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ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 613060

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.		4. Date
Supplemental [] Direct Revision [x] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	P. E. Roege, 16710, S6-81, 372-0443		8/18/94
	5. Project Title/No./Work Order No.: Functions & Requirements, B Plant Canyon Ventilation Upgrade, Project W-059	6. Bldg./Sys./Fac. No.: 291B/B25/2B	7. Approval Designator: ESQ
	8. Document Numbers Changed by this ECN (includes sheet no. and rev.): WHC-SD-W059-FRD-001, Rev 0	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

Direct revision of Functions and Requirements for Project W-059 B Plant Canyon Ventilation Upgrade.

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

13b. Justification Details

The primary purpose of the project is to isolate the retired B Plant canyon exhaust HEPA filters from the balance of the facility. The new air filters will support the facility in an inactive surveillance mode, with the capability for expansion to meet requirements of future missions or decontamination and decommissioning. The Functions and Requirements have been revised accordingly. The isolation barrier will be Safety Class 1; the new air filters will be Safety Class 3.

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

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1. ECN (use no. from pg. 1): 613060

15. Design Verification Required	16. Cost Impact				17. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
[] Yes	Additional	[] $N/A	Additional	[] $N/A	Improvement	[] N/A
[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	[X]	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	[X]	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	[]	None	[X]
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 Engineer P. E. Roege	8/17/94	PE	
Cog. Mgr. for J. A. O'Brien	8/17/94	QA	
QA	8/22/94	Safety	
Safety	8/24/94	Design	
Security		Environ.	
Environ.	8/16/94	Other	
Projects/Programs			
Tank Waste Remediation System			
Facilities Operations		DEPARTMENT OF ENERGY	
Restoration & Remediation		Signature or Letter No.	
Operations & Support Services			
IRM		ADDITIONAL	
Other			
Independent Review			
Instrumentation Engr			

RELEASE AUTHORIZATION

Document Number:	WHC-SD-W059-FRD-001, REV 1
Document Title:	FUNCTIONS AND REQUIREMENTS, B PLANT CANYON VENTILATION UPGRADE
Release Date:	9/1/94

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

APPROVED FOR PUBLIC RELEASE

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WHC Information Release Administration Specialist:

Kara Broz
(Signature)

9/1/94
(Date)

SUPPORTING DOCUMENT

1. Total Pages 11

2. Title	3. Number	4. Rev No.
Functions and Requirements, B Plant Canyon Ventilation Upgrade	WHC-SD-W059-FRD-001	1

5. Key Words

Functions and Requirements
B Plant
Canyon
Exhaust
HEPA

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6. Author

Name: P. E. Roege

Signature

Organization/Charge Code 16710/KB44B

7. Abstract

This document outlines the essential functions and requirements to be included in the design of the proposed B Plant canyon exhaust system upgrade. The project will provide a new exhaust air filter system and isolate the old filters from the airstream.

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9. Impact Level ESQ

10. RELEASE STAMP

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RECORD OF REVISION	(1) Document Number WHC-SD-W059-FRD-001, Rev 1	Page 1

(2) Title
Functions and Requirements, B Plant Canyon Ventilation Upgrade

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release	
		(5) Cog. Engr.	(6) Cog. Mgr. Date
1 RS	(7) Direct revision of WHC-SD-W059-FRD-001 PER ECN-613060	P. E. Roege	J. A. O'Brien 6/17/94
0	EDT-157689 6/30/94		

A-7320-005 (08/91) WEF168

FUNCTIONS AND REQUIREMENTS

FOR

PROJECT W-059

B PLANT

CANYON VENTILATION UPGRADE

Revision 1

August 18, 1994

PREPARED BY

Paul E. Roege

B Plant Facility and Design Engineering

WESTINGHOUSE HANFORD COMPANY
HANFORD OPERATIONS AND ENGINEERING CONTRACTOR
FOR THE
DEPARTMENT OF ENERGY

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1.0 INTRODUCTION

1.1 Background. The original B Plant canyon ventilation system exhausted air directly to the environment with no provision for cleaning. A sand filter was added in 1948. The first High Efficiency Particulate Air (HEPA) filter system was installed in the 1960s, with an array of filter elements installed in an underground concrete chamber. As the filter reached the end of its life, a new chamber was built beside the previous filter. This process continued; the fourth HEPA filter system, designated "D Filter" is now in service, and the "E Filter" is standing by. Airflow through the retired filters was blocked by a water seal provided at the outlet of each filter, but the inlet air continues to flow past the face of each retired filter.

