



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO APPENDIX J INTERVAL EXEMPTION

VIRGINIA ELECTRIC AND POWER COMPANY

SURRY POWER STATION, UNIT NO. 2

DOCKET NO. 50-281

1.0 INTRODUCTION

By letter dated September 14, 1990, as supplemented September 18, 1990, Virginia Electric and Power Company (the licensee) requested a one-time exemption for Surry Power Station, Unit No. 2 (Surry 2) from the requirements of 10 CFR Part 50, Appendix J pertaining to Type C leak rate test intervals. Paragraph III.D.3 of Appendix J requires that Type C testing be performed during each reactor shutdown for refueling but in no case at an interval of greater than 2 years. The licensee requested an extension of the 2-year Type C test interval of up to 9 months for 76 containment isolation valves associated with 42 penetrations which cannot be tested during power operation. The licensee intends to test these valves during the scheduled Cycle 10 refueling outage starting on April 5, 1991.

Surry 2 was shut down for refueling on September 10, 1988 and remained in the refueling outage for 374 days to perform maintenance and modifications. Local leak rate tests (LLRTs) commenced in September 1988 and were completed in September 1989. Due to the extended outage, certain containment isolation valves will exceed the 2-year Type C test interval before the scheduled refueling outage date. Among the 76 valves requested for test postponement, 14 first-tested valves exceeded the 2-year test interval on September 18, 1990. In order to eliminate plant shutdown solely for performing LLRTs, the licensee requested a one-time exemption of up to 9 months until June 30, 1991 to complete the LLRTs. A temporary waiver of compliance was issued on September 18, 1990 to remain in effect until the NRC staff had processed the requested exemption.

2.0 EVALUATION

To support the exemption from the requirements of Appendix J, the licensee provided the following rationale:

- (1) The actual power operation inservice period for the majority of the components will be 19 months, which is less than the 2-year allowable interval; the remaining calendar time was during a period of cold shutdown which was considered to be less severe conditions than power operation.
- (2) Primary containment integrity and compliance with the allowable leakage limits are not required when the reactor is in cold shutdown. An exemption would not be necessary, as considered by the licensee, in the event that Type C tests are not performed in 2 years if the interval expires during cold shutdown and the tests are completed prior to restart.

- (3) The LLRT program has undergone significant changes and improvements to minimize leakage. The latest Type B and C test results are well below 0.6La limit.
- (4) Compliance with the regulation would result in undue hardship or other costs in the form of lost revenues due to plant shutdown for performing Appendix J testing.
- (5) Extending the LLRTs would not affect the probability of occurrence of accidents. Increasing the LLRT interval would also eliminate one heatup and cooldown cycle and lower the probability of events which are likely during such plant evolutions.

The staff has reviewed the Appendix J exemption request and the licensee's justification and believes that the technical rationale has merit. The staff agrees that during a shutdown period the environment seen by a containment barrier can generally be considered to be less severe than during power operation conditions. However, the licensee's interpretation implies that no significant barrier degradation occurs during cold shutdown. The staff's experience with TMI-1 Appendix J leakrate testing during its long-time shutdown found that valves did degrade even if they were not in service. TMI-1 containment isolation valves were Type C tested almost every year during the cooldown period and increased valve leakage was found during each test. Extending LLRTs will increase the probability of valve leakage, especially when the valve is aged. As a result, the staff reaffirms its interpretation that the time referred to within Appendix J is calendar time. The intent of Appendix J Type C testing is to test valve leakage in a 24-month interval regardless of whether the valve is exposed to power operation or not.

In assessing the possible degradation of containment integrity resulting from the extended test period, the staff has reviewed previous LLRTs performed at Surry 2 in 1986 and 1988. The total "as-found" leakage for the 76 valves tested in 1986 was 925.66 SCFH, which was a failed LLRT. Corrective action for valve repair and replacement was taken to reduce valve leakage. Following these repairs, the final "as-left" leakages for the combined Type B and C tests, as shown in Attachment 2 of the submittal, were below the 0.6La allowable value of 180 SCFH. The total "as-found" leakage for the 76 valves tested in 1988 was 110.26 SCFH. Following valve repair and replacement, the final "as-left" combined Type B and C leakages were found acceptable. The licensee also identified the valves that had poor leakage history. The major contributors to the 1986 Type C test failure were valves TV-DA-200A/B, TV-CH-2160, MOV-RS-256A, and 2-VP-12. Both penetrations 38 (TV-DA-200A/B) and 46 (FCV-2160) had 300 SCFH leakage rates and penetration 28 (CH-2204) had a 169 SCFH leakage rate. The licensee stated that TV-DA-200A/B and CH-2204 were replaced and FCV-2160 is a water-filled valve, which is not considered a credible leakage path. The major contributors to the 1988 Type C test failure were valves 02-RS-11, MOV-RS-256 and 02-VP-12. The licensee stated that these valves were repaired and retested satisfactorily, as demonstrated by the test results in Attachment 2 of the submittal. The staff has reviewed the leakage data for valves included in the exemption request and finds that 80% of the valves tested in the "as found" condition had very low leakage except for the valves mentioned above.

The licensee also estimated leakage rates for the 1991 extended Type C testing based on 1986 and 1988 test results. The licensee first calculated the leakage trend per month for each valve and then found the projected leakage increase for the valve as a summation of the 1988 "as found" leakage and the 33-month leakage trend. If a valve had a negative leakage trend, the most recent "as found" leakage value was used for calculating the trend value. For valves that were overhauled or replaced, the most recent post-maintenance "as-found" leakage value was used. If the "as-found" leakage was not available, then the "as-left" leakage value was used. The projected leakage for the 76 valves was calculated to be 42.44 SCFH. The licensee then estimated leakages for all 122 valves using the same method and found the total "as found" leakages to be 91.52 SCFH. The staff has reviewed the valve leakage projection and finds that the methodology for estimated leakage for the extended period is acceptable. Furthermore, the ample margin between the estimated leakage and the allowable leakage should accommodate any degradation likely to be experienced for the 76 valves during the extended period.

The staff has completed its review of the licensee's submittals. The licensee has provided evidence to justify that extending the test interval should not result in a situation wherein the measured leakage from these valves would cause the 0.6La limit to be exceeded. However, based on the information provided, it is the staff's view that the exemption interval shall be effective until April 30, 1991, rather than the requested date of June 30, 1991, because this interval should provide sufficient time to complete the required tests following the start of the April 5, 1991 refueling outage. The staff has previously approved a similar test extension on Surry Unit 1. To ensure proper containment integrity, the licensee committed to perform Appendix J testing as soon as possible during any earlier outage of suitable duration should one occur prior to the scheduled refueling outage. If testing is performed, the following priorities, which the staff finds acceptable, have been established by the licensee: (1) first test the valves with the highest leakage, (2) then test all stop check valves, (3) and then larger-sized valves, (4) and finally, test the smaller-sized valves.

### 3.0 CONCLUSION

Based on the above, the staff has concluded that a 7-month test interval extension is acceptable for Surry Unit 2. This is a one-time exemption from the 2-year Type B and Type C test interval requirements as prescribed in Appendix J and will be in effect until April 30, 1991.

Dated: September 26, 1990

Principal Contributor:

J. Guo