

9. Related ECN No(s).
W291H-~~0~~10
DSM/SIA 9/27/94

10. Related PO No.
N/A/SC/3

11a. Modification Work
[] Yes (fill out Blk. 11b)
[] No (NA Blks. 11b, 11c, 11d)
unknown

11b. Work Package No.
UNKNOWN

11c. Modification Work Complete
N/A
Cog. Engineer Signature & Date

11d. Restored to Original Condition (Temp. or Standby ECN only)
N/A
Cog. Engineer Signature & Date

12. Description of Change

SC/3

ITEM 1: DWG H-2-817969 SHT 1
a. ZONE C-4; Change alignment of line and add line as shown in sketch on page 5.

ITEM 2: DWG H-2-817969 SHT 2
a. Zone DE-3,4; Change alignment of line L-1 and add 4" line as shown in sketch on page 6.
b. Zone AB-7; Change and add line to profile as shown in sketch on page 7.
c. Zone D-7; Change notes as shown in sketch on page 8.
d. Zone B-6; Change detail as shown in sketch on page 8. Related ECN: W291H-~~0~~10 DSM/SIA 9/27/94
e. Zone B-1; Change note 3 to read as follows:
3. The 4" PVC pipe for line L-1 shall be IAW pipe code A or B of section 02650 of the spec.

SEE CONTINUATION SHEET PAGE 3.

13a. Justification (mark one)

		Criteria Change	[]	Design Improvement	[X]	Environmental	[]
As-Found	[X]	Facilitate Const.	[X]	Const. Error/Omission	[]	Design Error/Omission	[X]

13b. Justification Details
See Continuation Sheet Page 4.

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

ICF KH DISTRIBUTION		J. D. Fulcher	S2-32
Const Doc Cntl	S2-53	O. M. Jaka	R3-08
		E. A. McNarma	K6-90
WHC DISTRIBUTION		K. S. Pedersen (COG)	R3-35
Project Files	R1-28	J. H. Rasmussen	T6-20
M. C. Arntzen Jr.	L4-93	B. T. Tabayoyon	R3-35
J. K. Epperley	R1-29	R. L. Veilleux	T3-28

RELEASE STAMP

OFFICIAL RELEASE ⑤
BY WHC
DATE SEP 27 1994
Sta. 4

A-7900-013-2 (06/94) GEF095

A-7900-013-1 (04/94)

ENGINEERING CHANGE NOTICE

Page 2 of 10

1. ECN (use no. from pg. 1)
W291H-0715 DSM/[illegible] 9/27/94

15. Design Verification Required
☐ Yes
☐ No

16. Cost Impact

ENGINEERING			CONSTRUCTION		
Additional	☐	$ 0	Additional	☐	$ 5K
Savings	☐	$	Savings	☐	$

17. Schedule Impact (days)
Improvement ☐ N/A
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 ☐
- Functional Design Criteria ☐
- Operating Specification ☐
- Criticality Specification ☐
- Conceptual Design Report ☐
- Equipment Spec. ☐
- Const. Spec. ☐
- Procurement Spec. ☐
- Vendor Information ☐
- OM Manual ☐
- FSAR/SAR ☐
- Safety Equipment List ☐
- Radiation Work Permit ☐
- Environmental Impact Statement ☐
- Environmental Report ☐
- Environmental Permit ☐

- Seismic/Stress Analysis ☐
- Stress/Design Report ☐
- Interface Control Drawing ☐
- Calibration Procedure ☐
- Installation Procedure ☐
- Maintenance Procedure ☐
- Engineering Procedure ☐
- Operating Instruction ☐
- Operating Procedure ☐
- Operational Safety Requirement ☐
- IEFD Drawing ☐
- Cell Arrangement Drawing ☐
- Essential Material Specification ☐
- Fac. Proc. Samp. Schedule ☐
- Inspection Plan ☐
- Inventory Adjustment Request ☐

- Tank Calibration Manual ☐
- Health Physics Procedure ☐
- Spares Multiple Unit Listing ☐
- Test Procedures/Specification ☐
- Component Index ☐
- ASME Coded Item ☐
- Human Factor Consideration ☐
- Computer Software ☐
- Electric Circuit Schedule ☐
- ICRS Procedure ☐
- Process Control Manual/Plan ☐
- Process Flow Chart ☐
- Purchase Requisition ☐
- Tickler File ☐
- ☐
- ☐

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. Eng.		9/26/94	PE		9-23-94
Cog. Mgr.		9/26/94	QA	N/A DSM	9-22-94
QA			Safety	N/A DSM	9-22-94
Safety			Design	David McShane	9-22-97
Environ.			Environ.	N/A DSM	9-22-94
Other			Other		

DEPARTMENT OF ENERGY

Signature or a Control Number that tracks the Approval Signature

ADDITIONAL

A-7900-013-3 (06/94) GEF096

RSM/SJa 9/27/94

ENGINEERING CHANGE NOTICE CONTINUATION SHEET

Page 3 of 10

ECN W-291H-015

Date 9/19/94

2. DESCRIPTION OF CHANGE CONT.

ITEM 3: DWG H-2-817969 SHT 3
a. Zone B-6,7; Remove gate and change notes as shown in sketch on page 9.

ITEM 4: DWG H-2-817969 SHT 4
a. Zone DEF-1,2,3,4; Remove TYP FENCE DETAIL and associated NOTES.

ITEM 5: DWG H-2-817969 SHT 5
a. Zone C-6; Add conduit to detail as shown in sketch on page 10.

ITEM 6: DWG H-2-817975 SHT 1
a. Zone C-1; Change note 6 to read as follows:

> 6. Pumps shall be supplied by ICF KH and installed by the Contractor IAW manufacturer's recommendations.

ITEM 7: CONSTRUCTION SPECIFICATION W-291H-C2, SECTION 02831
a. Delete Section 02831, Chain Link Fences and Gates.

ITEM 8: CONSTRUCTION SPECIFICATION W-291H-C2, SECTION 02831

a. Pipe Code A: Delete, FLEXIBLE COUPLINGS: COMPRESSION TYPE SLIP ON STEEL; DRESSER TYPE 38 OR 138.

b. Pipe Code C: Add, FLEXIBLE COUPLINGS: COMPRESSION TYPE SLIP ON STEEL; DRESSER TYPE 38 OR 138.

DAVID STEPHEN McSHANE
0027710
9-22-94

BJM/Sja 9/27/94

ENGINEERING CHANGE NOTICE CONTINUATION SHEET

Page 4 of 10

ECN W-291H-015

Date 9/19/94

13b. JUSTIFICATION DETAILS

ITEM 1:
a. AF, Sanitary Water line must be moved to avoid leak detection risers installed by project C-018. 4" lined installed by project C-018 is added.

ITEM 2:
a. AF, Same as Item 1a.
b. AF, 4" line installed by C-018 crosses line L-2 and is added to profile.
c. DI, Redundancy in note is removed.
d. FC, Pipe material as called out on the drawing made fabrication of pipe expensive and time consuming.

ITEM 3:
a. AF, Fence is no longer necessary, therefore installation of a gate is not needed.

ITEM 4:
a. AF, Fence is no longer necessary, therefore the installation of a gate is not needed.

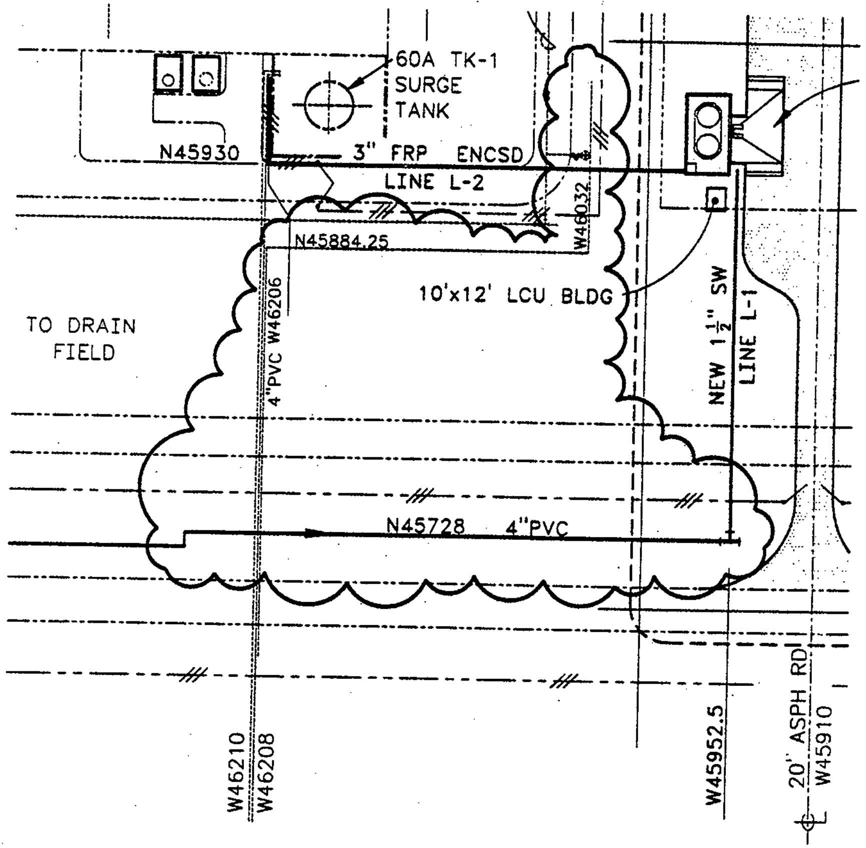
ITEM 5.
a. DE/O, Conduit penetration was left off of detail.

ITEM 6:
a. DI, Pump installation note is made more clear.

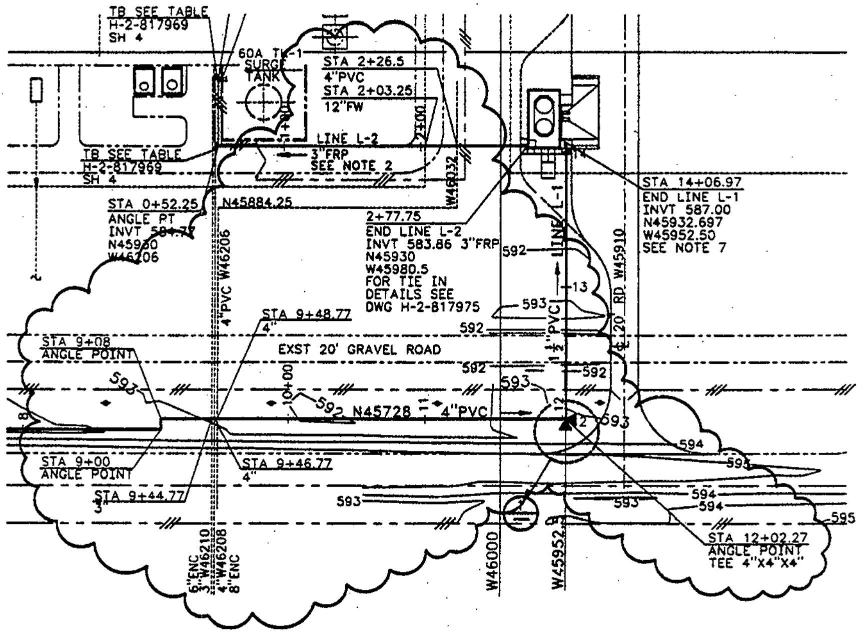
ITEM 7:
a. AF, Same as Item 3a and 4a.

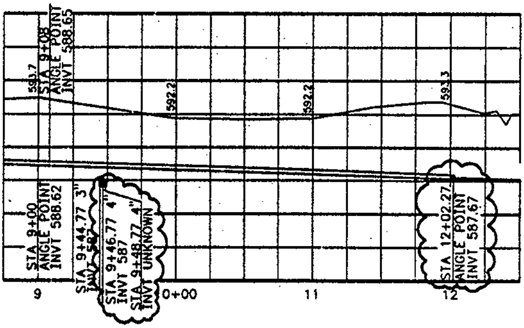
ITEM 8:
a. FC; Because of Item 2d, Compression Coupling is no longer needed in Pipe Code A and is needed in Pipe Code C.

KAISER ENGINEERS HANFORD				ENGINEERING CHANGE NOTICE SKETCH		
Ref. Dwg. H-2-817969	Sh. 1	Rev. 0	Prepared By RC CROSKREY	Checked By	ECN No. W-291H-15	Page 5/10



KAISER ENGINEERS HANFORD	ENGINEERING CHANGE NOTICE SKETCH					
Ref. Dwg. H-2-817969	Sh. 2	Rev. 0	Prepared By RC CROSKREY	Checked By	ECN No. W-291H-15	Page 6/10

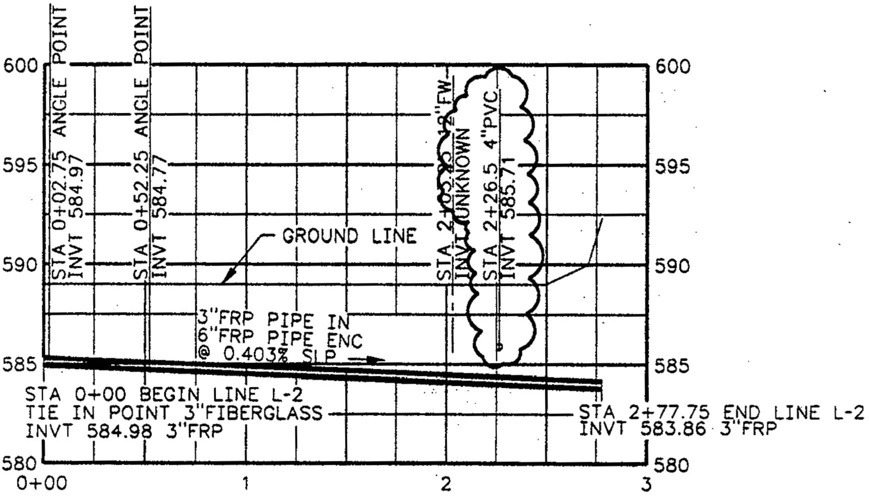




KAISER ENGINEERS
HANFORD

ENGINEERING CHANGE NOTICE SKETCH

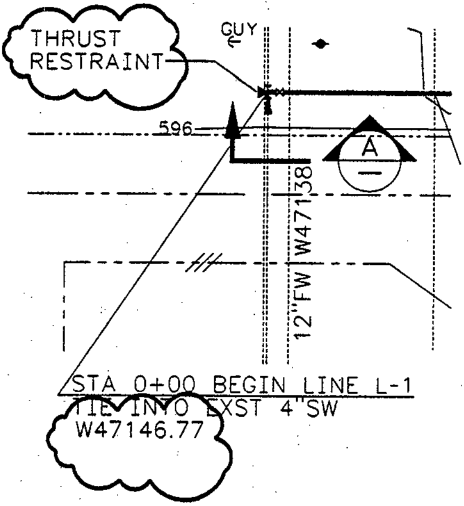
Ref. Dwg.	Sh.	Rev.	Prepared By	Checked By	ECN No.	Page
H-2-817969	2	0	RC CROSKREY		W-291H-15	7/10

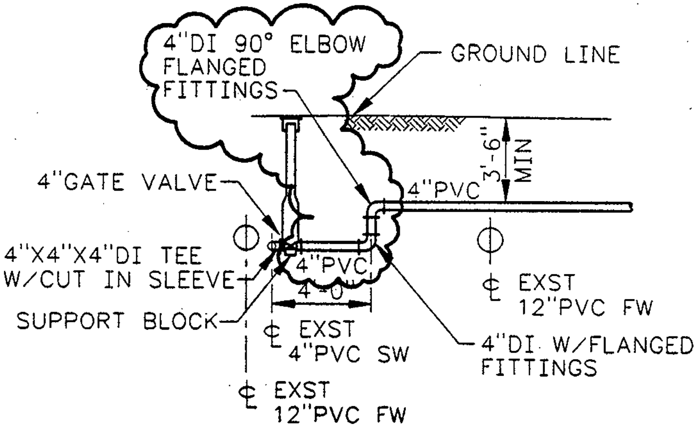


PROFILE LINE L-2

SCALE VERTICAL 1"=5'
HORIZONTAL 1"=50'

KAISER ENGINEERS HANFORD			ENGINEERING CHANGE NOTICE SKETCH			
Ref. Dwg. H-2-817969	Sh. 2	Rev. 0	Prepared By RC CROSKREY	Checked By	ECN No. W-291H-15	Page 8/10





