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Volume 3

Risk Management Study for the Retired Hanford Site Facilities

Qualitative Risk Evaluation for the Retired Hanford Site Facilities

Prepared for the U.S. Department of Energy
Office of Environmental Restoration and Waste Management

Westinghouse
Hanford Company Richland, Washington

Hanford Operations and Engineering Contractor for the
U.S. Department of Energy under Contract DE-AC06-87RL10930

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Qualitative Risk Evaluation for the Retired Hanford Site Facilities

G. A. Coles
M. V. Shultz
W. E. Taylor

Date Published
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Prepared for the U.S. Department of Energy
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DOCUMENT TITLE: QUALITATIVE RISK EVALUATION FOR THE RETIRED SURPLUS HANFORD SITE FACILITIES

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QUALITATIVE RISK EVALUATION FOR THE RETIRED HANFORD SITE FACILITIES

G. A. Coles
M. V. Shultz
W. E. Taylor

ABSTRACT

This document provides a risk evaluation of the 100 and 200 Area retired, surplus facilities on the Hanford Site. Also included are the related data that were compiled by the risk evaluation team during investigations performed on the facilities. Results are the product of a major effort performed in fiscal year 1993 to produce qualitative information that characterizes certain risks associated with these facilities.

The retired facilities investigated for this evaluation are located in the 100 and 200 Areas of the 1,450-km^2 (570-mi^2) Hanford Site. The Hanford Site is a semiarid tract of land in southeastern Washington State. The nearest population center is Richland, Washington, (population 32,000) 30 km (20 mi) southeast of the 200 Area.

During walkdown investigations of these facilities, data on real and potential hazards that threatened human health or safety or created potential environmental release issues were identified by the risk evaluation team. Using these findings, the team categorized the identified hazards by facility and evaluated the risk associated with each hazard. The factors contributing to each risk, and the consequence and likelihood of harm associated with each hazard also are included in this evaluation.

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EXECUTIVE SUMMARY

This document provides a risk evaluation of the 100 and 200 Area retired, surplus facilities on the Hanford Site. Also included are the related data that were compiled by the risk evaluation team during investigations performed on the facilities. Results are the product of a major effort performed in fiscal year 1993 to produce qualitative information that characterizes certain risks associated with these facilities. The primary motivation for this effort is an integrated action plan outlined in correspondence* from Westinghouse Hanford Company (WHC) to the U. S. Department of Energy Richland Operations Office. The plan is a response to a large number of findings, recommendations, and proposed actions that followed reviews of the fatal accident that occurred at the 105-F Reactor Building in 1992.

The objectives of this risk evaluation are (1) to identify on a qualitative basis the risk to humans and the environment from retired, surplus facilities; (2) differentiate risk in near term (0 to 5 years) and long term (5 to 10 years); and (3) use a common foundation for evaluating risk that provides a basis for comparing and prioritizing facilities and risks. In addition to meeting these objectives, the risk characterization information in this document provides (1) insights on dominant risk contributors and sensitivities; (2) identification of areas that may need more detailed study; and (3) a basis for carry-on activities related to improved management decision making and loss prevention.

---

*Hughes, M. C., 1992, *Westinghouse Hanford Company Integrated Plan for the Followup to the Fatality at 105-F Building* (external letter 9204633B R2 to J. D. Wagoner, U. S. Department of Energy, Richland Field Office, August 10, 1992), Westinghouse Hanford Company, Richland, Washington.

Table 1 provides a rank order of the fifteen facilities with the highest risk index for both the 0 to 5- and 5 to 10-year cases. The rank order for the 5 to 10-year case is different than the longer term case because aging and degradation contribute to risk.

Table 1. Rank Order of Buildings by Highest Risk.

Building			
Order	0 to 5 years	Order	5 to 10 years
1	105-F Reactor	1	105-DR Reactor
2	105-DR Reactor	2	105-F Reactor
3	105-H Reactor	3	105-H Reactor
4	105-D Reactor	4	105-D Reactor
5	221-U Canyon	5	105-C Reactor
6	105-B Reactor	6	183-C Water Plant
7	190-KW Pump House	7	1713-H Warehouse
8	202-S Canyon	8	105-B Reactor
9	105-KW Reactor	9	224-B Office and Canyon
10	105-C Reactor	10	205-A Solvent Handling
11	212-R Storage	11	221-U Canyon
12	224-B Office and Canyon	12	105-KE Reactor
13	1713-H Warehouse	13	190-KW Pump House
14	105-KE Reactor	14	291-S Exhaust Fan
15	185-B/190-B Pump Houses	15	292-U Stack Gas Monitor

Although this risk assessment is qualitative in nature, quantitative measures in the form of relative risk index values are used to make comparisons. This is accomplished by assigning each hazard identified to a risk category that has an associated risk index value. The total risk index for a facility is the sum of all the index values assigned to risks identified for that facility. Table 2 illustrates a matrix of the risk categories used.

Table 2. Risk Matrix Categories.

Likelihood index	Consequence categories			
	I - Catastrophic	II - Severe	III - Unplanned release	IV - Minor
A	Critical	Critical	1 Serious 2 Moderate 3 Minor	Moderate
B	Critical	Serious	1 Moderate 2 Minor 3 Negligible	Minor
C	Serious	Moderate	1 Minor 2 Negligible 3 Negligible	Minor
D	Minor	Minor	1 Negligible 2 Negligible 3 Negligible	Negligible
E	Negligible	Negligible	1 Negligible 2 Negligible 3 Negligible	Negligible

As shown, the risk categories are a function of both the likelihood and consequence of an undesired event. Table 3 shows the number of hazards that were identified for each facility by risk consequence categories. These risk categories are separated by near term (0 to 5 years) and long term (5 to 10 years). The resulting risk index is also tallied for each facility.

Of the hazards that were identified, falling, electrical shock, (and to a smaller degree) radiation exposure appear to be the most significant risk contributors. Falling hazards are primarily related to deteriorating roof panels and the need for more positive access control to the roofs from interior doors.

Table 3. Hazards per Risk Category.

Number of hazards per risk category						
Building	Critical	Serious	Moderate	Minor	Negligible	Risk index
0 to 5 years						
105-F Reactor	3	0	3	4	7	150,837
105-DR Reactor	2	2	2	5	8	103,608
105-H Reactor	1	1	3	6	8	52,378
105-D Reactor	1	1	2	7	6	52,146
221-U Canyon	1	1	0	1	7	51,527
105-B Reactor	1	0	2	7	9	50,649
190-KW Pump House	1	0	1	4	8	50,338
202-S Canyon	0	3	1	2	11	4,801
105-C Reactor	0	2	2	6	9	3,629
212-R Storage	0	2	2	0	2	3,502
224-B Office and Canyon	0	2	1	5	5	3,355
1713-H Warehouse	0	2	0	1	4	3,024
105-KW Reactor	0	2	3	5	9	3,589
105-KE Reactor	0	1	3	6	9	2,379
185-B/190-B Pump Houses	0	1	2	2	3	2,043
5 to 10 years						
105-DR Reactor	3	1	3	5	7	152,357
105-F Reactor	3	1	2	6	6	152,126
105-H Reactor	2	1	3	6	7	102,377
105-D Reactor	2	0	3	7	5	100,895
105-C Reactor	2	0	3	6	8	100,878
183-C Water Plant	2	0	1	3	5	100,315
1713-H Warehouse	2	0	0	3	2	100,062
105-B Reactor	1	1	3	7	7	52,397
224-B Office and Canyon	1	1	2	5	4	52,104
205-A Solvent Handling	1	1	0	4	5	51,585
221-U Canyon	1	1	0	3	5	51,565
105-KE Reactor	1	0	3	6	9	50,879
190-KW Pump House	1	0	3	3	7	50,817
291-S Exhaust Fan	1	0	2	4	3	50,583
292-U Stack Gas Monitor	1	0	1	1	2	50,272

Potential electrical shock also is a significant hazard. Out-of-service electrical distribution systems apparently are being energized for tours, surveillance work, and other activities. These systems are old, degraded, patched together, and in some cases receive no regular preventative maintenance. Potential radiation exposure risk exists primarily in the 200 Area retired processing facilities where there is a high potential for

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uptake of radionuclides and external exposure to ionizing radiation. Figures 1 and 2 show the risk contribution from different hazard types for the 100 and 200 Areas, respectively.

Figure 1. 100 Area Risk Contribution.

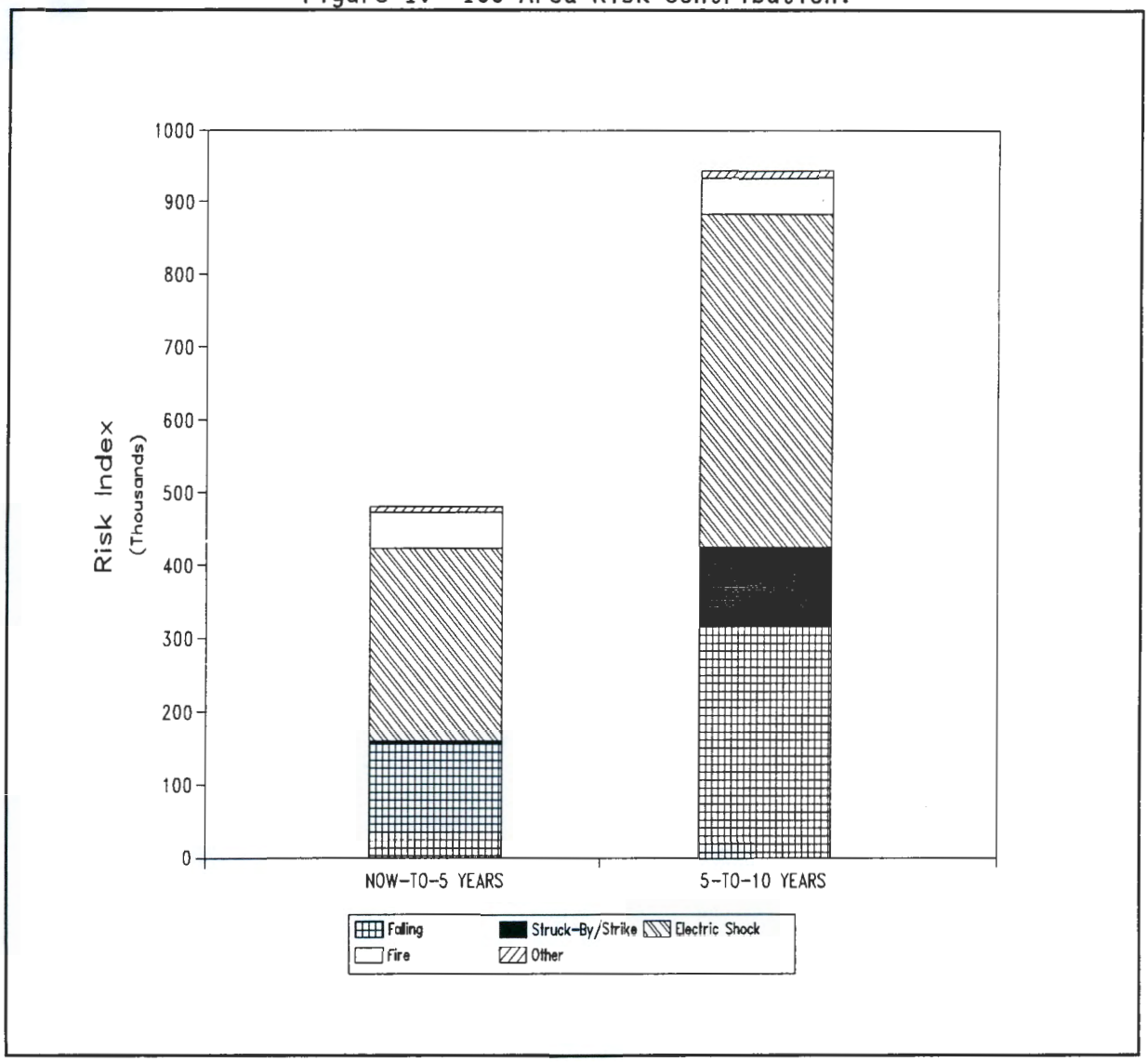
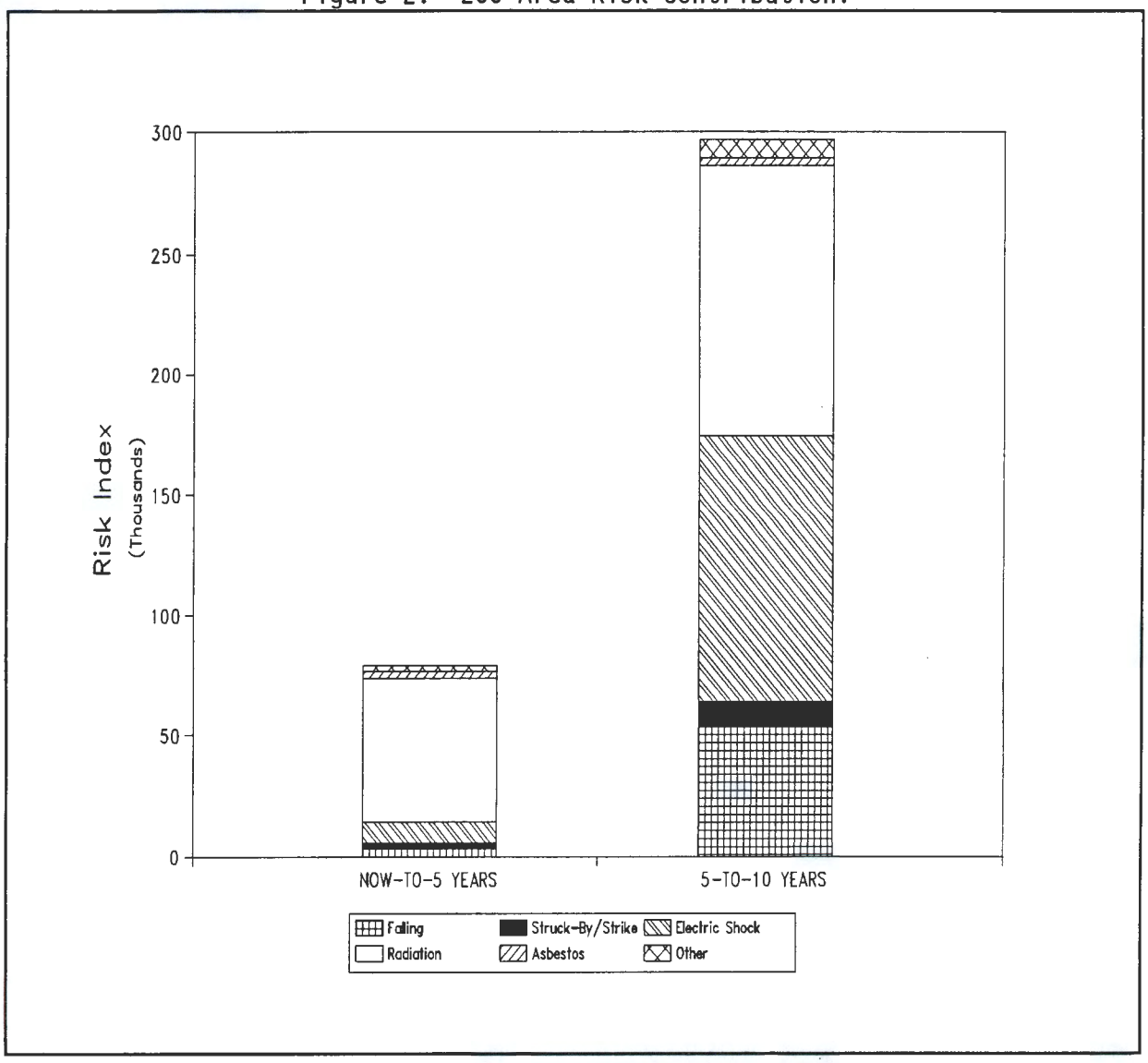


Figure 2. 200 Area Risk Contribution.



The dominate risks from these facilities are sensitive to factors that could change and should therefore be noted. These are referred to as risk sensitivities. For example, one risk sensitivity is the primary dependency on the amount of human activity in a building; an increase in activity increases human exposure to hazards. A second example is the possibility of increased radiation exposure or release risk when cutting into piping or structures, or

uncovering activated materials. For some buildings in the 200 Area, ventilation failure might increase the risk of a hazardous or radioactive material release. Two final important factors that affect risk are changes in administrative controls (such as changes in building access control), and the lack of human awareness to safety rules and potential hazards.

The evaluation process for determining risk consisted of three parts: (1) hazard investigations of retired, surplus facilities; (2) an evaluation (performed in a team meeting format) of the findings recorded during investigations; and (3) an evaluation of the results.

Team members conducted walkdown investigations of retired facilities and recorded findings on evaluation worksheets. The team included WHC and Kaiser Engineering Hanford professionals trained in the structural, electrical, industrial, radiation, and environmental safety disciplines. Walkdowns were augmented by reviews of applicable existing documentation, such as facility drawings, routine surveys, and hazard reports.

During team meetings, members (aided by the Team Risk Evaluation Lead) evaluated and condensed individual findings and recorded them on Risk Evaluation Summary Sheets. The Risk Evaluation Summary sheets are provided for each facility and are organized by hazard categories. Evaluations of results determined risk categories and corresponding risk indexes.

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ACRONYMS

cpm	counts per minute
dpm	disintegrations per minute
FY	fiscal year
HEHF	Hanford Environmental Health Foundation
HEPA	high-efficiency particulate air
HVAC	heating ventilation air conditioning
MLD	Master Logic Diagram
PCB	polychlorinated biphenyl
PPG	Priority Planning
PUREX	Plutonium-Uranium Extraction
REDOX	Reduction Oxidation
RL	U.S. Department of Energy, Richland Operations Office
WHC	Westinghouse Hanford Company

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QUALITATIVE RISK EVALUATION FOR THE RETIRED HANFORD SITE FACILITIES

1.0 INTRODUCTION AND PURPOSE

This document provides a risk evaluation of the 100 and 200 Area retired, surplus facilities on the Hanford Site. Included are the related findings that were compiled by the risk evaluation team during investigations performed on those facilities. Results are the product of a major effort performed in fiscal year (FY) 1993 to produce qualitative information that characterizes certain risks associated with these facilities.

This document is the third in a four volume series that comprise the risk management study for the retired, surplus facilities. Volume 1 is the executive summary of the risk management study; volume 2 is the risk evaluation work procedure; volume 3 provides the results of the risk evaluation; and volume 4 is the risk reduction cost comparison.

During walkdown investigations of these facilities, data on real and potential hazards that threatened human health or safety or created potential environmental release issues were recorded by the risk evaluation team. Using these findings, the team categorized the identified hazards by facility and evaluated the risk associated with each hazard. The factors contributing to each risk, and the consequence and likelihood of harm associated with each hazard also are included in this evaluation. Work for this evaluation was performed in accordance with the procedure described in *Risk Management Study for the Retired Hanford Site Facilities - Risk Evaluation Work Procedure for the Retired Hanford Site Facilities* (Coles et al. 1993).

Risk characterization information provides (1) insights on dominant risk contributors and sensitivities; (2) identification of areas that may need more detailed study; (3) a process for comparing the risks between facilities both in the present and future; and (4) ultimately a basis for carry-on activities related to improved management decision making and loss prevention.

The primary motivation for this effort is an integrated action plan outlined in correspondence (Hughes 1992) from Westinghouse Hanford Company (WHC) to the U.S. Department of Energy, Richland Operations Office (RL). The plan is a response to a large number of findings, recommendations, and proposed actions that followed reviews of the fatal accident that occurred at the 105-F Reactor Building in 1992.

The key criteria used in the preparation of this risk evaluation were derived from the integrated action plan and the risk evaluation work procedure (Coles et al. 1993):

- Risk evaluations shall be made using information recorded on findings worksheets during walkdown investigations of the retired facilities.

- Retired facility hazard investigations and risk evaluations shall be performed by a team of WHC and Kaiser Engineering Hanford professionals.
- Team members shall be trained in structural, electrical, industrial, radiation, and environmental safety disciplines.
- The primary focus shall be a measurement of risk to humans and the environment from each retired facility.
- Risk evaluations shall use the Priority Planning (PPG) approach.
- Risks shall be categorized by near term (0 to 5 years) and long term (5 to 10 years).

This evaluation uses elements of the PPG approach described in WHC-CM-1-3, *Management Requirements and Procedures*. The PPG approach was developed as a system to implement comprehensive self-assessment programs at WHC. However, because of the specific requirements of this risk evaluation, significant changes from the PPG system were necessary. Despite the changes, the system used in this evaluation and the original PPG system are both based on the concept of relative risk and use numerical indices to provide a qualitative estimate of risk. These systems require only order of magnitude estimates of the frequency and consequences of events. Using these estimates, a forecast of risk (5 to 10 years) was made for each hazard.

Section 2.0 provides a summary of results for the risk evaluation. This summary includes (1) a rank ordering of all 100 and 200 Area retired facilities by risk index, and (2) a general description of the dominant risk contributors and sensitivities. Section 3.0 provides a detailed description of the results and includes a facility-specific discussion of dominant risk contributors and sensitivities. Section 4.0 provides a brief description of the evaluation process. Information that supports the risk indexes and descriptions are included as appendices in the form of checklists, risk index worksheets, and risk evaluation summary sheets.

2.0 SUMMARY OF RESULTS

Information in Section 2.1 includes (1) a list of facilities in rank order by risk index with associated risk category information, and (2) a list of overall risk contributors by hazard category for the 0 to 5- and 5 to 10-year time frames. Section 2.2 provides a general narrative of dominant risk contributors and sensitivities.

Prioritizing was achieved by rank ordering the 100 and 200 Area retired facilities by their risk index values. A list of overall risk contributors by hazard category generally identify which hazards are consequential. Descriptions of dominant risk contributors provide engineering insights that can be used to determine how risk can be reduced. Discussions of risk sensitivities provide insight on how the risk might increase if the baseline operating mode changes (i.e., physical or administrative control changes associated with the buildings).

A large quantity of data supporting this risk evaluation were generated during the facility investigations and subsequent evaluations. Most of this data are summarized in this document and provided as appendixes. Some of this information is contained only in project files such as the raw findings and observations, and subsequent hazard categorizations. This document contains two concise primary information summaries:

Risk Evaluation Summary

Data generated during facility investigations were used to identify hazards and estimate likelihood and consequences of associated potential accidents. These estimates are arranged by hazard category and associated risk category. Locations where accidents could occur, factors that affect the estimates of likelihood and consequence, and recommended mitigating actions are also provided. This data represent a concise characterization of risk and are provided as Appendix C.

Risk Index Worksheets

A risk index worksheet for each facility was constructed from the Risk Evaluation Summary. The risk matrix category and corresponding risk index value for each hazard category is identified. Accordingly, a total risk index is calculated for a building by summing the value indexes associated with each hazard category. The risk index worksheets are provided as Appendix B.

2.1 RISK INDEX AND SUMMARY TABLES

Risk index values provide a measure of relative risk for each facility. Tables 2-1 and 2-2 rank all 100 and 200 Area retired facilities with the highest risk index for both the 0 to 5- and 5 to 10-year cases, respectively. Because aging and degradation contribute to risk, the rank order for the 5 to 10-year case is different than the 0 to 5-year case.

Table 2-1. Building Rank by Risk Index (0 to 5 Years). (sheet 1 of 2)

Number of hazards per risk category (0 to 5 years)						
Building	Critical	Serious	Moderate	Minor	Negligible	Risk index
105-F Reactor	3	0	3	4	7	150,837
105-DR Reactor	2	2	2	5	8	103,608
105-H Reactor	1	1	3	6	8	52,378
105-D Reactor	1	1	2	7	6	52,146
221-U Canyon	1	1	0	1	7	51,527
105-B Reactor	1	0	2	7	9	50,649
190-KW Pump House	1	0	1	4	8	50,338
202-S Canyon	0	3	1	2	11	4,801
105-KW Reactor	0	2	3	5	9	3,859
105-C Reactor	0	2	2	6	9	3,629
212-R Storage	0	2	2	0	2	3,502
224-B Office and Canyon	0	2	1	5	5	3,355
1713-H Warehouse	0	2	0	1	4	3,024
105-KE Reactor	0	1	3	6	9	2,379
185-B/190-B Pump Houses	0	1	2	2	3	2,043
205-A Solvent Handling	0	1	1	3	6	1,816
165-KW Power Control	0	1	0	4	5	1,585
291-S Exhaust Fan	0	1	1	3	5	1,815
232-Z Plutonium Incinerator	0	1	1	2	1	1,791
215-C Storage	0	1	1	0	4	1,754
292-U Stack Gas Monitor	0	1	1	0	3	1,753
103-B Riggers Loft	0	1	1	1	1	1,771
212-P Storage	0	1	0	3	3	1,563
233-S Plutonium Concentration	0	1	0	3	2	1,562
241-SX-401 Process Control	0	1	0	1	3	1,523
241-SX-402 Process Control	0	1	0	1	3	1,523
1701-BA Badge House	0	1	0	1	1	1,521
1714-C Solvent Storage	0	1	0	0	2	1,502
1702-C Badge House	0	1	0	0	1	1,501
183-KW Filter Plant	0	0	2	5	6	606
291-U Exhaust Fan	0	0	2	5	5	605
183-C Water Plant	0	0	2	4	5	585
182-K Pump House	0	0	2	4	5	585
108-F Biology Laboratory	0	0	2	4	4	584
190-B Tunnel/Annex	0	0	2	0	2	502
2718-S Sand Filter Sample	0	0	1	5	3	353
271-U Office	0	0	1	3	6	316
2711-S Stack Monitoring	0	0	1	3	5	315
115-KE Gas Recirculation	0	0	1	2	5	295
233-SA Exhaust Filter	0	0	1	2	1	291
293-S Offgas Treatment	0	0	1	1	4	274
115-KW Gas Recirculation	0	0	1	1	0	270

Table 2-1. Building Rank by Risk Index (0 to 5 Years). (sheet 2 of 2)

Number of hazards per risk category (0 to 5 years)						
Building	Critical	Serious	Moderate	Minor	Negligible	Risk index
103-D Fresh Metal Storage	0	0	1	0	2	252
183-F Clearwell	0	0	1	0	0	250
S Plant Butler	0	0	0	4	2	82
212-N Storage	0	0	0	3	1	61
276-S Solvent Handling	0	0	0	2	6	46
116-DR Reactor Exhaust Stack	0	0	0	2	0	40
1702-DR Badge House	0	0	0	2	0	40
1714-KW Warehouse	0	0	0	2	0	40
292-S Jet Pit House	0	0	0	1	4	24
2715-S Storage	0	0	0	1	4	24
1702-KE Badge House	0	0	0	1	1	21
1702-KW Badge House	0	0	0	1	1	21
1701-FA Badge House	0	0	0	1	0	20
116-KW Reactor Exhaust Stack	0	0	0	1	0	20
276-U Solvent Handling	0	0	0	0	4	4
104-B-2 Tritium Laboratory	0	0	0	0	2	2
1713-KER Warehouse	0	0	0	0	0	0
117-KW Filter	0	0	0	0	0	0
167-K Crosstie Tunnel/Annex	0	0	0	0	0	0
119-DR Air Sample	0	0	0	0	0	0
116-KE Reactor Exhaust Stack	0	0	0	0	0	0
117-KE Exhaust Air Filter	0	0	0	0	0	0
110-KE Gas Storage	0	0	0	0	0	0
116-D Reactor Exhaust Stack	0	0	0	0	0	0
117-DR Exhaust Air Filter	0	0	0	0	0	0
110-KW Gas Storage	-	-	-	-	-	-
1608-B Seal House	-	-	-	-	-	-
104-B-1 Tritium Vault	-	-	-	-	-	-
1720-HA Arsenal Building	-	-	-	-	-	-

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Table 2-2. Building Rank by Risk Index (5 to 10 Years). (sheet 1 of 3)

Number of hazards per risk category (5 to 10 years)						
Building	Critical	Serious	Moderate	Minor	Negligible	Risk index
105-DR Reactor	3	1	3	5	7	152,357
105-F Reactor	3	1	2	6	6	152,126
105-H Reactor	2	1	3	6	7	102,377
105-D Reactor	2	0	3	7	5	100,895
105-C Reactor	2	0	3	6	8	100,878
183-C Water Plant	2	0	1	3	5	100,315
1713-H Warehouse	2	0	0	3	2	100,062
105-B Reactor	1	1	3	7	7	52,397
224-B Office and Canyon	1	1	2	5	4	52,104
205-A Solvent Handling	1	1	0	4	5	51,585
221-U Canyon	1	1	0	3	5	51,565
105-KE Reactor	1	0	3	6	9	50,879
190-KW Pump House	1	0	3	3	7	50,817
291-S Exhaust Fan	1	0	2	4	3	50,583
292-U Stack Gas Monitor	1	0	1	1	2	50,272
165-KW Power Control	1	0	0	5	6	50,106
202-S Canyon	0	3	1	4	9	4,839
212-R Storage	0	3	1	0	2	4,752
241-SX-402 Process Control	0	3	0	1	1	4,521
241-SX-401 Process Control	0	3	0	0	2	4,502
105-KW Reactor	0	2	4	4	9	4,089
108-F Biology Laboratory	0	2	4	0	4	4,004
185-B/190-B Pump Houses	0	2	2	3	2	3,562
212-P Storage	0	2	1	1	3	3,273
232-Z Plutonium Incinerator	0	2	1	2	0	3,290
271-U Office	0	2	0	3	5	3,065
233-S Plutonium Concentration	0	2	0	3	1	3,061
291-U Exhaust Fan	0	1	3	3	5	2,315
2718-S Sand Filter Sample	0	1	3	3	2	2,312
182-K Pump House	0	1	2	4	4	2,084
2711-S Stack Monitoring	0	1	2	2	4	2,044
103-B Riggers Loft	0	1	1	1	2	1,772
215-C Storage	0	1	1	0	4	1,754
190-B Tunnel/Annex	0	1	1	0	2	1,752
1714-KW Warehouse	0	1	1	0	0	1,750
233-SA Exhaust Filter	0	1	0	2	1	1,541
1701-BA Badge House	0	1	0	1	1	1,521
1702-KE Badge House	0	1	0	1	0	1,520
1702-KW Badge House	0	1	0	1	0	1,520
1702-C Badge House	0	1	0	1	0	1,520
116-DR Reactor Exhaust Stack	0	1	0	1	0	1,520
103-D Fresh Metal Storage	0	1	0	0	2	1,502
1714-C Solvent Storage	0	1	0	0	2	1,502
183-KW Filter Plant	0	0	3	4	6	836

Number of hazards per risk category (5 to 10 years)						
Building	Critical	Serious	Moderate	Minor	Negligible	Risk index
1702-DR Area Badge House	0	0	2	0	0	500
115-KE Gas Recirculation	0	0	1	4	5	335
115-KW Gas Recirculation	0	0	1	3	0	310
293-S Offgas Treatment	0	0	1	2	3	293
2904-SA Water Sampling	0	0	1	0	0	250
183-F Clearwell	0	0	1	0	0	250
276-S Solvent Handling	0	0	0	4	4	84
S-Plant Butler	0	0	0	4	2	82
212-N Storage	0	0	0	3	1	61
292-S Jet Pit House	0	0	0	1	4	24
2715-S Storage	0	0	0	1	4	24
117-KW Exhaust Air Filter	0	0	0	1	0	20
1701-FA Gate House	0	0	0	1	0	20
117-KE Exhaust Air Filter	0	0	0	1	0	20
116-KW Reactor Exhaust Stack	0	0	0	1	0	20
276-U Solvent Handling	0	0	0	0	4	4
104-B-2 Tritium Laboratory	0	0	0	0	2	2
1713-KER Warehouse	0	0	0	0	0	0
110-KE Gas Storage	0	0	0	0	0	0
167-K Crosstie Tunnel/Annex	0	0	0	0	0	0
117-DR Exhaust Air Filter	0	0	0	0	0	0
119-DR Exhaust Air Sample	0	0	0	0	0	0
116-D Reactor Exhaust Stack	0	0	0	0	0	0
110-KW Gas Storage	-	-	-	-	-	-
1608-B Seal House	-	-	-	-	-	-
104-B-1 Tritium Vault	-	-	-	-	-	-
1720-HA Arsenal Building	-	-	-	-	-	-

NOTE: In considering the ranking shown in Tables 2-1 and 2-2, note that entry into some buildings was not allowed because of safety concerns or other reasons.

a. No entry was made into portions of the 115-KE and KW Gas Recirculation Buildings. The lower area is considered to be a confined space and much of the upper area is a radiation zone. These areas were not investigated because of locked doors.

b. The pipe tunnel and associated basement annex that connect the 190-B Main Pump House to the 105-B Reactor Building were evaluated as a separate structure; entry was made into the tunnel itself.

c. The 190-B Main Pump House and 185-B Water Treatment Plant were evaluated as one structure. These buildings are closely connected and joined by a long north-south wall.

d. The reactor exhaust stacks (prefix 116) were investigated from the outside only for structural integrity. Hazards that exist inside will not cause harm unless the stack loses its structural integrity. The 116-DR Reactor Exhaust Stack has a collar and penetration, and therefore needs further investigation (other than the external visual examination performed during this investigation).

e. The 1702-KE and KW Badge Houses are condemned and no access is allowed. These buildings were examined structurally from the outside.

f. The 117-KE and KW Exhaust Air Filter Buildings are not physically accessible unless the top is removed with a crane. No notable observations were recorded from a visual outside examination. Routine surveillance for radioactive material outside these facilities is performed.

g. No entry was made to the 110-KW Gas Storage Building because of a locked door.

h. The 1608-B Gas Line Pressure/Vacuum Seal House is entirely belowgrade and considered a confined space; therefore, no entry was made. No observations were made from the outside.

i. The 104 B-1 Tritium Vault is a restricted area because of radioactive concerns and was not entered. Additionally, no keys for the doors can be located. Radiological danger from this facility is assumed to be low as the tritium is presumed to have either decayed or diffused away. In addition, routine surveillance for radioactive material outside this building is performed.

Table 2-2. Building Rank by Risk Index (5 to 10 Years). (sheet 3 of 3)

j. No access was allowed to the 167-KW Crosstie Tunnel. No electrical service exists to this building. This building was examined at the entrance but nothing of significance was observed.

k. The 1720-HA Arsenal was not examined on the inside as this building appears to be in good condition. There is no electrical service to this building.

l. The 1608-D, 1621-D, 241-A-431, 241-C-801, and 241-W Buildings were identified near the end of this evaluation as facilities that should be evaluated. However, because of time constraints, these five small facilities were not included in this evaluation. These buildings are not entered by surveillance personnel.

m. The 190-B building was determined to be a surplus facility in FY 1993 and was scheduled for demolition; however, a risk assessment of the facility has not been performed.

Although this risk evaluation is qualitative in nature, quantitative measures in the form of relative risk index values are used to facilitate comparisons. This is accomplished by assigning each finding to one of 19 standard hazard groups. For each group, consequence and likelihood estimates determine the risk category. The relative risk index for each hazard group is determined for a facility and an overall risk index is calculated. Tables 2-1 and 2-2 show how many hazard groups fall into a particular risk category for each facility, as well as the resulting risk index.

Risk index values vary widely. For example, in the 0 to 5-year case, values vary from a value of 150,831 for the 105-F Reactor Buildings to 2,043 for the 185-B/190-B Pump Houses, and 0 for the 116-DR Reactor Exhaust Stack. These values are relative indexes that have no absolute meaning; they are intended only to assign risk priority.

The reactor buildings and fuel processing canyons have the highest risk of all the retired facilities investigated; risk indexes are one or two orders of magnitude greater than other buildings. There are a number of large nonreactor buildings that represent a moderate degree of risk. These include such buildings as the 185-B/190-B Pump Houses, the 108-F Biology Laboratory Building, and the 232-Z Plutonium Incinerator. Some smaller building represent a moderate degree of risk but most do not. Structures that represent a low degree of risk include certain badge houses, bunkers, storage areas, and sampling buildings.

2.2 GENERAL RISK CONTRIBUTORS

General dominant risk contributors and risk sensitivities are discussed in Sections 2.2.1 and 2.2.2, respectively.

Two types of dominant risk contributors are identified in this assessment. First, dominant risk facilities are those that have the highest risk indexes in relation to other buildings. Second, dominant risk contributors for a facility are those that have the greatest contribution to the risk index for that facility. For example, the 105-DR Reactor Building is the dominant facility with the highest risk index of 152,357 for the 5 to 10-year case. The dominant risk contributors at the 105-DR Reactor Building are falling, struck-by, and electrical shock risks, which are all classified as critical.

2.2.1 General Dominant Risk Contributors

Identification of the general dominant risk contributors was done on a hazard-by-hazard basis. This is shown in Tables 2-3 and 2-4 for the 100 Area and 200 Area, respectively. Each table contains both the 0 to 5- and 5 to 10-year cases. The columns on the left side of the tables contain the hazard categories in which all findings are classified. The uppermost row of the tables contain the risk categories into which the hazards for each facility are assigned. Table 2-3 for the 100 Area shows, for example, that while no facilities fell into the negligible category, the falling hazard was determined to be critical for 3 facilities, serious for 4, moderate for 5, and minor for 13; this accounts for 25 facilities. No falling hazards were identified for 20 facilities; this accounts for all 45 facilities that were evaluated.

Figures 2-1 and 2-2 are stacked bar graphs showing the major risk contributors for the 100 and 200 Areas, respectively. For the 100 Area, Figure 2-1 shows that falling, electrical shock, and fire hazards are the dominate risk contributors for the 0 to 5-year case. These same hazards, with the addition of struck-by hazards, are the dominate risks for the 5 to 10-year case. The sum of all other contributors represent only a small fraction of the risk to each case. For the 200 Area, Figure 2-2 shows that radiation hazards are the dominate risk contributor for the 0 to 5-year case.

In the 5 to 10-year case, radiation hazards are joined by electrical shock hazard and struck-by hazards as the dominate risk contributors.

The insights gained from Figures 2-1 and 2-2 can also be verified using Tables 2-3 and 2-4. For example, in the 100 Area a large portion of the risk is associated with falling, struck-by/strike, electrical, and fire hazards. In the 5 to 10-year case, the risk index associated with these hazards contributed 1,034,833 out of 1,045,140 risk index points (99% of the total facility risk). In the 200 Area for the 0 to 5-year case, radiation hazards contributed 59,648 out of a total of 80,925 risk index points (74% of the total facility risk).

Tables 2-3 and 2-4 show that only the hazards that score in the critical, serious, or moderate categories have any significant impact on the total risk. This is the result of the order of magnitude scale between risk categories. Findings that fall into the lesser categories (minor and negligible) are not dominant risk contributors but could be important if changes occur. Factors such as changes in administrative or physical conditions related to these categories are discussed in Section 3.3 as risk sensitivities.

The risk associated with falling hazards is dominated by the contribution of potential accidents involving missing or substantially weakened roof panels and wall cracks. This problem exists primarily in the 100 Area retired facilities. A large number of the precast gypsum and/or concrete 105 Reactor Building roof panels are in poor condition. Many roof panels, such as those over the fuel basins, will not support the weight of an individual. Moisture appears to have advanced the degradation of panels, particularly in areas where the roof membrane leaks or does not exist. The roof panel shown in Figure 2-3 from the 105-C Reactor Building is an example of this condition.

Table 2-3. 100 Area Risk Contributors by Hazard Category.

Hazard category	Critical	Serious	Moderate	Minor	Negligible	Totals	Risk
0 to 5 years							
Falling	3	5	4	13	0	25	158,760
Struck-by/strike	0	2	5	11	7	25	4,477
Drowning/suffocation	0	0	0	15	0	15	300
Electrical shock	5	9	0	4	0	18	263,580
Exposure to radiation	0	0	2	3	6	11	566
Exposure to asbestos	0	0	0	4	11	15	91
Exposure to lead	0	0	0	8	2	10	162
Exposure to mercury	0	0	0	1	9	10	29
Exposure to chemicals	0	0	0	14	3	17	283
Biological	0	0	15	0	1	16	3,751
Temperature extremes	0	0	12	0	0	12	3,000
Fire	1	0	0	10	2	13	50,202
Explosion	0	1	0	4	6	11	1,586
Release of radiation	0	0	0	0	11	11	11
Release of asbestos	0	0	0	0	15	15	15
Release of lead	0	0	0	0	10	10	10
Release of mercury	0	0	0	0	11	11	11
Release of oil/products	0	0	0	2	12	14	52
Release of chemicals	0	0	0	0	17	17	17
Totals	9	17	38	89	123	--	486,903
Risk	450,000	25,500	9,500	1,780	123	485,653	--
5 to 10 years							
Falling	7	11	3	6	0	27	367,370
Struck-by/strike	3	3	10	14	1	31	157,281
Drowning/suffocation	0	0	0	15	0	15	300
Electrical shock	9	6	0	3	0	18	459,060
Exposure to radiation	0	0	2	4	5	11	585
Exposure to asbestos	0	0	1	9	7	17	437
Exposure to lead	0	0	0	8	2	10	162
Exposure to mercury	0	0	0	1	9	10	29
Exposure to chemicals	0	0	0	14	3	17	283
Biological	0	0	15	0	1	16	3,751
Temperature extremes	0	0	12	0	0	12	3,000
Fire	1	0	4	6	2	13	51,122
Explosion	0	1	0	5	5	11	1,605
Release of radiation	0	0	0	0	11	11	11
Release of asbestos	0	0	0	2	13	15	53
Release of lead	0	0	0	0	10	10	10
Release of mercury	0	0	0	0	11	11	11
Release of oil/products	0	0	0	2	13	15	53
Release of chemicals	0	0	0	0	17	17	17
Totals	20	21	47	89	110	287	1,045,140
Risk	1,000,000	31,500	11,750	1,780	110	1,043,890	--

Table 2-4. 200 Area Risk Contributors by Hazard Category.

Hazard category	Critical	Serious	Moderate	Minor	Negligible	Total	Risk
0 to 5 years							
Falling	0	2	1	5	2	10	3,352
Struck-by/strike	0	1	3	10	2	16	2,452
Drowning/suffocation	0	0	0	7	2	9	142
Electrical shock	0	6	0	5	0	11	9,100
Exposure to radiation	1	6	2	7	8	24	59,648
Exposure to asbestos	0	2	1	6	9	18	3,379
Exposure to lead	0	0	0	0	7	7	7
Exposure to mercury	0	0	0	0	2	2	2
Exposure to chemicals	0	0	0	5	2	7	102
Biological	0	0	4	2	3	9	1,043
Temperature extremes	0	0	3	0	0	3	750
Fire	0	0	1	2	3	6	293
Explosion	0	0	1	1	4	6	274
Release of radiation	0	0	1	2	12	15	302
Release of asbestos	0	0	0	1	17	18	37
Release of lead	0	0	0	0	7	7	7
Release of mercury	0	0	0	0	2	2	2
Release of oil/products	0	0	0	0	7	7	7
Release of chemicals	0	0	0	1	6	7	26
Totals	1	17	17	54	95	--	80,925
Risk	50,000	25,500	4,250	1,080	95	80,925	--
5 to 10 years							
Falling	1	2	2	5	0	10	53,600
Struck-by/strike	0	6	5	5	0	16	10,350
Drowning/suffocation	0	2	0	7	0	9	3,140
Electrical shock	2	7	0	2	0	11	110,540
Exposure to radiation	2	8	1	5	8	24	112,358
Exposure to asbestos	0	2	1	11	4	18	3,474
Exposure to lead	0	0	0	2	5	7	45
Exposure to mercury	0	0	0	0	2	2	2
Exposure to chemicals	0	0	0	5	2	7	102
Biological	0	0	4	2	3	9	1,043
Temperature extremes	0	0	3	0	0	3	750
Fire	0	0	2	2	2	6	542
Explosion	0	1	0	2	3	6	1,543
Release of radiation	0	0	1	5	9	15	359
Release of asbestos	0	0	1	2	15	18	305
Release of lead	0	0	0	0	7	7	7
Release of mercury	0	0	0	0	2	2	2
Release of oil/products	0	0	0	0	7	7	7
Release of chemicals	0	0	0	1	6	7	26
Totals	5	28	20	56	75	184	298,195
Risk	250,000	42,000	5,000	1,120	75	298,195	--

Figure 2-1. 100 Area Risk Contribution.

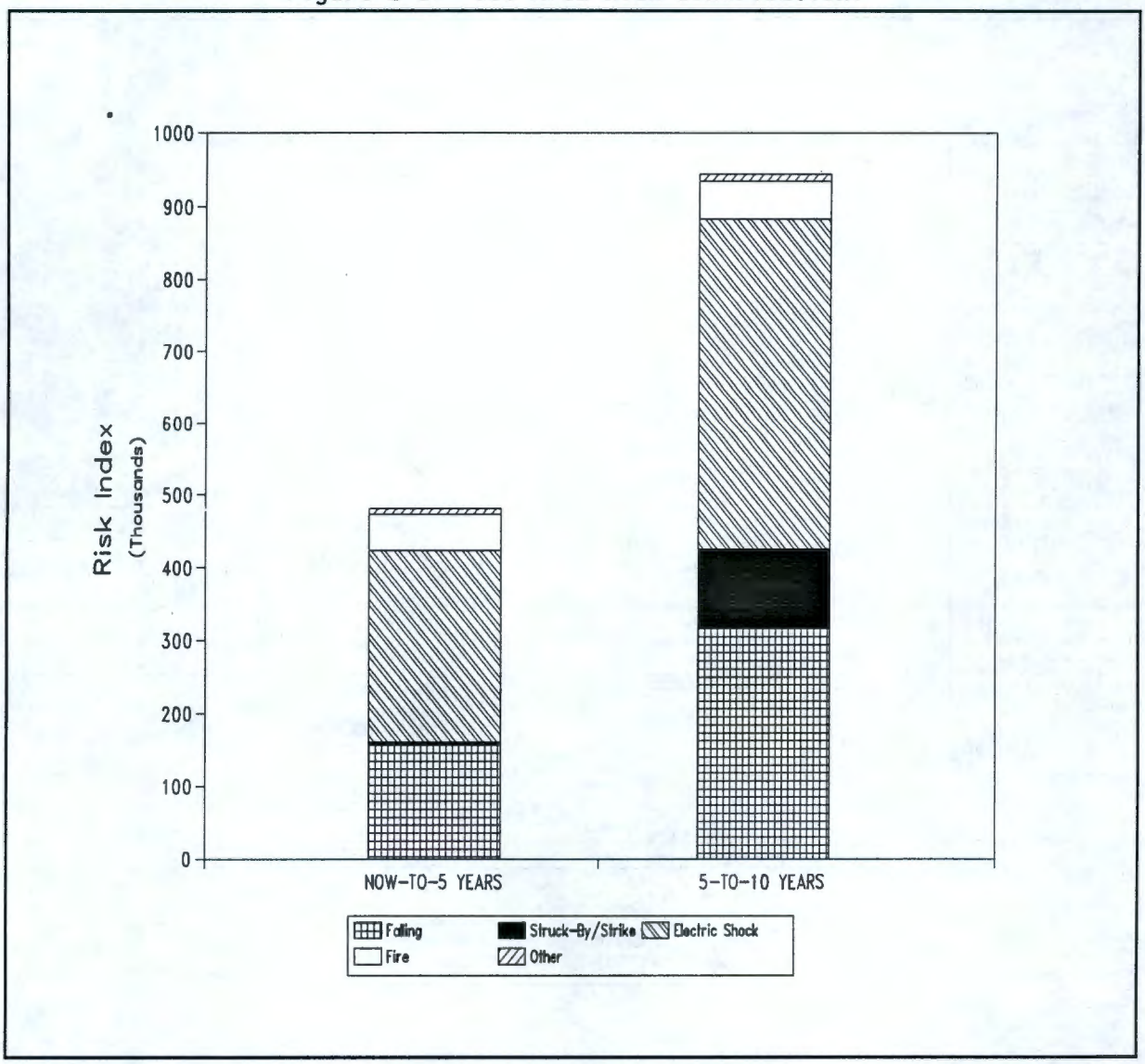

Figure 2-2. 200 Area Risk Contribution.

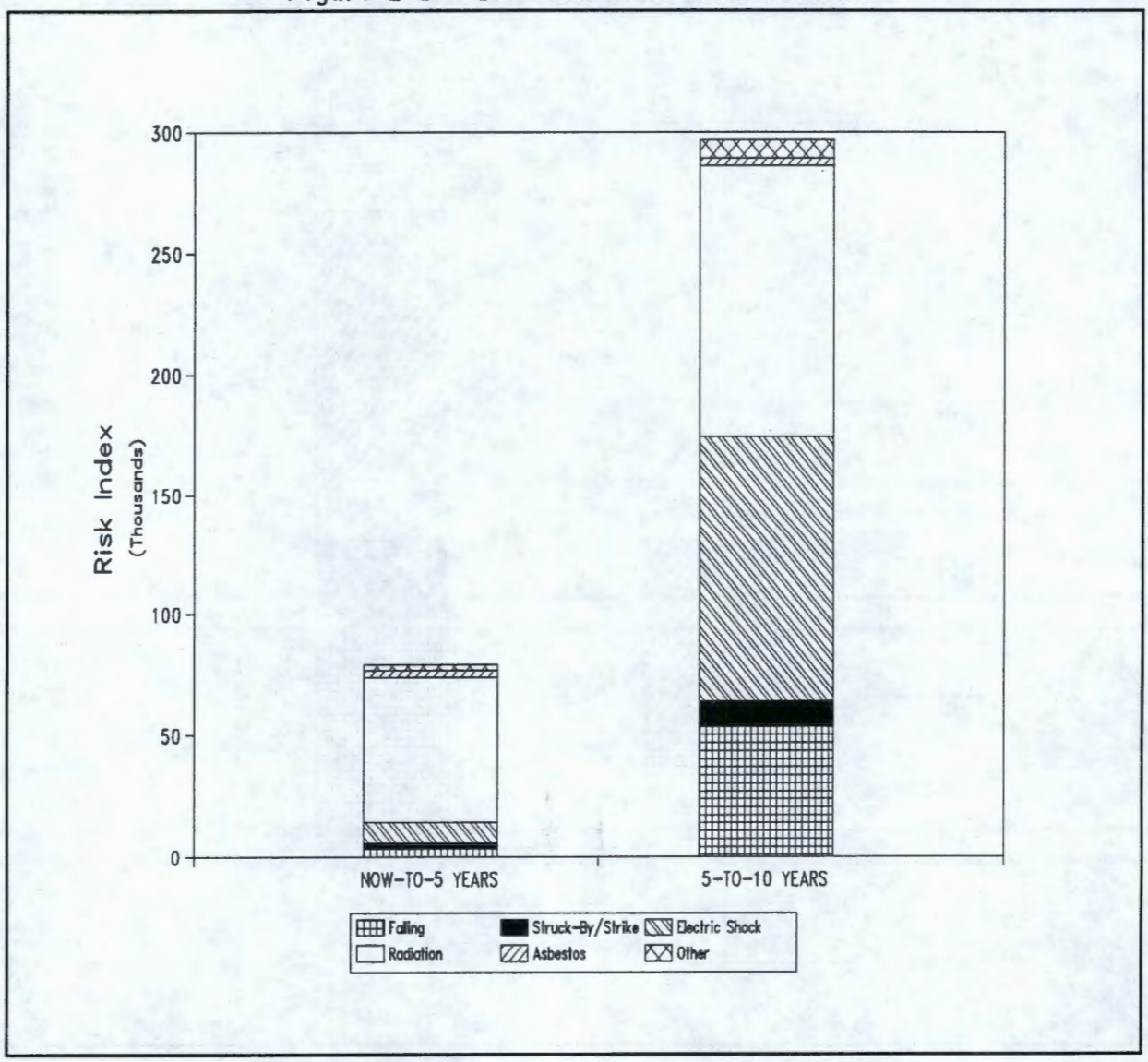

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Figure 2-3. Degraded Gypsum Roof Panels.

Another factor contributing to this risk is access control. Even though there are administrative controls against roof access that include warnings and barriers, there are many interior doors to roofs that are not locked or posted. Outside ladders and stairs, although posted "No Entry," also make access to the roof convenient in many buildings.

The risk associated with electrical hazards appears to be widespread, encompassing both the 100 and 200 Area retired facilities. The electrical systems generally are in poor condition in a large number of the retired facilities. In many facilities, such as the 105-M Reactor Buildings, out-of-service electrical distribution systems apparently are being energized to facilitate tours, surveillance work, and other activities. These systems are old, degraded, patched together, and receive no regular preventive maintenance. Figure 2-4 shows bare 480-V electrical wires in the 105-D Reactor Building. Electrical shock hazard is the single most significant contributor to risk in these facilities.

The following is a general list of some key factors contributing to the high risk index for electrical shock:

- No apparent program of routine maintenance for the energized electrical distribution systems
- Several cases of energized wires hanging loose from open junction boxes
- Flexible cords used as permanent wiring methods are severely overloaded, some as much as 100%
- Over-current protection is degraded or nonexistent
- Many enclosures do not have covers
- Many cases of improper wiring methods exist, such as tying the neutral and ground conductors together
- Labelling of deenergized and energized switch-gear is ambiguous, inconsistent, and sometimes in error
- Equipment has exceeded its design-life by as much as 2.5 times.

The risk associated with fire is generally comprised of small electrical fires or flashes that could burn the face or hands of a worker performing some associated activity. The main contributor to this potential accident is the lack of an enclosure around the main circuit breaker and other equipment. Although ignition sources exist that could initiate a fire, no significant amount of combustibles are present as the building material is primarily concrete and steel. Oils or flammable chemicals exist only in residual quantities.

Figure 2-4. Bare Energized 480-V Wires.

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Risk associated with radiation exists primarily in the 200 Area retired facilities. Risk from exposure to radiation is not a significant contributor in the 100 Area facilities because radioactive materials generally are contained. For example, fixative is used on the basin walls in the 105 Reactor Building and relatively high source terms in the reactor cores are encased by massive amounts of concrete and steel. However, this is not the case in the 200 Area facilities.

Factors contributing to radiation hazards in the 200 Area retired facilities are (1) the level of contamination spread in certain buildings; (2) the presence of alpha-emitting radionuclides; and (3) the external radiation level created by various pieces of radioactively contaminated equipment. In particular, inhaled alpha emitters represent a significant health risk. Another important contributing factor is the generally inconsistent and inaccurate radiation zone postings. Surveys performed during the walkdowns identified locations where radiation fields existed but were not posted, and locations that were posted but radiation fields were not detected. Both conditions contribute to confusion and risk. Figure 2-5 shows contaminated rubble near the exterior roof emergency exit in the 202-S Canyon Building. Additionally, spread of contamination is evident from the identification of contaminated tumbleweeds and rabbit droppings as well as various cracks and openings in the containment systems. Some buildings rely on active ventilation systems for containment control. Therefore, in assessing risk, consideration was given to the reliability of this system. Radiation hazards are most evident in the canyon buildings.

2.2.2 General Risk Sensitivity

This section examines the sensitivities of risk estimates in this assessment to variability in the basis and assumptions. Because the risk evaluation occurred at a single point in time, it was necessarily based on a fixed definition of factors that might change in the future and could affect the risk estimates. These factors are referred to as risk sensitivities. In this study, the effect of building degradation over time is explicitly accounted for in the 5 to 10-year estimate. Therefore, factors such as current facility use, control, and activity types are assumed to remain constant. Risk factors of significance are assumed to be identified during the walkdown investigations.

The risk of a postulated event is a function of its likelihood and consequence. In this evaluation, postulated events were evaluated according to the conditions observed during investigations and assigned potential consequences based on the expert judgment of the team members. Likelihood of an event occurring was developed similarly. Because the consequences were assigned based on a single outcome, most of the potential variability in risk will come from the factors affecting the likelihood of occurrence.

The largest variability in event occurrence likelihood is the estimate of hazard exposure to personnel. If few people are assumed to have access to the facility because of administrative controls, risk will incline toward lower values. Conversely, if no limitations exist for access, the assigned risk

Figure 2-5. Radiation Contaminated Rubble.

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will incline toward higher values. Exposure risk generally changes according to the number of persons exposed to a hazard, the number of hazards an individual is exposed to, and the amount of time an individual is exposed to a hazard.

The degree of uncertainty about the condition of the retired facilities contributes to uncertainty in the risk assessment. In some cases during the walkdown, locked doors were encountered that were not opened, preventing access to some areas of the building. In other cases, some of the lower levels in the building were not investigated because of preexisting limitations on access. In the 200 Area retired facilities, some areas could not be inspected because of high levels of contamination or external ionizing radiation. In such cases, assumptions had to be made based on observed conditions elsewhere in the building or on historical information about what was in these areas. The results of the analysis can be very sensitive to the state of knowledge about a facility.

Even when an entire area can be thoroughly examined, the level of knowledge about a facility may still be less than desired. Containers of unidentified chemicals were discovered during investigations. The initiative to clean up chemical residues by gathering them into one central area may represent significant risk if the unidentified chemicals are unstable. However, the likelihood of encountering unstable chemicals is essentially impossible to predict and therefore was not included in this risk evaluation.

Fire is a significant risk contributor in the retired facilities. Significant changes in the estimated risk from fire can occur if combustibles are introduced where none are expected. Changes can also occur if the type of combustible material introduced differs from the ignition sources identified. Inadvertent reenergizing of currently shutdown electrical circuits to facilitate work will change the fire hazard risk contribution by increasing the number of ignition sources.

Risk from electrical shock is the most dominant risk contributor in this evaluation. There is a high likelihood currently deenergized electrical circuits will be reenergized to perform work. This action not only increases the likelihood of fault-caused sparks, but also increases the likelihood of electrical shock. Electrical shock risk uncertainty for demolition activities is even greater than for current conditions. These uncertainties will need to be addressed to minimize risk before demolition activities begin.

Falling is also shown to be a large risk contributor. Changes in the estimated risk from falling will occur if access to many of the building roofs increases. The same type of change will occur if the number of workers or the amount of time they spend in the building increases significantly from the estimate.

Risk from suffocation in confined spaces has been given a very low risk value in this analysis. The risk from this hazard is driven solely by exposure. If an individual actually enters a confined space that has an atmosphere that cannot sustain life, death almost always results. The risk is low because the likelihood is estimated to be low. It is assumed that procedures are normally followed for confined space entry and that workers are aware of the hazard, reducing the likelihood of the event occurring. If conditions were to change, such as lack of awareness of the confined space

hazard or less control of confined spaces, a significant increase in the estimated risk would occur.

Risk from radiation exposure is assessed as low for the 100 Area retired facilities but higher for the 200 Area facilities. In the 100 Area facilities, radioactive materials (primarily activation products within the reactor core) are either fixed or contained in most instances. However, intrusive activity could change this condition. For example, the risk of radiation exposure or release could increase with such activities as cutting into contaminated piping or structures, uncovering activated materials, or removing shielding. Changes in risk from radiation exposure can also arise from intrusion of rainwater or the action of wind causing migration of radioactive material to areas previously diagnosed as safe. The likelihood associated with some consequences would increase. These variables will need to be addressed in the decommissioning work plan to minimize these risks.

Risk from asbestos release or exposure has been assigned a very low value for most buildings in this evaluation because of a number of factors. Handling of asbestos normally occurs in a very controlled manner. Much of the asbestos-containing material on the Hanford Site is not in a physical form that would allow asbestos fibers to easily become airborne. In accordance with WHC regulations, workers are given required training concerning the hazards associated with asbestos, and most areas where asbestos is present have been posted to indicate its presence. The publicity concerning asbestos exposure has created a concern within the general population that causes an aversion to contact or proximity with asbestos. The reality of asbestos exposure causing adverse health effects, however, is not being deemphasized. If asbestos handling controls are relaxed, or very large scale physical breakdowns of significant quantities of asbestos-containing materials occurs from weathering or other disruptive mechanisms, exposure risk from asbestos could be larger.

Allowing continued degradation of a building structure (e.g., roof panels) or its internal parts increases the likelihood of any accident or release to the environment. Eliminating a building by demolition eliminates these hazards. However, it should be recognized that the process of demolishing a building tends to increase accident likelihood in the short term. The condition of the building at the time of demolition also influences the accident likelihood; a building in good condition exhibits fewer demolition hazards than a building in poor condition.

3.0 FACILITY RISK EVALUATION SUMMARY

The following sections provide descriptions of each 100 and 200 Area retired facility that was investigated. Descriptions include general overall conditions of each building, ratings of the dominant risk contributors, specific factors associated with the risk contributors, and risk sensitivities.

3.1 SPECIFIC RISK CONTRIBUTORS FOR THE 100 AREA RETIRED FACILITIES

3.1.1 103-B Riggers Loft

The original 103-B Riggers Loft Building was used for pallet storage of unirradiated fuel elements before use in the reactor. However, in 1985 the building was decontaminated and cleaned and is now used for storage of rigging equipment. This building is located directly north of the 105-B Reactor Building, inside the exclusion area fence. The 103-B Facility is a one-story building (16.2 m by 8.2 m by 4.4 m [53 ft by 27 ft by 14.5 ft]) made of reinforced concrete foundation and floor, concrete block walls, and concrete roof with membrane and gravel surface. The general condition of the building interior and exterior is in fair condition, and the ramp and roofing are in poor condition.

3.1.1.1 Risk Contributors. Electrical shock risk is rated as serious. The factors contributing to this type of risk are a lack of maintenance from the electrical system that provides power to the 103-B Building, inadequate grounding, no service disconnect, and the frequent presence of personnel in areas where the hazard existed.

Falling risk is rated as moderate. The lack of guard rails on a loading ramp on the south end of the building, with degraded back steps and associated handrail, contributed to the falling risk. As with electrical shock risk, the presence of personnel on a regular basis also contributed to the risk.

Chemical exposure risk is rated as minor. The factor contributing to this type of risk is there is only a small quantity of chemicals in this facility.

3.1.1.2 Risk Sensitivities. The sensitivity of the risk values for this building is primarily the number of individuals exposed to a hazard. If the number of individuals using this building increases significantly, risk from the existing hazards will be greater.

3.1.2 104-B-1 Tritium Vault

The 104-B-1 Tritium Vault, located north of the 105-B Reactor Building inside the exclusion area fence, was placed in service in 1950 and was used for the storage of tritium recovered from irradiated lithium-aluminum target elements. This building is constructed of concrete block, 3.1 m (10 ft) belowgrade and 3.1 m (10 ft) abovegrade with a concrete slab roof.

The general condition of the building is the interior and exterior are in fair condition, and the roofing is in poor condition.

3.1.2.1 Risk Contributors. The 104-B1 Tritium Vault is a restricted area because of radiological concerns and was not entered. In addition, keys for the doors could not be located. Radiological danger from this facility is presumed to be low as the tritium is assumed to have either decayed or diffused away. Routine surveillance for radioactive material outside this building is performed. Because this building was not entered, unknown hazards may exist.

3.1.3 104-B-2 Tritium Laboratory

The 104-B-2 Tritium Laboratory, located in the northwest corner of the 100-B Area exclusion area fence, was used to store irradiated lithium-aluminum target elements before the separations processing at the 108-B Building. This building is a one-story concrete structure (3.7 m by 7.3 m by 3.1 m [12 ft by 24 by 10 ft]) with special cells in the floor to store casks used in the pilot P-10 program. The general condition of the building is the interior and roof are in fair condition, the exterior is in fair to poor condition, and the roofing is in poor condition.

3.1.3.1 Risk Contributors. There were no hazards rated higher than negligible. There are slight contamination levels, but the quantities present are not sufficient to raise the risk of exposure or release above negligible.

3.1.4 105-B Reactor Building

The 105-B Reactor Building was constructed from August 1943 to September 1944 to house the first production nuclear reactor and directly associated equipment used in reactor operations. This reactor was the first of nine plutonium-producing reactors constructed and operated on the Hanford Site.

The lower portion of the building is made of reinforced concrete. The reinforced concrete walls (0.9 m to 1.5 m [3 ft to 5 ft] thick) around the reactor block at the lower levels provide additional radiation shielding in conjunction with the biological core shield. The upper portion of this building is lighter concrete block construction.

The reactor block is located near the center of the building. Fuel discharge and storage areas are located adjacent to the rear face of the reactor block, one level below the ground. Experimental test penetrations are located on the right side of the reactor.

The reactor block consists of a graphite moderator stack encased in a cast-iron thermal shielding, a welded biological shield consisting of alternating layers of masonite and steel on the four sides, and an unwelded, stair-step labyrinth seal shield on top. The entire block rests on a concrete foundation. The block weighs 9,145 metric tons (1,008 tons) and is approximately 14.0 m by 14.0 m by 12.2 m (46 ft by 46 ft by 40 ft).

The fuel storage basin served as an underwater collection, storage, and transfer facility for the irradiated fuel elements discharged from the

reactor. The basin consists of a fuel element pickup, storage, and transfer area. It is 6.7 m (22 ft) deep and contained 6.1 m (20 ft) of water during operation. The basin has since been drained and cleaned of debris, and fixative has been applied to radiologically contaminated surfaces. However, the coating may need periodic renewal to ensure containment of contamination.

The roof is primarily composed of membrane-covered, reinforced, precast concrete panels of the same type as the 105-D, 105-DR, and 105-F Reactor Buildings. These panels have endured the past 49 years with a minimum of maintenance and continue to be in good condition because of the initial and continued preventative maintenance the roof has received since shutdown.

The interior of the building is in good condition and the exterior is in fair condition. The roof is in fair condition, but requires annual maintenance and repair to minimize water infiltration. The majority of the process area, storage basin, and transfer area roof panels are cracked. Small cracks in the masonry concrete walls require patching. A large crack in the southeast corner of the storage basin requires shoring. The overall building contains an estimated 13,500 Ci of radionuclides (primarily activation products contained within the graphite core). In addition, 89.4 metric tons (98.5 tons) of lead and an unknown quantity of asbestos are contained within the building structure.

In September 1976, the American Society of Mechanical Engineers established the B Reactor as a National Historic Mechanical Engineering landmark. In addition, the National Historic Foundation has recognized the B Reactor as a national monument and it has been registered with the Washington State Historical Society.

3.1.4.1 Risk Contributors. Electrical shock risk is rated as critical. The factors contributing to this type of risk are the presence of bare energized 480-V wires, inconsistencies in tagging and labeling, a lack of regular preventative maintenance, and the frequent presence of offsite tour groups creating a greater need for continued maintenance activities than would exist in the other surplus reactors.

Biological hazard risk is rated as moderate. The factors contributing to this type of risk include poisonous snakes, regularly found in the old reactor facilities; significant quantities of bird droppings, found in radiation zones in the upper floors of the facility; and wasps, a problem during the summer months. Bird droppings have been analyzed at Hanford Environmental Health Foundation (HEHF) and the presence of infectious diseases has been verified. Figure 3-1 shows an area of concentrated guano near the rear-side discharge elevator of the 105-B Building. Also, it is on record that a person was bitten by a rattlesnake in 1991 while working at the Hanford Site.

Risk from exposure to temperature extremes is rated as moderate. The factors contributing to this type of risk include high ambient temperatures that occur during the summer season, no active heating ventilation air conditioning (HVAC), cleanup work that requires the use of

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Figure 3-1. Bird Guano at 105-B Reactor Building.

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heat-trapping protective clothing, and heat exhaustion cases that have occurred at the Hanford Site.

Falling risk is rated as minor. The factors contributing to this type of risk are deteriorating roof panels and the lack of control for roof access. The deteriorating panels are made of precast concrete and have been exposed to water from the leaking roof. Continued water saturation causes significant degradation of the load-bearing capability of the panel. Only a few panels at this reactor have exhibited signs of degradation because the roofing membrane has had periodic maintenance to repair leaks. Access to the roof is available from inside the facility by several unlocked doors that have no warning signs. If a person walks on the roof of this facility, there is a possibility they will fall through. The risk from falling increased from minor to serious in the 10-year time frame estimate because of continued degradation of the concrete panels from unrepaired leaks.

Struck-by risk is rated as minor. The factors contributing to this type of risk are the presence of personnel in areas where panel degradation exists, and the fact that pieces of concrete panels have fallen in other old facilities. The concrete panels can degrade to the extent that snow loads or seismic events can cause the panels to collapse and fall. Anyone struck by a falling piece of panel will suffer injury. The poor condition of the concrete block construction in portions of this facility also contribute to the struck-by risk. This is from the numerous cracks in the mortar holding the blocks together--these cracks occur also in the southeast corner of the storage basin. Figure 3-2 illustrates this type of cracking. The risk from struck-by increased from minor to moderate in the 10-year time frame estimate because of continued degradation of roof panels.

Fire risk is rated as minor. The factors contributing to this type of risk are ignition sources, fuel quantity, and heat/flame exposure to individuals. The most likely ignition source is electrical faults. In this facility the quantity of fuel materials is small. Likewise, there are few individuals that spend large quantities of time in areas where fire is a significant hazard. The special case of flash burns from electrical arcs tends to be limited to electrical craft personnel.

Suffocation risk is rated as minor. All Hanford Site facilities that have unventilated belowgrade areas have a suffocation risk. Accumulations of water in unventilated areas also can cause a sufficient reduction of oxygen content from biological action or corrosion to be hazardous to human life. Belowgrade areas can also act as catch basins for heavier than air gases that are either toxic or displace an oxygen-bearing atmosphere. The belowgrade areas at this facility have not been appropriately posted as "Confined Spaces." Areas that were checked for oxygen levels were found to be safe.

Lead exposure risk is rated as minor. Risk from exposure to lead exists in areas where there are large quantities of lead. Lead was used as shielding at all the reactor facilities in the forms of lead shot, lead brick, lead sheet, and cast-lead forms. The amount of lead an individual may absorb depends on the length of exposure, the level of surface oxidation, how easily the surface of the lead can be disturbed, and whether the lead oxide is disturbed by activities such as cutting, grinding, and burning. Most work associated with lead cleanup does not require disruption of the surface. The

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Figure 3-2. Concrete Block Cracks.

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observed lead oxidation rates at the Hanford Site have been greater than initially expected in an arid area. An ongoing cleanup program that makes handling lead necessary and the desirability of lead contribute to the likelihood of unwanted exposure. The majority of lead in the 105-B Building is located in radiation zones and in the transfer area of the storage basin.

Explosion risk is rated as minor. Explosions are possible when chemicals are present that are shock sensitive, volatile, have a low ignition temperature, or can energetically react when mixed together. Risk results from individuals being within the sphere of influence of the explosion. In this evaluation, explosions are assumed to cause death if the individuals are within this sphere of influence. There are some unknown chemicals staged together for disposal in this building.

Chemical exposure risk is rated as minor. The factors contributing to this type of risk are the presence and quantity of a chemical, how likely contact is with the chemical, and the level of activities such as gathering and staging chemicals for elimination. In almost all cases, the quantity of such materials is small and the number of individuals involved in handling them are few.

3.1.4.2 Risk Sensitivities. The sensitivity of the assigned risk values for the 105-B Reactor Building is primarily the number of individuals exposed to a hazard. Because this building is accessible to the public, there are significant levels of activity necessary to maintain it to required standards. The increase in this activity increases the likelihood of electrical shock and other accidents. Risk from exposure to asbestos and radiation will change if activities disturb the material or make it easier to disturb. Disturbance can either occur by physically disrupting the material or, in the case of radiation, by moving shielding.

Also implicit in the risk estimate are the types of administrative rules in place and the compliance level to these rules. If rules are relaxed or compliance is poor, risk will be higher. An example is the uncontrolled reactivation of electrical circuits by switching on breakers. If upgrade work is performed, risk will be lower than estimated in this evaluation. This will also be true for exposure to chemicals and lead if elimination campaigns are instituted, as once the material has been removed the risk is eliminated. However, risk will increase during the removal process.

3.1.5 116-B Exhaust Stack

The 116-B Exhaust Stack was used to discharge ventilation air 61.0 m (200 ft) abovegrade from the 105-B Reactor Building. The stack extended 61.0 m (200 ft) abovegrade and 3.1 m (10 ft) belowgrade, with a 4.9-m (16-ft)-diameter base. The stack is a monolithic, reinforced concrete structure with a wall thickness of 0.5 m (1.5 ft) at the base and 0.3 m (1 ft) at the top. The stack is generally in good condition and has no noted structural defects. No evaluation of this structure was made.

3.1.5.1 Risk Contributors. All stacks were externally investigated visually from ground level. Although a modest quantity of radioactive material exists on the inside, the material cannot cause harm unless the stack loses its structural integrity. Also, the quantity of radioactive material contained in

the inactive 100 Area stacks is insufficient to cause a significant health or environmental problem if released.

3.1.6 185-B Water Treatment Plant and 190-B Main Pump House

The 185-B Plant was originally intended as a deaerating plant but was never used for that purpose. Instead it served primarily as a maintenance and storage area. The building itself is a 92 m (304 ft) by 14 m (48 ft) steel-framed, concrete block structure. The 185-B Building adjoins the 190-B Building high bay and shares a common wall.

The purpose of the 190-B Pump House was to supply treated water to the reactor and other equipment requiring cooling water. It once housed process and service pumps, and ventilation equipment but that equipment was removed in preparation for decommissioning. Like the 185-B, the 190-B is a steel-framed, concrete block construction. Presently, this structures does not serve a functional purpose.

The interior and exterior of both buildings are in extremely poor condition. The masonry walls of both buildings are cracked at the joints and whole concrete cinder blocks are missing. There are several openings in the north end of the 190-B Pump House. Recently, however, a plywood covering was installed across one opening and a wire fence was installed across the others.

The roof structures of both buildings are in poor condition and do not protect against water infiltration. The tar and gravel roofing material has been stripped away by the wind in some locations. The roof decking, which supports the roofing material, is either corrugated metal or precast concrete panels and is suspected to be unreliable. The corrugated metal is in good condition but the precast concrete panels, particularly in the 185-B Building, are cracked, show evidence of heavy leakage, and are missing in at least four locations. In addition, exposed reinforcing bars in the panels are rusty.

3.1.6.1 Risk Contributors. Biological hazard risk is rated as moderate. The factors contributing to this type of risk are poisonous snakes, which have been found regularly in the old reactor support facilities, and wasps, which are a problem during the summer months.

Falling risk is rated as minor for the 185-B Water Treatment Plant but serious for the 190-B Main Pump House. Deteriorating roof panels and the lack of control for roof access contribute to the risk of falling. These panels are made of precast concrete and have been exposed to water from roof leakage for a long period of time. Continued water saturation causes significant degradation of the load-bearing capability of the panels. Many panels in this building show signs of degradation. The roof is not easily accessible; however, there is no plausible reason to attempt access. However, if an individual walks upon the roof of this building, there is a high likelihood they will fall through the concrete panel areas.

Struck-by risk is rated as minor for the 185-B Building but moderate for the 190-B Building. The concrete panels can degrade to the extent that snow loads or seismic events can cause the panel to collapse and fall. Anyone struck by a falling piece of panel will suffer injury. However, personnel do

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not normally enter this facility. The concrete-block construction of this building also contributes to the risk of being struck-by as a result of numerous cracks in the mortar holding the blocks together. Vibration from equipment or an earthquake could result in the wall collapsing. Anyone struck by the wall could be severely injured. The risk from struck-by increases from minor to serious in the 10-year time frame estimate because of continued roof panel and wall degradation.

Suffocation risk is rated as minor. All Hanford Site facilities that have unventilated belowgrade areas have a suffocation risk. Accumulations of water in unventilated areas also can cause a sufficient reduction of oxygen content from biological action or corrosion to be hazardous to human life. Belowgrade areas also can act as catch basins for heavier than air gases that are either toxic or displace an oxygen-bearing atmosphere. The belowgrade areas at this facility have not been appropriately posted as "Confined Spaces."

Asbestos exposure risk is rated as minor. The factor contributing to this type of risk is that the asbestos has to be in a finely divided form (friable) and disturbed so that an individual can inhale or ingest it. As with most older Hanford Site facilities, the piping insulation contains asbestos. However, most of the insulation is not friable.

The risk from asbestos release is rated as negligible. The risk increases to minor in the 10-year time frame estimate as a result of continued degradation creating greater quantities of friable material.

3.1.6.2 Risk Sensitivities. The sensitivity of the assigned risk values for this building is primarily the number of individuals exposed to a hazard. It is assumed that very few individuals will have a need to be in this building. The performance of any work beyond what is required to maintain the status quo or during demolition will increase the risk in the falling and struck-by categories. Risk from asbestos exposure will also increase during the removal process. Once the material has been removed, the risk will noticeably decrease.

3.1.7 190-B Tunnel/Annex

A pipe tunnel runs between the 190-B Main Pump House, the 105-B Reactor Building, and the adjoining 190-B Annex basement. In the past this tunnel and annex contained piping that delivered treated water to the reactor but that piping has since been removed. The tunnel section actually consists of two discrete tunnels running parallel to each other but joined by cross connections. Both sections are reinforced concrete structures with rectangular cross sections. As well as being a confined space, this tunnel is not lighted and contains numerous jagged edges and tripping hazards. Presently, this structures does not serve a functional purpose.

3.1.7.1 Risk Contributors. Falling risk is rated as moderate. The factors contributing to this type of risk are this structure has cracked concrete access plates that may collapse if a person stands on them, and the area is not posted to indicate any danger. The structure also has an access grating that is deformed and may fail if stood upon. The risk from falling increases

from moderate to serious in the 10-year time frame estimate from continued concrete degradation.

Struck-by risk is rated as moderate. The factors contributing to this type of risk are there are numerous protrusions, jagged edges, and tripping points in the building. It has no lighting and is not regularly occupied.

3.1.7.2 Risk Sensitivities. The sensitivity of the assigned risk values for this building is primarily the number of individuals exposed to a hazard. It is assumed very few individuals will have a need to be in this building. The performance of any work beyond what is required to maintain the status quo or during demolition activities will increase the risk in the falling and struck-by categories.

3.1.8 1608-B Gas Line Pressure/Vacuum Seal House

The 1608-B Building contained the apparatus to provide a gas line pressure/vacuum for the 105-B Reactor Building gas system. This facility is 9.8 m (32 ft) belowgrade, 3.7 m (12 ft) long, and 3.7 m (12 ft) wide. It consists of two components: (1) a small, wooden-framed structure to provide entry to the lower structure; and (2) the belowgrade concrete structure. The interior of the facility is in fair condition and the exterior is in poor condition. The asphalt-shingled, wooden roof is in poor condition.

3.1.8.1 Risk Contributors. The 1608-B Facility is entirely belowgrade and considered a confined space. Therefore, no entry was made. Spalling in the concrete surface is evident and the wooden portion of the structure is extremely deteriorated. Because it was not entered, unknown hazards might exist.

3.1.9 1701-BA Exclusion Area Badge House

The 1701-BA Badge House is located at the entrance to the 105-B Exclusion Area. It provided a shelter for a security check before entrance to the exclusion area. The facility is a concrete block structure, 6.1 m by 6.1 m (20 ft by 20 ft). The general condition of the building is the interior is in fair condition (except the ceiling), the exterior is in fair condition, and the wooden-framed roof is in poor condition. During the summer of 1991, a high-velocity wind blew the rolled asphalt covering from the roof. Rebuilding and covering the roof structure is in process.

3.1.9.1 Risk Contributors. Electrical shock risk is rated as serious. The factors contributing to this type of risk include a fixture hanging by its wiring, creating a significant potential for conductors to become exposed; and a lack of regular preventative maintenance for the building. This building is not regularly occupied.

Fire risk is rated as minor. The factor contributing to this type of risk is an individual clearing debris from the hanging electrical fixture that might cause an electrical fault that results in a flash burn or a small fire. This risk could be eliminated by turning off the electrical power to the fixture. This building is not regularly occupied.

3.1.9.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. It is assumed very few individuals will have a need to be in this facility.

3.1.10 105-C Reactor Building

The 105-C Reactor Building was constructed from 1951 to 1952 to house the nuclear reactor and directly associated equipment used in reactor operations. It is similar to the 105-B Reactor Building, except it has a larger L-shaped building size (105.5 m by 45.7 m by 36.6 m [346 ft by 150 ft by 120 ft]; and 45.7 m by 27.4 m by 6.1 m [150 ft by 90 ft by 20 ft]) and additional variations in layout.

The lower portion of the building is made of reinforced concrete. The reinforced concrete walls (0.9-m to 1.5-m [3-ft to 5-ft] thick) around the reactor block at the lower levels provide additional radiation shielding in conjunction with the biological core shield. The upper section of this building is lighter in construction, using steel-framed transite panels.

The reactor block is located near the center of the building. Fuel discharge and storage areas are located adjacent to the rear face of the reactor block, one level below the ground. Experimental test penetrations are located on the far south side of the reactor.

The reactor block consists of a graphite moderator stack encased in cast-iron thermal shielding, a welded biological shield consisting of alternating layers of masonite and steel on the four sides, and a nonwelded, stair-step labyrinth seal shield on top. The entire block rests on a concrete foundation. The block weighs 9,145 metric tons (1,008 tons) and is approximately 14.0 m by 14.0 m by 12.2 m (46 ft by 46 ft by 40 ft).

The fuel storage basin served as an underwater collection, storage, and transfer facility for the irradiated fuel elements discharged from the reactor. It consists of a fuel element pickup, storage, fuel examination, and transfer area. The basin is 6.7 m (22 ft) deep and contained 6.1 m (20 ft) of water during operation. It has since been drained and cleaned of debris, and fixative has been applied to radiologically contaminated surfaces. The coating, however, may need periodic renewal to ensure containment of contamination.

The roof is primarily composed of asphalt covered, reinforced, precast gypsum panels of the same type used at the 105-H Reactor Building. These panels have endured the past 41 years with a minimum of maintenance, but have deteriorated past the point of corrective maintenance in numerous locations. In addition, roof support structures have deteriorated because of water infiltration.

The interior and exterior of the building are in poor condition, with numerous friable asbestos locations. The roof is in poor condition in several locations. The overall building contains an estimated 13,500 Ci of radionuclides (primarily activation products contained within the graphite core). In addition, 106.7 metric tons (117.6 tons) of lead and an unknown quantity of asbestos are contained within the building structure.

3.1.10.1 Risk Contributors. Falling risk is rated as serious. The roof panels are made of gypsum with a steel reinforcement mesh and the roofing has failed in many places, allowing rainwater to infiltrate a large number of the panels. When gypsum panels become wet, they lose almost all structural strength, divide along their center line, and begin to fall apart. Large chunks of material can fall from the ceiling at any time as many areas of the building already have chunks of roof panels on the floor. Access to the roof is available from inside the facility through several unlocked doors that have no warning signs. If an individual walks on the roof of this facility, there is a very high likelihood they will fall through. The process area elevator rooms roof panels show 80% degradation. Thirty percent of the panels above the reactor block are degraded and a number of panels above the fan house are cracked. Falling risk increases to critical in the 10-year time frame estimate from a continued increase in the number of degraded panels.

Electrical shock risk is rated as serious. The factors contributing to this type of risk are the presence of bare energized wiring in open electrical boxes throughout the facility, inconsistencies in tagging and labeling, a lack of regular preventative maintenance, and water leaking from the deteriorated roofing into energized switchgear. Electrical shock risk increases to critical in the 10-year time frame estimate from continued degradation of the roof, allowing increased quantities of water into the equipment and general aging of the circuit breakers.

Biological hazard risk is rated as moderate. The factors contributing to this type of risk include poisonous snakes, regularly found in the old reactor facilities; significant quantities of bird droppings, found in radiation zones in the upper floors of the facility; and wasps, a problem during the summer months. Bird droppings have been analyzed at HEHF and the presence of infectious diseases has been verified.

Risk from exposure to temperature extremes is rated as moderate. The factors contributing to this type of risk are high ambient temperatures that occur during the summer season , no active HVAC, cleanup work that requires the use of heat-trapping protective clothing, and heat exhaustion cases that have occurred on the Hanford Site in the past.

Struck-by risk is rated as minor. A crack in the upper concrete wall in the north corridor to the fan rooms contributes to the struck-by risk; this cracked area should be supported. The factors contributing to this type of risk are similar to the factors for falling. The roof panels, however, are made of gypsum which is much less likely to cause serious injury if it falls on someone. Workers do not regularly spend large amounts of time in this building. Struck-by risk increases to moderate in the 10-year time frame estimate from the continued degradation of the roof panels.

Fire risk is rated as minor. The factors contributing to this type of risk are ignition sources, fuel quantity, and the heat/flame exposure to an individual. The most likely ignition source is electrical faults. In this facility, the quantity of fuel materials is small. Likewise, there are few individuals that spend significant quantities of time in areas where fire is a significant hazard. The special case of flash burns from electrical arcs generally is limited to electrical craft personnel.

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Suffocation risk is rated as minor. All Hanford Site facilities that have unventilated belowgrade areas have a suffocation risk. Accumulations of water in unventilated areas also can cause a sufficient reduction of oxygen content from biological action or corrosion to be hazardous to human life. Belowgrade areas can also act as catch basins for heavier than air gases that are either toxic or displace an oxygen-bearing atmosphere. The belowgrade areas at this facility have not been appropriately posted as "Confined Spaces."

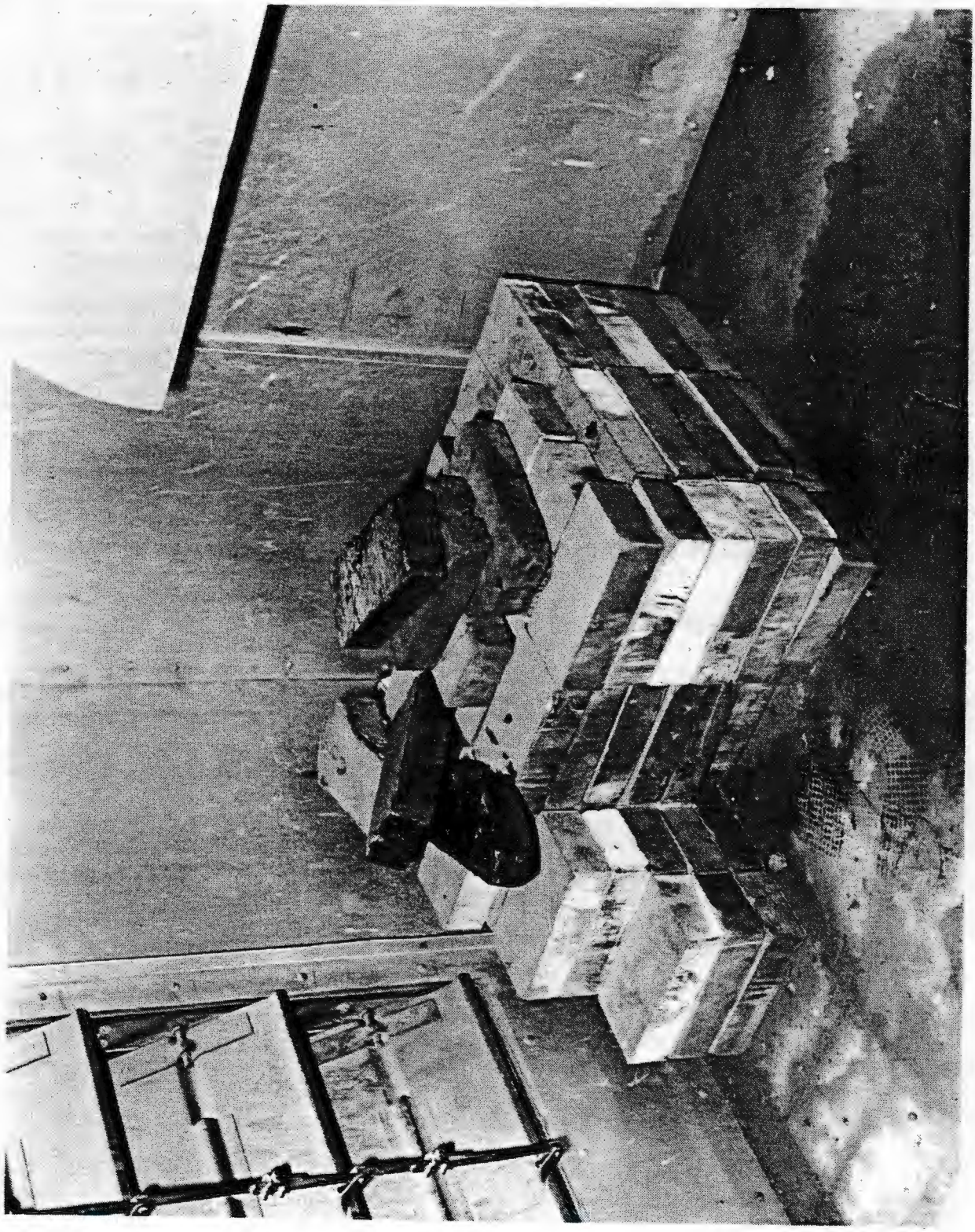
Lead exposure risk is rated as minor. Risk from exposure to lead exists in areas where there are large quantities of lead. Lead was used as shielding at all the reactor facilities in the forms of lead shot, lead brick, lead sheet, and cast-lead sheets. The amount of lead an individual may absorb depends on the length of exposure; the surface oxidation level; how easily the surface of the lead can be disturbed; and whether the lead oxide is disturbed by activities such as cutting, grinding, and burning. Most work associated with lead cleanup does not require disruption of the surface. The observed lead oxidation rates at the Hanford Site are greater than initially expected in an arid area. This oxidation can be seen on the shielding brick shown in Figure 3-3. An ongoing cleanup campaign that makes handling lead necessary and the desirability of lead contribute to the likelihood of undesired exposure. The majority of lead is located in radiation zones and in the transfer area of the storage basin.

Explosion risk is rated as minor. Explosions are possible when chemicals are present that are shock sensitive, volatile, have a low ignition temperature, or can energetically react when mixed together. Risk results from individuals being within the sphere of influence of the explosion. In this evaluation, explosions are assumed to cause death if the individuals are within this sphere of influence. In this facility there are some unknown chemicals staged together for disposal.

Chemical exposure risk is rated as minor. The factors contributing to this type of risk are the presence of a chemical, the quantity, how likely contact is with the chemical, and the level of activities such as gathering and staging chemicals for elimination. In almost all cases in this facility, the quantity of such materials is small and the number of individuals involved in handling them are few.

3.1.10.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. It is assumed that very few individuals will have a need to be in this facility. If maintaining the status quo requires more effort than assumed, such as having to fix or replace the roof to reduce water leakage into the building, risk will be greater than estimated. Larger numbers of individuals in this facility will require more lighting, increasing the likelihood that unused circuits will be energized and more shock hazards will be created. Larger numbers of individuals may also increase the chance that someone will gain

Figure 3-3. Lead Brick Oxidation at 105-C Reactor Building.



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access to the roof and fall through. Risk from exposure to asbestos and radiation will change if activities disturb the material. This disturbance can occur by either physically disrupting the material, or in the case of radiation, by moving the shielding.

Also implicit in the risk estimate is the type of administrative rules that in place and the compliance level to these rules. If rules are relaxed or compliance is poor, risk will be higher. An example is the uncontrolled reactivation of electrical circuits by switching on breakers. If upgrade work is performed, risk will be lower than estimated. This will also occur for exposure to chemicals and lead if elimination campaigns are instituted, as once the material has been removed, the risk is eliminated. However, the risk will be increased during the removal process.

3.1.11 183-C Filter Plant Pump Room

The purpose of the 183-C Filter Plant Pump Room was to provide treated water to the 105-B and 105-C Reactor Buildings. The facility houses water treatment and filtering systems and contains a large reservoir capacity for filtered water. The belowgrade portion and the front of the building is of reinforced concrete construction (96.0 m by 87.0 m [316 ft by 288 ft]). The major part of the aboveground construction is metal frames paneled with corrugated asbestos material. The roof is a steel truss and frame construction overlaid with corrugated asbestos panels that provide the roof decking. Presently, this building serves no purpose.

The walls of the building are in fair condition but the roof is in particularly poor condition. Sections of the rolled roofing material and thermal isolation have blown away. In addition, there are large gaps between the corrugated roof panels that allow snow and rainwater to leak inside. As a result of these gaps and the moist conditions under which the facility operated, the metal roof trusses are deteriorated from heavy rusting and in poor condition. The roofing over the clearwells is also in very poor condition.

3.1.11.1 Risk Contributors. Struck-by risk is rated as moderate. The factors contributing to this type of risk are the roofing is degraded enough to allow significant water leakage; the metal trusses holding the roof panels showed signs of significant corrosion; and snow loads or seismic events could cause the roof to collapse. However, the facility is not frequently occupied and a person has to be present at the time of collapse to be injured. The risk from struck-by increases hazards to critical in the 10-year time frame estimate from continued degradation of the roof structure.

Biological hazard risk is rated as moderate. The factors contributing to this type of risk include poisonous snakes, regularly found in the old reactor support facilities; significant quantities of bird droppings, found in radiation zones in the upper floors of the facility; and wasps that a problem during the summer months. Bird droppings have been analyzed at HEHF and the presence of infectious diseases has been verified.

The risk from release of polychlorinated biphenyl (PCB) contaminated oil to the environment is rated as moderate. The factor contributing to this type of risk was that a transformer (2-C4838E) was leaking oil in the substation

outside the northeast corner of the building. The quantity of oil in the transformer is unknown, but there could be a considerable amount. There are three other transformers that are not leaking; however, the age of the transformers and lack of maintenance increase the likelihood of a leak in the near future. The transformers are not hooked up to electrical power.

Falling risk is rated as minor. The factor contributing to this type of risk is the roof over the clearwell may not support an individual or snow loads. The roof is posted as dangerous; however, access is not prevented by a barrier. The roof is not easily accessible, but there is no plausible reason to attempt access. There is deterioration of the metal roof trusses that causes the risk to increase to critical in the 10-year time frame.

Suffocation risk is rated as moderate. All Hanford Site facilities that have unventilated belowgrade areas have a suffocation risk. Accumulations of water in unventilated areas also can cause a sufficient reduction of oxygen content from biological action or corrosion to be hazardous to human life. Belowgrade areas can also act as catch basins for heavier than air gases that are either toxic or displace an oxygen-bearing atmosphere. The belowgrade areas at this facility have not been appropriately posted as "Confined Spaces."

Asbestos exposure risk is rated as negligible. The factors contributing to this type of risk are asbestos has to be in a finely divided form (friable) and disturbed so an individual can inhale or ingest it. As with most older Hanford Site facilities, the piping insulation used contains asbestos. However, most of the insulation is not friable. The corrugated panels that form the roof and walls of this facility also contain asbestos in nonfriable form. The risk from asbestos exposure increases to minor in the 10-year time frame estimate from the destructive effect of continued water saturation of pipe insulation creating friable material.

3.1.11.2 Risk Sensitivities. The sensitivity of the risk values for this facility is primarily the number of individuals exposed to a hazard. It is assumed that very few individuals will have a need to be in this facility. The performance of any work beyond what is required to maintain the status quo or during demolition activities will increase the risk in the falling and struck-by categories. This will also be true for exposure to asbestos because during the asbestos removal process, exposure will increase. Removing asbestos material may result in the disturbance of vessels and pipes creating a greater likelihood for release. There also may be a lack of attention or awareness to the leaking transformers that may cause an increase in leakage risk. Once the material has been removed, the risk will markedly decrease.

3.1.12 1702-C Badge House

The 1702-C Badge House is located at the entrance to the 105-C exclusion area. It provided shelter for a security check before entrance to the exclusion area. The facility is a 19.5 m^2 (210 ft^2) wooden-framed structure. The general condition of the building is the exterior and the asphalt-covered, wooden-framed roof are in fair condition. The general condition of the building is the interior shows evidence of leaking through the ceiling tiles; one panel is particularly deformed.

3.1.12.1 Risk Contributors. The risk from electrical shock is rated as serious. All other hazards are rated as negligible or not present. The risk from struck-by increases from negligible to minor in the 10-year time frame estimate.

3.1.13 1714-C Solvent Storage

The 1714-C Building is located south of 105-C Reactor and was used for miscellaneous oil and solvent storage. This facility is a steel-framed, transite structure on a concrete foundation, approximately 14.5 m^2 (156 ft^2). The interior, exterior, and roof are in good condition.

3.1.13.1 Risk Contributors. The risk from electrical shock is rated as serious. Although the service conductors are deenergized, the source of power to this building is unknown and could be reestablished.

3.1.14 103-D Fresh Metal Storage

The 103-D Building was originally used for pallet storage of fresh fuel elements before use in the reactor. The facility is now used for miscellaneous storage. This building is a reinforced concrete and concrete block structure, approximately 16.2 m by 8.2 m by 4.4 m (53 ft by 27 ft by 14.5 ft). The general condition of the building is the interior and exterior of the building are in fair condition and the built-up gravel roof is in poor condition. The wooden steps on the west side of the building are in a deteriorated condition.

3.1.14.1 Risk Contributors. Falling risk is rated as moderate. The poor condition of the north side stairs contributes to the risk of falling. Although there are two sets of stairs on this building, one on the east side and the other on the north, the bad north side stairs have not been barricaded or posted to prevent use. This building is in active use. The risk from falling increases to serious in the 10-year time frame estimate.

3.1.14.2 Risk Sensitivities. The sensitivity of the risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the current hazards will be greater.

3.1.15 105-D Reactor Building

The 105-D Reactor Building was constructed from 1943 to 1944 to house the nuclear reactor and directly associated equipment used in reactor operations. It is similar to the 105-B Reactor Building, except for minor variations in layout.

The lower portion of the building is made of reinforced concrete. The reinforced concrete walls (0.9 m to 1.5 m [3 ft to 5 ft] thick) around the reactor block at the lower levels provide additional radiation shielding in conjunction with the biological core shield. The upper section of this building is constructed of concrete block.

The reactor block is located near the center of the building. Fuel discharge and storage areas are located adjacent to the rear face of the reactor block, one level below the ground. Experimental test penetrations are located on the right side of the reactor. The reactor block consists of a graphite moderator stack encased in cast-iron thermal shielding, a welded biological shield consisting of alternating layers of masonite and steel on the four sides, and a nonwelded, stair-step labyrinth seal shield on top. The entire block rests on a concrete foundation. The block weighs approximately 9,145 metric tons (1,008 tons) and is 14.0 m by 14.0 m by 12.2 m (46 ft by 46 ft by 40 ft).

The fuel storage basin served as an underwater collection, storage, and transfer facility for the irradiated fuel elements discharged from the reactor. It consists of a fuel element pickup area, storage area, and transfer area. The basin is 6.7 m (22 ft) deep and contained 6.1 m (20 ft) of water during operation. It has since been drained and cleaned of debris, and fixative has been applied to radiologically contaminated surfaces. The coating, however, may need periodic renewal to ensure containment of contamination.

The roof is primarily composed of asphalt-covered, reinforced, precast concrete panels of the same type used at the 105-B and 105-F Reactor Buildings. These panels have endured the past 49 years with a minimum of maintenance, but they are beginning to show severe signs of deterioration in numerous locations.

The general condition of the building is as follows: the interior is in poor condition with numerous friable asbestos locations in radiologically contaminated areas, the exterior is in poor condition with numerous friable asbestos problems, and the roof is in poor condition in several locations. The overall building contains an estimated 13,500 Ci of radionuclides (primarily activation products contained within the graphite core). In addition, 96.5 metric tons (106.3 tons) of lead and 2.83 m^3 (100 ft^3) of asbestos are contained within the facility.

3.1.15.1 Risk Contributors. Electrical shock risk is rated as critical. The factors contributing to this type of risk are bare energized 480-V wiring is outside the 105-D Building south wall approximately 1.5 m (5 ft) above the ground; inconsistencies exist in tagging and labeling, and a lack of regular preventative maintenance. Even though some circuits are deenergized, there is no system in place to prevent reenergization of these circuits by turning on circuit breakers, thereby increasing the number of potential hazards.

Falling risk is rated as serious. Deteriorating roof panels and the control of roof access contribute to the risk of falling. These panels are made of precast concrete and have been exposed to heavy water leakage. Continued water saturation causes significant degradation of the load-bearing capability of the panels. Few panels at this reactor currently exhibit signs of degradation. There is cracking and a potential for collapse of the concrete roof slab above the fan room. Access to the roof is available from inside the facility by several unlocked doors that have no warning signs. If an individual walks upon the roof of this facility, there is some likelihood they will fall through. The risk from falling increases from serious to critical in the 10-year time frame estimate from continued increases in the number of degraded roof panels.

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Biological hazard risk is rated as moderate. The factors contributing to this type of risk include poisonous snakes, regularly found in the old reactor facilities; significant quantities of bird droppings, found in radiation zones in the upper floors of the facility; and wasps, a problem during the summer months. Bird droppings have been analyzed at HEHF and the presence of infectious diseases has been verified.

Risk from exposure to temperature extremes is rated as moderate. The factors contributing to this type of risk include the following: high ambient temperatures during the summer season, no active HVAC, cleanup work requiring the use of heat-trapping protective clothing, and heat exhaustion cases occurring on the Hanford Site in the past.

Struck-by risk is rated as minor. Roof panels at this reactor show signs of degradation. The concrete panels can degrade to the extent that snow loads or seismic events can cause failure. Anyone struck by a falling piece of panel will suffer injury. The risk from struck-by increases to moderate in the 10-year time frame estimate from a continued increase in degradation and the number of panels affected.

Fire risk is rated as minor. The factors contributing to this type of risk are ignition source, fuel quantity, and heat/flame exposure to an individual. The most likely ignition source is electrical faults. In this facility the quantity of fuel materials is small. Likewise, there are few individuals that spend large quantities of time in areas where fire is a significant hazard. The special case of flash burns from electrical arcs is generally limited to electrical craft personnel.

Radiation exposure risk is rated as minor. Factors that contribute to the risk of radiation exposure include isolated areas of moderate to high exposure rates (100,000 counts per minute [cpm]), areas or items mislabeled or not posted, and changes in posting requirements. A large amount of time would have to be spent in any radiation area to accumulate a significant dose, which is unlikely.

Suffocation risk is rated as minor. All Hanford Site facilities that have unventilated belowgrade areas have a suffocation risk. Accumulations of water in unventilated areas also can cause a sufficient reduction of oxygen content from biological action or corrosion to be hazardous to human life. Belowgrade areas can also act as catch basins for heavier than air gases that are either toxic or displace an oxygen-bearing atmosphere. The belowgrade areas at this facility have not been appropriately posted as "Confined Spaces."

Lead exposure risk is rated as minor. Risk from exposure to lead exists anywhere there are large quantities of lead. Lead was used as shielding at all the reactor facilities in the forms of lead shot, lead brick, lead sheet, and cast-lead sheets. The amount of lead an individual may absorb depends on the length of exposure, the surface oxidation level, the ease with which the surface of the lead can be disturbed, and whether the lead oxide is disturbed by activities such as cutting, grinding, and burning. Most work associated with lead cleanup does not require disruption of the surface. The observed lead oxidation rates at the Hanford Site have been greater than initially expected in an arid area. An ongoing cleanup campaign that makes handling

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lead necessary and the desirability of lead contribute to the likelihood of undesired exposure. Most lead is located in radiation zone areas.

Chemical exposure risk is rated as minor. The factors contributing to this type of risk are the presence and quantity of a chemical, how likely contact is with the chemical, and the level of activities such as gathering and staging chemicals for disposal. In almost all cases, the quantity of such materials is small and only a few individuals are involved in handling them.

Explosion risk is rated as minor. Explosions are possible when chemicals are present that are shock sensitive, volatile, have a low ignition temperature, or can energetically react when mixed together. Risk results from an individual or individuals being within the sphere of influence of the explosion. In this evaluation, explosions are assumed to cause death if the individual is within this sphere of influence. In this facility, some unknown chemicals are staged together for disposal.

3.1.15.2 Risk Sensitivities. The sensitivity of the risk values for this facility is primarily the number of individuals exposed to a hazard. The performance of maintenance beyond what is required to simply maintain the status quo or during demolition will increase risk, especially in the electrical shock area. Risk from exposure to asbestos and radiation will change if activities disturb the material. This disturbance can occur by either physically disrupting the material or, in the case of radiation, by moving the shielding.

Also implicit in the risk estimate is the type of administrative rules in place and the compliance level to these rules. If rules are relaxed or compliance is poor, risk will be higher. An example is the uncontrolled reactivation of electrical circuits by switching on breakers. If upgrade work is performed, risk will be lower than estimated in this evaluation. This will also be true for exposure to chemicals and lead if disposal campaigns are instituted, as once the materials have been removed the risk is eliminated. However, the risk will be increased during the removal process.

3.1.16 116-D Reactor Exhaust Stack

The 116-D Exhaust Stack is used to discharge ventilation air 61.0 m (200 ft) abovegrade from the 105-D Building. The stack is 61.0 m (200 ft) abovegrade and 3.1 m (10 ft) belowgrade, with a 4.9-m (16-ft) diameter base. The stack is a monolithic, reinforced concrete structure, with a wall thickness of 0.5 m (1.5 ft) at the base and 0.3 m (1 ft) at the top. The stack is in generally good condition and has no noted structural defects. All hazards were rated as negligible or were not present.

3.1.16.1 Risk Contributors. All stacks were externally investigated visually from the ground level. Although the existence of radioactive material is presumably on the inside, release is unlikely unless the stack loses its structural integrity. As long as the stack is structurally sound, this is a very unlikely event. Also, the quantity of radioactive material contained in the inactive 100 Area stacks is insufficient to cause a significant health or environmental problem should release occur.

3.1.17 105-DR Reactor Building

The 105-DR Reactor Building was constructed from 1947 to 1950 as a replacement reactor for the low-neutron density 105-D Reactor. The building houses the nuclear reactor and directly associated equipment used in reactor operations. It is similar to the 105-B Reactor building, except for variations in layout.

The lower portion of the building is made of reinforced concrete. The reinforced concrete walls (0.9 m to 1.5 m [3 ft to 5 ft] thick) around the reactor block at the lower levels provide additional radiation shielding in conjunction with the biological core shield. The upper section of this building is concrete block construction.

The reactor block is located near the center of the building. Fuel discharge and storage areas are located adjacent to the rear face of the reactor block, one level below the ground. Experimental test penetrations are located on the right side of the reactor.

The reactor block consists of a graphite moderator stack encased in cast-iron thermal shielding, a welded biological shield consisting of alternating layers of masonite and steel on the four sides, and a nonwelded, stair-step labyrinth seal shield on top. The entire block rests on a concrete foundation. The block weighs approximately 9,145 metric tons (1,008 tons) and is 14.0 m by 14.0 m by 12.2 m (46 ft by 46 ft by 40 ft).

The fuel storage basin served as an underwater collection, storage, and transfer facility for the irradiated fuel elements discharged from the reactor. It consists of a fuel element pickup area, storage area, and transfer area. The basin is 6.7 m (22 ft) deep and contained 6.1 m (20 ft) of water during operation. It has since been drained and cleaned of debris, and fixative has been applied to radiologically contaminated surfaces. The coating, however, may need periodic renewal to ensure containment of contamination. The roof is primarily composed of built-up gravel, reinforced, precast concrete panels of the same type used at the 105-B, 105-D, and 105-F Reactor Buildings.

