



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

Enclosure

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
FIRE PROTECTION DEVIATIONS
PALO VERDE NUCLEAR GENERATING STATION
DOCKET NOS. 50-528/529/530

1.0 INTRODUCTION

By letter dated August 30, 1989, Arizona Public Service Company (the licensee) requested approval of certain deviations from the criteria contained in Section III.G.2 of Appendix R to 10 CFR 50. Specifically, certain cable tray enclosures are not installed in such a manner as to qualify for a 1-hour or 3-hour fire resistance rating as originally described by the licensee and approved by the staff at the time the plant was licensed.

2.0 DISCUSSION

In a number of plant locations (delineated in the subject letter) safe shutdown related cables in trays are enclosed in a fire-rated barrier system. The system has been subjected to standard fire exposure tests and is qualified to achieve a 1-hour or 3-hour fire rating when installed in accordance with the tested configuration and manufacturer's recommendations. Both 1-hour and 3-hour rated configurations are featured in the plant.

The fire barriers were installed in accordance with the vendor's specifications which were in effect at the time of initial installation. Subsequent research by the vendor has identified the need to protect intervening metal which penetrates the protective envelope for a distance of 18 inches outward from the point of contact of the barrier system. Prior to this research, and as an effort to limit thermal conductivity into the protected envelope, the licensee protected intervening steel which came in contact with the protected raceway to a distance of 8 inches. This protection was not provided to steel which penetrated the protected envelope but did not come in contact with the raceway or its supports.

In response to the referenced research results, the licensee conducted two fire tests to assess the adequacy of the existing barrier configurations found in the plant. The first was a standard fire test of 1-hour duration on the barrier system featuring intervening steel which contacts the raceway and which is protected up to 8 inches. The results of this test confirmed that the protected side temperatures during the test are within acceptable limits.

The second test was on the barrier system featuring unprotected intervening steel that does not contact the raceway. The results demonstrated that a maximum of 400°F would be reached within the protected raceway environment.

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The licensee also performed heat transfer calculations to assess the potential vulnerability of the cables within the enclosure and used the results in fire hazards analyses to evaluate the adequacy of existing fire protection in the subject zones to prevent damage to the cables. A summary of the results of these analyses and descriptions of existing fire protection features in the zones is provided in the August 30, 1989 letter. The licensee concluded that although the existing barrier configurations no longer qualified as 1-hour and 3-hour barriers, they provided sufficient protection along with the other fire protection features to assure that the cables within the protected envelope would remain free of damage.

3.0 EVALUATION

The staff's principal concern with the existing barrier configuration was that the cable tray protective envelope no longer possessed the fire resistance rating as initially described by the licensee and that, as a result, safe shutdown-related cables might be vulnerable to damage in a fire.

For the 1-hour barrier configuration, the licensee's fire tests and analyses demonstrated that under "worse-case" fire assumptions the environment within the protected envelope would not damage critical cables. Because the zones in which the protected raceways are located are protected by active (fire detection and suppression systems) fire protective features, as described by the licensee, the staff concludes that the extreme fire conditions assumed by the licensee would not likely develop.

For the 3-hour configuration, the licensee's heat transfer calculation concluded that a minimum of 18 minutes of protection would be provided under "worse-case" assumptions for fire spread and duration. Because the zones in which these barriers are located are provided with automatic fire detection systems the staff expects that any potential fire would be detected in its initial stages before significant heat generation or room temperature rise occurred. The plant fire brigade would be dispatched within minutes and would suppress the fire using manual fire fighting equipment. The staff, therefore, concludes that the existing barrier configuration provides sufficient passive fire protection for the cables prior to the arrival of the fire brigade.

3.0 CONCLUSION

Based on its evaluation of the information supplied by the licensee, the staff concludes that the deviations from the criteria of Appendix R, Section III.G.2 associated with the cable tray barrier system are acceptable, and adequate fire protection measures are provided.

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