DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	I. G. Papp	Date 5/02/95
Project Title/Work Order		EDT No. N/A
Project C-018H, 242-A Evaporator/PUREX Plant Process Condensate Treatment Facility, Functional Design Criteria, WHC-SD-C018H-FDC-001, Revision 3		ECN No. 622229

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
E. M. Bowers	S7-55				
D. L. Flyckt	S6-71				
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DISCLAIMER

ENGINEERING CHANGE NOTICE

Page 1 of 12

1. ECN № 622229

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	3a. USQ Required?	4. Date
Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	I.G. Papp / S6-71	[] Yes [X] No	3-22-95
	5. Project Title/No./Work Order No. Project C-018H	6. Bldg./Sys./Fac. No. 2025	7. Approval Designator 3QSD
	8. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-C018H-FDC-001 Rev 2	9. Related ECN No(s). N/A	10. Related PO No. N/A

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

12. Description of Change

See attached detailed description of changes.

The attached pages provide the specific changes listed by section and paragraph.

Note: Changes have directly affected page numbering and, therefore, the Table of Contents.

13a. Justification (mark one)

Criteria Change	[]	Design Improvement	[X]	Environmental	[]	Facility Deactivation	[]
As-Found	[]	Facilitate Const	[]	Const. Error/Omission	[]	Design Error/Omission	[]

13b. Justification Details

See the attached detailed description of changes for justification.

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

See Distribution Sheet ~~page 11~~

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DATE 6.12.95
STATION 34 CLERK 7LD

~~PREVIOUS REVISIONS~~
~~SUBMITTAL FILE~~

A-7900-013-2 (11/94) GEF095

A-7900-013-1

ENGINEERING CHANGE NOTICE	Page 2 of 12	1. ECN (use no. from pg. 1) 622229

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

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

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

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

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

20. Approvals

Signature	Date	Signature	Date
OPERATIONS AND ENGINEERING		ARCHITECT-ENGINEER	
Cog. Eng. I.G. Papp *I.G. Papp*	4-17-95	PE	
Cog. Mgr. N. J. Sullivan *N J Sullivan*	4-17-95	QA	
QA T. D. Hays *TD Hays*	5-4-95	Safety	
Safety T.D. Corbin per Telecon *IGP for*	5-3-95	Design	
Environ. D.L. Flyckt *[signature]*	4-17-95	Environ.	
Other J R Kelly *[signature]*	5/5/95	Other	
WHC Proj. Dept. J.J. Noble *[signature]*	5/4/95		
WHC Proj. Dept. J.W. Kelly *JW Kelly*	5/4/95		
WHC LEF Manager M.W. Peres *MW Peres*	4/17/95		
		DEPARTMENT OF ENERGY	
		Signature or a Control Number that tracks the Approval Signature Letter # 95-LEP-035 Dated June 01, 1995	
		ADDITIONAL	

ENGINEERING CHANGE NOTICE CONTINUATION SHEET Page 3 of 12 | ECN 622229 | Date 5/04/95

Page 1, section 1.0
Added wording.

This document provides the Functional Design Criteria (FDC) for Project C-018H, the 242-A Evaporator and Plutonium-Uranium Extraction (PUREX) Plant Condensate Treatment Facility (Also referred to as the 200 Area Effluent Treatment Facility [ETF]). The project will provide the facilities to treat and dispose of the 242-A Evaporator process condensate (PC), the Plutonium-Uranium Extraction (PUREX) Plant process condensate (PDD), and the PUREX Plant ammonia scrubber distillate (ASD).

Justification :
Wording added to reflect name of facility constructed under project C-018H.

Page 3, section 1.2, 3rd paragraph
Previous wording

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 the future integration of the 200 Area Treated Effluent Disposal System (TEDS). Site improvements will be provided by the project where necessary to construct, maintain, or operate the treatment and disposal systems.

New wording

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 the future integration of the 200 Area Treated Effluent Disposal System (TEDS).~~ Site improvements will be provided by the project where necessary to construct, maintain, or operate the treatment and disposal systems.

Justification: Utility requirements for the TEDS have been installed by the W-049H project.

Page 4, section 1.3, 3rd paragraph
Previous wording

The 200 Area TEDS will provide the collection piping, standby treatment, and disposal systems for 13 effluent streams in the 200 Area. The project will interface and, if necessary, increase the treatment capacities provided by Project C-018H. The 200 Area TEDS project is scheduled to be operational by June 1995.

New wording

The 200 Area TEDS will provide the collection piping, standby treatment, and disposal systems for ~~13~~ 7 effluent streams in the 200 Area. The project will interface and, if necessary, increase the treatment capacities provided by Project C-018H. The 200 Area TEDS project is scheduled to be operational by June 1995.

Justification: The number of effluent streams supplied to the W-049H project have been evaluated and determined to be 7.

Page 4, section 1.3, 5th paragraph
Added wording

The ETF SURGE Tank will be connected to the ETF loadin facility (provided by Project W-291) via a (3" carrier pipe) double containment piping system to accommodate hazardous waste shipments to the ETF by tanker truck. The ETF loadin facility and the ETF are both intended for hazardous waste service.

Justification: Wording added to illustrate interfaces between Project W-291 and C-018H.

Page 5, section 2.0, last paragraph
Added Wording

Following issuance of the original C-018H Project Functional Design Criteria, Westinghouse Hanford Company (WHC) received a letter from DOE-RL (9300055B, JR Hunter/DOE-RL to TM Anderson/WHC, TERMINATION OF THE PLUTONIUM-URANIUM EXTRACTION (PUREX) PLANT AND GUIDANCE TO PROCEED WITH SHUTDOWN PLANNING AND TERMINAL CLEANOUT ACTIVITIES) to discontinue operations at the Hanford PUREX facility. Subsequent to receipt of this DOE/RL letter, a study was conducted by WHC to assess whether it was appropriate to descope the ETF design based on the removal of the PUREX PDD and ASD feed streams. This, and other evaluations, led to the conclusion that the treatment train defined in the original project baseline was still appropriate for projected processing needs of the 242-A Process Condensate.

Justification: Wording was added to offer a basis for maintaining Project C-018H baseline after deleting PUREX Streams from the scope.

Page 7, section 2.2, 2nd paragraph
Previous wording

The state-approved land disposal structure will consider the following design features: underground drain field, liquid-level gauge wells, vent risers with filters, dry wells, and groundwater wells. The design infiltration rate will be established by site testing and/or evaluation of disposal site soil characteristics.

The design of the disposal system should, at a minimum, evaluate the following features:

- A stabilized finished grade to prevent water ponding
- Measures to prevent backfill material from silting the void volume
- Property fences according to plant standards
- Transfer piping and pumping stations to effect transfers from the treatment system to the disposal site; secondary containment systems are not required on the transfer piping
- Redundant composite samplers (designed in compliance with RCRA Standards) on the disposal transfer line
- Stabilization of all disturbed areas
- Environmental monitoring systems/stations

New wording

The state-approved land disposal structure will consider the following design features: underground drain field, liquid-level gauge wells, vent risers with filters, ~~dry wells~~, and groundwater wells. The design infiltration rate will be established by site testing and/or evaluation of disposal site soil characteristics. The design of the disposal system will, at a minimum, provide the following features:

- o A stabilized finished grade to prevent water ponding
- o Measures to prevent backfill material from silting the void volume
- o Property protection fences according to plant standards
- o Transfer piping and pumping stations to effect transfers from the treatment system to the disposal site; secondary containment systems are not required on the transfer piping
- o ~~Redundant~~ Composite samplers (designed in compliance with RCRA Standards) on the disposal transfer line
- o Stabilization of all disturbed areas
- ~~o Environmental monitoring systems/stations~~

Justification : Re-evaluation of the SALDS design is shown to be optimized by elimination of the dry wells. Fencing requirements have been evaluated and comply with current 200 East Area security requirements. Environmental monitoring systems/stations have been eliminated as determined by current regulatory evaluations.

<u>Page 8, section 2.3, 2nd paragraph</u>
Previous wording

The project will provide less than 90-day storage capacity for dangerous secondary wastes generated in the treatment process. The design of the treatment system will not consider the use of DSTs for the storage of any secondary wastes. Life-cycle costs will be considered during design of the secondary waste systems.

New wording

~~The project will provide less than 90-day storage capacity for dangerous secondary wastes generated in the treatment process.~~ The design of the treatment system will not consider the use of DSTs for the storage of any secondary wastes. Life-cycle costs will be considered during design of the secondary waste systems.

Justification : Negotiated regulatory requirements allow the storage of generated waste longer than 90 days.

<u>Page 8, section 2.5, 3rd, 9th, and 12th bullet</u>
Previous wording
o Systems to provide sufficient heating of tank, and process transfer line solutions to preclude solids formation

- o Hazardous chemical containment system(s) for tank truck load-in station, chemical storage tanks, and aqueous makeup tanks

- o Permanent and/or portable breathing air systems

New wording

- o Systems to provide sufficient heating of tank, and ~~process~~ transfer line ~~solutions~~ to preclude solids formation

- o Hazardous chemical containment system(s) ~~for tank truck load in station,~~ chemical storage tanks, and aqueous makeup tanks

- ~~o Permanent and/or portable breathing air systems~~

Justification : breathing air systems will not be required by the project. A specially designated load-in station for chemical delivery is not required for the project. An area for off loading chemicals is provided. The words "process and "solutions" removed for clarification.

Page 10, section 2.7

Previous wording

Appendix E contains a listing of design features that should be considered in the facility. A design goal shall be to minimize the staff required to operate the project. Limited office space will be provided inside the process facility. Approximately 9,000 square feet of supplemental office space will be provided to support the combined operational needs of projects W-105, "242-A Evaporator Interim Retention Basins," W-049H, "200 Area Treated Effluent Disposal Facility," and C-018H, "242-A Evaporator/PUREX Plant Condensate Treatment Facility." This additional space may be attached to, or detached from, the Process Facility. Appendix F contains guidelines that may be used for the design and construction of the supplemental office space. The project will be designed to be operated with an operating staff of less than 81, the proposed staffing levels presented in Appendix F. A design goal shall be to minimize the staff required to operate the project.

New wording

Appendix E contains a listing of design features that should be considered in the facility. A design goal shall be to minimize the staff required to operate the project. Limited office space will be provided inside the process facility. Approximately 9,000 square feet of supplemental office space will be provided to support the combined operational needs of projects W-105, "242-A Evaporator Interim Retention Basins," W-049H, "200 Area Treated Effluent Disposal Facility," and C-018H, "242-A Evaporator/PUREX Plant Condensate Treatment Facility." This additional space may be attached to, or detached from, the Process Facility. Appendix F contains guidelines that may be used for the design and construction of the supplemental office space. ~~The project will be designed to be operated with an operating staff of less than 81, the proposed staffing levels presented in Appendix F.~~ A design goal shall be to minimize the staff required to operate the project.

Justification: Operation staffing estimates were reflected in ECN 193076, issued 10/22/93.

Page 12, section 2.9, 2nd paragraph

Previous wording

The project will provide the required air delivery systems for process and ancillary services. Oil-less air compressors, air dryers and dewpoint monitoring will be provided for the instrument air supply, if instrument air is required.

New wording

The project will provide the required air delivery systems for process and ancillary services. ~~Oil less air compressors, air dryers and dewpoint monitoring will be provided for the instrument air supply, if instrument air is required.~~

Justification : Instrument air is provided by packaged, skid mounted systems. The system is capable of meeting all plant requirements.

Page 13, section 2.10, 2nd paragraph

Previous wording

A radio base station will be set up in the control room. Provisions for future connections to the Computer-Automated Surveillance System (CASS), the HLAN, and a data link to the laboratories via a Laboratory Customer Communications System (LCCS) terminal will be provided. No additional voice communication equipment is anticipated.

New wording

A radio base station will be set up in the control room. Provisions for future connections to ~~the Computer Automated Surveillance System (CASS), the~~The HLAN~~, and a data link to the laboratories via a Laboratory Customer Communications System (LCCS) terminal~~ will be provided. ~~No additional voice communication equipment is anticipated.~~

Justification : Evaluations on the radio based station, CASS, and data link capabilities have shown these features can be provided through re-engineering.

Page 13, section 2.12, 1st paragraph

Previous wording

Road access to the process and support services facilities will be provided. Specifically, road access must be included for chemical load-in, waste removal, supply delivery, maintenance, and equipment replacement. A parking area will be provided for support personnel. The 200 East Area perimeter fence will be extended to include the project facilities inside
200 East Area before operation. Parking areas will be provided. The fence expansion will comply with plant standards and include perimeter fence lighting.

New wording

Road access to the process and support services facilities will be provided. Specifically, road access must be included for chemical load-in, waste removal, supply delivery, maintenance, and equipment replacement. A parking area will be provided for support personnel. The 200 East Area perimeter fence will be extended to include the project facilities inside
200 East Area before operation. Parking areas will be provided. The fence expansion will comply with plant standards~~ and include perimeter fence lighting~~.

Justification : Fencing requirements have been updated to comply with current 200 East Area security requirements.

Page 14, section 3.0

Added wording

The facilities and systems provided by this project must meet DOE Order 6430.1A, 0275 ("Industrial Waste Facility") 1323 ("Radioactive Liquid Waste Facility"); and WHC-CM-4-9, *Radiological Design* (WHC 1988c) requirements. The project will also comply with the executive directives identified within DOE 5440.1C (DOE 1985a), the DOE Order 5480 series, DOE Order 5820.2A (DOE 1988b), DOE Order 6430.1A, DOE Order 5400.1 (DOE 1988c), and DOE Order 5480.5 (DOE 1986).

Justification : Add the word "liquid" for clarity.

Page 16, section 3.11, 2nd paragraph

Previous wording

If the facility is constructed outside of the 200 East Area then upon completion of construction the perimeter fence will be moved to establish the facility inside the 200 East Area. Relocation of the 200 East Area perimeter fence and other security-related systems (such as lighting) will be consistent with initial installation requirements. The facility will not contain accountable quantities of special nuclear material and will include features to comply with RCRA security requirements.

New wording

If the facility is constructed outside of the 200 East Area then upon completion of construction the perimeter fence will be moved to establish the facility inside the 200 East Area. Relocation of the 200 East Area perimeter fence and other security-related systems ~~(such as lighting)~~ will be consistent with initial installation requirements. The facility will not contain accountable quantities of special nuclear material and will include features to comply with RCRA security requirements.

Page 17, section 3.13

Previous wording

The project design will minimize hazardous and nonhazardous waste generation and the use of hazardous materials during construction, operation, and closure. Where materials are used that are hazardous or that will be designed as hazardous wastes, a note will be added to the definitive design media to identify the material as hazardous wastes. Where lead or similar hazardous materials must be used for shielding or other purposes, the item will be encapsulated to prevent radioactive contamination and allow retrieval in an uncontaminated condition. The item will be permanently marked as to contents.

New wording

The project design will minimize hazardous and nonhazardous waste generation and the use of hazardous materials during construction, operation, and closure. ~~Where materials are used that are hazardous or that will be designed as hazardous wastes, a note will be added to the definitive design media to identify the material as hazardous wastes.~~ Where lead or similar hazardous materials must be used for shielding or other purposes, the item will be encapsulated to prevent radioactive contamination and allow retrieval in an uncontaminated condition. The item will be permanently marked as to contents.

Justification: Hazardous waste identification is conducted by the LEF Environmental Compliance group.

Page 17, section 3.14

Previous wording

Existing facility drawings directly affected by the project will be as-built by the project. To the greatest extent practical, affected drawings should be changed by direct drawing change and used by the project. Fabrication drawings for components that may require future fabrication for replacement and maintenance will be drawn to Westinghouse Hanford shop standards.

New wording

Existing facility drawings directly affected by the project will be as-built by the project. To the greatest extent practical, affected drawings should be changed by direct drawing change and used by the project. ~~Fabrication drawings for components that may require future fabrication for replacement and maintenance will be drawn to Westinghouse Hanford shop standards.~~

Justification: As building will be applied to all essential drawings for the ETF.

Page 18, section 4.0, 2nd paragraph

Previous wording

Quality assurance (QA) activities for all contractors involved in the design, construction, and testing of the proposed facility will 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 to formulate verification, inspection, and testing activities on special projects. The quality assurance program requirements will be in accordance with DOE Order 6430.1A, 0140 "Quality Assurance;" DOE-RL Order 5700.1A, "Quality Assurance (DOE-RL 1983b);" and WHC-CM-4-2, *Quality Assurance Manual* (WHC, 1988d).

The QA program requirements are based on impact levels and safety classifications that are established by management. Safety classification of systems, components, and structures will be determined by risk analyses in accordance with DOE Order 6430.1A, 1300-3. A preliminary list of safety items will be included in a preliminary safety evaluation. A preliminary list of safety items will be included in a preliminary safety evaluation. A preliminary safety equipment list will be included in a Preliminary Safety Analysis Document (PSAD)/Preliminary Safety Analysis Report (PSAR). A final safety equipment list will be included in a Final Safety Analysis Document/Final Safety Analysis Report (FSAD/FSAR). All safety classifications will be supported by documented analysis.