The general condition of the building is the interior and exterior are in poor condition, with numerous friable asbestos locations, and the roof is in poor condition in several locations. The overall building contains an estimated 13,500 Ci of radionuclides (primarily activation products contained within the graphite core). In addition, 96.5 metric tons (106.3 tons) of lead and an unknown quantity of asbestos are contained within the facility.

3.1.17.1 Risk Contributors. Electrical shock risk is rated as critical. The factors contributing to this type of risk include bare energized wiring hanging out of a conduit; portions of a thermostat with exposed terminals still energized; energized light fixtures filled with water; inconsistencies in tagging and labeling; and a lack of regular preventative maintenance. Even though some circuits are deenergized, there is no system to prevent reenergizing these circuits by turning on circuit breakers, thereby increasing the number of potential hazards.

Falling risk is rated as critical. Deteriorating roof panels and the control of roof access contribute to the risk of falling. These panels are

made of precast concrete and have been exposed to water from roof leakage. Even though these panels do not contain gypsum, continued water saturation causes significant degradation of the load-bearing capability of the panel. Many panels at this reactor, including the ones shown in Figure 3-4, show signs of degradation. There is also a large crack in the concrete roof slab above the fan cells. Access to the roof is available from inside the facility by several unlocked doors that have no warning signs. If an individual walks on the roof of this facility, there is a likelihood they will fall through.

Struck-by risk is rated as serious. The concrete panels can degrade to the extent that snow loads or seismic events can cause failure. Anyone struck by a falling piece of panel will suffer injury. The risk from struck-by increases to critical in the 10-year time frame estimate.

Explosion risk is rated as serious. Explosions are possible when chemicals present are shock sensitive, volatile, have a low ignition temperature, or can energetically react when mixed together. Risk results from an individual or individuals being within the sphere of influence of the explosion. In this evaluation, explosions are assumed to cause death if the individual is within this sphere of influence. The 105-DR Building Fan Room was converted to a sodium burn experiment facility. Although the facility is no longer active, 17,690 kg (39,000 lb) of sodium remain stored in a tank in a small structure next to the 105-DR Building. This sodium could react, causing a large explosion under the right conditions, e.g., contact with water.

Biological hazard risk is rated as moderate. The factors contributing to this type of risk include poisonous snakes, found with some regularity in the old reactor facilities; significant quantities of bird droppings, found in radiation zones in the upper floors of the facility; and wasps, a problem during the summer months. Bird droppings have been analyzed at HEHF and the presence of infectious diseases has been verified.

Risk from exposure to temperature extremes is rated as moderate. The factors contributing to this type of risk include high ambient temperatures during the summer season; no active HVAC; cleanup work that requires the use of heat-trapping protective clothing; and heat exhaustion cases, which have occurred on the Hanford Site in the past.

Fire risk is rated as minor. The factors contributing to this type of risk are ignition sources, fuel quantity, and heat/flame exposure to an individual. The most likely ignition source is electrical faults. In this facility the quantity of fuel materials is small. There is a large pile of

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Figure 3-4. Concrete Roof Panel Degradation at 105-DR Reactor Building.

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tumbleweeds and debris at the back side of the building and the presence of sodium that contribute to the fire risk. There are few individuals that spend large quantities of time in areas where fire is a significant hazard. The special case of flash burns from electrical arcs is generally limited to electrical craft personnel. The risk from fire increases to moderate in the 10-year time frame estimate.

Suffocation risk is rated as minor. All Hanford Site facilities that have unventilated belowgrade areas have a suffocation risk. Accumulations of water in unventilated areas also can cause a sufficient reduction of oxygen content from biological action or corrosion to be hazardous to human life. Belowgrade areas can also act as catch basins for heavier than air gases that are either toxic or displace an oxygen-bearing atmosphere. The belowgrade areas at this facility have not been appropriately posted as "Confined Spaces."

Radiation exposure risk is rated as minor. The factors contributing to this type of risk include some isolated areas of moderate to high exposure rates (up to 120 mR/h) that have been identified, areas or items that are mislabeled or misposted, postings that are out of date, and posting requirements that have changed since the postings were emplaced. A large amount of time would have to be spent in any radiation area to accumulate a significant dose.

Lead exposure risk is rated as minor. Risk from exposure to lead exists anywhere there are large quantities of lead. Lead was used as shielding at all the reactor facilities in the forms of lead shot, lead brick, lead sheet, and cast-lead sheets. The amount of lead an individual may absorb depends on the length of exposure, the surface oxidation level, the ease with which the surface of the lead can be disturbed, and whether the lead oxide is disturbed by activities such as cutting, grinding, and burning. Most work associated with lead cleanup does not require disruption of the surface. The observed lead oxidation rates at the Hanford Site have been greater than initially expected in an arid area. An ongoing cleanup campaign that makes handling lead necessary and the desirability of lead contribute to the likelihood of undesired exposure. Most lead is located in radiation zone areas.

Chemical exposure risk is rated as minor. The factors contributing to this type of risk are the presence and quantity of chemicals, the likelihood of contact with the chemical, and the level of activities, e.g., gathering and staging chemicals for disposal. In almost all cases, the quantity of such materials is small and only a few individuals are involved in handling them.

3.1.17.2 Risk Sensitivities. The sensitivity of the risk values for this facility is primarily the number of individuals exposed to a hazard. This is particularly true for electrical shock, falling, and struck-by hazards. Risk from exposure to asbestos and radiation will change if activities disturb the material. This disturbance can occur by either physically disrupting the material or, in the case of radiation, by moving the shielding.

Also implicit in the risk estimate is the type of administrative rules in place and the compliance level to these rules. If rules are relaxed or compliance is poor, risk will be higher. An example is the uncontrolled reactivation of electrical circuits by switching on breakers. If upgrade work is performed, risk will be lower than estimated in this evaluation. Risk will

also be lower than estimated for exposure to chemicals and lead if disposal campaigns are instituted, as once the materials have been removed the risk is eliminated. However, during the removal process, risk will increase. Once the material has been removed, risk will decrease markedly. The existence of large quantities of sodium creates significant sensitivity in the effect of assumptions on the estimated risk from the explosion hazard.

3.1.18 116-DR Reactor Exhaust Stack

The 116-DR Exhaust Stack was used to discharge ventilation air from reactor operations as well as the experimental sodium burn facility located in the Fan Room. This air was discharged 61.0 m (200 ft) abovegrade from the 105-DR Building. The stack is 61.0 m (200 ft) abovegrade and 3.1 m (10 ft) belowgrade with a 4.9-m (16-ft) diameter base. The stack is a monolithic, reinforced concrete structure with a wall thickness of 0.5 m (1.5 ft) at the base and 0.3 m (1 ft) at the top. The stack is in good general condition and has no noted structural defects. However, the 116-DR Reactor Exhaust Stack has a collar and penetration that have an unknown effect on its structural integrity and therefore, needs further investigation (other than the external visual examination performed during this investigation). Additionally, the small concrete block attachment is severely deteriorated and shows evidence of old and new cracking in the concrete block walls.

3.1.18.1 Risk Contributors. All stacks were externally investigated visually from ground level. Although existence of radioactive material is presumably on the inside, release is unlikely unless the stack loses its structural integrity. As long as the stack is structurally sound, this is a very unlikely event. Also, the quantity of radioactive material contained in the inactive 100 Area stacks is insufficient to cause a significant health or environmental problem should release occur.

The risk from falling and struck-by is rated as minor for the small concrete-block building attached to this facility. The concrete roof is cracked and there are many cracks and some displacement of masonry block walls. The risk from falling increases from minor to serious in the 10-year time frame estimate.

3.1.19 117-DR Exhaust Air Filter Building

The 117-DR Building filtered ventilation air from the confinement zone of the 105-DR Reactor Building and the experimental sodium burn facility before discharging it to the atmosphere through the 116-DR Stack. The facility is a reinforced concrete structure 18.0 m (59 ft) long, 11.9 m (39 ft) wide, 10.7 m (35 ft) high, and 2.4 m (8 ft) abovegrade. The general condition of the building is the interior is in poor condition, the exterior is in fair condition, and the removable metal-plate roof is in fair condition.

3.1.19.1 Risk Contributors. All hazards are rated as negligible or are not present. This facility cannot be assessed without removing the top with a crane. Radionuclides and sodium residue are likely to be present but in low concentrations. The area is routinely monitored for evidence of migration.

3.1.20 119-DR Exhaust Air Sample Building

The 119-DR Building housed most of the instrumentation for the exhaust air system. A sample stream of the exhaust air was routed through a continuous air monitoring system in the building for monitoring radioactivity. The structure is a small prefabricated metal building, 4.6 m by 7.3 m (15 ft by 24 ft). The general condition of the building is the interior is in fair condition, and the exterior and metal roof are in good condition.

3.1.20.1 Risk Contributors. All hazards are rated as negligible or not present.

3.1.21 1702-DR Area Badge House

The 1702-DR Badge House is located at the entrance to the 105-DR Exclusion Area. It provided shelter for a security check before entrance to the exclusion area. The facility is a one story, wooden-framed structure, approximately 6.1 m by 6.1 m by 3.7 m (20 ft by 20 ft by 12 ft). The general condition of the building is the interior, exterior, and asbestos-shingled, wooden-framed roof are in extremely poor condition.

3.1.21.1 Risk Contributors. Falling risk is rated as minor. The deteriorated state of the plywood roof decking and several missing asbestos shingles contribute to the risk of falling. The building is small, unused, and not normally entered. Access to the roof requires a portable ladder; however, there is no reason to perform any maintenance work on this building. The risk from falling increases to moderate in the 10-year time frame from continued deterioration of the roof.

Struck-by risk is rated as minor. The factors contributing to this type of risk are the same as for the falling risk. The risk from struck-by increases to moderate in the 10-year time frame estimate from continued deterioration of the roof.

3.1.21.2 Risk Sensitivities. The sensitivity of the risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals with access to this facility increases significantly, risk from the existing hazards will be greater.

3.1.22 105-F Reactor Building

The 105-F Reactor Building was constructed from 1943 to 1945 to house the nuclear reactor and directly associated equipment used in reactor operations. It is similar to the 105-B Reactor Building, except for variations in layout. In 1982 the reactor was prepared for final demolition by removing all asbestos and the installation of temporary electrical distribution used for lighting.

The lower portion of the building is made of reinforced concrete. The reinforced concrete walls (0.9 m to 1.5 m [3 ft to 5 ft] thick) around the reactor block at the lower levels provide additional radiation shielding in conjunction with the biological core shield. The upper section of this building is concrete block construction.

The reactor block is located near the center of the building. Fuel discharge and storage areas are located adjacent to the rear face of the reactor block, one level below the ground. Experimental test penetrations are located on the right side of the reactor. The reactor block consists of a graphite moderator stack encased in cast-iron thermal shielding, a welded biological shield consisting of alternating layers of masonite and steel on the four sides, and a nonwelded, stair-step labyrinth seal shield on top. The entire block rests on a concrete foundation. The block weighs approximately 9,145 metric tons (1,008 tons) and is 14.0 m (46 ft) high, 14.0 m (46 ft) wide, and 12.2 m (46 ft) deep.

The fuel storage basin served as an underwater collection, storage, and transfer facility for the irradiated fuel elements discharged from the reactor. It consists of a fuel element pickup area, storage area, and transfer area. The basin is 6.7 m (22 ft) deep and contained 6.1 m (20 ft) of water during operation. It has since been partially drained and backfilled with soil and rock. Eight column supports were extremely damaged during the backfilling of this area.

The roofing material is composed of built-up gravel with a tar membrane. The decking is made of reinforced, precast concrete panels of the same type used at the 105-B, 105-D, and 105-DR Reactors. These panels have endured the past 49 years with a minimum of maintenance, and they now show severe signs of deterioration.

The general condition of the building is the interior and exterior are in poor condition. The built-up gravel is generally in poor to extremely poor condition. The overall building contains an estimated 13,500 Ci of radionuclides (primarily activation products contained within the graphite core). In addition, 96.5 metric tons (106.3 tons) of lead and a minimal quantity of asbestos are contained within the facility. In addition to the panel deterioration, the interior supporting roof trusses have deteriorated because of their continuous exposure to moisture.

3.1.22.1 Risk Contributors. Falling risk is rated as critical. The factors contributing to this type of risk are the roof panels are made of precast concrete that have been exposed to water saturation from roof leakage; continued saturation causes a significant degradation of the load-bearing capability of the panels. Large numbers of roof panels at this reactor exhibit signs of degradation. Access to the roof is available from inside the facility by several unlocked doors that have no warning signs. If an individual walks on the roof of this facility, there is a high likelihood they will fall through. A fatal accident occurred in April 1992 when an individual walked across the transfer area roof and fell through.

Electrical shock risk is rated as critical. The factor contributing to this type of risk is that the 105-F Building had been prepared for demolition in 1982. Parts of the electrical system in the building had been cut apart.

Figure 3-5. Electrical Cables Passing Through Walls.

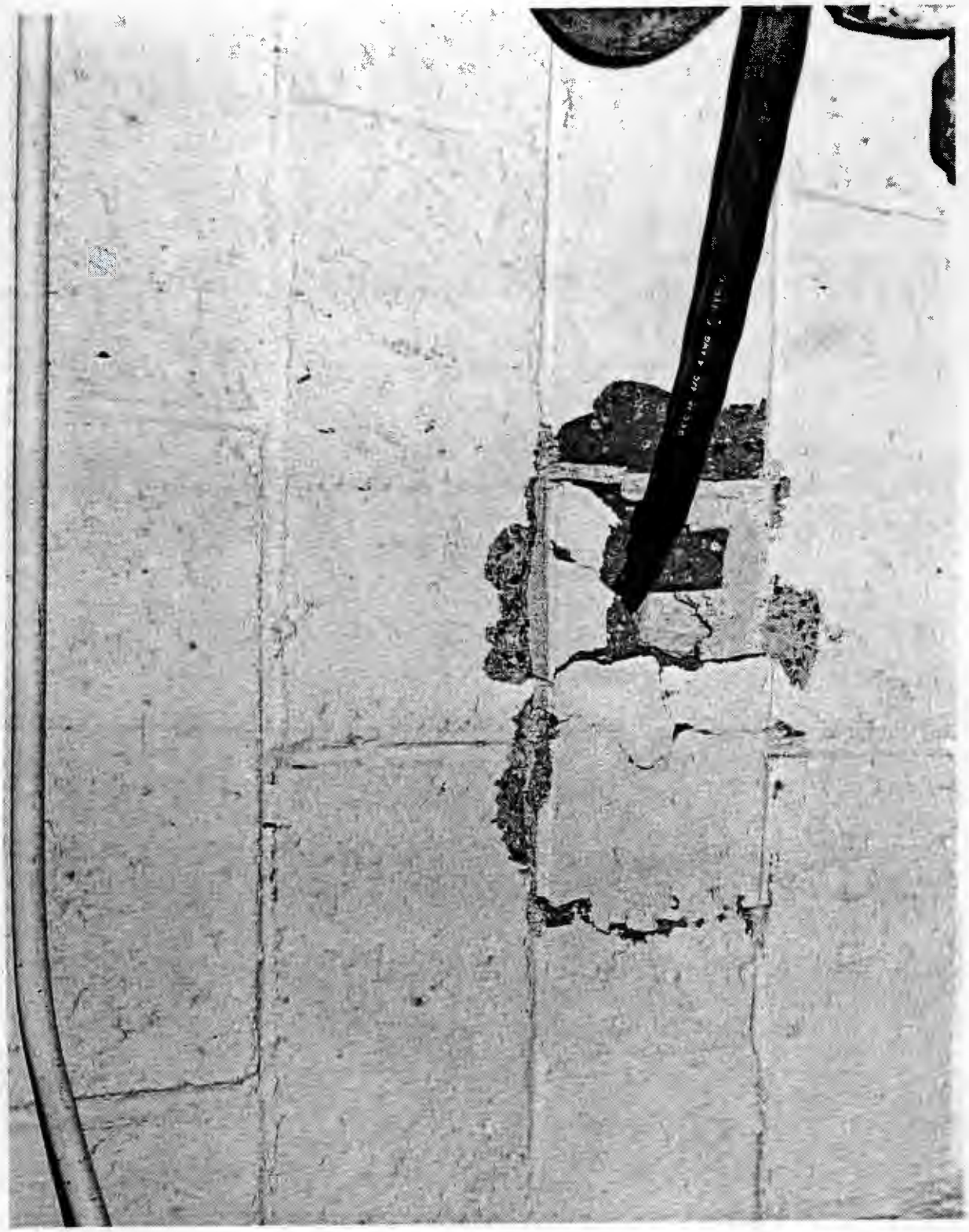

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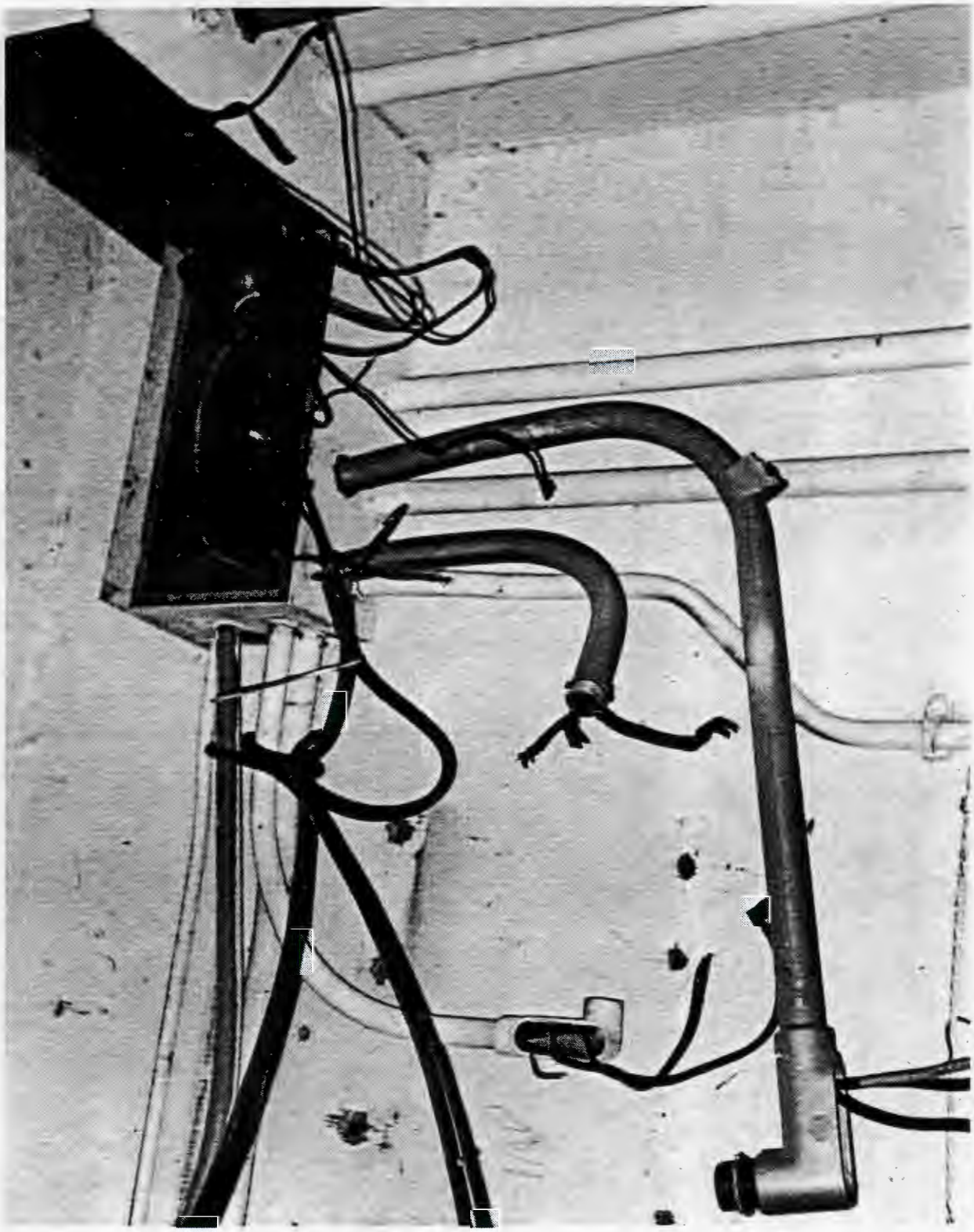
Figure 3-6. Electrical Hazard at 105-F Reactor Building.



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Many pieces of electrically powered equipment had been removed but the wires had been left hanging. The building had been reenergized later and some new power cables were emplaced. Temporary cables were routed through broken-out holes in the concrete wall (as shown in Figure 3-5) and old circuits were reenergized. These conditions have resulted in a large number of electrical hazards. The electrical system at the 105-F Building is the worst of all 105 Buildings. Even though some circuits are deenergized, there is no system in place to prevent reenergization of these circuits by turning on circuit breakers, and thereby increasing the number of potential hazards. Figure 3-6 demonstrates the general electrical condition of the 105-F Building. To eliminate these electrical hazards, the entire building lighting system is being upgraded and the existing hazardous system will be completely deactivated.

Fire risk is rated as critical. The factors contributing to this type of risk are the same as those for electrical shock, the most likely fire-related injuries coming from arc-caused flash burns.

Struck-by risk is rated as moderate. The concrete panels can degrade to the extent that snow loads or seismic events can cause the panels to collapse and fall. Anyone struck by a falling piece of panel or associated material will suffer injury. The risk from struck-by increases to serious in the 10-year time frame estimate from a continuing increase in the number of degraded panels.

Biological hazard risk is rated as moderate. The factors contributing to this type of risk include poisonous snakes, regularly found in the old reactor facilities; significant quantities of bird droppings, found in radiation zones in the upper floors of the facility; and wasps, a problem during the summer months. Bird droppings have been analyzed at HEHF and the presence of infectious diseases has been verified.

Risk from exposure to temperature extremes is rated as moderate. The factors contributing to this type of risk include high ambient temperatures occurring during the summer season, no active HVAC, cleanup work requiring the use of heat-trapping protective clothing, and heat exhaustion cases that have occurred on the Hanford Site in the past.

Suffocation risk is rated as minor. All Hanford Site facilities that have unventilated belowgrade areas can be at risk from suffocation. Accumulations of water in unventilated areas can cause reduction of oxygen content from biological action or corrosion sufficient to be hazardous to human life. Belowgrade areas can also act as catch basins for heavier than air gases that are either toxic or displace an oxygen-bearing atmosphere. The belowgrade areas at this facility have not been appropriately posted as "Confined Spaces."

Lead exposure risk is rated as minor. Risk from exposure to lead exists anywhere there are large quantities of lead. Lead was used as shielding at all the reactor facilities in the forms of lead shot, lead brick, lead sheet, and cast-lead sheets. The amount of lead an individual may absorb depends on the length of exposure; the surface oxidation level; how easily the surface of the lead can be disturbed; and whether the lead oxide is disturbed by activities such as cutting, grinding, and burning. Most work associated with lead cleanup does not require disruption of the surface. The observed lead

oxidation rates at the Hanford Site have been greater than initially expected in an arid area. An ongoing cleanup campaign that makes handling lead necessary and the desirability of lead contribute to the likelihood of undesired exposure. Most lead is located in radiation zone areas.

Asbestos exposure risk is rated as negligible. The factor contributing to this type of risk is asbestos has to be in a finely divided form (friable) and disturbed so an individual can inhale or ingest it. As with most older Hanford Site facilities, the piping insulation used contains asbestos. However, most of the insulation is not friable. The corrugated panels that form the roof and walls of this facility also contain asbestos in nonfriable form. The risk from exposure to asbestos increases from negligible to minor in the 10-year time frame estimate from continued degradation creating more friable material.

The risk from release of oil to the environment is rated as minor. The factor contributing to this type of risk is equipment is leaking oil in the facility.

3.1.22.2 Risk Sensitivities. The sensitivity of the risk values for this facility is primarily the number of individuals exposed to a hazard. If this facility is made accessible to the public in the future, significant amounts of maintenance would be required to make it safe. The performance of maintenance beyond what is required to simply maintain the status quo or during demolition will increase the risk, especially from electrical shock. Risk from exposure to asbestos and radiation will change if activities disturb the material. This disturbance can occur by either physically disrupting the material or, in the case of radiation, by moving the shielding.

Also implicit in the risk estimate is the type of administrative rules in place and the compliance level to these rules. If rules are relaxed or compliance is poor, risk will be higher. An example is the uncontrolled reactivation of electrical circuits by switching on breakers. If upgrade work is performed, risk will be lower than estimated in this evaluation. This will also occur for exposure to chemicals and lead if disposal campaigns are instituted, as once the materials have been removed the risk is eliminated. However, during the removal process the risk will increase.

3.1.23 108-F Biology Laboratory Building

The 108-F Building provided office and laboratory space for the Hanford Site Biology Laboratory. This building consists of the 108-F Laboratory Building (about 1,858 m^2 [20,000 ft^2], which was part of the original area construction, and an annex that was added in 1961. The original building is a rectangular four-story, steel-framed, concrete block structure with concrete foundation and floors. The newer annex, a rectangular three-story addition of concrete block construction (about 1,022 m^2 [11,000 ft^2]), adjoins the older building. The general condition of the building is the interior is in poor condition with severe friable asbestos problems and the exterior is in fair condition. The asphalt-covered roof is in poor condition and shows evidence of heavy leaking. The east annex roof is a precast, concrete-paneled roof that has several panels in extremely poor condition.

3.1.23.1 Risk Contributors. Biological hazard risk is rated as moderate. The factors contributing to this type of risk include poisonous snakes, regularly found in the old deactivated facilities; significant quantities of bird droppings, found in the HVAC system; and wasps, a problem during the summer months. Bird droppings have been analyzed at HEHF and the presence of infectious diseases has been verified.

Risk from exposure to temperature extremes is rated as moderate. The factors contributing to this type of risk include high ambient temperatures occurring during the summer season, no active HVAC, cleanup work requires the use of heat-trapping protective clothing, and heat exhaustion cases that have occurred on the Hanford Site in the past.

Falling risk is rated as minor. Deteriorating roof panels in the east annex and the control of roof access contribute to this type of risk. These panels are made of precast concrete and have been exposed to water from roof leakage. Continued water saturation causes significant degradation of the load-bearing capability of the panel. Large numbers of panels at the east annex exhibit signs of degradation. Access to the annex roof is available only via a portable ladder because there are no stairwells in the annex. If an individual walks upon the roof of this facility, there is a high likelihood they will fall through; however, because accessibility is difficult, and there is no valid reason to be on the roof, the number of individuals expected to gain roof access is limited. This building also has missing handrails that contribute to the risk of falling from an elevated surface. The risk from falling increases to serious in the 10-year time frame estimate from continued degradation of the roof.

Struck-by risk is rated as minor. The factors contributing to this type of risk are similar to those for the falling risk. The concrete panels can degrade to the extent that snow loads or seismic events can cause failure. Anyone struck by a falling piece of panel will suffer injury.

Electrical shock risk is rated as minor. The factors contributing to this type of risk include the service disconnect switch, which is energized but not labeled; receptacles hanging from the panel board without support; and the deenergized service, which is on the same pole as the temporary energized service, creating the possibility of inadvertent energization. The electrical services are planned to be disabled. Should the services not be disabled, the risk will increase to serious in the 10-year time frame.

Asbestos exposure risk is rated as minor. The factors contributing to this type of risk are large amounts of asbestos pipe insulation in a degraded, friable condition. This building has been designated as an asbestos-controlled entry area. The risk from exposure to asbestos increases to moderate in the 10-year time frame from continued degradation of asbestos-containing insulation creating more friable material.

3.1.23.2 Risk Sensitivities. The sensitivity of the risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

3.1.24 183-F Clearwell Facility

The 183-F Clearwell Facility served as the filtered water storage for the 105-F Reactor Building. It is a poured concrete belowgrade basin with a poured concrete roof supported by poured concrete pillars. The riverside clearwell is partially demolished and is used as a demolition and inert waste landfill.

3.1.24.1 Risk Contributors. Falling risk is rated as moderate. The factors contributing to this type of risk are the facility is partially demolished, not fenced, and unusable. The facility is belowground level and appears harmless to the casual observer.

3.1.24.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals around this facility increases significantly, risk from the existing hazards will be greater. As security is gradually relaxed at the Hanford Site, access to this facility by recreationists from the Columbia River is probable.

3.1.25 1701-FA Gate House

The 1701-FA Facility served as an area badge house and security patrol station. The single story, poured concrete building is 6.1 m by 9.8 m (20 ft by 32 ft). The general condition of the building is the interior and exterior are in fair condition and the tar and gravel surface roof is in fair condition.

3.1.25.1 Risk Contributors. Fire risk is rated as minor. The factors contributing to this type of risk are that even though loads in the service have been turned off, the service is still energized, creating the possibility of a fire by insulation failure and short circuits. The equipment is not serviced and is beyond its design life.

3.1.25.2 Risk Sensitivities. The sensitivity of the risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals around this facility increases significantly, risk from the existing hazards will be greater. Risk can be reduced by turning the electrical service off.

3.1.26 105-H Reactor Building

The 105-H Reactor Building was constructed from 1948 to 1949 to house the nuclear reactor and directly associated equipment used in reactor operations. It is similar to the 105-C Reactor Building, except for variations in layout.

The lower portion of the building is made of reinforced concrete. The reinforced concrete walls (0.9 m to 1.5 m [3 ft to 5 ft] thick) around the reactor block at the lower levels provide additional radiation shielding in conjunction with the biological core shield. The upper section of this building is constructed of lighter concrete block.

The reactor block is located near the center of the building. Fuel discharge and storage areas are located adjacent to the rear face of the reactor block, one level below the ground. Experimental test penetrations are located on the right side of the reactor. The reactor block consists of a graphite moderator stack encased in cast-iron thermal shielding, a welded biological shield consisting of alternating layers of masonite and steel on the four sides, and a nonwelded, stair-step labyrinth seal shield on top. The entire block rests on a concrete foundation. The block weighs approximately 9,145 metric tons (1,008 tons) and is 14.0 m (46 ft) high, 14.0 m (46 ft) wide, and 12.2 m (40 ft) deep.

The roofing material is composed of built-up gravel with a tar membrane, while the decking is reinforced, precast gypsum panels of the same type used at the 105-C Reactor Building. These panels have endured the past 43 years with a minimum of maintenance but they have deteriorated past the point of corrective maintenance in numerous locations. In addition, roof support structures have deteriorated because of water infiltration.

The fuel storage basin served as an underwater collection, storage, and transfer facility for the irradiated fuel elements discharged from the reactor. It consists of fuel element pickup, storage, and transfer areas. The basin is 6.7 m (22 ft) deep and contained 6.1 m (20 ft) of water during operation. It has since been partially drained and backfilled with soil and rock. There is evidence of severe damage to the steel columns which probably occurred at this time.

The general condition of the building is the interior and exterior are in poor condition, with numerous friable asbestos locations. The roof is in poor condition and shows evidence of heavy leakage. The overall building contains an estimated 13,500 Ci of radionuclides (primarily activation products contained within the graphite core). In addition, 113.8 metric tons (125.4 tons) of lead and an unknown quantity of asbestos are contained within the facility.

3.1.26.2 Risk Contributors. Electrical shock risk is rated as critical. The factors contributing to this type of risk include the following: the roof allows rainwater and melting snow to seep onto wired, energized equipment in numerous locations (Figure 3-7 shows the possibility of water intrusion into electrical equipment); nonmetallic sheathed cable used to supply power is subject to abrasion and mechanical damage; receptacle boxes are not approved for use in wet locations; lamp wires were found pinched between shade and ballast shroud; a live extension cord was found laying in a puddle of water; inconsistencies exist in tagging and labeling; and there is a lack of regular preventative maintenance. Even though some circuits are deenergized, there is no system in place to prevent reenergizing these circuits by turning on circuit breakers, which would increase the number of potential hazards. This facility is occasionally occupied.

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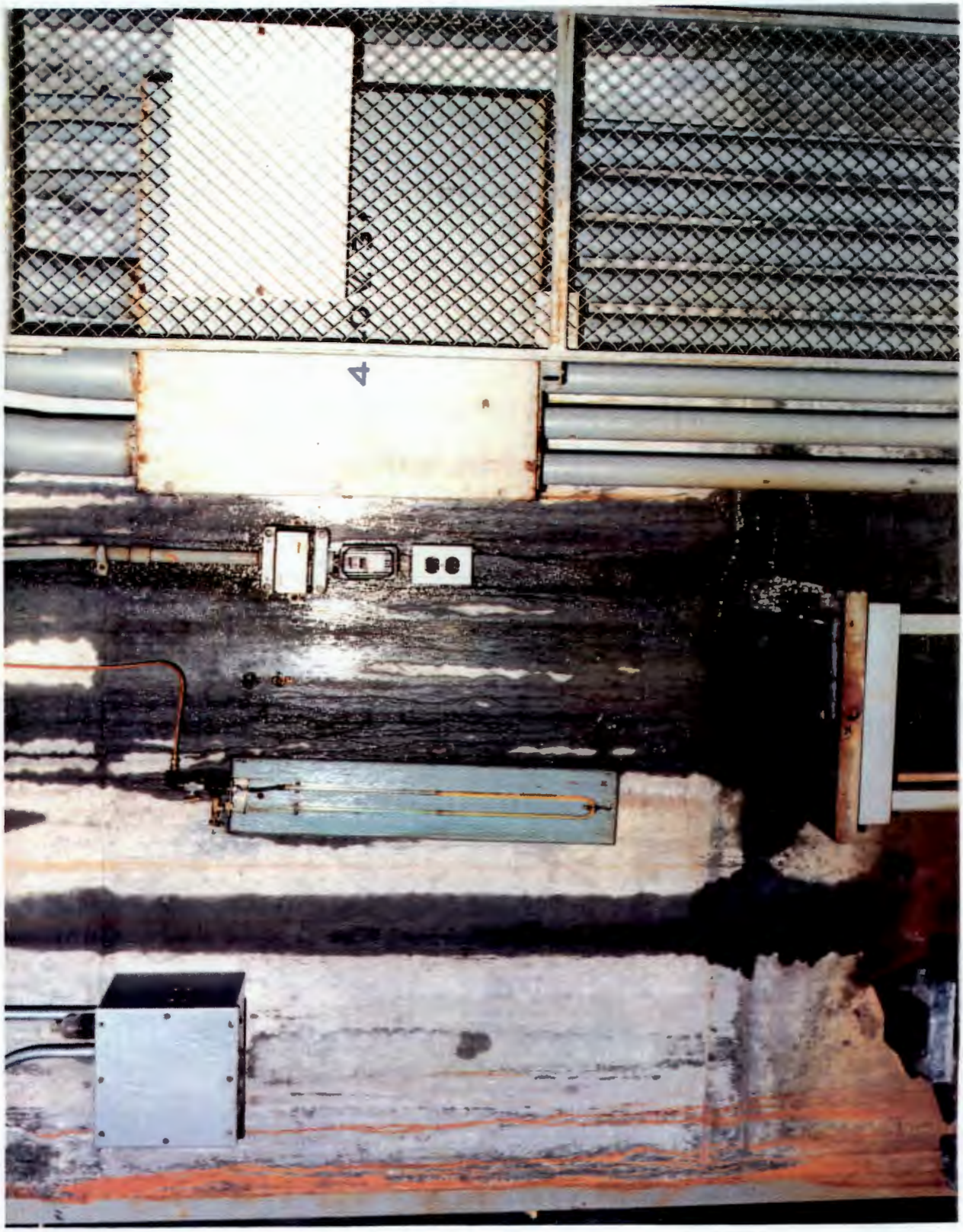
Figure 3-7. Wet Electrical Equipment at 105-H Reactor Building.



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Falling risk is rated as serious. The roof panels are made of gypsum with a steel reinforcement mesh and the roofing has failed in many places, allowing rainwater to infiltrate a significant portion of the panels which contributes significantly to risk. When gypsum panels become wet, they lose almost all structural strength, start dividing along their center line, and fall apart. Large chunks of material can fall from the ceiling at any time as many areas of the building already have chunks of roof panels on the floor. Access to the roof is available from inside the facility by several unlocked doors that have no warning signs. If an individual walks on the roof of this facility, there is an extremely high likelihood they will fall through. The risk from falling increases to critical in the 10-year time frame estimate from continued degradation of the roof panels.

Struck-by risk is rated as moderate. The factors contributing to this type of risk are deteriorated roof panels and numerous large cracks in concrete wall slabs similar to those found in the inner control rod room. Figure 3-8 shows a damaged steel column in the fuel basin area. These faults can contribute to wall and/or roof collapse. Heavy snow loads or seismic events could initiate this collapse. The risk from struck-by increases to serious in the 10-year time frame estimate from continued degradation of roof panels.

Biological hazard risk is rated as moderate. The factors contributing to this type of risk include poisonous snakes, regularly found in the old reactor facilities; significant quantities of bird droppings, found in radiation zones in the upper floors of the facility; and wasps, a problem during the summer months. Bird droppings have been analyzed at HEHF and the presence of infectious diseases has been verified.

Risk from exposure to temperature extremes is rated as moderate. The factors contributing to this type of risk include high ambient temperatures occurring during the summer season, no active HVAC, cleanup work requires the use of heat-trapping protective clothing, and heat exhaustion cases that have occurred on the Hanford Site in the past.

Radiation exposure risk is rated as minor. The factors contributing to this type of risk include the following: some isolated areas of moderate to high exposure rates (up to 100 mR/h) have been identified, areas or items are mislabeled or misposted, postings are out of date, and posting requirements have changed since the postings were emplaced. A large amount of time would have to be spent in any radiation area to accumulate a significant dose.

Fire risk is rated as minor. The factors contributing to this type of risk are ignition source, fuel quantity, and heat/flame exposure to an individual. The most likely ignition source is electrical faults. In this facility the quantity of fuel materials is small. Likewise, there are few individuals that spend large quantities of time in areas where fire is a significant hazard. The special case of flash burns from electrical arcs is generally limited to electrical craft personnel. The minor risk from fire increases to moderate in the 10-year time frame estimate.

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Figure 3-8. Damaged Fuel Basin Support Column at 105-H Reactor Building.

Suffocation risk is rated as minor. All Hanford Site facilities that have unventilated belowgrade areas have a suffocation risk. Accumulations of water in unventilated areas also can cause a sufficient reduction of oxygen content from biological action or corrosion to be hazardous to human life. Belowgrade areas can also act as catch basins for heavier than air gases that are either toxic or displace an oxygen-bearing atmosphere. The belowgrade areas at this facility have not been appropriately posted as "Confined Spaces."

Lead exposure risk is rated as minor. Risk from exposure to lead exists anywhere there are large quantities of lead. Lead was used as shielding at all the reactor facilities in the forms of lead shot, lead brick, lead sheet, and cast-lead sheets. The amount of lead an individual may absorb depends on the length of exposure; the surface oxidation level; how easily the surface of the lead can be disturbed; and the type of activity associated with lead exposure such as cutting, grinding, and burning. Most work associated with lead cleanup does not require disruption of the surface. The observed lead oxidation rates at the Hanford Site have been greater than initially expected in an arid area. An ongoing cleanup program that makes handling lead necessary and the attractive characteristics of lead contribute to the likelihood of unwanted exposure. Most lead is located in radiation zone areas.

Chemical exposure risk is rated as minor. The factors contributing to this type of risk are the presence and quantity of a chemical, how likely contact is with the chemical, and the level of activities, e.g., gathering and staging chemicals for disposal. In almost all cases, the quantity of such materials is small and only a few individuals are involved in handling them.

Explosion risk is rated as minor. Explosions are possible when chemicals are present that are shock sensitive, volatile, have a low ignition temperature, or can energetically react when mixed together. In this facility, there are some unknown chemicals staged together for disposal. Risk results from an individual or individuals being within the sphere of influence of the explosion. In this evaluation, explosions are assumed to cause death if the individual is within the sphere of influence.

Asbestos exposure risk is rated as negligible. However, the risk from exposure to asbestos increases to minor in the 10-year time frame from continued degradation of insulation creating more friable material.

3.1.26.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. It is assumed that very few individuals will have a need to be in this facility. If maintaining the status quo or demolition activities require more effort than is assumed, such as having to fix or replace the roof to reduce water leakage into the building, risk will be greater than estimated. Larger numbers of individuals in this facility will require more lighting and this will increase the likelihood that unused circuits will be energized which will create more shock hazards. Larger numbers of individuals in the facility may also increase the chance that someone will gain access to the roof and fall through. Risk from exposure to asbestos and radiation will change if activities disturb the material. This disturbance can occur by either physically disrupting the material or, in the case of radiation, by moving the shielding.

Also implicit in the risk estimate is the type of administrative rules in place and the compliance level to these rules. If rules are relaxed or compliance is poor, risk will be higher. An example is the uncontrolled reactivation of electrical circuits by switching on breakers. If upgrade work is performed, risk will be lower than estimated in this evaluation. This will also be true for exposure to chemicals and lead if disposal campaigns are instituted, as once the material has been removed the risk is eliminated. However, during the removal process the risk will increase.

3.1.27 1713-H Warehouse

The 1713-H Building provides miscellaneous storage space. The facility is an L-shaped (14.5 m by 18.9 m; and 22.0 m by 18.3 m [156 ft by 62 ft; and 72 ft by 60 ft]), single-story, steel-framed structure with corrugated transite siding. The general condition of the building is the interior and exterior of the building are in fair condition and the membrane with rock, ballast-steel roof is in fair condition. Presently the building is used to store equipment in support of the 100 Area Surveillance and Maintenance program.

3.1.27.1 Risk Contributors. Electrical shock risk is rated as serious. The factors contributing to this type of risk are that during replacement of Panel C, connections to the panel were run through water pipe rather than conduits. Water pipe does not have a smooth interior like a conduit, thus creating the possibility the cable was damaged when it was pulled in. The original equipment ground has not been connected to the new panel. In addition, all ground wires in the wiring system have been cut off, creating a possible shock hazard if a fault should occur. Although branch circuit breakers have been turned off, no lock and tag is present to prevent reenergizing. The risk from electrical shock increases to critical in the 10-year time frame estimate from continued system degradation.

3.1.27.1 Risk Contributors. Electrical shock risk is rated as serious. The factors contributing to this type of risk include the following:

- During replacement of Panel C, connections to the panel were run through water pipe rather than conduits. Water pipe does not have a smooth interior like a conduit, thus creating the possibility the cable was damaged when it was pulled in.
- The original equipment ground has not been connected to the new panel.
- All ground wires in the wiring system have been cut off, creating a possible shock hazard if a fault should occur.
- Although branch circuit breakers have been turned off, no lock and tag is present to prevent reenergizing.

The risk from electrical shock increases to critical in the 10-year time frame estimate from continued system degradation.

Struck-by risk is rated as moderate. A vertical crack in the concrete wall between the north and south parts of the building contribute to the risk

of being struck by parts the wall if it collapsed. This bearing wall supports roof trusses. Accordingly, collapse of the wall and roof can be initiated by snow loads or seismic events. Because this building is routinely in use, it is probable it would be occupied at the time of the incident. The risk from struck-by increases from moderate to critical in the 10-year time frame estimate from continued structural degradation.

Falling risk is rated as minor. The factors contributing to this type of risk include roof panels made of gypsum, and roofing that has failed in many places allowing rainwater to infiltrate a significant portion of the panels. When gypsum panels become wet, they lose almost all structural strength and begin to fall apart. Large chunks of material can fall from the ceiling at any time. There are no permanently attached roof-access ladders. If an individual walks on the roof of this facility, there is a high likelihood they will fall through.

Chemical exposure risk is rated as negligible. However, the risk from exposure to chemicals increases to minor in the 10-year time frame estimate from the escape of more chemicals.

Chemical release to the environment risk is rated as negligible. However, the risk from chemical release increases to minor in the 10-year time frame estimate.

Explosion risk is rated as negligible. However, the risk from explosions increases to minor in the 10-year time frame estimate from the possibility of more materials being found and placed in proximity to one another.

3.1.27.2 Risk Sensitivities. The sensitivity of the risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater. Because this facility is a warehouse, there are constantly changing chemical inventories. These changes will affect the likelihood of a fire or explosion occurring, as well as exposure to these events.

3.1.28 167-K Crosstie Tunnel Building

The 167-K Building is used as the midway entry and ventilation shaft for the crosstie tunnel connecting the 190-B and 165 buildings in the KE and KW Areas. The facility is a concrete and steel structure, 3.0 m by 4.6 m (10 ft by 15 ft). The general condition of the building is the interior is in poor condition, and the exterior and asphalt-covered concrete roof are in fair condition. All hazards are rated as negligible or not present.

3.1.28.1 Risk Contributors. No access was allowed to the 167-KW Crosstie Tunnel Building. No electrical service exists for this building. This facility was examined at the entrance but nothing of significance was observed. Because this facility was not entered, unknown hazards may exist.

3.1.29 182-K Emergency Water Reservoir and Pump House

The 182-K facility housed diesel engine-driven pumps and associated equipment for emergency reactor cooling. The building is a steel-framed structure approximately 242.47 m^2 (2,610 ft^2). The general condition of the building is the interior and exterior are in fair condition, and the asphalt-covered steel roof is in poor condition.

3.1.29.1 Risk Contributors. Biological hazard risk is rated as moderate. The factors contributing to this type of risk include poisonous snakes, regularly found in the old facilities, and wasps, which have been a problem during the summer months.

Risk from exposure to temperature extremes is rated as moderate. The factors contributing to this type of risk include high ambient temperatures occurring during the summer season, no active HVAC, cleanup work requiring the use of heat-trapping protective clothing, and heat exhaustion cases that have occurred on the Hanford Site in the past.

Falling risk is rated as minor. The factor contributing to this type of risk is a ladder way in the southwest corner that is not properly guarded, and the drop is approximately 3.7 m (12 ft) deep. Also there are several sections of handrail and guardrail missing or not properly guarded on the stairway, and a catwalk around the motors in the middle of the building. The risk from falling increases to serious in the 10-year time frame estimate from continued degradation of the roof and lack of maintenance for the interior structure.

Chemical exposure risk is rated as minor. The factors contributing to this type of risk are the presence and quantity of a chemical, how likely contact is with the chemical, and the level of activities, e.g., gathering and staging chemicals for disposal. In almost all cases, the quantity of such materials is small and only a few individuals are involved in handling them. The K Area facilities have an old ethylene glycol heating system that runs throughout the area; therefore, some residue may still remain in the piping.

Electrical shock risk is rated as minor. The factor contributing to this type of risk is many wires extend from conduits where equipment has been removed; some conductors are exposed, but the circuits are currently deenergized. However, there is nothing to prevent the circuits from becoming reenergized if a breaker is turned on.

Suffocation risk is rated as minor. All Hanford Site facilities that have unventilated belowgrade areas have a suffocation risk. Accumulations of water in unventilated areas also can cause a sufficient reduction of oxygen content from biological action or corrosion to be hazardous to human life. Belowgrade areas can also act as catch basins for heavier than air gases that are either toxic or displace an oxygen-bearing atmosphere. The belowgrade areas at this facility have not been appropriately posted as "Confined Spaces."

The risk from struck by is rated as negligible. However, the risk from struck-by increases to minor in the 10-year time frame estimate from continued degradation of the building roof structure caused by corrosion.

3.1.29.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. It is assumed very few individuals will have a need to be in this facility. The

performance of work beyond what is required to maintain the status quo or during demolition, such as removal of unused equipment, will increase the risk in the falling and struck-by categories. This will also occur for exposure to miscellaneous chemicals because during the disposal process, exposure will increase. Once the material has been removed, risk will markedly decrease.

3.1.30 105-KE Reactor Building

The 105-KE Reactor Building was constructed from 1953 to 1955 to house the nuclear reactor and directly associated equipment used in reactor operations. The reactor is a third-generation designed plutonium production system with a larger production capability (about twice) than the six older reactors.

The lower portion of the building is made of reinforced concrete. The reinforced concrete walls (0.9 m to 1.5 m [3 ft to 5 ft] thick) around the reactor block at the lower levels provide additional radiation shielding in conjunction with the biological core shield. The upper section of this building is lighter in construction and comprised of steel framing. Corrugated asbestos-cement panel is used on the upper half of the work area.

The reactor block is located near the center of the building. Fuel discharge and storage areas are located adjacent to the rear face of the reactor block one level below the ground. Experimental test penetrations are located on the right side of the reactor. The reactor block consists of a graphite moderator stack encased in cast-iron thermal shielding, a welded biological shield consisting of alternating layers of masonite and steel on the four sides, and a nonwelded, stair-step labyrinth seal shield on top. The entire block rests on a concrete foundation. The block weighs approximately 12,193 metric tons (13,440 tons) and is 14.0 m (46 ft) high, 14.0 m (46 ft) wide, and 12.2 m (40 ft) deep.

The fuel storage basin served as an underwater collection, storage, and transfer facility for the irradiated fuel elements discharged from the reactor. It consists of a fuel element pickup area, storage area, and transfer area. The basin is 6.7 m (22 ft) deep and contained 6.1 m (20 ft) of water during operation. The basin originally was cleaned of debris and deactivated as part of the initial reactor shutdown conditions. As part of the operation of the N Reactor, the 105-KE Basin was reactivated to provide additional storage space for irradiated fuel removed from the 105-N Reactor core. It currently contains irradiated N Reactor fuel in open storage canisters. This fuel will be placed in sealed type canisters when encapsulation plans have been completed.

The interior of the building is in good condition except for the friable asbestos in the pipe tunnel area. The exterior is in fair condition with numerous friable asbestos problems. The built-up gravel roofing, and the corrugated asbestos-cement roof panels are in poor condition. The overall building contains an estimated 58,000 Ci of radionuclides (primarily activation products contained within the graphite core), 170 metric tons (187 tons) of lead, and 707.93 m^3 (25,000 ft^3) of asbestos.

3.1.30.1 Risk Contributors. Electrical shock risk is rated as serious. The factors contributing to this type of risk include many isolated situations

where electrical wiring has been left energized, some wiring is exposed, and some cables are not protected from damage or abrasion. In areas with heavy water leakage, electrical shock is a problem. The K Area facilities are unique in that the correction of the isolated problems will create a substantial reduction in the electrical shock risk. This is because the wiring system is in generally good condition. Even though some circuits are deenergized, there is no system in place to prevent reenergizing these circuits by turning on circuit breakers and thereby increasing the number of potential hazards. The risk from electrical shock increases to critical in the 10-year time frame estimate from continued degradation of the system.

Radiation exposure risk is rated as moderate. The factors contributing to this type of risk include the following: some isolated areas of moderate exposure rates (up to 50 mR/h) have been identified, areas or items are mislabeled or misposted, postings are out of date, and posting requirements have changed since the postings were emplaced. A large amount of time would have to be spent in any radiation area to accumulate a significant dose. The K Area reactors represent a higher risk because of the higher inventories of radionuclides available. There are also many instances of isolated "hot spots."

Biological hazard risk is rated as moderate. The factors contributing to this type of risk include poisonous snakes, regularly found in the old reactor facilities; quantities of bird droppings, found in radiation zones in the upper floors of the facility (less than at other reactors); and wasps, a problem during the summer months. Bird droppings have been analyzed at HEHF and the presence of infectious diseases has been verified.

Risk from exposure to temperature extremes is rated as moderate. The factors contributing to this type of risk include high ambient temperatures occurring during the summer season, no active HVAC, cleanup work requiring the use of heat-trapping protective clothing, and heat exhaustion cases that have occurred on the Hanford Site in the past.

Falling risk is rated as minor. The factors contributing to this type of risk are roof panels made of corrugated asbestos cement panels that have been exposed to water saturation from roof leakage. Continued water saturation causes significant degradation of the load-bearing capability of the panels. Deteriorated panels were detected in the storage and transfer areas, but were not considered in the risk score because these panel areas are not technically within the scope of this evaluation and presently are being evaluated by K Basin personnel. Other than the storage and transfer area, only a few panels at this reactor have exhibited signs of degradation. Access to the roof is available from inside the facility by several unlocked doors that have no warning signs. If an individual walks upon the roof of this facility, there is some likelihood they will fall through.

Struck-by risk is rated as minor. The corrugated panels can degrade to the extent that snow loads or seismic events can cause failure. Anyone struck by a falling piece of corrugated panel will suffer injury. Although not part of this evaluation, it was noted during the walkdown investigations that the major portion of bad roof panels were in the storage basin area.

Fire risk is rated as minor. The factors contributing to this type of risk are ignition sources, fuel quantity, and heat/flame exposure to an

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individual. The most likely ignition source is electrical faults. In this facility the quantity of fuel materials is small. Likewise, there are few individuals that spend large quantities of time in areas where fire is a significant hazard. The special case of flash burns from electrical arcs is generally limited to electrical craft personnel.

Suffocation risk is rated as minor. All Hanford Site facilities that have unventilated belowgrade areas have a suffocation risk. Accumulations of water in unventilated areas also can cause a sufficient reduction of oxygen content from biological action or corrosion to be hazardous to human life. Belowgrade areas can also act as catch basins for heavier than air gases that are either toxic or displace an oxygen-bearing atmosphere. The belowgrade areas at this facility have not been appropriately posted as "Confined Spaces."

Lead exposure risk is rated as minor. Risk from exposure to lead exists anywhere there are large quantities of lead. Lead was used as shielding at all the reactor facilities in the forms of lead shot, lead brick, lead sheet, and cast-lead sheets. The amount of lead an individual may absorb depends on the length of exposure; the surface oxidation level; how easily the surface of the lead can be disturbed; and the type of activity associated with lead exposure such as cutting, grinding, and burning. Most work associated with lead cleanup does not require disruption of the surface. The observed lead oxidation rates at the Hanford Site have been greater than initially expected in an arid area. An ongoing cleanup campaign that makes handling lead necessary and the attractive characteristics of lead contribute to the likelihood of unwanted exposure. Most lead is located in radiation zone areas.

Chemical exposure risk is rated as minor. The factors contributing to risk from exposure to miscellaneous chemicals are the presence and quantity of a chemical, how likely contact is with the chemical, and the level of activities such as gathering and staging chemicals for disposal. In almost all cases the quantity of such materials is small, and only a few individuals are involved in handling them.

3.1.30.2 Risk Sensitivities. The sensitivity of the risk values for this facility is the number of individuals exposed to a hazard and the number of locations where the hazard exists. It is assumed that very few individuals will have a need to be in this facility. The performance of any work beyond what is required to maintain the status quo or during demolition will increase the risk in the falling, struck-by, and electrical shock categories. If larger numbers of individuals are in this facility, they will require more lighting, thus increasing the likelihood unused circuits will be energized and more shock hazards will be created. The isolated nature of the electrical hazards in this facility makes it very easy to reduce risk by eliminating these hazards. However, the amount of effort that might be expended to eliminate these hazards is difficult to estimate.

Increase in the exposure to a hazard will also occur if lead and miscellaneous chemicals are removed during elimination campaign. Once the material has been removed, the risk will markedly decrease.

3.1.31 110-KE Gas Storage Facility

The 110-KE Facility was the receiving and storage area at the 115-KE Gas Recirculation Building for the reactor graphite cooling media gas. It contained a number of helium and carbon dioxide tanks. The helium tanks and bunker have been removed; only the carbon dioxide tanks are left at this facility.

3.1.31.1 Risk Contributors. All hazards are rated as negligible or not present.

3.1.32 115-KE Gas Recirculation Building

The 115-KE Building housed the gas circulating pumps and associated equipment for the reactor gas coolant system. The building is a single-story, reinforced concrete structure, 34.6 m by 10.4 m (113.5 ft by 34 ft) with 6.1 m (20 ft) abovegrade and 6.1 m (20 ft) belowgrade. The exterior walls and roof of the attached shorter structure (near the lower east area) are steel-framed and covered with asbestos-cement panels. The general condition of the building is the interior and exterior are in fair condition and the roof is in poor condition.

3.1.32.1 Risk Contributors. No access was made into portions of the 115-KE and 115-KW Gas Recirculation Buildings. The lower area is considered a confined space and much of the upper area is a radiation zone. Both areas were not accessed because of locked doors.

Biological hazard risk is rated as moderate. The factors contributing to this type of risk are poisonous snakes that have been regularly found in the old facilities, and wasps and spiders that have been a problem during the summer months.

Risk from exposure to temperature extremes is rated as moderate. The factors contributing to this type of risk include high ambient temperatures that occur during the summer season , no active HVAC, cleanup work that requires the use of heat-trapping protective clothing, and heat exhaustion cases that have occurred on the Hanford Site in the past.

Chemical exposure risk is rated as minor. The factors contributing to this type of risk include the presence and quantity of a chemical, how likely contact is with the chemical, and the level of activities, e.g., gathering and staging chemicals for disposal. In almost all cases, the quantity of such materials is small and only a few individuals are involved in handling them.

Suffocation risk is rated as minor. All Hanford Site facilities that have unventilated belowgrade areas have a suffocation risk. Accumulations of water in unventilated areas also can cause a sufficient reduction of oxygen content from biological action or corrosion to be hazardous to human life. Belowgrade areas can also act as catch basins for heavier than air gases that are either toxic or displace an oxygen-bearing atmosphere. The belowgrade areas at this facility have not been appropriately posted as "Confined Spaces."

The risk from falling is rated as negligible. However, the risk from falling increases to minor in the 10-year time frame estimate from continued degradation of the roof.

The risk from struck-by is rated as negligible. However, the risk from struck-by increases to minor in the 10-year time frame estimate. The factors that contribute to the risk of struck-by are the exterior of the roof shows degradation and large snow loads or seismic events could cause the collapse of a degraded roof in the long term (5 to 10 years). Injury would occur if a person was present during the collapse.

3.1.32.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals required to access this facility increases significantly, risk from the existing hazards will be greater.

Because no entry was made into portions of the facility, unidentified risk contributors may exist and could alter the assigned risk value.

3.1.33 116-KE Reactor Exhaust Stack

The 116-KE Exhaust Stack was used to discharge ventilation air from the 105-KE Building. The stack is 91.4 m (300 ft) abovegrade and 3.1 m (10 ft) belowgrade with a 4.9-m (16-ft) diameter base. The stack is a monolithic, reinforced concrete structure, with a wall thickness of 0.5 m (1.5 ft) at the base and 0.3 m (1 ft) at the top. The stack was decontaminated and the height reduced to 53.3 m (175 ft). The clean rubble was dropped inside the remaining portion of the stack. The stack is in good general condition and has no noted structural defects. All hazards are rated as negligible or not present.

3.1.33.1 Risk Contributors. All stacks were externally investigated visually from the ground level. Although existence of radioactive material is presumably on the inside, release is unlikely unless the stack loses its structural integrity. As long as the stack is structurally sound, the release of this material is a very unlikely event. Also the quantity of radioactive material contained in the inactive 100 Area stacks is insufficient to cause a significant health or environmental problem in the event of release.

3.1.34 117-KE Exhaust Air Filter Building

The 117-KE Building filtered ventilation air from the confinement zone of the 105-KE Reactor Building before its discharge to the atmosphere through the 116-KE Stack. The building is a reinforced concrete structure 18.0 m long by 11.9 m wide by 10.7 m high (59 ft by 39 ft by 35 ft) with 2.4 m (8 ft) abovegrade. The interior and roof of the building are in fair condition. The above surface walls however, are in poor condition as numerous cracks are evident.

3.1.34.1 Risk Contributors. All hazards are rated as negligible or not present. This facility cannot be assessed without removing the top with a crane. Radionuclides are likely to be present but the area is routinely monitored for evidence of migration. The struck-by risk increases to minor in the 10-year time frame estimate.

3.1.35 1702-KE Badge House

The 1702-KE Badge House is located at the original entrance to the 105-KE exclusion area. It provided shelter for a security check before entrance to the exclusion area. The facility is a one-story, wooden-framed structure 6.1 m by 6.1 m by 3.7 m (20 ft by 20 ft by 12 ft). The general condition of the building is the interior, exterior, and the asphalt-covered, wood-framed roof are in extremely poor condition.

The 1702-KE and KW Badge Houses are condemned and no access is allowed; therefore, the buildings were examined structurally from the outside. These buildings are scheduled for demolition in FY 1993.

3.1.35.1 Risk Contributors. The risk from falling is rated as minor. The factors contributing to this type of risk are the roof is in very bad shape and there is no barricade or posting to prevent placing a ladder for roof access; however, there is no reason for going onto the roof. The risk from falling increases to serious in the 10-year time frame estimate from continued roof degradation.

The struck-by risk is rated as negligible. However, the risk increases to minor in the 10-year time frame estimate from continued water infiltration that causes degradation of the building roof structure.

3.1.35.2 Risk Sensitivities. The sensitivity of the risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals required to be around this facility increases significantly, risk from the existing hazards will be greater.

Because no entry was made into this facility, unidentified risk contributors may exist that could alter the assigned risk value. However, there are plans to demolish this building in FY 1993.

3.1.36 1713-KER Warehouse

The 1713-KER Warehouse was used for storage of office partitions, electrical supplies, and miscellaneous equipment. The building is a 74.32-m^2 (800-ft^2) sheet metal butler building with a concrete floor and footing. The general condition of the building is the interior is in fair condition, and the exterior and the roof are in good condition. Presently the building is being used for storage by K Area personnel.

3.1.36.1 Risk Contributors. All hazards were rated as negligible or were not present. Because this is a warehouse facility, there may be items stored in the future that could increase the risk of this facility above negligible.

3.1.37 105-KW Reactor Building

The 105-KW Reactor Building was constructed from 1952 to 1955 as housing for the nuclear reactor and directly associated equipment used in reactor operations. It is the same design as the 105-KE Reactor Building, which is about twice the size of the original six production reactors.

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The lower portion of the building is made of reinforced concrete. The reinforced concrete walls (0.9 m to 1.5 m [3 ft to 5 ft] thick) around the reactor block at the lower levels provide additional radiation shielding in conjunction with the biological core shield. The upper section of this building is constructed of lighter steel framing. The upper part of the work area exterior is corrugated asbestos-cement panels.

The reactor block is located near the center of the building. Fuel discharge and storage areas are located adjacent to the rear face of the reactor block, one level below the ground. Experimental test penetrations are located on the right side of the reactor. The reactor block consists of a graphite moderator stack encased in cast-iron thermal shielding, a welded biological shield consisting of alternating layers of masonite and steel on the four sides, and a nonwelded, stair-step labyrinth seal shield on top. The entire block rests on a concrete foundation. The block weighs approximately 12,193 metric tons (13,440 tons) and is 14.0 m high by 14.0 m wide by 12.2 m deep (46 ft by 46 ft by 40 ft).

The fuel storage basin served as an underwater collection, storage, and transfer facility for the irradiated fuel elements discharged from the reactor. It consists of a fuel element pickup area, storage area, and transfer area. The basin is 6.7 m (22 ft) deep and contained 6.1 m (20 ft) of water during operation. The basin was originally cleaned of debris and deactivated as part of the initial reactor shutdown conditions. As part of the operation of the N Reactor, the 105-KW Basin was reactivated to provide additional storage space for irradiated fuel removed from the 105-N Reactor core. The basin currently contains irradiated N Reactor fuel in sealed type canisters.

The general condition of the building is the interior is in good condition and the exterior is in fair condition, with numerous friable asbestos problems. The built-up gravel roof covering is in poor condition while the corrugated asbestos-cement (Transite**) roof panels are in fair condition. The process area shows signs of heavy leaking. The overall building contains an estimated 58,000 Ci of radionuclides (primarily activation products contained within the graphite core). In addition, 157.5 metric tons (173.6 tons) of lead and an unknown quantity of asbestos are contained within the facility.

3.1.37.1 Risk Contributors. Electrical shock risk is rated as serious. The factors contributing to this type of risk include many isolated situations where electrical wiring has been left energized, some wiring is exposed, and some cables are not protected from damage or abrasion. The K Area facilities are unique in that the correction of specific isolated problems will substantially reduce the electrical shock risk. This is because the wiring system is generally in good condition. Even though some circuits are deenergized, there is no system in place to prevent reenergizing these circuits by turning on circuit breakers and thereby increasing the number of potential hazards.

**Transite is a registered trademark of Johns-Mansville Corporation, New York.

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Falling risk is rated as serious. The factors contributing to this type of risk are roof panels made of corrugated asbestos-cement panels that have been exposed to water saturation from roof leakage, and continued water saturation, causing significant degradation of the load-bearing capability of the panels. Only a few panels at this facility have exhibited signs of degradation. Access to the roof is available from inside the facility by several unlocked doors that have no warning signs. If a person walks upon the roof of this facility, there is some likelihood they will fall through. Deteriorated asbestos-cement panels were detected in the storage and transfer areas but were not allowed to contribute to the risk score because the areas where these panels are located are not technically within the scope of this evaluation. These panels presently are being evaluated by K-Basin personnel.

Radiation exposure risk is rated as moderate. The factors contributing to this type of risk include some identified, isolated areas of moderate to high exposure rates (up to 4 R/hr), mislabeled or misposted areas or items, out-of-date postings, and posting requirements that have changed since the posting was emplaced. The K Area reactors represent a higher risk because of the higher inventories of radionuclides available. There are also many instances of isolated "hot spots."

Biological hazard risk is rated as moderate. The factors contributing to this type of risk are poisonous snakes, regularly found in the old reactor facilities; significant quantities of bird droppings, found in radiation zones in the upper floors of the facility; and wasps a problem during the summer months. Bird droppings have been analyzed at HEHF and the presence of infectious diseases has been verified.

Risk from exposure to temperature extremes is rated as moderate. The factors contributing to this type of risk include high ambient temperatures that occur during the summer season , no active HVAC, cleanup work that requires the use of heat-trapping protective clothing, and heat exhaustion cases that have occurred on the Hanford Site in the past.

Struck-by risk is rated as minor. The corrugated panels can degrade to the extent that snow loads or seismic events can cause failure. Anyone struck by a falling piece of corrugated panel will suffer injury. Although not part of this evaluation, it was noted during the walkdown investigation that the major portion of degraded roof panels were in the storage basin area.

Suffocation risk is rated as minor. All Hanford Site facilities that have unventilated belowgrade areas have a suffocation risk. Accumulations of water in unventilated areas also can cause a sufficient reduction of oxygen content from biological action or corrosion to be hazardous to human life. Belowgrade areas can also act as catch basins for heavier than air gases that are either toxic or displace an oxygen-bearing atmosphere. The belowgrade areas at this facility have not been appropriately posted as "Confined Spaces."

Lead exposure risk is rated as minor. Risk from exposure to lead exists anywhere there are large quantities of lead. Lead was used as shielding at all the reactor facilities in the forms of lead shot, lead brick, lead sheet, and cast-lead sheets. The amount of lead an individual may absorb depends on the length of exposure; the surface oxidation level; how easily the surface of the lead can be disturbed; and whether the lead oxide is disturbed by

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activities such as cutting, grinding, or burning. Most work associated with lead cleanup does not require disruption of the surface. The observed lead oxidation rates at the Hanford Site have been greater than initially expected in an arid area. An ongoing cleanup campaign that makes handling lead necessary and the attractive characteristics of lead contribute to the likelihood of undesired exposure. Most lead is located in radiation zone areas.

Chemical exposure risk is rated as minor. The factors contributing to this type of risk are the presence and quantity of a chemical, how likely contact with the chemical is, and the level of activities such as gathering and staging chemicals for disposal. In almost all cases, the quantity of such materials is small and only a few individuals are involved in handling them.

Fire risk is rated as minor. The factors contributing to this type of risk are ignition source, fuel quantity, and heat flame exposure to an individual. The most likely ignition source is electrical faults. In this facility, the quantity of fuel materials is small. Likewise, there are few individuals that spend large quantities of time in areas where fire is a significant hazard. The special case of flash burns from electrical arcs generally is limited to electrical craft personnel. The risk from fire increases from minor to moderate in the 10-year time frame.

3.1.37.2 Risk Sensitivities. The sensitivity of the risk values for this facility is the number of individuals exposed to a hazard and the number of locations where the hazard exists. It is assumed very few individuals will have a need to be in this facility. The performance of any work beyond what is required to maintain the status quo or during demolition activities will increase risk in the falling, struck-by, and electrical shock categories. If the number of individuals required to be in this facility increases, more lighting will be required, thus increasing the likelihood that unused circuits will be energized and more shock hazards will be created. The isolated nature of the electrical hazards in this facility makes it very easy to reduce risk by eliminating these hazards. However, the amount of effort that might be expended to eliminate these hazards is very difficult to estimate.

Increase in the exposure to a hazard will also occur if lead and miscellaneous chemicals are removed during elimination campaigns. Once the material is removed, the risk will markedly decrease.

3.1.38 110-KW Gas Storage Facility

The 110-KW Gas Storage Facility was the receiving and storage area at the 115-KE Gas Recirculation Building for the reactor graphite cooling media gas. An outdoor gas storage area consists of a number of 61-cm (24-in.) diameter by 24.4-m (80-ft) long, high-pressure helium tanks and four large diameter, low-pressure carbon dioxide tanks. The general condition of the bunker in the building is the interior, concrete exterior walls, and concrete roof are in fair condition.

3.1.38.1 Risk Contributors. The interior of this building was not inspected because of locked doors. Because no information is available, there is some likelihood the risk associated with this facility is greater than negligible.

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3.1.39 115-KW Gas Recirculation Building

The 115-KW Gas Recirculation Building housed the gas circulating pumps and associated equipment for the reactor gas coolant system. The building is a single-story, reinforced concrete structure 34.6 m by 10.4 m (113.5 ft by 34 ft), with 6.1 m (20 ft) abovegrade and 6.1 m (20 ft) belowgrade. The exterior walls and roof of the attached shorter structure (near the lower east area) are steel framed and covered with asbestos-cement panels. The general condition of the building is the interior, exterior, and roof are in fair condition.

3.1.39.1 Risk Contributors. Because of locked doors, no access was made into portions of the 115-KE and KW Gas Recirculation Buildings. The lower area is considered a confined space and much of the upper area is a radiation zone.

Biological hazard risk is rated as moderate. The factors contributing to this type of risk are poisonous snakes that have been regularly found in the old facilities, and spiders and wasps that have been a problem during the summer months. Personnel do occasionally access this building for routine surveillance.

Suffocation risk is rated as minor. All Hanford Site facilities that have unventilated belowgrade areas have a suffocation risk. Accumulations of water in unventilated areas also can cause a sufficient reduction of oxygen content from biological action or corrosion to be hazardous to human life. Belowgrade areas can also act as catch basins for heavier than air gases that are either toxic or displace an oxygen-bearing atmosphere. The belowgrade areas at this facility have not been appropriately posted as "Confined Spaces."

The falling and struck-by risk increases from negligible to minor in the 10-year time frame estimate. Large snow loads or seismic events could cause the collapse of a degraded roof in the 5 to 10-year time frame. Injury would occur if an individual were present when this collapse occurred.

3.1.39.2 Risk Sensitivities. The sensitivity of the risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals requiring access to this facility increases significantly, risk from the existing hazards will be greater.

Because no entry was made into portions of the facility, unidentified risk contributors may exist that could alter the assigned risk value.

3.1.40 116-KW Reactor Exhaust Stack

The 116-KW Exhaust Stack was used to discharge ventilation air from the 105-KW Building. The exhaust stack is 61.0 m (200 ft) abovegrade and 3.1 m (10 ft) belowgrade, with a 4.9-m (16-ft) diameter base. The stack is a monolithic, reinforced concrete structure with a wall thickness of 0.5 m (1.5 ft) at the base and 0.3 m (1 ft) at the top. The stack was decontaminated and the height reduced to 53.3 m (175 ft). The clean rubble was dropped inside the remaining portion of the stack. The stack is in good general condition and has no noted structural defects.

3.1.40.1 Risk Contributors. All stacks were investigated visually from the ground level. Although existence of radioactive material is presumably on the inside, release is unlikely unless the stack loses its structural integrity. As long as the stack is structurally sound, the release of radioactive material is a very unlikely event. Also, the quantity of radioactive material contained in the inactive 100 Area stacks is insufficient to cause a significant health or environmental problem in the event of release. The struck-by risk is rated as minor for this facility.

3.1.41 117-KW Exhaust Air Filter Building

The 117-KW Building filtered ventilation air from the confinement zone of the 105-KW Reactor Building before its discharge to the atmosphere through the 116-KW Stack. The facility is a reinforced concrete structure 18.0 m long by 1.9 m wide by 10.7 m high (59 ft by 39 ft by 35 ft), with 2.4 m (8 ft) abovegrade. The general condition of the building is the interior, exterior, and roof are in fair condition. The above surface walls however, are in poor condition as numerous cracks are evident.

3.1.41.1 Risk Contributors. All hazards were rated as negligible or were not present. This facility cannot be assessed without removing the top with a crane. Radionuclides are likely to be present but the area is routinely monitored for evidence of migration. The struck-by risk increases from none to minor during the 10-year time frame.

3.1.42 165-KW Power Control Building

The 165-KW Power Control Building provided housing for the power house, control room, valve pit, and electrical switchgear for the water supply system. The building is a single-story, concrete structure (73.2 m by 33.5 m by 4.6 m [240 ft by 110 ft by 15 ft]) consisting of three parts: (1) the pump room and valve pit, (2) the electrical area, and (3) the oil-fired steam plant and control room. The general condition of the building consists of an interior, exterior, and roof structure that are in fair condition and roofing material that is in poor condition. Presently the building supports the N Reactor fuel storage project.

3.1.42.1 Risk Contributors. Electrical shock risk is rated as serious. The factors contributing to this type of risk include a cracked and frayed flexible cord for a battery pack and a 120 volt heater with control wiring not protected from damage. This facility is similar to the 105-K Buildings in that the electrical system is in good shape except for isolated problems. Fixing these isolated problems will reduce risk significantly. Even though some circuits are deenergized, there is no system in place to prevent the reenergization of these circuits by turning on circuit breakers, thereby increasing the number of potential hazards. The risk from electrical shock increases to critical in the 10-year time frame estimate from continued system degradation.

Falling risk is rated as minor. The factor contributing to this type of risk is a brine pit outside the facility with a degenerated roof that has no barricade, which would prevent access to the roof. If the roof were to

collapse while an individual was standing on it, there could be serious injury or even death.

Suffocation risk is rated as minor. All Hanford Site facilities that have unventilated belowgrade areas have a suffocation risk. Accumulations of water in unventilated areas also can cause a sufficient reduction of oxygen content from biological action or corrosion to be hazardous to human life. Belowgrade areas can also act as catch basins for heavier than air gases that are either toxic or displace an oxygen-bearing atmosphere. The belowgrade areas at this facility have not been appropriately posted as "Confined Spaces."

Mercury exposure risk is rated as minor. The factors contributing to this type of risk are there are usually small quantities of mercury in containers in these types of buildings, and the mercury must be handled to be a hazard. In this facility, a spill of mercury was found in the western portion of the boiler house basement. The area was barricaded, and actions were taken to notify the appropriate personnel to clean up the spill.

Chemical exposure risk is rated as minor. The factors contributing to this type of risk are the presence and quantity of a chemical, how likely contact is with the chemical, and the level of disposal activities such as gathering and staging chemicals. In almost all cases, the quantity of such materials is small and only a few individuals are involved in handling them.

The struck-by risk increases from negligible to minor in the 10-year time frame estimate.

3.1.42.2 Risk Sensitivities. The sensitivity of the risk values for this facility is primarily the number of individuals exposed to a hazard. It is assumed very few individuals will have a need to be in this facility. The performance of any work beyond what is required to maintain the status quo or during demolition (such as removal of unused equipment) will increase the risk in the falling and struck-by categories. Exposure to miscellaneous chemicals will also increase during the disposal process. Once the chemicals have been removed, the risk will markedly decrease.

3.1.43 183-KW Filter Plant

The filter plant consists of a single story T-shaped structure referred to as the head house. The head house contains a laboratory and sample room, chlorinator room, switchgear room, and an operational area containing chemical feed equipment, storage tanks, water softeners, heat exchangers, pumps, and other miscellaneous equipment for the remote valving and flow control. The structure is 41 m by 9 m by 6 m high; 21 m by 18 m by 6 m high (136 ft by 31 ft by 20 ft high; 70 ft by 60 ft by 20 ft high) with a reinforced concrete foundation and floor, structural steel frame walls and transite siding, transite roof with build-up asphalt, and gravel surfacing.

The plant also contains a two-bay chlorine storage facility 29 m by 11 m (95 ft by 35 ft) with a railroad spur to each bay, a flocculation and subsidence basin consisting of open-air reinforced concrete basins, mixing chambers, inlet and outlet flumes. The total area of this facility is about 26,756 m^2 (288,000 ft^2). There is a filter area constructed of reinforced

concrete containing about (62,000 ft^2) of filter area. After leaving the filters, the water flows into two 34,068,706 L (9,000,000 gal) underground concrete storage tanks. The cover over the tank is asphalt roofing built up over a transite covering.

3.1.43.1 Risk Contributors. Biological hazard risk is rated as moderate. The factors contributing to this type of risk are poisonous snakes that have been regularly found in the old facilities, and spiders and wasps that are a problem during the summer months. Personnel do have occasional access to this building for routine surveillance.

Risk from exposure to temperature extremes is rated as moderate. The factors contributing to this type of risk include high ambient temperatures that occur during the summer season, no active HVAC, cleanup work that requires the use of heat-trapping protective clothing, and heat exhaustion cases that have occurred on the Hanford Site in the past.

Fire risk is rated as minor. The contributing factor for this type of risk is degraded wiring in the office area.

Struck-by risk is rated as minor. The factors contributing to this type of risk are similar to falling risk factors. There are additional factors of snow loads and seismic events that could cause the weakened roof trusses to fail. Injury could result if an individual is present when this happens. The risk from struck-by increases to moderate in the 10-year time frame estimate from continued degradation of roof trusses.

Electrical shock risk is rated as minor. The factors contributing to this type of risk include the roof of the chemical building, which is in very poor condition, and rainwater leaks into the switchgear room and forms puddles. There is a high likelihood the leakage will seep into the energized switchgear.

Asbestos exposure risk is rated as minor. The factor contributing to this type of risk includes asbestos that has to be in a finely divided (friable) form and disturbed to be inhaled or ingested. As with most older Hanford Site facilities, the piping insulation contains asbestos. In this building, some of the insulation is friable because rainwater has degraded the insulation. The corrugated panels from the roof and walls also contain asbestos but not in friable form.

Explosion risk is rated as minor. The factors contributing to risk from exposure to miscellaneous chemicals are the presence and quantity of a chemical, how likely contact is with the chemical, and the level of activities such as gathering and staging the chemicals for disposal. In almost all cases, the quantity of such materials is small and only a few individuals are involved in handling them. This facility handled many chemicals of which residues still remain.

3.1.43.2 Sensitivities. The sensitivity of the risk values for this facility is primarily the number of individuals exposed to a hazard. It is assumed that very few individuals will have a need to be in this facility. The performance of any work beyond what is required to maintain the status quo or during demolition (such as removal of unused equipment) will increase the risk in the falling and struck-by categories. Exposure to miscellaneous chemicals

will also increase during the disposal process. Once the chemicals have been removed, the risk will markedly decrease.

3.1.44 190-KW Process Water Pump House

The 190-KW Building is a concrete and steel-framed building. It houses the pumps that supply water to the 105-KW Reactor Building.

3.1.44.1 Risk Contributors. Falling risk is rated as critical. The factor contributing to this type of risk is a floor grate that has been significantly overstressed. Any further stress could cause it to fail. An individual standing on it would fall approximately 4 m (14 ft). The building is constantly occupied as it is used as a warehouse for the K Basin operations. Repairing the floor grate would reduce the falling risk considerably.

Biological hazard risk is rated as moderate. The factors contributing to this type of risk include poisonous snakes that have been regularly found in the old facilities and wasps that are a problem during the summer months.

Risk from exposure to temperature extremes is rated as moderate. The factors contributing to this type of risk include high ambient temperatures that occur during the summer season, no active HVAC, cleanup work that requires the use of heat-trapping protective clothing, and heat exhaustion cases that have occurred on the Hanford Site in the past.

Suffocation risk is rated as minor. All Hanford Site facilities that have unventilated belowgrade areas have a suffocation risk. Accumulations of water in unventilated areas also can cause a sufficient reduction of oxygen content from biological action or corrosion to be hazardous to human life. Belowgrade areas can also act as catch basins for heavier than air gases that are either toxic or displace an oxygen-bearing atmosphere. The belowgrade areas at this facility have not been appropriately posted as "Confined Spaces."

Electrical shock risk is rated as minor. The factors contributing to this type of risk are disconnect switches located behind a heater control panel that have no adequate working clearance. This lack of clearance increases the chance of coming in contact with energized conductors. A badly frayed cord from a roll-door switch was also discovered, but is not included as a risk contributor because the cord was repaired on the same day it was found.

Chemical exposure risk is rated as minor. The factors that contribute to risk from exposure to miscellaneous chemicals are the presence and quantity of a chemical, how likely contact is with the chemical, and the level of disposal activities such as gathering and staging chemicals. Many materials stored here have various chemical makeups, such as roofing patch material, paints, and glues.

Fire risk is rated as minor. The factors contributing to fire risk in this facility are ignition source, fuel quantity, and heat/flame exposure to an individual. The most likely ignition source is electrical faults. In this facility, the quantity of fuel materials is small. Likewise, there are few individuals that spend large quantities of time in areas where fire is a

significant hazard. This facility is used as a warehouse for the K Basin operations. Among the fuel-type materials stored in this facility are gasoline, volatile glues, wooden pallets, cardboard boxes, and other similar items. There is no active fire suppression system. The risk from fire increases to moderate in the 10-year time frame estimate.

The risk from struck-by is rated as negligible. However, the risk from struck-by increases to moderate in the 10-year time frame estimate from continued degradation of the roof.

3.1.44.2 Risk Sensitivities. The sensitivity of the risk values for this facility is primarily the number of hazardous materials or the effects these materials could cause. It is assumed many individuals will have a need to access this facility. Because this facility stores all types of materials, it is difficult to ascertain what materials will be present and the effects they could produce.

3.1.45 1702-KW Badge House

The 1702-KW Badge House is located at the original entrance to the 105-KW exclusion area. It provided shelter for a security check before entrance to the exclusion area. The facility is a one-story, wooden-framed structure (6.1 m by 6.1 m by 3.7 m [20 ft by 20 ft by 12 ft]). The general condition of the building is the interior, exterior, and asphalt-covered, wooden-framed roof are in extremely poor condition.

The 1702-KE and KW Badge Houses are condemned and no access is allowed--they were examined structurally from the outside. These buildings are scheduled for demolition in FY 1993.

3.1.45.1 Risk Contributors. The risk from falling is rated as minor. The factors that contribute to the risk of falling include a roof that is in very bad shape, and no barricade or posting to prevent placing a ladder for roof access; however, there is no plausible reason for going onto the roof. The risk from falling increases to serious in the 10-year time frame estimate from continued degradation of the roof.

The risk from struck-by is rated as negligible. However, the risk from struck-by hazards increases to moderate in the 10-time frame estimate from continued degradation of the roof.

3.1.45.2 Risk Sensitivities. The sensitivity of the risk values for this facility is primarily the number of individuals exposed to a hazard. It is assumed very few individuals will have a need for access. If the number of individuals requiring access increases significantly, risk from the existing hazards will be greater.

Because no entry was made into this facility, unidentified risk contributors may exist that could alter the assigned risk value.

3.1.46 1714-KW Warehouse

The 1714-KW Warehouse was used for storage of nonfissile material. The building is a 74.32-m^2 (800-ft^2) sheet-metal butler building with concrete floors and footing with an attached lean-to canopy. The sheet-metal building consisted of a warehouse and a storage area. The general condition of the building is the interior, exterior, and steel roof are in good condition, and the canopy is in poor condition.

3.1.46.1 Risk Contributors. Falling risk is rated as minor. The factors contributing to this type of risk include the roof of the canopy section that is in extremely poor shape, and no barricade or posting to prevent placing a ladder for roof access; however, there is no plausible reason for going onto the roof. The risk from falling increases from minor to serious in the 10-year time estimate from continued degradation of the roof.

Struck-by risk is rated as minor. The factors contributing to this type of risk include the roofing of the canopy section that is in poor condition and allows leakage of rainwater, a roof structure of wood that degrades when exposed to water, and snow loads or seismic events that could cause structural collapse. The building is not normally occupied, but if an individual were present when a collapse occurred, injury would result. The struck-by risk increases to moderate in the 10-year time frame estimate.

3.1.46.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. It is assumed very few individuals will have access to this facility. If the number of individuals using this facility increases significantly, risk from existing hazards will be greater. Because this facility is a warehouse, there is the possibility material stored in the future may contribute significantly to the risk of chemical exposure, fire, or explosion.

3.2 SPECIFIC RISK CONTRIBUTORS FOR 200 AREAS

3.2.1 205-A Solvent Handling Facility

The 205-A Solvent Handling Facility originally was designated as the Silica Gel Facility, a prototype unit in service at the Plutonium Uranium Reduction Extraction (PUREX) Plant during 1956 to prove process feasibility. The uranium solution from solvent extraction systems at the Reduction Oxidation (REDOX) and PUREX Plants often required further treatment to meet product specifications. Silica gel selectively absorbed the zirconium and niobium contaminants from the solution without significant loss of uranium. The 205-A unit was converted for production use upon successful demonstration of the process. A complete production-type silica gel facility was also built at REDOX. Because the PUREX prototype silica gel unit was not designed for continuous operation, the final uranium solution was transferred often to the REDOX silica gel unit for further treatment.

The 205-A Facility is approximately 3.6 m by 3 m by 2.4 m (12 ft by 10 ft by 8 ft) high and constructed with fiberboard sheeting walls and sheet metal roof.

The building is located within the 203-A Basin and houses the deactivated silica gel beds and a concrete tank enclosed by a concrete dike. The beds are

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comprised of four 208 L (55 gal) stainless steel drums, each shielded with a 6 mm (.25 in.) steel plate. Other equipment includes two pumps and several rotometers.

3.2.1.1 Risk Contributors. Falling risk is rated as serious. The factors contributing to this type of risk include a rusted steel roof frame and the fact that an individual on the one-story roof could cause it to collapse. However, there is no direct roof access and no plausible reason for going onto the roof. The risk from falling increases to critical in the 10-year time frame estimate from continued degradation of the steel roof frame.

Struck-by risk is rated as moderate. The factors contributing to this type of risk include an angle iron portion of the steel roof frame that is extremely rusty, and snow loads that may be sufficient to cause collapse. When a collapse occurs, individuals under the roof could be seriously injured. This facility is not regularly occupied. The struck-by risk increases to serious in the 10-year time frame estimate from continued degradation of the steel roof frame.

Electrical shock risk is rated as minor. The factors contributing to this type of risk are three separate conduits entering the building. However, it is not possible to determine the status of the feeders. Three feeders create the higher probability that some portions of the building electrical system could be inadvertently energized.

The risk from exposure to radiation is rated as negligible. However, this risk increases to minor in the 10-year time frame estimate from a loss of control of radioactive material that is present.

The risk from release of chemicals is rated as negligible. However, this risk increases to minor in the 10-year time frame estimate from continued degradation of the containment structures.

3.2.1.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater. The risk is sensitive also to the status of electrical feeders to the facility. If control of the power sources to these feeders is poor, the likelihood of an event occurring could be very high. Changes in mechanisms that disturb insulation containing asbestos could also significantly change the risk of asbestos release and exposure.

3.2.2 224-B Office and Canyon Building

The 224-B Office and Canyon Building was originally built as a process facility for final plutonium decontamination and concentration operations.

This building is a three story structure. The overall exterior dimension of the first and second floor are 21 m by 60 m (69 ft by 197 ft) with a height of 6 m (20 ft). The total area of the first and second floor is 1,071 m^2 (11,523 ft^2). The third floor is 21 m by 13 m (69 ft by 45 ft) with a height of 6 m (20 ft). The total area of the third floor is 837 m^2 (9,005 ft^2).

The 224-B Building consists of reinforced concrete and concrete block walls. The roof is reinforced concrete, edged in wood, with a rock-ballasted membrane roof.

The building is divided into two main sections: the office and gallery section and the process cell station. The office and gallery section is separated from the process cell section by a .3-m (1-ft) thick concrete wall.

The first floor of the office and gallery section is partitioned for offices, storage, restrooms, change rooms, and building service equipment. Building service equipment (and electrical switchgear) is located in a room 8 m by 15 m (26 ft by 51 ft). A storage room next to the building service equipment room measures 5 m by 8 m (16 ft by 26 ft). First floor access to the building elevator is through this storage room.

The pipe gallery is located on the second floor of the gallery section and the portion directly above the offices, lunchroom, changeroom, and restrooms is an open area approximately 10 m by 44 m (33 ft by 145 ft). Entrance into the cell portion of the building is possible through any four air-lock doors in this portion of the pipe gallery. These entrances into the cell portion lead out onto operating platforms and extend into the cell portion. The area on the second floor above the F-10 room and the largest office space was a control room for processing activities in the F Cell and is designated the F Operating Gallery.

The operating gallery is located on the third floor of the gallery section and contains scales, tanks, and process operating control stations. This gallery does not extend over the F Operating Gallery (on the second floor). Observation of the cell portion is possible from the third floor operating gallery through lead glass windows.

The process cell portion of the building is approximately 8 m by 60 m (27 ft by 197 ft) and is divided into five separate cells, each 8 m by 8.5 m (27 ft by 28 ft). One cell is designated as the F Cell and measures 7.6 m by 15 m (25 ft by 51 ft). A stairwell and platform at the second story level occupies an area 4 m by 8 m (13 ft by 26 ft) of the F Cell. At the second floor level there is a .6 m 15 cm (2 ft 6 in.) walkway that allows access around the outer walls of the cell portion except for the F Cell. The cells are three stories high and are divided by concrete walls that extend to the second floor level.

The concrete roof slabs are removable so that large vessels or process equipment may be removed readily.

There are pedestrian entrances into each of the cells at ground level and a 3.6 m (12 ft) wide by 6.4 m (21 ft) high opening into the second floor on the cell side of the building. A concrete loading platform on the outside of the building leads to the building elevator. The elevator is 2.1 m (7 ft) wide and 2.4 m (8 ft) high.

3.2.2.1 Risk Contributors. Electrical shock risk is rated as serious. The factors contributing to this type of risk include fluorescent light fixtures wired to an adjacent light fixture with a cord, missing electrical enclosure covers, a fuse panel door that would not latch, and portable extension cords used for permanent wiring. This facility is old and the equipment is not

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maintained well. Risk from electrical shock increases to critical in the 10-year time frame estimate from continued degradation of the electrical system.

Radiation exposure risk is rated as serious. The factors contributing to this type of risk include the following: the door to the canyon had 14,000 disintegrations per minute (dpm) smearable alpha contamination; the door only opened outward, increasing the chance of contamination spread; and the door had no seals. Ventilation control is provided by pressurizing the office facilities outside the canyon area. Alpha-emitting radionuclides that could be inhaled represent a significant health risk. There is some evidence of canyon building entries made within the past two or three years.

Biological hazard risk is rated as moderate. The factors contributing to this type of risk include poisonous spiders that have been regularly found in the unoccupied facilities as well as stinging insects, especially in the summer.

Fire risk is rated as minor. The factors contributing to this type of risk include large amounts of combustible materials are stored on the second and third levels, routine occupation of the facility, and some electrical panels that cannot be opened easily to allow shutdown of power in an emergency. The existing doors in the building are not fire doors and are not marked or lit. The risk from fire increases to moderate in the 10-year time frame estimate.

Struck-by risk is rated as minor. The factor contributing to this type of risk is the manual starter control stations for a fan have been painted over, making the ON-OFF switch markings unreadable. This could result in someone inadvertently starting the fan.

Chemical exposure risk is rated as minor. The factors contributing to this type of risk include the use of large quantities of chemicals during operation by the facility, and the possibility that some residual quantities of materials may remain. Risk of chemical release to the environment is rated as minor--factors contributing to this type of risk are the same as for chemical exposure risk.

Asbestos exposure risk is rated as negligible. The risk from asbestos exposure increases to minor in the 10-year time frame estimate. This increase is a result of continued aging of the insulation materials creating increasing quantities of friable material.

3.2.2.2 Risk Sensitivities. Implicit in the risk estimate is the type of administrative rules in place and the compliance level to these rules. If rules are relaxed or compliance is poor, risk will be higher. Risk from exposure to radiation will change if activities disturb the radioactive material. This disturbance can occur by either physically disrupting the radioactive material or by moving the shielding. Release of radiation is also possible if some degradation of the confinement barrier (such as wall cracks) or ventilation system failure occurs. The presence of transient or unknown chemicals can change the risk of exposure or release. An increase in the amount of combustibles near electrical equipment will change the risk of fire. Changes in mechanisms that disturb asbestos-containing insulation could significantly change the risk of asbestos release and exposure.

3.2.3 215-C Storage Building

The 215-C Building was built to provide compressed air for pneumatic equipment and instrument air. It also provided an inert gas system for use in the 201-C Hot Process Building when flammable solvents were used.

The building is 10 m by 6.4 m by 4 m (35 ft by 21 ft by 13 ft) high and has an area approximately 76.18 m^2 (820 ft^2). It has 10-cm (4-in.) concrete floors and a 15-cm (6-in.) flat concrete slab roof. The equipment room is 8.2 m by 3 m (27 ft by 10 ft), containing 20- to 25-cm (8- to 10-in.) thick concrete equipment pads of various sizes; walls are made of 20-cm (8-in.) thick concrete; and the vault is 3.6 m by 1.8 m (12 ft by 6 ft) with a 25-cm (10-in.) thick concrete floor. There is a cylinder storage deck lean-to 4.5 m by 1.8 m (15 ft by 6 ft) on the south side of the building.

3.2.3.1 Risk Contributors. Electrical shock risk is rated as serious. The factor contributing to this type of risk was a front cover of the main electrical panel that was not installed, allowing easy access to energized equipment. Personnel occasionally enter this facility.

Release of radiation risk is rated as moderate. The factors contributing to this type of risk are the area on the outside of the south side of the building that is posted as a surface contamination area and bird droppings that are present in this contaminated area, indicating a possibility of wildlife spreading the contamination.

3.2.3.2 Risk Sensitivities. The sensitivity of the risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

Also implicit in the risk estimate is the type of administrative rules in place and the compliance level to these rules. If rules are relaxed or compliance is poor, risk will be higher. Risk from exposure to radiation will change if activities disturb the radioactive material. This disturbance can occur by physically disrupting the radioactive material with many different agents that cannot be predicted. Release of radiation is also possible if some degradation of the confinement barrier or ventilation system occurs. The presence of transient or unknown chemicals can change the risk of chemical exposure or release. Increases in the amount of combustibles near electrical equipment will change the risk of fire. Changes in mechanisms that disturb asbestos-containing insulation could significantly change the risk of asbestos release and exposure.

3.2.4 212-N, 212-P, and 212-R Storage Buildings

The 212-N, 212-P, and 212-R Buildings are identical storage structures. Each building is composed of two main sections and a heater room--there are no windows. Each section has a concrete slab, roof, and walls constructed of concrete and concrete block.

The high roof, or transfer section, has an opening 4.6 m by 5.5 m (15 ft by 18 ft) high for the railroad into the building. The rail into the building penetrates 16.5 m (54 ft). The original 81.3-metric ton (80-ton) crane and

associated motors, brakes, etc., have been removed from the 212-N and 212-P Buildings, but the crane rails are in place and centered over the railroad unloading area. The interior height at the unloading area is 10.7 m (35 ft) from the top of the railroad rails to the ceiling. Height from the top of the rails to the top of the crane rail is 8.2 m (27 ft). At the rear of the railroad cut are two transfer pots approximately 9.1 m (30 ft) deep. There are walkways on each side of this unloading area resembling inside docks. The main walkway is 3.7 m by 22.6 m (12 ft by 74 ft). The height from the walkways to the ceiling is 8.5 m (28 ft).

The low-roof section of the building is 3.7 m (12 ft) abovegrade and extends 5.5 m (18 ft) belowgrade. It has a 5.0-cm (2-in.) wooden plank floor, level with the walkways in the high-roof section. This floor is 6.1 m (20 ft) above the floor of the storage basin and 2.4 m (8 ft) from the ceiling. This plank floor is supported by concrete piers 6.1 m (20 ft) high.

Adjacent to the low-roof section and centered in relation to it is a space 4.3 m by 7.9 m (14 ft by 26 ft) with a 2.4-m (8-ft) ceiling. This space once housed the fan, heaters, and controls to prevent freezeup of the water in the basin. Most of the equipment has been removed.

Exterior dimensions of the high-roof section are 8.2 m by 22.6 m by 9.1 m (27 ft by 74 ft by 30 ft). The low-roof section is 15.0 m by 22.0 m by 3.7 m (49 ft by 72 ft by 12 ft). The heater room is 4.3 m by 7.9 m by 3.7 m (14 ft by 26 ft by 12 ft). The total area is 554.61 m^2 (5,970 ft^2).

3.2.5 212-N Fuel Storage Facility

3.2.5.1 Risk Contributors. Falling risk is rated as minor. Deteriorating roof panels and the lack of control for roof access contribute to the risk of falling. The deteriorated stairs on the northwest side of the building also contribute to a falling hazard. Roof panels are made of precast concrete and have been exposed to water from roof leakage. Continued water saturation causes significant degradation of the load-bearing capability of the panel. Only a few panels at this facility have exhibited signs of degradation. Access to the roof is not available from inside the facility. However, if an individual is on the roof of this facility for a reason such as roofing repair, it is possible they will fall through. Cracked concrete stairs contribute to falling in the northwest portion. Degraded handrails contribute to falling in the transfer area.

Struck-by risk is rated as minor. The concrete panels can degrade to the extent that snow loads or seismic events could cause failure. Anyone struck by a falling piece of panel will suffer injury. Being struck by pieces of degraded stairs is also possible.

Radiation exposure risk is rated as minor. The factor contributing to this type of risk is the facility is used to store a number of highly contaminated ventilation hoods. These hoods are contaminated with alpha-emitting material that is hard to detect and can cause health problems if ingested. However, this facility has its doors welded shut and there is very little worker activity.

3.2.5.2 Risk Sensitivities. The sensitivity of the risk values for this facility is primarily the number of individuals exposed to a hazard,

particularly if accessing the roof is necessary to fix leaks. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

Also implicit in the risk estimate is the type of administrative rules in place and the compliance level to these rules. If rules are relaxed or compliance is poor, risk will be higher. Risk from exposure to radiation will change if activities disturb the radioactive material. This disturbance can occur by physically disrupting the radioactive material. Release of radiation is also possible if some degradation of the confinement barrier occurs.

3.2.6 212-P Fuel Storage Facility

3.2.6.1 Risk Contributors. Electrical shock risk is rated as serious. The factors contributing to this type of risk are exposed conductors extending from energized light fixture conduits.

Falling risk is rated as minor. Deteriorating roof panels and the lack of roof access controls contribute to the risk of falling. These panels are made of precast concrete and have been exposed to water from roof leakage. Continued water saturation causes significant degradation of the load-bearing capability of the panel. It is probable these panels will deteriorate more quickly than the ones at the 212-N Fuel Storage Facility. Only a few panels at this facility have exhibited signs of degradation. Access to the roof is not available from inside the facility. However, if an individual is on the roof of this facility for such reasons as repairing the roofing, there is some likelihood they will fall through. The risk from falling increases to serious in the 10-year time frame estimate.

Struck-by risk is rated as minor. Deteriorating roof panels and the lack of roof access controls contribute to the struck-by risk. These panels are made of precast concrete and have been exposed to water from leaking roofing. Continued water saturation causes significant degradation of the load-bearing capability of the panels. It is probable these panels will deteriorate more quickly than the ones at the 212-N Fuel Storage Facility. Only a few panels at this facility have exhibited signs of degradation. The concrete panels can degrade to the extent that snow loads or seismic events can cause failure. Anyone struck by a falling piece of panel will suffer injury. The struck-by risk increases to moderate in the 10-year time frame estimate.

Chemical exposure risk is rated as minor. The factors contributing to this type of risk include a number of PCB-contaminated transformers stored in the yard outside the building and barrels of PCB-contaminated oil stored in the area. The eastern-most room of the building is labeled "CAUTION PCBs." That part of the facility is not within the scope of this evaluation.

3.2.6.2 Risk Sensitivities. The sensitivity of the risk values for this facility is primarily the number of individuals exposed to a hazard. The eventual cleanup of PCBs around the facility is a situation where this could happen. If the number of individuals using this facility increases significantly, the risk from the existing hazards will be greater. Risk from exposure to radiation will change if activities disturb the radioactive material.

3.2.7 212-R Fuel Storage Facility

3.2.7.1 Risk Contributors. Falling risk is rated as serious. Deteriorating roof panels and the lack of roof access controls contribute to the risk of falling. These panels are made of precast concrete and have been exposed to water from roof leakage. Continued water saturation causes significant degradation of the load-bearing capability of the panels. Only a few panels at this facility have exhibited signs of degradation. Access to the roof is not available from inside the facility. However, if an individual is on the roof to repair existing wind-damaged roof panels, there is some likelihood they will fall through.

Electrical shock risk is rated as serious. The factors contributing to this type of risk are energized conductors extending from lighting conduits, missing conduit covers, and exposed components of broken light bulbs.

Struck-by risk is rated as moderate. The factors contributing to this type of risk are similar to those for falling. The concrete panels can degrade to the extent that snow loads or seismic events can cause failure. Anyone struck by a falling piece of panel will suffer injury. The outside concrete steps and stoop at the entrance of the heater room are very deteriorated. This facility does not have many individuals around it. The risk from struck-by increases from moderate to serious in the 10-year time frame estimate from continued degradation of roof panels.

3.2.7.2 Risk Sensitivities. The sensitivity of the risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater. Increased roof access could increase risk because of the poor condition of the panels above the transfer area. Roof access may be required to repair the roof.

3.2.8 Reduction Oxidation Plant (S Plant)

The REDOX Plant is located in the 200 West Area of the Hanford Site, directly south of the U Plant. This plant, constructed from 1950 to 1952, became the first large-scale, continuous-flow, solvent extraction process plant built in the United States for the recovery of plutonium from irradiated uranium fuel. This process, which replaced the batch precipitation methods first used at the Hanford Site, was designed to separate uranium, plutonium, and neptunium as individual product streams from the fission products with which they are associated in the irradiated fuel. This separation process was accomplished by controlling the relative distribution of the activated components between aluminum nitrated-salted aqueous solutions, and an immiscible organic extractant, hexone (methyl isobutyl ketone).

3.2.9 202-S Canyon Building

The 202-S Canyon Building is a reinforced concrete structure consisting of two main architectural features: the canyon and silo areas. The building is 142.6 m (468 ft) long and 49.1 m (161 ft) wide. The canyon portion contains all the equipment for handling radioactive materials such as fuel dissolution, feed preparation, solvent distillation, and waste concentration

and neutralization. The silo area, located at the west end of the canyon, houses the solvent extraction columns and aqueous makeup vessels. The building is extremely large and has been deactivated since 1967.

Operating, pipe, and sample galleries are located on the north and south sides of the canyon area. A storage gallery is located under the south sample gallery. The silo section consists of four chemical makeup levels: the column maintenance level, column operating gallery, sample gallery, and column chemical feed tank level.

All service portions of the 202-S Building are shielded from the radioactive processing areas by concrete walls, nominally 1.8 m (6 ft) in thickness. The location of cell equipment behind massive concrete shielding required the operations to be done by remote control. Chemical, steam, and water additions to the process vessels were made from the service areas through pipes penetrating the concrete shielding (referred to as the "cold" side of the piping). Transfers of radioactive solutions between process vessels were made by steam jets, gravity flow, and electrically operated pumps via piping contained in the pipe tunnel, which is located in the canyon section. This piping was referred to as the "hot" side of the transfer lines. Agitation of solutions was accomplished by remote-operated recirculating steam jets or electrically driven agitators. This equipment and the monitoring and control assemblies (comprising the majority of the deactivated equipment) are presently located within the canyon cells and building galleries. Presently, the canyon is used as a radioactive confinement area for the original equipment used in the REDOX process.

3.2.9.1 Risk Contributors. Struck-by risk is rated as serious. The factors contributing to this type of risk are numerous tripping and running-into hazards. Many areas have protruding objects, such as bolts. Heater fans are not properly guarded and are readily accessible. Mechanical equipment has been dismantled throughout the facility, but electrical connections have not been removed, making it possible to reenergize the equipment and create missiles from ejected parts. The locker room in the facility has a cantilever support of a cracked and severely dislocated beam; failure of this roof beam could result in collapse of the roof. This beam is illustrated in Figure 3-9. This fault might be typical of a more widespread problem. This facility is regularly visited by workers performing various maintenance and surveillance tasks.

Radiation exposure risk is rated as serious. The factors contributing to this type of risk include areas outside the canyon that have isolated spots with moderate to high exposure rates, and areas inside the canyon where there are large pieces of scrap equipment with high exposure rates. These areas are not labeled or roped to delineate where the highest radiation fields exist. If caution is not exercised, exposure rates in the canyon area are high enough to exceed company-allowed limits in a short period of time.

Electrical shock risk is rated as moderate. The factors contributing to this type of risk are numerous, isolated instances of improperly used nonpermanent wiring; nonfunctioning breaker status lights; cables hanging out of junction boxes; and other similar problems.

Fire risk is rated as moderate. The factors contributing to this type of risk are large amounts of combustible materials present around the power

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transformers on the north side of the building and electrical fires that could occur as a result of the degraded condition of the electrical system. An additional problem is fire damage to the power transformers could affect important equipment in the building and create a release of toxic air emissions and oil into the environment.

Suffocation risk is rated as minor. All Hanford Site facilities that have unventilated belowgrade areas have a suffocation risk. Accumulations of water in unventilated areas also can cause a sufficient reduction of oxygen content from biological action or corrosion to be hazardous to human life. Belowgrade areas can also act as catch basins for heavier than air gases that are either toxic or displace an oxygen-bearing atmosphere. The belowgrade

Figure 3-9. Degraded Support Beam at 202-S Canyon Building.

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areas at this facility have not been appropriately posted as "Confined Spaces." However, many belowgrade areas in this facility are ventilated and not considered confined spaces.

Chemical exposure risk is rated as minor. The factors contributing to this type of risk are the facility used large quantities of chemicals during operation and it is likely some quantities of residual materials still remain.

The risk from falling is rated as negligible. However, the risk from falling increases to minor in the 10-year time frame estimate.

The risk from exposure to asbestos is rated as negligible. However, the risk from exposure to asbestos increases to minor in the 10-year time frame estimate.