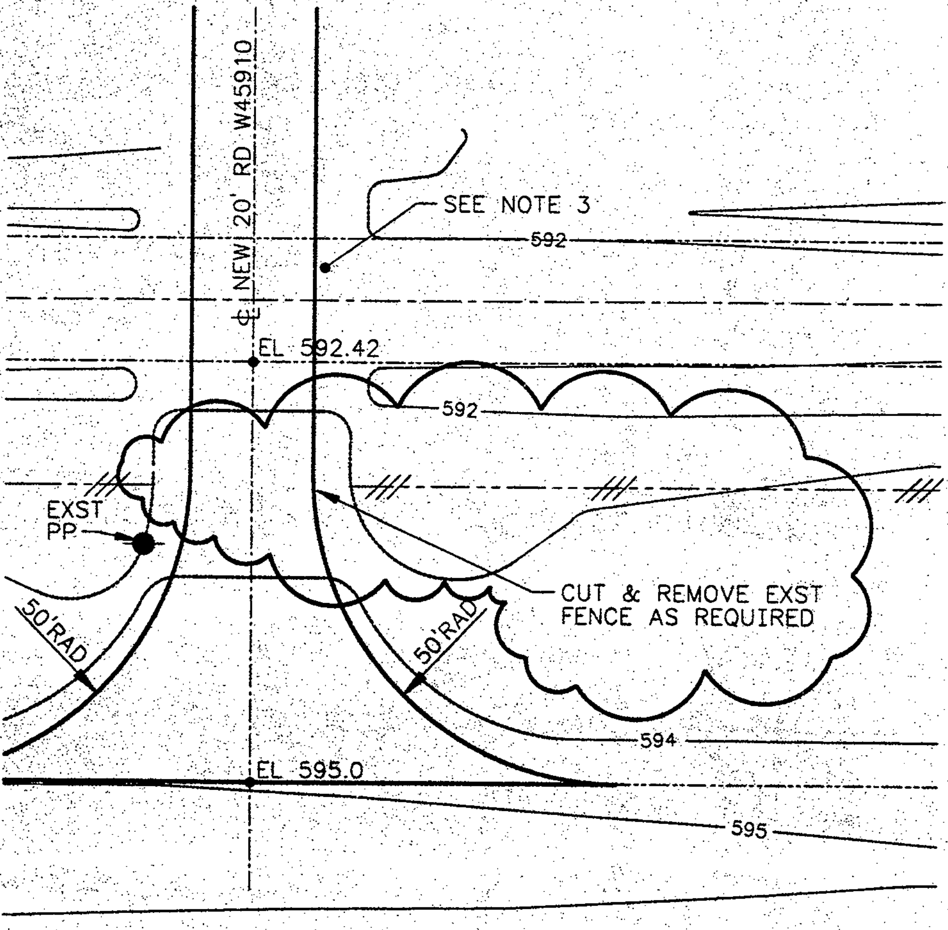
SECTION A

SCALE NONE

KAISER ENGINEERS
HANFORD

ENGINEERING CHANGE NOTICE SKETCH

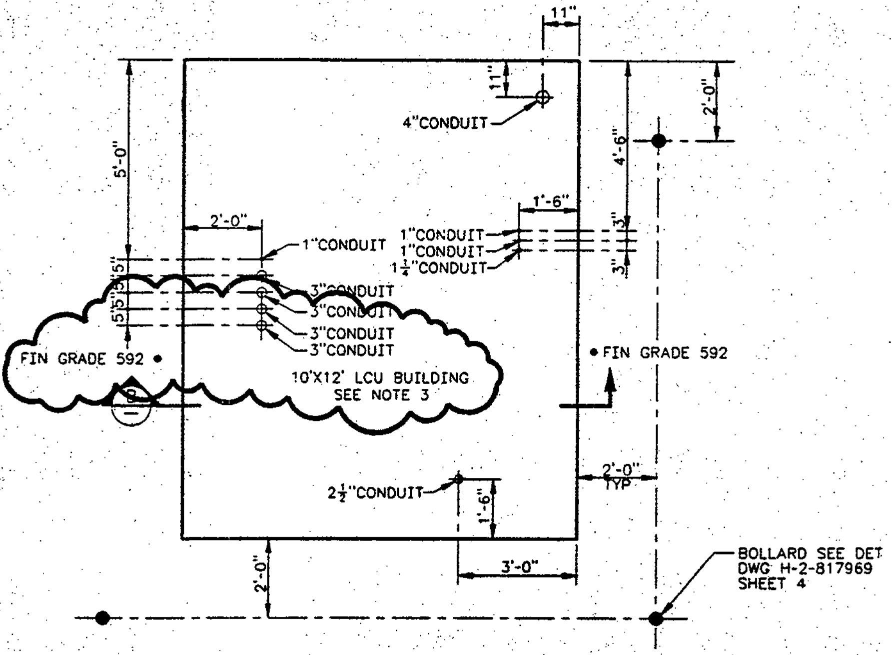
Ref. Dwg.	Sh.	Rev.	Prepared By	Checked By	ECN No.	Page
H-2-817969	3	0	RC CROSKREY		W-291H-15	9/10



KAISER ENGINEERS
HANFORD

ENGINEERING CHANGE NOTICE SKETCH

Ref. Dwg.	Sh.	Rev.	Prepared By	Checked By	ECN No.	Page
H-2-817969	5	0	RC CROSKREY		W-291H-15	10/10



DETAIL ②
SCALE ½"=1'-0" H-2-817969
SH 3

APPENDIX 4C

PROFESSIONAL ENGINEER TANK INTEGRITY ASSESSMENT FOR THE 200 AREA EFFLUENT TREATMENT FACILITY TANK SYSTEM

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DBM CONSULTANTS, INC.
DONALD B. MAUSSHARDT, P.E.

Registered
California
Maryland
Oregon
Virginia
Washington

7705 Falstaff Rd.
McLean, VA 22102
703-893-2921
703-893-9132 (F)

October 16, 1995

Mr. R. T. Cook, P. E.
President & Chief Operating Officer
ADTECHS Corporation
Suite 520
2411 Dulles Corner Park
Herndon, VA 22071

REF: Final RCRA Information Needs Report

Dear Mr. Cook,

I am attaching the final copy of the RCRA Information Needs Report covering section 01010, paragraph 1.7.10.2 of ADTECHS's contract for the ETF Project No. V-C018HCl-001, REV OE. This report, updates the initial March 1993 Information Needs Report prepared for the 100% Design submittal.

It is noted that many of the design documents (plans and specifications) have been revised incorporating changes(ECN's) and have been turned over to ICF-KH. A check of various design document revisions was conducted to assure that conformance with RCRA design requirements. As part of the close-out of the RCRA Independent Needs Report, the plant operation systems tests were observed during the acceptance testing program (ATP) along with the records, to verify conformance with engineering design and specifications for liquid tightness and leak detection.

For those items noted open in my April 1995 report to Mr. Copp Project Manager, all items have now been addressed and the following steps were taken to confirm closure and compliance. A representative sample of the record and modifications were reviewed to verify completeness. A final walkdown of the plant was completed to observe the final SPC used for secondary containment and interviews were conducted with selected staff and contractors to clarify questions raised in the review.

From a RCRA Information Needs stand points, there is one recommendation that would warrant consideration by the operators of the facility. I would recommend that the operators conduct on a annual basis a visual(corrosion indication) and UT(for thickness) inspection of each tank that had been modified or repaired. At the completion of a campaign or at some interval less than a yearly basis, one of the Clawson Tanks be randomly selected for inspection to assure the absence of corrosion. This should include visual and UT(Ultra sound) if any corrosion is observed. The Tanks that should be monitored are: the two Concentrate Tanks(60J-TK-1A & 1B); Secondary Waste Receiving Tanks(60I-TK-1A & 1B); First Stage RO Feed Tank(65C-TK-1); Verification Tanks & Roof and inside support structure(60H-TK-1A,1B,1C); and the Surge Tank(65A-TK-1).

Based upon the information supplied by ADTECHS to me, the facility design complies with the requirements noted in WAC 173-303 et-al. As a registered Professional Engineer licensed in the State of Washington, I have attached my certification to this final report.

Sincerely yours,

Donald B. Mausshardt
Independent RCRA Reviewer

CC: Mr. Denny Shiflett

Attachment: Final RCRA Information Needs Report

CERTIFICATION SECTION WAC 173-303-810-13A FOR FINAL RCRA INFORMATION NEEDS REPORT for EFFLUENT TREATMENT FACILITY
CONTRACT V-C018HCL-001, REVISION OE

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified Personnel properly gather and evaluate the information submitted. Based upon my inquiry of the person or persons who design the systems, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed____________________________
Donald B. Mausshardt, P. E.
Date 10-20-95

DONALD BRUCE MAUSSHARDT
STATE OF WASHINGTON
0029996
REGISTERED PROFESSIONAL ENGINEER

EXPIRES: 6·30·97

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APPENDIX 4D

STRUCTURAL INTEGRITY CERTIFICATION OF THE DIKES AT THE LIQUID EFFLUENT RETENTION FACILITY

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Enclosure

KAISER
ENGINEERS
HANFORD

KAISER ENGINEERS HANFORD COMPANY
POST OFFICE BOX 888
RICHLAND, WASHINGTON 99352

REG NO KAISEEH134BM

CERTIFICATION OF QUALIFIED ENGINEER

In accordance with WAC 173-303-650(4)(c)(i) and (ii), I, Edgar A. Goakey, P.E. certify that the dike portion of the W-105 Project has structural integrity. Specifically:

(i) The dike will withstand the stress of the pressure exerted by the types and amounts of wastes to be placed in the impoundment; and

(ii) The dike will not fail due to scouring or piping, without dependence on any liner[1] system included in the surface impoundment.

This certification is based upon the independent analysis of the structural integrity of the dike as set forth in the KEH memorandum dated March 29, 1991, attached as exhibit 1 and letters from Chen Northern, Inc. dated April 18, 1991 and April 10, 1991 attached as exhibit 2.

DATED THIS 5th day of May, 1991

Kaiser Engineers Hanford, Co.

Edgar A. Goakey
Edgar A. Goakey,
Professional Engineer

EDGAR A. GOAKEY
9813
Edgar A. Goakey 5/5/91

CERTIFICATION ACCEPTED BY

Teresa M Hennig 5/5/91
T. M. Hennig
U. S. Dept of Energy

5/5/91
R. J. Julian
Westinghouse Hanford Co.

T. L. Nord
State of Washington
Department of Ecology

---

[1] The soil/bentonite liner is considered a tertiary liner installed as a part of the dike structure and is in addition to the two flexible membranes (HDPE) and leachate collection system as specified in WAC 173-303 et seq.

Enclosure

KAISER
ENGINEERS
HANFORD

INTEROFFICE MEMORANDUM

TO S. L. Peterson

DATE March 29, 1991

FROM E. A. Goakey

COPIES TO

JOB NO. N/A

SUBJECT RESPONSE TO LETTER OF INSTRUCTION #55, ISSUE 11 AND 16

Please accept this letter as certification that the dike portion of the basins has been designed for structural integrity to prevent failure without dependence on any liner system included in the surface impoundment construction. The dike will withstand the stress of the pressure exerted by the types and amounts of wastes in the impoundment. The dike has a safety factor greater than 3 against failure by sliding and the top of sides are stabilized with a 3 inch layer of crushed gravel to prevent water and wind erosion of the surfaces.

Calculations are attached.

EAG:sme
Attachments

EDGAR A. GOAKEY
9113

Edgar A. Goakey 3/29/91

April 18, 1991

Kaiser Engineers Hanford Company
P.O. Box 888
Richland, Washington 99352

ATTENTION: Mr. Steve Peterson

SUBJECT: Additional Information for Project W-105
Part B Permit Application
Compliance with Washington Annotated Codes,
(WAC) 173-303-650

Gentlemen:

In accordance with your request of April 17, 1991, we have reviewed previously transmitted information and have prepared additional information regarding compliance of the W-105 geotechnical design with WAC 173-303-650. The new information includes:

- o Scour and piping potential for the soil-bentonite liner.

We have reviewed the following information previously transmitted to Kaiser Engineers Hanford Company (KEH):

- o Soil-Bentonite Liner Permeability (Chen-Northern letter of March 11, 1991 to KEH).
- o Shear strength, dike stability, settlement, subsidence, and uplift stresses on the gravel dikes and soil-bentonite liner (Chen-Northern letter of March 26, 1991 to KEH). In these analyses, each basin liner was assumed to consist of two High Density Polyethylene liners and a tertiary soil-bentonite system. The soil-bentonite liner was considered to be part of the dikes in regard to structural integrity.
- o Piping and scour potential of the gravel dikes (Chen-Northern letter of April 10, 1991 to KEH).

The results of our review and recent analysis indicates that:

1. The W-105 dikes, including the gravel basins and soil-bentonite liner, are expected to withstand the hydraulic pressures exerted by the liquid waste in the impoundment.
2. The geotechnical design of the W-105 project, including the factors listed above, complies with the requirements set forth in WAC 173-303-650.

April 18, 1991

Kaiser Engineers Hanford Company
P.O. Box 888
Richland, Washington 99352

ATTENTION: Mr. Steve Peterson

SUBJECT: Additional Information for Project W-105
Part B Permit Application
Compliance with Washington Annotated Codes,
(WAC) 173-303-650

Gentlemen:

In accordance with your request of April 17, 1991, we have reviewed previously transmitted information and have prepared additional information regarding compliance of the W-105 geotechnical design with WAC 173-303-650. The new information includes:

- Scour and piping potential for the soil-bentonite liner.

We have reviewed the following information previously transmitted to Kaiser Engineers Hanford Company (KEH):

- Soil-Bentonite Liner Permeability (Chen-Northern letter of March 11, 1991 to KEH).
- Shear strength, dike stability, settlement, subsidence, and uplift stresses on the gravel dikes and soil-bentonite liner (Chen-Northern letter of March 26, 1991 to KEH). In these analyses, each basin liner was assumed to consist of two High Density Polyethylene liners and a tertiary soil-bentonite system. The soil-bentonite liner was considered to be part of the dikes in regard to structural integrity.
- Piping and scour potential of the gravel dikes (Chen-Northern letter of April 10, 1991 to KEH).

The results of our review and recent analysis indicates that:

1. The W-105 dikes, including the gravel basins and soil-bentonite liner, are expected to withstand the hydraulic pressures exerted by the liquid waste in the impoundment.
2. The geotechnical design of the W-105 project, including the factors listed above, complies with the requirements set forth in WAC 173-303-650.

If you have any questions regarding this letter, or if we can be of further service, please contact us.

Respectfully Submitted,
CHEN-NORTHERN, INC.

Brian J. Williams, P.G.
Geotechnical Engineer

Dock J. Burrie, P.E.
Division Manager

PIPING AND SCOUR

Piping through a soil-bentonite liner may occur when the liner is penetrated by some conduit (hole or leakage path), and water is allowed to pass unimpeded through the conduit. In the design of the W-105 soil-bentonite liner, a non-woven geotextile (Polyfelt TS 750 ®) was specified for placement between the gravel dike materials and the soil-bentonite liner. Our analysis indicates that the geotextile will perform as an effective retention barrier, thus minimizing the potential for soil-bentonite liner piping.

Scour of a soil-bentonite liner is a function of flow type and velocity of flow adjacent to the soil-bentonite liner. Under normal operating conditions of hydrostatic pressure, a pinhole-type or seam-type leak is the normal mode of leakage. This type of leakage is typically low velocity and low volume. In this case, scour is not expected to occur. Scour of the soil-bentonite liner is only expected to occur under conditions of high velocity turbulent flow, such as a hose directed at unprotected section of the soil-bentonite, or a large-scale pipe failure leaking high-pressure fluid directly onto the soil liner. Since no piping penetrates the soil-bentonite liner, this situation is not expected to occur.

Chen-Northern, Inc.

April 10, 1991

Kaiser Engineers Hanford Company
P.O. Box 888
Richland, Washington 99352

ATTENTION: Mr. Steve Peterson

SUBJECT: Additional Information
W-105 Part B Permit Application

Gentlemen:

In accordance with your request of April 9, 1991, we have reviewed the potential for scour and piping in the gravel dikes of the W-105 project.

Our analysis indicates that, under all liner leakage conditions (excluding total loss of the liner), piping or scour are not expected to impact the stability of the gravel dikes.

If you have any questions regarding this letter, or if we can be of further service, please call us.

Respectfully Submitted,
CHEN-NORTHERN, INC.

Brian J. Williams
Brian J. Williams, P.G.
Geotechnical Engineer

Don J. Burrie, P.E.
Division Manager

PIPING AND SCOUR

Piping is a progressive erosion and transport mechanism which may occur when seepage forces through a water-retaining embankment cause erosion at the downstream face of the embankment. The erosion progresses upgradient from the face of the embankment and eventually encounters the impounded fluid, precipitating a massive loss of fluid. The primary factors controlling piping are embankment grain size and the exit velocity of seepage water through the embankment.

Scour is an open-surface erosion mechanism which may occur when free-field water velocities are of sufficient velocity to erode and transport particles, in accordance with Stokes law. The primary factors controlling scour are water velocity and grain size.

The basic assumption behind potential piping or scour is that a phreatic surface has formed through or below the water-retaining embankment, and that the seepage forces along, inside, or downstream (outside) of the embankment are sufficient to erode the embankment soils.

At the W-105 project, under all conditions except complete loss of the liner, no phreatic surface is expected to develop through the embankment which exits outside (downstream) of the embankment. The reasons for this include:

o Groundwater at the project site is more than 150 feet below the ground surface.

o The in-place permeability of the native soils is relatively high, ranging from about 5.5x10-4 centimeters per second to 1 centimeter per second (Chen-Northern, 1990).

Considering the relatively deep groundwater and relatively high rate of subsurface permeability, pond leakage (through the liner system) will tend to migrate vertically downward. In the case of this vertical flow, the basic mechanisms precipitating scour and piping cannot occur, and therefore neither piping or scour is expected to impact the stability of the gravel dikes at the W-105 project.

RREFERENCES

Chen-Northerrn, Inc., 1990, "Report of Geotechncial Investigation, W-105 242-A Evaporation and Purex Interim Rentention Basins", Report for Kaiser Engineers Hanford Company.

9102434

Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

MAY 17 1991

MAY 31 1991

91-WOB-172

Mr. Timothy L. Nord
Hanford Project Manager
State of Washington
Department of Ecology
Mail Stop PV-11
Olympia, Washington 98504

Dear Mr. Nord:

RESPONSE TO MAY 3, 1991, LETTER, "LERF POND LINER, LETTER OF APRIL 30, 1991, CERTIFICATION"

Reference: Letter, S. H. Wisness, U. S. Department of Energy-Richland Operations Office to T. L. Nord, Washington Department of Ecology, Response to April 30, 1991, letter, "LERF Pond Liner, Test Pad No. 6, "dated May 3, 1991.

