DISTRIBUTION SHEET

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Project Title/Work Order		EDT No.
W-007H B Plant Process Condensate Treatment Facility		ECN No. 609357

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ENGINEERING CHANGE NOTICE

1. ECN 609357

Proj. ECN

2. ECN Category (mark one) Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	3. Originator's Name, Organization, MSIN, and Telephone No. G. L. Rippy, Projects, R3-35, 372-2752		4. Date 7/18/94
	5. Project Title/No./Work Order No. W-007H, B Plant Process Condensate Treatment Facility	6. Bldg./Sys./Fac. No. 2221-B, 225-B, 221-BF, 276-B, 211-BA	7. Approval Designator ESQ
	8. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-W-007H-FDC-001, Rev. 2	9. Related ECN No(s).	10. Related PO No.

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

Revise sections 1.3.1 & 3.1.1 of Project W-007H, B Plant Process Condensate Treatment Facility, Functional Design Criteria as noted on attached pages. All revisions are noted by revision bars in left column of Revision 3 pages.

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

13b. Justification Details

The Beta Monitor is not identified in the Environmental Report, WHC-SD-W049H-ER-003, as a BAT/AKART requirement. The W-049H interface control document WHC-SD-W049H-ICD-001 Section 5.2.3, pages 10 & 11 say Beta Monitoring is not required for group II streams that are batch sampled. Additionally, the low-level waste concentrator will not be operating, which eliminates any need for Beta Monitoring.

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

See Distribution Sheet

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DATE JAN 20 1995

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A-7900-013-2 (06/94) GEF095

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A-7900-013-1 (06/92)

ENGINEERING CHANGE NOTICE	Page 2 of 2	1. ECN (use no. from pg. 1) 609357

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

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

20. Approvals

Signature	Date	Signature	Date
OPERATIONS AND ENGINEERING		ARCHITECT-ENGINEER	
Cog. Eng. G. E. Entrop *G. Entrop*	10/14/94	PE	
Cog. Mgr. D. ~~L. Halgren~~ *D. Halgren*	10/7/94	QA	
QA H. S. Bajwa *HSB*	10/14/94	Safety	
Safety W. P. Nelson *W. P. Nelson*	10/14/94	Design	
Environ. D. L. Halgren *D. Halgren*	10/17/94	Environ.	
Projects G. L. Rippy *G. L. Rippy*	10/14/94	Other	
Fac. Ops. W. W. Bowen *W. W. Bowen*	10/17/94		
Level III Project Mgr. J. R. Kelly *GB Becker for*	10/12/94		
HEC Mgr. G. B. Becker *G. B. Becker*	10/14/94	DEPARTMENT OF ENERGY	
		Signature or a Control Number that tracks the Approval Signature Ltr. No. 94-PMDB-152	12/13/94
		ADDITIONAL	

* The decision to delete the installation of this monitor was made at the end of Definitive Design and the cost reductions and schedule noted in CR-HEC-CCB-716 includes this change.

RELEASE AUTHORIZATION

Document Number:	WHC-SD-W007H-FDC-001, REV 3
Document Title:	B Plant Process Condensate Treatment Facility
Release Date:	1/20/95

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

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

Kara M. Broz (signature)

Kara M. Broz

January 20, 1995

SUPPORTING DOCUMENT

1. Total Pages ~~56~~ 54

2. Title	3. Number	4. Rev No.
B Plant Process Condensate Treatment Facility	WHC-SD-W007H-FDC-001	3

5. Key Words

B Plant Process Condensate
Liquid Effluent Stream
Treated Effluent Disposal Facility

KMB 1/20/95 **APPROVED FOR PUBLIC RELEASE**

6. Author

Name: G. L. Rippy

G. L. Rippy
Signature

Organization/Charge Code 7F160/J7F3A

7. Abstract

Backflow Dampers justification and operation requirements.

9. Impact Level ~~2~~ ESQ

10. RELEASE STAMP

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RECORD OF REVISION	(1) Document Number SD-W007H-FDC-001	Page ii

(2) Title
B Plant Process 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
0	(7) 7/10/90 EDT 106556		
1	Incorporate ECN 162705 and cancel ECN's 106877, 113965, 114006	G. L. Rippy	J. L. Monko
2	Incorporate ECN 165536 and cancel ECN 162705	G. L. Rippy	J. L. Monko
3 RS	Incorporate ECN 609357	G. L. Rippy	for J. L. Monko
		G. L. Rippy	G. L. Rippy

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MASTER

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APPENDIXES:

1.0 INTRODUCTION

1.1 BACKGROUND

The B Plant Canyon facility was constructed in the 1940's and is currently an operating facility required to ensure safe storage and management of the Waste Encapsulation and Storage Facility's (WESF) Cesium and Strontium capsules. This project was planned as a 1989 sub-part of the Hanford Environmental Compliance (HEC) line item.

1.1.1 B Plant Process Condensate Background

B Plant Process Condensate (BCP) liquid effluent stream is the condensed vapors originating from the operation of the B Plant low-level liquid waste concentration system. In the past, the BCP stream was discharged into the soil column under a compliance plan which expired January 1, 1987. Currently, the BCP stream is inactive, awaiting restart of the E-23-3 Concentrator. All low-level radioactive liquid waste is currently sent directly to the tank farms, which is only a short-term disposal solution.

As required by the "Hazardous and Radioactive Mixed Waste Program," U.S. Department of Energy (DOE) Order 5400.3, "The use of soil columns (i.e., trenches, cribs, ponds, and drain fields) to treat and retain suspended or dissolved radionuclides from liquid waste streams shall be discontinued at the earliest practicable time in favor of waste-water treatment." This same requirement has been established in the Richland Operations Office Implementation Plan as described in DOE-RLIP Order 5400.1, "General Environmental Protection Plan," Section 2.b.(1).

In response to a congressional request, a plan (Reference 2) has been developed to clean up all Hanford streams currently being disposed to the soil column to a level consistent with the best available radionuclide control technology. This clean-up level is the result of applying principles of Best Available Technology (BAT) and All Known, Available, and Reasonable Treatment (AKART) economically achievable.

1.1.2 B Plant Steam Condensate Background

B Plant Steam Condensate (BCS) liquid effluent stream is the spent steam condensate used to supply heat to the E-23-3 Concentrator. The tube bundles in the E-23-3 Concentrator discharge to the BCS. In the past, the BCS stream was discharged into the soil column under a compliance plan which expired January 1, 1987. Currently, the BCS stream is inactive, awaiting restart of the E-23-3 Concentrator. All radioactive low-level liquid waste is currently being sent directly to Tank Farms, which is only a short-term disposal solution. Although modifications to meet the DCG Table limits are ongoing, future effluent release standards will be more stringent than the table limits, and therefore will require more extensive clean-up measures.

As required by the "Hazardous and Radioactive Mixed Waste Program," DOE Order 5400.3, "The use of soil columns (i.e., trenches, cribs, ponds, and drain fields) to treat and retain suspended or dissolved radionuclides from liquid waste streams shall be discontinued at the earliest practicable time in favor of waste-water treatment." This same requirement has been established in the Richland Operations Office Implementation Plan as described in DOE-RLIP Order 5400.1, "General Environmental Protection Plan," Section 2.b.(1).

In response to a congressional request, a plan (Reference 2) has been developed to clean up all Hanford streams currently being disposed to the soil column to a level consistent with the best available radionuclide control technology. This clean-up level is the result of applying principles of BAT and AKART economically achievable. The BCS stream has been identified as requiring additional source controls to meet these levels.

1.1.3 B Plant Chemical Sewer Background

B Plant Chemical Sewer (BCE) effluent is mainly raw water used to cool air compressors and sanitary overflow from a high tank. Additionally, the effluent is made up of steam condensate and neutralized regenerant from the B Plant demineralizer. The BCE effluent is currently being combined with the B Plant Cooling Water and discharged to the soil column via B Pond. Although modifications to the BCE are being made so the effluent will meet the DCG Table limits, in the future these release standards will be more stringent, which will require additional source controls to the BCE.