New wording

Quality assurance (QA) activities for all contractors involved in the design, construction, inspection, and testing of the proposed facility will 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 to formulate verification, inspection, and testing activities. The quality assurance program requirements will be in accordance with DOE Order 6430.1A, 0140 "Quality Assurance;" DOE Order 5700.6C, "Quality Assurance (DOE 1991);" and WHC-CM-4-2, *Quality Assurance Manual* (WHC, 1988d).

The QA program requirements are based on ~~impact levels and~~ safety classifications that are established by safety analysis. Safety classification of systems, components, and structures will be determined by risk analyses in accordance with DOE Order 6430.1A, 1300-2/3. A preliminary safety equipment list will be included in a Preliminary Safety Analysis Document (PSAD)/Preliminary Safety Analysis Report (PSAR). All safety classifications will be supported by documented analysis. The ETF is designated as a "Radiological Facility with Non-Nuclear Facility documentation (WHC-SD-C-018H-HC-002).

Justification : The current facility hazard classification does not require preparation of a FSAD/FSAR. References are updated for clarification. Reference to the FSAR has been deleted because of the current hazard classification.

Page 22, section 6
New wording

- DOE Order 5700.6C, *Quality Assurance* (DOE 1991).

Justification: Change wording to reflect current revisions.

Page 24, section 7
New wording

DOE, 1991, *Quality Assurance*, DOE-RL Order 5700.6C, U.S. Department of Energy-Richland Operations Office, Richland, Washington.

Page 25, section 7

Delete
~~DOE RL, 1983b, Quality Assurance, DOE RL Order 5700.1A, U. S. Department of Energy Richland Operations Office, Richland, Washington.~~

Justification: Change wording to reflect current revisions.

Page 27, section 7
new wording

- *Hazardous Characterization Report for the 200 Area Effluent Treatment Facility*. WHC-SD-C-018H-HC-002 (WHC, 1995) Westinghouse Hanford Company, Richland, Washington.

Page 49, Appendix C
New wording

The following tables modify Table C.1. These tables provide the design basis for influent temperature and concentrations for the given constituents.

Temperature of Influent (°C)	Influent			
	PDD	ASD	PC	LERF[a]
Maximum	79	42.8	39	29.4
90% CI (high side)	78.2	38.3	30.6	--
Average	46.6	32.4	27.8	--
90% CI (low side)	25	27	21.7	--
Minimum	23	26	6.7	--

ASD = Ammonia scrubber distillate
CI = Confidence index
LERF = Liquid Effluent Retention Facility
PC = Process condensate
PDD = Process distillate discharge.
[a]The LERF operation at 90% confidence index (low side) could decrease to 3.3 °C during the winter months. The LERF feed at the low side and minimum temperature is anticipated for only a short period of time and is not to be considered in the design basis.

Parameter	Source	90% CI value
1-Butanol	242-A PC	30,000 ppb
Phenol	242-A PC	33 ppb
Pyridine	242-A PC	550 ppb
1,1,1-Trichlorethane	242-A PC	5 ppb
Sulfide	242-A PC	0 ppb[a]

CI = Confidence index.
[a]For sulfide the minimum and maximum is 0 ppb.

Justification: The following table was added to Appendix C as information to reflect results of the LERF maximum temperature analysis. Appendix material is for information only.

<u>Page 50, Footer</u>
old year date
[1]WHC, 1989, Waste Stream Characterization Report, WHC-EP-0287, Westinghouse Hanford Company, Richland, Washington.
new year date
[1]WHC, 1988d, Waste Stream Characterization Report, WHC-EP-0287, Westinghouse Hanford Company, Richland, Washington.

<u>Page 61, Table D-1, Heading</u>
previous Title

TREATMENT TARGETS
(with radionuclides)
March 1, 1991

new Title

TREATMENT TARGETS
(with radionuclides)
Dec. 31, 1990

<u>Page 81, appendix E, 8th bullet</u>
previous wording

- o Waste accumulation areas to these areas will include covered enclosures with heating and lighting; spill kit(s); separate areas for hazardous waste, mixed wastes, radioactive waste, clean waste (nonhazardous and radioactive), and used petroleum products in accordance with requirements of WHC-CM-7-5 (WHC 1989b) and WAC 173-303.

ENGINEERING CHANGE NOTICE CONTINUATION SHEET	Page 12 of 12	ECN 622229 Date 5/04/95

new wording

- Waste accumulation areas to these areas will include covered enclosures with heating and lighting; ~~spill kit(s);~~ separate areas for hazardous waste, mixed wastes, radioactive waste, clean waste (nonhazardous and radioactive), and used petroleum products in accordance with requirements of WHC-CM-7-5 (WHC 1989b) and WAC 173-303.

SUPPORTING DOCUMENT

1. Total Pages	98
2. Title	Project C-018H, 242-A Evaporator/PUREX Plant Condensate Treatment Facility, FDC
3. Number	WHC-SD-C018H-FDC-001
4. Rev No.	3
5. Key Words	C018H, ETF,
6. Author	Name: R.A. Compau, Jr.
Signature	R. A. Compau Jr.
Organization/Charge Code	8KB50 A6A18

7. Abstract

8. RELEASE STAMP

OFFICIAL RELEASE
BY ICF KAISER HANFORD
DATE 6.12.95
STATION 34 CLERK 73

A-6400-073 (08/94) WEF124

MASTER

RELEASE AUTHORIZATION

Document Number:	WHC-SD-C018H-FDC-001, Rev. 3
Document Title:	Project C-018H, 242-A Evaporator/PUREX Plant Condensate Treatment Facility, Functional Design Criteria
Release Date:	June 8, 1995

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

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

V.L. Birkland (signature) — June 8, 1995

V.L. Birkland

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RECORD OF REVISION	(1) Document Number WHC-SD-C018H-FDC-001	Page 1

(2) Title
Project C-018H, 242-A Evaporator/PUREX Plant Condensate Treatment Facility

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 EDT 105103	R.F. Neisinger	R. J. Thompson 6-6-89
1	Incorporate ECN 119527	D.L. Flyckt	J. C. Womack 7-12-90
2	Incorporate ECN 119532	A. F. Crane	D. L. Flyckt 3-12-91
3	Incorporates ECN 190755 and 193076 against rev 2 as well as additional changes made by this revision ECN 622229	I. G. Papp IG Papp 5-2-95	N. J. Sullivan [signature] 5-2-95

A-7320-005 (08/91) WEF168

* Signature Page from Original Document

Document Title: Functional Design Criteria for the 242-A Evaporator and the PUREX Plant Condensate Treatment Facility

Prepared by:

3/12/90
D.L. Flyckt, Date
Manager
Waste Management
Advanced Technology Unit

3/14/90
R.L. McCormack, Date
Engineer
PUREX Systems
Engineering

Approved by:

3/13/90
S.I. Bennion, Date
Manager
Engineering and
Development Quality
Assurance

3/13/90
T.D. Blankenship Date
Manager
Tank Farms

3/13/90
W.R. Brooksher, Date
Manager
Safeguards and Security

3/13/90
M.A. Cahill, Date
Manager
Defense Waste Projects

3/14/90
H.F. Daugherty, Date
Manager
Waste Management Division

3/12/90
R.L. Fielder, Date
Manager
Waste Management
Project Engineering

3/13/90
G.D. Carpenter, Date
Manager
Environmental Assurance

3-13-90
G.J. Miskho, Date
Manager
Evaporator Restart
Program

3/15/90
M.A. Payne, Date
Manager
PUREX Plant

3/12/90
D.H. Shuford, Date
Manager
PUREX/UO_3 Operations
Program

3/12/90
J.C. Wiborg, Date
Manager
Nuclear Safety

3/12/90
D.D. Wodrich, Date
Manager
Waste Management Engineering

DOE-RL Approval*:

6/4/90
R. E. Gerton, Date
Director
Waste Management Division

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*Appendix Material is considered as information, not for approval.

EXECUTIVE SUMMARY

This document provides the Functional Design Criteria (FDC) for Project C-018H, the 242-A Evaporator and the Plutonium-Uranium Extraction (PUREX) Plant Condensate Treatment Facility. This project will provide collection, treatment and disposal systems for the 242-A Evaporator process condensate (PC), and the combined PUREX Plant process condensate (PDD)/ammonia scrubber distillate (ASD) stream. The treatment and disposal systems contained within the scope of the FDC will meet all applicable regulations, including the requirements of the U.S. Environmental Protection Agency (EPA), the State of Washington Department of Ecology (Ecology), and the U.S. Department of Energy (DOE).

The facilities provided by the Liquid Effluent Retention Facility (Project W-105) and this project are required for the continued operation of the 242-A Evaporator. The operation of the 242-A Evaporator is vital to conducting the Hanford Site environmental restoration mission. It will not be possible to support the *Hanford Federal Facility Agreement and Consent Order* (known as the Tri-Party Agreement*) commitments if the evaporator remains in a standby condition. In addition, this project will enable Hanford to treat PUREX Plant PDD and ASD effluents to further reduce the radionuclide and chemical constituents in these streams prior to discharge.

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*Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

These criteria are coordinated with existing another new facilities under an overall plan to stop discharges of contaminated liquids into the soil column on the Hanford site. Specific criteria are presented for the coordination of this project with the 200 Area Treated Effluent Disposal System and the 242-A Evaporator Liquid Effluent Retention Facility.

LIST OF TERMS

AKART	all known, available, reasonable technology
ALARA	as low as reasonably achievable
AMU	aqueous makeup system
ASD	ammonia scrubber distillate
BDAT	Best Demonstrated Available Technology
CASS	Computer-Automated Surveillance System
DCG	derived concentration guidelines
DST	double-shell storage tank
DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy-Richland Office
Ecology	State of Washington Department of Ecology
EPA	U.S. Environmental Protection Agency
ERTC	Effluent Retention and Treatment Facility
FDC	Functional Design Criteria
FSAD/FSAR	Final Safety Analyses Document/Final Safety Analyses Report
HEC	Hanford Environmental Compliance
HLAN	Hanford Local Area Network
HVAC	Heating, Ventilation, and Air Conditioning
LCCS	Laboratory Customer Communications System
LDR	Land Disposal Restricted
MCL	maximum contaminant level
MCLG	maximum contaminant level goals
MCS	Monitor and Control System
NPDES	National Pollution Discharge Elimination System
PC	process condensate
PDD	PUREX Plant process condensate
PMCL	Primary Maximum Contaminant Levels
PQL	practical quantification level
PSAD	Preliminary Safety Analyses Document
PSAR	Preliminary Safety Analyses Report
PSE	Preliminary Safety Evaluation
PSD	Prevention of Significant Deterioration (Permit)
PUREX	Plutonium-uranium extraction
QA	quality assurance
QAPP	quality assurance program plan
RO	reverse osmosis
SER	Site Evaluation Report
TEDF	Treated Effluent Disposal Facility
TEDS	Treated Effluent Disposal System
TOE	total operating efficiency
UV	ultraviolet light-mediated (oxidation)
Westinghouse Hanford	Westinghouse Hanford Company
WRAP	Waste Recovery and Packaging

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1.0 INTRODUCTION

This document provides the Functional Design Criteria (FDC) for Project C-018H, the 242-A Evaporator and Plutonium-Uranium Extraction (PUREX) Plant Condensate Treatment Facility (Also referred to as the 200 Area Effluent Treatment Facility [ETF]). The project will provide the facilities to treat and dispose of the 242-A Evaporator process condensate (PC), the Plutonium-Uranium Extraction (PUREX) Plant process condensate (PDD), and the PUREX Plant ammonia scrubber distillate (ASD).

1.1 Background

For the past 45 years, the Hanford Site has used the favorable site characteristics of isolation, low precipitation, deep water table, and soil ion exchange properties to discharge large amounts of water containing low levels of radionuclides and stable chemicals to the soil column. The policy of the U.S. Department of Energy (DOE) requires that the use of soil columns to treat and retain suspended or dissolved radionuclides from liquid waste streams be discontinued at the earliest date practicable in favor of wastewater treatment and minimization. This policy is implemented through DOE Orders, which are based on federal and state environmental regulations.

In March 1987, the U.S. Department of Energy-Richland Operations Office (DOE-RL) issued a document entitled *Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site* (Plan and Schedule) (DOE-RL 1987). The Plan and Schedule, and its annual updates, contain a strategy for implementing alternative treatment and disposal systems for each of the 33 major waste streams discharged to the soil column. In this strategy, the wastestreams were prioritized into Phase I and Phase II. The alternative treatment and disposal systems for Phase I streams have a higher priority and are scheduled to be completed by June 1995. The Phase II streams are to be addressed after the completion of the Phase I projects.

Projects to provide alternative treatment and disposal methods for the Phase I streams have been incorporated into the recently signed "Action Plan for Implementation of the Hanford Federal Facility Agreement and Consent Order," an attachment to the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1989).

The Plan and Schedule considered the 242-A Evaporator PC and the PUREX Plant PDD and ASD streams to be Phase I streams and provided a schedule for the implementation of alternative treatment and disposal methods. Funding for implementation of the evaporator system was to be complete by June 1995 and for the PUREX Plant system by January 1994. Funding for these alternative systems were to be provided by two Hanford Environmental Compliance (HEC) line item sub-projects.

In April 1989, the 242-A Evaporator was placed in temporary standby because of a concern that past Hanford Site waste management and chemical processing activities may have generated listed waste as defined by the *Resource Conservation and Recovery Act* (RCRA) (1976). These potentially listed wastes are currently stored in double-shell tanks (DST) and are processed subsequently through the 242-A Evaporator to reduce the waste volume. The processing of the waste in the 242-A Evaporator produces a concentrated waste, which is returned to the DSTs, and a PC stream, which is transferred to a soil column disposal site. If the DSTs contain a listed waste, the PC is also a listed waste and must be managed in accordance with RCRA. Additionally, the level of ammonia in the 242-A Evaporator PC is high enough to make this discharge a dangerous waste according to WAC 173-303 (Ecology 1989) criteria.

An investigation of past PUREX Plant waste generation practices suggested a potential for a small amount of listed waste to enter the PUREX Plant PDD, thus potentially making past discharges listed wastes and precluding future discharges to the existing disposal site. These practices have been discontinued, and future PDD is not expected to contain listed waste. However, because of these potentially listed waste discharges to the existing disposal site, the PUREX Plant cannot operate until an alternative storage or disposal site is available.

The facilities provided by the Liquid Effluent Retention Facility (Project W-105) and this project are required for the continued operation of the 242-A Evaporator. The operation of the 242-A Evaporator is vital to conducting the Hanford Site environmental restoration mission. It will not be possible to support the *Hanford Federal Facility Agreement and Consent Order* (known as the Tri-Party Agreement*) commitments if the evaporator remains in a standby condition. In addition, this project will enable Hanford to treat PUREX Plant PDD and ASD effluents to further reduce the radionuclide and chemical constituents in these streams prior to discharge.

An engineering study has been prepared that contains descriptions of current plans to provide alternative treatment and disposal systems for the 242-A Evaporator PC and the PUREX Plant PDD and ASD streams. The engineering study considered methods to accelerate the implementation schedules for the currently planned systems as well as interim systems that would replace or operate until the currently planned systems are operational (Flyckt and McCormack 1989).

The engineering study recommended the construction of an interim system that would replace the currently planned systems. The preferred system would include a facility where the 242-A Evaporator PC stream would be stored until treatment and disposal systems could be brought online. The Liquid Effluent Retention Basins (Project W-105) is being implemented to provide storage for this stream.

The project described in this FDC will provide the recommended treatment and disposal systems for the 242-A Evaporator PC and the combined PUREX Plant PDD/ASD stream. The project systems are scheduled to be operational after Project W-105 is operational.

1.2 Scope

This project will provide collection, treatment, and disposal systems for the combined PUREX Plant PDD/ASD stream, and the 242-A Evaporator PC. The treatment and disposal systems contained within the scope of this FDC are anticipated to meet all applicable regulations, including the requirements of the U.S. Environmental Protection Agency (EPA), the State of Washington Department of Ecology (Ecology), and the DOE.

Included within the scope of this project are the following systems and facilities:

- The PC, PDD, and ASD treatment systems;
- Treated effluent disposal systems;
- Secondary waste pretreatment and packaging systems;
- Offgas treatment systems;
- Chemical storage and aqueous makeup (AMU) system;
- Feed and treated effluent staging and verification tanks;
- Process and support services facilities; and
- Monitoring and control systems.

The project will include the necessary utilities, communications, fire protection and other safety-related items or features to make the project operational. Site improvements will be provided by the project where necessary to construct, maintain, or operate the treatment and disposal systems.

Excluded from the scope of this project is the treatment and disposal of secondary wastes. Treatment and disposal of these secondary wastes will occur in existing or planned Hanford Site facilities. The use of DSTs for the storage of secondary wastes will not be considered in the design of the project.

The preferred site for the treatment systems provided by this project is the northeast corner of the 200 East Area. Because of the impact of future negotiations with the appropriate regulatory entities, it is not possible to identify a single location for the disposal systems provided by this project. The exact location will be determined during definitive design. Appendix A contains an illustration of the proposed treatment system site and three potential disposal system sites.

