GULF STATES UTILITIES COMPANY

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Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Denton:

River Bend Station Units 1 and 2
Docket Nos. 50-458/50-459

Enclosed are Gulf States Utilities Company responses to the open items identified in the Draft Safety Evaluation Report by the Auxiliary Systems Branch, responses to the request for additional information identified in part by Staff letters dated August 5, 1981 and December 31, 1981, and positions to the Licensing Review Group-II issues 1-ASB through 5-ASB. Attachment 1 of this letter summarizes the open items and indicates changes to be made in the River Bend Station FSAR. Attachment 2 provides a brief discussion of each open item, the response and reference material for each item. Where indicated, these responses will be provided in a future amendment to the FSAR.

Sincerely,

William J. Reed Jr.

for J. E. Booker
Manager-Engineering,
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River Bend Nuclear Group

JEB/WJR/ERG/JEP
JEP
Enclosures

B001
1/48

ATTACHMENT 1

ITEM NUMBER	DSER SECTION	SUBJECT	FSAR REVISIONS
1.	3.4.1 Pg 3-10 3.6.1 Pg 3-29	Control Building MELC/Flooding from MELC	January, 1985
2a.	3.5.1.1 Pg 3-13,15 3.5.1.2 Pg 3-17	Valve Bonnets, Thermowells, Nuts Bolts, Studs, Valve Stems, Fan Failures as possible missiles	December, 1983
2b.	3.5.1.1 Pg 3-14,15 3.5.1.2 Pg 3-16 12/31/81 letter	Gravitational Missiles	Enclosure 1
2c.	3.5.1.1 Pg 3-14,15 3.5.1.2 Pg 3-17	Missiles from Rotating Equipment	December, 1983
3.	3.6.1 Pg 3-28	High Energy Pipe Break Analysis (Pipe Whip and Jet Impingement Analysis)	January, 1985 (December, 1983)
4a.	4.6 Pg 4-50,52,53	Testing Scram Accumulators/ Loss of Both CRD Pumps	Technical Specifications
4b.	4.6 Pg 4-50,52,53	CRD System Air Pressure Bleedoff	N/A
5a.	5.2.5 Pg 5-14,22	LDS Accuracy and Capability	N/A
5b.	5.2.5 Pg 5-17,22	Intersystem Leakage Accuracy	N/A
5c.	5.2.5 Pg 5-19,22	Availability and LCO's for LDS	Technical Specifications
5d.	5.2.5 Pg 5-20,21,22	Account for All RCPB LDS	Enclosure 2
6a.	6.7.3 Pg 6-73	MSIV Leak Rate	Technical Specifications
6b.	6.7.4 Pg 6-74	RV and MSL Delta-P	Enclosure 3
7.	9.1.1 Pg 9-6	NF Storage Racks	Enclosure 4
8.	9.1.2 Pg 9-10,11	SF Racks Criticality Analysis	December, 1983
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9b.	9.1.3 Pg 9-16	Cooling of SF in UCSFP	Technical Specifications (Enclosure 6)
9c.	9.1.3 Pg 9-17	RHR and FPC Interconnection	N/A
9d.	9.1.3 Pg 9-17	SFP Siphon Breaker Failure	N/A

9e.	9.1.3 Pg 9-18	Containment SFP Siphon Breakers	N/A
10a.	9.1.4 Pg 9-24	FB Bridge Crane Failure	N/A
10b.	9.1.4 Pg 9-26	Fuel Transfer Tube Cooling	Enclosure 7
10c.	9.1.4 Pg 9-27	Light Load Max. KE	Enclosure 8
11.	9.1.5 Pg 9-30,33	Heavy Loads/NUREG-0612	October, 1984 (Enclosure 9)
11a.	9.1.5 Pg 9-32 8/5/81 letter	SF Cask Drop Analysis	Enclosure 10
11b.	9.1.5 Pg 9-32	Polar Crane Movement During Refueling	N/A
11c.	9.1.5 Pg 9-32,33	Polar Crane and RG 1.13, C.5	N/A
11d.	9.1.5 Pg 9-33	Polar Crane Drops Into RV	October, 1984
11e.	9.1.5 Pg 9-32	Polar Crane Drops and RG 1.13, C.6	N/A
12a.	9.2.2 Pg 9-41	RPCCW Failure Due to HELB	Enclosure 11
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14b.	9.2.6 Pg 9-58	Crack in CST to HPCS/RCIC Piping	Amendment 7
14c.	9.3.3 Pg 9-81	Leakage Collection for CST	N/A
15.	9.2.8 Pg 9-64,65 9.2.9 Pg 9-67 9.2.11 Pg 9-70	Flooding Safety-Related Equipment Due to RPCCW, VCWS, CTMW Systems Failure (MELC Analysis)	January, 1985
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16b.	9.3.1 Pg 9-73,75	Compressed Air Supply Qualify	Enclosure 15
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18c.	9.4.1 pg 9-96 9.4.2 Pg 9-112	CBVS/FBCFS Compliance with RG 1.52, C.2a-C.2f and C.2k	Enclosure 17
18d.	9.4.1 Pg 9-96 9.4.2 Pg 9-113	CBVS/FBCFS Delta-P and Flow Rate Records per RG 1.52, C.2g	Enclosure 18
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22d.	9.4.3 Pg 9-123	ABVS and SGTS Damper Failure	N/A
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22h.	9.4.3 Pg 9-126	AB Areas Not Cooled Following DBA or High Rad Signal	Enclosure 27 Enclosure 28
22i.	9.4.3 Pg 9-129	ABVS Portion of SGTS Compliance with RG 1.52, C.2	Enclosure 29
22j.	9.4.3 Pg 9-129 12/31/81 letter	Maintenance of 40°F in AB	Enclosure 30
23a.	9.4.3 Pg 9-121 9.4.4 Pg 9-134	RWVS and TBVS Compliance with RG 1.140, C.1a-C.1d, C.2a-C.2c and C.2e	Enclosure 24
23b.	9.4.4 Pg 9-135	TB Sample Room A/C System	Enclosure 31
23c.	9.4.4 Pg 9-135	TBVS Compliance with RG 1.29, C.2 and C.3	N/A

24a.	9.4.5.1 Pg 9-139 12/31/81 letter	Maintenance of Minimum Temp in DGB	Enclosure 32
24b.	9.4.5.2 Pg 9-142 12/31/81 letter	Maintenance of Humidity and Minimum Temp in Switchgear and Pump Rooms in SSWPH	Enclosure 32
25.	9.2.5 Pg 9-59 9.2.7 Pg 9-63	Water for Heat Removal, GDC-44	N/A
26.	N/A	LRG-II Positions 1-ASB through 5-ASB	N/A

ATTACHMENT 2

RESPONSES TO DSER OPEN ITEMS

1. 3.4.1 The applicant must show that all safety-related equipment in the control building is protected against flooding as a result of a moderate energy line crack within the control building. (DSER Pages 3-10; 3-29).

Response

As stated in the response to FSAR Question 210.54 (MEB), an analysis of flooding resulting from a moderate energy line crack and its effect on safety related equipment will be provided by the end of January 1985. The analysis will be performed using the methodology described in FSAR Section 3.6.

2. 3.5.1.1
3.5.1.2 Incomplete evaluations of missiles - did not include valve bonnets, thermowells, nuts, bolts, studs, valve stems, fan failures, and gravitational missiles. (DSER Pages 3-13 to 3-17).

Response

a. Justification for not viewing components such as valve bonnets, thermowells, nuts, bolts, studs, and valve stems as possible missiles will be provided by the end of December 1983 in the response to FSAR Question 410.15.

b. Gravitational missiles are addressed in the attached proposed response to FSAR Question 410.16 (Enclosure 1). This response will be incorporated into the FSAR in a future amendment.

c. The effects of missiles from rotating equipment, including fans, on safety related equipment both inside and outside of containment will be evaluated, and the results provided by the end of December 1983.

3. 3.6.1 HELB analysis is not complete; has not provided the results of a compartmental flooding analysis and detailed information on the environmental effects of a HELB and MELB. (DSER Pages 3-28; 3-29).

Response

Updated and revised tables and figures for the pipe whip and jet impingement analysis have been developed and will be submitted by the end of December 1983. Completion of the high energy pipe break analyses is scheduled for completion by the end of January 1985 (see related Questions 410.3, 210.45, and 210.46).

Moderate energy line cracks are addressed in the response to Item 1.

Examples of subcompartment pressure analyses for high energy line breaks outside containment (assumptions, methods, and results) are provided in FSAR Appendix 3B.

4. 4.6 Verify by test that the scram accumulators will maintain the capability to scram for 20 minutes after loss of both CRD pumps and that the scram function is maintained in the event of slowly decaying air pressure in the scram discharge inlet and outlet valves. (DSER Pages 4-50; 4-51; 4-53)

Response

a. Testing of the scram accumulators will be specified in the plant Technical Specifications (STS Section 3/4.1.3.3). In addition, a pre-operational test will be conducted implementing the technical specification requirements.

b. Slowly decaying air pressure in the scram discharge inlet and outlet valves could result in the discharge of water to the scram discharge volume. The scram discharge volume is monitored for accumulated water, and the reactor will scram before the volume is reduced to a point that could interfere with a scram. See FSAR Section 4.6.1.1.2.4.2.5.

5. 5.2.5 The applicant must:

a) provide assurance that the use of the containment floor drain sump will provide an accuracy of leak rate measurement of 1 gpm or better and the capability to detect a leakage rate of 1 gpm in less than one hour.
b) show how leakage from the primary system into the HPCS, LPCS, RCIC (both water and steam lines), and RHR systems is detected when these systems are supposedly isolated from the primary system.
c) specify the availability of the leakage detection methods and limiting conditions for operation based upon this availability in order to meet the guidelines of Regulatory Guide 1.45, Position C.9.
d) revise the FSAR to include a discussion of the sensors (tempera- ture, pressure, and radioactivity - both gaseous and particulate within containment but outside of the drywell) and verify that all systems and measurements which are part of the reactor coolant pressure boundary leakage detection system are accounted for. (DSER Pages 5-14, 5-17, 5-19, 5-20 to 5-22).

Response

a. The leak detection containment floor drain sump level transmitters have a range of 0 to 36 inches and an accuracy of 0.25 percent, or 0.09 inches. For an inflow of 1 gpm, the sump level increases at approximately 0.1 inches per minute. The rate converter has a range of 0 to 10 gpm with a total channel accuracy of 4 percent. Therefore, the design requirement to detect 1 gpm in 1 hour is readily met. This information will be incorporated into the FSAR in a future amendment.

b. As discussed in FSAR Section 5.2.5, various measurements are available to detect leakage of primary coolant into the HPCS, LPCS, RCIC, and RHR systems.

c. Limiting Conditions for Operation of the leak detection system will be contained in the plant Technical Specifications (STS Section 3/4.4.3).

d. The response to this request is provided in revised FSAR Section 5.2.5.1.2 (Enclosure 2). This information will be incorporated into FSAR in a future amendment.

6. 6.7 Specify the maximum allowable leakage rate and the differential pressure across the MSIVs. (DSER Pages 6-73, 6-74).

Response

a. Maximum allowable leakage rate across the main steam isolation valves (MSIV) will be specified in the plant Technical Specification (STS Section 3/4 6.1).

The MSIV leakage rate limit will be established based on the amount of sealing air supplied by the MS-PLCS. The sealing system air compressor capacity will be pro-rated by valve diameter for each valve sealed by the PVLCS and the MS-PLCS such that the total leakage from all valves including ADS accumulator makeup requirements is less than the compressor capacity. Consideration will be given to the following:

1. The containment and drywell are not over pressurized by inleakage of air when the PVLCS and MS-PLCS are in operation.

2. Offsite accident doses do not exceed 10CFR100 criteria and doses within the main control room do not exceed GDC 19 criteria when including the contribution from MSIV leakage (at the established limiting rate) for 20 minutes post-accident (i.e., prior to MS-PLCS initiation).

3. This is consistent with LRG-II position 1-AEB.

b. The differential pressure maintained between the reactor vessel and the pressurized portion of the main steam line by the main steam positive leakage control system (MS-PLCS) is 8.5 psi. This is shown in revised FSAR Section 6.7.2.2 (Enclosure 3). This response will be incorporated into the FSAR in a future amendment.

7. 9.1.1 The applicant must provide assurance that k_{eff} in excess of 0.98 will not be attained in the new fuel storage racks (under optimum moderation). The nature of the administrative controls and the times and conditions under which the new fuel covers will be removed should be addressed. (DSER Page 9-6).

Response

A description of the new fuel storage vault covers is provided in revised FSAR Sections 9.1.1.2 and 9.1.1.3.1 (Enclosure 4). This response will be incorporated into the FSAR in a future amendment.

8. 9.1.2 The applicant has not provided a criticality analysis to confirm the criticality limits to be attained in the spent fuel storage facility. (DSER Pages 9-10, 9-11).

Response

As stated in the current response to FSAR Question 410.6, the criticality analysis for the fuel building spent fuel storage racks will be provided by the end of December 1983. This analysis will verify that k_{eff} will be 0.95 under all normal and abnormal storage conditions.

9. 9.1.3 The applicant should:

a) provide the number of fuel bundles and frequency assumed for "normal" refueling so that the heat load calculations for the spent fuel pool may be verified.
b) show that the spent fuel stored in the dryer storage pool can be cooled in the event of a DBA or loss of offsite power combined with the worst single active failure.
c) show the interconnection of the RHR system with the fuel pool cooling system.
d) show that the syphon breaker design precludes failure so as to cause a reduction in the level of the spent fuel pool in the fuel building below 10 feet above the top of the fuel. (DSER Pages 9-16 to 9-18).
e) [See Draft SER Page 9-18 relative to why syphon breakers are not required for the dryer storage pool.]

Response

a. Assumptions used for the heat load calculations for the fuel building spent fuel pool are provided in revised FSAR Section 9.1.3.1.1 (Enclosure 5). This response will be incorporated into the FSAR in a future amendment.

b. The plant Technical Specifications will prohibit storage of spent fuel in the containment pool during normal plant operation. See revised response to FSAR Question 410.30 (Enclosure 6). FSAR Sections 9.1.3.2.1 and 9.1.3.3 describe the method of cooling the containment fuel pool. This revised response will be incorporated into the FSAR in a future amendment.

c. FSAR Section 9.1.3.2.1 describes the interconnection between the RHR system and the fuel pool cooling system. This interconnection is shown on FSAR Figures 9.1-23a and 5.4-12. Its function as a cooling source is described in FSAR Section 9.1.3.3.

d. Antisiphoning devices are provided on the fuel building and containment spent fuel pool piping to ensure that, in the event of a pipe break, the pool water is not siphoned to a level less than 10 feet above the top of the fuel. The minimum required water shielding depth is 8 ft.- 6 in. above the top of the fuel.

   Two types of siphon breakers are utilized:

   i. A ½ in. diameter hole is drilled in the highest portion of the pipe on those pipes that do not extend to the bottom of the pools.

   ii. A piece of ½ in. pipe extending above the minimum required water level is used on pipes that extend to the bottom of the pools. This piece of pipe is tapped to accept a pipe plug, which is inserted only when it is desired to draw down or empty a pool for maintenance purposes.

   The above-described siphon breakers are passive devices that admit air to the piping system to stop siphon-induced flow. There is no active failure which would preclude to operation of these devices. This information will be incorporated into the FSAR in a future amendment.

e. The dryer storage pool is provided with siphon breakers as shown in Figure 9.1-23a.

10. 9.1.4 The applicant should:

a) show that damage to the fuel building bridge crane is sufficiently limited in the event of an SSE so that either the crane retains its integrity or that any part of the crane becoming dislodged would not result in damage to the spent fuel, the spent fuel pool, or the spent fuel cooling system.
b) discuss what provisions are made for cooling the maximum number of spent fuel bundles in the fuel transfer tube during normal transfer operations and in the event fuel bundles become lodged in the tube. The possibility of a dry tube should also be discussed.
c) provide and analysis to show that the maximum kinetic energy resulting from a fall of any object which weighs less than a fuel bundle and its handling tool, when over spent fuel in either containment or the fuel building storage facilities will not exceed that obtained in the fall of a fuel bundle and its handling tool (Fuel Handling Accident). (DSER Pages 9-24, 9-26, 9-27).

Response

a. Refer to FSAR Sections 9.1.4.2.2.2 and 9.1.4.3. The fuel building bridge crane is equipped with an anti-tipping device (seismic restraint) to prevent the bridge and trolley from leaving the rails during a seismic event. Following installation of the high density spent fuel racks, mechanical blocks attached to the bridge rails will prevent the crane from travelling over or close to the spent fuel pool. Therefore, the dislodging of any major part of the crane will not result in an impact on stored fuel or the spent fuel pool. In addition, within the limits of travel of the crane, there are no spent fuel cooling system equipment or piping which could be impacted by dislodged parts of the crane.

b. The response to this request is provided in revised FSAR Section 9.1.4.2.3.11 (Enclosure 7). This response will be incorporated into the FSAR in a future amendment.

c. The response to this request is provided in revised FSAR Section 9.1.4.3 (Enclosure 8). This information will be incorporated into the FSAR in a future amendment.

11. 9.1.5 The Staff will require that the applicant implement the guidelines contained in NUREG-0612 before any operating license can be issued.

The applicant should:

a) provide the results of an analysis of a spent fuel cask drop accident which verifies that no unacceptable damage to

the spent fuel storage area or to safety-related equipment will result from the drop.

b) verify that the polar crane will not be moved over stored fuel when refueling is not in progress.

c) show that the polar crane meets the guidelines of Regulatory Guide 1.13, Position C.5, with regard to the effect of a load drop on spent fuel in the containment pool.

d) provide the results of the calculations of other polar crane load drops (when the loads could drop into the reactor vessel) to determine their effect on spent fuel in the core. (DSER Pages 9-30, 9-32, 9-33)

e) [See Draft SER Pages 9-32 and 9-33 relative to effects of polar crane load drop on the water level in the containment fuel storage pool]

Response

The schedule for submittal of the heavy loads analysis (NUREG-0612) is provided in an August 9, 1983 letter from J. E. Booker to D. G. Eisenhut (Enclosure 9).

a. The results of the spent fuel cask drop analysis are provided in the partial response to FSAR Question 410.8 (Enclosure 10). This response will be incorporated into the FSAR in a future amendment.

b. Spent fuel is not stored in the containment pool during normal operation, as noted in the response to Item 9(b).

c. As noted above, spent fuel is not stored in the containment pool during normal operation. The arrangement of the containment pools is such that deliberate operator positioning of both the bridge and trolley would be required to transport heavy loads over spent fuel stored in the containment pool. Administrative controls will be implemented to preclude such movement of the polar crane over spent fuel (see FSAR Section 9.1.4.3).

d. This item will be included in the study performed for NUREG-0612.

e. The response to this request is identical to Item 11(c) above.

12. 9.2.2 The applicant must show that:

a) the safety related portion of the RPCCW will not fail as the result of a HELB.

b) the safety-related portion of the RPCCW is protected against internally generated missiles (FSAR Section 3.5.1 does not list the RPCCW as one of the systems which need to be protected against internally generated missiles.) (DSER Page 9-41).

Response

a. The safety-related portion of the reactor plant component cooling water system (RPCCW) is protected from the effects of high energy line breaks. See revised FSAR Section 9.2.2.1 and revised Tables 3.6A-23 and 3.6A-24 (Enclosure 11). This response will be incorporated into the FSAR in a future amendment.

b. FSAR Section 3.5.1 is revised to include the safety-related portion of the RPCCW as one of the items to be protected against internally generated missiles (Enclosure 12). This response will be incorporated into the FSAR in a future amendment.

13. 9.2.3 The applicant should show that the pressure in the makeup water treatment system is always greater than the potentially radioactive sources to which it discharges (including during design basis accidents or loss of offsite power) or provide an explanation as to how adjacent or contiguous safety-related systems (including the control building chilled water system) and control room personnel are protected against the intrusion of radioactive water which has passed into the makeup water system, following a seismic event. (DSER Page 9-44).

Response

The response to this request is provided in revised FSAR Sections 9.2.3.2 and 9.2.3.3 (Enclosure 13). This response will be incorporated into the FSAR in a future amendment.

14. 9.2.6 The applicant should show:

a) that a catastrophic failure of the CST would not cause flooding of any safety-related systems, including electrical power supplies and controls.
b) that a crack in the piping from the CST to the HPCS/RCIC would not adversely affect the operation of these or other safety-related systems. (DSER Pages 9-58, 9-81, 9-83).

c) [See Draft DSER Page 9-81 relative to showing the leakage collection sump and pumps for the CST.]

Response

a. This response to this request is provided in revised FSAR Section 9.2.6.3 (Enclosure 14).

b. This item is addressed in the response to FSAR Question 410.46, submitted to the NRC in Amendment 7.

c. The leakage collection sump and pumps for the condensate storage tank are shown on FSAR Figure 9.2-21a.

15. 9.2.8 / 9.2.9 / 9.2.11 The applicant must demonstrate that all safety-related systems are protected against flooding in the event of a pipe line break in the TPCCW system, the VCWS system, and the CTMW system. (DSER Pages 9-64, 9-65, 9-67, 9-70)

Response

These systems will be included in the moderate energy line crack analysis described in the response to Item 1.