As required by the "Hazardous and Radioactive Mixed Waste Program," DOE Order 5400.3, "The use of soil columns (i.e., trenches, cribs, ponds, and drain fields) to treat and retain suspended or dissolved radionuclides from liquid waste streams shall be discontinued at the earliest practicable time in favor of waste-water treatment." This same requirement has been established in the Richland Operations Office Implementation Plan as described in DOE-RLIP Order 5400.1, "General Environmental Protection Plan," Section 2.b.(1).

In response to a congressional request, a plan (Reference 2) has been developed to clean up all Hanford streams currently being disposed to the soil column to a level consistent with the best available radionuclide control technology. This clean-up level is the result of applying principles of BAT and AKART economically achievable. The BCE stream has been identified as requiring corrective treatment to meet these levels.

1.1.4 B Plant Canyon Supply Fan Source Reduction

The B Plant canyon is maintained at a negative pressure with respect to atmosphere. To maintain this negative pressure two electrically-driven exhaust fans and one steam-turbine driven fan are available to pull air from the B Plant canyon. One electrically-driven exhaust fan is normally used with the second as a backup. The steam-turbine driven fan is used in emergency situations. Air supply is provided to B Plant canyon by ten supply fans in stairwells on the north side of B Plant. Each of these supply fans provides tempered air to the canyon. During hot weather, sanitary water is sprayed on cooling pads where it evaporates to cool the air. Excess water can drain via an overflow pan and drain pipe to the BCE. During cold weather, heating is accomplished by using steam, which condenses and drains to the BCE. These canyon supply fan drains are direct contributors to the BCE, Phase I stream addressed in paragraph 1.1.3.

1.2 BEST AVAILABLE TECHNOLOGY (BAT)/ALL KNOWN, AVAILABLE, AND REASONABLE TREATMENT (AKART)

1.2.1 B Plant Process Condensate BAT/AKART

Source controls have been determined to meet BAT/AKART for this particular waste stream. However, operation of the E-23-3 Concentrator will be optimized to meet TEDF discharge requirements. Justification for these recommendations is found in References 3 and 9. The second reference refers to the Project W-049H, "Treated Effluent Disposal Facility," Engineering Study (BAT/AKART), which specifies DCG limits of effluents (see Appendix D) discharging into its system. This is referenced since the BCP will be discharging into the W-049H pipeline south of B Plant.

B Plant would retain the capability to recycle this process condensate to the B Plant low level waste system.

1.2.2 B Plant Steam Condensate BAT/AKART

Flushing and cleaning of the BCS effluent piping and holding tank in 221-BB has been determined to meet BAT/AKART for this particular waste stream. In addition to flushing and cleaning of the BCS transport lines, batch collection, sampling, and release of the BCS effluent is proposed. Since the 114 header can receive steam condensate contribution from the vessel vent heaters operation, this header would likewise require cleaning and flushing. The effluent would then be valved back to the BCS stream in 221-BB, if it can meet the target discharge requirements for Project W-049H (see Appendix D). The BCS discharged from 221-BB would be diverted permanently from the 216-B-55 Crib to be batched and released from the 216-B-64 Retention Basin. The effluent would then be pumped to the Project W-049H Treated Effluent Disposal Facility (TEDF) pipeline via the existing 221-BF facility.

B Plant would retain the capability to recycle this steam condensate to the B Plant low level waste system. Justification for all of the above BCS recommendations is found in Reference 9.

1.2.3 BCE BAT/AKART

Repiping will be required in both the Waste Encapsulation Storage Facility (WESF) and B Plant to eliminate sources with the potential to contain contaminated discharges. Further controls at WESF include providing filtration for a potentially contaminated ventilation source and rerouting drains to Tk-100 line. At B Plant, rerouting of potentially contaminated B Plant canyon level heating, ventilating, and air conditioning (HVAC) floor drains to a batch collection (with monitoring) and disposal system were identified as BAT. Additional controls include capping floor drains at 276-B and providing a flow proportional sampler for the BCE stream. These controls will thus eliminate unmonitored environmental releases while utilizing the existing Facility Process Monitor and Control System (FPMCS). Implementation of the above source controls have been determined to meet BAT/AKART for this effluent stream.

1.3 SCOPE

1.3.1 BCP Scope

The scope of the BCP strategy will be to provide for source controls. The application of BAT/AKART have been applied to this stream to ensure that the stream is environmentally acceptable for discharge to the TEDF. Further controls include utilizing B Plant's existing FPMCS.

New equipment and components provided by this project will include, but not be limited to the following:

- Tank agitators
- Flow meter, totalizer and recorder
- Piping and valves
- Instrumentation
- Electrical conduit and conductors

1.3.2 BCS Scope

The scope of the BCS implementation strategy will be to provide for source controls. The application of BAT/AKART have been applied to this stream to ensure that the stream is environmentally acceptable for discharge to the TEDF. Existing BCS and 114 header-related vessels and piping in 221-BB will be cleaned and flushed. The 216-B-64 Retention Basin will be utilized for batch processing requiring that the existing pumping station be configured for acknowledgement of operation by the FPMCS. The basin's liquid level instrument requires replacement and inclusion into the FPMCS configuration. Further controls include utilizing B Plant's FPMCS. The effluent contribution from the 114 header, if generated, will be rerouted to the BCS stream following sampling and characterization.

New equipment and components provided by this project will include, but not be limited to the following:

- Flow meter, totalizer and recorder (shared with BCP system)
- Piping and valves
- Instrumentation
- Electrical conduit and conductors.

1.3.3 BCE Scope

The scope of the BCE implementation strategy will be to provide for source control in both B Plant and WESF by rerouting and monitoring potentially contaminated sources. Repiping will be required in both WESF and

B Plant to eliminate these category "F" discharges. Multiple controls will be required, including:

- Providing nontestable HEPA filtration for a potentially contaminated particulate source in a vent pipe at WESF
- Reroute WESF BCE drain into Tk-100 line
- Rerouting of potentially contaminated B Plant canyon level HVAC floor drains to a batch collection (with monitoring) and disposal system
- Capping floor drains at building 276-B
- Providing a flow proportional sampler for the BCE stream
- Utilizing the B Plant FPMCS for interface with the TEDF.

The new equipment and components provided by this project shall include, but not be limited to the following:

- Piping and valves
- Instrumentation
- High efficiency particulate air (HEPA) filter
- Flow proportional sampler
- Electrical conduit and conductors
- Batch tank
- Beta and gamma radiation monitoring system.

1.3.4 B Plant Canyon Supply Fan System Scope

The scope of the B Plant supply fan backflow damper upgrade is to eliminate the potential for discharge of radionuclides to the environment via the BCE drain system or airborne discharge. In particular this upgrade will provide controls which will prevent the potential for backflow of contaminated air from the B Plant canyon to the canyon air supply fans located in 221-B stairwells 1 through 19.

1.4 JUSTIFICATION

This project is needed to ensure compliance with appropriate regulatory agencies' requirements for liquid and airborne effluents, DOE-RL Order 5820.2A, "Radioactive Waste Management," DOE Order 6430.1A, "General Design Criteria," and Westinghouse Hanford Company (WHC) Standards for environmental protection. The project will provide controls and physical barriers which will allow B Plant to continue its mission in a safe and environmentally sound manner as defined in the above standards and regulations. These upgrades will also enhance operator interface and ALARA goals. In particular the following system deficiencies have been identified:

1.4.1 BCP Justification

The BCP effluent stream must meet Hanford Federal Facility Agreement and Consent Order -- Tri-Party Agreement (TPA) -- Milestone M-17-00A, "Complete liquid effluent treatment facilities/upgrades for Phase I effluents." The deadline for this milestone is June 1995.

1.4.2 BCS Justification

The BCS effluent stream must meet TPA Milestone M-17-00A, June 1995.

1.4.3 BCE Justification

The BCE effluent stream must meet TPA Milestone M-17-00A, June 1995.

1.4.4 Canyon Supply Fans Backflow Dampers Justification

The ten canyon supply fan overflow pans and drains are/have been contaminated. Five overflow streams discharge directly to the B Plant Chemical Sewer with no diversion or retention capabilities.

