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Document #: SD-W252-FDC-001

Title/Desc:

FDC FOR PROJECT W-252 PHASE II LIQUID EFFLUENT
TREATMENT & DISPOSAL

ENGINEERING CHANGE NOTICE	Page 1 of <u>2</u>	1. ECN № 622864 Proj. ECN
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2. ECN Category (mark one) Supplemental <input type="checkbox"/> Direct Revision <input checked="" type="checkbox"/> Change ECN <input type="checkbox"/> Temporary <input type="checkbox"/> Standby <input type="checkbox"/> 1 Supersedure <input type="checkbox"/> Cancel/Void <input type="checkbox"/>	3. Originator's Name, Organization, MSIN, and Telephone No. C.E. Hatch, LEE, H6-28, 3-1989	3a. USQ Required? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	4. Date 05/08/95
5. Project Title/No./Work Order No. Phase II Liquid Effluent Treatment and Disposal/W-252/A2081	6. Bldg./Sys./Fac. No. N/A	7. Approval Designator ESQD	
8. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-W252-FDC-001, REV 1-A	9. Related ECN No(s). N/A	10. Related PO No. N/A	
11a. Modification Work <input type="checkbox"/> Yes (fill out Blk. 11b) <input checked="" type="checkbox"/> No (NA Blks. 11b, 11c, 11d)	11b. Work Package No. N/A	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
 This revision is a complete rewrite of this document. The changes to this FDC reflect the changes in the BAT/AKART for this project. The effect of this change is to reduce the project scope to the cooling towers at B-Plant and a tie-in of the B-Pond line to the 200 Area TEDF.

13a. Justification (mark one)

Criteria Change <input checked="" type="checkbox"/>	Design Improvement <input type="checkbox"/>	Environmental <input type="checkbox"/>	Facility Deactivation <input type="checkbox"/>
As-Found <input type="checkbox"/>	Facilitate Const <input type="checkbox"/>	Const. Error/Omission <input type="checkbox"/>	Design Error/Omission <input type="checkbox"/>

13b. Justification Details
 The revision to the BAT/AKART report for this project requires this accompanying change to the FDC.

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

BP Atencio H6-25	CE Hatch H6-28	DL Flyckt S6-71
TS Basra R1-51	RA Wahlquist R1-43	MW Peres S6-71
AJ Diliberto H6-32	JD Williams H6-28	WE Toebe H6-22
WJ Evelo A5-18	JA Peltier B4-49	DW Fritz H6-22
RD Gustavson R1-51	OM Jaka R3-08	GC Moist S2-55
DP Hughes R3-35	RD Weissenfels S6-70	AF Crane S6-71
KS Pedersen R3-35	EM Bright S2-63	NJ Sullivan S6-76
Proj Files G6-51	GL Sinton S7-55	JR Kelly R3-35
Central Files A3-28		<i>ESTI EE-44</i>

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BY WHC

DATE OCT 27 1995

Sta. 21

ENGINEERING CHANGE NOTICE

15. Design Verification Required <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	16. Cost Impact <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">ENGINEERING</td> <td style="width: 50%; text-align: center;">CONSTRUCTION</td> </tr> <tr> <td>Additional <input type="checkbox"/> \$</td> <td>Additional <input type="checkbox"/> \$</td> </tr> <tr> <td>Savings <input type="checkbox"/> \$2.6M</td> <td>Savings <input type="checkbox"/> \$16.4M</td> </tr> </table>	ENGINEERING	CONSTRUCTION	Additional <input type="checkbox"/> \$	Additional <input type="checkbox"/> \$	Savings <input type="checkbox"/> \$2.6M	Savings <input type="checkbox"/> \$16.4M	17. Schedule Impact (days) Improvement <input type="checkbox"/> Delay <input type="checkbox"/> N/A
ENGINEERING	CONSTRUCTION							
Additional <input type="checkbox"/> \$	Additional <input type="checkbox"/> \$							
Savings <input type="checkbox"/> \$2.6M	Savings <input type="checkbox"/> \$16.4M							

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

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

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

20. Approvals

	Signature	Date	Signature	Date
OPERATIONS AND ENGINEERING				
Cog. Eng.	CE Hatch	6/1/95	ARCHITECT-ENGINEER	
Cog. Mgr.	JD Williams	5/26/95	PE	
QA	JA Peltier	5/22/95	QA	
Safety	OM Jaka	6/5/95	Safety	
Environ.	WE Toebe	6/1/95	Design	
Other Program	AJ Diliberto	6/1/95	Environ.	
Tank Farms	RA Wahlquist	6/21/95	Other	
Projects	KS Pedersen	6/2/95		
Projects	JR Kelly	5/21/95		
B-Plant	RD Weissenfels	4/5/95	DEPARTMENT OF ENERGY	
284-E	EM Bright	6/1/95	Signature or a Control Number that tracks the Approval Signature	
TEDF Ops.	MW Peres	6/12/95	R.P. Carter, for	10/11/95
TEDF ECO	DL Flyckt	6/12/95	T.K. Teyner	
			ADDITIONAL	

RELEASE AUTHORIZATION

Document Number: WHC-SD-W252-FDC-001, Rev. 2

Document Title: Functional Design Criteria for Project W-252,
"Phase II Liquid Effluent Treatment and Disposal"

Release Date: 10/27/95

**This document was reviewed following the
procedures described in WHC-CM-3-4 and is:**

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:



Janis Bishop

10/27/95

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SUPPORTING DOCUMENT

1. Total Pages ~~32~~ 44

2. Title

Functional Design Criteria for Project W-252,
"Phase II Liquid Effluent Treatment and Disposal"

3. Number

~~WHC-SD~~-WHC-SD-W252-
FDC-001

4. Rev No.

2

5. Key Words

BAT/AKART
Phase II
Liquid Effluent

6. Author

Name: CE Hatch

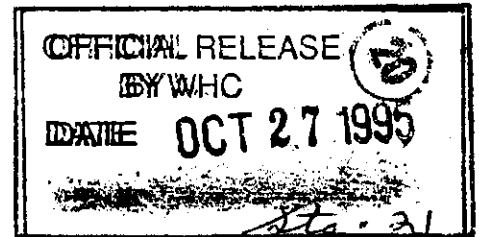
CE Hatch
Signature

Organization/Charge Code 86230/A2081

7. Abstract

This document is the Functional Design Criteria for Project W-252. Project W-252 provides the scope to provide BAT/AKART to 200 Liquid Effluent Phase II streams. This revision (Rev. 2) incorporates a major descoping of the project. The descoping was done to reflect a combination of budget cutting measures allowed by a less stringent regulatory posture toward the Phase II streams.

8. RELEASE STAMP



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RECORD OF REVISION

(1) Document Number
 WHC-SD-W252-FDC-001

Page 1

(2) Title
 Functional Design Criteria for Project W-252, Phase II Liquid Effluent Treatment and Disposal

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release		
		(5) Cog. Engr.	(6) Cog. Mgr.	Date
	(7)			
0	Initial release per EDT 158712, 01/06/93	N/A	N/A	
1	Incorporate ECN 603992 to remove (1) work at the 183-D Water Treatment Facility and (2) requirement for standby electrical power at the 242-A to support equipment installed by this project.	C. E. Hatch	J. D. Williams	11/8/94
1-A	Remove existing Rev 1 pages vii, 2, 3, 7, 15, 16, and insert the corresponding Rev 1-A pages in accordance with ECN 609364.	C. E. Hatch	J. D. Williams	
2 RS	Complete Revision <i>ECN-622864</i>	C. E. Hatch <i>CE Hatch</i>	N. J. Sullivan <i>NJ Sullivan</i>	<i>10-23-95</i>