1.3 Project Interfaces

The operation of the 242-A Evaporator is vital to the Hanford Site environmental restoration program and key to the Hanford site Waste Management Program. These programs will be significantly impacted if the project C-018H facilities are not operational. In addition, this project will enable Hanford to treat two PUREX plant effluents and support the implementation of the overall plan to stop discharges of contaminated liquids into the soil column.

Design and construction of the Project C-018H systems and facilities will be coordinated with the 200 Area TEDS and the Liquid Effluent Retention Facility.

The Liquid Effluent Retention Facility will provide interim storage basins for the 242-A Evaporator PC. The project will provide two basins for the 242-A Evaporator stream and a third basin for back-up capacity in the event of a primary basin failure. Included in the project are two 6.5-Mgal basins for the 242-A Evaporator PC and third 6.5-Mgal back-up basin. The total storage capacity in the interim storage basins is 19.5 Mgal. The basins will store the PC until the inventory is treated and disposed of by the facilities provided by Project C-018H. Regulatory agreements require that the Liquid Effluent Retention Facility be emptied of Land Disposal Restricted (LDR) wastes and residues by December 1994.

The 200 Area TEDS will provide the collection piping, standby treatment, and disposal systems for 7 effluent streams in the 200 Area. The project will interface and, if necessary, increase the treatment capacities provided by Project C-018H. The 200 Area TEDS project is scheduled to be operational by June 1995.

The design of Project C-018H will be coordinated with the 200 Area TEDS project. However, these measures will not compromise start-up of Project C-018H systems. To reduce overall life cycle costs, the design of these three related projects will consider the following measures:

- Utilize common utilities and operations support where practicable.
- Provide a design for the process building that can be expanded. The design of the process building may include a temporary, nonload-bearing wall that can be easily removed for expansion.
- Provide the ability to expand the utilities (e.g., electrical power, raw and sanitary water, compressed air and sanitary sewer).
- Provide the ability to expand support facilities to handle the incremental staffing levels and workloads of the 200 Area TEDS project.
- Provide capability in the design of the monitoring and control systems to allow expansion to incorporate the process control requirements of the 200 Area TEDS project.

The ETF SURGE Tank will be connected to the ETF loadin facility (provided by Project W-291) via a (3" carrier pipe) double containment piping system to accommodate hazardous waste shipments to the ETF by tanker truck. The ETF loadin facility and the ETF are both intended for hazardous waste service.

2.0 FUNCTIONAL REQUIREMENTS

The facilities provided by this project shall use commercially available equipment and technologies wherever practicable. The design should be based on treatment technologies currently used by commercial industries for treating industrial or process water.

The treatment system will be capable of treating a continuous flow of 150 gal/min. The design should utilize modular units wherever practicable. Appendix B contains a description of a proposed treatment system.

During the first two years of operation, the treatment systems will operate 7 day/week, 24 hour/day. This operating schedule is needed to treat the contents of the Liquid Effluent Retention Facility (13 Mgal) while jointly treating freshly generated 242-A Evaporator PC, PUREX PDD, and PUREX ASD. A reduced operating schedule is expected after the contents of the Liquid Effluent Retention Facility have been treated. The design will support a total operating efficiency (TOE) of 72% during the initial two years of treatment system operation. The process design shall provide sufficient equipment redundancy, unit process surge tank capacity and unit process recycle capability to meet and maintain TOE requirements.

Following issuance of the original C-018H Project Functional Design Criteria, Westinghouse Hanford Company (WHC) received a letter from DOE-RL (9300055B, JR Hunter/DOE-RL to TM Anderson/WHC, TERMINATION OF THE PLUTONIUM-URANIUM EXTRACTION (PUREX) PLANT AND GUIDANCE TO PROCEED WITH SHUTDOWN PLANNING AND TERMINAL CLEANOUT ACTIVITIES) to discontinue operations at the Hanford PUREX facility. Subsequent to receipt of this DOE/RL letter, a study was conducted by WHC to assess whether it was appropriate to descope the ETF design based on the removal of the PUREX PDD and ASD feed streams. This, and other evaluations, led to the conclusion that the treatment train defined in the original project baseline was still appropriate for projected processing needs of the 242-A Process Condensate and the project documentation would not need to be changed to reflect the termination of PUREX.

2.1 Treatment Requirements

A summary of the characterization data for these effluents is presented in Appendix C. Additional characterization data are available in WHC-EP-0287, *Waste Stream Characterization Report* (WHC 1989). The design of the treatment system will assume that chemical additions have been made to the wastes stored in the Liquid Effluent Retention Facility (e.g., algicide) and that the ion-exchange system currently used in the 242-A Evaporator has been bypassed. The characterization data presented in Appendix C have been modified to account for the elimination of the 242-A Evaporator ion-exchange system. The characterization data indicate the following:

- The streams are low-level wastes as defined in DOE Order 5820.2A (DOE 1988b);
- The 242-A Evaporator PC contains concentrations of ammonia that are sufficient to be a dangerous waste;

- The PUREX Plant streams are not dangerous waste; and
- The 242-A Evaporator PC is a listed dangerous waste.

The treatment system will be capable of meeting release limits contained in Washington State's *Waste Discharge Permit Program*, WAC 173-216 (Ecology 1986). Washington State policy requires the application of all known, available, and reasonable technology (AKART) to prevent and control the discharge of wastes into the waterways throughout the state. During the permitting process, the appropriate treatment system design will be determined by the AKART process. The AKART methodology will include a review of treatment system technologies. Releases from the treatment system will also be consistent with as low as reasonably achievable (ALARA) practices contained in DOE Order 6430.1A, WHC-CM-4-9 (WHC 1988c), WHC-CM-4-11 (WHC 1988e), and with the Best Available Technology (BAT) requirements of DOE Order 5400.5.

The WAC 173-216 permit conditions will be negotiated during the design of the project. Until these criteria are available, the design of the project will use the target levels presented in Appendix D. The treatment target for the radionuclide constituents (excluding tritium) is 0.04 of the derived concentration guides.

The treatment targets presented in Appendix D are intended to guide the design of the 242-A Evaporator and PUREX Plant Condensate Treatment System and are expected to be conservative (low) estimates of the release limits that will be contained in a WAC 173-216, state *Waste Discharge Permit Program*. The treatment targets are not intended to be an indication of the level of treatment that is possible with the facilities provided by this project. It is possible that the BAT selection process of DOE Order 5400.5 or the State of Washington's AKART process may determine that some of the treatment targets are not achievable.

The treatment targets presented in Appendix D result from an assessment of (1) the State of Washington's proposed groundwater standards and (2) the best demonstrated available technology (BDAT) treatment requirements of the RCRA. The treatment targets presented in Appendix D are based on the following:

- Safe Drinking Water Act[3] Primary Maximum Contaminant Levels (PMCL), Secondary Maximum Contaminant Level (SMCL), Maximum Contaminant Level Goals (MCLG)
- Ground water quality criteria as stipulated by WAC 173-200
- Land disposal restrictions, 40 CFR 268.41 and 40 CFR 268.43
- One tenth of the purgewater collection criteria values as stipulated in Table 1, "Strategy for Handling and Disposing of Purgewater at the Hanford Site," (90-ERB-076)

- Health based limit, as stated in Docket Report on Health-Based Levels and Solubilities Used in the Evaluation of Delisting Petitions Submitted Under 40 CFR 260.00 and 260.22, written by Science Applications International Corporation, prepared under EPA contract No. 68-W9-0091 for the EPA, Washington, D.C. (November 1989) or the practical quantification limit as listed in 40 CFR 264, Appendix IX, whichever is greater.

Not all of the contaminants listed in Appendix D, Table D-1, have been identified or are anticipated to be in the 242-A Evaporator PC or the PUREX Plant PDD and ASD streams.

2.2 Disposal Requirements

The project will provide a design for a state-approved land disposal structure. The disposal site will be approved by the DOE and the State of Washington and permitted under WAC 173-216. Should this type of disposal system become unacceptable because of technical or permitting system issues, it will become necessary to pursue a river discharge option. Criteria for this option are presented in Appendix E.

The state-approved land disposal structure will consider the following design features: underground drain field, liquid-level gauge wells, vent risers with filters, and groundwater wells. The design infiltration rate will be established by site testing and/or evaluation of disposal site soil characteristics.

The design of the disposal system should, at a minimum, evaluate the following features:

- A stabilized finished grade to prevent water ponding
- Measures to prevent backfill material from silting the void volume
- Property protection fences according to plant standards
- Transfer piping and pumping stations to effect transfers from the treatment system to the disposal site; secondary containment systems are not required on the transfer piping
- Composite samplers (designed in compliance with RCRA Standards) on the disposal transfer line
- Stabilization of all disturbed areas

2.3 Secondary Wastes

Minimization of secondary waste generation will be an objective during selection of the treatment process. Treatment processes that destroy hazardous materials will be given preference over processes that stabilize or concentrate those materials for storage.

Design of secondary waste systems will enable storage and disposal of these wastes using existing or planned Hanford Site facilities. All secondary waste forms will be solids with no freestanding liquids. The project will provide capabilities to treat and package secondary wastes to the extent necessary to comply with packaging, shipping and storage, and disposal requirements of the various onsite waste disposal facilities.

The design of the treatment system will not consider the use of DSTs for the storage of any secondary wastes. Life-cycle costs will be considered during design of the secondary waste systems.

2.4 Offgas Treatment

Offgas treatment, sampling, and monitoring will be commensurate with Clean Air Act permit requirements, state and local regulations, and Westinghouse Hanford Company (Westinghouse Hanford) policy as defined in the *Environmental Compliance Manual*, WHC-CM-7-5 (WHC 1988b). The following will define permit requirements:

- National Emission Standards for Hazardous Airborne Pollutants (NESHAPS) requirements per 40 CFR 61 (EPA 1988)
- Prevention of Significant Deterioration (PSD) permit per 40 CFR 52
- Requirements generated under the State of Washington Department of Health per WAC 402-80 and the Air Pollution Control Authority of Benton, Franklin, and Walla Walla Counties

2.5 Chemical Storage and Aqueous Makeup System

Chemical load-in, makeup, distribution, and storage capabilities will be provided as necessary to support Project C-018H. The chemical storage and AMU system design will be sufficient to maintain continuous operation of the treatment system secondary waste packaging and offgas control systems. Storage capacity will be based on optimal life-cycle cost.

The chemical storage and AMU system shall include the following components:

- Chemical storage and aqueous makeup tanks
- Equipment and piping to transfer solution from tank trucks to storage tanks and vice versa
- Systems to provide sufficient heating of tank, and transfer line to preclude solids formation

- Chemical addition systems, including dry chemical storage capabilities where necessary
- Water addition, tank flush, and dilution capabilities
- Tank ventilation systems for personnel protection, environmental regulatory compliance, and tank pressure control
- Instrumentation and alarms as specified in Section 2.8
- Storage and makeup tanks sampling and mixing systems
- Hazardous chemical containment system(s) chemical storage tanks, and aqueous makeup tanks
- Safety shower(s) and eyewash station(s)
- Operating platforms and stairways, as required

The hazardous chemical containment system will ensure that releases of hazardous chemicals to the environment are controlled in accordance with DOE Order 6430.1A (DOE 1989a) and Washington (State) Administrative Codes. Design will minimize containment system volumes and will provide the capability to transfer solutions from the containment area to chemical storage tanks, treatment feed tanks, or temporary storage (i.e., drums or tank truck).

2.6 Staging and Verification System

Storage capacity will be provided for staging feed to the process and for verifying the effectiveness of treatment. Feed tanks and verification tanks will comply with WAC 173-303-640 requirements (Ecology 1989). A minimum of one feed tank and three verification tanks will be provided. A sampling system will be provided on both the staging and verification tanks. The verification tanks sampling system will meet RCRA sampling criteria. Analysis of the samples will occur in a non-project facility.

The verification tanks will be used to periodically verify the quality of the treated effluent whenever one of the following conditions exist:

- A change in feed to the 242-A Evaporator
- A change in the treatment system configuration
- Start-up of the treatment system

Tank storage capacity requirements will be based on a life-cycle cost analysis of tank capacity instead of utilizing sampling-frequency sample processing cost and sample analyses turnaround time. Tank capacity shall be sufficient to enable the following:

- Recycling of the verification tank contents without requiring the shutdown of the PUREX Plant or the 242-A Evaporator;
- A minimum of 72 hours capacity for sampling and certified laboratory analysis prior to discharge without requiring a treatment system shutdown.

To meet these tank storage capacity requirements, continued use of the Project W-105 Liquid Effluent Retention Facility after start-up of the treatment facility should not be considered for the 242-A Evaporator PC stream. The staging and verification tank systems will include the following features:

- Tank flush capabilities and clean out systems
- Sufficient heating of tanks and transfer lines to prevent freezing of solutions
- Instrumentation and alarms as specified in Section 2.8
- Secondary containment systems to prevent releases to the environment
- Capability to transfer solutions from the secondary containment systems to the treatment process or to temporary storage

2.7 Process and Support Services Facilities

Facilities will be provided to house process equipment and support services. Process equipment must be located inside the facility whenever necessary to protect personnel and the environment. The design of process and support services facilities will be based on the requirements of the equipment and personnel necessary to safely operate and maintain the facility.

Appendix E contains a listing of design features that should be considered in the facility. A design goal shall be to minimize the staff required to operate the project. Limited office space will be provided inside the process facility. Approximately 9,000 square feet of supplemental office space will be provided to support the combined operational needs of projects W-105, "242-A Evaporator Interim Retention Basins," W-049H, "200 Area Treated Effluent Disposal Facility," and C-018H, "242-A Evaporator/PUREX Plant Condensate Treatment Facility." This additional space may be attached to, or detached from, the Process Facility. Appendix F contains guidelines that may be used for the design and construction of the supplemental office space. A design goal shall be to minimize the staff required to operate the project.

2.8 Monitor and Control Systems

The project will provide instrumentation to control and monitor the process during normal, upset, and accident conditions. Adequate instrumentation will monitor for hazardous and radioactive materials to ensure environmental and personnel safety. Instrumentation will be provided so that, during routine operation, the process will be self-functioning and load-in, makeup, and secondary waste removal activities are not considered routine operations; therefore, local operator control for these systems will be sufficient. The Monitor and Control System (MCS) shall provide for independent central and remote control of each unit process including startup, shutdown and optimization.

The MCS will consist of high resolution, state-of-the-art color monitors; dedicated keyboards; and printers, along with data storage and retrieval capability. The MCS logic development will be based on a Westinghouse Hanford approval system. The operation of the MCS will not require any special knowledge of computer programming or operating systems.

The MCS will be located in a clean area and will provide the following functions:

- Tank status (staging, verification, and AMU)
- The HVAC system status and control
- Conductivity, pH, total beta, and total organic carbon level of the feed and treated effluent
- Process equipment status & control
- Building radiation-monitoring status
- Leak-detection alarming for secondary containment systems
- Capability to input laboratory data into database
- Short-term trending of key parameters
- Graphics, trend, group, overview, and loop displays along with alarm summaries
- Capability to provide output to the Hanford Site local area network (HLAN)
- Pressure and temperature alarms and controls to maintain process system safety
- Position and indication on all actuated valves and on any manual valves that are critical to providing routing or process information (Separate on-off confirms, indication of all positions of multi-way valves, and 0-100% position indication for modulated valves)

- Misrouting protection on AMU and on process lines
- On-off confirms for all motor starters, contactors, etc.
- Current indication for rotating equipment and other applicable equipment
- Process vessels continuous-level indication and discrete high-high alarms (where practical, discrete low-low alarms if a low level would be detrimental to the process or equipment)

The MCS will have the capability to be expanded to include:

- The requirements of Project W-049H
- Throughput and material balances
- Long-term tending for key parameters (e.g., alarms)

Local instruments will be provided for normal operations, trouble-shooting, maintenance, and personnel safety. Local instruments will be located in a noncorrosive environment, where practicable, or be rated for corrosive service. At a minimum, the following local instrumentation and alarms will be provided:

- Indication and high-level alarm for staging tanks, verification tanks, chemical storage, and AMU tanks liquid levels
- Indication of critical flows, pH conductivity, total beta and total organic level of feed and treated effluent
- Failure alarms for individual system unit operations
- High radiation alarms and air monitoring systems necessary for personnel safety

Instrumentation, control wiring, signal wiring, etc., installed in process area will be water resistant to allow for washdown and decontamination.

2.9 Utilities

The project will utilize existing water and electrical supplies. Water and/or steam service required for process applications will be protected from potential backflows and contamination from the process system. The utility services will be designed with spare capacity based on projected requirements of the 200 Area TEDS project.

The project will provide the required air delivery systems for process and ancillary services.

When required to ensure compliance with existing environmental regulations and for personnel safety, backup power will be provided. An un-interruptible power supply will be provided where essential to safe operations or where continuity of operations or loss of power could require excessive effort for recovery and restart.

2.10 Communications

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. A private, automatic exchange system will enable supervision, operation, and maintenance communication throughout the administrative and treatment facilities. Crash alarm phones, evacuation sirens, and other safety-related communications will be provided in accordance with safety standards.

A radio base station will be set up in the control room. Provisions for future connections to HLAN will be provided.