The installation of backflow dampers will eliminate the potential discharge of gross radiological contaminants from B Plant canyon to the environment.

2.0 FUNCTIONAL REQUIREMENTS

2.1 DESIGN LIFE

This project shall provide liquid effluent systems (BCP/BCS/BCE) capable of operating for a minimum of 20 years, which does not include the anticipated decontamination and decommissioning (D&D) period. The upgrades for the canyon supply fans shall be designed to provide a useful operating life of 30 years, as this system will be required through the D&D period. Individual components of respective systems may have lesser operating life, but must be designed to minimize maintenance requirements.

2.2 OPERATION REQUIREMENTS

Redundant features to minimize downtime of the three effluent systems and the ventilation system shall be considered. In order to maintain appropriate operation of B Plant, backup features shall be provided only if justified by safety class criteria as determined by hazard classification review and safety analysis.

The BCP/BCS/BCE systems upgrades shall be designed to enhance human performance and minimize potential for human error during operations and maintenance of the systems under all anticipated conditions. The guidelines of MIL-STD-1472D shall be followed.

Design considerations shall be given to the following:

- Assure rapidity, safety, economy and ease of operations and maintenance
- Design systems for male or female operators (Anthropometry)
- Minimize distraction, discomfort, stress and fatigue during operations and maintenance.

2.3 LOCATION

The BCP/BCS/BCE systems upgrades shall be located in or near to B Plant and WESF (buildings 221-B and 225-B, respectively). The canyon supply fan upgrades will be located entirely within 221-B. The system revisions shall be located in such a manner as to allow convenient access by maintenance and operations personnel. Consideration shall be given to allow remote operation/maintenance which will minimize long-term surveillance costs. Where possible, limit the need to enter the facilities. Specific system locations follow.

2.3.1 BCP System Location

The B Plant BCP exits the 221-B building from the south side and enters the Process Condensate tank in building 221-BB. From the process condensate tank the effluent is gravity drained to Tank A or Tank B in 221-BF. A sample is taken from Tank A or B. The solution is then released to the TEDF line or recycled back to the plant.

The cell 23 Concentrator (E-23-3), located in 221-B, will be operated and optimized. The BCP discharge line will be flushed and cleaned from 221-B to 221-BB and from 221-BB to 221-BF. Based on data received from operation of E-23-3 and success of optimization, a decision will be made for further processing or release to tank farms.

The BCP piping will connect to the TEDF near the northwest corner and outside of the 221-BF facility.

Interface between B Plant's FPMCS with the TEDF monitoring and control system can be picked up via B Plant's existing local data highway.

2.3.2 BCS System Location

The B Plant BCS exits the 221-B building from the south side and enters the Steam Condensate tank in building 221-BB. From there it will gravity drain to the 216-B-64 Retention Basin for batch sampling. The BCS will be sampled as a batch, analyzed, and then pumped to the TEDF line or recycled back to B Plant for further processing.

The BCS piping will connect to the TEDF near the northwest corner and outside of the 221-BF facility. Existing buried pipe lines between 216-B-64 and 221-BF will be incorporated into the design.

Interface between B Plant's FPMCS with the TEDF monitoring and control system can be picked up via B Plant's existing local data highway.

2.3.3 BCE System Location

Portions of the BCE in this project scope are located in several buildings:

- 225-B, Waste Encapsulation and Storage Facility (WESF)
- 221-B, B Plant
- 271-B, (B Plant) Service Building
- 276-B, Organic Storage Building (empty facility)
- 211-BA, BCE Effluent Monitoring and Neutralization Facility.

2.3.3.1 In the 225-B building (WESF), four category "F" sources (see Reference 9) could cause radioactive contamination to reach the B Plant BCE. The four locations are shown on drawing H-2-67007. Two of the category "F" sources are located on the mezzanine level above the transmitter rooms. These potential sources to the BCE are due to surface contamination zones around the drains. The third potential source is the drain located in the manipulator repair shop on the second floor of WESF. The fourth potential source is from contamination migrating to a vent line for the BCE drains located in the Operating Gallery of 225-B shown on drawing H-2-67003. These drains, and possible drainage from the vent line, are collected by a common header which discharges toward the BCE near the WESF Special Work Permit (SWP) - protective clothing - lobby at the operating gallery level.

2.3.3.2 In the 221-B building, five category "F" sources from the canyon HVAC floor drains are currently routed directly to the BCE and provide a potential path for radioactive contamination. The location of these sources are at Stairwells 11, 13, 15, 17, and 19. These potential sources are to be rerouted to the existing 6-in. BCE header in the 221-B Electrical Gallery. The drain system from Stairwells 11 and 13 will each require a 3-ft long core drill, with piping at Section 11 or 13 added to combine with the 6-in. header in the 221-B Electrical Gallery. The canyon level HVAC floor drain piping from stairwells 15, 17, and 19 has been previously rerouted inside 221-B before discharge to the outdoor BCE, but needs to be redirected to the 6-in. BCE header inside the 221-B Electrical Gallery.

This 6-in. BCE header will then be provided with monitoring and batch release capability. The contents currently drain to an existing tank Tk-900 at Section 3 of the Electrical Gallery. A second Tk-900(B) for batch release capability is proposed at Section 3 and as shown in Figure 3, drawing H-2-96752. A sled-mounted radiological monitoring station is also proposed at the same location. These tanks (to be designated Tk-900A and Tk-900B) will collect the effluent from the 6-in. stainless steel header and continuously circulated the contents through the monitoring station. Existing automatic diversion capability will be retained and connected to the monitoring system. The second tank (Tk-900B) will provide batch sampling and release capability.

2.3.3.3 Floor drains in the old Organic Storage Building are connected to the BCE. This project proposes capping these drains to preclude chemical discharge to the environment. See engineering flow diagram H-2-61053.

2.3.3.4 A flow proportional sampler will be located at the 211-BA Effluent Monitoring and Neutralization Facility. The new unit will be connected to the existing flow rate monitor in 211-BA.

2.3.3.5 Interface between B Plant's FPMCS with the TEDF monitoring and control system can be picked up via B Plant's existing local data highway.

2.3.4 Canyon Supply Fan System Location

The canyon supply fan backflow dampers are located adjacent to the north wall of the 221-B canyon at the top of stairwells 1 through 19 (odd numbers only). Along with the installation of the backflow dampers on the discharge side of the supply fans, new door seals shall be installed on the supply fan room access doors. Damper instrumentation shall tie into the FPMCS.

3.0 PROCESS DESIGN CRITERIA

3.1 GENERAL

Equipment and components provided by this project shall be designed to meet established practices for packaging and disposal in accordance with WHC-EP-0063, "Hanford Radioactive Solid Waste Packaging, Storage and Disposal Requirements." Appropriate features for drainage, condensate/vent drains, and leak containment shall be provided. High reliability components shall be used.

Downtime to B Plant due to construction shall be minimized.

3.1.1 BCP Specific Design Criteria

The existing pumps in tanks A and B of building 221-BF shall be on/off statused and actuated from the B Plant FPMCS.

Existing control valves and piping from 221-BF tanks A and B will be utilized and controlled from the FPMCS.

A batch sampler exists at 221-BF. The control of this stream will be batch sampling.

A new flow meter shall be added to the line from 221-BF to the TEDF connection outside of 221-BF. The flow rate shall be recorded, totalized, and alarmed at the B Plant FPMCS and transmitted to the TEDF.

Approximately 50 ft of new pipe (Pipe Code M35) will be required from the new control valves inside of 221-BF to connect to the TEDF pipeline. The route from 221-BF to the 216-B-62 Crib shall be capped. Pipe material to be compatible with the BCP and BCS streams.

Signals from existing/new BCP instrumentation for the above upgrades shall be provided an interface with the TEDF through a Project W-049H provided Local Control Unit (LCU). It shall be located in 221-B operating gallery near existing PCU #3.

3.1.2 BCS Specific Design Criteria

The existing pump in 216-B-64 shall be on/off statused and actuated from the B Plant FPMCS.

