NOV 07 1996

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT

600058

2. To: (Receiving Organization) Distribution		3. From: (Originating Organization) Safety SAR Engineering		4. Related EDT No.: 141803	
5. Proj./Prog./Dept./Div.: B Plant		6. Cog. Engr.: S. E. Chalk		7. Purchase Order No.: N/A	
8. Originator Remarks: Document issued for approval and release.				9. Equip./Component No.: N/A	
11. Receiver Remarks: Design Baseline Document? [☐]Yes [☒]No				10. System/Bldg./Facility: B Plant	
				12. Major Assm. Dwg. No.: N/A	
				13. Permit/Permit Application No.: N/A	
				14. Required Response Date: COB 7/12/96	

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	WHC-SD-WM-ISB-008	-	0	B Plant Interim Safety Basis	SQD	1,2	1,2	1,2
2	WHC-SD-WM-SARR-030	-	0	B Plant Interim Safety Basis Accident Analysis	SQD	1,2	1,2	1,2

16. KEY									
Approval Designator (F)		Reason for Transmittal (G)				Disposition (H) & (I)			
E, S, Q, D or N/A (see WHC-CM-3-5, Sec. 12.7)		1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)				1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged			
17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)									
(G)	(H)	(J) Name (K) Signature (L) Date (M) MSIN				(G) (H)			
Reason	Disp.								
1,2	/	Cog. Eng. S. E. Chalk 7/11/96 S6-25				R. E. Heineman 7/11/96 S6-60			
1,2	/	Cog. Mgr. L. E. Johnson 7/11/96 S6-25				D. K. Smith 7/11/96 S6-60			
1,2	2	QA M. A. Hill 7/15/96 S6-69				SEAC R. G. Cash 7/15/96 S7-15			
1,2	1	Safety M. K. Ullah 7/15/96 S6-69							
		Env. N/A							
1,2	1	B. J. Gray 7/15/96 S6-81							
1,2	1	P. E. Roege 7/15/96 S4-66							
18. S. E. Chalk 7/12/96 Signature of EDT Originator		19. Authorized Representative Date for Receiving Organization		20. L. E. Johnson 7/12/96 Significant Manager Date		21. DOE APPROVAL (if required) Ctrl. No. 96-TPD-226 ☒ Approved ☐ Approved w/comments ☐ Disapproved w/comments			

B Plant Interim Safety Basis

S. E. Chalk

Westinghouse Hanford Company, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930

EDT/ECN: 600058 UC: 510
Org Code: 403 Charge Code: KN24F
B&R Code: EW3135090 Total Pages: 69

Key Words: B Plant, Safety Basis

Abstract: This interim safety basis (ISB-008) replaces the *B Plant Safety Analysis Report*, WHC-SD-WM-SAR-013, Rev. 2 (WHC 1993a). ISB-008 uses existing accident analyses, modified existing accident analyses, and new accident analyses to prove that B Plant remains within the safety envelope for transition, deactivation, standby, and shutdown activities. The analyses in ISB-008 are in accordance with the most current requirements for analytical approach, risk determination, and configuration management. This document and supporting accident analyses replace previous design-basis documents.

TRADEMARK DISCLAIMER. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

Printed in the United States of America. To obtain copies of this document, contact: WHC/BCS Document Control Services, P.O. Box 1970, Mailstop H6-08, Richland, WA 99352, Phone (509) 376-3430, Fax (509) 376-4989.

Karen H. Toland 11/7/96
Release Approval Date

Release Stamp

Approved for Public Release

**B PLANT
INTERIM SAFETY BASIS**

WESTINGHOUSE HANFORD COMPANY

September 1996

For the U.S. Department of Energy
Contract DE-AC06-87RL10930

This page intentionally left blank.

CONTENTS

1.0	INTRODUCTION AND SUMMARY	1-1
1.1	CONCLUSION	1-1
2.0	FACILITY DESCRIPTION	2-1
2.1	THE B PLANT COMPLEX	2-1
2.2	CURRENT PROCESSES	2-4
3.0	INTERIM SAFETY BASIS EVALUATION	3-1
3.1	HAZARDS ANALYSIS	3-1
3.1.1	Hazard Categorization	3-1
3.1.2	Hazard Identification and Bounding Conditions	3-1
3.1.3	Accident Analysis	3-6
3.2	HAZARDS CONTROLS	3-10
3.2.1	Safety Class Structures, Systems, and Components	3-11
3.2.2	Summary of Accident Analysis Assumptions	3-22
3.2.3	Institutional Safety Programs	3-23
3.3	INTERIM SAFETY BASIS EVALUATION SUMMARY	3-32
4.0	CONFIGURATION CONTROLS SYSTEM	4-1
4.1	CONFIGURATION MANAGEMENT	4-1
4.1.1	B Plant Configuration Control and Verification	4-1
4.1.2	B Plant Facility/Process Monitor and Control System Configuration Control	4-1
4.1.3	Work Management	4-1
4.1.4	Preparing Operating Documents	4-4
4.1.5	B Plant Complex Writer's Guide For Configuration Management	4-4
4.1.6	Quality Assurance Program Plan For Configuration Management	4-4
4.1.7	Sitewide Configuration Management	4-5
4.2	QUALITY ASSURANCE	4-5
4.2.1	Work Management	4-5
4.2.2	B Plant Maintenance	4-5
4.2.3	Quality Assurance Program Plan	4-5
4.2.4	Sitewide Quality Assurance	4-6
4.3	PROCEDURE CONTROL	4-6
4.3.1	Review of New, Revised, and Procedure Change Authorized Modified Procedures	4-6
4.3.2	Policy and Procedure Review	4-6
4.3.3	Preparing Operating Documents	4-6
4.3.4	Conduct of Operations	4-6
4.3.5	Quality Assurance Program Plan For Procedure Control	4-7
4.3.6	B Plant Complex Writer's Guide For Procedure Control	4-7
4.3.7	Sitewide Procedure Control	4-7
4.4	UNREVIEWED SAFETY QUESTION PROCESS	4-7
4.4.1	Sitewide Unreviewed Safety Question Requirement	4-7

CONTENTS (Continued)

5.0	REFERENCES	5-1
5.1	CODES AND REGULATIONS	5-1
5.2	DOCUMENTS	5-1
5.3	WESTINGHOUSE HANFORD COMPANY CONTROLLED MANUALS	5-4
5.4	U.S. DEPARTMENT OF ENERGY ORDERS	5-5
6.0	ACKNOWLEDGEMENTS	6-1
APPENDIX		
A	HAZARD CATEGORIZATION REPORT FOR B PLANT	A-1

LIST OF FIGURES

2-1	B Plant Layout	2-2
2-2	Chemical Storage Area Layout	2-3

LIST OF TABLES

1-1	Onsite Risk Acceptance	1-2
1-2	Estimated Onsite Dose Rate Reduction	1-2
3-1	Severity.	3-2
3-2	Probability.	3-2
3-3	B Plant Accident Scenarios Requiring Further Examination	3-3
3-4	Seismically Induced Hazards	3-5
3-5	Seismic Accident Scenarios	3-6
3-6	Radiological Risk Acceptance Guidelines	3-6
3-7	Toxicological Risk Acceptance Guidelines	3-6
3-8	Accidents Identified for Examination	3-8
3-9	Seismic Qualification Facility Safety Classifications	3-11
3-10	Summary of Assumed Failures for 0.12g Design-Basis Earthquake	3-22
3-11	Administrative and Programmatic Controls	3-24
4-1	Configuration Control Systems	4-2

LIST OF TERMS

ALARA	as low as reasonably achievable
AMU	aqueous makeup unit
D&D	decontamination and decommissioning
DBA	design-basis ashfall
DBE	design-basis earthquake
DOE	U.S. Department of Energy
ECA	environmental compliance assessment
HEPA	high-efficiency particulate air (filter)
HNO ₃	nitric acid
HRHE	Hanford (Site) Regional Historical Earthquake
IOSR	interim operational safety requirements
ISB	interim safety basis
NaOH	sodium hydroxide
PHA	preliminary hazards analysis
SSE	safe shutdown earthquake
TSR	technical safety requirements
USQ	unreviewed safety question
WESF	Waste Encapsulation and Storage Facility
WHC	Westinghouse Hanford Company

1.0 INTRODUCTION AND SUMMARY

This interim safety basis (ISB-008) replaces the *B Plant Safety Analysis Report*, WHC-SD-WM-SAR-013, Rev. 2 (WHC 1993a). ISB-008 uses existing accident analyses, modified existing accident analyses, and new accident analyses to prove that B Plant remains within the safety envelope for transition, deactivation, standby, and shutdown activities. The analyses in ISB-008 are in accordance with the most current requirements for analytical approach, risk determination, and configuration management. This document and supporting accident analyses replace previous design-basis documents.

The last B Plant process mission was completed in 1985. Currently, the facility is undergoing preparations for transition to decontamination and decommissioning (D&D). ISB-008 governs B Plant operations through this transition period. Currently, B Plant supports Waste Encapsulation and Storage Facility (WESF) Operations and some B Plant systems could support safety functions within WESF; however, these safety functions will be identified in the WESF ISB because WESF will be isolated from B Plant before the facility is turned over to D&D.

B Plant transition activities are described in *B Plant Cleanout and Stabilization Update*, WHC-SD-WM-PRS-014, Rev. 0 (WHC 1994a). These activities include removal of the remaining organic and aqueous inventories in the process cells. Requirements governing the inventory removal are not available at this time; however, it is anticipated that the organics may be required to undergo further processing (i.e., washing).

ISB-008 addresses the B Plant safety issues regarding routine transfers between canyon tanks and tank farms. Other possible methods of transfer, or transport of radioactive and hazardous material, are examined on a case-by-case basis. The safety analysis in this document is addressed through the following approach.

- B Plant hazards are identified and the facility is categorized.
- A preliminary hazards analysis (PHA) identifies accident scenarios that need to be addressed through the accident analysis.
- The accident analysis addresses the concerns identified in the PHA and any additional accident scenarios that were identified as safety concerns.

The B Plant configuration control system components addressed include configuration management, quality assurance, procedure control, and the unreviewed safety question process.

1.1 CONCLUSION

ISB-008 determines that the B Plant Complex remains within the safety envelope for transition, deactivation, standby, and shutdown activities, with the exception of the safety concerns stated in this ISB-008. The accident scenarios of concern are the design-basis earthquake (DBE) of 0.12g, the DBE

with a stack collapse on the filter building, and the DBE with (organic or aqueous) solution spray leak. B Plant remains within the offsite risk acceptance guidelines during these accident scenarios; however, the onsite doses are above the risk acceptance guidelines.

Based on the proposed B Plant hazard reduction initiative, a timetable for a set of cleanup activities is developed. These actions impact the onsite dose rate from the DBE.

Based on the reduction in dose rate for the DBE, the possibility of exceeding the risk acceptance guidelines (WHC-CM-4-46, *Nonreactor Facility Safety Analysis*) is reduced over the next three and one-half years, while B Plant continues with the cleanout and stabilization program (Tables 1-1 and 1-2). This conclusion is based on the analyses performed in *B Plant Interim Safety Basis Accident Analysis*, WHC-SD-WM-SARR-030, Rev. 0 (WHC 1996a).

Table 1-1. Onsite Risk Acceptance.

Scenario	Frequency (per year)	EDE (Rem)	EDE/RAG (Rem)
DBE	1 E-03	28.39	25
DBE with solution spray leak	2.3 E-06	29.6	100
DBA	2.08 E-03	15.06	25

DBA = Design-basis ashfall.
 DBE = Design-basis earthquake.
 EDE = Effective dose equivalent.
 RAG = Risk acceptance guideline.

Table 1-2. Estimated Onsite Dose Rate Reduction.

Activity	Baseline	¹ Removal of organics	² Canyon decontamination and aqueous solution removal
Date	4/95	6/97	9/98
DBE (1 E-03/yr)	--	--	--
EDE/RAG(rem)	28.39/25	11.69/25	2.0/25
DBE with solution spray leak (2.6 E-06/yr)	--	--	--
EDE/RAG (rem)	29.60/100	12.90/100	n/a (organic and aqueous solution removed)

¹Doses without organic fire or temperature degradation of filters, but includes stack collapse on B Filter.

²Doses without hydrogen explosion. A 50% reduction in dose from canyon contamination is assumed.

DBE = Design-basis earthquake. EDE = Effective dose equivalent.
 RAG = Risk acceptance guideline. n/a = not applicable.

2.0 FACILITY DESCRIPTION

B Plant was built in 1945 and is currently operated by Westinghouse Hanford Company (WHC). B Plant processed large quantities (>100 MCi) of ^{137}Cs and ^{90}Sr . Residual radioactive contamination from this processing is located throughout the facility in various forms.

2.1 THE B PLANT COMPLEX

The B Plant Complex consists of several buildings and support facilities in the northwest corner of the 200 East Area. A layout of B Plant is provided in Figure 2-1. B Plant was designed to chemically process spent nuclear fuels. The B Plant Canyon structure, 221-B, is uniquely suited for radioactive chemical processing. The 221-B Canyon is 247-m long, 23.5-m high, and has a cross-section width of 20 m. A bridge crane (40.82 t capacity) is operated remotely to perform all mechanical work in the process area and in other high-radiation canyon areas. Radioactive containment and confinement features are incorporated in the various facilities and support systems to protect plant personnel and the public from excessive radiation exposures. The 221-B Canyon structure separates clean working areas from highly-contaminated process areas with heavy concrete shielding. Figure 2-2 provides the 221-B Chemical Storage Area Layout.

The 221-B Canyon deck elevation is 217-m above mean sea level and is 92-m above the underlying water table at 124-m mean sea level and 77-m above the elevation of the Columbia River at 139.6-m mean sea level. The river makes its closest approach at 11.3-km northwest of the B Plant Complex.

The 221-B Canyon process area consists of 40 cells that are accessible from the crane and are covered with removable concrete shielding blocks. Most of the cells contain contaminated equipment that can be removed remotely by the crane. The hot (radioactive) pipe trench, located on the south side of the 221-B Canyon above the wind tunnel, is used for transferring radioactive process liquids and chemicals between the process cells. The hot pipe trench is also covered with removable concrete shielding. Three service galleries run the full length of the building and are located under the crane way. The electrical gallery, pipe gallery, and operating gallery provide space for noncontaminated electric, instrument, and process canyon equipment. The B Plant Complex is described in greater detail in *B Plant Facility Description*, WHC-SD-WM-TM-004, Rev. 0 (WHC 1994b), which details the following:

- Confinement system
- Containment barrier
- Ventilation system
- High-efficiency particulate air (HEPA) filter system
- Sand filter
- 291-B-1 Stack and monitoring system
- Primary containment
- Liquid handling
- Utilities and fire protection system.

Figure 2-2. Chemical Storage Area Layout.

2.2 CURRENT PROCESSES

B Plant is currently transitioning to long-term surveillance and maintenance to monitor any residual contamination and to ensure the health and safety of personnel before the facility enters the D&D phase. During this transition, segments of the facility will also undergo deactivation in preparation for D&D. Deactivation and WESF support activities are the only active B Plant operational processes.