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WHC-SD-W252-FDC-001 Rev. 2

FUNCTIONAL DESIGN CRITERIA

for

PROJECT W-252

PHASE II: LIQUID EFFLUENT TREATMENT AND DISPOSAL

Prepared by

C. E. Hatch

May 1995

Westinghouse Hanford Company
Remediation and Restoration
Liquid Waste Disposal

for the

United States Department of Energy
Richland Operations Office
Richland, Washington

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WHC-SD-W252-FDC-001 Rev. 2

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GLOSSARY

ALARA	as low as reasonably achievable
AMU	aqueous makeup unit
BAT/AKART	Best Available Technology/All Known, available, and reasonable methods of prevention, control and Treatment
BTU	British thermal unit
CASS	Computer-Automated Surveillance System
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DCG	Derived Concentration Guide
DOE	U.S. Department of Energy
DW	dangerous waste
ECL	effluent comparative level
Ecology	State of Washington Department of Ecology
EPA	U.S. Environmental Protection Agency
FDC	Functional Design Criteria
FSAD	Final Safety Analysis Document
FSAR	Final Safety Analysis Report
GPM	gallon per minute
HLAN	Hanford Local Area Network
HVAC	heating, ventilating, and air conditioning
LCCA	Life Cycle Cost Analysis
LCCS	Laboratory Customer Communications System
LCU	Local Control Unit
MCLG	Maximum Contaminant Level Goals
MCS	Monitor and Control System
MSDS	Material safety data sheets
NESHAPS	National Emission Standards for Hazardous Airborne Pollutants
NPDES	National Pollutant Discharge Elimination System
OCS	operator control station
PAX	private automatic exchange
PC	process condensate
PMCL	(Safe Drinking Water Act) Primary Maximum Contaminant Levels
PSAD	Preliminary Safety Analysis Document
PSAR	Preliminary Safety Analysis Report

GLOSSARY (cont.)

PSD	Prevention of Significant Deterioration
PSE	Preliminary Safety Evaluation
PTECS	(200 East Area) Phase II Effluent Collection System
QA	Quality Assurance
QAPP	Project Specific Quality Assurance Program Plan
RL	U.S. Department of Energy, Richland Field Office
RMW	radioactive mixed waste
RQ	reportable quantity
RW	radioactive waste
SMCL	Secondary Maximum Contaminant Level
TEDF	Treated Effluent Disposal Facility
TOE	Total operating efficiency
Tri-Party	
Agreement	<i>Hanford Federal Facility Agreement and Consent Order</i>
UPS	Uninterruptable Power Supply
WAC	Washington Administrative Code
WESF	Waste Encapsulation and Storage Facility
Westinghouse	
Hanford	Westinghouse Hanford Company
WRAP	West Central Waste Complex
WTF	Water Treatment Facility

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**FUNCTIONAL DESIGN CRITERIA
PHASE II LIQUID EFFLUENT TREATMENT AND DISPOSAL
PROJECT W-252**

1.0 INTRODUCTION

This document provides the functional design criteria required for the Phase II Liquid Effluent Treatment and Disposal Project, Project W-252. Project W-252 shall provide new facilities and existing facility modifications required to implement Best Available Technology/All Known, Available, and reasonable methods of prevention, control, and Treatment (BAT/AKART) for the 200 East Phase II Liquid Effluent Streams (Table 1). The project will also provide a 200 East Area Phase II Effluent Collection System (PTECS) for connection to a disposal system for relevant effluent streams to which BAT/AKART has been applied. For Phase II streams other than B-Plant, this connection will be accomplished by a 216-B-3 Pond System (B-Pond) to Treated Effluent Disposal Facility (TEDF) Tie-in. The Definitive Design of the B-Pond to TEDF tie-in is part of this project. The construction of this tie-in from existing project funds may be performed if there is adequate funding based on the construction estimates for both the B-Plant scope and the tie-in. If funding is not adequate for both pieces of scope, then only the B-Plant construction will be performed.

The BAT/AKART to be applied shall be that identified in WHC-SD-W252-ER-001, Rev. 0, as modified by Engineering Change Notice (ECN) #609363, except for the B-Plant scope which will be done in accordance with Alternative #3: Source Control and Collection Disposal Facility Discharge. The BAT/AKART method selected by the original 240 Engineering Report included source control measures for each facility and discharge to the 200 Area TEDF. The ECN noted above changes the BAT/AKART to the current status option. Necessary monitoring requirements at B-Plant for permitting will still be within the project scope.

1.1 BACKGROUND

Liquid wastestreams generated in the 200 East Area are currently discharged to the soil column. Included in these wastestreams are cooling water, steam condensate, raw water, and sanitary wastewaters.

It is the policy of the U.S. Department of Energy (DOE) to conduct operations in a safe, cost-effective, and environmentally-sound manner. This includes ensuring that discharges of radioactive and nonradioactive material to the environment meet applicable regulatory requirements, and are as low as reasonably achievable (ALARA). It is also the policy of the DOE that the use of soil columns to treat and retain radionuclides and nonradioactive contaminants be discontinued at the earliest practical time in favor of

wastewater treatment and waste minimization. These policies are implemented through DOE Orders and based on federal and state environmental regulations.

In support of these policies, the U.S. Department of Energy, Richland Field Office (RL) issued a document entitled "Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site" (RL 1987). The Plan and Schedule, and its annual updates, contain a strategy for implementing alternative treatment and disposal systems for each of the thirty-three major waste streams discharged to the soil column. In this strategy, the wastestreams were prioritized into Phase I and Phase II categories. A revised effluent prioritization, based on available information, was presented in the "Annual Status Report of the Plan and Schedule," WHC-EP-0196-1 and WHC-EP-0196-2, (WHC 1988a and WHC 1989b).

Table 1 Project W-252 Wastestreams

200 East Area

242-A Evaporator Cooling Water
242-A Evaporator Steam Condensate
B Plant Cooling Water
284-E Powerplant Wastewater
241-A Tank Farm Cooling Water

Note: BAT/AKART for these streams is current status, however the source control option will be implemented for B-Plant. Disposal requirements for the streams other than B-Plant will be accomplished by a B-Pond/TEDF Tie-in at a single point downstream. (Subject to funding restrictions identified in the Introduction.)

The following criteria were utilized to prioritize the effluents:

- o Criterion 1, Radionuclide Concentration--The effluent contains radionuclides in excess of DOE Order 5400.5, Derived Concentration Guide (DCG) values.
- o Criterion 2, Hazardous Waste Characteristics--The effluent exceeds WAC 173-303 dangerous waste threshold levels.
- o Criterion 3, Reportable Quantity or Listed Waste--The effluent released has a potential to contain a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) reportable quantity (RQ) of a hazardous constituent or has the potential to contain a dangerous waste listed in WAC 173-303.

- o Criterion 4, Disposal Facility Life--The duration of the facility mission exceeds the minimum estimated life of the disposal site.

Wastestreams designated as a Phase II effluent did not meet any of the above criteria. Additional information regarding the prioritization and criteria are in the Plan and Schedule (RL 1987) and the 1988 and 1989 status reports (WHC 1988a and WHC 1989).

A key element of the plan is the selection of BAT/AKART for the effluent streams. These studies determine the best management practices to assure discharged effluents meet environmental standards. The completed BAT/AKART studies have been incorporated into a Washington Administrative Code (WAC) 173-240 Engineering Report and submitted to the State of Washington Department of Ecology (Ecology) and the U.S. Environmental Protection Agency (EPA).

In 1989, the DOE entered into an interagency agreement with Ecology and EPA. This agreement is referred to as the "Hanford Federal Facility Agreement and Consent Order" (Tri-Party Agreement) (Ecology, et al. 1989). Project W-252 is one of the projects required to achieve the milestones set forth in the Tri-Party Agreement. One of the milestones, M-17-00B, requires BAT/AKART implementation for Phase II streams by October 1997. The wastestreams included in Project W-252 are the Phase II streams that are not addressed as part of the 200 Area Treated Effluent Disposal Facility (TEDF), Project W-049H and Project W-291H.