A new flow meter shall be added to the line from 221-BF to the TEDF connection. The flow rate shall be recorded, totalized, and alarmed at the B Plant FPMCS and transmitted to the TEDF. This flow monitoring system will be the same as that proposed for the BCP stream. That is, one system shall be used by both the BCP and BCS effluent streams.

A batch sampler is provided at 216-B-64. In addition, access for grab sampling will be provided at 216-B-64 for string and bottle technique. The control of this stream will be by batch sampling and additional indicator parameters will not be monitored.

Liquid level indicator with local and TEDF control room alarms will be provided for the 216-B-64 basin.

An existing Beta radiation monitor at the 221-BB facility is linked to the local FPMCS for trending and alarm response.

Approximately 50 ft of new pipe (Pipe Code M35) will be required at 221-BF to connect to the TEDF pipeline. Finally, the respective pipe routes from 221-BF and the BCS diversion pit to the 216-B-55 Crib shall be capped.

All signals from existing/new BCS instrumentation for the above upgrade shall be provided an interface with the TEDF through a project W-049H provided Local Control Unit (LCU). It shall be located in 221-B operating gallery near existing PCU #3.

3.1.3 BCE Specific Design Criteria

3.1.3.1 At the WESF, building 225-B, approximately 10 ft of stainless steel piping will be required to reroute the existing drain header from discharging to the BCE to the Tk-100 header. A cut through the existing concrete floor will be required to expose the existing headers. Following required testing of new piping, concrete floor shall be replaced.

3.1.3.2 At 221-B and 271-B, B Plant and its Service Building, respectively, several new components will be required. Another tank (Tk-900B), compatible in size and material makeup to existing Tk-900 (to become Tk-900A), needs to be procured. The original tank was purchased from Nalgene Industrial Products. All piping for effluent transport should be schedule 80 polyvinyl chloride (PVC).

Two-inch Reinforced Thermosetting Resin Pipe (RTRP) has been previously used at other stairwells in relocating drain pipes. The RTRP or comparable piping is required for rerouting stairwell BCE lines into the BCE header to Tk-900. Existing pipe at source is Duriron, and existing 6-in. BCE header in Electrical Gallery is stainless steel. Weld-o-lets will be required at the 6-in. header to receive stairwell drain pipe.

Additional instrumentation and controls for the new Tk-900B will include the following:

- Liquid level switches which will alarm and be recorded on the B Plant FPMCS
- A pH probe to monitor the pH level with both an "Alert" and a "High level" alarm which will be monitored and recorded by the FPMCS
- A sled-mounted beta and gamma radiation monitoring system (similar to existing system in 221-BA) which will alarm at both "Alert" and High level" and be recorded on the FPMCS.

Note: This system will be installed for use by Tks-900A+B and be connected to the existing diverter valve at Tk-900A in the Electrical Gallery.

3.1.3.3 At building 211-BA, the existing flow monitor currently provides for continuous flow-rate monitoring, recording, and totalizing. This information is also displayed and trended on the local FPMCS.

A flow proportional sampler is proposed for installation at 211-BA. The sampler will be tied to the local FPMCS to indicate sampler failure or electrical supply failure. Access for grab sampling will be at the 211-BA sump for string and bottle technique.

An existing sled-mounted beta and gamma monitor is installed to monitor for radiological activity at the 211-BA facility. This monitor is currently linked to the local FPMCS for trending and alarm response. A pH monitor and automatic neutralization is also currently provided at this facility. The local FPMCS provides alarm, monitoring, trending, and control.

3.1.3.4 The existing pipe drains in building 276-B are installed in accordance with M-9 pipe code. This project will permanently plug or cap these drains.

3.1.3.5 All signals from existing/new BCE instrumentation for the above upgrade shall be provided an interface with the TEDF through a project W-049H provided Local Control Unit (LCU). It shall be located in 221-B operating gallery near existing PCU #3.

3.1.4 Canyon Supply Fan Backflow Upgrades

The upgrades provided for this section of the workscope shall be designed and installed to minimize the potential for the backflow of canyon air into the supply fans. At a minimum the following are required to accomplish this:

- Differential pressure indicators between the outside of B Plant and the supply fan rooms which provide B Plant process operators with an indication of filter blockage. These indicators will be connected to the existing PCU located at Cell 20 in the B Plant operating gallery.

- New seals for the doors between the B Plant canyon and the supply fan room.

- New backflow dampers for each supply fan. These dampers shall be designed to prevent leakage of air from the canyon into the fan room when the fan is not running. To accomplish this, the dampers should close upon electrical failure, and any time the fan is switched off. The damper size required is 30-in. x 18-in. Eight dampers are 30-in. wide by 18-in. high while two dampers are 18-in. wide by 30-in. high. The dampers shall be constructed of stainless steel.

3.2 ENGINEERING FLOW DIAGRAMS/SCHEMATICS

3.2.1 Applicable Drawings

Applicable reference drawings for BCP system include, but are not limited to:

H-2-37866, sheets 1 and 2
H-2-37888
H-2-37890
H-2-61149.

3.2.2 Applicable Drawings

Applicable reference drawings for BCS system include, but are not limited to:

H-2-37183, sheets 1 - 3
H-2-60330
H-2-36574, sheets 1 - 3
H-2-61149.

3.2.3 Applicable Drawings

Applicable drawings for BCE system include, but are not limited to:

Building	Drawing No.
WESF/225-B	H-2-67007
	H-2-67003
221-B/271-B	H-2-96752
	H-2-95285
	H-2-94513
	H-2-94131
	W-70056
	W-71007
	W-76164
	W-76165
276-B	H-2-60308
	H-2-61053
211-BA	H-2-77728

3.2.4 Canyon Supply Fan upgrades applicable drawings include, but are not limited to:

W-70064, Sheet 1
H-2-94513, Sheets 1 through 5

3.3 DESIGN SOURCE TERMS

3.3.1 For Discharge Targets for BCP/BCS/BCE streams, see Appendix A of WHC-SD-W049H-FDC-001, Revision 1.

3.3.2 For Flow Rates for BCP/BCS/BCE streams, see Appendix E, WHC-SD-W049H-FDC-001, Revision 1.

3.3.3 For Constituents for BCP/BCS/BCE streams, see Appendix F, WHC-SD-W049H-FDC-001, Revision 1.

3.4 RECYCLING CAPABILITIES

Features for returning solutions to B Plant for recycling, and draining of process equipment shall be provided as appropriate.

3.5 CONTAINMENT/CONFINEMENT

Containment shall be provided to appropriate individual systems to protect against leaks that could spread contamination and/or allow hazardous waste spills. Each containment shall be corrosion resistant, have appropriate drainage features, and facilitate maintenance.

In accordance with DOE Order 6430.1A, Section 1300-7, "Confinement Systems," the numbers and arrangements of confinement barriers and their required design features and characteristics shall be determined by analysis.

3.6 INSTRUMENTATION AND SAMPLING/MONITORING

Instrumentation shall accommodate required calibrations and testing. As a minimum, the effluent streams instrumentation shall be provided to determine the following:

- Flowrate and totalizer for the feed stream
- Effluent sampling/monitoring
- Radiation monitoring (in-line and other areas)

Procurement of sampling equipment which meets all applicable DOE Orders, state and federal requirements for sampling/monitoring shall include certification for system reliability, precision and accuracy.

Features for manual sampling at appropriate locations of each individual system shall be provided. In-line sampling equipment shall provide representative sampling and minimize potential exposure of radionuclides and hazardous materials to personnel.

The instrumentation for the supply fan backflow dampers shall meet all applicable DOE Orders, federal and state requirements for monitoring pressures and controlling dampers. Certification of reliability, precision, and accuracy shall be provided.

3.7 ENVIRONMENTAL REGULATIONS

This project shall provide for a means as necessary to meet the applicable requirements of Federal, State, and local environmental regulations in effect at start of design. Presently, discharges to the soil column are regulated by DOE Orders but are not regulated by federal water pollution control laws.