Each retired filter now contains substantial amounts of radionuclides (primarily ^{90}Sr and ^{137}Cs). The filter elements themselves provide questionable integrity, due to their age and accumulated radiation dose. There are concerns regarding the potential for migration of radionuclides from retired filters to in-service filters. A larger concern addresses the potential release of radionuclides in the event of airflow through a deteriorated, retired filter element.

B Plant currently has no processing mission. In the short term, the plant will execute a Cleanout and Stabilization Plan (CSP) to prepare for deactivation. The intent of the CSP is to minimize the hazards, hence construction and/or surveillance costs associated with an extended inactive period leading to Decontamination and Decommissioning (D&D).

The radionuclide inventory present on the retired filters represents a substantial hazard. Isolating these filters from the balance of the plant is essential to minimize the risks associated with the deactivated plant. Westinghouse Hanford Company (WHC) contracted BNFL, Inc. to prepare an engineering study recommending how to isolate the retired filters. The present functional design will be based upon the recommendation from that report.

1.2 Scope. A Functional Design Criteria (FDC) will be prepared to isolate the retired HEPA filters from the balance of the plant by installing concrete plugs in the air duct. The project will include a replacement HEPA filter system for the B Plant canyon exhaust, including associated ductwork, utilities, structure, instrumentation and controls. The new system shall meet current regulations, orders, codes and standards.

2.0 FUNCTIONS AND REQUIREMENTS:

2.1 Design Standards. The design shall be prepared in accordance with DOE Order 6430.1A and ASME N509.

Basis: DOE Order 6430.1A, Section 1550 invokes ASME N509.

2.2 Operating Conditions.

2.2.1 Airflow design requirements for the new air cleaning system:

Normal airflow - 4720 - 7080 l/s (10,000 - 15,000 cfm)
Minimum airflow - 3540 l/s (7,500 cfm)
Maximum airflow - 7080 l/s (15,000 cfm)

Basis: This system will operate when the building is in the inactive (surveillance) mode. Exhaust airflow will be equal to the infiltration into the building; no supply fans will be operated. The normal infiltration (exhaust minus supply) flow is approximately 4720 - 7080 l/s (10,000 - 15,000 cfm). The minimum flow represents an allowance for reduced flow during filter changes. The building differential pressure (to atmosphere) will be slightly reduced during periods of reduced exhaust air flow.

2.2.2 Design air conditions:

Maximum relative humidity - 90%
Maximum air temperature - 43°C (110°F)
Minimum air temperature - -23°C (-10°F)

Basis: Humidity may approach saturation due to fire protection sprays in the air duct. Air temperatures correspond to extreme ambient conditions (see paragraph 2.4.4), in the event that heating and cooling are shut down when the facility becomes inactive.

2.2.3 Design pressures for duct and filter housing (design for external pressure):

Maximum expected operating pressure - 1.50 kPa (6 in w.g.) vacuum
Expected leak test pressure - 1.50 kPa (6 in w.g.) vacuum
Maximum design pressure - 5.25 kPa (21 in w.g.) vacuum

Basis: Operating experience. Actual maximum operating pressure will depend upon the pressure drops within the new air cleaning system. Leak test pressure shall be the calculated maximum operating pressure of the new system. Maximum design pressure corresponds to the peak (negative) pressure that the fans can produce.

2.2.4 Air stream characterization: The dust levels and radionuclide concentration levels cannot be accurately

predicted. Both characteristics vary substantially as a result of weather conditions and work activities in the canyon. No work activities are anticipated inside the canyon during the operation of this system. Dust loading will be primarily due to atmospheric dust. Radionuclide loading would be minimal.

2.2.5 The system design shall allow for expansion to increase exhaust airflow capacity by installation of additional air cleaning units.

Basis: Increased exhaust airflow would be required to support eventual D&D. In addition, this provision would provide flexibility in the event that the facility is given a new processing mission.