16. 9.3.1 The applicant should:

a) show that the seismic Category, safety class, and quality group of the compressed air system piping and components that interface with the safety/relief valves.
b) verify that the compressed air supply for the safety/relief valves meet the requirements of ANSI MC 11.1-1976 with respect to dewpoint, oil or hydrocarbon content, and free of corrosive or hazardous contaminants.
c) commit to periodic testing to the requirement of ANSI MC 11.1-1976. (DSER Pages 9-72, 9-73, 9-75, 9-76).

Response

a. Both the PVLCS and main steam safety and relief valve air systems are Safety Class 2 and Seismic Category I. Their interface is shown on FSAR Figures 5.2-14b, 9.3-13a, and Table 3.2-1.

b. The compressed air supply for the safety/relief valves meets the requirements of ANSI MC 11.1-1976. The requirements of ANSI MC 11.1-1976 are not applicable to the PVLCS and MS-PLCS air systems since they are service air applications, not instrument air. The revised response to FSAR Question 410.51 and additional revised FSAR sections describing the air systems are provided (Enclosure 15). This response will be incorporated into the FSAR in a future amendment.

c. Periodic testing to assure high quality instrument air meets the requirements of ANSI MC 11.1-1976.

17. 9.3.3 The applicant should:

a) provide drawings and narrative to complete the description of the equipment and floor drainage systems.
b) provide a discussion of the effects of failure of the CST to retain its radioactive contents with respect to prevention of the fluid from entering the environment and flooding of safety-related equipment. (DSER Pages 9-80, 9-81, 9-83)

Response

a. The response to this request is provided in revised FSAR Section 9.3.3 (Enclosure 16). This response will be incorporated into the FSAR in a future amendment.

b. The response to this request is provided in the response to FSAR Question 410.10, submitted in Amendment 5. (Note: Flooding is addressed in Item 14).

18. 9.4.1.1 The applicant should:

a) provide the results of an analysis which shows that the worst single failure of the radiation detection system will not allow entrance of radioactive material into the control room.

b) clarify whether the recirculating charcoal filter or equivalent (to be identified by the applicant) is used when the control room is isolated in the event of a chlorine release.

9.4.2 c) provide a detailed response to show compliance with the guidelines of Regulatory Guide 1.52, Positions C.2.a through C.2.f and C.2.k.

d) discuss how the pressure drop across all critical components of each charcoal filtration train in the MCRAC system will be recorded.

9.4.2 e) justify use of the Associated Air Balance Council tests
9.4.3 in lieu of Section 6 of ANSI N510-1975.
9.4.4 (DSER Pages 9-94 to 9-96, 9-112, 9-113, 9-120, 9-134)

Response

a. Redundant radiation detectors are provided in each of the local and remote air intakes. The redundant detectors are powered from independent power supplies (See Figure 9.4-1a). Therefore, a single failure in the radiation detection system does not cause a loss of the safety function of the control building ventilation system. This conclusion has been verified in the Failure Modes and Effects Analysis (FMEA).

b. The use of the charcoal filtration unit in the event of a chlorine release, as recommended in Regulatory Guide 1.95, is not required (see FSAR Section 2.2.3 for a discussion of potential chlorine release accidents). However, recirculation of the control room air through the charcoal filters in the event of control room isolation can be activated manually.

c. The main control room charcoal filtration units are described in detail in FSAR Sections 6.4.2.2 and 9.4.1, including Table 9.4-2, Item 4. The fuel building charcoal filtration system is described in detail in FSAR Section 9.4.2, including Table 9.4-3, Item 4. Table 6.5-1

provides an item-by-item comparison of these system designs with the positions of Regulatory Guide 1.52. A detailed description of compliance with positions C.2.a through C.2.f and C.2.k of Regulatory Guide 1.52 is provided in new Section 6.4.4.3 and in revised Section 9.4.2.3 (Enclosure 17). This response will be incorporated into the FSAR in a future amendment.

d. As indicated in FSAR Table 6.5-1, Note 1 (Enclosure 18), pressure drop is measured across all critical elements of the main control room charcoal filtration units. Continuous recording of these measurements is not provided. However, high pressure drop is alarmed in the main control room, and the alarm is recorded by the plant computer. Flow through the charcoal filtration units is monitored, but not recorded. Low flow actuates the redundant filter unit. This response will be incorporated into the FSAR in a future amendment.

The Surveillance Requirements of the filter units will be contained in the plant Technical Specifications (STS Section 3/4-7.2).

e. ESF systems ductwork leak tests are performed in accordance with position C.2.1. of Regulatory Guide 1.52. See revised FSAR Table 6.5-1 (Enclosure 19). This response will be incorporated into the FSAR in a future amendment.

The radwaste and turbine building ventilation systems are leak-tested in accordance with the provision of Section 6 of ANSI N510-1980. See revised FSAR Sections 9.4.3.4.2 and 9.4.4.4 (Enclosure 20). This response will be incorporated into the FSAR in a future amendment.

19. 9.4.1.2 The applicant should:

a) revise the FSAR narrative and P&ID to indicate the locations of each of the standby switchgear room AC trains.
b) provide a discussion of the significance of having two feedlines from the SSRAC system to battery room 1C while the other two rooms have only one feedline. (DSER Page 9-99).

Response

a. The standby switchgear rooms air-conditioning is located in the Control building at elevation 71'-0". See revised FSAR Section 9.4.1.2.2 and revised FSAR Figure 9.4-16 (Enclosure 21). This response will be incorporated into the FSAR in a future amendment.

b. There is no significance associated with having two separate air intake lines to battery room 1C. This room

is located close to the ductwork main which makes two intakes a better ductwork arrangement. The other two battery rooms are located further away from the ductwork main. For these two rooms, a single takeoff with a split before entering the room is a better ductwork arrangement.

20. 9.4.1.4 The applicant should provide revised P&IDs to show the condenser cooling water pumps and the associated piping arrangements. (DSER Page 9-103).

Response

The condenser cooling water pumps are shown on Figure 9.2-1a, Zones 5-I, 7-I, 9-I, and 10-I.

The cross-ties between the control building chilled water system and the standby service water system are shown on revised FSAR Figures 9.2-9a and 9.2-2b, Zones 2-E and 7-B. (Enclosure 22). The revised figures will be incorporated into the FSAR in a future amendment.

21. 9.4.2 The applicant should verify that records of volumetric flow and pressure drop will be kept to assure charcoal train operability in the event they need to be used. (DSER Pages 9-96, 9-113).

Response

The response to this request for the fuel building charcoal filtration units is identical to Item 18(d) for the main control room charcoal filtration units.

22. 9.4.3 The applicant should:

a) specify whether the operator will manually shut down the ventilation system upon receipt of a high airborne and radioactivity alarm or whether approval is required by an administrative official.
b) provide a discussion of the effects of roof exhaust damper failing open upon a high radiation signal.
c) provide a detailed response which shows compliance with the guidelines of Regulatory Guide 1.140, Positions C.1.a through C.1.d and C.2.a through C.2.e.
d) verify that no single failure of the isolation dampers between the auxiliary building ventilation systems and the SGTS, either during normal or accident conditions, will damage or defeat the SGTS.
e) provide a P&ID which shows each compartment of the ABVS and the equipment it serves. The room boundaries should be indicated.
f) provide the seismic Category and Quality Group classification of the fans in Table 3.2-1.

g) verify that the unit cooler information in Table 3.2-1 is correct. If the information is correct FSAR Section 9.4.3 should reflect that information.
h) provide a discussion for each area of the auxiliary building which is not cooled in the event of a DBA or high radiation signal.
i) provide a discussion of compliance with the guidelines of Regulatory Guide 1.52, Position C.2.
j) provide a discussion of the means to maintain the building at the minimum temperature of 40°F and the effects of this minimum temperature on normal operation and maintenance. (DSER Pages 9-119, 9-121, 9-123, 9-125, 9-126, 9-129, 9-130, 9-134).

Response

a. The radwaste ventilation system is shut down manually in the event of detection of high airborne radiation in the radwaste building. See revised FSAR Section 9.4.3.3.2, Item 2. (Enclosure 23). This response will be incorporated into the FSAR in a future amendment.

   Analyses of the radiological consequences of limiting failures in radioactive gas and liquid waste systems are presented in FSAR Section 15.7. In these analyses, no credit has been taken for any operator action to shutdown or isolate ventilation systems. Therefore, failure of the operator to shut down the radwaste building ventilation system upon detection of high airborne radiation does not result in consequences worse than those already analyzed.

b. The single isolation damper in the radwaste building ventilation system exhaust duct is designed to fail in the closed position. However, if it were to fail in the open position, in conjunction with a high radiation signal, the radiological consequences would be bounded by those analyzed in FSAR Section 15.7. See the discussion under Item 22(a) above.

c. Compliance of the charcoal filtration system in the radwaste building ventilation system (RBVS) (and in the turbine building ventilation system (TBVS)) is addressed in FSAR Table 1.8-1 and in Table 9.4-6. Specific details are provided in revised Section 9.4.3.3 and 9.4.4.3 (Enclosure 24).

d. The isolation dampers between the auxiliary building ventilation system (ABVS) and the standby gas treatment system (SGTS) are normally closed, and are opened in the event of an accident (See dampers 1HVR*AOD18A and B, Figure 9.4-7a, Zone G-5). These dampers are designed to fail open. As shown in Figure 9.4-7a, these dampers are located in separate, parallel flow paths and are powered

from separate, redundant electric power supplies such that the failure of one damper does not prevent the establishment of the flow path from the ABVS to the SGTS.

e. The equipment contained in the three safety-related pump rooms served by unit coolers in the ABVS is clarified in the attached revised FSAR Section 9.4.3.2.1.3 (Enclosure 25). The area served by each unit cooler in the ABVS is shown schematically in Figure 9.4-7e. This response will be incorporated into the FSAR in a future amendment.

f. The response to this request is provided in revised FSAR Table 3.2-1, Item XXXI,(Enclosure 26) and Section 9.4.3.2.1.3 (Enclosure 27). This response will be incorporated into the FSAR in a future amendment.

g. The information in FSAR Table 3.2.-1, Item XXXI, is correct as revised per item 22(f) above. FSAR Section 9.4.3 is revised accordingly (Enclosure 27). This response will be incorporated into the FSAR in a future amendment.

h. The only area of the auxiliary building not cooled in the event of a DBA and/or loss of offsite power or a high radiation signal is the CRD maintenance area. This area is intended for testing and maintenance of CRD mechanisms, and is not required for safe shutdown of the reactor or to mitigate the consequences of an accident. This area is normally cooled by non-safety-related unit cooler 1 HVR-UC14. See the revised FSAR Section 9.4.3.2.1.3 (Enclosure 27) and Table 9.4-4 (Enclosure 28). This response will be incorporated into the FSAR in a future amendment.

i. The auxiliary building system ductwork conveying exhaust air to the SGTS in the event of a high exhaust radiation signal complies with the guidelines of applicable portions of position C.2 of Regulatory Guide 1.52 as described in revised Section 9.4.3.3.1 (Enclosure 29). This response will be incorporated into the FSAR in a future amendment.

j. Auxiliary building heating is provided to prevent freezing of fluid systems located in the building. See response to FSAR Question 410.63 (Enclosure 30). This response will be incorporated into FSAR in a future amendment.

Normal operation of equipment at the design minimum temperature of 40°F is not affected as the equipment is qualified to this temperature. Normal maintenance is not expected to be adversely affected by the 40°F temperature

23. 9.4.4 The applicant should:

a) provide detailed information to show compliance with Regulatory Guide 1.140, Positions C.1.a through C.1.d, C.2.a through C.2.c, and C.2.e.
b) revise P&ID Figure 9.4-4 to include the sample room HVAC system and appurtenances.
c) provide a discussion which shows that the system meets the guidelines of Regulatory Guide 1.29, Positions C.2 and C.3. (DSER Pages 9-121, 9-134, 9-135).

Response

a. See the response to Item 22(c), which also applies to the charcoal filtration system in the turbine building ventilation system.

b. A drawing is provided of the turbine building sample room HVAC system (Enclosure 31). Figure 9.4-4b will be revised and incorporated into the FSAR in a future amendment.

c. The turbine building ventilation system (TBVS) is located within the turbine building. The building is a non-Seismic Category I structure. As noted in FSAR Section 9.4.4.1, all components of the TBVS are non-nuclear safety-related, nonseismic,and are not required to operate following a DBA. Regulatory Guide 1.29, Positions C.2 and C.3, are not applicable to the TBVS.

24. 9.4.5 The applicant should:

a) provide a discussion of the operation of the exhaust fan with respect to accommodating the minimum and maximum outside temperatures for both normal and accident conditions.
b) verify that under no conditions will the temperature, pressure or humidity conditions exceed the environmental qualifications of the safety-related equipment in the diesel generator rooms and the standby service water switchgear and pump rooms. (DSER Pages 9-139, 9-142).

Response

a. Diesel generator room heating is provided to maintain the design minimum temperature and to prevent freezing of fluid systems located in the rooms during the winter when the diesel generators are not operating. See the response to FSAR Question 410.64 (Enclosure 32). This response will be incorporated into the FSAR in a future amendment.

b. Heating is provided for the standby service pump rooms and switchgear rooms to maintain the design minimum temperature during the winter. See the response to FSAR Question 410.64 (Enclosure 32).

Humidity in the switchgear rooms is uncontrolled. The safety related equipment in these rooms is qualified for the environmental conditions to which it may be subjected.

25. During the NRC Auxiliary Systems Branch meeting of September 28, 1983 the Staff indicated that this issue has been CLOSED as the result of their review to GSU's compliance with the requirements of General Design Criterion 44.

26. The endorsement to LRG-II positions 1-ASB through 5-ASB is provided below. This table will be incorporated into the FSAR in a future amendment.

Item	Title	Endorsed	FSAR Discussion
1-ASB	BWR Scram Discharge Volume Modifications	Yes	Q410.17
2-ASB	Safe Shutdown for Fires and Remote Shutdown Systems	Yes	------
3-ASB	Protection of Equipment in Main Steam Pipe Tunnel	Yes	APP 3B and 3.11
4-ASB	Design Adequacy of the RCIC System Description of Pump Room Cooling System	Yes	9.4.3.2.1.3
5-ASB	Control Rod Drive System Vessel Inventory Make-up Rate Test	Yes	------

ENCLOSURE 1

QUESTION 410.16 (3.5.1.1, 3.5.1.2)

Provide assurance that in your review you have considered missiles due to gravitational effects (of such components as electrical hoists or any unrestrained equipment and non-safety-related items such as piping, non-Class 1E conduit, instrument tubing trays, structures, HVAC ducting, and non-Class 1E cable trays) during maintenance times, reactor operation and following any abnormal event.

RESPONSE

The response to this request ~~will be~~ is provided ~~by the third quarter of 1983.~~ in new Section 3.5.1.1.3. 7

INSERT Section 3.5.1.1.3

3.5.1.2 Internally Generated Missiles (Inside Containment)

Details for internally generated missiles inside the containment are given in Section 3.5.1.1.

3.5.1.3 Turbine Missiles

3.5.1.3.1 Turbine Placement and Orientation

Turbine placement and orientation for two units uses a peninsular arrangement as shown in Fig. 3.5-1. The axis of the turbine generator is oriented in a north-south direction, with the reactor and auxiliary buildings located to the north on the same centerline.

Fig. 3.5-1 also indicates the ±25-deg missile ejection zone for low-trajectory turbine missiles due to low-pressure turbine discs[4].

Fig. 3.5-1 identifies the Units 1 and 2 target areas for low-trajectory missiles. Applicable surfaces for which the wall areas are considered targets are also shown. The other surfaces have been excluded as targets because they are outside the ejection zone for low-trajectory missiles.

For high-trajectory missiles, target areas are the roof areas of all Seismic Category I structures.

3.5.1.3.2 Missile Identification and Characteristics

For turbine missile evaluation, a hypothetical missile is considered to be generated in the disc plane. As it penetrates through the stationary turbine parts, the missile is deflected from the vertical plane. It has been determined that the deflection angle is a maximum of 5 deg on each side of the plane of the disc for inner stage buckets. For last stage buckets, the deflection angles may be up to 25 deg on each side of the plane of the disc.

The missile characteristics used for this turbine missile strike probability evaluation have been provided by GE[2]. They are listed in Tables 3.5-1 and 3.5-2.

3.5.1.3.3 Target Description

Structures, equipment, and components which are required to perform safe shutdown and to maintain the cold shutdown, or to prevent the release of radiation to within allowable limits, are protected against turbine missiles. These

INSERT (For Page 3.5-5)

3.5.1.1.3 Gravitational Missiles

Seismic Category I systems, components, and structures are not potential gravitational missile sources.

Nonseismic items and systems in Seismic Category I buildings are classified as follows:

a. General

   All suspended nonsafety-related items such as piping, non-Class 1E conduit, instrument tubing structures, and HVAC ducting which could adversely affect safety related equipment in the event of failure are supported to prevent collapse during an SSE.

b. Cable Tray

   All cable trays for both Class 1E and non-Class IE circuits are seismically supported whether or not a hazard potential is evident.

c. Equipment for Maintenance

   All other equipment, which could adversely affect safety related equipment in the event of failure such as hoists, that is required during maintenance is either removed during operation or is restrained to prevent it from becoming a missile.

ENCLOSURE 2

monitors trip and activate an alarm in the main control room on detection of leakage from monitored components.

Excessive leakage inside the drywell (e.g., process line break or LOCA within drywell) is detected by high drywell pressure, low reactor water level or steam line flow (for breaks downstream of the flow elements). The instrumentation channels for these variables trip when the monitored variable exceeds a predetermined limit to activate an alarm and trip the isolation logic which closes appropriate isolation valves (Table 5.2-8).

The alarms, indication and isolation trip functions initiated by the leak detection systems are summarized in Tables 5.2-7 and 5.2-8.

5.2.5.1.2 Detection of Leakage External to the Drywell (within Containment)

The detection of leakage within the containment (outside the drywell) is accomplished by detection of increases in containment floor drain sump and containment equipment drain sump fillup time and pumpout time. The containment floor drain sump monitors detect unidentified leakage increases with a sensitivity of 50 percent of normal background and activate an alarm in the main control room when total leakage reaches 5 gpm. The containment equipment drain sump monitors detect identified leakage increase with a sensitivity of 50 percent normal background leakage and activate an alarm in the main control room when total leakage reaches 25 gpm.

INSERT →

5.2.5.1.3 Detection of Leakage External to Containment

The areas outside the containment which are monitored for primary coolant leakage are: equipment areas in the auxiliary building, the main steam tunnel, and the turbine building. The process piping for each system to be monitored for leakage is located in compartments or rooms separate from other systems where feasible so that leakage may be detected by area temperature indications. Each temperature and pressure leakage detection system detects leak rates that are less than the established leakage limits. The sumps outside the containment are equipped with a high-high alarm set point.

1. The monitored areas are monitored by dual element thermocouples for sensing high ambient temperature in the areas and high differential temperature between the inlet and outlet ventilation ducts

INSERT (For Page 5.2-35)

In addition, the containment is provided with radiation monitors which could provide an indication of RCPB leakage. These monitors are further described in Sections 11.5.2.1.2.3 and 12.3.4.

ENCLOSURE 3

The MS-PLCS isolation valves remain closed if the main steam line pressure is higher than the pressure interlock set point. When the interlock is cleared, air is admitted to raise the pressure of the steam lines 8.5 psi above the reactor vessel pressure ~~(based on a predetermined differential pressure~~ to ~~be~~ establish~~ed as~~ the containment leakage barrier~~)~~. Once the valves have cycled open, the pressure interlock function is disarmed and only a system isolation trip signal or the initiating RMS turned to "off" position can actuate reclosure. A pressure-control valve maintains the required pressure differential of 8.5 psi between the reactor vessel and the pressurized portion of the main steam line.

A 5-min timer is activated when closure of the drain valve is completed. During this time air is injected via a line which bypasses the pressure-control valve in order to provide an initial high flow at low differential pressure to rapidly pressurize the main steam line volume. When the 5-min timer cycle is completed, the bypass flow is isolated and the system air flow is reduced to that required for steady-state operation. If high flow or low differential pressure persists after the timer cycle is completed, an alarm is annunciated in the main control room. Further increase or flow, or continuous reduction of differential pressure to a specified set point, result in an automatic isolation of the respective MS-PLCS.

The bypass valve automatically closes on either timer set point duration, or upon establishing the required pressure differential between the main steam system and the reactor vessel.

6.7.2.3 Equipment

The following equipment is provided to accomplish system operation:

1. <u>Piping</u> - Process piping is carbon steel pipe throughout the system. The portion of the system piping, connected to the main steam piping between MSIVs, up to and including the first MS-PLCS isolation valve, is designed and constructed to ASME Section III, Class 1. The remainder is designed and constructed to ASME Section III, Class 2. The equipment and piping installation is designed to withstand Seismic Category I loads.

2. <u>Valves</u> - Motor- or solenoid-operated valves provide the required isolation and/or process control following system initiation. The valves are

ENCLOSURE 4

fuel element rests against the rack to provide lateral support. The design of the racks prevents accidental insertion of the fuel assembly in a position not intended for the fuel. This is achieved by abutting the sides of each casting to the adjacently installed casting. In this way, the only spaces in the assembly are those into which it is intended to insert fuel. The weight of the fuel assembly is supported by the lower tie plate which is seated in a chamfered hole in the base casting.

The material specifications for the racks are ASTM B108, alloy SG708-T61, and ASTM B211, alloy 6061-T651. 5

The floor of the new fuel storage vault is sloped to a drain located at the low point. This drain removes any water that may be accidentally and unknowingly introduced into the vault. The drain is part of the fuel building drain system and ultimately discharges to the liquid radwaste system.