Although not strictly applicable to Hanford site, considerations contained in Washington State's waste discharge regulation (WAC 173-216) have been incorporated into this project. WAC 173-216 requires "the use of all known, available and reasonable methods to prevent and control the discharge of wastes into the waters of the state." The Best Available Technology (BAT) determination, performed in accordance with WHC-EP-137, is a company imposed requirement that parallels the state's AKART requirement. WHC has determined that incorporation of the Project W-049H BAT/AKART study (Reference 9), which included the B Plant BCP/BCS/BCE (phase 1) streams, satisfactorily meets the requirements of WAC 173-216.

No additional environmental permit procedures, assessments, etc. are presently required to support this project.

3.8 SPARE PARTS

Critical equipment, components, or parts which assure continuity of operations shall be identified and supplied. Special tools, fixtures, etc. required for installation of spares shall be provided with the spares.

4.0 GENERAL REQUIREMENTS

4.1 PROPOSED STAFFING PLAN

Staffing levels, as foreseen as a result of the implementation of the proposed BAT/AKART for the BCP/BCS/BCE streams and the canyon supply fan backflow damper upgrades, are not expected to increase beyond current proposed staffing forecasts.

4.2 DISCUSSION OF RISKS

The project design shall ensure that no single credible project component failure shall result in unacceptable safety consequences. Unacceptable safety consequences are:

- Fire (other than localized minor fire, such as might be caused by shorting of electrical equipment)
- Explosion
- Release of radioactivity from the facility in excess of 5000 times the Derived Concentration Values defined in Appendix A, Westinghouse Environmental Compliance Manual, WHC-CM-7-5 at the point of discharge
- Exposure of personnel to toxic chemical agents in excess of Threshold Limit Values (TLV) established by the American Conference of Governmental Industrial Hygienists
- Release of radioactivity to the site boundary greater than the allowable limits specified in DOE Order 6430.1A. Specifically, the allowable limit for offsite, whole body dose is 0.5 rem.
- Injuries/illnesses incurred as a result of bypassing engineering, administrative, and/or personnel protective equipment controls.

During conceptual design, the effects of component failure, including control/monitoring and utility failure, shall be evaluated by the operating contractor for unacceptable consequences, and this evaluation shall be documented via the safety analysis process. In addition, a detailed radiological analysis must be performed to adequately identify potential safety hazards. The results of these evaluations shall be compared to the operational risks and natural forces criteria for potential changes to the design criteria.

4.2.1 Construction Risks

Risks associated with construction activities are to be considered by the design, and all applicable standards and regulations shall be complied with during construction to minimize these risks. Safety precautions shall be provided for, but not limited to, the following items:

- Airborne contaminants
- Background radiation
- Leaking of contaminated liquids
- Contaminated soil
- Hazardous materials.

The appropriate safety standards and procedures for removing, packaging, and disposing of contaminated materials shall be followed (WHC-CM-1-3, MRP 5.20, "Packaging and Transportation of Hazardous Materials," WHC-CM-4-10, "Radiation Protection," WHC-CM-4-9, "Radiological Design," and WHC-EP-0063, "Hanford Radioactive Solid Waste Packaging, Storage, and Disposal Requirements").

Design, construction and occupational safety standards mandatory for construction are prescribed in DOE Order 5480.4, DOE-RL Order 5480.4B and DOE-RLIP Order 5480.10 and shall be supplemented by Westinghouse "Industrial Safety Manual," WHC-CM-4-3, Volumes I-IV.

The major radiological hazards are airborne contaminants and potential leakage of contaminated liquids.

4.2.2 Operational Risks

All electrical, mechanical, and instrument systems shall be designed to ensure that failure will allow a prompt and safe shutdown. Interlocks and alarms shall be provided on systems or components to prevent operation in a manner which may affect safety or be detrimental to the equipment. Systems required for environmental control, safety, and/or critical processes (where recovery of operations would be expensive and/or hazardous) shall be provided with redundant or backup systems. Human factors engineering shall be used throughout the design to minimize the chance of operator error.

The special operational hazards to be considered during design for normal/abnormal/accident/Design Basis Accident (DBA) conditions include, but are not limited to, radionuclides and hazardous chemicals. Specifically, the containment of radioactive solutions (under high and/or normal pressure conditions), radiation exposure to operating personnel, high temperature exposure, contamination of the environment, confinement of airborne materials, and containment of radioactive and/or hazardous spills.

The risk of personnel radiation exposure from process solutions shall be minimized through appropriate shielding methods and, in any case, limit personnel radiation exposure to 1 Rem/year/individual (maximum) based on predicated exposure time in normally occupied areas. Use of lead for shielding shall be minimized.

Occupational safety standards mandatory for operation and maintenance are prescribed in DOE Order 5480.4, DOE-RL Order 5480.4B and DOE-RLIP Order 5480.10, and shall be supplemented by the Westinghouse "Industrial Safety Manual," WHC-CM-4-3, Volumes I-IV.

4.2.3 Impact Levels

The documents associated with this project shall be reviewed and approved in accordance with WHC-CM-1-3, MRP 5.43, "Impact Levels."

4.2.4 Safety Classifications

Safety classification of systems, components, and structures shall be in accordance with WHC-CM-1-3, MRP 5.46, "Safety Classification of Systems, Components, and Structures." See Section 5.0, also.

4.3 GENERAL UTILITY REQUIREMENTS

This project will provide for all utilities as necessary to make the BCP/BCS/BCE upgrades fully operational. Normal electrical power and backup power shall be supplied from existing sources within 221-B, 271-B, 221-BF, 221-BB, 225-B, 276-B or 211-BA, as required.

Instrument air shall be obtained from the existing system in Building 221-B. Operating pressure at maximum available flow and design pressure shall be determined for evaluation of the existing systems.

Upgrades performed in the 221-B canyon supply fan rooms shall utilize existing utilities.

4.4 MAINTENANCE REQUIREMENTS

The design of project components shall provide for ease of periodic routine maintenance as follows:

- Use interchangeable parts
- Provide access for visual inspection
- Provide access for disassembly
- Allow maintenance with standard tools
- Allow in-line pH/radiation monitor calibration.

In addition, capabilities to flush, clean, and decontaminate equipment to allow hands-on maintenance shall be provided. Design shall reflect the following order of preference for performing maintenance:

1. Adjust item or unit in place.
2. Repair item or unit by contact maintenance with radiation dose rates consistent with ALARA principles.
3. Replace with spare item or unit unless it is more economical to remove, decontaminate, repair, and return the item or unit to service.

Equipment items that require special and unique maintenance tools shall be identified. Special instructions shall be included with the equipment. Any special tools required to maintain project equipment shall be provided.

4.5 DECONTAMINATION AND DECOMMISSIONING

This project will provide new equipment and associated components which will be subject to significant radiation doses and surface contamination. The design shall incorporate features which will minimize the potential for contamination buildup and aid in future decontamination and decommissioning efforts. At a minimum the following should be incorporated into the design where feasible:

- Construction materials which minimize contamination buildup and are resistant to process solutions and decontamination agents
- Rigging and attachment points to facilitate removal of equipment/components
- Service piping, conduits and ductwork shall be arranged to facilitate decontamination
- Filters shall be positioned in ventilation systems in locations that minimize contamination of duct work
- If necessary, all cracks, crevices, and joints created by the new construction shall be caulked or sealed and finished smooth to prevent contamination accumulation in inaccessible areas.

4.6 SECURITY AND SAFEGUARDS

The upgrades will be performed within the 200 East Area. No special security or safeguard requirements are needed.

4.7 SAFETY

4.7.1 Component Failures

The design shall ensure that a single failure does not result in the loss of capability of a safety class system to accomplish its required safety functions. To protect against single failures, the design shall include appropriate redundancy and shall consider diversity to minimize the possibility of concurrent common-mode failures of redundant items.

Unacceptable safety consequences are:

- Fire (other than localized minor fire such as caused by shorting of electrical equipment)/Explosion

- Criticality
- Instantaneous release of radioactivity (airborne or liquid) from the facilities housing the upgrades in excess of 5,000 times the Derived Concentration Guides as specified in Appendix A, WHC-CM-7-5 at the point of discharge
- Exposure of personnel to ionizing radiation in excess of WHC-CM-4-10 values
- Exposure of personnel to toxic chemical agents in excess of ceiling values as defined by WHC-CM-4-46.