The subject letter again raises the question of "certification." At the technical meeting held in Richland, Washington, attended by your representatives, they accepted the "certification" as answered in the reference letter (repeated below):

> "The April 10 and 18 letters from Chen-Northern Inc., were discussed in relation to certifying that the dikes will not fail due to scouring or piping. It was agreed by Ecology (Gary Anderson) that both of these Professional Engineer (PE) stamped letters are acceptable and complete documentation that "the dikes will not fail due to scouring or piping" as required by WAC 173-303-650. It was also agreed that the Professional Engineer's opinion as indicated by the stamping of the aforementioned letters is acceptable and is consistent with the EPA permitting requirements for land disposal facilities cited in the Federal Register July 26, 1982, and as stated in RCW 18.43.070, Certificates and Seals; 1989 (both quoted below):
>
> o Federal Register July 26, 1982 - 'The terms "certification," "certify," and "certified" are used throughout the regulations,' including those promulgated today, to refer to the rendering of a professional opinion concerning compliance with a requirement of the regulations by a qualified professional in the field. Commenters have suggested that courts sometimes interpret these terms to imply that certification is equivalent to a guarantee or warranty, thus relieving other parties (e.g., owners and operators) of their responsibilities under regulations as a result of such certifications. This was not intended by the Agency in the various RCRA certification requirements. By requiring a certification, the Agency is seeking the opinion from a

professional qualified in the field but does not intend to relieve owners and operators from their responsibilities under the regulations. The definition does not address the potential liabilities of the certifying party. This a matter to be resolved between the certifying party and the owner or operator in accordance with applicable law. Since EPA still believes the terms "certification" and "certify" accurately denote the Agency's intention, EPA is choosing to define the terms to eliminate possible legal misinterpretation.'

- RCW 18.43.070, Certificates and Seals, 1989 - 'Each registrant hereunder shall upon registration obtain a seal of the design authorized by the board, bearing the registrant's name and the legend "registered professional engineer" or "registered professional land surveyor". Plans, specifications plats and reports prepared by the registrant shall be signed, dated and stamped with said seal or facsimile thereof. Such signature and stamping <u>shall constitute a certification</u> (underline emphasis added) by the registrant that the same was prepared by or under his direct supervision and that to his knowledge and belief the same was prepared in accordance the requirements of statute.'

The recorder's note from the May 1, 1991 technical meeting, indicates that Mr. Anderson stated, "in the morning (5-2-91) I'll grab Toby Michelena and tell him the results of this meeting and tell him that my objections to the moisture content spread are satisfied and I can accept the <u>certification because it is indeed a valid certification</u> (underline added) and I can recommend that we proceed with lining the ponds."

To expeditiously receive construction authorization, the attached "Certification of Qualified Engineer" was prepared and provided to you in Richland, Washington, on May 5, 1991. With attainment of your signature, construction of the LERF basins commenced on May 6, 1991.

It is felt that the "Certification of Qualified Engineer" was not required since the Revised Code of Washington defines the stamp and signature of a registered professional engineer as meaning "certification". I wish to point out that the preparation of the "Certification of Qualified Engineer" was done to minimize continued delay in starting construction of the LERF basins, since any additional delay would have cost greater than $11,000 per day.

A protocol must be established to identify Ecology's role in Hanford's construction activities. Though we welcome your participation, we must ensure that DOE retains the role of project/program manager. Ecology needs to be provided access and review of activities/documents while maintaining the stance of an independent regulatory. Please let me know when a special meeting to clarify our working protocol can be arranged.

Questions on this should be directed to Ms. T. M. Hennig on (509) 376-6888.

Sincerely,

Steven H. Wisness
Hanford Project Manager

Attachment

cc w/att
P. Stasch, Ecology
G. Anderson, Ecology
T. Michelena, Ecology
T. B. Veneziano, WHC
D. E. Kelley, WHC

APPENDIX 7A

BUILDING EMERGENCY PLAN FOR 200 AREA EFFLUENT TREATMENT FACILITY AND LIQUID EFFLUENT RETENTION FACILITY

Because the ETF, LERF, and the 200 Area Treated Effluent Disposal Facility (TEDF) are operated and managed by the same organization, the scope of this unit-specific building emergency plan addresses the 200 Area TEDF in addition to the ETF and LERF. The 200 Area TEDF is a conveyance and disposal system for non-hazardous, non-mixed wastewaters. Sections 1.4.3, 1.5.3, 5.3, and 6.1.3 pertain to the 200 Area TEDF, therefore, are included for completeness but are not subject to the requirements of WAC 173-303.

RUST FEDERAL SERVICES OF HANFORD INC.	Manual	HNF-IP-0263-ETF
	Revision	3
BUILDING EMERGENCY PLAN	Page	i of iv
FOR 200 AREA EFFLUENT TREATMENT FACILITY	Effective Date	6/27/97
AND LIQUID EFFLUENT RETENTION FACILITY	Organization	RFSH/LWPF

Approved by

DW Lindsey, Manager
200 AREA LIQUID WASTE
PROCESSING FACILITIES

This plan covers the following Locations:

200 Area Effluent Treatment Facility (ETF)
Liquid Effluent Retention Facility (LERF)
200 Area Treated Effluent Disposal Facility (TEDF)
200 Area Effluent Treatment Facility Groundwater Transfer System (GTS)

Approved:

Jim Dallas — 6-27-97
Building Emergency Director — Date

6-26-97
Emergency Preparedness — Date

R. M. — 6-27-97
Hanford Fire Department — Date

This document will be reviewed annually and updated as required by the Building Emergency Director and modified pursuant to Washington Administrative Code (WAC) 173-303-830 and in accordance with the Hanford Facility RCRA permit. This document will be approved by the primary Building Emergency Director, Manager of Emergency Preparedness (or delegate), and the Hanford Fire Department.

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BUILDING EMERGENCY PLAN FOR 200 AREA EFFLUENT TREATMENT FACILITY AND LIQUID EFFLUENT RETENTION FACILITY

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1.0 GENERAL INFORMATION

The 200 Area Effluent Treatment Facility (ETF) and the Liquid Effluent Retention Facility (LERF) are located in the northeast portion of the 200 East Area. The 200 Area Treated Effluent Disposal Facility (TEDF) and 200 Area ETF Groundwater Transfer System (GTS) are operated from the 2025E building. Transfer piping systems for both TEDF and GTS are located in the 200 East and 200 West areas. 200 East and 200 West areas are located near the center of the Hanford Site, a 560 square mile U.S. Department of Energy (DOE) site in southeastern Washington State.

1.1 **FACILITY NAMES:**
U.S. Department of Energy Hanford Site
200 Area Effluent Treatment Facility (ETF)
Liquid Effluent Retention Facility (LERF)
200 Area Treated Effluent Disposal Facility (TEDF)
200 Area ETF Groundwater Transfer System

1.2 **FACILITY LOCATIONS:** Benton County, Washington; within the 200 East and 200 West Areas.

ETF Buildings/facilities are:

2025E Building	Effluent Treatment Facility
2025EA Building	ETF Administration Building
MO-269	Materials Control Trailer
Load-in Station	Tanker truck load-in station

LERF Buildings/facilities are:

Basins 42, 43, and 44	Liquid Effluent Retention Facility
Change Trailer	Located directly between Basins 42 and 43
242AL71 Instrument Building	Located north between Basins 42 and 43
Electrical Power Substation	North side of LERF

TEDF and GTS Buildings/facilities are:

Transfer piping	200 East and West areas
225W Building	Pump House 1 - 200 West Area
225E Building	Pump House 2 - 200 East Area
6653A Building	Pump House 3 - 200 East Area
6653 Building	Disposal Sampling Building

1.3 **OWNER:**

U.S. Department of Energy
Richland Operations Office
825 Jadwin Avenue
Richland, Washington 99352

FACILITY MANAGER:	Rust Federal Services of Hanford, Inc. P.O. Box 700 Richland, Washington 99352
ORGANIZATION:	Liquid Waste Processing Facilities (LWPF)

1.4 DESCRIPTION OF THE FACILITY AND OPERATIONS

1.4.1 Effluent Treatment Facility

The ETF treats various aqueous wastes generated at the Hanford site prior to discharging the effluent to a State Approved Land Disposal Site (SALDS), located adjacent to the 200 West Area.

The ETF operations structure is comprised of the following:

Process area in 2025E Building
Administration areas in 2025E and 2025EA Buildings
Load-in Station
External tank storage area

The 2025E Building is a two story structure, with a control room on the second level overlooking the process area. The process area is a high bay, single story area of the 2025E Building. The process area is a Radiological Buffer Area (RBA). The RBA is a posted area and contains various Radiological Controlled Areas (RCA). The entire 200 East Area is classified as an RCA.

The external tank storage area is inside the fenced area immediately outside of the 2025E Building. The 200 East Area security fence encloses the ETF except for the discharge line from the verification tanks to the SALDS. This fence is used to control personnel access and exclude deer and other large animals from the facility.

Figure 1 shows the evacuation routes from the 2025E Building.

Figure 2 shows the ETF/LERF site staging areas.

1.4.2 Liquid Effluent Retention Facility

The LERF consists of three identical surface impoundments constructed with primary and secondary composite liners, a leachate detection, collection, and removal system between liners, and a floating cover. The LERF basins act as an interim storage location for aqueous waste from the 242-A Evaporator, groundwater, and other site remediation projects prior to treatment at ETF. The LERF is a basin operations structure comprised of the following:

- Excavation and dikes (basins)

- Primary and secondary composite liners
- Leachate detection, collection, and removal system
- Cover
- Piping and pumps
- MO-727 - Change trailer
- 242A171 Instrument Building

1.4.3 200 Area Treated Effluent Disposal Facility and Groundwater Transfer System

The 200 Area TEDF transports the 200 East and West Area facility effluents to a common disposal system. TEDF consists of approximately 62,000 feet of collection and transfer system piping, three pump stations, a sample building, and two 5-acre disposal ponds located southeast of ETF. The TEDF accepts liquid effluents from numerous sources in the 200 East and 200 West Areas that meet environmental permit requirements for disposal in the disposal ponds.

The GTS transfers groundwater extracted from the 200-UP-1 Operable Unit for interim storage at LERF and subsequent treatment at ETF. The system boundary begins at the first flowmeter from the 200-UP-1 pumps in the 200 West Area and ends at the connection to the LERF basins sample riser.

Figure 3 shows the major facility structures and liquid effluent sources for the SALDS, TEDF, and GTS.

1.5 BUILDING EVACUATION ROUTING

Figures 1 and 2 show building evacuation routes and staging areas.

1.5.1 Effluent Treatment Facility

The 2025E Building evacuation routes are shown in Figure 1. Primary and Alternate staging areas are shown in Figure 2.

1.5.2 Liquid Effluent Retention Facility

Primary and alternate staging areas are shown in Figure 2.

1.5.3 Treated Effluent Disposal Facility

Figure 3 shows the TEDF location.

1.5.4 Groundwater Transfer System

Figure 3 shows the GTS location.

FIGURE 1 - EVACUATION ROUTES FROM 2025E

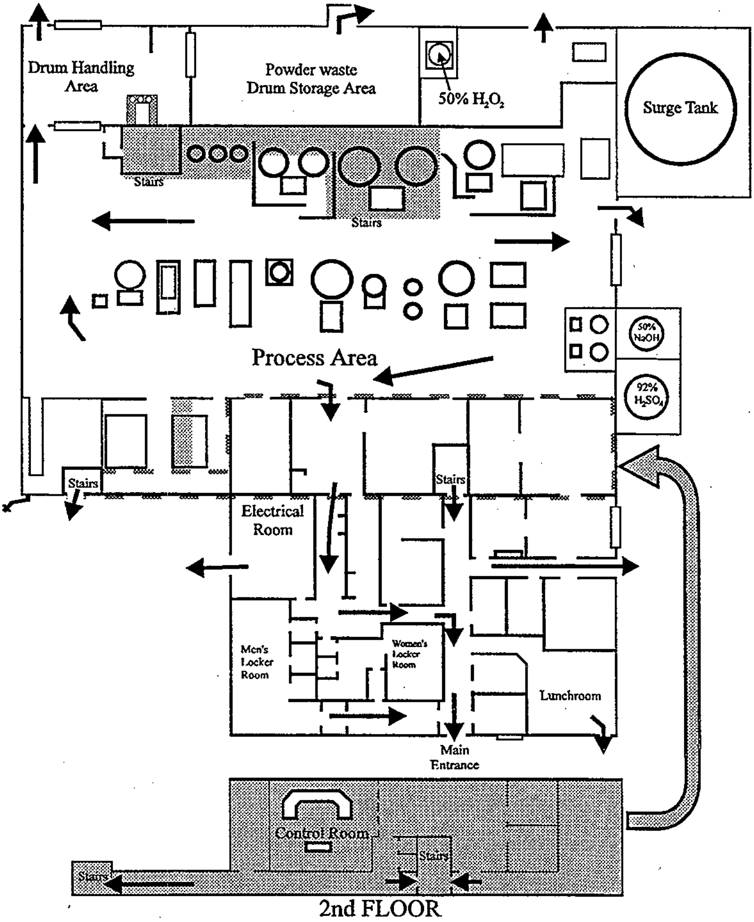
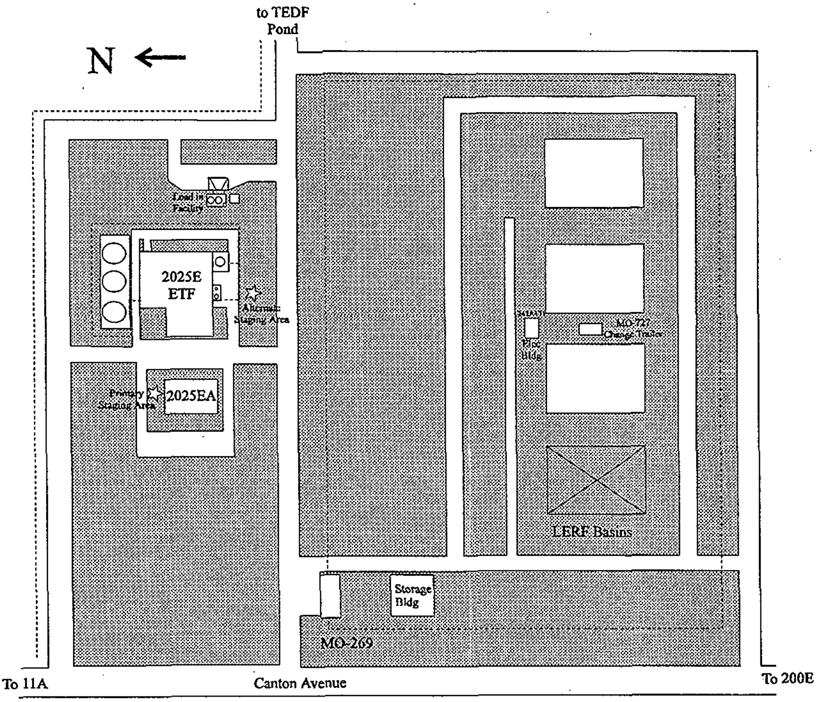


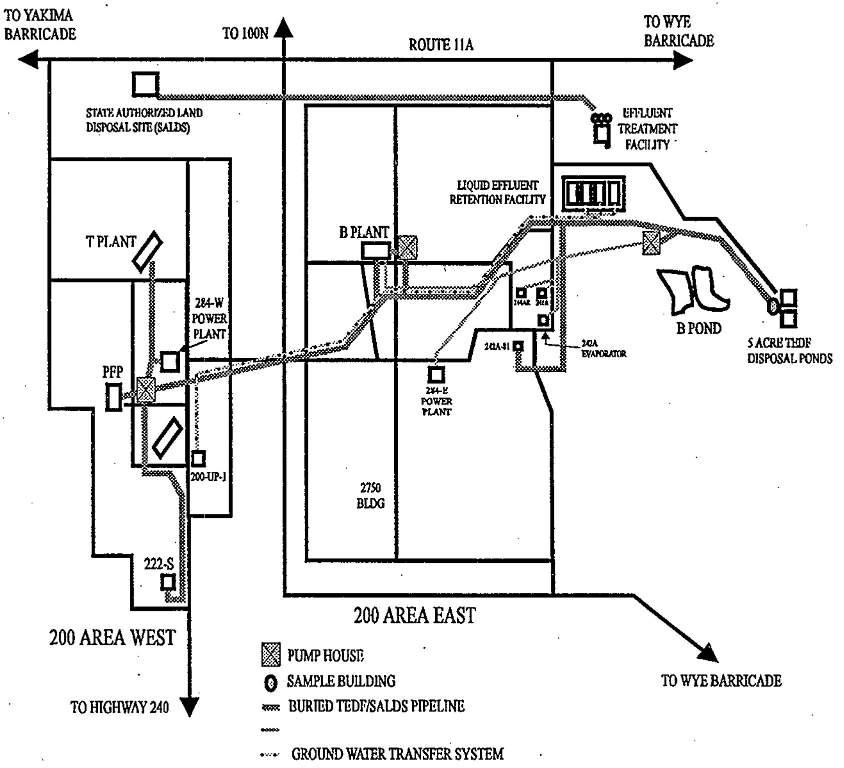
FIGURE 2 - ETF/LERF SITE PLAN



☆ Staging Area

ETF or LERF site evacuation routes will be determined by the Building Emergency Director dependent on event location and wind direction

FIGURE 3 - 200 AREA LWPF - SALDS, TEDF, GROUND WATER TRANSFER SYSTEM



2.0 PURPOSE

This plan describes both the facility hazards and the basic responses to upset and/or emergency conditions. "Emergency" as used in this document includes events meeting the Washington Administrative Code (WAC) 173-303 definition of emergency as well as U.S. Department of Energy (DOE) Order DOE O 232.1 categories of Unusual Occurrence and Emergency. These events include spills or releases, fires and explosions, transportation activities, movement of materials, packaging, storage of hazardous materials, and natural and security contingencies. When used in conjunction with the *Hanford Facility Contingency Plan* (DOE/RL-93-75), this plan meets the requirements for contingency planning as required by WAC 173-303.