INSERT A →

The radiation monitoring equipment for the new fuel storage area is described in Section 7.6.1.4.

9.1.1.3 Safety Evaluation

9.1.1.3.1 Criticality Control

The calculations of k_{eff} are based upon the geometrical arrangements of the fuel array and subcriticality does not depend upon the presence of neutron absorbing materials. The arrangement of fuel assemblies in the fuel storage racks results in k_{eff} below 0.95 in a dry condition or completely flooded with water which has a density of 1 g/cc. To meet the requirements of General Design Criterion 62, geometrically-safe configurations of fuel stored in the new fuel array are employed to assure that k_{eff} does not exceed 0.95 if fuel is stored in the dry condition or if the abnormal condition of flooding (water with a density of 1 g/cc) occurs. In the dry condition, k_{eff} is maintained ≤0.95 due to under-moderation. In the flooded condition, the geometry of the fuel storage array assures the k_{eff} remains ≤0.95 due to over-moderation. No limitation is placed on the size of the new fuel storage array from a criticality standpoint since all calculations are performed on an infinite basis.

REPLACE WITH INSERT B →

~~Administrative controls will be provided to preclude sources of optimum moderation in the new fuel storage area during the movement of fuel. Additionally, solid non combustible covers will be provided over the fuel when possible.~~ 3

INSERT A (Page 9.1-3)

The new fuel storage vault is provided with twelve separate steel covers to prevent moisture and debris from entering the vault. The covers are fabricated solid steel checked plate, with steel grating attached to the underside. The covers are attached to the fuel building floor by hinges. Gasket material is attached to the fuel building floor providing a seal around the perimeter of the new fuel vault between the covers and the floor.

INSERT B (Page 9.1-3)

Administrative controls are provided to preclude removal of the new fuel storage vault covers during times other than:

1. movement of fuel in or out of the vault
2. inspections
3. special nuclear material accounting

Additionally, administrative controls are provided to preclude sources of optimum moderation in the new fuel storage vault area.

ENCLOSURE 5

The heat load for normal operation was calculated based on the following: 3

a. Storage of 425 percent of an equilibrium core is in the pool. INSERT

b. A batch of equilibrium core from the most recent refueling outage is assumed to have been in the pool 150 hr after reactor shutdown, with the batches from previous refueling outages in the pool.

4. The fuel pool cooling subsystem is designed to remove the decay heat from the combined fuel storage pools' capacity at a rate sufficient to maintain the temperature of the water at or below 156°F, when 525 percent of an equilibrium core is stored in the pools (Fig. 9.1-8). The calculation of the water temperature for this abnormal load with the storage of 525 percent of an equilibrium core was based on the following:

   a. A full core removal event is assumed to be required at the time when batches from each of the previous refueling outages, totaling 4.25 cores, are in the pool.

   b. The last refueling outage required 30 days to complete. At the end of the 30-day period, the reactor was started up and brought to full power, and was forced to be shut down immediately and the full core was removed, which required 10 days. Two hundred spent fuel assemblies from the full core were stored in the containment fuel storage pool.

5. The fuel pool cooling subsystem is designed to maintain the temperature of the containment fuel storage pool water at or below 127°F, when 30 percent of an equilibrium core is stored in the fuel storage area of the containment pool during refueling operations.

6. The decay heat generated by the spent fuel was calculated in accordance with Branch Technical Position ASB9-2.

The fuel pool cooling subsystem is also designed to: 1) provide makeup water to the fuel building pools and containment pools from the condensate storage tank; 2) provide makeup water to the fuel building pools and containment pools from the standby service water system; 3)

INSERT (For Page 9.1-17)

This storage is comprised of 200 fuel assemblies removed from the first core after the first 18 months of operation, and 248 assemblies removed each 18 month refueling cycle thereafter. Residual decay energy release rates are calculated in accordance with Branch Technical Position ASB 9-2, Rev. 1.

ENCLOSURE 6

QUESTIONS 410.30 (9.1.3)

Will there be a technical specification or other provision prohibiting storage of spent fuel inside containment while the reactor is in operation?

Show that the loss of one RHR train (either "A" or "B" train) will not prevent satisfactory cooling of the reactor core, containment fuel pool or spent fuel pool during the refueling operation. In your consideration, select that single failure to make the RHR train inoperative which would produce the most severe consequences and explain your selection.

RESPONSE

~~There are no plans for development of a proposed technical specification or other provision that would prohibit storage of spent fuel inside the containment while the reactor is in operation.~~

REPLACE WITH INSERT

INSERT (For Page Q&R 9.1-11)

The plant Technical Specifications will prohibit storage of spent fuel in the containment pool during normal plant operation.

ENCLOSURE 7

provided by a load cell. Carriage position readout is provided. Cable enclosures, attached to the sheave box and projecting above the containment upper pool water level, provide the means for cable exit from the transfer tube while isolating the pool water from the tube.

A vent pipe with a fluid stop connected to the containment ventilation system isolates the displaced air in the tube during filling from the reactor building atmosphere and confines the water surge to the pool water.

A hydraulic power unit is provided in each building to actuate the cylinders attached to the upenders, the fill valve, the flap valve, and the fuel building gate valve.

In both buildings, the pool area in which the transfer system components are located is physically separated from the fuel storage area by a concrete wall which serves as a positive barrier to prevent fuel in the storage area from being uncovered in the event of loss of pool water through the transfer system. In addition, these walls are provided with gates to allow drainage of the transfer pool areas for maintenance and/or removal of the transfer tube and components.

Control panels are provided in close proximity to each transfer pool area and are connected for voice and interlock communication. Each panel has control buttons for actuating the upender, a button for initiating the transfer sequence to the other building and a stop button. The transfer operation functions on an automatic basis with provision made for manual override. Automatic sequencing is accomplished by use of an electronic controller located in the fuel building which utilizes sensors for confirming the successful completion of each step before initiating the next step. The completion of a transfer sequence is signaled at the control panels.

INSERT ⟶

Interlocks assure the correct sequencing of the transfer system components and fuel handling equipment during automatic or manual override operation. Interlocks prevent the refueling platform from moving into the reactor building transfer area unless the gate valve (25) is closed and the upender (7) is in the vertical position and prevent upender movement if the platform is in the transfer area. Interlocks prevent the fuel handling platform from moving into the fuel building transfer area unless the upender (31) is in the vertical position and prevent movement of the upender if the platform is in the transfer area.

INSERT (Page 9.1-36)

The Inclined Fuel Transfer control system is operated on a semi-automatic basis. Safety interlocks prevent opening the transfer tube bottom valve when the flap valve is open and vice versa to prevent drainage of the Reactor Building fuel transfer pool.

The interlock control system has dual channel logic which provides a backup sensor for each required sensor which provides the redundancy necessary for the system to function safely. The failure of a channel to perform its intended function causes an alarm which identifies the failed channel.

Emergency cooling is available in the unlikely event of the tilt tube becoming lodged in the transfer tube. The worst case scenario would be if the tilt tube, with the maximum heat source (two freshly discharged fuel assemblies), was lodged above the water exit valve with all valves closed and a loss of power and transfer tube leak occured. Thirty minutes is available before the water in the tilt tube boils down to active fuel level. The addition of cooling water by manually opening the water inlet valve or by running a hose through the vent pipes, would be started within thirty minutes. This additional cooling can maintain the fuel at a safe temperature indefinitely.

ENCLOSURE 8

INSERT (For Page 9.1-61)

The only items that are transported across the spent fuel pool or the containment fuel storage pool are the fuel channels, the fuel assemblies, or the individual sub-assemblies or components of these fuel assemblies. These items are handled by the same grapple that handles the entire fuel assembly, and the retraction elevation is limited to insure that the minimum safe water level is maintained over the fuel assembly during transport.

The lighter components of the fuel assembly, and the channels, which are much lighter than the fuel assemblies, cannot be raised any higher than a fuel assembly. Thus, the kinetic energy associated with an accidental drop is much less than that of a dropped fuel assembly.

cable" signal from the lifting cables indicates that the fuel assembly is seated.

In addition to the main hoist on the trolley, there is an auxiliary hoist on the trolley, and another hoist on its own monorail. These three hoists are precluded from operating simultaneously because control power is available to only one of them at a time. The two auxiliary hoists have load cells with interlocks which prevent the hoists from moving anything as heavy as a fuel bundle.

The two auxiliary hoists have electrical interlocks which prevent the lifting of their loads higher than 8 ft under water. Adjustable mechanical jam-stops on the cables back up these interlocks.

Administrative procedures and training are provided to control the handling of objects over the spent fuels in both the containment and spent fuel buildings so that the maximum kinetic energy of the object, if dropped from the height at which it is normally handled above a storage rack, does not exceed the kinetic energy assumed in any previously accepted analysis.

INSERT →

In summary, the fuel handling system complies with General Design Criteria 2, 3, 4, 5, 61, 62, and 63, applicable portions of 10CFR50, and Regulatory Guide 1.13. In addition, procedures and training, inspection and maintenance programs will be developed in accordance with Section 5.1 and NUREG-0612. 3

A system-level, qualitative-type failure mode and effects analysis relative to this system is discussed in Section 15A.6.5.

The safety evaluation of the new and spent fuel storage is presented in Sections 9.1.1.3 and 9.1.2.3.

9.1.4.4 Inspection and Testing Requirements

9.1.4.4.1 Inspection

Refueling and servicing equipment is subject to the controls of QA required for their safety class. Components defined as essential to safety, such as the fuel storage racks, refueling platform, and fuel transfer tube have an additional set of engineering specified, quality requirements that identify safety-related features which require specific QA verification of compliance to drawing requirements.

ENCLOSURE 9

GULF STATES UTILITIES COMPANY
POST OFFICE BOX 2951 • BEAUMONT, TEXAS 77704
AREA CODE 713 838-6631

August 9, 1983
RBG-15,640
File Nos. G9.11, G9.33.4

Mr. Darrell G. Eisenhut, Director
Division of Licensing
Office of Nuclear Reactor Regulations
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Eisenhut:

River Bend Station-Units 1 & 2
Docket Nos. 50-458/50-459

In Gulf States Utilities Company's (GSU) January 6, 1983 letter to your office, a submittal date of August 5, 1983, was established for responding to the scope of work required in section 2.1 (Phase 1) of Enclosure 3 to your December 22, 1980 letter, "Request for Additional Information on Control of Heavy Loads." To support the River Bend Station (RBS) fuel load schedule of April, 1985, a Consultant will now be assisting GSU in its control of heavy loads evaluation. Phase 1 is now scheduled to be submitted to your office by February, 1984. Sections 2.2 and 2.3 (Phase 2, of Enclosure 3) to your December 22, 1980 letter is anticipated to be complete by October, 1984.

Sincerely,

J E Booker

J. E. Booker
Manager-Engineering,
Nuclear Fuels & Licensing
River Bend Nuclear Group

JEB/RJK/kt

Enclosures

ENCLOSURE 10

QUESTION 410.8 (9.1.4.3)

Provide a schedule for submittal of spent fuel cask drop analysis and the polar crane load drop analysis or provide the analyses.

RESPONSE

~~The spent fuel cask drop analysis and the polar crane load drop analysis will be provided by June 1983~~. 7

REPLACE WITH INSERT

INSERT (For Page Q&R 9.1-3)

The spent fuel cask drop analysis is provided in revised Section 9.1.4.3. The polar crane load drop analysis will be provided by the end of December, 1983.

maintaining an adequate water level over the open cask for cooling and shielding purposes. After decontamination of the cask external surfaces, it is mounted on its transport vehicle with its attendent cask cooling systems, if necessary. The loaded spent fuel shipping cask is then ready for shipment offsite.

9.1.4.3 Safety Evaluation, Fuel Handling System

Safety aspects (evaluation) of the fuel servicing equipment are discussed in Section 9.1.4.2.3 and safety aspects of the refueling equipment are discussed throughout Section 9.1.4.2.7. A description of fuel transfer, including appropriate safety features, is provided in Section 9.1.4.2.11. In addition, the following summary safety evaluation of the fuel handling system is provided.

The SFCT is designed so that during a seismic event, no part of the trolley system, including main trolley, auxiliary trolley, and auxiliary bridge, leaves its rails or becomes detached. The SFCT is not designed to be operable during or after a seismic event. The spent fuel cask drop analysis ~~is~~ was ~~currently being~~ performed to verify that a cask drop does not result in unacceptable damages to the spent fuel storage facility or safety related equipment. INSERT ~~Detailed results of this analysis will be provided by a later amendment to the FSAR.~~ The fuel handling accident involving a fully loaded spent fuel cask is addressed in Section 15.7.5.

The fuel building bridge crane is not seismically designed but is provided with seismic restraints to prevent the trolley and bridge from leaving the rails during a seismic event.

The RBPC is designed and fabricated so that no component becomes detached during a seismic event. The crane bridge and trolley are designed and fabricated so that they do not leave their rails during a seismic event. The RBPC is not designed to be operable during or after a seismic event. An analysis was performed to determine the structural consequence of dropping the RPV head during maintenance operations. It was postulated that the vessel head would be dropped from a height of approximately 40 ft above the vessel-head flange, and that at impact, the head would be rotated 90 deg from the in-place orientation causing a point impact on the vessel.

The vessel loads due to the postulated impact were determined by dynamic, elastic perfectly-plastic finite element analysis.

INSERT (For Page 9.1-59)

The following considerations are applied in performing the cask drop analysis:

1. The cask is assumed to be a maximum loaded cask with a weight of 125 tons and handled by the main hook.

2. Each postulated cask drop assumes impact in a manner that inflicts the most severe damage.

3. No credit is taken for the spent fuel cask trolley's multiple independent braking systems, limit switches, or other safety features.

4. Drop analyses are based on an elastic-plastic curve that represents a true stress-strain relationship.

5. The cask is assumed to be transported at a height of 6 inches above elevation 113'-0" (Fig. 9.1-9).

6. All energy of each postulated drop is assumed to be absorbed by the structure.

7. Drops are postulated along the travel path of the cask (Fig. 9.1-9) not restricted by mechanical stops.

8. The cask is assumed to be rigid and not to experience any deformation during impact.

9. The cask pool is assumed to be flooded during the cask-handling process. The water level is lowered slightly to avoid spill-over while the cask is being handled in the pool. However, this small loss of water does not significantly diminish the drag forces of the cask pool volume.

The cask drop analysis shows that there are no unacceptable effects caused by the free fall of the cask at any point along the path of the main hoist's travel. The evaluation criteria of NUREG-0612, Section 5.1, are satisfied. None of the postulated cask drops result in the release of radioactivity. There is no damage to fuel or fuel storage racks since the SFCT Main Hook Position is fixed at the midpoint between the trolley rails, and thereby prevents the cask from being handled over the fuel storage pool or its walls. As shown in Fig. 9.1-9, rail stops prevent travel of the main hoist over the lower fuel transfer pool or its walls. None of the postulated drops cause damage that result in water leakage from the fuel storage pool. No damage to safe shutdown equipment or degradation in safe shutdown capability is experienced due to any of the postulated drops. As shown in Fig. 9.1-9 the cask does travel over a pipe tunnel (Position 3) which contains safety-related electric cable and one safety-related pipe. However, analysis of the postulated drop

shows that the reinforced concrete member does not collapse or experience generalized failure. Localized spilling of the concrete may occur, but it will be contained by metal decking and therefore is not considered capable of disabling the safety-related pipe or electric cable. The postulated cask drops at Positions 4 and 5 (Fig. 9.1-9) do not result in unacceptable damage to the reinforced concrete member or slab. A cask drop at either of these positions can be expected to cause localized chafing of the concrete at the impact point; however, analysis shows that structural integrity is maintained and no collapse, structural failure, or breach of the adjacent walls is caused.

A cask drop in the outside loading area does not result in any unacceptable damage since the cask's fall is onto the rail car or the rail tracks and does not impact any fuel building structural members.

ENCLOSURE 11

3. Remotely actuated valves are provided in the component cooling water system to isolate the piping which is not safety related from that which is safety related.

4. The RPCCW system is designed to provide a closed cooling water loop between potentially radioactive systems and the service water system used for cooling.

5. The RPCCW system is designed as a single unit system and does not share functions, piping, or equipment with other units.

6. System containment penetrations and isolation valves are designed to meet Seismic Category I and ASME Section III, Class 2 requirements. The process piping to and from the fuel pool coolers and RHR pump seal coolers, including the component isolation valves, is designed to meet Seismic Category I and ASME Section III, Class 3 requirements. The remainder of the system is designed to ANSI B31.1, TEMA, NEMA, and ASME Section VIII Codes and Standards as applicable. The RPCCW system also meets the requirements of 10CFR50, Appendix A, GDC 44, 45, 46, 54, and 57; and is designed according to the River Bend Station positions on Regulatory Guides 1.26, 1.29, 1.46, and 1.53 as applicable.

7. The safety-related components of the RPCCW system are located within plant structures which are designed to protect against the effects of adverse external environmental conditions as discussed in Sections 3.3, 3.4, 3.5, and 3.7. In addition, INSERT A. Section 3.6 and Appendix 3C address, respectively, the ability of the safety-related portions of the INSERT B system to withstand the effects of moderate energy pipe cracks and the resultant internal flooding. Section 3.11 addresses the qualification of safety-related components to specified internal environmental conditions such as pressure, temperature, humidity, and radiation.

1

9.2.2.2 System Description

The system is a closed-loop design and consists of three 50 percent flow cooling water pumps, three 50 percent capacity heat exchangers, one system surge tank, redundant headers in that portion of the system which is shared with

INSERT A (Page 9.2-6)

Protection is provided from the effects of internally generated missiles as described in Section 3.5.

INSERT B (Page 9.2-6)

...both high energy pipe breaks and ...

TABLE 3.6A-23 (Cont)

15. Penetration valve leakage control system[3]

16. Spent fuel pool cooling system[3]

17. Safety related portion of the reactor plant component cooling water system (RPCCW)

~~17~~ 18. The following equipment/systems, or portions thereof, required to assure the proper operation of those essential items listed in items 1 through ~~16~~ 17:

    a. Class IE electrical systems, ac and dc (including diesel generator system[3], emergency buses[3], motor control centers[3], switchgear[3], batteries[3], and distribution systems)

    b. Standby service water[3] to the following:

        (1) Unit coolers

        (2) Pumps coolers (motors and seals)

        (3) Diesel generator jacket coolers

        (4) Electrical switchgear coolers

    c. Environmental systems[3] (HVAC)

    d. Instrumentation (including post-LOCA monitoring)

---

[1] The essential items listed in this table are protected in accordance with Section 3.6.1A, consistent with the particular pipe break evaluated.

[2] Refer to Section 6.3 for detailed discussion of emergency core cooling capabilities.

[3] Located outside containment, but listed for completeness of essential shutdown requirements.

TABLE 3.6A-24

ESSENTIAL SYSTEMS/COMPONENTS/EQUIPMENT
EVALUATED FOR PIPE FAILURES OUTSIDE CONTAINMENT

1. Containment isolation system and containment boundary

2. Reactor protection system (SCRAM signals)

3. Emergency core and containment cooling systems

   a. HPCS or RCIC
   b. One LPCI or LPCS
   c. RHR shutdown cooling mode (one loop)
   d. RHR suppression pool cooling mode (one loop)

4. Flow restrictors

5. Main control room habitability system

6. Spent fuel pool cooling system

7. Standby gas treatment system

8. Safety related portion of the reactor plant component cooling water system (RPCCW)

9 ~~8~~. The following equipment/systems, or portions thereof, are required to assure the proper operation of those essential items listed in items 1 through ~~7~~ 8:

   a. Class 1E electrical systems, ac and dc (including diesel generator system, emergency buses, motor control centers, switchgear, batteries, auxiliary shutdown control panel, and distribution systems)

   b. Standby service water to the following:

      (1) Unit coolers
      (2) Pump coolers (motors and seals)
      (3) Diesel generator jacket coolers
      (4) Electrical switchgear coolers

   c. Environmental system (HVAC)

   d. Instrumentation (including post-accident monitoring)

NOTE: The essential items listed in this table are protected in accordance with Section 3.6A.1, consistent with the particular pipe break evaluated.

ENCLOSURE 12

j. Reactor protection system (RPS)

k. All containment isolation valves

l. HVAC systems required during operation of the previous items

m. Electrical systems and control systems and instruments required for operation of safety-related equipment, components, and systems.

n. Safety related portion of the reactor plant component cooling water system (RPCCW).

4. No offsite exposure exceeding the limits of 10CFR100.

5. No loss of integrity of the spent fuel pool.

6. Although Class 1E sensors to the (RPS) are located on the turbine control valve (TCV) and stop valve, failure of these sensors does not prevent the reactor from being safely shut down since other RPS sensors (high-pressure scram or high-flux scram) located in safety-related buildings provide sufficient backup. Therefore, these sensors are not analyzed for missile hazards inside the turbine building.

Essential structures, systems, and components are protected from the effects of internal missiles by one or more of the following practices:

1. Locating the system or component in an individual missile-proof structure

2. Physically separating redundant systems or components of the system from the missile trajectory path

3. Providing localized protective shields or barriers for systems and components

4. Designing the particular structure or local protective shield/barrier to withstand the impact of the most damaging missile

5. Providing design features on the potential missile source to minimize the probability of missile generation

ENCLOSURE 13

to the condensate storage tanks of both units. Other demineralized water services are as follows:

Turbine plant component cooling water system

Turbine generator stator cooling unit

Reactor plant component cooling water system

Control building chilled water system

Ventilation chilled water system

Auxiliary boiler makeup

INSERT A

Laboratories, decontamination areas, and sample sinks.