2.3 Configuration.

2.3.1 The replacement filter system design shall provide a prefilter and two stages of HEPA filters in series. The system shall provide the fittings and appurtenances necessary to perform efficiency testing of each HEPA filter stage in accordance with ASME N510.

Basis: DOE Order 6430.1A prescribes the use of a prefilter, as well as the provisions for testing. Current safety analyses rely upon two HEPA filter stages for confinement.

2.3.2 The system design shall allow changing of all filter elements. The design shall provide redundant air cleaning trains sufficient to maintain a canyon airflow of at least 3540 l/s (7,500 cfm) during filters changes.

Basis: The filters must be changed to limit personnel doses and to provide for continued operation as the filters become plugged. See ASME N509 for specific recommendations.

2.3.3 The design shall isolate the retired HEPA (A/B/C/D/E) filters from the airflow and protect against release of radionuclides to the environment. Containment shall be provided in a manner which allows access to the retired filters through the inspection ports in the roof. The method of isolating the filters should avoid restricting options for eventual remediation as feasible.

Basis: The primary purpose of this project is to reduce the risk of radionuclides escaping from the retired HEPA filter cells. The methods to be used for eventual D&D have not been selected. Surveys or inspections may be required inside the filters to support development of D&D methods.

2.3.4 The new filter housings shall be designed to collect, detect and dispose of any water intrusion.

Basis: Water may collect due to fire protection sprays into the airstream or leakage of rainwater.

2.3.5 Freeze protection shall be provided by electric heaters/heat tracing.

Basis: B Plant employs electrical heat tracing and heaters (versus steam).

2.3.6 The design shall provide for fire protection in accordance with DOE Order 5480.7A, Fire Protection.

Basis: DOE Order 5480.7A.

2.4 Operation.

2.4.1 The air cleaning system shall be designed to facilitate operator surveillance, maintenance and filter changes.

Basis: DOE Orders 6430.1A and 5480.19.

2.4.2 Installed systems shall designed to minimize surveillance and maintenance requirements.

Basis: This project is intended to prepare the plant for an unmanned surveillance mode. There may be no on-site personnel available to accomplish surveillance or maintenance tasks.

2.4.3 The system shall be designed to provide service with the plant in an inactive mode. The system shall operate reliably for periods up to six months without maintenance or adjustments.

Basis: The ventilation system will operate after the plant has been inactivated pending D&D.

2.4.4 Equipment and system configuration shall be compatible with the local environment. Notably, weather conditions may include temperatures from -23°C (-10°F) to 43°C (110°F), high winds, rain, snow, dust and strong sunlight.

Basis: DOE Order 6430.1A, SDC 5.1 and local environmental conditions.

2.4.5 The system shall be designed for a service life of at least 10 years. The design shall allow for indefinite extension of service life through the replacement of components.

Basis: Provide operation through anticipated D&D.

2.5 Safety.

2.5.1 The isolation barrier shall be designed to Safety Class 1 standards. The new HEPA filter system shall be designed to Safety Class 3 standards.

Basis: The safety classification of the components is based upon a preliminary safety evaluation. Safety classification will be verified during the development of the Preliminary Safety Evaluation Report (PSAR).

2.5.2 The design shall limit the dose to personnel outside the filter housing to 10 mrem/hr. The maximum dose to personnel during filter changes shall be 100 mrem/hr.

Basis: WHC-CM-4-9, Radiological Design, Table 1. Assume personnel will be in the vicinity of the filter an average of less than 1 hour per week, and filter changes will take less than 10 hours per year. Choose higher "maximum" dose limit for filter changes to limit the frequency of filter changes.

2.5.3 Consider design basis accidents in accordance with DOE Order 6430.1A, to include earthquake, wind and fire. Consider design basis earthquake and wind loads per Hanford Plant Standards. Provide fire protection as cited in paragraph 2.3.6 above.

Basis: DOE Order 6430.1A and B Plant Safety Analysis Report.

2.5.4 The Final Safety Analysis Report is the responsibility of the Plant, and is not within the scope of this FDC.

Basis: Contract scope.

