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Grand Gulf Nuclear Station

April 28, 1994

U.S. Nuclear Regulatory Commission
Mail Station P1-37
Washington, D.C. 20555

Attention: Document Control Desk

Subject: Grand Gulf Nuclear Station
Docket No. 50-416
License No. NPF-29
Reactor Containment Building 1993 Integrated
Leak Rate Test Report

GNRO-94/00072

Gentlemen:

In accordance with the requirements of 10 CFR 50 Appendix J, Paragraphs V.B.1 and V.B.3, attached is the Summary Technical Report for the Primary Containment Integrated Leak Rate Test (ILRT) successfully completed on November 21, 1993 at Grand Gulf Nuclear Station.

The ILRT was performed and data was collected and analyzed using the Total Time method specified for a 6 hour test in Bechtel Topical Report BN-TOP-1A. The 95% upper confidence limit (UCL) was calculated to provide a conservative statistical upper bound on leakage rate. The UCL was then adjusted for changes in suppression pool water level and for leakage through penetrations not isolated by normal means.

During performance of the ILRT it appeared that the measured leakage rate and the UCL on leakage rate might exceed the acceptance limits of 10 CFR 50, Appendix J. Leakage was discovered in the fission product monitor (FPM) sample panel and the post accident sample system (PASS). The associated containment isolation valves were subsequently closed and the ILRT was then successfully completed.

After the test was completed, an evaluation was performed to determine if any acceptance criteria had been exceeded. Two methodologies were used to determine "as found" leakage.

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The first methodology used numerical methods to estimate the final trended slope of the air mass plot and included the leakage through the FPM and PASS systems. Using this methodology the test results were found to be acceptable based on the leakage rate being below 1.0 L_a.

If any Type A test fails to meet the acceptance criterion of 0.75 L_a, GGNS Technical Specification 4.6.1.2.b requires that the test schedule for subsequent Type A test be reviewed and approved by the Commission. The NRC Staff is currently reviewing a request for an exemption from the requirements of Appendix J that outlines our proposed schedule. This proposed schedule would not change based on the results of this test.

Because of the potential for differing interpretations of the applicable acceptance criteria for "as found" leakage, Grand Gulf has requested a change to the Technical Specifications that will clarify that 1.0 L_a is the appropriate acceptance criteria for "as found" Type A tests. This request has been made as part of the Technical Specification Improvement Program and is expected to be implemented prior to the next refueling outage.

The second methodology analyzed the design and functions of the FPM and PASS considering containment design basis. This analysis concluded that the containment isolation valves should not have been specified to remain open during and following a Design Basis Accident. It is therefore appropriate that these valves be closed and vented to containment atmosphere during the ILRT. In this case the actual containment leakage rate is less than 0.75 L_a.

A detailed discussion of each methodology is included in the attached report. By both methodologies the leakage rates were found to be acceptable and it was concluded that the ILRT had demonstrated that the containment

maintained acceptable leaktight integrity at the end of the operating cycle.

If you have any questions or require additional information, please contact this office.

Yours truly,

DSPace

CRH/WBB

attachment: Reactor Containment Building 1993 Integrated Leak Rate Test Report

cc: Mr. R. H. Bernhard (w/a)
Mr. H. W. Keiser (w/a)
Mr. R. B. McGehee (w/a)
Mr. N. S. Reynolds (w/a)
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Mr. P. W. O'Connor, Project Manager (w/2)
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U.S. Nuclear Regulatory Commission
Mail Stop 13H3
Washington, D.C. 20555

DATE: April 27, 1994

MEMO TO: M. D. Meisner

FROM: J. P. Dimmette, Jr.

SUBJECT: Transmittal of Final Report of GGNS Reactor Containment Building 1993 Integrated Leakage Rate Test, dated November, 1993

REF:
(1) BCP Technical Services, Inc. Letter, dated March 3, 1994, Subject: ILRT Program Certificate of Conformance (Enclosure 1)
(2) Material Nonconformance Report (MNCR) No. 0345-93
(3) Federal Register, Vol. 51, No. 209, October 29, 1986, pp. 39538-39544 (51 FR 39538), "Proposed Rule to Amend Appendix J Requirements Regarding Leakage Rate Testing of Containments of Light-Water-Cooled Nuclear Power Plants"
(4) Letter from Thomas E. Tipton (NUMARC) to NUMARC Administrative Points of Contact, dated January 17, 1992, Subject: NRC Proposed Revision to 10 CFR 50, Appendix J, Containment Leak Rate Testing

GIN: 94/ 01401

BACKGROUND: The third periodic containment integrated leak rate test (ILRT) was performed on the Grand Gulf Nuclear Station (GGNS) Unit 1 containment building on November 20-21, 1993.