~~The control building chilled water system is the only safety related system serviced by the makeup water system. During accident conditions, the makeup water for the control building chilled water system is provided by the standby service water system. Leakage during both normal and accident conditions would result from leaks in fittings or equipment. The total leakage rate of the chilled water system is estimated at 5 gpd. Although demineralized water is required for normal makeup to the reactor plant component cooling water system, no demineralized water makeup is required during accident conditions (Section 9.2.2).~~

When the exchange capacity of either the cation exchange unit, the anion exchange unit, or the mixed bed exchange unit in a train becomes exhausted, the train is removed from service. The exhausted units are regenerated with solutions of dilute acid or dilute caustic or both as required. The cation and anion exchange unit pair is normally regenerated in the same sequence, even if only one is exhausted.

Dilute acid and dilute caustic are prepared by the in-line dilution of concentrated sulfuric acid and concentrated liquid caustic, which are pumped from their respective measuring tanks, with demineralized water.

A caustic dilution water heater maintains the caustic dilution water at a temperature sufficient to produce a caustic solution temperature of approximately 120°F. This ensures regeneration efficiency for the anion resin by enhancing silica elution. The measuring tanks are filled periodically from the acid and caustic bulk storage tanks.

INSERT A (For Page 9.2-15)

Standby Diesel Generators

Condenser Air Removal Pumps Discharge separators

Condensate Makeup and Drawoff System (to Condenser Hotwell)

into the cooling tower blowdown line for ultimate discharge to the Mississippi River.

9.2.3.3 Safety Evaluation

The two 350,000-gallon demineralized water storage tanks provide sufficient capacity to ensure a supply of demineralized water to meet station requirements. 9

INSERT B

Conductivity is continuously monitored at the effluent of each demineralizer exchange unit. High conductivity alarms are provided on the makeup demineralizer control panel in the auxiliary control room to alert the station operators to an abnormal condition. Silica analyzers are provided for each train of demineralizers to alert the operator of silica breakthrough. Operator action is then taken to correct the situation and to minimize the amount of contaminated fluid being distributed throughout the station, including the control building chilled water system. The makeup water requirement of the chilled water system is low (estimated at 5 gpd) when compared to the total volume in the system (1,100 gallons). Consequently, small amounts of fluid exceeding makeup water conductivity limits are not detrimental to the operation of the chilled water system.

INSERT C

9.2.3.4 Testing and Inspection Requirements

The demineralized water makeup system is an operational system which is expected to be in daily use and as such does not require periodic testing to ensure operability. During periods of low makeup requirements, standby equipment can be placed in a recycle mode and monitored to ensure acceptable quality and availability.

During startup, various inspections and performance tests are made to ensure that the system meets specification requirements.

Grab samples are periodically tested in the laboratory to verify demineralizer performance and to ascertain stored water quality.

9.2.3.5 Instrumentation Requirements

Control panels located in the auxiliary control room accommodate instruments and controls for operation of the makeup water system, makeup water treatment system, and waste water treatment system.

INSERT B (For Page 9.2-17)

The makeup water system is not required for safe shutdown of the plant or to support the operation of engineered safety feature systems.

Demineralized makeup water is not required for operation of the control building chilled water system, reactor plant component cooling water system, or the standby or HPCS diesel generators during accident conditions. Abnormal and accident conditions for these systems are discussed in Sections 9.2.10, 9.2.2 and 9.5.5 respectively.

INSERT C (For Page 9.2-17)

The entry of radioactive water into the makeup water system is not likely to occur because, with the exception of the condensate makeup and drawoff system, all other interconnecting systems do not normally contain radioactivity and the makeup water system is normally at a higher pressure.

The makeup water system is protected against the intrusion of low level radioactive water from the condensate makeup and drawoff system by the following:

a. The makeup water connection to the condensate storage tank is located one foot above the tank overflow and therefore radioactive contamination is not possible. This connection is an open nozzle, with no piping on the inside of the tank.

b. The makeup water connection to the condensate makeup and drawoff system is used for filling the condenser hotwell during maintenance. This connection is normally closed with a locked closed gate valve and check valve.

ENCLOSURE 14

The condensate storage tank normally supplies the HPCS and RCIC systems. However, automatic shutoff valves are provided to close on low condensate storage tank level and transfer HPCS and RCIC pump suctions to the suppression pool, which is the primary safety design source of core spray water.

The level instruments, together with their power supplies, transmitters, readout equipment, etc, that provide this transfer signal are safety related. The level instruments are connected to the safety-related suction piping leading to the HPCS and RCIC pumps, and are physically located within a Seismic Catagory I structure. 2

That portion of the condensate makeup and drawoff system which penetrates the containment and forms part of the containment boundary (Fig. 6.2-65) is Safety Class 2 and Seismic Category I (Table 3.2-1).

Failure of the condensate storage tank during normal operation would not result in the loss of water supply for the control rod drive hydraulic system since the normal CRD system supply is from the condensate system pump discharge.

INSERT

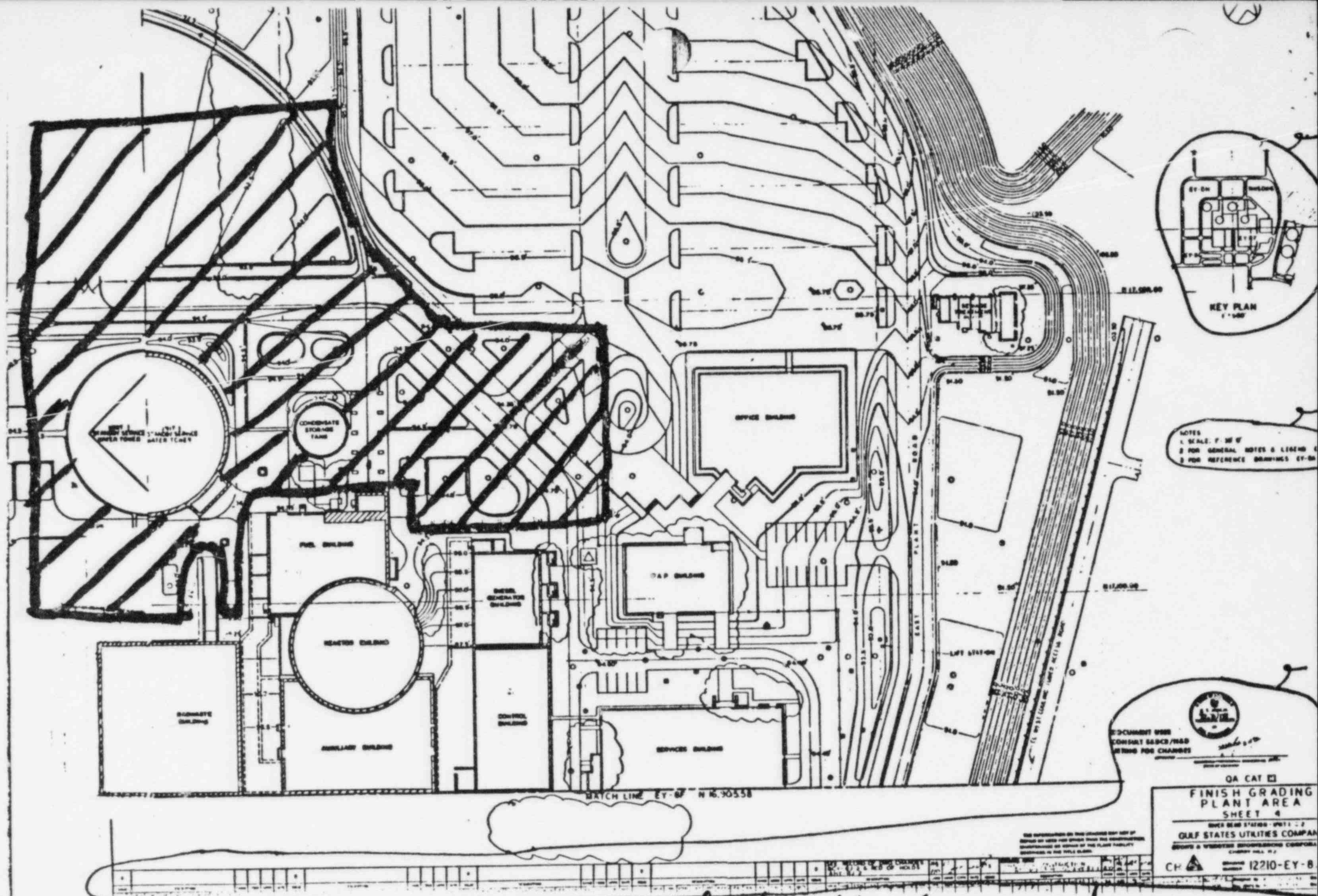
Failure of the condensate storage tank during accident conditions would not preclude plant safe shutdown or post-accident mitigation processes. The systems which draw water from this tank are all capable of performing their safety function without this water supply. Specifically, the HPCS and RCIC suction would automatically shift to the suppression pool; the CRD accumulators provide enough stored energy to insert control rods; and the fuel pool cooling system receives any required makeup water from the standby service water system.

Level in the condensate storage tank is normally maintained by the demineralized water transfer pumps. Should these pumps fail, level can be maintained directly from the makeup demineralizer forwarding pumps.

Continuous level monitoring of the condensate storage tank provides practical assurance that leakage does not go undetected or uncontrolled and meets the requirements of General Design Criterion 60. Tank overflow and drains are retained by the sump. Water collecting within the sump is pumped to the radioactive liquid waste treatment system by a sump pump. The overflow system is designed for the maximum influent from the largest single source. The tank vent is provided with a screen to prevent the entry of birds or

INSERT A (For Page 9.2-35)

The catastrophic failure of the condensate storage tank (CST) does not flood any safety related equipment. Figure 9.2-25 shows the finish plant grading in the area of the CST, and the approximate area that would be covered by 6 inches of water from CST failure; ie, to an elevation of 95'-0". Since the ground is relatively level, water from CST failure spreads out over a wide area. Exterior openings located closest to the CST are an access door at el. 98'-0" and a truck door at el. 94.75', both in the north wall of the fuel building. These doors are designed to be watertight. In addition, the design of safety related structures is based on a probable maximum flood level of 98'-0" msl. Flood protection of the plant is further discussed in Section 3.4.



*Assumes uniform 6" flood depth above grade

Figure 9.2-25

ENCLOSURE 15

QUESTION 410.51 (9.3.1)

The Penetration Valve Leakage Control System (FSAR Section 9.3.6), which supplies compressed air to the safety-related compressed air system (SRCAS), does not contain air dryers and after-filters. Discuss how you will meet the requirements of ANSI MC 11.1-1976 for air quality as stated in Section 9.3.1 of the Standard Review Plan (Paragraph III.2) for the compressed air supplied to the SRCAS.

RESPONSE

The penetration valve leakage control system (PVLCS) supplies air to three safety-related systems: the PVLCS, the main steam-positive leakage control system (MS-PLCS), and the main steam safety and relief valve system.

The response to this request for compressed air supplied to the main steam safety and relief valve system is provided in revised Section 5.2.2.4.1. This system meets ANSI MC 11.1-1976.

The PVLCS and MS-PLCS use air to pressurize valve bodies and pipes in various fluid systems that penetrate the containment. The air does not flow through small passages (such as solenoid valves) or equipment with small operating clearances (such as air operated pistons and cylinders); therefore, ~~the 5-micron inlet filter on the compressor is adequate.~~ Since most of the pipes and valve bodies to be pressurized are initially filled with water, air dryers would serve no purpose and are not provided.

3-micron filtration is not necessary.

The compressors are water seal units which by their design have no oil contamination. There also are no hazardous or corrosive vapors. The requirements of ANSI MC 11.1-1976 are not applicable to the PVLCS and MS-PLCS air systems since they are service air applications, not instrument air.

one ADS valve can fulfill longer term needs. Each accumulator is instrumented to provide the reactor operator with indication of an air supply problem.

3 The air supply to the ADS valves has been designed such that the failure of any one componenet does not result in the loss of air supply to more than one nuclear safety-related division of ADS valves. The loss of air supply to one division of ADS valves does not prevent the safe shutdown of the unit.

~~SRV and ADS pneumatic accumulators are supplied with air from the penetration valve leakage control system (PVLGS).~~ REPLACE WITH INSERT
2 ~~The air from the PVLGS is dried to a dewpoint of 0°F at 100 psig and filtered to a maximum particle size of 3 microns. Refer to Section 9.3.6 for a description of the PVLCS.~~

Each SRV discharges steam through a discharge line to a point below the minimum water level in the suppression pool. The SRV discharge lines are classified as Safety Class 3 and Seismic Category I. SRV discharge line piping from the SRV to the suppression pool consists of two parts. The first is attached at one end to the SRV and attached at its other end to a pipe anchor. The main steam piping, including the SRV discharge piping up to and including the first anchor, is analyzed as a complete system. Diameter, length, and
1 routing of the SRV piping are given in Appendix 6A, Table A.6A.4-1 and Fig. A.6A.10-1 and A.6A.10-2.

The second part of the SRV discharge piping extends from the anchor to the suppression pool. Because of the upstream anchor on this part of the line, it is physically decoupled from the main steam header and is therefore analyzed as a separate piping system.

The effect of the alternate shutdown cooling mode on SRV discharge piping has been considered. The resultant load
7 distribution is within the design capacity of the spring hangers and other support structures.

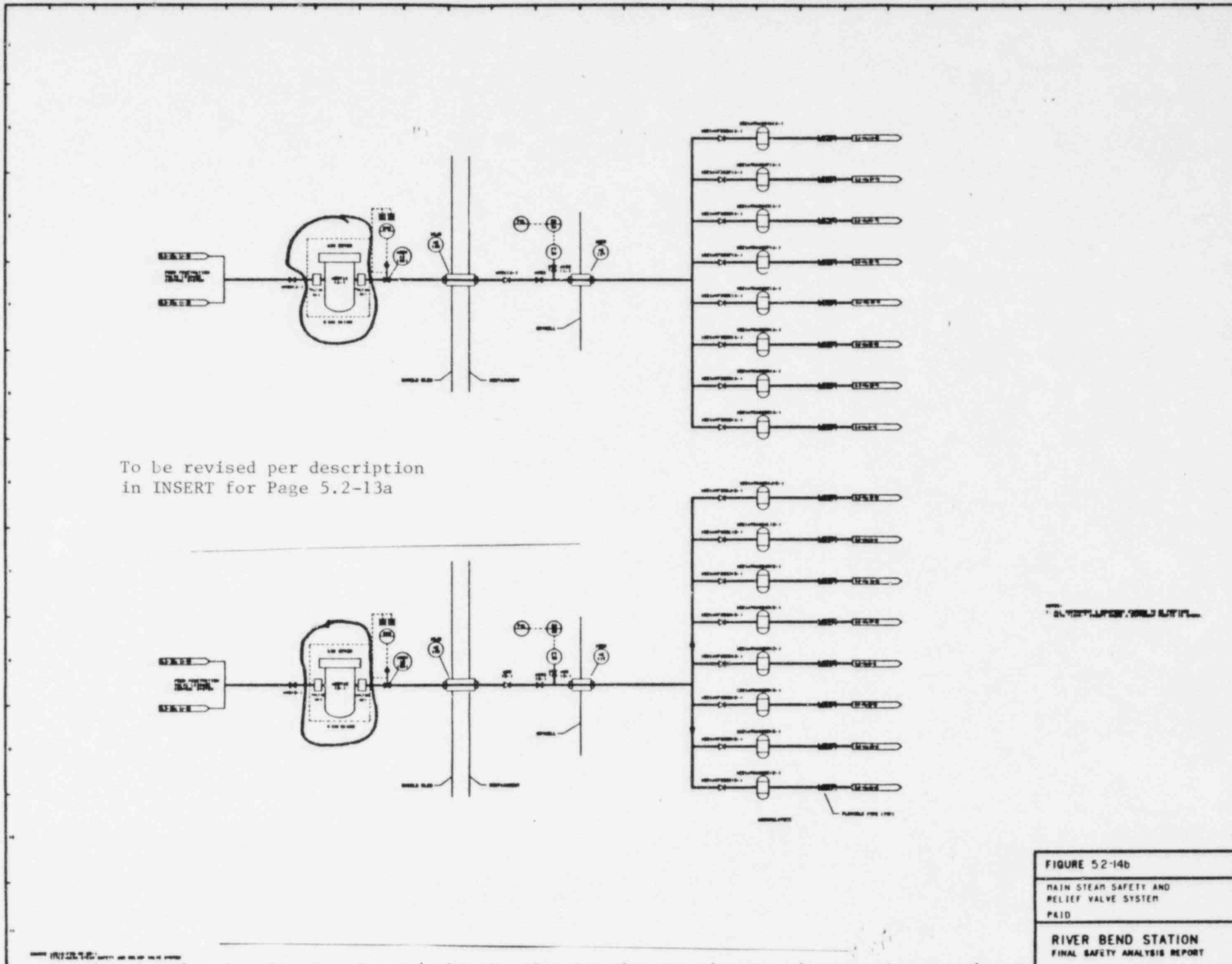
As a part of the preoperational and startup testing of the main steam lines, movement of the SRV discharge lines will be monitored.

The SRV discharge piping is designed to limit valve outlet pressure to 40 percent of maximum valve inlet pressure with the valve wide open. Water in the line more than a few feet above suppression pool water level would cause excessive pressure at the valve discharge when the valve is again

INSERT (For Page 5.2-13a)

During normal plant operation, SRV and ADS accumulators are supplied with air from the SVV air compressors. These NNS compressors provide 17 SCFM at 175 psig. Post-LOCA air requirements are supplied from the Penetration Valve Leakage Control System (PVLCS). Refer to Section 9.3.6 for a description of the PVLCS.

Air from either source is dried to a dew point of -40°F at 140 psig and filtered to a maximum particle size of 1 micon. The NNS air dryer and filters have a Safety Class 2 bypass line and isolation valves to ensure air is provided for the ADS function in the event the dryer/filter become inoperable or plugged. A Safety Class 2 pressure transmitter which activates an annunciator in the control room is provided downstream of the dryers to alert the operator to a malfunction and allow him to remote manually isolate and bypass the dryer/filter. Pressure transmitters are also provided on the PVLCS air accumulators as described in Section 9.3.6.



To be revised per description
in INSERT for Page 5.2-13a

FIGURE 5.2-14b

MAIN STEAM SAFETY AND
RELIEF VALVE SYSTEM
P&ID

RIVER BEND STATION
FINAL SAFETY ANALYSIS REPORT

of the MSIV beyond the capacity or capability of the MS-PLCS.

12. Equipment is provided (as part of the MS-PLCS) to prevent the release of valve stem packing leakage to the environment from MSIVs outside the containment.

6.7.2 System Description

6.7.2.1 General Description

The source of air for the MS-PLCS is the penetration valve leakage control system (PVLCS) air compressors, one for the outboard system and one for the inboard system. Each air compressor is a nuclear safety-related air supply source for the MS-PLCS, the PVLCS and the main steam safety/relief valve system. Each compressor assembly contains an accumulator which is sized to accommodate the initial post-accident requirements of the three above listed systems with the long term requirements being met with the function of the air compressor. The air compressors are equipped for water cooling and are designed to run continuously for 30 days after an accident. The design temperature and pressure for the compressor assemblies are 150°F and 200 psig, respectively. Each compressor assembly delivers 70 ~~25~~ scfm of air at an operating pressure of ~~150~~ 120 psig. Refer to Section 9.3.6 for a complete description of the PVLCS.

Two independent systems (outboard and inboard) are provided to accomplish the leakage control function. The leakage control barrier is established by pressurizing the isolated volumes in the main steam line between the inboard and outboard isolation valves and the main steam shutoff valves. The pressurized volume eliminates out-leakage through the closed MSIVs and main steam drain lines such that any leakage which does occur is inward from the pressurized volume into the reactor pressure vessel (RPV) or containment. Both systems are connected to the offsite as well as onsite emergency power.

The MS-PLCS is shown in Fig. 6.7-1 and 6.7-2. The outboard system is connected to each of the main steam shutoff valves, drain lines (inboard and outboard MSIV), and outboard MSIV stem packing leak-off lines. The inboard system is connected to the outboard MSIV body (inlet side), and to the inboard MSIV drain lines located outside the containment.

1. Main Steam Isolation Valves

On loss of air supply, the main steam isolation valves fail closed. A main steam air accumulator is located near each isolation valve to provide pneumatic pressure for the purpose of assisting in valve closure in the event of failure of pneumatic supply pressure to the valve operator system. In addition, three parallel strainers are located inline to ensure air cleanness (<50 micron) by filtering particles from the air to the MSIVs.

~~2. Main Steam Safety/Relief Valves~~

~~Each safety/relief valve is provided with a pneumatic accumulator which provides sufficient capacity, in the event of loss of air supply, to ensure adequate supply pressure to the valve actuator. Each safety/relief valve used for ADS function is provided with an additional accumulator which provides air reserve margin, on the loss of air supply for cycling of the valves. The function of the ADS valves is discussed in Section 7.3.1.~~

2 ~~3~~. Scram Valves

On loss of air supply, spring action and system pressure force the scram valves to fail open causing control rod drive water to force the piston upward, inserting the control rods.