3.0 BUILDING EMERGENCY ORGANIZATION

3.1 BUILDING EMERGENCY DIRECTOR

The Building Emergency Director (BED) or designated alternate has overall responsibility for implementing this plan. The BED has the responsibilities of the Emergency Coordinator as discussed in WAC 173-303-360 and is also the Event Commander for facility related events. A listing of primary and alternate BEDs by title, work location, and work telephone number is contained in Section 13 of this plan. Emergency Preparedness maintains a listing of BED names, work, and home telephone numbers, at the Patrol Operations Center (POC), in accordance with Hanford Facility RCRA Permit, Dangerous Waste Portion, General Condition II.A.4. The BEDs have the authority to commit all necessary resources (both equipment and personnel) to respond to any emergency. Additional responsibilities have been delegated to Hanford Fire Department (HFD) personnel who, as the designated Incident Commander, are authorized to act for the BED when the BED is absent in accordance with the *Hanford Facility Contingency Plan* (DOE/RL-93-75), Section 3.0. These HFD personnel have the authority to commit all necessary resources (both equipment and personnel) to respond to any emergency.

3.2 OTHER MEMBERS

As a minimum, the BED or designee appoints and trains individuals to perform as Personnel Accountability Aides and Staging Area Managers. The accountability aides are responsible for facilitating the implementation of protective actions (evacuation or take cover) and for facilitating the accountability of personnel after the protective actions have been implemented. Staging Area Managers are responsible for coordinating/conducting activities at the staging area. In addition, the BED may identify additional support personnel (rapid and detailed evaluation inspector, radiological control, maintenance, engineering, hazardous material coordinators, etc.) to be part of the building emergency organization.

The complete building emergency organization listing of positions, names, work locations, and telephone numbers for these facilities is maintained in a separate location in a format determined appropriate by facility management. Copies are distributed to appropriate facility locations and to Emergency Preparedness.

4.0 IMPLEMENTATION OF THE PLAN

To meet the requirements of WAC 173-303-360, this plan will be considered implemented when the BED has determined that a release, fire, or explosion involving dangerous waste or dangerous waste constituents that could threaten human health or the environment (WAC 173-303 Emergency) has occurred at the facility. An incident requiring evacuation of personnel or the summoning of emergency response units will not necessarily indicate that the plan has been implemented. The incident classification process is described in the *Hanford Facility Contingency Plan* (DOE/RL-93-75), Sections 4.0, 5.1.4, and 5.1.5.

Under DOE guidance, this plan will be considered implemented whenever the BED determines that one of the incidents listed in Section 6.0 has or will occur and that the severity is or will be such that there is a potential to endanger human health or the environment (DOE Unusual Occurrence or Emergency).

LWPF implements this plan through emergency response guides, plant casualty plans, and other documents in Attachment A.

The BED must assess each incident to determine the response necessary to protect personnel, facility, and the environment. If emergency assistance from Hanford Patrol, Fire, or ambulance units is required, the Hanford Emergency Response Number (911) must be used to contact the POC and request the desired assistance. To request other resources or assistance from outside the facility, the POC business number is used (373-3800).

5.0 FACILITY HAZARDS

Facility hazards and potential targets are identified and evaluated in the hazards assessment required by DOE Orders for the LERF/ETF. The hazards assessment is not used in the Hanford Facility contingency planning program. The objective of this section of the emergency plan is to document all known hazards that pose significant risks to human health or to the environment and identify quantitative values for those significant risks.

Certain information in this plan pertains only to DOE Order considerations (e.g., discussions pertaining to hazards from hazardous materials and radioactive-only materials). Terms such as Emergency Response Protective Guidelines (ERPG), Alert Emergencies, Site Area Emergencies, and General Emergencies pertain only to DOE Order planning considerations. These hazards and terms are not part of the

Hanford Facility contingency planning program. The only portion of this section that is part of the Hanford Facility contingency planning program are the chemical constituent hazards discussed in Section 5.1.3, 5.2.3, and 5.3.3.

Hazardous Material

Appropriate emergency response protective actions are based on the amount of hazardous material released and the potential consequences that material might have on human health and the environment. ERPGs identify consequences related to the following exposure levels for hazardous material:

- ERPG-1 is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing effects other than mild transient adverse effects or perceiving a clearly defined objectionable odor.
- ERPG-2 is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action.
- ERPG-3 is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects.

The criteria for emergency classification correlates the ERPG to boundaries between the hazardous material and the public and environment.

Radiological Material

The hazards assessment uses the maximum bounding radiological inventories at the ETF, which include waste characteristics, along with the surge tank, secondary waste receiving tank, evaporator concentrate tank, verification tanks, and 1,000 powder drum inventories added together to develop the total inventory for ETF. The total activities of individual isotopes are below 10 CFR 307.2, Schedule C, quantities and do not meet the requirement for analysis. Inventories at LERF are determined by the waste characteristics, along with the retention basin radiological inventories added together to develop the total inventory. Radiation survey results will alert the operator to a problem that might impact the human health or the environment.

Classification Criteria for an Alert Emergency

An Alert Emergency is declared when events are in progress or have occurred that involve an actual or potential substantial degradation of the level of safety of the facility with an increased potential for a release. This includes any release of hazardous or radiological materials that can be reasonably expected to exceed the following:

Hazardous Materials - Release:

Exposure (air concentrations) of > ERPG-1 but < ERPG-2 at the facility boundary.

Radioactive Materials - Release:

Projected dose > 100 millirem (0.001 Sv) Total Effective Dose Equivalent (TEDE) as calculated at the affected facility boundary.

Classification Criteria for a Site Area Emergency

A Site Area Emergency is declared when events are in progress or have occurred that involve actual or likely major failures of facility functions needed for the protection of human health and the environment. This includes any release of hazardous or radiological materials that can be reasonably expected to exceed the following:

Hazardous Materials - Release:

Exposure limits (air concentrations) > ERPG-2 at the facility boundary but < ERPG-2 at the Hanford Site boundary.

Radioactive Materials - Release:

Projected dose ≥ 1 rem (0.01 Sv) TEDE as calculated at the affected facility boundary.

Classification Criteria for a General Emergency

A General Emergency is declared when events are in progress or have occurred that involve actual or imminent catastrophic failure of facility safety systems with a potential for loss of confinement or containment integrity. This includes any release of hazardous or radiological materials that can be reasonably expected to exceed the following:

Hazardous Materials - Release:

Exposure limits (air concentrations) > ERPG-2 criteria at the Hanford Site boundary.

Radioactive Materials - Release:

Projected dose ≥ 1 rem (0.01 Sv) TEDE as calculated at the Hanford Site boundary.

5.1 ETF HAZARDS

5.1.1 Hazardous Materials

Materials at the ETF defined in DOE Order guidance as potentially hazardous include chemicals added as part of the treatment process, chemicals added to prevent corrosion, and anti-foaming agents added to the evaporator. There are no explosives in the system, although some chemicals can react or decompose violently. Hazardous chemicals in the process liquid are discussed in Section 5.1.3.

Hazardous process chemicals identified in the hazards assessment are given in Table 1, including the associated DOE Order ERPG values. DOE Order emergency planning ensures that appropriate protective actions are taken for the full range of events from a release of hazardous material that has the potential to exceed limits.

Table 1 ETF HAZARDOUS PROCESS CHEMICALS

Hazardous Chemical	ERPG Values		
	1	2	3
50% hydrogen peroxide	NA	25 ppm	50 ppm
92% sulfuric acid	2 mg/m^3	10 mg/m^3	30 mg/m^3
50% sodium hydroxide	2 mg/m^3	40 mg/m^3	100 mg/m^3

ppm-parts per million mg-milligram m^3-cubic meter

5.1.2 Industrial Hazards

The industrial hazards associated with the facility include electrical equipment, rotating equipment, confined spaces, compressed gas cylinders, and propane tanks. The industrial hazards associated with the facility do not pose a threat to the human health or the environment. Industrial hazards are addressed in the building health and safety plan and maintenance programs.

5.1.3 Radioactive/Dangerous/Mixed Waste

5.1.3.1 Solid Form

There are three types of solid mixed wastes at ETF:

- Secondary waste powder - A dry powder with a low radioactivity level that may contain ammonium, sodium, sulfates, silicon, nitrates, calcium, magnesium, and trace metals. The ETF Process Run Plan will document the characterization of the waste streams. The process drum capacity is 55 gallons. Locations include the thin film dryer room, drum handling area, and the process drum storage area. Maximum radiological source terms and hazardous materials for the secondary waste powder are below the levels requiring evaluation for emergency preparedness concerns.

- Indirect Waste - Materials that are used in the treatment process. These materials include spent resin beads, spent reverse osmosis membranes, spent high efficiency particulate air (HEPA) cartridges, carbon filter medium, and spent filter elements. Storage locations could include all staged maintenance areas or satellite accumulation areas.

- Dry active waste - Small quantities of waste from routine operations and maintenance activities (i.e., rags, sampling media, etc.). Locations include the process area, external tank area, staged maintenance areas, and satellite accumulation areas.

5.1.3.2 Liquid Form

The aqueous waste treated at ETF may contain trace amounts of radioactive materials and/or dangerous chemical constituents. The radioactive/dangerous/mixed waste is evaluated in the hazards assessment as required by DOE Orders. Maximum radiological source term and dangerous waste materials are evaluated in the ETF Process Run Plan. The amount present must be below the levels requiring reevaluation for emergency preparedness concerns prior to treatment.

The influent aqueous waste to the ETF is treated in the primary treatment train to remove contaminants to allow discharge to the ground in accordance with the Washington state Discharge Permit. These contaminants are concentrated in the secondary treatment train and are addressed in Section 5.1.3.1.

Emergency planning activities include implementing instructions that evaluate conditions and consequences associated with abnormal radiation levels, as well as release of waste water. For the purposes of field measurements, the site boundary is defined as 100 meters from the facility buildings.

5.1.3.3 Gaseous Form

Airborne effluent streams are produced through the following:

- Radiological control area Heating Ventilation Air Conditioning (HVAC) system - exhaust from radiologically controlled areas.

- Vessel offgas system - Vapors and gases from the various tanks and treatment systems.

The vessel offgas HEPA filters remove particulate and condensate from the air stream before discharge to the radiologically controlled area HVAC system. The

combined air stream passes through another HEPA filter and is monitored for radiation.
Analysis shows that potential radioactive release levels are less than the values requiring event classification.

5.1.4 Criticality

A criticality is not a credible hazard at ETF. Emergency planning is not required.

5.2 LERF HAZARDS

5.2.1 Hazardous Materials

No hazardous material is stored at LERF. Small quantities of hazardous material could be used in maintenance and sampling activities. Any release of these materials would not be classed as a WAC 173-303 or DOE emergency. No emergency planning response is required.

5.2.2 Industrial Hazards

The industrial hazards associated with LERF include electrical equipment, rotating equipment, confined spaces, compressed gas cylinders, and propane tanks. The industrial hazards associated with the facility do not pose a threat to the health and safety of the general public or environment. Industrial hazards are addressed in the building health and safety plan and maintenance programs.

5.2.3 Radioactive/Dangerous/Mixed waste

5.2.3.1 Solid Form

Small quantities of low radioactivity mixed waste from routine operations and maintenance activities (i.e., rags, sampling media, etc.). Locations include sampling areas, staged maintenance areas, and satellite accumulation areas. Any release of these materials would not be classed as a WAC 173-303 or DOE emergency. No emergency planning response is required.

5.2.3.2 Liquid Form

The aqueous waste stored in the LERF basins may contain trace amounts of radioactivity with dangerous chemical constituents and is evaluated in the hazards assessment as required by DOE Orders. Maximum radiological source terms for LERF are below the levels requiring evaluation for emergency preparedness concerns. The chemical constituent of concern, based on worst case scenarios for process condensate from the 242-A Evaporator, is ammonia. DOE Order ERPG values are shown in Table 2.

Table 2 LERF WASTE CHEMICAL CONSTITUENTS OF CONCERN

Constituent	ERPG Values		
	1	2	3
Process liquid - Ammonia	25 ppm	200 ppm	1000 ppm

5.2.3.3 Gaseous Form

Airborne effluent streams produced from the wastewater in the basins is vented through the basin vent system. Analysis shows that potential for gaseous release levels are less than the values requiring event classification.. However, release modes for the basin liquid are discussed in section 5.2.3.2.

5.2.4 Criticality

A criticality is not a credible hazard at LERF. Emergency planning is not required.

5.3 TEDF AND GROUND WATER TRANSFER SYSTEM HAZARDS

The hazards associated with the TEDF and the GTS are industrial hazards only. Industrial hazards to facility personnel are addressed in the building health and safety plan and maintenance programs.

5.3.1 Hazardous Materials

Only small amounts of sample preservative chemicals are stored at the TEDF. There are no hazardous materials associated with the TEDF or GTS that would pose a threat to human health or the environment. However, maintenance and sampling activities might require the use of small quantities of hazardous materials. Hazards associated with maintenance and sampling activities are addressed in the health and safety plan and maintenance programs.

5.3.2 Industrial Hazards

The industrial hazards associated with the TEDF include electrical equipment, rotating equipment, confined spaces, compressed gas cylinders, and propane tanks. A propane storage tank for the pump house #1 Standby Power Generator is the only hazard above common industrial hazards. Response to an event involving the propane tank would be as a result of fire or explosion. The industrial hazards associated with the TEDF or GTS do not pose a threat to human health or the environment.

5.3.3 Radioactive/Dangerous/Mixed Waste

The level of radioactive/dangerous materials in the influent to TEDF allows for disposal as a nondangerous waste. The total inventory of the GTS is based on the volume of the transfer line and the concentration of contaminants in the 200-UP-1 groundwater. The radioactive/dangerous material inventories associated with the aqueous waste in the TEDF or GTS are sufficiently low that there is no threat to human health or the environment.

5.3.4 Criticality

A criticality accident is not credible at the TEDF or GTS.

6.0 POTENTIAL EMERGENCY CONDITIONS

The objective of this section is to identify the appropriate emergency classification level value limit. Protective actions based on classification are discussed in Section 7.0 of this plan. Technical justification for the values and limits identified in this section are provided in the hazards assessment and hazard categorization documentation required by DOE Orders.

Potential emergency conditions may fall into one of three basic categories: operational (process upsets, fires and explosions, loss of utilities, spills, and releases), natural phenomena (earthquakes and storms), and security contingencies (bomb threat, hostage situation). For operational events, event frequency coupled with accident severity provide the criteria for emergency plan response.

Other potential hazardous release modes include fire, explosions, volcanic ashfall, weather, and security events. These events are evaluated based on the potential impact to operations and subsequent release of hazardous materials. Potential consequences to human health or the environment are the ultimate criteria for event classification and protective response actions. Additionally, prolonged small release rates have the potential to impact human health or the environment.

6.1 OPERATIONAL EMERGENCIES

Operational emergencies for each facility are discussed in the following section.

6.1.1 ETF Operational Emergencies

6.1.1.1 Loss of Utilities

Loss of utilities would interrupt the treatment processes but would not be classed as a WAC 173-303 or DOE Order defined emergency.

6.1.1.2 Major Process Disruption/Loss of Plant Control

Process disruption/loss of plant control would interrupt the treatment processes but would not be classed as a WAC 173-303 or DOE Order defined emergency.

6.1.1.3 Pressure Release

The ETF has low pressure compressed air and steam systems. Loss of the compressed air or steam system(s) could result in loss of plant control or a process disruption. Process disruption/loss of plant control would interrupt the treatment processes but would not be classed as a WAC 173-303 or DOE Order defined emergency.

Compressed gas cylinders are used at the ETF. Failure of compressed gas bottles could cause flying debris hazards and are addressed as part of fire and/or explosion, Section 6.1.1.4

A process system pressure release is categorized as a condensate spray release. This is addressed as a radioactive/dangerous/mixed waste spill, Section 6.1.1.6.

6.1.1.4 Fire and/or Explosion

A fire/explosion could generate highly toxic and/or corrosive fumes. Flying debris might result from explosions and compressed gas cylinder failure. Process system disruption, loss of plant control, and breach of process system boundaries could result from the flying debris. Fire involving sulfuric acid might be classified as a Site Area Emergency.

6.1.1.5 Hazardous Material Spill

Hazards associated with process chemical spills include potential exposure to corrosive, oxidizing, or toxic materials, as well as potential environmental damage by the release of these materials to the air, water, or soil column. The hazards assessment required by DOE Orders identifies sulfuric acid and hydrogen peroxide spills as events that could pose significant risk or consequences to warrant emergency planning. Emergency classification criteria are provided in Table 3.

Table 3 HAZARDOUS MATERIAL EMERGENCY CLASSIFICATION

Event	Emergency Action Level	Emergency Classification
Sulfuric acid spill	Entire contents of tank or tanker truck spill is released AND fire involving the contents of the tank or tanker truck AND field measurements at facility boundary (100 meters) indicate sulfuric acid concentrations of 2 milligrams per cubic meter or greater.	Site Area Emergency
Hydrogen peroxide spill	A spill of greater than or equal to 6800 liters (1800 gallons) AND field measurements at facility boundary indicate hydrogen peroxide concentrations of 25 parts per million or greater.	Site Area Emergency

6.1.1.6 Dangerous/Mixed Waste Spill

The ETF inventories include large quantities of process liquid, secondary powder waste, indirect waste, and dry active waste. The hazards assessment has evaluated that there are no events that could pose significant risk or consequences to warrant emergency planning. ETF has the potential for minor exposures to radioactive material, corrosive, oxidizing or toxic materials, as well as localized environmental damage by their release to air, water, or soil column. Therefore, response for dangerous/mixed waste releases are included in the scope of emergency planning.

6.1.1.7 Transportation and/or Packaging Incidents

A transportation and/or packaging incident involving chemicals, dangerous/mixed waste, or samples could result in exposure to hazardous materials (corrosive, oxidizer, toxic) and/or low levels of radioactivity, as well as potential environmental damage by their release to the air, water, or soil column.