This Functional Design Criteria (FDC) document provides the technical baseline required to initiate Project W-252 to meet the Tri-Party Agreement milestone for the application of BAT/AKART to the Phase II effluents. In April 1995 the BAT/AKART determination was revised per ECN #609363 to current status.

1.2 SCOPE

Within the scope of Project W-252 is BAT/AKART Alternative #3 implementation at B Plant, including the Waste Encapsulation and Storage Facility (WESF).

Some of the equipment and systems of this facility to be impacted by Project W-252 may include, but are not limited to, modification of effluent producing systems such as heating, ventilating, and air conditioning (HVAC), replacement of effluent producing equipment, replacement or modification of once-through cooling water systems, modification of piping systems, and/or additional instrumentation.

BAT/AKART implementation for the 241-A Tank Farms cooling water wastestream (Table 1) is excluded from this project. The systems necessary to implement BAT/AKART for this stream shall be provided by Tank Farms Ventilation Upgrade, Project W-030. Collection and transport of the wastestream remaining after

Project W-030 has implemented BAT/AKART will be in the scope of Project W-252. This will be accomplished by utilizing existing B-Pond piping, and the TEDF Tie-in. (Subject to funding restrictions identified in the Introduction.)

Project W-252 will provide the facilities and equipment to collect, sample, monitor, and transport to TEDF for disposal the effluent from B-Plant. In addition the project will collect and transfer to TEDF the remaining Phase II streams by a single downstream connection. (Subject to funding restrictions identified in the Introduction.) Required sampling, monitoring and signal interface of those streams will be done by others, except for pump interface signals.

The project will include the necessary utilities, communications, fire protection, and other safety-related items or features to make the project operational. In addition, these utilities will be designed to allow this project to be integrated with the 200 Area TEDF. Site improvements will be provided by the project where necessary to construct, maintain, or operate the provided systems.

The final treatment and disposal of secondary solid radioactive mixed waste (RMW), dangerous waste (DW), and/or radioactive waste (RW) is excluded from the scope of this project. Treatment and disposal of these wastes shall utilize existing or planned Hanford Site facilities including:

- o 200 East Burial Grounds
- o 200 West Central Waste Complex (WRAP)
- o 616 Facility.

2.0 FUNCTIONAL CRITERIA

Project W-252 shall provide the necessary systems, components, facility modifications, and buildings required to implement BAT/AKART Alternative #3 at B-Plant, including the Waste Encapsulation and Storage Facility (WESF). If funding is available Project W-252 will provide the necessary systems, components, and buildings to collect, and transport the effluents (Table 1) to a common disposal system. The effluents collected for discharge are to meet negotiated permit discharge requirements through the application of BAT/AKART, in accordance with WHC-EP-0137, "Best Available Technology Guidance Document," (WHC 1988j), as modified by ECN #609363. Interface points for application of BAT/AKART and connection of the generating facility to the PTECS will be identified during the project definitive design. The project shall include the necessary utilities, communications, fire protection, safety related systems, features, and site improvements required to make the project operational as required to comply with this Functional Design Criteria (FDC), as well as applicable local, state, and federal codes, regulations, statutes,

and standards. The project systems shall be designed to minimize interruptions to existing facility operations.

The project shall incorporate commercially available equipment and technologies, wherever practical. The use of technologies which are not currently used by private industries shall be minimized. The project will be designed to meet the applicable -99 sections and Division 13 of DOE Order 6430.1A (DOE 1989b).

Design of the project shall consider the following measures to reduce overall life cycle costs by:

- o Utilization of common facilities, components, and manufacturers wherever practical;
- o Siting to minimize operations support requirements and area site improvements such as roadways, fencing, and utility services; and

2.1 SITE LOCATION

Upgrades and additions required to implement BAT/AKART shall be at, or near, the effluent generating facility. This work will be done at one site in the 200 East Area. Collection and transport systems for effluents remaining after BAT/AKART application will be located within the 200 East Area. The PTECS will use TEDF piping whenever practical.

A site evaluation report shall be prepared to assess site location alternatives. The report will be prepared according to the guidance in DOE Order 4320.2C (DOE 1990) and WHC-CM-8-7 (WHC 1988). As part of the site review, a cultural resource review will also be conducted according to WHC-CM-7-5 (WHC 1988).

2.2 PROJECT INTERFACES

The design and construction at B-Plant for BAT/AKART Implementation will result in the following integration and responsibilities:

- o Projects will integrate the design and construction with the B-Plant.
- o B-Plant will then be responsible for the operation and maintenance of the equipment and processes involved.
- o The design and construction of the PTECS collection and transport system at the B-Plant will be coordinated with the B-Plant and the TEDF organizations.

The design and construction of the TEDF tie-in will be coordinated with the TEDF organization. TEDF will then be responsible for the operation and maintenance of the tie-in.

3.0 PROCESS DESIGN CRITERIA

3.1 INSTRUMENTATION AND CONTROL

3.1.1 BAT/AKART Instrumentation and Control at B-Plant

Project W-252 shall provide instrumentation for control and monitoring of all systems and equipment associated with BAT/AKART implementation, including connection to generating facility instrumentation and control systems. Adequate instrumentation will be provided for monitoring hazardous and radioactive materials to provide environmental and personnel safety. Instrumentation shall be provided to enable self-functioning or automated routine equipment operation. The instrumentation and controls shall be integrated with the facility monitoring and control systems, if available.

Project W-252 shall provide Local Control Units (LCU) at the installed B-Plant system. LCU control functions shall have sufficient hardware redundancy to preclude interruption of system operation. Any generator control system add-on equipment shall be of a similar type and same manufacturer as used in the existing system for ease of interface and reduction of maintenance and operating costs.

Local operator interface at the LCU and/or field instrumentation shall be provided for operations, trouble-shooting, maintenance, and personnel safety. Instrument monitors and sensors shall be located in a non-corrosive environment, rated for corrosive service, or placed in a suitable enclosure. The LCU and associated instrumentation shall comply with applicable referenced standards and provide the following minimum requirements:

- o Failure alarms for individual system and/or unit operation.
- o Pumps and other required equipment shall be automatically switched to the backup units by the respective LCU controller software upon primary pump failure or associated alarm conditions.
- o Temperature, conductivity, pH, level, flow, and pressure indication and alarms, where necessary, to assure proper system operation and support preventative maintenance.

- o Position indication on all actuated valves and on any manual valves which are critical to providing routing or process information. Separate on/off confirmation, indication of all positions of multi-way valves, and 0-100% position indication for modulating valves.
- o On/off confirmation for all motor starters, contractors, etc.
- o Current equipment status indication (e.g., rotating equipment).
- o Placement and location of local operator interfaces, calibration equipment, and maintenance access areas shall strictly comply with human factors requirements specified in the DOE Orders, Westinghouse Hanford Company (WHC) manual WHC-CM-4-9, "Radiological Design," (WHC 1988c), and NUREG 0700.
- o Real-time level indication and high level alarms.
- o Real-time indication and historical record of influent and effluent wastestream indicating parameters (e.g., flow, conductivity, pH, total beta).
- o Primary leak detection alarms where required.
- o All information concerning the general functions of packaged sampling systems shall be integrated into each respective LCU.

3.1.2 B-Pond/TEDF Tie-in Instrumentation

Provide pump operation signals to the TEDF control room.

3.2 PIPING

Piping systems shall be provided by Project W-252 for the collection, transport, and disposal of wastewater as required to meet the functional design requirements of the project. Piping system materials of construction shall be compatible with wastestream characteristics, intended service, and existing piping, if applicable.

All piping shall be designed to drain freely with features incorporated for leak detection (as required), location, and repair of failures. Pipe systems will use gravity flow whenever practical and be designed to minimize accumulation of contaminants.