3 ~~4~~. Scram Volume Vent and Drain Valves

On loss of air supply, spring action forces the scram vent and drain valves to fail closed to prevent loss of reactor water discharged from all the scram valve drivers during a scram, and also to contain the reactor water that leaks past the drivers following a scram.

4 ~~5~~. Residual Heat Removal System

Three testable check valves lose their test capability on loss of air, with no effect on the system.

5. Feedwater Check Valves Outside the Containment Wall

On loss of air supply, spring action forces the feedwater check valve off its back seat, allowing it to float with system flow.

The consequences of compressed air system active component failures are presented in the Failure Modes and Effects Analysis (FMEA) Report.

9.3.1.4 Testing and Inspection Requirements

The instrument and service air systems operate continuously and are observed and maintained during normal operation. No special inspection and testing are required following pre-operational testing. The breathing air system portable purification units are tested periodically for human use in accordance with normal unit operating procedures.

9.3.1.5 Instrumentation Requirements

9.3.1.5.1 Air Compressors

Manual control switches are provided in the main control room for operation of the air compressors.

Control logic is provided so that a low air receiver pressure condition automatically starts the standby air compressor.

Loading and unloading of the compressors are accomplished by automatic controls. A pneumatic unloader allows the air compressor to start unloaded.

A compressor trouble alarm is provided in the main control room. The air compressor stops if an extreme abnormal condition occurs.

The pressure of the cooling water for the air compressors is maintained at its setpoint by modulating a valve in the TPCCW supply line.

9.3.1.5.2 Instrument Air System

Operation of the drying and purging cycle for the instrument air dryers is controlled by a cycle timer in conjunction with a four-way valve operator. Automatic controls are provided for operation of the instrument air dryer heaters during the dryer purge cycle. A dryer trouble alarm is provided in the main control room.

and outboard PVLCSs is functioning properly. The pressure barrier is maintained at a pressure at least 10 percent higher than the peak calculated drywell pressure. Thus, only inleakage of nonradioactive air into the containment is possible past the valves, and no post-LOCA containment atmosphere is discharged through the pressurized valves. The effect on peak containment pressure due to air inleakage is insignificant over a 30-day post-accident period.

9.3.6.2.2 Detailed Description

The inboard and outboard systems are the same, and similar to the MS-PLCS in design and operation.

Each PVLCS consists of the following components as shown on Fig. 9.3-13a and 9.3-13b.

Component	Description
Inlet filter	Filters the air coming from the auxiliary building atmosphere, removing all particles larger than 5 microns
Air compressor	Delivers ~~25~~ 70 scfm of air at ~~150~~ 120 psig operating pressure. It is equipped for water cooling and runs continuously after an accident, providing a nuclear safety-related air supply for the PVLCS, the MS-PLCS, and the main steam safety/relief valve system. It is sized to accommodate the above systems. The maximum allowable leakage rates for the PVLCS process line valves are listed in Table 9.3-3.
~~Aftercooler~~	~~Cools the air leaving the air compressor to 120°F~~
~~Moisture separator~~	~~Removes water droplets which have condensed in the aftercooler~~
Air accumulator	Stores sufficient air at ~~150~~ 120 psig to fill the piping and valve body volumes being sealed.
	Downstream of the accumulator are two branch lines, one to the MS-PLCS

two per injection line). Higher pressure injection lines have two check valves in series. The high pressure feedwater injection header also has two isolation valves in series. The outboard system is equivalent to the inboard system.

The MS-PLCS injection valves remain closed and do not place any demands on the PVLCS air compressors. However, the main steam safety/relief valves' associated accumulators may draw air from the PVLCS accumulators ~~to make up for leakage~~ if their associated SVV compressors are unavailable. Pressure transmitters maintain the PVLCS accumulators at a predetermined set point, at which the accumulators maintain enough air to meet all short-term requirements of the PVLCS, the MS-PLCS, and the main steam safety/relief valve system. An automatic start is provided for the air compressors to recharge the accumulators above the minimum set point as determined by the pressure transmitters.

9.3.6.3.2 Design Basis Operation

Approximately 20 min after it has been ascertained that a LOCA has occurred, the PVLCS is actuated. The 20-min time period prevents the standby power supplies from being overloaded due to the starting current drawn by the PVLCS air compressors and motor-operated valves, adding to the starting current of other safety-related items. The 20-min time period also serves as sufficient time for the reactor vessel pressure to decay to a pressure at which the PVLCS can function. The air line pressure at the injection point to the process line valves is 1.1 times that of the reactor drywell pressure. In addition, the leakage of fission products during the 20-min period is insignificant with respect to 10CFR100 guidelines.

Upon initiation, the injection valves and isolation valves must be manually opened (remote manual initiating switch). The valves have interlocks that prevent leakage of any process line fluid upstream of the valves (Section 9.3.6.5).

If, 5 min after initiation, high flow or low pressure is detected in one system, that system automatically isolates and the other system provides the seal. High flow and low pressure indicate that the process line valve is stuck open or partially open, or the system no longer maintains system integrity. Low pressure (sensed downstream of the isolation valve) by itself indicates that an injection valve or isolation valve has failed to open, or that the compressor is not operating correctly. The compressor is equipped with suitable instrumentation to detect and annunciate failures.

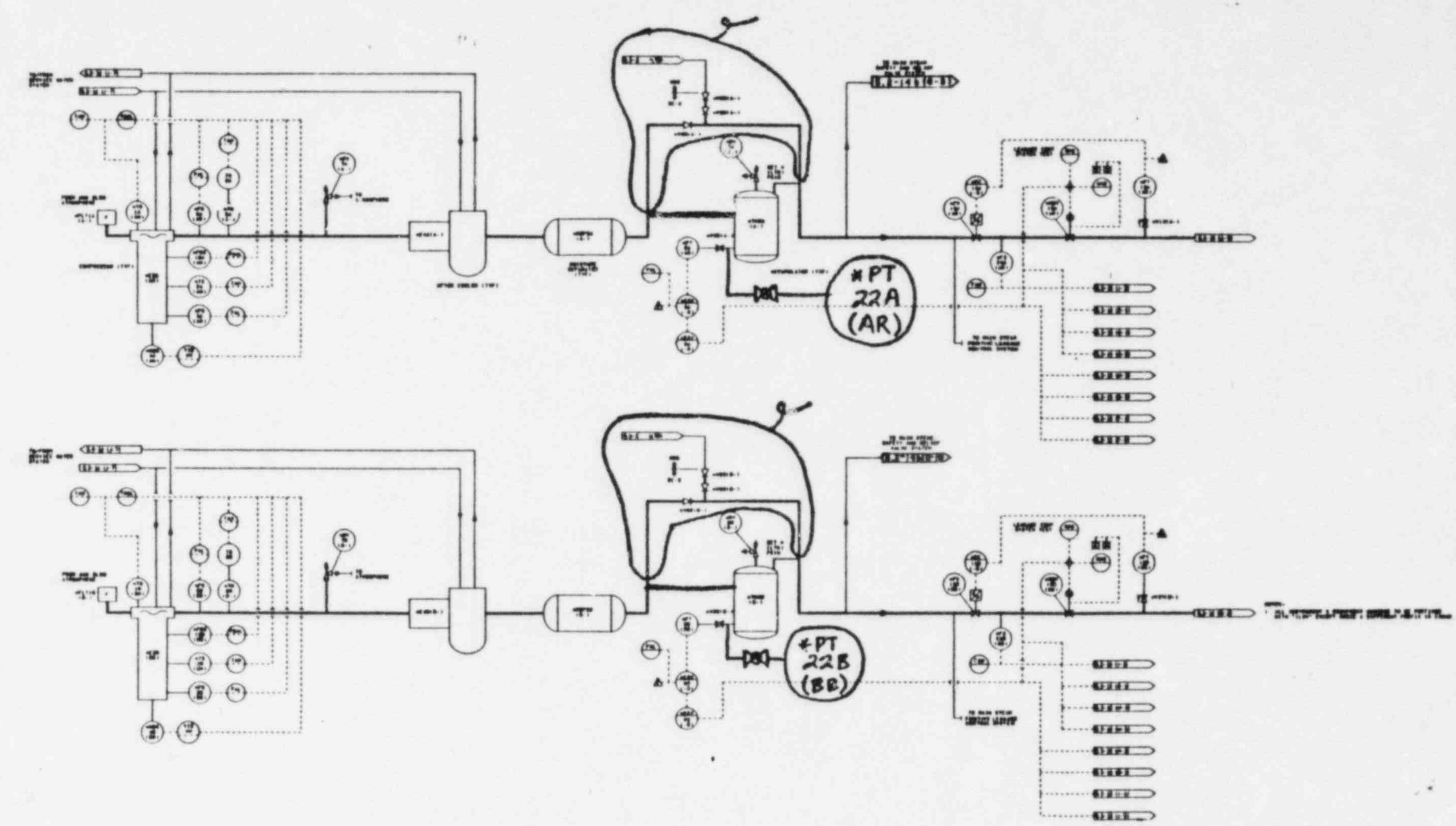


FIGURE 9.3-13a

CONTAINMENT PENETRATION VALVE
LEAKAGE CONTROL SYSTEM

P41D

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Local analyzers are provided where insertion-type conductivity cells, immersion-type pH electrodes, or local turbidity detectors are required.

Recorders and alarms are provided for the process sampling system in both the main and auxiliary control rooms.

9.3.3 Equipment and Floor Drainage Systems

The equipment drainage systems are schematically shown in Fig. 9.3-6a through 9.3-6e and 9.3-7a through 9.3-7j for the turbine building and reactor building, respectively.

~~The floor drainage systems are schematically shown in Fig. 9.3-8a through 9.3-8f, 9.3-10, 9.3-11a through 9.3-11e, and 9.3-12 for the reactor building, fuel building, turbine building, and radwaste buildings, respectively.~~ REPLACE WITH INSERT A

9.3.3.1 Design Bases

The design bases of equipment drainage systems are:

1. Sumps for the collection of equipment drainage are located in the turbine building, reactor building, and fuel building. Influent to these sumps is non-oily waste from radioactive, potentially radioactive, and nonradioactive sources (excluding all types of floor drainage), such as:

    a. Pump casings

    b. Air conditioning condensate drains

    c. Valve stem leakoffs

    d. Relief valves

    e. Other similar equipment.

2. Contamination of equipment drainage with floor surface drainage is prevented by having the equipment drainage sump covers located on elevated concrete curbs and by terminating equipment drainage piping in raised-rim hubs.

3. Equipment drainage sump pumps discharge effluent to the condenser hotwell for reuse in the steam generation system. A conductivity element located in the discharge piping header continuously monitors the effluent conductivity level

INSERT A (For Page 9.3-12)

The floor drainage systems are schematically shown in the following figures:

Reactor building	Fig. 9.3-8a through 9.3-8f
Fuel building	Fig. 9.3-10
Turbine building	Fig. 9.3-11a through 9.3-11e
Radwaste building	Fig. 9.3-12
Piping tunnels	Fig. 9.3-16
Services building	Fig. 9.3-17
Control building	Fig. 9.3-18
Electrical tunnels	Fig. 9.3-19
Makeup water pump house	Fig. 9.3-20

9.3.3.5.7 Condensate Demineralizer/Off Gas ~~Building~~ Area Floor Drains

~~This information will be provided in a future amendment.~~ INSERT B

9.3.3.5.8 Piping Tunnel Floor Drains

~~This information will be provided in a future amendment.~~ INSERT B

9.3.3.5.9 Services Building Floor Drains

~~This information will be provided in a future amendment.~~ INSERT B

9.3.3.5.10 Control Building Floor Drains

~~This information will be provided in a future amendment.~~ INSERT B

9.3.3.5.11 Electrical Tunnels Floor Drains

~~This information will be provided in a future amendment.~~ INSERT B

9.3.3.5.12 Makeup Water Pump House Floor Drains

~~This information will be provided in a future amendment.~~ INSERT B

9.3.4 Chemical and Volume Control System

Does not apply.

9.3.5 Standby Liquid Control System

9.3.5.1 Design Bases

The standby liquid control system (SLCS) has a safety-related function and is designed as a Seismic Category I system. It meets the following safety design bases:

1. Backup capability for reactivity control is provided, independent of normal reactivity control provisions in the nuclear reactor, to be able to shut down the reactor if the normal control ever becomes inoperative.

2. The backup system has the capacity for controlling the reactivity difference between the steady-state rated operating condition of the reactor with voids and the cold shutdown condition, including shutdown from the most reactive condition at any time in core life.

INSERT B (For Page 9.3-21)

9.3.3.5.7 Condensate Demineralizer/Off Gas Area Floor Drains

Level controls are provided for the condensate demineralizer and offgas area floor drain sump (TK7) to automatically start and stop the sump pumps (P7A, B). A mechanical alternator is provided for selecting the lead and standby pumps. Both pumps operate on a high-high water level. Local control switches are provided for either automatic or manual operation of the condensate, demineralizer and offgas area floor drain sump pumps. Extreme high or low water level activates a condensate demineralizer and offgas area floor drain sump level alarm in the auxiliary control room.

9.3.3.5.8 Piping Tunnel Floor Drains

Level controls are provided for the piping tunnel floor drain sumps (TK7; TK8; TK9; and TK11) to automatically start and stop the sump pumps (P7; P8; P9; and P11). Local control switches are provided for either automatic or manual operation of the piping tunnel floor drain sump pumps. An extreme high or low water level activates a piping tunnel sump level alarm in the auxiliary control room.

9.3.3.5.9 Services Building Floor Drains

Level controls are provided for the services building floor drain sump (TK6) to automatically start and stop the sump pumps (P6A, B). A mechanical alternator is provided for selecting the lead and standby pumps. Both pumps operate on high-high water level. Local control switches are provided for either automatic or manual operation of the services building floor drain sump pumps. Extreme high or low water level activates a services building floor drain sump level alarm in the auxiliary control room.

9.3.3.5.10 Control building floor drains

Level controls are provided for the control building floor drain sump (TK4) to automatically start and stop the sump pumps (P4A, B). A mechanical alternator is provided for selecting the lead and standby pumps. Both pumps operate on high-high water level. Local control switches are provided for either automatic or manual operation of the control building floor drain sump pumps. Extreme high or low water level activates a control building floor drain sump level alarm in the auxiliary control room.

9.3.3.5.11 Electrical tunnels floor drains

Level controls are provided for the electrical tunnel floor drain sumps (TK1; TK2; and TK3) to automatically start and stop the sump pumps (P1; P2 and P3). Local control switches are provided for either automatic or manual operation of the electrical tunnel floor drain sump pumps. An extreme high or low water level activates an electrical tunnel floor drain sump level alarm in the auxiliary control room.

9.3.3.5.12 Makeup water pump house floor drains

Level controls are provided for the makeup water pump house floor drain sump (TK5) to automatically start and stop the sump pumps (P5A, B). A mechanical alternator is provided for selecting the lead and standby pumps. Both pumps operate on a high-high water level. Local control switches are provided for either automatic or manual operation of the makeup water pump house floor drain sump pumps. An extreme high or low water level activates a makeup water pump house floor drain sump level alarm in the auxiliary control room.

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unit started so that the service time of both units is approximately equal. In the event the operating unit fails, the standby unit starts automatically.

The response of the main control room habitability system to airborne radioactivity from outside air intake is automatic. On receipt of a high radiation signal, air flow is diverted through the emergency charcoal filtration unit, and kitchen and toilet exhaust fans are shut down.

7 6.4.4 Design Evaluation

6.4.4.1 Radiological Protection

Under normal plant conditions, outside air enters the main control room through the local outside air intake located on the roof of the control buildings. During accident conditions, fresh air may be drawn in through the remote air intake. Unit 2 can also use the Unit 1 local intake as its remote air intake as described in Section 9.4.1. Measurements taken from the radiation monitor in the air supply duct allow operators to select the least radioactive air intake. During a LOCA the outside air supply is automatically diverted through the main control room charcoal filter as a precaution regardless of outside air quality. All habitability systems are designed to meet the single-failure criterion.

6.4.4.2 Toxic Gas Protection

The effects on main control room habitability resulting from postulated releases of offsite toxic chemicals, including chlorine and ammonia, are discussed in Section 2.2. Consideration of the human odor detection threshold is appropriate since the time difference between detection and incapacitation is equal to or greater than 120 sec.

The main control room operators are provided with self-contained breathing apparatus for protection in the event of
7 a toxic gas release. Each operator is taught to distinguish the odor of chlorine and ammonia and practice drills are conducted to ensure that each operator can don breathing apparatus within 2 minutes. The main control room air intake header can be manually isolated in the event of a toxic gas release.

The protection of main control room operators and analysis of hazardous chemicals, as discussed in Section 2.2, is in compliance with the guidance outlined in Regulatory Guide 1.78.

INSERT A →

INSERT A (For Page 6.4-12)

6.4.4.3 Compliance with Regulatory Guide 1.52

A detailed description of compliance with positions C.2.a through C.2.f and C.2.k of Regulatory Guide 1.52 is provided as follows:

C.2.a

The ESF atmosphere cleanup systems for the main control room is redundant and consist of the following components: (1) demister, (2) electric heater, (3) prefilters, (4) HEPA filters, (5) iodine adsorber (impregnated activated carbon), (6) HEPA filters.

C.2.b

The redundant ESF atmosphere cleanup system filtration units in the control building are physically separated by one foot thick reinforced concrete wall at the fans location.

C.2.c

All components of the control building ESF atmosphere cleanup system are designated as Seismic Category I.

C.2.d

The control building ESF atmosphere cleanup system is not subjected to pressure surges.

C.2.e

The effects of radiation are considered for all organic-containing materials that are necessary for operation during a postulated DBA.

C.2.f

The volumetric air flow rate through a single cleanup unit for the main control room is 4000 ft^3/min. The filter layout for the main control room is two HEPA filters high and two wide.

C.2.k

Outdoor air intake openings are equipped with louvers and bird screens.

c. Redundant isolation dampers in the supply air system.

6. The design features (Section 9.4.2.2) incorporated in the fuel building ventilation system minimizes moisture (and, thus, airborne radioactivity) propagation in the fuel building environment.

7. The consequences of fuel building ventilation system active component failures are presented in the Failure Modes and Effects Analysis (FMEA) Report submitted under separate cover.

8. The fuel building is maintained at a negative pressure of 0.25 in W.G. relative to outside during all modes of plant operation, thereby minimizing any possibility of leakage of unfiltered contaminated air to the environment.

9. The physical layout of nonessential portions of the fuel building ventilation system and of other systems in the fuel building not designed to Seismic Category I requirements is such that failure of any nonessential component does not affect operation of the essential safety-related portions of the system.

10. Two 100-percent capacity supply and exhaust fans are provided for reliable continuous normal operation.

INSERT B →

9.4.2.4 Inspection and Testing Requirements

To ensure and demonstrate the capability of the fuel building ventilation system, the system components and equipment are subjected to preoperational testing in accordance with the procedures described in Chapter 14.

Local display and/or indicating devices are provided for surveillance of vital parameters such as room temperature and buildup differential pressure. All system ductwork is subjected to leak tests during erection and is balanced in accordance with the procedures of the Associated Air Balance Control Council (AABC)[8]. 5

The inservice inspection and testing is done in accordance with the procedures described in the Technical Specifications (Chapter 16).

INSERT B (For Page 3.4-20)

A detailed description of compliance with positions C.2.a through C.2.f and C.2.k of Regulatory Guide 1.52 is provided as follows:

C.2.a

The ESF atmosphere cleanup system for the fuel building is redundant and consist of the following components: (1) demister, (2) electric heater, (3) prefilters, (4) HEPA filters, (5) iodine adsorber (impregnated activated carbon), (6) HEPA filters.

C.2.b

The redundant ESF atmosphere cleanup system filtration units in the fuel building are located in different cubicles separated by a 1½ foot thick reinforced concrete wall.

C.2.c

All components of the fuel building ESF atmosphere cleanup system are designated as Seismic Category I.

C.2.d

The fuel building ESF atmosphere cleanup system is not subjected to pressure surges.

C.2.e

The effects of radiation are considered for all organic-containing materials that are necessary for operation during a postulated DBA.

C.2.f

The volumetric air flow rate through a single cleanup unit for the fuel building is 10,000 ft^3/min. The filter layout for a fuel building cleanup train is three HEPA filters high and three wide.

C.2.k

Outdoor air intake openings are equipped with louvers and bird screens.

