



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
AMENDMENT TO APPROVED EXEMPTION FROM 10 CFR Part 50,
APPENDIX R, ITEM III.G.2 REQUIREMENTS FOR CONTAINMENT FIRE AREAS
SALEM GENERATING STATION, UNITS 1 AND 2
DOCKET NOS. 50-272 AND 50-311

1.0 INTRODUCTION

In response to a fire protection exemption request by Public Service Electric and Gas Co. (the licensee) for Salem Units 1 and 2 dated July 15, 1988, the NRC granted, on July 20, 1989, an exemption from the requirements of Item III.G.2 of Appendix R to 10 CFR Part 50 for the Salem Units 1 and 2 containments (Exemption Request No. 12, Fire Areas 1-FA-RC-78 and 2-FA-RC-78). The containment subareas (within the above fire areas) housing the pressurizer and Panel 335 at elevation 100 feet, were exempted from the requirement that redundant cables and equipment within the above subareas be separated either by at least 20 feet of horizontal distance that is free of intervening combustibles or by a radiant energy shield. The exemption further stated that no additional fire protection modifications at the pressurizer were needed to enhance the currently existing level of fire safety in the containment and that the licensee would install at Panel 335 for each unit an automatic fire suppression system to enhance the fire protection for the panels which contain redundant channels of pressurizer pressure and level instrumentation. By letter dated March 23, 1990, the licensee requested a correction to the totally automatic feature of the fire suppression system identified for the panel in the NRC's approval letter. The licensee pointed out that their intent as identified in the exemption request of July 15, 1988 was to provide for a localized automatically actuated fire suppression system only if a gaseous type suppression system would be used. If, however, a localized water-based fire suppression system were to be used, it would require a remote manual action to open the normally closed containment fire suppression header isolation valve to actuate the system. In the March 23, 1990 letter, the licensee further stated that on review of the various fire suppression agents available, they had determined that a water-based fire suppression system would be the best choice for the Salem units and that they had consequently chosen a dry pipe sprinkler system and outlined the procedures for activating such a system. Additionally, the licensee provided justification for eliminating the originally identified need (licensee's submittal dated July 15, 1988) for using fire detectors for the suppression system actuation. In a letter dated September 13, 1990, the licensee provided additional details concerning the alarms and air pressurization associated with the dry pipe sprinkler system. Staff's evaluation of the requested correction relating to the provision of a fire suppression system at Panel 335 and the proposed elimination of the use of fire detectors for the system actuation is given below.

2.0 EVALUATION

In the March 23, 1990 letter and supplemented on September 13, 1990, the licensee recognized the need for rapid opening of the normally closed containment fire suppression header isolation valve by the control room operator to activate the localized water-based fire suppression system and the potential for delay in personnel response to such a need. Therefore, the licensee stated that the following design provisions will be available and the following procedures will be implemented to activate the suppression system in a timely manner whenever it is required:

- (1) The containment fire suppression header isolation valve will be opened by control room operator using pushbuttons located in the control room.
- (2) The system design will include automatic controls to open the fire suppression system valve.
- (3) The system will be supplemented by smoke detectors in the areas around the Panel 335.
- (4) The control room operator will be required to open the header isolation valve on receipt of both an early warning smoke detector alarm and the dry pipe sprinkler system alarm that is activated by a pressure switch that senses the loss of system air pressure. The above manual action will be performed regardless of whether the fire brigade has entered the containment to investigate the fire situation. The two independent alarms required for actuating the fire suppression system will minimize inadvertent wetting of the equipment in the containment.
- (5) The above procedure will not preclude the control room operator's option to open the header isolation valve in advance of receipt of both alarms. However, exercising this option will require the fire brigade to identify a need to commence immediate fire fighting activities and communicate such a need to the control room operator.

The staff has determined that the time difference between detection alarm, and manual initiation versus detection and automatic initiation is not significant. The time difference will essentially be the few seconds that it takes for the operator to recognize the alarms and operate the push buttons.

Based on the above finding and the discussion of the fire hazard in the containment provided in the SE dated July 20, 1989, approving the exemption request identified above, the staff concludes that there is reasonable assurance that the water-based localized fire suppression system at the Panel 335 will be actuated in a timely manner. Therefore, at least one channel of pressurizer pressure and level instrumentation will be available at Panel 335, thus assuring the capability to achieve safe shutdown following a fire event in the containment.