3.2.9.1 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

Also implicit in the risk estimate is the type of administrative rules in place and the compliance level to these rules. If rules are relaxed or compliance is poor, risk will be higher. Risk from exposure to radiation will change if activities disturb the radioactive material. This disturbance can occur by either physically disrupting the radioactive material or by moving the shielding. Release of radioactive contamination is also possible if some degradation of the confinement barrier or ventilation system occurs. Cracking in the walls and degradation of the ventilation ducts at the 202-S Canyon Building in Figures 3-10 and 3-11 illustrate this possibility. Release might also occur from widening structural joints in the concrete.

If electrical loads increase significantly, risk from electrical fire also increases. Fire risk also would increase if combustible material accumulated.

The presence of transient or unknown chemicals can change the risk of exposure or release.

Mechanism changes that disturb asbestos-containing insulation could significantly change asbestos release and exposure risk.

3.2.10 233-S Plutonium Concentration Facility

The 233-S Plutonium Concentration Facility, located directly north of the 202-S Building, was built in 1954 and 1955 and was placed in operation in March 1955. During the initial process, a diluted plutonium-nitrate solution was transferred from the 202-S Canyon Building to the 233-S Facility. Within the 233-S Facility, the plutonium solution was concentrated and loaded into product removal cans for transportation to other facilities for further processing. The facility is a reinforced concrete and corrugated metal structure consisting of eight rooms and five airlocks. A 9.7-m (32-ft) high bay area is divided into two sections: a process zone, and a viewing bay partitioned by vertical transparent plastic panels. These panels offered very

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Figure 3-10. Large Wall Crack at 202-S Canyon Building.

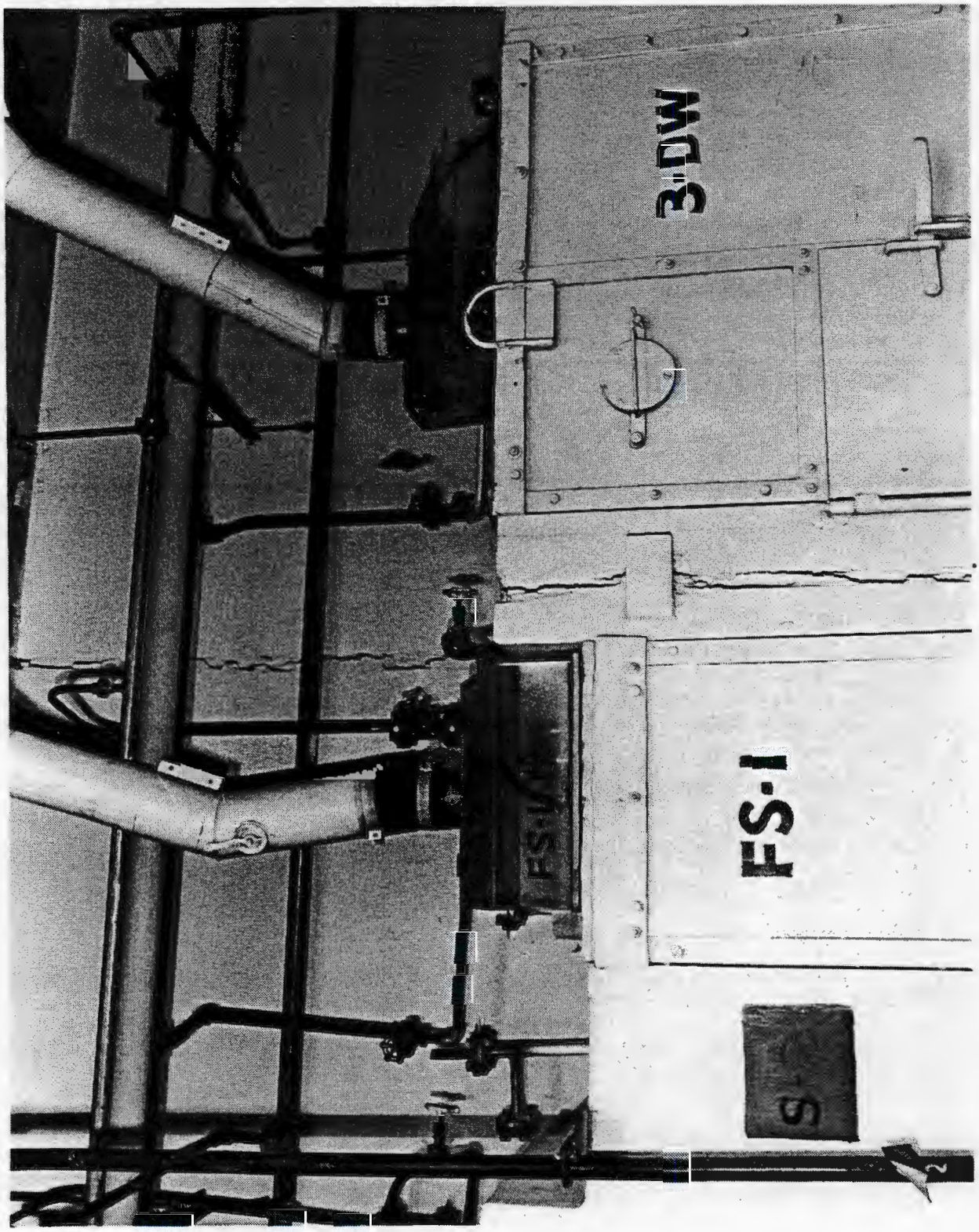

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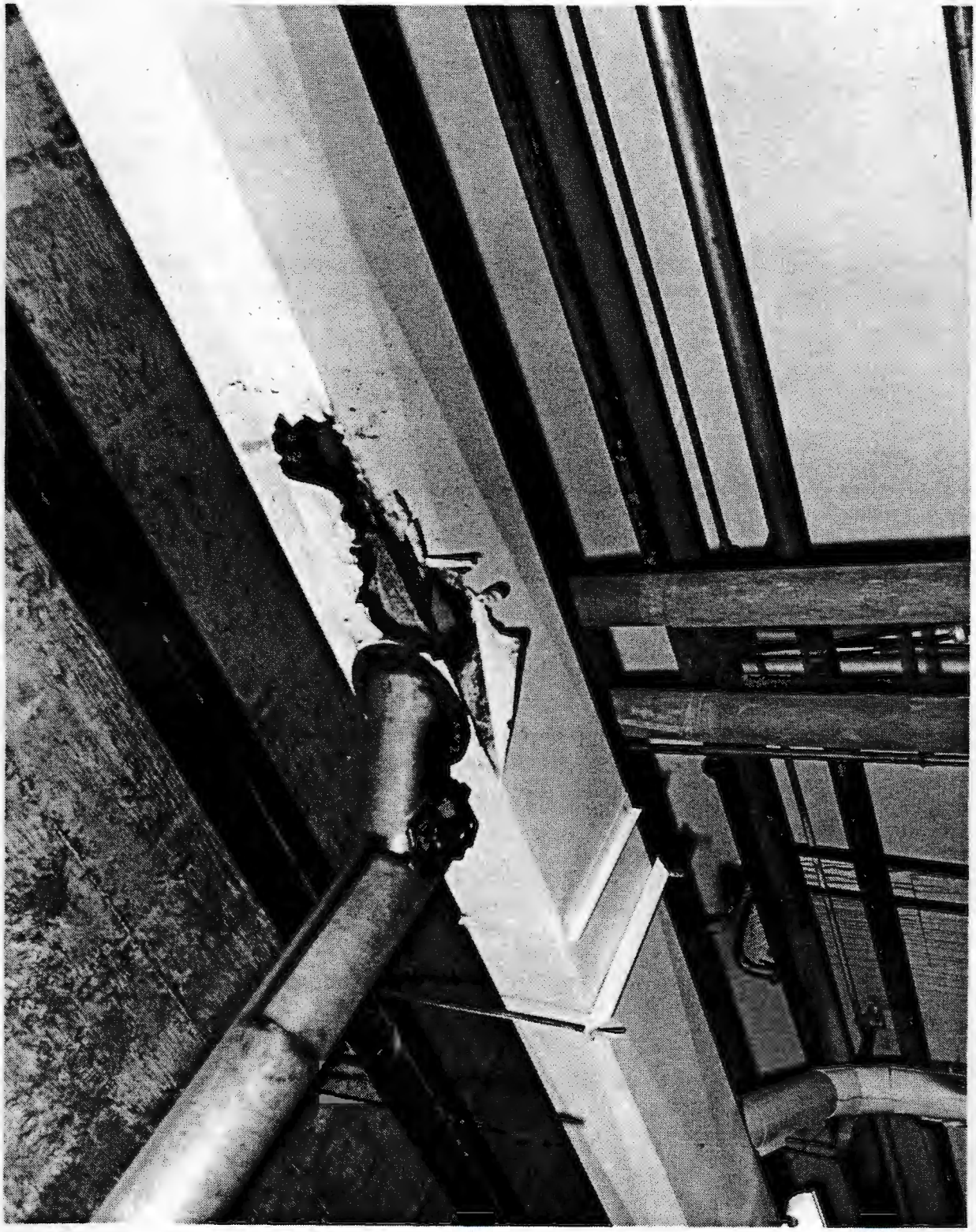
Figure 3-11. Degradation of Heating, Ventilation, and Air Conditioning System at 202-S Canyon Building.



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little shielding in the event of a criticality incident; therefore, all the process vessels were designed with a critically safe geometry. In 1962, the operations of the facility were expanded to include neptunium concentration and loadout processes, along with an ion exchange purification process. Presently, the building serves no purpose.

3.2.10.1 Risk Contributors. Radiation exposure risk is rated as serious. The factors contributing to this type of risk are this facility has significant alpha contamination spread throughout the facility, and these areas are contaminated to a level that requires supplied air for personnel entry. Inhaled alpha-emitting radionuclides represent a significant health risk.

Electrical shock risk is rated as minor. The factors contributing to this type of risk include extension cords used for long-term wiring, energized wires exposed in receptacles that have no covers, and an electrical enclosure with missing knockouts that could allow access to energized conductors. Risk from electrical shock increases to serious in the 10-year time frame estimate.

Falling risk is rated as minor. The factors contributing to this type of risk include a ladder, with no chain barrier, that passes through several floors , and a scaffold in the first zone area that is improperly constructed, creating the possibility of a fall.

Asbestos exposure risk is rated as minor. The factor contributing to this type of risk is heavy asbestos damage throughout the entire radiation zone area of the facility. This building is regularly surveyed but not occupied.

The risk from radiation release is rated as negligible. However, this risk increases to minor in the 10-year time frame estimate from continued migration of alpha contamination and a possible increase in the likelihood of material confinement loss.

3.2.10.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

Also implicit in the risk estimate is the type of administrative rules in place and the compliance level to these rules. If rules are relaxed or compliance is poor, risk will be higher. Risk from exposure to radiation will change if activities disturb the radioactive material. This disturbance can occur by either physically disrupting the radioactive material or by moving the shielding. Release of radiation is also possible if some degradation of the confinement barrier or ventilation system occurs.

If electrical loads increase significantly, there would be an increase in risk from electrical fire. Fire risk would also increase if combustibles were allowed to accumulate.

The presence of transient or unknown chemicals can change the risk of exposure or release.

Changes in mechanisms that disturb asbestos-containing insulation could significantly change the risk from asbestos release and exposure.

3.2.11 233-SA Exhaust Filter Building

The 233-SA Exhaust Filter Building was built adjacent to and equipped to handle ventilation for the 233-S Plutonium Concentration Facility. The building houses two banks of double high-efficiency particulate air (HEPA) filters. Each bank contains a separate exhaust fan, stack, and radiation monitoring instrumentation.

The 233-SA Building is a one-story, reinforced structure with outside dimensions of 7.3 m by 8.2 m by 2.6 m (24 ft by 27 ft by 8.5 ft). Presently the building is used to house the HEPA filters that remove particulates from the exhaust ventilation air before discharge to the environment. It will remain in operation until the 233-S Facility is demolished.

3.2.11.1 Risk Contributors. Radiation exposure risk is rated as moderate. The factors that contribute to this type of risk are alpha-emitting contamination levels as high as 18,000 dpm are present, and a crack along the floor under the door read 600 dpm. Alpha-emitting radionuclides that could be inhaled represent a significant health risk. The risk from exposure to radiation increases to serious in the 10-year time frame estimate from the increased likelihood of confinement failure.

Struck-by risk is rated as minor. The factors contributing to this type of risk include the following: the HVAC unit for the facility has a shaft only partially guarded; the shaft extends from outside the facility to inside the facility, making it readily accessible; and the ON-OFF markings on the fan/motor control station are not readable.

Electrical shock risk is rated as minor. The factors contributing to this type of risk include a broken light fixture with a missing refractor, a convenience receptacle located outside the building that is not weatherproof; and a nonweatherproof junction box fitting that has been used to repair a motor raceway junction box.

3.2.11.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

Also implicit in the risk estimate is the type of administrative rules in place and the compliance level to these rules. If rules are relaxed or compliance is poor, risk will be higher. Risk from exposure to radiation will change if activities disturb the radioactive material. This disturbance can occur by either physically disrupting the radioactive material or by moving the shielding. Release of radiation is also possible if some degradation of the confinement barrier or ventilation system occurs.

3.2.12 276-S Solvent Handling Building

The 276-S Solvent Handling Building was used for bulk storage of raw hexone and chemical treatment of new and recycled hexone. The facility is located west of the 202-S Canyon Building. It is an aboveground concrete building, 13.1 m (43 ft) wide by 17.7 m (58 ft) long. Presently, the building serves no purpose.

3.2.12.1 Risk Contributors. Struck-by risk is rated as minor. The factors that contribute to this type of risk are valve handles protrude into walkways, housekeeping and maintenance are poor, and there is no illumination in the facility. There is very little activity in this building.

Suffocation risk is rated as minor. All Hanford Site facilities that have unventilated belowgrade areas have a suffocation risk. Accumulations of water in unventilated areas also can cause a sufficient reduction of oxygen content from biological action or corrosion to be hazardous to human life. Belowgrade areas can also act as catch basins for heavier than air gases that are either toxic or displace an oxygen-bearing atmosphere. The belowgrade areas at this facility have not been appropriately posted as "Confined Spaces."

The risk from falling is rated as negligible. However, this risk increases to minor in the 10-year time frame estimate.

The risk from exposure to asbestos is rated as negligible. However, this risk increases to minor in the 10-year time frame estimate.

3.2.12.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

Changes in mechanisms that disturb asbestos-containing insulation could significantly change the risk from asbestos release and exposure.

3.2.13 291-S Exhaust Fan Facility

The exhaust ventilation equipment for the 202-S Canyon Building is contained in the 291-S Exhaust Fan Facility. There are three stainless steel, direct-driven blowers of identical design, installed in parallel. Two are powered by 60-horsepower electric motors, and the third is driven by a steam turbine. A single exhaust fan creates the 566 m^3/min (20,000 ft^3/min) flow rate up the process stack. The standby electric-driven fan provides backup capabilities should a malfunction occur or during scheduled maintenance of the primary unit. The steam turbine-driven exhaust fan is used to provide automatic backup capabilities and will automatically begin operation if electrical power fails, supply air fails, or differential pressure across the air tunnel to atmosphere decreases below established standards. The 291-S sand filter (25.9 m by 25.9 m by 3.3 m [85 ft by 85 ft by 10 ft]), is comprised of gradient layers of acid-resistant rocks and sand that removed radioactive particles from the exhaust ventilation air before discharge to the atmosphere. The 61-m (200-ft) high process stack provides a discharge point for the exhaust air, ensuring the velocity and altitude are sufficient to

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eliminate any hazards to personnel. The filter roof was recoated with urethane in 1991, thus eliminating the potential for water infiltration. Presently the sand filter removes particulate from the canyon ventilated air before discharge up the stack, and will remain in operation until the entire REDOX Plant is demolished.

3.2.13.1 Risk Contributors. Electrical shock risk is rated as serious. The factors contributing to this type of risk include missing junction box covers with energized insulated wires extending from them, indicator lights on the motor control panel that do not conform to accepted industry standard (the red light indicated the motor was off and the green light indicated the motor was on) and that could create confusion and an accident, and areas with electrical equipment that have little working space. The risk from electrical shock increases to critical in the 10-year time frame estimate.

Radiation exposure risk is rated as moderate. The factors contributing to this type of risk are a lack of labeling or posting and a spot under a rubber mat that reads 45,000 cpm. The building is regularly surveyed, but not regularly occupied.

Struck-by risk is rated as minor. The factors contributing to this type of risk include the following: rotating shafts on the exhaust fan units are not fully guarded, maintenance and upkeep for the building appear to be very poor, and workers are routinely in the area for surveillance. The risk from struck-by increases to moderate in the 10-year time frame estimate from continued degradation of the facility.

Asbestos exposure risk is rated as minor. The factor contributing to this type of risk is that the asbestos in and around the facility is extremely weather damaged. Release of asbestos, however, requires impact or other mechanical actions.

Chemical exposure risk is rated as minor. The factors contributing to this type of risk are four unmarked 208 L (55 gal) drums containing unknown materials found outside the west wall of the facility.

The risk from release of radiation is rated as negligible. However, the risk increases to minor in the 10-year time frame estimate from increased likelihood of confinement failure.

The risk from release of asbestos to the environment is rated as negligible. However, the release of asbestos increases to minor in the 10-year time frame estimate from continued degradation of material into friable forms.

3.2.13.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

Risk from radiation exposure will change if activities disturb the contaminated material. This disturbance can occur by either physically disrupting the radioactive material or by moving the shielding. Release of radiation is also possible if some degradation of the confinement barrier occurs.

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Changes in mechanisms that disturb asbestos-containing insulation could significantly change the risk from asbestos release and exposure.

3.2.14 292-S Jet Pit House

The 292-S Jet Pit House was in service from 1952 to 1967 and provided housing for the jets for the REDOX process vessel vent systems.

The 292-S Jet Pit House is a concrete building with outside dimensions of 4.8 m by 4.8 m by 3.2 m (15 ft 8 in. by 15 ft 8 in. by 10 ft 6 in.).

3.2.14.1 Risk Contributors. The risk of asbestos release to the environment is rated as minor. The factor contributing to this type of risk is pipe insulation within and around this facility is extremely damaged.

3.2.14.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

Exposure to asbestos risk could increase from changes in disturbance mechanisms or increased personnel activity if the area is classified as a nonradiation zone.

3.2.15 293-S Offgas Treatment and Recovery Building

The 293-S Offgas Treatment and Recovery Building was in service from 1958 through 1967 and provided absorption of nitrogen oxides and volatile fission products from REDOX dissolver offgas.

The 293-S Building is a reinforced concrete structure with a corrugated metal lean-to structure attached to the south wall. The general condition of the building is fair and the exterior and roof are in poor condition.

The concrete portion of the building is approximately 8.8 m by 4.9 m (29 ft by 16 ft) and extends from 3.7 m (12 ft) belowgrade to 9.1 m (30 ft) abovegrade. The main floor contains the absorption towers, with a pipe valve pit in the basement. The lean-to structure, 2.6 m by 8.5 m (8 ft 6-3/4 in. by 27 ft 9.5 in.), houses the control room and change room facility, with a concrete basement that houses control piping.

An underground acid storage area, 4.3 m by 4.0 m (14 ft by 13 ft), is adjacent to the west side of the main building. Ventilation supply equipment also is present aboveground and adjacent to the south end of the lean-to structure.

3.2.15.1 Risk Contributors. Biological hazard risk is rated as moderate. The factors contributing to this type of risk are poisonous spiders and stinging insects that have been regularly found in the unoccupied facilities, especially in the summer.

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Radiation exposure risk is rated as minor. The factor contributing to this type of risk is a HEPA filter box that was found to have 200 to 300 dpm/100 cm^2. This building is regularly surveyed but not occupied.

The risk from exposure to asbestos is rated as negligible. However, this risk increases to minor in the 10-year time frame estimate.

3.2.15.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater. Risk from exposure to radiation will change if activities physically disturb the HEPA filter box.

There may be electrical hazards in this facility, but this facility was not inspected for electrical hazards.

Changes in mechanisms or activities that disturb asbestos-containing insulation could significantly change the risk from asbestos release and exposure.

3.2.16 2711-S Stack Gas Monitoring Building

The 2711-S Stack Gas Monitoring Building is a wooden structure with a sloping roof that was used for gas monitoring and sheltering samples from the 291-S-1 stack. Dimensions are 3.8 m by 4.3 m by 2.4 m (12 ft 6 in. by 14 ft by 8 ft). Total floor area is 16.26 m^2 (175 ft^2). The interior, exterior, and roof of the building are in poor condition.

Visual inspection of the exterior revealed the walls are deteriorating and the roof is sagging. Substantial roof loads could result in collapse of the roof. Holes are present also in windows and walls.

Equipment contained in the building include a motor, pump, and instrumentation for 291-S-1 stack gas sampling.

3.2.16.1 Risk Contributors. Falling risk is rated as moderate. The factors contributing to this type of risk include the following: the roofing is in bad condition, the wooden roof structure is deteriorated, and the roof can be accessed with a portable ladder.

Struck-by risk is rated as minor. The roof structure is badly deteriorated and could collapse under snow loads. The risk from struck-by increases to moderate in the 10-year time frame estimate from continued degradation of the roof. This building is regularly surveyed, but not occupied.

Electrical shock risk is rated as minor. The factors contributing to this type of risk include energized electrical equipment in the building , congested access to electrical components by stored items, poorly maintained electrical utilities, and water leaking from the roof onto electrical equipment. The risk from electrical shock increases to serious in the 10-year time frame estimate from continued degradation of electrical components.

Asbestos exposure risk is rated as minor. The factor contributing to this type of risk is asbestos that has to be in a finely divided (friable) form and disturbed to be inhaled or ingested. As with most older Hanford Site facilities, the piping insulation contains asbestos.

The risk from fire is rated as negligible. However, the risk from fire increases to minor in the 10-year time frame estimate.

3.2.16.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

Also implicit in the risk estimate is the type of administrative rules in place and the compliance level. If rules are relaxed or compliance is poor, risk will be higher. Risk from exposure to radiation will change if activities disturb radioactive material. This disturbance can occur by either physically disrupting the radioactive material or by moving the shielding.

Changes in mechanisms or activities that disturb asbestos-containing insulation could significantly change the risk from asbestos release and exposure.

If electrical loads increase significantly, an increase in the risk from electrical fire would occur. Fire risk would also increase if combustibles were allowed to accumulate.

3.2.17 2715-S Storage Building

The 2715-S Building is a steel-framed structure with sheet metal walls and roof that was used to store miscellaneous materials.

3.2.17.1 Risk Contributors. Chemical exposure risk is rated as minor. The factors contributing to this type of risk include some unlabeled containers; oil, gasoline, aerosol cans, and bottled chemicals that are stored together; and no heating or ventilation system in the building.

3.2.17.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

Also implicit in the risk estimate are the type of administrative rules in place and the compliance level to these rules. If rules are relaxed or compliance is poor, risk will be higher. Risk from exposure to radiation will change if activities disturb the radioactive material. This disturbance can occur by either physically disrupting the radioactive material or by moving the shielding.

The presence of transient or unknown chemicals can change the risk of exposure or release.

3.2.18 2718-S Sand Filter Sampler Building

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The 2718-S Sand Filter Sampler Building was built to monitor the performance of the 291-S sand filter. It is a wooden structure with a sloping roof; outside dimensions are 3.8 m by 4.3 m by 2.4 m (12 ft 6 in. by 14 ft by 8 ft), with a total floor area of 16.26 m^2 (175 ft^2). The interior, exterior, and roof of the building are in poor condition.

Visual inspection of the exterior of the building revealed minor wood deterioration. Equipment in the building includes office furniture, a pressure differential gauge with associated vacuum pump, piping, and electrical wiring.

3.2.18.1 Risk Contributors. Biological hazard risk is rated as moderate. The factors contributing to this type of risk include poisonous spiders and stinging insects that have been regularly found in the unoccupied facilities, especially in the summer.

Falling risk is rated as minor. The factors contributing to this type of risk are the poor condition of the roofing, which is three-fourths gone; the deteriorated state of the roof structure; and accessibility to the roof by a portable ladder. This facility is regularly surveyed, but not occupied. The risk from falling increases to moderate in the 10-year time frame estimate from continued degradation of the roof.

Struck-by risk is rated as minor. The factors contributing to this type of risk are similar to those for falling. The roof structure is extremely deteriorated and could collapse under snow loads. This facility is regularly surveyed, but not occupied. The struck-by risk increases to moderate in the 10-year time frame estimate from continued degradation of the roof.

Electrical shock risk is rated as minor. The factors contributing to this type of risk include energized electrical equipment in the building ; the ceiling inside the main building that is collapsing and pulling the electrical conduit with it; and a leaking roof, allowing water to drip on equipment. The risk from electrical shock increases to serious in the time frame estimate from continued degradation of the system.

Radiation exposure risk is rated as minor. The factor contributing to this type of risk is the existence of a sample bucket with a count rate of 50,000 cpm.

Fire risk is rated as minor. The factors contributing to this type of risk are poor housekeeping, questionable wiring, combustible materials such as tumbleweeds and wooden radioactive waste containers located around the building, and the fact that the building is constructed of wood. This building is not occupied.

The risk from radiation release is rated as negligible. However, this risk increases to minor in the 10-year time frame estimate from possible increases in the likelihood of material confinement loss.

3.2.18.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

Also implicit in the risk estimate is the type of administrative rules in place and the compliance level to these rules. If rules are relaxed or compliance is poor, risk will be higher. Risk from exposure to radiation will change if activities disturb the radioactive material. This disturbance can occur by either physically disrupting the radioactive material or by moving the shielding.

If electrical loads increase significantly, an increase in the risk from electrical fire would occur. Fire risk would also increase if combustibles were allowed to accumulate. If the fire risk increases, an increase in the risk for radioactive material release could occur.

3.2.19 2904-SA Cooling Water Sampler Building

The 2904-SA Building was built in 1956 to provide sampling of process waste flowing from the REDOX Plant through 2904-S-170 weir to the liquid waste disposal site. The 2904-SA Building extends 1.0 m (3 ft 2 in.) over the south end of the 2904-S-170 weir. Samples of REDOX Plant process effluents were taken while they were being routed through the weir.

The 2904-SA Building is a prefabricated metal building resting on a concrete foundation with outside dimensions of 2.4 m by 2.4 m by 2.1 m (8 ft by 8 ft by 7 ft). The interior, exterior, and roof of the building are in good condition.

Sample equipment inside the building consists of a pump and a 0.6-m (2-ft) diameter, 0.9-m (3-ft) high stainless steel tank belowgrade, with a sample riser protruding up through the floor and associated piping.

3.2.19.1 Risk Contributors. Biological hazard risk is rated as moderate. The factors contributing to this type of risk include poisonous spiders and stinging insects that have been regularly found in the unoccupied facilities, especially in the summer.

3.2.19.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

3.2.20 S Plant Butler Building

The S Plant Butler Building is a small metal storage shed located near the S Plant.

3.2.20.1 Risk Contributors. Struck-by risk is rated as minor. The factor contributing to this type of risk is the building heater is inadequately supported and may fall, striking someone.

Electrical shock risk is rated as minor. The factor contributing to this type of risk is a heater power cord plugged into a duplex outlet 2.7 m (9 ft) above the floor, which could contribute to a shock during unplugging.

Radiation exposure risk is rated as minor. The factor contributing to this type of risk is the existence of minor contamination levels up to 1,500 cpm.

Chemical exposure risk is rated as minor. The factors contributing to risk from exposure to miscellaneous chemicals include no heating or ventilation in the building, and six or seven 209 L (55 gal) barrels on the north side of the building do not have content labels.

3.2.20.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

Also implicit in the risk estimate is the type of administrative rules in place and the compliance level to these rules. If rules are relaxed or compliance is poor, risk will be higher. Risk from exposure to radiation will change if activities disturb the radioactive material. This disturbance can occur by either physically disrupting the radioactive material or by moving the shielding.

The presence of transient or unknown chemicals can change the risk of exposure or release.

3.2.21 241-SX-401 Waste Disposal Condenser House

The 241-SX-401 Building was built in 1954 to provide condensation for the 241-SX tank farm offgasses. The 241-SX-401 Waste Disposal Condenser House is identical to the 241-SX-402 Building, except the 241-SX-402 Building contains additional instrumentation.

The building is constructed of concrete with walls varying from .3 to .76 m (1 to 2.5 ft) thick for shielding purposes. The building is 10 m (36 ft) long, 7 m (24 ft) wide, 7 m (24 ft) high, and 2 m (7 ft) belowgrade. Attached to the south end of both buildings is a single-story 3.6-m by 2.4-m (12-ft by 8-ft) control room made of wood and plaster board. There is evidence of heavy leaking through the roof.

3.2.21.1 Risk Contributors. Electrical shock risk is rated serious. The factors contributing to this type of risk include confusion that may occur when deenergizing this building, because two overhead electrical services attach to the building; services that are not labeled; and service disconnects that are not labeled. There is also an electrical distribution panel with a corroded cover, indicating water intrusion. It appears no maintenance is performed in this building.

The struck-by risk is rated as minor. However, the risk increases to serious in the 10-year time frame estimate from continuing roof degradation.

The risk from falling is rated as negligible. However, the risk increases to serious in the 10-year time frame estimate from continuing roof degradation.

3.2.21.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

Also implicit in the risk estimate is the type of administrative rules in place and the compliance level to these rules. If rules are relaxed or compliance is poor, risk will be higher. Risk from exposure to radiation will change if activities disturb the radioactive material. This disturbance can occur by either physically disrupting the radioactive material or by moving the shielding. Release of radiation is also possible if some degradation of the confinement barrier or ventilation system occurs.

If electrical loads increase significantly, an increase in the risk from electrical fire would occur. Fire risk would also increase if combustibles were allowed to accumulate.

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3.2.22 241-SX-402 Waste Disposal Condenser House

The 241-SX-402 Building was built in 1954 to provide condensation for the 241-SX tank farm offgasses. The building was hardly used and has very low levels of contamination as compared to the 241-SX-401 Building. The 241-SX-402 Waste Disposal Condenser House is identical to the 241-SX-401 Building, except the 241-SX-402 Building contains additional instrumentation.

The building is constructed of concrete with walls varying from .3 to .76 m (1 ft to 2.5 ft) thick for shielding purposes. The building is 10 m (36 ft) long, 7 m (24 ft) wide, 7 m (24 ft) high, and 2 m (7 ft) belowgrade. Attached to the south end of both buildings is a single-story, 3.6-m by 2.4-m (12-ft by 8-ft) control room made of wood and plaster board.

3.2.22.1 Risk Contributors. Electrical shock risk is rated as moderate. The factors contributing to this type of risk include exposed insulated wires in an electrical panel with the front cover missing; limited space in front of the panel; access to the area requires supplied air that limits visibility; and a collapsed ceiling, leaving rubble on the floor that creates tripping hazards. This risk increases to serious in the 10-year time frame estimate.

Radiation exposure risk is rated as minor. The factors contributing to this type of risk are there are areas of contamination, rain was leaking through the roof at the time of the investigation, and removable radioactive contamination is known to be present in the facility.

The risk from falling is rated as negligible. However, the risk from falling increases to serious in the 10-year time frame estimate from continuing roof degradation.

Struck-by risk is rated as negligible. The factors contributing to this type of risk include the following: the roof is leaking and causing deterioration of panels; snow loads could cause the roof to collapse; and if individuals are in the area during the collapse, injury will result. The control room also has struck-by hazards as the structure is wooden and

extremely deteriorated. The risk from struck-by increases to serious in the 10-year time frame estimate from continued roof degradation.

3.2.22.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

Also implicit in the risk estimate is the type of administrative rules in place and the compliance level to these rules. If rules are relaxed or compliance is poor, risk will be higher. Risk from exposure to or release of radiation will change if activities disturb contaminated material. This disturbance can occur by either physically disrupting the radioactive material or by moving the shielding. Release of radiation is also possible if some degradation of the confinement barrier occurs.

If electrical loads increase significantly, an increase in the risk from electrical fire would occur. Fire risk would also increase if combustibles were allowed to accumulate.

3.2.23 U Plant

The U Plant is located in the 200 West Area of the Hanford Site. The reinforced concrete 221-U Canyon Building was originally constructed between 1944 and 1945 as an integral part of the U Plant fuel separation facility, but was never used for that purpose. From 1950 to 1952, the U Plant was extensively modified for a uranium metal recovery program. Modification included all new cell process equipment in the canyon building. From 1952 to 1958, the 221-U Canyon Building recovered uranium from high-level waste underground storage tanks containing liquid from the bismuth phosphate process fuel separation plant (B Plant). The process involved solvent extraction with tributyl phosphate for the separation and decontamination of the uranium.

3.2.24 221-U Canyon Building

The main building associated with the U Plant is the 221-U Canyon. This building was built in 20 sections, with expansion joints between each section. The sections, numbered 1 through 20, are each 12.2 m (40 ft) long and house the cell equipment used in the batch precipitation method. The building is divided lengthwise into the gallery side and the process canyon side. These two sections are separated by a wall that runs the full length of the building and is generally 1.5 to 2.7 m (5 to 9 ft) thick. Other typical thicknesses are as follows: the floor, 1.8 m (6 ft); the roof, 0.9 to 1.2 m (3 to 4 ft); the outside wall (process side), 1.5 to 2.7 m (5 to 9 ft); and the outside wall (gallery side), 0.9 m (3 ft).

The gallery side has four floors--all are 4.3 m (14 ft) wide. From the bottom to the top, these are the electrical gallery, pipe gallery, operating gallery, and crane cabway platform. The crane cabway is open to the top of the canyon with a concrete wall separating the cabway from the canyon for shielding purposes. The remaining galleries contain all the cold piping, electrical distribution equipment, process controls, and instrumentation for

the canyon cells. Presently, the canyon is used as a radioactive confinement area for the storage of used process equipment from several processing plants.

3.2.24.1 Risk Contributors. Electrical shock risk is rated as critical. The factors contributing to this type of risk include a steam leak allowing condensation to run down the wall and onto the floor around a motor control center; a junction box that has pulled loose from the wall, allowing conductors to be exposed to sharp edges of the conduit; and circuit breakers that are installed upside down in a switchbox, creating possible confusion.

Radiation exposure risk is rated as serious. The factors contributing to this type of risk include very high exposure rates in some areas of the canyon, no labeling indicating where high exposure rates exist, and many isolated areas of high to moderate exposure rates outside the canyon area. Figure 3-12 shows such an area in the 221-S Canyon.

Struck-by risk is rated as minor. The factor contributing to this type of risk is poor housekeeping.

Asbestos exposure risk is rated as negligible. However, this type of risk increases to minor in the 10-year time frame estimate from continued degradation of insulation creating friable material.

Fire risk is rated as negligible. However, this type of risk increases to minor in the 10-year time frame estimate from continued poor housekeeping.

3.2.24.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

Also implicit in the risk estimate is the type of administrative rules in place and the compliance level to these rules. If rules are relaxed or

Figure 3-12. Radiation Area at 221-U Canyon.

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compliance is poor, risk will be higher. Risk from exposure to radiation will change if activities disturb the radioactive material. This disturbance can occur by either physically disrupting the radioactive material or by moving the shielding. Release of radiation is also possible if some degradation of the confinement barrier or ventilation system occurs. This building already shows open joints in the interior and exterior walls.

The presence of transient or unknown chemicals can change the risk of chemical exposure or release. This facility currently is used for storage of contaminated equipment, creating a high likelihood that unknown chemicals could be brought for storage in the future.

Changes in mechanisms or activities that disturb asbestos-containing insulation could significantly change the risk from asbestos release and exposure. Figure 3-13 shows the condition of asbestos in the 221-U Canyon. This condition is typical of many 100 and 200 Area buildings.

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3.2.25 271-U Office Building

The 271-U Building is a four-floor office and storage complex associated with the U Plant. The building is directly attached to the north side of the 221-U Canyon and was used to house support personnel.

Presently, the building is being upgraded to house operations and maintenance personnel who support all 200 Area retired facilities. There are also plans to use parts of this building for office space.

3.2.25.1 Risk Contributors. Fire risk is rated as moderate. The factor contributing to this type of risk is the fluorescent fixture in the shower stall could short out, causing an electrical fire. This risk increases to serious in the 10-year time frame estimate.

Falling risk is rated as minor. The factor contributing to this type of risk is the stairway exit outside rooms 105 and 106, which does not have the bottom portion of the handrail connected.

Struck-by risk is rated as minor. The factors contributing to this type of risk are unguarded rotating equipment and floor pads with protruding bolts.

Electrical shock risk is rated as minor. The factors contributing to this type of risk include fluorescent fixtures with missing parts, resulting in exposed wires; an outlet box with energized wires that has no cover; wires hanging out of a handy box that is fed from a panel with no tags, indicating there is a problem; water leaking from pipes onto light fixtures; and a fluorescent fixture in a shower stall that is not water tight. The risk from electrical shock increases from minor to serious in the 10-year time frame estimate from continued degradation of wiring.

Asbestos exposure risk is rated as negligible. However, this type of risk increases to minor in the 10-year time frame estimate from continued degradation of insulation creating friable material.

Figure 3-13. Typical Asbestos Conditions in 221-U Canyon.

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3.2.25.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

The presence of radioactive material in the adjacent 221-U Canyon Building creates a possibility of contamination moving into the clean portion of this facility. This could happen as a result of a combination of preexisting pathways and ventilation failures, or as a result of activities in the canyon area that would create release situations.

The use of presently deenergized circuits could increase the risk of electrical fire and shock. The increase in the number of persons occupying this facility could also create greater electrical loads that would increase the risk of electrical fire.

3.2.26 276-U Solvent Handling Facility

The 276-U Solvent Handling Facility was used for bulk storage of tributyl phosphate. This solvent was used for recovery of uranium from the underground storage waste tanks. The facility is located on the outside southwest wall of the 221-U Building. It is an aboveground concrete basin, 20.1 m by 16.5 m by 2.4 m (66 ft by 54 ft by 5 ft), with 1.5 m (5 ft) aboveground.

3.2.26.1 Risk Contributors. The risk contributors are electrical shock, exposure to chemicals, release of asbestos, and release of chemicals. All are rated as negligible.

3.2.26.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

The presence of transient or unknown chemicals can change the risk of exposure or release.

3.2.27 291-U Exhaust Fan Facility

The 291-U Exhaust Fan Facility contains the exhaust ventilation equipment for the 221-U Canyon, which maintains the radiologically contaminated areas under negative pressure with respect to the atmosphere and adjacent noncontaminated areas of the building. There are two stainless steel, direct-driven blowers of identical design, installed in parallel. Both are driven by a 60 horsepower electric motor. The ventilation load of the building is carried by an individual fan at a rate of 566 m^3/min (20,000 ft^3/min). The standby fan provides backup capabilities required during a malfunction or scheduled maintenance of the primary exhaust fan. The 291-U sand filter, which is 25.9 m by 25.9 m by 3 m (85 ft by 85 ft by 10 ft), is comprised of gradient layers of acid resistant rock and sand, which remove radioactive particles from the exhaust ventilation air before discharge to the atmosphere. The 291-U process stack, which is 61 m (200 ft) high, provides a discharge point for the exhaust air to ensure the velocity and altitude are sufficient to eliminate any hazards to personnel. Presently, the sand filter

removes particulates from the canyon-ventilated air before discharge up the stack.

3.2.27.1 Risk Contributors. Radiation exposure risk is rated as moderate. The factors contributing to this type of risk are the exposure rates in this facility are moderate to high, generally less than 7,500 cpm, and localized areas exist that have count rates as high as 55,000 cpm.

Biological hazard risk is rated as moderate. The factors contributing to this type of risk are poisonous spiders and stinging insects that have been regularly found in the unoccupied facilities, especially in the summer.

Falling risk is rated as minor. The factors contributing to this type of risk include the following: the area between the building and the stack is quite steep, there is no walkway, and there is no posting to indicate a hazard exists there. The risk from falling increases to serious in the 10-year time frame estimate from continued degradation of this hazardous area where walking occurs.

Struck-by risk is rated as minor. The factors contributing to this type of risk include the following: a strong wind could cause high pressure inside the building through a destroyed door that could rip the transite off the walls and create missiles; rotating shafts on fan units are not fully guarded; there are protrusions from a concrete pad; and steam pipes appear to be in such poor condition, some have burst.

Electrical shock risk is rated as minor. The factors contributing to this type of risk are nonfunctional indicating lights for fans, extension cords that lead from inside the facility to the outside, and electrical conduits that have been cut, exposing electrical wires.

Chemical exposure risk is rated as minor. The factors contributing to this type of risk include drums that were found marked toxic, corrosive, and persistent (drums were removed the next day); and several unlabeled containers that were found containing liquid.

Radiation release risk is rated as minor. The factors contributing to this type of risk include surface contamination observed in several outdoor locations on removable equipment around the facility, and contaminated rabbit droppings and tumbleweeds. The risk from release of radioactive material increases from minor to moderate in the 10-year time frame estimate from accumulation of released material.

3.2.27.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

Also implicit in the risk estimate is the type of administrative rules in place and the compliance level to these rules. If rules are relaxed or compliance is poor, risk will be higher. Risk from exposure to radiation will change if activities disturb the radioactive material. This disturbance can occur by either physically disrupting the radioactive material or by moving the shielding. Release of radiation is also possible if some degradation of the confinement barrier occurs.

If electrical loads increase significantly, an increase in the risk from electrical fire would occur. Fire risk would also increase if combustibles were allowed to accumulate.

The presence of transient or unknown chemicals can change the exposure or release risk.

Changes in mechanisms or activities that disturb asbestos-containing insulation could significantly change the asbestos release and exposure risk.

3.2.28 292-U Jet Pit House

The 292-U Jet Pit House housed the jets for the U Plant process vessel vent systems.

The building has block walls with a reinforced concrete foundation and floor, and a roof made of concrete sections with built-up asphalt gravel. The building is 6.4 m by 4.8 m (21 ft by 16 ft); 5.7 m 17 cm (19 ft 7 in.) high; and 31.22 m^2 (336 ft^2) total area.

3.2.28.1 Risk Contributors. Electrical shock risk is rated as serious. The factors contributing to the risk of electrical shock include three services feeding the jet pit house, two energized services with open panels, and a stack gas monitoring building with cords strung outside the building without ground fault protection. The risk from electrical shock increases to critical in the 10-year time frame estimate from continued degradation of the electrical wiring.

Biological hazard risk is rated as moderate. The factors contributing to this type of risk are poisonous spiders and stinging insects that have been regularly found in the unoccupied facilities, especially in the summer.

Struck-by risk is rated as negligible. The struck-by risk increases to minor in the 10-year time frame estimate from continued degradation of the exterior of the building.

3.2.28.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

Changes in mechanisms or activities that disturb asbestos-containing insulation could significantly change the asbestos release and exposure risk.

3.2.29 232-Z Plutonium Incinerator Facility

The 232-Z Facility was built in 1959 to remove plutonium from contaminated solid waste by incineration and leaching. An enclosed system of glove boxes was provided for sorting the wastes, leaching noncombustibles, and burning combustibles. The facility is a concrete block structure with slightly sloped concrete over metal decking roofs.

The building is divided into six areas: the process, storage, chemical preparation, ventilation, and electrical equipment areas; and the changeroom. Outside dimensions are 17 m 20 cm (56 ft 8 in.) in length by 10 m 20 cm (36 ft 8 in.) in width. The building is 5.7 m 8.8 cm (19 ft 3.5 in.) high at the two-story north end over the service area, and 4.5 m 21.5 cm (15 ft 8.5 in.) high over the remaining one-story process and storage area. There is also a small open-end condenser enclosure attached to the east wall measuring approximately 2.1 m by 2.4 m by 3 m (7 ft by 8 ft by 10 ft) high.

3.2.29.1 Risk Contributors. Radiation exposure risk is rated as serious. The factors contributing to this type of risk include moderate external radiation rates, and alpha-emitting material that is present and in a movable form. Alpha-emitting radionuclides that could be inhaled represent a significant health risk.

Falling risk is rated as moderate. The factor contributing to this type of risk is a stair landing, which is extremely corroded and approximately 2.4 m (8 ft) in the air. This building is not normally occupied.

Electrical shock risk is rated as minor. The factors contributing to this type of risk include unidentified circuit supply breakers, exposed wires (deenergized) found hanging on the wall, and a fluorescent light with a long cord found laying on top of the incinerator. The risk from electrical shock increases to serious in the 10-year time frame estimate from continued degradation of the electrical wiring.

Fire risk is rated as minor. The factor contributing to this type of risk is an electrical lighting panel that is blocked. This blockage could limit access to the panel when trying to deenergize a circuit that could limit an electrical fire.

Radiation release risk is rated as negligible. However, the risk from release of radioactive material increases from negligible to minor in the 10-year time frame estimate from continued degradation of building structure and subsequent loss of material confinement.

3.2.29.2 Risk Sensitivities. The sensitivity of the assigned risk values for this facility is primarily the number of individuals exposed to a hazard. If the number of individuals using this facility increases significantly, risk from the existing hazards will be greater.

Also implicit in the risk estimate is the type of administrative rules in place and the compliance level to these rules. If rules are relaxed or compliance is poor, risk will be higher. Risk from exposure to radiation will change if activities disturb the radioactive material. This disturbance can occur by either physically disrupting the radioactive material or by moving the shielding. Release of radiation is also possible if some degradation of the confinement barrier occurs.

If electrical loads increase significantly, an increase in the risk from electrical fire would occur.

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4.0 RISK EVALUATION PROCESS

The evaluation process is summarized here but described in more detail in Coles et al. 1933. (The purpose and scope of the evaluation are summarized in Section 1.0. of this evaluation). The evaluation process consisted of three parts: (1) a building hazard investigation, (2) a findings evaluation performed in a team meeting format, and (3) an evaluation of results.

Investigation of the Hanford Site 100 Area facilities was initiated in October 1992. The 200 Area facilities were investigated soon after in March 1993. The 100 Area consists of retired reactors and associated support facilities, such as water plants. The 200 Area consists of fuel processing facilities and associated support facilities.

The walkdown building investigations were conducted by professionals trained in the structural, electrical, industrial, radiation, and environmental safety disciplines. These walkdowns were augmented by reviews of applicable existing documentation, such as routine surveys and hazard reports. The walkdowns were conducted using discipline-specific checklists (see Appendix A). A master logic diagram (MLD) was used to assist in identifying issues specifically related to facilities requiring active components to maintain radioactive material confinement (see Appendix A, pages A-21 to A-89).

The findings from walkdowns constitute the raw data and were evaluated further in an interactive team meeting format. The meeting format created consistency across risk parameter estimates and allowed discussion among professionals from different disciplines. This interaction was one way of addressing secondary effects. Crumbling roof panels, for example, could promote the spread of asbestos fibers. Accordingly, the collapsing structure could be both a "Struck By" hazard and a "Release of Asbestos" hazard. The industrial safety professional could be unaware of the structural hazard without interaction with the structural engineering professional.

Potential accidents associated with each finding were assigned to a likelihood and consequence category according to criteria described in Coles et al. 1993. Hypothetical accidents were identified for all 19 hazard categories related to findings generated by the investigations. Locations where accidents could occur, factors that affect the likelihood, consequences, and estimates, and potential mitigating actions that could be taken were identified. This information was recorded on Risk Evaluation Summary sheets (see Appendix C).

The risk assessment was performed by the risk assessment specialists who used the information developed in the team meetings. Based on the assigned consequence and likelihood categories, risk matrix categories were determined for each facility on a hazard-by-hazard basis. Numerical values were assigned to weigh each hazard group pertaining to a particular facility. The sum of these values constitute the risk index for a facility. The risk matrix and associated weights are shown in Table 4-1. A detailed explanation of the bases for categories, definitions of their boundaries, and bases for the weighing factors are provided in Coles et al. 1993.

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Table 4-1. Risk Matrix Categories.

Likelihood index	Consequence categories			
	I- Catastrophic	II- Severe	III- Unplanned release	IV- Minor
A	Critical	Critical	1 Serious 2 Moderate 3 Minor	Moderate
B	Critical	Serious	1 Moderate 2 Minor 3 Negligible	Minor
C	Serious	Moderate	1 Minor 2 Negligible 3 Negligible	Minor
D	Minor	Minor	1 Negligible 2 Negligible 3 Negligible	Negligible
E	Negligible	Negligible	1 Negligible 2 Negligible 3 Negligible	Negligible

The following numerical ranges define the risk categories:

- Critical - 0.1 to 1.0, weight = 50,000
- Serious - 1×10^{-2}, weight = 1,500
- Moderate - 1×10^{-3}, 1×10^{-2}, weight = 500
- Minor - 1×10^{-5} to 1×10^{-3}, weight = 20
- Negligible - less than 1×10^{-5}, weight = 1

Special considerations were made related to the 200 Area investigations as compared to the 100 Area investigations. The 100 Area facilities contain hazardous materials, including passive radioactive material. No operating components or systems are required in these facilities. However, many of the 200 Area facilities have operating systems required for maintaining radioactive material confinement. Because of this difference, some additional hazard factors were considered while making the assessment. These differences are augmented in the original team checklists.

Additional factors were identified using a MLD. Use of an MLD is a deductive and structured way to identify unplanned events and unsafe conditions that can lead to undesired events. Use of the MLD is a process that was developed for use in Probabilistic Risk Assessments to ensure completeness related to identifying events. In the 200 Area buildings, the undesired event is release of radioactive or other hazardous material. The MLD and corresponding checklist considerations are provided in Appendix B.

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5.0 REFERENCES

40 CFR 261, 1993, "Identification and Listing of Hazardous Waste," *Code of Federal Regulations*, as amended.

40 CFR 302, 1993, "Designation, Reportable Quantities, and Notification," *Code of Federal Regulations*, as amended.

40 CFR 355, 1993, "Emergency Planning and Notification," *Code of Federal Regulations*, as amended.

Coles, G. A., M. V. Shultz, and W. E. Taylor, 1993, *Risk Management Study for the Retired Hanford Site Facilities - Risk Evaluation Work Procedure for the Retired Surplus Hanford Site Facilities*, Vol. 2, WHC-EP-0619, Westinghouse Hanford Company, Richland, Washington.

Hughes, M. C., 1992, *Westinghouse Hanford Company Integrated Plan for the Followup to the Fatality at 105-F Building* (external letter 9204633B R2 to J. D. Wagoner, U. S. Department of Energy, Richland Field Office, August 10, 1992), Westinghouse Hanford Company, Richland, Washington.

Toxic Substances Control Act, 15 USC 2601 et. seq.

WAC 173-303, 1993, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended.

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

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

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GLOSSARY

DEFINITIONS OF TERMS***

Activity. The use, generation, treatment, storage, disposal, release, or transport of regulated substances.

Ballasts. The primary electric components of fluorescent light fixtures that are generally located within the fixture under a metal cover plate. The ballast units are generally composed of a transformer to reduce the incoming voltage, a small capacitor (which may contain polychlorinated byphenyls [PCB]), and possibly a thermal cut-off switch and/or safety fuse. These components are surrounded by a tar-like substance that is designed to muffle the noise inherent in the operation of the ballast. There may be approximately 1 to 1.5 oz of PCB fluid in the capacitor itself.

Building. A structure created to shelter any form of human activity. At the Hanford Site, buildings may include reactor buildings, and office buildings, e.g., 2750 Building, 222-S Laboratory Building, etc.

Chemical.

Any organic or inorganic substance except:

1. Any tobacco product
2. Any source material, special nuclear material, or by-product material.
3. Any firearms, shells, or cartridges.
4. Any food, food additive, drug, cosmetic, or device, when used for its intended purpose.

Continuous Monitoring System. Real-time measurement of liquid, gaseous, and/or airborne effluents and contaminants using an in situ measurement system.

Decommissioning. Actions taken to reduce the potential health and safety impacts of DOE-controlled contaminated facilities. Actions could include stabilizing, reducing, or removing radioactivity or demolishing the contaminated facilities.

Decontamination. The removal of radioactive or hazardous contamination from facilities, equipment, or soils by washing, heating, chemical or electrochemical treating, mechanical cleaning, or other techniques.

Demolition. Any activity intended to destroy a structure.

Disposal. Discharging, discarding, or abandoning dangerous wastes, or the treatment, decontamination, or recycling of such wastes once they have

***Source: WHC-CM-7-5, *Environmental Compliance*.

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been discarded or abandoned. This includes the discharge of any dangerous wastes into or on any land, air, or water. This definition also includes radioactive materials.

Disposal Facility. Any facility or part of a facility where hazardous and/or radioactive waste is intentionally placed or where any land or water waste will remain after closure.

Emission. Any pollutant subject to regulations that is emitted into the atmosphere.

Facility. A processing plant, tank farm, shop, laboratory, powerhouse, or guardhouse. Including all contiguous land and structures, other appurtenances, and improvements on land used for recycling, reusing, reclaiming, transferring, storing, treating of dangerous waste (including treatment, storage and disposal sites as well as groundwater wells).

Hazardous Material.

Includes any of the following:

1. Any hazardous substance identified in 40 CFR 302.4
2. Any extremely hazardous substance identified in 40 CFR 355, Appendix A
3. Any dangerous waste regulated in WAC 173-303
4. Any Washington State Department of Ecology (Ecology) hazardous substance
5. Oil and petroleum products.

High efficiency particulate air (HEPA) filter. To qualify as a HEPA, a filter must achieve an efficiency of 99.97 percent under laboratory conditions and 99.95 percent after installation for the removal of airborne particulates greater than 3×10^{-5} cm (0.3 microns).

Intact and nonleaking PCB small capacitors are not regulated for disposal under the *Toxic Substances Control Act* (TSCA) regulations; therefore, nonleaking PCB light ballasts are not regulated for disposal. While these small capacitors are not regulated for disposal under the TSCA regulations, they are regulated by the Washington State Dangerous Waste regulations. The WHC management practices require that these intact, nonleaking PCB small capacitors be handled either as a dangerous waste or as a PCB waste.

Hot spot contamination. A spot or quantity of contamination less than 1 cubic cm in volume, or a real contamination less than 15 square cm in area.

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Oil. Includes oil of any kind or in any form including, but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes.

Operations. The contractor organization responsible for operating plants and facilities.

PCB-contaminated items. Transformers, circuit breakers, switch-gear, reclosers, voltage regulators, etc., that contain PCBs in concentrations of 50 p/M or greater, but less than 500 p/M.

PCB materials. Oils, liquids, rags, absorbent materials, etc., that contain PCBs in concentrations of 2 p/M (or 1 p/M depending on test method) or greater.

Piping. All piping including valves, elbows, joints, flanges, and flexible connectors through which regulated substances flow.

Plutonium processing and handling facility. Any facility constructed primarily to process plutonium (including ^{238}Pu) and handles in-process plutonium.

Plutonium storage facility. Any facility constructed to store strategic (category I) quantities of plutonium.

Polychlorinated biphenyls (PCB). Substituted derivatives of the compound biphenyl in which from one to ten of the hydrogen atoms have been replaced by chlorine.

Retired facilities. Surplus facilities include all facilities that have been accepted into a decommissioning program.

Release. Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing of any material into the environment. A "release" to the environment includes accidental or intentional discharges of any materials that are not wholly contained in a building or similar structure (40 CFR 302). Examples of releases to the environment include:

1. Direct release to a land surface or body of water.

2. Releases to ambient air either directly or by way of facility ventilation systems.

3. Releases to liquid effluent systems.

4. Releases of a hazardous substance into a secondary containment system that is open to the atmosphere (not wholly contained within a building or similar structure).

5. Releases from storage or shipping containers when such releases result in a loss of material as described in items 1, 2, 3, or 4 above.

6. Spread of contamination from a disposal site.

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7. Stockpiling of a hazardous substance in an unenclosed containment structure. An unenclosed containment structure is any surface impoundment, lagoon, tank, container, or other holding device that has an open side which allows the contained materials to be directly exposed to the ambient environment.

Routine survey. A method used on a regular basis to detect the release, disposal, or presence of radioactive materials or hazardous substances under a specific set of conditions to determine actual or potential hazards. Such an evaluation may include, but is not limited to, tests, physical examinations, and measurements of radiation or concentrations of materials.

Shall. Verb that designates requirements that are mandatory based on applicable environmental statutes and regulations, DOE Orders, and WHC policy.

Should. Verb that designates a guideline or goal, not a requirement.

Solid waste. Materials are solid waste if they are (1) abandoned by being disposed of, burned, or incinerated, or (2) accumulated, stored, or treated (but not recycled) before (or in lieu of) being abandoned by being disposed of, burned, or incinerated. In addition, a solid waste includes any material considered to be inherently waste-like.

Standard. A specified set of rules or conditions concerned with the classification of components; delineation of procedures; definition of terms; designation of materials, performance, design, or operations; or measurements of quality in describing materials, products, systems, services, or practices. A standard is more general than a procedure or specification and more specific than a criterion.

Transuranic waste. Without regard to source or form, radioactive waste that at the end of institutional control periods is contaminated with alpha-emitting transuranium radionuclides with half-lives greater than 20 years and concentrations greater than 100 nCi/g (3,700 Bq/g).

Waste. Those solid wastes that exhibit any of the characteristics of hazardous waste identified in 40 CFR 261, Subpart C (ignitible, corrosive, reactive, toxic, acutely hazardous or acutely toxic) or 40 CFR 261, Subpart D, "Lists of Hazardous Waste."

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APPENDIX A

100 AND 200 AREA CHECKLISTS

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APPENDIX A

100 AND 200 AREA CHECKLISTS

A1.0 INTRODUCTION

Appendix A contains the checklists for the 100 and 200 Areas. The 100 Area discipline specific checklists are augmented with the Master Logic Diagram (MLD) generated factors for 200 Area facilities that have active confinement systems.

Most surplus facilities that contain radioactive materials on the Hanford Site perform this function without additional operating components. For these types of facilities, the checklists normally used by the team professionals for identification of safety and environmental problems are sufficient. These checklists are presented as Items 1, 2, 3, 4, and 5. However, in the case of the 200 Area facilities that have active components or systems for maintaining material confinement, the basic checklists are not adequate, requiring consideration of additional hazard factors. Identification of the factors was facilitated by constructing an MLD. The factors identified were used to augment the discipline specific checklists used in the 100 Areas.

The MLD is shown in Section 5, the additional hazard factors in Section 3, and the resulting checklist considerations in Section 4. These new checklist considerations were used by all disciplines.

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Table A1-1. Retired Facility Decontamination and Decommissioning Radiological Hazard Checklist. (sheet 1 of 3)

FACILITY:_____ **DATE:**_____

EVALUATED?

A. Review historical survey data and correct for decay, as applicable ☐

B. Current and historical survey data complies with DOE Order 5400.5 release requirements (for unrestricted use):

Exposure Rate: 20 μR/h average ☐

Surface Contamination:[1] ☐

RADIONUCLIDES	AVERAGE	MAX.	REMVBL	COMPLY ?
Transuranics, I^{125}, I^{126}, Ra^{226}, Ac^{227}, Ra^{228}, Th^{228}, Th^{230}, Pa^{231}	NS[2]	NS[3]	NS[4]	
$Th^{NATURAL}$, Sr^{90}, I^{126}, I^{131}, I^{133}, Ra^{223}, Ra^{224}, U^{232}, Th^{232}	1,000	3,000	200	
$U^{NATURAL}$, U^{235}, U^{238} and decay products, alpha emitters	5,000	15,000	1,000	
Beta-gamma emitters (without alpha or spontaneous fission) except Sr^{90} and others noted above	5,000	15,000	1,000	

[1] In dpm/100 cm^2 (dpm = disintegrations/minute).

[2] NS = Not specified in DOE Order 5400.5, but DOE Order 5480.11 specifies 300 dpm/100 cm^2.

[3] NS = Not specified.

[4] NS = Not specified in DOE Order 5400.5, but DOE Order 5480.11 specifies 20 dpm/100 cm^2

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Table A1-1. Retired Facility Decontamination and Decommissioning Radiological Hazard Checklist. (sheet 2 of 3)

C. The chemical/physical form of the contamination enhances (E), decreases (D), or has no effect (N) on the dispersability of the contaminant. ☐

D. Spot surveys confirm validity of survey data in A and B above. ☐

POTENTIAL SURVEY AREAS	SURVEY PERFORMED[5]
Metal Storage Basin	
Metal Storage Transfer Area	
Gas Piping Tunnels	
Front Reactor Face	
Rear Reactor Face	
Outside Ancillary Buildings	
Tool Rooms	
Hot Tool Storage Areas	
Sample Rooms	
Inner Rod Room	
Outer Rod Room	
Metal Storage Room	
3X Ball Recovery and Storage Rooms	
Exhaust Fan Rooms	
Process Monitor Rooms	
Elevator	
Control Room	
Maintenance Shops	

E. Estimate relative radiotoxicity of contaminants. ☐

[5] Where Y = Yes, N = No and N/A = Not applicable.

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Table A1-1. Retired Facility Decontamination and Decommissioning Radiological Hazard Checklist. (sheet 3 of 3)

FACILITY:		PAGE NO.
SURVEY INSTRUMENTS: 1. 2.	CALIBRATION DATES:	BACKGROUND
	INSTRUMENT NO. 1: PROBE NO. 1:	INST. NO.1
TECHNOLOGIST(S):	INSTRUMENT NO. 2: PROBE NO. 2:	INST. NO.2
BLDG. LEVEL/ROOM	DESCRIPTION	READING

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Table A1-2. Structural Hazard Checklist.
(sheet 1 of 3)

Proj. No. ER3389 Structural Assessment of 100, 200, 212 Areas		
Bldg No.	Facility Description:	Date:
Area:	Year Construct.:	Time:
Inspect. by:	Bldg. Manager:	
Sketch of investigated part: (Cracked or demolished part of structure)		

Building elements	Existing condition	Recommendation
Walls Exterior	1. Concrete a. Tilt-up panels. b. Cast-in-place. c. Precast panels. 2. Masonry a. Block (CMU). b. Brick. 3. Steel frame w/___ siding. a. Preengineered Bldg. 4. Wood frame w/___ siding. 5. Other_____. Exterior walls and expansion joints condition.	
Interior	1. Concrete a. Cast-in-place. b. Tilt-up-panels. c. Precast panels. 2. Masonry a. Block (CMU). b. Brick. 3. Steel frame w/___ finish. 4. Wood frame w/___ finish. 5. Other_____. Interior walls and expansion joints condition.	

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Table A1-2. Structural Hazard Checklist.
(sheet 2 of 3)

Roof Elements Roofing	1. Metal type____ . 2. Built-up type___. 3. Single-ply type___. 4. Urethane. 5. Asphalt shingle. 6. Other _____ . Roofing condition.	
Decking	1. Reinforced concrete slab. 2. Precast concrete plank. 3. Prestressed concrete plank and deck. 4. Composite concrete slab. 5. Steel with concrete fill. 6. Steel. 7. Composite steel. 8. Plywood. 9. Other _____ . Decking condition.	
Roof structure	1. Concrete a. Waffle slab. b. Concrete beam. c. Precast concrete plank. 2. Masonry beam. 3. Steel a. Framework type ___. b. Joists. c. Trusses. 4. Wood a. Joists. b. Manufactured joists Type _____. c. Beams type _____. 5. Other _____. Roof structure condition.	
Ceiling	1. Gyp bg (framed). 2. Gyp bd (suspended). 3. Plaster (framed). 4. Plaster (suspended). 5. Metal type _____. 6. Suspended acoustical ceiling title. 7. Other _____. Ceiling condition.	

Table A1-2. Structural Hazard Checklist.
(sheet 3 of 3)

Framing Roof supporting structure	1. Concrete walls. 2. Masonry walls. 3. Concrete framework. 4. Steel framework. 5. Wood framework. Roof supporting structure condition.	
Floor	A. Decking 1. Reinforced concrete slab. 2. Precast concrete plank. 3. Prestressed concrete plank and deck. 4. Composite concrete slab. 5. Steel decks. 6. Steel with concrete fill. 7. Composite steel. 8. Plywood. 9. T&G wood plank. 10. Other _____. B. Framing 1. Concrete a. Waffle slab. b. Post and beams. c. Precast plank. 2. Masonry beams 3. Steel a. Framework type _____. b. Joists. c. Trusses. 4. Wood a. Joists. b. Manufactured joists. c. Beams type ____. d. Other _____. Floor condition.	
Miscellaneous	Facility includes:	

CMU = Concrete masonry unit
T&G = Tongue and groove
REMARKS: (References of previous investigation).

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Table A1-3. Retired Facility Environmental Risk Evaluation Checklist. (sheet 1 of 2)

The following checklist is intended to help determine the potential for environmental releases that are included in the scope of this risk evaluation.

1. Are nonradioactive airborne emissions possible?

   A. Does the facility contain operational point sources such as stacks, vents, etc. that could result in the emission of a regulated pollutant?

2. Are radioactive airborne emissions possible?

   A. Does the facility contain operational point sources such as stacks, vents, etc. that could result in the emission of a radioactive effluent?

3. Does the facility contain significant amounts of smearable radioactive contamination?

   A. Do pathways (e.g., openings around doors, deteriorated walls, open pipes, etc.) exist that would allow for the release of radioactive materials?

4. Are nonradioactive liquids present?

   A. Storage tanks
   B. Containers
   C. Sinks
   D. Basins and reservoirs
   E. Piping

5. Are oils or petroleum products present?

   A. Piping, pumps, motors, equipment reservoirs, bearing housings, etc.
   B. Storage tanks
   C. Containers (e.g., maintenance supplies, grease, oil cans, gas cans, etc.)

Table A1-3. Retired Facility Environmental Risk Evaluation Checklist. (sheet 2 of 2)

6. Are radioactive liquids present?

   A. Storage tanks
   B. Containers
   C. Sinks
   D. Basins and reservoirs
   E. Piping
   F. Sumps

7. Are radioactive solid wastes being stored in a manner that could result in a release to the environment?

   A. Storage area condition
   B. Radiation waste container condition
   C. Radiation contaminated equipment

8. Are hazardous materials present in the facility?

   A. Chemical residues
   B. Old chemical products with no identifiable use
   C. Lead management program
   D. Storage tanks
   E. Containers
   F. Piping
   G. Friable asbestos
   H. Unknown substances
   I. Mercury

9. Are mixed wastes in the facility being stored in a manner that could result in a release to the environment?

   A. Radiation contaminated lead.

10. Is there biological (e.g., birds, rodents, etc.) intrusion that could result in a release to the environment?

   A. Bird debris
   B. Insects
   C. Rodent debris
   D. Bats
   E. Snakes

11. Is there information available from previous inspections?

Table A1-4. Risk Evaluation Team Electrical Checklist. (sheet 1 of 2)

I. Electrical system documentation

A. Single line drawing?

B. Fault or coordination study?

C. Information from previous inspections?

II. Lock and tag

III. Master equipment list?

A. Preventive maintenance and frequencies?

IV. Distribution transformer and other equipment sized appropriate for load?

V. Condition of service entrance conductors?

VI. Service entrance and feeders

A. Physical condition

1. General
   a. Cleanliness of equipment?
   b. Illumination for operation?
   c. Illumination for maintenance?
   d. Clear working space?

2. Specific
   a. Insulation resistance test?
   b. Infrared examination of connections?

B. Size?

VII. Service disconnect clearly identified?

VIII. System grounding

A. System intact?

B. Physical condition?

C. Appropriate for service size?

Table A1-4. Risk Evaluation Team Electrical Checklist. (sheet 2 of 2)

IX. Equipment grounding?

- A. All energized equipment grounded?
- B. All metal parts not likely to become energized grounded?
- C. Condition of ground connections?

X. Raceways and boxes

- A. Condition
- B. Containment integrity
- C. Exposed conductors?

XI. Distribution centers

- A. Condition
- B. Enclosure integrity
- C. Labels, indicators
- D. Size

XII. Load equipment

- A. Operable?
- B. Energized?
- C. Size?

XIII. Overcurrent protection

- A. Operable
- B. Appropriate

Table A1-5. Industrial Safety and Hygiene Checklist for Inspections of Decontamination and Decommissioning Facilities. (sheet 1 of 3)

1. **WALKING AND WORKING SURFACES**

   A. Available information (previous inspections).

   B. Guarding floor and wall openings.

   C. Housekeeping.

   D. Fixed stairways.

   E. Elevated surfaces.

   F. Other slip, trip, and fall hazards.

2. **MEANS OF EGRESS**

   A. Available information (previous inspections).

   B. Exits and exit routes.

   C. Illumination.

   D. Housekeeping.

3. **OCCUPATIONAL HEALTH AND ENVIRONMENTAL CONTROL**

   A. Available information (previous inspections).

   B. Ventilation.

   C. Personal protective equipment.

   D. Temperature extremes.

   E. Biological hazards.

4. **HAZARDOUS MATERIALS**

   A. Available information (previous inspections).

   B. Compressed gases.

   C. Flammable and combustible liquids.

   D. Lead, mercury, asbestos, and other hazardous materials.

Table A1-5. Industrial Safety and Hygiene Checklist for Inspections of Decontamination and Decommissioning Facilities. (sheet 2 of 3)

5. **GENERAL ENVIRONMENTAL CONTROLS**

   A. Available information (previous inspections).

   B. Sanitation.

   C. Control of hazardous energy.

6. **MATERIALS HANDLING AND STORAGE**

   A. Available information (previous inspections).

   B. Storage of materials.

7. **MACHINERY AND MACHINE GUARDING**

   A. Available information (previous inspections).

   B. Machine and equipment guarding.

8. **ELECTRICAL**

   A. Available information (previous inspections).

   B. Wiring methods.

   C. Junction boxes, breaker boxes, electrical equipment.

   D. Degradation of systems.

   E. Unobstructed accesses.

9. **CONFINED SPACES**

   A. Available information (previous inspections).

   B. Identification.

   C. Monitoring.

   D. Access control.

10. **TOXIC AND HAZARDOUS SUBSTANCES**

   A. Available information (previous inspections).

   B. Labeling of containers.

   C. Hazard communication.

Table A1-5. Industrial Safety and Hygiene Checklist for Inspections of Decontamination and Decommissioning Facilities. (sheet 3 of 3)

11. **ROOF AND WATER DAMAGE**

    A. Available information (previous inspections).

    B. Damaged areas of roofs.

    C. Areas effected by leaking water.

12. **FIRE PROTECTION**

    A. Available information (previous inspections).

    B. Combustible loading.

    C. Electrical or chemical fire potential.

All inspections will be conducted in accordance with the Occupational Health and Safety requirements of *Code of Federal Regulations*, *Title 29* (29 CFR), and WHC-CM-4-3, Volumes 1 and 2.[1]

[1]29 CFR, 1992, *Code of Federal Regulations*, as amended.

WHC-CM-4-3, *Industrial Safety Manual*, Volume 1, "Safety Standards," Volume 2, "Safety Guides," Westinghouse Hanford Company, Richland, Washington.

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A2.0 MASTER LOGIC DIAGRAM DEVELOPMENT

The MLD method, like fault tree analysis, is a deductive technique that focuses on one particular undesired event (in this case radioactive release) and provides a system for determining the cause of that event. The model consists of events connected by gates. The gates define the interrelationship between events below the gate, such as "and" or "or" logic.

The MLD itself is a graphical model and is constructed in strictly defined levels with the undesired event being the top event or level 1. The use of levels is an ordering technique with a strategy of obtaining completeness at each level. With each succeeding level, the combination of events that can lead to the top event gain greater and greater specificity. In the MLD used for this study, seven levels were defined. The first level was the release of radioactive material. The second level defined the physical form of the material being released. Whether the material had its own containment is addressed in the third level. The fourth and fifth levels define the escape path character (direct or indirect) and its termination point (external atmosphere, soil, or redistribution within the building). The sixth level split the causes of release into low or high energy. The seventh level developed the various release causes such as fire, water movement, or simple breach in the structure. The actual MLD is presented in Section 5.0. Please note that the MLD begins on page A-27, but the header on the page shows sheet 1 of 61. This was done to allow use of the transfer points (triangle with a page number). The referenced page number corresponds to the sheet number.

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A3.0 HAZARD FACTORS DEVELOPED FROM THE MASTER LOGIC DIAGRAM

As indicated above, by itself the facility leak tightness may not be sufficient to prevent significant quantities of material from escaping. Proper air pressure balance is required to prevent movement of material out of the facility or from area to area within the facility. This requires an intact building structure and an operating ventilation system comprised of fans, ducts, dampers, seals, and filters. The following factors were identified as being important to maintaining material confinement:

1. Building structure integrity loss

   a. Roof panel failure
   b. Doors left open or failing to open
   c. Windows left open or failing to open
   d. Failure of pipes or drains leading to uncontaminated areas or the environment
   e. Wall cracking, open joints, or catastrophic failure.

2. Ventilation system failure

   a. Loss of fan power
   b. Significant damage that mechanically disables the fans
   c. Filter failure
   d. Seal failure
   e. Ventilation path plugging or breach.

3. Type and quantity of radioactive material

   a. Liquid
   b. Powder
   c. Solid
   d. External or internal exposure hazard.

4. Initiating events

   The conditions listed under 1 and 2 above may be pre-existing or may occur as a result of natural or man caused forces. Pre-existing conditions are noted in the findings. Effects of natural or man caused forces must be estimated. Some of these forces include the following:

   a. Tornado or high wind
   b. Internal or external explosion
   c. Internal fire
   d. Large object drop from cranes
   e. Large object falling, such as a crane or roof panel
   f. Movement of significant quantities of water.

   In addition to these forces, human error can disrupt confinement integrity by inadvertently leaving doors or access ways open or by causing power failures that disrupt air pressure balance. In all cases, the effects should be evaluated assuming the fans have failed

as well as assuming the fans continue to operate. In some cases, the fan operating situation may produce worse effects than if the fans failed.

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A4.0 DISCIPLINE SPECIFIC CONSIDERATIONS

The items listed under Section 3, factor 2 above should be kept in mind by all team members when evaluating a facility. Although not specifically identified by the MLD, there are some specific hazards that individual disciplines will be looking for that can be implied from the MLD. These are as follows:

1. Electrical

   a. Considerations of situations where failure of nonqualified equipment can cause the failure of engineered safety features

   b. Maintenance practices (preventive maintenance or the lack thereof, age of equipment, etc.)

2. Structural

   a. Pre-existing leakage paths (pre-existing cracks or holes large enough to permit radioactive material movement)

   b. Structural failures that impact equipment, wiring, or other parts of the facility structure or ventilation system (including considerations of 1.b above)

3. Radiation protection

   a. Quantity and type of radioactive material present

   b. Dispersability of the radioactive material

   c. Effects of fires, explosions, or other energy release events on the dispersability of materials

   d. Mitigative effects (or lack thereof) of filters in preventing release of dispersed material

   e. Consideration of the possible effects of inadvertent criticalities.

4. Industrial safety and environmental protection

   a. Presence of chemicals or combinations of chemicals that are corrosive, flammable, or explosive that can produce structural damage or equipment failure

   b. Presence of fuel sources for significant fires

   c. Factors that could allow fires in ducting

d. Presence of significant quantities of hazardous chemicals in reservoirs, pipes, tanks, etc.

e. Water leakage from roofs or supply piping that can move contamination.

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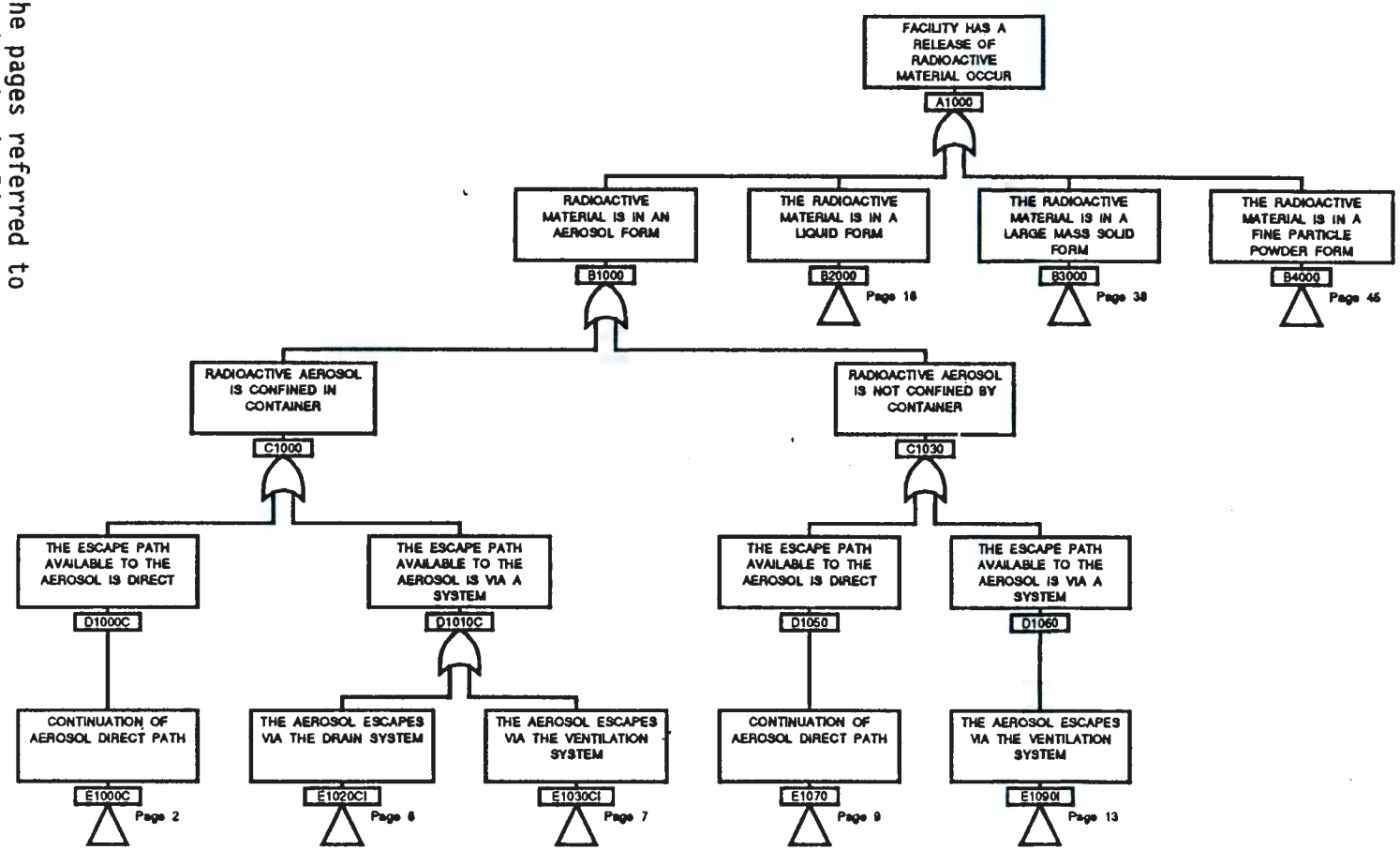
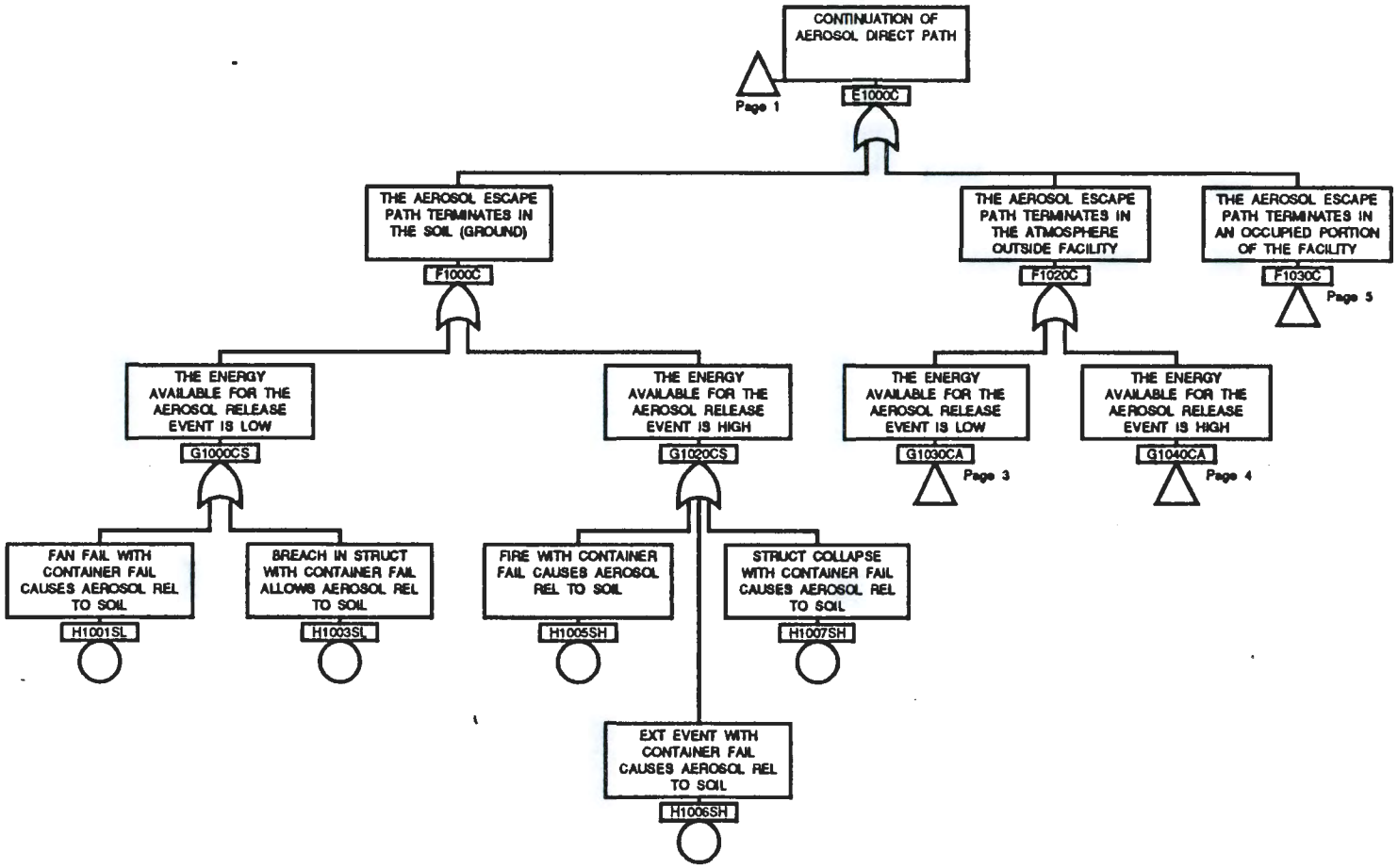
A5.0 MASTER LOGIC DIAGRAM (sheet 1 of 61)

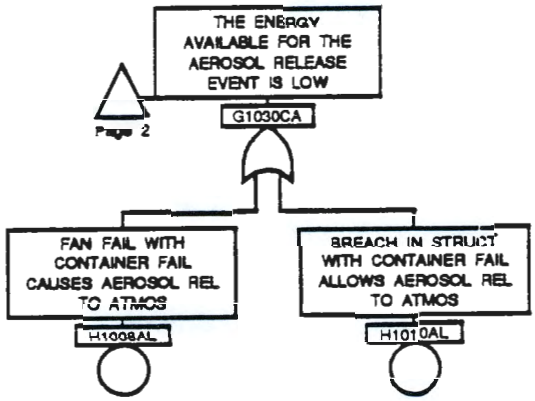


NOTE: The pages referred to on the Master Logic Diagram correspond to the sheet numbers in this Appendix.

A5.0 MASTER LOGIC DIAGRAM (sheet 2 of 61)



A5.0 MASTER LOGIC DIAGRAM (sheet 3 of 61)



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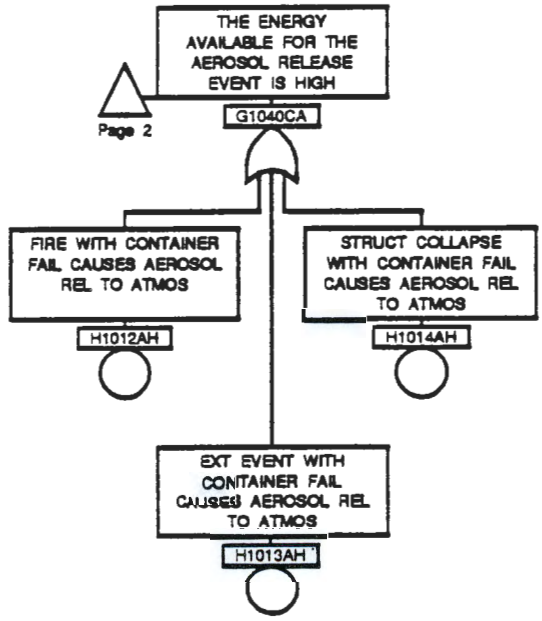
A5.0 MASTER LOGIC DIAGRAM (sheet 4 of 61)



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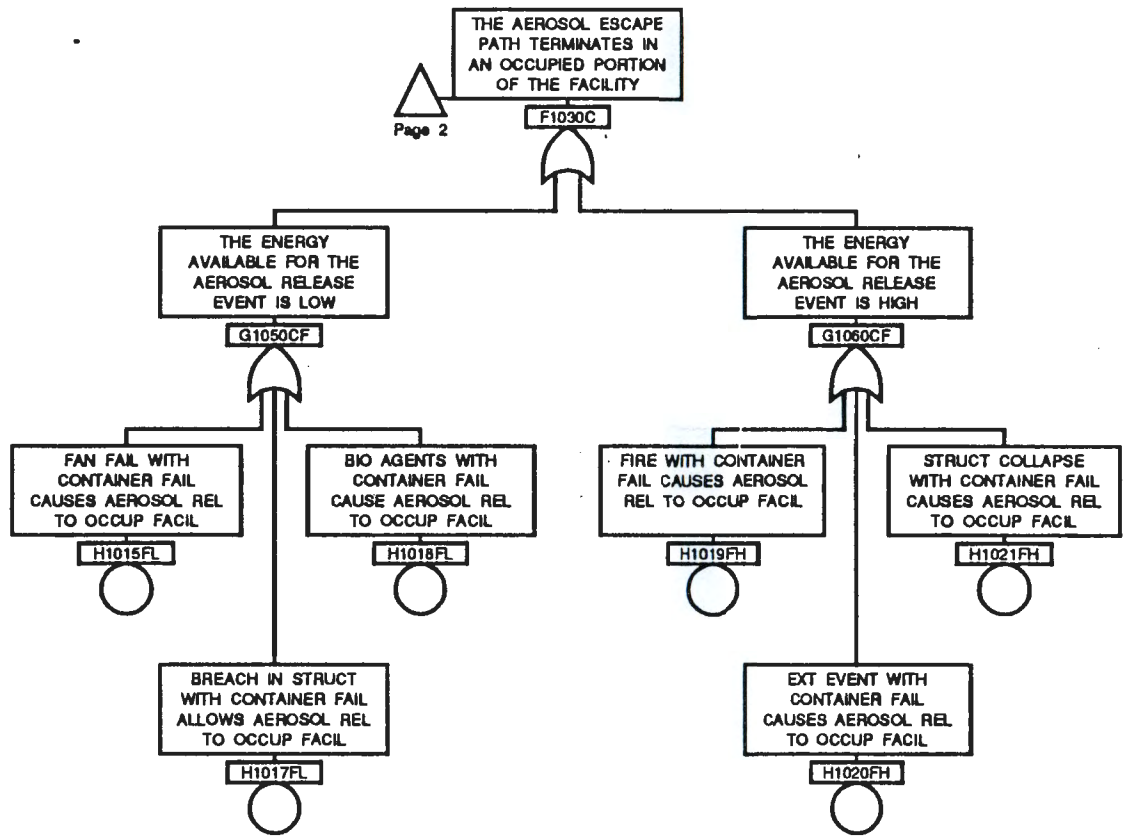
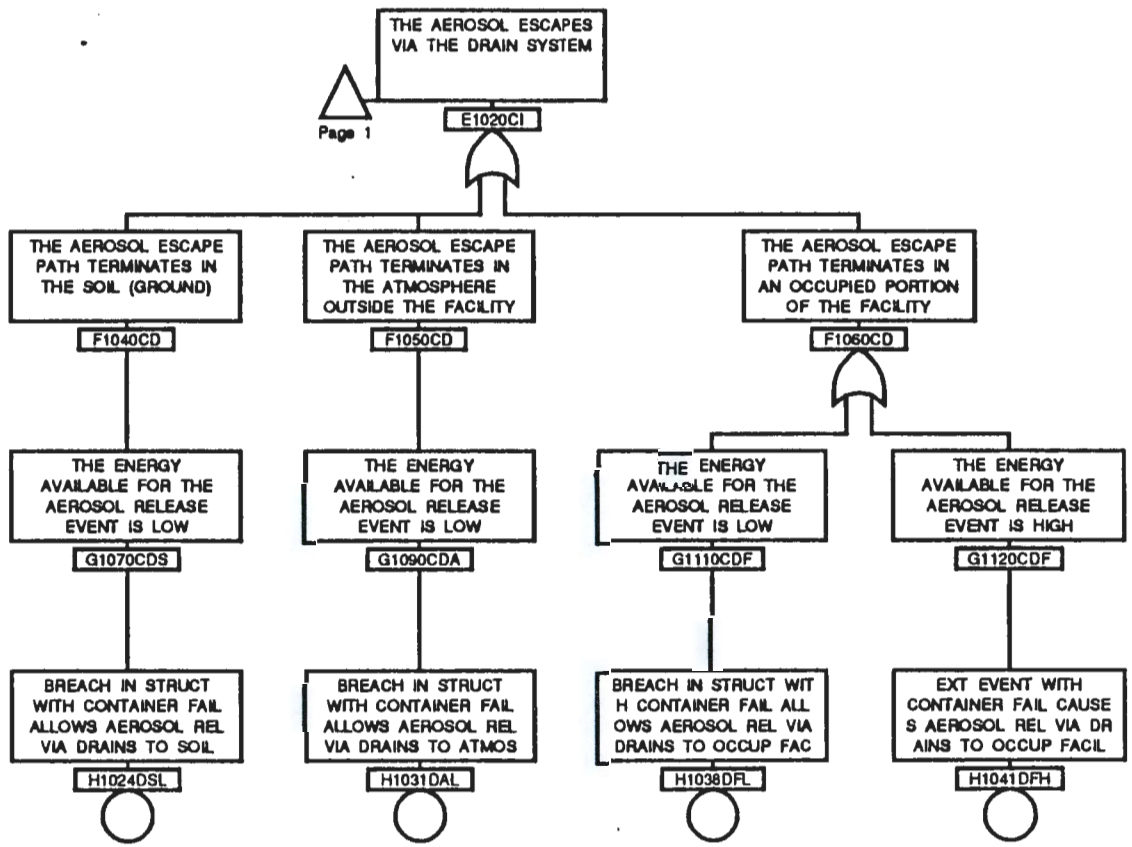
A5.0 MASTER LOGIC DIAGRAM (sheet 5 of 61)



A5.0 MASTER LOGIC DIAGRAM (sheet 6 of 61)



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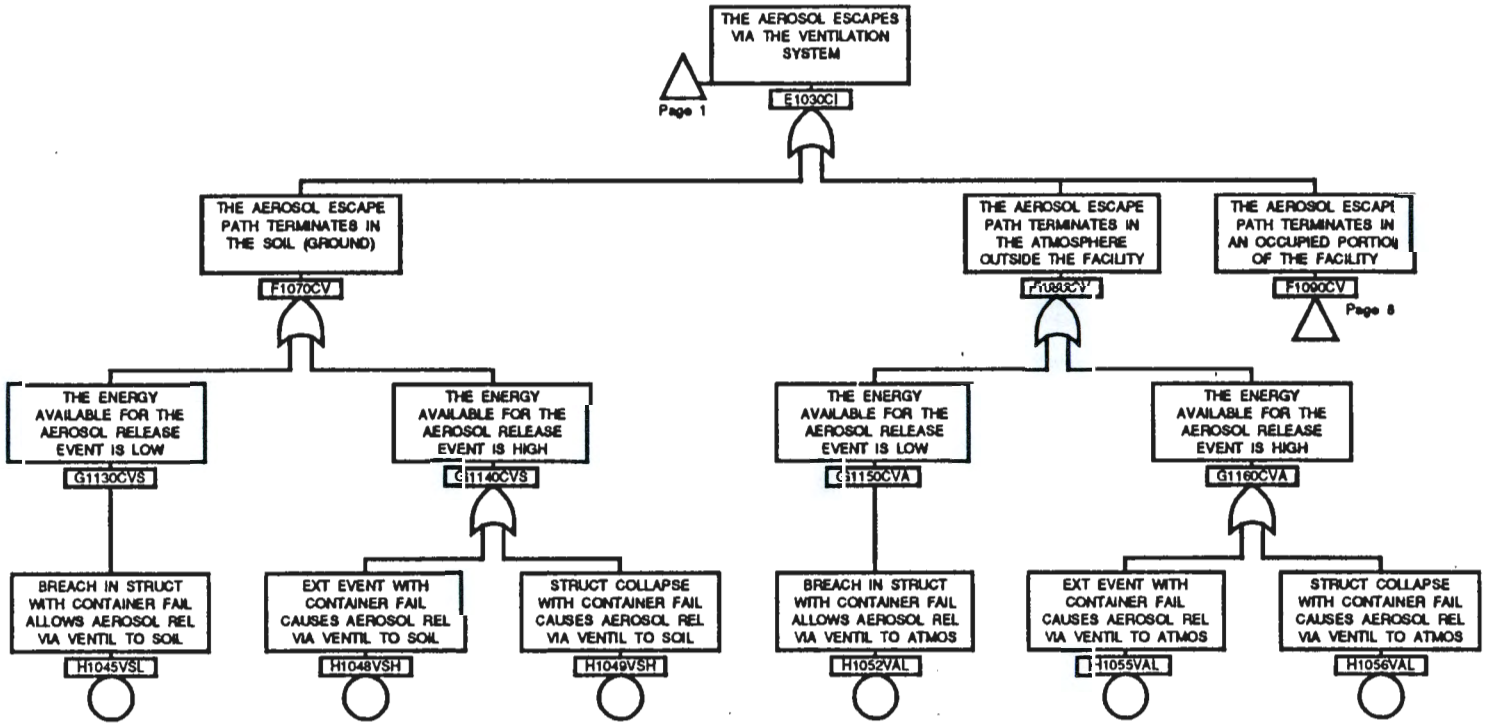
A5.0 MASTER LOGIC DIAGRAM (sheet 7 of 61)



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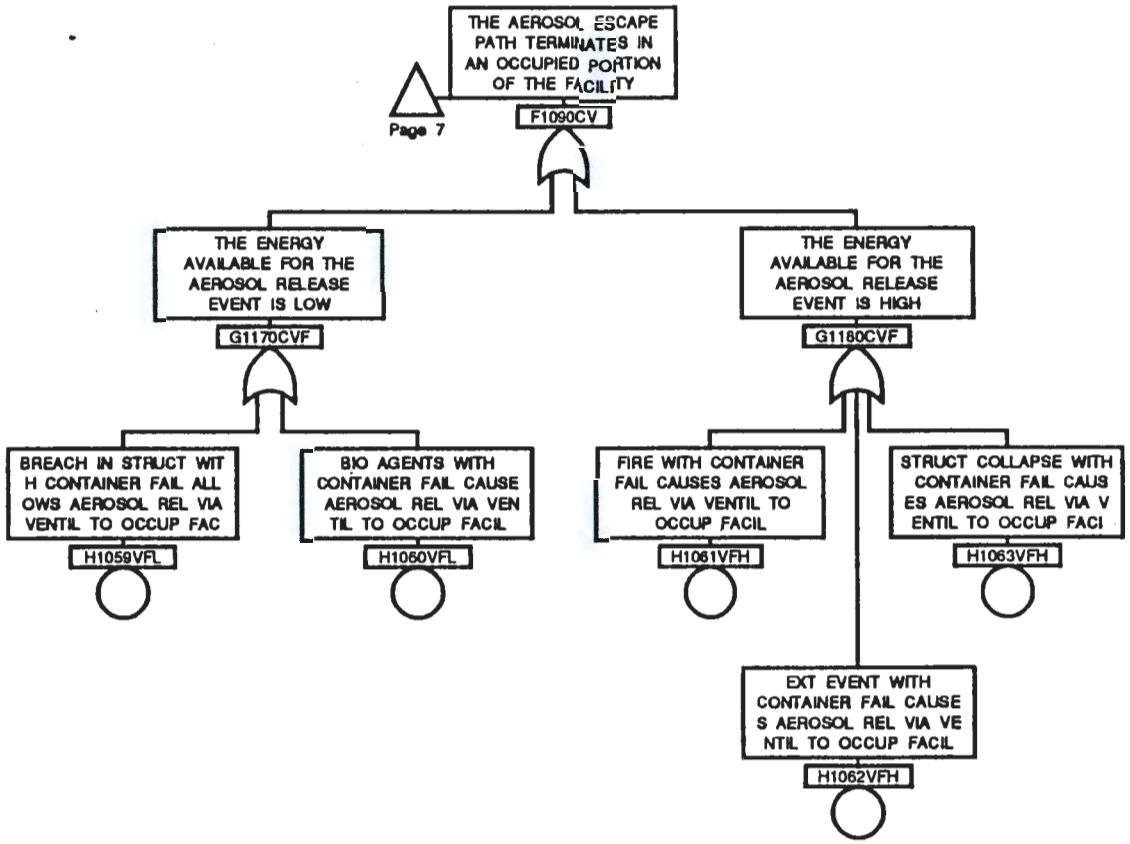
A5.0 MASTER LOGIC DIAGRAM (sheet 8 of 61)



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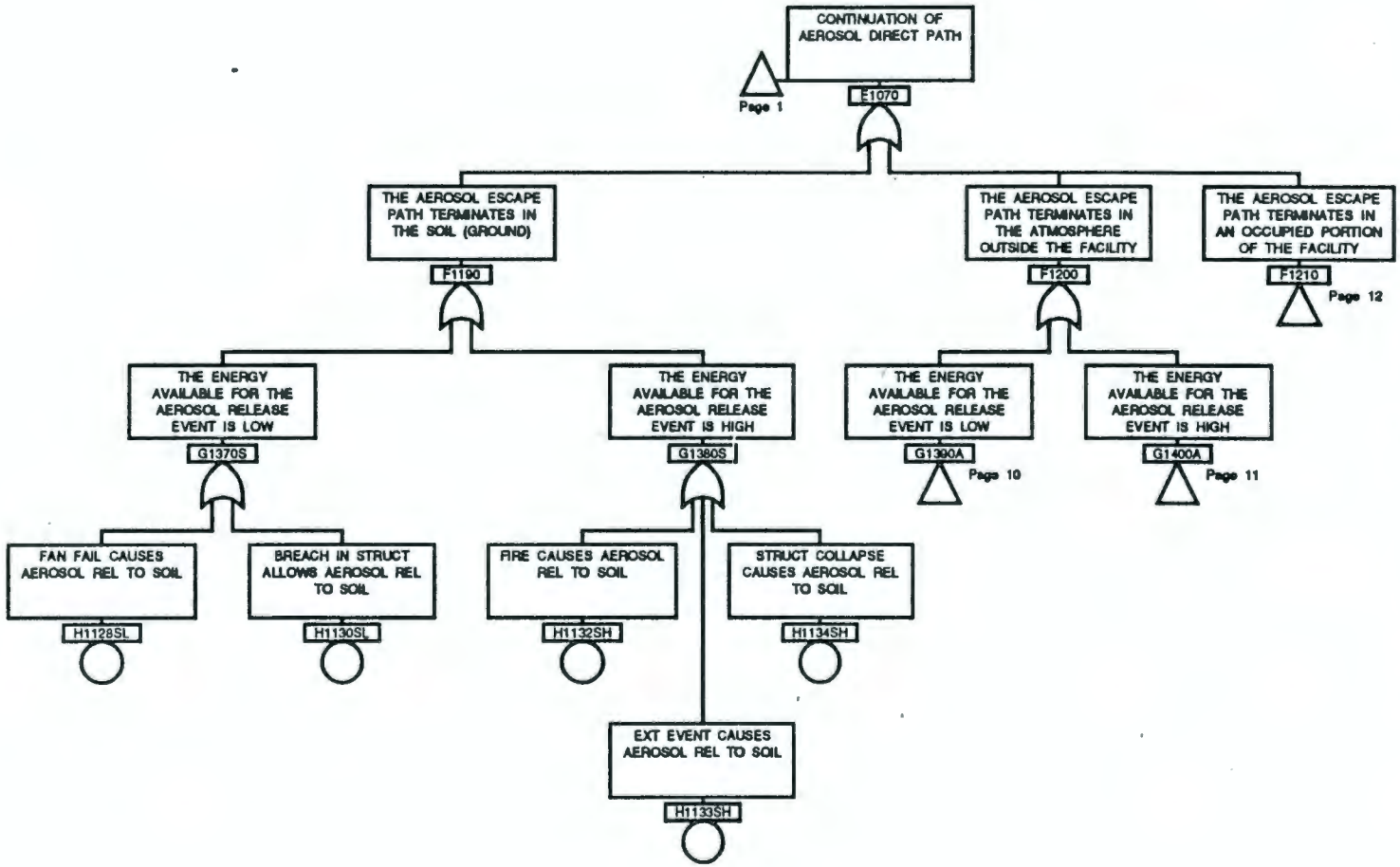
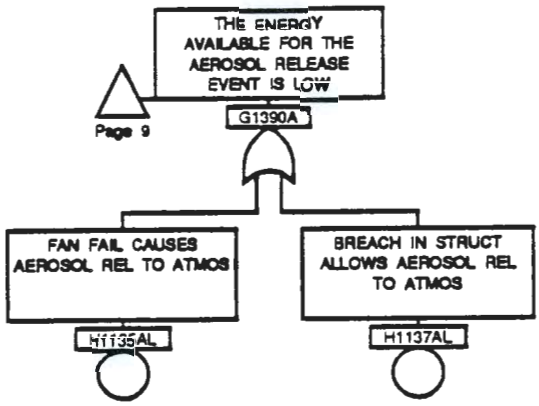
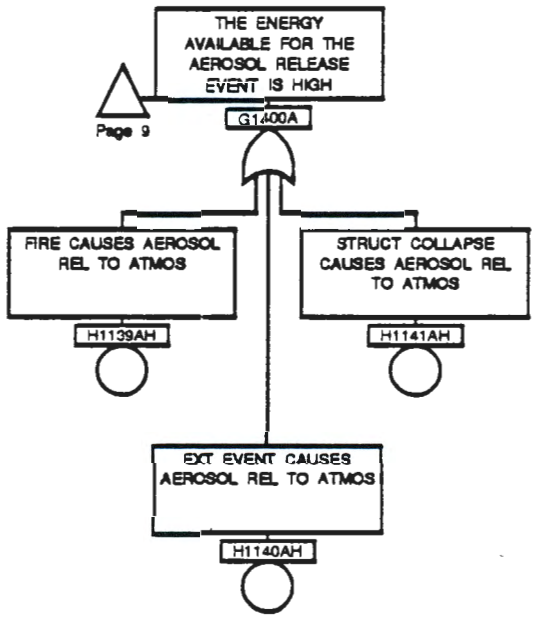
A5.0 MASTER LOGIC DIAGRAM (sheet 9 of 61)



A5.0 MASTER LOGIC DIAGRAM (sheet 10 of 61)



A5.0 MASTER LOGIC DIAGRAM (sheet 11 of 61)



