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 STN-50-529 Palo Verde Nuclear Station, Unit 2, Arizona Publi 05000529  
 STN-50-530 Palo Verde Nuclear Station, Unit 3, Arizona Publi 05000530

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SUBJECT: Submits revised deviation requests to commitments associated  
 w/10CFR50,App R for NRC review & approval,per Generic Ltr  
 86-10.

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April 29, 1993

WILLIAM F. CONWAY  
EXECUTIVE VICE PRESIDENT  
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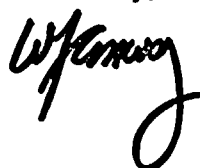
Dear Sirs:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)**  
**Units 1, 2, and 3**  
**Docket Nos. STN 50-528/529/530**  
**10 CFR 50 Appendix R,**  
**New and Revised Deviations**  
**File: 93-056-026**

Arizona Public Service Company (APS) hereby submits, for NRC review and approval, new and revised deviation requests to APS' commitments associated with 10 CFR 50, Appendix R. These deviations are in accordance with Generic Letter 86-10, Enclosure 1, Interpretations of Appendix R, Items 1 through 6.

If you have any questions, please call Thomas R. Bradish at (602) 393-5421.

Sincerely,



WFC/JNI/rv

Enclosures:

- 1) New and Revised Appendix R Deviation Requests
- 2) 10 CFR 50.59 Evaluation

cc: J. B. Martin  
J. A. Sloan  
C. M. Trammell

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**ENCLOSURE 1**

**NEW AND REVISED APPENDIX R DEVIATION REQUESTS**



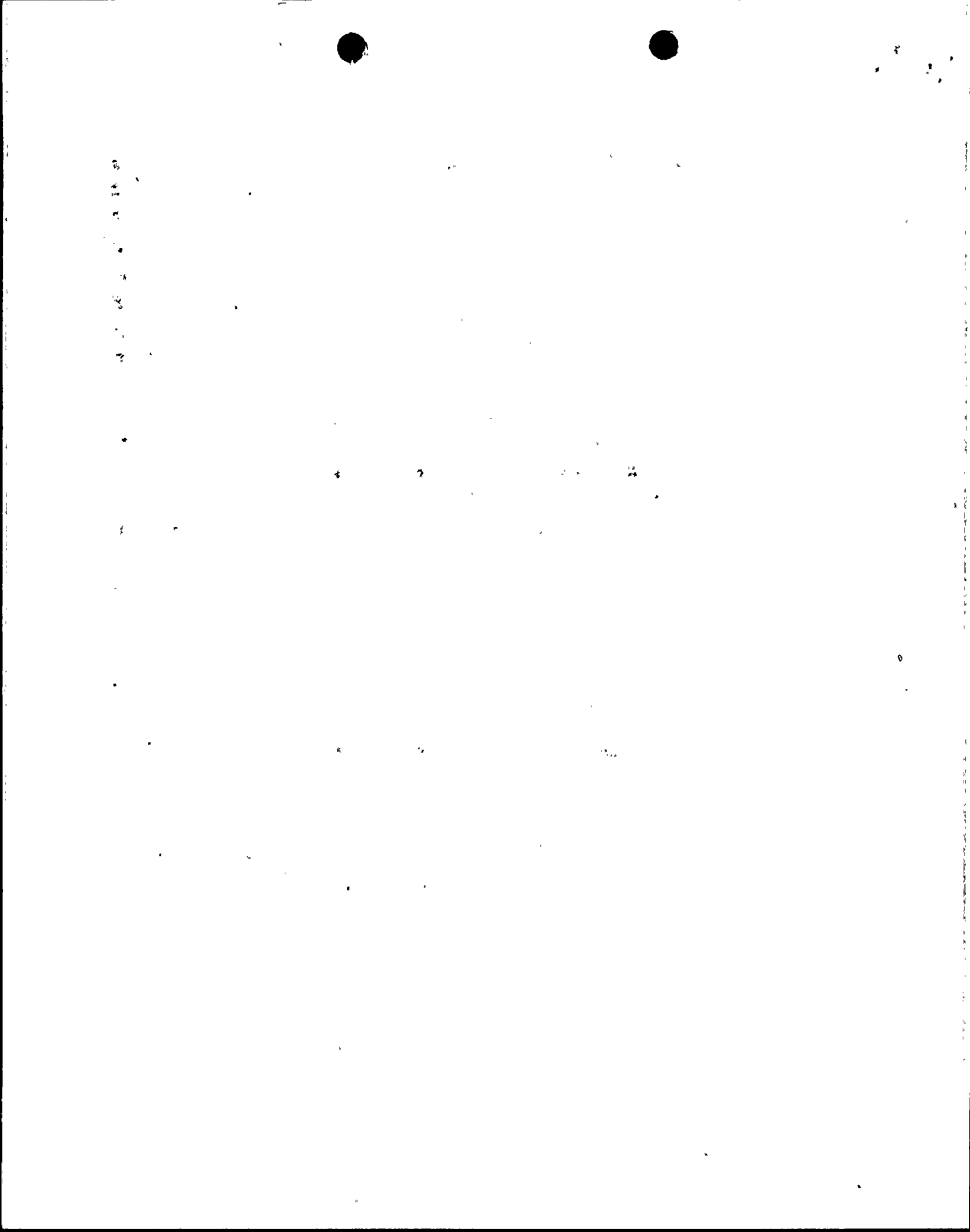
## New and Revised Appendix R Deviation Requests

This enclosure includes the following deviation changes, listed by the applicable UFSAR section. These deviations will be included in the UFSAR changes to Appendix 9B, "Fire Protection Evaluation Report":

- 9B.2.0.F - A new generic deviation. During the post-fire shutdown reactor coolant system process variables may exceed the limits described in 10 CFR 50 Appendix R, Section III.L and the guidance provided by Generic Letter 86-10. There is no adverse effect on the ability to achieve and maintain safe shutdown in the event of any postulated fire as a result of this deviation.
- 9B.2.1.B.5 - Adds detail regarding circuit separation between two Fire Zones (Fire Zones 86A and 86B), in the dead space compartment between the Auxiliary Building and Control Building.
- 9B.2.2.B.2 - Clarification to the deviation for the Train B, Zone 86B, east wall adjacent to the Corridor Building revising information on circuits located in the Corridor Building.
- 9B.2.3.B.3 - Credits one additional operator action (isolation of main steam) in the Control Room on the same panel as the reactor trip, prior to Control Room evacuation.
- 9B.2.15.B.2 - Discusses the addition of the Train E charging pump to the analysis.
- 9B.2.15.B.8 - Provides clarifications on details of the Auxiliary Building separation and protection within Fire Area XV.

### NOTE:

To facilitate review, existing UFSAR deviation statements attached are in ordinary (non-bold) type, new material is indicated in **bold** type and deleted material from the existing deviation is lined out ~~strike-out~~.





## FIRE HAZARDS ANALYSIS

performed in the outside yard areas can be easily performed by utilizing a hand-held lantern. The lanterns will be readily available in or near the control room and regularly maintained to ensure proper operation and will only need to be energized for the relatively short time that an operator is outside the plant buildings. In addition to utilizing hand-held lanterns for illumination in these outside areas, pole-mounted security lights are installed in the outside yard areas which, though not provided for Appendix R compliance, also provide a reliable source of yard illumination for traversing. The security lights are supplied by their own backup diesel generator which would not be affected by the fires identified in the above scenarios. Access/egress routes through plant buildings will continue to be provided with fixed 8-hour battery-powered emergency lights, as will the safe-shutdown areas inside the plant buildings.

INTRODUCTION

9B.2.0

NEW  
INSERT

F. (SEE NEXT PAGE)

## 9B.2.1 FIRE AREA I

9B.2.1.1 Fire Area Description

## A. Area Boundary Descriptions

Fire Area I (figures 9B-1, 9B-3, 9B-4, 9B-5, and 9B-6) contains train A components found in the control building. This fire area includes Zones 1, 3A, 4A, 5A, 6A, 7A, 8A, 9A, 10A, 11A, 15A, 18A, 20, and 86A (figures 9B-8, 9B-9, 9B-10, 9B-11, and 9B-12).

At elevation 74 feet 0 inch, Fire Area I is below grade and bounded to the north by a 3-hour rated barrier common to Fire Area XV, to the east by a 3-hour rated barrier common to Fire Area II (the east wall of Zone 86A is a nonrated barrier common to Fire Area II), and to the west and south by nonrated exterior walls. The west walls of Zones 3A

## **9B.2 FIRE HAZARDS ANALYSIS**

### **9B.2.0 INTRODUCTION**

- F. A deviation is requested from Section III.L using the guidance provided in Generic Letter 86-10, Questions 3.8.4 and 5.3.10, to the extent that it requires the reactor coolant system process variables, as discussed below, to be maintained within those predicted for a normal loss of AC power and the reactor coolant make-up function to be capable of maintaining the reactor coolant level within the level indication in the pressurizer.

#### **DISCUSSION**

10 CFR 50, Appendix R, Section III.L states:

- "1. (b) . . . During the postfire shutdown, the reactor coolant system process variables shall be maintained within those predicted for a loss of normal a.c. power, and the fission product boundary integrity shall not be affected; i.e., there shall be no fuel clad damage, rupture of any primary coolant boundary, or rupture of the containment boundary.
2. the performance goals for the shutdown functions shall be:
  - a. The reactivity control function shall be capable of achieving and maintaining cold shutdown reactivity conditions.
  - b. The reactor coolant makeup function shall be capable of maintaining the reactor coolant level above the top of the core for BWRs and be within the level indication in the pressurizer for PWRs.
  - c. The reactor heat removal function shall be capable of achieving and maintaining decay heat removal.
  - d. The process monitoring function shall be capable of providing direct readings of the process variables necessary to perform and control the above functions.
  - e. The supporting functions shall be capable of providing the process cooling, lubrication, etc., necessary to permit the operation of the equipment used for safe shutdown functions."