2.11 Fire Protection

Fire protection will be provided as required by DOE Order 6430.1A and DOE-RL Order 5480.7A (DOE 1989a, DOE-RL 1988a). The fire alarm system will be connected to the Hanford Radio Fire Alarm System. Fire extinguishers will be installed.

2.12 Site Improvements

Road access to the process and support services facilities will be provided. Specifically, road access must be included for chemical load-in, waste removal, supply delivery, maintenance, and equipment replacement. A parking area will be provided for support personnel. The 200 East Area perimeter fence will be extended to include the project facilities inside 200 East Area before operation. Parking areas will be provided. The fence expansion will comply with plant standards.

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 will be restored to original condition. Existing roads will be used to the maximum extent practical.

3.0 DESIGN PARAMETERS

The facilities and systems provided by this project must meet DOE Order 6430.1A, 0275 ("Industrial Waste Facility") 1323 ("Radioactive Liquid Waste Facility"); and WHC-CM-4-9, *Radiological Design* (WHC 1988c) requirements. The project will also comply with the executive directives identified within DOE 5440.1C (DOE 1985a), the DOE Order 5480 series, DOE Order 5820.2A (DOE 1988b), DOE Order 6430.1A, DOE Order 5400.1 (DOE 1988c), and DOE Order 5480.5 (DOE 1986).

3.1 Energy Conservation

The facilities provided by the project will comply with the energy conservation requirements as defined in DOE Order 6430.1A, 110-12.

3.2 Piping Systems

Collection and process piping will comply with RCRA secondary containment and interstitial leak detection requirements where applicable. The collection piping system will be installed to transport the 242-A Evaporator PC from the LERF to the ETF. This piping system will have the ability to bypass the LERF and go directly to the project feed tanks. Process piping system will be installed to transport liquid from the feed tanks through the treatment system and into the verification tanks.

Disposal piping system will be installed from the verification tanks to the state approved land disposal site (SALDS). In the event the ETF is required to initiate operational test procedures or water treatment operations prior to the availability of the SALADS, then a piping and transfer system, which can provide recycle capability of treated effluent from the ETF to one of all of the LERF basins, will be provided.

All piping will be designed to drain with minimal line hold up. Gravity flow systems will be used whenever practicable. Freeze protection will be provided wherever necessary for piping system protection by adequately burying the pipe underground or heat tracing.

Access to outdoor pipelines will be adjacent to the pipeline right of way to facilitate surveillance and repair. The piping systems will be designed so as not to interrupt the operation of the 242-A Evaporator unless specifically approved by Westinghouse Hanford.

3.3 Shielding

Personnel radiation exposure will not exceed 1 rem/yr (maximum) to the individual based on predicted exposure time in normally occupied areas. The risks of personnel radiation exposure will 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-CM-

4-9, *Radiological Design* (WHC 1988c); WHC-CM-4-10, *Radiation Protection* (WHC 1988f); and WHC-CM-4-11, *Alara Program Manual* (WHC 1988g). The use of lead for shielding will be minimized.

3.4 Maintenance and Operation

The project will provide the documentation as well as the initial complement of equipment and services required to initiate operation of the facility. This shall include, but not be limited to, operating and maintenance procedures, office equipment and furniture, equipment identification tags, and necessary computer software for operations and maintenance activities.

Ease of maintenance will be a design goal. Access will be provided to any component so that it can be replaced or repaired in place with minimal relocation or removal of other components. Those major components identified as requiring frequent maintenance will not be removed or relocated for repair or replacement. In accordance with ALARA guidelines, design of equipment and components will minimize exposure to maintenance personnel.

3.5 Natural Forces

The facility will comply with the earthquake, tornado, snow, volcanic ash and wind criteria defined in Hanford Plant Design Standard SDC-4.1, Rev. 11 (DOE-RL 1989e). Roof loads are to comply with SDC 4.1 design requirements.

3.6 Design Life

The design life for the nonmechanical equipment portion (e.g., structures, tanks, piping) of the facility will be 30 years. Ease of replacement will be considered for equipment and systems when a 30-year life is not practical.

3.7 System Reliability

The degree of reliability achieved by design will permit the facility to function throughout the intended, useful life without creating downtime longer than 1 wk, assuming critical spare equipment is available. Downtime caused by normal process operations or equipment failures will not exceed 1 d by design. The facility and processes facilitate easy and cost-effective upgrades necessitated by regulatory and treatment technology uncertainties.

3.8 Decontamination and Decommissioning

Design will incorporate ease of decontamination and decommissioning of all project systems in accordance with DOE Order 6430.1A and other referenced standards. Design will minimize the buildup of residual contamination other than in the intended process equipment. Systems will be designed for ease of removal and disposal at the end of the useful life of the facility. Design will minimize practices (such as socket weld fittings) that promote buildup of contamination in piping or equipment.

3.9 Materials of Construction

All equipment will be constructed of materials selected for compatibility with the process solutions or fumes to which the equipment is exposed. Special protective coatings will be provided where needed and will comply with DOE Order 6430.1A, 0900-99. Construction materials will be noncombustible, to the extent practical, and will be selected to minimize radiation buildup wherever practicable.

3.10 Human Factors

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, and WHC-CM-4-9, *Radiological Manual* (WHC 1988c):

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

The process systems will accommodate physical limitations such as hearing impairment and color blindness.

3.11 Secutity and Safeguards

The project will be located within the 200 East Area. Design and construction activities will comply with requirements of DOE Order 6430.1A, company security procedures, and an approved security plan.

If the facility is constructed outside of the 200 East Area then upon completion of construction the perimeter fence will be moved to establish the facility inside the 200 East Area. Relocation of the 200 East Area perimeter fence and other security-related systems will be consistent with initial installation requirements. The facility will not contain accountable quantities of special nuclear material and will include features to comply with RCRA security requirements.

3.12 Siting

The treatment system may be sited adjacent to the Project W-105 storage facility. The soil column disposal site will be in a section of land set aside by a site evaluation report. The proposed locations for these facilities are presented in Appendix A. The exact location of the site will be determined during definitive design.

3.13 Waste Minimization and Hazardous Material Usage

The project design will minimize hazardous and nonhazardous waste generation and the use of hazardous materials during construction, operation, and closure. Where lead or similar hazardous materials must be used for shielding or other purposes, the item will be encapsulated to prevent radioactive contamination and allow retrieval in an uncontaminated condition. The item will be permanently marked as to contents.

3.14 Drawing Configuration

Existing facility drawings directly affected by the project will be as-built by the project. To the greatest extent practical, affected drawings should be changed by direct drawing change and used by the project.

4.0 QUALITY ASSURANCE REQUIREMENTS

Quality assurance (QA) activities for all contractors involved in the design, construction, inspection, and testing of the proposed facility will 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 to formulate verification, inspection, and testing activities. The quality assurance program requirements will be in accordance with DOE Order 6430.1A, 0140 "Quality Assurance;" DOE Order 5700.6C, "Quality Assurance (DOE 1991);" and WHC-CM-4-2, *Quality Assurance Manual* (WHC, 1988d).

The QA program requirements are based on safety classifications that are established by safety analysis. Safety classification of systems, components, and structures will be determined by risk analyses in accordance with DOE Order 6430.1A, 1300-2/3. A preliminary safety equipment list will be included in a Preliminary Safety Analysis Document (PSAD)/Preliminary Safety Analysis Report (PSAR). All safety classifications will be supported by documented analysis. The ETF is designated as a "Radiological Facility with Non-Nuclear Facility documentation" (WHC-SD-C018H-HC-002).

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5.0 SAFETY

5.1 Construction Risks

Risks associated with construction activities are to be considered. In this regard, applicable, referenced DOE Orders and Westinghouse Hanford manuals issued for compliance during construction will be considered during design to minimize the risks. A hazards classification analysis will be performed for this project. Until this classification is completed, the design of the project will be consistent with the criteria for a low hazard nuclear facility. Design will ensure that construction of this project is accomplished without violating the National Fire Protection Association NFPA 101, "Life Safety Code" (NFPA 1988).

5.2 Operating Risks

The facilities provided by this project will provide an environmentally suitable disposal method for treated industrial or process water. The suspended and dissolved materials are of low concentrations. The concentration of radionuclides is below the levels requiring secondary containment as specified in DOE Order 5820.2A.

The process condensate from the 242-A Evaporator may contain low levels of source specific dangerous waste. The design and construction of the piping and treatment systems employed for the 242-A Evaporator PC will comply with the appropriate RCRA and WAC 173-303 containment and leak detection criteria.

The treatment process will require appropriate design and administrative controls to prevent excessive concentration of radionuclides, as well as prevent unacceptable exposure to the operating personnel (as quantified by Section 5.2 guidelines). The facility will not provide for the long-term storage or treatment of secondary solid wastes. These solid wastes will be transported to other Hanford Site storage and treatment facilities designed to handle these and similar Hanford Site wastes.

The treatment systems are anticipated to be commercially available systems. The operating procedures and requirements of the treatment systems present no great unknowns or risks.

5.3 Unacceptable Safety Consequences

The project design goal will be to prevent an unacceptable safety consequence. Unacceptable safety consequences include:

- o Fire or explosion;
- o Criticality event--At least two unlikely, independent, and concurrent changes (contingencies) in processing and/or

operating conditions must happen before a criticality accident is possible. (a criticality event is anticipated to be an unlikely event); verification will be in accordance with DOE Order 6430.1A, 1300.4;

- Radioactivity event--Instantaneous releases of radioactivity from the facility are in excess of 5,000 times the Derived Concentration Guidelines limits at the point of discharge averaged over 4-h period as defined in WHC-CM-7-5 *Environmental Compliance Manual* (WHC 1988b) (a radioactivity event is anticipated to be an unlikely event); verification will be in accordance with DOE Order 6430.1A;

- Exposure of personnel to ionizing radiation in excess of the standards and guidelines specified in the DOE Order 5480 series; and

- Exposure of personnel to toxic chemical agents in excess of ceiling threshold limit values (TLV-C) of the American Conference of Governmental Hygienists.

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 Projects C-018, W-049H, and W-105 will be analyzed to ensure required functions survive under normal, upset, and accident conditions.

6.0 CODES AND STANDARDS

The project will be designed to comply with RCRA containment and leak detection criteria found in 40 CFR 264 (EPA 1980) and WAC 173-303. The project will be designed to handle low-level wastestreams that are below the requirements of secondary containment found in DOE Order 5820.2A. The criteria for this discharge system will be based on the DOE Order 6430.1A and DOE Order 5400.1.

The following outline defines the appropriate codes, standards, regulations, guidelines, and orders that are not defined within DOE Order 6430.1A.

- DOE Order 5400.2A, *Environmental Compliance Issue Coordination* (DOE 1988a).
- DOE Order 5400.5, Radiation Protection of the Public and the Environment, February 8, 1990.
- DOE Order 5480.5, *Safety of Nuclear Facilities* (DOE 1986).
- DOE Order 5440.1C, *National Environmental Policy Act (DOE 1985a).*
- DOE Order 5480.3, *Safety Requirements for the Packaging of Hazardous Materials, Hazardous Substances, and Hazardous Wastes* (DOE 1985b).
- DOE Order 5700.6C, *Quality Assurance* (DOE 1991).
- DOE Order 5820.2A, *Radioactive Waste Management.*
- DOE-RL Order 4700.1, *Project Management Systems* (DOE-RL 1989a).
- DOE-RL Order 5480.1A, *Environment, Safety, and Health Program for DOE-RL Operations* (DOE-RL 1989b).
- DOE-RL Order 5480.4B, *Environmental Protection, Safety and Health Protection Standards for DOE-RL Operations* (DOE-RL 1989c).
- DOE-RL Order 6430.1C, Hanford Plant Standards (HPS) Program, March 5, 1990
- DOE-RL Order 5480.7A, *Fire Protection* (DOE-RL 1988a).
- DOE-RL Order 5480.10A, *Industrial Hygiene Program* (DOE-RL 1988).

- DOE-RL Order 5440.1A, *Implementation of the National Environmental Policy Act at the Richland Operations Office* (DOE-RL 1987).
- DOE-RL Order 5480.11A, *Requirements for Radiation Protection* (DOE-RL 1986).
- DOE-RL Order 5481.1, *Safety Analysis and Review System* (DOE-RL 1983).
- WAC 173-201, *Water Quality Standards for Waters of the State of Washington* (Ecology 1987).
- WAC 173-216, *Waste Discharge Permit* (Ecology 1986).
- WAC 173-303, *Dangerous Waste Regulations* (Ecology 1989).
- WHC-CM-4-2, *Quality Assurance Manual* (WHC 1988d).
- WHC-CM-4-3, *Industrial Safety Manual* (WHC 1988e).
- WHC-CM-4-9, *Radiological Design* (WHC 1988c).
- WHC-CM-4-10, *Radiation Protection* (WHC 1988f).
- WHC-CM-4-11, *ALARA Program Manual* (WHC 1988g).
- WHC-CM-4-46, *Non-reactor Facility Safety Manual* (WHC 1988h).
- WHC-CM-7-5, *Environmental Compliance Manual* (WHC 1988b).
- WHC-EP-0063, *Hanford Radioactive Solid Waste Packaging Storage and Disposal Requirements* (WHC 1988i).

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 will be used.

7.0 REFERENCES

Clean Water Act of 1977, as amended, Public Law 95-217, 92 Stat. 1566, 33 USC 1251.

DOE, 1991, *Quality Assurance*, DOE-RL Order 5700.6C, U.S. Department of Energy-Richland Operations Office, Richland, Washington.

DOE, 1989a, *General Design Criteria*, DOE Order 6430.1A, etc.

DOE, 1989b, *Hazardous and Radioactive Mixed Waste Program*, DOE Order 5400.3, U.S. Department of Energy, Washington, D.C.

DOE, 1988a, *Environmental Compliance Issue Coordination*, DOE Order 5400.2A, U.S. Department of Energy, Washington, D.C.

DOE, 1988b, *Radioactive Waste Management-Guidance Document*, DOE Order 5820.2A, U.S. Department of Energy, Washington, D.C.

DOE, 1988c, General Environmental Protection Program, DOE Order 5400.1, U.S. Department of Energy, Washington, D.C.

DOE, 1986, *Safety of Nuclear Facilities*, DOE Order 5480.5, U.S. Department of Energy, Washington, D.C.

DOE, 1985a, *National Environmental Policy Act*, DOE Order 5440.1C, U.S. Department of Energy, Washington, D.C.

DOE, 1985b, *Safety Requirements for the Packaging of Hazardous Materials, Hazardous Substances, and Hazardous Wastes*, DOE Order 5480.3, U.S. Department of Energy, Washington, D.C.

DOE-RL, 1989a, *Project Management Systems*, DOE-RL Order 4700.1, U.S. Department of Energy-Richland Operations Office, Richland, Washington.

DOE-RL, 1989b, *Environment, Safety, and Health Program for DOE-RL Operations*, DOE-RL Order 5480.1A, U.S. Department of Energy-Richland Operations Office, Richland, Washington.

DOE-RL, 1989c, *Environmental Protection, Safety and Health Protection Standards for DOE-RL Operations*, DOE-RL Order 5480.4B, U.S. Department of Energy-Richland Operations Office, Richland, Washington.

DOE-RL, 1989d, *Hanford Plant Standards/Specifications*, DOE-RL Order 6430.1B, and letter J. H. Antonen, RL to Contractors, "Hanford Plant Standards," July 22, 1989, U.S. Department of Energy-Richland Operations Office, Richland, Washington.

DOE-RL, 1989e, *Standard Architectural-Civil Design Criteria*, "Design Load for Structures," HPS SDC-4.1, Rev. 11 (periodically revised and reissued), U.S. Department of Energy-Richland Operations Office, Richland, Washington.

DOE-RL, 1988a, *Fire Protection*, DOE-RL Order 5480.7A, U.S. Department of Energy-Richland Operations Office, Richland, Washington.

DOE-RL, 1988b, *Industrial Hygiene Program*, DOE-RL Order 5480.10A, U.S. Department of Energy-Richland Operations Office, Richland, Washington.

DOE-RL, 1987, *Implementation of the National Environmental Policy Act at the Richland Operations Office*, DOE-RL Order 5440.1A, U.S. Department of Energy-Richland Operations Office, Richland, Washington.

DOE-RL, 1987, *Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site*, unnumbered U.S. Department of Energy-Richland Operations Office, Richland, Washington.

DOE-RL, 1986, *Requirements for Radiation Protection*, DOE-RL Order 5480.11A, U.S. Department of Energy-Richland Operations Office, Richland, Washington.

DOE-RL, 1983a, *Safety Analysis and Review System*, DOE-RL Order 5481.1, U.S. Department of Energy-Richland Operations Office, Richland, Washington.

Ecology, 1989, *Dangerous Waste Regulations*, Washington Administrative Code 173-303, Washington State Department of Ecology, Olympia, Washington.

Ecology, 1987, *Water Quality Standards for Waters of the State of Washington*, WAC 173-201, Washington State Department of Ecology, Olympia, Washington.

Ecology, 1986, *State Waste Discharge Permit Program*, Washington Administrative Code, WAC 173-216, Washington State Department of Ecology, Olympia, Washington.