The deactivation activities are defined in WHC-SD-WM-PRS-014 (WHC 1994a), which documents the progress and remaining tasks for facility cleanup and includes the following:

- Canyon work area decontamination
- Radioactive liquid removal
- Equipment deactivation
- Characterization and stabilization of source terms from contamination (e.g., HEPA filters, residual concrete, and equipment).

B Plant will continue to perform some operational activities and support WESF. These activities include the following.

- Storing organic and the associated aqueous phase and performing decontamination with caustic washes.
- Storing and transferring to Tank Farms the B Plant and WESF low-level waste.
- Maintaining and monitoring the liquid and air effluents and maintaining the HEPA filters and associated water seals.
- General plant maintenance.

The 224-B Building is a storage facility that housed tanks containing plutonium solution. The tanks are now empty except for residual contamination. The tanks are tied to the B Plant ventilation system and passively vent through the B Plant filters. Because the tanks are empty, except for residual contamination, venting is no longer required by 224-B.

Several systems must remain operational to support the adjacent WESF Complex and its radioactive inventory of strontium and cesium capsules. WESF will be isolated from B Plant before the facility is turned over to D&D.

3.0 INTERIM SAFETY BASIS EVALUATION

This section evaluates the interim B Plant hazards and identifies the controls needed to limit the risks from the hazards and ensure safe facility operation.

3.1 HAZARDS ANALYSIS

The B Plant Facility interim hazards analysis performs the following four functions.

1. Identifies or designates the facility hazard class, in accordance with WHC-CM-4-46, Section 4.0, "Determining and Documenting Facility Hazard Category."
2. Identifies the potential hazardous conditions and associated potential accident scenarios (including natural phenomena events) of current and proposed facility activities.
3. Provides consequence analyses of the significant accident scenarios that have the potential for exceeding acceptance criteria for the public and onsite worker. Analyses include the identification of any structures, systems, components, or operator actions utilized to control or mitigate consequences.
4. Provides qualitative or quantitative evaluation of risk for the accident scenarios.

3.1.1 Hazard Categorization

B Plant is classified as Hazard Category 2, in accordance with *Hazard Categorization and Accident Analysis Techniques for Compliance With DOE Order 5480.23*, DOE-STD-1027-92 (DOE 1992a), and DOE Order 5480.23, *Nuclear Safety Analysis Reports*. The hazard categorization analysis is included in Appendix A. The hazard categorization is identified by determining the ratio of the total quantity of each specific facility radionuclide to the Hazard Category 2 threshold quantities for the identical radionuclide provided in the standard. The ratio quantities are summed, once the individual isotopic ratios are established. If the total of the ratios exceeds one, then the facility is classified as a Hazard Category 2 nuclear facility.

3.1.2 Hazard Identification and Bounding Conditions

B Plant Preliminary Hazards Analysis, WHC-SD-WM-PHA-008, Rev. 0 (WHC 1993b), identified numerous hazards from which the accident scenarios requiring further examination are developed. Accident scenario examination is based on qualitative judgement, which determines the severity and frequency of postulated releases. Those accident scenarios identified as anticipated or

unlikely with Severity Level I, II, and III require further examination (Table 3-1 and 3-2 provide definitions). Extremely unlikely scenarios with Severity Level I and II also warrant additional examination.

Table 3-1. Severity.

Severity categories	Consequences to the public, personnel, or environment
I	May cause deaths onsite or loss of the facility/operation, major injuries or illness offsite, radiation exposure to offsite individuals in excess of annual limits, or severe impact on the environment.
II	May cause severe injuries or severe occupational illness onsite, exposure to onsite individuals in excess of annual limits, major damage to a facility/operation, minor illness or injury offsite, exposure to offsite individuals to radiation below annual limits, or major impact on the environment.
III	May cause minor injury or minor occupational illness onsite, or exposure of onsite individuals to radiation below annual limits, negligible impact offsite, or minor impact on the environment.
IV	Will not result in injury, occupational illness, or exposure onsite or offsite, or result in a significant impact on the environment.

Table 3-2. Probability.

Probability category	Category description	Frequency
Anticipated	An abnormal event that is expected to occur once or more during the lifetime of the facility (e.g., small radioactive materials spills, small fires)	10^{-2} to 1
Unlikely	Individually, the condition is not expected to occur during plant lifetime, but collectively, events in this category may occur several times.	10^{-4} to 10^{-2}
Extremely Unlikely	Extremely low probability conditions that are not expected during the plant lifetime but that represent extreme or limiting cases of faults identified as possible. This category includes design-basis accidents.	10^{-6} to 10^{-4}
Incredible	Accident for which no credible scenario can be identified.	$< 10^{-6}$

In summary, the PHA is used as a tool by the analyst to focus attention on scenarios that represent the greatest risk.

The breakdown of scenarios requiring further examination can be made on a severity basis.

- For Severity Level I and II — Only Anticipated, Unlikely, and Extremely Unlikely accident probabilities will be evaluated.
- For Severity III — Only Anticipated, and Unlikely accident probabilities will be evaluated.

Table 3-3 lists the hazards and subsequent accident scenarios requiring further examination, based on the determined severity and frequency criteria. The *Accident Analysis* further examines the hazards and subsequent accident scenarios specifically associated with the seismic event. Table 3-4 presents all of the potentially seismically induced hazards. Table 3.5 presents the list of seismically induced hazards analyzed. The seismic events presented below are analyzed further in the *Accident Analysis*.

Table 3-3. B Plant Accident Scenarios Requiring Further Examination. (2 sheets)

Facility	Hazard	Accident	Severity Level
General facility	Seismic event	Multiple failures	I/EU
General facility	High winds	Multiple failures	II/EU
221-B: organic process cells	Organic vapors	Exposure to vapors/fire	II/U
221-B: organic process cells	Seismic	Tank damage	II/U
221-B: organic process cells	Red oil	Explosion	III/I This accident does not meet the selection criteria; however, because of the overall concern for red oil throughout the DOE Complex, this accident scenario will be examined.
221-B: tank TK-10-1	Red oil	Explosion	III/I This accident does not meet the selection criteria; however, because of the overall concern for red oil throughout the DOE Complex, this accident scenario will be examined.
221-B: inactive process cells	Hydrogen accumulation	Fire/explosion	III/U
221-B: waste drums	Electrical equipment with combustibles	Fire	III/A
221-B: canyon	Combustible materials	Ignition/fire - explosion	II/A
221-B: operating gallery	Chemical reaction	Caustic/nitric acid mixing	III/U
221-B: pipe gallery	Pressure in piping system	Spray leak	III/A
271-B: AMU	Chemical reaction	Caustic/nitric acid	III/U
271-B: AMU	Pressurized piping	Leak	III/U
271-B: AMU	Seismic	Rupture of AMU tank	III/U
211-B: chemical tank farms	Pressurized line	Spray leak during transfer	III/A
211-BA: chemical sewer neutralizing facility	Tank Failure	Pool Spill	III/A
212-B: cask station	Kinetic energy	Dropped/ruptured containers	III/U

Table 3-3. B Plant Accident Scenarios Requiring Further Examination. (2 sheets)

Facility	Hazard	Accident	Severity Level
291-B: filters	Seismic event	HEPA filter housing damage, loss of canyon ventilation stack or wind tunnel collapse	II/U
291-B: filters	Retire filters on line	Loss of water seal	III/A
291-B: filters	Combustibles in filter	Fire in filter bank	III/U
291-B: filters	Explosion	Hydrogen accumulation as a result of inadvertent flooding	II/EU
291-B: filters	Moving vehicle	Failed ductwork and filter housing	III/U
291-B: filters	Pressure in water lines	Flooding in filter bank	III/A
291-B: sand filter	Vehicle impact	Housing collapse	III/U

NOTE: Previously B Plant was rated as a moderate hazard facility and tornado events were examined. Under current standards, B Plant is designated as a Safety Significant (Safety Class 2) facility; therefore, high-wind events are analyzed instead of tornados. The 212-B Cask Station is no longer in use and is vacant. The container rupture/drop scenario is no longer applicable.

AMU = Aqueous makeup unit.
 A = Anticipated.
 U = Unlikely.
 EU = Extremely unlikely.
 I = Incredible.

Table 3-4. Seismically Induced Hazards.

Hazard/effect	Result
Loss of confinement	Canyon walls separate, 271-B collapses, etc.
Loss of electrical power	Loss of ventilation leads to possible buildup of radiolytic hydrogen.
Ignition of organics	Cover block failure will result in tank failure and the presence of an ignition source to ignite the organic.
Cover block failure	Tank failure, jumper failure.
Red oil explosion	Not seismically induced (section on red oil).
Hydrogen accumulation	<p>Hydrogen accumulation requires approx. 9 days after the earthquake to accumulate to flammable concentrations (4% by volume) and a larger duration to accumulate to concentrations that, if ignited, could damage the tank and/or cause significant release.</p> <p>Any tank storing aqueous solution or organic solvent could generate radiolytic hydrogen. Low-level waste tanks are ignored because calculations show that significant hydrogen buildup would take years to reach a flammable mixture. Tanks considered include</p> <ul style="list-style-type: none"> • TK-27-3 and TK-28-3 store organic (up to 4,291 Ci, including suspended solids, in each tank) • TK-26-1 and TK-30-3 store aqueous (15,500 Ci; 13,500 Ci) - The aqueous could also be stored in other tanks (e.g., TK-25-2) • TK-36-1 12 Ci Sr and 5 Ci Cs • E-23-2 (concentrator) 16 Ci Sr and 6 Ci Cs.
Steam leaks	Steam leaks do not result in the release of radioactive or toxic materials and are, therefore, not considered.
Waste drums	Material in the waste drums is assumed to be covered by the 10^5 to 10^6 Ci of contamination in the cells and on the canyon deck.
Crane falls	Crane falls from wall movement, fails canyon cover block, and falls into cell.
Mixing of caustic and nitric acid	Considered.
Spray release	Spray releases of solutions with radioactive materials or toxic materials in the plant are considered as part of this analysis even though it could be ignored based on the short duration of a transfer and the low probability of transfer coupled with the low probability of the earthquake. More will be stated in the actual analysis.
Fire in electrical gallery	Not considered because it does not result in a release of radioactive material.
Release of chemicals in the tank farm via a spill	Considered.
Release of canyon contamination	Considered.
HEPA filter housing	Release because of structure collapse and/or collapse of the stack onto the structure. High temperature degradation also examined (organic tank fire section.)

HEPA = High-efficiency particulate air (filter).

Table 3-5. Seismic Accident Scenarios.

Ignition of organics because of cover block failure
Spray releases
Hydrogen accumulation
Suspension of canyon contamination
Mixing of caustic and acid
Release of chemicals from the tank farm and AMU
Stack failure
HEPA collapse or high temperature degradation
Filter flooding
Tank failure and accumulation in Cell 10

HEPA = high-efficiency particulate air filter.

3.1.3 Accident Analysis

The accident scenarios warranting further examination are examined in this section. The bounding accidents and the risks associated with these accidents are then identified and the risks are evaluated based on probability (frequency) and consequence. In accordance with WHC-CM-4-46, incredible accidents (i.e., those with frequencies less than 1×10^{-6} yr) are not evaluated for consequences. Tables 3-6 and 3-7 list the risk acceptance guidelines. Table 3-6 lists the accident frequency and associated radiological risk acceptance guidelines. Table 3-7 provides the toxicological risk acceptance guidelines for accident frequencies.

Table 3-6. Radiological Risk Acceptance Guidelines.

Event frequency category	Event frequency range (yr)	Effective dose equivalent (rem)	
		Onsite	Offsite
Anticipated	$>10^{-2} \leq 10^{-0}$	5	0.5
Unlikely	$>10^{-4} \leq 10^{-2}$	25	5
Extremely unlikely	$>10^{-6} \leq 10^{-4}$	100	25

Table 3-7. Toxicological Risk Acceptance Guidelines.

Event frequency category	Event frequency (yr) ⁻¹	Primary concentration guidelines	
		Onsite	Offsite
Anticipated	$>10^{-2}$ to $\leq 10^0$	$\leq \text{ERPG-1}$	$\leq \text{PEL-TWA}$
Unlikely	$>10^{-4}$ to $\leq 10^{-2}$	$\leq \text{ERPG-2}$	$\leq \text{ERPG-1}$
Extremely unlikely	$>10^{-6}$ to $\leq 10^{-4}$	$\leq \text{ERPG-3}$	$\leq \text{ERPG-2}$

ERPG = Emergency response planning guidelines.

PEL = Permissible exposure limit.

TWA = Time-weighted average.

Table 3-8 lists the accidents requiring further analysis for potential risk. If an accident is bounded by another accident scenario, the bounding accident scenario is also identified in Table 3-8. The risk associated with the bounding accidents and unbounded accident scenario are then examined. This examination is also part of the *Accident Analysis*.

The *Accident Analysis* reexamines previous accident analyses performed for B Plant and also performs new accident analyses.

3.1.3.1 Seismic Analysis. The DBE results in the following potential failures (Section 3.1.2).

- 221-B Canyon — building cracks and gaps; cover blocks fall into cells causing a leak, spill, or fire.
- 291-B Filters — filters A, B, and C and sand filter fail, unless survival with filter degradation from the organic solvent fire yields worse consequences.
- 291-B Stack — stack fails and falls.

The failed structures are designated Safety Significant (Safety Class 2), with the associated DBE of 0.12g. The DBE results in an offsite dose rate that is less than the risk acceptance guidelines from WHC-CM-4-46; however, the onsite dose rate exceeds the risk acceptance guidelines. The calculations are found in the *Accident Analysis*, Section 2.1.1.3.

3.1.3.2 High Winds. Previous analyses of B Plant's vulnerability to high winds determined that most of the facilities will not be affected. Although the analyses showed that some of the uncontaminated support buildings may not stand up to high winds, these buildings do not pose a risk to the public or onsite personnel. The aboveground portions of the 212-B Building may not survive a high-wind event, but the contamination in the 212-B Building is below ground and, therefore, does not pose a significant risk to the public or onsite personnel. The 271-B Building has not been analyzed for high winds. If 271-B is assumed to fail, the resulting consequences are below the EPRG-3 limit for onsite exposure and the EPRG-2 limit for offsite exposure. The calculations are provided in Section 2.1.2 of the *Accident Analysis*.

3.1.3.3 Chemical Tank Farm Spill Release. A spill is postulated to occur during the DBE for sodium hydroxide (NaOH) from the chemical storage tanks. The leak occurs outside on a hot summer day. The release of NaOH does not violate the criteria for offsite (permissible exposure limit - time weighted average) or onsite (EPRG-1) toxicological dose rate limits (*Accident Analysis*, Section 2.2).

Table 3-8. Accidents Identified for Examination.