Generic Letter 86-10, Question 3.8.4 states:

"The damage to the system in the control room for a fire that causes evacuation of the control room cannot be predicted. A bounding analysis should be made to assure that safe conditions can be maintained from outside the control room."

A bounding analysis was performed for the control room fire scenario to assure that safe shutdown conditions could be maintained from outside the control room. This

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bounding analysis (Reference Calculation 13-MC-FP-318, 10 CFR 50 Appendix R III.G/III.L Compliance Assessment and 13-MC-FP-317, 10 CFR 50 Appendix R Operational Considerations) assumed the worst case spurious actuations as well as loss of all automatic function (such as ESFAS, DG auto start and sequencing) of components where the control circuits could be affected by a fire in the control room. This conservative analysis indicated that the required reactor coolant system process variable and their indication, i.e., pressurizer level, RCS temperature and pressure could exceed those predicted for a loss of offsite power. These transients could occur until positive control of equipment affected by the fire and restoration of charging flow is established within 30 minutes.

## **CONCLUSIONS**

The bounding analysis evaluated the consequences of these transients and demonstrated that safe shutdown can be accomplished satisfactorily (reference calculation 13-MC-FP-317, 10 CFR 50 Appendix R Operational Considerations and calculation 13-MC-FP-316, 10 CFR 50 Appendix R Manual Action Feasibility) and concluded that:

- 1) The plant would not be placed in an unrecoverable condition,
- 2) Fuel damage would not occur, and
- 3) The process variables would be restored once positive control of the equipment and restoration of charging flow was established, within 30 minutes. This has been verified by a timed walk-down of procedure 4xAO-xZZ44, Shutdown Outside the Control Room Due to Fire and/or Smoke.

Therefore, there is no adverse effect on the ability to achieve and maintain safe shutdown in the event of any postulated fire as a result of this deviation.



## FIRE HAZARDS ANALYSIS

Within the Fire Area X side of this boundary, there are negligible combustibles; the compartment adjacent to the seismic gap is a large HVAC and pipe chase with floor dimensions approximately 13 feet by 50 feet. Within Fire Area I, Zone 86A is separated from the remainder of the fire area by 2- and 3-hour rated walls. Zone 86A is separated from Zone 86B (Fire Area II) by a nonrated barrier (see Fire Area I, deviation No. 5, for the Zone 86A/Zone 86B separation considerations). Zonal detection and automatic deluge water spray covers the predominant in situ combustible (cable trays at elevations 100 feet 0 inch and 120 feet 0 inch). The equivalent fire severity for Zone 86A is approximately 138 minutes. Fire team response (within 10 minutes) is expected before significant degradation of the existing fire barriers would occur. Access to Zone 86A for fire team response is available at elevation 100 feet 0 inch (through Zone 5A).

Conclusion

The existing design provides equivalent protection to that required by Section III.G.2, and upgrading the existing design to a 1-hour rating plus suppression would not significantly enhance protection currently provided.

FIRE AREA I  
DEVIATION 5

9B.2.1

B.5

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5. ~~A deviation is requested to Section III.G.2 to the extent that it requires 3-hour rated barriers to separate circuits of redundant trains.~~

OK



## 9B.2.1 FIRE AREA I

### B. Deviations from 10CFR50, Appendix R, Section III.G

5. A deviation is requested to Section III.G.2 to the extent that it requires 3-hour rated barriers to separate circuits of redundant trains.

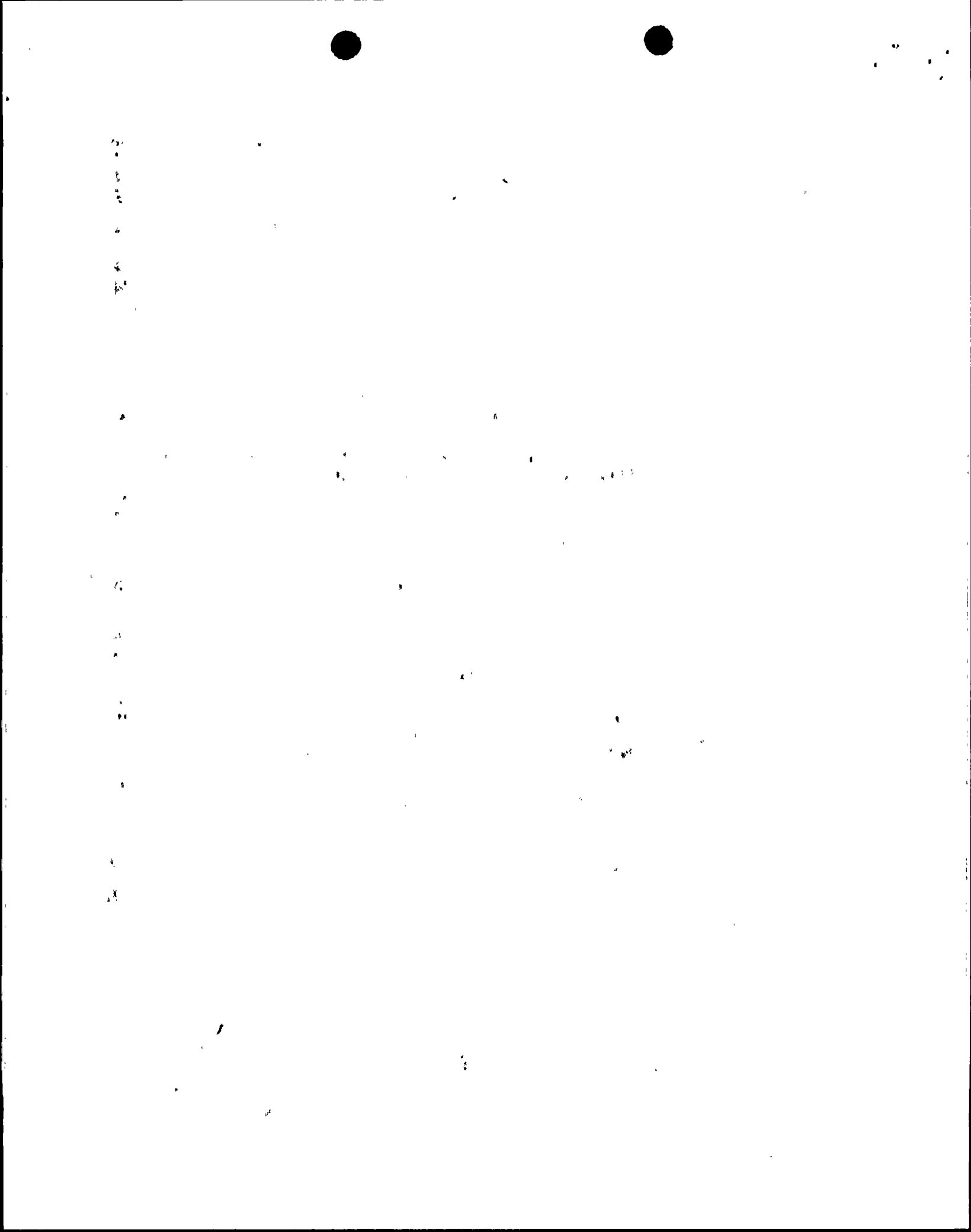
#### Discussion

The central wall of the dead space compartment between the auxiliary and control buildings is a fire area boundary common to Fire Area I (Zone 86A) and Fire Area II (Zone 86B) at elevations 74 feet 0 inch, 100 feet 0 inch, 120 feet 0 inch, and 140 feet 0 inch. The wall is reinforced concrete with a nominal 6-inch seismic gap. The seismic gap is covered by solid 1/4-inch steel plates bolted to each side of the concrete wall. The fit is snug and there is no path for heat or smoke to travel through the plate steel. The dead air space between the steel plates will have an insulation quality, thus minimizing radiant heat transfer to the other side as well as eliminating convected heat through the barrier. Zonal detection and automatic deluge water spray covers the predominant in situ combustible (cable trays at elevations 100 feet 0 inch and 120 feet 0 inch). ~~The train A safe shutdown cable trays of Zone 86A and the train B safe shutdown cable trays of Zone 86B are located approximately 10 feet from the central wall with no intervening combustibles.~~ Train A cable trays are located 8 to 9 feet from the center wall in Zone 86A. Train B cable trays are located more than 10 feet from the opposite side of the center wall in Zone 86B. The compliance strategies for the components associated with the "N" raceways do not rely on components whose cables are within 10 feet of the center wall. The equivalent ~~fire severity~~ total combustible (fire) loading for each of Zones 86A and 86B is ~~140 minutes and 350 minutes, respectively~~ high. This apparently high ~~fire severity~~ combustible loading is attributed to the calculation method, in that the combustible material is located in an area with a relatively small floor area combined with a high ceiling. Fire team response (within ~~10~~ 20 minutes) is expected, before significant degradation of the existing fire barriers would occur. Access to Zone 86A for fire team response is available at elevation 100 feet 0 inch (through Zone 5A). Access to Zone 86B for fire team response is available at elevation 100 feet 0 inch (through Zone 5B).