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

EPA, 1988a, *Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities*, Title 40, Part 265, Code of Federal Regulations, as amended, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1988b, *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, 19__, *Preventing Significant Deterioration Permit*, Title 40, Code of Federal Regulations, Part 52, U.S. Environmental Protection Agency, Washington, D.C.

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McKenney, D. E. 1990, *Double-Shell Tank Space Analysis of Hanford site Operating Scenarios*, WHC-EP-0286 Rev 1, Westinghouse Hanford Company, Richland, Washington.

National Environmental Policy Act of 1969, Public Law 91-190, 83 Stat. 852, 422 USC 4321, et seq.

NFPA, 1988, *Safety to Life from Building and Structures*, Code 101, National Fire Protection Association.

Resource Conservation and Recovery Act of 1976, as amended, Public Law 94-580, 90 Stat. 2795, 42 USC 6901 et seq.

WHC, 1988a, *Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids in to the Soil Column at the Hanford Site*, WHC-EP-0196-1, Westinghouse Hanford Company, Richland, Washington.

WHC, 1988b, *Environmental Compliance Manual*, WHC-CM-7-5, Westinghouse Hanford Company, Richland, Washington.

WHC, 1988c, *Radiological Design*, WHC-CM-4-9, Westinghouse Hanford Company, Richland, Washington.

WHC, 1988d, *Waste Stream Characterization Report*, WHC-EP-0287, Westinghouse Hanford Company, Richland, Washington.

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WHC, 1988e, *Industrial Safety Manual*, WHC-CM-4-3, Westinghouse Hanford Company, Richland, Washington.

WHC, 1988f, *Radiation Protection*, WHC-CM-4-10, Westinghouse Hanford Company, Richland, Washington.

WHC, 1988g, *ALARA Program Manual*, WHC-CM-4-11, Westinghouse Hanford Company, Richland, Washington.

WHC, 1988h, *Non-reactor Facility Safety Manual*, WHC-CM-4-46, Westinghouse Hanford Company, Richland, Washington.

WHC, 1988i, *Hanford Radioactive Solid Waste Packaging Storage and Disposal Requirements*, WHC-EP-0063, Westinghouse Hanford Company, Richland, Washington.

WHC, 1995, *Hazardous Characterization Report for the 200 Area Effluent Treatment Facility*, WHC-SD-C-018H-HC-002, Westinghouse Hanford Company, Richland, Washington.

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APPENDIX A

PROPOSED SITE PLAN

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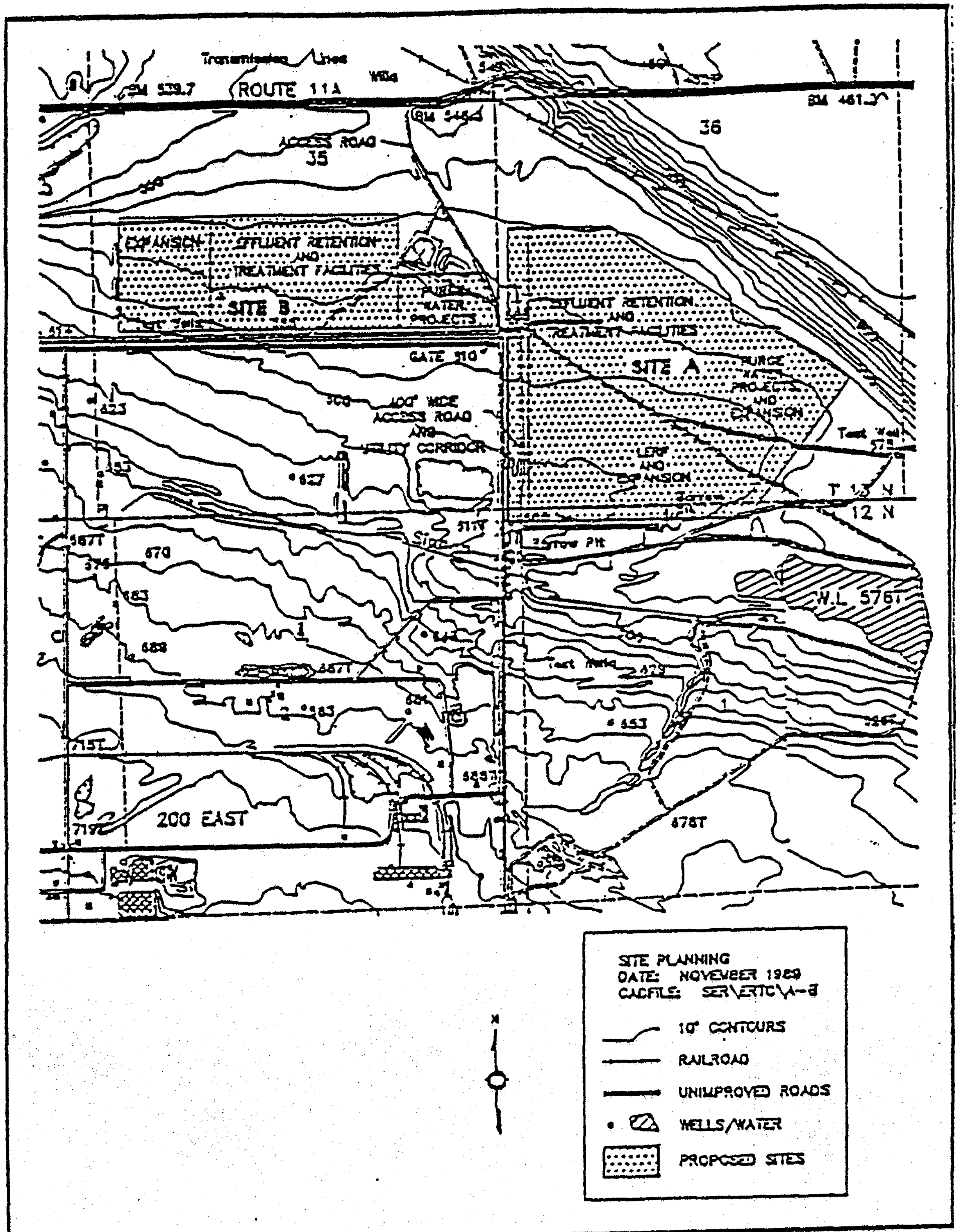
APPENDIX A

PROPOSED SITE PLAN

A Site Evaluation Report (SER) will be prepared to evaluate alternative locations and recommend a preferred site for the Effluent Retention and Treatment Complex (ERTC). The 242-A Evaporator and the PUREX Plant Condensate Treatment Facility are a part of the ERTC. Figure A-1 is an illustration of the preferred location for the 242-A Evaporator and the PUREX Plant Condensate Treatment facility. The preferred location is shown as "Site A." Figure A-2 is an illustration of the three potential soil column disposal sites currently being evaluated.



ROUTE 11A
ACCESS ROAD
35
36
EXPANSION
EFFLUENT RETENTION AND TREATMENT FACILITIES
SITE B
PURGE WATER PROJECTS
EFFLUENT RETENTION AND TREATMENT FACILITIES
SITE A
PURGE WATER PROJECTS AND EXPANSION
GATE 510
100' WIDE ACCESS ROAD AND UTILITY CORRIDOR
LERF AND EXPANSION
T 13 N
12 N
W.L 576T
200 EAST
SITE PLANNING
DATE: NOVEMBER 1989
CADFILE: SER\ERTC\A-8
10' CONTOURS
RAILROAD
UNIMPROVED ROADS
WELLS/WATER
PROPOSED SITES

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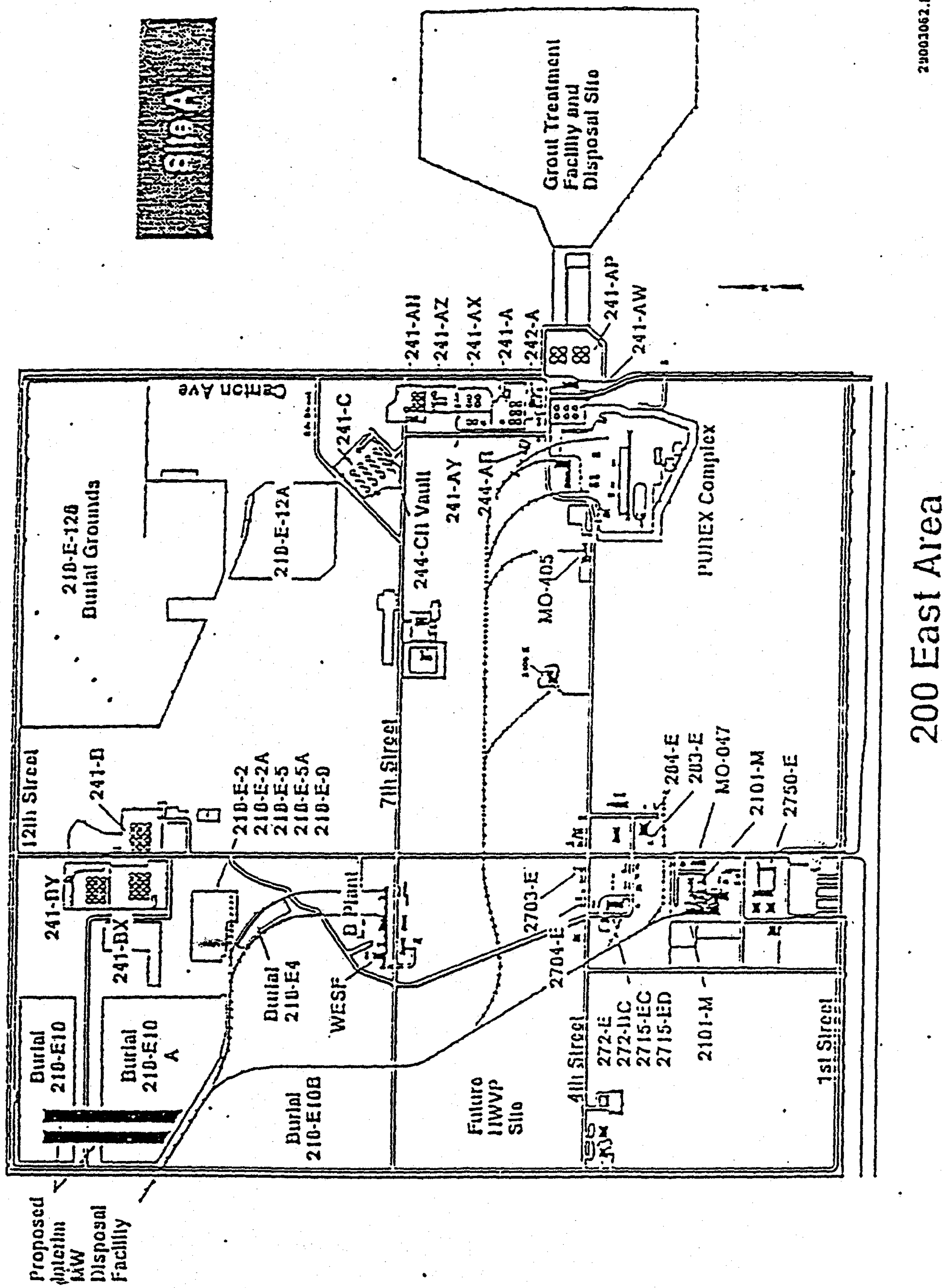
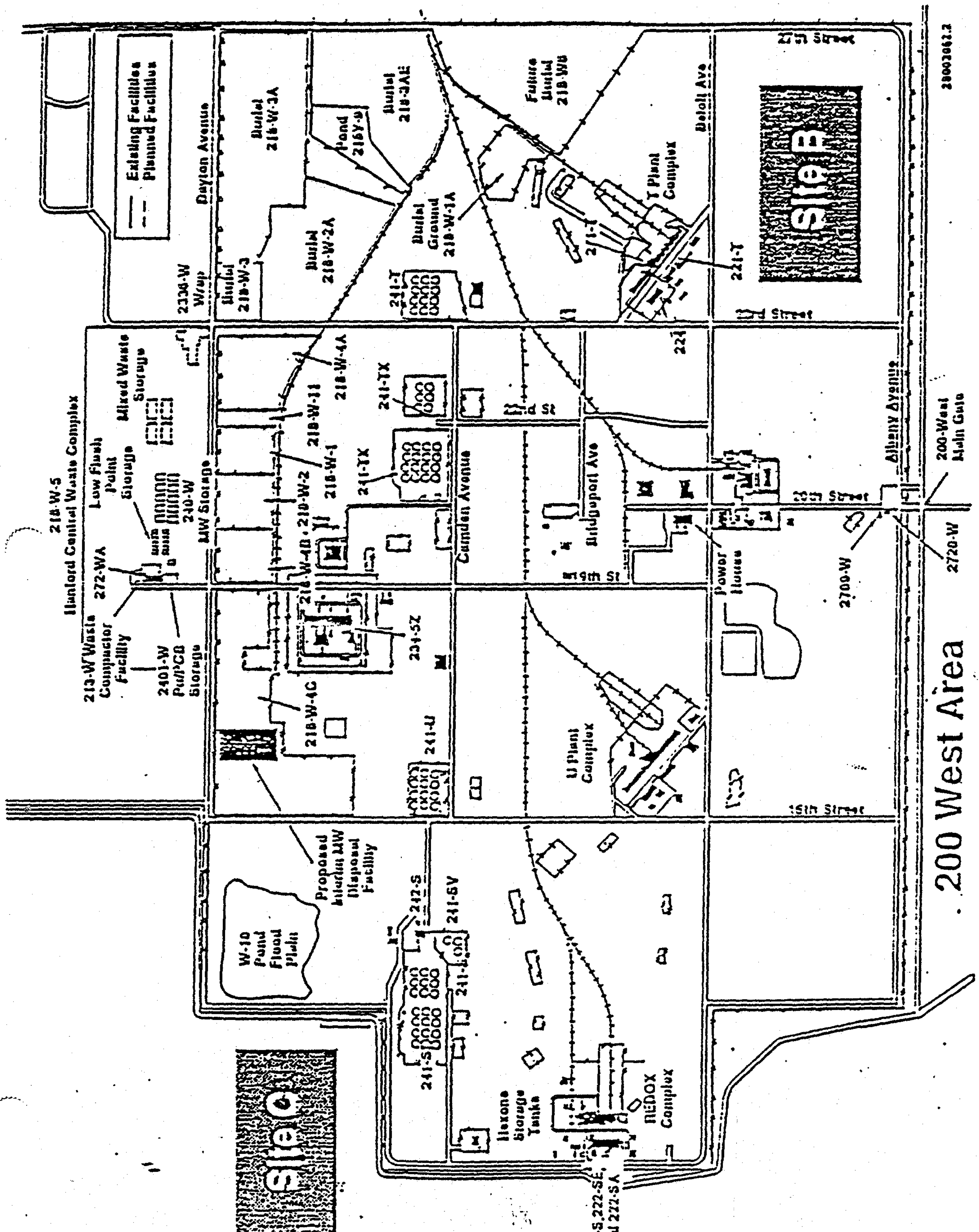
Figure A-2. Three Potential Soil Column Disposal Sites.


200 East Area
Grout Treatment Facility and Disposal Silo
241-AP
241-AW
241-AN
241-AZ
241-AX
241-A
242-A
Canton Ave
241-C
244-CR Vault
241-AY
244-AR
PUREX Complex
MO-405
218-E-12B Burial Grounds
218-E-12A
7th Street
12th Street
241-B
218-E-2
218-E-2A
218-E-5
218-E-5A
218-E-9
204-E
203-E
MO-047
2101-M
2750-E
241-BY
241-BX
B Plant
WESF
2703-E
2704-E
Burial 218-E4
Burial 218-E10
Burial 218-E10 A
Burial 218-E10B
Future HWVP Silo
4th Street
272-E
272-BC
2715-EC
2715-ED
2101-M
1st Street
Proposed Interim HW Disposal Facility
29003062.1


Existing Facilities
Planned Facilities
Dayton Avenue
Burial 218-W-3A
Pond 216Y-9
Burial 218-3AE
Future Burial 218-W6
Beloit Ave
27th Street
T Plant Complex
Burial 218-W-2A
Burial Ground 218-W-1A
221-T
2336-W Wrap
Burial 218-W-3
241-T
23rd Street
218-W-5
Hanford Central Waste Complex
Low Flash Point Storage
Mixed Waste Storage
240-W MW Storage
218-W-4A
241-TX
218-W-11
218-W-1
218-W-2
241-TY
Camden Avenue
Bridgeport Ave
Albany Avenue
200-West Main Gate
20th Street
272-WA
213-W Waste Compactor Facility
2401-W Pu/PCB Storage
218-W-4B
234-5Z
218-W-4C
19th St
Power House
2700-W
2720-W
U Plant Complex
241-U
16th Street
Proposed Interim MW Disposal Facility
W-10 Pond Flood Plain
242-S
241-SY
241-SX
241-S
Hexone Storage Tanks
REDOX Complex
222-S, 222-SE, and 222-SA
200 West Area
Site B
Site C
28003062.2

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APPENDIX B

PROPOSED TREATMENT SYSTEM

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APPENDIX B

PROPOSED TREATMENT SYSTEM

The proposed treatment system will be capable of treating 150 gal/min.