6.1.1.8 Unusual, Irritating, or Strong Odors

A fire in any building could generate highly toxic and/or corrosive fumes (Section 6.1.1.4). A spill or spray release could release hazardous materials (Section 6.1.1.5). Response for the full range of these events is included in the scope of emergency planning.

6.1.1.9 Radiological Material Release/Abnormal Radiation level

The ETF inventories include large quantities of process liquid, secondary powder waste, indirect waste, and dry active waste. Radioactive materials will accumulate in various treatment systems and in secondary waste powder. ETF has the potential for concentrating radioactive materials, therefore, response for abnormal radiation levels and radioactive material release are included in the scope of emergency planning. Criteria used to classify radiological emergencies is identified in Section 5.0.

6.1.1.10 Criticality

The hazards assessment concluded that criticality is not credible at the ETF.

6.1.2 LERF Operational Emergencies

6.1.2.1 Loss of Utilities

Loss of utilities would interrupt the pumping and automatic sampling processes but would not be classed as a WAC 173-303 or DOE Order defined emergency.

6.1.2.2 Major Process Disruption/Loss of Plant Control

Major process disruption/loss of plant control would interrupt the pumping and automatic sampling processes but would not be classed as a WAC 173-303 or DOE Order defined emergency.

6.1.2.3 Pressure Release

The are no high pressure systems at LERF. A piping system breach is addressed as a radioactive/dangerous/mixed waste spill (Section 6.1.2.6).

6.1.2.4 Fire and/or Explosion

A fire/explosion could generate highly toxic and/or corrosive fumes.

6.1.2.5 Hazardous Material Spill

Process liquid releases are addressed in Section 6.1.2.6. Small quantities of hazardous material could be used in maintenance and sampling activities. A spill of these materials would not be classed as a WAC 173-303 or DOE Order emergency. No emergency planning response is required.

6.1.2.6 Dangerous/Mixed Waste Spill

The LERF inventories include large quantities of process liquid. The hazards assessment has determined events listed in Table 4 could pose significant risks or consequences and warrant emergency planning. LERF has the potential for exposures to radioactive material, corrosive, oxidizing or toxic materials, as well as environmental damage by their release to air, water, or soil column. Therefore response for dangerous/mixed waste release are included in the scope of emergency planning.

Table 4 Dangerous/Mixed Waste Emergency Classification

Event	Emergency Action Level	Emergency Classification
Loss of basin cover	Significant portion of basin (>50%) is uncovered AND ammonia concentration in liquid > 7200 ppm AND field measurements at facility boundary (100 meters) indicate ammonia concentrations >25 ppm.	Alert Emergency
Process liquid spray	Breach in LERF piping occurs outside containment barriers, spilling greater that 37.8 liters (10 gallons) AND Ammonia concentration in liquid greater than 6800 ppm AND Field measurements at facility boundary (100 meters) indicate ammonia concentrations >25 ppm.	Alert Emergency
Process Liquid Spill	Spill of LERF liquid occurs outside containment barriers of greater that 37.8 liters (10 gallons) AND Ammonia concentration in liquid > 2500 ppm AND Field measurements at facility boundary (100 meters) indicate ammonia concentrations >25 ppm.	Alert Emergency
Process Liquid Spill	Spill of LERF liquid occurs outside containment barriers of greater that 280 liters (74 gallons) AND Ammonia concentration in liquid > 2500 ppm AND Field measurements at facility boundary (100 meters) indicate ammonia concentrations >200 ppm.	Site Emergency

6.1.2.7 Transportation and/or Packaging Incidents

A transportation and/or packaging incident involving hazardous chemicals, radioactive/dangerous/mixed waste, or samples could result in exposure to hazardous materials (corrosive, oxidizer, toxic) and/or low levels of radioactivity, as well as potential environmental damage by their release to the air, water, or soil column.

6.1.2.8 Unusual, Irritating, or Strong Odors

Refer to Section 6.1.2.6.

6.1.2.9 Radiological Material Release/Abnormal Radiation level

Refer to Section 6.1.2.6.

6.1.2.10 Criticality

A criticality accident is not credible at LERF.

6.1.3 TEDF and GTS Operational Emergencies

6.1.3.1 Loss of Utilities

Loss of utilities would interrupt the pumping and automatic sampling processes but would not be classed as a WAC 173-303 or DOE Order defined emergency. No emergency planning response is required.

6.1.3.2 Major Process Disruption/Loss of Plant Control

Process disruption/loss of plant control could cause an inadvertent discharge of *treated effluent or nontreated groundwater to a nonpermitted area.* Discharge to an unauthorized area would not be classed as a WAC 173-303 or DOE Order defined emergency. No emergency planning response is required.

6.1.3.3 Pressure Release

There are no high pressure systems at the TEDF or GTS. A piping system breach is addressed in section 6.1.3.6.

6.1.3.4 Fire and/or Explosion

A fire/explosion could generate highly toxic and/or corrosive fumes.

6.1.3.5 Hazardous Material Spill

No hazardous material is stored in the TEDF pump houses. Small quantities of hazardous material could be used in maintenance and sampling activities. This would not be classed as a WAC 173-303 or DOE Order emergency. No emergency planning response is required.

6.1.3.6 Dangerous/Mixed Waste Spill

Influent to TEDF is a nondangerous waste. TEDF and groundwater releases would not be classed as a WAC 173-303 or DOE Order emergency. No emergency planning response is required for this event. LWPF surveillance serves as leak detection.

6.1.3.7 Transportation and/or Packaging Incidents

There are no transportation and/or packaging activities at TEDF or GTS.

6.1.3.8 Unusual, Irritating, or Strong Odors

Unusual, irritating, or strong odors could be caused from highly toxic and/or corrosive fumes generated in a fire or a leak in the propane tank at TEDF Pump House #2. These events, by themselves, would not be classed as a WAC 173-303 or DOE Order emergency.

6.1.3.9 Radiological Material Release/Abnormal Radiation level

TEDF process liquid meets discharge limits. A groundwater release would not be classed as a WAC 173-303 or DOE Order emergency.. No emergency planning response is required for this event.

6.1.3.10 Criticality

A criticality accident is not credible at TEDF or the GTS.

6.2 NATURAL PHENOMENA

6.2.1 Seismic Event

Depending on the magnitude of the event, severe structural damage could occur resulting in serious injuries or fatalities and the release of hazardous materials to the environment. Damaged electrical circuits and wiring could result in the initiation of fires.

6.2.2 Volcanic Eruption/Ashfall

Though not expected to cause structural damage, the ash resulting from a volcanic eruption could cause shorts in electrical equipment and plug ventilation system filters.

6.2.3 High Winds/Tornados

High winds or tornados could cause structural damage to systems containing hazardous materials resulting in a release of the materials to the environment.

6.2.4 Flood

These facilities are not within the Columbia River flood plain therefore a flood is not a credible accident. Emergency planning is not required.

6.2.5 Range Fire

The hazards associated with a range fire are the same as those associated with a building fire plus potential site access restrictions and travel hazards such as poor visibility.

6.2.6 Aircraft Crash

In addition to the potential for serious injuries or fatalities, an aircraft crash could result in the direct release of hazardous materials to the environment or cause a fire that could lead to the release.

6.3 SECURITY CONTINGENCIES

6.3.1 Bomb Threat

A bomb threat could be received by anyone who answers the telephone or receives mail. For a credible bomb threat, the facility should be placed in a safe configuration, if time permits, and then perform an evacuation. If a bomb explodes, the effects are the same as those discussed under fire and explosion.

6.3.2 Hostage Situation

A hostage situation can pose an emergency situation if there is the potential to adversely impact the facility. This can result in a loss of facility control (operators removed from their stations) or in the coercion of an employee to take some malevolent action.

6.3.3 Suspicious Object

The major effect on the facility is that it should be placed in a safe configuration, if time permits, and then evacuated.

7.0 INCIDENT RESPONSE

Emergency action levels have been developed that provide clear classification and recognition criteria for emergency events in accordance with DOE Order guidance. The initial response to any emergency is to immediately protect the health and safety of persons in the immediate area. Identification of released material is essential to determine appropriate protective actions. Containment, treatment, and disposal assessment are secondary responses.

The following sections describe the process for implementing basic protective actions as well as descriptions of response actions for the events listed in Section 6.0 of this document. The *Hanford Facility Contingency Plan* (DOE/RL-93-75) provides a description of generic incident responses, describes the process for assessing and identifying dangerous waste, and describes the process for categorizing and classifying an incident.

Incident responses will be coordinated from the ETF control room or a designated alternate location.

7.1 PROTECTIVE ACTIONS RESPONSES

7.1.1 Evacuation

The objective of a facility evacuation order is to limit personnel exposure to hazardous materials or radioactive/dangerous/mixed waste by increasing the distance between personnel and the hazard. The scope of the evacuation includes evacuation of the facility because of an event at the facility as well as evacuation of the facility in response to a site evacuation order. Evacuation will be directed by the BED when conditions warrant and will apply to all personnel not actively involved in the event response or emergency plan-related activities.

The BED will initiate the evacuation by directing an announcement be made to evacuate along with the evacuation location over a public address system, facility radios, and, as conditions warrant, by activating the 200 Area site evacuation/take cover alarms by calling the POC using 911 (preferred) or 373-3800. Personnel proceed to a predetermined staging area (shown in Figure 2), or other safe upwind location, as determined by the BED. The BED will determine the operating configuration of the facility and identify any additional protective actions to limit personnel exposure to the hazard.

Emergency organization personnel or assigned operations personnel will conduct a sweep of occupied buildings to ensure that all non-essential personnel and visitors have evacuated. For an immediate evacuation, accountability will be performed at the staging area. The BED will assign personnel as accountability aides and staging managers with the responsibility to ensure that evacuation actions are taken at all occupied buildings at the ETF or LERF complexes. All implementing actions executed by the aides/managers are directed by the emergency response procedures identified in Attachment A. When evacuation actions are complete, the aides/managers will provide a status report to the BED. The BED will provide status to the Site Emergency Director.

7.1.2 Take Cover

The objective of the take cover order is to limit personnel exposure to hazardous materials, or radioactive/dangerous/mixed waste when evacuation is inappropriate or not practical. Evacuation might not be practical or appropriate because of extreme weather conditions or the material release might limit the ability to safely evacuate personnel.

The BED will initiate the take cover by directing an announcement be made over the public address system, facility radios, and, as conditions warrant, by activating the 200 Area site take cover alarms by calling the POC using 911 (preferred) or 373-3800. Actions to complete a facility take-cover will be directed by the emergency response procedure in Attachment A. Protective actions associated with operations include configuring, or shutting down, the ventilation systems. Determination of additional take cover response is based on plant operating configuration, weather conditions, amount and duration of release, and other conditions, as applicable to the event and associated hazard. As a minimum, personnel exposure to the hazard will be minimized. The BED will assign personnel as accountability aides with responsibility to ensure that take-cover actions are taken at all occupied buildings at the ETF complex. All implementing actions executed by the aides/managers are directed by the emergency response procedure in attachment A. When take cover actions are complete the aides/manager will provide the BED with a status report.

7.2 RESPONSE TO OPERATIONAL EMERGENCIES

Operations activities to isolate, contain, and mitigate the event can be performed in parallel with classification and protective action implementation. The response procedures are structured to allow parallel activity with clearly established priorities. The division of actions and workload between various personnel is such that coordinated team response will result in the successful implementation of both emergency operating actions and emergency planning requirements. Specific event mitigation strategy for each type of accident is provided in the following sections.

7.2.1 Loss of Utilities

The hazards assessment has determined that this occurrence does not pose significant risk to human health or the environment. This event is not classified as a WAC 173-303 or DOE Order defined emergency. No emergency planning is required.

7.2.2 Major Process Disruption/Loss of Plant Control

The hazards assessment has determined that this occurrence does not pose significant risk to human health or the environment. This event is not classified as a WAC 173-303 or DOE Order defined emergency. No emergency planning is required.

7.2.3 Pressure Release

The hazards assessment has determined that a pressure release does not pose significant risk to human health or the environment. This event is not classified as a WAC 173-303 or DOE Order defined emergency. No emergency planning is required. Hazardous material release and radioactive/dangerous/mixed waste releases are addressed in Section 7.2.5.

7.2.4 Fire and/or Explosion

In the event of a fire, the discoverer activates a fire alarm (preferred) or calls 911 or 373-3800. Automatic initiation of a fire alarm (through the smoke detectors and sprinkler systems) also is possible. Trained personnel may attempt to put out incipient fires with a portable fire extinguisher and then evacuate. Under no circumstances will personnel endanger personal health and safety to use portable fire extinguishers. At the ETF, the Control Room Operator, upon notification of a fire or a fire alarm, will attempt to place ETF in a stable condition by shutting down systems and then evacuate. Under no circumstances will personnel endanger personal health and safety to shut down equipment. All other personnel will immediately evacuate the affected building or area.

An incident requiring evacuation of personnel or the summoning of emergency response units does not necessarily indicate that the contingency plan has been implemented.

A fire or explosion involving 92% sulfuric acid will be classified as a Site Emergency. Actions described in Section 7.2.5.2 will be performed for this event.

7.2.5 Hazardous Material, Radioactive/Dangerous/Mixed Waste Spills or Releases

The ETF and LERF have engineering controls to contain or minimize spills. These controls include, containment berms, dedicated spill control sumps, remote gauges and level indicators as well as spray shields on chemical pipe flanges. LWPF procedures provide alarm response and maintenance actions for leak detection equipment, surveillance of possible leak locations, and response actions for detected spills.

Spills can result from many sources including process leaks, container spills or leaks, damaged packages or shipments, or personnel error. Spills of mixed waste are complicated by the need to deal with the extra hazard induced by the presence of radioactive materials.

Hazardous material and dangerous and/or mixed waste releases fall into one of two categories: minor spills or major spills. The criteria to determine whether a spill or release is minor are described in the *Hanford Facility Contingency Plan*, (DOE/RL-93-75), Section 5.2.

A spill or release of hazardous material or dangerous/ waste is considered "minor" if <u>all</u> of the following are true:

- The spill or release does not threaten human health (e.g., an evacuation is not necessary)
- The spill does not threaten the environment
- Non-emergency response personnel have received training to mitigate the spill and appropriate personal protective equipment is available
- The composition of the material or waste is known or can be quickly determined from label, manifest, MSDS, or disposal request information.

If one or more of the foregoing conditions are not met, responses are performed as described for the major spill.

7.2.5.1 Response To Minor Spills or Releases

The TSD unit personnel generally perform immediate cleanup of minor spills or releases using absorbents and emergency equipment. Personnel detecting such spills or releases contact the ETF control room for notification and to ensure notification of the BED. Responses to spills or releases occurring within facility boundaries are described in facility specific procedures. Response to minor spills generally does not require the implementation of the contingency plan.

7.2.5.2 Response To Major Spills or Releases

If a major spill or release is discovered, the discoverer:

1. Notifies the ETF control room and evacuates to a safe area.

2. Remains available for consultation with the BED, HFD, or other emergency response personnel

The control room operator:

1. Uses the public address (PA) system to notify the facility occupants of the event
2. Notifies the BED/HFD and relays information received from the event scene
3. Places the facility in a safe condition per plant operations procedures
4. Remains available to support further notification and response activities

The BED performs or arranges personnel to:

1. Coordinate response activity and establishes a command post at a safe location
2. Obtain all available information pertaining to the incident and determines if the spill or release warrants implementation of the contingency plan in accordance with Section 4.0.
3. Determine need for assistance from outside agencies and arranges for their mobilization and response
4. Initiate the appropriate announcements, if building or area evacuations are necessary
5. Arrange for care of any injured persons
6. Request activation of the affected area emergency sirens/crash alarm system if a threat to surrounding facilities
7. Provide for event notification
8. Maintain access control at the incident site by keeping unauthorized personnel and vehicles away from the area. Security personnel can be used to assist in site control if control of the boundary is difficult. In determining controlled access areas, considers environmental factors such as wind velocity and direction
9. Arrange for proper remediation of the incident after evaluation.
10. Remain available for HFD, Hanford Patrol, and other authorities on the scene and provides all required information

11. Enlist the assistance of alternate BED(s), if around-the-clock work is anticipated

12. Refer media inquiries to the Media Relations/Communications offices of the contractors or DOE-RL.

13. Ensure the use of proper protective equipment, remedial techniques (including ignition source control for flammable spills), and decontamination procedures by all involved personnel, if remediation is performed by LERF/ETF personnel.

14. Remain at the command post to oversee activities and to provide information, if remediation is performed by the HFD Hazardous Materials Response Team or other response teams

15. Ensure proper containerization, packaging, and labeling of recovered spill materials and over packed containers

16. Ensure decontamination (or restocking) and restoration of emergency equipment used in the spill remediation before resuming operations

17. Provide required reports after the incident.

7.2.5.3 Damaged, Unacceptable Hazardous Material, Dangerous and/or Mixed Waste Shipments

When a damaged shipment of hazardous material or dangerous waste arrives at the ETF and the shipment is unacceptable for receipt, actions will be taken to rectify the problem. If required, actions described in Section 7.2.5 are taken.

7.2.6 Fume Hazards

If an unusual, irritating, or strong odor is detected, and the discoverer has reason to believe that the odor might be the result of an uncontrolled release of a toxic or dangerous material, the discoverer reports to the control room and actions identified in Section 7.2.5 are taken.

7.2.7 Radiological Material Release

At a minimum, actions described in Section 7.2.5 are taken. Abnormal radiation actions also may be implemented if conditions are warranted.

7.2.8 Criticality

The hazards assessment has determined that a criticality is not credible for ETF or LERF. No emergency planning is required.