#### Conclusion

The existing design provides equivalent protection to that required by Section III.G.2, and upgrading the existing design to a 3-hour rating would not significantly enhance the protection currently provided.





approval for deviations from Section III.G of Appendix R to the extent that exterior walls, basemats, and roofs, which form the boundaries of fire areas, are not fire rated. The staff was concerned that an exterior fire may threaten shutdown capability. However, these construction features are not required to separate shutdown-related systems inside the plant from external fire hazards, such as oil-filled transformers. Also, they do not separate safety-related areas from non-safety-related areas that present a significant fire threat to the safety-related areas. The staff, therefore, concludes that the walls, basemats, and roofs described in the FSAR define valid fire areas as required by Section III.G of Appendix R and they represent an acceptable deviation from Section D.1 of BTP APCSB 9.5-1.

In the FSAR, the applicant described the construction of heating, ventilation, and air conditioning (HVAC) chase walls and stairwell walls of reinforced concrete construction that have a fire rating of 2 to 3 hours. These conditions represent a deviation from the technical requirements of Section III.G of Appendix R which stipulate that redundant shutdown divisions be separated by 3-hour fire-rated construction. Both the chase walls and the stairwell walls are continuous. All openings are protected by fire doors, fire dampers, or penetration seals. The interiors of the chases and stairwell are free of any fire hazard. For a fire to cause damage to redundant shutdown divisions, a fire has to burn through at least a 2-hour barrier, spread vertically in the chase, and burn through at least another 2-hour-rated barrier on an upper level. The staff, therefore, concludes that the chase and stairwell walls provide the equivalent of a 4-hour fire barrier between shutdown divisions, and therefore, achieve literal compliance with Section III.G of Appendix R and Section D.1 of BTP APCSB 9.5-1.

In Amendment No. 13 to the FSAR, the applicant described 6-in. (nominal) seismic gaps which are located in the boundary floors and walls between Fire Area I (control building) and Fire Area X (radwaste building), and between Fire Area II (control building) and the corridor building. The gaps are covered with non-fire-rated, solid, 18-gauge sheet-metal flashings on each side of a reinforced concrete stub wall or pillar. The staff was concerned that, because the gaps are not sealed with a fire-rated material, fire propagation through the gap would result in damage to redundant shutdown divisions. However, neither the radwaste building nor the corridor building contain safe shutdown equipment or cables. Therefore, fire propagation through the gap will have no effect on the ability to achieve and maintain safe shutdown. The combustible materials on either side of the gap are either negligible or are protected by an automatic deluge water spray system. Therefore, any potential fire would not be of sufficient magnitude to produce temperatures which would cause the metal flashings to fail. Because the flashings are tight against the stud walls and pillars, smoke and hot gases would not propagate to the adjoining area pending arrival of the fire brigade. The staff, therefore, concludes that the locations referenced above are valid fire areas, as required by Section III of Appendix R, and the fire area boundary construction represents an acceptable deviation from Section I.1 of Appendix A to BTP APCSB 9.5-1.

9B.2.1  
B.5  
A similar situation exists in the central wall of the "dead space compartment" between the auxiliary and control buildings as delineated in the FSAR. The central wall of the dead space compartment between the auxiliary and control buildings is a fire area boundary common to Fire Area I (Zone 86A) and Fire Area II (Zone 86B) at elevations 74 ft, 100 ft, 120 ft, and 140 ft. The wall is reinforced concrete with a nominal 6-in. seismic gap. The seismic gap is



B.5  
(CONT'D)

covered by solid 1/4-in. steel plates bolted tightly to each side of the concrete wall so that there is no path for heat or smoke to travel through the steel plate. The dead air space between the steel plates will have an insulating quality, thus minimizing radiant heat transfer to the other side as well as eliminating convected heat through the barrier. Existing fire protection consists of a fire detection system, cable tray fire suppression systems, and manual firefighting equipment as detailed in the FSAR.

The combustible materials on either side of the gap are either negligible or protected by an automatic deluge water spray system. Therefore, any potential fire would not be of sufficient magnitude to produce temperatures which would cause the steel plates to fail. Because the plates are tight against the walls, smoke and hot gases would not spread to the adjoining area pending arrival of the fire brigade. The staff, therefore, concludes that the wall referenced above is a valid fire area boundary as required by Section III of Appendix R, and the fire area boundary construction represents an acceptable deviation from Section D.1 of Appendix A to BTP APCSB 9.5-1.

In Supplement No. 6 to the SER, the staff found acceptable the absence of a fire-rated sealant at the seismic gap at the containment building/auxiliary building interface because of adequate compensatory protection. In Amendment No. 13 to the FSAR, the applicant indicated that this gap will be sealed with a fire-rated sealant. With the installation of this material, the boundary construction will be in compliance with Section D.1 of Appendix A to BTP APCSB 9.5-1 and is, therefore, acceptable.

In Amendment No. 13 to the FSAR, the applicant requested approval for a deviation from the technical requirements of Section III.G of Appendix R to the extent that it requires that fire area boundaries be defined by fire-rated construction. Mechanical and electrical penetrations and the personnel access hatch in the containment boundary are not fire rated. The mechanical penetrations are constructed of steel with a minimum thickness of 1/8-in. The electrical containment penetrations are fitted with a header plate of 1.78-in. steel. The personnel access hatch is constructed of 1-in.-thick steel. The above features, as designed in conjunction with the reinforced concrete containment boundary, form a continuous barrier to the passage of flame and hot gases from one fire area to another. The areas on both sides of the boundary are protected by fire detection systems, fire suppression systems, and manual firefighting equipment as delineated in the FSAR. Combustible materials are limited and generally well dispersed throughout the areas. Where concentrated combustibles or significant fire hazards exist, a fire suppression system is provided. The penetrations and access hatch are also located at varying distances below the ceiling. This means that the stratified hot gas layer which would form at the ceiling during a fire would not encompass the penetrations until well after a fire starts. By that time, the fire would be controlled either automatically or manually by the fire brigade. The staff, therefore, concludes that the design of the penetrations and the access hatch will withstand the effects of a postulated fire until extinguishment. The containment boundary, therefore, is a valid fire area boundary as required by Section III.G of Appendix R, and the design of the penetrations represents an acceptable deviation from Section D.1 of Appendix A to BTP APCSB 9.5-1.

In letters dated October 2 and December 10, 1984, the applicant requested approval for a deviation from the technical requirements of Section III.G of



## FIRE HAZARDS ANALYSIS

Conclusion

The existing design provides equivalent protection of that required by Section III.G.2, and upgrading the existing design for 3-hour ratings would not significantly enhance the protection currently provided.

FIRE AREA II  
DEVIATION 2

9B.2.2

B.2

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2. A deviation is requested to Section III.G.2 to the extent that it requires installation of a 1-hour fire-rated barrier and an area-wide suppression system.

Discussion

The east wall of Zone 86B is a fire area boundary between Fire Area II and the corridor building at elevations 90 feet 0 inch, 100 feet 0 inch, 120 feet 0 inch, and 140 feet 0 inch. The boundary contains a 6-inch (nominal) seismic gap which is covered with nonrated, solid, 18-gauge sheet metal flashings on each side of a reinforced concrete stub wall. The metal flashings would retard the passage of heat and/or smoke. The corridor building contains no safe shutdown equipment or cables; therefore, a postulated fire within the corridor building would have no effect upon safe shutdown capability.

Within Fire Area II, Zone 86B is separated from the remainder of the fire area by 2- and 3-hour rated walls. Zone 86B is separated from Zone 86A (Fire Area I) by a nonrated barrier (see Fire Area I, deviation No. 5, for the Zone 86A/Zone 86B separation considerations). Zonal detection and automatic deluge water spray covers the predominant in situ combustible (cable trays at

## 9B.2.2 FIRE AREA II

### B. Deviations from 10CFR50, Appendix R, Section III.G

2. A deviation is requested to Section III.G.2 to the extent that it requires installation of a 1-hour fire-rated barrier and area-wide suppression system.

#### Discussion

The east wall of Zone 86B is a fire area boundary between Fire Area II and the corridor building at elevations 90 feet 0 inch, 100 feet 0 inch, 120 feet 0 inch, and 140 feet 0 inch. The boundary contains a 6-inch (nominal) seismic gap which is covered with nonrated, solid, 18-gauge sheet metal flashings on each side of a reinforced concrete stub wall. The metal flashings would retard the passage of heat and/or smoke. ~~The corridor building contains no safe shutdown equipment or cables; therefore, a postulated fire within the corridor building would have no effect upon safe shutdown capability.~~ The Corridor Building contains safety related HVAC damper control cables and non-safety related RCP control cables. The ability to achieve and maintain safe shutdown is demonstrated by calculations 13-MC-FP-316 and 13-MC-FP-318.

Within Fire Area II, Zone 86B is separated from the remainder of the fire area by 2- and 3-hour rated walls. Zone 86B is separated from Zone 86A (Fire Area I) by a non-rated barrier (see Fire Area I, deviation No.5, for the Zone 86A/Zone 86B separation considerations). Zonal detection and automatic deluge water spray covers the predominant in situ combustible (cable trays at elevation 100 feet 0 inch and 120 feet 0 inch). ~~The equivalent fire severity total combustible (fire) loading for Zone 86B is 350 minutes high.~~ The apparently high ~~fire severity~~ combustible loading is attributed to the calculation method in that the combustible material is located in an area with a relatively small floor space combined with high ceilings. Fire team response (within ~~10~~ 20 minutes) is expected before significant degradation of the existing fire barriers would occur. Access to Zone 86A for fire team response is available at elevation 100 feet 0 inch (through Zone 5A). Because the metal flashings are tight against the concrete stub walls, smoke and hot gases would not propagate to the adjoining area pending arrival of the fire team. Therefore these boundaries form valid fire areas, as required by Section III of Appendix R.