5.0 QUALITY ASSURANCE

Quality Assurance/Quality Control activities for all contractors involved in the design, construction, and acceptance testing shall be executed in accordance with the project specific Quality Assurance Project Plan (QAPP). The QAPP shall be developed during conceptual design and approved/released prior to definitive design. This QAPP shall be used by the design contractor to develop verification criteria in design documents (i.e. drawings, specifications, test procedures, etc.), and by all contractors to define quality assurance interfaces and specific quality requirements/ responsibilities on the project.

The QAPP shall endorse the quality criteria of DOE Order 5700.6C, "Quality Assurance."

The basis for establishing Quality Assurance Program requirements is Safety Classification, as defined in WHC-CM-1-3, MRP 5.46, "Safety Classification of Systems, Components and Structures." The safety classifications of items provides a graded approach to application of quality requirements. The graded approach assigns requirements to items commensurate with the function of the system, component and structure in preventing or mitigating the consequences of hazards and postulated design basis accidents. The overall safety classifications for this project will be defined in the preliminary safety documents prepared for this project.

6.0 GENERAL CRITERIA AND STANDARDS

6.1 REGULATIONS, CODES, AND STANDARDS

Project design and construction efforts shall be in accordance with latest revisions of the listed regulations, codes and standards as applicable. Changes to regulations, codes and standards which affect the design shall be evaluated and controlled by WHC-CM-6-1, EP-2.2, "Engineering Document Change Control."

- DOE-RLIP Order 4700.1A, "Project Management System"
- DOE Order 5480.3, "Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Wastes"
- DOE Order 6430.1A, "General Design Criteria"
- DOE-RL Order 5440.1A, "Implementation of the National Environmental Policy Act at the Richland Operations Office"
- DOE-RL Order 5480.1A, "Environment, Safety, and Health Program for DOE Operations for Richland Operations"
- DOE-RL Order 5480.1B, "Environment, Safety, and Health Program for Department of Energy Operative"
- DOE-RL Order 5480.4B, "Environmental Protection, Safety, and Health Protection Standards for RL"
- DOE-RL Order 5480.5, "Safety of Nuclear Facilities"
- DOE-RLIP Order 5480.7, "Fire Protection"
- DOE Order 5480.9, "Construction Safety and Health Program"
- DOE-RLIP Order 5480.10, "Industrial Hygiene Program"
- DOE-RLIP Order 5480.11, "Radiation Protection for Occupational Workers"
- DOE-RL Order 5481.1, "Safety Analysis and Review System"
- DOE-RL Order 5484.1, "Environmental Protection, Safety, and Health Protection Information Reporting Requirements"

- DOE Order 5483.1A, "Occupational Safety and Health Program for DOE Contractor Employees at Government-Owned Contractor-Operated Facilities"
- DOE-RL Order 5700.3, "Cost Estimating, Analysis, and Cost Standardization"
- DOE Order 5700.6C, "Quality Assurance"
- DOE-RL Order 5820.2A, "Radioactive Waste Management"
- 29 CFR 1910, "General Industry Standard"
- 29 CFR 1926, "Construction Safety Standards"
- 40 CFR 61, Subpart H, "National Emission Standard for Radionuclide Emissions from Department of Energy (DOE) Facilities"
- 40 CFR 264, "Standards for Owners and Operators of Hazardous Waste Treatment Storage and Disposal Facilities"
- WAC 173-216, "State Waste Discharge Permit Program," Washington Administration Code, 1985
- WAC 173-303, "Dangerous Waste Regulations," Washington Administration Code, 1986
- WAC 296-155, "Safety Standards for Construction Work"
- Radiation Standards for Protection of the Public in the Vicinity of DOE Facilities, Memorandum from W. A. Vaughan, August 5, 1985
- WHC-CM-1-3, "Management Requirements and Procedures"
- WHC-CM-4-1, "Quality Assurance Manual"
- WHC-CM-4-3, "Industrial Safety Manual"
  - Volume I - "Safety Standards"
  - Volume II - "Safety Guides"
  - Volume III - "Safety Program"
  - Volume IV - "Health and Safety Programs for Hazardous Waste Operations"
- WHC-CM-4-9, "Radiological Design"
- WHC-CM-4-10, "Radiation Protection"
- WHC-CM-4-40, "Industrial Hygiene Manual"
- WHC-CM-4-41, "Fire Protection Program Manual"
- WHC-CM-4-46, "Non-reactor Facility Safety Analysis Manual"
- WHC-CM-6-1, "Standard Engineering Practices"

- WHC-CM-6-2, "Projects Department Management Manual"
- WHC-CM-7-5, "Environmental Compliance"
- WHC-EP-0063, "Hanford Radioactive Solid Waste Packaging, Storage, and Disposal Requirements"
- HS-BS-0084, "Jumper Fabrication" Rev. A
- Hanford Plant Standards, SDC 4.1, "Design Loads for Facilities," September 6, 1989
- MIL-STD-1472D, "Human Engineering Design," Criteria for Military Systems, Equipment, and Facilities, Mar 14, 1989
- Instrument Society of America (ISA), "Standards and Practices for Instrumentation"
- American National Standards Institute (ANSI) B31.3, "Chemical Plant and Petroleum Refinery Piping"

In addition to the above standards, applicable Hanford Standards, OSHA Standards, and the "National Consensus" Codes and Standards as developed by such organizations as the American Society of Mechanical Engineers, ANSI, and the Institute of Electrical and Electronic Engineers shall be used. The latest editions of all codes and standards in effect at the start of the design shall be used.

6.2 NATURAL FORCES CRITERIA

6.2.1 BCP System

The upgrades to the B Plant Process Condensate (BPC) system shall be designed to meet SDC 4.1 requirements for Non-Category 1 facilities. (Safety Class 3 design loads per Revision 11.)

6.2.2 BCS System

The upgrades to the B Plant Steam Condensate (BCS) system shall be designed to meet SDC 4.1 requirements for Non-Category 1 facilities. (Safety Class 3 design loads per Revision 11.)

6.2.3 BCE System

The upgrades to the B Plant Chemical Sewer (BCE) system shall be designed to meet SDC 4.1 requirements for Non-Category 1 facilities. (Safety Class 3 design loads per Revision 11.)

6.2.4 Canyon Supply Fan System

The upgrades to the canyon supply fans shall be designed to meet SDC 4.1 requirements for Non-Category I facilities. (Safety Class 3 design loads per Revision 11.)

6.3 FIRE PROTECTION

The design and construction of all components for this project shall minimize the risk of fire damage and all applicable fire protection standards shall be followed.

7.0 REFERENCES

1. Document, DOE Order 5400.5, "Radiation Protection of the Public and the Environment," 1990.

2. Document, "Planned Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site," March 1987.

3. Document, WHC-EP-0179, "Best Available Technology Equivalent Controls for B Plant Process Condensate," November 1988.

4. Document, WHC-EP-0137, "Best Available Technology (Economically Achievable) Guidance Document at the Hanford Site," 1988.

5. Manual, WHC-EP-0063, "Hanford Radioactive Solid Waste Packaging, Storage, and Disposal Requirements."

6. SD-WM-ES-074, December 20, 1985, M. L. Kimura, "B Plant Process Condensate Activity Reduction Engineering Study." [Original scope]

7. SD-647-ES-001, November 21, 1986, D. E. Kurath, "B Plant Process Condensate Treatment Facility, Project B-647" [later changed to Project W-007H. [Original scope]

8. Letter, June 26, 1987, M. A. Cahill to R. W. Brown, "B-647, B Plant Process Condensate Treatment Facility - Functional Design Criteria (Fiscal Year 1990 Line Item)." [Original scope]

9. Document, WHC-SD-W049H-ER-003, Rev. 0, "200 Area Treated Effluent Treatment Facility (Project W-049H) Waste Water Engineering Report." [Revised scope]

10. Document, WHC-SD-W049H-ICD-001, Rev. 0 (DRAFT), "Project W-049H Interface Control Document." [Revised scope]

11. Document, SD-W024-ES-001, "Engineering Study, B Plant Radiological Effluent/Containment Upgrades, Project W-024," D. L. Lamberd, February 15, 1990.