Piping shall be protected from the environmental conditions anticipated for the Hanford Site. Freeze protection will be provided, where required, by burial or other applicable methods. Underground piping shall be marked, within the backfill of the piping, with continuous plastic identification markers. All cross-country pipelines shall be staked, or otherwise marked, providing location, notification requirements, and wastestream identity. Above ground piping shall be labeled to indicate the contents, direction of flow, and any applicable warnings. The piping and installation shall meet the applicable sections of the "Hanford Plant Standards," (RL 1990a).

The piping systems installation will be designed to prevent interruption of generating facility operation.

3.3 GENERAL MECHANICAL/CHEMICAL PROCESS

The systems and processes required to implement BAT/AKART Alternative #3 at the B-Plant have been determined in the "Phase II Liquid Effluent Program, Project W-252, Engineering Report," (WHC 1992). This section provides the functional criteria for implementation of this alternative.

Project W-252 shall supply all facilities and equipment required to implement BAT/AKART Alternative #3 for the B-Plant effluent, as required in WAC 173-216 and the Tri-Party Agreement. The facilities provided by the project shall use commercially available equipment and technologies where practicable. Existing piping, equipment, and facilities should be used wherever feasible. Any new facility or equipment upgrades shall be designed to minimize interruptions to existing facility operations. Specific criteria are given in the following sections.

3.3.1 B Plant Cooling Water

The B Plant cooling water effluent stream is mainly non-contact, once-through cooling water from the WESF pool cell heat exchangers.

The cooling system implemented as BAT/AKART must eliminate the normal use of once-through cooling water for the B Plant cooling water contributors. The system must supply a minimum of 3.26 million BTU/hour of heat removal from the WESF heat exchangers and other equipment. The system shall be designed to meet a variable heat removal demand based on the number of WESF cells being used. The WESF pool cells have a temperature safety limit of 50 degrees C, an operational limit of 45 degrees C, and a normal operational limit of 35 degrees C. The system shall be designed to meet these requirements at all ambient environmental conditions.

All pumps used to circulate coolant in a closed-loop system shall be redundant. Other pumps used to supply makeup water or secondary loop cooling shall also be redundant. The redundant pump shall be capable of supplying 100% of the required capacity. The pumps shall be electrically powered and connected to the standby power system. Pumps and associated valves shall be capable of remote operation and monitoring.

All contributors remaining after BAT/AKART implementation shall be combined, sampled, monitored, and discharged to the PTECS for transport to a disposal site. Flow proportional sampling capabilities and required monitoring shall be provided. A description of a proposed system to implement BAT/AKART for the cooling water stream is contained in Appendix G.

3.3.2 Collection System

The 200 East Area PTECS will utilize existing piping wherever practical. Collected wastestreams shall require no additional treatment before disposal. The wastestreams continuing to be discharged to the B-Pond are listed in Table 1. These combined streams shall be routed to the TEDF in the most cost effective manner.

The collection system at B-Plant shall be designed to minimize impacts to the generating facilities through compliance with the following minimum requirements:

- o Pumps shall be redundant to prevent unforeseen interruption or shutdown of either the PTECS or generating facility operations. The redundant pump shall be capable of providing 100% of the design capacity.
- o Pumps shall be electric-powered and connected to standby power, as required.
- o Pumps and motors shall be equipped with monitoring and control features to permit remote operation and surveillance from the control room.
- o Sumps shall have liquid levels monitored on a real-time basis with high level alarms and other overflow protection, as required to meet the functional requirements of the PTECS.
- o Provision for clean-out and verification of sump integrity shall be provided by design.
- o Flow-proportional composite sampling capability shall be provided at each generator waste interface to the PTECS through the implementation of BAT/AKART.

3.3.3 Disposal System

The PTECS disposal system shall dispose of the combined 200 East Area effluents meeting the permitted release limits to a soil disposal site approved by RL and Ecology under WAC 173-216. The TEDF disposal site will be used.

3.3.4 Sample Collection and Analysis at B-Plant

All equipment required for sample collection, storage, and analysis to meet the regulatory compliance needs for the PTECS shall be provided by Project W-252. TEDF Interface Control Document (ICD) requirements are included in these requirements.

Sampling systems for the PTECS shall be redundant with connection to standby power to provide flow-proportional composite sampling capability. All sampling equipment shall be monitored and controlled via the respective LCUs, with data archived by the MCS. Sampling systems shall be in accordance with the sampling and analysis methods specified by SW-846, "Test Methods for Evaluating Solid Wastes - Physical Chemical Methods" or other appropriate methods.

3.3.5 Support Systems

Secondary solid wastes, derived from the maintenance operations of the PTECS, shall be packaged and shipped utilizing facilities and equipment provided in 2025E.

Utilities and site services for the PTECS and BAT/AKART systems shall be extensions from the nearest available source, if practical. The services shall include raw water, sanitary water, electrical power, and communication systems. Project W-252 shall provide standby power, as required, utilizing existing standby power systems wherever possible. No standby power is required at the B-Pond to TEDF Tie-in.

4.0 FACILITY DESIGN CRITERIA

The project facilities and systems shall be designed to comply with the laws and regulations applicable to industrial water pollution control found in ANL/ESS TM-264 Rev 1, "Environmental Protection Appraisals: A Suggested Guide for U.S. Department of Energy Field Organizations." The project shall also give consideration to the guidelines found in the overview of the laws and regulations of the above appraisal. Design criteria for the individual

facility implemented BAT/AKART systems and the PTECS are to be based upon the applicable provisions of DOE Order 6430.1A and DOE Order 5400.1.

The modifications under Project W-252 will, as a minimum, comply with the applicable requirements of DOE Order 6430.1A, including Division 0275, "Industrial Waste Facility." Other key DOE Orders pertinent to the project design and function are the following: DOE Orders 5400 series; DOE Order 5440.1C; DOE Orders 5480 series; DOE Order 5820.2A; and DOE Order 5400.1C. In addition, national consensus standards specified in the Orders, including NUREG 0700, are applicable to Project W-252. Project W-252 shall also comply with applicable federal, state, and local regulations specified in Section 6.0.

The following subsections define the general requirements that shall be included in the project to meet the functions of Project W-252.

4.1 ARCHITECTURAL

The auxiliary equipment and control/monitoring equipment and components shall be housed in buildings, structures, enclosures, or otherwise designed to withstand the Hanford environment. No additional building space is anticipated for operations and maintenance personnel.

Special consideration shall be given to personnel access to elevated portions of the architectural design (e.g. tank supports). Where appropriate, protection shall be provided at openings and clear drops by handrails or other engineered barriers.

Where applicable, a tank(s) shall have but shall not be limited to, ready access at its base for modifications, equipment inspections, maintenance repair, and expedient removal of waste.

4.2 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)

Facilities and systems provided by Project W-252 shall include building and process ventilation in compliance with applicable DOE Orders.

4.3 UTILITIES

The project shall take advantage of existing utilities and site services, wherever practical. The services shall include raw water, sanitary water,

electrical power, and communications systems. The project shall provide air delivery systems for process and ancillary services as required. Oil-less air compressors, air dryers, and dew point monitoring shall be provided for the instrument air supply, if needed.

4.4 LIGHTING

Occupied areas shall use white light with water resistant NEMA 4 installations. Exterior areas may be lighted by low-pressure sodium, if color rendition is not required for safety or operation. Emergency lighting shall be provided as required.

4.5 ELECTRICAL

Electric power for the BAT/AKART implemented systems shall be provided from existing services located in the 200 East Area as required by the project design. Electrical modifications shall comply with national and Hanford Site requirements.

Standby electric power at B-Plant only for the systems shall be provided from existing sources where practical and shall comply with the National Electrical Code, ANSI/NFPA 70 and NFPA 110, "Emergency and Standby Power Systems." UPS will be provided, where required, to maintain safe operations, compliance with environmental regulations, or where loss of power could require excessive effort for recovery and restart.