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TABLE 6.5-1 (Cont)

Reg. Guide Paragraph No.	SGTS	Fuel Building Charcoal Filtration System	Main Control Room Air-Conditioning Subsystem
3.p	See Note 9	See Note 9	See Note 9
C-4 - Maintenance			
4.a	See Note 10	See Note 10	See Note 10
4.b	In compliance	In compliance	In compliance
4.c	In compliance	In compliance	In compliance
4.d	See Note 11	See Note 11	See Note 11
4.e	In compliance	In compliance	In compliance
C-5 - In-Place Testing Criteria			
5.a	In compliance	In compliance	In compliance
5.b	In compliance	In compliance	In compliance
5.c	In compliance	In compliance	In compliance
5.d	In compliance	In compliance	In compliance
C-6 - Laboratory Testing Criteria for Activated Carbon			
6.a	See Note 12	See Note 12	See Note 12
6.b	See Note 12	See Note 12	See Note 12

Note 1: (C-2.g) Abnormal pressure drop across all critical components of SGTS, fuel building charcoal filtration system, and the main control room air-conditioning subsystem trains activates an alarm in the main control room, and flow-through units are indicated in the main control room; however, no facilities to record these readings are provided. Computer input is provided to record high-pressure alarms across critical components. ~~and flow at discharge from system fans.~~

The main control room air intake which is upstream of the control room (ESF) filter, the plant exhaust duct which is downstream of the standby gas treatment (ESF) filter, and the fuel building exhaust plenum which is downstream of fuel building (ESF) filter, are each provided with ~~redundant~~ safety grade radiation monitors for their respective flow paths. ~~These~~ Except for the monitors in the main control room intakes, these monitors have the capability to indicate ~~and record~~ flow rate ~~in the main control room~~. If a low-flow condition is detected, the affected ESF filter can be isolated and the 2

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TABLE 6.5-1

COMPARISON OF ENGINEERED SAFETY FEATURE FILTER SYSTEMS WITH REGULATORY GUIDE 1.52 REQUIREMENTS

Reg. Guide Paragraph No.	SGTS	Fuel Building Charcoal Filtration System	Main Control Room Air-Conditioning Subsystem
C-1 - Environmental Design Criteria			
1.a	In compliance	In compliance	In compliance
1.b	In compliance	In compliance	In compliance
1.c	In compliance	In compliance	In compliance
1.d	In compliance	In compliance	Not applicable
1.e	In compliance	In compliance	Not applicable
C-2 - System Design Criteria			
2.a	In compliance	In compliance	In compliance
2.b	In compliance	In compliance	In compliance
2.c	In compliance	In compliance	In compliance
2.d	In compliance	In compliance	In compliance
2.e	In compliance	In compliance	In compliance
2.f	In compliance	In compliance	In compliance
2.g	See Note 1	See Note 1	See Note 1
2.h	See Note 2	See Note 2	See Note 2
2.i	In compliance	In compliance	In compliance
2.j	See Note 3	See Note 3	See Note 3
2.k	In compliance	In compliance	In compliance
2.l	~~See Note 4~~ In compliance	~~See Note 4~~ In compliance	~~See Note 4~~ In compliance
C-3 - Component Design Criteria and Qualification Testing			
3.a	In compliance	In compliance	In compliance
3.b	In compliance	In compliance	In compliance
3.c	In compliance	In compliance	In compliance
3.d	In compliance	In compliance	In compliance
3.e	See Note 5	See Note 5	See Note 5
3.f	In compliance	In compliance	In compliance
3.g	In compliance	In compliance	In compliance
3.h	In compliance	In compliance	In compliance
3.i	In compliance	In compliance	In compliance
3.j	In compliance	In compliance	In compliance
3.k	See Note 6	See Note 6	See Note 6
3.l	See Note 7	See Note 7	See Note 7
3.m	In compliance	In compliance	In compliance
3.n	See Note 8	See Note 8	See Note 8
3.o	In compliance	In compliance	In compliance

TABLE 6.5-1 (Cont)

welded steel housing, and verified by surveillance requirements for leakage tests. All controls and instrumentation necessary to operate the ESF filters are located outside the filter cubicles in low radiation areas. 2

DELETE

~~Note 4: Housing leak tests are performed in accordance with the provisions of Section 6 of ANSI N510[3], as recommended in this paragraph. However, ductwork tests are performed using acceptable methods of the Associated Air Balance Council (AABC)[7].~~
~~(C-2.1)~~

Note 5: (C-3.e) Filter and adsorber mounting frames are constructed and designed in accordance with the recommendations of Section 4.3 of ERDA 76-21[2], except for the frame tolerance guidelines in Table 4.2. The tolerances selected for HEPA and adsorber mountings are sufficient to satisfy the bank leak test criteria of Paragraphs C.5.c and C.5.d of Regulatory Guide 1.52.

Note 6: (C-3.k) When conservative calculations show that the maximum decay heat generation from collected radioiodines is insufficient to raise the carbon bed temperature above 250°F with no system airflow, small capacity ESF filter systems may be designed without an air bleed cooling mechanism.

Exception is taken to the requirements of any cooling mechanism satisfying single-failure criteria because a backup mechanism is provided.

The decay heat produced by the radioactive material in the inactive charcoal adsorbers of the ESF filter units is removed by a 100-cfm capacity centrifugal fan (for main control room filter decay fans, see Fig. 9.4-1c; for fuel building filter decay fans, see Fig. 9.4-2a; and for SGTS filter decay fans, see Fig. 6.2-58) which automatically starts when the main filter exhaust fan stops. The decay fan takes air from the respective filter room and exhausts to the respective exhaust duct. In the event that the 100-cfm decay fan fails, the respective main filter exhaust fan can be started manually to remove decay heat, since a high temperature in the charcoal adsorbers will be alarmed in the main control room. The temperature will not rise to the level where the adsorption capability of charcoal filter is reduced. 2

References - 6.5

1. MIL-STD-282-1974, Filter Units, Protective Clothing, Gas-Mask Components, and Related Products: Performance - Test Methods, Military Standard.

2. ERDA 76-21, Nuclear Air Cleaning Handbook, Oak Ridge National Laboratory.

3. ANSI N510-1975, Testing of Nuclear Air Cleaning Systems, American National Standards Institute.

4. RDT Standard M16-IT-1977, Gas-Phase Adsorbents for Trapping Radioactive Iodine and Iodine Compounds, United States Nuclear Regulatory Commission, Division of Reactor Development and Technology.

5. ANSI N509-1976, Nuclear Power Plant Air Cleaning Units and Components, American National Standards Institute.

6. MIL-F-51068-1974, Filter, Particulate, High-Efficiency, Fire Resistant, Military Specification.

~~7. Associated Air Balance Council, Vol. 1, No. 82571. Air Distribution Duct Leakage Field Test.~~

DELETE

~~Associated Air Balance Council, Vol. 1, No. 81266. National Standards for Field Measurement and Instrumentation, Total System Balance.~~

7 ~~8~~. AMCA 201-1973, Fan Application Manual, Air Moving and Conditioning Association.

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(Chapter 14) to verify wiring and control hookup, system inplace integrity, and proper function of system components and control devices, and to establish system design air flow. Local display and/or indicating devices are provided for surveillance of vital parameters, such as room temperature. All system ductwork is subjected to leak tests during erection and is balanced in accordance with the
5 | procedure of the Associated Air Balance Council (AABC)[8].

The ventilation system components are periodically inspected to assure that all normally operating equipment is functioning properly. Maintenance is provided on a regularly scheduled basis to check and replace filters, provide lubrication, etc, in accordance with manufacturer's recommendations.

9.4.3.4.2 Radwaste Building Ventilation System

The radwaste building ventilation system is subjected to preoperational testing in accordance with procedures of INSERT
Chapter 14. ~~and leak tested and~~ balanced in accordance with
5 | the procedures of Associated Air Balance Council (AABC)[8].

The system is designed to permit periodic inspection of major components such as fans, motors, belts, coils, filters, ductwork, piping, and valves to assure the integrity and capability of the system. Local display and/or indicating devices are provided for surveillance of vital parameters such as room temperature. Test connections are provided in charcoal filter units and chilled water piping for periodic checking of air and water flows for conformance to design requirements.

The HEPA filters in the charcoal filter units are subjected to both shop and field efficiency tests. Upon installation, and periodically thereafter, HEPA filters are given an in-place DOP test in accordance with ANSI N510[3]. Filters are field tested at rated flow with an acceptance limit of less than 0.05 percent penetration.

9.4.3.5 Instrumentation Requirements

9.4.3.5.1 Auxiliary Building Ventilation System

Control switches are provided in the main control room for either automatic or manual operation of the auxiliary building supply and exhaust air fans. Interlocks are provided to prevent a fan from starting unless its containment isolation dampers are fully open.

INSERT (Page 9.4-34)

The system ductwork is subjected to leak test during erection in accordance with the provisions of Section 6 of ANSI N510-1980, and is ...

negative pressure with respect to the main turbine building area.

3. Two 100-percent capacity off-gas vault refrigeration units are provided (one operating and one on standby) to maintain the charcoal adsorber vault at subzero temperature for continuous reliable operation.

4. Redundant supply fans of 100-percent capacity are provided for the unit coolers of the steam tunnel and turbine well to ensure a continuous operation of the unit coolers.

5. Exhaust air is drawn from within the shielded areas of the turbine building thus inducing airflow from clean areas to potentially contaminated areas.

6. The exhaust air from the mechanical vacuum pump is passed through the charcoal filter unit prior to discharge to the plant exhaust duct thus minimizing radioactive release.

9.4.4.4 Inspection and Testing Requirements

The turbine building ventilation system is designed to permit periodic inspection of major components such as fans, motors, coils, filters, ductwork, piping, and valves, to assure the integrity and capability of the system. Local display and indicating devices are provided for periodic inspection of parameters such as filter pressure drops. Test connections are provided in the charcoal filter unit and chilled water piping for periodic checking of air and water flows for conformance to design requirements.

The HEPA filters in the charcoal filter units are subjected to both shop and field efficiency tests. Upon installation, and periodically thereafter, HEPA filters are given an in-place DOP test in accordance with ANSI N510[3].

All system ductwork is subjected to leak tests during erection and is balanced in accordance with the procedures of the Associated Air Balance Council (AABC)[8]. 5

9.4.4.5 Instrumentation Requirements

Local panels located at different elevations of the turbine building provide instrumentation and controls for operation of the turbine building area ventilation system. Abnormal temperatures, pressures, and flows in the system are alarmed

in accordance with the provisions of Section 6 of N510-1980,

ENCLOSURE 21

The standby switchgear room air-conditioning is located on elevation 71'-0" of of the control building and consists of an air-conditioning subsystem for the three switchgear rooms with associated individual battery room air exhaust systems.

The standby switchgear rooms air-conditioning subsystem provides heating, cooling, and ventilation to the standby switchgear rooms, the associated battery rooms, the cable vault, and the general areas. The air-conditioning subsystem maintains a maximum air temperature of 104°F for the switchgear rooms and cable vault and 90°F for the battery rooms and general areas. The subsystem is designed to operate during normal, shutdown, loss of offsite power, and DBA conditions without a loss of function.

Air is supplied to the standby switchgear rooms from redundant 100-percent capacity air-conditioning units. Each unit consists of a fan, filter, chilled water coil, and electric heating coil. Redundant full capacity fans return 25,300 cfm to the operating air-conditioning unit. An electric heating coil is located in the air handling unit to maintain a minimum supply air temperature. Smoke removal is provided by a separate subsystem consisting of an exhaust fan and dedicated ductwork. The smoke removal subsystem is seismically supported, but is not designed for DBA conditions. A description of the operation of the standby switchgear room and cable vault smoke removal is given in Section 6.4.2.

Each battery room is provided with an exhaust subsystem which includes redundant full capacity exhaust fans. The ventilation supply air for each battery room is provided by the standby switchgear rooms air-conditioning units. There is no air recirculation from the battery rooms. Smoke removal is provided for each battery room using redundant exhaust fans and exhaust ductwork.

The standby switchgear rooms and associated battery rooms are isolated from other areas in the building by fire doors, fire dampers, and fire rated walls. All fire dampers are thermally operated by means of a fusible link.

9.4.1.2.3 Chiller Equipment Room Air-Conditioning Subsystem

The chiller equipment room air-conditioning subsystem consists of an outside air supply, room exhaust, and redundant full capacity unit coolers. The outside air supply provides 1,100 cfm ventilation air supply to the chiller equipment room. An electric heating coil is located in the supply ductwork to maintain minimum supply air

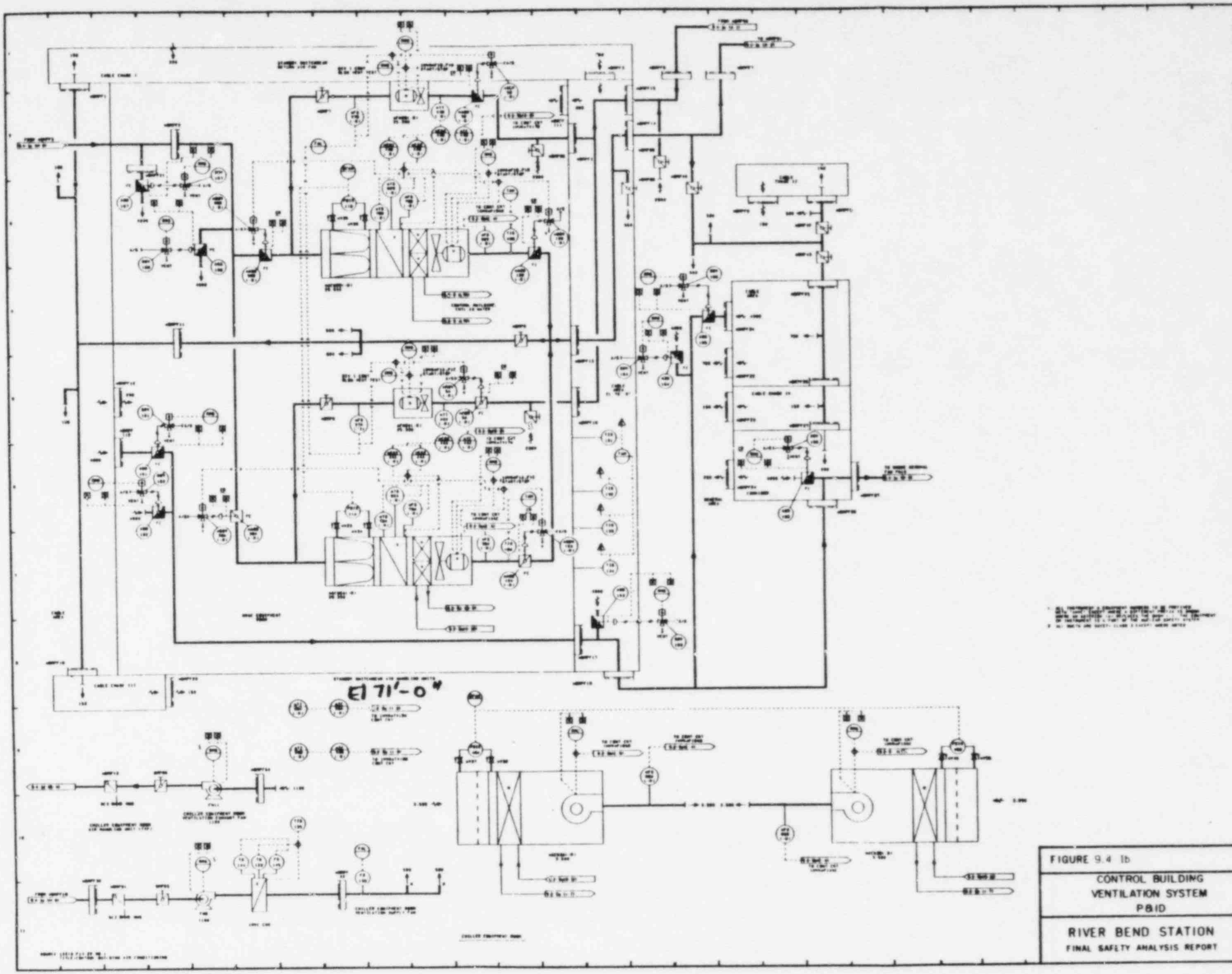
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FIGURE 9.4 1b
CONTROL BUILDING
VENTILATION SYSTEM
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RIVER BEND STATION
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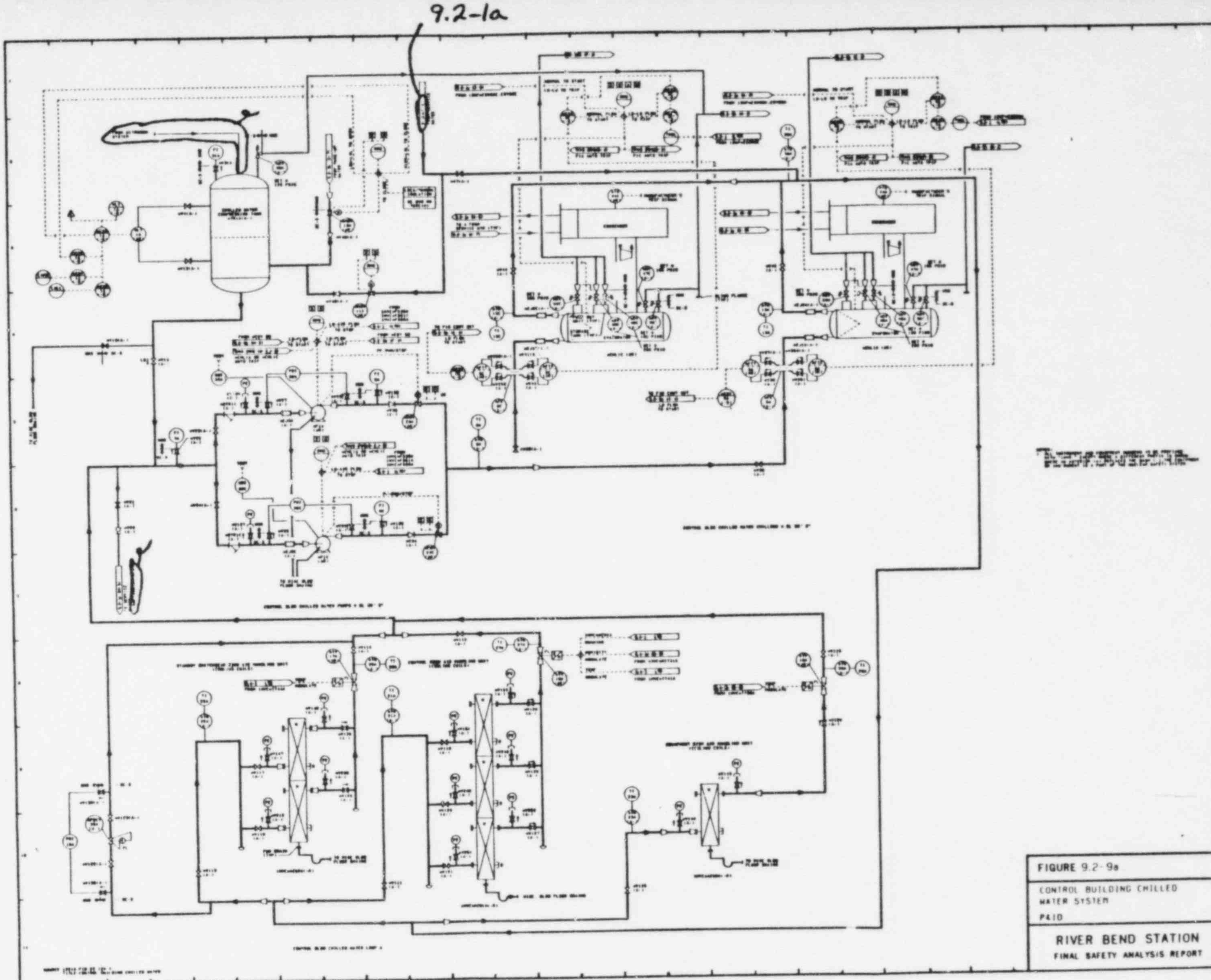

FIGURE 9.2-9a

CONTROL BUILDING CHILLED WATER SYSTEM

P&ID

RIVER BEND STATION

FINAL SAFETY ANALYSIS REPORT

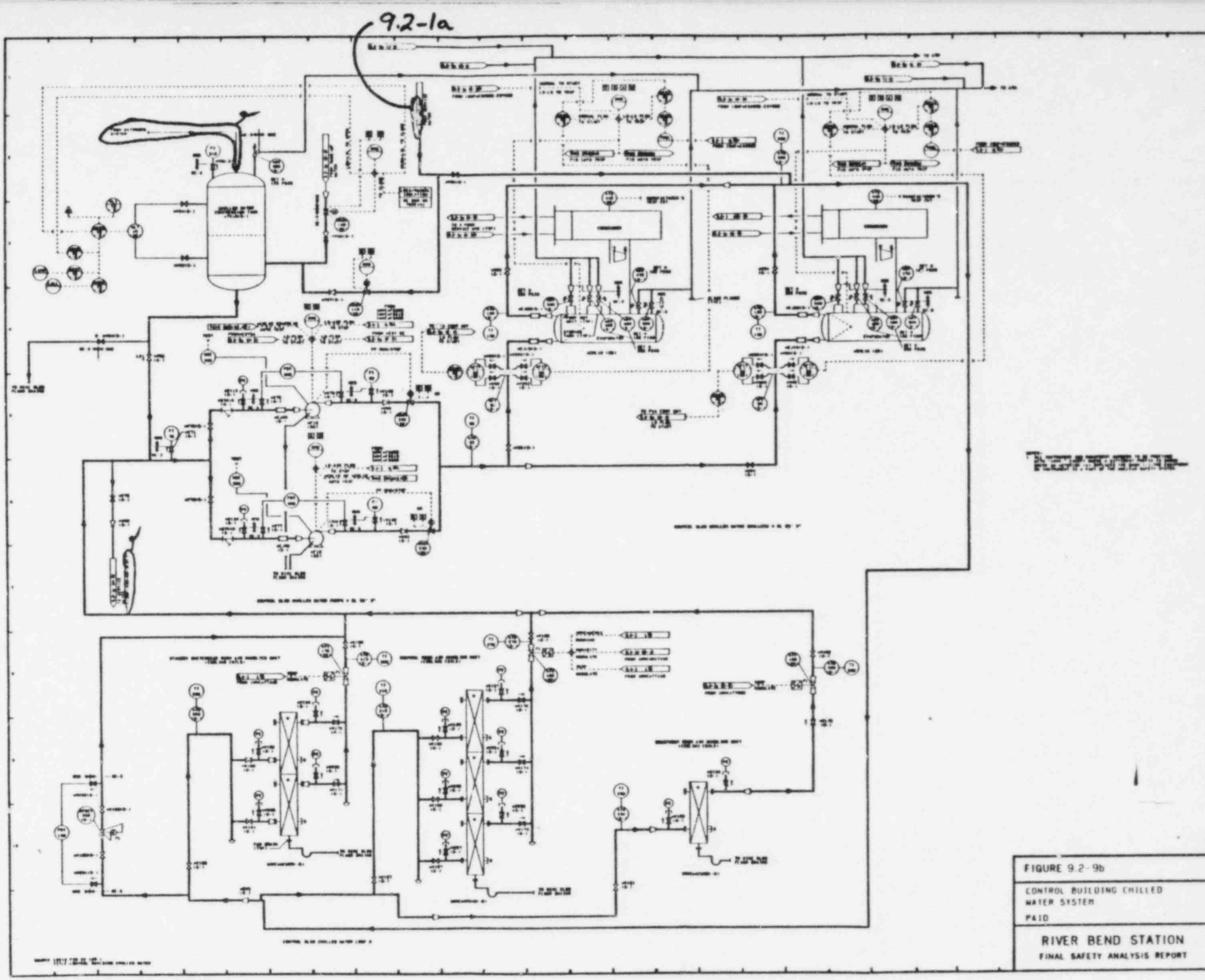

FIGURE 9.2-9b

CONTROL BUILDING CHILLED WATER SYSTEM

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following features are incorporated in its design to ensure system reliability and to minimize the uncontrolled release of airborne radioactive contaminants during normal plant operation:

1. Fifty percent standby capacity of the main exhaust fans ensures full system capacity with any unit inoperative due to equipment failure or maintenance outage.