12. Document, SD-WM-SAR-013, "B Plant Safety Analysis Report," R. G. Sewell, March 1986.

13. Document, SD-WM-TI-245, "B Plant Network 90 Configuration Document," P. A. Baynes, November 13, 1987.

14. Document, WHC-SD-W049H-FDC-001, Rev. 1, "Functional Design Criteria for the 200 Area Treated Effluent Disposal Facility," March 1992.

APPENDIX A

BCP BEFORE TREATMENT WASTE STREAM CHARACTERISTICS

Table for Appendix A.

Stream BAT/AKART Appendix MODE Flow Rate (gpm)[a]	B Plant BCP 0 n/a 2.3
Constituent	
ORGANICS	
Acetone	2.9 E+02
Acetophenone	1.7 E+01
2-Butanone (MEK)	2.7 E+01
2-Butoxyethanol	3.2 E+01
Decane	2.0 E+01
2,4-Dimethyl-1-decane	4.0 E+01
2-Ethyl-1-hexanol	2.0 E+01
Heneicosane	3.2 E+01
2-Hexanone	9.0 E+00
Phenol	1.5 E+01
Unknown	2.8 E+01
Unknown Aliphatic HC	9.1 E+01
INORGANICS	
Ammonia	1.3 E+03
Barium	6.4 E+00
Calcium	5.9 E+03
Iron	4.8 E+01
Lead	1.5 E+01
Magnesium	2.4 E+02
Manganese	7.0 E+00
Mercury	8.4 E+00
Nitrate (as NO_3)	9.0 E+02
Potassium	1.4 E+02
Sodium	4.3 E+02
Sulfate	9.5 E+02
Uranium	3.4 E-01

Table for Appendix A.

Stream	B Plant BCP
BAT/AKART Appendix	O
MODE	n/a
Flow Rate (gpm)[a]	2.3
Zinc	8.2 E+01
RADIONUCLIDES	
Alpha Activity (ρCi/L)[b]	3.3 E+00
Beta Activity (ρCi/L)[c]	2.4 E+04

Table for Appendix A.

Stream BAT/AKART Appendix MODE Flow Rate (gpm)[a]	B Plant BCP 0 n/a 2.3
MISCELLANEOUS PARAMETERS	
Conductivity (μS)	2.6 E+01
pH (dimensionless)	8.9 E+00
Temperature (°C)	2.0 E+01
Total Organic Carbon	1.0 E+03

Notes:

For most streams, data are taken from the stream specific reports.

Numerical data are the means from the sampling effort. Some data points are the result of single samples.

[a]Flow rates are the averages as given in Section 4 of the Stream Specific Reports, or as adjusted for additional sources.

[b]Alpha is modeled as ^{239}Pu.

[c]Beta is modeled as ^{90}Sr.

APPENDIX B

BCS BEFORE TREATMENT WASTE STREAM CHARACTERISTICS

Table for Appendix B.

Stream BAT/AKART Appendix MODE Flow Rate (gpm)[a]	B Plant BCS P n/a 3.1
Constituent	
ORGANICS	
Acetone	3.1 E+01
Phenol	1.0 E+01
Unknown	3.3 E+01
INORGANICS	
Ammonia	1.2 E+02
Calcium	1.8 E+02
Copper	1.1 E+01
Iron	9.4 E+01
Lead	5.0 E+00
Magnesium	5.1 E+01
Mercury	1.1 E-01
Nickel	1.0 E+01
Nitrate (as NO_3)	9.2 E+02
Potassium	1.0 E+02
Sodium	1.9 E+02
Uranium	2.7 E-01
Zinc	1.3 E+01
RADIONUCLIDES	
Alpha Activity (ρCi/L)[b]	3.0 E+00
Beta Activity (ρCi/L)[c]	7.0 E+01
MISCELLANEOUS PARAMETERS	
Conductivity (μS)	3.0 E+01
pH (dimensionless)	6.3 E+00
Temperature (°C)	5.0 E+01

Table for Appendix B.

Stream	B Plant BCS
BAT/AKART Appendix	P
MODE	n/a
Flow Rate (gpm)[a]	3.1

Notes:

For most streams, data are taken from the stream specific reports.

Numerical data are the means from the sampling effort. Some data points are the result of single samples.

[a]Flow rates are the averages as given in Section 4 of the Stream Specific Reports, or as adjusted for additional sources.

[b]Alpha is modeled as ^{239}Pu.

[c]Beta is modeled as ^{90}Sr.

APPENDIX C

BCE BEFORE TREATMENT WASTE STREAM CHARACTERISTICS

Table for Appendix C

Stream BAT/AKART Appendix MODE Flow Rate (gpm)[a]	B Plant BCE N Routine 130
Constituent	
ORGANICS	
Acetone	1.1 E+01
Unknown amide	2.3 E+01
INORGANICS	
Ammonia	5.5 E+01
Barium	2.9 E+01
Boron	1.9 E+01
Cadmium	2.2 E+00
Calcium	1.8 E+04
Chloride	1.5 E+03
Copper	2.1 E+01
Fluoride	1.4 E+02
Iron	5.3 E+01
Lead	5.8 E+00
Magnesium	4.2 E+03
Manganese	5.8 E+00
Nitrate (as NO_3)	8.2 E+02
Phosphate	1.2 E+03
Potassium	8.0 E+02
Silicon	2.3 E+03
Sodium	2.1 E+03
Strontium	9.6 E+01
Sulfate	1.1 E+04
Uranium	4.7 E-01
Zinc	1.3 E+01
RADIONUCLIDES	
Alpha Activity (ρCi/L)[b]	5.6 E+01

Table for Appendix C

Stream BAT/AKART Appendix MODE Flow Rate (gpm)[a]	B Plant BCE N Routine 130
Beta Activity (ρCi/L)[c]	2.2 E+00
^{242}Cm (ρCi/L)	4.6 E-03
^{137}Cs (ρCi/L)	1.1 E+00
^{14}C (ρCi/L)	4.2 E+00

Table for Appendix C

Stream BAT/AKART Appendix MODE Flow Rate (gpm)[a]	B Plant BCE N Routine 130
RADIONUCLIDES (continued)	
^{3}H (ρCi/L)	1.6 E+02
^{90}Sr (ρCi/L)	1.4 E-01
^{234}U (ρCi/L)	1.6 E-01
^{238}U (ρCi/L)	1.4 E-01
MISCELLANEOUS PARAMETERS	
Alkalinity ($CaCO_3$)	5.6 E+04
Conductivity (μS)	1.5 E+02
pH (dimensionless)	7.5 E+00
Total Dissolved Solids	5.1 E+04
Temperature (°C)	2.1 E+01
Total Organic Carbon	1.1 E+03
Total Carbon	1.4 E+04
TOX (as Cl)	4.3 E+01

Notes:

For most streams, data are taken from the stream specific reports. Numerical data are the means from the sampling effort. Some data points are the result of single samples.

[a]Flow rates are the averages as given in Section 4 of the Stream Specific Reports, or as adjusted for additional sources.

[b]Alpha is modeled as ^{239}Pu.

[c]Beta is modeled as ^{90}Sr.

APPENDIX D

REQUIRED "AFTER TREATMENT" WASTE STREAM TARGET CHARACTERISTICS TO ALLOW DISCHARGE INTO TEDF (PROJECT W-049H) SYSTEM

* 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 values needed for the Project C-018H RCRA delisting petition.