#### Conclusion

The existing design provides equivalent protection to that required by Section III.G.2, and upgrading the existing design to a 1-hour rating plus suppression would not significantly enhance protection currently provided.

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approval for deviations from Section III.G of Appendix R to the extent that exterior walls, basemats, and roofs, which form the boundaries of fire areas, are not fire rated. The staff was concerned that an exterior fire may threaten shutdown capability. However, these construction features are not required to separate shutdown-related systems inside the plant from external fire hazards, such as oil-filled transformers. Also, they do not separate safety-related areas from non-safety-related areas that present a significant fire threat to the safety-related areas. The staff, therefore, concludes that the walls, basemats, and roofs described in the FSAR define valid fire areas as required by Section III.G of Appendix R and they represent an acceptable deviation from Section D.1 of BTP APCSB 9.5-1.

In the FSAR, the applicant described the construction of heating, ventilation, and air conditioning (HVAC) chase walls and stairwell walls of reinforced concrete construction that have a fire rating of 2 to 3 hours. These conditions represent a deviation from the technical requirements of Section III.G of Appendix R which stipulate that redundant shutdown divisions be separated by 3-hour fire-rated construction. Both the chase walls and the stairwell walls are continuous. All openings are protected by fire doors, fire dampers, or penetration seals. The interiors of the chases and stairwell are free of any fire hazard. For a fire to cause damage to redundant shutdown divisions, a fire has to burn through at least a 2-hour barrier, spread vertically in the chase, and burn through at least another 2-hour-rated barrier on an upper level. The staff, therefore, concludes that the chase and stairwell walls provide the equivalent of a 4-hour fire barrier between shutdown divisions, and therefore, achieve literal compliance with Section III.G of Appendix R and Section D.1 of BTP APCSB 9.5-1.

9B.2.2  
B.2 In Amendment No. 13 to the FSAR, the applicant described 6-in. (nominal) seismic gaps which are located in the boundary floors and walls between Fire Area I (control building) and Fire Area X (radwaste building), and between Fire Area II (control building) and the corridor building. The gaps are covered with non-fire-rated, solid, 18-gauge sheet-metal flashings on each side of a reinforced concrete stub wall or pillar. The staff was concerned that, because the gaps are not sealed with a fire-rated material, fire propagation through the gap would result in damage to redundant shutdown divisions. However, neither the radwaste building nor the corridor building contain safe shutdown equipment or cables. Therefore, fire propagation through the gap will have no effect on the ability to achieve and maintain safe shutdown. The combustible materials on either side of the gap are either negligible or are protected by an automatic deluge water spray system. Therefore, any potential fire would not be of sufficient magnitude to produce temperatures which would cause the metal flashings to fail. Because the flashings are tight against the stud walls and pillars, smoke and hot gases would not propagate to the adjoining area pending arrival of the fire brigade. The staff, therefore, concludes that the locations referenced above are valid fire areas, as required by Section III of Appendix R, and the fire area boundary construction represents an acceptable deviation from Section I.1 of Appendix A to BTP APCSB 9.5-1.

A similar situation exists in the central wall of the "dead space compartment" between the auxiliary and control buildings as delineated in the FSAR. The central wall of the dead space compartment between the auxiliary and control buildings is a fire area boundary common to Fire Area I (Zone 86A) and Fire Area II (Zone 86B) at elevations 74 ft, 100 ft, 120 ft, and 140 ft. The wall is reinforced concrete with a nominal 6-in. seismic gap. The seismic gap is

## FIRE HAZARDS ANALYSIS

common to the southwest HVAC chase (Fire Area I), and 2-hour rated barriers common to the southeast outside air and HVAC chases (Fire Area II). The west boundary is a 3-hour rated barrier common to Fire Area X. The east boundary is a 3-hour rated barrier common to the corridor building and a 2-hour rated exterior wall. Fire Area III does not include the vestibule adjacent to the corridor building. The walls of the vestibule are 3-hour rated. The ceiling above and floor below Fire Area III are 3-hour rated barriers.

B. Safe Shutdown Equipment Subject to Loss in the Event of a Fire in Fire Area III

Fire Area III contains both train A and train B safe shutdown related equipment and cabling. In the event of a fire, the plant may be brought to safe shutdown from the train B remote shutdown panels located in Fire Area II. It is assumed the reactor operators manually trip the reactor prior to evacuating the control room. To assure operability independent of the control room, certain train B safe shutdown circuits can be disconnected from the control room at panels located outside the main control room.

9B.2.3

B.  
C.

Deviations from 10CFR50, Appendix R, Section III.G

1. The main control room (Zone 17) contains redundant safe shutdown cables and equipment. Alternative safe shutdown capability is provided as required by Section III.G.3 of Appendix R.
2. See subsection 9B.2.1 for deviations common to Fire Area I and subsection 9B.2.2 for a deviation common to Fire Area II.

SEE NEXT  
SHEET  
(NEW) } 3.



9B.2.3 FIRE AREA III

B. Deviations from 10CFR50, Appendix R, Section III.G

3. A deviation is requested from Section III.L to the extent that it allows credit for only one action in the control room prior to evacuation. (See Generic Letter 86-10, Question 3.8.4.)

In accordance with the guidance of Generic Letter 86-10, Questions 3.8.4 and 5.3.10, a bounding analysis was performed for the control room fire scenario to assure that safe shutdown conditions could be maintained from outside the control room (Ref. Calculation 13-MC-FP-318, 10CFR50 Appendix R III G/III L Compliance Assessment and 13-MC-FP-317, 10CFR50 Appendix R Operational Considerations). This bounding analysis assumed worst case spurious actuations as well as loss of all automatic function (such as ESFAS, DG auto start and sequencing) of components whose control circuits could be affected by a fire in the control room. This conservative analysis indicated that the steam generator may overfill in approximately two minutes if a main steam isolation signal is not initiated prior to control room evacuation. The action to isolate main steam is located on the same control board as the reactor trip push-button. The action in the control room prevents a very unlikely series of events, which includes spurious actuation and failure of specific automatic functions. If these series of events were to occur, however, main steam can be isolated outside the control room, regardless of the circuit damage in the control room.



## FIRE HAZARDS ANALYSIS

boundary. The access hatch opens to Fire Area XI, Zone 66A, which has an equivalent fire severity of less than 51 minutes. Mechanical containment penetrations are fitted with flued heads constructed of steel with a minimum thickness of 1/8 inch. Electrical containment penetrations are fitted with a stainless steel header plate with a thickness of 1.78 inches. The special construction of the flued heads and header plates was designed to maintain the integrity of the containment building.

Conclusion

The existing design provides equivalent protection to that required by Section III.G.2. The design is standard within the industry.

FIRE AREA ~~XV~~  
DEVIATION 2  
9B.2.15  
B.2

REVISED  
SEE NEXT  
SHEET

2.

A deviation is requested from Section III.G.2 to the extent that it requires a 1-hour rated barrier in addition to fire detection and fire suppression.

Discussion

Elevation 100 feet 0 inch of Fire Area XV contains the train A and train B charging pumps, with their associated power and control electrical cables, in adjacent Zones 46A and 46B, respectively.

The train A charging pump room (Zone 46A) walls, floor, and ceiling are of nonrated, reinforced concrete construction with all penetrations and openings, except two, sealed to an equivalent 3-hour fire boundary rating. One unsealed opening is a 22-inch wide and 14-inch high HVAC duct penetration of the west wall located 13 feet 3 inches above the floor just south of the north

## 9B.2.15 FIRE AREA XV

### B. Deviations from 10CFR50, Appendix R, Section III.G

2. A deviation is requested to Section III.G.2 to the extent that it requires a 1-hour rated barrier in addition to fire detection and fire suppression.

#### Discussion

Elevation 100 feet 0 inch of Fire Area XV contains the Train A, Train B and Train E charging pumps with their associated power and control electrical cables, in adjacent Zones 46A, 46B and 46E, respectively.

~~The train A charging pump room (Zone 46A) walls, floor, and ceiling are of non-rated, reinforced concrete construction with all penetrations and openings, except two, sealed to an equivalent 3-hour fire boundary rating. One unsealed opening is a 22-inch wide and 14-inch high HVAC duct penetration of the west wall located 13 feet 3 inches above the floor just south of the north wall. The other is the room access opening which is 3 feet wide and 7 feet high separating the corridor (Zone 42C) and the pump room entry valve gallery. The walls, floor, and ceiling of these Zones are of 3 hour rated, reinforced concrete construction with all electrical and pipe penetrations sealed to an equivalent 3-hour fire barrier rating. There is a non-rated personnel doorway opening to the north side corridor from each room. There are several unsealed HVAC duct penetrations in the pump room entry valve gallery area on the north side of the pump rooms. These HVAC ducts are not provided with fire dampers.~~

~~A horizontal distance of approximately 20 feet exists between the HVAC or room access personnel doorway openings and the charging pump inside of Fire Zone 46A respective charging pumps. The same separation distance exists between these openings and the train B charging pump in Zone 46B. An aggregate horizontal distance of at least 40 feet exists between the redundant devices.~~

~~The equivalent fire severity total combustible (fire) loading in Zone 46A is less than 18 minutes; Zone 46B, less than 20 minutes. The total combustible loading in each of the pump rooms and the adjoining corridor, Zone 42C, is low. A smoke detection and an automatic preaction water sprinkler system are provided in each of the two pump rooms, and a cable tray fire detection and automatic suppression system are provided for the cable trays running in the corridors (Zone 42C) just outside the rooms. Fire team response is expected in less than 30 minutes.~~

#### Conclusion

The existing design provides equivalent protection to that required by Section III.G.2, and upgrading the existing design openings to 1-hour rated walls, floor, and ceiling configurations would not significantly enhance the protection currently provided.