7.3 PREVENTION OF RECURRENCE OR SPREAD OF FIRES, EXPLOSIONS, OR RELEASES

The BED, in coordination with emergency response organizations, takes the steps necessary to ensure that a secondary release, fire, or explosion does not occur. The following actions are taken:

- Isolate the area of the initial incident by shutting off power, closing off ventilation systems, etc., to minimize the spread of a release and/or the potential for a fire or explosion
- Inspect containment for leaks, cracks, or other damage
- Inspect for toxic vapor generation
- Remove released material and waste remaining inside of containment structures as soon as possible
- Contain and isolate residual waste material using dikes and adsorbents
- Cover or otherwise stabilize areas where residual released materials remain to prevent migration or spread from wind or precipitation run-off
- Install new structures, systems, or equipment to enable better management of hazardous materials or dangerous waste
- Reactivate adjacent operations in affected areas only after cleanup of residual waste materials is achieved.

7.4 RESPONSE TO NATURAL PHENOMENA

If other emergency conditions arise as a result of a natural phenomena event, response would be appropriate for the condition created. For example: A fire due to lightning would initiate the fire response actions and a spill of hazardous material due to an earthquake would initiate spill response actions.

7.4.1 Seismic Event

The Hanford emergency response organization's primary role in a seismic event is coordinating the initial response to injuries, fires, and fire hazards and acting to contain or control radioactive and/or hazardous material releases.

Individuals should remain calm and stay away from windows, steam lines, and hazardous material storage locations. Once the shaking has subsided, individuals should evacuate carefully and assist personnel needing help. The location of any trapped individuals should be reported to the BED or is reported to 911 or 373-3800.

The BED takes whatever actions are necessary to minimize damage and personnel injuries. Actions include the following:

1. Coordinating searches for personnel and potential hazardous conditions (fires, spills, etc.)
2. Conducting accountability.
3. Securing utilities and facility operations.
4. Arranging rescue efforts, and notifying 911 or 373-3800 for assistance.
5. Assembling damage assessment teams to perform facility inspections in accordance with the post-natural phenomena hazards inspection plan and procedure.
6. Determining if hazardous materials were released.
7. Determining current local meteorological conditions.
8. Warning other facilities and implement protective actions if release of hazardous materials poses a danger.
9. Providing personnel and resource assistance to other facilities.

7.4.2 Volcanic Eruption/Ashfall

When notified of an impending ashfall, the BED will implement measures to minimize the impact of the ashfall, such as:

1. Installing filter media over building ventilation intakes.
2. Installing filter media or protective coverings on outdoor equipment that could be adversely affected by the ash (diesel generators, equipment rooms etc.).
3. Shutting down some or all operations and processes.
4. Sealing secondary use exterior doors.
5. Releasing all but essential personnel to go home.
6. Assembling damage assessment teams to perform facility inspections in accordance with the post-natural phenomena hazards inspection plan and procedure.

7.4.3 High Winds/Tornados

On notification of impending high winds, the BED takes steps necessary to secure all outside doors and windows, and secure all outdoor waste and hazardous material handling activities. All personnel are warned to use extreme caution when entering or exiting the building.

7.4.4 Flood

The hazard assessment determined that flooding at the LERF/ETF is not credible. No emergency planning response is required.

7.4.5 Range Fire

Responses to range fires are handled by preventive measures (i.e., keeping hazardous material and waste accumulation areas free of combustible materials such as weeds and brush). If a range fire breaches the facility boundary, the response is as described for a fire.

7.4.6 Aircraft Crash

Response to an aircraft crash would be appropriate for the condition created. For example: A fire due to explosion or electrical shorts would initiate the fire response actions specified in Section 7.2.4.

7.5 SECURITY CONTINGENCIES

7.5.1 Bomb Threat/Explosive Device

7.5.1.1 Telephone Bomb Threat

Personnel receiving telephoned threats attempt to get as much information as possible from the caller. Upon conclusion of the call, notify the BED and Security.

The BED evacuates the facility and questions personnel at the staging area regarding any suspicious objects in the facility.

When Security personnel arrive, follow their instructions.

7.5.1.2 Written Threat

Receivers of written threats handle the letter as little as possible and notify the BED and Security. Depending on the content of the letter, the facility may or may not be evacuated. The letter is turned over to Security personnel and their instructions are followed.

7.5.2 Hostage Situation/Armed Intruder

The discoverer of a hostage situation or armed intruder reports the incident to the POC via 911 or 373-3800 and to the BED, if possible. The BED, after conferring with Security personnel, may covertly evacuate areas of the facility not observable by the hostage taker(s)/intruder. No alarms will be sounded.

Security will determine the remaining response actions and will activate the Hostage Negotiating Team, if necessary.

7.5.3 Suspicious Object

The discoverer of a suspicious object notifies the BED and to the POC via 911 or 373-3800, if possible, and ensures that the object is not disturbed.

The BED will evacuate the facility and (based on the description provided by the discoverer) will attempt to determine the identity or owner of the object. This can be done by questioning facility personnel at the staging area.

If the identity/ownership of the object cannot be determined, Security will assume command of the incident. The canine unit will be used to determine if the package contains explosives. If there is a positive indication of explosives or it cannot be assured that there are no explosives, then the Richland Police Department's Emergency Ordinance Disposal Team will be dispatched to the facility to properly dispose of the device.

8.0 TERMINATION OF EVENT, INCIDENT RECOVERY, AND RESTART OF OPERATIONS

The *Hanford Facility Contingency Plan* (DOE/RL-93-75), Section 6.0, describes these considerations. The extent by which these actions are employed is based upon the incident classification of each event. In addition, information included in the *Hanford Facility Contingency Plan*, DOE/RL-93-75, considers the management of incompatible wastes that might apply.

8.1 TERMINATION OF EVENT

For events where the DOE-RL Emergency Operations Center (RL-EOC) is activated, the DOE-RL Emergency Manager has the authority to declare event termination. This decision is based on input from the BED, Incident Commander, and other emergency response organization members. For events where the RL-EOC is not activated, the BED in conjunction with the Incident Commander will declare event termination.

8.2 INCIDENT RECOVERY AND RESTART OF OPERATIONS

A recovery plan is developed when necessary. A recovery plan is needed following an event where further risk could be introduced to personnel, the facility, or the environment through recovery action and/or to maximize the preservation of evidence. Depending on the magnitude of the event and the effort required to recover from the event, recovery planning might involve personnel from DOE-RL and other contractors. If a recovery plan is required, it is reviewed by appropriate personnel and approved by a Recovery Manager before restart. Restart of operations is performed in accordance with the approved plan.

If this plan was implemented for a WAC emergency (refer to Section 4.0), the Washington State Department of Ecology must be notified before operations can resume. Section 9.0 of the *Hanford Facility Contingency Plan* (DOE/RL-93-75), discusses different reports to outside agencies. This notification is in addition to other required reports and must include information documenting the following conditions:

1. There are no incompatibility issues with the waste and released materials from the incident.

2. All the equipment has been clean, fit for its intended use, and placed back into service. The notification can be made via telephone conference. Additional information that Ecology requests regarding these restart conditions can be included in the required 15-day report identified in the *Hanford Facility Contingency Plan* (DOE/RL-93-75).

For emergencies not involving activation of the RL-EOC, the BED ensures that conditions are restored to normal before operations are resumed. If the Hanford Site Emergency Organization was activated and the emergency phase is complete, a special recovery organization could be appointed at the discretion of DOE-RL to restore conditions to normal. This process is detailed in DOE-RL and contractor emergency procedures. The makeup of this organization depends on the extent of the damage and its effects. The onsite recovery organization will be appointed by the appropriate contractor's management.

8.3 INCOMPATIBLE WASTE

After an event, the BED or the onsite recovery organization ensures that no waste that might be incompatible with the released material is treated, stored, and/or disposed of until cleanup is completed. Cleanup actions are taken by facility personnel or other assigned personnel. The *Hanford Facility Contingency Plan* (DOE/RL-93-75), Section 6.3, describes actions to be taken.

Waste from cleanup activities is designated and managed as newly generated waste. A field check for compatibility before storage is performed as necessary.

Incompatible wastes are not placed in the same container. Containers of waste are placed in storage areas appropriate for their compatibility class.

If incompatibility of waste was a factor in the incident, the BED or the onsite recovery organization ensures that the cause is corrected.

8.4 POST EMERGENCY EQUIPMENT MAINTENANCE AND DECONTAMINATION

All equipment used during an incident is decontaminated (if practicable) or disposed of as spill debris. Decontaminated equipment is checked for proper operation before storage for subsequent use. Consumable and disposed materials are restocked. Fire extinguishers are recharged or replaced.

The BED ensures that all equipment is cleaned and fit for its intended use before operations are resumed. Depleted stocks of neutralizing and absorbing materials are replenished, self-contained breathing apparatus are cleaned and refilled, protective clothing is cleaned or disposed of and restocked, etc.

9.0 EMERGENCY EQUIPMENT

Hanford Site emergency resources and equipment are described and listed in the *Hanford Facility Contingency Plan* (DOE/RL-93-75), Section 7.0.

9.1 FIXED EMERGENCY EQUIPMENT

FIXED EMERGENCY EQUIPMENT

TYPE	LOCATION	CAPABILITY
Safety shower/eye wash stations (ETF only)	1 - 2025E Rm 122 Decon Station 1 - 2025E South Wall of Process Area 1 - 2025E Rm 134 1 - Outside south 2025E near acid/caustic tanks 1 - Outside at Load-in station	Assist in flushing chemicals/materials from the body and/or eyes and face of personnel.
Wet pipe sprinkler (ETF only)	Throughout the ETF except those areas protected by pre-active sprinklers.	Assist in the control of a fire.
Preactive sprinkler (ETF only)	Control room, communications room, electrical equipment room	Assist in the control of a fire. Maintained dry to prevent accidental damage to equipment.

Fire alarm pull boxes (ETF only)	All high traffic areas in operations administration and support areas, truck bay, and process area	Activate the local fire alarm

9.2 PORTABLE EMERGENCY EQUIPMENT

PORTABLE EMERGENCY EQUIPMENT		
TYPE	LOCATION	CAPABILITY
Fire extinguisher ABC type	Throughout ETF (Administrative/Support areas), LERF, and TEDF	Fire suppression for Class A, B, and C fires
Fire extinguisher BC type	Throughout ETF (process area and electrical room)	Fire suppression for Class B and C fires
Portable safety showers and Eye Wash Stations	As needed for special evolutions and maintenance	Assist in flushing chemicals/ materials from the body and/or eyes and face of personnel.

9.3 COMMUNICATIONS EQUIPMENT/WARNING SYSTEMS

COMMUNICATIONS EQUIPMENT		
TYPE	LOCATION	CAPABILITY
Fire alarms (ETF only)	Corridors, locker rooms, process area, drum storage, and truck bay	Audible throughout ETF
Take cover/evacuation	Site Emergency Alarm System	Audible outside buildings and inside administrative buildings
Public address system (ETF Only)	Throughout the ETF	Audible throughout ETF
Portable radios	Operations and maintenance personnel	Communication to control room

Telephone	ETF - control room, 2025E, 2025EA offices, MO-269. LERF - MO-727 and 242A171 instrument building TEDF - 225E(pump house 1), 225W (pump house 2), 6653 (sample building), 6653A (pump house 3)	Internal and external communications. Allows notification off outside resources (POC, HFD, Hanford Patrol, etc,.)
Crash alarms (ETF only)	Control room, 2025EA Rm 101	Audible in ETF control room
Process alarm (ETF only)	ETF - beacon near IX columns	Visible from ETF control room

9.4 PERSONAL PROTECTIVE EQUIPMENT

PERSONAL PROTECTIVE EQUIPMENT

TYPE	LOCATION	CAPABILITY
Self contained breathing apparatus (SCBA)	5 - 2025E Rm 122 2 - 2025E Control room area 2 - Outside southeast 2025E.	Breathable air for initial response to emergency, and recovery activities when required
Acid suits	3 each included in the spill response cabinets in 2025E.	Chemical protection for personnel during containment and isolation.
Respirators	2025E Rm 203	Filtered air for recovery of known hazards.

9.5 SPILL CONTROL AND CONTAINMENT SUPPLIES

SPILL KITS AND SPILL CONTROL EQUIPMENT		
TYPE	LOCATION	CAPABILITY
Spill bag	1 - TEDF 6653 Disposal Sampling Building. 1 - 90-day storage CONEX East of 2025E buiding	Support containment and cleanup of 6 gallons of acids or bases.
Drum spill kit	2 - 2025E building in process area. 1 - MO-727 Change Trailer	Support containment and cleanup of 51 gallons of acids or bases.
Spill cart	2 - 2025E building in process area	Support containment and cleanup of 77 gallons of acids or bases.
Spill response cabinet	1 - 2025E Rm 122 1 - outside southeast side of 2025E.	Support equipment for spill response.
Spill bag	1 - 2025E Rm 112 1 - 2025E upper level process area.	Support containment and cleanup of 10 gallons of acids or bases.

9.6 EMERGENCY RESPONSE CENTER

For emergencies not requiring evacuation, the BED and support personnel will assemble in the ETF control room, 242-A Evaporator control room, or other location as identified by the BED.

10.0 COORDINATION AGREEMENTS

DOE-RL has established a number of coordination agreements, or memoranda of understanding (MOU) with various agencies to ensure proper response resource availability for incidents involving the Hanford Site. A description of the agreements is contained in Section 8.0 of the *Hanford Facility Contingency Plan* (DOE/RL-93-75).

11.0 REQUIRED REPORTS

Three types of written post-incident reports are required for incidents on the Hanford Site. The reports are summarized in the *Hanford Facility Contingency Plan* (DOE/RL-93-75), Section 9.0.

12.0 PLAN LOCATION

Copies of this plan are maintained at the following locations:

- ETF control room
- 242A Evaporator control room
- Operations Managers office (Building 2025EA, room 101)
- 200 LWPF regulatory file

13.0 BUILDING EMERGENCY ORGANIZATION

BUILDING EMERGENCY DIRECTOR (BED)	TITLE	WORK LOCATION	WORK PHONE
PRIMARY	Shift Operation Manager (SOM)	2025E Building - ETF control room or 242A Evaporator control room	373-9000 373-2737
ALTERNATE	Operations Manager	2025EA Building, room 101	373-4565

The complete building emergency organization listing of positions, names, work locations, and telephone numbers for the ETF is maintained in a separate, internally controlled, facility document. Copies are distributed to appropriate facility locations and to Emergency Preparedness. In addition, work and home telephone numbers of the BEDs and alternates are available from the POC (373-3800) in accordance with Hanford Facility RCRA Permit, Dangerous Waste Portion, General Condition II.A.4.

14.0 REFERENCES

DOE Order DOE O 232.1, "Occurrence Reporting and Processing of Operations Information"

DOE Order 5500.1B, "Emergency Management Systems"

DOE/RL-93-75, *Hanford Facility Contingency Plan*

29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response*

WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, Washington State Department of Ecology, Olympia, Washington.

NIOSH, *Pocket Guide to Chemical Hazards*, National Institute of Occupational Safety and Health, U.S. Department of Health and Human Resources, Public Health Service, Centers for Disease Control, Washington, D.C.

ATTACHMENT A

Listing of Procedures and Guides

A list of facility specific emergency response procedures and guides is maintained at the facility and will be provided upon request.

APPENDIX 8A

TRAINING PLAN

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Dangerous Waste Training Plan

Approved by:

D. W. Lindsey, Manager
200 Area Liquid Waste Processing Facilities

1.0 PURPOSE

This document outlines the Dangerous Waste Training Program (DWTP) for the 200 Area Liquid Waste Processing Facilities (LWPF) organization. The 200 Area Effluent Treatment Facility (ETF), Liquid Effluent Retention Facility (LERF), and 242-A Evaporator are under the control of LWPF and each is permitted as a Treatment, Storage, or Disposal (TSD) unit on the Hanford Facility.

The program is designed for compliance with the requirements of Washington Administrative Code (WAC) 173-303-330 and Title 40 Code of Federal Regulations (CFR) 264.16 for the development of a written dangerous waste training program. These training requirements were determined after assessment of employee duties and responsibilities.

2.0 SCOPE

This Dangerous Waste Training Plan applies to personnel who perform work at, or in support of, the 200 Area Effluent Treatment Facility (ETF), Liquid Effluent Retention Facility (LERF) and the 242-A Evaporator. This Dangerous Waste Training Plan defines the minimum required training for employees to perform tasks associated with dangerous waste(s).

The LWPF training program is designed to ensure that employees who operate and maintain LWPF systems/equipment receive the training they require to safely operate and maintain LWPF systems/equipment in a effective and environmentally sound manner. In addition to preparing employees to operate and maintain LWPF equipment/systems under normal conditions, this training program ensures that employees are prepared to respond in a prompt and effective manner should off-normal or emergency conditions occur.

3.0 DEFINITION

NONE

4.0 RESPONSIBILITIES

4.1 Training Manager

The LWPF Facility Manager has overall responsibility for all training required by Washington Administrative Code (WAC) 173-303-330 and Condition II.C of the Hanford RCRA Permit (DW portion) at LWPF. To meet the training requirements in WAC 173-303-330(1)(a), the training director position is described in Chapter 8.0 of DOE/RL-91-28, *Hanford Facility Dangerous Waste Permit Application, General Information Portion*.

4.2 Facility Management (including Team Leaders)

Develop and administer a comprehensive training program for employees.

Ensure annual training on dangerous waste(s) is provided to affected employees.

Ensure all applicable training requirements are met.

4.3 Operations Management

Ensure Operations personnel are trained.

Ensure required certifications are maintained.

4.4 Training Personnel

Maintain knowledge in the area of waste management, including updates.

Re-evaluate training courses at least every year to ensure waste training requirements continue to be met.

4.5 Employees

Handle dangerous waste(s) in accordance with applicable regulations.

Minimize personal exposure to all dangerous wastes.

Inform management of problems concerning dangerous waste handling / storage / disposal.