4.6 ENERGY CONSERVATION

The systems provided shall comply with the energy conservation requirements and shall be justified by Life Cycle Cost Analysis (LCCA) as defined in DOE Order 6430.1A, 110-12.

4.7 MAINTENANCE

The project will provide the documentation, and the initial complement of equipment and services required, to initiate operation of all systems. This shall include, but not be limited to: equipment identification tags, and necessary computer software development for operations and maintenance activities.

4.7.1 Equipment

Ease of maintenance will be a design goal. Access will be provided for all piping, process and ancillary equipment, for regular maintenance, repair, and

replacement. The design shall provide for maintenance activities to be completed in place to minimize exposure, in accordance with ALARA guidelines. The design shall provide for equipment lock out capabilities where applicable. Replacement of equipment or piping will occur with minimal relocation or removal of other equipment and piping. Regular maintenance will include lubrication, calibration, and testing of the equipment and piping. Regular maintenance, repair, and replacement will be completed in a manner to minimize cost of disassembly and interruption of service.

4.7.2 Materials

All equipment will be constructed of materials selected for compatibility with the intended service. Special protective coatings will be considered per DOE Order 6430.1A, 0900-99. Construction materials will be selected to minimize the potential for the buildup of hazardous and/or radioactive materials.

4.8 SITE IMPROVEMENTS

Road access to the process and support services systems and facilities, constructed by this project, shall be provided. Fencing at impacted facilities may require modification. Project W-252 shall provide for fence relocation and modification of installation.

Cross-country pipelines shall be provided with graded, gravel-surfaced access roads to facilitate periodic inspection, maintenance, or emergency access, as required. Access to outdoor pipelines will be adjacent to the pipeline right-of-way to facilitate surveillance and repair. Road access to the PTECS facilities will be provided. Specifically, road access must be included for operations, maintenance, and waste removal.

New roads or extensions will be designed for economical maintenance and upkeep based on their expected service and use. Existing streets and roads disturbed by the installation of the project are to be restored to a condition at least equivalent to that existing prior to the project. Existing roads will be used to the maximum extent practical.

4.9 DESIGN LIFE

All systems shall be designed to function for a minimum of 30 years. Equipment, instrumentation, and consumable components may have a design life less than 30 years if designed to accommodate repair and/or replacement, and are economically justified.

4.10 RELIABILITY

The degree of reliability provided shall be sufficient to ensure the systems, equipment, and components function efficiently and safely throughout the useful life of the facility without undue maintenance and repair. The project design shall provide for ease-of- and cost-effective upgrades to maintain flexibility to service future mission needs.

5.0 GENERAL REQUIREMENTS

5.1 SAFETY

5.1.1 Criticality

The project design goal will be to prevent a criticality event, or any other unacceptable safety consequence through implementation of BAT\AKART. The criteria that at least two unlikely, independent, and concurrent changes (contingencies) in processing and/or operating conditions must happen before a criticality accident is possible is met for systems of this project. A criticality event is anticipated to be an unlikely event for this project. Designs will be in accordance with DOE Order 6430.1A, 1300.4

5.1.2 Safety Analysis

New or revised safety documentation will verify the design features, operating requirements, and administrative controls required of the facilities prior to operation. The documentation shall include as a minimum: a Preliminary Fire Hazards Analysis and Final Fire Hazards Analysis, a Preliminary Safety Evaluation (PSE), Preliminary Safety Analysis Document (PSAD) or Preliminary Safety Analysis Report (PSAR), Final Safety Analysis Document (FSAD) or Final Safety Analysis Report (FSAR).

New safety documentation to be prepared by the operating and engineering contractor will verify the safety design features, operating requirements, and administrative controls required of the facilities before operation. The interactions of systems, components, and structures between TEDF and PTECS will be analyzed to ensure required safety functions survive under normal and unplanned conditions during W-252 operations. At facilities modified by BAT/AKART implementation the responsible operating organization will be responsible for updating the affected safety documentation.

5.1.3 Contamination Control

Contamination risks during construction are expected to be relatively low, however, some work shall be performed in and near existing non-reactor nuclear facilities. Existing work procedures will be implemented as appropriate to ensure the safety of the construction and operations personnel.

Facilities provided by this project will greatly reduce the quantity of liquid effluents being discharged and provide additional control measures to assure all discharges meet the permitted limits. Diversion capabilities for the effluents at B Plant shall be retained and used if an unplanned release were to occur. The projected concentration of radionuclides are below the levels requiring secondary containment as specified in DOE Order 5820.2A. The PTECS shall be designed to prevent unacceptable radionuclide or chemical exposures to the operating personnel in the event of an unplanned release to the project by a generating facility.

5.1.4 Shielding

Personnel shall be protected from exposures to potential radiation sources from generator facility upset conditions. The risks of personnel radiation exposure shall be minimized through appropriate shielding methods. The amount of shielding will be determined by analysis and will comply with ALARA principles in DOE Order 6430.1A; WHC-SD-GN-DGS-30011, "Radiological Design;" Hanford Site Radiological Control Manual (HSRCM-1); and WHC-CM-4-11, "ALARA Program Manual," (WHC 1988g). In any case, personnel radiation exposure shall not exceed .5 rem/yr to the individual (*maximum*), based on predicted exposure time in normally occupied areas. The use of lead shielding shall be minimized.

5.1.5 Industrial

Risks associated with construction activities are to be considered through applicable, referenced DOE Orders and WHC manuals. Compliance during construction will be considered during design to minimize the risks. Design will ensure that construction of this project is accomplished in accordance with the Code of Federal Regulations, Part 1926, "Occupational Safety and Health Administration, Labor."

5.1.6 Fire Protection

Fire protection will be provided as required by DOE Order 6430.1A, DOE Order 5480.7A, Fire Protection, and RLID 5480.7A. Any new fire alarm system provided by this project will be connected to the Hanford Radio Fire Alarm System. Fire extinguishers will be installed as required.

5.2 ENVIRONMENTAL PROTECTION

5.2.1 Air

Air effluent treatment, sampling, and monitoring will be commensurate with Clean Air Act permit requirements, state and local regulations, and Westinghouse Hanford Company (WHC) policy, as defined in the "Environmental

Compliance Manual," WHC-CM-7-5 (WHC 1988). The following will define permit requirements:

- o National Emission Standards for Hazardous Airborne Pollutants (NESHAPS) requirements per 40 CFR 61 (EPA 1991b).
- o Prevention of Significant Deterioration (PSD) permit per 40 CFR 52 (EPA 1991a).
- o Requirements generated under the State of Washington per WAC 173-400, 173-460, 173-480, and 246-247, and the Air Pollution Control Authority of Benton, Franklin, and Walla Walla Counties.

5.2.2 Permitting Documentation

The reports, calculations, specifications, and drawings shall be prepared, as required, to support the permitting submittal requirements of the system. The permitting of the streams addressed by Project W-252 will be accomplished by modifying the existing 200 Area TEDF State Industrial Waste Discharge Permit # ST4502 to accept these streams after the appropriate BAT/AKART has been applied.

5.2.3 Hazardous Material Usage

The project design shall minimize the use and generation of hazardous substances for the construction, maintenance, operation, and decommissioning of the project. Hazardous substances shall be noted, or otherwise identified, in the definitive design media and, if used, shall be encapsulated to prevent contamination while permitting recovery, recycle, and/or reuse wherever feasible. Encapsulated hazardous materials shall be permanently marked identifying contents. Material safety data sheets (MSDS) shall be provided for all materials utilized in the construction and operation of the facility as required. Examples of materials requiring data sheets include, but are not limited to, paints, sealants, oils, lubricants, chemicals, and instrumentation fluids. Activities at each of the facilities will follow the applicable Hazardous Communication Program.