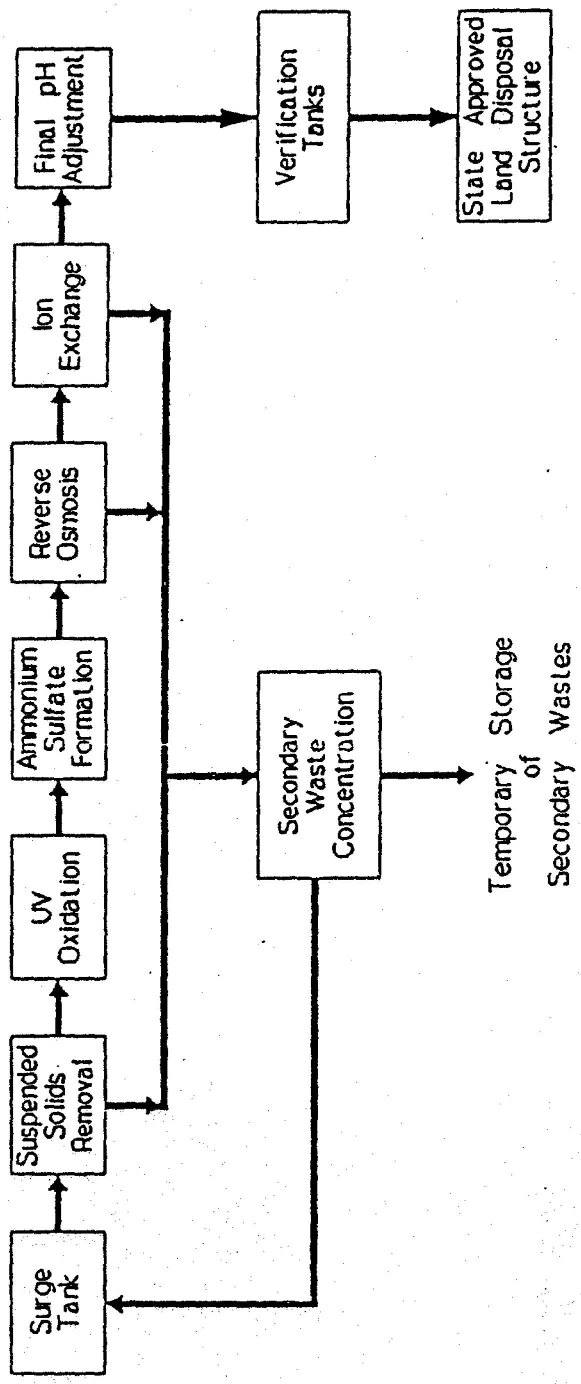
Because the 242-A Evaporator PC is a listed waste, it is necessary to prepare a U.S. Environmental Protection Agency (EPA)-approved delisting petition for the wastestream before operation of the treatment system.

The design capacity for the 242-A Evaporator is based on the following considerations:

- o The maximum expected flow rate for the 242-A Evaporator PC is 75 gal/min. This flow rate assumes that the existing ion-exchange column is bypassed.
- o The 242-A Evaporator will produce 40 Mgal of PC during the first two years of the treatment facility operation.
- o The Liquid Effluent Retention Facility (Project W-105) will contain 13 Mgal of 242-A Evaporator PC at the time of the treatment facility start-up. A recent agreement with the EPA and the coordination with the 200 Area Treated Effluent Disposal System (TEDS) require that this inventory be treated and any Land Disposal Restricted (LDR) wastes removed from the basins by December 1994.
- o During the first 2 years of operation the treatment system will operate 7 day/week, 3 shifts per day. The assumed total operating efficiency (TOE) for this period of time is 72%.

The design capacity for the PUREX Plant train will also be 75 gal/min. The expected average flow rate for the combined PDD/ASD stream is 40 gal/min with a maximum 24-hour flow rate of 60 gal/min. As a result, some excess capacity will be provided.

FIGURE B-1. PROPOSED TREATMENT SYSTEM



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The proposed treatment system will consist of the following components:

- o Staging tanks
- o Suspended solids removal
- o Organic removal
- o Ammonium sulfate formation
- o Dissolved solids removal
- o Dissolved solids polishing
- o Final pH adjustment
- o Verification tanks
- o Secondary waste concentration

B.1 Staging Tanks

The criteria for the staging tanks are presented in Section 2.6 of this Functional Design Criteria (FDC). Because the 242-A Evaporator PC is a listed waste, the staging tanks for this stream will comply with WAC 173-303-640[1]. The capability to obtain a representative sample of the feed before it enters the tanks will be provided.

The design shall consider the following to provide sufficient staging tank capacity to support:

- o The 242-A Evaporator and the PUREX Plant operations if the treatment system is non-operational for a 48-h period;
- o Staging of the feed without shutdown of either facility during treatment systems operations; and
- o Staging of feed from the Liquid Effluent Retention Facility (LERF). The feed from the LERF can be mixed with the feed from the 242-A Evaporator.

B.2 Suspended Solids Removal

The suspended solids removal step will remove particles in the 0.5 to 2 micron range. The filters will be designed to minimize secondary waste volumes. The filters could be designed to be air-scoured and backwashable with one to two filter volumes of backwash. The design should permit backwashing remotely to eliminate personnel radiation exposure to the maximum extent possible.

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[1]Ecology, 1989, Dangerous Waste Regulations, Washington Administrative Code 173-303-640, Washington State Department of Ecology, Olympia, Washington.

The suspended solids removal step shall allow for the treatment facility to operate at design capacity during periods of filter backwash and filter maintenance.

B.3 Organic Removal

The preferred organic removal step will consist of an ultraviolet (UV) light mediated-oxidation process (UV oxidation). The system will utilize hydrogen peroxide and/or ozone as the oxidant to promote destruction of the organic impurities. This unit is assumed to be capable of destroying the organic impurities to the treatment requirements as listed in Appendix B of this FDC. The validity of this assumption will be tested during the design of the treatment system. Activated carbon columns may be considered if the verification testing shows that the UV oxidation system cannot reliably meet the treatment targets, as described in Appendix D of this FDC.

The design of the UV oxidation step should be based on commercially available units. The design should minimize modifications to commercially available units. The design should identify critical components and allow for rapid replacement.

B.4 Ammonium Sulfate Formation

The ammonium sulfate formation step will consist of an in-line neutralizer to adjust the pH of the stream to the 4 to 6 range. This neutralization will occur in several steps and utilize sulfuric acid. The design should identify critical components and allow for rapid replacement.

B.5 Dissolved Solids Removal

The preferred dissolved solids removal step will consist of a reverse osmosis (RO) unit. The reject for the RO units will be concentrated to maximum extent possible. It is anticipated that a three-stage RO unit will be required. Consideration should be given to providing a particulate filter before the RO units. This filter will collect any particulates that are formed during the UV oxidation step or the ammonium sulfate formation step.

The design of the dissolved solids removal step should be based on commercially available RO units. The design should minimize modifications to the commercially available units. The design should identify critical components and allow for rapid replacement. For example, the facility should be designed to allow for routine replacement of the RO membranes.

B.6 Dissolved Solids Polishing

The dissolved solids polishing step will consist of an ion-exchange system. This polishing step may be necessary to meet the treatment targets as described in Appendix E of this FDC. The design of the ion-exchange system will incorporate a variety of ion-exchange media. Potential media to be used in the ion-exchange system include: strong acid/base resins, weak acid/base resins, mixed-bed resins, zeolites, ion-specific resins, and activated carbon. The final selection of media is dependent upon negotiations with regulators and upon the results of the ongoing verification testing.

The design of the ion-exchange system will include the following features:

- Multi-vessel design--Consideration should be given to a five-vessel design: cation vessel, anion vessel, mixed-bed vessel, activated carbon, and a spare vessel. The design should allow for easy modification of the flow path. Because of expected changes in the regulations and in the feed to the treatment system, it may be necessary to reconfigure the flow path of the ion-exchange system.
- Regeneration of the ion-exchange media.
- Sluicing of the resins into and out of the ion-exchange vessels.

The design of the system will be based on commercially available ion-exchange units. The design should minimize the modifications to commercially available equipment. The design will identify critical components and allow for their rapid replacement.

B.7 Final pH Adjustment

The pH of the treated effluent will be adjusted and will consist of an in-line neutralizer to adjust the pH of the stream to the 6 to 8 pH range. This neutralization will occur in several steps. The design should identify critical components and allow for rapid replacement.

B.8 Verification Tanks

Before release, the treated effluent will be routed to three verification tanks that will be capable of containing the treated effluent for a minimum of 72 h. The verification tanks are required only for the 242-A Evaporator PC stream. The verification tanks shall meet the requirements of WAC 173-303-640.

It is anticipated that these tanks will be used to periodically verify the quality of the treated effluent whenever one of the following conditions exist:

- A change in feed to the 242-A Evaporator
- A change in treatment system configuration
- During the initial start-up of the treatment system

It is anticipated that several analytical tests required for verification will require a minimum of 72 hours. During these periods of extensive verification testing, the effluent will be recycled back to the staging tanks or the system will be placed in a temporary standby condition.

The design of the treatment system will allow for the collection of a flow-proportional sample of the treated effluent. The design of the sampling system will be consistent with the requirements of the *Resource Conservation and Recovery Act*[2] (RCRA) and the *Clean Water Act*.[3]

B.9 Secondary Waste Concentration

The preferred process for the secondary waste concentration step is a mechanical vapor recompression evaporator. The concentrate from the evaporator is to be converted into a solid without any freestanding liquid. The criteria for the secondary waste are contained in Section 2.3 of the FDC. A single waste concentrator will be provided for both the 242-A Evaporator and the PUREX Plant condensate treatment systems.

The design of the secondary waste concentrator will be based on commercially available units. The design of the system will minimize modification to commercially available equipment. Redundant concentration units will not be provided. However, the design of the system should identify critical components and allow for ease of replacement and/or repair.

[2]Resource Conservation and Recovery Act of 1976, as amended, Public Law 94-580, 90 Stat. 2795, 42 USC 6901 et seq.

[3]Clean Water Act of 1977, as amended, Public Law 94-580, 90 Stat. 2795, 42 USC 6901 et seq.

APPENDIX C

CHARACTERIZATION DATA

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APPENDIX C

CHARACTERIZATION DATA

The design of the 242-A Evaporator and PUREX Plant condensate treatment system will be based on the characterization data presented in Table B.1. Additional characterization data can be obtained from the *Waste Stream Characterization Report*.[1] Source terms for safety analysis and permitting activities will be developed separately.

The characterization data for the 242-A Evaporator process condensate (PC) are based on samples collected downstream of the existing ion-exchange column. After the start-up of this project, these ion-exchange columns will be bypassed. The ion-exchange media currently used in the 242-A Evaporator is very specific for cesium and strontium. As a result, the cesium and strontium characterization data presented in Table C-1 have been increased by a factor of 10. The only other expected change is a decrease in the concentration of silicon. The high silicon levels are likely the result of degregation of the ion-exchange media.

The following tables modify Table C.1. These tables provide the design basis for influent temperature and concentrations for the given constituents.

Temperature of Influent (°C)	Influent			
	PDD	ASD	PC	LERF[a]
Maximum	79	42.8	39	29.4
90% CI (high side)	78.2	38.3	30.6	--
Average	46.6	32.4	27.8	--
90% CI (low side)	25	27	21.7	--
Minimum	23	26	6.7	--

ASD = Ammonia scrubber distillate
CI = Confidence index
LERF = Liquid Effluent Retention Facility
PC = Process condensate
PDD = Process distillate discharge.
[a]The LERF operation at 90% confidence index (low side) could decrease to 3.3 °C during the winter months. The LERF feed at the low side and minimum temperature is anticipated for only a short period of time and is not to be considered in the design basis.

Parameter	Source	90% CI value
1-Butanol	242-A PC	30,000 ppb
Phenol	242-A PC	33 ppb
Pyridine	242-A PC	550 ppb
1,1,1-Trichlorethane	242-A PC	5 ppb
Sulfide	242-A PC	0 ppb[a]

CI = Confidence index.
[a]For sulfide the minimum and maximum is 0 ppb.

[1]WHC, 1988d, *Waste Stream Characterization Report*, WHC-EP-0287, Westinghouse Hanford Company, Richland, Washington.

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Table C-1. C-018 Influent Characterization Data. (Sheet 1 of 3)

		PUREX Plant PDD			PUREX Plant ASD				242-A Evaporator PC		
Parameter	Units	Average	90% CI	Maximum	Average	90% CI	Maximum	Minimum	Average	90% CI	Maximum
Flow	gal/min	40		70	35		60	45	60		75
Annual Flow	(Mgal/yr)	5			1				20		
Temperature	(°C)	46.6	78.2	79	32.4	38.3	42.8		27.9		39
Conductivity	(µs)	508	1060	1,500	179	300	395	125	304		590
pH		3.04	2.28	2.3	9.35	9.66	9.74	7.8	10.1		11.3
Ignitability	(°F)	208	205	204							
TOC		106,000	130,000	142,000	2160	4820	7020		42,024	218,415	4,920,000
TOX (as Cl)	ppb	48	57.7	64							
TDS	ppb										2700
Aluminum	ppb							162	1295	1330	4992
Ammonium	ppb							8,585	482,511	511,344	9,350,000
Ammonia	ppb	53.2	58.1	66	366,000	909,000	1,360,000				
Barium	ppb							6	6.8	7.2	8
Boron	ppb	16.4	22.4	27				4	65	97	151
Calcium	ppb	50.2	50.5	51	68	86.8	98	280	2600	2800	8300
Carbonate	ppb							3,800	98,000	104,347	750,000
Chloride	ppb				1,700	2,290	3,220	530	1000	1200	2300
Chromium	ppb				10.6	11.7	12.6	10	52	66	156
Copper	ppb							1	60	67	127
Cyanide	ppb	35.7	44.3	46.5							
Fluoride	ppb	860	1,210	1,600				133	874	971	12273
Iron	ppb							10	112	131	503
Magnesium	ppb				21	na	21	10	122	153	3670
Manganese	ppb								5		
Mercury	ppb	0.966	1.39	1.90				0.1	0.3	0.31	0.69
Phosphorus	ppb							31	1177	1336	6195
Nickel	ppb				10.2	10.7	11	11	14	15	17
Nitrate	ppb	55,600	119,000	217,000	550	632	700	710	2800	2292	5000
Potassium	ppb	508	994	1,740				547	5944	6495	19238
Silicon	ppb	219	243	280				871	15616	24,252	985,819
Sodium	ppb	12,900	20,200	29,400	279	456	533	92	3586	4469	51,497
Sulfate	ppb							510	2600	2800	13000
Sulfide	ppb							5,220	36000	66,000	66,000
Uranium	ppb				0.39	0.75	1.03				
Vanadium	ppb							5	6.3	6.7	7
Zinc	ppb				35	64.5	77				

Table C-1. C-018 Influent Characterization Data. (Sheet 1 of 3)

		PUREX Plant PDD			PUREX Plant ASD			242-A Evaporator PC			
Parameter	Units	Average	90% CI	Maximum	Average	90% CI	Maximum	Minimum	Average	90% CI	Maximum
Flow	gal/min	40		70	35		60	45	60		75
Annual Flow	(Mgal/yr)	5			1				20		
Temperature	(°C)	46.6	78.2	79	32.4	38.3	42.8		27.9		39
Conductivity	(µs)	508	1060	1,500	179	300	395	125	304		590
pH		3.04	2.28	2.3	9.35	9.66	9.74	7.8	10.1		11.3
Ignitability	(°F)	208	205	204							
TOC		106,000	130,000	142,000	2160	4820	7020		42,024	218,415	4,920,000
TOX (as Cl)	ppb	48	57.7	64							
TDS	ppb										2700
Aluminum	ppb							162	1295	1330	4992
Ammonium	ppb							8,585	482,511	511,344	9,350,000
Ammonia	ppb	53.2	58.1	66	366,000	909,000	1,360,000				
Barium	ppb							6	6.8	7.2	8
Boron	ppb	16.4	22.4	27				4	65	97	151
Calcium	ppb	50.2	50.5	51	68	86.8	98	280	2600	2800	8300
Carbonate	ppb							3,800	98,000	104,347	750,000
Chloride	ppb				1,700	2,290	3,220	530	1000	1200	2300
Chromium	ppb				10.6	11.7	12.6	10	52	66	156
Copper	ppb							1	60	67	127
Cyanide	ppb	35.7	44.3	46.5							
Fluoride	ppb	860	1,210	1,600				133	874	971	12273
Iron	ppb							10	112	131	503
Magnesium	ppb				21	na	21	10	122	153	3670
Manganese	ppb								5		
Mercury	ppb	0.966	1.39	1.90				0.1	0.3	0.31	0.69
Phosphorus	ppb							31	1177	1336	6195
Nickel	ppb				10.2	10.7	11	11	14	15	17
Nitrate	ppb	55,600	119,000	217,000	550	632	700	710	2800	2292	5000
Potassium	ppb	508	994	1,740				547	5944	6495	19238
Silicon	ppb	219	243	280				871	15616	24,252	985,819
Sodium	ppb	12,900	20,200	29,400	279	456	533	92	3586	4469	51,497
Sulfate	ppb							510	2600	2800	13000
Sulfide	ppb							5,220	36000	66,000	66,000
Uranium	ppb				0.39	0.75	1.03				
Vanadium	ppb							5	6.3	6.7	7
Zinc	ppb				35	64.5	77				