DISCUSSION: The subject report has been prepared as required by 10CFR50, Appendix J, Section V.B. A copy of the report in binder is hereby transmitted to you for submittal to the Nuclear Regulatory Commission (NRC). In addition, a master copy for making copies for distribution to other internal and external addressees per Entergy Operations policy is attached.

BCP Technical Services, Inc., which performed the reduction of the test data and prepared the report under Contract No. C-1124-G004, has certified the accuracy of the analysis and acceptability of the results, as indicated in Reference 1, a copy of which is attached. BCP's certification pertains to portions of Sections 2, 3, 4 and 5, all of Section 7 (graphs and tables) and all of Appendices II and III. We certify that the remainder of the report is true and accurate to the best of our knowledge.

Determination of whether or not the "as-found" Type A test passed the acceptance criteria was made difficult due to excessive leakage that was found in the fission product monitor (FPM) sample panel and post-accident sampling system (PASS) piping during the test.

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The Type A test was stopped, the leakage was stopped by closing the containment isolation valves in containment penetrations 109A and 109B, and the Type A test was restarted. After the ILRT, MNCR 0345-93 was issued to document the leakage problem.

The report provides two analyses to justify that the "as-found" leakage rate is acceptable. Therefore, based on both analyses, Plant Staff concludes that the "as-found" test was acceptable. The two analyses are as follows:

1. The first analysis uses numerical methods to treat the entire duration of collected air mass data during both the aborted and the completed Type A tests, as well as the verification test, as one long test and includes the known leakage through the FPM and PASS penetrations. The analysis concludes that the leakage rate is acceptable because it is less than 1.0 L_a, even though it is greater than 0.75 L_a. This analysis is presented in Section 5.5 of the report.

2. The second analysis uses the argument that penetrations 109A and 109B isolation valves, which isolate the fission product monitor (FPM) sample panel and post-accident sampling system (PASS) from the drywell atmosphere, should have been closed during the ILRT. By this logic, the "as-found" leakage rate was less than 0.75 L_a and is, therefore, acceptable. The second analysis is presented in Section 5.6 of the report.

Both of the analyses have weaknesses which make them less than fully acceptable as proof that the "as-found" Type A test was successful.

- The first analysis outlined above is weak because it is based on an analysis method that is not normally used in ILRT reports, and because the final calculated leakage rate (0.391 %/day) is greater than the specified limit of 0.75 L_a in Tech Spec Surveillance Requirement 4.6.1.2.b, which is equal to 0.328 %/day.

- The second analysis outlined above is weak because it is based on Type A test results performed after penetrations 109A and 109B isolation valves were closed, even though the "as-found" leakage rate was less than 0.75 L_a by this analysis. The

isolation valves would probably not have been closed during a design basis accident prior to Refueling Outage No. 6 (RF06).

The first analysis method is acceptable because it presents the "as-found" ILRT results with the penetration 109A and 109B isolation valves in their actual "as-found" configuration as specified in the UFSAR, includes all of the "as-found" measured leakage from the FPM panel and PASS, and shows that the leakage rate is less than the L_a limit of 0.437 %/day specified in Tech Spec LCO 3.6.1.2.a, although it is greater than the 0.75 L_a limit specified in Tech Spec Action Statement 3.6.1.2.a and Tech Spec Surveillance Requirement 4.6.1.2.b.

The 0.75 L_a limit of 0.328 %/day should not be used as the acceptance criterion for "as-found" Type A test results (although it is appropriate for "as-left" test results) for the following reasons:

1. Tech Spec Limiting Condition for Operation (LCO) 3.6.1.2.a states the following:

   "3.6.1.2 Containment leakage rates shall be limited to:

   "a. An overall integrated leakage rate of less than or equal to L_a, 0.437 percent by weight of the containment air per 24 hours at P_a, 11.5 psig."