5.3 SAFEGUARDS AND SECURITY

Project W-252 will be in the 200 East Area and may be in the 600 Area if the B-Pond to TEDF tie-in is constructed. Design and construction activities will comply with requirements of DOE Order 6430.1A and WHC security procedures. A

construction security plan will be prepared for this project. The systems will not contain accountable quantities of special nuclear material.

5.4 NATURAL FORCES

The facility structures provided by this project all comply with the criteria defined in DOE Order 6430.1A, paragraph 0110-5.2. Analysis shall be performed in accordance with "Hanford Plant Standard," SDC 4.1, Design Loads for Facilities.

5.5 DESIGN FORMAT

As-built drawings for the 200 East Area PTECS, including modifications to TEF facilities and systems, shall be provided by Project W-252. As-built drawings for the BAT/AKART implementation systems, including modifications to the impacted facility, shall also be provided by Project W-252. Existing drawings and project drawings shall be consolidated to the extent practical to enhance facility configuration. Other facility drawings affected by the project shall also be as-built, as required by the DOE and contractor procedures. Logic diagrams required for the MCS shall be in the same format as those provided by TEF. Drawings provided shall be verified after completion of construction as "as-built."

5.6 QUALITY ASSURANCE

Quality Assurance (QA) activities for all contractors involved in the design, construction, testing, and inspection of the proposed project shall be formulated and executed through the use of a Project Specific Quality Assurance Program Plan (QAPP). The QAPP shall establish quality assurance program requirements used for verification, inspection, and testing activities. The QAPP shall provide the means to ensure the facility complies with program requirements; the project plans and specifications are adequate; and tests and inspections are sufficient to confirm the adequacy of design and the quality of construction and manufactured components. The quality assurance program requirements will be in accordance with DOE Order 6430.1A, 0140, "Quality Assurance;" CFR Part 830.120, "Quality Assurance Requirements"; and WHC-CM-4-2, "Quality Assurance Manual," (WHC 1989d).

The QA program requirements are based on impact levels and safety classifications that are established in accordance with documented procedures. Safety classification of systems, components, and structures will be determined by risk analyses in accordance with WHC-CM-1-3, MRP 4.46. Details on safety classification will be listed in the QAPP and verified in subsequent safety documentation. A final safety equipment list will be included in a Final Safety Analysis Document/Final Safety Analysis Report (FSAD/FSAR). All

safety classifications are to be supported by documented analysis. Impact levels are determined in accordance with WHC-CM-1-3, MRP 5.43.

5.7 DECONTAMINATION AND DECOMMISSIONING

The design will incorporate ease of decontamination and decommissioning of all project systems, in accordance with DOE Order 6430.1A and other referenced standards. The project shall minimize the buildup of residual contamination by avoiding practices (such as socket weld fittings) which promote accumulation of contamination in piping or equipment. All equipment and components provided by the project shall be designed to facilitate eventual decontamination and decommissioning. All underground piping removed from service by this project shall be isolated in an environmentally acceptable manner.

5.8 OPERATING PERSONNEL AND SERVICES

The design will consider human factors for maintenance and operations activities, including equipment, valve location and orientation, secondary waste handling, and building layout. To the extent practical, design will follow the guidelines and standards of DOE Order 6430.1A, 1300-12, NUREG 0700, Mil-STD 1472D and WHC-SD-GN-DGS-30011, "Radiological Design."

- o Rapid, safe, economical operations and maintenance.
- o Anthropometric design for male and female personnel.
- o Minimal distraction, discomfort, stress, and fatigue during operations and maintenance.

The completed project will, to the extent possible, accommodate physical limitations such as hearing impairment and color blindness. Gauges, instruments, etc., shall be placed in accordance with the human factors requirements of the referenced standards.

5.9 COMMUNICATIONS AND TELECOMMUNICATIONS SYSTEMS

Radio station communications, telephones, and extensions to the private automatic exchange (PAX) associated with each facility shall be provided, as required to support the functional requirements of the project. Telephones will be installed in the occupied work areas to permit communications within the new facilities and with other area facilities. The number of telephones installed will be determined in the definitive design. Crash alarm phones,

evacuation sirens, and other safety-related communications will be provided in accordance with safety standards.

Connections to the Computer-Automated Surveillance System (CASS), Hanford Local Area Network (HLAN), and a data link to the laboratories, via a Laboratory Customer Communications System (LCCS) terminal, will be provided as required to meet the functional requirements of this project.

6.0 CODES AND STANDARDS

The project will be designed to handle low-level radioactive wastestreams which are below the requirements of secondary containment found in DOE Order 5820.2A. Design criteria for Project W-252 are to be based upon the applicable provisions of DOE Order 6430.1A and DOE Order 5400.1.

The following list identifies the appropriate codes, standards, regulations, guidelines, orders, etc., which are not defined within DOE Order 6430.1A. Revisions to the codes and standards during the project shall be administered by the project, with assessments prepared to identify the impact of these revisions. Impacts shall be managed in accordance with DOE, contractor, and project specific requirements and procedures.

Utilize the codes and standards established for the 200 Area TEDF for interconnecting piping and instrumentation and as much as possible for all other comparable equipment.

- o RL Implementing Procedure 4700.1A, "Project Management System," (RL 1991)
- o RL Order 5440.1A, "Implementation of the National Environmental Policy Act at the Richland Operations Office," (RL 1987)
- o DOE Order 5440.1D, "National Environmental Policy Act Compliance Program," (DOE 1991a)
- o DOE Order 5400.2A, "Environmental Compliance Issue Coordination," (DOE 1989a)
- o RL Order 5480.1A, "Environmental Safety and Health Program for Department of Energy Operations for Richland Operations," (RL 1988)
- o RL Order 5480.3, "Safety Requirements for the Packaging of Hazardous Materials, Hazardous Substances, and Hazardous Wastes," (DOE 1985)
- o RL Order 5480.4B, "Environmental Protection, Safety and Health Protection Standards," (RL 1989)
- o RL Implementation Procedure 5480.7, "Fire Protection," (RL 1990b)
- o RL Order 5480.10, "Industrial Hygiene Program," (RL 1990c)
- o DOE Order 5400.1, "General Environmental Protection Program," (DOE 1988)
- o RL Order 5481.1, "Safety Analysis and Review System," (RL 1983)

- o DOE Order 5481.1B, "Safety Analysis and Review System," (DOE 1986)
- o DOE Order 5483.1A, "Occupational Safety and Health Program for Department of Energy Contractor Employees at Government Owned-Company Operated Facilities," (DOE 1983)
- o RL Order 5484.1, "Environmental Protection, Safety, and Health Protection Information Reporting Requirements," (RL 1983a)
- o DOE Order 5700.6C, "Quality Assurance," (DOE 1991b)
- o DOE Order 5820.2A, "Radioactive Waste Management," (DOE 1990)
- o WAC 173-201, "Water Quality Standards for Waters of the State of Washington," (Ecology 1987)
- o WAC 173-216, "Waste Discharge Permit," (Ecology 1986)
- o WAC 173-303, "Dangerous Waste Regulation," (Ecology 1991a)
- o WAC 246-247, "Radiation Protection - Air Emissions," (Ecology 1991b)
- o WHC-CM-1-3, "Management Requirements and Procedures," (WHC 1991)
- o WHC-CM-4-2, "Quality Assurance Manual," (WHC 1988a)
- o WHC-CM-4-3, "Industrial Safety Manual," (WHC 1988b)
- o WHC-CM-4-40, "Industrial Hygiene Manual," (WHC 1992)
- o WHC-CM-4-41, "Fire Protection Program Manual"
- o WHC-CM-4-11, "ALARA Program Manual," (WHC 1988c)
- o WHC-CM-4-46, "Non-reactor Facility Safety Manual," (WHC 1988d)
- o WHC-CM-6-1, "Standard Engineering Practices," (WHC 1988e)
- o WHC-CM-6-2, "Project Management," (WHC 1988f)
- o WHC-CM-7-5, "Environmental Compliance," (WHC 1988g)
- o WHC-EP-0063, "Hanford Radioactive Solid Waste Packaging Storage and Disposal Requirements," (WHC 1988h)

In addition to the above standards, applicable national consensus codes and standards and pertinent state and local codes and standards will be used. The

latest edition of all codes and standards at the time of the conceptual design will be used.