Facility	Hazard	Accident	Bounding accident
General facility	Seismic event	Multiple failures	--
General facility	High wind	Multiple failures	--
221-B: organic process cells	Organic vapors	Exposure to vapors/fire	Organic fire
221-B: organic process cells	Seismic event	Tank damage	--
221-B: organic process cells	Red oil	Explosion	--
221-B: inactive process cells	Hydrogen accumulation	Fire/explosion	--
221-B: waste drums	Electrical equipment with combustibles	Fire	Organic fire
221-B: canyon	Combustible materials	Ignition/fire - explosion	Organic fire
221-B: operating gallery	Chemical reaction	Caustic/nitric acid mixing	Inadvertent mixing in AMU area
221-B: pipe gallery	Pressure in piping system	Spray leak	Chemical tank farm spray leak
271-B: AMU	Chemical reaction	Caustic/nitric	--
271-B: AMU	Pressurized piping	Leak	Inadvertent mixing of chemicals
271-B: AMU	Seismic	Rupture of AMU tank	--
211-B: chemical tank farms	Tank Failure	Spill	--
211-BA: chemical sewer neutralizing facility	Pressurized line	Spray leak	Rupture of chemical storage tank
221-B: Tank TK-10-1	Red oil	Explosion containers	--
291-B: filters	Seismic event	HEPA filter housing damage, loss of canyon ventilation stack or wind tunnel collapse	--
291-B: filters	Retire filters on line	Loss of water seal	Organic fire
291-B: filters	Combustibles in filter	Fire in filter bank	--
291-B: filters	Hydrogen accumulation as a result of inadvertent flooding	Explosion	Organic fire
291-B: filters	Moving vehicle	Failed ductwork and filter housing	Organic fire
291-B: filters	Pressure in water lines	Flooding in filter bank	Organic fire
291-B: sand filter	Vehicle impact	Housing collapse	Organic fire

AMU = Aqueous makeup unit.

HEPA = High-efficiency particulate air.

3.1.3.4 Inadvertent Mixing of Chemicals in 271-B AMU. This accident scenario postulates the spill of NaOH and nitric acid (HNO_3) in the 271-B AMU area.

The release of chemicals does not violate the criteria for offsite toxicological dose rate limits or the onsite toxicological dose rate limits for high probability events. The calculations are performed in Section 2.2.2.4 of the *Accident Analysis*.

3.1.3.5 Red Oil Explosion. Red oil is a very heavy substance that forms during a rapid chemical reaction when HNO_3 is added to an organic solution containing tributyl phosphate and the mixture becomes heated. This reaction generates offgas because of the degradation of nitrated compound. The red oil reaction and subsequent gas generation in a confined environment yields an explosion. Section 2.3.2 of the *Accident Analysis* concludes that the possibility of a red oil event at B Plant is incredible. The system is now configured so that the interconnecting piping between the HNO_3 tanks and the organic tanks has been removed. Therefore, no credible way to introduce HNO_3 into the organic tanks exists.

Mixing of HNO_3 and organic solution could occur in tank TK-10-1, which is the cell drain header tank. This is a large, rectangular tank that is open at the top. Explosive reactions involving degraded organic can only occur in closed systems. Open systems (tanks) allow for the rapid venting of reaction products. Because superheating cannot occur, pressurization of the tank is not possible. The contents of the tank may froth and boil over, but an event which would result in a release to the environment is deemed incredible.

3.1.3.6 High-Efficiency Particulate Air Filter Fire. Burning embers cannot reach the HEPA filters because cool air from other parts of the 221-B Canyon mix with the air from the filter fire. The air tunnel is also long, making the possibility of a hot ember reaching the HEPA filters extremely unlikely. However, the accident analysis is performed (*Accident Analysis*, Section 2.3.3.2) and the results are within the risk acceptance guidelines.

3.1.3.7 Organic Solvent Fire. This organic solvent fire scenario assumes that a cover block falls and destroys the tank(s) containing the organic solvent, and thereby plugs the cell drain header and traps the solvent in the cell. The falling cover block creates an ignition source and the organic solvent burns. The smoke from the fire exhausts through the ventilation system and out the stack. The calculations for this scenario are developed in Section 2.3.3.1 of the *Accident Analysis* and show consequences well below the guidelines.

3.1.3.8 Radiolytic Hydrogen Generation. Radiolytic hydrogen generation is examined in the *Accident Analysis* for a tank containing organic solvent and a tank containing aqueous solution. All aqueous solution is combined in another location, and all organic solvent is combined in one location. The aqueous solution generates hydrogen at a slightly higher rate than the organic solvent. The calculations in Section 2.3.1 of the *Accident Analysis* show a radioactive material release resulting from hydrogen explosion in the cells does not exceed the risk acceptance guidelines.

If a power failure occurs and the power is not restored, hydrogen accumulates in the process cells. The generation of hydrogen could become a problem in approximately 9 days. Section 2.5 of the *Accident Analysis* shows a hydrogen explosion from the loss of power event is within guidelines.

3.1.3.9 Design-Basis Ashfall/Snow Load. The DBA has a frequency of 2.08×10^{-3} per year. The consequences for a DBA for the 221-B Canyon do not exceed the onsite and offsite risk acceptance guidelines per WHC-CM-4-46.

3.1.3.10 Other Analyses. Besides the hazards and accident scenarios identified in the PHA, other scenarios are examined in the *Accident Analysis*. A release of radioactive material via an organic solvent spray leak is included. The spray leak does not violate the onsite or offsite dose limit criteria (*Accident Analysis*, Section 2.2.1). The flood scenario is examined and determined to not pose a hazard for B Plant (*Accident Analysis*, Section 2.1.3).

3.2 HAZARDS CONTROLS

The *Accident Analysis* determines the following B Plant interim hazard controls.

- There are no interim operational safety requirements (IOSR) for B Plant interim activities based on the conclusions found in the *Accident Analysis*. WHC's technical safety requirements (TSR) policy is contained in WHC-CM-4-46, Chapter 6.0, "Technical Safety Requirements." IOSR are identical in intent and content to TSR, but differ because they are based on an ISB rather than a final safety analysis report that meets the requirements of DOE Order 5480.23.
- Only an aqueous spray leak results in unmitigated offsite doses greater than 0.5 rem or unmitigated onsite doses greater than 5 rem (excluding the natural phenomena events of DBE); therefore, there are no safety limits, limiting control settings, or limiting conditions for operation. However, the stack for non-DBE is designated as Safety Significant (Safety Class 2) to mitigate this event. Section 3.2.1.2 provides further details.
- There are no surveillance requirements because there are no limiting conditions for operation.
- Design features employed to withstand natural phenomena events, ensure worker safety, and ensure radiological protection are discussed in the WHC-SD-WM-PHA-008, Rev. 0, WHC-SD-WM-TM-004, Rev. 2, and the *Accident Analysis*. The unreviewed safety question (USQ) process, discussed in Section 4.4, ensures that changes made to design features are controlled so that they do not adversely affect facility safety.

None of the current B Plant operational processes have the potential to increase the facility radiological or chemical inventories. The inventories continue to decrease as cleanout and stabilization activities progress toward

long-term surveillance and maintenance and, ultimately, D&D. The USQ process (Section 4.4) ensures that the B Plant inventory remains at or below the level assumed in the *Accident Analysis*.

3.2.1 Safety Class Structures, Systems, and Components

The Safety Class (Safety Class 1) and Safety Significant (Safety Class 2) structures, systems, and components are discussed in the following subsections. As WHC has now adopted the Safety Class and Safety Significant designation for safety classification, the use of Safety Class and Safety Significant are used interchangeably with Safety Class 1 and Safety Class 2, respectively. All previous B Plant safety analyses used the older safety classification designation.

3.2.1.1 Structures. The original B Plant design was based on the requirements of the *Uniform Building Code* (UBC 1940), which required resistance to a lateral force resulting from a dead load on the structure, but did not require resistance to lateral acceleration forces resulting from an earthquake. *Standard Architectural-Civil Design Criteria Design Loads for Facilities*, Rev. 11 (SDC-4.1); DOE Order 6430.1A, *General Design Criteria*; and *Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards*, UCRL-15910 (LLNL 1980), contain the current seismic criteria for the design of nonreactor facilities at the Hanford Site. Based on the safety classification of the B Plant facilities, the contents of the facilities are conservatively assumed to escape to the environment without mitigation during a DBE. Table 3-9 provides the seismic qualification for the facility safety classifications. The safety classification also serves as the basis for determination of seismic adequacy/qualification of the facilities and structures. As determined in the following sections, some facilities are not seismically qualified for their safety class DBE.

Table 3-9. Seismic Qualification Facility Safety Classifications.

Facility	Safety Class
221-B Canyon Building	SS (SC-2)
291-B Duct and stack	SS (SC-2)
291-B Filter Structure	NSC (SC-3)
211-B Chemical Storage Tanks	NSC (SC-3)
212-B Cask Loading Station*	NSC (SC-3)
271-B AMU Tanks	NSC (SC-3)

*Building 212-B is inactive. However, residual contamination remains.

SS = Safety Significant

NSC = non safety class

SC-2 = Safety Class 2

SC-3 = Safety Class 3

As a minimum, UCRL-15910 specifies that an elastic dynamic analysis should be performed for Safety Class 1 and 2 structures and resulting demand/capacity ratios should be calculated for the structure. If the demand/capacity ratios are below unity for the entire structure, the facility is considered seismically adequate. If the demand/capacity ratios are not below unity for the entire structure, inelastic analysis is necessary to allow redistribution of the local peak demands. Evaluations of Safety Class 3 facilities are based on normal building code seismic provisions. UCRL-15910 also addresses special considerations for existing facilities and emphasizes the need for establishing the as-built condition of the facility and materials of construction. The specified probability of exceedance for maximum ground accelerations noted in UCRL-15910 are as follows:

- $2 \times 10^{-4}/\text{yr}$ for Safety Class 1
- $1 \times 10^{-3}/\text{yr}$ for Safety Class 2
- $2 \times 10^{-3}/\text{yr}$ for Safety Class 3.

The UCRL-15910 probabilities correspond to current requirements for maximum horizontal ground surface accelerations of 0.2g, 0.12g, and 0.09g. Most of the analyses reviewed were performed when B Plant was considered a Safety Class 1 facility. Maximum ground surface accelerations of 0.2g and 0.25g were used in these analyses, depending on when the analyses were performed. Limiting analyses were also performed for a 0.1g Hanford Regional Historical Earthquake (HRHE). Many of the structures that are overstressed in the original calculations may prove adequate in view of the reduced seismic demands for a Safety Class 2 facility. Because of the nonlinear nature of many of the analyses, linear scaling of all model results is not possible; however, the calculated stresses that are much larger than the material allowable cannot be justified without further analysis. No such analysis was performed during the publication of this document.

The confinement boundary of B Plant is comprised of the 221-B walls, floor, and roof, and is maintained by the ventilation system. All analyses of the components that define the confinement boundary must meet the criteria discussed previously. The previous analyses conservatively predicted the structure displacements and stresses and, therefore, envelop current DOE requirements.

3.2.1.1.1 Previous Analyses of 221-B: B Plant Canyon Structure.

The first analysis to seismically qualify the canyon structure to current standards was performed using linear elastic dynamic analysis techniques and is referred from *B Plant Structural Qualification Interim Report*, WHC-SD-WM-SA-001, Rev. 0 (WHC 1991a). This analysis examined the feasibility of demonstrating compliance of the 221-B Canyon structure with DOE requirements for a Safety Class 1 facility. The first step was a detailed, nondestructive inspection of the structural elements of the reinforced concrete facility. A linear elastic dynamic finite element analysis that includes the concrete tension capabilities was conducted for a 0.2g DBE. Soil-structure interaction effects were included, but inelastic effects were not. The analysis methodology meets current (i.e., 1995) guidelines for a Safety Class 1 facility, but several areas of high stress were identified.

The report concluded that to structurally qualify the 221-B structure, a more detailed nonlinear evaluation was required. A nonlinear static analysis was also proposed to identify the potential collapse mechanism and the static load capacity.

An analysis with the recommended nonlinearities was conducted in the *B Plant Canyon Structure Seismic Evaluation*, WHC-SD-WM-SA-005, Rev. 0 (WHC 1991b). The analysis planned to first determine the as-built condition and the current condition using standard nondestructive testing techniques. Considerable effort was spent in developing a model that accurately characterizes the nonlinear behavior of the various construction joints. Both static and dynamic analyses were then conducted. The static analyses predicted a positive margin against collapse for the DBE of 0.2g with a collapse load of $\approx 0.4g$.

The nondestructive examination showed that the concrete in the north and south canyon walls was in good-to-excellent condition, with minimal degradation and cracking. The cracks that existed were 15- to 23-cm deep at a maximum. Some of the construction joints were unbonded. Similar findings were made for the roof and galleries.

An elastic analysis was next performed using response spectrum techniques. The initial elastic analysis indicated that there were several locations of local overstress. As a result, it was decided to follow up with an inelastic analysis in order to secure a comprehensive understanding of the potential structural responses during the postulated seismic event.

The inelastic analysis was performed using a nonlinear finite element model. The inelastic dynamic analysis predicted peak plastic strains of less than 2% for the reinforcing bar. The ultimate strain for Grade 40 reinforcing bar is 12%, which indicated a significant margin against failure. Gapping at the construction joints and cracking of the concrete were not precluded; although, no complete through-thickness cracking was predicted. Demand/capacity curves generated for the canyon roof and walls verified compliance with the capacities defined in UCRL-15910.

The results of the inelastic analysis were used to perform a nonlinear time-history analysis. The inelastic time-history analyses results indicated that rebar yielding occurs at the crane level. The outer rebar at the north crane wall showed the largest strains. The analysis showed a peak plastic strain of 1.6% against an ultimate strain of 12%. The structure was deemed stable if the north deflections stayed below 1.91 cm and south deflections stayed below 3.18 cm. The analysis showed displacements of 0.56 and 1.22 cm, which indicated that the section strength was not exceeded at any location. This analysis showed seismic adequacy relative to UCRL-15910. Further analyses showed that accelerations of about 0.4g are necessary for collapse of the building. While the building will not collapse, gapping and yielding at construction joints is expected.

B Plant Canyon Structure Seismic Evaluation Review Documentation, WHC-SD-WM-SA-007, Rev. 0 (WHC 1990a), concluded that the structural analysis of the canyon performed by WHC was thorough and fully complied with all applicable criteria contained in DOE 6430.1A, UCRL-15910, and SDC-4.1 for the specified DBE of 0.2g. Recommendations from the independent review were

noted. The previously described analyses were performed with a two-dimensional plane model of the canyon cross section, so that the end-walls were not modeled. The study recommended that the effect of these end-walls be evaluated. Also, the 271-B Support Building adjoins the canyon north wall, and the interaction of these two structures should be evaluated.