5.0 PROCEDURE

The LWPF Dangerous Waste Training Program is implemented based on training requirements related to job responsibilities. Personnel affected by the Dangerous Waste Training Program complete those portions of the training curriculum delineated in the company level environmental compliance manuals, and tracked by the (computerized) Training Matrix (TMX), prior to performing unsupervised work in a facility.

Personnel new to LWPF, or changing positions within LWPF, complete the required dangerous waste training within six months of the assignment. Personnel who have not completed required training are permitted to perform work requiring handling dangerous wastes at LWPF only under the supervision of a trained employee. LWPF operations management is responsible for ensuring that all operations personnel are trained and required certifications are maintained.

5.1 Identification of Training

The required training is specified by the employee's specific job duties as determined by a job analysis or management assessment. Training requirements for individual operations personnel can be found in TMX. Required training is based on worker positions/job titles described in this plan and listed on Attachment 3, Required LWPF Training.

5.2 Dangerous Waste Worker Positions

Employee duties have been categorized within six worker positions. In the event personnel duties and responsibilities overlap and fall into more than one position, the employee will complete the training requirements for each position. The six worker positions are: 1) All Employee, 2) General Worker, 3) Advanced General Worker, 4) General Manager, 5) General Shipper, and 6) Waste Designator.

The level of training is determined by the duties associated with each worker position. The description of job duties for each position can be matched to individual job titles held by employees at the Hanford Site. The determining factor for placing a specific worker within any of the worker positions are the duties of the worker's job.

5.3 Job Title and Descriptions

Each employee is assigned a job title and job description. The job descriptions include requisite skills, work experience, education, and other qualifications, and a brief list of duties and/or responsibilities for each position. Work experience, education, and other qualifications required for each position are maintained by the company's human resources department.

In the following sections, brief job titles and job descriptions of employees associated with dangerous waste management at LWPF are listed within the appropriate position.

1) All Employees

Employees included in this position are those personnel who do not fall into one of the other five positions and have no duties or responsibilities directly associated with dangerous waste. The types of personnel in this position typically include Secretaries, Clerks, and Oversight (example: Quality Assurance) Personnel.

Most non-Hanford Facility Personnel will be categorized as All Employees since they generally tour, provide oversight, or are brought on site for interviews. Other non-Hanford Facility Personnel who gain access to the LWPF facilities to complete work in controlled areas but do not become involved in the management of dangerous or mixed waste will be categorized as All Employees.

2) General Worker

Facility or support personnel with limited dangerous waste management duties, which include general activities associated with the generation of waste, facility maintenance or modification, are categorized as General Workers. Job duties and responsibilities for general workers are not unit specific.

Hanford Facility personnel categorized as General Workers may be assigned duties and responsibilities for:

Placing waste generated into pre-approved containers and filling out log sheets where applicable.

Completing radiological surveys of dangerous or mixed wastes.

The loading of packaged containers onto trucks or movement of containers.

Responding to a spill or release of known contents where the duties and responsibilities are limited to containing the spill/release, returning the drum to an upright position, and placing the known spilled material or waste into a pre-approved container.

Applying advanced container markings or labels based on direction from an Advanced General Worker, General Manager, or General Shipper.

Support organizations management and technical support personnel assist management in the safe, effective, efficient, and environmentally acceptable operation and maintenance of the facilities. Personnel who function as general workers may include, but are not limited to: maintenance personnel, radiological control technicians (RCTs), craftspeople, supervisors of general workers, truck drivers, and laboratory personnel.

3) Advanced General Worker

Nuclear Process Operators (NPOs) and designated environmental engineering personnel are categorized as advanced general workers, based on job duties. Their activities either generate and manage dangerous waste or they operate the facility systems and processes.

Examples of the duties and responsibilities of an Advanced General Worker for management of dangerous waste in containers include: container inspection, determining advanced container markings and preparing container log sheets, completing waste inventories, sampling of waste, responding to spills and releases of waste in accordance with approved procedures, etc.

LWPF NPOs responsibilities and duties include:

- Operate the ETF, LERF and 242-A Evaporator facilities.
- Package and transport waste samples.
- Perform sampling.
- Conduct routine inspections.
- Provide surveillance.
- Respond to facility alarms.
- Respond to abnormal and/or emergency conditions.

4) General Manager

Personnel identified as General Managers coordinate, direct and oversee the work of general or advanced general workers in the management of dangerous waste or in the operation and control of the facility. Other duties may include command responsibilities during emergency events requiring implementation of the contingency plan. The personnel at LWPF who may be categorized as General Managers include: the Operations Manager (OM), Shift Operations Managers (SOMs), Environmental Compliance Officer (ECO), Cognizant Engineers (Cogs), Persons In Charge (PICs), and Hazardous Material Coordinator (HMC). The TMX identifies employees currently filling these positions.

a) Operations Manager (OM) responsibilities include:

- Supervise, coordinate, and direct the activities of the SOMs.
- Maintain control over the LWPF unit operations in accordance with established operating procedures and policies, DOE Orders, and Federal and State regulations.
- Direct, control, and coordinate the storage and transfer of dangerous waste.
- Comply with LWPF discharge permits, delisting, and operating limits.
- Provide guidance to SOMs during abnormal or emergency conditions.

b) Shift Operations Managers (SOMs) responsibilities include:

- Supervise and coordinate LWPF operation and maintenance activities.
- Maintain control of LWPF unit operations in accordance with established policies and operating procedures, DOE Orders, and Federal and State regulations.
- Conduct pre-job safety meetings with personnel.
- Maintain operational records.
- Review and revise LWPF operations procedures.
- Recognize and respond to abnormal and/or emergency conditions.
- Supervise the storage, handling, and transfer of dangerous waste.
- Comply with LWPF discharge permit/Delisting requirements and operating limits.

c) **Environmental Compliance Officer (ECO) responsibilities include:**

- Maintain Operations Management awareness of environmental compliance requirements and issues.
- Provide support to ensure compliance with applicable environmental rules and regulations.
- Serve as LWPF's liaison on environmental issues and permits.
- Advise LWPF management of emerging environmental. requirements and policies, and recommend implementation strategies to ensure compliance.
- Ensure compliance with LWPF discharge permit/Delisting requirements.

d) **Cognizant Engineers (Cog Engs) responsibilities include:**

- Ensure emergency and monitoring equipment, process equipment, procedures, designs, etc., comply with DOE Orders, Federal and State regulations, national standards, and applicable engineering procedures and management standards.
- Issue and maintain operating documentation, operating procedures, flowsheets, sample schedules, specifications, process test plans and procedures, operational safety requirements, etc.
- Perform evaluations of LWPF unit process to ensure compliance with process control requirements and discharge permits/Delisting.
- Prepare and approve engineering design documents and drawings in compliance with applicable policies, procedures, and instructions per national standards and codes.
- Provide technical assistance for hazardous material and dangerous waste spill response.

e) Person In Charge (PIC) responsibilities include:

- Provide in-field direction of tasks in progress.

f) **Hazardous Material Coordinator (HMC) responsibilities include:**

- Create and maintain Satellite Accumulation Areas (SAAs), as needed, for maintenance of waste generated at LWPF in accordance with applicable requirements.
- Supervise and coordinate dangerous waste storage and transfer.
- Provide approved storage containers and applicable markings.
- Interface with other organizations to ensure proper and timely disposal of waste.
- Prepare and maintain applicable waste handling documentation in accordance with DOE Orders and Federal and State regulations.
- Ensure non-regulated alternatives are used whenever possible.
- Provide review and waste disposition instructions as required.

5) General Shipper

General Shippers prepare and sign waste movement documentation for on-site and off-site shipments of dangerous waste. Additionally, at LWPF they are involved in the development and approval of hazardous waste procedures. Designated environmental engineering personnel are categorized as General Shippers as noted on the TMX. The Environmental Compliance Officer should also meet all training requirements for a General Shipper.

6) Waste Designator

Personnel who perform and/or complete waste designations at unit/buildings are categorized as waste designators under the RCRA training program.

5.4 Type and Amount of Training

This section provides an overview of dangerous waste management and job-specific training provided to employees in job titles and positions discussed in the previous sections. In addition to normal operating conditions, all employees are trained on emergency equipment, systems, and procedures to include the following, as applicable to meet the requirements in WAC 173-303-330(1)(d):

- Procedures for using, inspecting, and maintaining emergency response equipment.
- Automatic and manual waste feed cut-off systems.
- Communication and alarm systems.
- Response to fires and explosions.
- Response to dangerous waste contamination incidents and spills.
- Shutdown of operation.

LWPF uses existing courses to the maximum extent practical, ranging from introductory to task specific waste training. Attachment 1 gives listing of the classes, with brief descriptions, required for the stated job classifications and Attachment 2 provides a matrix of job positions and required training.

Support organization employees are also required to complete identified facility specific training applicable to their involvement with dangerous waste management. LWPF Managers and Team Leaders are responsible for identifying individual employee training requirements, in accordance with this plan, and for ensuring training requirements are met.

1) Training for Emergency Response

Federal and state regulations require all employees be able to respond effectively to emergencies and employees be familiar with emergency procedures, emergency equipment, and emergency systems. Specific topics required by federal and state dangerous waste regulations are addressed throughout the Dangerous Waste Training Program and are included in the following training, as applicable:

- Waste Management Awareness.
- Facility Specific Orientation, including Building Emergency Plan.
- Facility Emergency and Hazard Information Checklist.
- Nuclear Process Operator certification.
- Building Emergency Director training.

2) Non-Hanford Facility Personnel Training

Non-Hanford Facility personnel who will be performing unsupervised work at LWPF must complete training required by WAC 173-303 and 40 CFR 264.16.

Non-Hanford Facility personnel who not will be performing un-supervised work in a facility, such as touring a facility, must be escorted by facility personnel with the training required for the tasks.

The TSD Unit Manager is responsible for ensuring non-Hanford Facility personnel meet applicable access requirements before granting access to the facilities.

5.5 Relevance of Training to Positions

The dangerous waste training program for LWPF employees was developed after reviewing state and federal regulations and the completion of a job analysis for selected positions. Tasks performed by employees were identified and evaluated to determine training requirements. In addition, training needs are evaluated continually in relation to current state and federal regulations.

The LWPF Dangerous Waste Training Program ensures personnel responsible for waste handling are trained properly to perform the job duties pertinent to the handling, storage, treatment, and/or disposal of dangerous wastes.

5.6 Conduct of Training

Training is provided using classroom instruction, On-the-Job Training, and/or computer based training methods. Training is developed and provided by personnel knowledgeable in dangerous waste management policies/procedures.

Hanford Facility personnel shall maintain appropriate knowledge and skills by reviewing training material, required reading, self-paced instruction manuals, lessons learned, group discussions, continued training, etc.. Employees requiring certification are required to recertify annually or biennially, as applicable.

5.7 Documentation of Training

Classroom training is documented on course completion rosters, which are signed by students attending the course. Written examinations are signed by the student at the time of taking the exam and when reviewed with the instructor who grades the examination.

Training record files for LWPF employees are stored in the TMX computer database, which is accessed by the Facility Records Specialist. A report is generated from the database to inform facility management when an employee's training is within 90 days of expiration. An example of a TMX report is included in Attachment 3. Copies of completed TSD unit-specific training certifications/qualifications are available from the LWPF Training Department. Additional information regarding training records can be accessed through the Training Records and Information (TRI) system. The TRI system is managed by the Hanford Training Records organization.

Training record summaries for support organization employees are also stored in the TRI system. Training records for former employees are kept on the TRI system for three years from the date the employee last worked at LWPF. Original signed and dated training records are maintained by the Hanford Training Records organization. These records are transferred quarterly to the Records Holding Facility in Richland, Washington. After approximately one year at the Records Holding Center, the original training records are archived.

1) Access of Training Records

When a training record is requested during an inspection, an electronic data storage record will be provided. If an electronic data storage record does not satisfy the inspection concern, a hard copy training record will be provided. Training records of former employees may not be readily available to facility personnel and may require a representative from the Training Records organization to access this information.

2) Determining Current Training Status

The electronic data storage training record, coupled with this training plan, will give the ability to quickly determine the training status of personnel in the field.

3) Personnel List

A list of personnel for Advanced General Workers, General Managers, General Shippers and Waste Designators is maintained on TMX, including the direct link between these positions and the individuals filling the positions. The TMX is updated quarterly.

6.0 REFERENCES

The following documents were used in the development of this DWTP:

WAC 173-303-330, Washington Administrative Code, Dangerous Waste Regulations
Title 40 Code of Federal Regulations 264.16, Personnel Training
1992, HAMTC Agreement
Hanford Facility RCRA Permit, Dangerous Waste Portion
Hanford Facility Dangerous Waste Permit Application, General Information Portion (DOE\RL-91-28)

7.0 ATTACHMENTS

ATTACHMENT 1. RCRA TRAINING PROGRAM COURSE DESCRIPTIONS
ATTACHMENT 2. REQUIRED LWPF TRAINING
ATTACHMENT 3. EXAMPLE OF TMX DATABASE REPORT

ATTACHMENT 1. RCRA TRAINING PROGRAM COURSE DESCRIPTIONS

The following list of courses constitutes the RCRA training program courses as determined by (1) the Dangerous Waste Regulations WAC 173-303, (2) the Hanford Facility RCRA Permit, and (3) correspondence between RL and Ecology on dangerous waste training.

HANFORD TRAINING COURSES

Title / course number	**000001 Hanford General Employee Training**
Description	Course covers DOE orders and applicable policies pertaining to employer and employee rights and responsibilities, general radiation training, hazard communications, dangerous waste, fire prevention, personal protective equipment, safety requirements, certain unit/building orientation refresher training, emergency preparedness, accident reporting, and avenues for addressing safety concerns. The RCRA training program identifies this course as a program element as an annual refresher to the Hanford Facility RCRA permit condition concerning training.
Mandating Document(s)	Hanford Facility RCRA Permit, General Condition II.C.2 and 4
Target Audience	All Hanford Facility personnel working on the Hanford Site.
Frequency	Initially and annually thereafter

Title	02006G Waste Management Awareness
Description	Course introduces workers to federal laws governing chemical safety in the work place. The course provides the hazardous material/waste worker with the basic fundamentals for safe use of hazardous materials and initial accumulation or storage of dangerous or mixed waste in containers. The concepts covered in this course instruct personnel on specific waste generation procedures and requirements which includes: (1) Applicable waste management practices (i.e., waste stream identification, waste segregation practices, completing container logsheets, and housekeeping requirements), (2) proper responses to incidents pertaining to the waste in the initial accumulation containers, (3) proper responses to dealing with waste of unknown origins, and (4) proper responses to questions posed in the field concerning the above elements.
Mandating Document(s)	Satellite accumulation areas: Letter: RL/US Army Corps of Engineers to Ecology "State of Washington Department of Ecology Administrative Order No. DE 94NM-063" dated April 14, 1994, items 3 and 4. Hanford Facility RCRA Permit, General Condition II.C.4 90-day accumulation areas: WAC 173-303-330(1) Letter: RL/US Army Corps of Engineers to Ecology "State of Washington Department of Ecology Administrative Order No. DE 94NM-063" dated April 14,, 1994, items 3 and 4. Hanford Facility RCRA Permit, General Condition II.C.4 TSD unit storage containers: WAC 173-303-330(1) Letter: RL/US Army Corps of Engineers to Ecology "State of Washington Department of Ecology Administrative Order No. DE 94NM-063" dated April 14,, 1994, items 3 and 4. Hanford Facility RCRA Permit, General Conditions II.C.1 and II.C.4
Target Audience	Hanford Facility personnel categorized as a General Worker, Advanced General Worker, and General Manager. Subcontractors categorized as General Workers. Other courses may provide equivalent training so that credit for this course is provided when the electronic data storage training record is generated.
Frequency	One-time-only Justification: The initial accumulation of waste can be conducted under satellite accumulation area provisions in WAC 173-303-200(2), during a project where the 90-day accumulation period starts when the waste is first placed into a container, inside an Area of Contamination during CERCLA or RCRA past practice activities, or in a TSD unit storage container. Annual refresher training is not required because unit/building specifics are adequately covered through the annual BEP and container waste management courses.

Title	**020159 Advanced Course 2 - Hazardous Waste Shipper Certification**
Description	Course introduces General Shippers to identify shippers' responsibilities and liabilities with regard to compliance to manifesting requirements and DOT regulations, including placarding, identifying proper shipping names, and loading requirements.
Mandating Document(s)	WAC 173-303-330(1), -180, -190, and -370. Hanford Facility RCRA Permit, General Condition II.Q as applicable.
Target Audience	General Shippers of dangerous or mixed waste on roadways anywhere on the Hanford Facility.
Frequency	Every three years.

Title	**02028B Building Emergency Director Training**
Description	Course provides an overview of the responsibilities of the Building Emergency Director, identifies the building emergency organizations, actions required during an event, implementing the contingency plan, and discusses drill and exercise requirements.
Mandating Document(s)	WAC 173-303-330(1), -340, -350, and -360
Target Audience	Hanford Facility personnel categorized as a General Managers because they perform the responsibilities of a RCRA Emergency Coordinator through the title of Building Emergency Director or alternate. The BED can function over TSD units or generator activities.
Frequency	Initial (Retrained annually by Building Emergency Director Requalification)

Title	**035010 Waste Designation**
Description	Course teaches dangerous waste designation according to WAC 173-303. Class content includes section-by-section lecture on the regulations, with examples following each section. Students complete examples using a waste designation flow chart. Examples addressed include: listed waste, characteristic waste, and Washington State criteria: toxicity and persistence.
Mandating Document(s)	WAC 173-303-330(1), -070, and -080 through -100
Target Audience	General Shippers and Waste Designators
Frequency	One-time only Justification: Another course, the Waste Designation Qualification course, annually qualifies those personnel who designate waste. General Shippers do not need to be annually retrained in this course because they can rely upon other resources within the company to help them ensure wastes are properly designated.