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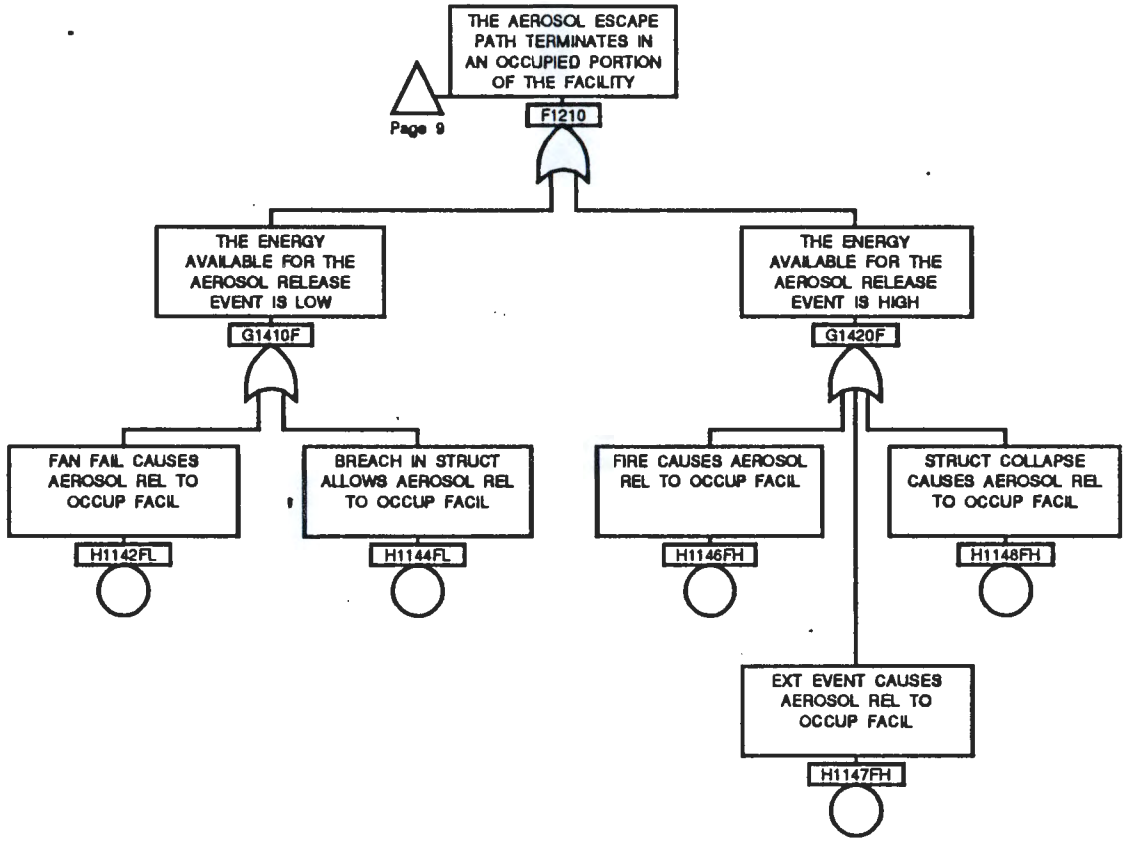
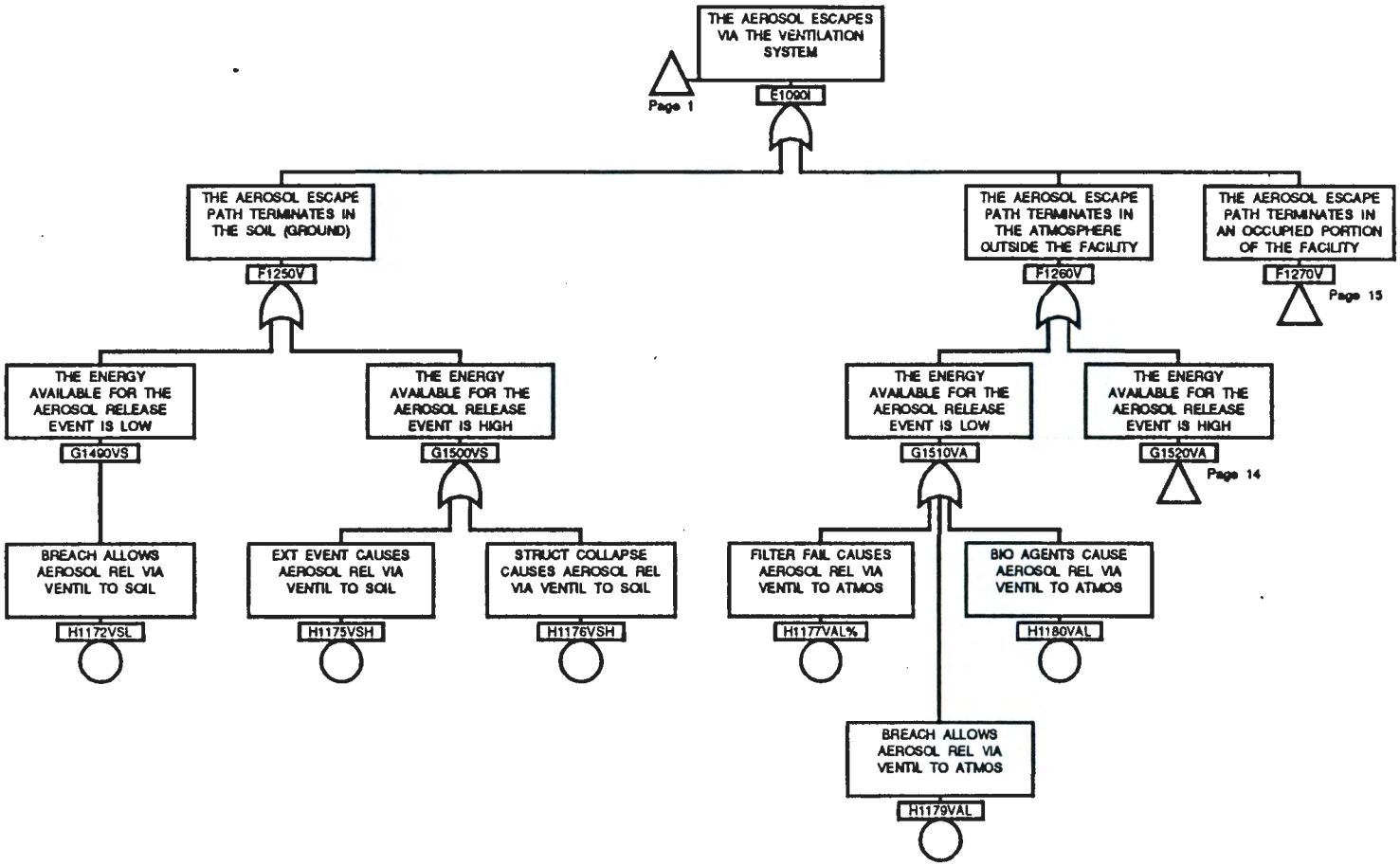
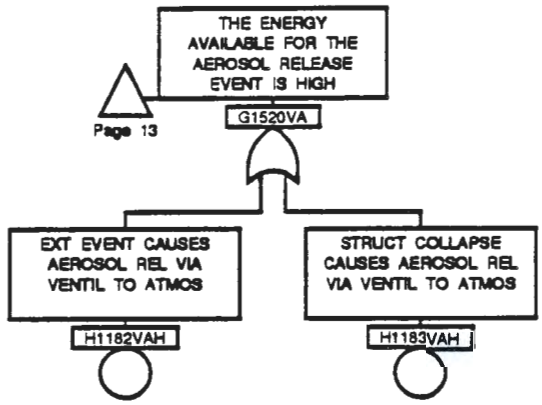
A5.0 MASTER LOGIC DIAGRAM (sheet 12 of 61)



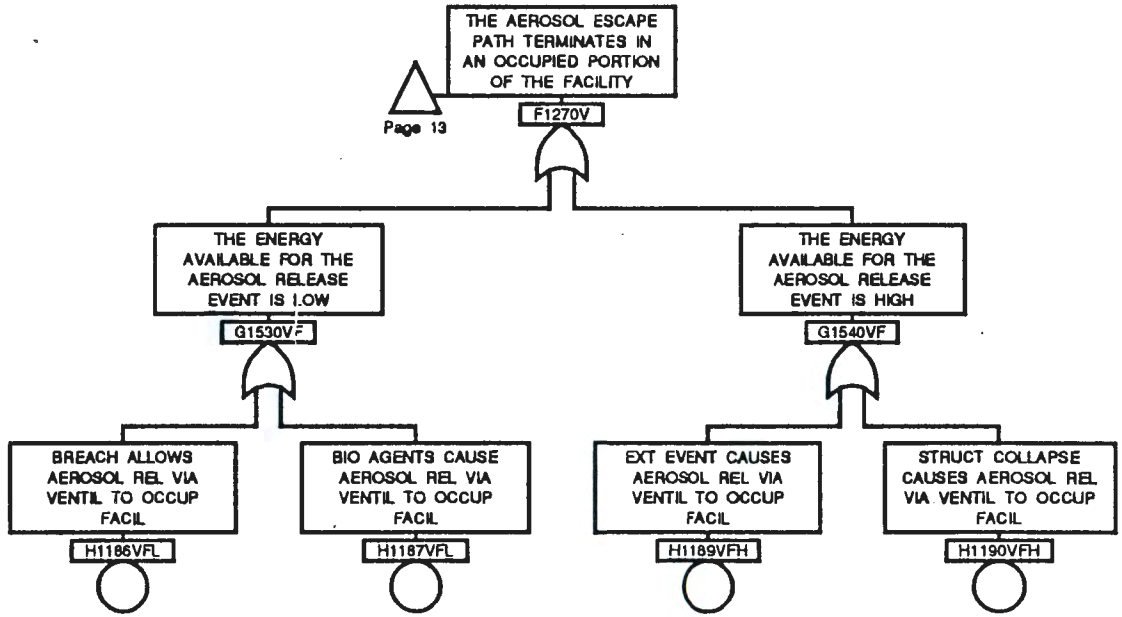
A5.0 MASTER LOGIC DIAGRAM (sheet 13 of 61)



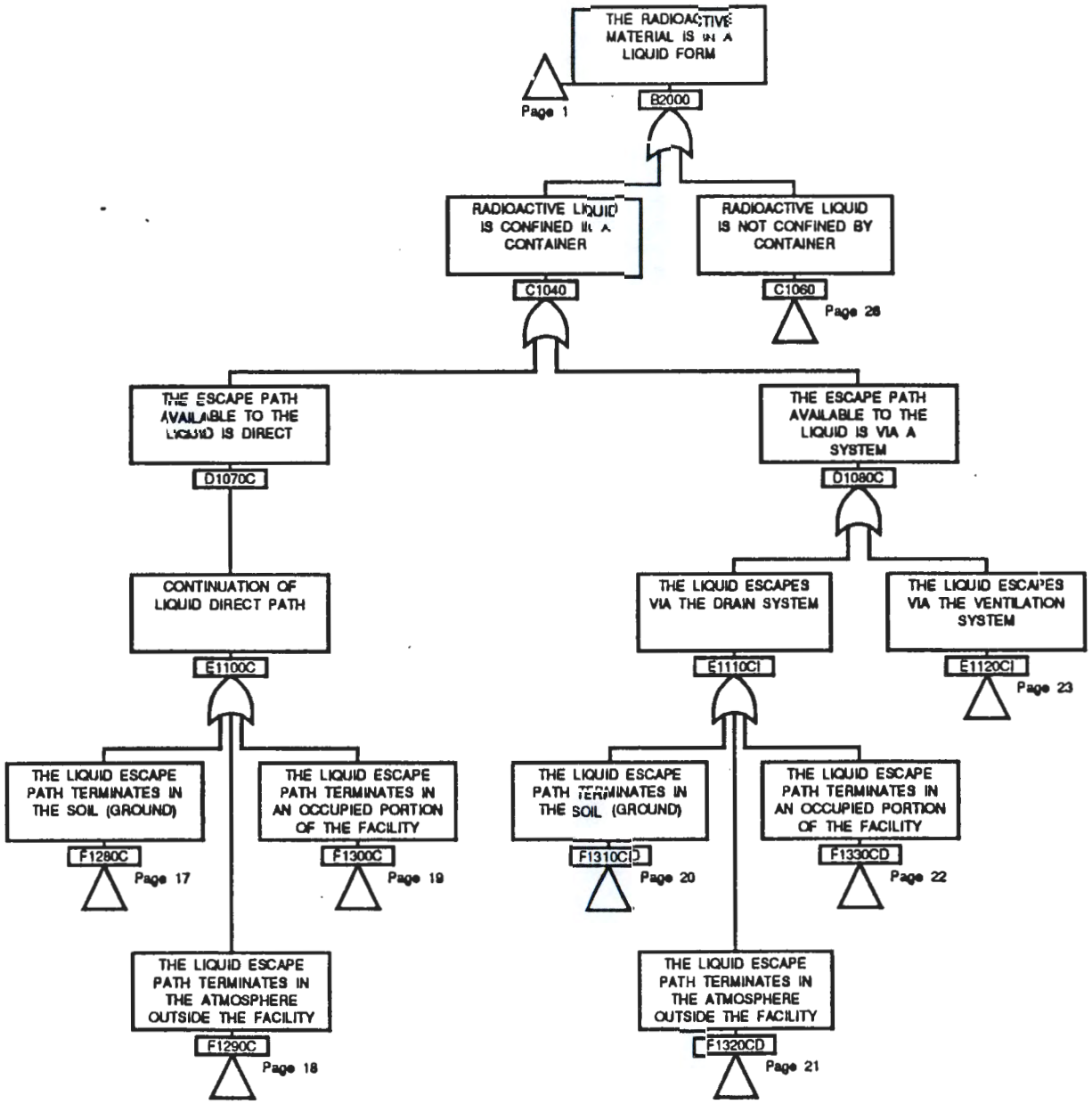
A5.0 MASTER LOGIC DIAGRAM (sheet 14 of 61)



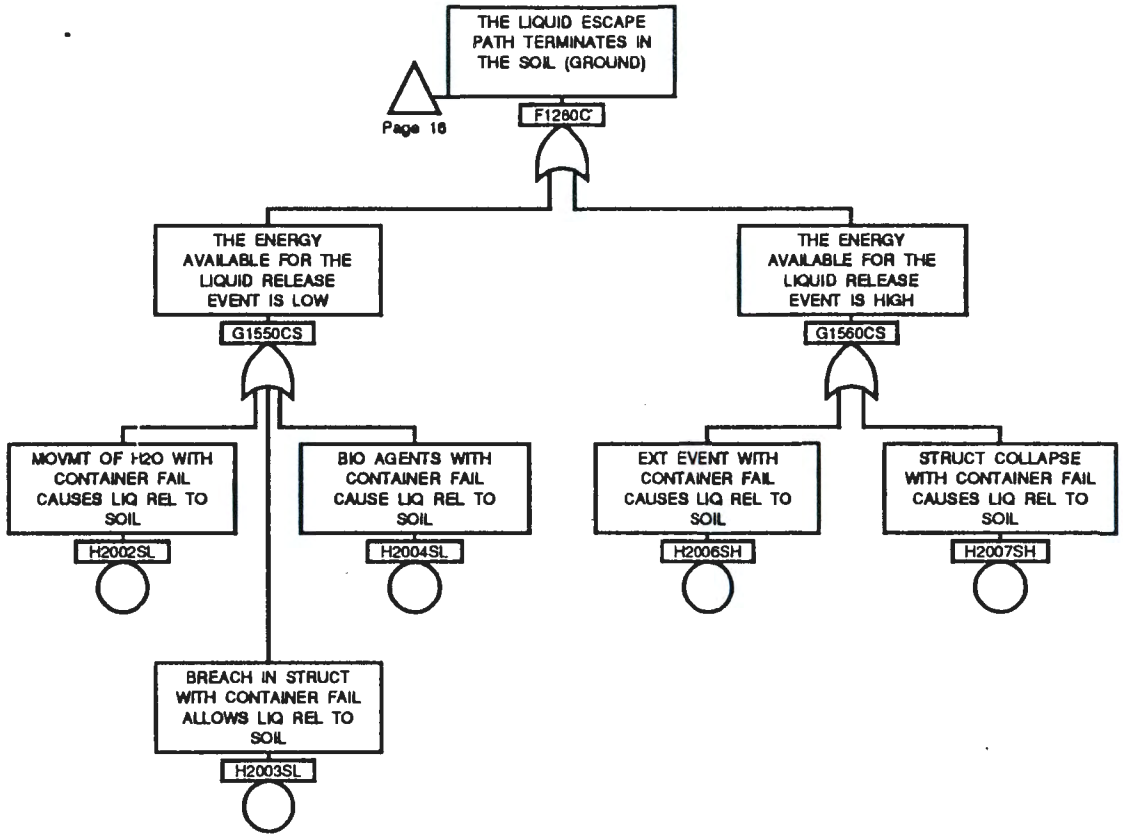
A5.0 MASTER LOGIC DIAGRAM (sheet 15 of 61)



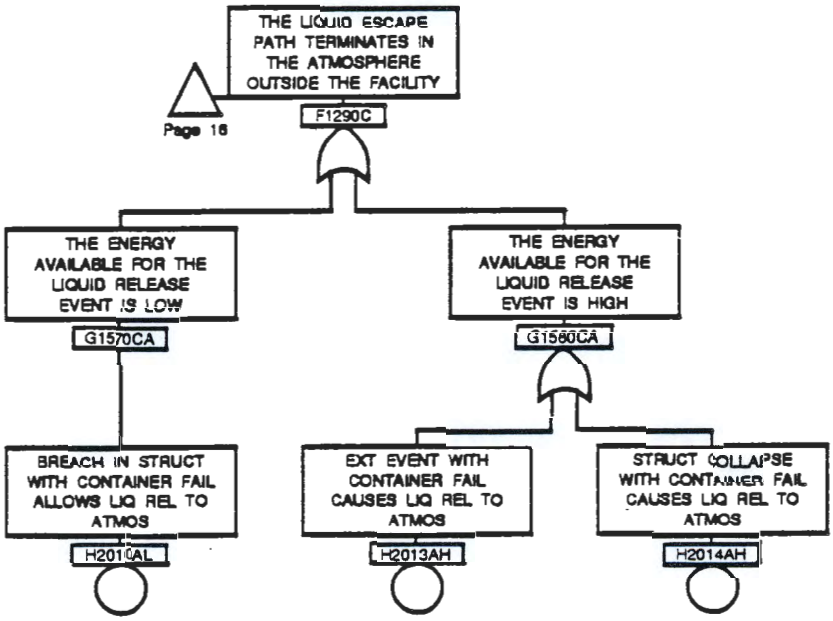
A5.0 MASTER LOGIC DIAGRAM (sheet 16 of 61)



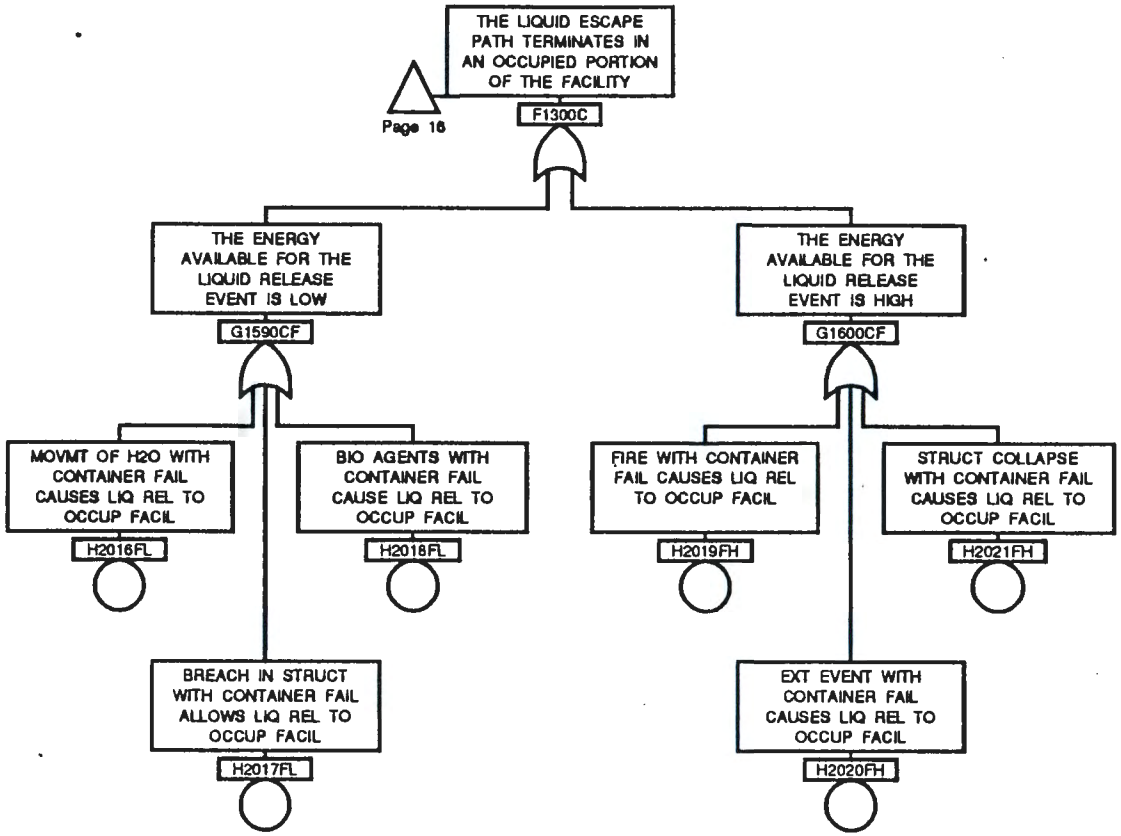
A5.0 MASTER LOGIC DIAGRAM (sheet 17 of 61)



A5.0 MASTER LOGIC DIAGRAM (sheet 18 of 61)



A5.0 MASTER LOGIC DIAGRAM (sheet 19 of 61)



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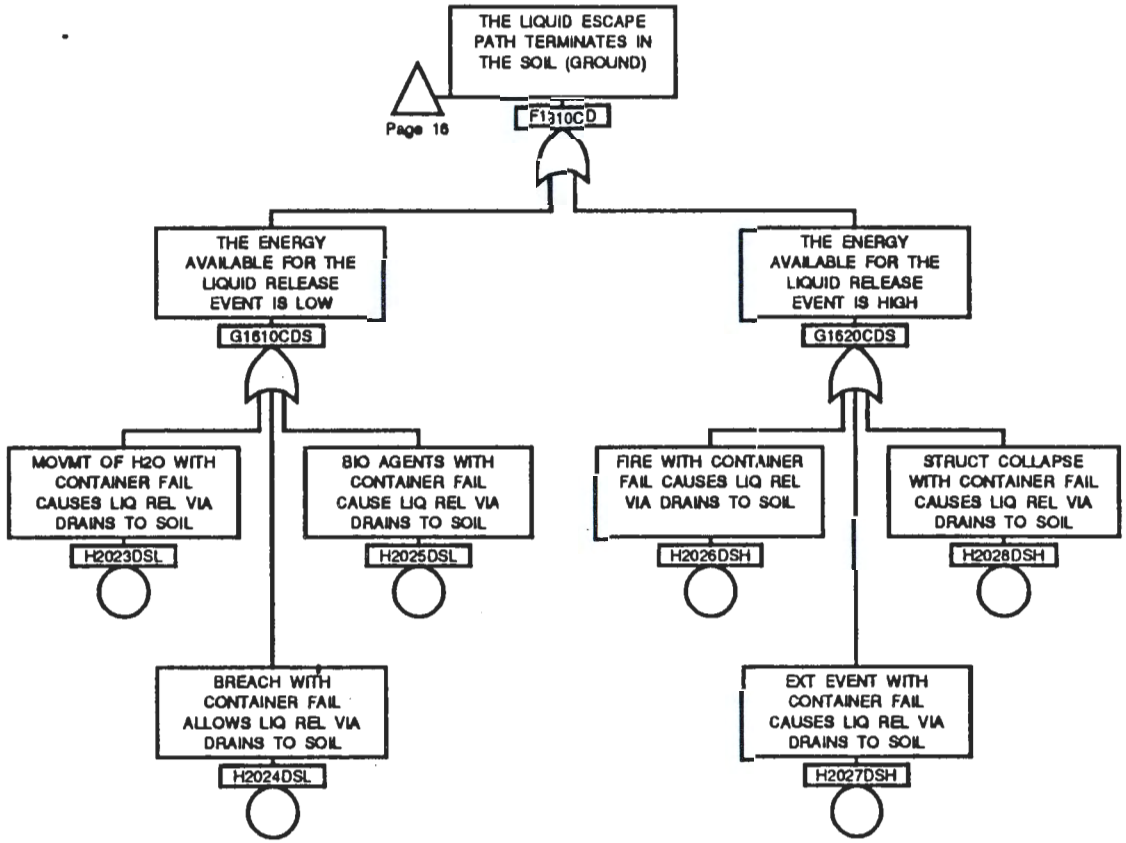
A5.0 MASTER LOGIC DIAGRAM (sheet 20 of 61)



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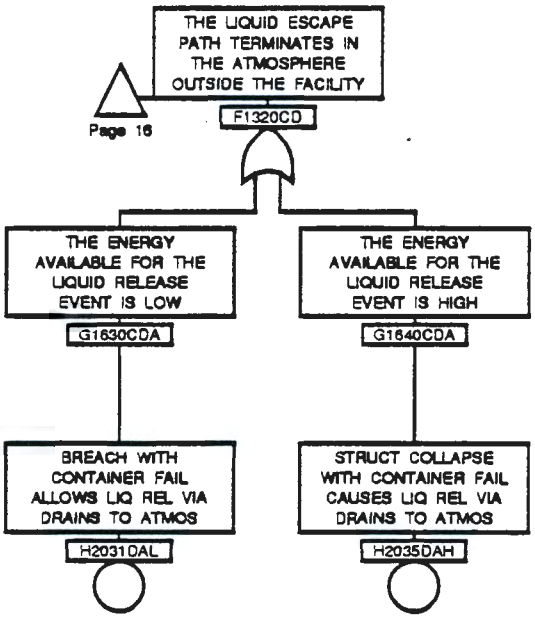

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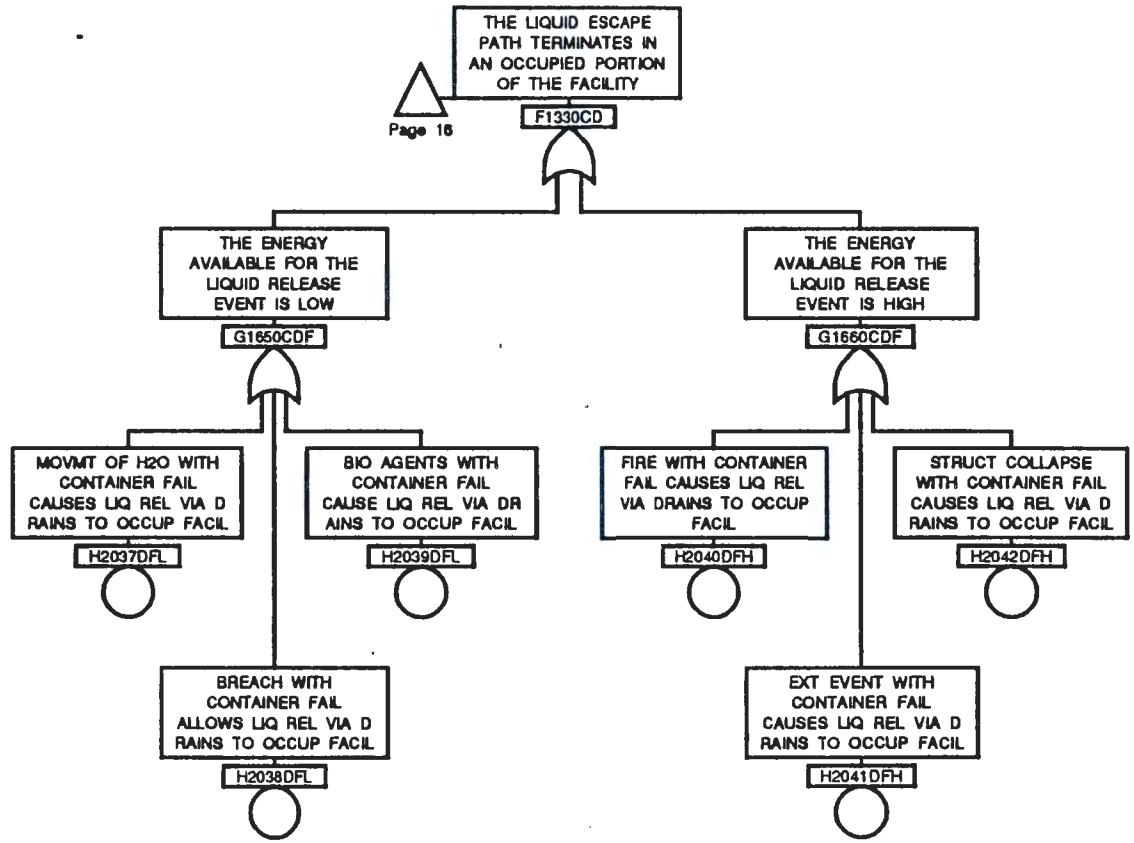

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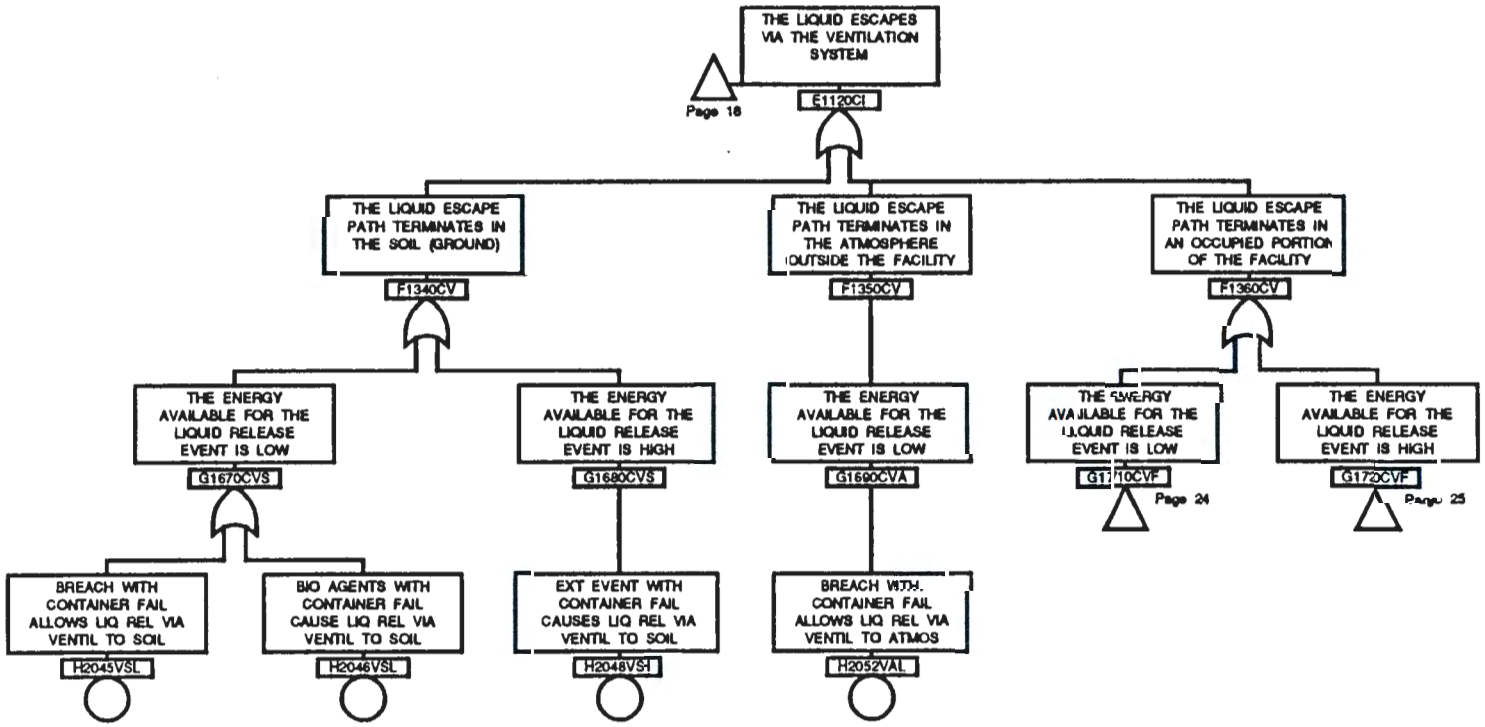

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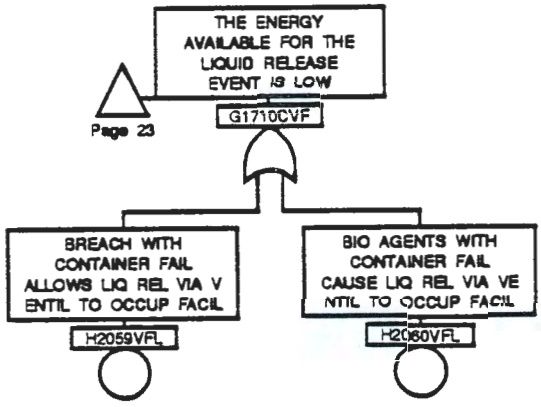

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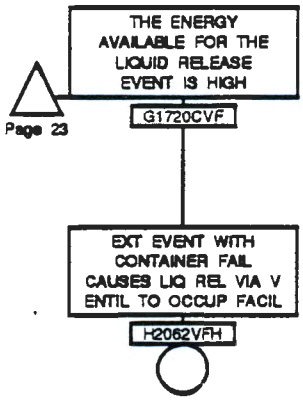

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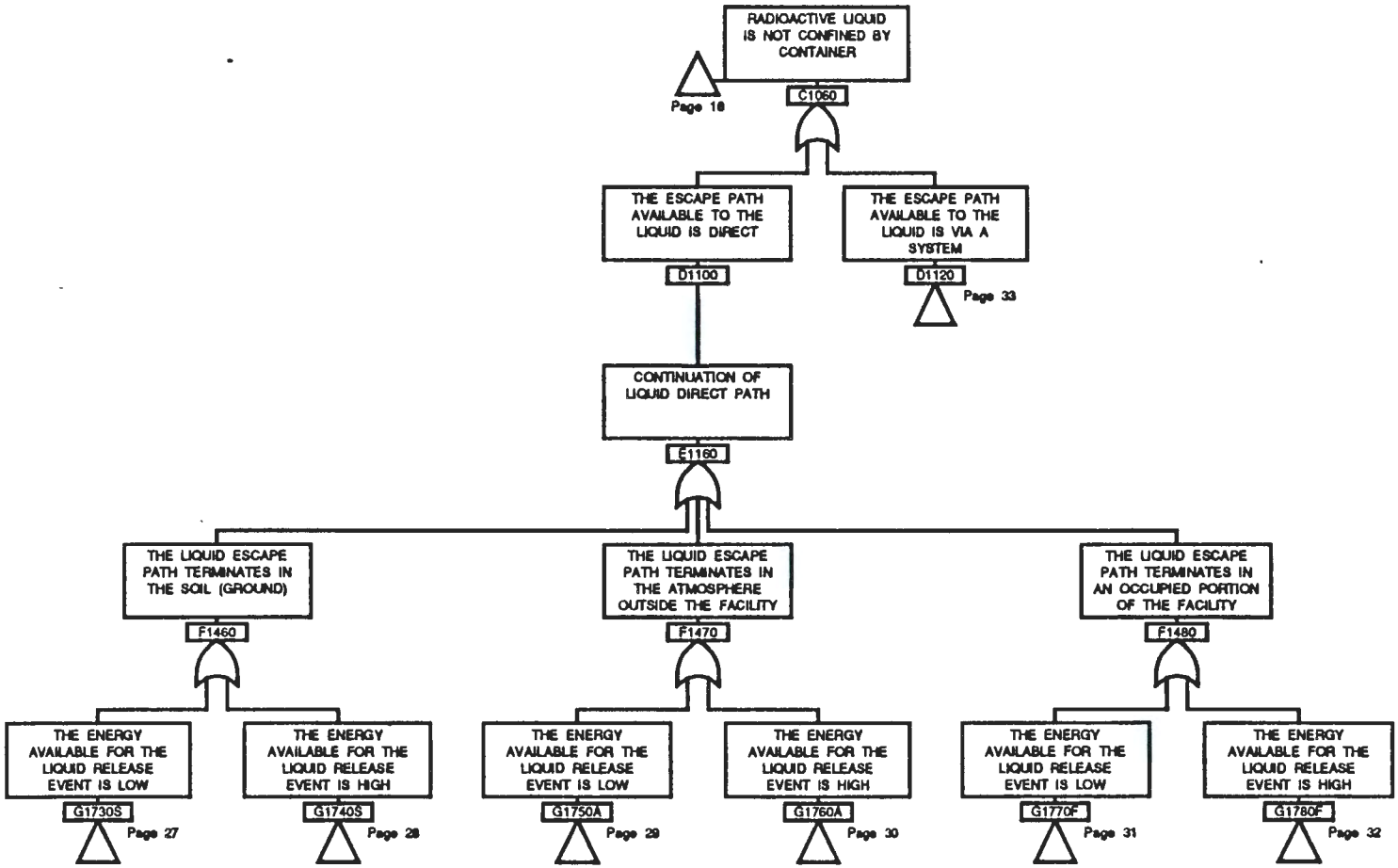

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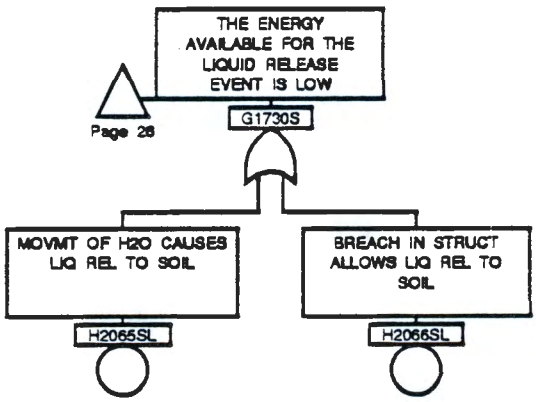

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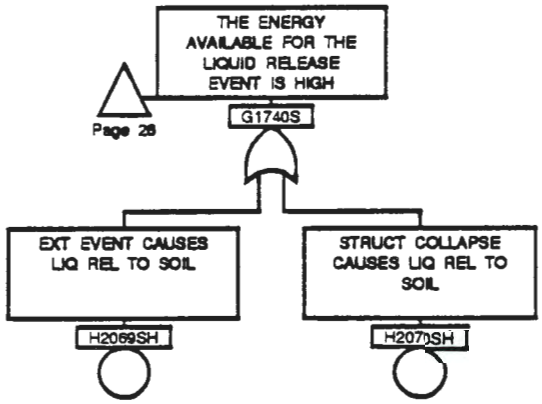

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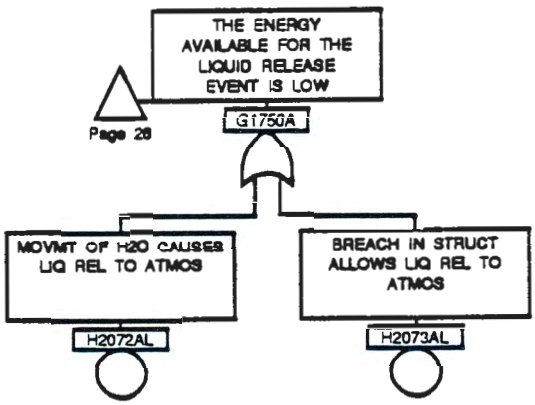

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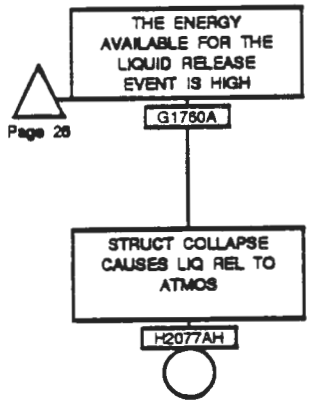

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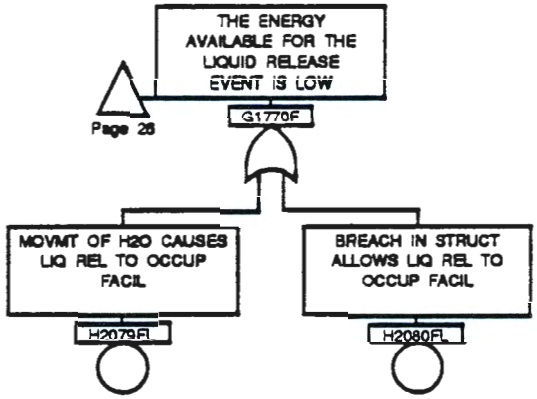

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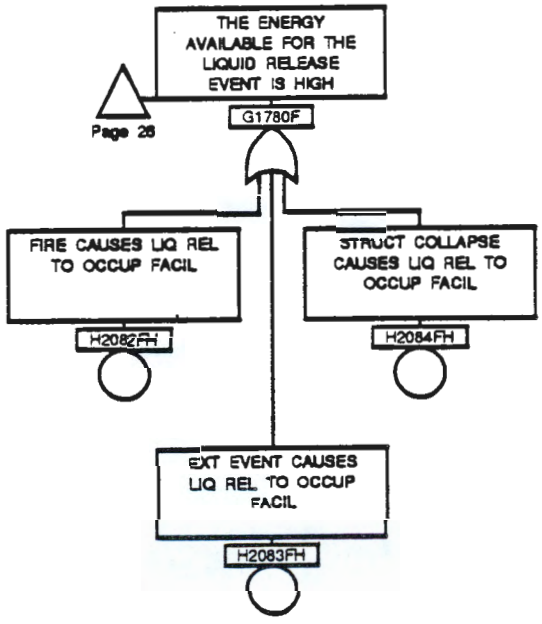

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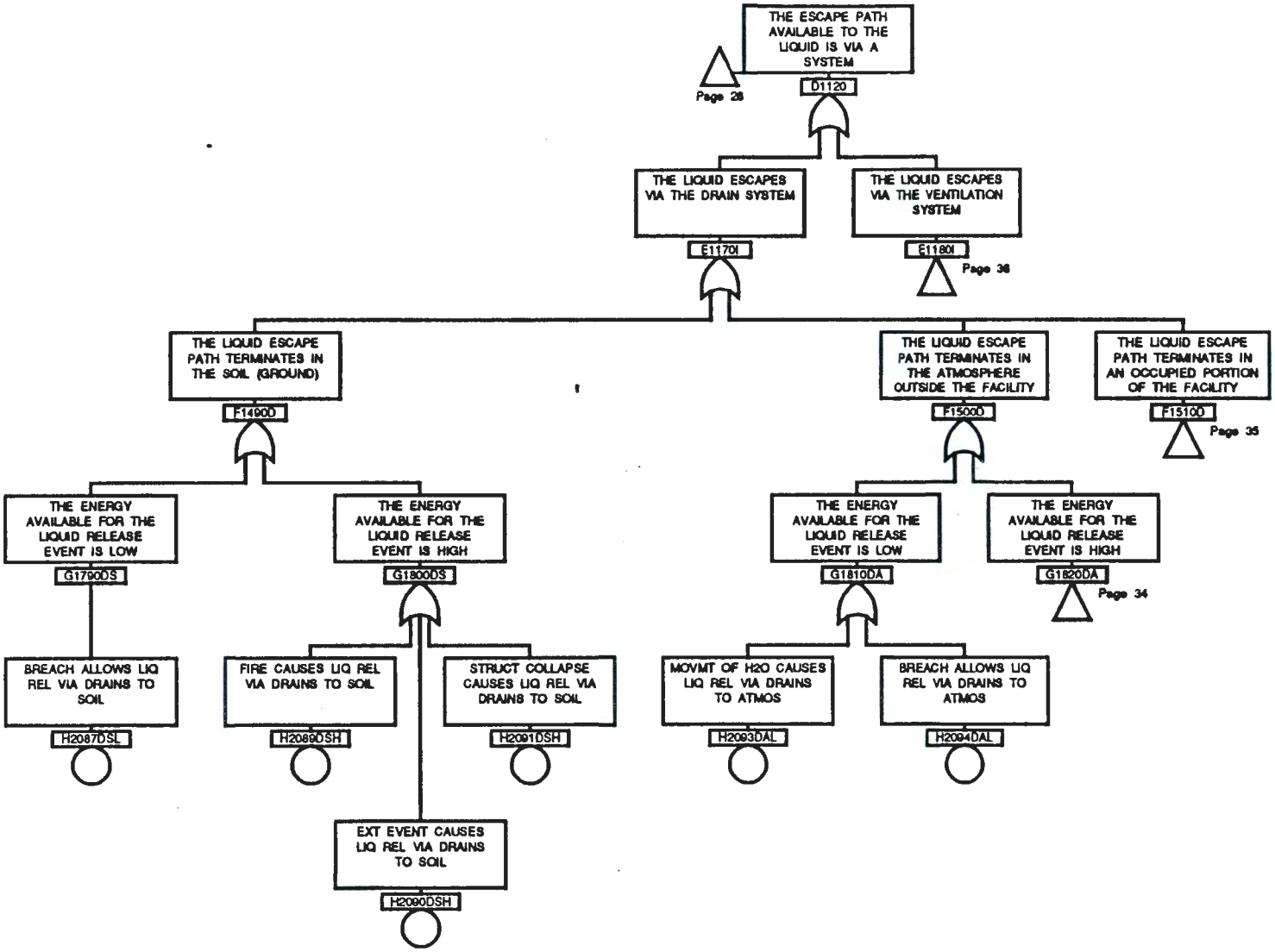

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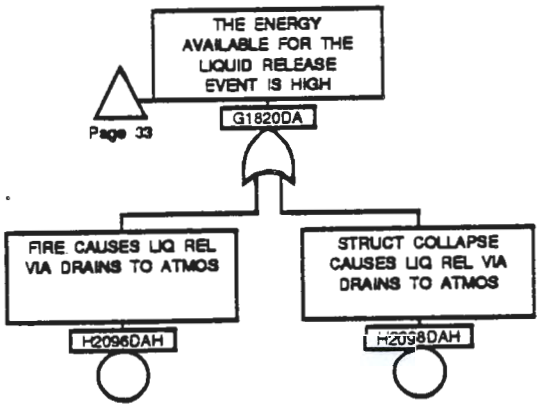

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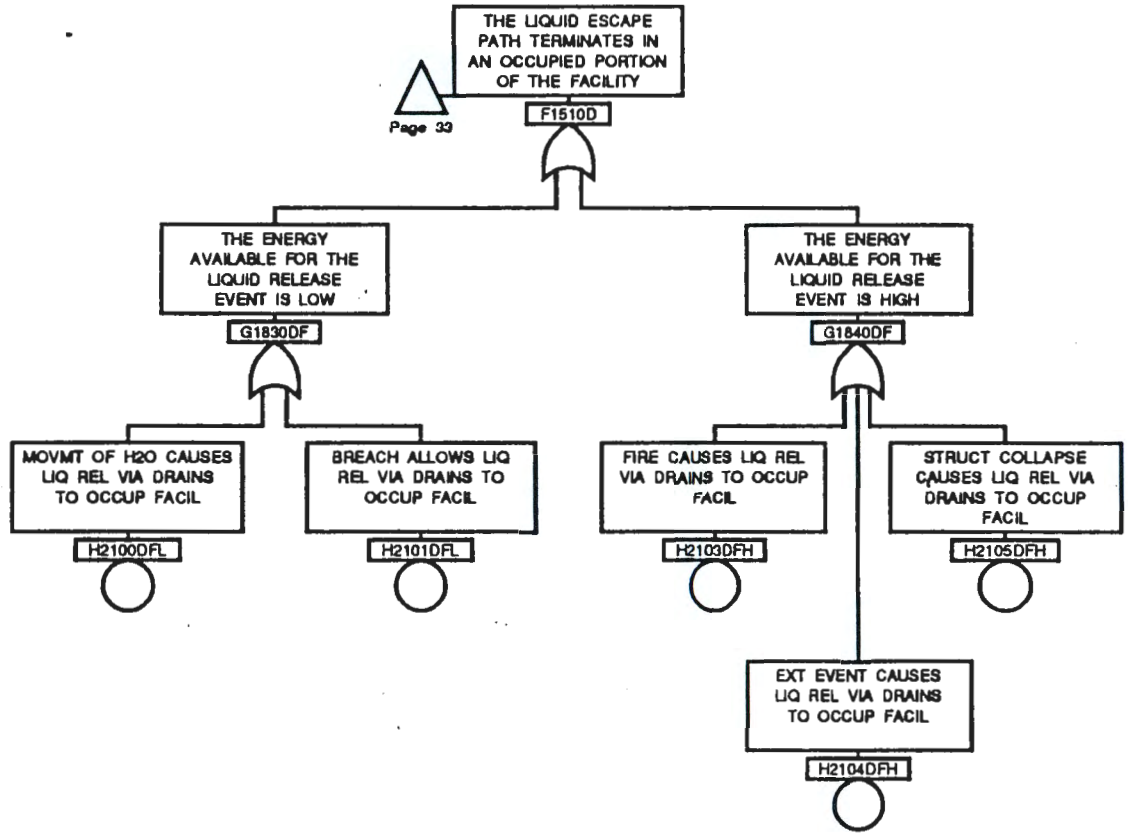

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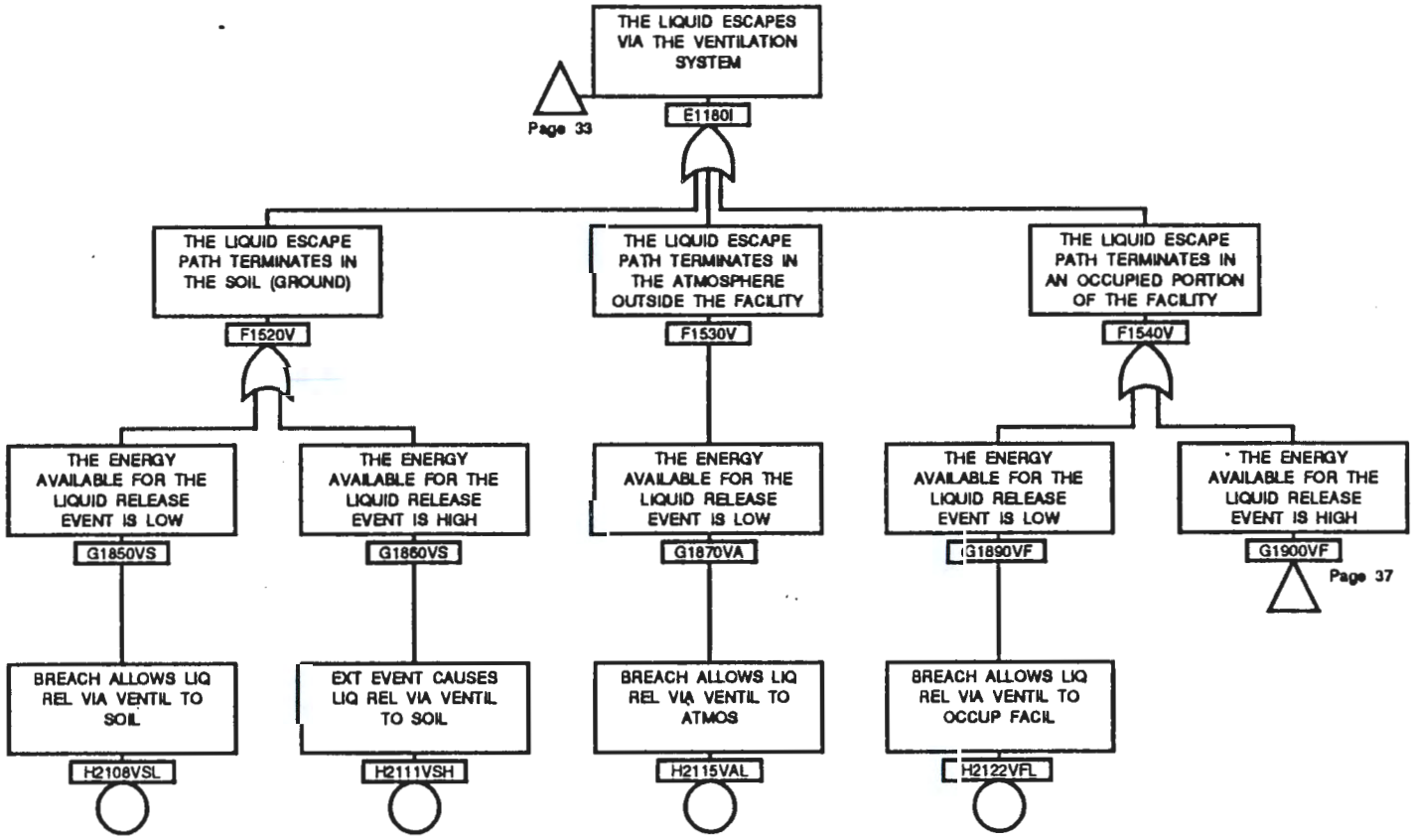

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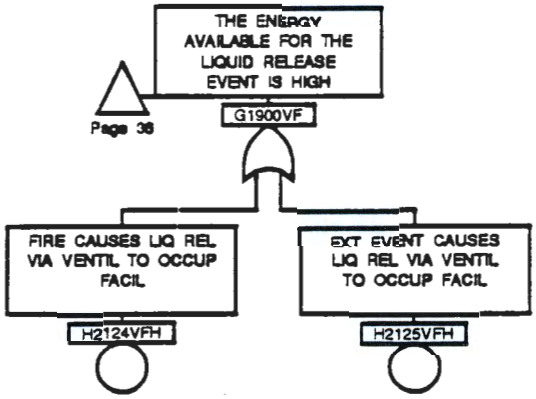

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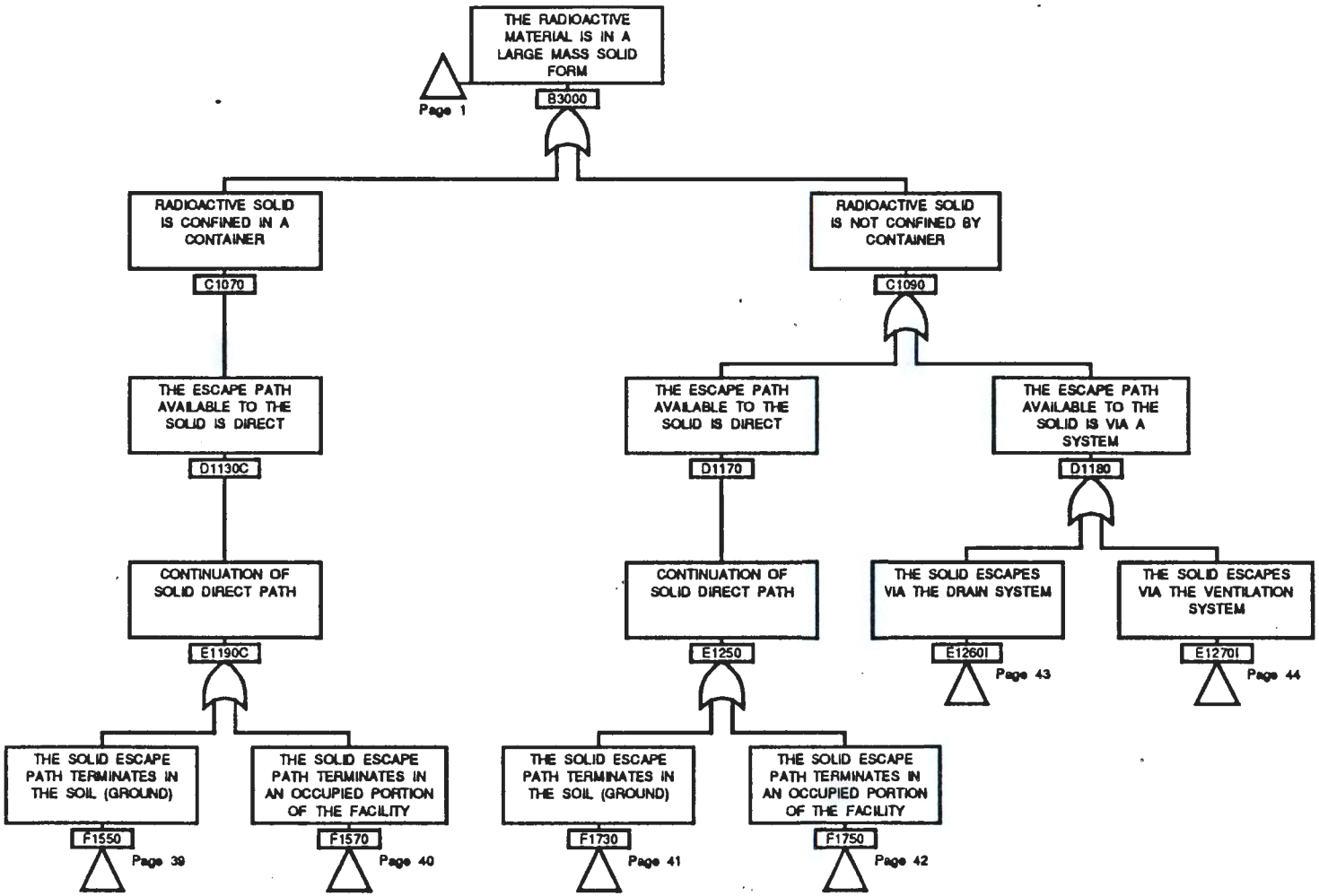

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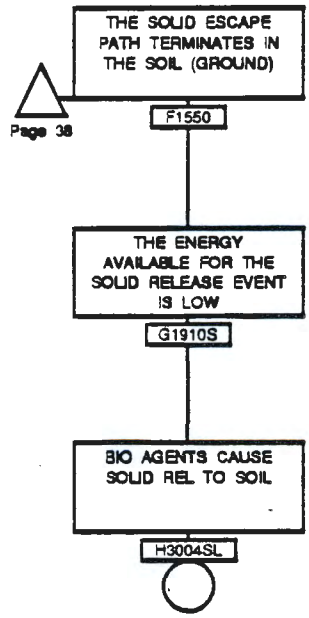

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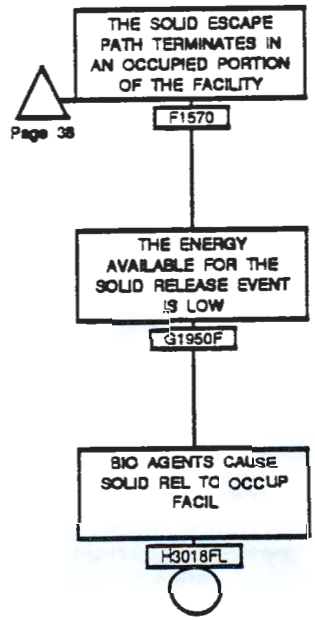

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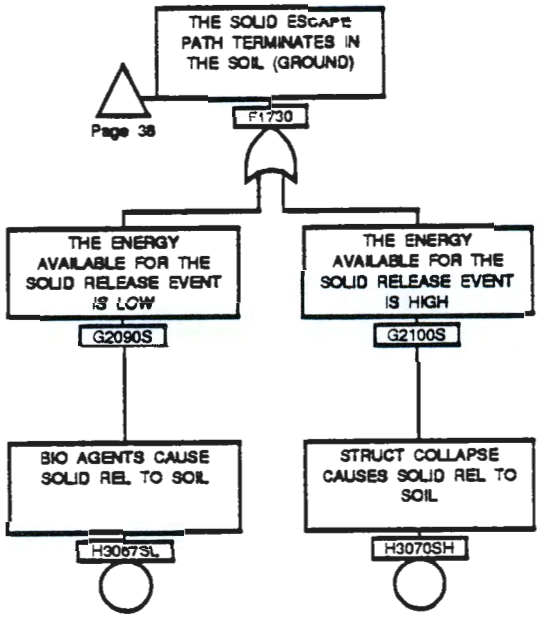

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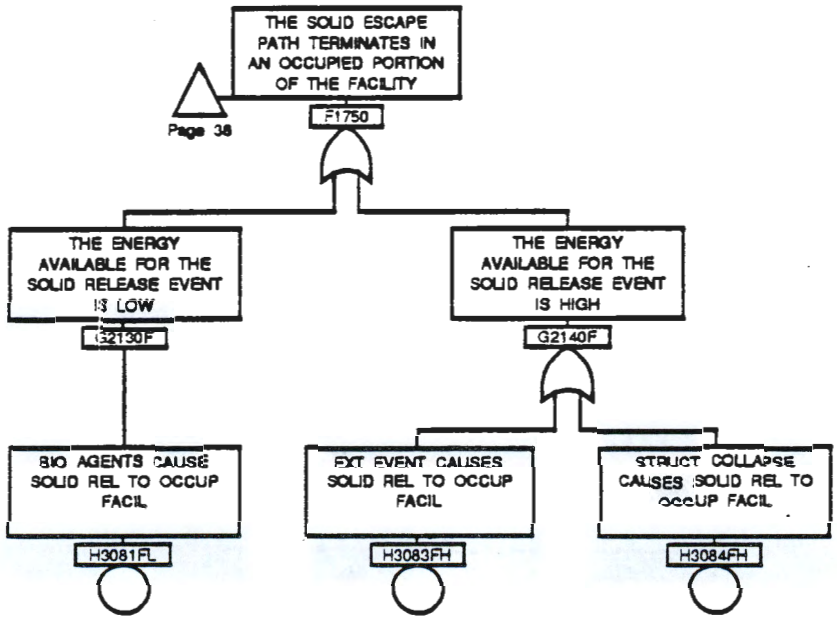

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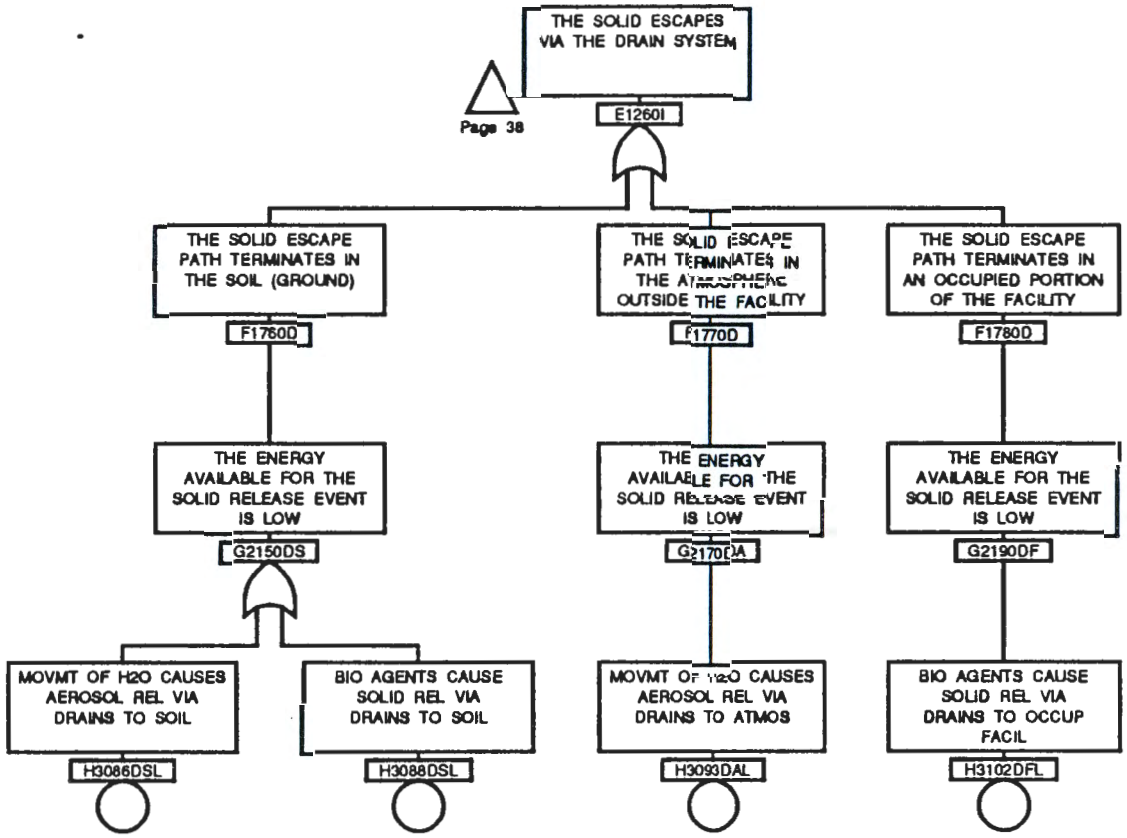

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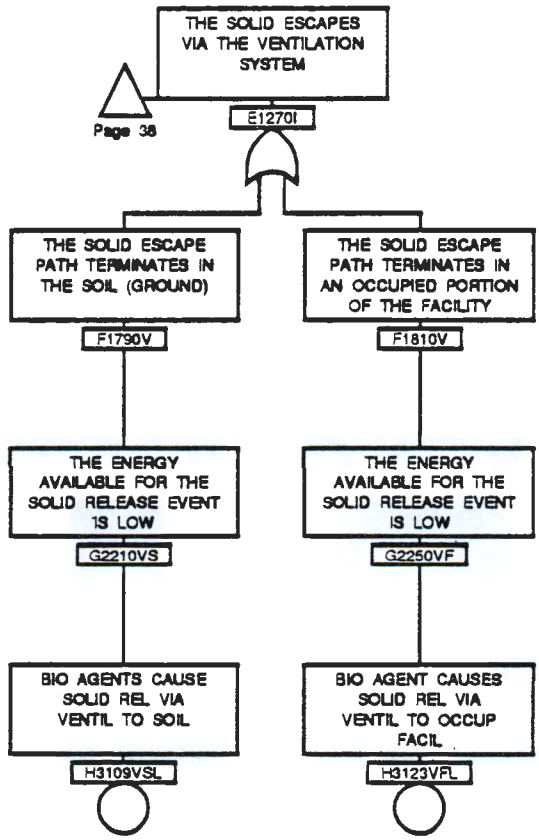

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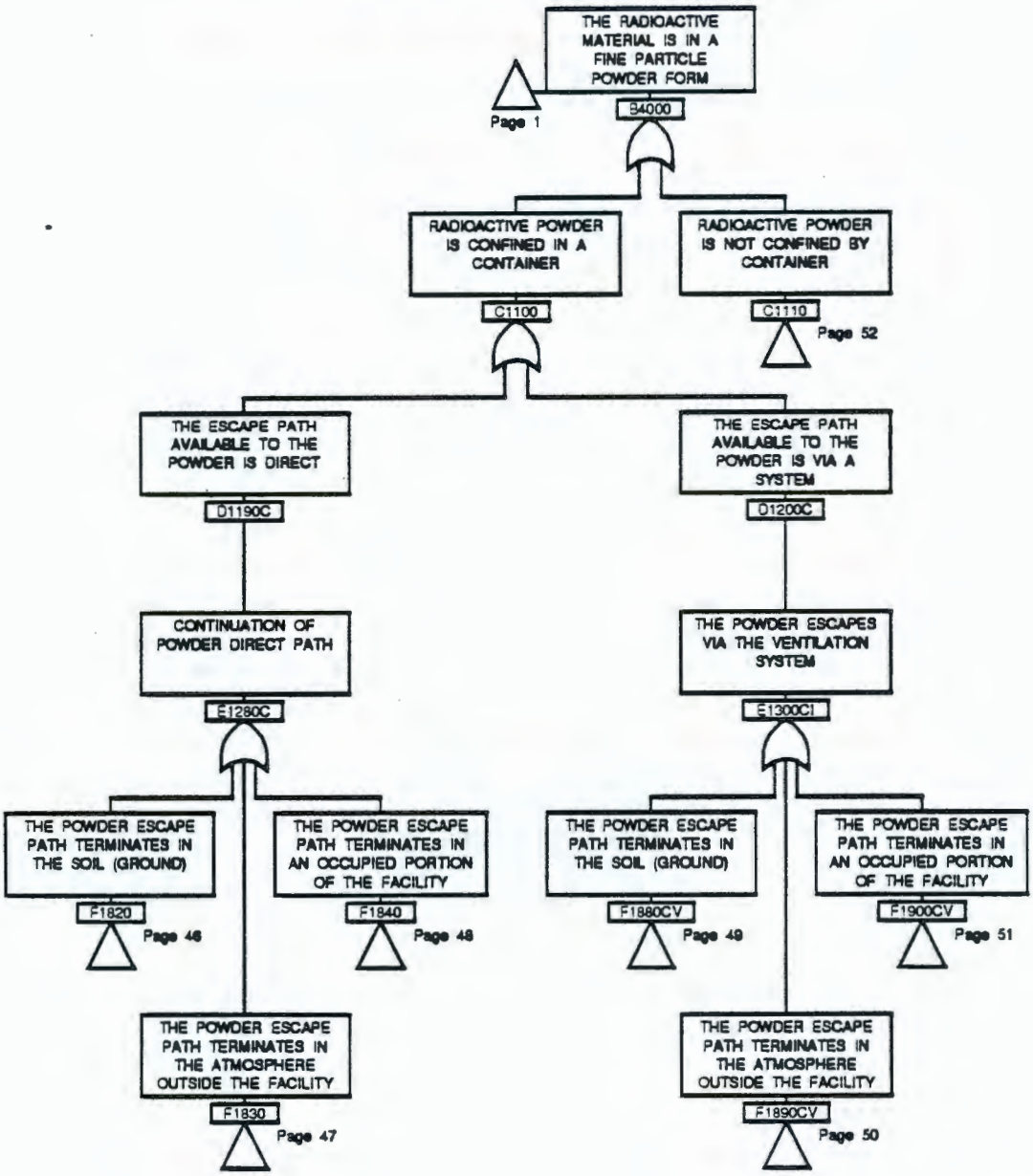

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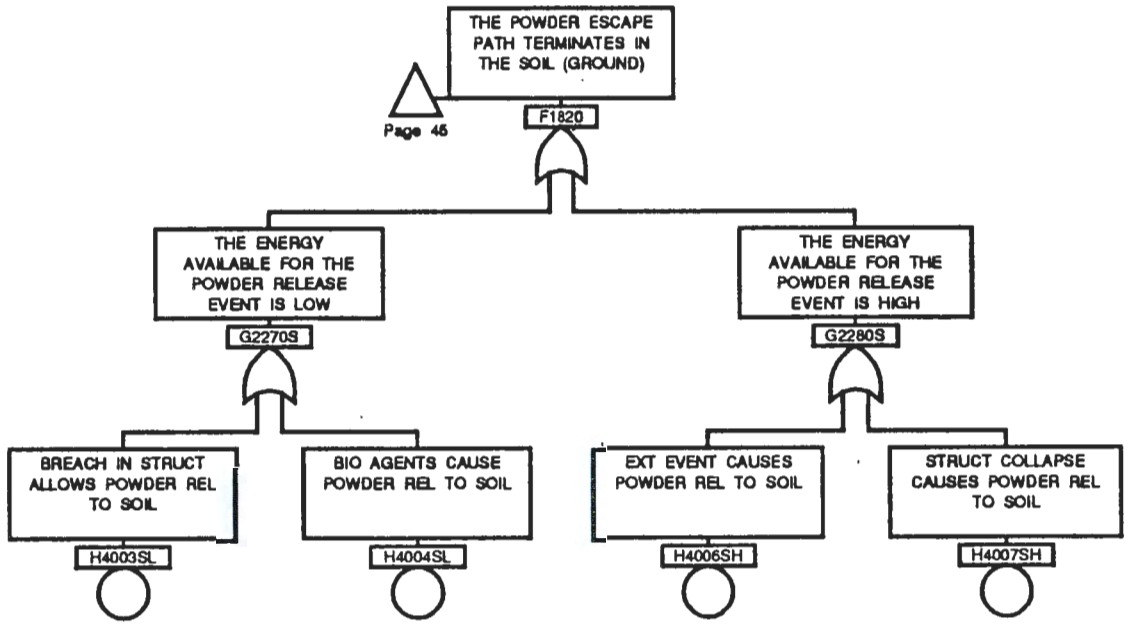

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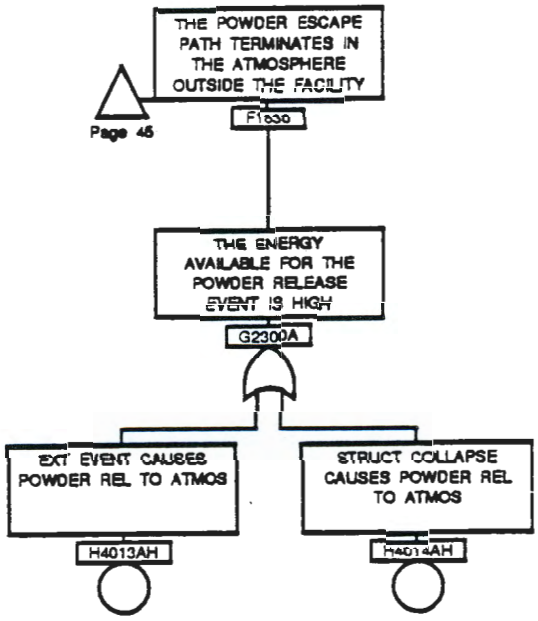

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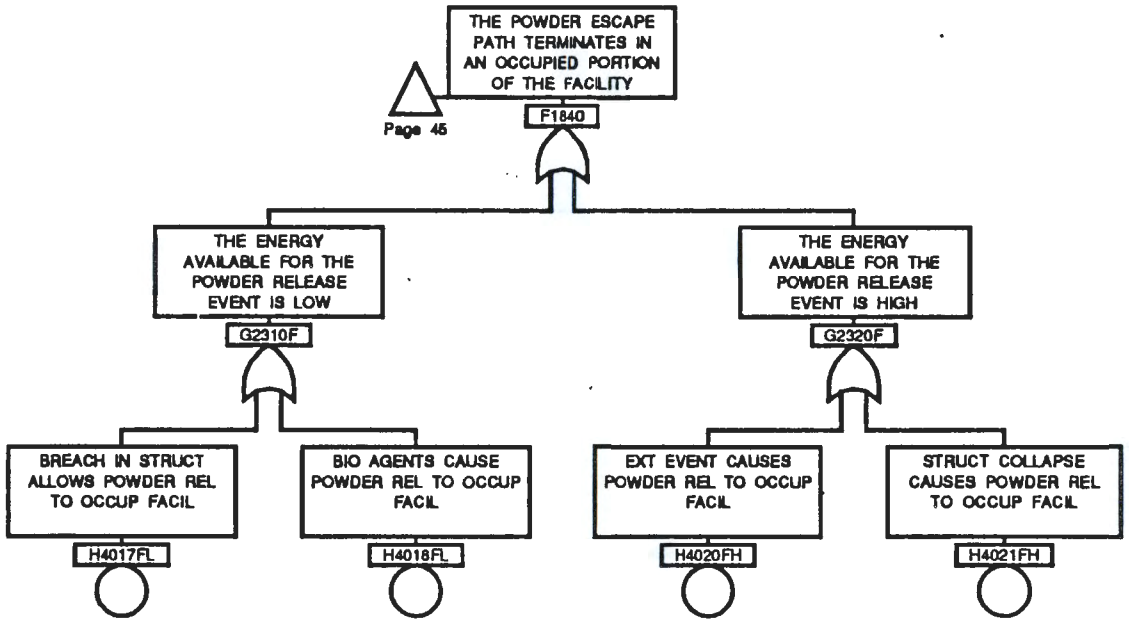

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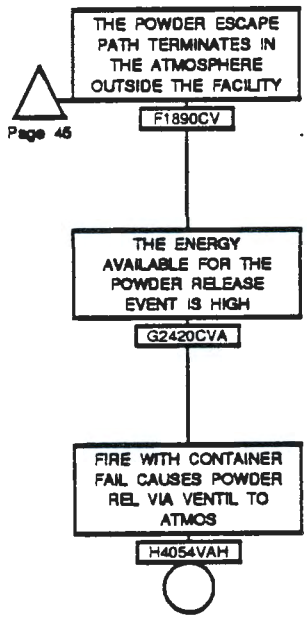

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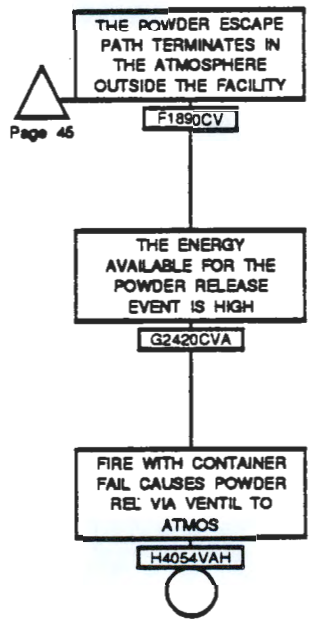

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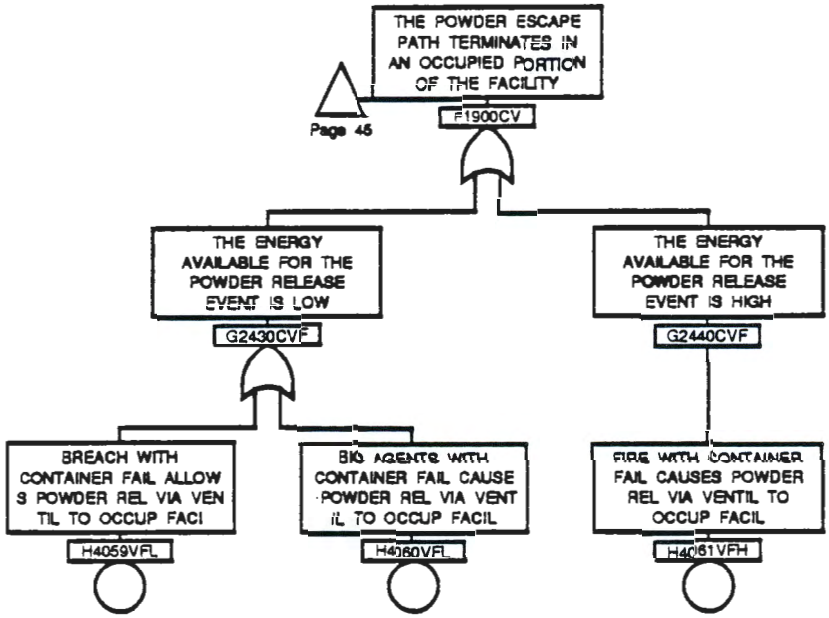

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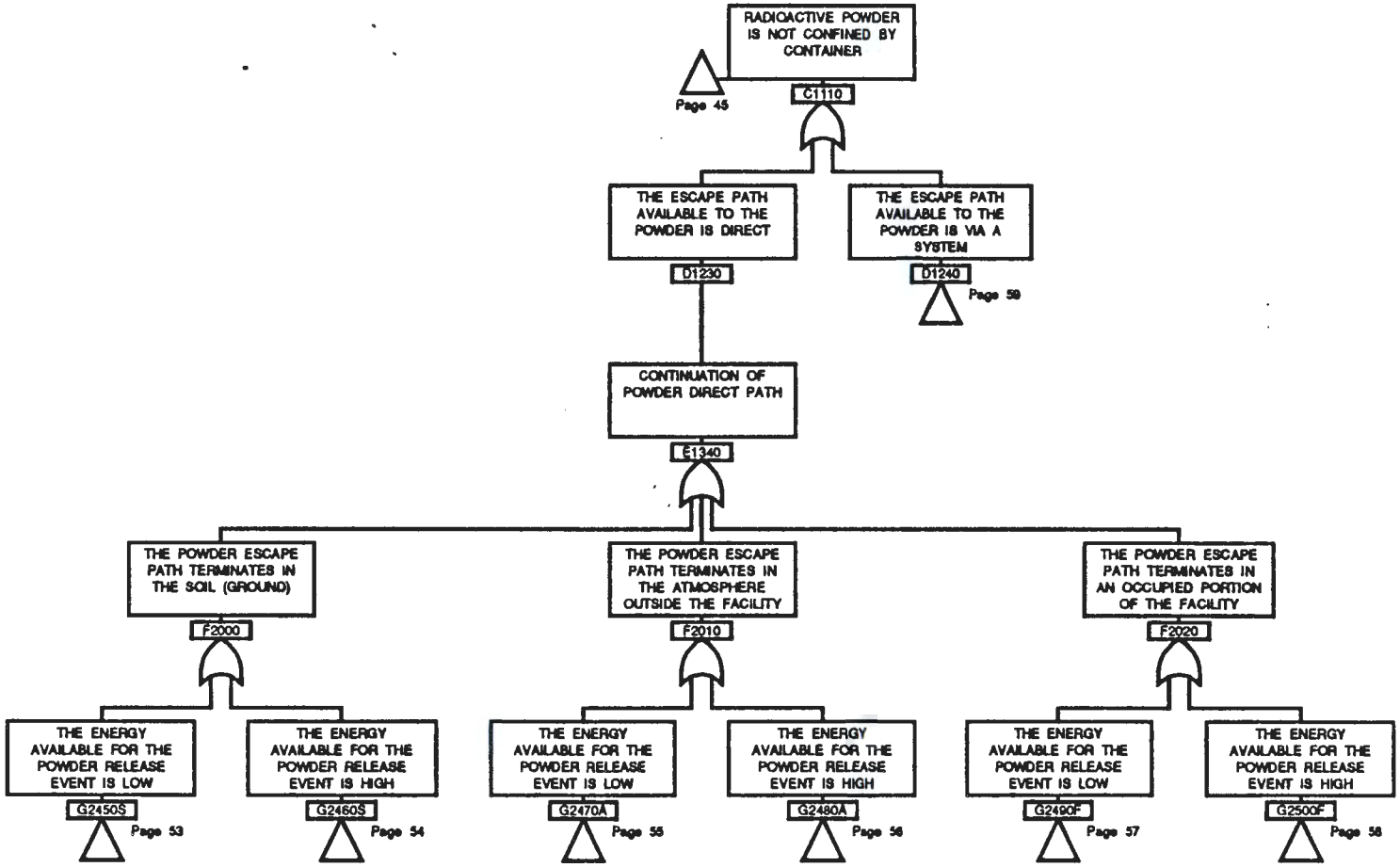

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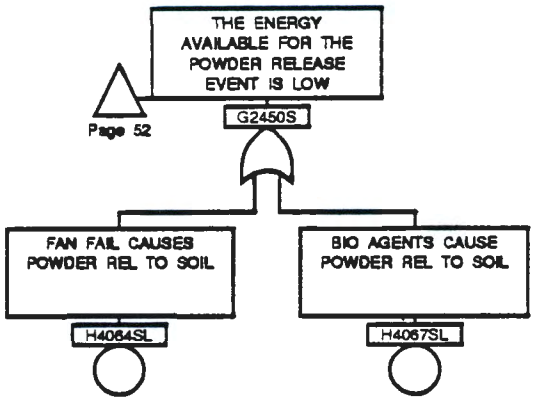

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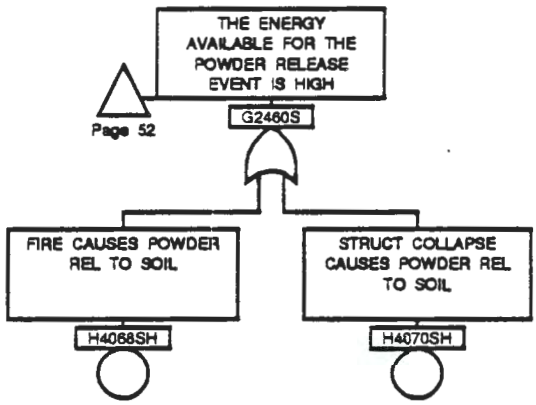

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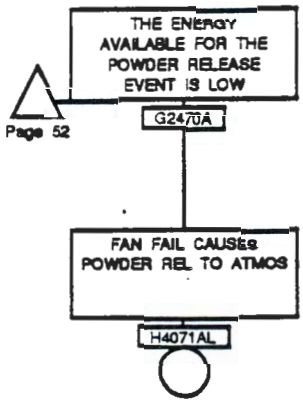

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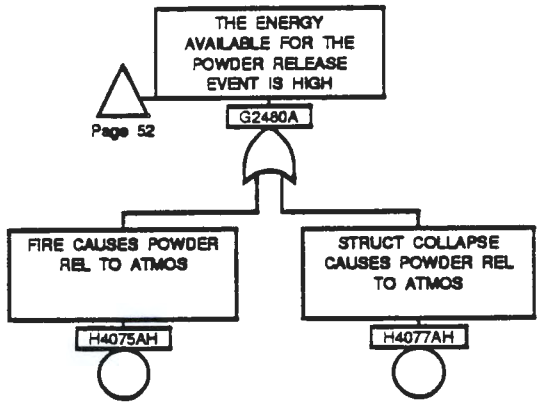

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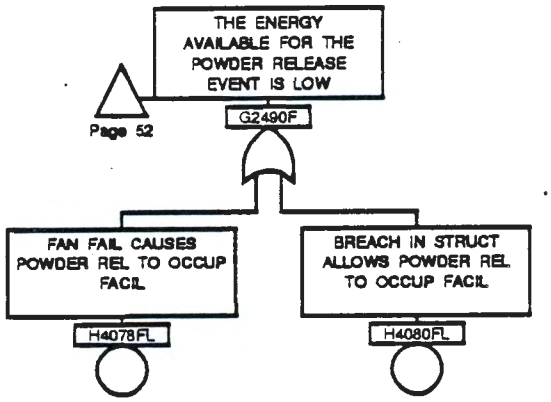

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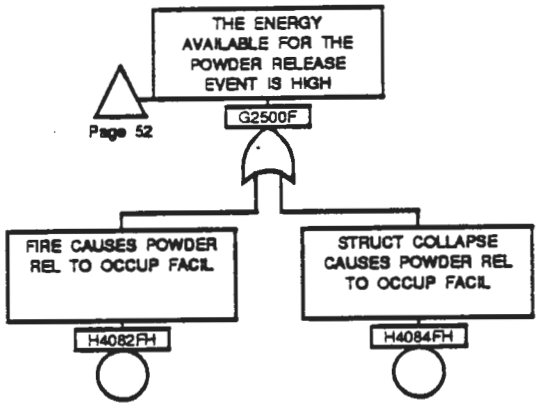

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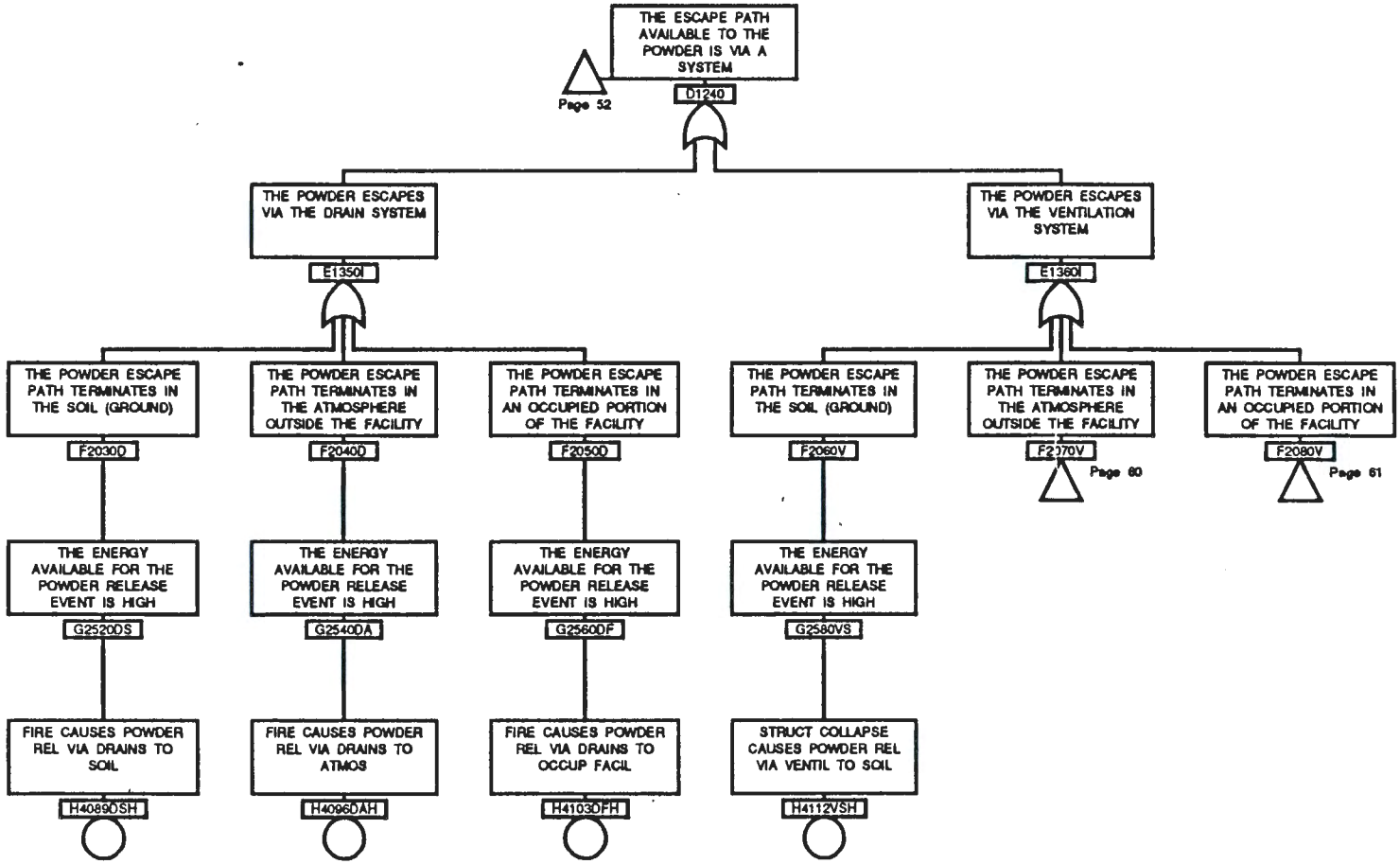

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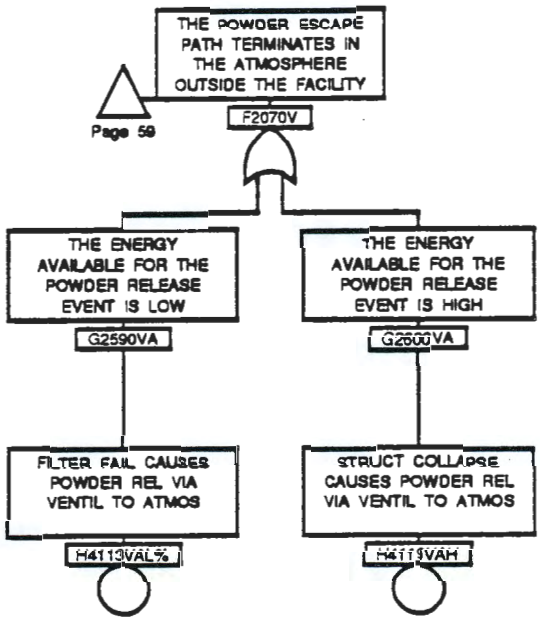

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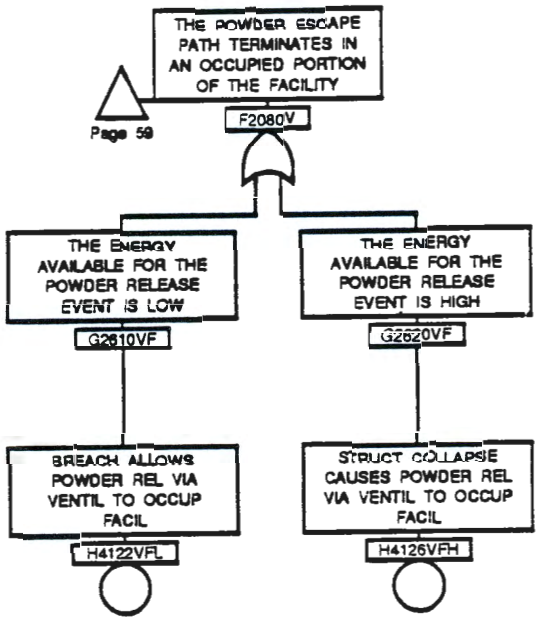

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APPENDIX B

RISK INDEX WORKSHEETS

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Table B-1. 103-B Riggers Loft.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling			X			
Struck-by/strike						None
Drowning/suffocation						None
Electric shock		X				
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals					X	
Biological						None
Temperature extremes						None
Fire					X	
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	1	0	2	
Risk	0	1500	250	0	2	1752

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling			X			
Struck-by/strike						None
Drowning/suffocation						None
Electric shock		X				
Exposure to radiation						None
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire					X	
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	1	0	2	
Risk	0	1500	250	0	2	1752

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Table B-2. 104-B2 Tritium Laboratory.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation					X	
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	0	2	
Risk	0	0	0	0	2	2

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation					X	
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	0	2	
Risk	0	0	0	0	2	2

9313041.1644

Table B-3. 105-B Reactor Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike				X		
Drowning/suffocation				X		
Electric shock	X					
Exposure to radiation					X	
Exposure to asbestos					X	
Exposure to lead				X		
Exposure to mercury					X	
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire				X		
Explosion				X		
Release of radiation					X	
Release of asbestos					X	
Release of lead					X	
Release of mercury					X	
Release of oil/products					X	
Release of chemicals					X	
Totals	1	0	2	7	9	
Risk	50000	0	500	140	9	50649

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling		X				
Struck-by/strike			X			
Drowning/suffocation				X		
Electric shock	X					
Exposure to radiation				X		
Exposure to asbestos				X		
Exposure to lead				X		
Exposure to mercury					X	
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire				X		
Explosion				X		
Release of radiation					X	
Release of asbestos					X	
Release of lead					X	
Release of mercury					X	
Release of oil/products					X	
Release of chemicals					X	
Totals	1	1	3	7	7	
Risk	50000	1500	750	140	7	52397

9313041.1645

Table B-4. 185/190-B Water Treatment and Main Pump House.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike				X		
Drowning/suffocation				X		
Electric shock						None
Exposure to radiation						None
Exposure to asbestos				X		
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological			X			
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos					X	
Release of lead						None
Release of mercury					X	
Release of oil/products						None
Release of chemicals					X	
Totals	0	0	1	4	3	
Risk	0	0	250	80	3	333

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike		X				
Drowning/suffocation				X		
Electric shock						None
Exposure to radiation						None
Exposure to asbestos				X		
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological			X			
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos				X		
Release of lead						None
Release of mercury					X	
Release of oil/products						None
Release of chemicals					X	
Totals	0	1	1	4	2	
Risk	0	1500	250	80	2	1832

9413304.1646

Table B-5. 190-B Tunnel/Annex.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling			X			
Struck-by/strike			X			
Drowning/suffocation				X		
Electric shock						None
Exposure to radiation						None
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological					X	
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	2	1	2	
Risk	0	0	500	20	2	522

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling		X				
Struck-by/strike			X			
Drowning/suffocation				X		
Electric shock						None
Exposure to radiation						None
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological					X	
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	1	1	2	
Risk	0	1500	250	20	2	1772

Table B-6. 1701-BA Exclusion Area Badge House.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock		X				
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire				X		
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	0	2	0	
Risk	0	1500	0	40	0	1540

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock		X				
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire				X		
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	0	2	0	
Risk	0	1500	0	40	0	1540

Table B-7. 105-C Reactor Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling		X				
Struck-by/strike				X		
Drowning/suffocation				X		
Electric shock		X				
Exposure to radiation					X	
Exposure to asbestos					X	
Exposure to lead				X		
Exposure to mercury					X	
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire				X		
Explosion				X		
Release of radiation					X	
Release of asbestos					X	
Release of lead					X	
Release of mercury					X	
Release of oil/products					X	
Release of chemicals					X	
Totals	0	2	2	6	9	
Risk	0	3000	500	120	9	3629

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling	X					
Struck-by/strike			X			
Drowning/suffocation				X		
Electric shock	X					
Exposure to radiation					X	
Exposure to asbestos				X		
Exposure to lead				X		
Exposure to mercury					X	
Exposure to chemicals					X	
Biological			X			
Temperature extremes			X			
Fire				X		
Explosion				X		
Release of radiation					X	
Release of asbestos				X		
Release of lead					X	
Release of mercury					X	
Release of oil/products					X	
Release of chemicals					X	
Totals	2	0	3	6	8	
Risk	100000	0	750	120	8	100878

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Table B-8. 183-C Filter Plant.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike			X			
Drowning/suffocation				X		
Electric shock						None
Exposure to radiation					X	
Exposure to asbestos				X		
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals					X	
Biological			X			
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products			X			
Release of chemicals					X	
Totals	0	0	3	3	5	
Risk	0	0	750	60	5	815

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling	X					
Struck-by/strike	X					
Drowning/suffocation				X		
Electric shock						None
Exposure to radiation					X	
Exposure to asbestos				X		
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals					X	
Biological			X			
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos				X		
Release of lead						None
Release of mercury						None
Release of oil/products			X			
Release of chemicals					X	
Totals	2	0	2	3	4	
Risk	100000	0	500	60	4	100564

9313041.1650

Table B-9. 1702-C Badge House.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike					X	
Drowning/suffocation						None
Electric shock		X				
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	0	0	1	
Risk	0	1500	0	0	1	1501

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock		X				
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	0	1	0	
Risk	0	1500	0	20	0	1520

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Table B-10. 1714-C Solvent Storage.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock		X				
Exposure to radiation						None
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	0	0	2	
Risk	0	1500	0	0	2	1502

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock		X				
Exposure to radiation						None
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	0	0	2	
Risk	0	1500	0	0	2	1502

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Table B-11. 103-D Fresh Metal Storage Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling			X			
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals					X	
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals					X	
Totals	0	0	1	0	2	
Risk	0	0	250	0	2	252

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling		X				None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals					X	
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals					X	
Totals	0	1	0	0	2	
Risk	0	1500	0	0	2	1502

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Table B-12. 105-D Reactor Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling		X				
Struck-by/strike				X		
Drowning/suffocation				X		
Electric shock	X					
Exposure to radiation				X		
Exposure to asbestos					X	
Exposure to lead				X		
Exposure to mercury						None
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire				X		
Explosion				X		
Release of radiation					X	
Release of asbestos					X	
Release of lead					X	
Release of mercury						None
Release of oil/products					X	
Release of chemicals					X	
Totals	1	1	2	7	6	
Risk	50000	1500	500	140	6	52146

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling	X					
Struck-by/strike			X			
Drowning/suffocation				X		
Electric shock	X					
Exposure to radiation				X		
Exposure to asbestos				X		
Exposure to lead				X		
Exposure to mercury						None
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire				X		
Explosion				X		
Release of radiation					X	
Release of asbestos					X	
Release of lead					X	
Release of mercury						None
Release of oil/products					X	
Release of chemicals					X	
Totals	2	0	3	7	5	
Risk	100000	0	750	140	5	100895

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Table B-13. 116-D Reactor Exhaust Stack.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	0	0	
Risk	0	0	0	0	0	0

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	0	0	
Risk	0	0	0	0	0	0

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Table B-14. 105-DR Reactor Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling	X					
Struck-by/strike		X				
Drowning/suffocation				X		
Electric shock	X					
Exposure to radiation				X		
Exposure to asbestos					X	
Exposure to lead				X		
Exposure to mercury					X	
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire				X		
Explosion		X				
Release of radiation					X	
Release of asbestos					X	
Release of lead					X	
Release of mercury					X	
Release of oil/products					X	
Release of chemicals					X	
Totals	2	2	2	5	8	
Risk	100000	3000	500	100	8	103608

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling	X					
Struck-by/strike	X					
Drowning/suffocation				X		
Electric shock	X					
Exposure to radiation				X		
Exposure to asbestos					X	
Exposure to lead				X		
Exposure to mercury					X	
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire			X			
Explosion		X				
Release of radiation					X	
Release of asbestos					X	
Release of lead					X	
Release of mercury					X	
Release of oil/products					X	
Release of chemicals					X	
Totals	3	1	3	4	8	
Risk	150000	1500	750	80	8	152338

Table B-15. 116-DR Reactor Exhaust Stack.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	2	0	
Risk	0	0	0	40	0	40

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling		X				
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	0	1	0	
Risk	0	1500	0	20	0	1520

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Table B-16. 117-DR Exhaust Air Filter Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	0	0	
Risk	0	0	0	0	0	0

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	0	0	
Risk	0	0	0	0	0	0

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Table B-17. 119-DR Exhaust Air Sample Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	0	0	
Risk	0	0	0	0	0	0

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	0	0	
Risk	0	0	0	0	0	0

Table B-18. 1702-DR Area Badge House.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	2	0	
Risk	0	0	0	40	0	40

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling			X			
Struck-by/strike			X			
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	2	0	0	
Risk	0	0	500	0	0	500

Table B-19. 105-F Reactor Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling	X					
Struck-by/strike			X			
Drowning/suffocation				X		
Electric shock	X					
Exposure to radiation					X	
Exposure to asbestos					X	
Exposure to lead				X		
Exposure to mercury						None
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire	X					
Explosion					X	
Release of radiation					X	
Release of asbestos					X	
Release of lead					X	
Release of mercury						None
Release of oil/products					X	
Release of chemicals					X	
Totals	3	0	3	3	8	
Risk	150000	0	750	60	8	150818

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling	X					
Struck-by/strike		X				
Drowning/suffocation				X		
Electric shock	X					
Exposure to radiation					X	
Exposure to asbestos				X		
Exposure to lead				X		
Exposure to mercury						None
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire	X					
Explosion					X	
Release of radiation					X	
Release of asbestos					X	
Release of lead					X	
Release of mercury						None
Release of oil/products			X			
Release of chemicals					X	
Totals	3	1	3	5	6	
Risk	150000	1500	750	100	6	152356

Table B-20. 108-F Biology Laboratory.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock				X		
Exposure to radiation						None
Exposure to asbestos				X		
Exposure to lead					X	
Exposure to mercury						None
Exposure to chemicals						None
Biological			X			
Temperature extremes			X			
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos					X	
Release of lead					X	
Release of mercury						None
Release of oil/products					X	
Release of chemicals						None
Totals	0	0	2	4	4	
Risk	0	0	500	80	4	584

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling		X				
Struck-by/strike			X			
Drowning/suffocation						None
Electric shock		X				
Exposure to radiation						None
Exposure to asbestos			X			
Exposure to lead					X	
Exposure to mercury						None
Exposure to chemicals						None
Biological			X			None
Temperature extremes			X			None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos					X	
Release of lead					X	
Release of mercury						None
Release of oil/products					X	
Release of chemicals						None
Totals	0	2	4	0	4	
Risk	0	3000	1000	0	4	4004

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Table B-21. 183-F Clearwell.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling			X			
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	1	0	0	
Risk	0	0	250	0	0	250

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling			X			
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	1	0	0	
Risk	0	0	250	0	0	250

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Table B-22. 1701-FA Gate House.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire				X		
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	1	0	
Risk	0	0	0	20	0	20

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire				X		
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	1	0	
Risk	0	0	0	20	0	20

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Table B-23. 105-H Reactor Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling		X				
Struck-by/strike			X			
Drowning/suffocation				X		
Electric shock	X					
Exposure to radiation				X		
Exposure to asbestos					X	
Exposure to lead				X		
Exposure to mercury					X	
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire				X		
Explosion				X		
Release of radiation					X	
Release of asbestos					X	
Release of lead					X	
Release of mercury					X	
Release of oil/products					X	
Release of chemicals					X	
Totals	1	1	3	6	8	
Risk	50000	1500	750	120	8	52378

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling	X					
Struck-by/strike		X				
Drowning/suffocation				X		
Electric shock	X					
Exposure to radiation				X		
Exposure to asbestos				X		
Exposure to lead				X		
Exposure to mercury					X	
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire			X			
Explosion				X		
Release of radiation					X	
Release of asbestos					X	
Release of lead					X	
Release of mercury					X	
Release of oil/products					X	
Release of chemicals					X	
Totals	2	1	3	6	7	
Risk	100000	1500	750	120	7	102377

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Table B-24. 1713-H Warehouse.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike		X				
Drowning/suffocation						None
Electric shock		X				
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals					X	
Biological						None
Temperature extremes						None
Fire						None
Explosion					X	
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products					X	
Release of chemicals					X	
Totals	0	2	0	1	4	
Risk	0	3000	0	20	4	3024

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike	X					
Drowning/suffocation						None
Electric shock	X					
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals				X		
Biological						None
Temperature extremes						None
Fire						None
Explosion				X		
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products					X	
Release of chemicals				X		
Totals	2	0	0	4	1	
Risk	100000	0	0	80	1	100081

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Table B-25. 167-K Crosstie Tunnel Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	0	0	
Risk	0	0	0	0	0	0

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	0	0	
Risk	0	0	0	0	0	0

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Table B-26. 182-K Emergency Water Reservoir and Pump House.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike					X	
Drowning/suffocation				X		
Electric shock				X		
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead					X	
Exposure to mercury						None
Exposure to chemicals				X		
Biological			X			
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead					X	
Release of mercury						None
Release of oil/products					X	
Release of chemicals					X	
Totals	0	0	1	4	5	
Risk	0	0	250	80	5	335

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling		X				
Struck-by/strike				X		
Drowning/suffocation				X		
Electric shock				X		
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead					X	
Exposure to mercury						None
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead					X	
Release of mercury						None
Release of oil/products					X	
Release of chemicals					X	
Totals	0	1	2	4	4	
Risk	0	1500	500	80	4	2084

Table B-27. 105-KE Reactor Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike				X		
Drowning/suffocation				X		
Electric shock		X				
Exposure to radiation			X			
Exposure to asbestos					X	
Exposure to lead				X		
Exposure to mercury					X	
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire				X		
Explosion					X	
Release of radiation					X	
Release of asbestos					X	
Release of lead					X	
Release of mercury					X	
Release of oil/products					X	
Release of chemicals					X	
Totals	0	1	3	6	9	
Risk	0	1500	750	120	9	2379

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike				X		
Drowning/suffocation				X		
Electric shock	X					
Exposure to radiation			X			
Exposure to asbestos					X	
Exposure to lead				X		
Exposure to mercury					X	
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire				X		
Explosion					X	
Release of radiation					X	
Release of asbestos					X	
Release of lead					X	
Release of mercury					X	
Release of oil/products					X	
Release of chemicals					X	
Totals	1	0	3	6	9	
Risk	50000	0	750	120	9	50879

Table B-28. 110-KE Gas Storage Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	0	0	
Risk	0	0	0	0	0	0

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	0	0	
Risk	0	0	0	0	0	0

Table B-29. 115-KE Gas Recirculation Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation				X		
Electric shock						None
Exposure to radiation					X	
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury					X	
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury					X	
Release of oil/products						None
Release of chemicals					X	
Totals	0	0	2	2	5	
Risk	0	0	500	40	5	545

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike				X		
Drowning/suffocation				X		
Electric shock						None
Exposure to radiation					X	
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury					X	
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury					X	
Release of oil/products						None
Release of chemicals					X	
Totals	0	0	2	4	5	
Risk	0	0	500	80	5	585

Table B-30. 116-KE Reactor Exhaust Stack.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	0	0	
Risk	0	0	0	0	0	0

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	0	0	
Risk	0	0	0	0	0	0

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Table B-31. 117-KE Exhaust Air Filter Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	0	0	
Risk	0	0	0	0	0	0

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	1	0	
Risk	0	0	0	20	0	20

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Table B-32. 1702-KE Badge House.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike					X	
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	1	1	
Risk	0	0	0	20	1	21

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling		X				
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	0	1	0	
Risk	0	1500	0	20	0	1520

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Table B-33. 1713-KER Warehouse.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	0	0	
Risk	0	0	0	0	0	0

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	0	0	
Risk	0	0	0	0	0	0

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Table B-34. 105-KW Reactor Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling		X				
Struck-by/strike				X		
Drowning/suffocation				X		
Electric shock		X				
Exposure to radiation			X			
Exposure to asbestos					X	
Exposure to lead				X		
Exposure to mercury					X	
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire				X		
Explosion					X	
Release of radiation					X	
Release of asbestos					X	
Release of lead					X	
Release of mercury					X	
Release of oil/products					X	
Release of chemicals					X	
Totals	0	2	3	5	9	
Risk	0	3000	750	100	9	3859

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling		X				
Struck-by/strike				X		
Drowning/suffocation				X		
Electric shock			X			
Exposure to radiation			X			
Exposure to asbestos					X	
Exposure to lead				X		
Exposure to mercury					X	
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire			X			
Explosion					X	
Release of radiation					X	
Release of asbestos					X	
Release of lead					X	
Release of mercury					X	
Release of oil/products					X	
Release of chemicals					X	
Totals	0	2	4	4	9	
Risk	0	3000	1000	80	9	4089

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Table B-35. 115-KW Gas Recirculation Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation				X		
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological			X			
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	1	1	0	
Risk	0	0	250	20	0	270

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike				X		
Drowning/suffocation				X		
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological			X			
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	1	3	0	
Risk	0	0	250	60	0	310

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Table B-36. 116-KW Reactor Exhaust Stack.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	0	0	
Risk	0	0	0	0	0	0
5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	0	0	
Risk	0	0	0	0	0	0

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Table B-37. 117-KW Exhaust Air Filter Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	0	0	
Risk	0	0	0	0	0	0

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	1	0	
Risk	0	0	0	20	0	20

9313041.1679

Table B-38. 165-KW Power Control Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling			X			
Struck-by/strike					X	
Drowning/suffocation				X		
Electric shock		X				
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury				X		
Exposure to chemicals				X		
Biological						None
Temperature extremes						None
Fire						None
Explosion					X	
Release of radiation						None
Release of asbestos					X	
Release of lead						None
Release of mercury					X	
Release of oil/products						None
Release of chemicals					X	
Totals	0	1	1	3	5	
Risk	0	1500	250	60	5	1815

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling			X			
Struck-by/strike				X		
Drowning/suffocation				X		
Electric shock	X					
Exposure to radiation						None
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury				X		
Exposure to chemicals				X		
Biological						None
Temperature extremes						None
Fire						None
Explosion					X	
Release of radiation						None
Release of asbestos					X	None
Release of lead						None
Release of mercury					X	
Release of oil/products					X	
Release of chemicals					X	
Totals	1	0	1	4	6	
Risk	50000	0	250	80	6	50336

9313041.1680

Table B-39. 1702-KW Badge House.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike					X	
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	1	1	
Risk	0	0	0	20	1	21

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling		X				
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	0	1	0	
Risk	0	1500	0	20	0	1520

9313041.1681

Table B-40. 1714-KW Warehouse.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	2	0	
Risk	0	0	0	40	0	40
5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling		X				
Struck-by/strike			X			
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	1	0	0	
Risk	0	1500	250	0	0	1750

9313041.1682

Table B-41. 183-KW Filter Plant.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock				X		
Exposure to radiation						None
Exposure to asbestos				X		
Exposure to lead						None
Exposure to mercury					X	
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire					X	
Explosion						None
Release of radiation						None
Release of asbestos					X	
Release of lead						None
Release of mercury					X	
Release of oil/products					X	
Release of chemicals					X	
Totals	0	0	2	5	6	
Risk	0	0	500	100	6	606

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike			X			
Drowning/suffocation						None
Electric shock				X		
Exposure to radiation						None
Exposure to asbestos				X		
Exposure to lead						None
Exposure to mercury					X	
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire					X	
Explosion						None
Release of radiation						None
Release of asbestos					X	
Release of lead						None
Release of mercury					X	
Release of oil/products					X	
Release of chemicals					X	
Totals	0	0	3	4	6	
Risk	0	0	750	80	6	836

9313041.1683

Table B-42. 190-KW Process Water Pump House.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling	X					
Struck-by/strike					X	
Drowning/suffocation				X		
Electric shock				X		
Exposure to radiation						None
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury					X	
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire				X		
Explosion					X	
Release of radiation						None
Release of asbestos					X	
Release of lead						None
Release of mercury					X	
Release of oil/products					X	
Release of chemicals					X	
Totals	1	0	2	4	8	
Risk	50000	0	500	80	8	50588

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling	X					
Struck-by/strike			X			
Drowning/suffocation				X		
Electric shock				X		
Exposure to radiation						None
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury					X	
Exposure to chemicals				X		
Biological			X			
Temperature extremes			X			
Fire			X			
Explosion					X	
Release of radiation						None
Release of asbestos					X	
Release of lead						None
Release of mercury					X	
Release of oil/products					X	
Release of chemicals					X	
Totals	1	0	4	3	7	
Risk	50000	0	1000	60	7	51067

9313041.1684

Table B-43. 205-A Solvent Handling Facility.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling		X				
Struck-by/strike			X			
Drowning/suffocation						None
Electric shock				X		
Exposure to radiation					X	
Exposure to asbestos					X	
Exposure to lead					X	
Exposure to mercury						None
Exposure to chemicals					X	
Biological						None
Temperature extremes						None
Fire						None
Explosion					X	
Release of radiation				X		
Release of asbestos					X	
Release of lead					X	
Release of mercury						None
Release of oil/products						None
Release of chemicals				X		
Totals	0	1	1	3	7	
Risk	0	1500	250	60	7	1817

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling	X					
Struck-by/strike		X				
Drowning/suffocation						None
Electric shock				X		
Exposure to radiation					X	
Exposure to asbestos					X	
Exposure to lead					X	
Exposure to mercury						None
Exposure to chemicals					X	
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation				X		
Release of asbestos					X	
Release of lead					X	
Release of mercury						None
Release of oil/products						None
Release of chemicals				X		
Totals	1	1	0	3	6	
Risk	50000	1500	0	60	6	51566

9313041.1685

Table B-44. 224-B Office and Canyon Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock		X				
Exposure to radiation		X				
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals				X		
Biological			X			
Temperature extremes						None
Fire				X		
Explosion					X	
Release of radiation				X		
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products					X	
Release of chemicals					X	
Totals	0	2	1	5	5	
Risk	0	3000	250	100	5	3355

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling					X	
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock	X					
Exposure to radiation		X				
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals				X		
Biological			X			
Temperature extremes						None
Fire			X			
Explosion					X	
Release of radiation				X		
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products					X	
Release of chemicals				X		
Totals	1	1	2	4	5	
Risk	50000	1500	500	80	5	52085

9313041.1686

Table B-45. 215-C Storage Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock		X				
Exposure to radiation					X	
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire					X	
Explosion						None
Release of radiation			X			
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	1	0	4	
Risk	0	1500	250	0	4	1754
5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock		X				
Exposure to radiation					X	
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire					X	
Explosion						None
Release of radiation			X			
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	1	0	4	
Risk	0	1500	250	0	4	1754

9313041.1687

Table B-46. 212-N Fuel Storage Facility.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock						None
Exposure to radiation				X		
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	3	1	
Risk	0	0	0	60	1	61

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock						None
Exposure to radiation				X		
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	3	1	
Risk	0	0	0	60	1	61

Table B-47. 212-P Fuel Storage Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock			X			
Exposure to radiation					X	
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals				X		
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products					X	
Release of chemicals						None
Totals	0	0	1	3	3	
Risk	0	0	250	60	3	313

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike			X			
Drowning/suffocation						None
Electric shock			X			
Exposure to radiation					X	
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals				X		
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products					X	
Release of chemicals						None
Totals	0	0	2	2	3	
Risk	0	0	500	40	3	543

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Table B-48. 212-R Fuel Storage Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling		X				
Struck-by/strike			X			
Drowning/suffocation						None
Electric shock			X			
Exposure to radiation					X	
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological			X			
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	3	0	2	
Risk	0	1500	750	0	2	2252

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling		X				
Struck-by/strike		X				
Drowning/suffocation						None
Electric shock			X			
Exposure to radiation					X	
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological			X			
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	2	2	0	2	
Risk	0	3000	500	0	2	3502

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Table B-49. 202-S Canyon Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling					X	
Struck-by/strike		X				
Drowning/suffocation				X		
Electric shock			X			
Exposure to radiation		X				
Exposure to asbestos					X	
Exposure to lead					X	
Exposure to mercury					X	
Exposure to chemicals				X		
Biological						None
Temperature extremes						None
Fire			X			
Explosion					X	
Release of radiation					X	
Release of asbestos					X	
Release of lead					X	
Release of mercury					X	
Release of oil/products					X	
Release of chemicals					X	
Totals	0	2	2	2	11	
Risk	0	3000	500	40	11	3551

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike		X				
Drowning/suffocation				X		
Electric shock			X			
Exposure to radiation		X				
Exposure to asbestos				X		
Exposure to lead					X	
Exposure to mercury					X	
Exposure to chemicals				X		
Biological						None
Temperature extremes						None
Fire			X			
Explosion					X	
Release of radiation					X	
Release of asbestos					X	
Release of lead					X	
Release of mercury					X	
Release of oil/products					X	
Release of chemicals					X	
Totals	0	2	2	4	9	
Risk	0	3000	500	80	9	3589

Table B-50. 233-S Plutonium Concentration Facility.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike						None
Drowning/suffocation						None
Electric shock				X		
Exposure to radiation		X				
Exposure to asbestos				X		
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	0	3	1	
Risk	0	1500	0	60	1	1561

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike						None
Drowning/suffocation						None
Electric shock			X			
Exposure to radiation		X				
Exposure to asbestos				X		
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation				X		
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	1	3	0	
Risk	0	1500	250	60	0	1810

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Table B-51. 233-SA Exhaust Filter Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock				X		
Exposure to radiation			X			
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	1	2	1	
Risk	0	0	250	40	1	291

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock				X		
Exposure to radiation		X				
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	0	2	1	
Risk	0	1500	0	40	1	1541

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Table B-52. 276-S Solvent Handling Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling					X	
Struck-by/strike				X		
Drowning/suffocation				X		
Electric shock						None
Exposure to radiation					X	
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals					X	
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	2	6	
Risk	0	0	0	40	6	46

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling					X	
Struck-by/strike				X		
Drowning/suffocation				X		
Electric shock						None
Exposure to radiation					X	
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals					X	
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	0	2	6	
Risk	0	0	0	40	6	46

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Table B-53. 291-S Exhaust Fan Facility.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock		X				
Exposure to radiation			X			
Exposure to asbestos				X		
Exposure to lead						None
Exposure to mercury					X	
Exposure to chemicals				X		
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos					X	
Release of lead						None
Release of mercury					X	
Release of oil/products						None
Release of chemicals					X	
Totals	0	1	1	3	5	
Risk	0	1500	250	60	5	1815

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike			X			
Drowning/suffocation						None
Electric shock	X					
Exposure to radiation			X			
Exposure to asbestos				X		
Exposure to lead						None
Exposure to mercury					X	
Exposure to chemicals				X		
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation				X		
Release of asbestos				X		
Release of lead						None
Release of mercury					X	
Release of oil/products						None
Release of chemicals					X	
Totals	1	0	2	4	3	
Risk	50000	0	500	80	3	50583

Table B-54. 292-S Jet Pit House.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation					X	
Exposure to asbestos				X		
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products					X	
Release of chemicals					X	
Totals	0	0	0	1	5	
Risk	0	0	0	20	5	25

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation					X	
Exposure to asbestos				X		
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products					X	
Release of chemicals					X	
Totals	0	0	0	1	5	
Risk	0	0	0	20	5	25

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Table B-55. 293-S Offgas Treatment and Recovery Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation				X		
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological			X			
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products					X	
Release of chemicals						None
Totals	0	0	1	1	4	
Risk	0	0	250	20	4	274

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation				X		
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological			X			
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products					X	
Release of chemicals						None
Totals	0	0	1	1	4	
Risk	0	0	250	20	4	274

Table B-56. 2711-S Stack Monitoring Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling			X			
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock				X		
Exposure to radiation					X	
Exposure to asbestos				X		
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire					X	
Explosion						None
Release of radiation					X	
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products					X	
Release of chemicals						None
Totals	0	0	1	3	5	
Risk	0	0	250	60	5	315

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling			X			
Struck-by/strike			X			
Drowning/suffocation						None
Electric shock		X				
Exposure to radiation					X	
Exposure to asbestos				X		
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire				X		
Explosion						None
Release of radiation					X	
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products					X	
Release of chemicals						None
Totals	0	1	2	2	4	
Risk	0	1500	500	40	4	2044

Table B-57. 2715-S Storage Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation					X	
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals				X		
Biological						None
Temperature extremes						None
Fire					X	
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products					X	
Release of chemicals					X	
Totals	0	0	0	1	5	
Risk	0	0	0	20	5	25

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation					X	
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals				X		
Biological						None
Temperature extremes						None
Fire					X	
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products					X	
Release of chemicals					X	
Totals	0	0	0	1	5	
Risk	0	0	0	20	5	25

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Table B-58. 2718-S Sand Filter Sampler Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock				X		
Exposure to radiation				X		
Exposure to asbestos						None
Exposure to lead					X	
Exposure to mercury						None
Exposure to chemicals						None
Biological			X			
Temperature extremes						None
Fire				X		
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead					X	
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	1	5	3	
Risk	0	0	250	100	3	353

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling			X			
Struck-by/strike			X			
Drowning/suffocation						None
Electric shock		X				
Exposure to radiation				X		
Exposure to asbestos						None
Exposure to lead					X	
Exposure to mercury						None
Exposure to chemicals						None
Biological			X			
Temperature extremes						None
Fire				X		
Explosion						None
Release of radiation				X		
Release of asbestos						None
Release of lead					X	
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	3	3	2	
Risk	0	1500	750	60	2	2312

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Table B-59. 2904-SA Cooling Water Sampler Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological			X			
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	1	0	0	
Risk	0	0	250	0	0	250

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation						None
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological			X			
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	1	0	0	
Risk	0	0	250	0	0	250

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Table B-60. S Plant Butler Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock				X		
Exposure to radiation				X		
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals				X		
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals					X	
Totals	0	0	0	4	2	
Risk	0	0	0	80	2	82

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock				X		
Exposure to radiation				X		
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals				X		
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals					X	
Totals	0	0	0	4	2	
Risk	0	0	0	80	2	82

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Table B-61. 241-SX-401 Process Control Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling					X	
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock		X				
Exposure to radiation					X	
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	0	1	3	
Risk	0	1500	0	20	3	1523

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling		X				
Struck-by/strike		X				
Drowning/suffocation						None
Electric shock		X				
Exposure to radiation					X	
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	3	0	0	2	
Risk	0	4500	0	0	2	4502

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Table B-62. 241-SX-402 Process Control Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling					X	
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock			X			
Exposure to radiation				X		
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	0	1	2	2	
Risk	0	0	250	40	2	292

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling		X				
Struck-by/strike		X				
Drowning/suffocation						None
Electric shock			X			
Exposure to radiation				X		
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire						
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	2	1	1	1	
Risk	0	3000	250	20	1	3271

Table B-63. 221-U Canyon Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock	X					
Exposure to radiation		X				
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals					X	
Biological						None
Temperature extremes						None
Fire					X	
Explosion						None
Release of radiation					X	
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products					X	
Release of chemicals					X	
Totals	1	1	0	0	7	
Risk	50000	1500	0	0	7	51507

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock	X					
Exposure to radiation		X				
Exposure to asbestos				X		
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals					X	
Biological						None
Temperature extremes						None
Fire				X		
Explosion						None
Release of radiation					X	
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products					X	
Release of chemicals						None
Totals	1	1	0	4	4	
Risk	50000	1500	0	80	4	51584

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Table B-64. 271-U Office Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock				X		
Exposure to radiation					X	
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals					X	
Biological						None
Temperature extremes						None
Fire			X			
Explosion						None
Release of radiation					X	
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals					X	
Totals	0	0	1	3	6	
Risk	0	0	250	60	6	316

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock		X				
Exposure to radiation					X	
Exposure to asbestos				X		
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals					X	
Biological						None
Temperature extremes						None
Fire		X				
Explosion						None
Release of radiation					X	
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals					X	
Totals	0	2	0	3	5	
Risk	0	3000	0	60	5	3065

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Table B-65. 276-U Solvent Handling Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation					X	
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals					X	
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals					X	
Totals	0	0	0	0	4	
Risk	0	0	0	0	4	4

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike						None
Drowning/suffocation						None
Electric shock						None
Exposure to radiation					X	
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals					X	
Biological						None
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals					X	
Totals	0	0	0	0	4	
Risk	0	0	0	0	4	4

Table B-66. 291-U Exhaust Fan Facility.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling				X		
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock				X		
Exposure to radiation			X			
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals				X		
Biological			X			
Temperature extremes						None
Fire					X	
Explosion						None
Release of radiation				X		
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products					X	
Release of chemicals					X	
Totals	0	0	2	5	5	
Risk	0	0	500	100	5	605

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling		X				
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock				X		
Exposure to radiation			X			
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals				X		
Biological			X			
Temperature extremes						None
Fire					X	
Explosion						None
Release of radiation			X			
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products					X	
Release of chemicals					X	
Totals	0	1	3	3	5	
Risk	0	1500	750	60	5	2315

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Table B-67. 292-U Stack Gas Monitoring Building.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike					X	
Drowning/suffocation						None
Electric shock		X				
Exposure to radiation						None
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological			X			
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	1	0	3	
Risk	0	1500	250	0	3	1753

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling						None
Struck-by/strike				X		
Drowning/suffocation						None
Electric shock	X					
Exposure to radiation						None
Exposure to asbestos					X	
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological			X			
Temperature extremes						None
Fire						None
Explosion						None
Release of radiation						None
Release of asbestos					X	
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	1	0	1	1	2	
Risk	50000	0	250	20	2	50272

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Table B-68. 232-Z Plutonium Incinerator Facility.