B Plant Canyon End-Wall Study, WHC-SD-WM-SA-013, Rev. 0 (WHC 1995a), determined the effect of the canyon end-walls. The analysis evaluated the end-wall structural integrity and stability and the interaction of the end-wall with the adjacent segment of canyon structure. In the analysis, both linear static and dynamic analysis techniques for a DBE of 0.2g were used. The shear keys between the end-wall and the canyon structure were found to be overstressed; however, a rocking analysis of the end-wall without considering shear keys showed that the walls were stable. The end-wall analysis predicted stresses in the shear keys that are excessively high. The analysis results did not indicate collapse of the canyon structure; however, the analytical methodology used did not demonstrate compliance with DOE requirements for a Safety Class 1 facility. While a Safety Class 2 earthquake is lesser in magnitude, Safety Class 2 seismic qualification cannot be concluded from this analysis either.

The two buildings adjacent to the 221-B Canyon structure present potential hazards because of seismic displacements. The *B Plant Building Interface Study*, WHC-SD-WM-SA-014, Rev. 0 (WHC 1991c), evaluated the interaction of the 225-B and 271-B Buildings with the canyon. *Earthquake Analysis of the Waste Encapsulation Facility*, JABE-VITRO-01 (Blume 1971), concluded that the 225-B facility was designed to withstand a 0.25g seismic event. Also, a 5.1-cm seismic gap isolates the 225-Building from the canyon structure. An evaluation of the calculated displacements proved that no interaction occurs between the 225-B Building and the canyon structure; therefore, no analysis is necessary.

The 271-B Facility adjoins, but is not structurally anchored to the canyon facility. The evaluation of the 221-B/271-B interaction used previous analyses (WHC 1990a) of the 221-B Facility to impose acceleration loads on a combined 221-B/271-B model developed for this study. A true dynamic interaction analysis was not performed, but the study concluded that the 271-B Building would not impose sufficient additional loadings on the canyon to result in failure.

Another area of concern for the 221-B Facility is the relative displacement of the horizontal construction joints on the north and south walls and the vertical expansion joints between 12.2-m segments. During a seismic event, confinement boundary leakage from through-wall cracking or gapping of these joints was postulated. Results from the original analysis (WHC 1990a) of the 221-B Facility were used to evaluate the construction joint. An analysis of these results showed that the horizontal construction joint displacement and rotations were small and would not result in a through-wall leak path. The vertical expansion joints were evaluated separately by using a soil-structure-interaction model to conservatively predict the gapping. The maximum displacements were determined to be insufficient to produce gapping in the expansion joints, as a result of the

0.2g DBE. The reference contains further hand calculations to determine the impact forces generated between 12.2-m segments during a seismic event. The calculated stresses were found to be within allowable code limits.

The *B Plant Confinement Study*, WHC-SD-WM-SA-012, Rev. 0 (WHC 1991d), defines the canyon confinement boundary to determine whether the existing structures and components will maintain confinement under seismic loading. Previous analyses and evaluations of components not addressed in other analyses were summarized in that document. Various access doors in the canyon were evaluated for the 0.2g seismic event by using hand calculations and detailed numerical models. The resulting stresses and displacements were low and thereby verified the structural integrity of the access doors during the specified seismic event. The results indicated the following.

- The west wall contains two openings that allow access from 221-B to WESF. The floor frame is distributed less than 0.25 cm and, therefore, survives the earthquake.
- The west wall will not collapse, but gaps will form between the walls and the rest of the structure.
- The 221-B Building and WESF will not impact each other.
- The 10 canyon doors on the south side are not failed or opened by seismic forces. The peak displacement is 0.08 cm.
- The air tunnel will remain intact, but will have some cracking.
- The stair wells on the north side could collapse but the doors will remain closed.

It is assumed the wall movement will cause the crane to fall from the movement of the rail and impact the coverblocks causing some cracking and minor structural damage, and the jumpers will leak but the coverblocks will remain intact during the event to prevent spray to the canyon and out the facility through the gaps.

221-B Cover blocks. The structural analysis referred to above demonstrated that the stresses and displacements for the structure at or near the vicinity of the canyon deck were minor. This was determined because the structure is quite massive and well tied together in this location and because the horizontal and vertical accelerations were almost identical to those of the ground (no amplification or differential accelerations). The process cell cover blocks are a concern because of their size and the presence of organic solvent and aqueous solution. These cover blocks are 1.8-m thick and have a stepped construction. There are four cover blocks per cell, with a cell dimension of 5-m long and 4-m wide. The weight is about 57,700 kg for each cover block. As a result, the natural frequency of the cover block is similar to the structure around it and, therefore, the cover block should not fail. The stepped construction also protects against the cover block falling into the cell because the weight rests on many edges rather than on two edges, as in the case of single-ear cover blocks used at WESF. It might therefore be possible to qualify the cover blocks against failure. Because this qualification is not yet done, it is assumed, as in the safety analysis report

(WHC-SD-WM-SAR-013, Rev. 2 [WHC 1993a]), that the cover blocks can fall into the cells.

Equipment. The equipment in the process cells is supported by a variety of bases, depending on the length of the tank. At the top, the tanks and other equipment are connected to the sides of the process cell via jumpers. The jumpers are made of heavy pipe. Seismic effects could cause the partial breaking of a jumper connection and equipment could fall over onto the side of the cell (the equipment being typically too large to fall completely over in the process cells). Fracturing of the top of the vessel or sides near the top of the vessel could occur, if any of these vessel walls are weak as compared to the jumpers that rigidly hold the top nozzles. However, the fracturing of the vessel is extremely unlikely because the vessels walls, top, and bottom are typically made of 1.27-cm thick stainless steel. If the cover block falls into the cell, vessel fracturing could occur. The extent of the fracturing is dependent on the number of jumpers that are present and act to break the fall of the cover block, the size of the cover block pieces, and distance of the fall. As a result, the assumed damage includes the following.

- If a cover block remains in place, the damage is jumper leaks or openings in the jumper/tank connection.
- If a cover block falls, the damage is small openings in the top or bottom of the tank.

Cell Drain Header. The *B Plant Cell Drain Header Seismic Analysis*, WHC-SD-W024H-SA-001, Rev. 0 (WHC 1991e), was referred to for this study. In this study, it is evaluated for a 0.12g lateral acceleration and is assumed to survive a Safety Class 2 seismic event.

Conclusion for 221-B. The conclusions for the 221-B Facility seismic analysis include the following.

- 221-B structure will not collapse.
- There are gaps in the construction joints and in the meeting of the east and west walls with the north and south walls.
- The crane will fall from movement of the rail.
- Cover blocks are assumed to fall into the cells.
- Jumper loss or massive tank breach can occur in the organic process cells because of cover blocks.

3.2.1.1.2 Previous Seismic Analyses of Canyon Exhaust Ventilation System. *B Plant Support Facilities Natural Forces Evaluation*, WHC-SD-WM-TA-002, Rev. 0 (WHC 1983), analyzed the filter cells for seismic loads. The maximum seismic demands were determined for the walls of the cell by using a safe shutdown earthquake (SSE). The SSE is an earthquake with a zero period acceleration of 0.25g with an applicable ground response spectrum. Soil loads were also determined.

The A and B filter cells analysis found that the roof and the roof supports survive the SSE, but the north wall fails because of the soil pressures generated by seismic motion. The results also predicted cracking with possible resultant loss of the water seal. The north wall failure could also result in the collapse of the entire cell. If the cell remains intact, the HEPA filter frames would survive the SSE motions.

The roof and support columns of the C filter cell will survive the SSE. The south wall panels between the pilasters will fail because of soil pressures generated by seismic motions. The pilasters are marginal. Failure of the south wall could cause the loss of the water seal and potentially result in the collapse of the cell. If the cell survives, the filter support frames will survive the SSE intact.

The structure of the D filter cell will survive the SSE loads and motions. The steel in the prefilter will yield, causing the prefilters to leak. The HEPA filters could experience impact loads because of the loosening of the anchor bolt for the center support strut. The strut might also fall away, depriving the frame of its center support. The analysis results also show that if the differential pressure is above 5.8-cm of water, the anchor bolt will not pull out.

WHC 1983 also provided an assessment of the A-D filter cells under the 0.12g earthquake. The information in the document is not presented clearly; however, it appears that the failures discussed for the 0.2g earthquake will also occur, as a result of the 0.12g earthquake.

It is assumed from WHC 1983 that the A, B, and C filter cells collapse. The D filter cell will remain intact.

The *B Plant Canyon Exhaust Ductwork and Filter Study*, WHC-SD-WM-SA-016, Rev. 0 (WHC 1991f), assessed the ability of the canyon exhaust duct and filter system to withstand seismic and other loadings. The study summarized several different analyses performed over the last 15 years. The seismic events used for these analyses (0.20 and 0.25g) resulted in conservative loadings.

Limited analyses were completed for a 0.10g HRHE. The stated goal of the study was to collect and evaluate the existing analyses, recommend additional work, and lay the groundwork for future work by providing a concise system description and reference lists. Many of the analyses summarized are taken from an earlier report (WHC 1983). Unfortunately, many of the calculational details of these analyses are not available. The study reached the following conclusions.

- The underground ducts may sustain local cracking but catastrophic failure is unlikely.
- Filter cells A, B, and C will experience partial failure.
- Local cracking could also cause the water seals of out-of-service filters to fail.
- Filter cell D design is acceptable but the HEPA filter bank is suspect.

- Filter cell E design analyses are inadequate.
- Filter cell F design calculations are adequate.
- The sand filter is not adequate for seismic event.
- The exhaust stack is susceptible to seismic events.

After reviewing the study, the following recommendations are made.

- Further analysis of A, B, and C filters may be required.
- E filter should be reanalyzed to current standards.
- The sand filter should be reanalyzed, if the filter is critical to operations and cannot be replaced.
- The exhaust stack is vulnerable to earthquake loadings and additional analysis may be necessary.

An overall conclusion for the exhaust system is not possible on the basis of the information evaluated. Instead, specific conclusions concerning each component can be made. The exhaust duct analysis was thorough and conservative and, therefore, the exhaust duct analysis is considered adequate. Filters A, B, and C are marginal for the 0.2g DBE. A conclusion cannot be drawn for a 0.12g DBE without a detailed evaluation. Analysis of the D filter cell predicts the reinforced concrete structure will survive the 0.25g earthquake, but yielding will occur in the filter frame. This filter uses the same filter support frames as E filter, which is shown in subsequent detailed analysis to be adequate and, therefore, D and E filters are considered to survive the 0.12g DBE. *B Plant Filter Design Calculations* (ICF KEH 1991) evaluated F filter to the requirements of SDC-4.1, Rev. 10. The details of these calculations are not available, but the requirements of Rev. 10 are generally more severe than those of Rev. 11 and F filter is thus considered adequate for the 0.12g DBE. The sand filter cannot adequately resist the 0.10g HRHE and would probably collapse.

A subsequent analysis of E filter was conducted in the *B Plant Seismic Qualification of E Filter*, WHC-SD-W239-SA-001, Rev. 0 (WHC 1993c). It should be noted that both E and F filters have never been contaminated and B Plant does not intend to use F filter. In the analysis, linear elastic static analysis was used to qualify E filter. An argument was made concerning the use of a static analysis versus the UCRL-15910 for dynamic analysis. It was noted that evaluation of the F filter used dynamic analysis techniques with no significant change in the response. Because of the close proximity of the E and F filters and the similarity in configuration, a dynamic analysis of the E filter is not deemed necessary. Results from the analysis predicted local overstressing for the DBE of 0.2g. Also, cracking was calculated to occur, but the structural integrity and function of the filter were not expected to be compromised. Linear scaling of the calculated stresses showed that the structure would not be overstressed for the DBE of 0.12g. As a result of the reduced seismic demand, the E filter housing and frame were considered structurally adequate.

Conclusions for the Canyon Exhaust Ventilation System. Filter cells A, B, and C are assumed to experience some failure. New analyses could demonstrate survival. The sand filter is seismically inadequate. A new analysis might or might not demonstrate seismic qualification.

3.2.1.1.3 291-B Stack. WHC 1983, analyzed the B Plant stack. This document concluded that the vertical steel reinforcement would yield and that the stack foundation is unstable (overturning possible) at 0.12g. At 0.25g, the concrete stresses exceed allowable limits. WHC 1983 also showed that the masonry is incapable of resisting lateral motions and would fail.

AR Vault, AR Stack, and B Plant Stack Seismic Evaluation, internal letter, SA:GRW 89-15 (Conrad and Wagenblast 1989), provided a preliminary assessment of the B Plant stack. The analysis was performed to the requirements of DOE Order 6430.1A and UCRL-15910. The evaluations used static methods and dynamic analyses were to follow later. Engineering experience shows that dynamic analyses usually increase the margin to failure.

The stack was analyzed as a cantilevered beam held at the base. A peak acceleration of 0.33g was applied to the entire mass of the stack, assuming it was all at the stack's center of mass. The value of 0.33g was obtained by using the peak acceleration from a 10% damped response spectrum curve anchored at 0.2g. The results of this analysis indicated that the stack was unstable and would collapse (topple over) with this load. The analysis also showed that the load would have to be reduced by 50% to demonstrate survival. A preliminary response spectrum evaluation was also performed. This analysis showed that the use of 0.33g over the entire mass was very conservative. This analysis also showed that only 25% of the mass experiences 0.33g and the rest experience lessor g values. This response spectrum analysis demonstrated that the use of dynamic analysis would most likely demonstrate survival; however, the dynamic analysis has not yet been performed.

Based on WHC 1983, the internal brick of the stack is assumed to fall into a large pile within the stack. The stack itself is also assumed to fall at both 0.12g and 0.25g earthquakes; however, based on the response spectra analysis, the entire stack is not assumed to fall (i.e., the damage radius is <61 m).

The evaluation of the stack in Conrads and Wagenblast's internal letter determined the stack could survive the 0.12g earthquake. However, WHC 1983 states that the stack is unstable with regards to overturning motions and the stack is assumed to fall.

The 291-B stack was evaluated for both the HRHE of 0.1g and the SSE of 0.25g (WHC 1991f). The results predicted that the stack would likely collapse during the SSE event, but the stack was considered adequate to resist the 0.10g event with some loss of function because of the masonry liner collapsing. The study is inconclusive with regards to the 0.12g DBE.

3.2.1.1.4 Previous Seismic Analyses of 211-B: Chemical Storage Area. WHC 1983 evaluated other components that are not critical for B Plant confinement, including 211-B. The Chemical Storage Areas were classified as Safety Class 3 structures. The 211-B Chemical Storage Area consists of a

series of horizontal and vertical aboveground tanks, associated piping, and access and support platforms.

The equivalent static method was used in WHC 1983 for these tanks. The seismic analysis was based on 0.2g. The liquids in the tank, as well as the tank, were assumed to be subjected to the peak horizontal response spectra accelerations. The internal pressure caused by the acceleration of the liquid and the forces on the concrete haunch and footing, which support the tanks, were determined and the stresses were combined using existing industry practice.

The results for the horizontal tanks concluded that the dead weight by itself creates excessive soil-bearing pressures with unacceptable factors of safety. These pressures result in movements that would overturn the tank, break the supports and subsequently collapse the tank.