   Tech Spec 3.6.1.2 LCO statements, including LCO 3.6.1.2.a, are specified as being applicable at all times when primary containment integrity is required. Tech Spec 3.6.1.1 specifies that primary containment integrity is required in Operational Conditions 1, 2 and 3. These two LCO statements indicate that the 1.0 L_a limit applies at all times during the power cycle (Operational Conditions 1, 2 and 3), including at the end of the power cycle, just before the plant is shut down and cooled down below 200°F for the next refueling outage, which is effectively the "as-found" condition of the containment. However, as discussed in Reason 2 below, it does not apply in Operational Conditions 4 and 5 immediately prior to returning to power operation.

2. GGNS Tech Spec Limiting Condition for Operation (LCO) Action Statement 3.6.1.2.a states the following, in part:

   "With:

   "a. The measured overall integrated containment leakage rate exceeding 0.75 L_a, ...

   "restore:

   "a. The overall integrated leakage rate(s) to less than or equal to 0.75 L_a ... prior to increasing reactor coolant system temperature above 200°F."

   This LCO Action Statement implies that the Type A test leakage rate is determined at the end of an outage (Operational Condition 4 or 5) and must be no greater than 0.75 L_a just prior to startup, which is the "as-left" condition. Once the plant reaches power operation (Operational Conditions 1, 2 and 3), the LCO (See Reason 1 above) limit of 1.0 L_a applies.

3. Tech Spec Bases 3/4.6.1.2 (Containment Leakage) states the following:

   "The limitations on containment leakage rates ensure that the total containment leakage volume will not exceed the value assumed in the analyses at the peak accident pressure of 11.5 psig, P_a. As an added conservatism, the measured overall integrated leakage rate is further limited to less than or equal to 0.75 L_a during performance of the periodic tests to account for possible degradation of the containment leakage barriers between leakage tests."

   Clearly, this basis statement reflects the expectation that the containment leak tightness will degrade during the power cycle(s) between ILRTs. Imposing a limit of 0.75 L_a on the containment before the plant is allowed to start up after the ILRT (the "as-left" condition) sets an expectation and an implied limit of 0.25 L_a on the degradation between ILRTs.

4. On October 29, 1986, the NRC published in the Federal Register (51 FR 39538) a proposed revision of 10 CFR 50, Appendix J (see Reference 3). The 1986 proposed Appendix J rule, among other things, specifically identified 1.0 L_a as the leakage criterion for "as-found" Type A tests. The 1986 proposed Appendix J rule also identified 0.75 L_a as the leakage limit for "as-left" Type A tests. Based on numerous comments from the nuclear industry, the proposed rule was removed from the rulemaking process until 1991.

5. On May 8, 1991, the NRC presented to the NRC Commissioners a revised draft of the proposed Appendix J rule which had been approved by the Advisory Committee on Reactor Safeguards (ACRS) (Reference 4). Like the 1986 proposed Appendix J rule, the 1991 proposed Appendix J rule also identified 1.0 L_a as the leakage limit for "as-found" Type A tests and 0.75 L_a as the leakage limit for "as-left" Type A tests.

6. The background material accompanying the April 8, 1991, draft revision identified that the revision "reflects acceptable changes in regulatory requirements resulting from: (1) experience in applying the existing requirements; (2) advances in containment leakage rate testing methods; (3) interpretive questions; (4) simplifying the text; (5) various external/internal comments since 1973; and (6) exemption requests received and approved."

   The clear interpretation of these draft changes is that the NRC, for whatever reason, is presently willing to accept 1.0 L_a as the acceptance criterion for "as-found" Type A tests.

7. GGNS Tech Spec Surveillance Requirements 4.6.1.2.a and b state the following, in part:

   "a. Three Type A Overall Integrated Containment Leakage Rate tests shall be conducted at 40 ± 10 month intervals* during shutdown at P_a, 11.5 psig, during each 10-year service period.

   "b. If any periodic Type A test fails to meet 0.75 L_a, the test schedule for subsequent Type A

tests shall be reviewed and approved by the Commission."