0 to 5 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling			X			
Struck-by/strike						None
Drowning/suffocation						None
Electric shock				X		
Exposure to radiation		X				
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire				X		
Explosion						None
Release of radiation					X	
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	1	2	1	
Risk	0	1500	250	40	1	1791

5 to 10 Years						
Hazard Category	Critical	Serious	Moderate	Minor	Negligible	
Falling			X			
Struck-by/strike						None
Drowning/suffocation						None
Electric shock			X			
Exposure to radiation		X				
Exposure to asbestos						None
Exposure to lead						None
Exposure to mercury						None
Exposure to chemicals						None
Biological						None
Temperature extremes						None
Fire				X		
Explosion						None
Release of radiation				X		
Release of asbestos						None
Release of lead						None
Release of mercury						None
Release of oil/products						None
Release of chemicals						None
Totals	0	1	2	2	0	
Risk	0	1500	500	40	0	2040

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APPENDIX C

100 AND 200 AREAS RISK EVALUATION

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C2-22 271-U Office Building C2-137
C2-23 176-U Solvent Handling Facility C2-141
C2-24 291-U Exhaust Fan Facility C2-143
C2-25 292-U Stack Gas Monitoring Building C2-151
C2-26 232-Z Plutonium Incinerator Facility C2-155

APPENDIX C - PART I

100 AREA RETIRED FACILITIES

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Table C1-1. 103-B Riggers Loft. (2 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						II, C Moderate	II, C Moderate
	Loading ramp	Person falls from loading ramp on south end of building	1. No guard rails	II/II	C/C		
			2. Building is in regular use				
			3. Ramp about 4 ft high				
	Back steps	Person falls from degraded back steps	4. Degraded back steps and handrail	II/II	D/C		
Electrical shock						I, C Serious	I, C Serious
	Outside of south wall, east side of door	Person receives shock from contact with exposed wires in electrical switch	1. Distribution raceway improperly modified, exposing 120-V energized wire	I/I	C/C		
	Loading dock	Person receives shock while clearing debris from light socket, causing a fault	2. Foreign material in light socket	I/I	D/D		
			3. No disconnect for circuit				
	Electrical equipment entrance, east wall	Person receives shock while clearing debris from light socket, causing a fault	4. No grounding conductor in the 480-V and 120-V circuits	I/I	C/C		
			5. Over-current protection questionable				
	General	Person receives electrical shock from contact with miscellaneous metal conductors during fault	6. No disconnect switch in 120-V circuit	I/I	C/C		
			7. Over-current protection questionable				
			8. Building actively in use				
Fire						IV, D Negli.	IV, D Negli.
	Loading dock	Person is burned by arc flash while contacting light socket during fault that may also ignite local debris	1. Foreign material in light socket	IV/IV	D/D		
			2. No disconnect for circuit				

Table C1-1. 103-B Riggers Loft. (2 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Fire (cont.)	--	--	3. Over-current protection questionable	--	--	--	--
Exposure to miscellaneous chemicals	Inside building	Person is exposed to unknown chemical through inhalation, consumption, or absorption	1. Unmarked and/or unidentified liquids in building 2. Building is unoccupied	II/II	D/D	II, D Minor	II, D Minor

Table C1-2. 104-B-2 Tritium Laboratory.

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 years
Exposure to radiation	General	Person is exposed to tritium radiation	1. Low radiotoxicity of tritium 2. Door locked; access limited 3. Tritium diffuses rapidly	IV/IV	E/E	IV, E Negli.	IV, E Negli.
Release of radiation	Ventilators on south wall and vent pipes	Release of tritium through vents from air movement and diffusion	1. Unknown concentrations of tritium 2. Tritium half-life is 12.3 years 3. Tritium diffuses rapidly	III-3 III-3	D/E	III-3, D Negli.	III-3, E Negli.

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Table C1-3. 105-B Reactor Building. (14 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, D Minor	I, C Serious
			*Interior doors to roof allow access				
			*No roof danger postings on many upper level roof access doors				
	Corridor to storage basin	Person falls through roof panel while on roof	1. Three panels with large holes, two of which are dangerous	I/I	D/C		
	Fan room		2. One broken roof panel				
	Charge preparation area		3. One bad roof panel				
	Process area, rod room		4. One roof panel with serious 2-in. deflection; two cracked panels				
	East corridor to storage basin		5. Three panels with large holes and others with cracks	I/I	D/C		
	Basin, storage area	Person falls through roof from a wall collapse	6. Load-bearing wall severely cracked	I/I	E/E		
			7. Slant cracks in south and west transfer area walls				
	Stairway above accumulator room	Person falls because of handrail failure	8. Loose handrail	I/I	E/D		
	Far side stairway	Person falls during routine relamping activities	9. Poor illumination	II/II	D/D		
	Access ladders off reactor		10. Poor illumination				
	Stairway steps in accumulator room	Person falls from failure of stair steps	11. Concrete steps cracked	II/II	D/D		
	Charge preparation area		12. Seven broken concrete steps				
	Workshop roof near control room	Person falls from roof because of handrail failure	13. Workshop roof handrail degraded	II/II	D/D		
	General front face	Person trips over temporary electrical cords on floor	14. Temporary cords used for permanent power supply	IV/IV	C/C		

Table C1-3. 105-B Reactor Building. (14 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling (cont.)	Third fan cell	Person trips from lighting circuit trip shutting down lights	15. Degraded insulation on energized dangling receptacle	II/II	D/D	--	--
	Access ladders off reactor	Person falls from ladder	16. Projections into ladder space and lack of caging	I/I	D/D		
Struck by or striking						II, D Minor	II, C Modera.
			*Snow loading will increase chance of roof or wall collapse				
			*A seismic event would initiate roof or wall collapse				
			*Activities that cause significant structural vibration could initiate roof or wall collapse				
			*Most of the ceiling material is not concrete but made of a lighter sheetrock material				
	Corridor to basin	Person struck by roof panel spontaneously falling	1. Bad roof panels (same panels as identified in falling hazard section)	II/II	E/C		
	Basin, storage area	Wall or roof collapses and strikes person	2. Load-bearing wall severely cracked (same wall as identified in falling hazard section)	I/I	E/D		
	Fuel transfer area		3. Slant crack over east door; slant, vertical, and horizontal cracks on south wall	I/I	E/D		
	Process area and control rod room		4. Large vertical crack in southwest corner of south masonry wall	I/I	E/D		
	Accumulator area		5. Large vertical crack in east masonry wall	I/I	E/D		
	Front face curtain	Person is struck by front face curtain when cable fails, allowing it to unroll	6. Unknown condition of cables; could be corroded	II/II	E/D		
	Room 8 - heater fans	Hand injury from unguarded fans	7. Inadequate guards	II/II	D/D		
	Rear stairwell, just out of zone	Person strikes wall mount light fixtures	8. Fixture mounted at head height	IV/IV	B/B		

Table C1-3. 105-B Reactor Building. (14 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	Top of reactor in ceiling near stairwell	Person struck by falling lamp	9. Lamp has come loose from fixture	IV/IV	B/B	--	--
Drowning or suffocation						I, D Minor	I, D Minor
	Global throughout building	Person enters confined space and is overcome by gases or lack of oxygen	1. Many confined spaces exist in the building, both above- and belowgrade 2. There is evidence of oxidation and water accumulation 3. Samples of confined space atmospheres showed no problems 4. Building lacks ventilation 5. Most of the confined spaces in the building were not checked 6. Conditions can change at any given time 7. Confined spaces are not identified	I/I	D/D		
Electrical shock						I, B Critical	I, B Critical
	Main switchgear room	Person receives shock due to contact with energized switchgear frame	1. Enclosure not grounded 2. Main switch gear not grounded 3. Fault to cabinet occurs 4. Fault not cleared because of no grounding--causes breaker to be unable to sense fault 5. Lack of breaker preventive maintenance--not properly tested and maintained	I/I	C/C		
	Remote lighting panels, panel D, and south wall of vent room	Person receives shock from energized frame	6. Enclosure not grounded	I/I	C/C		
	Above panel E--valve pit room	Person receives shock from raceway	7. Fault to cabinet occurs				

Table C1-3. 105-B Reactor Building. (14 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	8. Electrical hookup is using groundpath for neutral return	I/I	D/C	--	--
			9. Raceway sections not firmly connected, results in energized condition				
	Accumulator room mezzanine	Person receives shock from contact with energized abraded heat trace	10. Switch using groundpath must be on	I/I	D/C		
			11. Heat trace not protected				
	Third fan room	Person receives shock from contact with energized wire when insulation is abraded	12. Receptacles hanging (dangling) loose, causing insulation abrasion	I/I	D/D		
			13. Circuits energized				
	Fan room switch gear--480 V	Person receives shock from contact with circuit by assuming that circuit is deenergized when it is actually energized	14. Inconsistencies in tagging/labeling	I/I	C/B		
	Charging room, south side, panel C		15. No panel directory	I/I	D/D		
	Walkway above ball hoppers	Person receives shock when contacting conducting surface when light filament comes in contact with rail	16. Light fixtures with missing globes are mounted at same height as hand rail	I/I	E/D		
	Balance of plant	Person receives shock from contact with energized circuit that is labeled deenergized	17. Tagging or labeling inconsistencies	I/I	B/B		
	Balance of plant	Person receives shock from contact with exposed conductors	18. Temporary cord is routed through walls and doorways subjecting it to abrasion	I/I	D/C		
			19. Temporary cord load capacity is not compatible with panel				
Exposure to radiation						II, E Negli.	II, D Minor
	Global	Person exposed to external ionizing radiation, predominantly from cobalt and cesium fixed contamination	1. Energetic gamma emitters possible in immediate vicinity of basin walls and activated structures (such as the graphite blocks and thermal shield)	II/II	E/D		

Table C1-3. 105-B Reactor Building. (14 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to radiation (cont.)	--	--	2. No specific high gamma readings were obtained during walkdown (nothing significantly above background)	--	--	--	--
		Person exposed to radioactive material by inhalation, ingestion, or absorption	3. Only occurs from resuspendable material 4. Areas and items are mislabeled or misposted 5. Postings at some areas are misleading 6. Some postings are out of date because of changes in posting requirements 7. Most material is buried with soil fill in basins or contained in stable matrix (such as stack graphite or activated steel) 8. Release of radioactive materials would require performance of activities that are intrusive in nature	IV/IV	D/D		
	Specific locations: Fuel basin walls Metal storage basin walls Process tubes Biological and thermal shields Graphite moderator						
Exposure to asbestos	Global	Person inhales friable asbestos fibers; potential exists for asbestos-related illness in future	1. Fibers must be disturbed	IV/IV	D/C	IV, D Negli.	IV, C Minor

Table C1-3. 105-B Reactor Building. (14 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to asbestos (cont.)	--	--	2. Removal program left asbestos adhering to piping and valves 3. Asbestos residue does not appear to be fixed by sealant or fixant 4. Facility is normally unoccupied 5. Zone areas worse than clean areas 6. Many pipes above human height (not as likely to be disturbed) 7. Could be exacerbated by structural failures (see falling hazard)	--	--	--	--
Exposure to lead	Global--primarily in radiation zone and transfer area	Person inhales lead dust	1. Lead is in solid form with oxidized surfaces 2. Lead control program requires moving lead to centralized locations 3. Observed lead oxidation rates in general greater than expected 4. Sensitivity to lead exposure is variable	IV/IV	B/B	IV, B Minor	IV, B Minor
Exposure to mercury	Switch on wall of northwest corner of fuel basin	Person exposed to mercury from ingestion or absorption Person receives exposure from stolen mercury	1. Very small quantities 2. Contained in glass containers 3. During D&D of 108-B Building, a significant quantity of mercury was stolen and never recovered 4. History of accidents involving spills of mercury	IV/IV IV/IV	E/E D/D	IV, D Negli.	IV, D Negli.

Table C1-3. 105-B Reactor Building. (14 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals						II, D Minor	II, D Minor
		Person exposed to unknown or known chemicals through inhalation, ingestion, or absorption from breach of container	1. Facility is normally unoccupied in most areas	II/II	D/D		
			2. The materials may be more or less stable, depending on age and chemical makeup				
			3. Few chemicals in facility				
			4. Exposure requires loss of chemical containment				
			5. Person must come in contact with material				
			6. Process of collecting and staging material increases possibility of exposure				
			7. Some materials are unknown				
	Specific locations:						
	X-2 level		8. Unknown solid material in two glass containers; could be cobalt chloride				
	Storage basin wash pad bucket elevator		9. Facility contains spray paint and container of bowl cleaner				
	Fan room, north end		10. Unknown mixture of blue crystalline material with liquid in a waste basket				
	Fan room, south end		11. 5-gal can of heptane				
	Fan room, southwest corner		12. Unknown aerosol can				
	Fan room, southeast corner		13. Two 5-gal containers of decontaminator label indicates harmful if inhaled				

Table C1-3. 105-B Reactor Building. (14 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals (cont.)	North end of mezzanine outside outer control rod room Valve pit	--	14. Two partially full 5-gal containers of concentrating chlorinating solution 15. 55-gal container of unknown material hand-labeled as vermiculite (unable to verify) 16. Unknown chemical residues (suspected to be decontamination agent) on floor on north end	--	--	--	--
Exposure to biological hazards	Zone areas	Person exposed to dusts from bird guano and dead animals; contracts disease Person exposed to spider bites, wasp stings, bat bites, snake bites, and snake bites	NOTE: Events that are serious in nature are of low probability. Likewise, events that are minor in effect are of higher probability. Low frequency accidents have significant consequences High frequency accidents have small consequences 1. Presence of spiders, wasps, etc. is seasonal 2. Very low building activity 3. Hazards mostly found in radiation zone areas 4. Several sightings of bats have occurred 5. Bat bites may have occurred in the past 6. Mouse bites may have occurred in past (rodents) 7. Snakes have been found in the buildings (including rattlesnakes) 8. Activities for cleanup and maintenance occur where hazards exist	 II/II IV/IV	 C/C A/A	II, C Modera.	II, C Modera.

Table C1-3. 105-B Reactor Building. (14 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to biological hazards (cont.)	--	--	9. Current conditions are not severe	--	--	--	--
Temperature extremes						II, C Moderate	II, C Moderate
	General	Person experiences heat exhaustion	1. Seasonal 2. Dependent on ventilation 3. Hanford Site has a history of this problem occurring 4. Hazard depends on type of work being performed 5. Can be controlled by limiting exposure 6. Low activity of concern 7. Workers have natural inclination to express discomfort in temperature extremes	II/II	C/C		
		Person experiences hypothermia	8. Low temperatures occur occasionally at the Hanford Site 9. No active heating system in much of building				
Fire						II, D Minor	II, D Minor
	Global--switch boxes	Person exposed to injury from fire caused by sparking contacts igniting combustible materials in the switch boxes	1. Missing cover plates, or cover plates with holes, that allow the entrance of combustible materials	II/II	D/D		
	Fan room	Person exposed to injury from fire caused by electrical fault	2. Lack of breaker preventive maintenance 3. Severity depends on combustible loading				
	Main switchgear room	Person exposed to injury from fire caused by failure of bus duct system	4. Enclosure not grounded (see electrical shock) 5. Not much combustible material in main switch room	IV/IV	D/C		

Table C1-3. 105-B Reactor Building. (14 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Fire (cont.)	Balance of plant	Person injured from fire resulting from insulation failure of flexible cords (type "50")	6. Insulation degraded in overhead cord	IV/IV	D/D	--	--
	Ball hopper mezzanine	Person injured from fire resulting from ignition of nesting materials	7. Nesting material present in energized electrical hardware 8. Not much ignitable material in ball hopper mezzanine cable tray	IV/IV	D/D		
	Places where roof or wall collapse can occur • Transfer area • Storage area • Control rod room	Person injured from fire resulting from roof or wall collapse resulting in electrical faults that ignite wood or paper		I/I	E/E		
Explosion						I, D Minor	I, D Minor
	General	Shock sensitive material causes explosion that injures individual	1. Age of material 2. Type of material 3. Ambient temperature 4. Movement of chemicals occurs as part of the cleanup program 5. It is not clear that the WHC policy on unknown chemicals is followed 6. Not many unknown chemicals in facility 7. Fire department has been the designated contact for handling unknown chemical spills	I/I	D/D		

Table C1-3. 105-B Reactor Building. (14 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive materials						III-2, D Negli.	III-2, D Negli.
	Radiation zones	Spread of contamination by biological agency (birds, mice, etc.)	1. Mortar deterioration	III-2 III-2	D/D		
	Valve pit		2. Openings around exterior doors				
	Lab area on south side of reactor		3. Deteriorated doors				
			4. Open pipes				
	Radiation zones	Release of radioactive material as a result of wind or water erosion in building	5. Mortar deterioration				
	Valve pit		6. Openings around exterior doors				
	Lab area on south side of reactor		7. Deteriorated doors				
	Transfer area		8. Approximately 1,500 counts/min highest level of smearable contamination				
	Sink near accumulator room	Release resulting from improper or accidental use of drains	9. Drains are labeled "UNCONTAMINATED"; not sealed	III-2 III-2	D/D		
			10. Unknown discharge point for drain				
	Global	Release of contaminated lead via theft, sabotage, etc.	11. Lead could be contaminated or activated				
Release of asbestos						III-3, C Negli.	III-3, C Negli.
	Global	Release of asbestos from friable pipe or wire insulation	1. Normal wear and tear releases asbestos	III-3 III-3	C/C		
	Inside and outside building	Release of asbestos from fire or collapse of structure	2. Cracked wall	III-2 III-2	D/E		
			3. Seismic event				
			4. Deterioration of roof (see falling and struck by hazards)				

Table C1-3. 105-B Reactor Building. (14 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of lead						III-2, D Negli.	III-2, D Negli.
	Global	Release of lead by theft or sabotage	1. Significant quantities of removable lead 2. Potential to be mixed waste 3. Located in remote areas of building 4. Located in radiation zones 5. High density minimizes likelihood for removing large quantities 6. Usefulness in a number of recreational activities increases likelihood of theft 7. Theft of materials has occurred in the past 8. Evidence of water intrusion	III-2 III-2	D/D		
Release of mercury						III-3, D Negli.	III-3, D Negli.
		Mercury released to environment as a result of container breakage	1. Very small quantities 2. Contained in glass containers that are subject to breakage 3. Located in remote areas of building 4. Known locations are in radiation zones 5. Possibility for existence as mixed waste	III-3 III-3	D/D		
		Mercury released to environment from theft or sabotage	6. During D&D of 108-B, a significant quantity of mercury was stolen and never recovered				

Table C1-3. 105-B Reactor Building. (14 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of Mercury (cont.)	Specific location: Switch on wall of northwest corner of fuel basin	--	7. One mercury switch	--	--	--	--
Release of oil and petroleum products						III-3, D Negli.	III-3, D Negli.
		Release of oil outside the building due to failure of equipment seals, valves, piping, reservoirs, etc.	1. Materials are located inside building	III-3 III-3	D/D		
			2. Most areas have small quantities of oil present				
			3. Unknown quantities of oil in VSR drive motors				
			4. Majority of oil-containing equipment is not leaking				
			5. Oil in radiation zones has potential of being designated as mixed waste				
			6. Seals and gaskets are growing older, increasing likelihood of leakage				
			7. Gaskets and seals tend to leak during temperature changes				
	Specific locations: Storage basin adjacent to door 37		8. Oil in line oiler, industrial chemical				
	Outer rod and accumulative room		9. Oil in rod drive system				
	North end of 50-ft level		10. Oil in line oiler and steel tank				
	Ball hopper area		11. Oil on floor and drip pans				
	Fan room		12. Oil from fan bearings and regulators in cabinet				

Table C1-3. 105-B Reactor Building. (14 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of oil and petroleum products (cont.)	Fan cell 8	--	13. In line oiler and manifold	--	--	--	--
Release of miscellaneous chemicals						III-3, D Negli.	III-3, D Negli.
		Release of miscellaneous chemicals from container failure	1. Small quantities	III-3 III-3	D/D		
			2. Inside building				
			3. Majority of chemicals staged in one location				
			4. The majority of containers are in good condition				
	Specific locations:						
	X-2 level		5. Unknown solid material in two glass containers; could be cobalt or chloride				
	Storage basin wash pad bucket elevator		6. Facility contains spray paint and container of bowl cleaner				
	Fan room, north end		7. Unknown mixture of blue crystalline material with liquid in a waste basket				
	Fan room, south end		8. 5-gal can of heptane				
	Fan room, southwest corner		9. Unknown aerosol can				
	Fan room, southeast corner		10. Two 5-gal containers of decontaminator label indicates harmful if inhaled				

*Common to a number of different accidents and/or locations.
D&D = Decontamination and decommissioning
ID = Identification
LEL = Lower exposure levels
VSR = Vertical safety rod

Table C1-4. 185-B Water Treatment Plant/190-B Main Pump House. (3 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, C Serious	I, C Serious
	General roof	Person falls through deteriorated concrete roof panel or through missing panel	1. Six panels missing	I/I	C/C		
			2. South roof panels (185-B) deteriorated from leaks				
			3. Fifty percent of 190-B roof panels cracked; four panels severely cracked				
			4. Building is open to access				
	Pump room	Person falls into floor level holes	5. A number of medium diameter holes (18-24 in.) exist where equipment has been extracted	II/II	D/D		
			6. No illumination in building				
	Pit at southeast corner of 190-B	Person falls into 20-ft pit located immediately outside	7. No guard rails, but a low retaining wall surrounds pit	II/II	D/D		
Struck by or striking						I, C Moderate	I, C Serious
	General roof	Person struck by falling concrete roof panel	1. Six panels missing	I	D/C		
			2. South roof panels (185-B) deteriorated from leaks				
			3. Fifty percent of 190-B roof panels cracked; four panels severely cracked				
	General interior	Person struck by falling wall or associated roof section	4. Cracks and large opening in walls	II	C/C		
			5. Walls and roof panels subject to wind, seismic events, and snow loading				
			6. Infrequent unauthorized access				
			7. Building is easy to enter physically				
			8. Walls can fall outward as well as inward				

Table C1-4. 185-B Water Treatment Plant/190-B Main Pump House. (3 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Drowning or suffocation	Subgrade level, HVAC plenum rooms, vessels, and pits	Person is overcome by gases or lack of oxygen upon entering a confined space	1. Corrosion and oxidation in low areas 2. Access to lower areas is easy 3. Air samples taken showed no problems 4. No ventilation 5. Atmosphere in confined spaces is subject to change	I/I	D/D	I, D Minor	I, D Minor
Exposure to asbestos	South wall 190 B tank room East outside 190-B	Person inhales friable asbestos; potential exists for asbestos-related illness in future from such exposure	1. Small quantity of friable asbestos 2. Disturbance would have to occur to create friable quantities	IV/IV	D/D	IV, D Minor	IV, D Minor
Exposure to biological hazards	General areas	Person exposed to dusts from bird guano and dead animals; contracts disease	NOTE: Events that are serious in nature are of low probability. Likewise, events that are minor in effect are of higher probability.			II, C Modera.	II, C Modera.
		Person exposed to spider bites, wasp stings, bat bites, mouse bites, and snake bites	Low frequency events have significant effects	IV/IV	A/A		
			High frequency events have small effects 1. Presence of spiders, wasps, etc. is seasonal 2. Very low building activity 3. Hazards mostly found in radiation zone areas 4. Several sightings of bats have occurred	II/II	C/C		

Table C1-4. 185-B Water Treatment Plant/190-B Main Pump House. (3 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to biological hazards (cont.)	--	--	5. Bat bites may have occurred in the past 6. Mouse bites (rodents) may have occurred in past 7. Snakes have been found in the buildings (including rattlesnakes)	--	--	--	--
Release of asbestos	South wall 190-B tank room East outside 190-B Building On ground	Disturbance of friable asbestos releases asbestos into the air	1. Small quantity of friable asbestos 2. Large openings to 190-B tank room 3. Poor asbestos control by 1980's demolition contractor	III-3 III-2	C/B	III-3, C Negli.	III-2, B Minor
Release of mercury	Mercury switch on north stairwell in north mezzanine in 185-B Building	Break of glass container in switch releasing mercury	1. Very small quantity of mercury 2. Mercury in breakable glass container 3. Area posted with sign and roped off	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.
Release of miscellaneous chemicals	Room east side of north mezzanine in 185-B Building	Break or spill of glass container releasing unknown liquid	1. Small quantity of unknown liquid 2. Unknown material in breakable glass container	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.

HVAC = Heating, ventilation, and air conditioning

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Table C1-5. 190-B Tunnel/Annex. (2 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						II, C Modera.	I, C Serious
	Control openings	Person falls through precast concrete plate while standing on it	1. Precast concrete plate cracked	I/I	D/C		
	Deformed floor grating	Person falls through grating	2. Grating is deformed				
	All grating locations	Person trips over stubs projecting at intervals from the grating	3. Support beams have been cut .5 in. above floor creating multiple stubs	II/II	C/C		
			4. No illumination in tunnel				
Struck by or striking						II, C Modera.	II, C Modera.
	Under steel decking	Person injured when roof collapses in tunnel	1. Moisture condensing on steel decking and column base plates causing corrosion	II/II	D/C		
	Section under 190-B Building	Person is punctured by nail protruding out of wooden boards	2. Wooden boards with protruding nails are scattered throughout tunnel section under 190-B Building	II/II	C/C		
			3. No illumination				
			4. Tripping hazards exist				
	General	Person is punctured by metal brackets and extensions that have been cut away	5. Jagged metal edges exist that extend into walkways	II/II	C/C		
			6. No illumination				
			7. Tripping hazards exist				
Exposure to asbestos						IV, D Negli.	IV, D Negli.
	General	Person inhales friable asbestos; potential exists for asbestos-related illness in future from such exposure	1. Comparatively small amounts of asbestos exists in pipe insulation and transite	IV/IV	D/D		
			2. Very little disturbance in tunnels that would create friable quantities				
			3. Extensive water damage				

Table C1-5. 190-B Tunnel/Annex. (2 sheets)

Risk evaluat ummary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to biological hazards						IV, D Negli.	IV, D Negli.
	General, but particularly under 190-B Building	Person exposed to dusts from bird guano and dead animals; contracts disease (e.g., Aspergillosis or Histoplasmosis)	1. Likelihood of contacting disease is low if dust levels are low 2. Some evidence of animal droppings	IV/IV	D/D		

Table C1-6. 1701-BA Exclusion Area Badge House. (2 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking						IV, E Negli.	IV, D Negli.
	General	Person struck by falling ceiling tiles	1. Visible water leaks 2. Ceiling is currently being fixed	IV/IV	D/E		
Electrical shock						I, C Serious	I, C Serious
	Room in northeast corner along north wall	Person receives electrical shock from contact with energized raceways or equipment during fault	1. Electrical distribution panel door stuck closed, no panel maintenance	I/I	D/D		
	Outside north end of building	Person receives electrical shock from contact with energized light fixture or raceway	2. Fixture is hanging by wires 3. Fixture is loose from raceway (not grounded)	I/I	C/C		
	Outside yard post	Person receives electrical shock from contact with receptacle	4. Improper fittings used 5. Drilled holes in waterproof box to mount	I/I	D/D		
	Northwest corner room, east wall	Person receives electrical shock from contact with bare wires if energized	6. No cover on box with exposed 120-V wires 7. Presently is not energized; may have power reapplied at any time	I/I	D/D		
Fire						IV, C Minor	IV, B Minor
	Room in northeast corner along north wall	Person burned by electrical fire in raceways or equipment caused by fault	1. Electrical distribution panel door stuck closed with no panel maintenance 2. Fire is of brief duration 3. Very low building activity	IV/IV	E/E		
	Outside north end of building	Person burned by arc flash when clearing debris or changing light caused by shorted condition	4. Fixture is hanging by wires	IV/IV	C/B		

Table C1-6. 1701-BA Exclusion Area Badge House. (2 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Fire (cont.)	--	--	5. Fixture is loose from raceway (not grounded) 6. Nesting material in fixture	--	--	--	--

Table C1-7. 105-C Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, C Serious	I, B Critical
			*Interior doors to roof allow access.				
			*No roof danger posting on many upper level roof access doors.				
	Fan room	Person falls through roof panel	1. Ten degraded panels in fan room; no visible leaks but suspect capacity	I/I	C/B		
	Work area		2. Four cracked panels in work area	I/I	C/B		
			3. Large number of broken panels in corridors, electrical room, and office areas. Evidence of heavy leaking.				
	Storage and Transfer area		4. One panel in storage area is broken	I/I	C/B		
			5. Seven panels in corridor west of transfer area are damaged				
			6. Many damaged panels and evidence of heavy leaking in miscellaneous storage room and associated south corridor				
	Process area		7. Eighty percent of the panels above process area are degraded	I/I	C/B		
			8. Thirty percent panels above core area are in bad condition				
			9. Limited access from outside and zones				
	Miscellaneous poorly illuminated areas	Person slips or trips	10. Poor illumination				
	Specific locations:		11. Clutter and debris	II/II	D/D		
	Switch gear room						
	Office area 2						

Table C1-7. 105-C Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling (cont.)	Kitchen area Front face work area Exhaust room 10 Radiation zones	--	--	--	--	--	--
Struck by or striking						II, D Minor	II, C Moderate
			*Poor illumination in certain areas *Clutter and debris *Gypsum roof panels are relatively light to other panels *Snow loading will increase likelihood of roof or wall collapse *Seismic events could initiate roof or wall collapse *Activities that cause structural vibration could initiate roof or wall collapse				
	Fan room	Person struck by falling gypsum roof panel initiated by snow, rain, or seismic events	1. Ten degraded panels in fan room; no visible leaks but suspect capacity	II/II	D/C		
	Work area		2. Four cracked panels in work area	II/II	D/C		
			3. Large number of broken panels in corridors, electrical room, and office areas. Evidence of heavy leaking.				
	Storage and transfer area		4. One panel in storage area is broken	II/II	D/C		
			5. Seven panels in corridor west of transfer area are damaged				

Table C1-7. 105-C Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	Miscellaneous storage room and associated south corridor	--	6. Many damaged panels and evidence of heavy leaking	--	--	--	--
	Process area	Person falls through roof panel	7. Eighty percent of panels above process area degraded	II/II	D/C		
			8. Thirty percent of panels above core area are in bad condition				
	Under light fixtures	Person struck by fluorescent light tube falling from fixture	9. Light tubes loose	IV/IV	D/D		
	Bathroom and control room	Person receives laceration from heater fan from lack of fan guard	10. Fan is in operation during the winter	II/II	D/D		
			11. Located below 8-ft height				
			12. Fan guard inadequate				
			13. Poor maintenance				
	Connected electrically powered equipment	Person is struck by inadvertently energized mechanical equipment	14. Some equipment does not appear to be disconnected	II/II	E/E		
			15. Circuits apparently get energized for various reasons without consideration for what might be connected				
			16. This risk becomes more important during intrusive activity				
Drowning/ Suffocation						I, D Minor	I, D Minor
	Global throughout building	Person enters confined space and is overcome by gases or lack of oxygen	1. Many confined spaces exist in the building, both above- and belowgrade	I/I	D/D		
			2. There is evidence of oxidation and water accumulation				
			3. Samples of confined space atmospheres showed no problems				
			4. Building has lack of ventilation				

Table C1-7. 105-C Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Drowning/ Suffocation (cont.)	--	--	5. Most of the confined spaces in the building were not checked 6. Conditions can change at any given time 7. Confined spaces are not identified	--	--	--	--
Electrical shock						I, C Serious	I, B Critical
	Balance of plant	Person receives electrical shock from contact with energized circuits	1. Improper identification of energized circuits 2. Drawings not current 3. Inadequate tagging of energized equipment	I/I	C/C		
	Multiple locations (approximately 40 locations)	Person receives electrical shock from contact with exposed electrical equipment that could become energized	4. Open electrical boxes 5. Exposed wiring 6. Deactivated circuits are not disconnected	I/I	C/B		
	Tool rooms just west of work area and general	Person receives electrical shock due to water leak through degraded roof into electrical fixtures or boxes causing shock potential	7. Leaking degraded roofing	I/I	D/C		
Exposure to radiation						IV, D Negli.	IV, D Negli.
	Global	Person receives internal uptake of radioactive material	1. Contamination fixed to wall floor surfaces 2. Leaks could dislodge fixed contamination 3. Source material is a stable matrix such as the graphite stack or activated steel 4. Release of radioactive material would require intrusive activity	IV/IV	D/D		

Table C1-7. 105-C Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to radiation (cont.)	--	Person is exposed to external radiation	5. Many radiation fields	IV/IV	D/D	--	--
			6. No readings significantly over background were detected during the walkdown (see 3 mR on X level)				
			7. Need extended exposure to receive significant doses				
		Person is exposed to external radiation from alternation of shielding, causing increased exposure rates	8. Radiation levels around portable safe were found to increase when bricks were moved	IV/IV	D/D		
			9. Nonexistent and/or inaccurate labeling				
	Specific locations:						
	Fuel basin metal storage area						
	Nonradiation tool storage door						
	Lead brick shielding in non-radiation tool room ceiling						
	X1 level, pipe asbestos		Approximately 3 mR/h reading on outside of pipe				
	Number 4 reactor face (X1 left)						
	High-press pipe (X1 level)						
	Shielding safe on floor of (X1 level)						
	Switch at top of access stairs at top of reactor						
	Ball hopper 4 ft from stairwell						

Table C1-7. 105-C Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to asbestos						IV, D Negli.	IV, C Minor
	Switch gear room Office area 2 Kitchen service area Second floor level Basin entrance step-off area Laundry storage area Men's change room Lab room Fan room Exhaust fan rooms 8 and 9	Person inhales asbestos fibers	1. Age of facility--friable asbestos 2. Access to building controlled--very low activity level 3. Areas not tested for hazard but potential exists 4. Leaking roof is degrading asbestos condition 5. Significant amounts of friable asbestos exists in pipe insulation and some electrical wire insulation 6. Exposure to asbestos could be exacerbated by structural failures such as structural collapse (see falling hazard) *Factors apply to all locations	IV/IV	D/C		
Exposure to lead						IV, B Minor	IV, B Minor
	Change room drain X1 level X2 level Top of reactor block	Person breathes in lead dust	1. Lead bricks are handled for environmental cleanup purposes 2. Lead bricks are old, lead dust exists 3. Observed oxidation rates at the Hanford Site in general are greater than expected 4. Sensitivity to lead exposure varies	IV/IV	B/B		

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Table C1-7. 105-C Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to lead (cont.)	Nonradiation tool room	--	--	--	--	--	--
Exposure to mercury						IV, D Negli.	IV, D Negli.
	Meters in left pump room adjacent to door	Person receives exposure to mercury (fumes and skin absorption) from broken mercury containers	1. Small quantities	IV/IV	D/D		
	Switch in northwest corner of balcony above reactor core	Person receives exposure to stolen mercury	2. Contained in breakable glass				
	Switch of west wall of the D machine room		3. Located in remote areas of the building				
			4. Mercury locations in radiation zones				
			5. Theft of mercury has occurred at B Area				
Exposure to miscellaneous chemicals						II, D Minor	II, D Minor
	Water workshop	Person receives harmful exposure to miscellaneous chemicals (janitorial supplies, water treatment chemicals, and unknown substances) from spilled containers	1. Unknown chemicals in water workshop cabinet	II/II	D/D		
			2. Small quantities				
			3. Container in good condition				
	Specific locations:						
	Men's room adjacent to entrance		4. Janitorial supplies				
	Along west wall of control room		5. Small glass jar of methyl silicone polymer				
	Cabinet adjacent to stainless steel sink in change room		6. Unknown liquid in 1-L bottle, 1 gal of phosphoric acid, scouring powder, and unknown powder substance				

Table C1-7. 105-C Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals (cont.)	B exhaust fan room	--	7. Belt dressing	--	--	--	--
	Tool room access from lab		8. Miscellaneous solvents				
	Southeast corner of X1 level		9. Two unknown compressed gas bottles				
Exposure to biological hazards						II, C Moderate	II, C Moderate
	Zone areas	Person exposed to dusts from bird guano and dead animals; contracts disease	NOTE: Events that are serious in nature are of low probability. Likewise, events that are minor in effect are of higher probability.				
		Person exposed to spider bites, wasp stings, bat bites, mouse bites, and snake bites	Low frequency accidents have significant consequences.	II/II	C/C		
			High frequency accidents have small consequences.	IV/IV	A/A		
			1. Presence of spiders, wasps, etc., is seasonal				
			2. Very low building activity				
			3. Hazards mostly found in radiation zone areas				
			4. Several sightings of bats have occurred				
			5. Bat bites may have occurred in the past				
			6. Mouse bites may have occurred in past (rodents)				
			7. Snakes have been found in the buildings, including rattlesnakes				

Table C1-7. 105-C Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Temperature extremes						II, C Modera.	II, C Modera.
	General	Person experiences heat exhaustion	1. Seasonal 2. Dependent on ventilation 3. Hanford Site has a history of this problem occurring 4. Hazard depends on type of work being performed 5. Can be controlled by limiting exposure 6. Low activity of concern 7. Workers have natural inclination to express discomfort in temperature extremes	II/II	C/C		
		Person experiences hypothermia	8. Low temperatures occur occasionally at the Hanford Site 9. No active heating system in much of the building				
Fires						IV, C Minor	IV, B Minor
	General	Person burned by fire started from ignition caused by fault in electrical system	1. Circuit breakers not maintained. 2. No fire protection or suppression system in building 3. Many exit doors locked. 4. Open electrical boxes 5. Few combustion materials 6. Evidence of small fire in control room light fixture. Over-current protection did not clear fire source.	IV/IV	C/B		

Table C1-7. 105-C Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Fires (cont.)	--	--	7. Over-current protection questionable.	--	--	--	--
Explosion	General	Shock sensitive material causes explosion that injures individual	1. Age of material 2. Type of material 3. Ambient temperature 4. Movement of chemicals occurs as part of the cleanup program 5. It is not clear that the WHC policy on unknown chemicals is followed 6. Not many unknown chemicals in facility 7. Fire department has been designated contact for handling unknown chemical spills	I/I	D/D	I, D Minor	I, D Minor
Release of radioactive material	On east wall of change room	Release of radiation to unknown location from inadvertent use of contaminated drain	1. Contamination is fixed or contained 2. Posted as contaminated 3. Unknown discharge location for drain 4. No active water supply at sink or in building 5. Contamination levels of drain unknown 6. Drain not sealed	III-2 III-2	D/D	III-2, D Negli.	III-2, D Negli.

Table C1-7. 105-C Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material (cont.)	Exterior northeast corner of building adjacent to the fuel exam area	Release of radiation from wind or water erosion that transports radioactive material outside contaminated area	7. Area contained surface contamination	III-2 III-2	D/D	--	--
		Release of radiation from contamination spread by insects or animals.	8. Area contains vegetation, wind blown soil, and tumbleweeds	III-3 III-3	D/D		
	Global in radiation zone	Release of radiation from spread of contamination by biological intrusion (rodents)	9. Small amounts of bird and rodent debris 10. Small amounts of smearable material 11. Relative few openings in building 12. No reportable occurrences				
Release of asbestos	General Specific locations: Switch gear room Office area 2 Kitchen area Second floor level	Release from accidental disturbance of friable asbestos	1. Outside asbestos on vent dusts is presently exposed to environment because encapsulant is flaking off 2. Significant amounts of friable asbestos exists in pipe and some electrical wire insulation 3. Asbestos abatement program started but terminated early 4. Building posted as an asbestos hazard 5. Access to building controlled, very low activity level	III-3 III-3	B/A	III-3, B Negli.	III-3, A Minor

Table C1-7. 105-C Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of asbestos (cont.)	Basin entrance step-off area Laundry storage area Men's change room Lab room Fan room Exhaust fan room 8 and 9	--	--	--	--	--	--
Release of lead	X1 level X2 level Top of reactor Nonradiation tool room	Release caused by activities related to theft of lead and dumping lead to environment	1. Significant quantities of removable lead 2. Potential to be mixed waste 3. Located in remote areas of building 4. Located in radiation zones 5. High density minimizes likelihood for removing large quantities 6. Usefulness in a number of recreational activities increase likelihood of theft 7. Theft of materials has occurred in the past 8. Evidence of water intrusion	III-2 III-2	D/D	III-2, D Negli.	III-2, D Negli.

Table C1-7. 105-C Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of mercury						III-3, D Negli.	III-3, D Negli.
		Mercury released to environment as a result of broken container	1. Very small quantities	III-3 III-3	D/D		
			2. Contained in glass containers that are subject to breakage				
			3. Located in remote areas of building				
			4. Known locations are in radiation zones				
			5. Possibility for existence as mixed waste				
		Mercury released to environment from theft or sabotage	6. During D&D of 108-B, a significant quantity of mercury was stolen and never recovered				
	Specific locations:						
	Meters in left pump room adjacent to door		7. In meter				
	Switch in northwest corner of balcony above reactor core		8. One mercury switch				
	Switch of west wall of the "D" machine room		9. One mercury switch				
Release of oil or petroleum products						III-3, D Negli.	III-3, D Negli.
		Release of oil from failure of seals, valves, and equipment	1. Older oils could contain hazardous material (regulatory status unknown)	III-3 III-3	D/D		
			2. Inside building				
			3. Residual quantities				
			4. Majority of oil containing equipment leaks				

Table C1-7. 105-C Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of oil or petroleum products (cont.)	--	--	5. Oil in radiation zone, potential for mixed waste	--	--	--	--
	Specific locations:						
	Bearing housing in fan room area		6. Oil leak from bearing				
	Fan motor in exhaust fan room 9		7. Oil leak from motor				
	Pumps in lift pump room		8. Oil leak from pump				
	Level 2		9. Oil leak from hoist				
	Large portion of floor or Rx block		10. Oil leak on floor				
	Southwest corner balcony above reactor block		11. Oil in reservoir				
	West wall of gallery level above Rx block		12. Oil in-line oiler				
Release of miscellaneous chemicals						III-3, D Negli.	III-3, D Negli.
		Release of miscellaneous chemicals from container failures	1. Floor drains in bathroom and change room	III-3 III-3	D/D		
			2. Small quantities				
			3. Containers in good condition				
	Specific locations:						
	Men's room adjacent to entrance		4. Janitorial supplies				
	Along west wall of control room		5. Small glass jar of methyl silicone polymer				

Table C1-7. 105-C Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of miscellaneous chemicals (cont.)	Cabinet adjacent to stainless steel sink in change room	--	6. Unknown liquid in 1-L bottle, 1 gal of phosphoric acid, scouring powder, and unknown powder substance	--	--	--	--
	B exhaust fan room		7. Belt dressing				
	Tool room access from lab		8. Miscellaneous solvents				
	Southeast corner of X1 level		9. Two unknown compressed gas bottles				

*Common to a number of different accidents and/or locations.
D&D = Decontamination and decommissioning
WHC = Westinghouse Hanford Company

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Table C1-8. 183-C Filter Plant Pump Room. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, D Minor	I, B Critical
	Roof over clearwell	Person falls through roof over clearwell	1. Access to roof over clearwell exists 2. Access to roof posted as DANGEROUS	I/I	D/D		
	Transite roof over filter basins	Person falls through roof over filter basins	3. Leaks have degraded steel roof understructure 4. Transite becomes very soft when saturated with standing water (nonload bearing) 5. Access to roof is posted 6. The level of degradation of transite panels is not always visible to naked eye (requires tensile testing)	I/I	D/B		
Struck by or striking						II, C Moderate	I, B Critical
	General	Person is struck by falling roof that collapses under snow load	1. Leaks have degraded under roof structure 2. Hanford Site snow loads can occasionally be heavy 3. Atmosphere was wet during operation, leading to roof structure effects 4. Transite roof panels are not heavy 5. After 5 years, the roof steel structure could collapse	II/I	C/B		
Drowning/ suffocation						I, D Minor	I, D Minor
	General	Person enters confined space and is overcome by gases or lack of oxygen	1. Some areas tested with no negative results 2. Age of facility 3. Facility inactive for a long time	I/I	D/D		

Table C1-8. 183-C Filter Plant Pump Room. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Drowning/ suffocation (cont.)	--	--	4. No ventilation 5. No confined space postings	--	--	--	--
Exposure to radiation	General	Person is exposed to radioactive material caused by mechanical disturbance of piping, etc.	1. Buildup of naturally occurring radioactive material 2. In 183-B Head House, radioactive thorium was found in systems handling bauxite (similar functions) 3. Pipe scavenging not uncommon	IV/IV	E/E	I, E Negli.	I, E Negli.
Exposure to asbestos	Near piping throughout facility	Person inhales disturbed friable asbestos	1. Significant quantities of friable asbestos 2. Minimal level of building activity	IV/IV	C/C	IV, C Minor	IV, C Minor
Exposure to miscellaneous chemicals	Dichromate tanks	Person is exposed to dichromate due to release from tank	1. Unknown small quantities appear to reside in bottom of tank	IV	E	IV, E Negli.	IV, E Negli.
Exposure to biological hazards	Zone areas	Person exposed to dusts from bird guano and dead animals; contracts disease	NOTE: Events that are serious in nature are of low probability likewise, events that are minor in effect are of higher probability			II, C Moderate	II, C Moderate
		Person exposed to spider bites, wasp stings, bat bites, mouse bites, and snake bites	Low frequency events have significant effects	II/II	C/C		
			High frequency events have small effects	IV/IV	A/A		

Table C1-8. 183-C Filter Plant Pump Room. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to biological hazards (cont.)	--	--	1. Presence of spiders, wasps, etc., is seasonal 2. Very low building activity 3. Hazards mostly found in radiation zone areas 4. Several sightings of bats have occurred 5. Bat bites may have occurred in the past 6. Mouse bites (rodents) may have occurred in past 7. Snakes have been found in the buildings, including rattlesnakes	--	--	--	--
Release of radiation	General	Release of radioactive material due to mechanical disturbance of piping, etc.	1. Buildup of naturally occurring radioactive material 2. In the 183-B Head House, radioactive thorium was found in systems handling bauxite	III-3 III-3	E	III-3, E Negli.	III-3, E Negli.
Release of asbestos	From piping throughout facility	Release of disturbed friable asbestos	1. Significant quantities of friable asbestos 2. Minimal level of building activity	III-3 III-3	D/C	III-3, D Negli.	III-3, C Negli.
Release of oil and/or petroleum products	Pump room	Release of oil due to failure of various equipment seals, valves, etc.	1. Small quantities of oil 2. Release inside facility 3. No leak containment	III-3 III-3	C/C	III-2, B Minor	III-2, B Minor

Table C1-8. 183-C Filter Plant Pump Room. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of oil and/or petroleum products (cont.)	Substation outside near northeast corner	Release of transformer oil due to failure of seal valve, etc.	4. Unknown quantities in four transformers 5. Past sampling shows safe levels (<50 p/m) of PCBs 6. Transformer 2-C4838E shows signs of leaking 7. No containment but mounted on concrete pads 8. Transformers deactivated 9. Subject to weather	III-2 III-2	B/B	--	--
Release of miscellaneous chemicals	Dichromate tanks	Release of dichromate from failure of tank	1. Unknown small quantities appear to reside in bottom of tank 2. Tanks in good physical condition 3. Leak from tank would be contained by building	III-3 III-3	E/E	III-3, E Negli.	III-3, E Negli.

PCB = Polychlorinated biphenyl

Table C1-9. 1702-C Badge House.

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking	General	Person is struck by falling ceiling tiles	1. Heavy leaking through roof 2. Deformed plaster board ceiling tile	IV/IV	D/C	IV, D Negli.	IV, C Minor
Electrical shock	Inside south wall	Person receives shock by contacting conductors that may be energized	1. Building is locked 2. No interior access was permitted so a complete assessment of the facility could not be done 3. Service disconnect switch has been removed from inside building leaving conductors protruding from cut off conduit 4. It is not known whether conductors are energized at this time 5. Power source for service conductors was not obvious creating the possibility that conductors could be inadvertently energized at a later time	I/I	C/C	I, C Serious	I, C Serious

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Table C1-10. 1714-C Solvent Storage.

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock	Outside, north wall, service disconnect switch	Person receives shock from contact with energized conductors	1. Building is locked 2. Building was not entered for inspection 3. Line side service conductors cut off at service disconnect switch on outside of building 4. Service conductor power source unidentified (suspected to be located in 105-C) 5. Unknown if service conductors are energized 6. Service conductors could become energized unintentionally from activities outside the 1714-C Building	I/I	C/C	I, C Serious	I, C Serious
Exposure to asbestos	Near pipe on inside north wall	Person inhales disturbed friable asbestos	1. Small quantity of friable asbestos 2. Building is not in use and is locked	IV/IV	E/E	IV, E Negli.	IV, E Negli.
Release of asbestos	Near pipe on inside north wall	Release of disturbed friable asbestos	1. Small quantity of friable asbestos 2. Building is not in use and is locked 3. Release contained within facility	III-3 III-3	D/C	III-3, D Negli.	III-3, C Negli.

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Table C1-11. 103-D Fresh Metal Storage. (2 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling	Ramp, west stairs (wood structure)	Person falls from stairs	1. No south handrail 2. Steps in very bad condition 3. East stairs are concrete and in good condition 4. Building used for storage infrequently 5. Personnel not present frequently 6. No barrier preventing use of west stairs or warning of degraded condition 7. Person has equal likelihood of using either east or west stairs	II/II	C/B	II, C Moderate	II, B Serious
Exposure to miscellaneous chemicals	103-D Building near east interior wall	Person exposed to chemicals through inhalation, ingestion, or absorption from breach of container	1. Located inside locked building 2. Container is presently in good condition 3. Container is improperly stored 4. Container is improperly labeled 5. Material is in solid form 6. Material is a mixture of absorbent and paint thinner	IV/IV	D/D	IV, D Negli.	IV, D Negli.
Release of miscellaneous chemicals	103-D Building near east interior wall	Failure of container results in release of chemicals to the environment	1. Located inside locked building 2. Container is presently in good condition 3. Container is improperly stored	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.

Table C1-11. 103-D Fresh Metal Storage. (2 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of miscellaneous chemicals (cont.)	--	--	4. Container is improperly labeled 5. Material is in solid form 6. Material is a mixture of absorbent and paint thinner 7. Future storage could consist of different materials	--	--	--	--

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, C Serious	I, B Critical
	General to all locations		*Roof panels generally are in deteriorated condition				
			*Access to all roofs available if ladders on outside are used once roof access has been obtained from inside				
			*Doors to roof from inside building were not posted with roof access warnings				
			*Doors to roof were not securely locked				
	Fan house:						
	Concrete roof in fan cell 2D	Person falls through degraded concrete slab while on roof	1. Large crack in roof concrete slab	I/I	E/D		
	Process area roof	Person falls through degraded panels while on roof	2. Four bad panels in south stairway	I/I	C/C		
			3. Nine bad panels over top of reactor block				
	Storage basin and transfer area	Person falls through degraded panels while on roof	4. Two panels cracked and five panels with exposed rebar over E corridor to storage basin	I/I	C/C		
			5. Seven panels with exposed rebar (south side of roof) and five panels with exposed rebar (east part of roof)				
			6. A 12-ft drop from storage basin roof to basin decking; 44-ft drop from transfer area roof to ground level				
		Person falls through decayed wood floor planks in basin area	7. Two rotted wood planks at entrance to storage basin	I/I	C/B		
			8. A 20-ft drop from basin decking to basin floor				
	Southwest side of transfer pit	Person falls into transfer area pit	9. Grating is loose				
			10. No guard rail, only 2 1/2-in. cement wall				

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling (cont.)	--	--	11. Pits are deeper than basin	--	--	--	--
	Work area and valve pit	Person falls through degraded roof panels while on roof	12. Two panels cracked in corridor to work area	I/I	C/B		
			13. Three panels cracked in valve pit extension				
			14. Three panels with exposed rebar over valve pit				
			15. Five bad panels in work area				
			16. Deteriorated wooden plank roof decking over B room				
			17. Roof leaking severely				
	Basin area	Person falls between handrails	18. Handrails have 1-ft to 2-ft gaps	I/I	D/D		
			19. A 20-ft drop from basin decking to basin floor				
	All grating areas of facility	Person slips or trips on grating	20. Gratings are full of open holes	II/II	D/C		
	Electrical room	Person catches foot, trips, and falls	21. Open penetrations through electrical room floor	IV/IV	C/C		
			22. Penetrations near normal traffic area in center of room				
	Fixed ladders	Person falls while climbing fixed ladders inside building	23. Ladders are not caged	I/I	D/D		
			24. Projections into the rail climbing zone increase chance for an accident				
			25. Ladders are rusty and deteriorated				
			26. Water damage in evidence				
			27. Wall fasteners in question				

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking						II, D Minor	II, C Moderate
	Struck by hazard (in general)		*Water infiltration in wood-framed roof areas will cause rapid deterioration				
			*Snow loading will increase likelihood of roof or wall collapse				
			*Seismic event will facilitate roof or wall collapse				
			*Activities that cause significant structural vibration will facilitate roof or wall collapse				
	Fan house:						
	Concrete roof in fan cell 2d	Person is struck by collapsing concrete roof	1. Large crack in roof concrete slab	II/II	D/C		
	Process area	Person struck by falling roof or ceiling panels	2. Four panels in south stairway bad (same as falling)	IV/IV	C/C		
			3. Nine panels above top of unit bad (same as falling)				
			4. Partial failure of ceiling in mechanical room				
			5. Crack in exterior masonry block walls and top of unit	IV/IV	C/C		
	Work area and valve pit	Person struck by collapsing walls or collapsing roof	6. Masonry block walls have cracks	II/II	D/C		
			7. Daylight visible and heavy leak evident at connection between east part of lower roof and upper wall in accumulator room				
		Person struck by falling roof or ceiling panels	8. Two cracked panels in corridor to work area (same as falling)	II/II	D/C		
			9. Partial failure of suspended acoustical ceiling in southeast part of valve pit extension				
			10. Three panels cracked in valve pit extension (same as falling)				

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	--	--	11. Three panels with exposed rebar over valve pit (same as falling)	--	--	--	--
			12. Five bad panels in work area (same as falling)				
	Room adjacent to electrical room	Person struck by light fixtures falling from ceiling	13. Suspended ceiling is partially removed	IV/IV	D/D		
			14. Remaining structure of ceiling attached to light fixtures is not adequate for support				
	Maintenance rooms north of room adjacent to electric room		15. Significant water damage to ceiling supporting light fixtures	IV/IV	D/D		
	Rear face, maintenance room, first level, north stairwell	Person struck by unsecured light fixture falling from ceiling	16. Wooden roof leaks badly	IV/IV	D/D		
			17. Water damage has degraded ceiling to point where it cannot safely support light fixtures				
	Accumulator room	Person injured by collapse of wall	18. Masonry wall is cracked	II/II	D/C		
	Throughout the facility	Person injured by inadvertent energizing of mechanical equipment	19. Equipment presently is deenergized	II/II	E/E		
			20. Equipment is partially dismantled				
			21. No readily identifiable disconnects present for equipment				
			22. Equipment is still connected				
			23. Equipment can be reenergized because electrical circuits are inadequately or inaccurately identified				

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Drowning/ suffocation						I, D Minor	I, D Minor
	Global throughout building	Person enters confined space and is overcome by gases or lack of oxygen	1. Many confined spaces exist in the building, both above- and belowgrade 2. There is evidence of oxidation and water accumulation 3. Samples of confined space atmospheres showed no problems 4. Building has lack of ventilation 5. Most of the confined spaces in the building were not checked 6. Conditions can change at any given time 7. Confined spaces are not identified	I/I	D/D		
Electrical shock						I, A Critical	I, A Critical
	Global throughout building		*Circuits and breakers are not identified correctly, or are not identified at all as to what they feed *Breakers can be switched on at any time energizing circuits				
	Outside 105-D Building, south wall, left of fixed personnel ladder, and north of sample building	Personnel receives shock from contact with energized 480-V conductors	1. Exposed conductors have 480 V between them 2. Conductors are easily accessible at 5 ft above ground 3. Conductors are not identified 4. Conductors are not protected to prevent personnel contact	I/I	A/A		
	Electrical room	Person receives shock when switch fails from contact with energized switch boxes and conduit	5. Switches fail and shorting occurs to box by the action of a sustained arc	I/I	D/C		

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	6. Switch 1 makes arcing noise and moves sluggishly; switch 2 does not make contact at the same time operating handle is moved; possibility for carbon tracking	--	--	--	--
	Balance of plant	Person receives shock from contact with energized equipment that has failed flexible cords	7. Switches are beyond design life				
			8. Several portable 480-V heaters are supplied by SO type flexible cord that is not intended for permanent installations	I/I	D/C		
			9. Cord is routed through walls, subjecting it to abrasion and strain beyond its design intent				
	Relay room, east wall	Person receives shock from exposed conductors in open gutter (gutter is like a junction box)	10. A section of gutter is missing cover	I/I	D/D		
			11. Conductors are unprotected from access by damaging items				
			12. Energized conductors are present in gutter				
			13. Because the gutter is used as a junction box, there is reason for an individual to be intruding into the wiring to perform maintenance work				
	Relay room, south of wooden relay cabinet	Person receives shock from exposed energized conductors in abraded SO cord	14. A section of gutter cover is not secured	I/I	D/D		
			15. Gutter has many knockout seals missing				
			16. Flexible cord is routed through open cover of gutter, exposing it to abrasion and strain				
			17. SO cord extending from knock-out in lighting panel. Eddy current has no connector in knockout allowing chafing and strain.	I/I	D/C		

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	18. Outer insulation jacket peeled back for 3 in. exposing inner conductor insulation.	--	--	--	--
	Control room, northeast corner	Person receives shock from exposed energized wiring	19. Dimmer control for control room overhead lighting set on heat radiator	I/I	D/D		
			20. Wires supplying dimmer not enclosed in raceway				
			21. Control energized and operational				
	Accumulator room	Person receives shock from water soaked equipment	22. Significant roof leakage exists near electrical equipment	I/I	D/D		
			23. Water in equipment can provide fault path				
Exposure to radiation						II, D Minor	II, D Minor
	Global	Person exposed to external ionizing radiation, predominantly from cobalt- and cesium-fixed contamination	1. Predominantly low (<50/mR/h) exposure rates	II/II	D/D		
			2. Energetic gamma emitters possible in immediate vicinity of basin walls and activated structures such as graphite pile, biological and thermal shields, etc				
			3. Areas and items are mislabeled or misposted				
			4. Postings at some areas are misleading				
			5. Some postings are out of date because of changes in posting requirements				
			6. Some isolated moderate to high exposure rates (100,000 counts/min)				
		Person exposed to radioactive material by inhalation, ingestion, or absorption	7. Only occurs from material that can be moved	IV/IV	D/D		

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to radiation (cont.)	--	--	8. Most material is stabilized by asphalt fixative in basin or entrained in stable matrix such as graphite or steel 9. Areas and items are mislabeled or misposted 10. Postings at some areas are misleading 11. Some postings are out of date because of changes in posting requirements	--	--	--	--
	Specific locations: First level, front face floor drains Maintenance room Top of reactor (3X safe) X-2 level Outer and inner control rod rooms Fuel basin walls Metal storage basin walls Process tubes Biological and thermal shields Graphite moderator						
Exposure to asbestos	Multiple potential locations	Person inhales friable asbestos; potential exists for asbestos related illness in the future from such exposure	1. Building not normally occupied 2. There is water damage evidence throughout building	IV/IV	D/C	IV, D Negli.	IV, C Minor

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Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to asbestos (cont.)	--	--	3. Uncertainty concerning which materials contain asbestos	--	--	--	--
			4. Friable material requires disturbance for release				
			5. Original abatement practice left residue; current requirements require complete removal or application of a fixative or encapsulant				
			6. Floor tiles require crushing to present an asbestos hazard				
	Specific areas:						
	Work area corridor		7. Residue from abatement activities				
	Restrooms		8. Broken floor tiles				
	Work area room		9. Incomplete abatement on piping				
	Foyer near work area		10. Incomplete abatement				
	Fan room		11. Incomplete abatement				
	Storage room off valve pit		12. Incomplete abatement				
	Electrical and instrument shop		13. Broken floor tiles				
	Clerk's office off control room corridor		14. Incomplete abatement				
	A/C room off lunch room corridor		15. Incomplete abatement				
	Office off lunchroom corridor		16. Incomplete abatement				
	Lunchroom		17. Incomplete abatement				
	Room next to storage basin		18. Incomplete abatement				

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to lead						IV, C Minor	IV, C Minor
		Person inhales lead dust	1. Oxidation exists on lead bricks	IV/IV	C/C		
			2. Persons must handle lead as required by regulatory requirements to control it				
			3. Most lead is in radiation zones				
			4. Lead oxidation rates around Hanford Site were found to be larger than initially expected				
			5. Sensitivity to lead exposure is variable				
	Specific locations:						
	Entrance to far side stairwell		6. One lead brick				
	Maintenance shop on west side of building		7. One lead brick				
	South side of the "D" machine room		8. Six lead bricks				
	Southeast corner at top of unit		9. Five lead bricks				
	Top of unit		10. Lead caves and lead shielding				
	X-2 level		11. Lead shielding				
Exposure to miscellaneous chemicals						II, D Minor	II, D Minor
		Container or associated equipment failure resulting in release of chemicals	1. Facility is not normally occupied	II/II	D/D		
			2. The materials may be more or less stable depending on age and chemical makeup				
			3. Few chemicals in facility				

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals (cont.)	--	--	4. Exposure requires loss of chemical containment	--	--	--	--
			5. Person must come in contact with material				
			6. Process of collecting and staging material increases possibility of exposure				
	Specific locations:		7. Some materials are unknowns				
	Accumulator room		8. Oil in hydraulic pump and accumulator tank piping system				
	Accumulator room--upper walkway		9. Ballast for lights may contain polychlorinated biphenyl				
	Storage room of work area		10. Chemicals on floor				
	Maintenance shop--west side of building		11. Metallic lead lubricant				
	Northwest corner of storage basin		12. Nickel lubricant				
	Men's room, located between control room and lunchroom		13. Janitorial supplies				
	North side of the valve pit		14. Chemical storage and/or mixing tank unlabeled				
			15. Red chemical residue present				
			16. Red chemical residue on floor near drainage trench and sump				
			17. Piping in vicinity labeled sodium silicate				
			18. Residue appears to be sodium dichromate because of color				

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals (cont.)	Accumulator room	--	19. Unlabeled plastic 30-gal drum, possibly containing floor sweep	--	--	--	--
	Northwest wall on ground level--far side		20. Unidentified green liquid in glass container				
	Gamma monitoring room, first level belowgrade, far side		21. Rectangular steel tank containing 3 in. to 4 in. of clear liquid				
Exposure to biological hazards						II, C Moderate	II, C Moderate
	Located throughout the facility	Person exposed to dusts from bird guano and dead animals; contracts disease (this item is located primarily in radiation zone)	Low frequency accidents have significant consequences	II/II	C/C		
			High frequency accidents have small consequences	IV/IV	A/A		
			NOTE: Events that are serious in nature are of lower probability. Likewise, events that are minor in effect are of higher probability.				
		Person exposed to spider bites, wasp stings, rodent bites, and snake bites	1. Presence of spiders, wasps, etc. is seasonal				
			2. Very low building activity				
			3. Hazards found in radiation zone areas				
			4. Several sightings of bats have occurred				
			5. Bat bites may have occurred in the past				
			6. Mouse bites (rodents) may have occurred in the past				
			7. Snakes have been found in the buildings, including rattlesnakes				

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to biological hazards (cont.)	--	--	8. Activities for cleanup and maintenance occur where hazard exists	--	--	--	--
Temperature extremes						II, C Moderate	II, C Moderate
	General	Person experiences heat exhaustion	1. Seasonal 2. Dependent on ventilation 3. Hanford Site has a history of this problem occurring 4. Hazard depends on type of work being performed 5. Can be controlled by limiting exposure 6. Activities that require concern about temperature extremes are not performed frequently 7. Worker has some awareness of hazard	II/II	C/C		
		Person experiences hypothermia	8. Low temperatures occasionally occur on the Hanford Site 9. No active heating in most of building	II/II	D/D		
Fire						IV, C Minor	IV, B Minor
	Electrical room, west wall	Person exposed to flash burn caused by electrical fault in armored cable fed by breaker FX33	1. Armor cable supported by hemp rope tied to steel beams 2. Rope support is not an approved method as it can break 3. Armor cable is heavy, and falling can cause damage to internal conductors 4. Event most likely to occur during maintenance when items are disturbed	IV/IV	D/C		

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Fire (cont.)	Electrical room	Person exposed to fire from electrical fault in unsupported cable	5. Armored cable from main distribution equipment through the roof opening is not supported for its entire length	IV/IV	D/D	--	--
			6. Weight of cable can cause insulation failure at the point where cable passes through penetration				
			7. Ability of main over-current protective devices to operate is highly suspect				
	Electrical room	Person is exposed to fire from failure of main switch gear to clear fault	8. Switch gear last serviced in 1966	IV/IV	C/C		
			9. All circuit breakers in switch gear are ON				
			10. It is doubtful that all circuit breakers are required to be ON				
		Person is exposed to flash burn caused by sparks, flames, and burning materials escaping from panels during a fault condition	11. Energized main combustion center is energized and panel cover near top of enclosure is missing	IV/IV	D/C		
			12. Gutter above the main combustion center is missing part of its cover				
			13. Gutter covers that are present are improperly secured, allowing large gap to exist				
			14. Conductor routing contributes to likelihood that fault will occur				
			15. Suspect condition of downstream protection devices contributes to fault effect				
			16. Maintenance activities increase likelihood of accident occurring				
	Electrical room	Person exposed to flash burn caused by sparks, flames, and burning material produced from fault condition from equipment failing to clear fault	17. Only 4 of 24 bolts hold back panel cover in place on main switch gear	IV/IV	D/D		

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Fire (cont.)	--	--	18. Interrupting rating of switch gear is not valid	--	--	--	--
	Rear face D machinery room, north end	Person exposed to flash burn caused by sparks, flames, and burning material produced from fault condition	19. Panel J has two old fabric covered nonmetallic sheathed cables exiting the enclosure under cover	IV/IV	C/B		
			20. Cover is pinching cables				
			21. One cable has outer covering stripped off allowing individual conductors to be pinched				
			22. Maintenance activities increase likelihood of accident occurring				
			23. Conductors are energized				
			24. Large quantity of bird dung available for ignition				
	Storage basin viewing area	Person exposed to fire caused by sparks, flames, and burning material produced from fault condition at main combustion center or gutter	25. Conductors energized	IV/IV	D/D		
			26. Conductors laying across sharp edges of the enclosure				
			27. Gutter will not contain sparks and fire in event of fault				
	Relay room, main combustion center south of wooden relay cabinet	Person exposed to fire caused by overdutied conductor overheating	28. SO cable fed by 100-A breaker but cable is rated for only 25-A	IV/IV	C/B		
			29. Overheating causes insulation to degrade				
			30. Flexible cords are routed and draped over jagged edges, thus facilitating chafing and stress				
			31. Accident likelihood is increased by moving the cable				
	Accumulator room	Person exposed to fire caused by fault condition in wiring	32. No bushing in conduit to protect wires from chafing	IV/IV	D/D		
			33. No equipment ground routed in flex conduit-feeding water heater				

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Fire (cont.)	--	--	34. Heat trace on water heater not physically protected	--	--	--	--
	General fire conditions in building	Person is exposed to large fire caused by electrical system failure	35. In all cases, an accumulation of combustible material is required to produce significant effects	II/II	E/E		
			36. There are no fire detection systems in the building				
			37. There are no fire suppression systems in the building				
Explosion						I, D Minor	I, D Minor
	General	Shock sensitive material causes explosion that injures individual	1. Age of material	I/I	D/D		
			2. Type of material				
			3. Ambient temperature				
			4. Movement of chemicals occurs as part of the cleanup program				
			5. It is not clear whether the WHC policy on unknown chemicals is followed				
	General to 105-DR Facility	Person is injured as a result of an explosion at the 105-DR sodium burn facility	6. Inventory of 39,000 lb of sodium remains at 105-DR sodium burn facility				
			7. Sodium is reactive (explosive) with water				
			8. Water is supplied to sink in sodium burn facility				
			9. Closure plan has not been drafted for sodium burn facility				
			10. Disposition of sodium has yet to be determined				
			11. 105-D Building is in close proximity to 105-DR Facility				

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material						III-2, D Negli.	III-2, C Negli.
	General	Release of radioactive material as a result of wind or water erosion in building	1. Most contamination is fixed in stable matrix	III-3 III-3	D/D		
		Release and/or spread of radioactive material resulting from storm water accumulation	2. Roof leaks in radiation zones	III-3 III-3	D/D		
			3. Existing pathways are inefficient for movement of material to exterior				
			4. Potential exists for removable contamination				
		Release and/or spread of radioactive materials by wind and water action, insects, birds, rodents, or contaminated vegetation	5. Area posted as having surface contamination	III-2 III-2	D/D		
			6. Exterior wash pad area contains loose tumbleweeds				
			7. Subsidence observed in vicinity of demolished 1608 Building				
		Release and/or spread of moveable contamination	8. Large quantities of bird dung	III-2 III-2	D/C		
			9. Relatively moderate levels of localized removeable contamination (average 200-400 counts/min)				
			10. No history of contamination outside of building proven to originate from inside				
			11. Numerous openings to environment were identified in building				
			Locations of discovered openings				
			1. Vents in northwest corner of facility				
			2. Hole in transite siding on storage basin bucket elevator				
			3. Drain 4 (open pipe) exiting building between transfer bay and wash pad				

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material (cont.)	--	--	4. Vent in room near the southeast corner of the front face work area 5. Missing cover plates from three core holes through the exterior wall at the rear face of the RX block 6. Large opening in exterior door located at the top of the north side rear stairwell 7. Mortar deterioration in block walls at the top of the unit 8. Open door found on the north wall of outer control rod room 9. Open door in wooden structure attached to rear face exterior wall and storage basin roof	--	--	--	--
	Specific locations: "D" machine room Storage basin and wash pad Front face work area Tool room just off the near stairwell on second level Exterior wash pad area (east side of 105-D Building) Area in vicinity of demolished 1608-D Building, adjacent to south side of 105-D Building						

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material (cont.)	Valve pit Fan room Near side rear stairwell Outer control rod room	--	--	--	--	--	--
Release of asbestos	Throughout the building	Release of asbestos in side building due to disturbance of material	1. Residue remaining on piping following asbestos removal project 2. Residue does not appear to be coated with fixative 3. Some residue is not normally within reach 4. Small quantities 5. Original abatement practice left residue; current requirements require complete removal or application of a fixative or encapsulant 6. Floor tiles require crushing to present an asbestos hazard 7. Roof collapse could facilitate asbestos release	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.
	Specific areas where piping was observed:						
	Piping in lunchroom		8. Asbestos residue				
	Piping near north entrance to rear face		9. Asbestos residue				
	Piping in office north of control room		10. Asbestos residue				

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of asbestos (cont.)	Piping in front face area	--	--	--	--	--	--
	Piping in storage basin		11. Asbestos residue				
	Work area corridor		12. Asbestos residue				
	Restrooms		13. Broken floor tiles				
	Work area room		14. Incomplete abatement				
	Foyer near work area		15. Incomplete abatement				
Release of lead	General	Release of lead by theft or sabotage	1. Significant quantities of removable lead	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.
			2. Lead located inside radiation zones has potential to be mixed waste				
			3. Located in remote areas of building				
			4. High density minimizes likelihood of large quantities being removed				
			5. Use of lead increases likelihood of theft (fishing weights, bullets, anchors, etc.)				
			6. Thefts of other materials, such as mercury, has occurred in the past				
			7. Theft of lead has occurred				
	Specific locations:						
	Entrance to far side stairwell		8. One lead brick				
	Maintenance shop on west side of building		9. One lead brick				

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of lead (cont.)	South side of the "D" machine room	--	10. Six lead bricks	--	--	--	--
	Southeast corner at top of unit		11. Five lead bricks				
	Top of unit		12. Lead caves and shielding				
	X-2 level		13. Lead shielding mounted on side of RX block				
Release of oil/petroleum products						III-3, D Negli.	III-3, D Negli.
	General	Release of oil outside the building due to failure of equipment seals, valves, piping, reservoirs, etc.	1. Materials are located inside building	III-3 III-3	D/D		
			2. Most areas have small quantities of oil present				
			3. Unknown quantities of oil in VSR drive motors				
			4. Majority of oil-containing equipment is leaking				
			5. Oil in radiation zones has potential of being designated as mixed waste				
	Specific locations:						
	Wall at north entrance to rear face		6. Inline oiler containing oil				
	General in fan room		7. Fan equipment shows evidence of oil				
	North wall, front face work area		8. Oil or grease residue on floor				
	West control room office		9. Absorbent material containing leaking oil from room above				
	Accumulator room		10. Residual amounts of oil in equipment				
	Valve pit		11. Oil leaking from sumps				

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of oil/petroleum products (cont.)	"D" machine room	--	12. Oil spot under refrigerator	--	--	--	--
	"C" elevator drive platform		13. Oil leaking from equipment				
	VSR drive motors		14. Oil leaking from motor gears				
	Ball hoppers at top of reactor		15. Oil on floor from VSR drives				
	Far side stairwell, ground level		16. Can of 3-in-1 oil				
	Transfer area		17. Oil leaking from overhead crane				
	Outer control rod room		18. Oil residue in equipment				
Release of miscellaneous chemicals						III-3, D Negli.	III-3, D Negli.
	Throughout building	Release of chemicals occurs from container failure	1. Small quantities	III-3	D/D		
			2. Chemical residue in the valve pit has color that could indicate presence of sodium dichromate	III-3			
			3. Roof leaks into rooms above valve pit				
			4. Room above valve pit has core holes in floor providing pathway for water to reach chemical residue				
			5. Chemicals are inside the building				
			6. No pathways were identified from inside building to outside				
			7. A 30-gal drum and rectangular steel tank were not labeled				

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of miscellaneous chemicals (cont.)	Specific locations:	--	--	--	--	--	--
	Accumulator room		8. Oil in hydraulic pump and accumulator tank piping system				
	Accumulator room--upper walkway		9. Ballast for lights may contain polychlorinated biphenyl				
	Storage room of work area		10. Chemicals on floor				
	Maintenance shop--west side of building		11. Metallic lead lubricant				
	Northwest corner of storage basin		12. Nickel lubricant				
	Men's room, located between control room and lunchroom		13. Janitorial supplies				
	North side of the valve pit		14. Chemical storage and/or mixing tank unlabeled				
			15. Red chemical residue present				
			16. Red chemical residue on floor near drainage trench and sump				
			17. Piping in vicinity labeled sodium silicate				
			18. Residue appears to be sodium dichromate because of its color				

Table C1-12. 105-D Reactor Building. (24 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of miscellaneous chemicals (cont.)	Accumulator room	--	19. Unlabeled plastic 30-gal drum possibly containing floor sweep	--	--	--	--
	Northwest wall on ground level--far side		20. Unidentified green liquid in glass container				
	Gamma monitoring room, first level belowgrade, far side		21. Rectangular steel tank containing 3 in. to 4 in. of clear liquid				

*Common to all accidents where person falls through degraded roof panels while on roof.
A/C = Air conditioning
VSR = Vertical safety rod
WHC = Westinghouse Hanford Company

Table C1-13. 116-D Reactor Exhaust Stack.

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
None	116-D stack	--	The 116-D stack is a concrete structure with climbing rungs attached to the side. It represents no hazard as there is no access into it, and the structure is sound.	--	--	--	--

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Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, B Critical	I, A Critical
	General to all locations		*Roof panels generally are in deteriorated condition				
			*Access doors to roof from inside building are not posted or locked				
	Fan room	Person falls through roof panels while on roof	1. Ten panels with small cracks and many panels with signs of water damage	I/I	C/C		
		Person falls with collapsing roof while on D Cell roof area	2. Long crack at roof in fan north cell (D Cell)	I/I	C/C		
			3. Snow or seismic event facilitates collapse				
			4. Large water leak in D Cell roof				
	Miscellaneous storage and northeast areas	Person falls through roof panels while on roof	5. Ninety percent of panels in operation physics and laundry rooms cracked	I/I	C/B		
			6. Five cracked panels in change room				
			7. Four cracked panels in southeast area rooms				
			8. Ten cracked panels in north part of corridor to storage basin, including one panel with exposed rebar				
			9. Seven cracked panels in room west of corridor to storage basin				
	Process area	Person falls through roof panels while on roof	10. Three cracked panels in southeast part of lower roof above reactor block	I/I	D/C		
			11. One damaged panel in west lower roof of process area				
			12. Two cracked panels above reactor block				

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling (cont.)	Process area (cont.)	--	13. Six cracked panels in sample room	--	--	--	--
			14. Four cracked panels in control rod room				
			15. Deteriorated panels with evidence of large leak in elevator room				
	Storage basin and transfer area	Person falls through panels while on roof	16. Three cracked panels with rusty rebars	I/I	B/A		
			17. Twelve deteriorated panels showing water damage in transfer area				
			18. Nine panels with no structural integrity at north part of east roof area				
			19. Seventy percent of panels showing water damage and deterioration in storage basin (45% cracked, 25% exposed rebar)				
			20. Eighty percent of panels cracked in wash pad area				
			21. Roof panel in extremely bad condition; any roof occupancy will result in fall				
	Work area and valve pit	Person falls through roof panels while on roof	22. One cracked panel in lunch room	I/I	B/A		
			23. Six panels with exposed rebars and 70% of the panels in southeast part of roof in corridor to work area show evidence of heavy water leakage				
			24. Eight cracked panels in instrument shop room with evidence of water leakage				
			25. Ten deteriorated panels with small cracks in electrical equipment room				
			26. Large area of deteriorated panels in lower part of accumulator room				

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling (cont.)	Work area and valve pit (cont.)	--	27. A few deteriorated panels in upper part of accumulator room	--	--	--	--
			28. Fifty percent deteriorated and cracked panels with rusty rebars in valve pit area				
			29. Four cracked panels in valve pit electrical equipment room				
			30. Two panels with exposed rebars in work area				
			31. Eighty percent cracked panels with evidence of significant water leakage in south corridor to transfer area				
	Global	Person slips or trips and falls while on grating	32. All grating areas of the plant have sections where grating is loose or pulling up	II/II	C/C		
		Person falls through rusted grating	33. Grating in down comer room is very rusted and suspect	II/II	C/C		
	Storage basin	Person falls between guard rail	34. Guardrail in basin has 1- to 2-ft gap between them	I/I	C/C		
	North side of far side lab area, ground level	Person falls over guard rail	35. Guardrail in lab area has been cut in half with blow torch				
	North side of X-1 level	Person falls through wood planking	36. Wood planking is very deteriorated	I/I	C/B		
	All areas having fixed metal ladders	Person falls while climbing ladder	37. Ladders are not locked out	I/I	D/D		
			38. Ladders are not caged				
			39. Projections into the rail climbing zone increase chance for accident				
			40. Ladders are rusty and deteriorated				
			41. Water damage in evidence				
			42. Wall fasteners in question				

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking						II, B Serious	II, A Critical
	Struck by hazard in general		*Roof is leaking badly in many places				
			*Water infiltration in wood-framed roof areas will cause rapid deterioration				
			*Snow loading will increase likelihood of roof or wall collapse				
			*Seismic event will facilitate roof or wall collapse				
			*Activities that cause significant structural vibration will facilitate roof or wall collapse				
	Fan room	Person struck by falling roof panels or parts of roof panels	1. Ten panels with small cracks and many panels with signs of water damage	II/II	D/C		
		Person struck by collapsing roof while on D Cell roof area	2. Long crack at roof in fan north cell (D Cell)	I/I	D/C		
			3. Large water leak in D Cell roof				
	Miscellaneous storage and northeast areas	Person struck by falling roof panels or parts of roof panels	4. Ninety percent of panels in operation; physics and laundry rooms	II/II	C/B		
			5. Five cracked panels in change room				
			6. Four cracked panels in southeast area rooms				
			7. Ten cracked panels in north part of corridor to storage basin, including one panel with exposed rebar				
			8. Seven cracked panels in room west of corridor to storage basin				
		Person struck by collapsing wall	9. East wall of corridor to storage basin is cracked	I/I	D/C		

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	Process area	Person struck by falling roof panels or parts of roof panels	10. Three cracked panels in southeast part of lower roof above reactor block	II/II	D/C	--	--
			11. One damaged panel in west lower roof of process area				
			12. Two cracked panels above reactor block				
			13. Six cracked panels in sample room				
			14. Four cracked panels in control rod room				
			15. Deteriorated panels with evidence of large leak in elevator room				
	Storage basin and transfer area	Person is struck by falling roof panels	16. Three cracked panels with rusty rebars	II/II	B/A		
			17. Twelve deteriorated panels showing water damage in transfer area				
			18. Nine panels with no structural integrity at north part of east roof area				
			19. Seventy percent of panels showing water damage and deterioration in storage basin (45% cracked, with 25% exposed rebar)				
			20. Eighty percent cracked panels in wash pad area				
		Person struck by falling walls	21. Vertical cracks along column lines at south wall of transfer area	I/I	D/C		

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	Work area and valve pit	Person struck by falling roof panel or pieces of roof panel	22. One cracked panel in lunch room	II/II	B/A	--	--
			23. Six panels with exposed rebars. Seventy percent of the panels in southeast part of roof in corridor to work area show evidence of heavy water leakage.				
			24. Eight cracked panels in instrument shop room with evidence of water leakage				
			25. Ten deteriorated panels with small cracks in electrical equipment room				
			26. Large area of deteriorated panels in lower part of accumulator room				
			27. A few deteriorated panels in upper part of accumulator room				
			28. Fifty percent of panels deteriorated and cracked panels with rusty rebars in valve pit area				
			29. Four cracked panels in valve pit electrical equipment room				
			30. Two panels with exposed rebars in work area				
	Global	Person struck by equipment inadvertently energized	31. Labeling of electrical circuits and energy paths is inaccurate to nonexistent	II/II	E/E		
			32. No visible disconnects for power to equipment				
			33. Much equipment is partially dismantled, increasing chance of ejected parts				
	Valve pit area, west wall	Person struck by falling wooden block	34. A 4-by-4 board used to wedge cover on electrical box	IV/IV	C/B		
			35. Box is overhead in area that may be routinely traveled to reach other areas of valve pit				

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	South side exterior of building	Person trips/suffers puncture wound from rebar sticking 2 in. to 3 in. above concrete pad	36. Persons travel through area 37. Rebar not highly visible 38. Appears to be left from removal of a small structure at an earlier time, indicating incomplete demolition	II/II	C/C	--	--
Drowning or suffocation	Global throughout building	Person enters confined space and is overcome by gases or lack of oxygen	1. Many confined spaces exist in the building, both above- and belowgrade 2. There is evidence of oxidation and water accumulation 3. Samples of confined space atmospheres showed no problems 4. Building has lack of ventilation 5. Most of the confined spaces in the building were not checked 6. Conditions can change at any given time 7. Confined spaces are not identified	I/I	D/D	I, D Minor	I, D Minor
Electrical shock	Electrical panel "G" near north entrance to facility	Person receives shock from contact with exposed energized conductors or equipment	1. Circuit breaker space 17 does not have a breaker installed 2. Bus bars are energized 3. Bus bars are exposed	I/I	D/D	I, B Critical	I, B Critical
	Ground floor instrument shop east wall		4. Conduit terminates in tee. Conduit body, with only one conduit installed.	I/I	D/D		

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	5. Conduit body does not have cover installed	--	--	--	--
			6. The ends of red and white insulated conductors are insulated with electrical tape				
	Ground floor instrument shop east wall (cont.)		7. The conductors are energized				
	South wall of room adjacent to instrument shop, ground floor		8. A 4-in. square box has two wires protruding from box	I/I	D/D		
			9. Box is 7 ft above floor				
			10. Box is not covered				
			11. Black wire is energized				
	Maintenance hallway (corridor 5) and balance of plant	Person receives shock from fault	12. SO cords are used throughout facility to supply fixed equipment	I/I	D/D		
			13. Cords routed through doors and walls without physical protection				
			14. Abrasion and pinching causes internal short circuits to other conductors				
			15. Overcurrent protection is inadequate				
	Electrical room west of valve pit area	Person receives shock through contact with exposed, energized conductors	16. Receptacle on right side of door on east wall of electrical room has no cover	I/I	C/C		
			17. Device is energized				
			18. Front side of switch has open terminals and conductors				
			19. Frequency of switch operation determines opportunity for accidents				

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	Intersection of maintenance hallway and north hallway	--	20. Stem-hung light fixture has been removed and wires cut off at end of stem	I/I	D/C	--	--
			21. Conductors are close to the stem				
	Intersection of maintenance hallway and north hallway (cont.)		22. Conductors are energized				
			23. Investigator touched one of the conductors with a voltage tester and it arced to the fixture stem without tripping an overcurrent device				
	South side of work area, near entrance to metal storage area	Person receives shock from contact with exposed, energized conductors	24. A No. 8 wire gauge four-conductor cable is routed through a knock out in panel C	I/I	C/B		
			25. No physical protection for cable is provided at the knockout				
		Person receives shock from contact with energized conductors or equipment as a result of an electrical fault	26. Cable is routed through open doorway while being draped and wrapped around and across several pipes	I/I	C/B		
			27. Cable is spliced at doorway				
			28. Individual conductors are pinched against edge of concrete without protection				
			29. A No. 8 WG cable is energized				
			30. Cable feeds a portable board with four double duplex receptacles				
			31. Cable is not protected from abrasion				
	North wall of hallway between metal storage area and transfer area	Person receives shock from contact with energized conductors or equipment	32. Three wires are hanging out of a conduit	I/I	B/B		
			33. Wires are approximately 4 ft from ground				

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	34. One of the conductors is energized	--	--	--	--
	North wall of hallway between metal storage area and transfer area (cont.)		35. An equipment repair tag dated approximately April 1993 is hanging on conduit				
			36. An inspection of these wires in April 1993 found them to be deenergized				
	Corridor between metal storage area and transfer area	Person receives shock from contact with energized conductors as a result of insulation failure	37. A 12- by 12- by 36-in. gutter has cover removed	I/I	D/D		
			38. Conductors inside are energized				
			39. Conductors are insulated				
	Metal storage room corridor, west wall	Person receives shock from energized conductors or equipment	40. 8- by 8- by 24-in. enclosure has cover removed eliminating protection from conductors inside	I/I	C/C		
			41. Conductors inside are energized				
			42. Cover has indicating lights				
	RM lab	Person receives shock from energized conductors as a result of insulation failure	43. Conduit body has only one of three possible conduits installed	I/I	C/C		
			44. Conduit body cover is missing				
			45. Conductors inside are doubled over and taped				
			46. Conductors are energized				
	Storage basin, each column with extension cord connected	Person receives shock from energized conductors as a result of insulation failure	47. Many support columns have extension cords connected to receptacle	I/I	D/D		
			48. Receptacles are energized				

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	Storage basin, each column with extension cord connected (cont.)	--	49. No maintenance on overcurrent protection devices creates likelihood of failure to disconnect on fault occurrence	--	--	--	--
			50. Roof is in very poor condition, creating likelihood of falling in and creating faults				
	West wall of storage basin	Person receives shock from exposed energized conductors or equipment	51. Portions of a line voltage thermostat are still attached to a box about 5 ft from floor	I/I	B/B		
			52. Two energized conductors hanging from thermostat				
			53. Floor area is wet from ceiling leaks				
			54. Area is most heavily traveled in basin				
			55. Thermostat appears to be dismantled and deenergized				
	Shower room	Person receives shock from contact with exposed, energized conductors	56. Abandoned light fixtures have bare conductors that are energized	I/I	C/C		
	North side stairwell, plus 30-ft elevation	Person receives shock as a result of an electrical fault	57. Open junction box with conductors tied in a bundle are hanging outside of box	I/I	D/D		
			58. Conductors are energized				
			59. Conductors are insulated				
			60. Isolated by elevation				
	Storage area hallway near to former RM, timekeeper's office	Person receives shock as a result of contact with exposed, energized conductors	61. Instrument panel is in severe state of disassembly	I/I	D/C		
			62. Wires are energized				
			63. Many wires are hanging loose				

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	Rear side south stairwell at plus 30-ft elevation	Person receives shock as a result of contact with energized equipment	64. Light fixtures and conduit are leaking water	I/I	B/B	--	--
			65. One fixture has glass globe that is filled with water				
			66. Lighting system appears to be energized				
			67. Corrosion is taking place that may cause conduit to become energized				
	Outside metal storage room, reactor south side	Person receives shock from contact with energized conductors or equipment	68. Light fixture above door off. Removed, and wires cut at end of fixture stem.	I/I	D/D		
			69. Wire ends are exposed and energized				
			70. Condition exists at other portal lights				
Exposure to radiation						II, D Minor	II, D Minor
	Global	Person exposed to external ionizing radiation, predominantly from cobalt and cesium fixed contamination	1. Predominantly low (<20 mR/h) exposure rates	II/II	D/D		
			2. Energetic gamma emitters possible in immediate vicinity of basin walls and activated structures such as graphite piles, biological and thermal shields, etc.				
			3. Small isolated fields associated with specific components up to 120 mR/h				
		Person exposed to radioactive material by inhalation, ingestion, or absorption	4. Occurs only from resuspendable material	IV/IV	D/D		
			5. Areas and items are mislabeled or misposted				
			6. Postings at some areas are misleading				

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to radiation (cont.)	Global (cont.) Specific locations: Fuel basin walls Metal storage basin walls Process tubes Biological and thermal shields Graphite moderator	Person exposed to radioactive material by inhalation, ingestion, or absorption (cont.)	7. Some postings are out-of-date because of changes in posting requirements 8. Most material is stabilized by asphalt fixative in basin or entrained in stable matrix such as graphite or steel	--	--	--	--
Exposure to asbestos	Multiple potential locations	Person inhales friable asbestos; potential exists for asbestos related illness in the future from such exposure	1. Building not normally occupied 2. There is water damage evidence throughout building 3. Uncertainty concerning which materials contain asbestos 4. Friable material requires disturbance for release 5. Exterior duct insulation asbestos content is unknown 6. Exterior duct insulation is exposed to weather and in poor condition	IV/IV	D/C	IV, D Negli.	IV, C Minor

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to asbestos (cont.)	Multiple potential locations (cont.)	--	7. Original abatement practice left residue; current requirements require complete removal or application of a fixative or encapsulant	--	--	--	--
			8. Floor tiles require crushing to present an asbestos hazard				
			9. Some portions of the building have not had asbestos removed, such as in the sodium burn area				
	Specific locations:						
	Piping in hallway south of lunchroom		10. Asbestos residue				
	Ventilation duct on the exterior of the building		11. Insulation on the duct work on exterior of the building is suspected to contain asbestos				
	Piping in the metal storage area		12. Asbestos residue				
	Piping in instrument shop		13. Asbestos residue				
	Piping in near side stairwell		14. Loose asbestos insulation				
	Piping in storage basin		15. Asbestos residue				
	Piping in air conditioning room		16. Asbestos residue				
	Piping in south balcony area above stack		17. Asbestos residue				
	Piping at winch level		18. Asbestos residue				
	Piping in water sample room off far side stairwell		19. Asbestos residue				

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to lead						IV, C Minor	IV, C Minor
		Person inhales lead dust	1. Oxidation exists on lead bricks	IV/IV	C/C		
			2. Persons must handle lead as required by regulatory requirements to control it				
			3. Most lead is in radiation zones				
			4. Lead oxidation rates around the Hanford Site has been found to be larger than initially expected				
			5. At least twice as much lead observed as in other 100 Area facilities				
			6. Heavy water leakage in areas where lead is present facilitates oxidation				
			7. Sensitivity to lead exposure varies				
	Specific locations:						
	Transformer pad--west side of building exterior		8. Lead coated wires protruding from pad				
	Drains in room off passageway to near side stairwell		9. Lead shielded drains				
	Sodium burn facility		10. Lead bricks				
	On shelving in wash pad area of the storage basin		11. Three piles of lead bricks				
	Control room		12. One lead brick				
	10-ft "X" Level		13. Lead shielding				
	20-ft "X" Level		14. Lead bricks and lead sheets				

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to lead (cont.)	West side of balcony level	--	15. Lead bricks	--	--	--	--
	Observation level of near side stairwell		16. Lead bricks				
	Walls in room off far side, 40-ft level		17. Lead shielding covering walls				
	Water sample room off 10-ft level		18. Lead shot and lead sheet				
	In front of cargo elevator at entrance to "X" levels		19. Lead bricks				
	Top of reactor		20. Lead bricks, shielding, and lead caves				
Exposure to mercury	General	Person exposed to mercury due to ingestion or absorption	1. Very small quantities	IV/IV	E/E	IV, E Negli.	IV, E Negli.
			2. Contained in glass containers				
			3. Located in remote areas of building				
			4. Known locations are in radiation zones				
			5. Possibility for existence as mixed waste				
			6. During D&D of 108-B Building, a significant quantity of mercury was stolen and never recovered				
	Specific locations:						
	"X" Area 0-ft level, south wall		7. Two mercury switches				
	Observation level of near side stairwell		8. One mercury switch				

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals						II, D Minor	II, D Minor
		Person exposed to unknown or known chemicals through inhalation, ingestion, or absorption from breach of container	1. Facility is normally unoccupied	II/II	D/D		
			2. The materials may be more or less stable depending upon age and chemical makeup				
			3. Few chemicals in facility				
		Person exposed to unknown or known chemicals through inhalation, ingestion, or absorption from breach of container (cont.)	4. Exposure requires loss of chemical containment				
			5. Person must come in contact with material				
			6. Process of collecting and staging material increases possibility of exposure				
			7. Some materials are unknowns				
	Specific locations:						
	Far side of reactor next to step-off pad, 0 ft		8. Unmarked liquids and solids				
			9. Several cans of penetrants caged in paper				
	General areas		10. Oil residues around equipment				
	Bottom of far side stairwell		11. Chemicals staged for disposal				
	Metal storage areas		12. Soap and solvents				
	Metal building south of sodium burn facility		13. Eight 5-gal cans of sodium bicarbonate and sodium chloride				
	Storage basin discharge chute		14. Recorder ink				

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals (cont.)	Accumulator room mezzanine	--	15. Unknown liquid in sampling device	--	--	--	--
	Area between "X" level stairwell and ball hoppers		16. Galvanized bucket containing silica gel desiccant				
	Electrical junction box in northwest corner of winch level		17. Electrical solvent and tube of grease				
	Sodium burn facility		18. 39,000 lb of sodium				
Exposure to biological hazards						II, C Moderate	II, C Moderate
	Located throughout the facility	Person exposed to dusts from bird guano and dead animals; contracts disease. This item located primarily in a radiation zone.	Low frequency accidents have significant consequences	II/II	C/C		
			High frequency accidents have small consequences	IV/IV	A/A		
			NOTE: Events that are serious in nature are of lower probability. Likewise, events that are minor in effect are of higher probability.				
		Person exposed to spider bites, wasp stings, rodent bites, and snake bites	1. Presence of spiders, wasps, etc., is seasonal 2. Very low building activity 3. Hazards found in radiation zone areas 4. Several sightings of bats have occurred 5. Bat bites may have occurred in the past 6. Mouse bites (rodents) may have occurred in the past				

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to biological hazards (cont.)	--	--	7. Snakes have been found in the buildings, including rattlesnakes 8. Activities for cleanup and maintenance occur where hazard exists	--	--	--	--
Temperature extremes						II, C Moderate	II, C Moderate
	General	Person experiences heat exhaustion	1. Seasonal 2. Dependent on ventilation 3. Hanford Site has a history of this problem occurring 4. Hazard depends on type of work being performed 5. Can be controlled by limiting exposure 6. Activities that require concern about temperature extremes are not performed frequently 7. Worker has some awareness of hazard	II/II	C/C		
		Person experiences hypothermia	8. Low temperatures occasionally occur on the Hanford Site				
Fire						II, D Minor	II, C Moderate
	Backside of reactor building Far side near step-off pad	Person exposed to large fire from spark setting combustibles aflame	1. Large accumulation of tumble weeds on outside of reactor building 2. Combustibles located on far side near step-off pad 3. No fire detection or suppression systems	II/II	D/C		
	Electrical room west of valve pit	Person exposed to flash fire occurring in switchgear	4. Circuit breakers have not been maintained, thus placing their ability to perform their safety function in question	IV/IV	D/D		

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Fire (cont.)	--	--	5. Switchgear containing breakers covered with plastic for dust control	--	--	--	--
			6. Plastic traps heat and moisture				
			7. Heat and moisture accelerate equipment failure				
	Valve pit area	Person exposed to fire responding to fire in lighting system	8. Light fixtures covered with spider webs and dead insects	IV/IV	D/C		
			9. Insects and spider webs are combustible				
			10. High concentrations of insects and spider webs inhibits heat dissipation in fixtures				
	"D" machinery room, east wall (cont.)	Fire in bird nesting materials exposes person to injury	11. Lighting panel "S" is labeled ACTIVE and tagged "keep this panel energized for surveillance use"	IV/IV	D/D		
			12. Three old-style nonmetallic sheathed cables connected to panel for use as extension cords				
			13. Nonmetallic sheathed cabled frayed and worn in several places				
			14. Top of panel covered with bird nesting material				
			15. Coiled, nonmetallic, sheathed cable on floor also covered with bird nesting material				
			16. Power for panel controlled by contactor "S"				
			17. Contactor "S" condition indicates inability to keep circuits isolated				
	Hallway near transfer area (access is from metal storage room)	Person is exposed to fire from ignition of combustible material in contactor enclosure	18. Contactor located in this area is labeled "blackout contactor"	IV/IV	C/B		

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Fire (cont.)	--	--	19. Contactor cannot be deenergized because of a rolled up danger tag stuck in space between solenoid coil and its frame	--	--	--	--
	Sodium burn facility and balance of plant	Person exposed to sustained fire from electrical light fixture failure	20. Aluminum foil used as reflectors for fluorescent fixtures	IV/IV	D/D		
			21. Foil contributes to fixture overheating by inhibiting heat dissipation				
			22. Overheating can cause insulation failure, ballast failure, and ignition of combustibles				
Explosion						I, C Serious	I, C Serious
	General	Shock sensitive material causes explosion that injures individual	1. Age of material	I/I	D/D		
			2. Type of material				
			3. Ambient temperature				
			4. Movement of chemicals occurs as part of the cleanup program				
			5. It is not clear whether the WHC policy on unknown chemicals is followed				
	Area near sodium burn facility sodium storage tank	Explosion from sodium reaction injures person	6. Inventory of 39,000 lb sodium remains at sodium burn facility	I/I	C/C		
			7. Sodium is reactive (explosive) with water				
			8. Water is supplied to sink in sodium burn facility				
			9. Closure plan has not been drafted for sodium burn facility				
			10. Disposition of sodium has yet to be determined				

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Explosion (cont.)	--	--	11. The building structure will not withstand significant exterior blast	--	--	--	--
			12. Energy may be sufficient to affect reactor stack				
			13. Sodium burn facility under control of organization separate from D&D				
Release of radioactive material						III-2, D Negli.	III-2, C Negli.
	General	Release and or spread of radioactive material resulting from stormwater accumulation	1. Roof leaks in radiation zones	III-3 III-3	D/D		
			2. Existing pathways to environment are inefficient for transporting material				
			3. Potential for movable contamination in areas where roof leaks				
			4. Water observed on storage basin floor				
			5. Transite siding on bucket elevator enclosure has a hole in it				
			6. Storage valve pit posted as having surface contamination				
		Release and or spread of radioactive material from biological intrusion	7. Bird and rodent debris present	III-2 III-2	D/C		
			8. Relatively low levels of movable contamination in localized areas (200 to 400 counts/min)				
			9. Live bat observed inside radiation zone				
			10. Bird skeletons found				
			11. Three openings to environment observed				

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material (cont.)	--	--	12. No history of contamination outside of building proven to originate from inside	--	--	--	--
	Room at 30-ft level	Release and or spread of radioactive material from biological intrusion					
	Exterior wash pad area east side of 105-DR Building	Release and/or spread of radioactive material by wind and water action	13. Area posted as surface contamination area	III-2 III-2	D/D		
			14. Exterior wash pad area contains loose tumbleweeds				
		Spread of radioactive material caused by insects, birds, rodents, and/or contaminated vegetation	15. Same as 13	III-2 III-2	D/D		
			16. Same as 14				
	Specific locations:						
	Vent at top of reactor building						
	Valve pit roof						
	Roof over the storage basin						
	Storage basin bucket elevator						
	Hallway off lunchroom						
	10-ft level of "X" Area						
	20-ft level of "X" Area						
	Balcony level						
	"D" machine room						
	Storage basin, transfer bay, and wash pad						
	Room under control rod rack						

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material (cont.)	Winch level at top of unit	--	--	--	--	--	--
Release of asbestos						III-3, D Negli.	III-3, D Negli.
	Throughout building	Release of asbestos from disturbance of residue or friable asbestos insulation	1. Residue remaining on piping from asbestos removal project	III-3 III-3	D/D		
			2. Residue appears to not be coated with fixative				
			3. Some residue is not within reach				
			4. Asbestos removal incomplete				
			5. Asbestos insulation remains on piping in several locations				
			6. Exterior duct insulation asbestos content is unknown				
			7. Exterior duct insulation is exposed to weather and in poor condition				
	Specific locations:						
	Piping in hallway south of lunchroom		8. Asbestos residue				
	Ventilation duct on exterior of building		9. Insulation on the duct work on exterior of the building is suspected to contain asbestos				
	Piping in metal storage area		10. Asbestos residue				
	Piping in instrument shop		11. Asbestos residue				
	Piping in near side stairwell		12. Loose asbestos insulation				
	Piping in storage basin		13. Asbestos residue				
	Piping in AC room		14. Asbestos residue				

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of asbestos (cont.)	Piping in room under control rod rack	--	15. Asbestos residue	--	--	--	--
	Piping in south balcony area above stack		16. Asbestos residue				
	Piping at winch level		17. Asbestos residue				
	Piping in water sample room		18. Asbestos residue				
Release of lead						III-2, D Negli.	III-2, D Negli.
		Release of lead by theft or sabotage	1. Significant quantities of removable lead	III-2 III-2	D/D		
			2. Potential to be mixed waste				
			3. Located in remote areas of building				
			4. Located in radiation zones				
			5. High density minimizes likelihood for removing large quantities				
			6. Usefulness in a number of recreational activities increases likelihood of theft				
			7. Theft of materials has occurred in the past				
	Transformer pad--west side of building exterior		8. Lead coated wires protruding from pad				
	Drains in room off passageway leading to near side stairwell		9. Lead shielded drains				
	Sodium burn facility		10. Lead bricks				
	On shelving in wash pad area of the storage basin		11. Three piles of lead bricks				

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of lead (cont.)	Control room	--	12. One lead brick	--	--	--	--
	10-ft "X" level		13. Lead shielding				
	20-ft "X" level		14. Lead bricks and lead sheets				
	West side of balcony level		15. Lead bricks				
	Observation level of near side stairwell		16. Lead bricks				
	Walls in room off far side 40-ft level		17. Lead shielding covering walls				
	Water sample room off 10 ft level		18. Lead shot and lead sheet				
	In front of cargo elevator at entrance to "X" levels		19. Lead bricks				
	Top of reactor		20. Lead bricks, shielding, and lead caves				
Release of mercury						III-3, D Negli.	III-3, D Negli.
		Mercury released to environment from theft or sabotage	1. Very small quantities	III-3 III-3	D/D		
		Mercury released to environment as a result of container breakage	2. Contained in glass containers that are subject to breakage				
			3. Located in remote areas of building				
			4. Known locations are in radiation zones				
			5. Possibility for existence as mixed waste				
			6. During D&D of 108-B Building, a significant quantity of mercury was stolen and never recovered				

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of mercury (cont.)	Specific locations: "X" Area 0-ft level, south wall Observation level of near side stairwell	--	7. Two mercury switches 8. One mercury switch	--	--	--	--
Release of oil or petroleum products	Specific locations: Center console in control room 0-ft level of "X" Area Accumulator room Tank on far side near top of stack "D" machine room "C" elevator drive equipment on balcony level	Release of oil outside the building caused by failure of equipment seals, valves, piping, reservoirs, etc.	1. Inside building 2. Small quantities of oil known 3. Unknown quantities in VSR drive motor reservoir 4. Majority of oil-containing equipment is leaking 5. Oil in radiation zones has potential for being designated as mixed waste 6. Unknown quantities of material in reservoirs 7. Oil in hydraulic pump and tubing 8. Oil residue in piping and equipment 9. Oil residue underneath tanks and pumping equipment 10. Oil residue on equipment 11. Oil residue 12. Oil leaking from equipment	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of oil or petroleum products (cont.)	VSR drive motors	--	13. Reservoir may contain oil	--	--	--	--
	Ball hoppers		14. Oil residue				
	Outer control rod room		15. Oil residue on equipment				
Release of miscellaneous chemicals						III-1, D Negli.	III-1, D Negli.
		Release of miscellaneous chemicals from container failure	1. Small quantities	III-3	C/C		
			2. Inside building	III-3			
			3. No pathways were identified that could allow release to environment				
			4. Majority of chemicals staged in one location				
		Release of sodium as a result of water reaction	5. Inventory of 39,000 lb sodium remains at sodium burn facility	III-1	D/D		
			6. Sodium is reactive (explosive) with water	III-1			
			7. Water is supplied to sink in sodium burn facility				
			8. Closure plan has not been finalized for sodium burn facility				
			9. Disposition of sodium has yet to be determined				
			10. Uncertainty concerning procedures, because sodium is responsibility of another organization				
	Specific locations:						
	Far side of reactor next to step-off pad, 0-ft level		11. Unmarked liquids or solids				
			12. Several cans of penetrants caged in paper				

Table C1-14. 105-DR Reactor Building. (29 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of miscellaneous chemicals (cont.)	General areas	--	13. Oil residues around equipment	--	--	--	--
	Bottom of far side stairwell		14. Chemicals staged for disposal				
	Metal storage areas		15. Soap and solvents				
	Metal building south of sodium burn facility		16. Eight 5-gal cans of sodium bicarbonate and sodium chloride				
	Storage basin discharge chute		17. Recorder ink				
	Accumulator room mezzanine		18. Unknown liquid in sampling device				
	Area between "X" level stairwell and ball hoppers		19. Galvanized bucket containing silica gel desiccant				
	Electrical junction box in northwest corner of winch level		20. Electrical solvent and tube of grease				
	Sodium burn facility		21. 39,000 lb of sodium				

*Common to all accidents where person falls through damaged roof panels while on roof.
AC = Air conditioning
D&D = Decontamination and decommissioning
RM = Radiation monitor
VSR = Vertical safety rod

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Table C1-15. 116-DR Reactor Exhaust Stack.