The vertical tank is 3-m in diameter by 4.3-m high. The analysis of the vertical tanks indicated that the horizontal loading will buckle the vertical supports and overload the foundation anchors. The result is that these tanks will also fail. The analysis also showed that the tank piping will fail.

Conclusions for 211-B. Several upgrades have been made to the 211-B Chemical Storage Area subsequent to this analysis and are documented in *Preliminary Safety Analysis Report, B Plant Environmental Compliance Upgrades 211-B Chemical Tank Farm and 211-B Gallery Scale Tanks*, WHC-SD-W010H-PSAR-001, Rev. 0 (WHC 1993d). A retention basin to provide secondary containment for each group of tanks has been added. These reinforced concrete basins were designed per Safety Class 2 seismic criteria. The tank supports, piping, piping supports, and associated equipment have been modified to meet seismic criteria for Safety Class 3 structures; however, the vertical supports were removed, and HNO_3 is not presently stored at 211-B. In light of the reduced seismic resistance requirement and increased structural capacity, the chemical storage area is adequate as a Safety Class 3 structure.

3.2.1.1.5 Previous Seismic Analysis of 212-B: Cask Loading Station. The 212-B Building is inactive and the casks have been removed, but residual contamination remains and thus it is examined.

WHC 1983 analyzed the Cask Loading Station for both 0.1g and 0.25g seismic event. The 212-B Cask Loading Station, which is classified as a Safety Class 3 structure, consists of three separate structural components:

- Below grade operating gallery constructed of reinforced concrete
- Above grade operating gallery constructed of a structural steel frame with siding
- Above grade enclosure additions.

These above grade and below grade areas were evaluated separately. The stresses for the below grade gallery during the seismic events were within code limitations. A response spectrum analysis of the above grade portions of the Cask Loading Station indicated that the structure was adequate for both seismic events considered. The east-west (two dimensional) structural support

member at column line 2 of the cask-handling area was analyzed for earthquake motions. The results of the analysis were that the cask-handling area can survive a 0.2g seismic event with the stresses remaining within code allowables. The structure was assumed to remain intact with the contamination contained; therefore, the main structural components of the 212-B Cask Loading Station are adequate to resist the 0.09g seismic event required for a Safety Class 3 structure.

Only a qualitative appraisal was made for the enclosures on the north and south sides. These enclosures are not part of the main portion of the building (the cask-handling area). The enclosures have no movement-resistant connections; therefore, the siding provides only minimal lateral force resistance. These enclosures were considered inadequate for the seismic events considered; however, the contamination levels of the north and south enclosures are very small, meaning that collapse will result in little or no release.

3.2.1.1.6 Seismic Analyses of Other B Plant Support Facilities. The B Plant Complex is composed of a number of small buildings (e.g., compressor buildings, pump houses) that are not contaminated and may contain extremely small quantities of hazardous materials. Complete collapse of the buildings during a seismic event would not yield consequences above the risk acceptance guidelines.

3.2.1.2 Seismic Analysis Conclusions. Several deficiencies, with respect to current DOE requirements, are noted from the previous analyses. The canyon end-wall evaluation predicts excessively high stresses in the shear keys, but the wall is predicted to remain stable after shear-key failure. The analysis provides adequate assurance that the end-walls are structurally stable, but a time-history dynamic analysis would be required to establish that the walls can be classified as a Safety Class 1 structure. The end-wall analyses are also considered inadequate to confirm the structural stability of the end walls to Safety Class 2 criteria (0.12g). The organic process cell cover blocks are also assumed to be seismically unqualified.

The sand filter is found to be inadequate for the HRHE of 0.1g, which indicates that the structure would not survive the 0.12g DBE. On the basis of the analyses reviewed, filter cells A through C would be expected to fail the 0.12g DBE. Similarly, the 291-B stack is structurally inadequate for the DBE. The assumed failures are listed in Table 3-10.

Table 3-10. Summary of Assumed Failures for 0.12g Design-Basis Earthquake.

221-B Canyon	
Structure	Structure remains intact. There are gaps in the construction joint and in the area where the east and west wall meet the north and south walls. The crane falls to the floor of the canyon.
Crane	Falls, fails cover block, and falls into cell.
Cover blocks	Falls, ruptures tank or breaks jumper connection, and starts fire or spray leak.
291-B Filters	
A and B filters/vaults	North wall fails with a potential collapse.
C filter/vault	South wall fail with potential collapse.
Water seals	Could leak as a result of cracking.
Stack	Brick liner collapses and stack topples.

3.2.1.3 System and Components. Unmitigated nonseismic events do not exceed onsite or offsite guidelines for dose or exposure except for an aqueous spray release. There are no Safety Class (Safety Class 1) systems or components identified to prevent or mitigate credible accident scenarios that result in unmitigated offsite doses greater than 0.5 rem. For the aqueous spray release, the unmitigated onsite dose is greater than 5 rem. The stack is therefore designated as Safety Significant (Safety Class 2) to mitigate this event. WHC safety classification system policy is contained in WHC-CM-1-3, *Management Requirements and Procedures*, MRP 5.46, "Safety Classification of Systems, Components, and Structures" and WHC-CM-4-46, Chapter 9.0, "Assigning Safety Classes to Systems, Structures, and Components." Additionally, there are no Safety Class (Safety Class 1) or Safety Significant (Safety Class 2) systems or components identified for protection of the environment, in accordance with WHC-CM-4-46, Chapter 9.0.

3.2.2 Summary of Accident Analysis Assumptions

This section provides a summary of significant assumptions made within the accident analysis. The intent is to facilitate compliance with the safety basis, including screening for USQs, in accordance with DOE Order 5480.21. This section is not intended to impose requirements beyond those already specified or implied elsewhere in the safety basis.

3.2.2.1 Radiological/Toxicological Inventory. The radioactive and chemical inventory assumed in the *Accident Analysis* will not be exceeded without additional analysis.

B Plant is in a transitional status and would not routinely receive significant additional inventories not previously accounted for in the *Accident Analysis*. This section is not intended to impose an accounting or

periodic sampling program to verify the existing bounding inventory within B Plant; instead, it is intended to invoke the USQ process, as necessary. To that end, the following guidance applies.

- New radiological inventory in excess of 1,000 Ci or chemicals received into B Plant will be compared to the chemical and radiological inventories listed in the *Accident Analysis* to ensure that B Plant remains within the analyzed bounds.
- Quantities of chemicals routinely used for cleaning or maintenance purposes, which are controlled by the industrial safety, hazardous waste or other programs would not require an explicit review.
- Transfer of low-level waste (solid and liquid) from WESF, as described in WHC-SD-WM-TM-004, Rev. 0 (WHC 1994b), has been considered as part of the quantities listed in Table 1-9 and would not require additional review.

This section is related to Sections 2.1.1, "Seismic Events;" 2.2.1, "Release of Radioactive Materials;" 2.2.2, "Release of Nonradioactive Materials;" and 2.3.3.1, "Cell 27 Organic Fire," of the *Accident Analysis*.

3.2.2.2 Emergency Planning for Seismic Event. The *Accident Analysis* (Section 2.1.1, "Seismic Events") relies upon actions taken to mitigate a potential hydrogen buildup in the canyon exhaust filters after a seismic event. Such an accident would involve loss of ventilation airflow coincident with flooding of the filter; therefore, B Plant emergency planning will incorporate instructions to respond as necessary to these conditions, which will mitigate potential hydrogen buildup within 30 days.

3.2.3 Institutional Safety Programs

Institutional safety programs encompass the policies and procedures instituted by WHC and B Plant Operations to provide additional facility safety and to ensure the safety of the public and facility worker.

In accordance with WHC-CM-4-46, this document addresses the following institutional safety programs, which are found in Table 3-11:

- Safety training
- Radiation protection
- ALARA
- Environmental protection
- Emergency planning
- Operations assurance
- Industrial and occupational safety
- Industrial hygiene
- Fire protection
- Hydrogen explosion/deflagration
- Occurrence reporting
- Radioactive hazardous waste management.

Table 3-11. Administrative and Programmatic Controls. (3 sheets)

Institutional Safety Programs	Applicable DOE Order(s)*	Applicable WMC Controlled Manual(s)*
Safety training	DOE Order 5480.20, <u>Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Nonreactor Nuclear Facilities</u>	HSRCM-1, <u>Hanford Site Radiological Control</u> WMC-CM-1-10, <u>Safety</u> : industrial safety training requirements WMC-CM-2-15, <u>Training Standards</u> : radiological safety training WMC-IP-1043, <u>ALARA Program</u> : occupational ALARA program (WMC 1995b) WMC-CM-7-5, <u>Environmental Compliance</u> : environmental training and compliance verification, 90 day accumulation area dangerous waste training plan
Radiation protection	DOE Order 5400.5, <u>Radiation Protection of the Public and Environment</u> DOE Order 5480.4, <u>Environmental Protection, Safety, and Health Protection Standards</u> DOE Order 5480.11, <u>Radiation Protection for Occupational Workers</u> DOE/EH-256T, <u>Radiological control Manual</u> 10CFR835, <u>Occupational Radiation Protection</u>	HSRCM-1, <u>Hanford Site Radiological Control</u> WMC-SD-GM-DGS-30011, <u>Radiological Design Guide</u> (WMC 1994c) WMC-CM-4-16, <u>Dosimetry and Medical Services</u> : external and internal dosimetry, area monitoring, dosimetry reports and records WMC-CM-7-5, <u>Environmental Compliance</u> : High Level Waste WMC-CM-1145, <u>Radiation Protection Program</u>
ALARA	DOE Order 5480.11, <u>Radiation Protection for Occupational Workers</u>	HSRCM-1, <u>Hanford Site Radiological Control</u> WMC-CM-1, <u>Company Policies and Charters</u> : ALARA WMC-CM-1-3, <u>Management Requirements and Procedures</u> : ALARA WMC-IP-1043, <u>ALARA Program</u> : ALARA policy and program objective, job monitoring
Environmental protection	DOE Order 5400.1, <u>General Environmental Protection Program</u> DOE Order 5400.5, <u>Radiation Protection of the Public and the Environment</u> DOE Order 5480.4, <u>Environmental Protection, Safety, and Health Protection Standards</u> DOE Order 5484.1, <u>Environmental Protection, Safety, and Health Protection Information Reporting Requirements</u> RL Order 91-50, <u>Environmental Monitoring Plan</u> RL Order 93-97, <u>Environmental Protection Implementation Plan</u>	WMC-CM-1, <u>Company Policies and Charters</u> : environment/safety/health policy, preventing pollution and minimizing waste policy WMC-CM-7-5, <u>Environmental Compliance</u> : air quality, hazardous material management, NEPA/SEPA, solid waste management, water quality, environmental statutes/regulations/orders, compliance agreements/consent orders

Table 3-11. Administrative and Programmatic Controls. (3 sheets)

Institutional Safety Programs	Applicable DOE Order(s)*	Applicable WMC Controlled Manual(s)*
Emergency planning	<p>DOE Order 5500.1B, <u>Emergency Management System</u></p> <p>DOE Order 5500.2B, <u>Emergency Categories, Classes, and Notification and Reporting Requirements</u></p> <p>DOE Order 5500.3A, <u>Planning and Preparedness for Operational Emergencies</u></p> <p>DOE Order 5500.10, <u>Emergency Readiness Assurance Program</u></p>	<p>WMC-CM-1-10, <u>Safety</u>: emergency response guidance</p> <p>WMC-CM-4-43, <u>Emergency Management Procedures</u>: event command, reentry/recovery</p> <p>WMC-CM-4-44, <u>Emergency Preparedness Administration</u>: emergency center activation</p>
Operations assurance	DOE Order 5480.19, <u>Conduct of Operations Requirements for DOE Facilities</u>	<p>WMC-CM-1-3, <u>Management Requirements and Procedures</u>: operations assurance</p> <p>WMC-CM-1-5, <u>Standard Operating Practices</u>: operational practices</p>
Industrial and occupational safety	<p>DOE Order 5480.4, <u>Environmental Protection, Safety, and Health Protection Standards</u></p> <p>DOE Order 5483.1A, <u>Occupational Safety and Health Program for DOE Contractor Employees at Government-Owned, Contractor-Operated Facilities</u></p>	<p>WMC-CM-1, <u>Company Policies and Charters</u>: environment/safety/health policy, compliance with safety and environmental requirements</p> <p>WMC-CM-1-10, <u>Safety</u>: industrial safety/occupational safety</p> <p>WMC-CM-4-2, <u>Quality Assurance</u>: reduction and reporting of chemical analysis results</p>
Industrial hygiene	<p>DOE Order 5480.4, <u>Environmental Protection, Safety, and Health Protection Standards</u></p> <p>DOE Order 5480.8, <u>Radiological Health and Safety Policy</u></p> <p>DOE Order 5480.10, <u>Contractor Industrial Hygiene Program</u></p>	<p>WMC-CM-1-10, <u>Safety</u>: Industrial Hygiene Standards and Guides</p> <p>WMC-CM-4-40, <u>Industrial Hygiene</u>: industrial hygiene program</p>
Fire protection	DOE Order 5480.7A, <u>Fire Protection</u>	WMC-CM-4-41, <u>Fire Protection Program</u> : fire protection program, fire protection design, management and administration, fire protection systems
Hydrogen explosion/deflagration	<p>DOE Order 5483.1A, <u>Occupational Safety and Health Program for DOE Contractor Employees at Government-Owned, Contractor-Operated Facilities</u></p> <p>DOE Order 5480.7A, <u>Fire Protection</u></p>	<p>WMC-CM-1-10, <u>Safety</u>: Industrial Hygiene Standards and Guides</p> <p>WMC-CM-4-41, <u>Fire Protection Program</u>: fire protection program, fire protection design, management and administration, fire protection systems</p>
Occurrence reporting	DOE Order 0 232.1, <u>Occurrence Reporting and Processing of Operations Information</u>	<p>WMC-CM-1-4, <u>Corrective Action Management</u>: lessons learned evaluation procedure for occurrence reports</p> <p>WMC-CM-1-5, <u>Standard Operating Practices</u>: investigation of and response to abnormal events and conditions</p>

Table 3-11. Administrative and Programmatic Controls. (3 sheets)

Institutional Safety Programs	Applicable DOE Order(s)*	Applicable WHC Controlled Manual(s)*
Radioactive and hazardous waste management	DOE Order 5400.1, <u>General Environmental Protection Program</u> DOE Order 5480.1B, <u>Environmental Safety and Health Program for DOE Operations</u> DOE Order 5820.2A, <u>Radioactive Waste Management</u>	WHC-CM-1, <u>Company Policies and Charters</u> : preventing pollution and minimizing waste policy, transuranic waste certification review committee WHC-CM-2-14, <u>Hazardous Material Packaging and Shipping</u> : solid waste management, nonradioactive hazardous materials/waste shipments, mixed waste characterization WHC-CM-5-16, <u>Solid Waste Management</u> : solid waste disposal system, radioactive solid waste storage and disposal, dangerous waste annual report WHC-CM-7-5, <u>Environmental Compliance</u> : hazardous material management, solid waste management, water quality, air quality, 90 day accumulation area dangerous waste training plan WHC-SD-GN-DGS-30011, <u>Radiological Design Guide</u> HSRM-1, <u>Hanford Site Radiological Control</u>

* WHC-CM-5-6, B Plant/WESF Transition Projects Administration, administers these WHC administrative and programmatic requirements and the applicable DOE requirements.