Title	**035012 Waste Designation Qualification**
Description	Course provides qualification to become a qualified waste designator.
Mandating Document(s)	WAC 173-303-330(1), -070, and -080 through -100
Target Audience	Waste Designators
Frequency	Annual

Title	**035020 Facility Waste Sampling and Analysis**
Description	Course presents waste sampling methodologies according to EPA Protocols SW-846, "Test Methods for Evaluating Solid Waste Physical/Chemical Methods." This course also covers documentation requirements in a sampling plan, waste analysis plan, field and laboratory quality control/assurance, data quality objectives process, and use of actual sampling equipment as specified by WAC 173-303-110. Finally topics on listed waste management pertaining to sample management and available on-site sampling services are covered.
Mandating Document(s)	WAC 173-303-330(1), -070, -110, and -300
Target Audience	General Shippers
Frequency	One time only Justification: In most cases on the Hanford Facility, the General Shipper will utilize resources from outside organizations to physically acquire samples. In addition, the General Shipper will also rely on the review and approval process for the development and issuance of Sampling and Analysis Plans regarding a sampling effort. This training provides an overview of information to ensure that sampling efforts are properly arranged for and planned.

Title	**035100 Container Waste Management - Initial**
Description	Course covers general training requirements pertaining to waste management in container at 90-day accumulation areas and TSD units. The course incorporates WAC 173-303-200(1), -630, DOE orders, and FDH policy for container management. Includes practical exercises for hands-on experience with the packaging of dangerous or mixed waste, and preparation of packages for final destination. This course does not cover waste management aspects pertaining to other RCRA waste management units such as tank systems, surface impoundments, containment buildings, landfills, etc.
Mandating Document(s)	WAC 173-303-330(1), -630, -200(1) and Waste Minimization
Target Audience	Advanced General Workers and General Managers categorized because they are immediate managers of Advanced General Workers who manage containers of dangerous or mixed waste.
Frequency	Initial only (refresher - Container Waste Management Training)

Title	**035110 Container Waste Management - Refresher**
Description	Refresher Course - Container Waste Management - Initial
Mandating Document	WAC 173-303-330(1), -630, -200(1), and waste minimization
Target Audience	Advanced General Workers and General Managers who are categorized because they are immediate managers of Advanced General Workers who manage dangerous or mixed waste in containers.
Frequency	Annual

Title	**035120 Waste Management Administration - Initial**
Description	Course is designed for personnel preparing to become shippers of dangerous and/or mixed waste. This course covers regulatory and company policies, forms, reports, forecasts, and plans. Topics also covered include: waste characterization, waste storage disposal request, low level waste storage/disposal record, transuranic waste storage/disposal record, and radioactive mixed waste attachment sheet. In addition, students will learn how these forms are used to complete shipping papers.
Mandating Document(s)	WAC 173-303-330(1), -630, -200, -210, -220, -380, and -390.
Target Audience	General Shippers
Frequency	Initial only (Refresher - Waste Management Administration)

Title	**035130 Waste Management Administration - Refresher**
Description	Refreshes course - Waste Management Administration - Initial
Mandating Document(s)	WAC 173-303-330(1), -630, -200, -210, -220, -380, and -390.
Target Audience	General Shippers
Frequency	Annual

Title	**037510 Building Emergency Director Requalification**
Description	Refresher for Building Emergency Director Training
Mandating Document(s)	WAC 173-303-330, -340, -350, and -360
Target Audience	General Manager categorized because they can act as RCRA Emergency Coordinator in WAC 173-303-360.
Frequency	Annual

Title	**03E096 Unit/building-Specific Contingency Plan/Hazard Communication/Emergency Preparedness Training for 242-A Evaporator/LERF** (Uses "Facility Emergency and Hazard Information Checklist", A-6000-784R)
Description	Course consists of a review of specific chemical hazards associated with each RCRA waste management unit and job assignment, as covered by a RCRA contingency plan. The training is completed by the supervisor, manager, or a designated individual using a checklist available on the Hanford Local Area Network under Jet Forms. The unit/building-specific information is reviewed concerning hazards in the work area and emergency response requirements, including where applicable, waste feed cut-off, communication and alarm systems, and response to fires. The training is completed by the immediate manager, or a designated individual using a checklist. The checklist acts as a guide to ensure consistent coverage of necessary topics.
Mandating Document(s)	WAC-173-303-330, -340, and -350 Letter: RL/US Army Corps of Engineers to Ecology "State of Washington Department of Ecology Administrative Order No. DE 94NM-063" dated April 14,, 1994, items 3 and 4. Hanford Facility RCRA Permit, General Condition II.C.4
Target Audience	All Hanford Facility personnel assigned to, or performing work at 242-A Evaporator/LERF. Non-Hanford personnel who will perform work unsupervised.
Frequency	Annual

Title	**03E074 Unit/Building-Specific Contingency Plan/Hazard Communication/Emergency Preparedness Training for ETF/LERF** (Uses "Facility Emergency and Hazard Information Checklist", A-6000-784R)
Description	Course consists of a review of specific chemical hazards associated with each RCRA waste management unit and job assignment, as covered by a RCRA contingency plan. The training is completed by the supervisor, manager, or a designated individual using a checklist available on the Hanford Local Area Network under Jet Forms. The unit/building-specific information is reviewed concerning hazards in the work area and emergency response requirements, including where applicable, waste feed cut-off, communication and alarm systems, and response to fires. The training is completed by the immediate manager, or a designated individual using a checklist. The checklist acts as a guide to ensure consistent coverage of necessary topics.
Mandating Document(s)	WAC-173-303-330, -340, and -350 Letter: RL/US Army Corps of Engineers to Ecology "State of Washington Department of Ecology Administrative Order No. DE 94NM-063" dated April 14,, 1994, items 3 and 4. Hanford Facility RCRA Permit, General Condition II.C.4
Target Audience	All Hanford Facility personnel assigned to, or performing work at ETF/LERF. Non-Hanford Facility personnel who will perform work unsupervised.
Frequency	Annual

Title	**350400 242-A Evaporator Operator Certification**
Description	Qualifies NPOs to control 242-A Evaporator systems.
Mandating Document(s)	WAC-173-303-330, -640
Target Audience	Advanced General Workers and General Managers who are categorized because they are immediate managers of Advanced General Workers who manage mixed waste in tank systems.
Frequency	Biennial

Title	**350540 242-A Evaporator Orientation**
Description	Introduction to the 242-A Evaporator, including facility mission, hazards and emergency response procedures. (Includes BEP)
Mandating Document(s)	WAC-173-303-330 Hanford Facility RCRA Permit, General Condition II.C.2
Target Audience	All Hanford Facility personnel assigned to, or doing work at, the 242-A Evaporator. Non-Hanford Facility Personnel who will perform work unsupervised.
Frequency	Annual

Title	**705020 LWPF Hazardous Material/Waste Handling**
Description	Presents Waste Handlers with state, federal and Hanford specific regulations on waste handling, including: segregation, packaging, and disposal.
Mandating Document(s)	WAC-173-303-330, -630
Target Audience	All General Workers, and Advanced General Workers and General Managers who are categorized because they are immediate managers of Advanced General Workers who manage dangerous or mixed waste in containers.
Frequency	Annual

Title	**705120 LWPF Outside Operator Certification**
Description	Qualifies NPOs to operate those systems under the control of the LWPF Outside Operator, including: TEDF, Load-In Station, and LERF.
Mandating Document(s)	WAC-173-303-330, -640, -650
Target Audience	Advanced General Workers and General Managers who are categorized because they are immediate managers of Advanced General Workers who manage dangerous or mixed waste in tank systems and/or surface impoundments.
Frequency	Biennial

Title	**705125 LWPF Primary Systems Operator Certification**
Description	Qualifies NPOs to operate the ETF's Primary Treatment Train systems, including the UV/OX and the RO systems.
Mandating Document(s)	WAC-173-303-330, -640
Target Audience	Advanced General Workers and General Managers who are categorized because they are immediate managers of Advanced General Workers who manage mixed waste in tank systems.
Frequency	Biennial

Title	**705130 LWPF Secondary Systems Operator Certification**
Description	Qualifies NPOs to operate the ETF's Secondary Treatment Train systems, including the Secondary Waste Receiving Tanks and the ETF Evaporator and Thin Film Dryer.
Mandating Document(s)	WAC-173-303-330, -640
Target Audience	Advanced General Workers and General Managers who are categorized because they are immediate managers of Advanced General Workers who manage mixed waste in tank systems.
Frequency	Biennial

Title	**705135 ETF Control Room Operator Certification**
Description	Qualifies NPOs to control ETF and TEDF systems from a centralized computer system, including emergency response procedures.
Mandating Document(s)	WAC-173-303-330, -340, -350, 360, -630, and -640.
Target Audience	Advanced General Workers and General Managers who are categorized because they are immediate managers of Advanced General Workers who manage dangerous or mixed waste in containers and/or tank systems. General Managers who are Building Emergency Directors.
Frequency	Biennial

Title	**705700 200 Area LEF Facility Orientation**
Description	Introduction to the ETF, LERF and TEDF facilities including: facility missions, hazards, and emergency response procedures.
Mandating Document(s)	WAC-173-303-330 Hanford Facility RCRA Permit, General Condition II.C.2
Target Audience	All Hanford Facility personnel assigned to, or doing work at ETF, LERF, or TEDF. Non-Hanford Facility Personnel who will perform work unsupervised.
Frequency	Annual

ATTACHMENT 2. REQUIRED LWPF TRAINING

Position	Job Title	Required Training
All Employee	All other Job Titles not specifically listed below.	000001, 350540[1], 705700[2], 03E096[1], 03E074[2]
General Worker	Radiological Control Technician, Maintenance Personnel, including: Electrician, Instrument Technician, Insulator, Millwright, Painter, Pipefitter, Power Operator, Process Crane Operator, Rigger, Sign Painter, Truck Driver, Welder Maintenance Manager, Radiological Control Manager	000001 02006G 350540[1] 705700[2] 03E096[1] 03E074[2]
Advanced General Worker	Nuclear Process Operator	000001, 02006G, 035100, 035110, 705120[2], 705125[2], 705130[2], 705135[2], 350400[1], 03E096[1], 03E074[2]
General Manager	Operations Manager, Shift Operations Managers, Environmental Compliance Officer, Person-in-Charge, Hazardous Material Coordinator	000001, 02006G, 02028B, 037510, 035100, 035110, 350540[1], 705700[2], 03E096[1], 03E074[2]
General Shipper	Shipper	000001, 02006G, 020159, 035010, 035020, 035100, 035110, 035120, 035130, 350540[1], 705700[2], 03E096[1], 03E074[2]
Waste Designator	Waste Designator	000001, 035010, 035012, 350540[1], 705700[2], 03E096[1], 03E074[2]

Notes:

1. These classes are specific to the 242-A Evaporator and are not required for personnel who work exclusively at LERF/ETF. TMX provides information on personnel who work exlusively at 242-A Evaporator or LERF/ETF.

2. These classes are specific to the LERF/ETF and are not required for personnel who work exclusively at the 242-A Evaporator. TMX provides information on personnel who work exlusively at 242-A Evaporator or LERF/ETF.

ATTACHMENT 3. EXAMPLE OF TMX DATABASE REPORT

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***** BUSINESS SENSITIVE *****        POSITION TRAINING REPORT        *****BUSINESS SENSITIVE *****

Tracking Code:                              Matrix Last Modified on 07/19/97          07/21/97    Position 1
Manager:                                    30 Days Delinquent Forecast               16:16:46    Sheet 1 of 2
Organization : 200A EFFLUENT TREATMENT FAC OPS
Position: Shift Ops Mgr - ETF      (GM)

      Course      Title                          Retrain    Individual   Individual   Individual   Individual
       No.                                       Course     #1           #2           #3           #4

M     000001   HGET                              000001     09/30/97     10/10/97     01/10/98     08/26/97
M     003034   LOCK & TAG - AUTH WRKR INITIAL    003037     11/15/97     10/29/97     11/18/97     03/10/98
M     020001   RAD WORKER TRNG II - INIT         020003     08/06/98     11/09/97     07/11/98     09/24/98
M     020030   SCBA ANNUAL                       020030     05/09/98     10/04/97     05/22/98     06/04/98
M     020032   SCOTT SKA-PAK AIRLINE SYSTEM      020032     05/09/98     10/04/97     05/22/98     06/04/98
M     020041   BASIC RESP PROTECT TRNG           020041     01/10/98     10/30/97     09/05/97     11/19/97
M     020044   QUANTITATIVE MASK FIT             020044     01/10/98     10/30/97     09/05/97     11/19/97
M     02006G   WASTE MANAGEMENT AWARENESS        ---------    OK           OK           OK           OK
M     020130   CONFND SPC ENTRY (CSE)            ---------    OK           OK           OK           OK
M     02028B   BLDG EMER DIR TRNG                037510     02/18/98     02/04/98     01/28/98     01/11/98
M     020702   RAD WORKER I/II REFRESH           020702     09/30/98     10/10/98     01/09/99     08/26/98
M     031110   24 HR RCRA TSD HAZ WASTE          032020     05/09/98     10/09/97     05/22/98     06/04/98
M     350540   242-A EVAPORATOR ORIENT           ---------    OK           OK           OK           OK
M     703036   LWPF  LOCK & TAG                  703036     12/31/98     12/31/98     01/09/99     12/31/98
M     705020   200 AREA WSTE HNDLING OPS         ---------    OK           OK           OK           OK
M     705700   200A  LEF FAC ORIENT              705700     09/30/97     10/10/97     01/10/98     08/26/97
D     000390   OJT TRAINING WORKSHOP             ---------    OK           OK           OK           OK
D     020107   BHVR BASED SAFETY TRNG            ---------    OK           OK           OK           OK
D     020704   RAD CON MANUAL TRNG - MGRS        ---------    OK           OK           OK           OK
D     03E074   BLDG EMERG PLAN - 0263 - ETF      03E074     09/30/97     10/10/97     01/09/98     08/26/97
D     03E096   242A EVAP/LERF FAC EMERG ID CH    03E096     03/19/98     12/19/97     03/12/98     03/12/98
D     042720   AERIAL LIFT OPER TRNG             043920     05/17/98       /  /       06/15/98     04/07/00
D     044470   FORKLIFT OPERATNL SAFETY          041890     03/18/00       /  /       11/29/98     11/22/99
D     044480   MEDIUM RISK ELECT SAFETY          044480     12/12/97     04/30/00   <<08/16/97>>   09/13/97
==========================================================================================================
                                                LEGEND
            Upper case (M/D/C/P)  =  Course needed by all           Date  =  Course retrain date
            Lower case  (m/d/c/p).  =  Course needed by some        OK    = Course taken; no retrain required
                   *              =  Retrain not to be maintained   ****  = Course taken; retrain requirement not maintained
              <<      >>          =  Course delinquent              Blank = Course not needed (lower case) and not taken
                 /  /             = Course needed (upper case) but not taken
            To delete specific employee retrain dates for lower case (m, d, c, p): See TMX Main Menu 5., TMX Course Alternates.
```

***** BUSINESS SENSITIVE *****

POSITION TRAINING REPORT

*****BUSINESS SENSITIVE *****

Tracking Code:
Manager:
Organization : 200A EFFLUENT TREATMENT FAC OPS
Position: Shift Ops Mgr - ETF (GM)

Matrix Last Modified on 07/19/97
30 Days Delinquent Forecast

07/21/97 Position 1
16:16:46 Sheet 2 of 2

	Course No.	Title	Retrain Course	Individual #1	Individual #2	Individual #3	Individual #4
D	170500	BASIC MEDIC FIRST AID	170535	01/23/98	03/05/99	08/05/98	09/13/97
D	170640	QTRC - INTRO TO OCC RPTG	---------	OK	OK	OK	OK
D	170642	OCCURRENCE REPORT WRITING	---------	OK	OK	OK	OK
D	170656	HANDS-ON FIRE EXTINGSHR	170656	05/14/98	03/06/98	<<06/12/97>>	08/28/97
D	705035	200 AREA LEF EP/APC	705035	09/30/97	09/30/97	10/28/97	10/21/97
D	705120	200 LEF OUTSDE OPER CERT	705120	03/07/99	12/26/98	03/10/99	03/13/99
D	705125	200 AR PRMRY SYS OPR CER	705125	09/20/97	03/24/99	09/20/97	10/04/97
D	705130	200 LEF SCNDRY WSTE OPER	705130	09/20/97	03/24/99	09/20/97	10/04/97
D	705135	200 LEF CNTRL RM OP CERT	705135	09/20/97	03/24/99	09/20/97	10/04/97
m	020140	FALL PROTECTION TRAINING	---------				
d	001000	CONDUCT OF OPS - INTRO	---------	OK	OK	OK	OK
d	001005	OVERVIEW CONDUCT OPERTNS	---------	OK	OK	OK	OK
d	010108	WORK MGT & JCS OVERVIEW	010108	****		****	****
d	02006L	ASBESTOS CONTROL	02006L		05/27/98		
d	040784	BASIC CRANE & RIGGING SAFETY	040788		****		
d	060760	COND IND WTR HAMMER SFTY	060765		****	****	05/06/98
d	080969	NEW MANAGER ORIENTATION	---------			OK	
d	705115	200A LEF PIC TRAINING	---------	OK	OK	OK	OK
d	705140	200 ETF SHTDN SHFT OPS MGR QUL	705140		01/06/99		
p	080553	SELF ASSESS FOR MGT SKLS	---------				
p	080810	COM SKILLS WORKSHOP	---------		OK		OK
p	080925	SEXUAL HARASSMENT WRKPL	---------			OK	
p	170002	RISK EVALUATION	---------	OK		OK	
p	170654	SELF ASSES 1ST LIN SPVSR	---------				
p	170780	INTRO TO OSHA STDS	---------			OK	

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