2. The radwaste building exhaust air is monitored by radiation detectors prior to discharge, to ensure against release of radioactive contaminants. ~~In the event of detection of high airborne radioactivity in the building, administrative control is required to shut down the system.~~

3. Redundant unit coolers for sample room, laundry room, and formaldehyde area ensure supply system operation in the event of single fan failure.

4. All exhaust air from waste tanks and other equipment handling radioactive materials is passed through the charcoal filter unit prior to discharge, thus minimizing the release of radioactive contaminants.

5. A manually actuated water spray fire protection system is provided for each filter unit to protect against possible fire in the filters.

6. The redundant 100-percent capacity of the charcoal filtration system for processing contaminated tanks and shielded compartment exhaust ensures continued operation of the system at all times.

The radiation monitors continuously sense the radiation level and automatically send an alarm signal to the main control room (Section 12.3.4).

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The radwaste building ventilation system is shut down manually upon detection of high radiation levels in the common air exhaust duct.

9.4.3.4 Inspection and Testing Requirements

9.4.3.4.1 Auxiliary Building Ventilation System

The auxiliary building ventilation system is subjected to preoperational testing in accordance with procedures

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TABLE 1.8-1 (Cont)

Regulatory Guide 1.140, Rev. 1 (October 1979)

Design, Testing, and Maintenance Criteria for Normal Ventilation Exhaust System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants

Project Assessment - Comply, with the following clarifications and exceptions:

1. Paragraph C.2.d - Regulatory Guide 8.8 will be addressed in a future amendment.

2. ~~Paragraph C.2.f - Housing leak tests are performed in accordance with the guide, but ductwork leak tests are performed using the methods of the Associated Air Balance Council instead of ANSI N510-1975.~~

   ~~The methods recommended by the Associated Air Balance Council are considered to be acceptable alternatives to ANSI N510-1975.~~

3. Paragraph C.3.c - For HEPA filters and adsorber mountings, the requirements of ANSI N509-1976 Section 5.6.3 are complied with except for the tolerance requirements. The tolerances for HEPA filters and adsorber mounting frames are sufficient to pass the bank leak tests of paragraphs 5.c and 5.d of the guide.

   An acceptable bank leak rate is the primary objective. Variations in manufacture from the tolerance values listed in ORNL-NSIC-65 (Table 4.2) are considered to be acceptable.

4. Paragraph C.3.h - Exception is taken to Section 5.2.2.4 of ANSI N509-1976 which calls for a means of compaction to uniform density. Where uniform compaction can be demonstrated, compacting means are not required.

   A means for compaction, vibratory or otherwise, need not be mandatory if uniform compaction is demonstrated.

following features are incorporated in its design to ensure system reliability and to minimize the uncontrolled release of airborne radioactive contaminants during normal plant operation:

1. Fifty percent standby capacity of the main exhaust fans ensures full system capacity with any unit inoperative due to equipment failure or maintenance outage.

2. The radwaste building exhaust air is monitored by radiation detectors prior to discharge, to ensure against release of radioactive contaminants. ~~In the event of detection of high airborne radioactivity in the building, administrative control is required to shut down the system.~~

3. Redundant unit coolers for sample room, laundry room, and formaldehyde area ensure supply system operation in the event of single fan failure.

4. All exhaust air from waste tanks and other equipment handling radioactive materials is passed through the charcoal filter unit prior to discharge, thus minimizing the release of radioactive contaminants.

5. A manually actuated water spray fire protection system is provided for each filter unit to protect against possible fire in the filters.

6. The redundant 100-percent capacity of the charcoal filtration system for processing contaminated tanks and shielded compartment exhaust ensures continued operation of the system at all times.

The radiation monitors continuously sense the radiation level and automatically send an alarm signal to the main control room (Section 12.3.4).

MOVE TO TOP OF PAGE

The radwaste building ventilation system is shut down manually upon detection of high radiation levels in the common air exhaust duct.

INSERT A →

9.4.3.4 Inspection and Testing Requirements

9.4.3.4.1 Auxiliary Building Ventilation System

The auxiliary building ventilation system is subjected to preoperational testing in accordance with procedures

INSERT A (For Page 9.4-33)

A detailed description of compliance of the radwaste building ventilation system (RBVS) charcoal filtration system with positions C.1.a through C.1.d and C.2.a through C.2.e of Regulatory Guide 1.140 is provided as follows:

C.1.a The design of the charcoal filtration system is based upon the maximum operating parameters of temperature (105°F), pressure (atmospheric), relative humidity (20-100%), and radiation levels (70 rads).

C.1.b The charcoal filtration unit is not located in areas of high radiation during normal plant operation so no special shielding of the components from the radiation source needs to be provided.

C.1.c No engineered-safety-feature system that must operate after a design basis accident will be adversely affected by the charcoal filtration system's operation in the radwaste building.

C.1.d Contaminants that could damage the filter units were evaluated. No contaminants were identified that could damage the units.

C.2.a In accordance with Regulatory Guide 1.140, the RBVS charcoal filtration system consists of fans, dampers, ductwork, and filter units. Each filter unit consists of a moisture separator, an electric heating coil, a prefilter, a HEPA filter, a charcoal iodine adsorber bank, and another HEPA filter.

C.2.b The volumetric air flow through the RBVS unit is 4000 CFM.

C.2.c The charcoal filtration system's instrumentation is designated to monitor and alarm pertinent pressure drops and flow rates in accordance with the recommendations of Section 5.6 of ERDA 76-21 (see Figure 9.4-3a). Each filter bank, moisture separator, and charcoal adsorber has it's own pressure differential monitors. Flow indicators are provided to ensure that the flow is in the desired range. High Delta P and low flow conditions are alarmed on a local panel.

C.2.e The outdoor air intake openings for the RBVS consist of a louvered intake plenum with filter banks to ensure that contanimants do not enter the system (see Figure 9.4-3a).

negative pressure with respect to the main turbine building area.

3. Two 100-percent capacity off-gas vault refrigeration units are provided (one operating and one on standby) to maintain the charcoal adsorber vault at subzero temperature for continuous reliable operation.

4. Redundant supply fans of 100-percent capacity are provided for the unit coolers of the steam tunnel and turbine well to ensure a continuous operation of the unit coolers.

5. Exhaust air is drawn from within the shielded areas of the turbine building thus inducing airflow from clean areas to potentially contaminated areas.

6. The exhaust air from the mechanical vacuum pump is passed through the charcoal filter unit prior to discharge to the plant exhaust duct thus minimizing radioactive release.

INSERT B

9.4.4.4 Inspection and Testing Requirements

The turbine building ventilation system is designed to permit periodic inspection of major components such as fans, motors, coils, filters, ductwork, piping, and valves, to assure the integrity and capability of the system. Local display and indicating devices are provided for periodic inspection of parameters such as filter pressure drops. Test connections are provided in the charcoal filter unit and chilled water piping for periodic checking of air and water flows for conformance to design requirements.

The HEPA filters in the charcoal filter units are subjected to both shop and field efficiency tests. Upon installation, and periodically thereafter, HEPA filters are given an in-place DOP test in accordance with ANSI N510[3].

All system ductwork is subjected to leak tests during erection and is balanced in accordance with the procedures of the Associated Air Balance Council (AABC)[8]. 5

9.4.4.5 Instrumentation Requirements

Local panels located at different elevations of the turbine building provide instrumentation and controls for operation of the turbine building area ventilation system. Abnormal temperatures, pressures, and flows in the system are alarmed

INSERT B (For Page 9.4-43)

A detailed description of compliance of the turbine building ventilation system (TBVS) charcoal filtration system with positions C.1.a through C.1.d and C.2.a through C.2.e of Regulatory Guide 1.140 is provided as follows:

C.1.a The design of the charcoal filtration system is based upon the maximum operating parameters of temperature (96°F), pressure (atmospheric), relative humidity (20-100%), and radiation levels (10 rads).

C.1.b The charcoal filtration unit is not located in areas of high radiation during normal plant operation so no special shielding of the components from the radiation source needs to be provided.

C.1.c No engineered-safety-feature system that must operate after a design basis accident will be adversely affected by the charcoal filtration system's operation in the turbine building.

C.1.d Contaminants that could damage the filter units were evaluated. No contaminants were identified that could damage the units.

C.2.a In accordance with Regulatory Guide 1.140, the TBVS charcoal filtration system consists of fans, dampers, ductwork, and filter units. Each filter unit consists of a moisture separator, an electric heating coil, a prefilter, a HEPA filter, a charcoal iodine adsorber bank, and another HEPA filter.

C.2.b The volumetric air flow through the TBVS unit is 5000 CFM.

C.2.c The charcoal filtration system's instrumentation is designed to monitor and alarm pertinent pressure drops and flow rates in accordance with the recommendations of Section 5.6 of ERDA 76-21 (see Figure 9.4-3a). Each filter bank, moisture separator, and charcoal adsorber has it's own pressure differential monitors. Flow indicators are provided to ensure that the flow is in the desired range. High Delta P and low flow conditions are alarmed in the auxiliary control room.

C.2.e The outdoor air intake openings for the TBVS consist of a louvered intake plenum with filter banks to ensure that contanimants do not enter the system (see Figure 9.4-3a).

ENCLOSURE 25

2. Main steam pipe tunnel, north end

3. East and west general areas, annulus mixing system, and charcoal filter room

4. Charcoal filter rooms

5. HPCS pump cubicle

6. RHR pump room and heat exchanger cubicle

7. RPCCW pumps and heat exchanger cubicles

8. RWCU pump cubicle

9. RCIC pumps and turbine cubicle

10. General areas

11. LPCS pump cubicle.

Each unit cooler consists of a housing, throw-away type filters, cooling coils, vaneaxial fan, and ductwork. The unit coolers are designed for adequate air recirculation to remove heat dissipated from electrical equipment, piping, motors and to maintain design ambient temperature. Warm building air is cooled by recirculating the air through cooling coils by the unit cooler fans. Cooling water for the cooling coils is provided by the normal service water system (Section 9.2.1). During loss of offsite power and DBA conditions, the cooling water is supplied by the standby service water system as described in Section 9.2.7. During loss of offsite power or during DBA conditions coincident with loss of offsite power, power for the unit coolers is provided by the independent standby buses. The unit cooler protecting an ECCS component is connected to the same bus supplying power to the ECCS component.

There are three units coolers serving the safety-related pump rooms as follows:

INSERT →

~~1. Group 1 - The HPCS pump room served by unit cooler 1HVR*UC5.~~

~~2. Group 2 - The RHR heat exchangers A and C and pump room A, the LPCS pump room, and the RCIC pump room served by unit cooler 1HVR*UC6.~~

~~3. Group 3 - The RHR heat exchangers B&D and room B, and pump room C served by unit cooler 1HVR*UC9.~~

INSERT (For Page 9.4-27)

There are three unit coolers serving the safety-related pump rooms as follows:

1. Group 1 - The HPCS pump room which contains the high pressure core spray pump and discharge line fill pump is served by unit cooler 1HVR*UC5.

2. Group 2 - The RHR heat exchangers A and C and pump room A which contains the residual heat removal pump and heat exchangers, the LPCS pump room which contains the low pressure core spray pump and discharge line fill pump and the RCIC pump room which contains the reactor core isolation cooling pump, turbine, and discharge line fill pump are served by unit cooler 1HVR*UC6.

3. Group 3 - The RHR heat exchangers B and D and pump room B, which contains the residual heat removal pump and heat exchangers, and the RHR pump room C which contains the residual heat removal pump and discharge line fill pump are served by unit cooler 1HVR*UC9.

TABLE 3.2-1 (Cont)

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
4. Containment unit cooler ductwork up to pressure relief damper	2	I	B	E	C	P	S	
5. Ductwork, other	NNS	NA	S	E	C	P	S	
6. Dampers, other	NNS	NA	S	E	C	P	V	
7. Dome recirculation fan	NNS	NA	S	E	C	P	V	
8. Containment unit cooler (1HVR*UC1C)	NNS	NA	S	E	C	P	V	
XXI. Auxiliary Building Ventilation System								
1. Outside air intake ductwork from tornado damper to isolation damper	3	I	B	E	A	P	S	
2. Unit cooler ductwork	3	I	B	E	A	P	S	
3. Unit cooler dampers	3	I	B	E	A	P	V	
4. Exhaust ductwork to isolation dampers	3	I	B	E	A	P	S	
5. Inlet isolation dampers	3	I	B	E	A	P	V	
6. Outlet isolation dampers	2	I	B	E	A	P	V	
7. Air exhaust system ductwork from isolation damper to tornado dampers	2	I	B	E	A	P	S	
8. Inlet tornado dampers	3	I	B	P	A	P	V	
9. Outlet tornado dampers	2	I	B	P	A	P	V	
10. Fire dampers	3	I	B	E	A	P	V	
11. Exhaust system balancing dampers	3	I	B	E	A	P	V	
12. Exhaust system backdraft dampers	3	I	B	E	A	P	~~S~~ V	
13. Inlet and exhaust fans	NNS	NA	S	E	A	P	V	
14. Intake and exhaust filters	NNS	NA	S	E	A	P	V	
15. Dampers, other	NNS	NA	S	E	A	P	V	
16. Ductwork, other	NNS	NA	S	E	A	P	S	

INSERT

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
XXII. Power Conversion System								
1. Main steam line (MSL) from second isolation valve to and including first field weld outside the jet impingement wall and all branch lines out to and including the first valve in the branch line	1	I	B	E	A	P	S	(10)

ENCLOSURE 26

INSERT (For Table 3.2-1, Sh. 11)

		Safety(1) Class	Seismic(2) Category	Quality(3) Assurance Category	Tornado(4) Protection Designation	Location(5)	Scope(6) of Supply	Design(7) Detail	Notes
17.	Unit coolers/coils (1HVR*UC2 through UC11A, B)	3/3	I	B	E	A	P	V	
18.	Unit cooler 1HVR-UC14	NNS	NA	S	E	A	P	V	

ENCLOSURE 27

INSERT A

Failure of any one unit cooler affects no more than one group of safety-related pump rooms. Each cooler is supplied by its associated independent standby service water supply and served by an independent standby bus.

safety related

The unit coolers' cooling coil construction conforms to the requirements of ASME[7] Section III, Class 3 and bears the N stamp. The cooling coils' framing and supports conform to the requirements of subsection NF of ASME Section III, Division I.

INSERT B

9.4.3.2.2 Radwaste Building Ventilation System

The radwaste building ventilation system is shown in Fig. 9.4-3a and 9.4-3b. The principal system components and their performance data are listed in Table 9.4-5. The radwaste building ventilation system is a 100-percent outside air supply and exhaust system, providing once-through air flow with no recirculation.

The system consists of a common air intake built-up filter unit, unit coolers, and distribution ductwork. The filter unit consists of an insulated steel cabinet housing prefilters, high-efficiency filters, intake dampers, and plenum. The prefilters are of renewable roll type, automatically progressed to maintain uniform pressure drop. The high-efficiency filters are of extended surface type.

Each unit cooler consists of a housing, cooling coil, electric heating coil, vaneaxial fan, and ductwork. Prefilters and high-efficiency filters function to remove dust particulates from the outside air before it is delivered to the system. Electric coils are provided for temperature and humidity control.

All unit coolers draw outside air from the intake plenum through ductwork. The cooling coils are provided with chilled water from the radwaste building chilled water system (Section 9.2.9). Distribution duct from the unit coolers supplies air to the clean areas. Air is exhausted from potentially contaminated areas only, thus maintaining air flow from clean to contaminated areas.

During normal plant operation, the supply system operates continuously, providing tempered air throughout the building via unit coolers and the supply duct distribution system. The radwaste building supply system has no safety functions and is inoperative in the event of a loss of offsite power.

The exhaust air system is divided into two sections:

INSERT A (For Page 9.4-28)

With the exception of unit cooler 1HVR-UC14, the unit coolers are classified as Safety Class 3 and Seismic Category I.

INSERT B (For Page 9.4-28)

Unit cooler 1HVR-UC14 is not designed to meet safety class or Seismic Category I requirements since it is not required to operate following a postulated DBA or loss of offsite power.

ENCLOSURE 28

TABLE 9.4-4 (Cont)

10. Unit Cooler	
Equipment Mark No.	1HVR*UC10
Cooling capacity (mbh, max)	109.4
Cooler air flow (cfm)	4,900
Fan type	Vaneaxial
Motor (hp)	5
Cooling medium	Standby service water
Flow rate (gpm, max)	37
Leaving air temp dry/wet bulb (°F)	100/82
11. Unit Cooler	
Equipment Mark No.	1HVR*UC11A & 11B
Cooling capacity (mbh, max)	1214.7
Cooler air flow (cfm)	53,000
Fan type	Vaneaxial
Motor (hp)	75
Cooling medium	Standby service water
Flow rate (gpm, max)	410
Leaving air temp dry/wet bulb (°F)	100/82
INSERT →	
13 ~~12~~. Supply Fans	
Equipment Mark No.	1HVR-FN6A & 6B
Type	Vaneaxial direct drive
Airflow capacity (cfm)	10,000
Total pressure capability (in W.G.)	6
Speed (rpm)	3550
Motor (hp)	15
Type of discharge	Horizontal
14 ~~13~~. Roll Type Air Filter	
Equipment Mark No.	1HVR-FLT2
Total air capacity (cfm)	10,000
Filter pressure drop (dirty) (in W.G.)	1.5
Face velocity (max, fpm)	475
Filter efficiency (average)	85% NBS
Filter media thickness (in)	2
15 ~~14~~. Extended Surface Type Filters	
Equipment Mark No.	1HVW-FLT7
Total air capacity (cfm)	10,000
Filter pressure drop (dirty) (in W.G.)	0.7

TABLE 9.4-4 (Cont)

Face velocity (max, fpm)	475
Filter efficiency (average)	95 ASHRAE 52-76
Filter media thickness (in)	22
16 ~~15~~. Exhaust Fans	
Equipment Mark No.	1HVR-FN7A & 7B
Airflow capacity (cfm)	10,000
Total pressure capability (in W.G.)	6
Speed (rpm)	3550
Motor (hp)	20
Type of discharge	Horizontal

INSERT (For Table 9.4-4, Sh. 3)

12. Unit Cooler

Equipment Mark No.	1HVR-UC14
Cooling Capacity (mbh, max)	68,200
Cooler Air Flow (cfm)	3500
Fan Type	Centrifugal
Motor (hp)	10
Cooling Medium	Chilled water
Flow Rate (gpm, max)	11
Leaving Air Temp. Dry/Wet Bulb (°F)	62.6/61.7

ENCLOSURE 29

3. Redundant unit coolers are provided for essential areas to ensure that this part of the system satisfies the single-failure criteria.

4. The fresh air intake for the ventilation system is protected by a missile barrier (Fig. 1.2-13). The air intake is designed so as to prevent direct impingement on the system ductwork from any type of precipitation. The air intake opening is designed for a low velocity of approximately 250 ft/min to minimize water droplet carryover. A protective bird screen of 1/2 in square, 16-gauge mesh is provided to prevent accumulation and subsequent blockage by either snow or ice.

The system capacity is based on maximum summer ambient design air temperature and the hea generated by equipment, motors, electrical components, piping and pipe hangers, valves and lighting. Heat dissipation within the areas where safety-related equipment is located, are analyzed individually to establish air quantities for effective cooling.

A radiation monitor is provided in the exhaust duct. High radiation exceeding set point in the auxiliary building exhaust duct sounds an alarm in the main control room, and air is manually diverted to the SGTS.