ALARA = As low as reasonably achievable.

DOE = U.S. Department of Energy.

NEPA = National Environmental Policy Act.

SEPA = State (Washington) Environmental Policy Act.

WHC = Westinghouse Hanford Company.

Table 3-11 also presents administrative and programmatic documentation for these and corresponding DOE Orders and implementation plans.

3.2.3.1 Safety Training. Safety training for the B Plant Complex is incorporated into many of the other facility programs, policies, and procedures. While the majority of the facility-specific aspects of safety training are derived from WHC-CM-5-6, *B Plant/WESF Transition Projects Administration*, the company-wide or programmatic approach to safety training is documented in the following manuals (Table 3-11):

- HSRM-1, *Hanford Site Radiological Control*
- WHC-IP-1043, *ALARA Program*
- WHC-CM-1-10, *Safety*
- WHC-CM-2-15, *Training Standards*
- WHC-CM-7-5, *Environmental Compliance*.

The *Maintenance Implementation Plan for B Plant*, WHC-SP-0858 (WHC 1993e), identifies the training and qualification requirements of maintenance personnel. Adherence to maintenance procedures is of particular importance because safety equipment is required to mitigate potential accident scenarios and routine maintenance allows for identification and correction of equipment and systems problems that protects personnel. WHC-SP-0858 includes the following:

- Responsibilities
- Maintenance training programs
- Training schedules and support
- On-the-job training
- Qualifications
- Training in root cause analysis
- Training program approval, effectiveness, and feedback
- Management and supervisory training.

3.2.3.2 Radiation Protection. Radiation protection for the public, onsite personnel, and the environment is one of the major concerns at the Hanford Site. DOE Orders 5400.5, *Radiation Protection of the Public and the Environment*; 5480.4, *Environmental Protection, Safety, and Health Protection Standards*; and 5480.11, *Radiation Protection for Occupational Workers*, directly address radiation protection, while HSRM-1, WHC-SD-GN-DGS-30011, (WHC 1994c); WHC-CM-4-16, *Dosimetry and Medical Services*; and WHC-CM-7-5 address the programmatic approach to this issue (Table 3-11). WHC-CM-5-6, addresses most of the aspects governing B Plant programs, policies, and procedures directly related to radiation protection. One of these programs is as low as reasonably achievable (ALARA). The following topics are part of the B Plant-specific approach to radiation protection, which is discussed in WHC-CM-5-6.

3.2.3.3 As Low as Reasonably Achievable. The ALARA program is applied in all aspects of the B Plant radiation protection program and is a response to DOE Order 5480.11. The ALARA program philosophy is also applied in the material protection program, as part of the overall industrial/occupational safety program. The B Plant ALARA program implements the requirements and procedures defined in HSRM-1, WHC-CM-1-3, and WHC-IP-1043. WHC-CM-5-6 documents the B Plant-specific ALARA program. This program guides the B Plant team in the

matters of ALARA awareness and implementation of ALARA practices. The B Plant ALARA program has a set of procedures to address goals, meetings, ALARA management worksheets, and post-ALARA reviews.

The B Plant administration plays a vital role in the successful implementation of the ALARA program. The B Plant manager designates a point of contact for B Plant ALARA program activities.

3.2.3.4 Environmental Protection. A number of DOE Orders specify requirements for environmental protection. These Orders include:

- 5400.5, *Radiation Protection of the Public and the Environment*
- 5480.1B, *Environment Safety, and Health Program*
- Order 5480.4, *Environmental Protection, Safety, and Health Protection Standards*
- Order 5484.1, *Environmental Protection, Safety, and Health Protection Information Reporting Requirements.*

The WHC programmatic approach to environmental protection is documented in WHC-CM-1, *Company Policies and Charters*, WHC-CM-1-3, and WHC-CM-7-5. A significant portion of the B Plant environmental protection program is embedded in the facility's waste management programs (Section 3.2.3.12). Some of the existing documents that address B Plant environmental protection issues include:

- *B Plant Effluent and Facilities Process Units*, WHC-MR-0067 (WHC 1989)
- *B Plant Liquid Radioactive Waste Characterization Sampling Plan*, WHC-SD-WM-EV-072, Rev 0-A (WHC 1994d)
- *B Plant Chemical Sewer Sampling and Analysis Plan*, WHC-SD-WM-PLN-029, Rev. 1 (WHC 1992)
- *Effluent Monitoring Plan for B Plant Steam Condensate*, WHC-SD-EMP-027, Rev. 0 (WHC 1990c)
- *Effluent Monitoring Plan for B Plant Chemical Sewer*, WHC-SD-WM-EV-028, Rev. 0 (WHC 1990d)
- *Effluent Monitoring Plan for B Plant Cooling Water*, WHC-SD-WM-EMP-029, Rev. 0 (WHC 1990e)
- *Effluent Monitoring Plan for B Plant Process Condensate*, WHC-SD-EMP-030, Rev. 0 (WHC 1990f)
- *Preliminary Safety Evaluation: B Plant Environmental Compliance Upgrades*, WHC-SD-W010-PSE-001, Rev. 0 (WHC 1993f).

WHC-CM-5-6 documents the procedure for conducting environmental compliance assessments (ECA). The procedure includes responsibilities, requirements, scheduling, conducting ECAs, ECA results, training and qualifications, functions in B Plant to be assessed, and record keeping.

3.2.3.5 Emergency Planning. Emergency planning is required by DOE Orders 5500.1B, *Emergency Management System*; 5500.2B, *Emergency Categories, Classes, and Notification and Reporting Requirements*; 5500.3A, *Planning and Preparedness for Operational Emergencies*; and 5500.10, *Emergency Readiness Assurance Program*. The WHC programmatic approach to emergency planning is documented in WHC-CM-1-10; WHC-CM-4-43, *Emergency Management Procedures*; and WHC-CM-4-44, *Emergency Preparedness Administration*. *Emergency Plan for the B Plant Complex*, WHC-IP-0263-BPC (WHC 1994e), documents the B Plant-specific emergency plan. The emergency plan provides employees and visitors information necessary to react to emergency situations in order to do the following:

- Maximize employee safety, minimize risk to life, and provide prompt and efficient treatment for injured persons
- Ensure continuity of leadership at all times and in all emergency situations
- Minimize the effects of an accident on the health and safety of the general public and the environment
- Minimize property damage
- Ensure prompt internal and external communications with responsible authority.

The emergency plan addresses building evacuation routes, employee requirements, potential emergency conditions, emergency plan implementation, emergency resources, emergency response plans, termination of emergency, accident recovery, post-event analysis, and reporting requirements.

3.2.3.6 Operations Assurance. Operations assurance can be considered a major part of any conduct of operations program. Operations assurance is required by DOE Order 5480.19, *Conduct of Operations Requirements for DOE Facilities*. WHC-wide operations assurance is documented in WHC-CM-1, and WHC-CM-1-5, *Standard Operating Practices*, and is applied through WHC-SP-0708, which also documents compliance with DOE Order 5480.19. WHC-CM-5-6 documents the following aspects of operations assurance for the B Plant Complex:

- Administration
- Organizational interface control
- Conduct of operations.

3.2.3.7 Industrial and Occupational Safety. B Plant has numerous industrial and occupational safety programs, policies, and procedures. These requirements are primarily derived from DOE Orders 5480.4 and 5483.1A, *Occupational Safety and Health Program DOE Contractor Employees at Government-Owned, Contractor-Operated Facilities*. The WHC programmatic

approach to industrial and occupational safety is documented in WHC-CM-1, WHC-CM-1-3, WHC-CM-4-2, *Quality Assurance*, and WHC-CM-1-10.

WHC-CM-5-6 implements policies, plans, and procedures regarding industrial and occupational safety. Other segments of Section 3.2.3 describe additional programs such as safety training, ALARA, emergency planning, industrial hygiene, fire protection, and radioactive hazardous waste management.

3.2.3.8 Industrial Hygiene. An industrial hygiene program is interrelated with a facility's industrial/occupational safety program and with its radiation protection and radioactive/hazardous waste management programs. DOE Orders 5480.4, 5480.8, *Radiological Health and Safety Policy*, and 5480.10, *Contractor Industrial Hygiene Program*, refer to the establishment of an industrial hygiene program, and WHC-CM-1-10 and WHC-CM-4-40, *Industrial Hygiene*, document the WHC programmatic approach to industrial hygiene. Industrial hygiene is addressed in the B Plant administration manual. The topics addressed include:

- Organizational interface control
- Canyon housekeeping and contamination control
- Chemical spills, water leaks, and condensate leaks
- Safety program
- Hazard communication program.

3.2.3.9 Fire Protection. Fire protection requirements are presented in DOE Order 5480.7A, *Fire Protection*. Fire Protection at B Plant is addressed on many levels. The company-wide or programmatic approach to fire protection is documented in WHC-CM-4-41, *Fire Protection Program*.

3.2.3.10 Hydrogen Explosion/Deflagration. An accumulation of radiolytic hydrogen within the plant could represent an explosion/deflagration hazard. As described in the *Accident Analysis*, this potential is limited primarily to locations where hydrogenous materials, such as water, organic chemicals or ion exchange resins, exist in conjunction with high radiation fields.

For locations where hydrogen rich atmospheres may develop, DOE Order 5483.1A, DOE Order 5480.7A, WHC-CM-4-3, and WHC-CM-4-41, prescribe measures required to protect against hydrogen explosion or deflagration.

3.2.3.11 Occurrence Reporting. Occurrence reporting requirements are presented in DOE Order 5000.3B, *Occurrence Reporting and Processing of Operations Information*. Programmatic documentation for occurrence reporting is presented in Table 3-11. Documents that address occurrence reporting include the following:

- WHC-CM-1-3, *Management Requirements and Procedures*
- WHC-CM-1-4, *Corrective Action Management*
- WHC-CM-1-5, *Standard Operating Practices*.

The following B Plant-specific programs are presented in WHC-CM-5-6:

- Occurrence Categorization, Notification, and Reporting
- Conduct of Operations.

3.2.3.12 Radioactive and Hazardous Waste Management. The handling or management of radioactive and hazardous waste is specified in DOE Order 5400.1, *General Environmental Protection Program*, DOE Order 5480.1B, and DOE Order 5820.2A, *Radioactive Waste Management*.

Radioactive and hazardous waste management involves various aspects of environmental protection, radiation protection, ALARA, industrial safety, and occupational safety programs. The WHC-wide programmatic approach to radioactive and hazardous waste management is contained in the following documents:

- HSRCM-1, *Hanford Site Radiological Control*
- WHC-CM-1, *Company Policies and Charters*
- WHC-CM-1-3, *Management Requirements and Procedures*
- WHC-CM-2-14, *Hazardous Material Packaging and Shipping*
- WHC-SD-GN-DGS-30011, *Radiological Design Guide*, Rev. 0 (WHC 1994c)
- WHC-CM-5-16, *Solid Waste Management*
- WHC-CM-7-5, *Environmental Compliance*.

Many radioactive and hazardous waste programs specifically applied at B Plant are presented in WHC-CM-5-6. These programs are described in the manual under the following topics:

- B Plant administration
- Organizational interface control
- Maintenance of waste shipment records
- Conduct of Operations
- Safety program
- Solid waste management
- Controlling lead inventory and use
- Controlling procurement of hazardous material
- Hazard communications program.

Cleanout and Stabilization at B Plant, WHC-SA-1811-FP (WHC 1993g), discusses the following B Plant cleanup issues.

- Canyon work area decontamination
- Radioactive liquid inventory removal
- Systematic equipment deactivation
- HEPA filter inventory stabilization and/or remediation
- Contaminated process equipment and cell characterization
- Residual facility contamination stabilization
- Decisions required to determine the scope of characterization, disposal of equipment by burial, decontamination activities, and isolation or remediation of significant source terms.

B Plant Waste Minimization Plan, WHC-SD-WM-EV-025, Rev. 0-B (WHC 1993h), presents a formalized waste minimization program composed of management

policies, requirements, and procedures. The plan discusses material use and specifies a review plan at least annually, with revisions made appropriately. This document details the B Plant Waste Minimization Organization's responsibilities, training, employee participation/incentive program, and waste minimization for new projects/designs. The potential for waste identification and minimization is also discussed.

3.3 INTERIM SAFETY BASIS EVALUATION SUMMARY

The accident analysis presented in this ISB shows that, with the assistance of safety structures, safety equipment, and institutional safety programs, B Plant is capable of operating within the WHC "offsite" safety envelope described. The accident analysis shows that B Plant is capable of operating within the WHC "onsite" safety envelope described except for the design basis earthquake with the following contributors: organic fire, canyon contamination, filter contamination, and stack collapse on the filter vault.

4.0 CONFIGURATION CONTROLS SYSTEM

This chapter addresses drawing control, operating procedure control, maintenance procedure control, modification control, USQ procedures, and quality assurance procedures, in accordance with the format and content requirements for ISB documentation in WHC-CM-4-46. Table 4-1 provides the WHC programmatic documentation and DOE Orders that apply to configuration controls systems for configuration management, quality assurance, procedure control, and the USQ process.

4.1 CONFIGURATION MANAGEMENT

B Plant-specific programs supporting configuration management are detailed in WHC-CM-5-6. A brief discussion of these programs is contained in the following subsections.

4.1.1 B Plant Configuration Control and Verification

The B Plant configuration control and verification program provides the administrative system used to record and verify the condition of, and changes to, B Plant operating facilities to ensure that operations are carried out in a safe and cost-effective manner. The documentation for this program includes responsibilities, requirements, and the program procedure.

4.1.2 B Plant Facility/Process Monitor and Control System Configuration Control

The B Plant Facility process monitor and control system configuration control program describes the administrative system used to maintain, modify, and document the configuration of the facility/process monitor and control system. The program provides administrative guidelines for the system key access and control, and includes responsibilities and requirements. The procedure provides guidance for B Plant Engineering, B Plant Maintenance, and B Plant Operations.

4.1.3 Work Management

The Work Management Procedure defines how the nine-step process of the job control system described in WHC-CM-1-8, *Work Management*, is implemented and used in the B Plant Facility. Subjects discussed include the following:

- Modification impact review
- Work change notice
- Construction interfaces
- Work item validation
- Post-work review and documentation.