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, D Minor	I, C Serious
	116-DR stack attached structure	Person falls while on roof when it collapses	1. Concrete roof is cracked	I/I	D/C		
			2. Many cracks and some displacement of masonry block walls				
			3. Heavy snow or seismic load can create collapse				
			4. Inspection could only be made from outside building				
			5. Unpatched cracks near patched cracks indicating continuing degradation				
	116-DR stack	Person falls while climbing stack ladder	6. Stack is in good condition	II/II	D/D		
			7. Ladder is intact to bottom of stack allowing easy access				
			8. Ladder is not locked out				
Struck by or striking						I, D Minor	I, D Minor
	116-DR stack attached structure	Person is injured while in building when collapse occurs	1. Concrete roof is cracked	I/I	D/D		
			2. Many cracks and some displacement in masonry block walls				
			3. Heavy snow or seismic load can create collapse				
			4. Unpatched cracks appear near patched cracks indicating continuing degradation				
			5. Inspection could only be made from outside building				
			6. Persons not required to enter building				

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Table C1-16. 117-DR Exhaust Air Filter Building.

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
None	--	--	1. Only the top of the building was inspected	--	--	--	--

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Table C1-17. 119-DR Exhaust Air Sample Building.

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
None	--	--	1. Building was inspected	--	--	--	--

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Table C1-18. 1702-DR Area Badge House.

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling	Roof	Person falls through deteriorated plywood while on roof	1. Roofing is in bad condition 2. Plywood roof decking is deteriorated 3. Access to roof requires the use of a portable ladder 4. Building is unused and not normally entered 5. Building is very small 6. No signs are present warning against going onto roof 7. There is currently no reason to perform any maintenance work on this building 8. A fall through the roof represents an 8-ft drop	II/II	D/C	II, D Minor	II, C Moderate
Struck by or striking	Roof	Person struck by collapsing roof	1. Roofing is in bad condition 2. Plywood roof decking is deteriorated 3. Building is unused and no reason exists to enter it 4. Roof collapse is exacerbated by snow or ash loading 5. Building is very small 6. No signs are present warning against entry	II/II	D/C	II, D Minor	II, C Moderate

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Table C1-19. 105-F Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, B Critical	I, A Critical
			*Interior doors to roof allow access				
			*No roof danger postings on many upper level roof access doors				
	Fan house area	Person falls through roof panel while on roof	1. Four panels are exposed. Eight broken panels in fan room.	I/I	C/C		
			2. Twenty percent of panels over valve pit have extensive water damage; 60% of panels over fan room have extensive water damage				
			3. No warning signs posted on roof doors				
			4. No substantial locks on doors leading to roof, only slide bars				
			5. Doors leading to roof not locked				
	Process area roof	Person falls through roof panel while on roof	6. One panel broken in access area to zone	I/I	C/C		
			7. Two panels cracked in stairway roof				
			8. Many panels cracked from water leak				
	Storage basins and transfer area (no access was allowed)	Person falls through roof panel while on roof	9. Many panels in bad condition	I/I	B/A		
			10. Six panels in corridor to storage basin cracked				
			11. Eight steel columns in storage basin area badly damaged				
			12. A fatality occurred in February 1992 from fall through roof panel at F area				
	Work area	Person falls through roof panel while on roof	13. Three cracked panels in access to work area	I/I	D/D		

Table C1-19. 105-F Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling (cont.)	--	--	14. Two panels bad in electrical room	--	--	--	--
	Top most grating above reactor block	Person falls through hole in grating	15. A 8-ft by 8-ft hole guarded by wooden handrails	I/I	D/D		
			16. Mid rail missing on one side				
			17. Rail will not withstand 200 lb side force				
			18. 45-ft to 50-ft drop from hole to concrete reactor top				
	Valve pit	Person steps through hole in grating and injures self from 2-ft drop	19. All the grating in valve pit has many holes in it	II/II	D/D		
			20. Grating is uneven and will tip when stepped on				
Struck by or striking						II, C Moderate	II, B Serious
			*Snow loading will increase chance of roof or wall collapse				
			*A seismic event would initiate roof or wall collapse				
			*Activities that cause significant structural vibration could initiate roof or wall collapse				
			*Most of ceiling is not concrete but a lighter "Sheetrock" type material				
	Fan house area	Person is struck by collapsing roof panels	1. Bad roof panels (same panels as identified in the falling hazard section)	II/II	D/D		
	Storage basin and transfer area		2. Bad roof panels (same panels as identified in the falling hazard section)	II/II	C/B		
			3. Eight steel columns in storage basin are badly damaged				
	Process area stairwell	Person is struck by partial masonry wall collapse	4. Crack in masonry block wall at top of stairway near corner	IV/IV	D/D		

Table C1-19. 105-F Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	Top of reactor	Person is struck by falling fluorescent light tubes	5. No lamp restraints	IV/IV	D/D	--	--
			6. Lamp clips and sockets are old				
	General	Person walks into sharp object projecting into walkway	6. Sharp objects projecting into walkway	IV/IV	D/D		
			7. Majority of areas have poor or no lighting				
			8. Most hazards are in radiation zone areas				
	Specific locations:						
	Valve pit						
	Outer control rod room						
	Access to inner control rod room						
	Maintenance tool room						
Drowning or suffocation						I, D Minor	I, D Minor
	Global throughout building	Person enters confined space and is overcome by gases or lack of oxygen	1. Many confined spaces exist in the building, both above- and belowgrade	I/I	D/D		
			2. There is evidence of oxidation and water accumulation				
			3. Samples of confined space atmospheres showed no problems				
			4. Building has lack of ventilation				
			5. Most of the confined spaces in the building were not checked				
Electrical shock			*Poor global physical condition of electrical system			I, B Critical	I, B Critical

Table C1-19. 105-F Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	*Not all circuits or loads are correctly identified	--	--	--	--
			*Roof leakage can short electrical equipment				
			*Circuits can be and are energized for various uses				
	Rear face stairwells	Person receives shock from contact of festoon lighting with accessible metal parts after fault from abrasion	1. Festoon lighting presently spliced onto extension cord; this is not an approved wiring method as it does not provide protection from insulation abrasion	I/I	C/C		
			2. Insulation lacks abrasion resistance				
			3. Could easily become energized				
	Maintenance hallway--entrance to valve pit area	Person receives shock from energized metal objects after fault occurs	4. Ground wire and neutral wire connected	I/I	B/B		
			5. Normally grounded equipment is carrying neutral current				
			6. Voltage drop will lead to touch and step potential				
	Accumulator room	Person receives shock from contact with energized conductors from chafed insulation	7. Flexible cord is not clamped	I/I	C/C		
			8. Outer jacket pulled away from clamp				
	North south hallway, northeast corner, ground floor	Person contacts energized conductors	9. Junction box is not covered and contains energized conductors	I/I	D/D		
	Ceiling of north-south hallway, northeast corner, ground floor	Person contacts energized conductors	10. Wires protrude out of open junction box	I/I	D/D		

Table C1-19. 105-F Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	Electrical room, northeast corner, ground floor	Persons contacts energized conductors or equipment	11. 480-V flex cord exits wireways without fittings allowing insulation and conductor abrasion	I/I	D/D	--	--
	Miscellaneous room between electrical room and hallway	Person contacts energized conductors when system is energized	12. Equipment mislabeled	I/I	C/C		
			13. Energized or deenergized status mislabeled				
			14. Deenergized at time of inspection				
	Electrical room and balance of plant	Personnel contact with energized conductors from damaged cable insulation	15. 480-V feeders and flexible cords routed through walls, ceiling, and ducts without physical protection	I/I	C/C		
	Valve room, ground floor, southeast doorway	Personnel contact with energized conductors or equipment	16. Valve room lighting circuit used flexible cord and existing wiring, routed through wall	I/I	B/B		
			17. Wiring exposed and unprotected				
			18. Splices unprotected				
			19. Damaged insulation repaired with tape				
			20. Located next to doorway, increasing exposure				
	Valve room, north wall lighting panel "E"	Personnel contact with energized conductors or equipment after cable insulation is abraded	21. Unprotected cable	I/I	D/D		
			22. Routed through block wall				
	Electric relay room	Personnel contact with energized conductors or equipment	23. Unprotected flexible cords (both physically and electrically)	I/I	C/C		
	Accumulator room	Person receives shock from energized pipe	24. Heat trace on pipe is not physically protected from damage	I/I	D/D		
			25. Heat trace is not presently damaged				

Table C1-19. 105-F Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	26. Required ground fault protection is not present	--	--	--	--
	Basin storage area	Person receives shock by coming in contact with energized conductors or equipment	27. Unprotected cable	I/I	D/D		
			28. Cable routed through jagged hole in block wall				
			29. Supply lighting circuit in basin area				
			30. Energized and in use constantly				
			31. Better condition than other wiring				
			32. Low traffic area				
	East-west hallway near reactor work area	Person receives shock by coming in contact with energized conductors or equipment	33. Energized conductors	I/I	D/D		
			34. Open junction boxes				
			35. Inside wireway or conduit				
Exposure to radiation						IV, D Negli.	IV, D Negli.
	General	Person receives exposure to external radiation fields	1. Isolated discreet sources	IV/IV	D/D		
			2. Low exposure rates (<27 mR/h)				
		Person unstacks lead shielding and receives substantial dose	3. Lead shielding limits current exposure	IV/IV	D/D		
			4. Bricks moved easily				
			5. Labeling does not describe hazard within shielding				
			6. Labeling in general is inaccurate				
		Person receives exposure to internal radiation fields from ingestion and inhalation	7. Contamination contained in a stable matrix	IV/IV	D/D		

Table C1-19. 105-F Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to radiation (cont.)	--	--	8. Contamination could be released through mechanical means such as cutting and grinding	--	--	--	--
			9. Corrosion processes create dispersable contamination				
		Fire fighter breathes in contaminated smoke during fire	10. See factors in fire hazard section for a general roof collapse and electrical fire	II/II	E/E		
	Specific likely locations						
	Ball washer						
	X-2 level, lead brick pile						
	Basin walls						
	Process tubes						
	Biological and thermal shields						
Exposure to asbestos						IV, D Negli.	IV, C Minor
	Global	Person inhales friable asbestos fibers	1. Asbestos fibers must be disturbed	IV/IV	D/C		
			2. Removal program left asbestos adhering to piping and valves				
			3. Asbestos residue does not appear to be fixed by sealant or fixant				
			4. Facility is normally unoccupied				
			5. Zone areas worse than clean areas				
			6. Many pipes above human height (not as likely to be disturbed)				
	Specific locations:						
	Front hallway (piping)		7. Piping				
	Fan room (valve)		8. Valve				

Table C1-19. 105-F Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to asbestos (cont.)	Exhaust fan rooms 9 and 10 30-ft level east stairwell General	--	9. Pipes and valves 10. Pipe	--	--	--	--
Exposure to lead	General Specific locations: Inner control rod room Top of reactor X-2 level	Person inhales lead dust	1. Oxidation exists on lead bricks 2. Persons must handle lead as required by regulatory requirements to control it 3. Most lead is in radiation zones 4. Lead oxidation rates around the Hanford Site have been found to be larger than initially expected	IV/IV	C/C	IV, C Minor	IV, C Minor
Exposure to miscellaneous chemicals		Person exposed to known and unknown chemicals through inhalation, absorption, or ingestion	1. Majority of containers unmarked or unlabeled 2. No ventilation in building 3. Stability of materials may be related to age 4. Materials being collected in front face reactor work area as required by regulatory requirements for disposal 5. Unknowns must be sampled and analyzed resulting in more handling	II/II	D/D	II, D Minor	II, D Minor

Table C1-19. 105-F Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals (cont.)	Specific locations:	--		--	--	--	--
	Work area near charge platform		6. Unknown liquids in 400-L bottles				
	Accumulator room		7. 55-gal black barrel filled with floor sweep				
	Valve pit		8. Unknown chemical residues on southwest floor				
	Outer control rod room		9. Oil accumulation from control rod drive mechanisms on floor and machinery				
	"D" elevator drive shaft room		10. Three unidentified containers, one can open and two other containers				
	Top of reactor		11. One 1-gal can sealed, unidentified at north side of the reactor				
Exposure to biological hazards						II, C Moderate	II, C Moderate
	Zone areas	Person exposed to dusts from bird guano and dead animals; contracts disease	Note: Events that are serious in nature are of low probability. Likewise, events that are minor in effect are of higher probability.				
		Person exposed to spider bites, wasp stings, bat bites, mouse bites, and snake bites	Low frequency accidents have significant consequences	II/II	C/C		
			High frequency accidents have small consequences	IV/IV	A/A		
			1. Presence of spiders, wasps, etc. is seasonal				
			2. Very low building activity				
			3. Hazards mostly found in radiation zone areas				
			4. Several sightings of bats have occurred				
			5. Bat bites may have occurred in the past				

Table C1-19. 105-F Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to biological hazards (cont.)	--	--	6. Mouse bites (rodents) may have occurred in the past	--	--	--	--
			7. Snakes have been found in the buildings, including rattlesnakes				
Temperature extremes						II, C Moderate	II, C Moderate
	General	Person experiences heat exhaustion	1. Seasonal	II/II	C/C		
			2. Dependent on ventilation				
			3. Hanford Site has a history of this problem occurring				
			4. Hazard depends on type of work being performed				
			5. Can be controlled by limiting exposure				
			6. Low activity of concern				
			7. Worker has some awareness of hazard				
		Person experiences hypothermia	8. No active heating system in most of building	II/II	D/D		
Fires						II, A Critical	II, A Critical
	Electrical room (incoming power location)	Person is burned from electrical fire started by fault in main circuit breaker	1. Enclosure will not contain sparks from an electrical fault	II/II	A/A		
		Person is burned from electrical fire started by fault in wireway	2. Protected and unprotected conductors in the same enclosure (some conductors are not protected in the enclosure)				
			3. Equipment has no interrupting rating (field manufactured)				
			4. Two of ten cover screws installed				
			5. Faults generally occur as a result of human activity				
	Electrical room		6. Cable short circuit (fault) causes sparks	IV/IV	D/D		

Table C1-19. 105-F Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Fires (cont.)	--	--	7. 480-V feeders and flexible cords routed through walls unprotected (also a factor in electrical shock section)	--	--	--	--
			8. Good housekeeping limits combustibles				
	Valve room lighting panel E	Person is burned from electrical fire started by fault	9. Enclosure will not contain sparks from an electrical fault	IV/IV	D/D		
			10. Energized panel has unsealed openings				
	General	Roof failure causes fire by damaging electrical panels and wiring, and person is harmed	11. Structural failure precipitates electrical fault				
			12. Personnel generally not present				
			13. There are no fire detection or protection systems in the building				
			14. Oils in control rod room may exacerbate fire problem				
			15. Oil on surfaces tends not to spread fire				
Explosions						I, E Negli.	I, E Negli.
	General	Person is injured by chemical explosion	1. Some unknown chemicals exist in facility	I/I	E/E		
			2. Requires multiple factors for an event				
			3. Movement of chemicals occurs as part of the cleaning effort				
			4. It is not clear whether the WHC policy on unknown chemicals is followed				

Table C1-19. 105-F Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material						III-3, D Negli.	III-3, C Negli.
	General	Release of radioactive material as a result of wind or water erosion in building	1. Most contamination is fixed in stable matrix	III-3 III-3	D/D		
			2. Standing water evident, indicating water getting into building				
	Roof over reactor at 14-ft level	Spread of contamination by storm water accumulation	3. Roof leaks	III-3 III-3	D/D		
	Roof over southwest stairwell D elevator drive room	Spread of radioactive material by movement of contaminated corrosion products	4. Therefore no obvious pathways from inside building to outside				
			5. There is some movable contamination inside the building				
	General	Spread of contamination by biological agency (birds, mice, etc.)	6. There is evidence of biological intrusion	III-3 III-3	D/C		
	Specific locations:						
	Maintenance shop N at valve pit		7. Large quantities of bird and rodent debris exist				
	Front face at work area		8. Radiation zone areas exhibit low levels of contamination				
	Both rear stairways		9. There are few exits from building as evidenced by remains of dead birds				
	Top of reactor block		10. Live bats were observed on front face				
	X-2 level		11. There is no historical evidence of contamination spread by biological agents at the 100 Areas				

Table C1-19. 105-F Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of asbestos						III-3, D Negli.	III-3, D Negli.
	General	Release of asbestos from disturbance of residual material on piping	1. Small quantities	III-3 III-3	D/D		
			2. Residue stuck to piping, etc., after abatement activities				
			3. Residue is not encapsulated				
			4. Some residue is out of reach				
	Specific locations:						
	Front hallway		5. Piping				
	Fan room		6. Valve				
	Exhaust fan rooms 9 and 10		7. Piping and valves				
	30-ft level east stairwell		8. Pipe				
	Transfer area	Release of asbestos caused by roof and/or wall impacting asbestos		III-3 III-3	D/D		
Release of lead						III-3, D Negli.	III-3, D Negli.
	General	Release of lead by theft or sabotage	1. Lead bricks used for shielding	III-3 III-3	D/D		
			2. Bricks are movable and there is a program in place to inventory				
			3. Most lead is in radiation zones				
			4. Most lead is in remote areas				
			5. Potential exists for mixed lead and radionuclides (mixed waste)				
			6. Theft unlikely because of weight				
	Specific locations:		7. Intrinsic value (relocation)				
	X-2 level		8. History of mercury				

Table C1-19. 105-F Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of lead (cont.)	Inner control rod room Top of reactor	--	--	--	--	--	--
Release of petroleum products						III-3, A Minor	III-3, A Minor
	General	Failure of seals, piping, equipment, etc. resulting in release inside and outside of building	1. Oil already released inside building in some places--indications of current leakage	III-3 III-3	D/D		
			2. Majority of oil-containing equipment already leaking				
			3. Small quantities of oil in most sources				
			4. Unknown quantities of oil in VSR drives				
			5. Oil in radiation zones has potential of being designated mixed waste				
	Specific locations:						
	Valve pit		6. Pump is leaking oil				
	Fan area		7. Fan bearings, etc. are leaking oil				
	West wall front face of work area		8. Oil in inline oiler				
	"D" and "C" elevator drive rooms		9. Oil leaks by drive mechanisms				
	Ball hopper area		10. Oil leaks on floor by hoppers				
	X-1 level		11. Oil in oil drip pan				
	In northeast office adjacent to control room	Polychlorinated biphenyl contaminated oil released from light ballast to inside of building	12. Evidence on floor of leaking ballast	III-3 III-3	A/A		
			13. Room has label on tape across door				
			14. Inside building				

Table C1-19. 105-F Reactor Building. (15 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of petroleum products (cont.)	--	--	15. Small quantity	--	--	--	--
Release of miscellaneous chemicals						III-3, B Negli.	III-3, B Negli.
	General	Release of miscellaneous chemicals caused by breach or spilling of container	1. Small quantities	III-2 III-2	E/E		
			2. No pathways (drains, etc.) were noted near chemical containers				
			3. Material would be contained in building in the event of a spill				
	Three-product storage at east end valve pit	Release of sodium dichromate, sodium silicate, or other unknown chemicals from leaking water	4. Unknown quantities in product storage and mixing tanks	III-2 III-2	E/D		
			5. Large tank appears to be empty except for residue				
			6. Two tanks could not be examined to determined contents				
			7. Chemical residue on floor near drain sump by tank	III-3 III-3	B/B		
	Specific locations:						
	Restroom cabinet		8. Janitorial supplies				
	Top right hand drawer in lunchroom		9. Unknown janitorial supplies are leaking in desk drawer				
	Front face work area		10. Staged chemicals				
	"D" elevator drive room		11. Can of penetrating oil				

*Common to a number of different accidents and/or locations.
VSR = Vertical safety rod

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Table C1-20. 108-F Reactor Building. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, D Minor	I, C Serious
	Annex (lowest roof)	Person falls through concrete roof panels over annex section of building	1. Eighty percent of annex roof panels deteriorated (Fan Room) 2. Eighty percent deteriorated and six panels with rusty reinforcements (Room 109A) 3. Evidence of heavy leaking over Fan Room roof 4. No access to annex roof from interior or exterior stairway 5. Access to annex roof (8 ft) possible with portable ladder	I/I	D/D		
	Old section (2nd, 4th, and 5th roof levels)	Person falls through roof panels over old section of buildings	6. Three panels with small cracks and one damaged on 5th level over Elevator Room 7. Four panels replaced with plywood; four are deteriorated in 4th level. Sky light between panels is visible. 8. Deteriorated panels at west portion of 2nd level 9. Roof access via exterior stairway to old section of building is chained and posted 10. Roof access via interior stairway to old uppermost section is posted	I/I	D/C		
	Southwest stairway	Person falls from stairway	11. Missing handrails on 200, 300, and 400 levels 12. No interior lighting	I/I	D/C		
Struck by or striking			*Snow loading will increase chance of roof or wall collapse *A seismic event would initiate roof or wall collapse *Most of the ceiling material is precast concrete			II, D Minor	II, C Moderate

Table C1-20. 108-F Reactor Building. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	--	--	*Building access is highly controlled (asbestos training required)	--	--	--	--
	Annex (new portion of building)	Person is struck by a collapsing roof panel	1. Eighty percent of roof panels deteriorated (see falling hazard for more details)	II/II	D/C		
	Old section (2nd, 4th, and 5th roof sections)	Person is struck by a collapsing roof and/or wall	2. Some deterioration of roof panels (see falling hazard for more details)	II/II	D/C		
			3. Vertical cracks at north and south middle top wall; crack across broken joints at top part of building				
	Room 404 and globally	Person is struck by a falling electrical fixture	4. Ceiling support for four fixtures in Room 404 is loose	IV/IV	D/D		
	Northwest stairway between 100 and 200 level	Person trips and falls, striking floor	5. Extension cord laid across walkway	II/II	D/D		
	400 level		6. Electrical cords and other items on 400 level floor				
	100, 200, and 300 levels		7. Levels have miscellaneous tripping hazards				
	Fifth level piping room		8. Piping on floor				
	General	Person struck by falling lighting cover	9. Lighting covers have been opened and left hanging in all areas of the building	II/II	D/C		
	Fifth level piping room	Person strikes protruding object	10. Protruding pipes from floors and walls				
	Room 404		11. Concrete pad with protruding bolts				
	Southwest stairway of 400 level		12. Pipes and other projections				
	Room 126		13. Three bolts protruding from floor near entrance door and wall				
	West side of 100 level next to trolley hoist room		14. Three pieces of rebar protruding from wall				

Table C1-20. 108-F Reactor Building. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	--	--	15. There is no lighting in this facility	--	--	--	--
Electrical shock						I, D Minor	I, C Serious
			*Building access is highly controlled (asbestos training required)				
			*Service to building is scheduled to be disconnected in present fiscal year (1993)				
	Main floor, south end of building	Person receives shock from contact with unlabeled energized switchgear	1. Service disconnect switch is energized but not labeled	I/I	D/C		
			2. The majority of equipment in building is deenergized; this could lead to believing the unlabeled equipment is also deenergized				
	Main floor, south end, main panelboard	Person receives shock from contact with exposed energized conductors related to poorly attached receptacles	3. Four receptacles hang from panelboard without support or twistlocks	I/I	D/D		
			4. Energized surfaces are not currently exposed but could easily become so when a device is plugged in				
			5. Receptacles are within easy reach (30 in. from floor)				
			6. Receptacles are energized				
	Outside substation, southeast corner of building	Person receives shock from contact with conductors associated with deenergized service that becomes energized	7. Deenergized service is on the same pole as the temporary energized service	I/I	D/C		
			8. The energized service could energize the out-of-service feeds inadvertently during high winds or some accident				

Table C1-20. 108-F Reactor Building. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to asbestos	Multiple potential locations	Person inhales friable asbestos; potential exists for asbestos related illness in the future from such exposure	1. Building is locked, not normally occupied, and routine maintenance does not take place 2. Asbestos training and masks are required for entry 3. There is more friable asbestos here than in any other 100 Area building 4. There is water damage evidence throughout building 5. Most of the friable asbestos is located in the piping closets 6. Friable material requires disturbance for release 7. The top four levels of the building have been designated as an asbestos regulated area 8. Pipe lagging and flooring, roofing, or other materials may or may not contain asbestos	II/II	D/C	II, D Minor	II, C Moderate
Exposure to lead	Specific locations: Rooms 111 A, C, and D	Person inhales lead dust	1. Oxidation exists on lead bricks 2. Persons must handle lead as required by regulatory requirements to control it 3. Most lead is in radiation zones 4. Lead oxidation rates around Hanford Site found to be larger than initially expected 5. Sensitivity to lead exposure varies 6. The walls of these rooms are lead lined	IV/IV	E/E	IV, E Negli.	IV, E Negli.

Table C1-20. 108-F Reactor Building. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to lead (cont.)	--	--	7. The wall surfaces appear to be in fair condition	--	--	--	--
Exposure to biological hazards						II, C Moderate	II, C Moderate
	Located throughout the facility	Person exposed to dusts from bird guano and dead animals and contracts disease. This item located primarily in radiation zone.	NOTE: Events that are serious in nature are of lower probability. Likewise, events that are minor in effect are of higher probability. Low frequency accidents have significant consequences High frequency accidents have small consequences	II/II IV/IV	C/C A/A		
		Person exposed to spider bites, wasp stings, and snake bites	1. Presence of spiders, wasps, etc. is seasonal 2. Very low building activity 3. Pigeon guano and carcasses observed in heating, ventilation, and air conditioning system 7. Snakes have been found in other deactivated buildings, including rattlesnakes 8. Activities for cleanup and maintenance occur where hazard exists 9. Asbestos control requirements reduce biological hazard exposure for disease and insect bites 10. No interior lighting				

Table C1-20. 108-F Reactor Building. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Temperature extremes						II, C Moderate	II, C Moderate
	General	Person experiences heat exhaustion	1. Seasonal	II/II	C/C		
			2. Dependent on ventilation				
			3. Hanford Site has a history of this problem occurring				
			4. Hazard depends on type of work being performed				
			5. Can be controlled by limiting exposure				
			6. Activities that require concern about temperature extremes are not performed frequently				
			7. Worker has some awareness of hazard				
		Person experiences hypothermia	8. Low temperatures occasionally occur on the Hanford Site	II/II	D/D		
Release of asbestos						III-3, E Negli.	III-3, E Negli.
	Global	Release of asbestos caused by disturbance of friable asbestos insulation	1. Building is locked, not normally occupied, and routine maintenance does not take place	III-3 III-3	E/E		
			2. There is more friable asbestos here than in any other 100 Area building				
			3. There is water damage evidence throughout the building				
			4. Most of the friable asbestos is located in the piping closets				
			5. Friable material requires disturbance for release				
			6. The top four levels of the building have been designated as an asbestos regulated area				
			7. Pipe lagging and flooring, roofing, or other materials may or may not contain asbestos				

Table C1-20. 108-F Reactor Building. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of asbestos (cont.)	--	--	8. Building appears weathertight 9. Loss of adminstrative controls would make release more probable	--	--	--	--
Release of lead	General	Release of lead by theft or sabotage	1. Lead is contained in walls and in facility structure but cannot be easily removed 2. Theft of materials (such as mercury) has occurred in the past 3. Lead is perceived as a useful and valuable material	III-3 III-3	E/E	III-3, E Negli.	III-3, E Negli.
Release of oil and petroleum products	Penthouse at top of building	Release of oil outside the building from failure of equipment seals, valves, piping, reservoirs, etc.	1. Quantities of oil are residual and small 2. No mechanism for releasing oil to the outside	III-3 III-3	E/E	III-3, E Negli.	III-3, E Negli.

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Table C1-21. 183-F Clearwell.

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident		C-C	L-C	Now	10 Years
Falling	East unit of underground structure	Person falls from roof structure to floor	1. Roof structure is partially demolished 2. Small sign and thin chain exist for warning individuals to stay off roof of 183 clearwell 3. Area is completely accessible to anyone in area	II/II	C/C	II, C Moderate	II, C Moderate

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Table C1-22. 1701-FA Gatehouse.

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Fire	Electrical service entrance equipment	Personnel exposed to fire caused by electrical insulation failure and short circuit	1. Electrical equipment is not maintained 2. The loads in the service have been turned off; however, the service is still energized 3. The equipment is beyond its design life	IV/IV	C/C	IV, C Minor	IV, C Minor

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Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, C Serious	I, B Critical
	General to all locations		[1]Roof panels generally are in deteriorated condition [1]Access doors to roof from inside building are not posted or locked				
	Control room and offices area:						
	East part of corridor 5	Person falls through damaged roof panel while on roof	1. Two gypsum panels with large holes	I/I	D/C		
	East room		2. Ten gypsum panels are deteriorated 3. Five gypsum panels have heavy damage from large leak				
	Northeast offices		4. One gypsum panel is damaged 5. One gypsum panel is cracked 6. Three gypsum panels have exposed rusty reinforcement caused by large leak				
	Entrance corridor and rest room		7. Five gypsum panels are deteriorated 8. Two gypsum panels are damaged				
	Compressor room		9. Three gypsum panels are deteriorated 10. One gypsum panel is damaged				
	Battery room		11. Four gypsum panels are deteriorated 12. One gypsum panel is damaged with large leak				
	Upper level-large room		13. Five gypsum panels are damaged with evidence of leakage				
	Fan room and dryer areas:						
	Roof of upper fan room	Person falls through damaged roof panel while on roof	14. Twenty-seven panels are deteriorated	I/I	D/D		

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling (cont.)	Process Area:	Person falls through damaged roof panel while on roof				--	--
	Outer control rod room		16. Fifteen gypsum panels deteriorated	I/I	C/B		
			17. Twenty-eight gypsum panels are badly deteriorated, two are damaged				
			18. Significant water leakage on west steel panel wall caused by joint leak				
			19. Significant water leakage on east wall at north side from joint leak				
	Gamma monitor room		20. One gypsum panel is deteriorated	I/I	C/B		
			21. One gypsum panel is damaged but is fixed from top side and is not leaking				
	Elevator room		22. Twenty-five gypsum panels are damaged, but fixed				
			23. Very large leak on east wall at south wall				
	Process area, elevator level		24. One gypsum panel is cracked at west lower level				
			25. Two gypsum panels are damaged, one is cracked across, and seven are deteriorated at north lower level				
			26. Very large leakage through damaged panels				
	Above reactor block		27. Twenty-four gypsum panels deteriorated, two very badly				
			28. Very large leakage through damaged panels				
	4th level, rear cap decon room		29. Four gypsum panels are deteriorated				
			30. Two gypsum panels are damaged				

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling (cont.)	4th level, rear cap decon room (cont.)	--	31. Very large leakage visible through damaged panels	--	--	--	--
	Storage basin and transfer area:						
	Storage basin	Person falls through roof panels while on roof	32. Four gypsum panels are badly damaged	I/I	C/B		
			33. Seven panels are repaired from top				
			34. Seventy percent of gypsum panels deteriorated (generally there is visible water vapor damage in basin area)				
	Transfer area		35. Five panels are deteriorated				
	Mechanical shop		36. Five panels are badly damaged, three fixed from top by plywood and steel plate				
			37. Eleven panels are deteriorated				
	Mechanical office		38. All panels are badly deteriorated				
	Corridor to storage basin		39. South part of roof gypsum panels cracked over HVAC duct				
			40. Very large leak is visible				
	Corridor 3		41. Four panels with exposed rusty reinforcement				
	Work area						
	Front face	Person falls through roof panels while on roof	42. Forty-eight panels are deteriorated	I/I	C/B		
			43. Ten panels are damaged				
			44. Very large leak is visible through deteriorated panels				
			45. Very large leak is visible on northeast wall close to corridor 5				

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling (cont.)	Metal storage rooms	--	46. Eight panels are deteriorated, one very badly	--	--	--	--
			47. Leak at place of connection between metal decking and south wall				
	Monitor room		48. Two panels with large holes fixed from top				
			49. Very large leak through panels				
	Corridor 11	Person falls through damaged roof panel while on roof	50. One panel is damaged				
	Corridor 13		51. A few areas have deteriorated gypsum panels				
			52. Very large leak is visible				
	Change room		53. Two panels are deteriorated				
			54. Very large leak is visible				
	All fixed metal ladders in facility	Person falls from ladder while climbing	55. Ladders are not properly caged	I/I	C/C		
			56. Projections exist into the climbing space of the ladder				
Struck by or striking	Struck by hazard (in general)		[2]Roof is leaking badly in many places [2]Most of the ceiling material is not concrete but a lighter "sheetrock" type material [2]Water infiltration in wood-framed roof areas will cause rapid deterioration [2]On the day the investigation occurred, it was raining, revealing many leaks [2]Snow loading will increase likelihood of roof or wall collapse			II, C Moderate	II, B Serious

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	--	--	[2]Seismic event will facilitate roof or wall collapse	--	--	--	--
			[2]Activities that cause significant structural vibration will facilitate roof or wall collapse				
	Specific locations:						
	Upper level--large room	Person is struck by collapsing roof or wall	1. Crack between concrete wall and chemical makeup wall	II/II	D/C		
	East part of corridor 5		2. Two gypsum panels with large holes (same as falling)				
	Control room offices	Person is struck by collapsing roof or wall	3. Crack in concrete slab with evidence of leakage	I/I	E/E		
	East room	Person is struck by falling roof panel pieces	4. Ten gypsum panels deteriorated (same as falling)	II/II	D/C		
			5. Five gypsum panels have heavy damage from large leak (same as falling)				
	Northeast offices		6. One gypsum panel is damaged (same as falling)				
			7. One gypsum panel is cracked (same as falling)				
			8. Three gypsum panels with exposed rusty reinforcement exposed caused by large leak (same as falling)				
	Entrance corridor and restroom		9. Five gypsum panels are deteriorated (same as falling)				
			10. Two gypsum panels are damaged (same as falling)				
	Compressor room		11. Three gypsum panels are deteriorated (same as falling)				
			12. One gypsum panel is damaged (same as falling)				
	Battery room		13. Four gypsum panels are deteriorated (same as falling)				

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	--	--	14. One gypsum panel is damaged with large leak (same as falling)	--	--	--	--
	North corridor (south of compressor room)	Person is struck by collapsing concrete slab	15. Crack in composite concrete slab with evidence of large leak	I/I	E/E		
	Office 1, control room, control room office	Person is struck by falling roof panel pieces	16. Suspended ceiling is deteriorated by water leakage	II/II	D/D		
	Upper level-- large room		17. Five gypsum panels are damaged with evidence of leakage (same as falling)				
	Fan room and dryer areas:						
	Roof of upper fan room	Person is struck by falling roof panel pieces	18. Twenty-seven panels are deteriorated (same as falling)	II/II	D/D		
			19. Two panels are damaged, but fixed				
	Upper fan room	Person is injured by tripping over exposed bolts jutting from old equipment pedestals	20. Bolts are exposed				
			21. Bolts are not easily seen				
	Process area:						
	Valve room	Person is struck by collapsing roof of tunnel	22. Crack across roof of concrete slab at tunnel entrance to valve room	I/I	E/E		
			23. No evidence of water leakage exists				
	Outer control rod room	Person is struck by falling roof panel pieces	24. Fifteen gypsum panels are deteriorated (same as falling)	II/II	D/D		
			25. Twenty-eight gypsum panels are badly deteriorated; two are damaged (same as falling)				
			26. Significant water leakage on west steel panel wall				

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	--	--	27. Significant water leakage on east wall at north side	--	--	--	--
	Inner control rod room	Person is injured when roof collapses	28. Crack along concrete slab, beam and walls	I/I	D/C		
	Gamma monitor room	Person is struck by falling roof panel pieces	29. One gypsum panel is deteriorated (same as falling)	II/II	C/B		
			30. One gypsum panel damaged but fixed from top side (same as falling)				
	Elevator room		31. Twenty-five gypsum panels damaged, but fixed (same as falling)				
			32. Very large leak on east wall at south wall				
	Process area, elevator level		33. One gypsum panel cracked at west lower level (same as falling)				
			34. Two gypsum panels are damaged; one is cracked across and seven are deteriorated at north lower level (same as falling)				
			35. Very large leakage through damaged panels				
	Above reactor block		36. Twenty-four gypsum panels are deteriorated, two very badly (same as falling)				
			37. Very large leakage through damaged panels				
	West stairway, 5th level (corridor)	Person is struck by collapsing roof	38. Roof concrete slab is cracked	I/I	E/E		
			39. Evidence of very large leak exists				
	Rear cap decon room (4th level)	Person is struck by falling roof panel pieces	40. Four gypsum panels are deteriorated (same as falling)	II/II	D/C		

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	Rear cap decon room (4th level) (cont.)	Person is struck by falling roof panel pieces (cont.)	41. Two gypsum panels are damaged (same as falling)	--	--	--	--
			42. Very large leakage through damaged panels is visible				
	Hot tool room (3rd level)	Person is struck by collapsing roof	43. Composite slab cracked with evidence of large leak	I/I	E/E		
	Upper level chemical makeup walls	Person is struck by falling roof panel pieces	44. Large quantity of small cracks across mortar joints	II/II	D/C		
			45. Cracking of joint structure of concrete block walls will accelerate if cracks are not sealed				
			46. Vertical crack along steel column at south wall				
	Process area		47. Steel beams show signs of rust				
	Elevator room		48. Steel beam in elevator room is twisted				
	Storage basin and transfer area:						
	Storage basin	Person is struck by falling roof panel pieces	49. Four gypsum panels badly damaged (same as falling)	II/II	C/B		
			50. Seven panels repaired from the top				
			51. Seventy percent of gypsum panels are deteriorated (same as falling)				
	Transfer area		52. Five panels are deteriorated (same as falling)				
	Mechanical shop		53. Five panels are badly damaged and three are fixed from the top by plywood and steel plate (same as falling)				
			54. Eleven panels are deteriorated (same as falling)				

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	Mechanical office	Person is struck by falling roof panel pieces (cont.)	55. One hundred percent of panels badly deteriorated (same as falling)	--	--	--	--
	Corridor to storage basin		56. South part of roof gypsum panels cracked over HVAC duct (same as falling)	II/II	C/B		
			57. Very large leak is visible				
	Corridor 3		58. Four panels with exposed rusty reinforcement (same as falling)				
	Work area						
	front face	Person is struck by falling roof panel pieces	59. Forty-eight panels are deteriorated (same as falling)	II/II	C/B		
			60. Ten panels are damaged (same as falling)				
			61. Very large leak is visible through deteriorated panels				
			62. Very large leak on northeast wall close to corridor 5				
	Metal storage rooms		63. Eight panels are deteriorated, one very badly (same as falling)	II/II	C/B		
			64. Leak at place of connection between metal decking and south wall				
	Monitor room		65. Two panels have large holes fixed from the top (same as falling)	II/II	C/B		
			66. Very large leak through panels is visible				
	Corridor 11		67. One panel is damaged (same as falling)	II/II	C/B		
	Room north of laboratory		68. Roof penetration by electrical conduit not sealed and leaks badly	II/II	C/B		

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	Corridor 13	Person is struck by falling roof panel pieces (cont.)	69. A few areas of deteriorated gypsum panels (same as falling)	--	--	--	--
			70. Very large leak is visible				
	Change room	Person is struck by falling roof panel pieces	71. Two panels are deteriorated (same as falling)				
			72. Very large leak is visible				
		Person is struck by collapsing roof	73. Steel beams in change room rusty	I/I	E/E		
			74. Anchor bolts supporting roof beams in room 4 have pulled free of wall				
	Wall connection between chemical makeup at room 4 and chemical makeup wall in south wall, corridor 11		75. Crack in connection between wall and room	II/II	D/C		
	Throughout the facility	Person is injured by inadvertent energizing of mechanical equipment	76. Equipment presently is deenergized	II/II	E/E		
			77. Equipment is partially dismantled				
			78. No readily identifiable disconnects present for equipment				
			79. Equipment is still connected				
			80. Equipment can be reenergized because electrical circuits are inadequately or inaccurately identified				
	Southeast corner of power block "S" of outer control rod room	Person is struck by falling lighting fixture	81. One fixture suspended only by broken conduit system	IV/IV	D/D		

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	Outer control rod room wall	Person strikes or trips over protruding bolt or hook	82. Bolts protruding from equipment pad, brackets sticking out from wall	II/II	D/D	--	--
	Maintenance shop		83. Hooks sticking out of walls				
	Hallway outside of storage basin		84. Projections sticking out from walls				
	Rooms above control room (28-ft level)		85. Bolts protruding from equipment pad				
			86. No lighting in many of the hazard areas				
	Third level HVAC room		87. Low clearance under fan units with bolts protruding from floor near entrance				
	Ventilation plenum	Person is struck by falling plenum	88. Two metal posts supporting plenum are buckled	II/II	E/E		
	High-tank storage area	Person strikes or trips over protruding bolt	89. Bolts are projecting from pad				
			90. Area is roped off	II/II	E/E		
Drowning/ suffocation	Global throughout building	Person enters confined space and is overcome by gases or lack of oxygen	1. Many confined spaces exist in the building both above- and belowgrade	I/I	D/D	I, D Minor	I, D Minor
			2. There is evidence of oxidation and water accumulation				
			3. Samples of confined space atmospheres showed no problems				
			4. Building has lack of ventilation				
			5. Most of the confined spaces in the building were not checked				
			6. Conditions can change at any given time				
			7. Confined spaces are not identified				

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock						I, B Critical	I, B Critical
	Global		[3]Circuits and breakers are not identified correctly, or are not identified at all as to what they feed [3]Breakers can be switched on at any time, energizing the circuits [3]Roof leakage wetting electrical equipment [3]There has been a conscious effort to shut down electrical power to unneeded sections of the plant				
	Greenhouse between 105-H Building and trailer change rooms	Person receives shock from contact with exposed energized conductors or equipment caused by insulation failure	1. Nonmetallic sheathed cable used to supply power that is subject to abrasion and other mechanical damage 2. Roof is leaking rain and snow melt onto receptacle boxes 3. Extension cord is laying on the floor in a puddle of water 4. Receptacle boxes are not qualified (approved) for use outdoors or in a wet location	I/I	B/B		
	Men's change room between corridor 11 and corridor 13	Person receives shock from contact with exposed energized conductors or equipment	5. Light switch for this room does not have a cover plate 6. Construction of switch results in exposure of terminals at front of switch 7. Circuit was not energized when tested 8. It could not be determined if there was a method to prevent switch from becoming energized	I/I	C/B		
	Northeast corner of storage basin area	Person receives shock from contact with exposed energized conductors or equipment from insulation failure	9. Nonmetallic sheathed cable used to supply power that is subject to abrasion and other mechanical damage	I/I	E/D		

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	10. Receptacle box is fastened to wall at about 6 ft above floor	--	--	--	--
			11. Cable is not supported adequately				
	Southeast corner of power block "S" of outer control rod room	Person receives shock from contact with exposed energized conductors or equipment from insulation failure	12. Ceiling significantly deteriorated	I/I	B/B		
			13. Lamps are energized but not lit				
			14. Wires feeding fixtures are pinched between industrial shade and ballast shroud				
			15. Insulation protecting pinched wires is damaged				
	Northeast corner of power block area, instrument repair shop	Person receives shock from contact with exposed energized conductors or equipment from insulation failure	16. Three feet of energized wires are hanging out of a raceway near ceiling	I/I	C/B		
			17. Wires are looped around conduits in vicinity				
			18. Ends of wire are protected with electrical tape				
	Above doorway from electrical equipment room to hallway adjacent to reactor work area	Person receives shock from contact with exposed energized conductors or equipment from electrical fault	19. Nonmetallic sheathed cable tied into conduit-protected wiring system with nonstandard method	I/I	D/D		
			20. The spliced conductors are not enclosed by the conduit body, leaving conductors exposed				
			21. The splice is located above the doorway and above three conduits running perpendicular to the conduit having the splice				
			22. There is no temperature controller				
			23. There is no routine inspection of heat trace insulation				

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	24. Heat trace not protected from mechanical damage	--	--	--	--
	"D" elevator machine room	Person receives shock from contact with exposed energized conductors or equipment	25. Enclosure between panel "E" and panel "EL" has no cover	I/I	D/D		
			26. There are energized conductors				
			27. The connections are made on a terminal strip				
	Stairwell "D" elevator machine, room 2	Person receives shock from contact with exposed energized conductors or equipment from insulation failure	28. No cover on conduit body above the doorway from stairwell into machinery room	I/I	D/D		
			29. Conductors are outside the conduit body				
			30. Conductors are spliced with wire nuts				
Exposure to radiation						II, D Minor	II, D Minor
	Global	Person exposed to external ionizing radiation, predominantly from cobalt- and cesium-fixed contamination	1. Predominantly low (less than 20 mR/h) external exposure rates	II/II	D/D		
			2. Energetic gamma emitters possible in immediate vicinity of basin walls and activated structures such as graphite pile, biological and thermal shields, etc.				
			3. Isolated moderate to high radiation fields exist on or near the top of the reactor unit and the inner control rod room. Exposure rates as high as 100 mR/h found.				
		Person exposed to radioactive material by inhalation, ingestion, or absorption	4. Only occurs from resuspendable material	IV/IV	D/D		
			5. Areas and items are mislabeled or misposted				
			6. Postings at some areas are misleading				

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to radiation (cont.)	--	--	7. Some postings are out of date because of changes in posting requirements 8. Most material is buried with soil fill in basin or contained in stable matrix such as stack graphite or activated steel 9. Release of radioactive materials would require performance of activities that are intrusive in nature	--	--	--	--
	Specific locations: Fuel basin walls Metal storage basin walls Process tubes Biological and thermal shields Graphite moderator						
Exposure to asbestos	Throughout building	Person inhales friable asbestos; potential exists for asbestos related illness in future from such exposure	1. Residue remaining on piping following asbestos removal project 2. Residue appears to not be coated with fixative 3. Some residue is not within reach 4. Evidence of water damage throughout building	IV/IV	D/C	IV, D Negli.	IV, C Minor
	Specific locations: On piping throughout building						

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to asbestos (cont.)	Air conditioning room	--	5. Asbestos residue	--	--	--	--
	Storage basin		6. Asbestos residue				
	Upper fan room		7. Asbestos residue				
	Operating gallery		8. Asbestos residue				
Exposure to lead						IV, B Minor	IV, B Minor
		Person inhales lead dust	1. Oxidation exists on lead bricks	IV/IV	B/B		
			2. Persons must handle lead as required by regulatory requirements to control it				
			3. Most lead is in radiation zones				
			4. Lead oxidation rates around the Hanford Site found to be larger than initially expected				
			5. Sensitivity to lead exposure varies				
	Specific locations of lead:						
	Minus 12-ft storage "H" loop recirculation room		6. Lead bricks and shot sitting on floor and some lead overhead				
	Corridor leading to "H" loop recirculation room		7. Lead shielded sewer pipe				
	Gas tunnels		8. Small amounts of lead				
	Gamma monitor room		9. Lead bricks on top of turrets				
	Next room up from gamma monitor room		10. Several lead bricks				
	Near side front face		11. Pile of lead bricks				
	30 ft ready room		12. Lead bricks on floor				

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to lead (cont.)	Specific locations: (cont.)	--		--	--	--	--
	20-ft hot tool room		13. Three lead bricks				
	10-ft gamma monitor room		14. Lead bricks				
	Outer control rod room		15. Lead sheets and lead bricks				
	10-ft. level near stairwell		16. Lead shot and lead bricks				
	Top of reactor block		17. Lead bricks and ball 3X cave				
	Near side viewing window		18. Lead bricks				
Exposure to mercury						IV, D Negli.	IV, D Negli.
		Person exposed to mercury from ingestion or absorption	1. Very small quantities	IV/IV	E/E		
			2. Contained in glass containers				
			3. Located in remote areas of building				
			4. Known locations are in radiation zones				
			5. Possibility for existence as mixed waste				
		Person receives exposure to mercury from theft	6. During D&D of 108-B Building, a significant quantity of mercury was stolen and never recovered	IV/IV	D/D		
			7. History of accidents involving spills of mercury				
	Specific locations:						
	Hallway opposite "H" loop recirculation room minus 12 ft		8. Two mercury switches				
	30-ft level near side stairwell		9. One mercury switch				

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to mercury (cont.)	Near side viewing window	--	10. One mercury switch	--	--	--	--
Exposure to miscellaneous chemicals						II, D Minor	II, D Minor
		Person exposed to unknown or known chemicals through inhalation, ingestion, or absorption from breach of container	1. Facility is normally unoccupied in most areas	II/II	D/D		
			2. The materials may be more or less stable depending upon age and chemical makeup				
			3. Few chemicals in facility				
			4. Exposure requires loss of chemical containment				
			5. Person must come in contact with material				
			6. Process of collecting and staging material increases possibility of exposure				
			7. Some materials are unknowns				
	Specific locations:						
	Outer control rod room		8. Two 55-gal drums labeled as radiation waste and kerosene				
			9. One 5-gal container with radiation release sticker dated 3/25/92				
			10. One 1-gal container of decontamination agent				
			11. One 5-gal container of resin				
			12. One 5-gal container of floor stripper				
			13. Two aerosol cans of solvent				
			14. One aerosol can of insecticide				
	Monitor room						
	Storage basin						

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals (cont.)	Exhaust fan room 6 Sink in tool room at 20-ft level, far side rear stairwell Control room Transfer area East end of gas wing corridor (west of storage basin)	--	--	--	--	--	--
			15. One 55-gal plastic drum full of unknown material with oily substance on lid 16. Two 10-gal carboys with unknown liquid 17. Three cans of spray paint, one can of lubricant, and a plastic container of cutting fluid 18. One 1-gal container of decontamination agent 19. Oil in board 20. Small unmarked containers and 55-gal drum marked aerosol spray 21. Five glass flasks on wall filled with oil				
Exposure to biological hazards						II, C Moderate	II, C Moderate
	Located throughout the facility	Person exposed to dusts from bird guano and dead animals and contracts disease (this item located primarily in radiation zone)	Low frequency accidents have significant consequences	II/II	C/C		
			High frequency accidents have small consequences	IV/IV	A/A		
			NOTE: Events that are serious in nature are of lower probability. Likewise, events that are minor in effect are of higher probability.				
		Person exposed to spider bites, wasp stings, rodent bites, and snake bites					

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to biological hazards (cont.)	--	--	1. Presence of spiders, wasps, etc., is seasonal 2. Very low building activity 3. Hazards found in radiation zone areas 4. Several sightings of bats have occurred 5. Bat bites may have occurred in the past 6. Mouse bites (rodents) may have occurred in the past 7. Snakes have been found in the buildings, including rattlesnakes 8. Activities for cleanup and maintenance occur where hazard exists 9. Current conditions not severe	--	--	--	--
Temperature extremes						II, C Moderate	II, C Moderate
	General	Person experiences heat exhaustion	1. Seasonal 2. Dependent on ventilation 3. Hanford Site has a history of this problem occurring 4. Hazard depends on type of work being performed 5. Can be controlled by limiting exposure 6. Activity that requires concern about temperature extremes are not performed frequently 7. Worker has some awareness of hazard	II/II	C/C		
		Person experiences hypothermia	8. Low temperatures occasionally occurs on the Hanford Site 9. No active heating in most of the building	II/II	D/D		

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Fire						II, D Minor	II, C Moderate
	Small office area in rooms, southeast corner of power block, south of outer control rod room	Person exposed to flash burn from electrical fault caused by spark source	1. Ceiling material has deteriorated significantly	IV/IV	D/C		
			2. Lamps are not lit, but are energized				
			3. Wires feeding these fixtures are pinched between the industrial shade and the ballast shroud				
			4. The insulation protecting these wires is damaged				
	Northeast corner of building, electric equipment room, where original service entered	Person exposed to fire from electrical wiring overheating	5. Wiring method is improper for industrial facility	IV/IV	D/D		
			6. Nonmetallic sheath cable is not supported adequately				
			7. Very little combustible material present				
	Room south of outer control rod room and balance of plant	Person exposed to fire from electrical wiring overheating or cable faults	8. Flexible cord used throughout facility to connect portable heaters	IV/IV	D/D		
			9. Flexible cord is routed through walls, doors, and other places where abrasion can occur				
	Electrical equipment area, west end, near greenhouse	Person exposed to fire from overheating of combustible material by heater	10. Space heater (13 kW) operating	II/II	D/C		
			11. No apparent reason for heater to be energized				
			12. Significant quantity of spider webs providing combustible material				
			13. Doors are locked in area, and there are no exits				

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Fire (cont.)	--	--	14. General activities at "H" area place people where hazard exists	--	--	--	--
Explosion						I, D Minor	I, D Minor
	General	Shock sensitive material causes explosion that injures individual	1. Age of material	I/I	D/D		
			2. Type of material				
			3. Ambient temperature				
			4. Movement of chemicals occurs as part of the cleanup program				
			5. It is not clear whether the WHC policy on unknown chemicals is followed				
			6. Not many unknown chemicals in facility				
			7. Fire department has been designated contact for handling unknown chemical spills				
Release of radioactive material						III-2, D Negli.	III-2, C Negli.
	Specific locations:						
	Steps, far side stairwell	Release and/or spread of radioactive material resulting from storm water accumulation	1. Roof leaks in radiation zones	III-3 III-3	D/D		
	Floor in outer control rod room		2. Existing pathways are inefficient for movement of material to exterior				
	Underneath west exit door on mezzanine above reactor		3. Potential exists for movable contamination in roof area				
	Transfer bay	Release and/or spread of radioactive materials from mismanagement of stored water	4. Significant volumes	III-2 III-2	D/D		
	Outer control rod room		5. Some items were only wrapped in plastic				

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material (cont.)	Instrument repair room at northeast corner of building	--	6. Radioactive waste and materials are not subject to disposal within specific time limit; material may be forgotten or ignored	--	--	--	--
	H-loop recirculation control room at minus 12 ft	Spread of radioactive material by insects, birds, rodents, or contaminated vegetation	7. Some bird droppings observed	III-2 III-2	D/C		
	Upper fan room		8. Observed dead bird				
	Downcomer room		9. Less evidence of biological intrusion than at previously investigated facilities	III-2 III-2	D/C		
			10. No history of contamination outside of building, proven to originate from inside				
Release of asbestos						III-3, D Negli.	III-3, D Negli.
	Throughout building	Release of asbestos caused by disturbance of residue or friable asbestos insulation	1. Residue remaining on piping following asbestos removal project	III-3 III-3	D/D		
			2. Residue appears to not be coated with fixative				
			3. Some residue is not within reach				
			4. Evidence of significant water damage				
	Specific locations:						
	On piping throughout building						
	Air conditioning room		5. Asbestos residue				
	Storage basin		6. Asbestos residue				
	Upper fan room		7. Asbestos residue				
	Operating gallery		8. Asbestos residue				

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of lead						III-2, D Negli.	III-2, D Negli.
		Release of lead by theft or sabotage	1. Significant quantities of removable lead	III-2	D/D		
			2. Potential to be mixed waste	III-2			
			3. Located in remote areas of building				
			4. Located in radiation zones				
			5. High density minimizes likelihood for removing large quantities				
			6. Usefulness in a number of recreational activities increases likelihood of theft				
			7. Theft of materials has occurred in the past				
			8. Evidence of water intrusion				
	Locations of lead:						
	Minus 12-ft storage "H" loop recirculation room		9. Lead bricks and shot setting on floor and some lead overhead				
	Corridor leading to "H" loop recirculation room		10. Lead shielded sewer pipe				
	Gas tunnels		11. Small amounts of lead				
	Gamma monitor room		12. Lead bricks on top of turrets				
	Next room up from gamma monitor room		13. Several lead bricks				
	Near side front face		14. Pile of lead bricks				
	30-ft ready room		15. Lead bricks on floor				
	20-ft hot tool room		16. Three lead bricks				

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of lead (cont.)	10-ft gamma monitor room	--	17. Lead bricks	--	--	--	--
	Outer control rod room		18. Lead sheets and lead bricks				
	10-ft level near stairwell		19. Lead shot and lead bricks				
	Top of reactor block		20. Lead bricks and ball 3X cave				
	Near side viewing window		21. Lead bricks				
Release of mercury						III-3, D Negli.	III-3, D Negli.
		Mercury released to environment as a result of container breakage	1. Very small quantities	III-3 III-3	D/D		
			2. Contained in glass containers that are subject to breakage				
			3. Located in remote areas of building				
			4. Known locations are in radiation zones				
			5. Possibility for existence as mixed waste				
		Mercury released to environment from theft or sabotage	6. During D&D of 108-B Building a significant quantity of mercury was stolen and never recovered				
	Specific locations:						
	Hallway opposite "H" loop recirculation room minus 12 ft		7. Two mercury switches				
	30-ft level near side stairwell		8. One mercury switch				
	Near side viewing window		9. One mercury switch				

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of oil/petroleum products						III-3, D Negli.	III-3, D Negli.
		Release of oil outside the building due to failure of equipment seals, valves, piping, reservoirs, etc.	1. Materials are located inside building	III-3 III-3	D/D		
			2. Most area have small quantities of oil present				
			3. Unknown quantities of oil in VSR drive motors				
			4. Majority of oil contained in equipment is not leaking				
			5. Oil in radiation zones has the potential of being designated as mixed waste				
			6. Seals and gaskets are growing older, increasing likelihood of leakage				
			7. Gaskets and seals tend to leak during temperature changes				
	Specific locations:						
	Minus 12 ft near entrance of "H" loop control room		8. Oil in inline oiler				
	Minus 12-ft level instrument room		9. Red oil in instruments				
	Tunnel under operating gallery		10. Oil in vacuum seal and pressure seal tanks				
	Operating gallery		11. Oil in several inline oilers				
	Gamma monitoring area at 10-ft level		12. Oil residue on floor near floor drain				
	"D" machine room		13. Oil and grease on elevator drive equipment				
	VSR drive motors		14. Oil in VSR drive motors				
	Elevator drive equipment on mezzanine level		15. Oil and grease in drive equipment				
	Ball hoppers		16. Small amount of oil residue				

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of oil/petroleum products (cont.)	"D" elevator	--	17. Oil can	--	--	--	--
Release of miscellaneous chemicals						III-3, D Negli.	III-3, D Negli.
		Release of miscellaneous chemicals caused by container failure	1. Small quantities	III-3 III-3	D/D		
			2. Inside building				
			3. Majority of chemicals staged in one location				
			4. The majority of containers are in good condition				
	Specific locations:						
	Outer control rod room		5. Two 55-gal drums labeled as radiation waste and kerosene				
			6. One 5-gal container with radiation release sticker dated 3/25/92				
			7. One 1-gal container of phosphoric acid				
			8. One 5-gal container of resin				
			9. One 5-gal container of floor stripper				
			10. Two aerosol cans of solvent				
			11. One aerosol can of insect fogger insecticide				
	Monitor room		12. One 55-gal plastic drum full of unknown material with oily substance on lid				
	Storage basin		13. Two 10-gal carboys with unknown liquid				
	Exhaust fan room 6		14. Three cans of spray paint, one can of lubricant, and a plastic container of cutting fluid				

Table C1-23. 105-H Reactor Building. (28 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of miscellaneous chemicals (cont.)	Sink in tool room at 20-ft level off far side rear stairwell	--	15. One 1-gal container of phosphoric acid 16. Oil in board 17. Small unmarked containers and 55-gal drum marked aerosol spray 18. Five glass flasks on wall filled with oil	--	--	--	--

[1]Common to all accidents where person falls through damaged roof panels while on roof.
[2]Common to all accidents where person is struck by falling roof panel pieces or by a collapsing wall or roof.
[3]Common to all accidents where person receive shock from contact with exposed energized conductors or equipment.
D&D = Decontamination and decommissioning
HVAC = Heating, ventilating, and air conditioning
VSR = Vertical safety rod
WHC = Westinghouse Hanford Company

Table C1-24. 1713-H Warehouse. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, D Minor	I, D Minor
	North roof	Person falls through gypsum board roof panels while on roof	1. Ten deteriorated (water damaged) panels on east side	I/I	D/D		
			2. One panel exposed with rusty reinforcements				
			3. This building is in heavy use as a warehouse				
	South roof		4. Forty-four deteriorated and seven bad panels on north side of south roof	I/I	D/D		
			5. Forty deteriorated and three bad panels on south side of south roof				
			6. No permanently attached roof access ladders				
Struck by or striking						I, C Serious	I, B Critical
	Area near wall between north and south portion of warehouse	Person is struck by collapsing wall and associated roof members	*Routine access (approximately daily)	I/I	C/B		
			1. Vertical cracks in concrete wall supporting steel roof trusses				
			2. Large snow loads or seismic force could collapse concrete wall and associated roof				
			3. This building is in heavy use as a warehouse				
	North roof	Person is struck by falling gypsum board roof panels	4. Ten deteriorated (water damaged) panels on east side	I/I	D/D		
			5. One panel exposed with rusty reinforcements				
	South roof		6. Forty-four deteriorated and seven bad panels on north side of south roof				
			7. Forty deteriorated and three bad panels on south side of south roof				

Table C1-24. 1713-H Warehouse. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock						I, C Serious	I, B Critical
	Panel "C" at north end of building	Person receives electrical shock from contact with exposed conductors or equipment after fault occurs	*Breakers can be switched on energizing potentially harmful circuits	I/I	C/B		
			1. Panel "C" recently replaced with modern General Electric circuit breaker panel				
			2. Connections to panel run through water pipe rather than conduit				
			3. Some branch circuits are made of nonmetallic sheathed cable that runs into a gutter above the panel				
			4. All ground wires have been cut off				
			5. Original equipment ground has not been connected to panel				
	South wall of room on north end of building	Person receives electrical shock from contact with energized conductors associated with damaged receptacles	6. Receptacles on this wall have been damaged or removed	I/I	C/B		
			7. Branch circuit breakers have been turned off				
			8. No lock and tag to prevent breakers from being turned on				
Exposure to miscellaneous chemical						IV, D Negli.	II, D Minor
	North end of building	Person is exposed to one of a number of different chemicals from spills or other container breaches	1. Spray paint, safety containers marked as solvents, acetone, and mineral spirits were found stored in the facility	IV/IV	D/D		

Table C1-24. 1713-H Warehouse. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemical (cont.)	--	Person breathes hazardous fumes from burning chemicals	2. Bottles of compressed air, oxygen, propane, and acetylene present 3. Mechanical or electrical ignition source possible (electrical system is in satisfactory condition) 4. Routine building access (approximately daily)	II/II	E/D	--	--
Explosion	Global	Person is burned during fire in building	1. Spray paint, safety containers marked as solvents, acetone, and mineral spirits were found stored 2. Bottles of compressed air, oxygen, propane, and acetylene present 3. Mechanical or electrical spark sources possible (electrical system is in satisfactory condition) 4. Heat from sunlight possible ignition source 5. Routine building access (approximately daily)	I/I	E/D	I, E Negli.	I, D Minor
Release of oil and/or petroleum products	North end of building	Oil or petroleum products release caused by spill or other breaches of a container	1. Containers in good condition 2. Relatively small quantities	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.
Release of miscellaneous chemicals	North end of building	Release of miscellaneous chemical caused by spill or other breaches of a container	1. Spray paint, safety containers marked as solvents, acetone, and mineral spirits were found stored in facility	III-3 III-3	D/D	III-3, D Negli.	III-2, D Negli.

Table C1-24. 1713-H Warehouse. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of miscellaneous chemicals (cont.)	--	--	2. Chemicals in vicinity of cracked wall	--	--	--	--
		Release of miscellaneous chemicals caused by fire	3. Bottles of compressed air, oxygen, propane, and acetylene present				
			4. Collapsing wall or electrical system could be potential ignitors	III-2 III-2	E/D		

Table C1-25. 167-K Crosstie Tunnel Building.

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
No hazards within facility Two gas cans observed next to building under lean-to							

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Table C1-26. 182-K Emergency Water Reservoir and Pump House. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, D Minor	I, C Serious
	Entire roof	Person falls through roof panel while on roof	1. Built up gravel roofing is in bad condition	-/I	-/D		
			2. Roof panels are steel decking that is currently in good condition				
			3. Long term exposure of decking to water from roofing leaks will result in degradation from rusting				
			4. Access to roof is from outside ladders only				
	East wall	Person falls through steel grating	5. Grating is loose and suspect (1.5 ft to 2.0 ft deep.)	II/II	D/C		
	Southwest corner		6. Ladder entry way through grating not properly guarded (10 ft to 12 ft deep)	I/I	D/C		
	Stairway and catwalk around motors in middle of building	Person falls through hand rail	7. Several sections of handrail or guardrail missing or not properly guarded (8 ft high)	I/I	D/C		
Struck by or striking						II, E Negli.	II, D Minor
	General to building	Person struck by collapsing roof panel	1. Existing roofing is in bad condition	-/II	-/D		
			2. Steel decking is currently in good shape				
			3. Long term exposure of decking to water from roofing leak will result in rusting and eventual weakness				
			4. Snow loading or seismic forces on weakened decking can cause roof collapse				
	East side of building side	Person trips over piping projecting from ground	5. Several cut off pipes projecting	II/II	E/D		
			6. Ground is uneven and covered with rocks				

Table C1-26. 182-K Emergency Water Reservoir and Pump House. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	Inside building, global	Person trips over material on floor	7. Housekeeping is poor	--	--	--	--
	Next to west side grating inside building	Person trips over projecting object	8. Several pipes projecting up 3-in. from floor				
	North wall inside building		9. Pipe extends into walkway				
	Next to west side grating inside building		10. Pile of loose pipes				
Drowning/ Suffocation	Global throughout building	Person enters confined space and is overcome by gases or lack of oxygen	1. Some confined spaces exist in the building belowgrade 2. There is evidence of oxidation and water accumulation 3. Samples of confined space atmospheres showed no problems 4. Building has lack of ventilation 5. Most of the confined spaces in the building were not entered or checked 6. Conditions can change at any given time 7. Confined spaces are not identified 8. There is a clearwell under building for pump suction that is a potential confined space	I/I	D/D	I, D Minor	I, D Minor
Electrical shock	North interior wall	Person receives shock as a result of coming into contact with exposed energized conductors during maintenance or other work	1. Breakers that are off may be turned on resulting in components that were deenergized becoming energized 2. Many wires extend from conduits where equipment has been removed	I/I	D/D	I, D Minor	I, D Minor

Table C1-26. 182-K Emergency Water Reservoir and Pump House. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	3. Some wires have conductors that are exposed	--	--	--	--
			4. Currently the circuits are deenergized				
	Ceiling of office in northeast corner of building	Person receives shock as a result of contacting energized conductors during maintenance or other work after wiring insulation in junction box has been damaged or removed	5. Flush mounted junction box in ceiling has no cover	I/I	D/D		
			6. Deenergized conductors are accessible in the box				
			7. A splice has been insulated with plastic screw-on caps				
			8. The circuit appears to be part of the energized lighting circuits				
Exposure to lead						IV, E Negli.	IV, E Negli.
		Person inhales lead dust	1. Oxidation exists on lead sheet	IV/IV	E/E		
			2. Persons must handle lead as required by regulatory requirements to control it				
			3. Most lead is in radiation zones				
			4. Lead oxidation rates found to be larger than initially expected				
			6. Sensitivity to lead exposure is variable				
	Specific locations:						
	Middle portion of north wall		7. One lead sheet				
	North end of building		8. One lead sheet				

Table C1-26. 182-K Emergency Water Reservoir and Pump House. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals						II, D Minor	II, D Minor
		Person exposed to unknown or known chemicals through inhalation, ingestion, or absorption from breach of container	1. Facility is not occupied	II/II	D/D		
			2. The materials may be more or less stable depending upon age and chemical makeup				
			3. Few chemicals in facility				
			4. Exposure requires loss of chemical containment				
			5. Person must come in contact with material				
	Specific locations: Throughout building		6. Ethylene glycol piping may have ethylene glycol residue				
Exposure to biological hazards						II, C Moderate	II, C Moderate
	Located throughout the facility	Person exposed to dusts from bird guano and dead animals and contracts disease	Low frequency accidents have significant consequences	II/II	C/C		
			High frequency accidents have small consequences	IV/IV	A/A		
			NOTE: Events that are serious in nature are of lower probability. Likewise, events that are minor in effect are of higher probability.				
		Person exposed to insect bites and stings, rodent bites, and snake bites					
			1. Presence of spiders, wasps, etc. is seasonal				
			2. Hazards found in radiation zone areas				
			3. Mouse bites may have occurred in past (rodents)				

Table C1-26. 182-K Emergency Water Reservoir and Pump House. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to biological hazards (cont.)	--	--	4. Snakes have been found in the buildings, including rattlesnakes 5. Activities for cleanup and maintenance occur where hazards exist	--	--	--	--
Temperature extremes						II, C Moderate	II, C Moderate
	General	Person experiences heat exhaustion	1. Seasonal 2. Dependent on ventilation 3. Hanford Site has a history of this problem occurring 4. Hazard depends on type of work being performed 5. Can be controlled by limiting exposure 6. Activities that require concern about temperature extremes are not performed frequently 7. Worker has some awareness of hazard 8. Building has asbestos that will necessitate special protective clothing for its removal 9. Building is entered infrequently	II/II	C/C		
		Person experiences hypothermia	10. Low temperatures occasionally occur on the Hanford Site	II/II	D/D		
Release of lead						III-3, D Negli.	III-3, D Negli.
	General	Release of lead by theft or sabotage	1. Lead bricks used for shielding 2. Bricks are movable and program is in place to inventory 3. Most lead is in radiation zones 4. Most lead is in remote areas	III-3 III-3	D/D		

Table C1-26. 182-K Emergency Water Reservoir and Pump House. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of lead (cont.)	--	--	5. Potential exists for lead and radionuclides (mixed waste) 6. Theft unlikely because of weight 7. Intrinsic value (relocation) 8. One lead sheet 9. One lead sheet	--	--	--	--
	Specific locations: Middle portion of north wall North end of building						
Release of petroleum products						III-2, D Negli.	III-2, D Negli.
	General	Failure of seals, piping, equipment, etc., resulting in release inside and outside of building	1. Oil already released inside building in some places; indications of current leakage 2. Small quantities of oil in most sources 3. Tank has sight glass indicating nearly full 4. Container contains unknown oil 5. Underground storage tanks are approximately 40 yr old 6. Building has possibility of spills in excess of 2,000 gal	III-2 III-2	D/D		
	Specific locations: Southwest corner of building over pipe tunnel Grating of north diesel engine Out building on north side						
Release of miscellaneous chemicals						III-3, D Negli.	III-3, D Negli.
		Release of miscellaneous dangerous or hazardous chemicals caused by breach or spilling of container	1. Small quantities 2. No pathways (e.g., drains) were noted near chemical containers	III-3 III-3	D/D		

Table C1-26. 182-K Emergency Water Reservoir and Pump House. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of miscellaneous chemicals (cont.)	--	--	3. Material would be contained in building in the event of a spill	--	--	--	--
	Specific locations: Throughout facility		4. Ethylene glycol lines run through building and may contain ethylene glycol residue				

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Table C1-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, D Minor	I, D Minor
	General to all locations		[1]Some roof panels are in deteriorated condition [1]Access doors to roof from inside building are not posted or locked				
	Storage and transfer areas (not included in the risk evaluation)	Person falls through damaged roof panel while on roof	1. Twenty-two roof panels (corrugated asbestos-cement sheets) are deteriorated and cracked with large deflection 2. One cracked panel in transfer area 3. Personnel are in this area on a continuous basis 4. This area could not be investigated fully because of the activity going on	I/I	D/D		
	All metal ladders throughout facility	Person falls from ladder while climbing	5. Ladders are not constructed to current safety standards 6. Lighting is poor 7. There are projections into the climbing zone of the ladder 8. Ladders are not locked out to prevent use	I/I	D/D		
Struck by or striking						II, D Minor	II, D Minor
	Struck by hazard in general		[2]Roof is leaking badly in a few places [2]Most of the ceiling material is not concrete but a lighter asbestos-cement type material fabricated in corrugated sheets				
	Process area	Person is struck by collapsing roof or wall	1. Some cracks (few) across concrete slabs in control rod rooms	II/II	E/D		

Table C1-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	--	--	2. Large number of cracks in concrete slab forming ceiling of storage room, tool room, and one level above	--	--	--	--
			3. Large leak on wall in storage room 3				
	Storage and transfer areas: (not included in risk evaluation)	Person is struck by collapsing roof or wall	4. Twenty-two roof panels (corrugated asbestos-cement sheets) are deteriorated and cracked with large deflection (same as falling)	II/II	C/B		
			5. K Basin Operations manages the buildings for this area; people are continually present				
			6. One cracked panel in transfer area (same as falling)				
	Striking hazard in general	Person trips and falls, sustaining an injury	7. Housekeeping is poor throughout the facility	II/II	E/D		
			8. There is no lighting in most of the facility				
	Control room	Person falls onto or bumps against a projection	9. Metal brackets project into walkways behind panels	II/II	D/D		
	Flux monitor room	Person falls onto or bumps against a projection	10. Metal projections on south wall				
	E metal storage area		11. Concrete pad with metal bolts protruding				
	Mezzanine over supply fan area		12. Several concrete pads with bolts protruding				
	Valve pit area		13. Projections and head hazards throughout				
	Solid purge room		14. Valve handles sticking into walkway				
	Irradiation testing and instrument station room		15. Concrete pad with bolts projecting				
	Mechanical equipment throughout facility	Person struck by equipment that is inadvertently energized	16. Mechanical equipment not visibly disconnected from power source	II/II	E/E		

Table C1-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	--	--	17. Labeling of electrical circuits and energy paths inaccurate or nonexistent	--	--	--	--
			18. No visible disconnects near equipment				
	Mezzanine over supply fan area	Person struck by equipment that is inadvertently energized	19. Compressor has inadequate guard that will allow objects as large as a hand to enter	II/II	E/E		
			20. Compressor is energized and operating				
	Entrance hallway going north towards basin	Person struck by falling object	21. Supports for light fixture are inadequate (less than one support per fixture)	IV/IV	B/B		
			22. Supports have been modified by using a 2 ft by 4 ft to support row of fixtures				
			23. Air duct is currently being supported by light fixtures				
Drowning/ suffocation						I, D Minor	I, D Minor
	Global throughout building	Person enters confined space and is overcome by gases or lack of oxygen	1. Many confined spaces exist in the building, both above- and belowgrade	I/I	D/D		
			2. There is evidence of oxidation and water accumulation				
			3. Samples of confined space atmospheres showed no problems				
			4. Building has lack of ventilation				
			5. Most of the confined spaces in the building were not entered or checked				
			6. Conditions can change at any given time				
			7. Confined spaces are not identified				

Table C1-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock						I, C Serious	I, B Critical
	General to facility		[3]Most circuits and breakers in the facility are unidentified or incorrectly identified [3]Breakers providing fault protection may not trip because of age and lack of maintenance [3]Breakers that are off may be turned on resulting in components that were deenergized becoming energized [3]Persons are continually present in some areas while other areas are not normally occupied [3]The 105-KE Facility is overall in better condition electrically than the other 105 facilities that have been inspected				
	Control room	Person receives shock from contact with exposed energized conductors or equipment as a result of fault from insulation failure	1. Space heaters in this area are wired using nonmetallic sheathed cable 2. Cable is supported by metal conduit clamps 3. Nonmetallic sheathed cable is not approved for industrial environments 4. Heaters are 480-V units 5. Exposure of conductors requires the insulation to be damaged 6. This facility has at least a 20-yr active life before power and heat can be removed	I/I	D/D		
	Inside instrument cabinet, east end of control room		7. Instrument cabinet has energized conductors 8. Cabinet doors have been removed	I/I	C/B		

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Table C1-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	9. Cabinet appears to be deenergized because there is ample evidence of equipment removal	--	--	--	--
			10. Energized conductors are not protected				
			11. No warning signs are present				
	Control room, concrete column N center of room	Person contacts energized conductors while adjusting thermostat or reaching for materials	12. No cover over 120-V thermostat	I/I	C/C		
			13. Terminals for securing wiring are open and uninsulated				
			14. Thermostat is located approximately 5.5 ft above floor, near work desk and letter tray				
	Control room	Person contacts exposed energized conductors while operating light switch	15. A portion of the wall adjacent to control room entrance has been removed	I/I	D/C		
			16. The light switch originally located in the removed partition is tied up to the adjacent wall by its flexible conduit				
			17. Circuit is energized				
			18. Although recessed in box, light switch does not have cover and terminals are exposed				
			19. Wiring is old and will not withstand flexing				
			20. Using the switch requires the person to hold the box, which causes the conduit to flex				
	"F" elevator lobby, adjacent to charge elevator area, below ball 3X control panel	Person contacts energized conductors	21. No device is installed in open receptacle box	I/I	C/C		

Table C1-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	"F" elevator lobby, adjacent to charge elevator area, below ball 3X control panel (cont.)	Person contacts energized conductors (cont.)	22. Wires are energized and protrude from box	--	--	--	--
			23. Some energized wires are taped; some are not				
			24. Area around box is densely populated with metal equipment that may become energized from contacting bare wires				
	West side of work area, dummy storage area	Person contacts energized conductors while operating light switch	25. Light switch on concrete wall is only 6 in. inside roped off area	I/I	C/C		
			26. Light switch does not have cover installed; however, the terminals are recessed in the box				
			27. Uninsulated terminals are accessible to personnel on front of switch				
			28. Switch is energized				
	Lighting panel K in misc. storage room adjacent to outer control rod room	Person receives shock as a result of contacting energized equipment or conductors when working on panel while in contact with grounded pipe fence	29. Panel "K" is surrounded by fence fabricated from plumbing pipe for physical protection from fork lift trucks	I/I	D/D		
			30. Material requiring handling using a forklift is still stored in area				
			31. Working clearance between panel and protective fence is not sufficient to ensure safety of persons working on panel "K"				

Table C1-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	Panel "V" adjacent to stairs next to miscellaneous storage area and south door to inner control rod room	--	32. Panel "V" has pipe barrier to provide physical protection	I/I	D/D	--	--
			33. Working clearance between panel and barrier not sufficient to ensure safety of persons working on panel "V"				
			34. Area is not subject to forklift traffic				
	Electrical room (door 214) above metal storage area	Person contacts energized equipment or conductors because of confusion about status while performing repair work	35. MCC bucket C-2 identified with label as Air Compressor 1; however, there is some doubt as to whether this is true	I/I	E/D		
			36. A sign reads "Breaker Deactivated Bus Hot"				
			37. Pink deactivation status tag, dated 1987, indicates that wires are disconnected				
			38. There are current locks and tags on switch dated March 1992				
			39. The tagging situation creates confusion				
	Corridor 6 north of "F" elevator lobby, adjacent to X-0 lab	Person contacts energized wire and receives shock	40. Devices have been removed from recessed boxes	I/I	C/C		
			41. Remaining wiring is bare				
			42. Wiring is energized				
	Southeast entry, interior north wall	Person contacts energized conductors while inserting plug into receptacle	43. Single duplex receptacle box is missing box cover	I/I	D/D		
			44. Terminals are exposed				
			45. Terminals are energized				

Table C1-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	Southeast entryway, interior south wall, fire alarm	Person contacts energized conductors if insulation has been damaged	46. Fire alarm circuits consist of Nonmetallic sheathed cable	I/I	D/D	--	--
			47. Cable is unprotected from damage				
			48. Cable penetrates wall openings without physical protection				
			49. Cable is currently undamaged				
	Fan control panel, grade level, adjacent to fan room	Person contacts energized conductors if insulation is damaged	50. Conduit fitting entering left side of enclosure contains energized wires	I/I	E/D		
			51. Conduit fitting does not have cover				
			52. Insulation is exposed to possible damage				
	Drip leg control panel located on floor below high pressure testing room	Person receives shock by contacting energized conductors or equipment if insulation is damaged	53. Individual supply wires to receptacle are energized and not physically protected by conduit	I/I	D/D		
	Room at top level of reactor pile	Person receives shock by contacting energized conductors or equipment if insulation damaged	54. Disconnect switches for "440-V Welder," "VSR-Hoist Monorail 884 Elevation," and "VSR-100' Elevation Equip Crane" are energized and on	I/I	E/D		
			55. Cables supplied by these switches could become damaged by general aging and/or abuse and expose energized conductors				
		Person receives shock by contacting energized conductors due to damaged insulation	56. Two individual lamp holders attached to the catwalk are supplied by an extension cord connected to a receptacle in the area	I/I	D/D		

Table C1-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	57. The two lamp holders are connected to a single plug cap with individual conductors not enclosed in cable or conduit	--	--	--	--
			58. The conductors are draped over catwalk railings and supports, exposing them to possible damage				
	Southeast entryway, interior south wall	Person receives shock from contact with energized conductors when insulation is damaged	59. Fire alarm circuits consist of physically unprotected nonmetallic sheathed cable	I/I	D/D		
			60. Nonmetallic sheathed penetrates wall openings without physical protection				
Exposure to radiation						II, C Moderate	II, C Moderate
		Person exposed to external ionizing radiation	1. Predominantly low (<500 mR/h) exposure rates	II/II	C/C		
			2. Moderate to high exposure rates exist in the immediate vicinity of the inner and outer control rod rooms, reactor rear face, mezzanine and top of reactor vertical safety control rod actuators, and laundry carts				
			3. Energetic gamma emitters possible in immediate vicinity activated structures such as graphite pile, biological and thermal shields, etc.				
			4. Approximately 30 locations identified with exposure rates >20 mR/h, or > twice the background				
	Inner control rod room		5. Lack of labeling and posting				
	Outer control rod room		6. Some locations read 500 mR/h				
	Ball 3X hoppers						
	Top of reactor						

Table C1-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to radiation (cont.)	--	Person exposed to radioactive material by inhalation, ingestion, or absorption	7. Only occurs from resuspendable material 8. Areas and items are mislabeled or misposted 9. Postings are misleading at some areas 10. Some postings are out of date because of changes in posting requirements	IV/IV	D/D	--	--
Exposure to asbestos	Multiple potential locations	Person inhales friable asbestos; potential exists for asbestos related illness in the future from such an exposure	1. Building partially occupied by workers 2. Ninety-five percent of facility insulation in good shape; some isolated instances of degradation 3. Uncertainty concerning which materials contain asbestos 4. Friable material requires disturbance for release 5. Some areas are posted for friable asbestos hazard 6. There is no evidence of an asbestos abatement program 7. Some construction materials such as roof panels are known to contain asbestos but are not classified as friable	IV/IV	D/D	IV, D Negli.	IV, D Negli.
	Specific locations: Work area Supply fan area Valve pit		8. Piping insulation along walls 9. Piping insulation 10. Piping insulation worst along walkways				

Table C1-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to asbestos (cont.)	Solid purge room, upper deck	--	11. Piping insulation	--	--	--	--
	Offices under control room		12. Piping insulation				
	X-2 level		13. Piping insulation				
Exposure to lead						IV, B Minor	IV, B Minor
		Person inhales lead dust	1. Oxidation exists on lead bricks	IV/IV	B/B		
			2. Persons must handle lead as required by regulatory requirements to control it				
			3. Most lead is in radiation zones				
			4. Lead oxidation rates found to be larger than initially expected				
			5. Large quantities of lead observed				
			6. Sensitivity to lead exposure varies				
	Specific locations:						
	X-1 level irradiation test facility		7. Large pile of 50 to 60 lead bricks				
	X-2 level irradiation test facility		8. Two lead bricks				
	"C" elevator drive shaft area		9. Six lead bricks south of caged area				
	Inner control rod room		10. Lead pigs and sheeting in southwest corner; estimated 20-30 bricks in pile in southeast corner				
	X-1 level		11. Lead bricks				

Table C1-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to lead (cont.)	Solid purge room and decontamination agent mixing room	--	12. Lead based paint is peeling	--	--	--	--
Exposure to mercury						IV, E Negli.	IV, E Negli.
	General	Person exposed to mercury from ingestion or absorption	1. Small quantities	IV/IV	E/E		
			2. Contained in glass containers				
			3. Possibility for existence as mixed waste				
			4. During D&D of 108-B Building, a significant quantity of mercury was stolen and never recovered				
	Specific locations:						
	Southwest area of valve pit		5. Mercury in manometer				
	"D" elevator drive platform		6. Two mercury switches				
	"C" elevator drive platform		7. One mercury switch				
	Room across from control room		8. Room is posted as being mercury contaminated; however, inspection was not completed for this room				
Exposure to miscellaneous chemicals						II, D Minor	II, D Minor
		Person exposed to unknown or known chemicals through inhalation, ingestion, or absorption from breach of container	1. Facility is partially occupied	II/II	D/D		
			2. The materials may be more or less stable depending upon age and chemical makeup				
			3. Few chemicals in facility				

Table C1-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals (cont.)	--	--	4. Exposure requires loss of chemical containment	--	--	--	--
			5. Person must come in contact with material				
			6. Process of collecting and staging material increases the possibility of exposure				
			7. Some materials are unknowns				
			8. Ethylene glycol can break down into hazardous materials				
	Specific locations:						
	Corridor between control room and basin operations area		9. Eleven 55-gal drums were being prepared for packaging hazardous waste				
	Front face work		10. Facility contains spray paint, adhesives, oil, talc, carbon, acetone, cleaning agent, methyl alcohol, cloroethylene, kerosene, and paint staged for disposal				
	Fan room		11. Two 55-gal drums (one blue and one green) full on unknown substance in northeast area				
	Near fan room		12. Five gal can of coolant for air compressor				
	Throughout 105-KE Facility		13. Ethylene glycol piping used for heating the facility has been drained but contains residue				
	Valve pit		14. Decontamination agent pipes in valve pit may contain residue				
	X-1 level		15. Recorder ink and 6-V battery				
	Northwest stairwell off rear face		16. Bucket containing aerosol cans and degreasers				

Table C1-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals (cont.)	Irradiation testing and instrument station room Mezzanine over supply fan area	--	17. Several cans of enamel sitting on spindles 18. One can of pressurized lubricant	--	--	--	--
Exposure to biological hazards						II, C Moderate	II, C Moderate
	Located throughout the facility	Person exposed to dusts from bird guano and dead animals; contracts disease (these items located primarily in the radiation zone)	Low frequency accidents have significant consequences High frequency accidents have small consequences NOTE: Events that are serious in nature are of lower probability. Likewise, events that are minor in effect are of higher probability.	II/II IV/IV	C/C A/A		
		Person exposed to insect bites and stings, rodent bites, and snake bites	1. Presence of spiders, wasps, etc. is seasonal 2. Hazards found in radiation zone areas 3. Mouse bites (rodents) may have occurred in past 4. Snakes have been found in the buildings, including rattlesnakes 5. Activities for cleanup and maintenance occur where hazard exists				
Temperature extremes						II, C Moderate	II, C Moderate
	General	Person experiences heat exhaustion	1. Seasonal 2. Dependent on ventilation 3. The Hanford Site has a history of this problem occurring	II/II	C/C		

Table C1-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Temperature extremes (cont.)	--	--	4. Hazard depends on type of work being performed	--	--	--	--
			5. Can be controlled by limiting exposure				
			6. Activities that require concern about temperature extremes are not performed frequently				
			7. Worker has some awareness of hazard				
		Person experiences hypothermia	8. Low temperatures occasionally occur on the Hanford Site	II/II	D/D		
Fire						II, D Minor	II, D Minor
	Control room, above suspended ceiling	Person exposed to small electrical fire	1. Open 3/0 boxes are located in ceiling	IV/IV	D/D		
			2. Deenergized wiring is nonmetallic sheathed cable routed above the acoustic tile suspended ceiling				
			3. Wiring method not approved for use in industrial facilities because of possibility of insulation damage. The fire alarm system uses nonmetallic sheathed cable.				
	Control room	Person exposed to fire in combustible materials	4. Control room contains five rows of boxes and paper	II/II	D/D		
	Work area		5. Work area contains more than 20 large wooden crates with miscellaneous chemicals stored on or around them				
			6. "E" metal storage room contains combustibles				
	Instrument testing area		7. Irradiation testing and instrument station room contains combustibles				
			8. No ignition source identified				

Table C1-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Explosions						I, E Negli.	I, E Negli.
	General	Person is injured by chemical explosion	1. Some unknown chemicals exist in the facility 2. Requires multiple factors for an explosion 3. Movement of chemicals occurs as part of the cleanup effort 4. It is not clear whether the WHC policy regarding unknown chemicals is followed 5. Only a few chemicals will create this condition	I/I	E/E		
Release of radioactive material						III-3, D Negli.	III-3, D Negli.
	38-ft sample room off stairway 6 Front face work area Tool room off X-2 level Inner control rod room	Spread of contamination by storm water accumulation	1. Water leaking into area 2. Inside building, no obvious pathways to outside exist 3. Significant volumes of radioactive material contained in wooden boxes, 55-gal drums, and plastic bags 4. Forty to fifty 30-gal drums containing boron balls with radiation levels up to 500 mR/h 5. Most contamination is part of stable matrix that limits mobility	III-3 III-3	D/D		
	General Specific locations: Front work face Valve pit	Spread of contamination by biological agency (birds, mice, etc.)	6. Evidence of bird and rodent debris 7. No history of contamination outside building via this pathway 8. Radiation zone areas exhibit low levels of contamination	III-3 III-3	D/D		

Table C1-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material (cont.)	Top of reactor	--	9. Less evidence of biological intrusion was observed at 105-KE than at other reactors	--	--	--	--
	Outer control rod room		10. Dead bird				
	Entrance to rear face		11. There is no historical evidence of contamination spread by biological agents at the 100 Areas				
	Gamma monitoring room						
	General to facility	Mismanagement of stored waste results in release of radioactive material	12. Large quantities of material exists				
			13. Drums of boron balls in inner and outer control rod rooms				
Release of asbestos						III-3, D Negli.	III-3, D Negli.
	General	Release of asbestos from disturbance of friable insulation on piping	1. Potential for large quantities	III-3 III-3	D/D		
			2. Most piping still has insulation in place				
			3. Insulation must be disturbed for release				
			4. An escape path must be present and very few paths were evident				
	Some specific locations:						
	Work area		5. Piping insulation along walls				
	Supply fan area		6. Piping insulation				
	Valve pit		7. Piping insulation, worst along walkways				
	Solid purge room, upper deck		8. Piping insulation				
	Offices areas under control room		9. Piping insulation				

Table C1-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of asbestos (cont.)	X-2 level	--	10. Piping insulation	--	--	--	--
Release of lead						III-3, D Negli.	III-3, D Negli.
	General	Release of lead by theft or sabotage	1. Lead bricks used for shielding	III-3 III-3	D/D		
			2. Bricks are movable and program is in place to inventory				
			3. Most lead is in radiation zones				
			4. Most lead is in remote areas				
			5. Potential exists for lead and radionuclides (mixed waste)				
			6. Theft unlikely because of weight				
	Specific locations:		7. Intrinsic value (relocation)				
	Test facility		8. Large pile of lead bricks (50 to 60)				
	X-2 level		9. Two lead bricks				
	"D" elevator drive shaft area		10. Six lead bricks south of caged area				
	Inner control rod room		11. Lead pigs and sheeting in southwest corner. An estimated 20-30 bricks in pile in southeast corner (highest level)				
	X-1 level		12. Lead bricks				
	Solid purge room and decontamination agent mixing room		13. Lead-based paint is peeling				
Release of mercury						III-3, D Negli.	III-3, D Negli.
		Mercury released to environment from theft or sabotage	1. Small quantities	III-3 III-3	D/D		

Table C1-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of mercury (cont.)	--	Mercury released to environment as a result of container breakage	2. Contained in glass containers that are subject to breakage 3. Possibility for existence as mixed waste 4. During D&D of 108-B Building, a significant quantity of mercury was stolen and never recovered	--	--	--	--
	Specific locations: Southwest area of valve pit "D" elevator drive platform Room across from control room		5. Mercury in manometer 6. Two mercury switches 7. Room is posted as being mercury contaminated; however, inspection was not completed for this room				
Release of petroleum products						III-3, D Negli.	III-3, D Negli.
	General	Failure of seals, piping, equipment, etc. resulting in release inside and outside of building	1. Oil already released inside building in some places; indications of current leakage 2. Small quantities of oil in most sources 3. Oil in radiation zones has the potential of being designated as mixed waste 4. Chance of oil leaking outside the building is remote; this facility is in better shape than other 105 buildings that have been inspected	III-3 III-3	D/D		
	Specific locations: Front face work area, "C" elevator drive unit		5. Oil and grease residue				

Table C1-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of petroleum products (cont.)	Valve pit	--	6. Oil leaking from valve actuator and other equipment	--	--	--	--
	Solid purge room		7. Oil leaking from equipment				
	Exhaust fan room adjacent to valve pit area		8. Oil leaking from diesel engines and centrifuge				
	X-1 level		9. Oil in inline oiler				
	"D" elevator drive unit		10. Oil leaking from drive unit				
	Outer control rod room		11. Oil leaking from control rod drive units				
	Crane above top of reactor block		12. Oil leaking from crane				
Release of miscellaneous chemicals						III-3, D Negli.	III-3, D Negli.
		Release of miscellaneous chemicals caused by breach or spilling of container	1. Small quantities	III-3 III-3	D/D		
			2. No pathways (e.g., drains) were noted near chemical containers				
			3. Material would be contained in the building in the event of a spill				
	Specific locations:						
	Corridor between control room and basin operations area		4. Eleven 55-gal drums were being prepared for packaging hazardous waste (transient condition)				
	Front face work area		5. Facility contains spray paint, adhesives, oil, talc, carbon, acetone, cleaning agent, methyl alcohol, cloroethylene, kerosene, and paint				
	Supply fan room		6. Two 55-gal drums (one green and one blue) full of unknown substance in northeast area				

Table CI-27. 105-KE Reactor Building. (21 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of miscellaneous chemicals (cont.)	Northeast area near fan room	--	7. Five-gal can of coolant for air compressor	--	--	--	--
	Throughout 105-KE Facility		8. Ethylene glycol piping used for heating the facility has been drained but contains residue				
	Valve pit		9. Decontamination agent pipes in valve pit may contain residue				
	X-1 level		10. Recorder ink and 6-V battery				
	Stairwell 6 off rear face		11. Bucket containing aerosol cans and degreasers				
	Irradiation testing and instrument station room		12. Several cans of enamel sitting on spindles				
	Mezzanine over supply fan area		13. One can of pressurized lubricant				

[1]Common to all accidents where person falls through damaged roof panels while on roof.
[2]Common to all accidents involving struck by or striking.
[3]Common to all accidents involving shock.
D&D = Decontamination and decommissioning
MCC = Motor control center
VSR = Vertical safety rod
WHC = Westinghouse Hanford Company

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Table C1-28. 110-KE Gas Storage Facility.