CONSTITUENT	TARGET VALUE (ppb)
1,1,1,2-tetrachloroethane	5.0
1,1,1-trichoroethane	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-dichloroethane	7.0
1,2,3,4-tetrachlorobenzene	50.0
1,2,3,5-tetrachlorobenzene	50.0
1,2,3-trichlorobenzene	9.0
1,2-dibromo-3-chloropropane	5.0
1,2-dichlorobenzene	8.0
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
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-napthylamine	10.0
2,3,4,6-tetrachlorophenol	10.0

CONSTITUENT	TARGET VALUE (ppb)
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-dinitrotoluene	0.1
2,4-diaminetoluene	0.002
2,4,6-trinitrotoluene	1.0
2,6-dichlorophenol	10.0
2,6-dinitrotoluene	0.1
2,6-toluenediamine	6,000.0
2-chloroethyl vinyl ether	57.0
2-hexanone	50.0
2-methoxy-5-nitroaniline	2.0
2-methylaniline	0.2
2-methylaniline hydrochloride	0.5
2-methylnaphthalene	10.0
2-acetylaminofluorene	10.0
2-chloronaphthalene	10.0
2-chlorophenol	44.0
2-naphthylamine	10.0
2-picoline	5.0
3,3'-dichlorobenzidine	0.2
3,3'-dimethoxybenzidine	6.0
3,3'-dimethylbenzidine	0.007
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

CONSTITUENT	TARGET VALUE (ppb)
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
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	3,000.0
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
Americium-241	1.2 pCi/l
Ammonia	1,300.0
α,α-dimethylphenethylamine	10.0
Analine	10.0
Anthracene	10.0
Antimony	3.0
Antimony, filtered	1,600.0
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	1,000.0
Barium, total metals	1,000.0
Barium, filtered	1,000.0
Benzal Chloride	280.0
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 alcohol	20.0
Benzyl chloride	0.5
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(chloromethyl)ether	0.0002
Bis(2-ethylhexyl)phthalate	6.0
Bromodichloromethane	0.3
Bromoform	2.0

CONSTITUENT	TARGET VALUE (ppb)
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	2,800 pCi/l
Cesium-137	120 pCi/l
Chloral	70.0
Chlordane	0.06
Chloride	250,000.0
Chlorobenzene	2.0
Chlorobenzilate	30.0
Chlorodibromomethane	0.5
Chloroethane	5.0
Chloroform	6.0
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	200 pCi/l
Coliform bacteria, total	1/100 ml
Color	15 color units
Copper	1,000.0
Copper, total metals	1,000.0
Corrosivity	noncorrosive
Cresols	10.0
m-Cresols	770.0
Curium-242	40.0 pCi/l

CONSTITUENT	TARGET VALUE (ppb)
Curium-244	2.4 pCi/l
Cyanides, amendable	100.0
Cyanide	5.2
Cyanogen	1,000.0
Cyanogen bromide	3,000.0
Cyclohexanone	125.0
DDD	0.1
DDE	0.05
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
Diallate	1.0
Dibenz(a,h)acridine	10.0
Dibenz(a,h)anthracene	10.0
Dibenzofuran	10.0
Dibromomethane	110.0
Dichlorodifluoromethane	5.0
Dichlorovos	0.3
Dieldrin	0.005
Diethyl phthalate	200.0
Dimethyl terephthalate	4,000.0
Diguat	20.0
Dimethoate	20.0
Dinoseb	1.0
Dioxin	0.01
Diphenylamine	10.0
Diphenylnitrosamine	400.0
Direct black 38	0.009
Direct blue 6	0.009
Direct brown 95	0.009
Disulfoton	2.0
Endosulfan I	0.06

CONSTITUENT	TARGET VALUE (ppb)
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	2,000.0
Fluorotrichloromethane	20.0
Foaming agents	500.0
Folpet	20.0
Formic acid	70,000.0
Furazolidone	0.02
Furium	0.002
Furmecyclox	3.0
Glyphosate	700.0
Gross alpha activity	1.2 pCi/l
Gross beta activity	50 pCi/l
Heptachlor	0.01
Heptachlor epoxide	0.009
Hexabromobenzene	70.0
Hexachlorobenzene	0.05
Hexachlorobutadiene	5.0
Hexachlorocyclohexane (alpha)	0.001

CONSTITUENT	TARGET VALUE (ppb)
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
Indeno(1,2,3-c,d)pyrene	5.5
Iodine-129	20 pCi/l
Iodine-131	120 pCi/l
Iodomethane	5.0
Iron	300.0
Iron, total metals	300.0
Iron, filtered	300.0
Isobutanol	1,000.0
Isodrin	10.0
Isophorone	10.0
Isosafrole	10.0
Kepone	1.1
Lead	37.0
Lead, total metals	50.0
Lead, filtered	3.2
Lead-210	1.2 pCi/l
Lindane, ß-BHC	0.14
Lindane, δ-BHC	23.0
Maleic anhydride	4,000.0
Maleic hydrazide	20,000.0
Manganese	50.0
Manganese, total metals	50.0
Manganese, filtered	50.0
Manganese-54	2,000.0 pCi/l

CONSTITUENT	TARGET VALUE (ppb)
Mercury	2.0
Mercury, total metals	2.0
Mercury, filtered	0.01
Methacrylonitrile	5.0
Methanol	250.0
Methapyrilene	10.0
Methomyl	90.0
Methoxychlor	0.3
Methyl bromide	10.0
Methyl chloride	1.0
Methyl chlorocarbonate	40,00.0
Methyl chrysene	3,000.0
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	4,000.0
Nitrogen dioxide	40,000.0
N-nitrosodiphenylamine	10.0
N-nitroso-di-n-butylamine	0.006
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
Nickel, filtered	160.0
Nickel-63	12,000 pCi/l
Nitrate (as nitrogen)	10,000.0

CONSTITUENT	TARGET VALUE (ppb)
Nitrite	3,300.0
Nitrobenzene	10.0
Nitrofurazone	0.06
Odor	3 threshold odor units
0,0,0-triethyl phosphorothioate	10.0
o-cresol	110.0
Oxamyl	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
pH	6.5-8.5
Phenacetin	10.0
Phenanthrene	7.0
Phenol	39.0
Phenylenediamine	10.0
Phenylmercury acetate	3,000.0
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

CONSTITUENT	TARGET VALUE (ppb)
Propylene oxide	0.01
Pynene	4,000.0
Pyrene	10.0
Pyridine	14.0
para-α,α,α-Tetrachlorotoluene	0.004
Quinoline	0.003
Radium-226	5 pCi/l
Radium-228	4 pCi/l
Ruthenium-103	2000 pCi/l
Ruthenium-106	240 pCi/l
Safrol	10.0
Selenium, total metals	10.0
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
Sodium-22	400 pCi/l
solids, Total dissolved	500,000.0
Strontium-89	800 pCi/l
Strontium-90	40 pCi/l
Styrene	1.0
Sulfate	250,000.0
Sulfide	14,000.0
Sym-trinitrobenzene	10.0
Technetium-99	10.0
Tetrachlorodibenzofurans	1.0
Tetrachloro-dibenzo-p-dioxins, all	0.063
Tetrachloro-dibenzo-furans, all	0.063
Tetrachloroethene	6.0
Tetrachloroethylene	0.8
Tetrachlorophenols (total)	18.0
Tetraethyldithiopyrophosphate	20.0

CONSTITUENT	TARGET VALUE (ppb)
Tetraethylpyrophosphate	10.0
Thallium	0.5
Thiourea	0.02
Tin, filtered	8,000.0
Toluene	2.0
Toxaphene	0.08
trans-1,2-dichloroethane	33.0
trans-1,2-dichloroethylene	1.0
trans-1,3-dichloropropene	36.0
Trichloroethylene	3.0
Trichloromonofluoromethane	5.0
Trihalomethanes (includes chloroform, bromoform, bromodichloromethane, and dibromochloromethane)	100.0
Trimethyl phosphate	2.0
tris-2,3 dibromopropyl) phosphate	25.0
Tritium-3	80,000.0 pCi/l
Uranium, chemical	59.0
Uranium-234	20 pCi/l
Uranium-235	24 pCi/l
Uranium-238	24 pCi/l
Vanadium	42.0
Vanadium, filtered	40.0
Vanadium Pentoxide	70.0
Vinyl acetate	5.0
Vinyl chloride	0.02
Xylene (mixed)	11.0
Zinc	5,000.0
Zinc, total metals	5,000.0
Zinc, filtered	110.0
m-nitroaniline	50.0
m-phenylenediamine	200.0
m-xylene	5.0
n-butyl alcohol	5,000.0
o,p'-DDD	23.0
o,p'-DDE	31.0

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