7.0 REFERENCES

- Army 1991, *Human Engineering Design Criteria for Military Systems, Equipment and Facilities*, MIL-STD 1472D, U.S. Department of the Army, Washington, D.C.
- AWWA, 1991, *Standards*, (latest edition), American Water Works Association, Denver, CO.
- Barisas, S., Polich, J., 1985, *Environmental Protection Appraisals: A Suggested Guide for U.S. Department of Energy Field Organizations*, ANL/EES-TM-264, Argonne National Laboratories, Argonne, Illinois.
- Clean Air Act*, 1955, 42 USC 7401 et seq.
- Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, 42 USC 9601 et seq.
- Brown, M.J., 1992, *200 Area Effluent BAT/AKART Implementation Functional Design Criteria*, WHC-SD-W291-FDC-001, Westinghouse Hanford Company, Richland, Washington.
- Crane, A.F., 1992, *200 Area Treated Effluent Disposal Facility Functional Design Criteria*, WHC-SD-W049H-FDC-001, Rev. 1, Westinghouse Hanford Company, Richland, Washington.
- Davis, J.D., 1991, *Site Evaluation Report - Site Screening, Evaluation and Selection: Project W-049H, 200 Area Treated Effluent Disposal System*, WHC-SD-W049H-SE-004, Rev 0, Westinghouse Hanford Company, Richland, Washington.
- DOE 1985, *National Environmental Policy Act*, DOE Order 5440.1C, U.S. Department of Energy, Washington, D.C.
- DOE 1988a, *Radioactive Waste Management*, DOE Order 5820.2A, U.S. Department of Energy, Washington, D.C.
- DOE 1988b, *Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Wastes*, DOE Order 5480.3, U.S. Department of Energy, Washington, D.C.
- DOE 1989a, *Environmental Compliance Issue Coordination*, DOE Order 5400.2A, U.S. Department of Energy, Washington, D.C.
- DOE 1989b, *General Design Criteria*, DOE Order 6430.1A, U.S. Department of Energy, Washington, D.C.
- DOE 1990a, *General Environmental Protection Program*, DOE Order 5400.1, U.S. Department of Energy, Washington, D.C.

- DOE 1990b, *Radiation Protection of the Public and the Environment*, DOE Order 5400.5, U.S. Department of Energy, Washington, D.C.
- DOE 1991a, *National Environmental Policy Act Compliance Program* DOE Order 5440.1D, U.S. Department of Energy, Washington, D.C.
- DOE 1991b, *Quality Assurance*, DOE Order 5700.6C, U.S. Department of Energy, Washington, D.C.
- DOE 1992, *Imposition of Proposed Nuclear Safety Requirements*, DOE Order 5480.5, U.S. Department of Energy, Washington, D.C.
- Ecology 1990a, "Submission of Plans and Reports for Construction of Wastewater Facilities," *Washington Administrative Code*, Chapter 173-240, as amended, Washington State Department of Ecology, Olympia, Washington.
- Ecology 1990b, "Dangerous Waste Regulations," *Washington Administrative Code*, Chapter 173-303, as amended, Washington State Department of Ecology, Olympia, Washington.
- Ecology 1990c, "State Waste Discharge Permit Program," *Washington Administrative Code*, Chapter 173-216, as amended, Washington State Department of Ecology, Olympia, Washington.
- Ecology 1990d, "General Regulations for Air Pollution Sources," *Washington Administrative Code*, Chapter 173-400 through 495, as amended, Washington State Department of Ecology, Olympia, Washington.
- Ecology 1990e, "Controls for New Sources of Toxic Air Pollutants," *Washington Administrative Code*, Chapter 173-460, as amended, Washington State Department of Ecology, Olympia, Washington (1991).
- Ecology 1990f, "Ambient Air Quality Standards and Emission Limits for Radionuclides," *Washington Administrative Code*, Chapter 173-480, as amended, Washington State Department of Ecology, Olympia, Washington.
- Ecology 1990g, "Water Quality Standards of the State of Washington," *Washington Administrative Code*, Chapter 173-200, as amended, Washington State Department of Ecology, Olympia, Washington.
- Ecology 1990h, "Minimum Functional Standards for Solid Waste Handling," *Washington Administrative Code*, Chapter 173-304, as amended, Washington State Department of Ecology, Olympia, Washington.
- Ecology 1990i, "Implementation of Regulations for Air Containment Sources," *Washington Administrative Code*, Chapter 173-403, as amended, Washington State Department of Ecology, Olympia, Washington.

- Ecology 1990j, "Permits for Developments on Shorelines of the State," *Washington Administrative Code* Chapter 173-14, Washington State Department of Ecology, Olympia, Washington.
- Ecology 1990k, "Water Quality Standards for Surface Waters of the State of Washington," *Washington Administrative Code* Chapter 173-201, Washington State Department of Ecology, Olympia, Washington.
- Ecology, EPA, and DOE 1989, *Hanford Federal Facility Agreement and Consent Order*, 2 vols., as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.
- EPA 1986, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, SW-846, 3rd Edition, U.S. Environmental Protection Agency, Washington, D.C.
- EPA 1989, *Docket Report on Health-Based Levels and Solubilities Used in the Evaluation of Delisting Petitions Submitted Under 40 CFR 260.00 and 260.22*, Science Applications International Corporation for U.S. Environmental Protection Agency, Washington, D.C.
- EPA 1991a, "Approval and Promulgation of Implementation Plans," Title 40, *Code of Federal Regulations*, Part 52, as amended, U.S. Environmental Protection Agency, Washington, D.C.
- EPA 1991b, "National Emission Standards for Hazardous Airborne Pollutants," Title 40, *Code of Federal Regulations*, Part 61, as amended, U.S. Environmental Protection Agency, Washington, D.C.
- EPA 1991c, "State Certification of Activities Requiring a Federal License or Permit," Title 40, *Code of Federal Regulations*, Part 121, as amended, U.S. Environmental Protection Agency, Washington, D.C.
- EPA 1991d, "EPA Administered Permit Programs: The National Pollutant Discharge Elimination System", Title 40, *Code of Federal Regulations*, Part 122, as amended, U.S. Environmental Protection Agency, Washington, D.C.
- EPA 1991e, "State Program Requirements," Title 40, *Code of Federal Regulations*, Part 123, as amended, U.S. Environmental Protection Agency, Washington, D.C.
- EPA 1991f, "Procedures for Decision Making," Title 40, *Code of Federal Regulations*, Part 124, as amended, U.S. Environmental Protection Agency, Washington, D.C.
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APPENDIX G

B PLANT COOLING WATER BAT/AKART SYSTEM

Installation of a cooling tower that can provide a minimum of 7 million BTU/hr was the selected alternative of the B Plant Cooling Water BAT Evaluation in the W-252 Engineering Report. The cooling tower will eliminate the once through condenser cooling water effluent, as shown in Figure G-1. The exact type of wet cooling tower (e.g. open tower, closed tower) will be determined in the subsequent design process.

As part of the cooling tower system, equipment and facilities will be installed to supply chemicals, such as biocides and scale inhibitors, as required for proper cooling tower operation and maintenance. Capability to perform routine cooling tower water quality checks shall also be provided in the support facility. Freeze protection will be required for the tower and outside pipelines. The use of filtration shall be considered as a means to keep solids from building up in the system.