Table C-1. C-018 Influent Characterization Data. (Sheet 2 of 3)

		PUREX Plant PDD			PUREX Plant ASD			242-A EVAPORATOR PC			
Parameter	Units	Average	90% CI	Maximum	Average	90% CI	Maximum	Minimum	Average	90% CI	Maximum
Acetone	ppb	57.5	83.7	79				12	980	1000	5100
Benzyl alcohol	ppb							9	13	14	18
Benzaldehyde	ppb								23		
2-Butoxy-ethanol	ppb							22	380	400	920
Butoxyethanol	ppb										
1-Butanol	ppb	19	33.2	34	12	na	12	5	9800	11,000	88,000
2-Butanone	ppb	28.5	52.3	72				17	51	53	120
Butoxy-glycol	ppb							38	280	290	810
Butoxy-diglycol	ppb							11	19	44	27
Butoxytri-ethyleneglycol	ppb								35		
Butylated hydroxy toluene	ppb	100	na	100							
Butralde-hyde	ppb							5	56	62	230
Chloroform	ppb							10	14	14	27
Caproic acid	ppb							17	70		
3,5-Di-methyl-pyridine	ppb							40	21	23	24
Dimethylnitro-samine	ppb							33	57		
Dibutyl-phosphate	ppb	17,400	24,000	28,100							
Dodecane	ppb	9,140	16,200	35,000				28	43	52	46
Ethoxytri-ethylene glycol	ppb							33	99	120	150
Ethyl alcohol	ppb								2		
Hexadecane	ppb								17		
Heptadecane	ppb								18		
Methoxydi-glycol	ppb							28	40	52	52
Methoxytri-glycol	ppb							65	220	370	370
Methylene chloride	ppb							48	120	140	180
Methyl n-propyl ketone	ppb							6	9.3	9.7	12
Methyl n-butyl ketone	ppb							4	13	14	79

Table C-1. C-018 Influent Characterization Data. (Sheet 3 of 3)

		PUREX Plant PDD			PUREX Plant ASD			242-A Evaporator PC			
Parameter	Units	Average	90% CI	Maximum	Average	90% CI	Maximum	Minimum	Average	90% CI	Maximum
MIBK (Hexone)	ppb							3	11	14	68
2-Methyl-nonane	ppb							14	16	17	17
Pentadecane	ppb								20		
Phenol	ppb								33		
2-Propanol	ppb							9	22	24	39
Pyridine	ppb								550		
Tetradecane	ppb	21,000	35,500	77,000				5	76	83	440
Tetrahydro-furan	ppb	74.5	98.3	103				3	37	39	170
Tributyl phosphate	ppb	77,800	107,000	198,000				66	3900	4100	21,000
1,1,1-Tri-chlorethane	ppb								5		
Tridecane	ppb	32,800	55,300	120,000				4	70	77	350
Triglyme	ppb								90		
Undecane	ppb	120	na	120							
Unknown	ppb	3780	9900	1500							
Unknown - alphatic HC	ppb	119	2750	1700							
Unknown ester	ppb	524	1170	1700							
Unknown ester	ppb	30.7	42.7	42							
Alpha	pCi/L	100,000	220,000		1,100	2,000		3.3	160	350	750
Beta	pCi/L	200,000	490,000		41,000	490,000		130	4600	6000	74,000
^{90}Sr	pCi/L	500	850		9500	19,000		190	5200	7600	81,000
^{106}Ru	pCi/L	34,000	55,000		240,000	280,000		4430	10,500	11,080	17,800
^{103}Ru	pCi/L	1,900	2700		48,000	63,000					
^{134}Cs	pCi/L	0.0088	na								
^{137}Cs	pCi/L	45,000	88,000		8,000	11,000		10	4,400	5,400	26,000
^{147}Pm	pCi/L	3,200	4,200		28,000	37,000		120	1,300	1,600	4,100
Uranium (gross)	pCi/L	51	64		39	160		0.17	20	33	140
^{3}H	pCi/L	60,000,000	68,000,000		3,100,000	4,300,000		13	5,600,000	6,300,000	24,000,000
^{241}Am	pCi/L	6,500	12,000		750	2,100					
^{129}I	pCi/L	560	780		53	140					
^{238}Pu	pCi/L	1,200	2,200								
^{241}Pu	pCi/L	120,000	190,000		3,300	5,600					
^{239}Pu	pCi/L	12,000	19,000		500	930		0.000017	0.00037	0.00068	0.0024
^{113}Sn	pCi/L				28,000	34,000		130	540	770	2,500
^{155}Eu								0.17	1,400	na	1,400

Notes:
1. ^{137}Cs and ^{90}Sr values for the 242-A Evaporator have been multiplied by 10 to account for the removal of the existing ion-exchange system in the 242-A Evaporator.

2. Abbreviations:
 Mgal = millions of gallons
 C = degrees Celsius
 gal/min = gallons per minute
 TDS = total dissolved solids
 pCi/L = picocuries per liter
 ppb = parts per billion
 mS = microsiemen
 SU = Standard pH units
 TOC = total organic carbon
 Mgal/yr = million gallons per year

References:

1. PUREX PDD chemical and radionuclide statistical data were taken from WHC-EP-0342, Addendum 12 (Tables 3-2 and 3-3).
2. PUREX ASD chemical and radionuclide statistical data were taken from WHC-EP-0342, Addendum 14 (Tables 3-2 and 3-3).
3. 242-A Evaporator statistical data was compiled by A. P. Larrick. (Internal memo, 13331-89-491, to D. L. Flyckt)

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APPENDIX D
TREATMENT TARGETS

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APPENDIX D

TREATMENT TARGETS

The preferred alternative for the disposal of the treated effluent from the 242-A Evaporator and PUREX Plant condensate treatment facility is a soil column disposal system, permitted in compliance with WAC 173-216, *Waste Discharge Permit Program.*[1] Should this alternative become unacceptable because of technical or permitting issues, it will be necessary to pursue a river disposal option. The design and cost for this option should be included in the conceptual design report.

The treatment system will be capable of meeting release limits contained in a State of Washington Waste Discharge Permit (WAC 173-216)[1] or an NPDES permit. This are negotiated permits, and requires the application of all known, available, and reasonable technology (AKART) to satisfy the requirements of the state of Washington or Best Available Technology to satisfy the Federal requirements. During the permitting process, the appropriate treatment system design will be determined by either the AKART or BAT processes. Both methodologies will include a review of treatment system technclogies.

Both WAC 173-216 and NPDES permit conditions will be negotiated during the design of the project. Until these criteria become available, the design of the project will use the target levels as presented in Table D-1.

The design of the river disposal option will provide a piping system to transport the treated effluent to the Columbia River. The discharge site will be located in accordance with the Site Evaluation Report for the 200 Area Effluent Retention and Treatment Complex (ERTC). The following outlines the minimal requirements of the river discharge system.

- o A river outfall or diffuser, if provided, shall comply with the National Pollution Discharge Elimination System (NPDES) and U.S. Army Corps of Engineers requirements.
- o River piping and diffusers, if provided, shall be secured and anchored to accommodate the 100-year flood.
- o Piping shall be compatible with the anticipated flow characteristics and shall be designed for gravity flow wherever practicable.
- o Pumps, if used, shall be electric, connected to standby power, and shall be redundant.
- o Piping shall be underground and/or otherwise protected from freezing.

[1]Ecology, 1986, *State Waste Discharge Permit Program*, Washington Administrative Code, WAC-173-216, Washington State Department of Ecology, Olympia, Washington.

The treatment targets presented in this appendix are intended to be conservative (low) estimates of the release limits that would be contained in either a WAC-173-216 or NPDES permit. They are not intended to be an indication of the level of treatment that is possible with the facilities provided by this project.

The treatment targets presented in Table D-1 are the most stringent of the following:

- Safe Drinking Water Act[3] Primary Maximum Contaminant Levels (PMCL), Secondary Maximum Contaminant Level (SMCL), Maximum Contaminant Level Goals (MCLG)
- Ground water quality criteria as stipulated by WAC 173-200
- Land disposal restrictions, 40 CFR 268.41 and 40 CFR 268.43
- One tenth of the purgewater collection criteria values as stipulated in Table 1, "Strategy for Handling and Disposing of Purgewater at the Hanford Site," (90-ERB-076)
- Health based limit, as stated in Docket Report on Health-Based Levels and Solubilities Used in the Evaluation of Delisting Petitions Submitted Under 40 CFR 260.00 and 260.22, written by Science Applications International Corporation, prepared under EPA contract No. 68-W9-0091 for the EPA, Washington, D.C. (November 1989) or the practical quantification limit as listed in 40 CFR 264, Appendix IX, whichever is greater.

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[1]Ecology, 1986, *State Waste Discharge Permit Program*, Washington Administrative Code, WAC-173-216, Washington State Department of Ecology, Olympia, Washington.

[2]Resource Conservation and Recovery Act of 1976, as amended, Public Law 94-580, 90 Stat. 2795, 42 USC 6901 et seq.

[3]*Safe Drinking Water Act of 1974*, as amended, Public Law 93-523, 88 Stat. 1660, 42 USC 300f et seq.

Table D-1. Treatment Targets

TREATMENT TARGETS*
(with radionuclides)
Dec. 31, 1990

* Determined from the most restrictive of the constituent values from the table "Liquid Effluent Current Comparative Limits, October 16, 1990" (WA State Dept. of Ecology) as supplemented by adding constituents and target levels needed for the RCRA delisting petition.

CONSTITUENT	TARGET VALUE (ppb)
1,1,1,2- tetrachloroethane	5.0
1,1,1-trichloroethane	7.0
1,1,2,2-tetrachloroethane	0.5
1,1,2-Trichloro-1,2,2-triflouroethane	57.0
1,1,2-trichloroethane	0.6
1,1-dichloroethane	1.0
1,1-dichloroethylene	7.0
1,2,3,4-tetrachlorobenzene	50.0
1,2,3,5- tetrachlorobenzene	50.0
1,2,3-trichlorobenzene	50.0
1,2,3-trichloropropane	5.0
1,2,4,5-tetrachlorobenzene	10.0
1,2,4-trichlorobenzene	9.0
1,2-dibromo-3-chloropropane	5.0
1,2-dibromoethane	0.001
1,2-dichlorobenzene	50.0
1,2-dichloroethane	0.5
1,2-dichloropropane	0.6
1,2-dimethylhydrazine	60.0
1,2-diphenylhydrazine	0.04
1,3,5-trichlorobenzene	50.0
1,3-Butadiene	0.3
1,3-dichlorobenzene	36.0

CONSTITUENT	TARGET VALUE (ppb)
1,3-dichloropropene	0.2
1,3-dinitrobenzene (meta)	10.0
1,4-dichlorobenzene	4.0
1,4-dichloro-2-butene	5.0
1,4 dinitrobenzene	320.0
1,4-dioxane	7.0
1,4-napthaquinone	10.0
1-butanol	5000.0
1-napthylamine	10.0
2,3,4,6-tetrachlorophenol	10.0
2,3,7,8-tetrachlorodibenzo-p-dioxin	0.0000006
2,4,5-T	2.0
2,4,5-TP (Silvex)	50.0
2,4,5-trichlorophenol	16.0
2,4 6-trichlorophenol	4.0
2,4-D	100.0
2,4-dichlorophenol	44.0
2,4-dimethylphenol	5.0
2,4-dinitrophenol	50.0
2,4-dichlorophenoxy-acetic acid	1000.0
2,4-dinitrotoluene	0.1
2,4-diaminetoluene	0.002
2,4,6-trinitrotoluene	1.0
2,6-dichlorophenol	10.0
2,6-dimethylphenol	2.0
2,6-dinitrotoluene	0.1
2,6-toluenediamine	6000.0
2-chloroethyl vinyl ether	57.0

CONSTITUENT	TARGET VALUE (ppb)
2-sec-Butyl-4,6-dinitrophenol	66.0
2-acetylaminoflourene	59.0
2-hexanone	50.0
2-methoxy-5-nitroaniline	2.0
2-methylaniline	0.2
2-methylaniline hydrochloride	0.5
2-methylnapahthalene	10.0
2-acetylaminofluorene	10.0
2-chloronaphthalene	10.0
2-chlorophenol	44.0
2-napthylamine	10.0
2-picoline	5.0
3,3'-dichlorobenzidine	0.2
3,3'-dimethoxybenzidine	6.0
3,3'-dimethylbenzidine	0.007
3-chloropropene (see Allyl chloride)	
3-methylcholanthrene	5.5
3,4-dimethylphenol	4.0
4,4'-methylene-*bis*-(2-chloroanaline)	500.0
4,4'-methylene-*bis*- (N,N'-dimethyl)analine	2.0
4,6-dinitro-o-cresol and salts	50.0
4-nitro-1-oxo-quinoline	10.0
4-aminobiphenyl	10.0
4-bromophenyl phenyl ether	10.0
4-chloro-2-methyl aniline	0.1
4-chloro-2-methyl aniline hydrochloride	0.2
4-nitrophenol	120.0
5-nitro-o-toluidine	10.0

CONSTITUENT	TARGET VALUE (ppb)
7,12-dimethylbenz(a) anthracene	10.0
Acenaphthalene	10.0
Acenapthene	59.0
Acetone	50.0
Acetonitrile	100.0
Acetophenone	10.0
Acrolein	21.0
Acrylamide	0.02
Acrylic acid	3000.0
Acrylonitrile	0.07
Adipates [Di(ethylhexyl)adipate]	500.0
Alachlor	2.0
Aldrin	0.005
Allyl alcohol	200.0
Allyl chloride	10.0
Aluminum	50.0
Aluminum, filtered	50.0
Ammonia	1300.0
α,α-dimethylphenethylamine	10.0
Analine	10.0
Anthracene	10.0
Antimony	3.0
Antimony, filtered	1600.0
Antimony-125	300 pCi/l
Aramite	3.0
Arochlor 1016	0.1
Arochlor 1221	0.1
Arochlor 1232	0.1

CONSTITUENT	TARGET VALUE (ppb)
Arochlor 1242	0.1
Arochlor 1248	0.1
Arochlor 1254	0.1
Arochlor 1260	0.1
Arsenic	50.0
Arsenic, total metals	0.05
Arsenic, filtered	48.0
Arsenic acid	790.0
Arsenic oxide	790.0
Azobenzene	0.7
Barium	1000.0
Barium, total metals	1000.0
Barium, filtered	1000.0
Benz(a)anthracene	10.0
Benzal Chloride	280.0
Benzal Chloride	100.0
Benzene	1.0
Benzidine	0.002
Benzotrichloride	0.007
Benzo(a)anthracene	10.0
Benzo(g,h,i)perylene	5.5
Benzo(k)fluoranthene	10.0
Benzo(a)pyrene	zero (10.0)
Benzo(b/k)fluoranthene	29.0
Benzo(b)fluoranthene	10.0
Benzo(k)fluoranthene	10.0
Benzyl alchohol	20.0
Benzyl chloride	0.5

CONSTITUENT	TARGET VALUE (ppb)
Beryllium	zero (2.0)
Beryllium, filtered	5.3
Bis(2-chloro-isopropyl)ether	10.0
Bis(2-chloroethoxy) methane	10.0
Bis(chloroethyl)ether	0.07
Bis(2-chloroethyl) ether	7.0
Bis(chloroisopropyl)ether	1000.0
Bis(chloromethyl)ether	0.0002
Bis(2-ethylhexyl) phthalate	6.0
Bromodichloromethane	0.3
Bromoform	2.0
Bromomethane	50.0
Butyl benzyl phthalate	17.0
Cadmium	10.0
Cadmium, total metals	10.0
Cadmium, filtered	1.1
Carbazole	5.0
Carbon disulfide	5.0
Carbon tetrachloride	0.3
Carbon-14	2000 pCi/l
Cesium-137	200 pCi/l
Chloral	70.0
Chlordane	0.06
Chloride	250000.0
Chlorobenzene	2.0
Chlorobenzene (by ABN)	2.0
Chlorobenzilate	30.0
Chlorodibromomethane	0.5

CONSTITUENT	TARGET VALUE (ppb)
Chloroethane	5.0
Chloroform	6.0
Chloromethane	190.0
Chloromethyl methyl ether	0.004
Chlorthalonil	30.0
Chromium	50.0
Chromium, total metals	50.0
Chromium (VI)	11.0
Chromium, filtered	11.0
Chrysene	10.0
cis-1,2-dichloroethylene	70.0
cis-1,3-dichloropropene	36.0
Cobalt-60	100 pCi/l
Coliform bacteria, total	1/100 ml
Color	15 color units
Copper	1000.0
Copper, total metals	1000.0
Copper, filtered	12.0
Corrosivity	noncorrosive
Cresols	10.0
Cresols, m and p isomers	770.0
Cyanides, amenable	100.0
Cyanide	5.2
Cyanogen	1000.0
Cyanogen bromide	3000.0
Cyclohexanone	125.0
DDD	0.1
DDE	0.05