Table 4-1. Configuration Control Systems. (2 sheets)

Configuration control system	Applicable DOE order	Applicable WHC controlled manuals and other programmatic manuals
Configuration management	<p>DOE Order 4330.4B, <u>Maintenance Management Program</u></p> <p>DOE Order 5480.21, <u>Unreviewed Safety Questions</u></p> <p>DOE Order 5480.22, <u>Technical Safety Requirements</u></p> <p>DOE Order 5480.23, <u>Nuclear Safety Analysis Reports</u></p>	<p>WHC-CM-2-5, <u>Management Control System</u>: revisions - change control/change control procedures</p> <p>WHC-CM-3-5, <u>Document Control and Records Management</u>: document control</p> <p>WHC-CM-4-2, <u>Quality Assurance</u>: design control, instructions/procedures/drawings, control of processes, design control, document control</p> <p>WHC-CM-6-1, <u>Standard Engineering Practices</u>: design/configuration identification practices, design/configuration control practices, design/configuration verification practices</p> <p>WHC-CM-6-2, <u>Project Management</u>: project control, project baseline management and change control</p> <p>WHC-CM-6-32, <u>Safety Analysis and Engineering Work Procedures</u>: document review and issue</p> <p>WHC-CM-1-8, <u>Work Management</u>: job control system - including modifications</p>
Quality assurance	DOE Order 5700.6C, <u>Quality Assurance</u>	<p>WHC-CM-1, <u>Company Policies and Charters</u>: quality assurance policy, total quality policy</p> <p>WHC-CM-2-1, <u>Procurement Manual and Procedures</u>: quality assurance requirements</p> <p>WHC-CM-3-5, <u>Document Control and Records Management</u>: quality assurance records</p> <p>WHC-CM-4-2, <u>Quality Assurance</u>: quality assurance program, quality assurance records, audits</p> <p>WHC-CM-6-32, <u>Safety Analysis and Engineering Work Procedures</u>: quality assurance program plan requirements</p> <p>WHC-CM-1-8, <u>Work Management</u>: automatic data processing quality assurance requirements</p>

Table 4-1. Configuration Control Systems. (2 sheets)

Configuration control system	Applicable DOE order	Applicable WHC controlled manuals and other programmatic manuals
Procedure control	DOE Order 4330.48, <u>Maintenance Management Program</u> DOE Order 5480.19, <u>Conduct of Operations Requirements for DOE Facilities</u> DOE-STD-1029-92, <u>Writer's Guide For Technical Procedures</u> (DOE 1992b)	WHC-CM-1-3, <u>Management Requirements and Procedures</u> : overall set of requirements and procedures WHC-CM-3-5, <u>Document Control and Records Management</u> : working level procedure control WHC-CM-4-2, <u>Quality Assurance</u> : procedures WHC-CM-6-1, <u>Standard Engineering Practices</u> : engineering documents and procedures, operability test procedures and reports, acceptance test procedures and reports WHC-CM-1-8, <u>Work Management</u> : planning and scheduling reference procedures WHC-IP-0240, <u>Plant Operating Procedures Format and Preparation Guidelines</u> (WHC 1988): guidelines to authors of plant operating procedures, procedure design and writing, procedure release, definitions for procedure format and writing conventions WHC-SP-0708, <u>Conduct of Operations</u> : operations procedures (WHC 1993i)
USQ process	DOE Order 5480.21, <u>Unreviewed Safety Questions</u>	WHC-CM-1-3, <u>Management Requirements and Procedures</u> : identifying and resolving unreviewed safety questions

DOE = U.S. Department of Energy.
 USQ = Unreviewed safety question.
 WHC = Westinghouse Hanford Company.

4.1.4 Preparing Operating Documents

Chapter 16 in WHC-IP-1182, B Plant/WESF Conduct of Operations describes the B Plant-specific responsibilities and requirements for preparing operating documents. This preparation is a process consisting of development, review approval, and controlled issue and release.

4.1.5 B Plant Complex Writer's Guide For Configuration Management

The B Plant Writer's Guide for Configuration Management provides assistance in recognizing the requirements and guidance provided in DOE Orders and WHC Manuals for preparing most of the documents required at the B Plant Complex. The guide also discusses the responsibilities of B Plant personnel. The guidelines include:

- Document standards
- Identifying the need for a document
- Assigning documentation tasks
- Determining document type
- Preparing document basis
- Agreeing on editing tasks
- Preparing documents
- Reviewing and approving documents' first level of review, verification, validation, approval, first use of a procedure
- Issuing and releasing a document
- Managing records.

4.1.6 Quality Assurance Program Plan For Configuration Management

The quality assurance program plan for configuration management plan discusses design control, including the requirements and implementation plan, based on the requirements set forth in WHC-CM-4-2 and WHC-CM-6-1, *Standard Engineering Practices*. The plan also discusses document control and procurement document control, as part of the overall quality assurance program. The quality assurance program plan for the B Plant facility is contained in WHC-CM-5-6.

4.1.7 Sitewide Configuration Management

Table 4-1 provides a list of Sitewide programmatic configuration management system documents and a brief summary of the document contents and associated DOE Orders.

4.2 QUALITY ASSURANCE

The B Plant-specific programs supporting quality assurance are detailed in WHC-CM-5-6. Brief descriptions of these programs are contained in the following subsections.

4.2.1 Work Management

The quality assurance function, as described in WHC-CM-5-6, is responsible for the review and approval of work packages per MRP 5.43, "Impact Levels," and is responsible for post-review per MRP 5.43. This MRP has been canceled effective 2/1/94 and replaced with WHC-CM-3-5, *Document Control and Records Management*, MRP 12.7, "Approval of Environmental, Safety, and Quality Affecting Documents."

4.2.2 B Plant Maintenance

B Plant Maintenance provides a guide for the administration of B Plant Complex maintenance activities. The quality assurance function, as described in the WHC-CM-5-6, participates in the work authorization process (Section 5.18, "Work Authorization"). In accordance with WHC-CM-4-2, this organization performs normal quality assurance oversight activities.

4.2.3 Quality Assurance Program Plan

The quality assurance program plan procedure provides guidance for the implementation of the B Plant quality assurance program plan, as required by WHC-CM-4-2. WHC-CM-4-2 is based on *Quality Assurance Program Requirements for Nuclear Facilities*, ASME NQA-1-89 (ASME 1989). Over the next three years, WHC will be changing over to compliance with 10 CFR 830.120, "Quality Assurance Rule," *Code of Federal Regulations*, as amended. The *Westinghouse Hanford Company Quality Assurance Program Implementation Plan*, WHC-SP-1131, (WHC 1995c), has been developed for this procedure. The B Plant quality assurance program plan discusses the following topics:

- General requirements
- Quality assurance program implementation
- Design control requirements and implementation
- Procurement document control
- Instructions procedures drawings
- Document control
- Purchased material, equipment, and services control
- Identification and control of items
- Process control

- Inspection
- Test controls
- Control of measuring and test equipment
- Handling, storage, and shipping
- Determination of inspection, testing, and operating statuses
- Nonconforming items control
- Corrective action
- Records maintenance
- Audit performance.

4.2.4 Sitewide Quality Assurance

Table 4-1 provides a list of Sitewide programmatic quality assurance documentation and a brief summary of the document contents and associated DOE Orders.

4.3 PROCEDURE CONTROL

The B Plant-specific programs supporting quality assurance are detailed in WHC-CM-5-6. Brief descriptions of the programs are contained in the following subsections.

4.3.1 Review of New, Revised, and Procedure Change Authorized Modified Procedures

The review of modified procedures establishes the system necessary to ensure that B Plant Operations personnel are aware of new and revised procedures and procedure change authorizations affecting B Plant facilities.

4.3.2 Policy and Procedure Review

The Policy and Procedure Review ensures that appropriate B Plant Operations staff are aware of new and revised WHC policies and procedures and provides a method for documenting B Plant Operations staff review of such policies and procedures.

4.3.3 Preparing Operating Documents

The Preparing Operating Documents Procedure provides guidelines for the preparation of plant operating procedures, temporary and one-time procedures, and work procedures and work plans.

4.3.4 Conduct of Operations

The conduct of operations program includes compliance by operations, conditions when not to follow procedures along with alternate guidance, what

to do in the case of procedural inadequacy during emergencies, procedure implementation, procedure sign-off list, and periodic review of operating procedures.

4.3.5 Quality Assurance Program Plan For Procedure Control

The quality assurance program plan for procedure control addresses the requirements and implementation of instructions, procedures, and drawings.

4.3.6 B Plant Complex Writer's Guide For Procedure Control

Chapter 16 in WHC-IP-1182, B Plant/WESF Conduct of Operations provides assistance in document preparation and procedures. The guide assigns responsibilities and provides guidelines. Guidelines include document preparation and document review, including validation and verification, and document approval. The guide also provides guidance for the first use of a procedure.

4.3.7 Sitewide Procedure Control

Table 4-1 provides a list of Sitewide programmatic procedural control system documentation and a brief summary of the document contents and associated DOE Orders.

4.4 UNREVIEWED SAFETY QUESTION PROCESS

The B Plant-specific program supporting the USQ process is detailed in WHC-CM-5-6 and describes the B Plant-specific requirements for implementing WHC-CM-1-3, MRP 5.12 "Identifying and Resolving Unreviewed Safety Questions." The B Plant USQ process program also addresses the responsibilities, requirements, and procedures associated with the process. It also defines the processes of ensuring that the USQ review is based on a valid safety basis, screening and evaluating a proposed change, and screening and evaluating occurrences.

4.4.1 Sitewide Unreviewed Safety Question Requirement

Table 4-1 provides the Sitewide USQ requirement, and a brief summary of the procedure contents and associated DOE Order.

This page intentionally left blank.

5.0 REFERENCES

5.1 CODES AND REGULATIONS

- ASME, 1989, *Quality Assurance Program Requirements for Nuclear Facilities*, ASME NQA-1-89, American Society of Mechanical Engineers, New York, New York.
- SDC-4.1, 1989, *Standard Architectural-Civil Design Criteria: Design Loads for Facilities*, Rev. 11, Hanford Plant Standards, Westinghouse Hanford Company, Richland, Washington.
- UBC, 1940, *Uniform Building Code*, International Conference of Building Officials, Whittier, California.
- 10 CFR 830.120, "Quality Assurance Rule," *Code of Federal Regulations*, as amended.

5.2 DOCUMENTS

- Blume, John A., 1971, *Earthquake Analysis of the Waste Encapsulation Facility*, JABE-VITRO-01, John A. Blume and Associates, San Francisco, California.
- Conrad, T. J., and G. R. Wagenblast, 1989, *AR Vault, AR Stack, and B Plant Stack Seismic Evaluation*, (Internal Letter SA:GRW: 89-15, to R. J. Murkowski), Westinghouse Hanford Company, Richland, Washington.
- ICF KEH, 1991, *B Plant Filter Design Calculations*, ICF KEH, Richland, Washington.
- LLNL, 1980, *Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards*, UCRL-15910, Lawrence Livermore National Laboratory, Livermore, California.
- WHC, 1983, *B Plant Support Facilities Natural Forces Evaluation*, WHC-SD-WM-TA-002, Rev. 0, Rockwell Hanford Operations, Hanford, Washington.
- WHC, 1988, *Plant Operating Procedure Format and Preparation Guidelines*, WHC-IP-0240, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1989, *B Plant Effluent and Facilities Process Units*, WHC-MR-0067, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1990a, *B Plant Canyon Structure Seismic Evaluation Review Documentation*, WHC-SD-WM-SA-007, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1990b, Not Used.

- WHC, 1990c, *Effluent Monitoring Plan for B Plant Steam Condensate*, WHC-SD-WM-EMP-027, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1990d, *Effluent Monitoring Plan for B Plant Chemical Sewer*, WHC-SD-WM-EMP-028, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1990e, *Effluent Monitoring Plan for B Plant Cooling Water*, WHC-SD-WM-EMP-029, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1990f, *Effluent Monitoring Plan for B Plant Process Condensate*, WHC-SD-WM-EMP-030, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1991a, *B Plant Structural Qualification Interim Report*, WHC-SD-WM-SA-001, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1991b, *B Plant Canyon Structure Seismic Evaluation*, WHC-SD-WM-SA-005, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1991c, *B Plant Building Interface Study*, WHC-SD-WM-SA-014, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1991d, *B Plant Confinement Study*, WHC-SD-WM-SA-012, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1991e, *B Plant Cell Drain Header Seismic Analysis*, WHC-SD-W024H-SA-001, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1991f, *B Plant Canyon Exhaust Ductwork and Filter Study*, WHC-SD-WM-SA-016, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1992, *B Plant Chemical Sewer Sampling and Analysis Plan*, WHC-SD-WM-PLN-029, Rev. 1, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1993a, *B Plant Safety Analysis Report*, WHC-SD-WM-SAR-013, Rev. 2, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1993b, *B Plant Preliminary Hazards Analysis*, WHC-SD-WM-PHA-008, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1993c, *B Plant Seismic Qualification of E-Filter*, WHC-SD-W239-SA-001, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1993d, *Preliminary Safety Analysis Report, B Plant Environmental Compliance Upgrades, 211-B Chemical Tank Farm and 221-B Gallery Scale Tanks*, WHC-SD-W010H-PSAR-001, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- WHC, 1993e, *Maintenance Implementation Plan for B Plant*, WHC-SP-0858, Rev. 1, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1993f, *Preliminary Safety Evaluation: B Plant Environmental Compliance Upgrades Project W010H*, WHC-SD-W010-PSE-001, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1993g, *Cleanout and Stabilization at B Plant*, WHC-SA-1811-FP, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1993h, *B Plant Waste Minimization Plan*, WHC-SD-WM-EV-025, Rev. 0-B, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1993i, *Westinghouse Hanford Company Conduct of Operations — GOCO Cross Cultivation*, WHC-SP-0708, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1994a, *B Plant Cleanout and Stabilization Program Update*, WHC-SD-WM-PRS-014, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1994b, *B Plant Facility Description*, WHC-SD-WM-TM-004, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1994c, *Radiological Design Guide*, WHC-SD-GN-DGS-30011, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1994d, *B Plant Liquid Radioactive Waste Characterization Sampling Plan*, WHC-SD-WM-EV-072, Rev. 0-A, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1994e, *Emergency Plan for the B Plant Complex*, WHC-IP-0263-BPC, Rev. 4, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1995a, *B Plant Canyon End-Wall Study*, WHC-SD-WM-SA-013, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1995b, *Westinghouse Hanford Company Occupational ALARA Program*, WHC-IP-1043, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1995c, *The Westinghouse Hanford Company Quality Assurance Program and Implementation Plan*, WHC-SP-1131, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1996a, *B Plant Interim Safety Basis Accident Analysis*, WHC-SD-WM-SARR-030, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1996b, *B Plant Building Interface Study*, WHC-SD-WM-SA-014, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1996c, *B Plant Confinement Study*, WHC-SD-WM-SA-012, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

WHC, 1996d, *B Plant Canyon Exhaust Ductwork and Filter Study*, WHC-SD-WM-SA-016 Rev. 0, Westinghouse Hanford Company, Richland, Washington.