2.0 EVALUATION

In the March 23, 1990 letter and supplemented on September 13, 1990, the licensee recognized the need for rapid opening of the normally closed containment fire suppression header isolation valve by the control room operator to activate the localized water-based fire suppression system and the potential for delay in personnel response to such a need. Therefore, the licensee stated that the following design provisions will be available and the following procedures will be implemented to activate the suppression system in a timely manner whenever it is required:

- (1) The containment fire suppression header isolation valve will be opened by control room operator using pushbuttons located in the control room.
- (2) The system design will include automatic controls to open the fire suppression system valve.
- (3) The system will be supplemented by smoke detectors in the areas around the Panel 335.
- (4) The control room operator will be required to open the header isolation valve on receipt of both an early warning smoke detector alarm and the dry pipe sprinkler system alarm that is activated by a pressure switch that senses the loss of system air pressure. The above manual action will be performed regardless of whether the fire brigade has entered the containment to investigate the fire situation. The two independent alarms required for actuating the fire suppression system will minimize inadvertent wetting of the equipment in the containment.
- (5) The above procedure will not preclude the control room operator's option to open the header isolation valve in advance of receipt of both alarms. However, exercising this option will require the fire brigade to identify a need to commence immediate fire fighting activities and communicate such a need to the control room operator.

The staff has determined that the time difference between detection alarm, and manual initiation versus detection and automatic initiation is not significant. The time difference will essentially be the few seconds that it takes for the operator to recognize the alarms and operate the push buttons.

Based on the above finding and the discussion of the fire hazard in the containment provided in the SE dated July 20, 1989, approving the exemption request identified above, the staff concludes that there is reasonable assurance that the water-based localized fire suppression system at the Panel 335 will be actuated in a timely manner. Therefore, at least one channel of pressurizer pressure and level instrumentation will be available at Panel 335, thus assuring the capability to achieve safe shutdown following a fire event in the containment.

2.0 EVALUATION

In the March 23, 1990 letter and supplemented on September 13, 1990, the licensee recognized the need for rapid opening of the normally closed containment fire suppression header isolation valve by the control room operator to activate the localized water-based fire suppression system and the potential for delay in personnel response to such a need. Therefore, the licensee stated that the following design provisions will be available and the following procedures will be implemented to activate the suppression system in a timely manner whenever it is required:

- (1) The containment fire suppression header isolation valve will be opened by control room operator using pushbuttons located in the control room.
- (2) The system design will include automatic controls to open the fire suppression system valve.
- (3) The system will be supplemented by smoke detectors in the areas around the Panel 335.
- (4) The control room operator will be required to open the header isolation valve on receipt of both an early warning smoke detector alarm and the dry pipe sprinkler system alarm that is activated by a pressure switch that senses the loss of system air pressure. The above manual action will be performed regardless of whether the fire brigade has entered the containment to investigate the fire situation. The two independent alarms required for actuating the fire suppression system will minimize inadvertent wetting of the equipment in the containment.
- (5) The above procedure will not preclude the control room operator's option to open the header isolation valve in advance of receipt of both alarms. However, exercising this option will require the fire brigade to identify a need to commence immediate fire fighting activities and communicate such a need to the control room operator.

The staff has determined that the time difference between detection alarm, and manual initiation versus detection and automatic initiation is not significant. The time difference will essentially be the few seconds that it takes for the operator to recognize the alarms and operate the push buttons.

Based on the above finding and the discussion of the fire hazard in the containment provided in the SE dated July 20, 1989, approving the exemption request identified above, the staff concludes that there is reasonable assurance that the water-based localized fire suppression system at the Panel 335 will be actuated in a timely manner. Therefore, at least one channel of pressurizer pressure and level instrumentation will be available at Panel 335, thus assuring the capability to achieve safe shutdown following a fire event in the containment.

In the March 23, 1990 submittal and supplemented on September 13, 1990, the licensee further stated that the dry pipe sprinkler system employs pressurized air from the Control Air System to hold the fire suppression system valve closed. The Control Air System maintains pressure in the dry pipe sprinkler system and provides for makeup of minor system losses through the use of an air pressure maintenance device. The air pressure maintenance device incorporates a check valve to prevent water backflow into the air system and a 1/16-inch diameter orifice. The orifice restricts air flow, thus allowing the dry pipe sprinkler system to depressurize when a fusible sprinkler head is thermally actuated. Releasing the air pressure causes the fire suppression system valve to open, thus eliminating their originally identified need (July 15, 1988 submittal) to use the fire detectors for the suppression system actuation. The staff finds the above justification acceptable.

3.0 CONCLUSION

Based on the above, the staff concludes that the installation of a localized water-based fire suppression system requiring remote manual opening of the containment fire suppression header isolation valve in lieu of a totally automatic localized fire suppression system at Panel 335 in the Salem Units 1 and 2 containments is acceptable. In addition, the use of smoke detectors around the panels to provide early warning alarms for remote manual opening of the header isolation valve is also acceptable. Based on our review, we conclude that the licensee's alternate fire protection configuration provides a level of fire safety equivalent to that previously approved by the NRC staff and does not invalidate NRC's earlier approval of the licensee's exemption request, identified above, from the requirements of 10 CFR Part 50, Appendix R, Section III.G.2.

Principal Contributor: T. Chandrasekaran

Dated: November 14, 1990