#### 9.5.1.6 Fire Protection for Safe Shutdown Capability

In Supplement No. 6 to the SER, the staff evaluated certain deviations from the technical requirements of Section III.G of Appendix R pertaining to the protection of redundant shutdown systems in the auxiliary building. In Amendment No. 13 to the FSAR, the applicant requested approval for additional deviations to the extent that Section III.G requires that redundant shutdown divisions be: (1) separated by 3-hour fire barriers; or (2) separated by 20 ft free of combustible material and protected by a fire detection and a fire suppression system; or (3) separated by a 1-hour fire barrier and protected by a fire detection and fire suppression system.

In general, the plant locations where these deviations are located can be characterized by a low in situ fire loading, with combustible materials dispersed throughout the area. In locations where concentrated combustibles or a significant fire hazard exists, the hazard is mitigated by the presence of an automatic fire suppression system. These areas also have large floor-to-ceiling heights and large room volumes, which means that the effects of a fire, such as smoke and hot gases, will be dissipated.

In some locations, such as an elevation 51 ft 6 in. of the auxiliary building, the separation between redundant shutdown systems is greater than 80 ft. The area is completely protected by a fire detection system and manual firefighting equipment. Because of the large separation distance, the low fire loading and existing fire protection, there is reasonable assurance that one division will remain free of fire damage until the fire is extinguished by the plant's fire brigade.

9B.2.15  
0.2 In other locations, such as Zones 46A and 46B (elevation 100 ft in the auxiliary building) the straight-line-separation distance between redundant systems is less than 20 ft. However, floor-to-ceiling masonry cubicle walls partially enclose the systems. These walls would act to confine the fire so that not more than one division would be damaged. The areas are also protected by automatic fire suppression and detection systems. These systems provide reasonable assurance that any potential fire will be detected early and either suppressed automatically or manually by the fire brigade.

In certain locations, such as in elevation 120 ft of the auxiliary building, separation of redundant shutdown-related cables and components is approximately 20 ft or more. The areas are protected by a partial sprinkler system, which covers at least one division, and a complete fire detection system. The applicant has installed a 1-hour fire-rated barrier around one division of cables. The remaining systems consist of tanks and piping which are not readily damaged by fire. Because of the fire detection system, the staff expects a potential fire to be detected early and suppressed manually by the fire brigade. If rapid fire propagation occurs, the sprinkler system will actuate and either control the fire or discharge water onto one division of shutdown systems. The 1-hour fire barrier and the substantial construction of the rest of the shutdown components in the area will achieve a degree of passive protection sufficient to provide reasonable assurance that safe shutdown capability can be maintained free of fire damage.

The applicant has also analyzed the consequences if vertical fire propagation did occur in places where floor/ceiling assemblies do not form a continuous fire

FIRE AREA ~~XV~~  
DEVIATION 89B.2.15  
B.8REVISED  
SEE NEXT  
SHEET

## FIRE HAZARDS ANALYSIS

8. A deviation is requested from Section III.G.2 to the extent that it requires either a 1-hour rated barrier or separation by a horizontal distance of 20 feet or more without intervening combustibles, and fire detection and suppression.

Discussion

Redundant trains of safe shutdown raceway exist on all elevations of Fire Area XV in the auxiliary building, except for elevation 40 feet 0 inch, which contains no safe shutdown raceway, and elevation 140 feet 0 inch, which contains only train A safe shutdown conduit. Redundant safe shutdown raceway within Fire Area XV are separated by a combination of features providing spatial separation, and thereby precluding fire spread along the shortest path between redundant safe shutdown equipment. For example, the design employs small, fire-rated walls to block corridors, and sealing of piping penetrations in nonrated walls when either action can be shown to be beneficial. Another feature is the addition of localized water suppression in zones which have a higher likelihood of initiating a fire, or in those zones where additional protection for safe shutdown equipment is required. For Fire Area XV, the following table lists corresponding zones of safe shutdown equipment (by building elevation) and the maximum fire severity along the separation path. Fire protection features which enhance the existing separation are also listed. Wherever fire detection is provided, fire team response is expected within 30 minutes. In all cases listed, detection is provided along the separation path.



## 9B.2.15 FIRE AREA XV

### B. Deviations from 10CFR50, Appendix R, Section III.G

8. A deviation is requested from Section III.G.2 to the extent that it requires either a 1-hour rated barrier or separation by a horizontal distance of 20 feet or more without intervening combustibles, and fire detection and suppression.

#### Discussion

Redundant trains of safe shutdown raceway exist on all elevations of Fire Area XV in the auxiliary building, except for elevation 40 feet 0 inch, which contains no safe shutdown raceway, and elevation 140 feet 0 inch, which contains only train A safe shutdown conduit. Redundant safe shutdown raceway within Fire Area XV are separated by a combination of features providing spatial separation, and thereby precluding fire spread along the shortest path between redundant safe shutdown equipment. For example, the design employs small, fire-rated walls to block corridors, and sealing of piping penetrations in nonrated walls when either action can be shown to be beneficial.

Another feature is the addition of localized water suppression in zones which have a higher likelihood of initiating a fire, or in those zones where additional protection for safe shutdown equipment is required. For Fire Area XV, the following table lists corresponding zones of safe shutdown equipment (by building elevation) and the ~~maximum-fire-severity~~ total combustible (fire) loading along the separation path. Fire protection features which enhance the existing separation are also listed. Wherever fire detection is provided, fire team response is expected within 30 minutes. In all cases listed, detection is provided along the separation path.

#### Elevation 40 feet 0 inch

No safe shutdown raceway located in Fire Area XV at this elevation

#### Elevation 51 feet 6 inches

- Train A safe shutdown raceway located in Zone 88A
- Train B safe shutdown raceway located in Zone 88B
- 80 feet minimum horizontal separation along south corridor between column lines AD and AH
- ~~equivalent fire-severity~~ Total combustible (fire) loading along separation path (Zone 88A, Zone 90, Zone 89, Zone 88B) is less than 10 minutes low.

- Fire detection along separation path (no automatic fire suppression provided) for all zones
- 3-hour rated ECCS pump room walls, and across north corridor at column line AF
- Nonrated reinforced concrete construction wall with unsealed penetrations across south corridor at column line AF
- No redundant raceway below
- Redundant raceway above uses same separation path.

Elevation 70 feet 0 inch

- Train A safe shutdown raceway located in Zones 34A, 35A, 37A, and 37C
- Train B safe shutdown raceway located in Zones 34B, 35B, 37B, and 37D
- 80 feet minimum horizontal separation distance along south corridor between column lines AD and AH
- ~~Equivalent fire severity~~ Total combustible (fire) loading along separation path (Zone 37C, Zone 34A, Zone 35A, Zone 37A, Zone 37B, Zone 35B, Zone 34B, Zone 37D) is ~~less than 20 minutes~~ low.
- Fire detection along separation path (no automatic suppression provided) for all zones
- 1-hour rated wall in north corridor, 3-hour rated wall along column line AE except for south corridor (open), and nonrated reinforced concrete construction between north corridor and piping penetration rooms (2-hour rated wall about stairwell)
- Redundant raceway below uses same separation path.
- Redundant raceway above is a continuation of the raceway at this elevation.



Elevation 88 feet 0 inch

- Train A safe shutdown raceway located in Zone 37C
- Train B safe shutdown raceway located in Zone 37D
- Train A and B safe shutdown raceway located in Zone 39B. (Note: These raceways contain redundant power and control circuits for the condensate transfer pumps which are only required to be stopped to achieve and maintain safe shutdown. In the event of a fire damaging both train A and train B circuitry, makeup water for the essential cooling water, essential chilled water, and the diesel generator systems may be added through connections provided on the fill side of each system's surge tanks [refer to figures 9B-46, 9B-47, and 9B-48]). Makeup water to these systems is available from the fire protection system. This makeup capability, however, is not required for safe shutdown (refer to calculation 13-MC-FP-319)
- 80 feet minimum horizontal separation distance along north pipe chase between column lines AD and AH
- ~~Equivalent fire severity~~ Total combustible (fire) loading along separation path (Zone 37C, Zone 39A, Zone 39B, Zone 37D) is ~~less than~~ 10 minutes low.
- Fire detection along separation path (no automatic suppression provided) for all zones
- Heavy concrete construction wall between pipe chase zones and piping penetration areas, 3-hour fire-rated vertical cable chases, and heavy concrete construction floor and ceiling with penetration seals for radiation shielding. 1-hour rated ceiling below Fire Area XVI (Zone 42A) and Fire Area XVII (Zone 42B)
- Redundant raceway below is a continuation of the raceway at this elevation.
- Redundant raceway above uses a similar separation path.





Elevation 100 feet 0 inch

- Train A safe shutdown raceway located in Zones 42D and 46E
- Trains A and B safe shutdown raceway located in Zones 42C, 46A, 46B
- 25-foot minimum horizontal separation distance along north (Zone 42D) and south (Zone 42C) corridors for redundant circuits along with a 1-hour rated fire barrier across the corridors and fire detection and automatic cable tray suppression provided in both zones
- Train A safe shutdown raceway in Zone 42C running parallel with train B cable trays in north, east, and south corridors (contains circuits for shutdown cooling system valve J-SIC-UV-653 only) is provided with a protective coating affording equivalent 1-hour rated fire barrier protection plus fire detection and automatic cable tray suppression.