The auxiliary building normal exhaust path is provided with redundant, air operated, fail-closed isolation dampers to preclude the possibility of airborne radioactivity bypassing the boundary regions of the SGTS. In the event of failure of the nonsafety-related portion of the auxiliary building ventilation system due to a seismic event or malfunction of equipment, the safety-related portion is isolated by the redundant isolation dampers without jeopardizing the ventilation system.

Failure of the nonsafety-related portion of the system does not compromise any safety-related system or component and does not prevent safe reactor shutdown.

The SGTS performs the operations required for control of radioactivity following an accident. Refer to Section 6.5 for a description of this system.

INSERT →

9.4.3.3.2 Radwaste Building Ventilation System

The radwaste building heating and ventilation system is not required for a safe shutdown of the plant; however, the

INSERT (For Page 9.4-32)

The auxiliary building system ductwork conveying exhaust air to the SGTS in the event of a high exhaust radiation signal complies with the guidelines of applicable portions of Position C.2 of Regulatory Guide 1.52 as follows:

C.2.a The auxiliary building ventilation system ductwork and damper arrangement is designed with sufficient redundancy to meet single-failure criterion (see Figure 9.4-7a).

C.2.d Pressure surges resulting from a postulated accident on the auxiliary building ductwork will be analyzed and the system will be revised, if necessary, to support the findings of the analysis.

C.2.e The effects of radiation on the ESF system components such as controls, joining compounds, dampers, gaskets and other organic-compounds materials that are necessary for operation during a postulated DBA have been considered.

ENCLOSURE 30

QUESTION 410.63 (9.4.3)

Table 9.4-1 indicates a design temperature range in the auxiliary building supply and exhaust system of 122°F maximum and 40°F minimum. Describe the means provided for meeting the minimum temperature in the winter when the plant is shut down.

RESPONSE

The response to this request ~~will be provided by June 1983~~. 7

is provided in revised Section 9.4.3.2.1.1 and 9.4.3.5.1, and in revised Table 9.4-4.

9. Design charcoal filtration units in accordance with Regulatory Guide 1.140 (see Table 9.4-6 for exceptions).

9.4.3.2 System Description

9.4.3.2.1 Auxiliary Building Ventilation System

The auxiliary building ventilation system is shown in Fig. 9.4-7a through 9.4-7c. The principal system components and their performance data are listed in Table 9.4-4. The auxiliary building contains equipment for normal plant operation and safety-related equipment valves, switchgear, safety-related instrumentation, cables, and control wiring required for safe shutdown of the plant.

The auxiliary building ventilation system consists of the following systems:

1. Supply air system
2. Exhaust air system
3. Unit coolers system.

9.4.3.2.1.1 Supply Air System

REPLACE WITH INSERT 1

~~The supply air system consists of two 100-percent capacity, 10,000 cfm vaneaxial fans, a prefilter, high-efficiency filters, dampers, and ductwork. The prefilters are of a renewable roll type, automatically progressed to maintain uniform pressure drop. The high-efficiency filters are of extended surface type. The supply air system serves the following areas within the auxiliary building through distribution ductwork:~~

1. Normal switchgear and terminal box areas
2. Control rod drive (CRD) transfer and work area
3. RPCCW pump and heat exchanger area
4. RHR heat exchangers and pump rooms
5. Work area and miscellaneous areas.

The supply air from these areas flows to areas of progressively higher potential contamination and is exhausted by the exhaust air system. During normal operation the supply air system operates continuously,

INSERT #1 (For Page 9.4-25)

The supply air system consists of two 100-percent capacity 10,000 CFM vaneaxial fans, a prefilter, high-efficiency filters, one 100-percent capacity 80 KW electric duct heater, dampers, and ductwork. The prefilters are of a renewable roll type, automatically progressed to maintain uniform pressure drop. The high-efficiency filters are of extended surface type. The electric duct heater is a duct-mounted, staged type heating coil. The supply air system serves the following areas within the auxiliary building through distribution ductwork.

providing ventilation air. The supply air system is not in operation during a DBA or when a high radiation level exists within the building. All components of the supply air system are nonnuclear safety class and nonseismic, with the exception of outside air intake and isolation dampers which are designed to Seismic Category I and Safety Class 3 requirements. Ventilation air for the auxiliary building is drawn through a common missile protected and tornado-proof opening serving both the containment and auxiliary buildings and is designed to meet Seismic Category I requirements (Fig. 1.2-13). Redundant isolation dampers are provided in the outside air intake to prevent any outleakage of radioactivity during a postulated seismic event.

INSERT 2 →

9.4.3.2.1.2 Exhaust Air System

The exhaust system consists of two 100-percent capacity, 10,000 cfm exhaust fans, dampers, ductwork, and necessary controls. The ventilation air is induced into cubicles from the general building areas, thus keeping the cubicle at a slightly negative pressure and ensuring flow of air from areas of less to progressively greater potential radioactive contamination. The exhaust air is continuously monitored for radioactivity in the main control room by a radiation monitoring system located in the exhaust duct (Section 12.3.4). In the event that radioactivity approaches a predetermined level, specified in the Technical Specifications, main control room operators can manually shut down the supply fans and reroute the exhaust air through the SGTS (Section 6.5). Each fan is connected with an automatic open/close damper which operates in conjunction with the fan.

During the DBA, the auxiliary building ventilation system in conjunction with the SGTS maintains 1/4 in W.G. negative pressure within the building. At this time, the supply and exhaust air systems are shut down, and the exhaust air is diverted to the SGTS.

The exhaust fans are used for smoke removal in the event of fire in the auxiliary building during normal plant operation.

9.4.3.2.1.3 Unit Coolers System

Unit coolers are provided for removal of heat dissipated from equipment for the following areas:

1. Switchgear areas

INSERT #2 (For Page 9.4-26)

The one 100-percent capacity outside air heating coil tempers the supply air during conditions of low outside ambient temperature to maintain the auxiliary building minimum design temperature.

(Chapter 14) to verify wiring and control hookup, system inplace integrity, and proper function of system components and control devices, and to establish system design air flow. Local display and/or indicating devices are provided for surveillance of vital parameters, such as room temperature. All system ductwork is subjected to leak tests during erection and is balanced in accordance with the procedure of the Associated Air Balance Council (AABC)[8].

The ventilation system components are periodically inspected to assure that all normally operating equipment is functioning properly. Maintenance is provided on a regularly scheduled basis to check and replace filters, provide lubrication, etc, in accordance with manufacturer's recommendations.

9.4.3.4.2 Radwaste Building Ventilation System

The radwaste building ventilation system is subjected to preoperational testing in accordance with procedures of Chapter 14, and leak tested and balanced in accordance with the procedures of Associated Air Balance Council (AABC)[8].

The system is designed to permit periodic inspection of major components such as fans, motors, belts, coils, filters, ductwork, piping, and valves to assure the integrity and capability of the system. Local display and/or indicating devices are provided for surveillance of vital parameters such as room temperature. Test connections are provided in charcoal filter units and chilled water piping for periodic checking of air and water flows for conformance to design requirements.

The HEPA filters in the charcoal filter units are subjected to both shop and field efficiency tests. Upon installation, and periodically thereafter, HEPA filters are given an in-place DOP test in accordance with ANSI N510[3]. Filters are field tested at rated flow with an acceptance limit of less than 0.05 percent penetration.

9.4.3.5 Instrumentation Requirements

9.4.3.5.1 Auxiliary Building Ventilation System

Control switches are provided in the main control room for either automatic or manual operation of the auxiliary building supply and exhaust air fans. Interlocks are provided to prevent a fan from starting unless its containment isolation dampers are fully open.

INSERT 3 →

INSERT #3 (For Page 9.4-34)

Control logic is provided to stage the electric duct heater to maintain the supply air temperature within a predetermined range and to deenergize the heater at a high air temperature condition.

TABLE 9.4-4 (Cont)

Face velocity (max, fpm)	475
Filter efficiency (average)	95 ASHRAE 52-76
Filter media thickness (in)	22
16 ~~15~~. Exhaust Fans	
Equipment Mark No.	1HVR-FN7A & 7B
Airflow capacity (cfm)	10,000
Total pressure capability (in W.G.)	6
Speed (rpm)	3550
Motor (hp)	20
Type of discharge	Horizontal

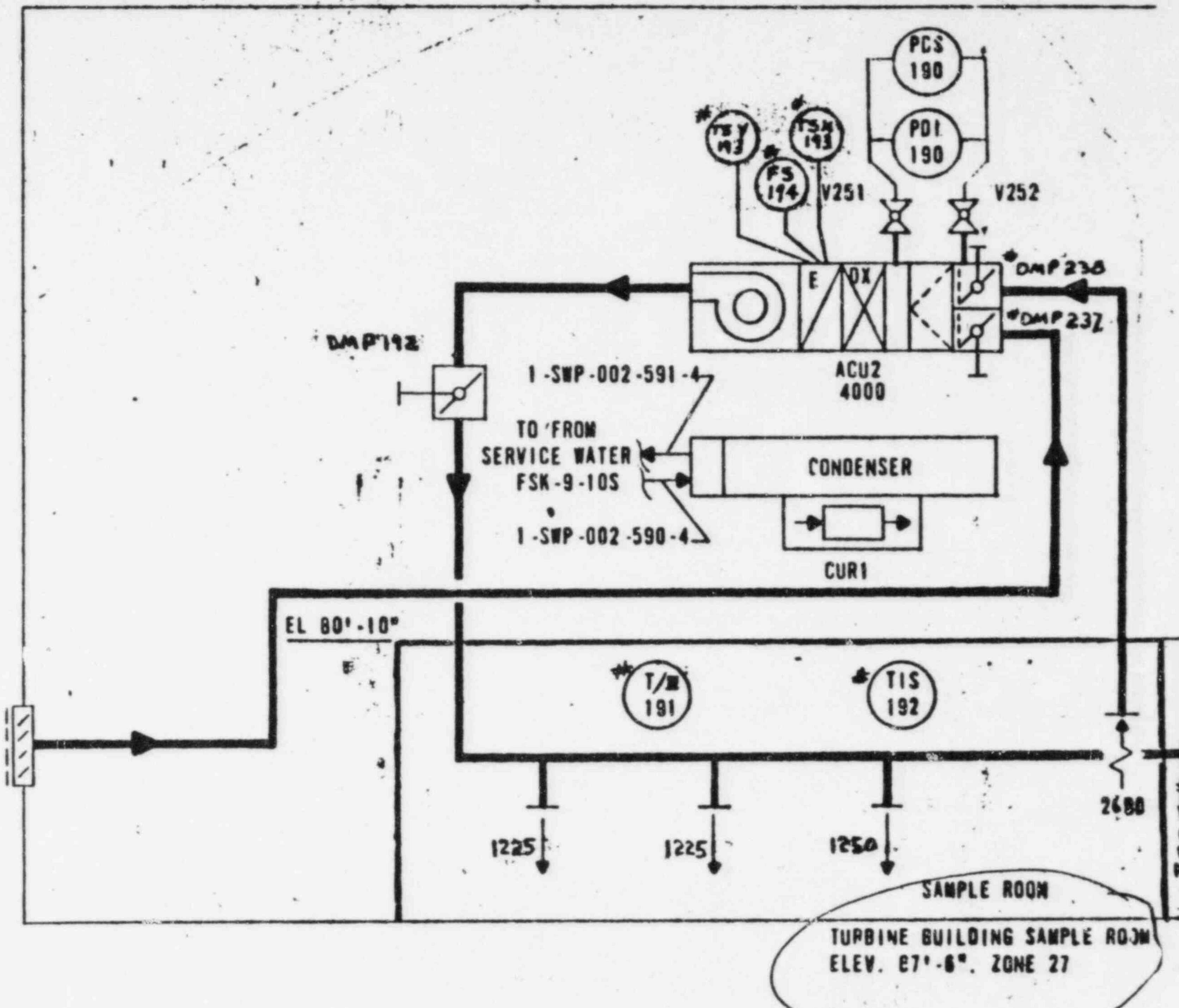
INSERT 4 →

INSERT #4 (For Page 4 of Table 9.4-4)

17. Electrical Duct Heater

Equipment Mark No.	1HVR-CH1
Type	Finned Tubular
Capacity	80 kw
Stages	4

ENCLOSURE 31


PCS 190
PDI 190
TSY 193
TSH 193
FS 194
V251
V252
DMP 238
DMP 237
DMP192
ACU2 4000
1-SWP-002-591-4
TO/FROM SERVICE WATER FSK-9-10S
1-SWP-002-590-4
CONDENSER
CUR1
EL 80'-10"
T/E 191
TIS 192
2680
1225
1225
1250
300
SAMPLE ROOM
TURBINE BUILDING SAMPLE ROOM
ELEV. 67'-6". ZONE 27

ENCLOSURE 32

QUESTION 410.64 (9.4.5)

Table 9.4-1 indicates that a minimum temperature of 40°F will be maintained in the diesel generator buildings and standby service water pumphouse. Describe the means provided for maintaining this temperature in the winter when the diesels or standby service water pumps are not operating.

RESPONSE

7 ~~The response to this request will be provided by June 1983~~.

REPLACE WITH INSERT

INSERT (For Page Q&R 9.4-12)

The response to this request for the diesel generator building is provided in revised Section 9.4.5.2.2 and in revised Table 9.4-8.

The response to this request for the standby service water pumphouse is provided in revised Sections 9.4.5.2.3.1 and 9.4.5.2.3.2, and in revised Table 9.4-8.

control room is ventilated by one dedicated supply fan controlled to start on high ambient diesel generator control room temperature. Power to each fan is supplied from normal offsite power or its respective diesel emergency bus. Ventilation air from the diesel generator control room is exhausted through fire protected openings to the diesel generator room.

Each diesel generator room is provided with a nonsafety-related and nonseismic ventilation fan to prevent stagnation of room air.

INSERT A ⟶

9.4.5.2.3 Standby Service Water (SSW) Pump House Ventilation System

The SSW pump house ventilation system serves the SSW cooling tower pump house pump rooms and switchgear rooms.

The pump house ventilation system is shown in Fig. 9.4-6b. The major system components and performance data are listed in Table 9.4-8.

9.4.5.2.3.1 SSW Cooling Tower Pump House Pump Rooms

The SSW cooling tower pump house pump rooms ventilation subsystem consist of two 100 percent capacity supply fans for each pump room utilizing separate ducting, dampers, and controls to maintain the space design temperature as listed in Table 9.4-1. Each pump room ventilation system is connected to the emergency bus which serves the pumps that are being cooled. In this manner, the associated fan operates when its respective pump is operating, and operation is assured in the event of the loss of offsite power supply. Ventilation air is exhausted through missile and tornado protected openings.

INSERT B ⟶

9.4.5.2.3.2 SSW Cooling Tower Pump House Switchgear Rooms

The SSW cooling tower pump house switchgear rooms ventilation subsystem is shown in Fig. 9.4-6b. The major system components and performance data are listed in Table 9.4-8.

The SSW cooling tower pump house switchgear rooms ventilation subsystem consists of two 100-percent capacity supply fans for each switchgear room utilizing separate ducting, dampers, and controls to maintain the space design temperature of 109°F maximum. Each switchgear room ventilation system is connected to the emergency bus which serves the switchgear. In this manner, the associated fan

INSERT A (For Page 9.4-47)

Unit heaters are provided in each diesel generator room to maintain the minimum design temperature for the areas during conditions of low outside ambient temperature.

INSERT B (For Page 9.4-47)

Each pump room is supplied with an electric unit heater in order to maintain the minimum design temperature.

operates when its respective switchgear is operating, and operation is assured in the event of the loss of offsite power supply. Ventilation air is exhausted through missile and tornado protected openings.

INSERT C

9.4.5.2.4 Auxiliary Building Ventilation System (Safety-Related Pump Rooms and Standby Gas Treatment)

For a description of the safety-related pump rooms ventilation subsystems see Section 9.4.3. For a description of the standby gas treatment subsystem see Section 6.5.

9.4.5.2.5 Annulus Mixing System

For a description of the annulus mixing system see Section 9.4.6.

9.4.5.2.6 Containment Ventilation System

For a description of the containment ventilation system see Section 9.4.6.

9.4.5.2.7 Fuel Building Ventilation System (Charcoal Filtration Subsystem)

For a description of the charcoal filter subsystem see Section 9.4.2.

9.4.5.3 Safety Evaluation

The equipment which forms part of the ESF ventilation systems must maintain functional integrity during a DBA. Therefore, the ventilation and air conditioning equipment and all associated ductwork and piping for these areas is designed to Seismic Category I requirements.

All equipment is located within Seismic Category I structures. Redundant components are provided to ensure that a single failure does not impair or preclude systems operation. The systems are connected to the emergency power bus and are operable during loss of offsite power.

The safety evaluations of the control building, fuel building, auxiliary building, and containment ventilation systems and of the annulus mixing system are further discussed in the respective sections referenced in Section 9.4.5.2 for these systems.

Each SSW cooling tower pump house pump room and SSW cooling tower pump room switchgear room is equipped with two

INSERT C (For Page 9.4-48)

Each switchgear room is supplied with an electric unit heater in order to maintain the minimum design temperature.

TABLE 9.4-8

DESIGN DATA FOR THE ENGINEERED SAFETY FEATURES VENTILATION SYSTEMS

Diesel Generator
Rooms Exhaust Fans

Equipment Mark No.	1HVP*FN2A&B, 1HVP*FN3A&B
Type	Vaneaxial
Capacity	131,000 cfm
Static pressure	3.5 in W.G.
Motor	100 hp

Equipment Mark No.	1HVP*FN5A&B
Type	Vaneaxial
Capacity	34,000 cfm
Static pressure	2.0 in W.G.
Motor	20 hp

Diesel Generator Control
Rooms Supply Fans

Equipment Mark No.	1HVP*FN6A, B, & C
Type	Centrifugal
Capacity	2,000 cfm
Static pressure	0.7 in W.G.
Motor	1 hp

INSERT D →

SSW Cooling Tower
Pump House Pump Rooms Supply Fans

Equipment Mark No.	1HVY*FN1A, 1B, 1C, & 1D
Type	Vaneaxial
Capacity	15,000 cfm
Static pressure	2 in W.G.
Motor	7.5 hp

INSERT E →

SSW Cooling Tower
Switchgear Rooms Supply Fans

Equipment Mark No.	1HVY*FN2A, 2B, 2C, & 2D
Type	Vaneaxial
Capacity	6,200 cfm
Static pressure	1.5 in W.G.
Motor	3 hp

INSERT F →

INSERT D (For Table 9.4-8)

Diesel Generator
<u>Rooms Unit Heaters</u>

Equipment Mark No.	1HVP-UH1A & B & C, 1HVP-UH2A & B & C
Type	Electric Unit Heater
Capacity	7.5 KW
Equipment Mark No.	1HVP-UH3A, B & C, 1HVP-UH4A, B & C
Type	Electric Unit Heater
Capacity	5 KW

INSERT E (For Table 9.4-8)

SSW Cooling Tower
Pump House Pump Rooms Unit Heaters

Equipment Mark No.	1HVY-UH17 & 18
Type	Electric Unit Heater
Capacity	5 KW

INSERT F (For Table 9.4-8)

SSW Cooling Tower
<u>Switchgear Rooms Unit Heaters</u>

Equipment Mark No.	1HVY-UH15 & 16
Type	Electric Unit Heater
Capacity	4 KW

TABLE 9.4-1 (Cont)

HVAC System	Temperature (°F) Normal Range	Temperature (°F) Post Accident	Pressure (in W.G.) Normal Range	Pressure (in W.G.) Post Accident	Rel. Humidity (%) Normal Range	Rel. Humidity (%) Post Accident	ESF Power Required	Degree of Redundancy (Major Components)	Operation Under Postulated Accident Conditions	Provision for Radiation monitoring at Release Point	Remarks
Auxiliary building unit coolers system	122 max 40 min	122 max 40 min	NA	NA	20-60	20-90	Yes	2-100% Coolers for electrical, mechanical general area	Yes	No	Recirculation type coolers
Radwaste building supply and exhaust systems	90-105 max 40 min	NA	-0.25	NA	20-60	NA	No	3-50% Exhaust fans	No	Yes	Sample room and Laundry room normal temp 75°F
Radwaste building charcoal filtration system	NA	NA	-0.25	NA	NA	NA	No	2-100% Filter unit & exhaust fans	No	Yes	To provide filtration to radioactive tank ventilation discharge
Turbine building supply and exhaust system	96-120 max 40 min	NA	-0.125	NA	20-60	NA	No	3-50% Exhaust fans	No	Yes	Sample room 75°F normal
Off gas-condensate demineralizer area ventilation system	0 to -40	NA	-0.25	NA	100 max	NA	No	2-100%	No	Yes	
Hogging pumps charcoal filtration system	NA	NA	NA	NA	NA	NA	NA	2-100%	No	Yes	To provide filtration to radioactive hogging pump discharge
Diesel generator ventilation system	122 max 40 min	122 max 40 min	Atmos.	Atmos.	20-90	20-90	Yes	2-100% & HPCS	Yes	No	122°F based on diesel engine running
Switchgear and transformer room standby service water cooling tower ventilation system	~~122~~ 109 max 40 min	~~122~~ 109 max 40 min	Atmos.	Atmos.	~~95~~ 100 max	~~95~~ 100 max	Yes	2-100%	Yes	No	
Standby service water pump house ventilation system	109 max 40 min	109 max 40 min	Atmos.	Atmos.	100 max	100 max	Yes	2-100%	Yes	No	