5.3 WESTINGHOUSE HANFORD COMPANY CONTROLLED MANUALS

HSRCM-1, *Hanford Site Radiological Control*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-1, *Policies And Charters*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-1-3, *Management Requirements and Procedures*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-1-4, *Corrective Action Management*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-1-5, *Standard Operating Practices*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-1-8, *Work Management*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-1-10, *Safety*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-2-1, *Procurement Manual and Procedures*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-2-5, *Management Control System*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-2-14, *Hazardous Material Packaging and Shipping*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-2-15, *Training Standards*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-3-5, *Document Control and Records Management*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-4-2, *Quality Assurance*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-4-16, *Dosimetry and Medical Services*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-4-40, *Industrial Hygiene*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-4-41, *Fire Protection Program*, Westinghouse Hanford Company, Richland, Washington.

- WHC-CM-4-43, *Emergency Management Procedures*, Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-4-44, *Emergency Preparedness Administration*, Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-4-46, *Nonreactor Facility Safety Analysis*, Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-5-6, *B Plant/WESF Transition Projects Administration*, Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-5-16, *Solid Waste Management*, Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-6-1, *Standard Engineering Practices*, Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-6-2, *Project Management*, Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-6-32, *Safety Analysis and Engineering Work Procedures*, Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-7-5, *Environmental Compliance*, Westinghouse Hanford Company, Richland, Washington.

5.4 U.S. DEPARTMENT OF ENERGY ORDERS

- DOE, 1992a, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*, DOE-STD-1027-92, U.S. Department of Energy, Washington, D.C.
- DOE, 1992b, *Writer's Guide for Technical Procedures*, DOE-STD-1029-92, U.S. Department of Energy, Washington, D.C.
- DOE O 231.1, *Occurance Reporting and Processing of Operations Information*, U.S. Department of Energy, Washington, D.C.
- DOE Order 4330.4B, *Maintenance Management Program*, U.S. Department of Energy, Washington, D.C.
- DOE Order 5000.3B, *Occurrence Reporting and Processing of Operations Information*, U.S. Department of Energy, Washington, D.C.
- DOE Order 5400.1, *General Environmental Protection Program*, U.S. Department of Energy, Washington, D.C.
- DOE Order 5400.5, *Radiation Protection of the Public and Environment*, U.S. Department of Energy, Washington, D.C.
- DOE Order 5480.1B, *Environmental Safety and Health Program for DOE Operations*, U.S. Department of Energy, Washington, D.C.

- DOE Order 5480.4, *Environmental Protection, Safety, and Health Protection Standards*, U.S. Department of Energy, Washington, D.C.
- DOE Order 5480.7A, *Fire Protection*, U.S. Department of Energy, Washington, D.C.
- DOE Order 5480.8, *Radiological Health and Safety Policy*, U.S. Department of Energy, Washington, D.C.
- DOE Order 5480.10, *Contractor Industrial Hygiene Program*, U.S. Department of Energy, Washington, D.C.
- DOE Order 5480.11, *Radiation Protection for Occupational Workers*, U.S. Department of Energy, Washington, D.C.
- DOE Order 5480.19, *Conduct of Operations Requirements for DOE Facilities*, U.S. Department of Energy, Washington, D.C.
- DOE Order 5480.20, *Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Nonreactor Nuclear Facilities*, U.S. Department of Energy, Washington, D.C.
- DOE Order 5480.21, *Unreviewed Safety Questions*, U.S. Department of Energy, Washington, D.C.
- DOE Order 5480.22, *Technical Safety Requirements*, U.S. Department of Energy, Washington, D.C.
- DOE Order 5480.23, *Nuclear Safety Analysis Reports*, U.S. Department of Energy, Washington, D.C.
- DOE Order 5483.1A, *Occupational Safety and Health Program for DOE Contractor Employees at Government-Owned, Contractor-Operated Facilities*, U.S. Department of Energy, Washington, D.C.
- DOE Order 5484.1, *Environmental Protection, Safety, and Health Protection Information Reporting Requirements*, U.S. Department of Energy, Washington, D.C.
- DOE Order 5500.1B, *Emergency Management System*, U.S. Department of Energy, Washington, D.C.
- DOE Order 5500.2B, *Emergency Categories, Classes, and Notification and Reporting Requirements*, U.S. Department of Energy, Washington, D.C.
- DOE Order 5500.3A, *Planning and Preparedness for Operational Emergencies*, U.S. Department of Energy, Washington, D.C.
- DOE Order 5500.10, *Emergency Readiness Assurance Program*, U.S. Department of Energy, Washington, D.C.
- DOE Order 5700.6C, *Quality Assurance*, U.S. Department of Energy, Washington, D.C.

DOE Order 5820.2A, *Radioactive Waste Management*, U.S. Department of Energy, Washington, D.C.

DOE Order 6430.1A, *General Design Criteria*, U.S. Department of Energy, Washington, D.C.

RL Order 91-50, *Environmental Monitoring Plan*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

RL Order 93-97, *Environmental Protection Implementation*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

This page intentionally left blank.

6.0 ACKNOWLEDGEMENTS

The authors would like to acknowledge the following for their contributions to this document.

- K. S. McCullough, Hazard Categorization
- S. E. Chalk, ISB Rewrite/Update
- B. A. Schwehr, Assistance in Plant Configuration Corrections

This page intentionally left blank.

APPENDIX A
HAZARD CATEGORIZATION
REPORT FOR B PLANT

This page intentionally left blank.

1.0 INTRODUCTION

This Appendix provides the hazard categorization analysis of the B Plant Facility, as required by DOE Order 5480.23, *Nuclear Safety Analysis Reports* and DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23* (DOE 1992). The hazard category identified for a facility provides the basis for determining the level of detail in the facility safety analysis documentation and the methodologies to be applied in the accident analysis process.

B Plant is located in the northwest corner of the 200 East Area at the Hanford Site. The B Plant was originally designed to chemically process spent nuclear fuels. The last process mission was completed in 1985. Presently, the B Plant Facility is not operating and has been placed in a cleanout and stabilization program. The new mission is to complete a transition to long-term surveillance and maintenance in preparation for D&D. Details of the cleanout and stabilization activities are provided in *Cleanout and Stabilization Program Update*, WHC-SD-WM-PRS-014, Rev. 0 (WHC 1994a).

During the transition to shutdown, several systems must remain operational to support WESF and its radioactive strontium and cesium capsule inventory. B Plant supplies cooling water and deionized water for pool cells and accepts low-level liquid waste streams, liquid effluents, and solid waste from WESF. Systems supporting the WESF operations have been included in the analysis.

B Plant is a complex of several buildings and support buildings. *B Plant Facility Description*, WHC-SD-WM-TM-004, Rev. 0 (WHC 1994b), provides more detail of the B Plant facilities. As a result of the cleanout and stabilization activities, the radiological material inventory in the plant has been significantly reduced. The radiologically contaminated systems, structures and components remaining within the B Plant Complex and considered in this hazard categorization analysis include the following:

- 221-B, B Plant Main Facility
 - Tank TK-9-1, low-level waste storage
 - Tank TK-10-1, low-level waste storage
 - Tank TK-24-1, low-level waste storage
 - Tank TK-26-1, aqueous storage
 - Tank TK-27-3, organic solvent storage
 - Tank TK-27-4, ICF pump (currently not in use: residual contamination)
 - Tank TK-28-3, organic solvent storage
 - Tank TK-28-4, IBF pump R (currently not in use: residual contamination)

- Tank TK-29-2, supernatant receiver (currently not in use: residual contamination)
- Tank TK-30-3, aqueous storage
- Tank TK-36-1, flush water
- Tank TK-39-1, low-level waste storage
- Cells 4 and 22, Process Cells
- Canyon structure and miscellaneous equipment
- 291-B, Sand Filter Building
 - Sand Filter
- 291-BD, Filter Building
 - A filter
 - B filter
 - C filter
 - D filter
- 212-B Cask Transfer Facility.

2.0 RADIOLOGICAL HAZARD CATEGORIZATION ANALYSIS

Based on the results of the radiological hazard categorization analysis described in the following sections, the B Plant Facility is classified as a Hazard Category 2 nuclear facility.

2.1 METHODOLOGY

The B Plant Facility hazard categorization was performed using the methodology provided in DOE-STD-1027-92. DOE-STD-1027-92 requires categorization of a facility based on total curies per radionuclide located in the facility. The hazard categorization is identified by determining the ratio of the total quantity of each specific facility radionuclide to the Hazard Category 2 threshold quantities for the identical radionuclide provided in DOE-STD-1027-92. Once the individual isotopic ratios are established, the ratio quantities are summed. If the total of the ratios exceeds one, then the facility is classified a Hazard Category 2 nuclear facility.

2.2 RADIOLOGICAL HAZARD CATEGORIZATION ANALYSIS

The radiological isotopes of consequence for the B Plant have been identified as ⁹⁰Sr and ¹³⁷Cs and ²³⁹Pu. The B Plant radiological inventory is provided in Table A-1. The total B Plant inventory for ⁹⁰Sr is 562,401 Ci;

the total inventory for ^{137}Cs is 1,246,716 Ci and the total inventory for ^{239}Pu is 0.93 Ci.

Table A-1. B Plant Radiological Inventory.

System	Ci of ^{90}Sr	Ci of ^{137}Cs	Ci of ^{239}Pu
Tank TK-26-1 ^(a)	22,891	992	n/a
Tank TK-27-3 ^(a)	2,112	1,456	n/a
Tank TK-28-3 ^(a)	3,346	1,473	n/a
Tank TK-30-3 ^(a)	21,802	945	n/a
Tank TK-36-1 ^(b)		3,000	n/a
Tanks TK-9-1, TK-10-1, ^(b) TK-22-1, TK-24-1, TK-29-2, TK-39-1	1,250	850	
A filter ^(b)	12,000	18,000	0.062
B filter ^(b)	29,000	43,000	0.062
C filter ^(b)	16,000	25,000	0.062
D filter ^(b)	50,000	550,000	0.062
Sand filter ^(b)	3,000	2,000	0.682
Canyon structure and miscellaneous equipment ^(b)	400,000	600,000	
212-B ^(b)	1,000	n/a	n/a
Total	562,401	1,246,716	0.93 ^{239}Pu

^(a) Derived from Table 2-17, WHC-WM-SD-SARR-030, Rev. 0 (WHC 1995), with 80% tank capacity.

^(b) Derived from Table 1-9, WHC-SD-WM-SARR-030.

The ratio of plant inventory curies to the Hazard Category 2 threshold curie provided in DOE-STD-1027-92 are calculated and totaled in Table A-2. As noted in the table, the summed ratios total 3.94×10^1 , which is greater than 1; therefore, B Plant is classified as a Hazard Category 2 nuclear facility and is considered to have significant onsite dose consequences.

Table A-2. B Plant Category Determination.

Isotope	B Plant inventory curie	Hazard Category 2 threshold curie	Ratio of facility inventory to Hazard Category 2
^{90}Sr	562,401	22,000 (2.2×10^4)	25.56
^{239}Pu	0.93	56 (5.6×10^1)	0.02
^{137}Cs	1,246,716	89,000 (8.9×10^4)	14.01
Total of Ratios			39.59 or, 3.96×10^1

According to DOE-STD-1027-92, the application of the graded approach to the facility-specific accident analysis is determined by the hazard category of the facility. In turn, the level of detail in the safety analysis report must support the methodology and level of detail provided in the accident analysis. Consequently, the B Plant *Accident Analysis* (WHC 1995) should use the methodology identified in DOE-STD-1027-92 for Hazard Category 2 nuclear facilities.

3.0 REFERENCES

- DOE Order 5480.23, *Nuclear Safety Analysis Reports*, U.S. Department of Energy, Washington, D.C.
- DOE, 1992, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*, DOE-STD-1027-92, U.S. Department of Energy, Washington, D.C.
- WHC, 1994a, *B Plant Cleanout and Stabilization Program Update*, WHC-SD-WM-PRS-014, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1994b, *B Plant Facility Description*, WHC-SD-WM-TM-004, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1995, *B Plant Interim Safety Basis Accident Analysis*, WHC-SD-WM-SARR-030, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

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

OCT 25 1996

96-TPD-226

Mr. H. J. Hatch, President
Fluor Daniel Hanford, Inc
Richland, Washington

Dear Mr. Hatch:

Post-it* Fax Note	7671	Date	10/30/96	# of pages	1
To	AURORA HAU	From	PAUL ROEGE		
Co./Dept.	FDHWS	Co.	BWHC		
Phone #		Phone #	372-0443		
Fax #	370-0629	Fax #			

APPROVAL OF B PLANT SAFETY EVALUATION REPORT - BASIS FOR INTERIM OPERATION
(CONTRACT DE-AC06-96RL13200)

The enclosed Safety Evaluation Report (SER) presents the results of an RL review of the proposed Basis for Interim Operation (BIO) for B Plant. The SER states that the operation of B Plant, as described in the proposed BIO and within the conditions established in the SER, can be performed without undue risk to the public, the environment, and onsite and facility workers.

The following documents comprise the proposed B Plant BIO: WHC-SD-WM-TM-004, Rev 1, B Plant Facility Description, WHC-SD-WM-15B-008, Rev 0, B Plant Interim Safety Basis, and WHC-SD-WM-SARR-030, Rev 0, B Plant Interim Safety Basis Accident Analysis.

It is RL's understanding that the BIO is intended to supersede the existing B Plant Safety Analysis Report WHC-SD-WM-SAR-013 and the 212B Hazards Identification and Evaluation Report WHC-SD-WM-SAR-008. The existing B Plant SARs and their associated OSRs will remain in effect until FDH has developed and executed an implementation plan for the BIO.

FDH is directed to notify the RL Manager when implementation has been completed. FDH is further directed to formally request deletion of the B Plant Safety Analysis Reports and their associated OSRs when the BIO implementation is complete.

If you have any questions, please contact me or your staff may contact David T. Evans, B Plant Program Manager, on 373-9278.

Sincerely,

John D. Wagoner
Manager

TPD:DTE

Enclosure

cc w/encl:
L. Olguin, FDH
G. Reddick, FDH
W. F. Heer, BWHC

R. E. Heineman, BWHC
P. E. Roegel, BWHC
K. A. Beecher, GSFC

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	S. E. Chalk	Date 11/7/96
Project Title/Work Order		EDT No. 600058
B Plant Interim Safety Basis/KN24F		ECN No. N/A

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
S. E. Chalk	A2-25	X			
L. I. Covey	S6-51	X			
D. W. Craig	S6-81	X			
E. N. Dodd, Jr.	S7-12	X			
D. T. Evans (4 copies)	T1-98	X			
B. J. Gray	S6-81	X			
R. E. Heineman	S6-65	X			
L. E. Johnson	A2-25	X			
S. E. Killoy	S4-66	X			
G. L. McCormick	H5-31	X			
A. B. Rau (2 copies)	A2-25	X			
P. E. Roege (5 copies)	S4-66	X			
D. K. Smith	S6-81	X			
M. K. Ullah	S6-69	X			
Central Files (2 copies + originals)	A3-88	X			
Docket Files (2 copies)	B1-17	X			