NOTE

This description is applicable to Unit 1 only. (Circuits were rerouted in Units 2 and 3 to minimize the length of raceway requiring wrapping.)

- Train A charging pump conduit in Zones 46B, 46E, and the south corridor of Zone 42C is provided with a protective coating affording equivalent 1-hour rated fire barrier protection and zonal detection and automatic suppression in Zones 46B and 46E.
- Train B charging pump conduit in Zone 46A is provided with a protective coating affording equivalent 1-hour rated fire barrier protection and zonal detection and automatic water suppression.
- Train A safe shutdown conduit in the north end of the Zone 42C east corridor (contain circuits for the auxiliary feedwater pump turbine and flow regulating/isolation valves, area AHU and the MSIVs and ADVs) are provided with a protective coating affording equivalent 1-hour rated fire barrier protection and zonal detection and automatic water suppression.
- ~~Equivalent fire severity~~ Total combustible (fire) loading in separation paths (Zone 42C, Zone 42D, Zone 46E) is less than 40 minutes low.



- Fire detection/suppression in separation paths
  - Zone 42C - Cable tray fire detection and automatic suppression
  - Zone 42D - Cable tray fire detection and automatic suppression
  - Zone 46A - Zonal fire detection and automatic suppression
  - Zone 46B - Zonal fire detection and automatic suppression
  - Zone 46E - Zonal fire detection and automatic suppression
- Column line AG wall between the north and south corridors is ~~non-rated~~ reinforced concrete construction with all penetrations sealed to provide ~~an equivalent~~ a 3-hour fire rating except for an HVAC duct penetration through the wall near column line A7. The opening is 12 inches wide by 12 inches high located 8 feet 10 inches above the floor.
- The floors and ceilings of Zones 44, 45, 46A, and 46B and 46E are ~~non-rated~~ reinforced concrete construction with all penetrations sealed to provide ~~an equivalent~~ a 3-hour fire rating except as described in Fire Area XV deviation No.2.
- The 100 foot floor is reinforced concrete construction with sealed electrical and pipe penetrations to a 3-hour fire rating and is also a pressure boundary. There are non-fire rated penetrations which include several HVAC ducts without fire dampers, equipment and personnel hatches with steel cover plates, two stairs with doors and an enclosed concrete pipe chase at column lines A7/AC. The combustible loading on the floor below at the 88 foot elevation pipeway consisting of piping and valves is very low which, combined with the heavy concrete floor, does not present an exposure fire hazard to cables and equipment required for safe shutdown located at the 100 foot elevation.
- The walls of Zone 46A, 46B and 46E are described in Fire Area XV deviation No. 2.

Elevation 120 feet 0 inch

- Train A safe shutdown raceway in Zone 52A with redundant train B safe shutdown raceway in Zones 48, 51B, 53, and 50A (Note: See Fire Area XV, deviation No.4, for the Zone 48 separation considerations.)

Elevation 120 feet 0 inch (cont'd.)

- Redundant train A and train B safe shutdown raceway in Zone 52D. The train A conduit in the north end of the Zone 52D east corridor is a continuation of the raceway described at elevation 100 feet 0 inch directly below and are provided with a protective coating affording equivalent 1-hour rated fire barrier protection at this elevation also.
- 80 feet minimum horizontal separation distance along north corridor (Zones 52A and 52D) between column lines AD and AH with a 1-hour rated fire barrier across the corridor and fire detection and automatic cable tray suppression provided in both zones.

Additionally, there are the following barriers:

- 3-hour rated wall sections along column line AF between A7 and A8, and along column line AG between A8 and A10.
- Nonrated Reinforced concrete construction wall along column line A8 between AF and AG with all penetrations sealed to provide an equivalent a 3-hour fire rating.
- Nonrated reinforced concrete construction wall along column line A7 between AE and AF having two open HVAC ducting penetrations and an access opening from the Zone 52D corridor to Zone 50A.
- ~~Equivalent fire severity~~ Total combustible (fire) loading in separation paths (Zone 52A, Zone 50A, Zone 51B, Zone 53, Zone 52D) is ~~less than 106 minutes moderate~~, including allowance for transient combustibles.
- Fire detection/suppression in separation paths

Zone 52A - Cable tray fire detection and automatic suppression system

Zone 52D - Cable tray fire detection and automatic suppression system

Zone 50B - None

Zone 53 - None

Zone 50A - None



#### Elevation 140 feet 0 inch

- Train A safe shutdown raceway in Zones 56B, 56C, 57N, ~~57I~~, and 57J
- 20 feet minimum horizontal distance between redundant trains located at elevations 120 feet and 140 feet. (Note: Nonrated hatch opening in floor between Zones 56C and 52D below.)
- ~~Equivalent fire severity~~ Total combustible (fire) loading in separation path (Zone 56B, Zone 56C, Zone 52D) is ~~less than 51 minutes~~ moderate.
- Fire detection/suppression in separation path

Zone 56B - Zonal fire detection and automatic wet pipe sprinkler system

Zone 56C - Automatic wet pipe sprinkler system (including coverage above hatch)

Zone 52D - Area suppression in northeast corner of Zone 52D, but none directly below hatch area.

- 2-hour and 3-hour rated barrier floor above Fire Area XVI (Zone 47A) and Fire Area XVII (Zone 47B). Three (3) hour rated barrier floor above Analysis Area XVD (Zones 50B, 51A, 51B, 52D, 53 and 54) except for the steel plate covered hatch of concern and the 2 hour rated walls of the duct chase west of column AH at column A7. Remainder of the floor area is ~~nonrated~~ reinforced concrete construction with all penetrations sealed to provide an equivalent 3-hour fire rating except for the steel plate covered hatch of concern, the unsealed sample piping chase opening into Zone 57C, and the HVAC shaft penetration in Zone ~~57I~~ 57J which has a 2-hour fire rating.

#### Conclusion

The existing design provides equivalent protection to that required by Section III.G.2, and upgrading the existing design to 1-hour rated walls, floors, and ceilings or installing area-wide detection and suppression would not significantly enhance the protection currently provided.

#### 9.5.1.6 Fire Protection for Safe Shutdown Capability

96.2.15  
B.8 In Supplement No. 6 to the SER, the staff evaluated certain deviations from the technical requirements of Section III.G of Appendix R pertaining to the protection of redundant shutdown systems in the auxiliary building. In Amendment No. 13 to the FSAR, the applicant requested approval for additional deviations to the extent that Section III.G requires that redundant shutdown divisions be: (1) separated by 3-hour fire barriers; or (2) separated by 20 ft free of combustible material and protected by a fire detection and a fire suppression system; or (3) separated by a 1-hour fire barrier and protected by a fire detection and fire suppression system.

In general, the plant locations where these deviations are located can be characterized by a low in situ fire loading, with combustible materials dispersed throughout the area. In locations where concentrated combustibles or a significant fire hazard exists, the hazard is mitigated by the presence of an automatic fire suppression system. These areas also have large floor-to-ceiling heights and large room volumes, which means that the effects of a fire, such as smoke and hot gases, will be dissipated.

In some locations, such as an elevation 51 ft 6 in. of the auxiliary building, the separation between redundant shutdown systems is greater than 80 ft. The area is completely protected by a fire detection system and manual firefighting equipment. Because of the large separation distance, the low fire loading and existing fire protection, there is reasonable assurance that one division will remain free of fire damage until the fire is extinguished by the plant's fire brigade.

(Cont'd)  
96.2.15  
B.2 In other locations, such as Zones 46A and 46B (elevation 100 ft in the auxiliary building) the straight-line-separation distance between redundant systems is less than 20 ft. However, floor-to-ceiling masonry cubicle walls partially enclose the systems. These walls would act to confine the fire so that not more than one division would be damaged. The areas are also protected by automatic fire suppression and detection systems. These systems provide reasonable assurance that any potential fire will be detected early and either suppressed automatically or manually by the fire brigade.

96.2.15  
B.8  
(Cont'd) In certain locations, such as in elevation 120 ft of the auxiliary building, separation of redundant shutdown-related cables and components is approximately 20 ft or more. The areas are protected by a partial sprinkler system, which covers at least one division, and a complete fire detection system. The applicant has installed a 1-hour fire-rated barrier around one division of cables. The remaining systems consist of tanks and piping which are not readily damaged by fire. Because of the fire detection system, the staff expects a potential fire to be detected early and suppressed manually by the fire brigade. If rapid fire propagation occurs, the sprinkler system will actuate and either control the fire or discharge water onto one division of shutdown systems. The 1-hour fire barrier and the substantial construction of the rest of the shutdown components in the area will achieve a degree of passive protection sufficient to provide reasonable assurance that safe shutdown capability can be maintained free of fire damage.

The applicant has also analyzed the consequences if vertical fire propagation did occur in places where floor/ceiling assemblies do not form a continuous fire





98.2.15  
B.8  
(CONT'D)

barrier. At least one division would remain free of fire damage. Alternately, the applicant has upgraded the floor/ceiling assembly in such a manner that this assembly forms a continuous barrier between one elevation and the next. In some cases, such as between elevation 120 ft and 140 ft of the auxiliary building, the vertical fire barrier is not completely fire rated, such as at a steel hatchway. However, because of the existing fire protection features (fire detection, partial fire suppression, manual firefighting equipment) and the low fire load, it is the staff's judgment that the non-fire-rated construction will withstand the effects of a fire until the fire is extinguished.

The staff, therefore, concludes that although deviations have been identified in Amendment No. 13 to the FSAR, the fire protection capability for safe shutdown achieves an acceptable level of safety comparable to that achieved by full compliance with Section III.G of Appendix R.