Risk evaluation summary sheet				Risk assessment			
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
No hazards identified All that remains of this facility are four steel tanks	--	--	--	--	--	--	--

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Table C1-29. 115-KE Gas Recirculation Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling	General	Person falls through damaged roof	1. Roof insulation is deteriorated 2. Hazard does not exist in short term but could begin to be a problem if no action is taken 3. Inspection access only available at ground level 4. Portions of roof are concrete slab	-/I	-/D	--	I, D Minor
Struck by or striking	General	Person is struck by falling roof pieces	1. Exterior of roof shows degradation 2. Problem does not exist currently but could begin to be a problem if no action is taken 3. Large snow or seismic force can cause roof to collapse 4. Area is not normally entered	-/II	-/D	--	II, D Minor
Drowning/ suffocation	Global throughout building	Person enters confined space and is overcome by gases or lack of oxygen	1. Many confined spaces exist in the building, both above- and belowgrade 2. There is evidence of oxidation and water accumulation 3. Samples of confined space atmospheres showed no problems 4. Building has lack of ventilation 5. Most of the confined spaces in the building were not entered or checked 6. Conditions can change at any given time	I/I	D/D	I, D Minor	I, D Minor

Table C1-29. 115-KE Gas Recirculation Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Drowning/ suffocation (cont.)	--	--	7. Confined spaces are not identified	--	--	--	--
Exposure to radiation	Inside ventilation ducts in building	Radioactive contamination escapes from louvers in ductwork into the environment	1. The inside of the ventilation ducts are marked as having surface contamination 2. Ductwork is open to environment	IV/IV	D/D	IV, D Negli.	IV, D Negli.
Exposure to mercury	Inside building	Person exposed to mercury from ingestion or absorption	1. Small quantities 2. Contained in glass containers 3. During D&D of 108-B Building, a significant quantity of mercury was stolen and never recovered 4. Mercury switch found	IV/IV	E/E	IV, E Negli.	IV, E Negli.
Exposure to miscellaneous chemicals	Inside building	Person exposed to unknown or known hazardous chemicals through inhalation, ingestion, or absorption from breach of container	1. Facility is not occupied 2. The materials may be more or less stable depending upon age and chemical makeup 3. Few chemicals in facility 4. Exposure requires loss of chemical containment 5. Person must come in contact with material 6. Ethylene glycol is a hazardous material that can break down into other hazardous materials	II/II	D/D	II, D Minor	II, D Minor

Table C1-29. 115-KE Gas Recirculation Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to biological hazards						II, C Moderate	II, C Moderate
	Located throughout the facility		Low frequency accidents have significant consequences	II/II	C/C		
			High frequency accidents have small consequences	IV/IV	A/A		
			NOTE: Events that are serious in nature are of lower probability. Likewise, events that are minor in effect are of higher probability.				
		Person exposed to rodent bites and snake bites	1. Presence of spiders, wasps, etc. is seasonal 2. Hazards found in radiation zone areas 3. Mouse bites (rodents) may have occurred in the past 4. Snakes have been found in the buildings, including rattlesnakes 5. Activities for cleanup and maintenance occur where hazard exists 6. Building is occupied infrequently, but often enough for biological hazards to be important				
Release of radioactive materials						III-3, D Negli.	III-3, D Neglig.
	Inside ventilation ducts in building	Radioactive contamination escapes from louvers in ductwork into the environment	1. The inside of the ventilation ducts are marked as having surface contamination 2. Ductwork is open to environment	III-3 III-3	D/D		

Table C1-29. 115-KE Gas Recirculation Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of mercury	Inside building	Mercury released to environment from theft or sabotage Mercury released to environment as a result of container breakage	1. Small quantities 2. Contained in glass containers that are subject to breakage 3. Possibility for existence as mixed waste 4. During D&D of 108-B, a significant quantity of mercury was stolen and never recovered 5. Mercury switch found	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.
Release of miscellaneous chemicals	In building	Release of miscellaneous dangerous or hazardous chemicals caused by breach or spilling of container	1. Small quantities 2. No pathways (e.g., drains) were noted near chemical containers 3. Material would be contained in building in the event of a spill 4. Ethylene glycol lines may contain residue	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.

Table C1-30. 116-KE Reactor Exhaust Stack.

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
None	--	No potential accidents identified	--	--	--	--	--

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Table C1-31. 117-KE Exhaust Air Filter Building.

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking	Inside building	Person is struck by collapsing roof or walls	1. Walls and roof show signs of cracking 2. Large snow load or seismic force could cause roof or wall to collapse 3. Metal covers are difficult to open for access into area	-/II	-/D	--	II, D Minor

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Table C1-32. 1702-KE Badge House.

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling	Roof	Person falls through deteriorated wooden roof	1. No access to roof, but building is not tall and no barricade exists around building to prevent placing ladder for roof access 2. Roofing in very bad condition	I/I	D/C	I, D Minor	I, C Serious
Struck by or striking	Inside building	Person struck by collapsing roof	1. Condemned; no access allowed 2. Snow load or seismic force could cause collapse 3. Roofing in bad condition 4. No access allowed to building	II/II	E/D	II, E Negli.	II, D Minor

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Table C1-33. 1713-KER Warehouse.

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
No hazards identified	--	--	--	--	--	--	--

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Table C1-34. 105-KW Reactor Building. (17 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, C Moderate	I, C Moderate
	General to all locations		[1]Some roof panels are in deteriorated condition [1]Access doors to roof from inside building are not posted with danger signs or locked				
	Storage and transfer areas (not included in risk evaluation)	Person falls through damaged roof panel while on roof	1. Twelve roof panels (corrugated asbestos-cement sheets) are deteriorated and cracked with large deflections in storage basin 2. Three cracked roof panels in transfer area 3. Five roof panels temporarily shored using plywood with unistrut and conduit as supporting members	I/I	D/D		
	Process area	Person falls through damaged roof panel while on roof	4. One roof panel is damaged at "C" elevator (12-in. by 24-in. area missing) 5. Heavy rain leakage through cracks in inner control rod room roof	IV/IV	E/E		
	Work and fan areas, northeast side of roof		6. Three roof panels, partially supported by small dimension pipes and plywood panels on unistruts carrying electrical wire 7. Four panels over room located at 3rd level with cracks in longitudinal direction, one panel with transverse cracks 8. Heavy leak in process area	I/I	C/C		
	All metal ladders throughout facility	Person falls while climbing ladder	9. Ladders are not constructed to current safety standards 10. Lighting is poor 11. Most of the ladders are in controlled zones	I/I	D/C		

Table C1-34. 105-KW Reactor Building. (17 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling (cont.)	--	--	12. Ladders are not locked out to prevent use (around reactor)	--	--	--	--
Struck by or striking						II, D Minor	II, D Minor
	Struck by hazard in general		[2]Roof is leaking badly in a few places [2]Most of the ceiling material is not concrete but a lighter asbestos-cement type material fabricated in corrugated sheets [2]Snow loading will increase chance of roof or wall collapse [2]A seismic event would initiate roof or wall collapse				
	Storage and transfer areas (not included in risk evaluation)	Person struck by collapsing roof	1. Twelve roof panels (corrugated asbestos-cement sheets) deteriorated and cracked with large deflection in storage basin (same as falling)	II/II	C/B		
			2. Three cracked roof panels (corrugated asbestos-cement sheets) in transfer area (same as falling)				
			3. Five roof panels (corrugated asbestos-cement sheets) temporarily shored using plywood with unistrut and conduit as supporting members (same as falling)				
	Process area		4. One roof panel damaged at "C" elevator (12-in. by 24-in. area missing); (same as falling)	IV/IV	E/D		
	Work and fan areas, northeast side of roof		5. Three roof panels partially supported by small dimension pipes and plywood panels on unistruts carrying electrical wire (same as falling)	II/II	D/D		

Table C1-34. 105-KW Reactor Building. (17 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	--	--	6. Four panels over 3rd level room with cracks in longitudinal direction; one panel with transverse cracks (same as falling)	--	--	--	--
	Global to facility	Person injured by striking projections from floors, walls, or ceilings	7. Housekeeping is poor in areas inspected.	II/II	D/D		
			8. One portion of facility is normally occupied (basin)				
			9. There is no lighting in many of the areas that were inspected (mostly zone areas)				
	Mechanical equipment throughout facility	Person struck by equipment that is inadvertently energized	10. Mechanical equipment not visibly disconnected from power source	II/II	E/E		
			11. Labeling of electrical circuits and energy paths inaccurate or nonexistent				
			12. No visible disconnects near equipment				
	Mezzanine over supply fan area	Person places hand into rotating equipment and suffers injury	13. Operating compressor is inadequately guarded	II/II	E/E		
Drowning/ suffocation						I, D Minor	I, D Minor
	Global throughout building	Person enters confined space and is overcome by gases or lack of oxygen	1. Many confined spaces exist in the building, both above- and belowgrade	I/I	D/D		
			2. There is evidence of oxidation and water accumulation				
			3. Samples of confined space atmospheres showed no problems				
			4. Building has lack of ventilation				
			5. Most of the confined spaces in the building were not entered or checked				
			6. Conditions can change at any given time				

Table C1-34. 105-KW Reactor Building. (17 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Drowning/ suffocation (cont.)	--	--	7. Confined spaces are not identified	--	--	--	--
Electrical shock						I, C Serious	I, C Serious
	General to facility		[3]Most circuits and breakers in the facility are unidentified or incorrectly identified [3]Breakers providing fault protection may not trip because of age and lack of maintenance [3]Breakers that are off may be turned on resulting in components that were de-energized becoming energized [3]Persons are continually present in some areas while other areas are not normally occupied [3]The 105-KW Facility is in better overall condition electrically than other 105 facilities that have been inspected, including 105-KE Facility [3]The good condition of the building, and the isolated nature of the electrical hazards allow elimination of these hazards with simple fixes				
	Wall of stairwell below grade level, near electrical panel "V"	Person receives shock by coming into contact with energized gutter created by fault from damaged flexible cord	1. 16/2 type "S" flexible cord exits between gutter and cover 2. Cover has been tightened, pinching the cord 3. Pressure and age, as well as cable movement, may cause insulation failure and resulting fault 4. Cable is energized	I/I	D/C		

Table C1-34. 105-KW Reactor Building. (17 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	Ground level hallway, west entrance to reactor front face	Person receives shock by contacting exposed energized component during relamping or relocating lamp	5. Bulb in fixture of portable halogen floodlight stand is broken	I/I	D/D	--	--
			6. There is no guard on front of lamp fixture				
			7. Fixture is energized				
	Top of reactor core, east side, near amber warning light	Person contacts energized conductors at exposed ends during maintenance work	8. A 4-in. junction box (wall mounted) has wires hanging out	I/I	D/D		
			9. No cover exists				
			10. Wires have been cut, exposing conductors				
			11. Conductors are assumed to be energized				
	East side of reactor, under staircase from top of reactor core hallway, below equipment mounting rack	Person receives shock by contacting energized conductors while performing maintenance, inspection, or further equipment removal as a result of insulation failure	12. Energized wiring is coiled with miscellaneous cables below wall-mounted cabinet where equipment has been removed	I/I	C/C		
			13. The number of coiled wires creates confusion about which wires may be energized and which are not				
Exposure to radiation						II, C Moderate	II, C Moderate
		Person exposed to external ionizing radiation	1. Predominantly low (<20 mR/h) exposure rates	II/II	C/C		
			2. Moderate to high exposure rates exist in the immediate vicinity of the inner and outer control rod rooms, reactor rear face, mezzanine and top of reactor vertical safety rod actuators, and laundry carts				
			3. Energetic gamma emitters possible in immediate vicinity of activated structures; e.g., such as graphite pile and biological and thermal shields				

Table C1-34. 105-KW Reactor Building. (17 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to radiation (cont.)	--	--	4. Approximately 67 locations identified with exposure rates >20 mR/h or > twice background	--	--	--	--
			5. There is a lack of labeling and posting				
			6. Present postings are inaccurate				
			7. Some postings are out of date because of changes in posting requirements				
	Inner and outer control rod room		8. Many unexpected discreet sources of exposure exist (surprises)				
	Front face of reactor						
	Ball 3x equipment		9. Some locations read 50 mR/h up to 4 R/h				
	X-1 level						
		Person exposed to radioactive material by inhalation, ingestion, or absorption	10. Only occurs from resuspendable material	IV/IV	D/D		
Exposure to asbestos						IV, D Negli.	IV, D Negli.
	Multiple potential locations	Person inhales friable asbestos; potential exists for asbestos related illness in the future from such exposure	1. Building partially occupied by workers	IV/IV	D/D		
			2. Ninety-five percent of facility insulation in good shape, some isolated instances of degradation				
			3. Uncertainty concerning which materials contain asbestos				
			4. Friable material requires disturbance for release				
			5. Some areas are posted for friable asbestos hazard				
			6. There is no evidence of an asbestos abatement program				

Table C1-34. 105-KW Reactor Building. (17 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to asbestos (cont.)	--	--	7. Some construction materials such as roof panels are known to contain asbestos but are not classified as friable	--	--	--	--
	Specific locations:						
	Work area		8. Piping insulation along walls				
	Supply fan area		9. Piping insulation				
	Valve pit		10. Piping insulation				
	"D" elevator shaft room		11. Piping insulation				
	Exhaust fan room		12. Piping insulation				
Exposure to lead						IV, B Minor	IV, B Minor
		Person inhales lead dust	1. Oxidation exists on lead bricks	IV/IV	B/B		
			2. Persons must handle lead as required by regulatory requirements to control it				
			3. Most lead is in radiation zones				
			4. Lead oxidation rates found to be larger than initially expected				
			5. Large quantities of lead observed				
			6. Sensitivity to lead exposure varies				
	Specific locations:						
	Top of reactor		7. Lead sheet on floor				
	"D" elevator drive platform		8. Contaminated lead bricks				
	Outer control rod room		9. Lead brick cave mounted on wheels and lead shot in 2-gal pail				

Table C1-34. 105-KW Reactor Building. (17 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to lead (cont.)	Inner control rod room	--	10. Fourteen lead bricks and lead lined cave located near entrance to inner control rod room	--	--	--	--
			11. Seven lead bricks, lead sheet on 3rd level of inner control rod room				
			12. Approximately 50 lead bricks on 4th level of inner control rod room				
	First stairwell landing of sampling room		13. Lead bricks				
	Sampling room north of rear face		14. Lead bricks and peeling lead paint				
	X-1 level irradiation test facility		15. Numerous lead bricks and lead sheet				
	X-2 level irradiation test facility		15. Two piles of lead bricks and lead shielding				
Exposure to mercury						IV, E Negli.	IV, E Negli.
	General	Person exposed to mercury from ingestion or absorption	1. Small quantities	IV/IV	E/E		
			2. Contained in glass containers				
			3. Possibility for existence as mixed waste				
			4. During D&D of 108-B Building, a significant quantity of mercury was stolen and never recovered				
	Specific locations:						
	East end of mezzanine level in fan room		5. Mercury switch				
	Exhaust fan room		6. Mercury switch				

Table C1-34. 105-KW Reactor Building. (17 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to mercury (cont.)	Vertical safety control rod drive units, top of reactor "D" elevator drive unit X-2 level irradiation test facility	--	7. Mercury switches on vertical safety control rod drive units 8. Two mercury switches 9. Mercury switch	--	--	--	--
Exposure to miscellaneous chemicals	Specific locations: Corridor between control room and K Basin operations area	Person exposed to unknown or known hazardous chemicals through inhalation, ingestion, or absorption from breach of container	1. Facility is partially occupied 2. The materials may be more or less stable depending upon age and chemical makeup 3. Few chemicals in facility 4. Exposure requires loss of chemical containment 5. Person must come in contact with material 6. Process of collecting and staging material increases possibility of exposure 7. Some materials are unknown 8. Ethylene glycol is a hazardous material that can break down into other hazardous materials 9. Several 55-gal drums being prepared for packaging hazardous waste were staged together; however, the materials are incompatible based on the markings	II/II	D/D	II, D Minor	II, D Minor

9313041.1948

Table C1-34. 105-KW Reactor Building. (17 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals (cont.)	Fan room	--	10. Facility contains spray paint, carbon, acetone, cleaning agent, and flaked graphite	--	--	--	--
	Valve pit		11. Chemical residue on hot water circulation pump				
	Sample room north of rear face		12. One small can of molysulfide lubricant				
	Global to facility		13. Piping contains ethylene glycol residue				
			14. Oily residues of unknown composition				
Exposure to biological hazards						II, C Moderate	II, C Moderate
	Located throughout the facility	Person exposed to dusts from bird guano and dead animals; contracts disease (this item located primarily in radiation zone)	Low frequency accidents have significant consequences	II/II	C/C		
			High frequency accidents have small consequences	IV/IV	A/A		
			NOTE: Events that are serious in nature are of lower probability. Likewise, events that are minor in effect are of higher probability.				
		Person exposed to insect bites and stings, rodent bites, and snake bites					
			1. Presence of spiders, wasps, etc. is seasonal				
			2. Hazards are found in radiation zone areas				
			3. Mouse bites (rodents) may have occurred in past				
			4. Snakes have been found in the buildings, including rattlesnakes				
			5. Activities for cleanup and maintenance occur where hazards exist				

9313041.1949

Table C1-34. 105-KW Reactor Building. (17 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Temperature extremes						II, C Moderate	II, C Moderate
	General	Person experiences heat exhaustion	1. Seasonal	II/II	C/C		
			2. Dependent on ventilation				
			3. Hanford Site has a history of this problem occurring				
			4. Hazard depends on the type of work being performed				
			5. Can be controlled by limiting exposure				
			6. Activities that require concern about temperature extremes are not performed frequently				
			7. Worker has some awareness of hazard				
		Person experiences hypothermia	8. Low temperatures occasionally occur on the Hanford Site	II/II	D/D		
Fire						II, D Minor	II, C Moderate
	Work area	Person exposed to fire from combustible materials	1. Twenty large wooden crates	II/II	D/C		
	First room to the left, south of main entrance		2. Spider web accumulation on lights				
	Global to facility	Person exposed to fire caused by electrical fault	3. Little or no preventative maintenance is performed on the breakers				
			4. Breakers that are not maintained are more likely to fail to clear faults				
			5. If faults are not properly cleared, fires can result				
			6. Some areas of the facility have limited exit access				
			7. There is no fire protection or suppression system in the facility				

Table C1-34. 105-KW Reactor Building. (17 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Fire (cont.)	--	--	8. Many areas have little or no combustible material	--	--	--	--
Explosions						I, E Negli.	I, E Negli.
	General	Person is injured by chemical explosion	1. Some unknown chemicals exist in the facility 2. Requires multiple factors for an explosion 3. Movement of chemicals occurs as part of the cleanup effort 4. It is not clear whether the WHC policy on unknown chemicals is followed 5. Only a few chemicals will create this condition	I/I	E/E		
Release of radioactive material						III-3, D Negli.	III-3, D Negli.
	Front face work area Inner control rod room Outer control rod room	Spread of contamination by stormwater accumulation	1. Water leaking into area 2. From inside building no obvious pathways to outside 3. Significant volumes of radioactive material contained in wooden boxes, 55-gal drums, and plastic bags 4. Forty to fifty 30-gal drums containing boron balls 5. Contents of one 30-gal drum unknown 6. Large wood box containing radioactive waste 7. Most contamination has limited mobility because it is part of the stable matrix	III-3 III-3	D/D		
	General to building	Spread of contamination by biological agent (e.g., birds and mice)	8. Bird and rodent debris in evidence; birds found roosting in HVAC units	III-3 III-3	D/D		

Table C1-34. 105-KW Reactor Building. (17 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material (cont.)	--	--	9. No history of contamination outside building via this pathway	--	--	--	--
			10. Radiation zone areas exhibit low levels of smearable contamination				
			11. The design of the 105-KE and 105-KW facilities contribute to less smearable contamination when compared with other 105 facilities				
			12. Less evidence of biological intrusion was observed at 105-KW than at other reactors				
	Storage room 3 off west rear stairwell		13. Dead bird found				
			14. There is no historical evidence of contamination spread by biological agents from this facility				
Release of asbestos						III-3, D Negli.	III-3, D Negli.
	General	Release of asbestos caused by disturbance of friable insulation on piping	1. Potential for large quantities	III-3 III-3	D/D		
			2. Most piping still has insulation in place and is not in a friable form				
			3. Insulation must be disturbed in order to get release				
			4. An escape path must be present and very few paths were evident				
	Some specific locations:						
	Work area		5. Piping insulation along walls				
	Supply fan area		6. Piping insulation				
	Valve pit		7. Piping insulation				

Table C1-34. 105-KW Reactor Building. (17 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of asbestos (cont.)	"D" elevator shaft room	--	8. Piping insulation	--	--	--	--
	Exhaust fan room		9. Piping insulation				
Release of lead						III-3, D Negli.	III-3, D Negli.
	General	Release of lead by theft or sabotage	1. Lead bricks used for shielding	III-3 III-3	D/D		
			2. Bricks are movable and program is in place to inventory				
			3. Most lead is in radiation zones				
			4. Most lead is in remote areas				
			5. Potential exists for lead and radionuclides (mixed waste)				
			6. Theft unlikely because of weight				
	Specific locations:		7. Intrinsic value (relocation)				
	Top of reactor		8. Lead sheet on the floor				
	"D" elevator drive platform		9. Contaminated lead bricks				
	Outer control rod room		10. Lead brick cave mounted on wheels and lead shot in 2-gal pail				
	Inner control rod room		11. Fourteen lead bricks and lead-lined cave located near entrance to inner control rod room				
			12. Seven lead bricks and lead sheet on 3rd level of inner control rod room				
			13. Approximately 50 lead bricks on 4th level of inner control rod room				
	First stairwell landing of sampling room		14. Lead bricks				

9313041.1953

Table C1-34. 105-KW Reactor Building. (17 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of lead (cont.)	Sampling room north of rear face	--	15. Lead bricks and peeling lead paint	--	--	--	--
	X-1 level irradiation test facility		16. Numerous lead bricks and lead sheets				
	X-2 level irradiation test facility		17. Two piles of lead bricks and lead shielding				
Release of mercury						III-3, D Negli.	III-3, D Negli.
		Mercury released to environment from theft or sabotage	1. Small quantities present	III-3 III-3	D/D		
		Mercury released to environment as a result of container breakage	2. Contained in glass containers that are subject to breakage				
			3. Possibility for existence as mixed waste				
			4. During D&D of 108-B Building, a significant quantity of mercury was stolen and never recovered				
	Specific locations:						
	East end of mezzanine level in fan room		5. Mercury switch				
	Exhaust fan room		6. Mercury switch				
	Vertical safety control rod drive units, top of reactor		7. Mercury switches on vertical safety control rod drive units				
	"D" elevator drive unit		8. Two mercury switches				
	X-2 level irradiation test facility		9. Mercury switch				

9313041.1954

Table C1-34. 105-KW Reactor Building. (17 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of petroleum products						III-3, D Negli.	III-3, D Negli.
	General	Failure of seals, piping, equipment, etc. resulting in release inside and outside of building	1. Oil already released inside building in some places; indications exist of current leakage	III-3 III-3	D/D		
			2. Small quantities of oil in most sources				
			3. Oil in radiation zones has potential of being designated as mixed waste				
			4. The chance of oil leaking outside building is remote; this facility is in better shape than other 105 buildings that have been inspected (except 105-KE)				
	Specific locations:						
	Valve pit		5. Oil is leaking from valve actuator and other equipment				
	Exhaust fan room adjacent to valve pit		6. Oil residue from diesel engines and centrifuge				
	X-1 level irradiation test facility		7. Oil in inline oiler				
	"D" elevator drive unit		8. Oil is leaking from drive unit				
	"C" elevator drive unit		9. Oil is leaking from drive unit				
	Outer control rod room		10. Oil is leaking from control rod drive equipment				
	Crane over reactor block		11. Oil on top of unit floor leaking from overhead crane				
	East mezzanine level of fan room		12. One-gal container of compressor oil				
	Southwest corner of fan room		13. "Red Oil" in gauge				

Table C1-34. 105-KW Reactor Building. (17 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of petroleum products (cont.)	Exhaust fan room	--	14. Several "Red Oil" gauges	--	--	--	--
	Southeast corner of top of reactor block		15. Oil is leaking onto floor and into drain				
	North wall of sampling room		16. Oil is in inline oiler				
Release of miscellaneous chemicals						III-3, D Negli.	III-2, D Negli.
		Release of miscellaneous dangerous or hazardous chemicals caused by breach or spilling of container	1. Small quantities	III-3 III-3	D/D		
			2. No pathways (e.g., drains) were noted near chemical containers				
			3. Material would be contained in building in the event of a spill				
	Specific locations:						
	Corridor between control room and K-Basin operations area		4. Several 55-gal drums were being prepared for packaging hazardous waste				
	Fan room		5. Facility contains spray paint, carbon, acetone, cleaning agent, and flaked graphite				
	Valve pit		6. Chemical residue on hot water circulation pump				
	Sample room north of rear face		7. One small can of molysulfide lubricant				
	Global to facility		8. Piping contains ethylene glycol residue				
			9. Oily residues of unknown composition				

[1]Common to all accidents where person falls through damaged roof panels while on roof.
[2]Common to all accidents where person is struck by falling roof panel pieces or by collapsing wall or roof.
[3]Common to all accidents involving shock.

D&D = Decontamination and decommissioning
HVAC = Heating, ventilation, and air conditioning
WHC = Westinghouse Hanford Company

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Table C1-35. 110-KW Gas Storage Facility.

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
No hazards identified	--	--	--	--	--	--	--

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9313041.1958

Table C1-36. 115-KW Gas Recirculation Building. (2 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling	General	Person falls through damaged roof	1. Roof insulation is deteriorated 2. Hazard does not exist in the short term but could begin to be a problem if no action is taken 3. Inspection access limited to ground level portion of the building 4. Roof is a concrete slab	-/I	-/D	--	I, D Minor
Struck by or striking	General	Person is struck by falling roof pieces	1. Exterior of roof shows degradation 2. Problem does not exist currently but could begin to be a problem if no action is taken 3. Large snow or seismic force can cause roof to collapse 4. Area is not entered normally	-/II	-/D	--	II, D Minor
Drowning/ suffocation	Global throughout building	Person enters confined space and is overcome by gases or lack of oxygen	1. Many confined spaces exist in the building, both above- and belowgrade 2. There is evidence of oxidation and water accumulation 3. Samples of confined space atmospheres showed no problems 4. Building has lack of ventilation 5. Most of the confined spaces in the building were not entered or checked 6. Conditions can change at any given time	I/I	D/D	I, D Minor	I, D Minor

Table C1-36. 115-KW Gas Recirculation Building. (2 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Drowning/ suffocation (cont.)	--	--	7. Confined spaces are not identified	--	--	--	--
Exposure to biological hazards						II, C Moderate	II, C Moderate
	Located throughout the facility	Person exposed to dusts from bird guano and dead animals; contracts disease (this item located primarily in radiation zone)	Low frequency accidents have significant consequences	II/II	C/C		
			High frequency accidents have small consequences	IV/IV	A/A		
			NOTE: Events that are serious in nature are of lower probability. Likewise, events that are minor in effect are of higher probability.				
		Person exposed to insect bites and stings, rodent bites, and snake bites	1. Presence of spiders, wasps, etc. is seasonal 2. Hazards found in radiation zone areas 3. Mouse bites (rodents) may have occurred in the past 4. Snakes have been found in the buildings, including rattlesnakes 5. Activities for cleanup and maintenance occur where hazards exist 6. Building is occupied infrequently, but often enough for biological hazards to be important				

9313041.1961

Table C1-37. 116-KW Reactor Exhaust Stack.

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking	At facility	Person is struck by falling stack	1. Stack exhibits cracking about 6 ft from ground that may indicate structural weakness	I/I	D/D	I, D Minor	I, D Minor

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9313041.1962

9313041.1963

Table C1-38. 117-KW Exhaust Air Filter Building.

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking	Inside building	Person is struck by collapsing roof or walls	1. Walls and roof show signs of cracking 2. Large snow load or seismic force could cause roof or wall to collapse 3. Metal covers are difficult to remove to gain access	-/II	-/D	--	II, D Minor

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9413304.1661

9313041.1965

Table C1-39. 165-KW Power Control Building. (9 pages)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, D Minor	I, D Minor
	Blind pit outside building	Person falls into blind pit while on damaged roof slab	1. Roof of pit is degenerated	I/I	D/D		
			2. Degeneration will continue if repair and protection are not provided				
			3. Roof area is not large and personnel do not have a reason to access pit				
	Tunnels, north part of basement	Person falls while climbing ladder	4. Ladder access (3-ft open space, 12- to 15-ft deep) not properly guarded	I/I	E/E		
Struck by or striking						IV, E Negli.	I, D Minor
	West side of oil-fired steam plant area	Person is struck by falling chunks and splinters from concrete roof	1. Roof concrete slab shows evidence of significant water leakage through cracks, including rust stains	II/II	-/D		
			2. Large opening has been made in steam plant main floor wall, creating weak area supporting roof				
			3. Seismic events can cause concrete fracturing and failure				
	Pipe tunnel	Person is struck by falling concrete pieces	4. Construction joints in tunnel leak	I/I	-/D		
			5. Water leakage is causing deterioration of concrete				
	Valve pit area	Person is struck by falling pipes	6. Many of the pipe supports in the pit show significant rust degradation				
	Lower level switch gear room, southwest corner	Person trips over projections in floor	7. Two concrete floor pads are broken and have rebar protruding from them	IV/IV	E/E		
	Global	Person bumps into projection	8. Facility has numerous nonserious struck-by-hazards created by projections				
			9. Lighting in the facility is poor				

Table C1-39. 165-KW Power Control Building. (9 pages)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Drowning/ suffocation						I, D Minor	I, D Minor
	Global throughout building	Person enters confined space and is overcome by gases or lack of oxygen	1. Many confined spaces exist in the building, both above- and belowgrade 2. There is evidence of oxidation and water accumulation 3. Samples of confined space atmospheres showed no problems 4. Building has lack of ventilation 5. Most of the confined spaces in the building were not entered or checked 6. Conditions can change at any given time	I/I	D/D		
	Tunnels going to 105 Building		7. Confined spaces are not identified 8. A chlorine odor was detected in basement area near chlorinator 9. Other individuals were observed in the area with no evidence that air monitoring had been performed 10. There have been changes recently in confined space regulations				
Electrical shock						I, C Serious	I, B Critical
	General to facility		*Most circuits and breakers in the facility are unidentified or incorrectly identified *Breakers providing fault protection may not trip because of age and lack of maintenance *Breakers that are off may be turned on resulting in components that were deenergized becoming energized				

9313041.1967

Table C1-39. 165-KW Power Control Building. (9 pages)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	*Persons are continually present in some areas while other areas are not normally occupied *The good condition of the building, and the isolated nature of the electrical hazards allow elimination of these hazards with simple fixes	--	--	--	--
	West wall, ground floor, electrical room	Person receives shock by contacting energized conductor or equipment after further deterioration of cord insulation exposes conductors	1. Flexible power cord for battery pack is cracked and frayed near clamp at equipment case 2. Location and weight of cord subjects deteriorating insulation to continued stress 3. Battery pack is located about 2 ft above floor on wall rack in hallway in front of MCC	I/I	C/B		
	Electrical room, ground floor, predominantly 6 ft above floor	Person receives shock from contact with energized conductors exposed by insulation damage	4. Heater circuits are fed by nonmetallic sheathed cable not installed in conduit 5. Cable is improperly secured to frame work above MCC with metal conduit clamps 6. Along east wall, cable is routed adjacent to ventilation damper louver control mechanisms without physical protection or isolation	I/I	D/D		
	North-south hallway, ground floor, just west of electrical room	Person receives shock from contact with exposed energized conductors in wall mounted clock	7. The wall-mounted clock case is open, exposing energized, uninsulated 120-V wiring and terminals 8. Clock is energized	I/I	D/D		
	Concrete column in control room	Person receives shock from contact with energized conductors exposed by insulation damage	9. 120-V heater control circuit is routed on surface of concrete column between 1 ft and 5 ft above floor	I/I	C/C		

Table C1-39. 165-KW Power Control Building. (9 pages)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	10. Conductors are nonmetallic sheathed cable without physical protection	--	--	--	--
			11. Location of wiring against concrete column causes high susceptibility to damage				
			12. Wiring is energized				
	Control room, north doorway and east wall	Person receives shock from contact with energized terminals, or energized conductors if insulation damage occurs	13. Energized conductors are accessible in open device boxes	I/I	D/C		
			14. Conductors are insulated or taped				
			15. Energized terminals are accessible on exposed receptacle				
			16. Receptacle is hanging from box by conductors, subjecting insulation to possible damage				
	Switch gear in electrical room	Person receives shock from contact with energized conductors because of confusion concerning breaker status	17. Circuit breaker indicating lights are not functioning	I/I	D/D		
			18. The number of deactivated systems in this switchgear may lead to incorrect assumptions about which breakers and cubicles are in service				
	West end of building, ground floor, front work area of boiler	Person receives shock from contact with energized conductors because of insulation failure	19. Flexible cords providing power to devices near front of boiler, and behind central monitor panel are connected to energized receptacles through cord caps	I/I	D/C		
			20. The braided covering and conductor insulation of the cords is deteriorated				
			21. The integrity of the insulation cannot be assured				
	West end of building, northeast corner	Person receives shock from contact with exposed, energized conductors while performing maintenance, inspections or other work	22. Steam flow meter clock drive motor is energized	I/I	D/D		

9313041.1969

Table C1-39. 165-KW Power Control Building. (9 pages)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	23. Equipment case is open, exposing energized terminals	--	--	--	--
	General observations	Person receives shock from contact with energized conductors from insulation failure	24. Electrical conduit feeding into outside light is missing cover and wires are protruding 25. Open "J" box in janitor's closet 26. North wall of switch gear room has 4160-V breaker test plug with open knockout that has cable running through it	I/I	D/C		
Exposure to asbestos	Multiple potential locations	Person inhales friable asbestos; potential exists for asbestos-related illness in the future from such exposure	1. Building occasionally occupied by workers 2. Ninety-five percent of facility insulation in good shape; some isolated instances of degradation 3. Uncertainty concerning which materials contain asbestos 4. Friable material requires disturbance for release 5. There is no evidence of an asbestos abatement program	IV/IV	D/D	IV, D Negli.	IV, D Negli.
	Specific location: HVAC room		6. Friable asbestos found in the HVAC room				
Exposure to mercury	General	Person exposed to mercury from ingestion, inhalation, or absorption	1. Small quantities 2. Contained in glass containers 3. During D&D of 108-B Building, a significant quantity of mercury was stolen and never recovered	II/II	D/D	II, D Minor	II, D Minor

Table C1-39. 165-KW Power Control Building. (9 pages)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to mercury (cont.)	Specific locations: Control room middle south wall Western portion of basement Center of boiler room	--	4. Two mercury switches 5. Mercury spill in western portion of building in basement that is being cleaned up 6. Mercury manometer	--	--	--	--
Exposure to miscellaneous chemicals	Specific locations: Lower level battery room Tunnel entry area, basement	Person exposed to unknown/known chemicals through inhalation, ingestion, or absorption from breach of container	1. Facility is partially occupied 2. The materials may be more or less stable depending on age and chemical makeup 3. Few chemicals in facility 4. Exposure requires loss of chemical containment 5. Person must come in contact with material 6. Some materials are unknowns 7. Fifty plus batteries in use 8. Two 5-gal buckets of sodium hypochlorite being used to supply chlorinator	II/II	D/D	II, D Minor	II, D Minor

9313041.1971

Table C1-39. 165-KW Power Control Building. (9 pages)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Explosions						I, E Negli.	I, E Negli.
	General	Person is injured by chemical explosion	1. Some unknown chemicals exist in the facility 2. Multiple factors were required for an explosion	I/I	E/E		
	Battery room in basement under electrical room		3. Battery room may have explosion potential because of hydrogen gas production 4. It is not clear whether the WHC policy on unknown chemicals is followed 5. Only a few chemicals will create this condition				
Release of asbestos						III-3, D Negli.	III-3, D Negli.
	General	Release of asbestos caused by disturbance of friable insulation on piping	1. Insulation must be disturbed to be released 2. An escape path must be present and very few paths were evident	III-3 III-3	D/D		
	Specific locations: HVAC room		3. Friable asbestos found in HVAC room				
Release of mercury						III-3, D Negli.	III-3, D Negli.
		Mercury released to environment from theft or sabotage Mercury released to environment as a result of container breakage	1. Spill has occurred 2. Contained in glass containers that are subject to breakage 3. During D&D of 108-B Building, a significant quantity of mercury was stolen and never recovered	III-3 III-3	D/D		

Table C1-39. 165-KW Power Control Building. (9 pages)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of mercury (cont.)	Specific locations: Control room, middle south wall Western portion of basement Boiler room	--	4. Two mercury switches 5. Mercury spill in northern portion of building in basement 6. Mercury manometer	--	--	--	--
Release of petroleum products	General Specific locations: Valve pit area Underground, west of building	Failure of seals, piping, and equipment resulting in release inside/outside of building	1. Oil already released inside building in some places; indications of current leakage 2. Small quantities of oil in most sources 3. Oil is leaking from valve actuators 4. Underground oil storage tanks may contain oil residue or heels	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.
Release of miscellaneous chemicals	Lower level battery room Tunnel entry area, basement	Release of miscellaneous chemicals caused by breach or spilling of container	1. Small quantities 2. No pathways (e.g., drains) were noted near chemical containers 3. Material would be contained in building in the event of a spill 4. Fifty plus batteries in use 5. Two 5-gal buckets of sodium hypochlorite being used to supply chlorinator	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.

9313041.1973

Table C1-39. 165-KW Power Control Building. (9 pages)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of miscellaneous chemicals (cont.)	--	--	6. Possibility of lead paint on roof of north tunnel	--	--	--	--
	Brine pit, outside north corner of building		7. Brine pit may contain salt residue				

*Common to all accidents involving shock.

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9313041.1975

Table C1-40. 183-KW Facility. (9 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, D Minor	I, D Minor
	Roof of 183 Chemical Addition Building	Person falls while on roof through deteriorated roof panels	1. Building roof leaks badly in many spots 2. Continued exposure of water to corrugated asbestos-cement roof panels will result in degradation 3. Continued leaking will result in degradation of roof panel support structure (steel beams) 4. Roof beams already exhibit significant rusting 5. There is no access to roof from inside building	I/I	D/D		
Struck by or striking						II, D Minor	II, C Moderate
	Struck by hazard in general	*Common to all accidents where person is struck by falling roof panel pieces or by collapsing wall or roof	*Roof is leaking badly in many places *Most of the ceiling material is not concrete but a lighter asbestos-cement type material fabricated in corrugated sheets				
	Two rooms adjacent to switchgear room	Person is struck by falling ceiling tile	1. Significant roof leakage has occurred 2. Large areas of ceiling tiles are missing, indicating that tiles have fallen before 3. Light fixtures are providing support for any of the existing ceiling tiles 4. Personnel seldom enter this area	IV/IV	D/D		

Table C1-40. 183-KW Facility. (9 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	Main area of 183 Chemical Addition Building	Person is struck by falling roof panels or support "I" beams	5. Beams are already rusted	II/II	D/C	--	--
			6. Snow or seismic forces can create collapse of part of the roof structure				
	Filter effluent tunnel	Person is struck by falling concrete pieces	7. Many cracks in concrete beams	II/II	D/C		
		Person is struck by falling beam or concrete pieces because of failure of crane support beam when crane is used	8. Crane support track is tied to cracked concrete beams				
			9. Crane is not currently present				
	East wall, main floor next to 3rd tank	Person is struck by falling object	10. 3-in. steel pipe above head level is not secured and could fall if moved	II/II	D/D		
	Electrical room		11. Aluminum "I" beam (used to support lifting devices) secured by a .125-in. cable on each end has been left in the room	IV/IV	D/D		
Electrical shock						I, D Minor	I, D Minor
	General to facility	*Common to all accidents involving shock	*Some circuits and breakers in the facility are unidentified or incorrectly identified				
			*Breakers providing fault protection may not trip because of age and lack of maintenance				
			*Breakers that are off may be turned on resulting in components that were de-energized becoming energized				
	Main switchgear room	Person receives shock from contact with energized equipment or conductors when water shorts out equipment	1. Significant water leakage present in room as evidenced by standing water	I/I	D/D		
			2. Roof leakage is allowing water to enter switchgear, which may cause it to short out				
			3. Switchgear is energized				

9313041.1977

Table C1-40. 183-KW Facility. (9 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	4. Personnel seldom enter the facility	--	--	--	--
	Main floor, laboratory	Person receives shock from contact with energized equipment or conductors when insulation fails.	5. Receptacle box is suspended 4 ft above floor by vertical conduit only	I/I	D/D		
			6. Box contains two energized conductors, no blank cover				
			7. Conductors are taped				
	Main floor, west corridor	Person receives shock from contact with exposed energized conductors or equipment	8. Wall clock installed perpendicular to hallway wall has one face missing	I/I	E/E		
			9. The contacts for the receptacle feeding the remaining clock face are exposed and energized				
			10. Exposed contacts are isolated by elevation above floor				
Exposure to asbestos						IV, C Minor	IV, B Minor
	Multiple potential locations	Person inhales friable asbestos, potential exists for asbestos-related illness in the future from such an exposure	1. Building not occupied by workers	IV/IV	C/B		
			2. Uncertainty concerning which materials contain asbestos				
			3. Friable material requires disturbance for release				
			4. There is no evidence of an asbestos abatement program				
			5. Some construction materials such as roof panels are known to contain asbestos but are not classified as friable				
	Specific locations:						
	Adjacent to southeast corner of building		6. Friable asbestos on piping				
	General inside building		7. Pipes throughout building				

9313041.1978

Table C1-40. 183-KW Facility. (9 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to mercury	General Specific locations: East wall in basement	Person exposed to mercury from ingestion or absorption	1. Small quantities 2. Contained in glass containers 3. During D&D of 108-B Building, a significant quantity of mercury was stolen and never recovered 4. Mercury switch mounted on east wall of basement	IV/IV	E/E	IV, E Negli.	IV, E Negli.
Exposure to miscellaneous chemicals	Throughout building Specific locations: Southwest corner roof area	Person exposed to unknown/known hazardous chemicals through inhalation, ingestion, or absorption from breach of container	1. Facility is not normally occupied 2. The materials may be more or less stable depending on age and chemical makeup. 3. Few chemicals in facility 4. Exposure requires loss of chemical containment 5. Person must come in contact with material 6. Some materials are unknowns 7. Ethylene Glycol is a hazardous material that can breakdown into other hazardous materials 8. Chemical tank on roof shows evidence of leaking	II/II	D/D	II, D Minor	II, D Minor

9313041.1979

Table C1-40. 183-KW Facility. (9 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals (cont.)	Brine pit adjacent to southeast corner of building	--	9. Residue in brine pit	--	--	--	--
	Next to bauxite silo outside building		10. Thrity-gal garbage can located next to silo with unknown material in it				
	Sodium dichromate pumping equipment		11. Chemical residue				
Exposure to biological hazards						II, C Moderate	II, C Moderate
	Located throughout the facility	Person exposed to animal droppings and contracts disease	Low-frequency accidents have significant consequences	II/II	C/C		
			High-frequency accidents have small consequences	IV/IV	A/A		
			NOTE: Events that are serious in nature are of lower probability. Likewise, events that are minor in effect are of higher probability.				
		Person exposed to insect bites and stings, rodent bites, and snake bites					
			1. Presence of spiders, wasps, etc. is seasonal				
			2. Significant quantities of rat droppings were observed				
			3. One dead bird found				
			4. Snakes have been found in the buildings, including rattlesnakes.				
			5. Activities for cleanup and maintenance occur where hazards exist				

Table C1-40. 183-KW Facility. (9 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Temperature extremes						II, C Moderate	II, C Moderate
	General	Person experiences heat exhaustion	1. Seasonal	II/II	C/C		
			2. Dependent on ventilation				
			3. Hanford Site has a history of this problem occurring				
			4. Hazard depends on type of work being performed and type of protective clothing required				
			5. Can be controlled by limiting exposure				
			6. Activities, such as asbestos removal, that require concern about temperature extremes are not performed frequently				
			7. Worker has some awareness of hazard				
		Person experiences hypothermia.	8. Low temperatures occasionally occur on the Hanford Site	II/II	D/D		
Fire						IV, D Negli.	IV, D Negli.
	Office areas	Person exposed to fire while extinguishing fire in ceiling tile material caused by electrical fault	1. Significant roof leakage saturating ceiling fixtures	IV/IV	D/D		
			2. Area will dry out when rain stops				
			3. Water leakage could cause potential electrical fault problem later				
			4. Ceiling tile appears to be combustible when dry				

Table C1-40. 183-KW Facility. (9 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of asbestos						III-3, D Negli.	III-3, D Negli.
	General	Release of asbestos caused by disturbance of friable insulation on piping	1. Potential for large quantities	III-3 III-3	D/D		
			2. Most piping still has insulation in place				
			3. Insulation must be disturbed to get release				
			4. An escape path must be present and very few paths were evident				
	Specific locations:						
	Adjacent to southeast corner of building		5. Friable asbestos on piping				
	General inside building		6. Pipes throughout building				
Release of mercury						III-3, E Negli.	III-3, E Negli.
		Mercury released to the environment from theft or sabotage	1. Small quantities	III-3 III-3	E/E		
		Mercury released to the environment as a result of container breakage	2. Contained in glass containers that are subject to breakage				
			3. During D&D of 108-B Building, a significant quantity of mercury was stolen and never recovered				
	Specific locations:						
	East wall of basement		4. Mercury switch mounted on east wall				

Table C1-40. 183-KW Facility. (9 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of petroleum products						III-3, C Negli.	III-3, C Negli.
	General	Failure of seals, piping, equipment, etc. resulting in a release inside and outside of the building	1. Oil already released inside building in some places; indications of current leakage 2. Small quantities of oil in most sources	III-3 III-3	C/C		
	Specific locations: Pumping equipment		3. Oil is leaking from pumping equipment				
	Outside building on east side		4. Oil is leaking from active transformers located outside the building				
Release of miscellaneous chemicals						III-3, D Negli.	III-3, D Negli.
		Release of miscellaneous dangerous or hazardous chemicals caused by breach or spilling of container	1. Small quantities 2. No pathways (e.g., drains) were noted near chemical containers 3. Material would be contained in building in the event of a spill	III-3 III-3	D/D		
	Specific locations: Throughout building		4. Ethylene glycol is a hazardous material that can break down into other hazardous materials				
	Southwest corner roof area		5. Chemical tank on roof shows evidence of leaking				
	Brine pit adjacent to southeast corner of building		6. Residue in brine pit				

9313041.1983

Table C1-40. 183-KW Facility. (9 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of miscellaneous chemicals (cont.)	Next to bauxite silo outside building	--	7. Thirty-gallon garbage can located next to silo with unknown material in it	--	--	--	--
	Sodium dichromate pumping equipment		8. Chemical residue				

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9313041.1985

Table C1-41. 190-KW Facility. (8 pages)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, B Critical	I, B Critical
	General	Person falls through damaged panel while on roof	1. Evidence of heavy leakage present, roof membrane damaged	I/I	E/C		
			2. Panels currently in good condition				
			3. Roof access by outside ladders only				
			4. Panels are corrugated asbestos-cement construction				
			5. Roof panels presently are in good condition				
	Outside fenced area, inside building	Person falls through damaged floor grate	6. Floor grate is damaged with a 2-in-deflection	I/I	B/B		
			7. This facility is frequently occupied				
			8. Distance to basement floor is approximately 14 ft				
	Ladder and catwalk in building	Person falls from ladder	9. Ladder is not properly locked out	I/I	D/D		
			10. Ladder is in good shape				
Struck by or striking						II, E Negli.	II, C Moderate
	Struck by hazard in general	*Common to all accidents where person is struck by falling roof panel pieces or by collapsing wall or roof	*Roof is leaking badly in a few places	II/II	E/C		
			*Most of the ceiling material is not concrete but a lighter asbestos-cement type material fabricated in corrugated sheets				
		Person struck by collapsing roof panels	1. Roof membrane is damaged and allowing water leakage				

Table C1-41. 190-KW Facility. (8 pages)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	--	--	2. Roof panels will degrade with continued exposure to water and no repair 3. Large snow loads or seismic forces can create a collapse of roof panels that are degraded 4. Long term leakage will cause degradation of roof structure and eventual failure	--	--	--	--
		Person struck by collapsing roof structure					
Drowning/ suffocation	Global throughout building	Person enters confined space and is overcome by gases or lack of oxygen	1. Confined spaces exist in the building belowgrade 2. There is evidence of oxidation/water accumulation 3. Samples of confined space atmospheres showed no problems 4. Building has lack of ventilation 5. Most of the confined spaces in the building were not entered or checked 6. Conditions can change at any given time 7. Confined spaces are not identified	I/I	D/D	I, D Minor	I, D Minor
Electrical shock	General to facility		*Most circuits and breakers in the facility are unidentified or incorrectly identified *Breakers providing fault protection may not trip because of age and lack of maintenance *Breakers that are off may be turned on, resulting in components that were deenergized becoming energized			I, D Minor	I, D Minor

9313041.1987

Table C1-41. 190-KW Facility. (8 pages)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	*Persons are continually present in some areas while other areas are not normally occupied	--	--	--	--
	West end of building, north door (immediately required)	Person receives shock by coming in contact with exposed energized conductors or energized door caused by damaged insulation	1. Flexible cord attached between lower left interior corner of door and fixed frame for powering limit switch has broken and frayed insulation 2. Conductors are exposed by broken and frayed insulation 3. Cord flexes when door is opened	I/I	B/A		
	North wall of building	Person receives shock by coming in contact with conductors or energized equipment during maintenance of energized switch or fuse because of inadequate working space	4. Disconnect switches are located behind heater control panels 5. Front access to switches is limited by panels and no adequate working clearance is available	I/I	D/D		
Exposure to asbestos						IV, D Negli.	IV, D Negli.
	Multiple potential locations	Person inhales friable asbestos; potential exists for asbestos related illness in the future from such an exposure	1. Building partially occupied by workers 2. Ninety-five percent of facility insulation in good shape with some isolated instances of degradation 3. Uncertainty concerning which materials contain asbestos 4. Friable material requires disturbance for release 5. Very little material appeared to be friable 6. There is no evidence of an asbestos abatement program	IV/IV	D/D		

Table C1-41. 190-KW Facility. (8 pages)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to mercury						IV, E Negli.	IV, E Negli.
	General	Person exposed to mercury from ingestion or absorption	1. Small quantities	IV/IV	E/E		
			2. Contained in glass containers				
			3. Possibility for existence as mixed waste				
			4. During D&D of 108-B Building, a significant quantity of mercury was stolen and never recovered				
	Specific locations:						
	Equipment near center of building		5. Mercury switches				
Exposure to miscellaneous chemicals						II, D Minor	II, D Minor
	Facility is one large room with basement	Person exposed to unknown or known hazardous chemicals through inhalation, ingestion, or absorption from breach of container	1. Facility is routinely occupied	II/II	D/D		
			2. The materials may be more or less stable depending upon age and chemical makeup				
			3. Exposure requires loss of chemical containment				
			4. Person must come in contact with material				
			5. Many chemicals are stored in this facility because of quantity; not all have been listed in these findings				
			6. Some materials are unknowns				
			7. Large quantity of 5-gal buckets full of a variety of products being stored (this facility is being used as a storage area)				

Table C1-41. 190-KW Facility. (8 pages)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals (cont.)	--	--	8. Some materials are unknowns; others contain adhesives, roof tars, adsorbents, portland cement, soda-ash, de-icer, etc. 9. Many packages are unlabeled. 10. Ethylene glycol (a hazardous material) lines run throughout the building	--	--	--	--
Temperature extremes						II, C Moderate	II, C Moderate
	General	Person experiences heat exhaustion	1. Seasonal 2. Dependent on ventilation 3. The Hanford Site has a history of this problem occurring 4. Hazard depends on type of work being performed 5. Can be controlled by limiting exposure 6. Activities that require concern about temperature extremes are not performed frequently 7. Worker has some awareness of hazard	II/II	C/C		
		Person experiences hypothermia	8. Low temperatures occasionally occur on the Hanford Site	II/II	D/D		
Fire						II, D Minor	II, C Moderate
	General	Person exposed to fire in combustible materials	1. Many combustibles are stored in this facility 2. Some materials are flammable, such as gasoline or adhesives 3. Flammable liquids are not stored in an approved manner 4. A spark source is needed to have a fire occur	II/II	D/C		

9313041.1990

Table C1-41. 190-KW Facility. (8 pages)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Fire (cont.)	--	--	5. Roof leak is permitting water to wet the crane electrical system 6. The crane electrical system may be energized 7. Shorting of the electrical system may produce sparks 8. Little or no preventative maintenance is performed on breakers 9. Breakers that are not maintained are more likely to fail to clear faults 10. If faults are not properly cleared, fires can result 11. There is no fire protection or suppression system in the facility	--	--	--	--
Explosions	General	Person is injured by chemical explosion	1. Some unknown chemicals exist in the facility 2. Multiple factors are required for an event 3. There are materials stored in this facility such as gasoline that can support explosions 4. Gasoline is not correctly stored in this facility 5. Only a few chemicals will create this condition	I/I	E/E	I, E Negli.	I, E Negli.

Table C1-41. 190-KW Facility. (8 pages)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of asbestos	General	Release of asbestos caused by disturbance of friable insulation on piping	1. Building partially occupied by workers 2. Ninety-five percent of facility insulation in good shape, some isolated instances of degradation 3. Uncertainty concerning which materials contain asbestos 4. Friable material requires disturbance for release 5. Very little material appeared to be friable 6. There is no evidence of an asbestos abatement program	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.
Release of mercury	Specific locations: Center of building	Mercury released to environment from theft or sabotage Mercury released to environment as a result of container breakage	1. Small quantities 2. Contained in glass containers that are subject to breakage 3. During D&D of 108-B Building, a significant quantity of mercury was stolen and never recovered 4. Mercury switches	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.

9313041.1992

Table C1-41. 190-KW Facility. (8 pages)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of oil/petroleum products						III-2, D Negli.	III-2, D Negli.
	Valve pit	Failure of seals, piping, equipment, etc. resulting in a release inside and outside of building	1. Valve actuators in the valve pit area are leaking oil	III-3 III-3	D/D		
	West of building	Failure of tank allows seepage of oil into soil	2. Underground oil storage tanks located west of the building may contain oil residue or heels	III-2 III-2	D/D		
Release of miscellaneous chemicals						III-3, D Negli.	III-3, D Negli.
	General	Release of miscellaneous dangerous or hazardous chemicals caused by breach or spilling of container	1. Facility is routinely occupied	III-3 III-3	D/D		
			2. Exposure requires loss of chemical containment				
			3. Many chemicals are stored in this facility because of quantity--not all have been listed in these findings				
			4. Some materials are unknowns				
			5. Large quantities of 5-gal buckets full of a variety of products being stored (this facility is being used as a storage area)				
			6. Some materials are unknowns; others contain adhesives, roof tars, adsorbents, Portland cement, soda-ash, de-icer, etc.				
			7. Many packages are unlabeled (a hazardous material)				
			8. Ethylene glycol (a hazardous material) lines run throughout the building				

Table C1-42. 1702-KW Badge House.

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling	Roof	Person falls through deteriorated wooden roof while on it	1. No access to roof, but building is not tall, and there is no barricade around the building to prevent placing ladder for roof access 2. Roofing is in very bad condition	I/I	D/C	I, D Minor	I, C Serious
Struck by or striking	Inside building	Person struck by collapsing roof	1. Building condemned and no access is allowed 2. Snow load or seismic force could cause collapse 3. Roofing in bad condition	II/II	E/D	II, E Negli.	II, D Minor

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Table C1-43. 1714-KW Warehouse.

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling	Roof	Person falls through roof while on roof	1. Roofing is in bad condition 2. No access to roof except by portable ladder 3. Facility not normally occupied	I/I	D/C	I, D Minor	I, C Serious
Struck by or striking	Inside building	Person struck by collapsing roof	1. Roofing is in bad condition allowing water leakage 2. Roof structure is wood 3. Snow or seismic load could cause collapse 4. Building not normally occupied	II/II	D/C	II, D Minor	II, C Moderate

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APPENDIX C - PART II

200 AREA RETIRED FACILITIES

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Table C2-1. 205-A Solvent Handling Facility. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, C Serious	I, B Critical
	Valve protection building	Person falls through deteriorated roof structure	1. The angle iron portion of the steel roof frame is very rusty 2. Low personnel activity in this area 3. No interior or exterior stairs 4. One story building, could be accessed with a portable ladder 5. No danger postings 6. No reason to access roof 7. Restricted area	I/I	C/B		
	Basin areas	Person falls into pipe trench	8. Missing cover plate at northeast basin 9. The area under the missing cover plate was filled with water, creating the impression that no trench was present	II/II	C/B		
Struck by or striking						II, C Serious	II, B Critical
	Valve protection building	Person is struck by collapsing roof structure caused by snow or seismic loading	1. Angle iron portion of steel roof frame is very rusty 2. Heavy snow or seismic loading can collapse steel roof frame	II/II	C/B		
	Basin areas	Person is struck by collapsing basin walls and/or steel tanks	3. Very deteriorated circular foundations under large tanks (TK-P1, TK-P2, TK-P3 and TK-P4) 4. Heavy snow or seismic loading can collapse steel tanks and associated walls 5. Low building acitivity	II/II	C/B		

Table C2-1. 205-A Solvent Handling Facility. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock	General	Person receives shock as a result of contact with energized equipment during maintenance or decommissioning	1. Three separate conduits enter the building from the building to the south at 10 ft above grade 2. It was not possible to determine the status of the feeders 3. Access to the power source in the second building was not possible 4. Facility does not appear to require power	I/I	D/D	I, D Minor	I, D Minor
Exposure to radiation	General	Person exposed to external ionizing radiation	1. Predominantly low exposure rates (< 20 mR/h) 2. Lack of labeling and posting	IV/IV	D/D	IV, D Negli.	IV, D Negli.
		Person exposed to radioactive material by inhalation, ingestion, or absorption	3. Occurs only from resuspendable material 4. Predominantly low levels of removable contamination (<750 counts/min)	IV/IV	D/D		
Exposure to asbestos	General	Person inhales friable asbestos; potential exists for asbestos related illness in the future from such an exposure	1. Potential for large quantities 2. Most piping still has insulation in place that is not in a friable form 3. Insulation must be disturbed in order to get release	IV/IV	D/C	IV, D Negli.	IV, C Minor
Exposure to lead	Tanks inside building	Lead is stolen and released into the environment through improper use	Lead is extremely difficult to steal at this facility	IV/IV	D/D	IV, D Negli.	IV, D Negli.

Table C2-1. 205-A Solvent Handling Facility. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals	Basin areas	Migration of nitric acid or uranium nitrate through basin walls	1. Cracks in basin walls 2. Evidence of heavy leaking 3. Foundation failure required to get release	IV/IV	D/D	IV, D Negli.	IV, D Negli.
Release of radioactive material	Basin areas	Release of radioactive material through cracked basin walls caused by potential failure of chemical storage tank foundations	1. Many cracks in catch basin walls 2. Radioactive material is contained in tanks 3. Catch basins are exposed to extreme weather conditions 4. Chemical tank circular platforms were in poor condition that could allow collapse and subsequent rupture of tanks containing radioactive material	III-2 III-2	B/B	III-2, B Minor	III-2, B Minor
Release of asbestos	General	Release of asbestos caused by disturbance of friable insulation on exterior piping	1. Potential for large quantities 2. Most piping still has insulation in place that is not in a friable form 3. Insulation must be disturbed in order to get release	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.
Release of lead	Tanks inside building	Lead is stolen and released into the environment through improper use	Lead is extremely difficult to steal at this facility	III-3 III-3	E/E	III-3, E Negli.	III-3, E Negli.

Table C2-1. 205-A Solvent Handling Facility. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of miscellaneous chemicals						III-2, C Minor	III-2, C Minor
	Basin areas	Migration of nitric acid or uranium nitrate through basin walls	1. Cracks in basin walls	III-2	C/C		
			2. Evidence of heavy leaking	III-2			
			3. Foundation failure required to get release				

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Table C2-2. 224-B Office and Canyon Building. (11 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						II, D Minor	II, D Minor
	All areas of roof with exception of west end high bay roof	Person falls from elevated area	1. Building is occupied and routine surveillances are performed	I/I	E/E		
			2. Roof access door at east end not posted with warnings				
			3. Rock ballast is missing on roof; this could result in membrane damage by wind and further degradation of roof by water leakage				
		Person falls down deteriorated steps	4. Three of the ten steps on the entrance to elevator room at fourth level are deteriorated	II/II	D/D		
	Third floor storage area	Person trips on floor holes or projections	5. Floor holes are currently covered by plywood	I/I	E/E		
			6. Area is routinely occupied				
			7. Plywood is not secured to floor				
Struck by or striking						II, D Minor	II, D Minor
	Main floor, lunch room entry	Person is struck by rotating fan or motor	1. Two manual starter control stations on the wall have been painted, making the ON and OFF labels unreadable	II/II	D/D		
	Third floor storage area	Person trips on floor holes or projections	2. Floor holes (3.5 ft by 2.5 ft) are currently covered by plywood	II/II	E/E		
			3. Area is routinely occupied				
			4. Plywood is not secured to floor				
	Third floor bathroom	Person is struck by loose wall pipe in bathroom	5. Wall pipe is not secured; it is supported by an open bathroom door (closing door removes support)				
	Third floor storage area	Person is struck by falling pallets or tank	6. Several pallets are stacked improperly				

Table C2-2. 224-B Office and Canyon Building. (11 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	--	--	7. Tank A-1B is sitting on blocks in an unbalanced manner	--	--	--	--
	Second floor storage area next to sample room door (a, b, and f)	Person strikes protruding object	8. Metal pipe brackets hanging from ceiling at 5 ft height				
			9. Protruding metal legs present on table that is turned upside down				
	Roof	Person is struck by falling roof pieces	10. No rock ballast on a few roof areas	II/II	E/D		
Electrical shock						I, C Serious	I, B Critical
	Main floor, lunch area storage room ceiling	Person receives shock as a result of contact with energized equipment caused by damaged cord insulation	1. Fluorescent light fixture is wired with a cord from an adjacent incandescent light fixture	I/I	D/D		
			2. The use of cord for this purpose exposes it to situations that could result in insulation damage				
			3. This is not an approved wiring practice				
	General location in facility	Person receives shock as a result of contact with energized wire or equipment after insulation has been damaged	4. Condulet or electrical enclosure cover is missing	I/I	D/D		
			5. Knock-out cover is missing				
			6. Wiring is energized				
	Main floor, lunch room, east wall	Person receives shock from contact with energized electrical equipment	7. Electrical fuse panel door does not latch closed	I/I	C/C		
			8. Energized fuses are exposed when door is open				
	Main floor, office area	Person receives shock from contact with energized electrical conductors caused by insulation failure	9. Portable extension cords are used as permanent wiring (National Electric Code violation)	I/I	C/C		

Table C2-2. 224-B Office and Canyon Building. (11 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	10. Cords run through ceiling panels and doorways, exposing them to mechanical damage	--	--	--	--
	Main floor, main equipment room	Person receives shock as a result of contact with energized equipment while performing maintenance	11. A 30-A disconnect switch does not have identifying label	I/I	D/D		
			12. Proper lock and tag system may not be possible if identification of power feed is not made				
	Second floor, materials storage floor, east end of room at north wall	Person receives shock as a result of contact with energized conductors during maintenance, or normal operation when insulating caps are damaged	13. Junction box on wall is not supported	I/I	D/C		
			14. Energized wires with plastic caps are exposed				
	Materials storage floor, east end of room	Person receives shock from contact with energized conductors from insulating tape failure	15. Energized wires are suspended from the ceiling to 6 ft to 7 ft above floor (wires looped and hanging)	I/I	C/B		
			16. Temporary taping currently protects the energized wires				
			17. This is not an approved method for protecting personnel from shock as the tape can loosen and expose the conductors				
	Material storage floor, center area of floor	Person receives shock from contact with energized conductors or equipment	18. An overhead light fixture, 8 ft to 9 ft above floor has no bulb installed	I/I	D/D		
			19. The junction box is open, exposing energized wires to possible damage				
	Material storage area, general	Person receives shock from contact with energized lamp socket while performing maintenance or moving equipment	20. Several light fixtures do not have bulbs or protective globes installed, exposing energized sockets	I/I	D/D		
			21. The general area is not well lit, contributing to unawareness of hazard				

Table C2-2. 224-B Office and Canyon Building. (11 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	22. Considerable material and equipment is stored and moved within this area	--	--	--	--
	Roof at entrance to elevator room	Person receives shock from contact with energized wires during maintenance or entry to room	23. The over-the-door light fixture is missing (approximately 7 ft above floor)	I/I	C/B		
			24. Energized bare wires are exposed				
	Outside east building entrance door	Person receives shock from contact with energized conductors during maintenance activities	25. Light fixture is missing	I/I	D/D		
			26. Wires are exposed (approximately 10 ft above-grade) and are suspected of being energized				
	Next to F Cell door	Person receives shock from contact with energized conductors	27. Face plate to plug is missing	I/I	D/D		
	F Cell		28. Electrical wire in middle of south wall protruding from box inside cell (status unknown)				
			29. This building is partially occupied				
Exposure to radiation						II, B Serious	II, B Serious
	Global	Person is exposed to external ionizing radiation	*Building is occupied in noncanyon areas				
			1. Only F Cell was inspected	II/II	D/D		
			2. Contamination levels are not homogeneous				
			3. Contamination is alpha, which is not an external exposure threat				
		Person is exposed to radioactive material by inhalation, ingestion, or absorption	4. Occurs only from resuspendable material	II/II	B/B		
			5. Contamination is primarily alpha, which is an internal exposure threat				

Table C2-2. 224-B Office and Canyon Building. (11 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to radiation (cont.)	Door to canyon	--	6. The door to the canyon had 14,000 dpm smearable contamination (alpha)	II/II	B\B	--	--
	F Cell		7. F Cell had low levels of removable beta and gamma contamination, and high levels of alpha	II\II	D\D		
			8. Because the passage is narrow, the likelihood of contamination to an individual is increased				
			9. Door is locked				
			10. Door opens outward, increasing the likelihood of contamination being spread and individuals being exposed				
			11. Door has no seals, increasing the likelihood that ventilation failure can cause migration to clean zone where individual an could come in contact				
			12. There is evidence of recent entry into F Cell (within the past 2 to 3 years)				
Exposure to asbestos						IV, D Negli.	IV, C Negli.
	Transite HVAC ducting throughout second and third levels	Person inhales friable asbestos; potential exists for asbestos related illness in the future from such an exposure	1. Transite HVAC ducting has holes cut into ducting creating possible fiber accumulation in HVAC	IV/IV	D/C		
			2. Transite is an asbestos and cement product				
	West side of second floor behind control cabinets		3. Damaged friable asbestos on piping that is not marked				
			4. These areas are routinely accessed by personnel				
			5. Area is not properly posted, and signs are inside the area rather than on facility entrance				

Table C2-2. 224-B Office and Canyon Building. (11 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals						II, D Minor	II, D Minor
	Third floor storage area	Person exposed to unknown or known chemicals through inhalation, ingestion, or absorption caused by breach of container	*This facility is routinely occupied and materials moved or used				
	Second level storage room		1. Several chemical products are being stored throughout the room on pallets	II/II	D/D		
			2. Several chemical products are being stored throughout room				
			3. There are a number of unlabeled, full, 55-gal barrels				
			4. Unlabeled containers are inside flammable material storage cabinets				
	F Cell		5. There is an asbestos encapsulant (may be considered hazardous)				
			6. Flammable liquid safety can containing unknown liquid				
			7. Sulfuric acid (causes burns on contact and can react with other materials causing hazardous compounds)				
Exposure to biological hazards						II, C Moderate	II, C Moderate
	Located throughout the facility	Person exposed to dusts from bird guano and dead animals; contracts disease (this item located in radiation zone)	Low frequency accidents have significant consequences	II/II	C/C		
			High frequency accidents have small consequences	IV/IV	A/A		
			NOTE: Events that are serious in nature are of lower probability. Likewise, events that are minor in effect are of higher probability.				

Table C2-2. 224-B Office and Canyon Building. (11 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to biological hazards (cont.)	--	Person exposed to insect bites and stings, and snakebites.	1. Presence of spiders, wasps, etc., is seasonal 2. Large quantity of spiders, including black widows, was noted 3. Accumulations of bird guano in piles below ceiling vents in F Cell 4. Bird skeletons found 5. F Cell vents appear to be open to the outside and do not have filtering or screening 6. Activities for cleanup and maintenance occur where hazard exists 7. Noncanyon areas of building routinely occupied	--	--	--	--
Fire						II, D Minor	II, C Moderate
	Main floor, northeast building entrance hallway	Person is exposed to electrical fire caused by inability to deenergize equipment	1. The door to panel "A" cannot be opened because the latch is not operational 2. In an emergency, the door cannot be opened to deenergize circuits 3. No maintenance occurs because no access has been allowed	II/II	D/C		
	Main floor, office area, northeast corner of building	Person is exposed to electrical fire or continuous electric arc caused by inability to deenergize equipment	4. A file cabinet is positioned in front of an emergency lighting panel, restricting access 5. Restricted access prevents deenergizing circuit in an emergency	II/II	D/C		

Table C2-2. 224-B Office and Canyon Building. (11 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Fire (cont.)	Second and third level storage areas	Person is exposed to fire from stored combustibles	6. Existing doors are not fire doors and are not marked or lit 7. Large amounts of combustibles (e.g., wood, paper, plastic) stored in second and third levels 8. Facility is routinely occupied	II/II	E/D	--	--
Explosion	F Cell	Unknown material in safety can explodes	1. Safety can contains unknown liquid 2. Liquid may be explosive 3. No ignition sources appear to be present	I/I	E/E	I, E Negli.	I, E Negli.
Release of radioactive material	224-B Building roof 224-B Building roof Inside ventilation ducts in silo	Disturbance of surface contamination in the canyon results in release through vents on roof Movement of water from roof leakage causes release of radioactive material	1. 224-B Building roof has five large vents over the canyon area 2. Doors on canyon exterior are in poor condition, with holes large enough to see daylight 3. Ventilation over the F Cell is not sealed. Evidence of bird intrusion such as droppings and skeletons exists. 4. Rock ballast on the roof membrane is missing; strong wind can tear membrane off roof and allow rain water to leak in	III-2 III-2	B/B	III-2, B Minor	III-2, B Minor

Table C2-2. 224-B Office and Canyon Building. (11 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material (cont.)	Canyon wall	Canyon ventilation balance is upset because of filter or fan failure causing disturbance of radioactive materials and resulting in a release through leaks in canyon walls	5. Cracks in the exterior concrete walls at third level, east side of the building 6. Cracks in interior concrete walls at first floor, corridor side, and third level under concrete beams 7. Canyon is posted as having airborne radioactive contamination 8. Exterior areas south of the canyon are posted as surface contamination zones, indicating that an environmental release has already occurred 9. East entry door to canyon was highly contaminated with alpha	III-2 III-2	D/D	--	--
Release of asbestos	General West side of second floor behind control cabinets	Release of asbestos caused by disturbance of friable insulation on piping	1. Majority of friable asbestos found in Blower Room 2. F Cell gallery has friable asbestos on piping 3. Appears that asbestos is not coated with fixative 4. Friable asbestos is on piping that is not normally within reach 5. Area is not properly posted, and posting is inside rather than on entrances to building 6. Asbestos release requires asbestos to be disturbed 7. Most asbestos-containing materials are not in friable form	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.

Table C2-2. 224-B Office and Canyon Building. (11 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of asbestos (cont.)	--	--	8. First floor mechanical room blower provides office area ventilation	--	--	--	--
Release of oil/petroleum products						III-3, C Negli.	III-3, C Negli.
	General	Failure of seals or gaskets results in release of oil inside building	1. Oil was found on the elevator drive unit in the enclosure on the roof of the building 2. Quantity of oil was small	III-3 III-3	C/C		
Release of miscellaneous chemicals						III-3, E Negli.	III-3, D Negli.
	Specific locations: On and inside chemical process piping In flammable storage cabinets on west end, ground floor Third floor F Cell Second floor	Process chemical residues are released into the environment as a result of water or steam pipe breakage or roof leakage	1. Very few sources of water that would cause a release to the environment are present 2. Chemicals such as sulfuric acid can react violently with water 3. Chemicals used in facility may still be present in pipes and tanks 4. Several flammable liquids were stored in flammable liquid storage cabinets located on ground floor at the west end of the building 5. Oxygen bottle found on third floor 6. Excess chemical coatings have exceeded shelf life located on the third floor 7. Asbestos encapsulant was found in six 55-gal drums on the second floor	III-3 III-3	E/D		

Table C2-2. 224-B Office and Canyon Building. (11 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of miscellaneous chemicals (cont.)	--	--	8. The status of chemical process tanks located in F Cell are unknown	--	--	--	--
			9. A box was found in F Cell labeled as sulfuric acid				
	Northwest corner of F Cell		10. A full 5-gal flammable liquid storage can was found in F Cell				

dpm = disintegrations/minute
HVAC = Heating, ventilating, and air conditioning

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Table C2-3. 215-C Storage Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling	--	--	No structural hazards identified	--	--	None	None
Electrical shock	Electrical room on west side of building (separate annex)	Person receives shock from inadvertent contact with main electrical panel bus	1. The front cover of the main electrical panel is not installed, and the bus is exposed 2. The panel is energized 3. The panel is located 2 ft to 4 ft above floor height, allowing easy access and contact 4. This is a radiation controlled zone 5. Area has limited access	I/I	C/C	I, C Serious	I, C Serious
Exposure to radiation	Global	Person exposed to external ionizing radiation	1. Historical surveys indicate background or very low external exposure rates 2. Surveys during the walkdown detected only one area with an exposure rate greater than 10 times background 3. Low personnel activity in this building 4. 8,000 counts/min was detected on one radiation trefoil fixed to concrete floor	IV/IV	E/E	IV, E Negli.	IV, E Negli.

Table C2-3. 215-C Storage Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to asbestos	General	Person inhales friable asbestos; potential exists for asbestos related illness in future from such exposure	1. Pipe insulation residue may or may not contain asbestos 2. Friable areas would have to be disturbed (bumped into or knocked down) for a significant release to occur	IV/IV	D/D	IV, D Negli.	IV, D Negli.
Fire	Inside main room on west wall and in main electrical room	Person is exposed to fire caused by insulation damage and shorting at separated raceway joint	1. The fire system EMT raceway is separated at a joint, exposing internal wires 2. Condulet cover is also missing	IV/IV	D/D	IV, D Negli.	IV, D Negli.
Release of radioactive material	Global	Release of, or spread of, moveable contamination	1. Surveys during the walkdown detected only one area with an exposure rate greater than 10 times the background 2. Contamination is predominantly entrained (fixed)	III-3 III-3	E/E	III-2, A Moderate	III-2, A Moderate
		Release of, or spread of, moveable contamination by biological agent	3. Bird debris was observed on south side of the building in a surface contamination area 4. Radioactive release (by definition) has already occurred in contamination area	III-2 III-2	A/A		

Table C2-3. 215-C Storage Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of asbestos	General	Release of asbestos caused by disturbance of friable insulation on piping	1. Pipe insulation residue may or may not contain asbestos 2. Friable areas would have to be disturbed (bumped into or knocked down) for a significant release to occur	III-3 III-3	E/E	III-3, E Negli.	III-3, E Negli.

EMT = Electrical metallic tubing

Table C2-3. 215-C Storage Building. (4 sheets)

Hazards not found during walkdown investigation
Falling
Struck by or striking
Drowning/suffocation
Exposure to lead
Exposure to mercury
Exposure to miscellaneous chemicals
Exposure to biological hazards
Explosion
Release of lead
Release of mercury
Release of oil/petroleum products
Release of miscellaneous chemicals

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Table C2-4. 212-N Fuel Storage Facility. (3 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, D Minor	I, D Minor
	Basin area	Person falls through damaged roof panel while on roof	1. Thirteen deteriorated panels, including eight cracked panels with exposed rusty rebar (east side storage basin roof)	I/I	D/D		
	Transfer area	Person falls from stairs because of failure of step	2. Stairs at northwest side of transfer area have crack across bottom side in the middle span	I/I	D/D		
			3. This building has low worker activity				
			4. There may be some reason to repair roof because of the gloveboxes that are stored inside				
Struck by or striking						II, D Minor	II, D Minor
	Struck by hazard in general areas		*Snow loading will increase likelihood of roof or wall collapse				
			*Seismic event will facilitate roof or wall collapse				
	Storage basin	Person is struck by falling roof panels	1. Thirteen deteriorated panels, including eight cracked panels with exposed rusty rebars (roof of the storage basin, east side--same as falling)	II/II	D/D		
	Transfer area	Person is struck by falling stair parts	2. Stairs at northwest side of transfer area have crack across bottom side in middle span (same as falling)	II/II	E/E		
			3. South handrail at transfer area is bad (outside basin)	II/II	E/E		
			4. This building has little worker activity				

Table C2-4. 212-N Fuel Storage Facility. (3 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock	--	None	There is no electrical service to this building	--	--	--	--
Exposure to radiation	General, except access was prohibited to the 212-N Basin	Person exposed to external ionizing radiation, predominantly from cobalt and cesium fixed contamination	1. Predominantly low (<4X background) exposure rates	IV/IV	D/D	II, D Minor	II, D Minor
			2. Energetic gamma emitters possible in immediate vicinity of basin walls (none found)				
		Person exposed to radioactive material by inhalation, ingestion, or absorption	3. Occurs only from material that can be moved	II/II	D/D		
			4. Two ventilation hoods are stored in this facility. However, access to this area is not possible as the doors have been sealed with welded steel plates.				
			5. The ventilation hoods are contaminated with significant quantities of alpha emitting radionuclides				
			6. This building has little worker activity				
Release of radioactive material	--	None	No release concerns in areas where surveys were taken	--	--	None	None

*Common to all accidents where person is struck by falling roof panel pieces or by collapsing wall or roof.

Table C2-4. 212-N Fuel Storage Facility.
(3 sheets)

Hazards not found during walkdown investigation
Drowning/suffocation
Exposure to asbestos
Exposure to lead
Exposure to mercury
Exposure to miscellaneous chemicals
Exposure to biological hazards
Fire
Explosion
Release of asbestos
Release of lead
Release of mercury
Release of oil/petroleum products
Release of miscellaneous chemicals

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Table C2-5. 212-P Fuel Storage Facility. (5 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, D Minor	I, D Minor
	Basin area	Person falls through damaged roof panel while on roof	1. Thirty-five deteriorated panels, including 26 cracked panels (west side storage basin roof) 2. Roof membrane is damaged 3. Evidence of heavy water leakage	I/I	D/D		
	Basin area	Person falls from stairs while climbing	4. Stairs at northwest side of transfer area are cracked (rebar exposed) 5. Outside concrete steps and stoop at entrance to storage basin is very deteriorated	I/I	D/D		
	Basin area	Person falls through floor while walking across it	6. The floor has multiple puddles of water indicating the roof is leaking 7. The floor material covering the wood planking over the basin is bubbled in several areas; because the wood planking cannot be seen, it must be considered suspect 8. Basin floor is 20 ft below the planking 9. This facility has some worker activity because of the presence of the PCB transformer work and storage area 10. There may be some need to repair the roof because of the use of the building	I/I	D/C		
Struck-by or striking						II, D Minor	II, C Moderate
	Struck-by hazard in general		*Snow loading will increase likelihood of roof or wall collapse *Seismic event will facilitate roof or wall collapse				

Table C2-5. 212-P Fuel Storage Facility. (5 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	Storage basin	Person is struck by falling roof panels	1. Thirty-five deteriorated panels, including 26 cracked panels (roof of the storage basin, west side--same as falling)	II/II	D/C	--	--
			2. There is evidence of heavy leakage of rain water (same as falling)				
		Person trips on deteriorated steps/surface	3. Outside concrete steps and stoop at entrance are very deteriorated	II/II	D/C		
		Person is injured by collapsing wall/roof	4. Vertical cracks at south wall (CMU) of storage basin along mortar joints	II/II	D/C		
		Person trips over clutter around outside of building	5. Miscellaneous clutter around the building such as wood crates, barrels, boards, etc.	II/II	D/C		
			6. There is some worker presence because of the PCB work area				
Electrical shock						I, C Moderate	I, C Moderate
	North wall of transfer bay, above west door	Person receives shock from contact with exposed energized wiring	1. Light fixture has been removed, leaving exposed and energized conductors extending from conduit	I/I	C/C		
			2. Conductors are located approximately 8 ft above doorstep				
	South wall of basin, above east doorway	Person receives shock from contact with exposed energized wiring	3. Exposed conductors extend from two conduits in this location	I/I	C/C		
			4. One conduit has part of a broken light fixture attached				
	Basin	Possible electrical shock accident, but bad flooring prevented inspection	5. No entry to basin area was allowed; fluorescent light fixtures are energized and attempting to start	I/I	C/C		
	Basin transfer bay area	Possible electrical shock accident, but no entry allowed for inspection	6. No entry to transfer bay area was allowed	I/I	C/C		

Table C2-5. 212-P Fuel Storage Facility. (5 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to radiation						IV, D Negli.	IV, D Negli.
	Global	Person exposed to external ionizing radiation, predominantly from cobalt and cesium fixed contamination	1. Predominantly low (50 counts/min or less) exposure rates	IV/IV	D/D		
		Person exposed to radioactive material by inhalation, ingestion, or absorption	2. Occurs only from material that can be moved	IV/IV	D/D		
Exposure to miscellaneous chemicals						II, D Minor	II, D Minor
	Outside building, southwest corner	Person exposed to PCBs	1. PCB storage area near the southwest corner of the building 2. Transformers and several other items stored in this area 3. Items are not protected from elements 4. Most eastern room of building is labeled "CAUTION PCB'S" 5. This portion of the facility is not under the control of D&D	II/II	D/D		
Release of radioactive material						III-3, E Negli.	III-3, E Negli.
	Basin area	Spread of contamination by storm water accumulation	1. Water leaking into area 2. No obvious pathways leading from inside to outside of building 3. Requires removable contamination (none was observed)	III-3 III-3	E/E		
Release of oil/petroleum products						III-3, D Negli.	III-3, D Negli.
	Outside building, southwest corner	Person exposed to PCBs	1. PCB storage area near the southwest corner of the building 2. Transformers and several other items stored in this area	III-3 III-3	D/D		

Table C2-5. 212-P Fuel Storage Facility. (5 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of oil/petroleum products (cont.)	--	--	3. Items are not protected from elements 4. Most eastern room of building is labeled "CAUTION PCB'S" 5. This portion of the facility is not under the control of D&D	--	--	--	--

*Common to all accidents where person is struck by falling roof panel pieces or by collapsing wall or roof.
CMU = Concrete mansonry unit
D&D = Decontamination and decommissioning
PCB = Polychlorinated biphenyl

Table C2-5. 212-P Fuel Storage Facility.
(5 sheets)

Hazards not found during walkdown investigation
Drowning/suffocation
Exposure to asbestos
Exposure to lead
Exposure to mercury
Exposure to miscellaneous chemicals
Exposure to biological hazards
Fire
Explosion
Release of asbestos
Release of lead
Release of mercury
Release of miscellaneous chemicals

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Table C2-6. 212-R Fuel Storage Facility. (5 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, C Serious	I, C Serious
	Transfer area, southwest corner	Person falls through damaged roof panel while on roof	1. Nine deteriorated panels, including two cracked panels (southwest side storage basin roof)	I/I	C/C		
			2. Evidence of heavy water leakage caused by wind damaged roofing; light shows between flanges of panels on southwest corner				
	West walkway over basin	Person falls into ladder access area	3. Ladder access into the basin (located on the west walkway over basin) not properly guarded; only has chain				
	Crane access ladder in southwest corner	Person falls from ladder while climbing	4. Crane access ladder in southwest corner is not posted or locked out	I/I	E/E		
			5. Ladder only accesses a steel beam with no handrails because crane is located at other end				
	Northeast side of walkway over basin	Person falls onto basin floor from walkway because of inadequate handrail	6. Northeast side of walkway over basin has 2 ft by 4 ft used as handrail; there is no midrail	I/I	E/E		
			7. The metal guardrail on the east side walkway over basin has been wired to another metal handrail, making it doubtful that the rail will resist 200 lb pressure				
			8. Low building activity by workers				
			9. No need to go on roof				
Struck by or striking						II, C Moderate	II, B Serious
	Struck-by hazard in general		*Snow loading will increase likelihood of roof or wall collapse				
			*Seismic event will facilitate roof or wall collapse				

Table C2-6. 212-R Fuel Storage Facility. (5 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	Transfer area, southwest corner	Person struck by falling roof panels	1. Nine deteriorated panels, including two cracked panels (same as falling) 2. There is evidence of heavy leakage of rainwater (same as falling)	II/II	C/B	--	--
	Outside building, southwest side	Person trips on deteriorated steps or surface	3. Outside concrete steps and stoop at entrance of heater room very deteriorated 4. Stairway is currently roped off and marked with a danger sign	II/II	C/B		
	Supply fan room, east side of building	Person trips and falls on damaged steps	5. Steps are decayed and cracked; however, they are usable 6. This facility is occasionally occupied 7. Low building activity	II/II	C/B		
Electrical shock						I, C Moderate	I, C Moderate
	West wall, north end, transfer bay	Person receives shock from contact with energized wire from work causing insulation damage	1. Condulet below main switch in conduit system between main lighting switch and lighting panel is missing its cover 2. Conductors in conduit system are energized 3. Access to uncovered opening is from below	I/I	E/D		
	North wall of basin above east doorway	Person receives shock from contact with energized, exposed equipment	4. Light fixture contains broken light bulb 5. Filament holders of broken bulb are exposed, accessible, and energized 6. Exposed parts are located approximately 8 ft above doorstep	I/I	C/C		

Table C2-6. 212-R Fuel Storage Facility. (5 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	North wall of transfer bay, above west doorway	Person receives shock from contact with exposed energized conductors	7. Exterior light fixture is missing	I/I	C/C	--	--
			8. Energized conductors extend from the conduit				
			9. Exposed wires are approximately 8 ft above doorstep				
	Basin		10. No assessment of the electrical hazards in the basin was made, because there was no access to this area				
Exposure to radiation						IV, D Negli.	IV, D Negli.
	Gantry crane hook	Person exposed to external ionizing radiation, predominantly from cobalt and cesium fixed contamination	1. Predominantly low (400 counts/min or less) exposure rates	IV/IV	D/D		
			2. Only associated with the gantry crane hooks				
		Person exposed to radioactive material by inhalation, ingestion, or absorption	3. Occurs only from material that can be moved	IV/IV	E/E		
			4. No removable contamination detected				
Exposure to biological hazards						II, C Moderate	II, C Moderate
	Located throughout the facility	Person exposed to dusts from bird guano and dead animals; contracts disease (this item located primarily in radiation zone)	Low frequency accidents have significant consequences	II/II	C/C		
			High frequency accidents have small consequences	IV/IV	A/A		
			NOTE: Events that are serious in nature are of lower probability. Likewise, events that are minor in effect are of higher probability				
		Person exposed to insect bites and stings, and snake bites.	1. Presence of spiders, wasps, etc., is seasonal				
			2. Evidence of large quantities of spider webs and several wasp nests in supply fan room				

Table C2-6. 212-R Fuel Storage Facility. (5 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to biological hazards (cont.)	--	--	3. Snakes have been found in the Hanford Site buildings, including rattlesnakes 4. Activities for cleanup and maintenance occur where hazard exists 5. Evidence on main floor of basin that birds have been roosting on overhead crane	--	--	--	--
Release of radioactive material	Gantry crane hook	Radioactive material is released to environment from action of water	1. Predominantly low (400 counts/min or less) exposure rates 2. Only associated with the gantry crane hooks 3. Occurs only from material that can be moved 4. No removable contamination detected	III-3 III-3	E/E	III-3, E Negli.	III-3, E Negli.

*Common to all accidents where person is struck by falling roof panel pieces or by collapsing wall or roof.