All pumps used for circulating liquid in the cooling loop, supplying cooling water, and supplying makeup or return water shall be redundant. The redundant pump shall supply 100% of the required capacity. Controls shall be supplied that will automatically energize the backup pump on failure of the primary pump. Any other equipment or controls identified during subsequent design as critical to the operation of the cooling system shall have a redundant backup. Such redundancy will reduce the possibility of interruption of the cooling tower system operation.

Routing of the emergency water supply wells, 282-B and 282-BA, shall be changed to supply well water as makeup to the cooling tower during loss of normal makeup water supply. The well will not directly supply cooling water to the condensers.

Contributors to the existing B Plant cooling water effluent that would not be eliminated by installation of closed-loop cooling will be used as makeup water to the cooling tower. This includes the demineralized water flushed from the WESF pool cells and the steam condensate from the Stairwell No.1 HVAC system. Piping changes will be required to route these contributors to the cooling tower thus eliminating them from the effluent. A flow diagram of the system is shown in Figure G-1.

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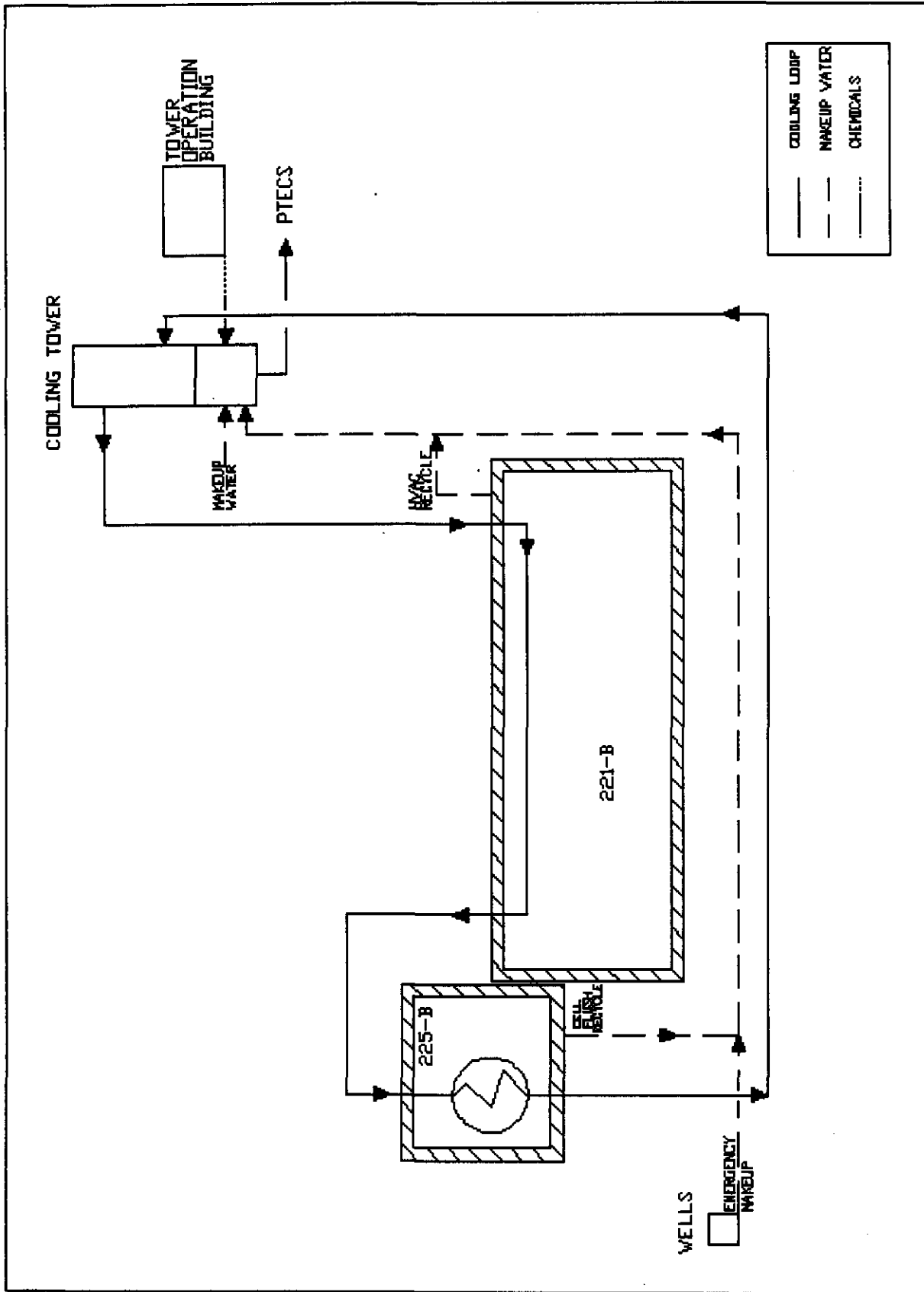


FIGURE G-1 B PLANT COOLING WATER SYSTEM FLOW DIAGRAM

APPENDIX J

PROCESS AND SUPPORT FACILITY DESIGN CONSIDERATIONS

The design of the Project W-252 systems shall consider the following design features:

- o Heating, ventilation, and air conditioning (HVAC) systems will be installed in facilities as required for BAT/AKART implementation and PTECS support facilities. The purpose of the HVAC systems will be to control airborne contamination, provide environmental control for instrumentation and electrical systems, and maintain human comfort in areas of personnel occupancy.
- o Equipment and services required to flush and decontaminate internal components and exterior surfaces of Project W-252 systems and support facility building interior surfaces will be provided to maintain them in a relatively clean condition.
- o Safety showers and eyewash stations in compliance with DOE Order 6430.1A requirements will be installed.
- o Permanent and/or portable breathing air systems will be provided where required to support maintenance activities or recovery from postulated accident conditions.
- o Posts, guards, and other types of protection needed to prevent damage to equipment, piping, and structures will be installed.
- o Guard rails, or other fall protection, around all pits, platforms, and surfaces where a fall from more than four feet could occur will be installed.
- o A system of cranes and/or hoists (including monorail systems) and equipment for equipment handling and transport will be installed as necessary for maintenance.
- o A network of stairways, walkways, and maintenance platforms for access to equipment and instrumentation where routine or frequent maintenance and surveillance inspections will be required. Elevators will be considered for use when frequent and rapid access is needed to higher elevations in facilities where bulky or heavy items must be moved. The use of ladders shall be minimized.
- o Service doors will be installed to enable movement of equipment to and from the facility.

- o The following flow information reflects current system design information as of the date of REV 2 of this FDC.

The facilities addressed by this FDC are the 241-A, 242-A, 244-AR, B-Plant, and the 284-E. The changes being made to this project per REV 2 is to delete all of the source control scope on all but the B-Plant. The tie-in to the 200 Area TEDF is being handled differently, therefore, by a direct tie to the TEDF line downstream of all the facilities, (except B-Plant which will be tied in to TEDF E-Line at B-Plant). The flow information is thus being tabulated in two parts:

B-Plant.....With cooling towers running.....Approx 30-50 GPM
 B-Plant.....Emergency Raw water.....Normal.600 GPM
 Design Max. 1300GPM

Others that will discharge through the current B-Pond line, but be collectively tied in are:

241-A.....10-20GPM (evaporative cooler
 blowdown)
 244-AR.....Descoped....no flow
 284-E.....110GPM
 242-A.....2725GPM When evaporator
 operates, 0 GPM when not.
 Total 2855 GPM

The B-Plant emergency raw water flow will occur rarely, if ever. In the event this occurs, other streams such as the evaporator will be curtailed until the emergency situation is corrected.

The design of the tie-in with a pump assist can be accomplished in two ways, on the B-Pond leg only or on the combined leg. If the design is on the B-Pond leg, the pump capacity will be sized per the 2855GPM flow value. If the combined leg design is used, the maximum flow value shall be 4000GPM.

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