#### Alternate Shutdown

By letters dated September 26 and October 5 and 16, 1984, the applicant submitted the results of its spurious actuation analyses for a fire in the control room or outside of the control room. Because of several concerns raised during the staff's review of these reports, the applicant provided revisions to these documents by a November 13, 1984, letter.

In determining the ability of the plant to be safely shut down in the event of a fire, the applicant analyzed the effects of fire-induced hot shorts, open circuits, and shorts to grounds on safe shutdown capability. For the fire outside of the control room, the evaluation was performed for each fire zone identified in the submittal; for the control room fire the study considered only the electrical circuitry in the control room. Both analyses were performed for situations with and without offsite power.

Once a given spurious operation was identified, whether action or inaction of a component, the applicant determined what capabilities would be available to the operator which would assist in the identification and mitigation of the undesirable event. In addition, any time constraints that affected rectification of unwanted plant conditions were quantified. Next, those actions necessary to prevent the spurious operation were detailed along with any compensatory measures needed to implement the corrective actions.

The results of the above process yielded those areas of the plant where either manual actions were acceptable or where design changes, such as rerouting or protecting cables, were necessary. In those instances where operator actions are needed, the applicant will identify those requirements in the plant procedures or fire strategy book.

On the basis of its review of the methodology used by the applicant to determine those spurious operations resulting from a fire outside of or in the control room, the staff concludes that the PVNGS 1-3 design conforms to the technical requirements of Section III.G and III.L of Appendix R to 10 CFR 50.

During its review the staff noted that several fire areas, systems, or evaluation findings had been deleted in a November 13, 1984, submittal (Revision 1 to the reports) without justification. In response to staff questions, the applicant stated in a letter dated December 7, 1984, that Fire Areas 1, 2, 3A, and

**ENCLOSURE 2**  
**10 CFR 50.59 EVALUATION**



10CFR50.59  
SCREENING AND EVALUATION

Evaluation Log No.: 92-00307  
Page 1 of 2  
12-9-

ACTION UNDER REVIEW:

Changes Made to UFSAR Section 9B

REVISION:

4

PCN:

N/A

DESCRIPTION OF PROPOSED CHANGE:

See Page 2

10CFR50.59 SCREEN (Provide References on Response Justification Page)

Does the proposed change:

NO YES

1. Make changes in the facility as it is described in the UFSAR?

— X

2. Make changes in procedures as they are described in the UFSAR?

X —

3. Involve test or experiments not described in the UFSAR?

X —

4. Require a change to the technical specifications?

X —

X Any answer to questions 1 through 3 "YES", then a 10CFR50.59 evaluation is required. Contact Document Control at ext. 82-6633 to obtain a tracking log number and enter the number in the Evaluation Log number block above. UFSAR Change Request per procedure 93AC-0LC01 may also be required.

Answer 4 is "YES", then Technical Specification Change Request per procedure 93AC-0LC01 and NRC approval is required prior to implementation

All answers 1 through 4 are "NO", no 10CFR50.59 Evaluation required or Technical Specification change required, recommend action approval.

10CFR50.59 EVALUATION (Provide Response Justification with References)

5. May the probability of an accident previously evaluated in the UFSAR be increased?

X —

6. May the consequences of an accident previously evaluated in the UFSAR be increased?

X —

7. May the probability of a malfunction of equipment important to safety be increased?

X —

8. May the consequences of a malfunction of equipment important to safety be increased?

X —

9. May the possibility of an accident of a different type than any previously evaluated in the UFSAR be created?

X —

10. May the possibility of a different type of malfunction than any previously evaluated in the UFSAR be created?

X —

11. Is the margin of safety as defined in the basis for any technical specification reduced?

X —

Any answer to questions 5 through 11 "YES", then an unreviewed safety question is identified. Proceed to procedure 93AC-0LC03 prior to implementation.

X All answers 5 through 11 are "NO," there is no unreviewed safety question and action approval is recommended.

If UFSAR Chapter 6/Chapter 15 is potentially affected, forward a copy of evaluation to Nuclear Fuels Management.

I verify that the above screening/evaluation is adequate and accurate and that the undersigned have received required training.

Robert Connell 12/15/92  
SCREENER/EVALUATOR DATE

Donald K. Neal 12-15-92  
50.59 REVIEWER DATE

Robert Connell  
SCREENER/EVALUATOR(PRINT)

DONALD K. NEAL  
50.59 REVIEWER (PRINT)



### RESPONSE JUSTIFICATION

ACTION UNDER REVIEW: Changes Made to UFSAR      REVISION: 4    PCN: N/A  
Section 9B

UFSAR Section 9B, Fire Hazards Analysis, has been revised as a result of the recently completed FHA Reconstitution Project. A detailed comparison of the 10CFR50 Appendix R guidelines against the PVNGS design was conducted. This comparison evaluated the capability to safely shut down the plant in the event of an exposure fire that could impact electrical equipment, cables, or components necessary for safe shutdown. A summary of the methodology is as follows:

- The predetermined area (mentioned in 5 above) in the latest analysis is called an analysis area. An analysis area is a subset of a fire area and contains one or more fire zones as



## RESPONSE JUSTIFICATION

ACTION UNDER REVIEW: Changes Made to UFSAR      REVISION: 4   PCN: N/A  
Section 9B

1. Section 9B.1.3 was revised to describe the methodology used in the evaluation.
2. Section 9B.1.4 now describes the Fire Hazards Analysis format and contains definitions.
3. Table 9B.1-3, Safety Function Success Paths, and Figures 9B-37 through 9B-50 were deleted. This information is now contained in Calculation 13-MC-FP-315 and Drawings 13-M-FPR-001 through -021.
4. Table 9B.1-4, Listing of Active Safe Shutdown Equipment, was deleted. This information is now contained in 13-MC-FP-315.



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10CFR50.59 REVIEW AND EVALUATION

RESPONSE JUSTIFICATION

PAGE 4 OF 14

ACTION UNDER REVIEW: Changes Made to UFSAR      REVISION: 4    PCN: N/A  
Section 9B

PROCEDURE/PCP/TEMP MOD. NO.:    N/A

5.    The following changes were made to each fire area description:
  - a.    The analysis areas contained in the fire area were added to the fire area description.
  - b.    The list of safe shutdown equipment subject to loss in the event of a fire was deleted. This information is now contained in Calculation 13-MC-FP-318 and summarized on an analysis area basis.
  - c.    A discussion of each analysis area contained within the fire area was added. This discussion includes a description of the analysis area location and boundaries, the systems which have components and/or cable in the area, and a summary and conclusion.
6.    The fire zone discussions were revised by deleting the safety-related equipment and components required for safe shutdown within the fire zone. This information has been superseded by the discussion of each analysis area. The safety-related equipment and components not required for safe shutdown and non-safety related equipment and components contained in the zone were not deleted.
- 7..   The following deviation clarifications and new deviations were added:
  - a.    Fire Area I - Deviation 5: This deviation is generally correct for Train A/B separation issues. However, with the addition of N Train components the deviation requires the following clarification.

Train A cable trays are located 8'9" to 8'11" from the center wall. Train N cable trays are located approximately 3" from the center wall. The Train N trays contain cables for the following components that are subject to fire damage:



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J-CHN-UV-501	J-CHE-HV532
J-CHE-FV241 - 244	J-CHN-UV527
J-CHE-PDV240	J-CHE-UV231P
J-NCN-UV099	J-RCE-HV431
PZR Heaters	J-CHE-HV536

The compliance strategies for these components (except for J-NCN-UV99) do not rely on redundant equipment located in 86A. The compliance strategy for the loss of J-NCN-UV99 credits the Train A ex-core neutron monitoring system. However, it has been shown that a return to criticality is not possible. Therefore, from a systems standpoint this deviation can be revised. The fire protection systems and physical plant arrangements remain the same.

- b. Fire Area II - Deviation 2: This deviation is correct except that as a result of the revisions to the safe shutdown equipment list, the corridor building now contains cables for the following safe shutdown components.

Reactor Coolant Pumps      Train A/B damper controls

The deviation needs to be revised to reflect the as built condition of the plant.

The HVAC interaction is being addressed by an existing CRDR. The compliance strategy for the RCPs in the corridor building credits an action in TB-4 to secure the pumps. The compliance strategy for the RCPs in fire zone 86B indicates that control of the RCPs remains available from the Control Room. If the fire were to propagate between 86B and the corridor building the compliance strategy although different is still credible. Therefore, from a systems standpoint this deviation can be revised.



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- c.    Fire Area XII - Deviation 7: Although the original Safe Shutdown Analysis took credit for the floor separating the Fire Zones 72 and 74A, the non-rated hatch was not specifically evaluated in a deviation request. This deviation is being added to address the non rated hatch. This deviation is acceptable for the following reasons:

*NOTE:  
THIS EVALUATION IS  
FOR SEPARATION OF  
SAFE SHUTDOWN  
COMPONENTS IN THE  
SAME TRAIN,  
NOT SUBMITTED AS  
APPENDIX R DEVIATION.  
3-10-93 AKM*

- The non-rated hatch is covered by a 1/2" thick steel plate reinforced with structural T sections. The plate overlaps the opening by approximately 6" all around and is fastened down with 1/2" Bolts at 6 inch centers.
  - A 4" high curb surrounds the opening.
  - Fire Zone 72 has smoke detection and an automatic preaction sprinkler system. fire Zone 74A has smoke detection and an automatic preaction sprinkler system.
  - The total combustible fire loading in both zones is low.
- d.    Fire Area XV - Deviation 8: This is correct for Train A/B separation issues however with the addition of N Train components the deviation requires clarification.