CONSTITUENT	TARGET VALUE (ppb)
DDT	0.01
DDT+ DDE+ DDD	0.3
δ-BHC	0.1
Dalapon	200.0
Di-n-butyl phthalate	57.0
Di-n-octal phthalate	17.0
Di-n-propylnitrosamine	10.0
Diallate	1.0
Dibenz(a,h)acridine	10.0
Dibenz(a,h)anthracene	10.0
Dibenzofuran	10.0
Dibromomethane	110.0
Dibromochloromethane	1.0
Dichlorodifluoromethane	5.0
Dichlorovos	0.3
Dieldrin	0.005
Diethyl phthalate	200.0
Dimethyl phthalate	47.0
Dimethyl terephthalate	4000.0
Diguat	20.0
Dimethoate	10.0
Dinitrobenzene	10.0
Dinoseb	1.0
Dioxane	150.0
Dioxin	0.01
Diphenylamine	10.0
Diphenylnitrosamine	400.0
Direct black 38	0.009

CONSTITUENT	TARGET VALUE (ppb)
Direct blue 6	0.009
Direct brown 95	0.009
Disulfoton	2.0
Endosulfan I	0.06
Endosulfan II	29.0
Endosulfan sulfate	29.0
Endothall	100.0
Endrin	0.01
Endrin aldehyde	25.0
Epichlorohydrin	8.0
Ethyl acetate	50.0
Ethyl acrylate	2.0
Ethyl benzene	2.0
Ethyl ether	50.0
Ethyl methacrylate	5.0
Ethyl methanesulfonate	10.0
Ethylene dibromide	0.001
Ethylene thiourea	2.0
Ethylene oxide	0.1
Famphur	17.0
Fluoranthene	10.0
Fluorene	7.0
Fluoride	2000.0
Flourotrichloromethane	20.0
Foaming agents	500.0
Folpet	20.0
Formic acid	70000.0
Furazolidone	0.02

CONSTITUENT	TARGET VALUE (ppb)
Furium	0.002
Furmecyclox	3.0
Glyphosate	700.0
Gross alpha	15 pCi/l
Gross beta particle activity, gross beta activity	20 pCi/l
Gross beta particle activity, tritium	20,000 pCi/l
Gross beta particle activity, strontium 90	8 pCi/l
Heptachlor	0.01
Heptachlor epoxide	0.009
Hexabromobenzene	70.0
Hexachlorobenzene	0.05
Hexachlorobutadiene	5.0
Hexachlorocyclohexane (alpha)	0.001
Hexachlorocyclohexane (technical)	0.05
Hexachlorocyclopentadiene	5.2
Hexachlorodibenzofurans	1.0
Hexachlorodibenzo-p-dioxin, mix	0.00001
Hexachlorodibenzo-furans, All	0.063
Hexachloroethane	7.0
Hexachlorophene	10.0
Hexachloropropene	10.0
Hydrazine/Hydrazine Sulphate	0.03
Hydrocyanic acid	700.0
Hydrogen sulfide	2.0
i-butyl alcohol	5000.0
Indeno(1,2,3-c,d)pyrene	5.5
Iodine-129	1 pCi/l
Iodine-132	3 pCi/l

CONSTITUENT	TARGET VALUE (ppb)
Iodomethane	5.0
Iron	300.0
Iron, total metals	300.0
Iron, filtered	300.0
Isobutanol	1000.0
Isodrin	10.0
Isophorone	10.0
Isosafrole	10.0
Kepone	1.1
Lead	37.0
Lead, total metals	50.0
Lead, filtered	3.2
Lindane	0.06
Lindane, α-BHC	0.14
Lindane, ß-BHC	0.14
Lindane, δ-BHC	23.0
Lindane, γ-BHC	0.08
m-phenylenediamine	200.0
Maleic anhydride	4000.0
Maleic hydrazide	20000.0
Manganese	50.0
Manganese, total metals	50.0
Manganese, filtered	50.0
Mercury	2.0
Mercury, total metals	2.0
Mercury, filtered	0.01
Methacrylonitrile	5.0
Methanol	250.0

CONSTITUENT	TARGET VALUE (ppb)
Methapyrilene	10.0
Methomyl	90.0
Methoxychlor	0.3
Methyl bromide	10.0
Methyl chloride	1.0
Methyl chlorocarbonate	40000.0
Methyl chrysene	3000.0
Methyl ethyl ketone	10.0
Methyl isobutyl ketone	5.0
Methyl methacrylate	2.0
Methyl methanesulfonate	10.0
Methyl parathion	0.5
Methylene chloride	5.0
Mirex	0.05
Nitric oxide	4000.0
Nitrogen dioxide	40000.0
N-nitrosodiphenylamine	10.0
N-nitroso-di-n-butylamine	0.006
N-nitrosodiethanolamine	0.01
N-nitrosodiethylamine	0.0005
N-nitrosodimethylamine	0.002
N-nitroso-di-n-propylamine	0.01
N-nitroso-n-methylethylamine	0.004
N-nitrosomorpholine	10.0
N-nitrosopiperidine	10.0
N-nitrosopyrrolidine	0.04
Napathalene	7.0
Nickel	100.0

CONSTITUENT	TARGET VALUE (ppb)
Nickel, filtered	160.0
Nickel-63	50 pCi/l
Nitrate (as nitrogen)	10000.0
Nitrite	3300.0
Nitrobenzene	10.0
Nitrofurazone	0.06
Nitrosopyrrolidine	10.0
Odor	3 threshold odor units
O,O,O-triethyl phosphorothioate	10.0
O-toluidine hydrochloride	10.0
o-cresol	200.0
Oxamyl	200.0
p-chloroaniline	100.0
p-chloro-m-cresol	200.0
PAH	0.01
PBBs	0.01
PCBs	0.01
Parathion	0.2
Pcdd's	0.01
Pcdf's	0.01
Pentachlorobenzene	10.0
Pentachlorodibenzo furans	1.0
Pentachloro-dibenzo-p- dioxins, all	0.063
Pentachloro-dibenzo-p-furans, all	0.035
Pentachloroethane	7.0
Pentachloronitrobenzene	10.0
Pentachlorophenol	13.0

CONSTITUENT	TARGET VALUE (ppb)
pH	6.5 - 8.5
Phenacetin	10.0
Phenanthrene	7.0
Phenol	39.0
Phenylenediamine	10.0
Phenylmercury acetate	3000.0
Phorate	2.0
Phthalates [Di(ethylhexyl)phthalate]	zero
Phthalic anhydride (as phthalic acid)	540.0
Phthalic acid esters	3.0
Picloram	500.0
Plutonium-238	1.6 pCi/l
Plutonium-239,240	1.2 pCi/l
Pronamide	10.0
Propionitrile (Ethyl cyanide)	5.0
Propylene oxide	0.01
Pynene	4000.0
Pyrene	10.0
Pyridine	14.0
para-α,α,α-Tetrachlorotoluene	0.004
Quinoline	0.003
Radium-226 & 228	5 pCi/l
Radium-226	3 pCi/l
Radium	5 pCi/l
Ruthenium-103	200.0
Ruthenium-106	30 pCi/l
Safrol	10.0
Selenium, total metals	10.0

CONSTITUENT	TARGET VALUE (ppb)
Selenium, filtered	10.0
Selenium	10.0
Selenious acid	100.0
Silver	50.0
Silver, total metals	50.0
Silver, filtered	1.0
Simazine	1.0
solids, Total dissolved	500,000.0
Strontium-89	20 pCi/l
Styrene	1.0
Sulfate	250,000.0
Sulfide	14,000.0
Sym-trinitrobenzene	10.0
Technetium-99	900 pCi/l
Tetrachlorodibenzofurans	1.0
Tetrachloro-dibenzo-p-dioxins, all	0.063
Tetrachloro-dibenzo-furans, all	0.063
Tetrachloroethene	6.0
Tetrachlorophenols (total)	18.0
Tetrachloroethylene	0.8
Tetraethyldithiopyrophosphate	20.0
Tetraethylpyrophosphate	10.0
Thallium	0.5
Thiourea	0.02
Tin, filtered	8000.0
Toluene	2.0
Toxaphene	0.08
trans-1,2-dichloroethane	33.0

CONSTITUENT	TARGET VALUE (ppb)
trans-1,2-dichloroethylene	1.0
trans-1,3-dichloropropene	36.0
Trichloroethylene	3.0
Trichloroethane	200.0
Trichlorofluoromethane	50.0
Trichloromonofluoromethane	5.0
Trihalomethanes (includes chloroform, bromoform, bromodichloromethane, and dibromochloromethane)	100.0
Trimethyl phosphate	2.0
tris-(2,3 dibromopropyl) phosphate	25.0
Uranium	40 pCi/l
Uranium, chemical	59.0
Vanadium	42.0
Vanadium, filtered	40.0
Vanadium Pentoxide	70.0
Vinyl acetate	5.0
Vinyl chloride	0.02
Xylene	11.0
Zinc	5000.0
Zinc, total metals	5000.0
Zinc, filtered	110.0
m,p-cresols	770.0
m-dichlorobenzene	36.0
m-nitroaniline	50.0
m-xylene	5.0
n-butyl alcohol	5000.0
o,p'-DDD	23.0
o,p'-DDE	31.0
o,p'-DDT	3.9

CONSTITUENT	TARGET VALUE (ppb)
o-chloronitrobenzene	3.0
o-cresol	110.0
o-dichlorobenzene	8.0
o-nitroaniline	50.0
o-nitrophenol	28.0
o-phenylenediamine	0.005
o-toluidine	0.2
o-xylene	5.0
p,p'-DDD	23.0
p,p'-DDE	31.0
p,p'-DDT	3.9
p-chloro-m-cresol	5.0
p-chloroaniline	20.0
p-chloronitrobenzene	5.0
p-dichlorobenzene	8.0
p-dimethylaminoazobenzene	10.0
p-nitroaniline	28.0
p-nitrophenol	150.0
p-xylene	5.0

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APPENDIX E

PROCESS AND SUPPORT FACILITY

DESIGN CONSIDERATIONS

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APPENDIX E

PROCESS AND SUPPORT FACILITY DESIGN CONSIDERATIONS

The design of the process and support services facilities should consider the following design features:

- A process equipment confinement area with excess floor area for incorporation of Project W-049H will be provided. If necessary, shielding will be included in this area.

- A packaging and shipping area to facilitate the removal of secondary waste will be included.

- Floor drains and sumps Will be installed in process areas. The ability to transfer sump solutions to feed tanks or temporary storage will be provided. Embedded floor drains and wet sumps shall have testable secondary containment. The design of the system should give preference to the use of lined troughs where drainage is collected and directed to tanks.

- Emergency lighting will be provided for personnel egress. Process areas that are occupied will use white light, and the lighting will be water resistant. Exterior areas and parking lots may be lighted by low-pressure sodium if color rendition is not required for safety or operation.

- Heating, ventilation, and air conditioning (HVAC) systems will be installed. 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 high personnel occupancy.

- Equipment and services to flush and decontaminate internal components and exterior surfaces of process systems and the process building interior surface will be provided to maintain them in a relatively clean condition.

- A maintenance area will include equipment necessary to support the maintenance requirements.

- Waste accumulation areas to these areas will include covered enclosures with heating and lighting; separate areas for hazardous waste, mixed waste, radioactive waste, clean waste (nonhazardous and radioactive), and used petroleum products in accordance with requirements of WHC-CM-7-5 (WHC 1989b) and WAC 173-303.

- Safety showers and eyewash stations in compliance with requirements of DOE Order 6430.1A, will be installed.

- Separate change room facilities for men and women will be provided. Separate areas for street clothes and protective clothing will be provided. An area equipped with portal monitors shall be included.

- Sample preparation and storage area with equipment required to meet sampling requirements will be provided.

- A process control laboratory area located adjacent to the sample preparation and storage area.

- Separate storage areas for clean and dirty laundry, including laundry pick-up and delivery areas, will be provided. Storage of contaminated clothing will comply with DOE Order 6430.1A.

- A break and lunchroom area will be included in the facilities.

- Shower and restroom facilities will be provided.

- Personnel survey and decontamination areas will be provided.

- Office space will be provided for operations, maintenance, and other personnel required to support 5 day/week, 2 shifts per day operation of the facilities.

- A control room area (with "clean" access) for remote process surveillance and control will be provided.

- Process instrumentation readouts typically shall be located 4.5 feet above floor level.

- Storage and janitor closets for supplies will be provided.

- Posts, guards and other types of protection needed to prevent damage to equipment, piping, and structures will be installed.

- Guard rails or other fall protection around all pits, platforms and surfaces where a fall greater than 4 feet could occur will be installed.

- A system of cranes and/or hoists (including monorail systems) and equipment for material handling and transport will be installed as necessary for operation and maintenance.

- 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 the facility or where bulky or heavy items must be moved. The use of ladders shall be minimized.

- Services doors will be installed to enable movement of equipment to and from facility.

APPENDIX F

PROPOSED STAFFING PLAN

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APPENDIX F

PROPOSED STAFFING PLAN

This appendix presents the proposed staffing plan for the following three projects:

- 242-A Evaporator Liquid Effluent Retention Facility, Project W-105;
- 200 Area Treated Effluent Disposal Facility (TEDF), Project W-049H; and
- 242-A Evaporator and PUREX Plant Condensate Treatment Facility, Project C-018H.

The Liquid Effluent Retention Facility (Project W-105) will provide interim storage basins for the 242-A Evaporator process condensate (PC).

The 200 Area TEDF will provide the collection piping and disposal systems for 13 effluent streams in the 200 Area. New collection piping will transport the 200 East and West streams to the W-105 retention basins. The basins will have covers and primary liners replaced to ensure a clean background for the streams. The effluents collected in the basins will be sampled and analyzed prior to release. If clean, the effluent will be discharge to a new pond provided by Project W-049H. If the effluent is not releasable, it will be recycled and treated by the equipment installed by Project C-018H.

Project C-018H will provide a treatment system for the 242-A Evaporator PC and the combined PUREX Plant PDD and ASD streams. Beginning in June 1995, the Project C-018H treatment system will also provide the necessary standby treatment capacity for the 200 Area TEDF (Project W-049H).

The estimate of staffing requirements is based on the following assumptions:

- All three projects will be operated by Westinghouse Hanford Company Waste Management.
- All three projects will located northeast corner of the 200 East Area and will be incorporated within the 200 East Area security fence.
- During the first two years of operation, Project C-018H will operate 7 day/week, 3 shifts per day. Total operating efficiency (TOE) for the treatment system will exceed 70%.
- After the first two years of operation, Project C-018H will operate at an estimated TOE of 50%, 3 shifts per day.

- A single control room will be provided for Projects C-018H and W-049H.

The estimated staffing requirements for the three projects are presented in Table F-1. The total personnel count accommodated by Project C-018H is based on the long-term operations requirements. Additional personnel required for the start-up and first 2 years of operation will be accommodated by existing or temporary facilities.

STAFFING PLAN FOR C-018H

Staff Title	Shift	Number of Offices Required		Total Staff
		In ETF	In Office	
Operations Mgr	Day		1	1
Assistant Ops Mgr	Day		1	1
Secretary	Day		1	1
Clerk	Day	1		1
Shift Ops Mgr	ABCDE	1	1	5
Shift Engineers	ABCDE	1	0.5	5
Dayshift Engineers	Day		1.5	5
Process Operators	ABCDE		3	30
Power Operators	ABCDE	0.5		5
Power Operators	Day	0.5		2
HPT	ABCDE	1		5
HPT	Day	2	1	3
Ops Analysis Mgr	Day		1	1
Procedure/Support	Day		1	3
Document Control	Day	1	1	1
Trainer	Day		1	2
Haz Mat Coord	Day		1	1
QA Org	Day		1	3
Work Control Mgr	Day		1	1

Work Control Eng	Day		1	2
Process Engineers	Day		1	2
Planner/Scheduler	Day		1	2
Work Control Eng	Swing	1		1
Mechanical Supr	Day	1		1
Electrical Supr	Day	1		1
Millwright	Day	0.5 (shop)		3
Pipefitter	Day	0.5 (shop)		3
Electrician	Day	0.5 (shop)		3
Instrument Tech	Day	1 (shop)		3
Instrument Tech	Swing	0.5 (shop)		1
Mat'l Coordinator	Day		1	1
Tool Crib Attend	Day		1	1
Janitor	Day		1	1
Misc (Future need)	Day		4	4
TOTALS		14	27	103

Supplemental Office Space Approximate Sizes

- office space, sized for approximately 40 persons, (approximately 135 square foot per person).
- one strategically located area for convenience copy machines, facsimile machines and storage area (approximately 300 square feet each).
- rest rooms sized to building occupancy, 60/40 ration for male and female employees (approximately 200 square feet).
- one lunchroom including appliances (ex. hot tap, microwave ovens, refrigerators and stoves), sized for building occupancy (approximately 1200 square feet).
- two conference/training rooms (approximately 600 square feet each) with a center divider.
- an approximately 350 square foot entry area with central mail receiving/distribution area.

- o separate space for telephone, electrical and janitorial equipment (approximately 80 square feet each) for storage of general equipment and supplies.

- o unobstructed space for wet fire suppression system sprinkler riser (approximately 70 square feet).