2.6 Instrumentation and Controls.

2.6.1 Provide instrumentation and controls necessary to support unmanned surveillance. For the retired filters, provide instrumentation and controls for any new equipment installed. For the air filter system include, as a minimum, instrumentation identified on Table 4-1 of ASME N509. In addition, provide liquid detection instrumentation and alarms.

Basis: DOE Order 6430.1A.

2.6.2 Signals for remote instrumentation shall be run to the Facility Process Monitoring and Control (FPMCS) Process

Control Unit (PCU) in Building 291-BK. The instrumentation system shall allow for remote surveillance of radiation, differential pressure, temperature and liquid level indications.

Basis: Plant operating configuration, and provision for possible future remote surveillance requirements.

2.6.3 Hardware shall be compatible with existing devices as much as possible to facilitate maintenance.

Basis: Facilitate maintenance.

2.7 Testing and Acceptance

2.7.1 The design, procurement, fabrication and construction associated with the isolation barrier shall be in accordance with quality assurance standards outlined in ANSI/ASME NQA-1.

Basis: ASME N509, Section 8, Quality Assurance.

2.7.2 Testing and acceptance of the air filter system shall be in accordance with ASME N509 and ASME N510.

Basis: DOE Order 6430.1A.

2.8 Drawing and Engineering Standards

2.8.1 Drawings shall be prepared in accordance with WHC-CM-6-3, Drafting Standards Manual

Basis: WHC-CM-6-3.

2.8.2 Drawings shall be cross-referenced to existing drawings as appropriate.

Basis: Configuration control.

2.8.3 Drawings shall include Piping and Instrumentation Diagrams (P&IDs), sequence of operations, schematic diagrams and physical drawings.

Basis: Conduct of Operations and configuration control. This requirement is intended to ensure that the project drawings include P&IDs and operating instructions as well as construction drawings.

2.8.4 In addition to drawings, the designer shall provide and justify proposed alarms and setpoints, and operating and maintenance instructions.

Basis: Configuration control.

2.8.5 Engineering documents, including calculations, drawings and specifications shall be prepared using metric units.

Basis: DOE/RL-94-0070, Hanford Metric Implementation Plan.

3.0 REFERENCES:

3.1 B Plant Retired HEPA Filters Engineering Study (W-059), BNFL, Inc, March 16, 1994.

3.2 SD-WM-TI-415, Canyon Exhaust Ventilation Requirements, L. D. Rakestraw, April 1990.

3.3 ASME N509-1989, Nuclear Power Plant Air Cleaning Units and Components.

3.4 ASME N510-1989, Testing of Nuclear Air Treatment Systems.

3.5 ANSI/ASME NQA-1-1986, Quality Assurance Program Requirements for Nuclear Facilities.

3.6 DOE Order 5400.5, Radiation Protection of the Public and the Environment.

3.7 DOE Order 5480.7A, Fire Protection.

3.8 DOE Order 5480.19, Conduct of Operations Requirements for Government Facilities.

3.9 DOE Order 5820.2A, Radioactive Waste Management.

3.10 DOE Order 6430.1A, General Design Criteria.

3.11 DOE/EH-0173T, Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance.

3.12 DOE/RL-94-0070, Hanford Metric Implementation Plan

3.13 SDC 4.1, Hanford Plant Standard, Arch-Civil Design Criteria, Design Loads for Facilities, Rev 12, September 3, 1993.

3.14 SDC 5.1, Hanford Plant Standard, Standard Design Criteria for Heating, Ventilation and Air Conditioning, Rev 7, December 7, 1992.

3.15 HS-V-P-4042, Procurement Specification for Nuclear Grade High Efficiency Particulate Air (HEPA) Filters, September 24, 1992.

3.16 WHC-CM-6-3, Drafting Standards Manual.

3.17 WHC-CM-4-9, Radiological Design.

3.18 WAC 173-400, Air Pollution Sources.

3.19 WAC 173-460, Controls for New Sources of Toxic Air Pollutants.

3.20 WAC 173-480, Ambient Air Quality Standards and Emission Limits for Radionuclides.

3.21 WAC 246-221, Radiation Protection Standards.

3.22 WAC 246-247, Radiation Protection - Air Emissions.

3.23 40 CFR 61, National Emission Standards for Hazardous Air Pollutants.