Deviation 8 credits varying separation distances in which neither A nor B trains are located. The N train components do not meet these separation distances. However, for all fire zones, except 52A and 52D, the N train components which do not meet the deviation separation criteria are located on both sides of the "separation boundary". In fire zones 52A and 52D the following components subject to fire damage are located in the area



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which is identified as "not containing safe shutdown components".

J-CHE-HV532	J-CHE-FV241 - 243
J-CHN-UV231P	J-CHE-PDV240
J-CHE-UV527	J-CHE-HV536
J-CHE-HV239	

The compliance strategies for these components do not credit redundant components on the other side of the separation boundary. Therefore, from a systems standpoint this deviation can be revised. The fire protection systems and other physical plant characteristics in the deviation remain the same.

- e. Fire Area XV - Deviation 2: This deviation was revised to include the non-rated features in the B and E Charging pump rooms. The original deviation only credited the A/B train separation. Since the Reconstitution Effort added the E Charging pump to the Safe Shutdown list the deviation was revised to discuss the HVAC duct wall penetrations not provided with fire dampers. The justification for the deviation remains the same as the existing deviation.
- f. A bounding analysis for the Control Room fire scenario was conducted during the Appendix R reconstitution. The results of the analysis indicated that the process variables may not stay within those predicted for a loss of normal ac and the potential exists for overfilling the steam generator if an MSIS is not initiated in the Control Room prior to evacuation.

The justification for these deviations is as follows:





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Additional Action in the Control Room:

- The action in the control room prevents very unlikely series of events, which includes spurious actuation and the failure of specific automatic functions (ESFAS) in accordance with the guidance of Generic Letter 86-10 Questions 3.8.4 and 5.3.10.
- The action is taken on the same board (B05) within the control room as the Reactor trip action, and
- The Control Room action is immediately followed-up by an action in the DC Equipment Room which will isolate main steam regardless of the circuit damage in the Control Room.

Parameters Outside those expected for a normal loss of ac:

- The process variables are restored, and
  - The plant is not placed in an unrecoverable condition.
8. A new section containing miscellaneous fire zones containing safe shutdown components and/or cables was added. The previous section containing miscellaneous fire zones remains but now contains only those miscellaneous zones without safe shutdown equipment.

Changes Resulting from Remodel of 140 ft Auxiliary Building

1. Fire Zone 57I was deleted. This area was incorporated into Fire Zone 57J. The boundaries of Fire Zone 57N were changed. The deletion of Zone 57I and changes in Fire 57N resulted in changes to the descriptions of Fire Zones 50B, 51B, 52D, 53, 54, 56B and 57L which border the deleted zone

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57I and revised zone 57N:

2.    The access description of Fire Zone 57A and 57K were changed as the result of a door being added between them.
3.    The title of Fire Zone 57H was changed and changes were made to Table 9B.3-1 as a result of the function of the room changing.

10CRF50.59 Screen and Evaluation

The following provides the justification for the answers to questions 1 through 11 for both the FHA reconstitution and the remodeling done on the 140 foot of the Auxiliary Building.

Question	Justification
1	Yes. Changes have been made to the description of the facility contained in UFSAR Section 9B as a result of the safe shutdown re-evaluation and as a result of the remodeling done to the 140 foot elevation of the Auxiliary Building under DCP 1,2,3-FA-ZA-142.
2	No. Changes made to UFSAR Section 9B as a result of the safe shutdown re-evaluation and as a result of the remodeling done to the 140 foot elevation of the Auxiliary Building under DCP 1,2,3-FA-ZA-142 do not affect procedures as described in the UFSAR.
3	No. The changes made to UFSAR Section 9B as the result of the safe shutdown re-evaluation or as a result of the remodeling done to the 140 foot elevation of the Auxiliary Building under DCP 1,2,3-FA-ZA-142 do not involve test or experiments.



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4 No. The changes made to UFSAR Section 9B as the result of the safe shutdown re-evaluation or as a result of the remodeling done to the 140 foot elevation of the Auxiliary Building do not require a change to the Technical Specifications. Fire Protection has been removed from the Technical Specifications.

5 No. The changes to UFSAR Section 9B as a result of the safe shutdown re-evaluation or as a result of the remodeling done on the 140 foot elevation of the Auxiliary Building do not increase the probability of an accident previously evaluated.

The Appendix R Safe Shutdown Analysis Reconstitution verified that, for a fire in any given analysis area, the plant can be safely shutdown. Except as identified in corrective action documents (CRDRs), no changes have been made to the plant. The clarifications to existing deviations and the new deviations are acceptable as discussed above.

The remodeling of the 140 foot elevation does not affect safe shutdown related conduit (Train A only) above the finished ceiling. There is no increased exposure to these conduits because the combustible loading has not changed significantly and the area is still protected below the finished ceiling by an automatic wet pipe sprinkler system. There is no adverse effect on plant safety as previously evaluated in the UFSAR as a result of these changes.

6 No. The changes to UFSAR Section 9B as a result of the safe shutdown re-evaluation or as a result



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of the remodeling done on the 140 foot elevation of the Auxiliary Building do not increase the consequence of an accident previously evaluated.

The Appendix R Safe Shutdown Analysis Reconstitution verified that, for a fire in any given analysis area, the plant can be safely shutdown. Except as identified in corrective action documents (CRDRs), no changes have been made to the plant. The clarifications to existing deviations and the new deviations are acceptable as discussed above.

The remodeling of the 140 foot elevation does not affect safe shutdown related conduit (Train A only) above the finished ceiling. There is no increased exposure to these conduits because the combustible loading has not changed significantly and the area is still protected below the finished ceiling by an automatic wet pipe sprinkler system. There is no adverse effect on plant safety as previously evaluated in the UFSAR as a result of these changes.

7

No. The changes to UFSAR Section 9B as a result of the safe shutdown re-evaluation or as a result of the remodeling done on the 140 foot elevation of the Auxiliary Building do not increase the probability of a malfunction of equipment important to safety previously evaluated.

The Appendix R Safe Shutdown Analysis Reconstitution verified that, for a fire in any given analysis area, the plant can be safely shutdown. Except as identified in corrective action documents (CRDRs), no changes have been



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JUSTIFICATION

made to the plant. The clarifications to existing deviations and the new deviations are acceptable as discussed above.

The remodeling of the 140 foot elevation does not affect safe shutdown related conduit (Train A only) above the finished ceiling. There is no increased exposure to these conduits because the combustible loading has not changed significantly and the area is still protected below the finished ceiling by an automatic wet pipe sprinkler system. There is no adverse effect on plant safety as previously evaluated in the UFSAR as a result of these changes.

8

No. The changes to UFSAR Section 9B as a result of the safe shutdown re-evaluation or as a result of the remodeling done on the 140 foot elevation of the Auxiliary Building do not increase the consequences of a malfunction of equipment important to safety previously evaluated.

The Appendix R Safe Shutdown Analysis Reconstitution verified that, for a fire in any given analysis area, the plant can be safely shutdown. Except as identified in corrective action documents (CRDRs), no changes have been made to the plant. The clarifications to existing deviations and the new deviations are acceptable as discussed above.

The remodeling of the 140 foot elevation does not affect safe shutdown related conduit (Train A only) above the finished ceiling. There is no increased exposure to these conduits because the combustible loading has not changed significantly and the area is still protected below the finished



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ceiling by an automatic wet pipe sprinkler system. There is no adverse effect on plant safety as previously evaluated in the UFSAR as a result of these changes.

9

No. The changes to UFSAR Section 9B as a result of the safe shutdown re-evaluation or as a result of the remodeling done on the 140 foot elevation of the Auxiliary Building do not increase the possibility of an accident of a different type than previously evaluated.

The Appendix R Safe Shutdown Analysis Reconstitution verified that, for a fire in any given analysis area, the plant can be safely shutdown. Except as identified in corrective action documents (CRDRs), no changes have been made to the plant. The clarifications to existing deviations and the new deviations are acceptable as discussed above.

The remodeling of the 140 foot elevation does not affect safe shutdown related conduit (Train A only) above the finished ceiling. There is no increased exposure to these conduits because the combustible (fire) loading has not changed significantly and the area is still protected below the finished ceiling by an automatic wet pipe sprinkler system. An HVAC duct is added in the area of safe shutdown conduit (Train A auxiliary feedwater). This duct is supported for seismic category IX so there will be no new unanalyzed adverse impact on plant safety as a result of this change.

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No. The changes to UFSAR Section 9B as a result of the safe shutdown re-evaluation or as a result



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of the remodeling done on the 140 foot elevation of the Auxiliary Building do not increase the possibility of a malfunction of equipment important to safety of a different type than previously evaluated.

The Appendix R Safe Shutdown Analysis Reconstitution verified that, for a fire in any given analysis area, the plant can be safely shutdown. Except as identified in corrective action documents (CRDRs), no changes have been made to the plant. The clarifications to existing deviations and the new deviations are acceptable as discussed above.

The remodeling of the 140 foot elevation does not affect safe shutdown related conduit (Train A only) above the finished ceiling. There is no increased exposure to these conduits because the combustible loading has not changed significantly and the area is still protected below the finished ceiling by an automatic wet pipe sprinkler system. An HVAC duct is added in the area of safe shutdown conduit (Train A auxiliary feedwater). This duct is supported for seismic category IX so there will be no new unanalyzed adverse impact on plant safety as a result of this change.

11

No. The Fire protection is not addressed in the technical specifications. No margins of safety are reduced by these changes. There is reasonable assurance that at least one train of equipment necessary to achieve and maintain hot or cold shutdown will continue to be free of fire damage.