Table C2-6. 212-R Fuel Storage Facility. (5 sheets)

Hazards not found during walkdown investigation
Drowning/suffocation
Exposure to asbestos
Exposure to lead
Exposure to mercury
Exposure to miscellaneous chemicals
Fire
Explosion
Release of radioactive material
Release of asbestos
Release of lead
Release of mercury
Release of oil/petroleum products
Release of miscellaneous chemicals

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Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, E Negli.	I, D Minor
	All areas of the roof with the exception of the west end high bay roof	Person injured by fall from elevated surface	1. None of the roof access doors had "DANGER UNSAFE ROOF" signs on them or were locked	I/I	E/D		
			2. Roofs, except the west end high bay, do not have handrails on them				
			3. The roof over the south side 100 series offices is damaged and leaking				
	All fixed metal ladders of the facility		4. There are several fixed ladders that were not effectively locked out	I/I	E/D		
			5. The facility is illuminated in most areas				
	East end of the electrical gallery		6. Catwalk is rusty and has several small holes cut in it	II/II	E/D		
	Blower room	Person falls through roof panels while on roof	7. All panels in blower room are deteriorated	I/I	E/D		
	Hivox room		8. Three panels in Hivox room are deteriorated				
	Compressor room		9. Four panels in compressor room are deteriorated				
			10. Two weak panels in lunchroom with 3-ft by 3-ft and 2-ft by 2-ft holes				

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking						II, B Serious	II, B Serious
	South sample gallery	Strike parts of body on obstructions in congested walk way to exit gallery	1. Emergency light is not operable and will not provide adequate lighting to exit area in the event or loss of general lighting; existing exit light is not plugged into receptacle for charging (it will not operate if required)	II/II	D/C		
	Plant wide, specifically south operating gallery	Person strikes objects because of lack of emergency lighting when power failure occurs	2. Numerous blackout relay lighting panelboards are energized; however, the blackout lights throughout the facility are not operational	II/II	D/C		
	Power office	Person is struck by fall onto or bumps against a projection	3. Most of the facility is well illuminated; housekeeping in most areas is fair. This facility is routinely inspected, but some zone areas have not been examined as of February 22, 1993.	II/II	D/D		
			4. Lighting covers hanging from lights				
	Compressor room	Person is struck by rotating equipment	5. Operating compressor has guard with openings	II/II	E/E		
		Person trips over bolts in floor	6. Several floor pads with protruding bolts				
	Pipe galleries north and south	Person struck by falling pieces of wood or runs into pieces of wood	7. Metal-framed pieces of wood strapped to overhead piping with thin metal straps	II/II	E/E		
		Person trips over bolts in floor	8. Several locations with floor pads with protruding bolts	II/II	E/E		
	Blower room 2	Person is struck by rotating equipment	9. Rotating belt has guard with openings	II/II	E/E		
	North side electrical gallery	Person trips over bolts in floor	10. Several locations with floor pads with bolts protruding	II/II	E/E		
	100 series offices, south and west end	Person is struck by falling ceiling panels	11. Ceiling has heavy water damage and is falling down in places	II/II	E/E		

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	West side high bay, level 5	Person trips over bolts in floor	12. Floor pad with bolts protruding	II/II	E/E	--	--
	West side high bay, level 7	Person trips over bolts in floor	13. Floor pad with bolts protruding	II/II	E/E		
	Global	Person bumps into inadequately guarded heating coils and suffers burn	14. The front of the heater has openings large enough to allow contact with the heating coils	II/II	E/E		
			15. Heater fans are currently operating that are not properly guarded 5 to 45 ft high				
	South operating gallery (floor pad with bolts protruding)	Person trips over protruding bolts	16. Floor pad with protruding bolts	II/II	E/E		
	Blower room 5	Person is struck by rotating equipment	17. Rotating belt improperly guarded				
	Mechanical equipment throughout the entire facility	Person is struck with mechanical equipment that is inadvertently energized	18. It appeared that most of the mechanical equipment in the facility has been deenergized; however, there are no visible disconnect(s) on most components. Labeling of electrical circuits is inaccurate to nonexistent.	II/II	E/E		
			19. Much of the mechanical equipment throughout the facility has been partially dismantled, and energization could cause parts to be ejected				
			20. Mechanical equipment does not have a labeled, visible disconnect from its power source				
			21. Accidental energizing of old or partially dismantled equipment could damage the facility or injure personnel in the immediate area				
	Concrete steps on south side of building	Person trips on deteriorated steps	22. Steps on south side of building are deteriorated	II/II	B/B		

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	Locker room	Person is injured by collapsing roof	23. Cantilever support of roof beam in locker room is cracked and has no structural strength 24. Heavy snow load can cause roof collapse 25. Building is regularly occupied, but locker room is not used	II/II	B/B	--	--
Drowning/ suffocation	Global throughout building	Person enters confined space and is overcome by gases or lack of oxygen	1. Some belowgrade levels of this facility are considered confined spaces; all limited access areas that are not designed for human occupancy are considered confined spaces (e.g., HVAC plenum rooms, tanks, vessels, pits) 2. There are areas of corrosion, water accumulation, and oxidation that can all contribute to a lack of oxygen 3. The facility has ventilation in most areas 4. No confined areas were entered in this building. Many of the confined spaces (those that were not entered) were not checked with the O_2/LEL meter. 5. Conditions can change at any time 6. Confined spaces are not specifically identified 7. Posting of these areas is planned	I/I	D/D	I, D Minor	I, D Minor

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock						I, C Moderate	I, C Moderate
	General note		Building is partially occupied; however, maintenance is not regularly performed on electrical equipment				
	Exterior southwest corner of 202-S Building, approximately 6 ft abovegrade	Person receives shock from contact with conduit or equipment energized after ground fault from water intrusion into conduit system	1. Cover is missing from 90-degree conduit body on 1-in. conduit supplying circuits to storage area and vestibule on east end of building	I/I	D/D		
			2. Water entry into conduit is allowed				
	North 480-V switchgear room	Person receives shock from contact with energized conductors or equipment due to incorrect assumption that circuits are out of service and/or deenergized based upon nonfunctional indicator lights	3. Breaker status indicating lights are not functioning for the following breakers: feeder 27, feeder 30, bus tie, and F8X5	I/I	D/D		
	North 480-V switchgear room, portable lamp stand	Person receives shock from contact with energized conductors of flexible cord while using portable light after further insulation damage from use and age	4. Flexible cord supplying light stand has damaged insulation; light is burned out, and cord is plugged into energized receptacle	I/I	D/C		
	Electric shop, east wall, above workbench	Person receives shock from contact with energized equipment or conductors after damaging insulation of flexible cord with tools or equipment	5. Wall mounted receptacle strip above work table on east wall is energized through 6-in. length of flexible cord wired into 4-in. junction box	I/I	D/D		
			6. The cord is not physically protected from damage; cord is near work area of workbench				
	Electric shop, north wall, east side of doorway, approximately 5 ft above floor	Person receives shock from contact with energized parts of light bulb or fixture after fixture or bulb is broken	7. Lamp base is affixed to 4-in. box mounted on wall near doorway	I/I	C/C		
			8. Bulb is unguarded and extends perpendicularly from the wall; location and arrangement presents considerable opportunity for breakage				

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	Electric shop, work table along north wall	Person receives shock from contact with energized conductors of flexible cord exposed as a result of continual damage to the cord insulation	9. Receptacle strip mounted under front edge of table is supplied by flexible cord plugged into receptacle on north wall	I/I	D/C	--	--
			10. Cord insulation is cracked and separated at receptacle plug				
			11. There is no slack in cord, and cord is under constant strain				
	Blower room 2 MCC, cubicle for BSF-2	Person receives shock from contact with energized conductors or equipment from incorrect assumption that circuits are out of service and/or deenergized based upon nonfunctional indicator lights	12. Breaker status indicating lights for breaker BSF-2 are not functioning	I/I	D/D		
	Near raw water header, north pipe gallery, north wall, west end, approximately 5 ft above floor, conductors are hanging from wall-mounted junction box	Person receives shock from contact with energized conductors or parts while handling cord with damaged and corroded receptacle	13. Two flexible cables approximately 2 ft in length are hanging from junction box mounted on wall	I/I	D/C		
			14. Screw-on receptacles at ends of cables are heavily corroded, and insulation is discolored				
			15. One cable is energized and one is not (deenergized cable has deactivated tag attached)				
	North pipe gallery, west end, hanging from center of ceiling, near elevator shaft	Person receives shock from contact with exposed and energized ends of cut conductors during inspection or maintenance activities	16. Lighting pendant conduit hangs from ceiling	I/I	D/D		
			17. Light fixture has been removed from pendant; energized conductors extend from end of conduit				
			18. Ends of cut wires have been lightly taped				

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	North 24-kV switchgear room, 2,400-V switchgear	Person receives shock from contact with energized conductors or equipment from incorrect assumption that circuits are out of service and/or deenergized based upon nonfunctional indicator lights	19. Breaker status indicating lights are not functioning for the following breakers: E8X100, E8X101, E8X104, E8X105, E8X106, E8X111, E8X112, E8X114, E8X116, E8X124, E8X125, E8X126	I/I	D/D	--	--
	Women's change room has open 4-in. junction box	Person receives shock from contact with energized conductors after damaging insulation during maintenance or demolition activities	20. Uncovered junction box contains energized conductors	I/I	D/D		
			21. The uninsulated portion of the conductors are insulated with twist-on caps				
	South pipe gallery, near compressor room, 12-in. by 12-in. junction box imbedded in the wall		22. Junction box is missing cover	I/I	D/D		
			23. Energized 480-V wiring is accessible				
			24. Splices and taps in box are insulated with tape				
			25. Box is approximately 7 ft above floor				
	East end of south pipe gallery, rear of "202-S Vent System" differential pressure recorder has 4-in. junction box with missing cover		26. Junction box missing cover contains accessible energized wires	I/I	D/D		
			27. Wire splices have been insulated with wire caps				

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	Nivox room, south wall, instrument cabinet adjacent to doorway, 2-in. by 4-in. device box without cover	--	28. Device box without cover contains energized wires that supply instrument cabinet--unknown if instruments are in use	I/I	D/D	--	--
	South 480-V switchgear room	Person receives shock from contact with energized conductors or equipment due to incorrect assumption that circuits are out of service and/or deenergized based upon nonfunctional indicator lights	29. Breaker status indicating lights are not functional for the following breaker cubicles: F8X6, F8X7, F8X8, F8X13, FDR 42, FDR 44, FDR 45. Switchgear is in service.	I/I	D/D		
	Compressor room, MCC on west side		30. Indicating lights for the two in-service air compressors are not functional	I/I	D/D		
	Blower room 1, MCC		31. Indicating lights of in-service MCC are not functional	I/I	D/D		
	Blower room 1, rear of air washer instrument cabinet, open electrical wiring gutter	Person receives shock from contact with energized conductors during maintenance or demolition activities	32. Wire gutter has no cover, and energized wires are hanging out	I/I	D/D		
			33. The cut ends of some are taped and others are not; conductors are exposed				
	North operating gallery, DB-2 panel alarm cabinet, open device box	Person receives shock from contact with energized conductors after damaging insulation during maintenance or demolition activities	34. Box has energized wiring hanging out	I/I	D/D		
			35. Wires are insulated with tape				
	Blower room 3, MCC	Person receives shock from contact with energized conductors or equipment from incorrect assumption that circuits are out of service and/or deenergized based upon nonfunctional indicator lights	36. Indicating lights are not functional for in-service MCC	I/I	D/D		

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	Silo first floor, MCC	--	37. Indicating lights of in-service MCC are not functional	I/I	D/D	--	--
	Silo fourth floor, MCC		38. Indicating lights of in-service MCC are not functional	I/I	D/D		
	Silo fifth floor, north end, near elevator door, open junction box	Person receives shock from contact with energized conductors after damaging insulation during maintenance or demolition activities	39. Junction box has no cover with accessible energized wiring	I/I	D/D		
			40. Splices are insulated with twist-on caps				
	Silo fifth floor, caustic pump status board		41. Unused panel-mounted equipment is plugged into energized receptacles with flexible cord	I/I	D/D		
	Silo seventh floor, MCC	Person receives shock from contact with energized conductors or equipment from incorrect assumption that circuits are out of service and/or deenergized based upon nonfunctional indicator lights	42. Indicating lights for in-service MCC are not functional	I/I	D/D		
	Hallway to SWP lobby at east end of SWP change room, on west wall, approximately 7 ft above floor, open relay box	Person receives shock from contact with exposed energized conductors with tools or materials being used or carried in area during construction, maintenance, or normal activity	43. Approximately 12-in. by 18-in. enclosure has no cover	I/I	C/C		
			44. Energized terminal blocks, conductors, and relay contacts are exposed and easily accessible to hands or material being carried through area				
	Blower room 5, MCC	Person receives shock from contact with energized conductors or equipment from incorrect assumption that circuits are out of service and/or deenergized based upon nonfunctional indicator lights	45. Indicator lights for inservice cubicles for Main and SF-5 are not functional	I/I	D/D		

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	Exterior doorway to stairway from ground level to cable room level at east end of south operating gallery, light fixture above door	Person receives shock from contact with energized conductors after damaging insulation during maintenance or demolition activities, or contact with conduit energized after ground fault from water intrusion	46. Conduit supplying exterior light fixture has conduit body with enclosed accessible energized wires	I/I	D/D	--	--
	Silo roof, south-east corner, conduit and cord supplying flood lights	Person receives shock from contact with energized conductors exposed by damaged insulation or water intrusion	47. Electrical power is supplied to the two flood light fixtures through each end of a T conduit body	I/I	D/D		
			48. The openings through which the flexible cords pass do not have appropriate fittings for cord				
			49. Openings around cord are sealed with only electrical tape and may allow water intrusion				
			50. Cords are under constant tension; conduit T and attached conduit are held off roof by taut cords--cord insulation may be damaged				
	South operating gallery, above first MCC inside east-end door, has open conduits with wire hanging out	Person receives shock from contact with energized conductors during maintenance, inspection, or demolition activities	51. Two open conduits above MCC have wires hanging out	I/I	C/C		
			52. Wires have been cut and ends are not insulated				
			53. Wires in larger conduit are energized and ends of conductor are exposed				

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	Near lighting panel ND, hallway outside 2,400-V switchgear room has junction box missing knockout	Person receives shock from contact with energized conductors exposed after damaging insulation inside box, or contact with energized conduits after ground fault caused by damaged insulation	54. Four-inch junction box missing knockout, wiring inside is energized	I/I	E/E	--	--
	Basement storage gallery, south side of canyon, east end, near entrance to communications room	Person receives shock from contact with energized conductors during maintenance, inspection, or demolition activities	55. A ventilation fan installed in ductwork is mounted on a framework in corner of room	I/I	C/C		
			56. The fan motor has been removed				
			57. Power supply wires for the motor extend from the end of the flexible conduit hanging from the wall at about 4 ft above floor				
			58. Conductors are exposed and easily accessible				
			59. The motor circuit has been deenergized at a wall-mounted snap switch located about 10 ft away that serves as a control for the fan motor				
			60. The line-side of the switch is energized				
			61. The switch has not been tagged or locked out				
			62. The exposed motor circuit conductors may be energized by closing snap switch				
	Blower room 2, northwest corner, north wall, has portable transformer and disconnect switch wired to electrical gutter	Maintenance or operating personnel contact energized conductors or equipment from damaged cord insulation	63. A transformer and disconnect switch are mounted on portable stand	I/I	D/D		

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	64. Switch is supplied by flexible cord permanently wired into wiring gutter on wall	--	--	--	--
			65. Transformer supplies 14/4 flexible cord coiled and hung on wall with exposed conductors at load end				
			66. Equipment is presently not energized				
			67. Flexible cord is not an approved wiring method for permanent equipment				
	Plant-wide, ten or more locations	Maintenance or operating personnel has contact with energized equipment or conductors as a result of possible confusion concerning proper identification of disconnect switch	68. Existing in-service welding receptacle disconnect switches have been reconnected to supply space heating units	I/I	E/E		
			69. Disconnect switches have conflicting labeling for original "Welding Receptacle" as well as for newer heaters				
			70. New function of switch is obvious in most cases				
	Plant wide	Person receives shock when operating or maintaining system from high voltage to ground on a phase that causes wire insulation or service devices to fail	71. Transformers 3 and 4, 480-V switchgear ground meters read unbalanced, which shows that ground current leakage exists on this switchgear and all of the circuits they supply (indication of insulation deterioration)	I/I	C/C		
			72. Higher than normal voltage on phase conductors				
	Electric shop, north wall	Person receives shock from contact with energized conductors with failed insulation through a conduit opening	73. Open conduit is connected to junction box with energized insulated conductors, which is a National Electric Code violation	I/I	E/E		
			74. Energized individual insulated conductors are to be enclosed to prevent contact by personnel				

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	Electric shop	Person receives shock from contact with energized equipment caused by failure of the temporary wiring method used	75. Permanently wall-mounted plug mold is connected by a portable cord to a four-square duplex box, a violation of the National Electric Code. Equipment is not installed per the National Electric Code.	I/I	D/D	--	--
			76. Insufficient physical protection provided by the use of portable cord and cord insulation age can lead to failure of the protective covering				
	Electric shop	Person receives shock from contact with energized conductors when working on energized lighting fixtures because of the need to maintain sufficient lighting to perform the repair	77. Fixture is not approved for direct wired method; the National Electric Code requires plug and receptacle	I/I	D/D		
			78. Fixture can then be individually deenergized before maintenance				
	Plant wide; electric shop--west wall and several other locations	Person receives shock from contact with energized bare terminations inside the box through opening in the duplex receptacle box	79. The receptacle duplex enclosure has a hole in it allowing access	I/I	D/D		
	North 480-V switchgear room, behind 440-V switchgear	Person receives shock from contact with energized circuits from switching the wrong equipment during normal and emergency situations	80. Distribution panel is not labeled with identification, as required by the National Electric Code	I/I	D/D		
	Blower room 2, northwest wall	Person receives shock from contact with energized wires	81. Cover screws are missing from a wire way gutter and a junction box (8 in. by 8 in. by 4 in.)	I/I	D/D		
	North pipe gallery--center section; silo fifth floor; basement decontamination room; north sample gallery	Person receives shock from contact with energized portable cords because insulation on cords was penetrated and damaged from handling	82. Two portable cords are laying on top of overhead pipes or around equipment; they are plugged into receptacles but have no load connected	I/I	C/C		
			83. Portable cords are for temporary use only, not long term use				

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	Plant wide, 10 to 15 locations	Person receives shock from contact with energized internal panel components or is exposed to electrical fault arc, heat, or material via the cover openings	84. Panel covers have been modified by cutting openings to allow conduits to pass through the cover and drilling holes to facilitate mounting hasp on the cover to replace nonoperational or missing door latches	I/I	D/D	--	--
	Plant wide, 15 to 20 locations	Person receives shock from contact with energized circuits caused by switching devices that are not documented as to source or load	85. Numerous safety (disconnect) switches throughout the facility are not labeled with an identifying tag as required by the National Electric Code. Identifying these switches allows personnel to locate the correct disconnecting device for normal and emergency situations.	I/I	D/D		
	Plant wide (two locations) sample gallery north and south	Person receives shock from contact with energized fixture caused by breaking the fragile tubular lamp glass bulb creating electrical contact	86. The glass lamp is located at 5 ft on the hallway wall with no protective cover	I/I	C/C		
			87. These "Sample Gallery Test Lights" are operational				
	Switchgear room, 24 kV, northwest corner at ceiling	Person receives shock from contact with energized conductors from insulation being damaged	88. The electrical tray that delivers main power to the switchgear is missing one large protective cover, and a second cover is severely damaged from an earlier fault	I/I	C/C		
	Switchgear room, 24 kV, battery room	Person receives shock from contact with energized bare terminals or devices because of false indication that the circuit is deenergized	89. Battery charger operating indicator light is not operational	I/I	D/D		
		Person receives shock from energized equipment caused by battery acid fumes damaging electrical equipment and causing equipment failure	90. Battery room doors are required to be closed to control fumes and gases as they are corrosive and explosive	I/I	D/D		
			91. The door in question was propped open and a sign on the door stated it should stay open				
	100 series offices, south side main floor	Person receives shock from contact with energized light fixtures; fixture support that hangs the fixture from the wires and exposes the wires to the fixture housing fails	92. Fluorescent light fixtures are supported by ceiling panels	I/I	D/C		

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	93. The panels are water damaged and do not provide adequate support 94. Conductors to the fixture could be stretched, damaging the insulation that could energize the fixture	--	--	--	--
	Hivox room	Person receives shock from contact with energized wires in a fluorescent light fixture as a result of foreign objects damaging the wire insulation, exposing bare energized wires or energizing the fixture housing	95. The protective cover on light fixture is missing, exposing the fixture wires	I/I	D/D		
	Hivox room	Person receives shock from contact with energized exposed contacts in a broken light switch	96. The operator handle on a standard light switch is broken	I/I	D/D		
	Switchgear room, 480 V south	Person receives shock from contact with energized conductors at terminations to the circuit breakers or bus	97. There is a power distribution panel constructed from a communications enclosure (the use of a "homemade" electrical distribution panel is a strictly forbidden practice) 98. The interior mounting panel has openings cut out for the circuit breakers, and unused openings through the panel expose the electrical bus 99. Openings in the panel allow foreign objects to easily contact the energized electrical bus	I/I	D/D		
	North operating gallery, multiple panels	Person receives shock from contact with energized conductors or devices caused by aged insulation failure	100. Panel boards are dead front type with open sides and back 101. Numerous conductors and devices were energized and exposed to anyone in the vicinity 102. No apparent reason for most or any of this equipment to be energized	I/I	D/D		

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	North operating gallery	Person receives shock from contact with energized equipment caused by water and rust energizing exposed parts of the panelboard	103. An instrument panelboard, with 120 V, has been damaged by water leaking into it from above (it shows signs of rust at several points)	I/I	D/D	--	--
	Silo fifth floor	Person receives shock from contact with exposed energized conductors	104. Portable extension cord supplies power to a permanently mounted fluorescent fixture; this is not allowed per the National Electric Code 105. Portable cords are not suitable for permanent installations because they are easily subject to insulation damage from age and handling	I/I	D/D		
	Basement hot shop	Person receives shock when work is being performed on the inside of the panel as a result of limited access	106. Work table is positioned in front of panel RS; access is not readily accessible as required by the National Electric Code, and area is contaminated	I/I	D/D		
	Basement decontamination room and other specific areas	Person receives shock from contact with energized equipment when working on or around energized circuits and devices because of limited visibility	107. Lighting is below recommended levels in some of the areas	I/I	D/D		
	Basement remote shop	Person receives shock from contact with energized equipment when performing work in the vicinity of these unprotected light fixtures	108. Several of the glass globes are missing from the 10-ft to 12-ft-high wall light fixtures in this area 109. The glass bulbs are easily broken by hoisting cables or long tools, producing the opportunity for personnel contact	I/I	D/D		
	Basement remote shop	Person receives shock from contact with energized enclosure caused by corrosion visible on the external surfaces	110. A large junction box on the wall shows considerable signs of rust and external corrosion 111. The condition of the inside of the box and its contents is unknown	I/I	D/D		

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	112. It is not known if energized conductors are contained within	--	--	--	--
			113. The enclosure is not a liquid resistant type, and external corrosion could easily indicate internal corrosion that is attacking the insulation of the contained conductors; these conductors could then contact the enclosure				
	South sample gallery, east end	Person receives shock from contact with energized equipment caused by insulation failure	114. Two pipe heat trace circuits are supplied from multioutlet plug-in unit (supported by hanging over a pipe) that is plugged into an extension cord plugged into a wall outlet	I/I	C/C		
			115. This is not a National Electric Code approved method of supplying heat trace (the circuit supplying this heat trace does not have ground fault protection or metal covering as required by National Electric Code 427-22); the water system is active				
			116. The cord connected to the heat trace circuits does not provide the safety required for a permanently installed circuit				
			117. Cords do not have the resistance to abrasion or handling required, causing an increased opportunity for contact with the energized conductors				
	South operating gallery	Person receives shock from contact with energized bus by foreign object protruding through opening	118. Distribution panel SD has a circuit breaker missing leaving a hole in the inside panel that exposes the energized electrical bus	I/I	D/D		

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	Blower room 5	Person receives shock from contact with energized conductors caused by insulation damage	119. The flexible raceway from the disconnect switch to space heater 6 is approximately 8 ft long; 6 ft is the maximum length per the National Electric Code	I/I	E/E	--	--
			120. The extra flexible conduit length may be too long for the approved fittings, causing it to separate and expose damaged conductors				
	Basement electrical cable room	Person receives shock from contact with energized conductor or equipment caused by insulation failure	121. Miscellaneous items (stove oven element, metal bar, conduit, dust pan) are stored on or near the power cables to the building	I/I	C/C		
			122. Metal objects in contact with insulated conductors are required to be bonded to ground; normally, these items consist of raceway or cable supports				
	Basement storage gallery	Person receives shock from contact with energized insulated conductors that are not contained within a suitable enclosure, which results in insulation failure	123. Energized, insulated wires are not contained within a junction box	I/I	D/D		
	Roof of canyon, outside	Person receives shock from contact with energized conductors or equipment caused by insulation damage	124. Conductors are not enclosed in a raceway or box when they transition from the roof raceway to the wall raceway	I/I	C/C		
			125. Conductors passing between two raceway systems are subject to wear on the insulation system of the wires, which would cause the wire to energize the raceway system				

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	East end, first room inside entry	Personnel exposed to energized conductors or equipment; wires between two raceway systems are subject to conductor insulation wear that might cause the wire to contact the raceway	126. Electrical metal tubing conduit pulled apart with wires exposed and deenergized but could be energized at any time	I/I	D/C	--	--
	East end, first room inside entry at recorder panelboard	Person receives shock from contact with energized insulated conductors or equipment from insulation being damaged	127. Exposed insulated wires are energized in an area where all people entering the building pass through	I/I	C/C		
			128. Foreign objects, with the ability to damage the wire insulation, are routinely carried through the vicinity				
	Electrically operated mechanical equipment throughout the entire facility	Person receives shock as a result of inadvertent energization of mechanical equipment creating an electrical shock hazard	129. It appeared that most of the mechanical equipment in the facility has been deenergized	I/I	D/C		
			130. However, there are no visible disconnect(s) on most components				
			131. Labeling of electrical circuits is inaccurate to nonexistent				
	General	Person receives shock from contact with an unprotected energized component (e.g., open electrical box, panel, and exposed wire)	132. Most of the circuits and breakers in the facility are unidentified or incorrectly identified	I/I	D/C		
			133. In other inspections, it was noticed that once breakers were flipped, components that were once shut down operated				
			134. Due to age, circuit breakers may not trip in the case of an accident				
			135. Surveillance is conducted in this facility				

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	136. Presence of water would increase likelihood of accident	--	--	--	--
	North side pipe gallery across from the men's bathroom on the south wall; there are two conduits with wires protruding from them		137. The wires are capped and are on the zone side of the barrier chain (it is not known if the wires are energized)	I/I	D/D		
	202-S maintenance shop, near the west side maintenance door, out in the north pipe gallery		138. Conduit with one blue electrical wire protruding; status unknown	I/I	D/D		
	North side electrical gallery (exposed electrical on the backside of all panels)		139. Status of exposed electrical equipment is unknown	I/I	D/D		
	Second AMU area (electrical wires near entrance)		140. Several electrical wires hanging on piping at entrance above the steps; status of wires is unknown	I/I	D/D		
	Third level AMU (exposed wires)		141. Electrical box with bare protruding wires next to tank 307	I/I	D/D		
			142. Status of wires unknown	I/I	D/D		
	Third level blower room (wires protruding from conduit)		143. On west side of the room, there are some protruding electrical wires extending from the floor	I/I	D/D		
			144. The wires are taped, but status is unknown	I/I	D/D		

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	Level 4 (exposed electrical) AMU	--	145. There are some exposed electrical wires next to a large tank. The tank is covered with plywood.	I/I	D/D	--	--
	Level 7 operations room AMU (exposed wires behind panels)		146. There are some exposed electrical wires on the southeast side behind the control panel	I/I	D/D		
			147. There is no visible electrical disconnect, and status is unknown	I/I	D/D		
	High voltage cable room east end (protruding electrical wires)		148. On the east side of the cable room there are several exposed electrical wires; status is unknown	I/I	D/D		
			149. The wires are capped and taped				
	South operating gallery, east end (protruding wires)		150. Protruding electrical wires coming from pump near the east end of operating gallery; status is unknown	I/I	D/D		
Exposure to radiation						II, B Serious	II, B Serious
	Areas outside the canyon	Person is exposed to external ionizing radiation	1. Moderate to high exposure rates	II/II	B/B		
			2. A shielded viewing window and several access ports on the first and second levels represent the largest exposure hazards in nonradiologically controlled zones				
			3. Surveys detected 31 areas with greater than ten times background				
	The canyon	Person is exposed to external ionizing radiation	4. Moderate to high external dose rates	II/II	B/B		
			5. Almost complete lack of labeling makes delineation of high radiation fields difficult				

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to radiation (cont.)	--	--	6. The floor and individual pieces of scrap equipment represent the largest exposure hazards 7. This area is routinely entered by individuals doing surveillance and by persons storing or removing equipment 8. In general, dose rates increase as one moves toward the west end of the canyon and closer to the canyon wall 9. Surveys detected five areas with elevated exposure rates greater than ten times background	--	--	--	--
	The canyon	Person receives radiation exposure from internal sources of radiation that were ingested, inhaled, or absorbed	10. Removable contamination is present in all areas of the canyon 11. Open joints in the floors and walls can allow contamination to migrate from contaminated areas to clean areas	II/II	B/B		
Exposure to asbestos	General	Person inhales friable asbestos; potential exists for asbestos related illness in future from such exposure	1. Most of the asbestos products in this building are in good condition 2. This facility is routinely occupied 3. The facility is ventilated 4. There are few water leaks within the piping galleries 5. Pipe insulation and flooring, roofing, or other materials may or may not contain asbestos 6. Friable areas would have to be disturbed (bumped into, knocked down) for a significant release to occur	IV/IV	D/C	IV, D Negli.	IV, C Minor

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to asbestos (cont.)	Exterior north-east corner of 202-S Building near railroad tunnel	--	7. Pipe insulation in friable condition	--	--	--	--
	Exterior west end, high bay roof		- See 7 above				
	Exterior tank farm on the west side of 202-S Building		8. Asbestos in and on ground from piping and tank insulation				
	Power office		9. Pipe insulation in friable condition				
	North and south side pipe gallery		10. Throughout pipe galleries, there are areas of slight damage to pipe insulation				
	Room 112-C (fireproof file cabinet)		11. May have asbestos seals on drawers				
	Second AMU area		12. Broken and split pipe insulation				
	Hot shop		13. Damaged pipe insulation				
	Decontamination room off hot shop		- See 13 above				
	North and south sample gallery		- See 13 above				
	South operating gallery		- See 13 above				
	Blower room 5		14. Heavy pipe insulation damage, labeled asbestos				
			15. Insulation is all over blower units				
Exposure to lead	General	Person is exposed to lead by inhalation or absorption during handling (moving), chipping, grinding, or boring of the lead or lead based product	1. Oxidation exists on lead bricks	IV/IV	D/D	IV, D Negli.	IV, D Negli.

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to lead (cont.)	--	--	2. Persons must handle lead due to regulatory requirements to control it	--	--	--	--
			3. Most of the lead found in this facility is or has been used as a radiation shield, so moving the lead could also result in a radiation exposure				
			4. Most lead is in radiation zones				
			5. Lead oxidation rates found to be larger than initially expected				
			6. Large quantities of movable lead observed, much greater than in other facilities				
			7. Sensitivity to lead exposure is variable				
			8. Maintenance employees for the D&D facilities have been instructed to move lead in the past, this apparently is a continuing effort				
	Specific locations:		9. Personal monitoring has been conducted by HEHF on employees handling lead in the 100 Areas, and the results showed an exposure to lead dust				
	North side pipe gallery		10. Two large pieces of lead attached to the south wall				
	Hot shop		11. Two sheets under table on south side of room, and one brick of lead on drill press				
	North sample gallery		12. Multiple lead sheets, bricks, plugs, etc., along the south wall				

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to lead (cont.)	South sample gallery	--	13. On cell H-9 and H-7, approximately 300 lead bricks; more multiple bricks, sheets, etc., throughout the rest of the gallery	--	--	--	--
	Silo, first floor; AMU		14. Lead bricks attached to manipulator arms, being used as counter weights				
	Second AMU area		15. Lead plugs being used for wall holes				
Exposure to mercury	General	Person exposed to mercury due to ingestion or absorption	1. Small quantities	IV/IV	D/D	IV, D Negli.	IV, D Negli.
			2. Contained in glass containers				
			3. Possibility for existence as mixed waste				
	Specific locations:						
	Compressor room		4. Two mercury switches on yellow compressor				
	Blower room 2		5. Gage with mercury and red oil in it				
	North side electrical gallery		6. All "brown brand" gages have mercury switches in them (requires opening covers to gain access)				
	Level 75 (feed tank level)		7. Several manometers that may contain red oil or mercury				
Exposure to miscellaneous chemicals	General	Person exposed to unknown or known chemicals through inhalation, ingestion, or absorption due to breach of container	1. Facility is a chemical handling facility and is very large and routinely entered	II/II	D/D	II, D Minor	II, D Minor
			2. The materials may be more or less stable depending upon age and chemical makeup				

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals (cont.)	--	--	3. Exposure requires loss of chemical containment	--	--	--	--
			4. Person must come in contact with material				
			5. Process of collecting and staging material increases possibility of exposure				
			6. It appears that most of the chemicals have been and will be physically moved				
			7. Many of the materials are unknowns				
	Specific locations:						
	Compressor room		8. The floor drain has chemical residue and corrosion in and around it				
			9. Catch pan under compressor contains H_2O and oil				
	North side pipe gallery		10. Ceiling pipe has chemical corrosion on outside, possibly sodium nitrate				
	North side electrical gallery		11. D Cell differential pressure panel board has instrument with red oil in it				
			12. Compressed air system leaking green oil				
			13. D-10 and D-13 tanks still have unknown liquids in them, according to gages				
	Silo, first floor; AMU		14. Chemical residues on piping				
	Third level blower room		15. Chemical stains on HVAC unit				
	Level 4 west end high bay		16. Chemical residues on piping				

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals (cont.)	Hot shop	--	17. Several aerosol cans	--	--	--	--
	Decontamination room off hot shop		18. Several unlabeled containers, two gas cans, and several aerosol cans				
	North sample gallery		19. Chemical corrosion on piping, ventilation ducting has corrosion, several unmarked containers sitting on the top of Cell D-9 (one labeled caustic)				
	South sample gallery		20. Cabinet on south wall has several unlabeled containers and one container of acetone; heavy oil residue on generator motors by east entrance and on floor; plus, a bucket one-half full of oil on the floor.				
	South operating gallery		21. Several large manometers across from panel 13 may have red oil in them				
	Level 75 west end high bay		22. Several manometers in this room may contain red oil or mercury				
	Blower room 5		23. Air pressure system leaking green oil onto wall and floor				
Fire						II, C Moderate	II, C Moderate
	North, outside power transformers	Accumulation of tumbleweeds could contribute to a fire around these transformers, causing loss of power to the building and damage to major equipment	1. Accumulation of tumbleweeds around electrical equipment	II/II	C/C		
			2. Electrical system damage could result in loss of ventilation control and possible release of radioactive material				

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Fire (cont.)	Most areas with mechanical equipment have oil residues or oil accumulations	There is a potential for a fire to ignite due to an accumulation of materials such as oils or chemical incompatibles that may mix	3. Accumulations of these types of materials are small	II/II	C/C	--	--
			4. If a fire did start, it is questionable whether the fire would spread due to the lack of combustibles				
			5. There are no fire detection or suppression systems in the building				
	Electrical systems in some areas	The electrical system is not maintained in some areas. An electrical fire is possible.	6. Building is regularly occupied	II/II	C/C		
Explosion						II, E Negli.	II, E Negli.
	Battery storage room (approximately 60 batteries in this room with no ventilation)	There is a potential for an explosion of a battery in the battery storage room; there is also a potential for an accumulation of hydrogen gas in the battery room	1. The ventilation does not work in the battery storage room; the door to the room was open however	II/II	E/E		
			2. The batteries are in service and used to power the breakers				
	Hot shop and decontamination rooms (several gas cans being stored)	Potential for explosion of gas vapors	3. The gas cans may or may not have gas in them	II/II	E/E		
	General	There are multiple unlabeled containers throughout the facility	4. Unlabeled containers may or may not contain chemicals that are unstable or shock sensitive	II/II	E/E		
Release of radioactive material						III-3, C Negli.	III-3, C Negli.
	South side of north operating gallery	Disturbance of surface contamination in the building resulting in a release through effluent stack 296-S-6	1. Stack 296-S-6 is not HEPA filtered	III-3 III-3	C/C		

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material (cont.)	--	Canyon ventilation balance is upset due to filter or fan failure causing a disturbance of radioactive materials and resulting in a release through voids in canyon walls	2. Ventilation ducts are posted as surface contamination zones	--	--	--	--
			3. The walls and floors of the canyon have unsealed joints				
	Inside ventilation ducts in silo		4. A record sampler monitors for radioactive emissions	III-3 III-3	D/D		
	Cracks or voids in expansion joints in canyon wall		5. Surface contamination zones exist in the building	III-3 III-3	D/D		
			6. Air pressure in the REDOX Canyon is slightly negative even when ventilation system fails				
	South side of north operating gallery to the 216-S-10 ditch	Water intrusion causes surface contamination to spread in the building and to be released to the 261-S-10 ditch through the floor drains	7. Roof is not leaking in radiation zones	III-3 III-3	D/D		
			8. Water is supplied to lavatory off the north operation gallery and a pipe break could mobilize radioactive contamination and escape to environment through the floor drains				
			9. Building is routinely occupied				
			10. The 216-S-10 ditch was designed to receive liquid waste from the REDOX facility floor drains				
	Radioactive waste in large wooden boxes stored outside on the north side of the REDOX Plant	Release of radioactive waste due to severe environmental conditions such as fire, wind, or precipitation	11. Radioactive waste containers are stored outside and are exposed to weather	III-3 III-3	D/D		
			12. Severe weather conditions occur routinely				
			13. Range fires normally occur in the summertime at Hanford				

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material (cont.)	--	--	14. A range fire could ignite wooden boxes and cause an airborne release of radionuclides	--	--	--	--
			15. Wooden boxes were covered with plastic				
	Canyon area	Release of radioactive material due to severe environmental conditions such as fire, wind, or precipitation	16. Open joints in concrete walls and floors	III-3 III-3	D/D		
Release of asbestos						III-3, E Negli.	III-3, E Negli.
	General	Release of asbestos due to disturbance of friable insulation on piping	1. Potential for large quantities	III-3 III-3	E/E		
			2. Most piping still has insulation in place				
			3. Insulation must be disturbed to get released				
			4. An escape path must be present and very few paths were evident				
	Specific locations:						
	Exterior north-east corner of 202-S Building near railroad tunnel	Disturbance of residue and/or friable asbestos insulation resulting in the release of asbestos fibers	5. Pipe insulation in friable condition				
	Exterior west end high bay roof						
	Exterior tank farm on the west side of 202-S Building		6. Asbestos in and on ground from piping and tank insulation				
	Power office	Disturbance of residue and/or friable asbestos insulation resulting in the release of asbestos fibers through ventilation stacks or doors	7. Pipe insulation in friable condition				
	North and south side pipe gallery		8. Throughout pipe galleries there are areas of slight damage to pipe insulation				

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of asbestos (cont.)	--	--	9. Appears not to be coated with fixative 10. Friable asbestos is on piping that is not normally within reach 11. Exhaust ventilation is HEPA filtered before being released to the atmosphere, except for Stack 296-S-6 in the silo gallery 12. May have asbestos seals on drawers 13. Broken and split pipe insulation 14. Damaged pipe insulation 15. Heavy pipe insulation damage, labeled asbestos	--	--	--	--
	Room 112-C (fireproof file cabinet) Second AMU area Hot shop Decontamination room off hot shop North and south sample gallery South operating gallery Blower room 5						
Release of lead	General	Release of lead by theft or sabotage	1. Lead bricks used for shielding 2. Bricks are moveable, and a program is in place to inventory 3. Most lead is in radiation zones 4. Most lead is in remote areas 5. Potential exists for lead and radionuclides (mixed waste) 6. Theft unlikely due to weight	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of lead (cont.)	Specific locations	Lack of management controls resulting in lead being removed from the facility (e.g, theft, sabotage) and exposed to the environment	7. Maintenance employees for the D&D facilities have been instructed to move lead in the past, this apparently is a continuing effort	III-3 III-3	D/D	--	--
			8. Personal monitoring has been conducted by HEHF on employees handling lead in the 100 Areas, and the results showed an exposure to lead dust				
			9. Low quantities of removable lead				
			10. Lead is useful for a number of recreational activities (e.g., fishing weights, bullets, anchors), which increases the likelihood of theft (e.g., the theft of a significant quantity of mercury from the 108-B Building during decommissioning and that was never recovered)				
	First floor of the north operating gallery		11. Lead sheet used as shielding				
	Silo on second floor		12. Lead shields on wall				
	North side pipe gallery		13. Two large pieces of lead attached to the south wall				
	Hot shop		14. Two sheets under table on south side of room and one brick on drill press				
	North sample gallery		15. Multiple lead sheets, bricks, and plugs along the south wall				
	South sample gallery (on cell H-9 and H-7)		16. Approximately 300 lead bricks, many more bricks, sheets, etc., throughout the rest of the gallery				
	Silo, first floor; AMU		17. Lead bricks attached to manipulator arms, apparently being used as counter weights				

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of lead (cont.)	Second AMU area	--	18. Lead plugs being used for wall holes	--	--	--	--
Release of mercury						III-3, D Negli.	III-3, D Negli.
	General	Mercury released to environment from theft or sabotage	1. Small quantities	III-3 III-3	D/D		
		Mercury released to environment as a result of container breakage	2. Contained in glass containers that are subject to breakage				
			3. Possibility for existence as mixed waste				
			4. During D&D of 108-B Building, a significant quantity of mercury was stolen and never recovered				
	Specific locations:						
	Mercury switches in the air compressor room	Mercury is spilled into a floor drain and is washed through sewer to the 216-S-10 ditch	5. Mercury is inside building and is unlikely to reach the environment if glass container is broken				
	Manometer in blower room 2		6. Significant quantities of liquid would be required to wash mercury through sewer to the 216-S-10 ditch				
	The upper level of the north operating gallery		7. Source of liquids that could wash mercury to floor drains is relatively small				
			8. Several mercury switches are located in the control panels				
			9. Mercury would be very difficult to recover from a floor drain				
Release of oil/petroleum products						III-3, C Negli.	III-3, C Negli.
	General	Failure of seals, piping, equipment, etc., resulting in release inside and outside building	1. Oil inside the building is not present in enough quantities to reach the environment unless additionally spread by a large amount of water intrusion	III-3 III-3	C/C		

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of oil/petroleum products (cont.)	Specific locations:	--		--	--	--	--
	Blower room 2		2. Five-gallon can of oil				
	Compressor room		3. Oil reservoir in retired compressor is partially full				
			4. Catch pan under operating compressor has water and oil in it				
	Blower room 2		5. Red oil in manometers				
	Battery room		6. Red oil in manometers				
	Seventh floor of silo		7. Red oil in manometers				
	Upper level of the north operating gallery		8. Oil in gauges				
	Oil filled transformers located outside on the north and south side of the building	Release of oil from transformer into the environment due to seal or valve failure	9. Transformers are not leaking at the present time	III-2 III-2	C/C	III-3, C Negli.	III-3, C Negli.
			10. Transformer leak would be released directly to the environment				
			11. Transformers are in use				
			12. Transformer leaks are not uncommon on the Hanford Site				
			13. The transformers contain the greatest volume of oil to be released at this facility				
	North side electrical gallery		14. D Cell differential pressure panel board has instrument with red oil in it				
			15. Air pressure system leaking green oil				
	South operating gallery		16. Several large manometers across from panel 13 may have red oil in them				

Table C2-7. 202-S Canyon Building. (35 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of oil/petroleum products (cont.)	Level 75 west end high bay	--	17. Several manometers in this room may contain red oil or mercury	--	--	--	--
	Blower room 5		18. Air pressure system leaking green oil onto wall and floor				
	Near crane		19. Oil on floor under crane				
Release of miscellaneous chemicals						III-3, D Negli.	III-3, D Negli.
	Global; on and inside of chemical process piping	Process chemical residues are released into the environment through floor drains as a result of water pipe breakage or roof leakage	1. Chemical residues observed on piping throughout the building	III-3 III-3	D/D		
			2. Very few sources of water that would cause a release to the environment				
			3. Numerous floor drains in the facility are not sealed				
			4. Majority of chemical residues are assumed to be contained within piping				
			5. Some of the residues could be a result of the shutdown process that included a series of chemical flushes. The chemicals used in the flushes included nitric acid, acid-fluoride solutions, alkaline permanganate, and oxalic acid.				
			6. Point of release would be to the 216-S-10 ditch				
			7. Many items in the canyon portion of this facility are unlabeled				

AMU = Aqueous makeup unit
D&D = Decontamination and decommissioning
HEHF = Hanford Environmental Health Foundation
HEPA = High-efficiency particulate air
HVAC = Heating, ventilating, and air conditioning
LEL = Lower explosive limit
MCC = Motor control center
REDOX = Reduction Oxidation (Plant)
SWP = Special Work Permit

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Table C2-8. 233-S Plutonium Concentration Facility. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, D Minor	I, D Minor
	Wall ladder at gallery rooms	Person falls through floor opening while on gallery floor at southwest area	1. No chain protection	I/I	D/D		
			2. Ladder passes through several levels				
			3. No warning signs exist				
	Scaffold inside first zone area	Person falls from elevated surface	4. Scaffold is improperly built (violates requirements of WHC-CM-4-3)	I/I	D/D		
			5. Access to and from the scaffold creates a fall hazard of greater than 10 ft				
			6. The zone areas of this complex are rarely surveyed due to high radiation levels				
			7. Entry into zone areas requires fresh air				
Struck by or striking						--	--
	--	No struck-by hazards identified	--	--	--		
Electrical shock						I, D Minor	I, C Moderate
	First floor on north wall, outside of processing area	Person receives shock from contact with energized wire during normal maintenance, operation, or decontamination	1. A duplex convenience outlet cover is missing from a wall mounted receptacle	I/I	D/D		
			2. Bare conductors and receptacle terminals are exposed inside the receptacle box				
	Building in general; approximately five locations	Person receives shock from contact with energized conductor due to actions causing failure of insulation	3. Electrical enclosure has openings from missing knock-outs or conduit openings through which objects could be inadvertently poked	I/I	E/E		

Table C2-8. 233-S Plutonium Concentration Facility. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	Building in general	Person receives shock from contact with energized equipment or conductors due to insulation failure caused by handling activities	4. Extension cords are laying on the floor or strung through the building on what appears to be a long term basis	I/I	D/D	--	--
			5. Traffic through areas can damage these types of cord				
	Fourth floor on east outside wall of the process area at approximately 5 ft above floor	Person receives shock from contact with energized equipment or conductors due to insulation failure	6. Energized wires are exposed where flexible conduit has pulled back from the conduit fitting	I/I	D/C		
			7. Wire insulation is currently intact				
Exposure to radiation						II, B Serious	II, B Serious
	Global to area surveyed	Person is exposed to external ionizing radiation fields	1. Viewing room has dose rate of 30 mR/h	II/II	D/D		
			2. Contamination is widespread throughout this facility, permeating nearly every component				
			3. No change in dose rates is expected in the next 5 years				
		Person is exposed to ionizing radiation from radioactive materials that are ingested, absorbed, or inhaled	4. Facility has large quantities of alpha contamination	II/II	B/B		
			5. Potential for sporadic and undetected high levels of removable contamination is high				
			6. Contamination has high likelihood of moving due to alpha recoil				
			7. Ventilation system is required to maintain material confinement				
			8. Building requires regular entry for surveillance				
			9. Alpha contamination is difficult to detect				

Table C2-8. 233-S Plutonium Concentration Facility. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to radiation (cont.)	--	--	10. Mask is required 11. If ventilation is lost, contamination can escape confinement area	--	--	--	--
Exposure to asbestos	All zone areas of the 233-S Facility	Person inhales friable asbestos; potential exists for asbestos-related illness in future from such exposure	1. There is heavy asbestos damage throughout all zone areas 2. Pipe insulation and flooring, roofing, or other materials may or may not contain asbestos 3. Friable areas would have to be disturbed (bumped into, knocked down) for a significant release to occur	IV/IV	C/B	IV, C Minor	IV, B Minor
Release of radioactive material	Roof of 233-S Building	Exhaust ventilation system is upset due to fan failure resulting in airborne release of radionuclides	1. Radionuclides are likely to be present in sufficient quantities to exceed offsite dose allowances 2. The roof is posted as a surface contamination area	III-1 III-1	D/C	III-1, D Negli.	III-1, C Minor
		A heavy moving object caused damage to exterior ducting resulting in release of radioactive material	3. An object falling from 202-S Building could cause damage 4. The ducting contains radioactive contamination 5. Ducting was inspected from exterior only	III-1 III-1	D/C		

Table C2-8. 233-S Plutonium Concentration Facility. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of asbestos						III-2, E Negli.	III-2, D Negli.
	All zone areas of the 233-S Facility	Person inhales friable asbestos; potential exists for asbestos-related illness in future from such exposure	1. There is heavy asbestos damage throughout all zone areas	III-2 III-2	E/D		
			2. Pipe insulation and flooring, roofing, or other materials may or may not contain asbestos				
			3. Friable areas would have to be disturbed (bumped into, knocked down) for a significant release to occur				
			4. The friable asbestos is contained within a radioactive material confinement zone with active ventilation and filtration				

Table C2-9. 233-SA Exhaust Filter Building. (3 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling	N/A	N/A	No structural hazards identified No falling hazards identified	--	--	None	None
Struck by or striking	Outside building on north side	Person is injured by contact with rotating shaft on HVAC unit	1. The local ON and OFF markings on the fan and MCC are not readable (painted over)	II/II	D/D	II, D Minor	II, D Minor
			2. Rotating shaft on HVAC is partially guarded	II/II	D/D		
			3. Shaft is outside building				
			4. Maintenance and upkeep of this complex has been poor				
			5. The complex is routinely inspected				
Electrical shock	Outside building on north wall, 10 ft abovegrade	Person receives shock from contact with energized electrical equipment	1. The light fixture refractor is missing, and the fixture is broken	I/I	D/D	I, D Minor	I, D Minor
	Outside building on north wall	Person receives shock from water-shorted convenience receptacle	2. Convenience receptacle located outside in weather does not have weatherproof enclosure	I/I	D/D		
			3. Water intrusion could cause short circuit, energizing enclosure				
	Outside building on north side at exhaust fan	Person receives shock from contact with energized raceway junction box	4. Motor raceway junction box is located outside in the weather	I/I	E/D		
			5. Nonweatherproof junction box fitting has been used for repair				
			6. The fitting will allow water to leak into the junction box, creating a possible shorting condition				

Table C2-9. 233-SA Exhaust Filter Building. (3 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to radiation						II, C Moderate	II, B Serious
	Global	Person exposed to external ionizing radiation	1. Contamination levels are not homogeneous	IV/IV	D/D		
			2. Contamination is primarily alpha, which is not an external exposure threat				
		Person exposed to radioactive material by inhalation, ingestion, or absorption	3. Only occurs from resuspendable material	II/II	C/B		
			4. Contamination levels as high as 18,000 dpm were observed at floor cover to sump				
			5. Crack along floor under door read 600 dpm				
Release of radioactive materials						III-2, D Negli.	III-2, C Negli.
	Exterior ducting on roof	Failure of exterior ducting causes release	1. Earthquake could cause damage to ducting	III-2 III-2	D/C		
			2. A heavy moving object such as a crane lifting piece of equipment could strike ducting				
			3. An object falling from 202-S Building could damage ducting				
			4. Ducting appears to be in good condition				
	Exterior walls	Failure of ventilation causes release of radioactive materials	5. Small horizontal thermal cracks in interior bank walls and exterior southeast wall of east bank	III-2 III-2	E/D		
			6. Loss of negative pressure (ventilation failure) could allow migration of contamination through cracks				
			7. Ventilation system has redundant fans and power supply				

HVAC = Heating, ventilating, and air conditioning
MCC = Motor Control Center

Table C2-9. 233-SA Exhaust Filter Building. (3 sheets)

Hazards not found during walkdown investigation
Falling
Drowning/suffocation
Exposure to asbestos
Exposure to lead
Exposure to mercury
Exposure to miscellaneous chemicals
Exposure to biological hazards
Fire
Explosion
Release of asbestos
Release of lead
Release of mercury
Release of oil/petroleum products
Release of miscellaneous chemicals

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Table C2-10. 276-S Solvent Handling Building. (3 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling	General	Person falls through deteriorated roof panels	1. Roof corrugated asbestos panels have two small holes 2. Leakage through holes will eventually cause panel degradation and weakness 3. Very low building activity 4. No roof access	I/I	E/D	I, E Negli.	I, D Negli.
Struck by or striking	North side of 276-S Building along the grating walkway	Person trips over valve handles and falls	1. Valve handles stick out into walkways 2. Housekeeping is poor 3. Maintenance is poor 4. The complex is rarely inspected 5. There is no illumination in the facility 6. Very low building activity	II/II	D/D	II, D Minor	II, D Minor
Drowning/ suffocation	Lower levels and tanks	Person enters confined space and is overcome by gases or lack of oxygen	1. Confined spaces exist in the building belowgrade 2. There is evidence of oxidation and water accumulation 3. Samples of confined space atmospheres showed no problems 4. Building has lack of ventilation 5. The confined spaces in the building were not entered or checked 6. Conditions can change at any given time 7. Confined spaces are not identified	I/I	D/D	I, D Minor	I, D Minor

Table C2-10. 276-S Solvent Handling Building. (3 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (no hazard)	N/A	N/A	No electrical service to area, the breaker that supplies the electrical power to the building has been removed from service	N/A	N/A	--	--
Exposure to radiation	Five isolated areas	Person exposed to ionizing radiation	1. Most areas measured at background 2. Isolated locations found with readings as high as 9000 cpm	IV/IV	D/D	IV, D Negli.	IV, D Negli.
Exposure to asbestos	North side of building; along south wall on west side of building	Person inhales friable asbestos; potential exists for asbestos related illness in future from such exposure	1. There are more asbestos containing products on the south side of the building than there are on the north side 2. Evidence of friable asbestos present on south side of building	IV/IV	D/C	IV, D Negli.	IV, C Negli.
	Throughout building		3. The south side of the facility is posted as an asbestos controlled area 4. Pipe insulation and flooring, roofing, or other materials may or may not contain asbestos 5. Friable areas would have to be disturbed by being bumped into or knocked down for a significant release to occur	IV/IV	D/C		
Exposure to miscellaneous chemicals	General	Person exposed to unknown or known chemicals through inhalation, ingestion, or absorption caused by breach of container	1. One can of aerosol lubricant 2. One empty gasoline can	IV/IV	E/E	IV, E Negli.	IV, E Negli.

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Table C2-10. 276-S Solvent Handling Building. (3 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material						III-3, D Negli.	III-3, D Negli.
	General	Radioactive material released due to action of rodents or wind and water	1. Radioactive material is very localized low activity	III-3 III-3	D/D		
Release of asbestos						III-2, D Negli.	III-2, C Negli.
	North side of building; along south wall on west side of building	Release of asbestos due to disturbance of friable insulation on piping	1. There are more asbestos containing products on the south side of the building than there are on the north side	III-2 III-2	D/C		
			2. Evidence of friable asbestos present on south side of building				
	Throughout building		3. The south side of the facility is posted as an asbestos controlled area	III-2 III-2	D/C		
			4. Pipe insulation and flooring, roofing, or other materials may or may not contain asbestos				
			5. Friable areas would have to be disturbed by being bumped into or knocked down for a significant release to occur				

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Table C2-11. 291-S Exhaust Fan Facility. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling	--	--	No structural hazards identified	--	--	None	None
Struck by or striking						II, D Minor	II, C Moderate
		There were no potential accidents identified resulting from structural hazards	No structural hazards identified Turbine is in service People are not normally present for long periods				
	Steam turbine control building	Personnel are struck by failed turbine parts due to failure of overspeed protection	1. Turbine interlock switches for overspeed indicating lights are not mounted to the turbine as they should be (they are tied back away from the mounting plate) 2. Small missiles are not a hazard as a result of concrete wall construction	II/II	D/C		
	Stack exhaust fan units located on concrete pad	Person contacts rotating shaft and is injured	3. Rotating shafts on the units do not have fully enclosed guards that could allow hand or clothing to enter and be caught or struck 4. Maintenance and upkeep of this complex is poor 5. This complex is routinely inspected	II/II	D/D		
Electrical shock						I, C Serious	I, B Critical
			This facility is not occupied on a continuous basis, but is regularly surveyed				
	MCC	Personnel contact with energized conductors or equipment caused by an incorrect assumption that circuits are out of service and/or deenergized based upon nonfunctional indicator lights	1. Indicating lights are not functional; fan switch is ON, and fan is in service	I/I	D/D		

Table C2-11. 291-S Exhaust Fan Facility. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electric shock (cont.)	MCC	Personnel contact with energized conductors or equipment due to incorrect assumption that circuits are deenergized based on improperly applied color coding of indicator lights	2. The color of the indicator lights on this MCC do not conform to accepted industry standard or to the Hanford Plant Standards. The standard practice is to use green indicator lights to signify an open motor contactor (motor OFF), and red for a closed contactor (motor ON). The use of the colors green and red are reversed on this MCC. At least three of the cubicles of this MCC are in service.	I/I	C/C	--	--
	Steam turbine control building at control panel	Maintenance personnel contact energized conductors and equipment while working behind the control panel in confined space. Wire insulation is old and subject to damage by contact.	3. Junction box (8) covers are missing, energized insulated wires are extending out of boxes 4. Area has very little working space	I/I	C/B		
		Operating personnel contact energized conductors and equipment in the confined space behind the control panel and in the panels to be operated. Caused by damaging wire through tool contact with exposed insulated wires.	5. Working space behind the control panel is less than NEC minimums; distribution panel R and cabinet M fuse box are also located behind the control panelboard and do not have adequate working space	I/I	C/B		
		Maintenance and operating personnel contact energized conductors and equipment; bare wires and equipment terminals in the working space	6. A control transformer is supported by the energized wire to the transformer; its mounting to the control panel was removed	I/I	B/B		
		Maintenance personnel contact energized bare conductor during troubleshooting or routine maintenance	7. Junction box near the top of the control panel has a bare energized wire sticking out	I/I	C/B		
		Maintenance personnel contact energized conductors and equipment during troubleshooting or routine maintenance	8. Electrical box, at front of control panel near outside door. Door opening is restricted to less than 90 degrees (NEC violation) because of adjacent location of control panel.	I/I	D/C		

Table C2-11. 291-S Exhaust Fan Facility. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	Steam turbine control building	Maintenance or operating personnel contact and damage energized insulated conductors with foreign objects (pipes, conduits, rods, etc.)	9. Conduit cover is missing on ceiling light circuit 10. This facility is not occupied, but surveillances are completed on a routine basis	I/I	E/D	--	--
Exposure to radiation	General	Person exposed to external ionizing radiation	1. Predominantly low (<5,000 counts/min) exposure rates 2. Moderate to high exposure rates exist under rubber mat near stack (45,000 counts/min adhering to concrete under mat) 3. Building is routinely surveyed, but is not regularly occupied 4. Lack of labeling or posting	IV/IV II/II	D/D C/C	II, C Moderate	II, C Moderate
Exposure to asbestos	In and around the structure	Person inhales friable asbestos; potential exists for asbestos related illness in future from such exposure	1. Asbestos in and around the facility is heavily weather damaged. 2. Pipe insulation and flooring/roofing or other insulating/construction materials may or may not contain asbestos 3. Friable areas would have to be disturbed by bumping or being knocked down for a significant release to occur	IV/IV	C/B	IV, C Minor	IV, B Minor
Exposure to mercury	General	Person exposed to mercury due to ingestion or absorption	1. Small quantities 2. Contained in glass containers that are subject to breakage 3. Possibility for existence as mixed waste	IV/IV	D/D	IV, D Negli.	IV, D Negli.

Table C2-11. 291-S Exhaust Fan Facility. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to mercury (cont.)	--	--	4. During D&D of 108-B Building, a significant quantity of mercury was stolen and never recovered	--	--	--	--
	Specific locations: In mercury switches in the steam generator house						
Exposure to miscellaneous chemicals						II, D Minor	II, D Minor
	Outside 291-S Facility on west wall	Person exposed to unknown or known chemicals through inhalation, ingestion, or absorption due to breach of container	1. Four 55-gal barrels of unknown contents	II/II	D/D		
			2. The facility is routinely surveyed				
			3. The containers are exposed to the environment				
Release of radioactive materials						III-2, C Negli.	III-2, B Minor
	General	Release to environment due to disturbance in system	1. Radionuclides are likely to be present in sufficient quantities to exceed the offsite dose equivalent throughout the entire system	III-2 III-2	D/C		
			2. Any opening in the 291-S Facility system or REDOX canyon area provides a pathway for release if the system is upset				
			3. Poor electrical condition contributes to likelihood of release event				
	291-S stack	Release of radioactive material from the stack when fan operation is returned to normal following a fan or filter malfunction that disturbs dispersable radioactive material within the system	4. Fan and filters are not in building	III-2 III-2	D/C		

Table C2-11. 291-S Exhaust Fan Facility. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive materials (cont.)	Seal on stack plenum	Release of radioactive material from seal failure on fan ducting	5. Seal on stack plenum is in poor condition (fan duct seals); a leak may not be readily detected	III-2 III-2	C/B	--	--
	Northeast corner of sand filter	Release of radioactive material from opening in top sand filter during ventilation upset	6. Sand filter has a 10-in. by 10-in. hole in the northeast corner (hole was later sealed, but configuration control appears poor)	III-2 III-2	C/B		
			7. Roof over sand filter appears in good condition (roof has been recently replaced)				
	General	Catastrophic failure and damage of the 291-S Facility due to earthquake	- See 1 and 7 above	III-2 III-2	D/D		
	291-S stack	Release of radioactive material occurs when door at bottom of stack is opened	8. Interior of stack is contaminated with radioactive dust	III-2 III-2	D/D		
			9. Door at bottom of stack is not locked				
			10. Door at bottom of stack is not posted in any manner				
			11. The area is fenced				
			12. The only large object identified near the sand filter was the 291-S stack				
	Sand filter	A heavy falling object causes damage to the roof of sand filter or exhaust ducting	13. Cranes were observed at the 222-S Facility nearby	III-2 III-2	D/D		
	Exhaust ducting	A heavy falling object causes damage to the roof of sand filter or exhaust ducting	- See 13 above	III-2 III-2	D/D		
	Canyon area	Exhaust ventilation system is upset caused by fan failure, which results in an air disturbance within the canyon area. The air disturbance results in airborne release of radionuclides through small openings in the canyon walls	14. Canyon walls contain small openings	III-2 III-2	D/D		

Table C2-11. 291-S Exhaust Fan Facility. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive materials (cont.)	--	--	15. Failure of ventilation air flow allows airborne radionuclides to exit canyon walls due to lack of lower delta pressure in the canyon	--	--	--	--
	Stack	Release of radioactive material caused by disturbance of fixed radioactive material under rubber mat	16. Exposure rates of 45,000 counts/min discovered under rubber mat on concrete surface	III-2 III-2	D/D		
Release of asbestos						III-2, C Negli.	III-2, B Minor
	General	Release of asbestos caused by disturbance of friable insulation on piping	1. Potential for large quantities 2. Most piping still has insulation in place 3. Insulation must be disturbed in order to get release 4. An escape path must be present, and very few paths were evident	III-2 III-2	C/B		
	Specific location: Exterior piping		5. Wind can disturb the insulation, and the release is to the environment because the piping is outside building 6. Insulation is damaged, some pieces are laying on ground 7. There is a definite pattern of poor maintenance of these "out" buildings				
Release of mercury						III-3, D Negli.	III-3, D Negli.
	General	Mercury released to environment from theft or sabotage Mercury released to environment as a result of container breakage	1. Small quantities 2. Contained in glass containers that are subject to breakage 3. Possibility for existence as mixed waste 4. During D&D of 108-B Building, a significant quantity of mercury was stolen and never recovered	III-3 III-3	D/D		

Table C2-11. 291-S Exhaust Fan Facility. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of Mercury (cont.)	Specific location: In mercury switches in the steam generator house	--		--	--	--	--
			5. Mercury is inside the building and is unlikely to reach the environment if glass container is broken 6. No floor drains were identified in the facility 7. Switch may be active	III-2 III-2	D/D		
Release of oil/ petroleum products						III-2, D Negli.	III-2, D Negli.
	Global	Failure of seals, piping, equipment, etc. resulting inside/outside building	1. Building contains several 5 gal containers of lubricating oil for use at the facility 2. A leak in a 5 gal container could be sufficient to leak outside the building 3. Cleanup of a leak would be relatively minor 4. Many of these containers appear to be old and the products may not have been used for years; unused products should be removed from building 5. The HVAC pad outside the building has heavy oil residue accumulations and several containers of oil	III-2 III-2	D/D		

D&D = Decontamination and decommissioning
MCC = Motor control center
NEC = National Electric Code
REDOX = Reduction oxidation

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Table C2-12. 292-S Jet Pit House. (3 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling	N/A	N/A	No structural hazards identified	--	--	None	None
Struck by or striking	N/A	N/A	No hazards identified	--	--	None	None
Electrical shock	N/A	None identified, the building was inspected for electrical shock hazards	No hazards identified	--	--	None	None
Exposure to radiation	General	Person exposed to external ionizing radiation	1. Two locations identified with exposure rates <= 1200 counts/min 2. Very low building activity, but regular surveillances are performed	IV/IV	D/D	IV, D Negli.	IV, D Negli.
Exposure to asbestos	Within and around the facility	Person inhales friable asbestos; potential exists for asbestos related illness in future from such exposure	1. Asbestos insulation is very heavily damaged 2. There is evidence of incomplete asbestos removal 3. Access into the 292 Area is radiologically controlled 4. Pipe insulation and flooring, roofing, or other materials may or may not contain asbestos 5. Friable areas would have to be disturbed by bumping or knocking down for a significant release to occur	IV/IV	D/C	IV, D Negli.	IV, C Minor

Table C2-12. 292-S Jet Pit House. (3 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material	Global	Radioactive material spread to ground from rodent activity	1. Rodent debris was observed in the building 2. Building is posted as a surface contamination area 3. Openings to the interior of the building were not identified during the inspection	III-3 III-3	C/C	III-3, C Negli.	III-3, C Negli.
Release of asbestos	Within and around the facility	Release of asbestos caused by disturbance of friable insulation on piping	1. Asbestos insulation is very heavily damaged 2. There is evidence of incomplete asbestos removal 3. Access into the 292 Area is radiologically controlled 4. Pipe insulation and flooring, roofing, or other materials may or may not contain asbestos 5. Friable areas would have to be disturbed by bumping or knocking down for a significant release to occur	III-3 III-3	D/C	III-3, D Negli.	III-3, C Negli.

Table C2-12. 292-S Jet Pit House (3 sheets)

Hazards not found during walkdown investigation
Falling
Struck by or striking
Drowning/suffocation
Electrical shock
Exposure to lead
Exposure to mercury
Exposure to miscellaneous chemicals
Exposure to biological hazards
Fire
Explosion
Release of lead
Release of mercury
Release of oil/petroleum products
Release of miscellaneous chemicals

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Table C2-13. 293-S Offgas Treatment and Recovery Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling	N/A	N/A	No structural hazard accidents were identified No access to absorption tower, underground acid storage, pipe valve pit, or basement			None	None
Struck by or striking	N/A	No structural hazard accidents were identified	No structural hazards were identified			None	None
Electrical shock	N/A	N/A	Building was not accessed for electrical hazard evaluation			None	None
Exposure to radiation	Global	Person is exposed to external ionizing radiation	1. Low levels of contamination found (≤50 counts/min)	II/II	D/D	II, D Minor	II, D Minor
	HEPA filter box	Person is exposed to internal sources of ionizing radiation due to ingestion, absorption, or inhalation or radioactive materials	2. HEPA filter box was found to have 200-300 dpm/100 cm^2	II/II	D/D		
			3. Facility is routinely surveyed, but not regularly occupied				
Exposure to asbestos	Within and around the facility	Person inhales friable asbestos; potential exists for asbestos related illness in future from such exposure	1. Asbestos insulation is very heavily damaged	IV/IV	D/C	IV, D Negli.	IV, C Negli.
			2. There is evidence of incomplete asbestos removal				
			3. Access into the 293 Area is radiologically controlled				
			4. Pipe insulation and flooring/roofing or other materials may or may not contain asbestos				

Table C2-13. 293-S Offgas Treatment and Recovery Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to asbestos (cont.)	--	--	5. Friable areas would have to be disturbed by bumping or knocking down for a significant release to occur	--	--	--	--
Exposure to biological hazards						II, C Moderate	II, C Moderate
	Located throughout the facility	Person exposed to dusts from bird guano and dead animals; contracts disease (such as asspergillosis or histoplasmosis)	Low frequency accidents have significant consequences High frequency accidents have small consequence NOTE: Events that are serious in nature are of lower probability. Likewise, events that are minor in effect are of higher probability	II/II	C/C		
		Person is exposed to insect bites and stings, and snake bites	1. Presence of spiders, wasps, etc. is seasonal 2. There is presence of bird and rodent guano and carcasses 4. Snakes have been found in the buildings, including rattlesnakes 5. Activities for cleanup and maintenance occur where hazard exists				
Release of radioactive material						III-3, D Negli.	III-3, D Negli.
	General to building	Spread of contamination by biological agent (birds, mice, etc.)	1. Rodent debris was observed in building 2. Building is posted as a surface contamination area 3. Openings to the interior of the building were not identified during the inspection	III-3 III-3	C/C		

Table C2-13. 293-S Offgas Treatment and Recovery Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material (cont.)	HEPA filter	Release of radioactive materials caused by HEPA filter failure (passive failure or during repair and maintenance)	4. HEPA filter box was found to have 200-300 dpm/100 cm^2	III-3 III-3	D/D	--	--
Release of asbestos	Within and around the facility	Release of asbestos from disturbance of friable insulation on piping	1. Asbestos insulation is very heavily damaged 2. There is evidence of incomplete asbestos removal 3. Access into the 293 Area is radiologically controlled 4. Pipe insulation and flooring, roofing, or other materials may or may not contain asbestos 5. Friable areas would have to be disturbed by bumping or knocking down for a significant release to occur	III-3 III-3	D/C	III-3, D Negli.	III-3, C Negli.
Release of oil/petroleum products	General	Petroleum products released to environment	1. Small amount of oil observed in instruments 2. No credible release path to environment identified	III-3 III-3	E/E	III-3, E Negli.	III-3, E Negli.

dpm = disintegrations/minute
HEPA = High-efficiency particulate air

Table C2-13. 293-S Off-Gas Treatment and Recovery Building. (4 sheets)

Hazards not found during walkdown investigation
Falling
Struck by or striking
Drowning/suffocation
Electrical shock
Exposure to lead
Exposure to mercury
Exposure to miscellaneous chemicals
Fire
Explosion
Release of lead
Release of mercury
Release of miscellaneous chemicals

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Table C2-14. 2711-S Stack Gas Monitoring Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling	Roof area	Person falls through deteriorated roof	1. Bad roofing condition 2. Deteriorated roof structure 3. Heavy leak 4. Whole structure is deteriorated 5. Small building 6. Structure is constructed of wood 7. No access and no reason for access 8. Roof access could be accomplished with portable ladder	II/II	C/C	II, C Moderate	II, C Moderate
Struck by or striking	Roof area	Person under collapsing roof can be injured	1. Bad asphalt roofing condition 2. Deteriorated plywood roof structure 3. Deteriorated wooden siding 4. Heavy leak 5. Heavy snow can create collapse of deteriorated roof 6. Person has to be present to be injured 7. Infrequent entry	II/II	D/C	II, D Minor	II, C Moderate

Table C2-14. 2711-S Stack Gas Monitoring Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock						I, D Minor	I, C Serious
	Exterior (west) wall	Personnel contact with energized conductors or conduit after damaging wire insulation in conduit body with tool or equipment	1. Exterior 90-degree conduit body contains energized conductors	I/I	D/D		
			2. Exterior 90-degree conduit body does not have a cover				
		Personnel contact with energized conductors or conduit due to ground fault from water intrusion	3. Exterior conduit body contains energized conductors	I/I	D/D		
			4. Exterior conduit body is open to the weather				
	General	Person receives shock as a result of contact with energized equipment during maintenance	5. Electrical equipment in the building is energized	I/I	D/C		
			6. Floor area is congested with miscellaneous items, limiting access to all electrical components				
			7. The electrical utilities in this facility are poorly maintained				
			8. Water is leaking from roof onto electrical equipment				
			9. Building was not entered for detailed inspection				
Exposure to radiation						IV, E Negli.	IV, E Negli.
	Entrance at floor level and water sample column	Person exposed to external ionizing radiation fields	1. Exposure in this facility is low, less than or equal to 50 counts/min (essentially background level)	IV/IV	E/E		
			2. Area is fenced				
			3. Building is locked				

Table C2-14. 2711-S Stack Gas Monitoring Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to asbestos	Within and around the facility	Person inhales friable asbestos; potential exists for asbestos related illness in future from such exposure	1. Asbestos insulation is very heavily damaged 2. There is evidence of incomplete asbestos removal 3. The building is very small (10 ft by 10 ft) 4. Pipe insulation and flooring, roofing, or other materials may or may not contain asbestos 5. Friable areas would have to be disturbed by bumping or knocking down for a significant release to occur	IV/IV	C/B	IV, D Minor	IV, C Minor
Fire	Entire building	Person exposed to fire from building catching fire due to electrical faults	1. The facility is contructed of wood 2. The electrical system is in very poor condition 3. The building is small making the likelihood of someone being trapped inside during a fire very small 4. The electrical system is in very poor condition, making a fault more likely	II/II	E/E	II, E Negli.	II, D Minor
Release of radioactive material	Entrance at floor level and water sample column	Radioactive material released to environment	1. Exposure in this facility is low, less than or equal to 50 counts/min (essentially background level) 2. Area is fenced 3. Building is locked	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.

Table C2-14. 2711-S Stack Gas Monitoring Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of asbestos						III-2, C Negli.	III-2, C Negli.
	Inside building	Release of friable asbestos to the air as a result of fire	1. Building is constructed of wood	III-2	C/C		
			2. Pieces of asbestos insulation are laying on floor	III-2			
			3. Electrical system is in very poor condition				
		Release of friable asbestos to environment due to water action	4. Roof leaks very badly				

Table C2-15. 2715-S Storage Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling	N/A	N/A	No structural hazards were identified for this facility	N/A	N/A	None	None
Struck by or striking	N/A	N/A	No structural hazards identified	N/A	N/A	None	None
Electrical shock	N/A	None	No electrical power supply to facility was identified	N/A	N/A	None	None
Exposure to radiation	Global	Person exposed to external source of ionizing radiation	1. Contamination levels were low, less than, or equal to 50 counts/min (background levels only) 2. Building is routinely surveyed	IV/IV	E/E	IV, E Negli.	IV, E Negli.
Exposure to miscellaneous chemicals	Throughout facility	Person exposed to unknown or known chemicals through inhalation, ingestion, or absorption caused by breach of container	1. This facility is routinely surveyed 2. It appears that most of the chemicals have been and will be physically moved 3. There is no heating or ventilation to this building, therefore these products are being subjected to temperature extremes 4. There are oils, gasoline, aerosol cans, and bottled chemicals stored together in this structure 5. Some containers are unlabeled	II/II	D/D	II, D Minor	II, D Minor

Table C2-15. 2715-S Storage Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Fire						IV, D Negli.	IV, D Negli.
	General	Person is exposed to fire	1. This building contains a relatively large quantity of various oil products in numerous containers ranging from a 1-qt glass to a 55-gal drum 2. A fire could cause containers to explode or leak, causing a release of petroleum and toxic fumes to the environment 4. Many of these containers appear to be old, and the products may not have been used for years; unused products should be removed from building 5. There is no fire suppression system in this facility	IV/IV	D/D		
Release of oil/petroleum products						III-2, D Negli.	III-2, D Negli.
	Global	Release of oil and/or petroleum products to the environment caused by a leak in container	1. This building contains a relatively large quantity of various oil products in numerous containers ranging from a 1-qt glass to a 55-gal drum 2. A leak in a 55-gal drum would be sufficient to leak outside the building 3. Cleanup from leak would be relatively minor 4. Many of these containers appear to be old, and the products may not have been used for years	III-2 III-2	D/D		
		Fire causes a release of oil to the environment	5. This building contains a significant quantity of various oil products in numerous containers ranging from a 1-qt glass to 55-gal drum				

Table C2-15. 2715-S Storage Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of oil/petroleum products (cont.)	--	--	6. A fire could cause containers to explode or leak, causing a release of petroleum and toxic fumes to the environment 7. Many of these containers appear to be old, and the products may not have been used for years 8. No heating or air conditioning in this building	--	--	--	--
Release of miscellaneous chemicals	Throughout facility	Release of miscellaneous chemicals caused by breach or spilling of container	1. This facility is routinely surveyed 2. It appears that most of the chemicals have been and will be physically moved 3. There is no heating or ventilation to this building, therefore these products are being subjected to temperature extremes 4. There are oils, gasoline, aerosol cans, and bottled chemicals stored together in this structure 5. Some containers are unlabeled	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.

Table C2-15. 2715-S Storage Building. (4 sheets)

Hazards not found during walkdown investigation
Falling
Struck by or striking
Drowning/suffocation
Electrical shock
Exposure to asbestos
Exposure to lead
Exposure to mercury
Exposure to biological hazards
Explosion
Release of radioactive material
Release of asbestos
Release of lead
Release of mercury

Table C2-16. 2718-S Sand Filter Sampler Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						II, D Minor	II, C Moderate
	Roof area	Person falls through deteriorated roof while on roof	1. Bad roofing condition, three-fourths of covering missing 2. Very deteriorated plywood roof structure 3. The structure is very small 4. Very low building activity 5. Roof access by portable ladder only	II/II	D/C		
Struck by or striking						II, D Minor	II, C Moderate
	General	Person is struck by collapsing roof	1. Plywood roof structure is badly deteriorated 2. Heavy snow can cause roof to collapse 3. Person must be in building to be injured 4. Very low building activity	II/II	D/C		
Electrical shock						I, D Minor	I, C Serious
	West side of main room at main service panelboard	Person receives shock while performing service work due to restricted access	1. Equipment (as well as clutter and debris) is stacked in front of the main electrical service panelboard restricting access to it	I/I	D/D		
	Inside building on north wall	Person receives shock from rain water shorted equipment	2. Equipment is in poor condition 3. Roof is in poor condition, allowing rain water to get on equipment 4. Equipment is energized	I/I	D/C		
	Inside building	Person receives shock from energized equipment caused by failed insulation	5. Inside main building, a ceiling light is falling and slowly pulling the electrical conduit down with it	I/I	D/C		

Table C2-16. 2718-S Sand Filter Sampler Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	6. The building is not occupied, but surveillances are completed on a routine basis	--	--	--	--
Exposure to radiation	Stack facility	Person exposed to external ionizing radiation fields	1. Localized area (sample bucket) exists with count rate of 50,000 counts/min 2. Door to interior is locked 3. No labeling or posting is present 4. The area around the building is fenced	II/II	D/D	II, D Minor	II, D Minor
Exposure to lead	West side of building	Person inhales lead dust	1. Multiple lead sheets and several lead pigs are being stored in this facility 2. Maintenance employees for the D&D facilities have been instructed to move lead in the past as part of a continuing cleanup effort 3. Personal monitoring has been conducted by HEHF on employees handling lead in the 100 Areas, results showed a potential exposure to lead dust 4. The lead may be radioactively contaminated 5. The lead is heavily oxidized	IV/IV	D/D	IV, D Negli.	IV, D Negli.

Table C2-16. 2718-S Sand Filter Sampler Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to biological hazards						II, C Moderate	II, C Moderate
	Located throughout the facility	Person exposed to dusts from bird guano and dead animals; contracts disease (such as aspergillosis or histoplasmosis)	Low frequency accidents have significant consequence High frequency accidents have small consequence NOTE: Events that are serious in nature are of lower probability. Likewise, events that are minor in effect are of higher probability.	II/II IV/IV	C/C A/A		
		Person exposed to insect bites and stings, and snake bites	1. Presence of spiders, wasps, etc. is seasonal 2. There is presence of bird and rodent guano and carcasses 3. Snakes have been found in the buildings, including rattlesnakes 4. Activities for cleanup and maintenance occur where hazard exists				
Fire						II, D Minor	II, D Minor
	General	Person exposed to small electrical fire	1. Building is constructed of combustible wood 2. Other combustible materials such as tumbleweeds and wooden radioactive waste containers located around building 3. Electrical wiring appears to be questionable 4. Housekeeping is very poor 5. There is no fire suppression system in this building	II/II	D/D		

Table C2-16. 2718-S Sand Filter Sampler Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material						III-2, C Negli.	III-2, B Minor
	General	Radioactive material is released as a result of roof failure	1. Roof is in very bad condition, three-fourths of the roofing is missing	III-2 III-2	D/C		
			2. There is contamination in the building; it is posted as a surface contamination area				
		Radioactive materials released as a result of a fire	3. Building is constructed of wood, which is combustible	III-2 III-2	C/B		
			4. Other combustible materials such as tumbleweeds and wooden radioactive waste containers located around building				
			5. Electrical wiring appears to be questionable				
			6. Housekeeping is very poor				
Release of lead						III-2, C Negli.	III-2, C Negli.
	Global	Release of lead from theft	1. Lead is useful for personal hobbies	III-2 III-2	C/C		
			2. Lead is in large pieces which would be difficult to carry				
		Release of lead to the air as a result of fire	3. Lead can vaporize and be released to the air if it becomes hot enough				
			4. Building is constructed of wood				
			5. Combustible materials are located around the building such as tumbleweeds and wooden radioactive waste containers				
			6. Electrical wiring appears to be questionable				
			7. Lead is badly oxidized				

D&D = Decontamination and decommissioning
HEHF = Hanford Environmental Health Foundation

Table C2-17. 2904-SA Cooling Water Sampler Building. (2 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling	N/A	N/A	No structural hazards were identified	N/A	N/A	None	None
Struck by or striking (no structural hazard)	N/A	N/A	No hazards identified	N/A	N/A	None	None
Electrical shock	N/A	None	There is no electrical power to this building	N/A	N/A	None	None
Exposure to biological hazards	Located throughout the facility	Person exposed to dusts from bird guano and dead animals; contracts disease	Low frequency accidents have significant consequence	II/II	C/C	II, C Moderate	II, C Moderate
			High frequency accidents have small consequence	IV/IV	A/A		
			NOTE: Events that are serious in nature are of lower probability. Likewise, events that are minor in effect are of higher probability.				
		Person is exposed to insect bites and stings, and snake bites	1. Presence of spiders, wasps, etc., is seasonal 2. Personnel access is limited 3. Snakes have been found in the buildings, including rattlesnakes 4. Activities for cleanup and maintenance occur where hazard exists				

Table C2-17. 2904-SA Cooling Water Sampler Building. (2 sheets)

Hazards not found during walkdown investigation
Falling
Struck by or striking
Drowning/suffocation
Electrical shock
Exposure to radiation
Exposure to asbestos
Exposure to lead
Exposure to mercury
Exposure to miscellaneous chemicals
Fire
Explosion
Release of radioactive material
Release of asbestos
Release of lead
Release of mercury
Release of oil/petroleum products
Release of miscellaneous chemicals

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Table C2-18. Reduction Oxidation Plant, Butler Building. (3 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling	N/A	N/A	No structural hazards identified	--	--	None	None
Struck by or striking	Ceiling, main room	Person struck by falling heater	1. Building heat is provided by a standard portable cord-connected room heater 2. The heater is supported at 8 ft to 9 ft above floor by the ceiling joist 3. This facility appears to be used on a regular basis	II/II	D/D	II, D Minor	II, D Minor
Electrical shock	Ceiling, main room	Person receives shock by coming in contact with energized conductors while adjusting heater control or disconnecting heater at convenience outlet	1. Building heat is provided by a standard portable cord-connected room heater 2. The heater is supported at 8 ft to 9 ft above floor by the ceiling joist 3. The power cord is plugged into a duplex outlet at the same height 4. The height above the floor makes adjustment or power cord unplugging awkward, resulting in a possible shock hazard	I/I	D/D	I, D Minor	I, D Minor
Exposure to radiation	Global	Person exposed to external ionizing radiation Person exposed to internal sources of ionizing radiation due to ingestion, absorption, or inhalation of radioactive materials	1. Contamination levels of 1500 counts/min observed 2. Area is marked, and labeling is correct	IV/IV IV/IV	C/C C/C	IV, C Minor	IV, C Minor

Table C2-18. Reduction Oxidation Plant, Butler Building. (3 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals	Throughout structure	Person exposed to unknown or known chemicals through inhalation, ingestion, or absorption due to breach of container	1. There are six or seven 55-gal barrels on the north side of building that are unlabeled as to contents 2. The facility is routinely surveyed 3. It appears that most of the drums have been and will be physically moved 4. There is no heating or ventilation in this building that subjects these items to temperature extremes	II/II	D/D	II, D Minor	II, D Minor
Release of radioactive material	Global	Release of radioactive material occurs	1. Contamination levels of 1500 counts/min observed 2. Area is marked, and labeling is correct	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.
Release of miscellaneous chemicals	Throughout structure	Release of miscellaneous chemicals caused by breach or spilling of container	1. There are six or seven 55-gal barrels on the north side of building that are unlabeled as to contents 2. The facility is routinely surveyed 3. It appears that most of the drums have been and will be physically moved 4. There is no heating or ventilation in this building that subjects these items to temperature extremes	III-3 III-3	D/D	II, D Minor	II, D Minor

Table C2-18. S Plant Butler Building. (3 sheets)

Hazards not found during walkdown investigation
Falling
Drowning/suffocation
Exposure to asbestos
Exposure to lead
Exposure to mercury
Exposure to biological hazards
Fire
Explosion
Release of radioactive material
Release of asbestos
Release of lead
Release of mercury

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Table C2-19. 241-SX-401 Process Control Building. (3 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, E Negli.	I, C Serious
	Control room roof	Person falls through wooden roof while on roof	1. Wooden roof is deteriorating due to water damage from large roofing leaks	II/II	E/C		
	Process room roof	Person falls through concrete roof panels while on roof	2. Concrete panels are being wet by large leaks in roofing	I/I	E/C		
			3. No roof access available without use of portable ladder				
			4. 10 ft to 12 ft onto equipment from roof				
			5. This area is not frequently accessed				
Struck by or striking						I, D Minor	I, C Serious
	Process room	Person struck by collapsing roof due to loads exceeding structural strength	1. Roofing is leaking, causing deterioration of panels	I/I	D/C		
			2. Deteriorated panels may not be able to support snow loads or withstand seismic forces				
			3. Person in room would be harmed if roof collapses				
	Control room		4. Deteriorated roof can collapse under snow loads or seismic forces	I/I	E/C		
Electrical shock						I, C Serious	I, C Serious
	Outside building, northeast and southwest corners	Person receives shock from energized equipment due to failure to deenergize both services to building	1. There are two overhead electrical services attached to the outside of the building	I/I	C/C		
			2. Confusion may result in only one service disconnect being turned off when it is desired to deenergize building equipment for maintenance				
			3. The service disconnects are not labeled				
	Outside building at southwest corner	Person receives shock from contact with energized electrical panel or supplied equipment	4. The electrical distribution panel cover is corroded indicating that the internal insulation may also be degraded	I/I	C/C		

Table C2-19. 241-SX-401 Process Control Building. (3 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	5. The panel does not appear to be NEMA rated for outside service 6. Corrosion indicates that the panel has been subjected to adverse conditions for a significant period of time 7. The building roof leaks on the electrical equipment below it 8. No maintenance is performed on the equipment in this building. Low building access.	--	--	--	--
Exposure to radiation						IV, D Negli.	IV, D Negli.
	Throughout building	Person exposed to external ionizing radiation	1. Rain was leaking through the roof at the time the survey was conducted, creating the possibility of contamination spread 2. Surveys detected only background exposure rates 3. Long exposure times are required to acquire doses that could cause appreciable acute somatic effect	IV/IV	D/D		
		Person exposed to radioactive material by ingestion, inhalation, or absorption	4. Removable radioactive contamination is known to be present in this facility	IV/IV	D/D		
Release of radioactive material						III-3, D Negli.	III-3, D Negli.
	Throughout building	Material released to environment from stormwater intrusion	1. Rain was leaking through the roof at the time the survey was conducted, creating the possibility of contamination spread 2. Surveys detected only background exposure rates 3. Movable radioactive contamination is known to be present in this facility	III-3 III-3	D/D		

NEMA = National Electrical Manufacturing Association

Table C2-19. 241-SX-401 Process Control Building. (3 sheets)

Hazards not found during walkdown investigation
Drowning/suffocation
Exposure to asbestos
Exposure to lead
Exposure to mercury
Exposure to miscellaneous chemicals
Exposure to biological hazards
Fire
Explosion
Release of asbestos
Release of lead
Release of mercury
Release of oil/petroleum products
Release of miscellaneous chemicals

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Table C2-20. 241-SX-402 Process Control Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						I, E Negli.	I, C Serious
	Control room roof	Person falls through wooden roof while on roof	1. Wooden roof is deteriorating due to water damage from large roofing leaks	I/I	E/C		
	Process room roof	Person falls through concrete roof panels while on roof	2. Concrete panels are being wet by rain due to large leaks in roofing 3. No roof access available without use of portable ladder 4. This area is not frequently accessed	I/I	E/C		
Struck by or striking						I, D Minor	I, C Moderate
	Process room	Person struck by collapsing roof due to loads exceeding structural strength	1. Roofing is leaking, causing deterioration of panels 2. Deteriorated panels may not be able to support snow loads or withstand seismic forces 3. Person in room would be harmed if roof collapses 4. Area is not frequently occupied	I/I	D/C		
	Control room		5. Deteriorated roof collapses under snow loads or seismic forces 6. Structure is wood, roof is in bad condition 7. Roof is leaking badly	IV/IV	E/E		
Electrical shock						I, C Moderate	I, C Moderate
	Control room, south end of building	Person receives shock from energized wire or equipment from maintenance work causing damage to insulation	1. Exposed energized insulated wires run through the electrical distribution panel to an adjacent contactor 2. The cover for the electrical panel is missing	I/I	C/C		

Table C2-20. 241-SX-402 Process Control Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	3. The space in front of the panel is located behind the large control panelboard with very little clearance 4. Access to this area requires use of SCBA, which limits the ability to see hazards and presents an additional clearance problem due to the air bottle being carried by the worker 5. The conditions in the room are very bad, as water leakage through the roof has caused the ceiling to fall down and leave rubble on the floor 6. The floor of the building had water on it from roof leakage during winter	--	--	--	--
Exposure to radiation						II, D Minor	II, D Minor
	Throughout building	Person exposed to external ionizing radiation	1. Rain was leaking through the roof at the time the survey was conducted, creating the possibility of contamination spread 2. Surveys detected only three areas within the building with elevated exposure rates (>10 times background) 3. Long exposure times are required to acquire doses that could cause appreciable acute somatic effect	II/II	D/D		
		Person exposed to radioactive material by ingestion, inhalation, or absorption	4. Movable radioactive contamination is known to be present in this facility 5. Samples for removable contamination were not taken during this survey due to potential for further spread of contamination	II/II	D/D		

Table C2-20. 241-SX-402 Process Control Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material						III-3, D Negli.	III-3, D Negli.
	Throughout building	Material released to environment from stormwater intrusion	1. Rain was leaking through the roof at the time the survey was conducted, creating the possibility of contamination spread 2. Surveys detected only three areas within the building with elevated exposure rates (>10 times background) 3. Movable radioactive contamination is known to be present in this facility 4. Samples for removable contamination were not taken during this survey due to potential for further spread of contamination	III-3 III-3	D/D		

SCBA = Self-contained breathing apparatus

Table C2-20. 241-SX-402 Process Control Building. (4 sheets)

Hazards not found during walkdown investigation
Drowning/suffocation
Exposure to asbestos
Exposure to lead
Exposure to mercury
Exposure to miscellaneous chemicals
Exposure to biological hyazards
Fire
Explosion
Release of asbestos
Release of lead
Release of mercury
Release of oil/petroleum products
Release of miscellaneous chemicals

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Table C2-21. 221-U Canyon Building. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling	N/A	N/A	No structural hazards identified	--	--	None	None
Struck by or striking						II, D Minor	II, D Minor
	Operating gallery	Person injured from striking protruding objects	1. Several floor pads with protruding bolts in operating gallery 2. Facility is well illuminated in most areas 3. Housekeeping in most areas is fair	II/II	D/D		
	Pipe gallery, north of door 9	Person is injured by being struck by falling pipe	4. Ceiling pipe is hanging supported by only one piece of bailing wire	II/II	D/D		
	Throughout the facility	Person is struck by mechanical equipment that is inadvertently energized	5. Much of the mechanical equipment throughout the facility has been partially dismantled 6. Equipment has not been physically disconnected from its power supply 7. Energizing partially dismantled equipment could result in parts being ejected	II/II	E/E		
Electrical shock						I, B Critical	I, B Critical
	Operating gallery, just above door 11	Personnel contact energized electrical conductors or equipment due to insulation damage	1. A four-square box is intended to be connected to an EMT conduit protruding through concrete, which is adjacent to the door frame 2. The EMT connectors on the box have loosened, and conduit has separated from the box	I/I	B/B		

Table C2-21. 221-U Canyon Building. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	3. The separation has exposed the conductors to the sharp edges of the conduit and the unsupported box	--	--	--	--
			4. The conduit appears damaged				
			5. The anchors intended to support this conduit have pulled out of the wall				
			6. The box is not attached to the wall or properly supported				
			7. The box is within easy reaching distance				
			8. The conduit appears to be associated with an alarm notification system				
	Electrical gallery near MCC "Section 8"	Personnel receive shock by contacting energized conductors or equipment due to water shorting out equipment	9. There is a steam leak near this MCC	I/I	C/B		
			10. The condensation from this leak is running down the wall and covering the floor around this MCC				
			11. There is no protection to prevent water from entering this electrical equipment				
	Electrical gallery, enclosed breaker panels located on wall to right of E8-l160/E8-l158	Person receives shock from contact with energized conductors or equipment caused by incorrect assumptions about circuit status	12. Circuit breakers are installed upside down in the enclosure immediately adjacent to the transfer switch and in the enclosure between the 240-V disconnect switch and the water heater circuit breaker enclosure	I/I	D/D		
			13. The improper orientation of the breakers resulted in the up position of the handle being in the OFF position				
			14. Normal and customary practice is that the up position of a breaker handle denotes that the circuit supplied by the breaker is energized				

Table C2-21. 221-U Canyon Building. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	15. This situation causes confusion and could result in circuits being energized when the intention was that they be de-energized 16. The positioning of the breaker also results in the labeling being upside down	--	--	--	--
Exposure to radiation						II, B Serious	II, B Serious
	Noncanyon areas	Person exposed to external ionizing radiation fields	1. Areas outside the canyon had exposure rates that were moderate to high 2. The floor and a number of control valves represent the largest exposure hazards found in the nonradiologically controlled zones 3. Approximately 13 locations in the nonradiologically controlled zones were identified with exposure rates >10 times background	II/II	D/D		
	Canyon areas	Person exposed to external ionizing radiation fields	4. Exposure rates in specific locations in the canyon are extremely high 5. Almost complete lack of labeling makes delineation of high radiation fields difficult 6. The floor and individual pieces of scrap equipment represent the largest exposure hazards found in the canyon 7. In general, the dose rates increase from east to west 8. Surveys detected 15 areas with elevated exposure rates greater than 10 times background	II/II	B/B		

Table C2-21. 221-U Canyon Building. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to asbestos	Most carrier unit rooms in stairwells Compressor room Aqueous makeup room Mechanical equipment room	Person inhales friable asbestos; potential exists for asbestos related illness in future from such exposure	1. Facility is routinely occupied by workers 2. Most of facility insulation in good shape, some isolated instances of degradation 3. Uncertainty concerning which materials contain asbestos 4. Friable material requires disturbance for release 5. Many areas show signs of incomplete asbestos removal 6. Incomplete abatement program 7. Some construction materials such as roof panels are known to contain asbestos but are not classified as friable	IV/IV	D/C	IV, D Negli.	IV, C Minor
Exposure to miscellaneous chemicals	Operating gallery and pipe gallery	Person exposed to unknown or known chemicals through inhalation, ingestion, or absorption due to breach of container	1. Piping in the operating gallery and pipe gallery may contain hazardous chemicals	IV/IV	D/D	IV, D Negli.	IV, D Negli.
Fire	All exit doors from facility	Person is injured by exposure to fire as a result of inadequate exits	1. There are no fire doors within the 221-U Facility 2. Existing doors do not have panic hardware 3. There are no established fire exits 4. The facility is normally occupied 5. Low combustible loading	II/II	E/D	II, E Negli.	II, D Minor

Table C2-21. 221-U Canyon Building. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Fire (cont.)	--	--	6. Doors are not easy to open 7. Exits are inadequately marked, two marked exits were jammed and would not open	--	--	--	--
Release of radioactive material						III-1, D Negli.	III-1, D Negli.
	General	Release of surface contamination to environment due to loss of material confinement	1. The canyon building has an active ventilation and confinement system 2. Release of material requires loss of ventilation and disturbance of material 3. Building is relatively leak tight 4. Natural convection air flow from stack may provide sufficient negative structure pressure to prevent release	III-1 III-1	E/E		
	All gallery levels	Release of radioactive materials due to water intrusion	5. Surface contamination present on all levels of the gallery side of the canyon building 6. Cell 10 and 24-in. tile sewer pipe contain contamination 7. A ruptured steam line allowed water to enter the building in the electrical gallery 8. The steam leak caused water to run across a surface contamination zone	III-3 III-3	D/D		
	General	Release of radioactive materials through cracks and open joints (requires water intrusion or ventilation failure)	9. Open joints at exterior and interior walls 10. Small cracks at interior walls between canyon deck and galleries 11. Roof leaking at areas 13, 15, 18, 185, and 195	III-3 III-3	D/D		

Table C2-21. 221-U Canyon Building. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material (cont.)	--	--	12. Small cracks and open joints at gallery floors	--	--	--	--
Release of asbestos	Most carrier unit rooms in stairwells Compressor room Aqueous makeup room Mechanical equipment room	Release of asbestos due to disturbance of friable insulation on piping	1. Most of facility insulation in good shape, some isolated instances of degradation 2. Uncertainty concerning which materials contain asbestos 3. Friable material requires disturbance for release 4. Many areas show signs of incomplete asbestos removal 5. Incomplete abatement program 6. Some construction materials such as roof panels are known to contain asbestos but are not classified as friable	III-3 III-3	D/C	III-3, D Negli.	III-3, C Negli.
Release of oil/petroleum products	Operating gallery	Release of oil due to gauge failure	1. Red oil in gauges located in 221-U operating gallery 2. No readily discernable release pathways	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.
Release of miscellaneous chemicals	221-U operating gallery 221-U pipe gallery	Hazardous chemicals are released into the environment as a result of water pipe breakage, broken steam line, or roof leakage	1. Very few significant sources of water available to cause release to environment 2. Majority of chemical residues are assumed to be contained within piping 3. There is water intrusion under rollup door in 221-U basement	III-3 III-3	D/D	III-3, D Negli.	III-3, D Negli.

Table C2-21. 221-U Canyon Building. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of miscellaneous chemicals (cont.)	--	--	4. Major steam leak has caused water to accumulate on floor in 221-U basement	--	--	--	--
			5. Water has collected in sump near rollup door in 221-U basement				
	221-U operating gallery surface contamination zone	Hazardous chemicals are released into the environment as a result of container failure or spillage	6. Two 55-gal drums located in this area	III-3 III-3	D/D		

EMT = Electrical metallic tubing
MCC = Motor control center

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Table C2-22. 271-U Office Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						II, D Minor	II, D Minor
	Stairway exit outside rooms 105 and 106	Person falls due to bad stair railing	1. Bottom portion of handrail is not connected	II/II	D/D		
			2. Fourth floor of facility was not inspected due to no access				
			3. This facility is intended to be used as an office area				
Struck by or striking						II, D Minor	II, D Minor
	200 level	Person is struck by unguarded rotating fan blades	1. Small interior or exterior wall fan does not have a guard	II/II	D/D		
			2. Fan is approximately 8 ft up wall				
	Compressor room	Person places hand in unguarded area of rotating equipment	3. Rotating shaft for HVAC unit is unguarded, belt guard has openings	II/II	E/E		
	Aqueous makeup room	Person trips over protrusions from floor resulting in injury	4. Floor pad with protruding bolts	II/II	D/D		
			5. This facility will be used as an office area				
Electrical shock						I, D Minor	I, C Serious
	Basement level, former shop area now used to store spill control equipment	Person receives shock from contact with energized exposed conductors	1. Fluorescent fixtures in this area have missing parts resulting in exposed wires	I/I	E/D		
	Operating gallery level, room 212, west wall	Person receives shock from contact with exposed energized conductors due to insulation failure	2. A receptacle outlet 12 in. above floor does not have device or blank cover to protect personnel from contacting the energized conductors tucked inside	I/I	D/C		
	Operating gallery level, room 205, east wall		3. A handy box is present at end of a flexible conduit near wall in room 2005	I/I	E/D		
			4. The box does not appear to provide power to anything				

Table C2-22. 271-U Office Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	5. There are wires hanging out of the box	--	--	--	--
			6. Wires are not currently energized				
			7. The panel supplying this box is in the same room and does not have a tag indicating the presence of open circuits downstream of the panel				
	Operating gallery level, room 205		8. There is water leaking from pipe onto light fixture	I/I	E/D		
	First floor, shower stall in change room	Person receives shock from energized lighting fixture	9. Fluorescent fixture in shower stall is hung with chains attached to sides of fixture with sheetmetal screws	I/I	D/D		
			10. Power is supplied to top of fixture through flexible conduit (longer than 6 ft) from 2-in. by 4-in. device box attached to bottom of conduit pendant				
			11. The device box is not water tight; numerous open screw holes are present, and cover is not gasketed				
			12. Accident will most likely happen when personnel are taking showers				
Exposure to radiation	Open joints at 221-U canyon building wall	Person exposed to radiation due to leak through canyon walls	1. There are open joints in the concrete wall adjoining the 271-U facility	IV/IV	E/E	IV, E Negli.	IV, E Negli.
Exposure to miscellaneous chemicals	271-U floor drain	Person exposed to hazardous chemicals	1. Unknown green powder located in 271-U floor drain	IV/IV	D/D	IV, D Negli.	IV, D Negli.

Table C2-22. 271-U Office Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to asbestos	Entire facility (potential)	Person inhales friable asbestos; potential exists for asbestos related illness in future from such exposure	1. This building is routinely occupied 2. The ventilation system throughout the building may be asbestos contaminated 3. Uncertainty concerning which materials contain asbestos 4. Friable material requires disturbance for release 5. The third level is posted for friable asbestos hazard 6. There is no evidence of an asbestos abatement program 7. The ventilation system is operating	IV/IV	D/C	IV, D Negli.	IV, C Minor
Fire	First floor, shower stall in change room	Person is exposed to wiring fire as a result of short circuit in fluorescent fixture	1. Fluorescent fixture in shower stall is hung with chains attached to sides of fixture with sheetmetal screws 2. Power is supplied to top of fixture through flexible conduit (longer than 6 ft) from 2-in. by 4-in. device box attached to bottom of conduit pendant 3. The device box is not water tight; numerous open screw holes are present, and cover is not gasketed 4. Accident will most likely happen when personnel are taking showers	II/II	C/B	II, C Moderate	II, B Serious

Table C2-22. 271-U Office Building. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material						III-2, D Negli.	III-2, D Negli.
	Open joints at 221-U canyon building wall	Contamination is released through joints from 221-U canyon wall	1. There are open joints in the concrete wall adjoining the 271-U Building	III-2 III-2	D/D		
Release of asbestos						III-3, D Negli.	III-3, D Negli.
	General	Release of asbestos due to disturbance of friable asbestos-containing insulation	1. Ventilation stack is located on 271-U Building. Ventilation ducting in 271-U Building is constructed from asbestos-containing materials 2. Material is not presently friable	III-3 III-3	D/D		
Release of miscellaneous chemicals						III-3, D Negli.	III-3, D Negli.
	271-U floor drain	Hazardous chemicals are released into the environment as a result of water pipe breakage, broken steam line, or roof leakage	1. Unknown green powder located in 271-U floor drain	III-3 III-3	D/D		

HVAC = Heating, ventilating, and air conditioning

Table C2-23. 176-U Solvent Handling Facility. (2 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling	N/A		No structural hazards identified	N/A	N/A	None	None
Struck by or striking	N/A		No structural hazards identified	N/A	N/A	None	None
Electrical shock	N/A		There is no electrical power feeding this facility	N/A	N/A	None	None
Exposure to radiation	General	Person exposed to external ionizing radiation fields	1. Exposure in this facility is low to moderate, generally less than 1,000 counts/min 2. Very low building activity 3. This area is bounded by a small concrete wall retention basin with a radiation rope boundary	IV/IV	D/D	IV, D Negli.	IV, D Negli.
Exposure to miscellaneous chemicals	General	Person inadvertently exposed to chemicals due to leak from piping or tanks	1. Spills have occurred in the past from this type of activity	II/II	E/E	II, E Negli.	II, E Negli.
Release of radioactive material	Entire facility	Wind action results in movement of radioactive contamination and airborne release	1. Entire facility is posted as a surface contamination zone 2. Outdoor areas are already contaminated 3. Wind can move contamination 4. Facility is contained within concrete walls and floor	III-2 III-2	C/C	III-3, C Negli.	III-3, C Negli.

Table C2-23. 176-U Solvent Handling Facility. (2 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material (cont.)	--	Water intrusion moves contamination from inside facility to soil outside facility	5. Facility is open to elements 6. There is a concrete retaining wall for containing liquids	--	--	--	--
Release of miscellaneous chemicals	Piping and tanks	Hazardous chemicals are released to environment by water intrusion	1. Facility is outdoors and exposed to the elements 2. Concrete walls and floor act as containment 3. Facility may have chemical residues in tanks and piping	III-2 III-2	D/D	III-2, D Negli.	III-2, D Negli.

Table C2-24. 291-U Exhaust Fan Facility. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						II, D Minor	II, C Serious
	South side of concrete pad for fan unit	Person falls from concrete pad due to noncontinuous hand rail	1. Handrail is not continuous, there is a 2-ft to 3-ft gap	I/I	E/E		
			2. The complex is routinely surveyed but not regularly occupied				
			3. No structural hazards identified				
		Person slips and falls down hill	4. No walkway to stack	II/II	D/C		
			5. Area between building and stack is very steep				
			6. No postings for slipping or tripping hazards				
Struck by or striking						II, D Minor	II, D Minor
	Destroyed door in auxiliary building	Person is struck by flying roof or wall panels propelled by high wind	1. Door to facility has been destroyed	IV/IV	D/D		
			2. Strong wind can cause high pressure inside building through opening created by destroyed door				
			3. People have to be present when incident occurs for injury to take place				
			4. Area is not usually occupied				
			5. Facility is constructed of transite, which is not particularly heavy				
	Fan unit south of 291-U Building	Person is injured by contact with rotating equipment	6. Rotating shafts on fan unit do not have fully enclosed guards	II/II	D/D		
			7. Evidence of people working in area where contact with rotating shafts could occur				
		Person trips over protrusions from concrete pad	8. Concrete pad just east of fan unit has protruding metal bolts				

Table C2-24. 291-U Exhaust Fan Facility. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Struck by or striking (cont.)	--	--	9. Facility is fenced	--	--	--	--
			10. Weekly surveys of the area are conducted				
		Person is struck by steam or hot water	11. A steam pipe has burst recently in this area	II/II	D/D		
			12. Steam pipes appear to be in poor condition				
Electrical shock						I, D Minor	I, D Minor
	MCC	Person receives shock as a result of contact with energized conductors or equipment due to incorrect assumption that circuits are deenergized	1. Indicating lights for inservice cubicles for fan 1, fan 2, main, and 291-U-601 are not functional	I/I	D/D		
			2. Indicating lights are normally lit when circuits are energized				
	MCC in southeast corner	Person receives shock as a result of contact with energized conductors or equipment	3. The MCC has two sheetmetal covers missing from access areas near the floor	I/I	D/D		
			4. There are energized conductors inside the MCC				
			5. One of the energized conductors (orange) is not connected to anything in MCC				
	Receptacle inside sample shelter	Person receives shock as a result of contact with energized conductors or equipment due to failure of frayed insulation	6. Receptacles inside this sample shelter feed flexible cords and extension cords	I/I	D/D		
			7. There is no ground fault interrupter protection for these receptacles				
			8. The condition of the cords indicates that they are not part of a routine inspection program				
	Near west gate		9. Exposed electrical wires on concrete air duct				
	Fan unit south of 291-U Facility		10. Electrical conduits have been cut exposing electrical wires				

Table C2-24. 291-U Exhaust Fan Facility. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to radiation	Stack facility	Person exposed to external ionizing radiation fields	1. Exposure in this facility is moderate to high, generally less than 7,500 counts/min 2. Localized areas exist with count rates as high as 55,000 counts/min 3. This area is fenced 4. There is a total lack of labeling or posting in this area 5. This facility is routinely surveyed	II/II	C/C	II, C Moderate	II, C Moderate
Exposure to asbestos	Multiple potential locations within building	Person inhales friable asbestos; potential exists for asbestos related illness in future from such exposure	1. Routine surveillance is performed in this area 2. Most of the potential asbestos-containing products in this complex are in poor condition 3. Uncertainty concerning which materials contain asbestos 4. Friable material requires disturbance for release 5. Snow was on the ground at the time of inspection 6. There is no evidence of an asbestos abatement program	IV/IV	D/C	IV, D Negli.	IV, C Negli.
	Piping on west side, outside building		7. Pipe insulation is in a damaged friable state, pieces have fallen to the ground inside and outside the facility 8. No maintenance of the facility is evident	IV/IV	D/C		

Table C2-24. 291-U Exhaust Fan Facility. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to miscellaneous chemicals						II, D Minor	II, D Minor
	Outside the 291-U Complex fence	Person is exposed to toxic chemicals through inhalation, consumption, or absorption. Because these chemicals are unidentified, the potential injury cannot be determined.	1. Fifty-five-gallon drums sitting next to each other marked as toxic, corrosive, persistent (these drums were removed the next day)	II/II	D/D		
			2. These materials are incompatible				
	Inside 291-U Facility		3. Several buckets of oil	II/II	D/D		
			4. Several aerosol cans, cleaners, and unlabeled containers on floor				
			5. Potential for red oil in gauges within building				
	Small building west of 291-U Facility		6. Several unlabeled containers containing liquid	II/II	D/D		
Exposure to biological hazards						II, C Moderate	II, C Moderate
	Located throughout the facility	Person exposed to dusts from bird guano and dead animals; contracts disease	Low frequency accidents have significant consequences	II/II	C/C		
			High frequency accidents have small consequences	IV/IV	A/A		
			NOTE: Events that are serious in nature are of lower probability. Likewise, events that are minor in effect are of higher probability.				
		Person is exposed to insect bites and stings, and snake bites	1. Presence of spiders, wasps, etc. is seasonal				

Table C2-24. 291-U Exhaust Fan Facility. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to biological hazards (cont.)	--	--	2. Snakes have been found in the buildings, including rattlesnakes 3. Activities for cleanup and maintenance occur where hazard exists	--	--	--	--
Fire						IV, D Negli.	IV, D Negli.
	Gutter above panels on south wall	Person exposed to hot gases or other byproducts of short circuit in wire gutter	1. Only 7 out of 22 screws are installed on front cover of wiring gutter supplying panel boards 2. Cover may not contain byproducts of short circuit due to missing fasteners	IV/IV	D/D		
Release of radioactive material						III-1, C Minor	III-1, B Moderate
	Stack and sand filter	Damage to the sand filter cover caused by heaving falling objects, weathering, etc., causes pathway for release of airborne radiation materials to environment	1. The sand filter provides exhaust air filtration for the entire 221-U Canyon Building 2. The sand filter is likely to contain significant quantities of radionuclides 3. Damage to the cover over the sand filter could be caused by earthquake, severe weather conditions, or sudden shock from heavy falling objects 4. The sand filter cover was not visible for inspection due to snow cover 5. Heavy objects are not normally near cover	III-1 III-1	C/B		
		Wind spreads radioactive contamination	6. Surface contamination was observed in several outdoor locations on removable equipment around the facility	III-2 III-2	C/C		

Table C2-24. 291-U Exhaust Fan Facility. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material (cont.)	--	--	7. Wind can move loose surface contamination	--	--	--	--
			8. There is surface contaminated soil around facility				
			9. Moderately contaminated tumbleweeds were found in the area				
		Release of radioactive materials caused by biological agent	10. Contaminated rabbit droppings were found in the 291-U area	III-2 III-2	C/C		
		Release of radioactive materials caused by water intrusion	11. Contaminated areas are exposed to rain	III-2 III-2	D/D		
Release of asbestos						III-3, D Negli.	III-3, D Negli.
	Piping in 291-U exhaust fan control house	Asbestos is released caused by a disturbance of friable material	1. Asbestos in fan control house appears to not be coated with fixative	III-3 III-3	D/D		
			2. Friable asbestos is on piping that is not normally within reach				
			3. Most of the potential asbestos-containing products in this complex are in poor condition				
			4. Uncertainty concerning which materials contain asbestos				
			5. Friable material requires disturbance for release				
			6. Snow was on the ground at the time of inspection				
			7. There is no evidence of an asbestos abatement program				
			8. Pipe insulation is in a damaged friable state, pieces have fallen to the ground inside and outside the facility				
			9. No maintenance of the facility is evident				

Table C2-24. 291-U Exhaust Fan Facility. (7 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of oil/petroleum products						III-2, D Negli.	III-2, D Negli.
	Near floor drain	Oil is released to environment from spill	1. Oil in open bucket was found near drain 2. Drain was not sealed 3. Bucket is easily spilled	III-2 III-2	D/D		
Release of miscellaneous chemicals						III-2, D Negli.	III-2, D Negli.
	General Outside the 291-U Complex fence Inside 291-U Building Small building west of 291-U	Hazardous chemicals are released to environment as a result of container failure or spill	1. Miscellaneous maintenance solvents are located in 291-U exhaust fan control house 2. Fifty-five gallon drums sitting next to each other marked as toxic, corrosive, persistent (these drums were removed the next day) 3. Several aerosol cans, cleaners, and unlabeled containers on floor 4. Potential for red oil in gauges within building 5. Several unlabeled containers containing liquid	III-2 III-2	D/D		

MCC = Motor control center

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Table C2-25. 292-U Stack Gas Monitoring Building. (3 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling	N/A	N/A	1. No structural hazards identified	--	--	None	None
Struck by or striking	South wall	Person struck by falling window louvers	1. Window louvers are hanging and may fall	II/II	E/D	II, E Negli.	II, D Minor
Electrical shock	South wall	Person receives shock from energized conductors or equipment	1. There are three services into this tiny building 2. Two services have open panels that are energized 3. The covers are lying in front of the panels 4. The condition of the panel interiors is less than adequate to ensure proper operation of devices within the panels 5. There are very minor, if any, loads connected	I/I	C/B	I, C Serious	I, B Critical
	Small building near base of stack with door missing	Person receives shock from contact with energized conductors due to insulation failure	6. Cords supplied from this building are not protected by GFCI breakers 7. Cords are strung outside and buried in the snow indicating there is no protection from adverse weather 8. No inspection of the cords 9. Extension cords are not approved for long term service 10. This facility is routinely surveyed, but is not regularly occupied	I/I	D/C		
Exposure to asbestos	Multiple potential locations	Person inhales friable asbestos; potential exists for asbestos related illness in future from such exposure	1. Uncertainty concerning which materials contain asbestos	IV/IV	D/D	IV, D Negli.	IV, D Negli.

Table C2-25. 292-U Stack Gas Monitoring Building. (3 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to asbestos (cont.)	--	--	2. Friable material requires disturbance for release 3. There is no evidence of an asbestos abatement program 4. Some construction materials such as roof panels are known to contain asbestos but are not classified as friable 5. This facility is routinely surveyed, but not regularly occupied	--	--	--	--
Exposure to biological hazards	Located throughout the facility	Person exposed to insect bites and stings, and snake bites	Low frequency accidents have significant consequences High frequency accidents have small consequences NOTE: Events that are serious in nature are of lower probability. Likewise, events that are minor in effect are of higher probability. 1. Presence of spiders, wasps, etc., is seasonal 2. Snakes have been found in the buildings, including rattlesnakes 3. Activities for cleanup and maintenance occur where hazard exists	II/II IV/IV	C/C A/A	II, C Moderate	II, C Moderate

Table C2-25. 292-U Stack Gas Monitoring Building. (3 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of asbestos	Multiple potential locations	Person inhales friable asbestos; potential exists for asbestos related illness in future from such exposure	1. Uncertainty concerning which materials contain asbestos 2. Friable material requires disturbance for release 3. There is no evidence of an asbestos abatement program 4. Some construction materials such as roof panels are known to contain asbestos but are not classified as friable	III-3 III-3	D/C	III-3, D Negli.	III-3, C Negli.

GFCI = Ground fault circuit interrupts

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Table C2-26. 232-Z Plutonium Incinerator Facility. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Falling						II, C Moderate	II, C Moderate
	Outside stair landing	Person falls through deteriorated stair landing while on stairs	1. The stair landing is badly corroded 2. This facility was used for chemical mixing, the metal in this building shows chemical attack 3. Facility not normally accessed 4. Stair is posted for hazard 5. Stair landing is approximately 8 ft abovegrade	II/II	C/C		
Struck by or striking						---	---
	N/A	--	1. No struck by or striking hazards found 2. Industrial safety did not complete a walkthrough of this facility	N/A	N/A		
Electrical shock						I, D Minor	I, C Moderate
	Process room, north wall, 5 ft above floor	Person receives shock as a result of contact with exposed wires that have been inadvertently energized	1. Deenergized wires are exposed on the wall 2. The switch for this circuit is unknown; it may be likely that this circuit would be reenergized	I/I	D/D		
	Process room, north wall	Person receives shock while working on fire alarm system from contact with 120-V power	3. The 120-V raceway systems enters the same junction box as the fire alarm system 4. Mixing low and high voltage systems creates the possibility of inadvertently coming in contact with high voltage	I/I	D/D		
	Process room on top of the incinerator	Person receives shock from contact with energized conductor or equipment due to insulation failure	5. A portable fluorescent light is sitting on top of the incinerator	I/I	D/D		

Table C2-26. 232-Z Plutonium Incinerator Facility. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Electrical shock (cont.)	--	--	6. The supply to this light is SO cord 7. The SO cord is connected to an extension cord 8. The long period of time that this cord may lay here could result in insulation degradation and eventual failure	--	--	--	--
	Process room and lavatory	Person receives shock from contact with energized wires as a result of damaged insulation	9. Three electrical enclosures (two in process room and one in lavatory) are missing part of their containment, exposing energized insulated wires to possible damage	I/I	D/D		
	Lavatory room	Person receives shock by breaking incandescent lamp	10. A porcelain lamp or receptacle socket is located on the wall approximately 7 ft above the floor 11. This room is used to store protective clothing and as a dressing area 12. There is no protection for the bulb from contact	I/I	D/C		
	Electric room and caustic room	Person receives shock from contact with faulty electrical heat trace or energized components	13. The heat trace does not have a protective shield or ground fault protection	I/I	D/C		
Exposure to radiation						II, B Serious	II, B Serious
	General	Person exposed to external ionizing radiation	1. Predominantly moderate exposure rates 2. Contamination has been stabilized to a large extent with paint 3. The moderate exposure rates observed are not representative of the entire facility, as those parts of the facility where high exposure rates are known to exist were not accessible for inspection	II/II	B/B		

Table C2-26. 232-Z Plutonium Incinerator Facility. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Exposure to radiation (cont.)	--	--	4. Exposure to external radiation fields are predominantly from energetic gamma-emitting fixed contamination	--	--	--	--
	General	Person exposed to internal exposure from highly radiotoxic alpha-emitters	5. Surveys that were conducted were not exhaustive, but were meant to confirm the validity of detailed, current, and historical survey data posted at the facility 6. Contamination is globally present 7. Although contamination is stabilized by coatings, mobile alpha contamination is present 8. Smears for removable contamination were not taken because of potential for further release of removable contamination or degradation of stabilization coatings	II/II	B/B		
Fire						II, D Minor	II, D Minor
	Outside entrance to process room	Person is exposed to electrical fire as a result of inability to deenergize circuits	1. Multiple 8-ft fluorescent tubes are stacked in front of lighting panel "A" blocking access 2. Panels were not allowed to be opened because of contamination hazard	II/II	D/D		

Table C2-26. 232-Z Plutonium Incinerator Facility. (4 sheets)

Risk evaluation summary sheet				Risk assessment		Total risk	
Hazard	Location	Potential accident	Factors	C-C	L-C	Now	10 Years
Release of radioactive material						III-1, D Negli.	III-1, C Minor
	Exhaust ducting	Radioactive material is released to environment due to ventilation upset	1. Fan failure required for event to occur	III-1	D/C		
		Radioactive material is released to environment due to exhaust duct damage	2. Duct is exposed on outside of building	III-1			
			3. Heavy moving object striking duct could cause damage				
			4. Duct appears to be in good shape				
			5. Radionuclides in the facility are likely to be present in sufficient quantities to exceed offsite dose allowances.				