These requirements do not specify whether the Type A tests are "as-found" or "as-left." Since the Tech Spec surveillance requirements are performed in order to verify compliance with the LCO statements, which require that the overall integrated leakage rate be less than or equal to 1.0 L_a, it is apparent that the Type A test leakage rate referred to in Tech Spec Surveillance Requirement 4.6.1.2.b must be "as-left," that is, prior to startup. It is not clear and appears contrary to Tech Spec LCO 3.6.1.2.a and Tech Spec Bases 3/4.6.1.2 that the 0.75 L_a limit is for "as-found" leakage in addition to "as-left" leakage. This is consistent with Tech Spec 3.6.1.2.a LCO and Action Statement discussed in Reasons 1 and 2 above.

Based on the above, the 0.75 L_a limit of Tech Spec LCO Action Statement 3.6.1.2.a and Tech Spec Surveillance Requirement 4.6.1.2.b applies only to the "as-left" Type A test leakage rate and the Tech Spec LCO 3.6.1.2.a limit of 1.0 L_a is an acceptable limit for "as-found" Type A test leakage rate. In addition, it appears appropriate that Tech Spec Surveillance Requirement 4.6.1.2.b should be clarified to specifically distinguish between leakage limits of 1.0 L_a for "as-found" leakage and 0.75 L_a for "as-left" leakage. This could be accomplished either by revising the Tech Spec or by issuing a Tech Spec position statement.

The second analysis method is acceptable based on GGNS's evaluation of the post-accident positions of penetration 109A and 109B isolation valves. The evaluation is summarized in Section 5.6 of the report. The evaluation concludes that the isolation valves should be closed during post-accident conditions, even though the UFSAR shows them to be open, and that they should have been closed during the ILRT. In Supplement 3 to MNCR 0345-93 NPE committed to change the FSAR. Had the isolation valves been closed, the "as-found" leakage rate UCL would have been 0.312 %/day, which is below the 0.75 L_a limit of 0.328 %/day.

Based on the justifications presented above, both "as-found" and "as-left" Type A test leakage rates were acceptable. The "as-left" leakage rate is less than 0.75 L_a, and the "as-found" leakage rate, by either analysis, is less than 1.0 L_a. Therefore, the Tech Spec

4.6.1.2.b requirement for the NRC to review and approve our schedule for subsequent Type A tests is not applicable.

ACTION: Please submit to the NRC and distribute as required the enclosed subject final report.

In addition, please consider issuing a Tech Spec Position Statement on "as-found" Type A test acceptance in accordance with the position outlined above. Such a position statement may not be needed if the Technical Specification Improvement Program will incorporate this position and if the applicable improved Tech Spec will be issued before the next scheduled ILRT.

If you have questions or comments, please contact Jim Malone, ext. 6781.

J. P. Dimmette, Jr.
Plant Manager, Engineering

AJM/CMR/RVM/JPD:jm

Enclosures: 1. BCP letter
2. Final report in binder
3. Final report copy

cc: W. B. Brice w/1 & 3
L. F. Daughtery w/1 & 3
D. L. Pace w/o
Central File w/1 & 3 (166)
File (P&SE) w/1 & 3
File (ISI) w/1 & 3

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BCP TECHNICAL SERVICES, INC.

March 3, 1994

Mr. Jim Malone
Senior Engineer, M&E/P&SE
Entergy Operations, Inc.
Grand Gulf Nuclear Generation Station
P.O. Box 756
Port Gibson, MS 39150

SUBJECT: ILRT Program Certificate of Conformance

Dear Jim:

This letter serves to certify that the BCP ILRT Program accurately calculated the GGNS leakage rate as required by the station Technical Specification, 10CFR50 Appendix J, ANSI/ASME 56.8 - 1987, BN-TOP-1, and all other applicable standards.

The programs accuracy was validated by the BCP Technical Services Quality Assurance Program (QAP-6.4) and procedures (QIP-2), which was approved by Entergy Operations' Corporate Quality Assurance Department. The data package package entitled "Grand Gulf Nuclear Generating Station 1993 Computer Program Validation" that was provided at the time of the ILRT, provides the necesary backup data.

Issued:

Daniel L. Cox
Project Engineer

Approved:

Ronald L. Rowley
Acting Quality Assurance Manager