SNUPPS
Standardized Nuclear Unit
Power Plant System

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Executive Director

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SUBJ: Containment Leakage Testing

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Docket Nos.: STN 50-482, STN 50-483, and STN 50-486

Dear Mr. Denton:

In discussions with Dr. Gordon Edison, NRC Project Manager for the SNUPPS applications, it was determined that the Containment Systems Branch required additional information in order to complete their review of the SNUPPS FSAR. The enclosure to this letter provides the requested information and will be included in the next revision to the SNUPPS FSAR.

Very truly yours,

N A Petrick

Nicholas A. Petrick

RLS/dck/3a28

Enclosures: FSAR pp 6.2.6-2, -2a, -3, -4, and -4a

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position by the normal method with no accompanying adjustment. Normal and accident positions for each isolation valve are shown on Figure 6.2.4-1.

Systems which are isolated following a LOCA must be properly isolated, drained, or vented to reflect their worst potential status to assure that the Type A test results accurately reflect the most restrictive LOCA conditions.

Portions of the fluid systems that are part of the reactor coolant pressure boundary and are open indirectly to the containment atmosphere due to the accident conditions and are, therefore, an extension of the boundary of the containment are opened or vented to the containment atmosphere prior to and during the test. Figure 6.2.4-1 contains the applicable GDC or other defined criteria for the isolation valve arrangements provided.

Portions of the closed systems inside the containment that penetrate the containment and might rupture as a result of a LOCA are vented to the containment atmosphere. All vented systems are drained of water or other fluids to the extent necessary to assure the exposure of the system containment isolation valves to the containment air test pressure and to assure that they will be subjected to the post-accident differential pressure. Systems that are required to maintain the plant in a safe condition during the test, such as the essential service water lines to the containment air coolers, are operable in their normal mode and need not be vented. However, the containment isolation valves are tested in accordance with Type C test requirements.

Systems that are normally filled with water and operating under post-accident conditions, such as the ECCS lines and containment spray system lines, are not vented. The containment isolation valves in these systems will be closed if the associated subsystem is not operating. Normally a water seal will be present inside the inner isolation valve during the long-term period. Should operational leakage exist outside the containment and the isolation valves leak, the containment sump water level (Elevation 2003'-10") will ensure that the water in the piping system will provide a water seal on the outside containment isolation valves which are located at Elevations 2002'-0" and ~1993'. These water seals will ensure that containment air will not leak into the auxiliary building. Also, test connections are provided to allow leakage testing. These penetrations are identified in Section 6.2.6.3 and Figure 6.2.4-1.

The steam generator tubes and shell and the associated piping systems passing through the containment liner are considered to be an extension of the containment. Therefore, the secondary side of the steam generator and connecting systems are not vented to the containment atmosphere. After the containment stabilization period of the Type A test, the secondary side of the steam generators will be vented outside of the containment to ensure the most conservative test configuration. The systems

associated with the secondary side of the steam generator are identified in Figure 6.2.4-1.

Pressurized gas and water systems are vented downstream of the outside isolation valve for the system and vented outside of the containment. This is done to preclude inleakage into the containment and to expose the outside isolation valve to a conservatively low back pressure to obtain leakage characteristics.

The reactor coolant drain tank, pressurizer relief tank, and accumulator tanks are vented to the containment atmosphere. This

is done to protect the tanks from the external pressure of the test and to preclude leakage to or from the tanks which would detract from the accuracy of the test results.

During preoperational testing, a structural integrity test (SIT) is performed in conjunction with the first ILRT. The SIT is a pressure test conducted to verify that the containment structural response due to the induced load is consistent with the predicted behavior. Section 3.8.1.7 describes the SIT deflection measurements and concrete crack inspections.

Following the preoperational SIT, an ILRT is performed.

6.2.6.1.2 ILRT Test Method

The ILRT will be conducted in accordance with ANS N45.4. The test procedure used during the Type A tests is described in Chapter 14.0. Figure 6.2.6-1 shows the test arrangement for a Type A test. For penetrations which are exempt from Type B or C tests, as noted in Figure 6.2.4-1, the leakage testing requirement of Appendix J is accomplished by the Type A test.

The absolute test method is used to measure containment leakage. Containment dry bulb temperature, pressure, and dew point temperature are periodically monitored during the test. These data are analyzed as they are taken so that the leakage rate and its statistical significance is known as the test progresses. Once the leak rate has been found with sufficient accuracy, a known additional leak is imposed and the measurements are continued, giving additional verification of the leakage rate. Further details, including the accuracy analysis and test duration criteria, are in BN-TOP-1 or in Section 6.2.6 of each Site Addendum.

The following aspects of Type A testing follow 10 CFR 50, Appendix J guidelines without exception:

a. Pretest requirements including a general inspection

b. Conduct of tests

c. Acceptance criterion

d. Periodic retest schedule

e. Inspection and reporting of test

Should an inservice ILRT fail, repairs will be made and a successful ILRT conducted prior to leaving cold shutdown conditions, subject to one exception. The integrated leakage rate retest after repair will not be required provided that 1) the prerepair ILRT was completed and met the acceptance criteria with acceptable accuracy with the leaking penetration(s) isolated, 2) before and after repair local leak rate data are available on the

repaired or adjusted components taken at the test pressure equal to the calculated peak containment pressure following a LOCA, Pa and, 3) the adjusted integrated leakage rate (and its statistical uncertainty) meets the acceptance criteria. The adjusted leakage rate is determined by adding the postrepair Type C leakage rates for the penetration to the upper 95 percent confidence level of the measured containment leakage rate.

The postrepair leakage rate assigned to a penetration is the maximum amount which could leak through both penetration barriers during a Type A test. The penetration leakage rates are determined as follows:

a. For barriers tested in series - The penetration leakage rate is the measured leakage rate of the barrier with the lowest leakage rate.

b. For penetration barriers tested simultaneously - for penetrations which are tested by pressurizing between the barriers, the penetration leakage rate is 1/2 of the measured leakage rate.

c. For penetrations which have one or both barriers consisting of parallel valves - For parallel valves tested individually, the barrier leakage rate is the sum of the leakage rates. For parallel valves tested together, the barrier leakage rate is the measured leakage. The penetration leakage rate is that of the barrier with the lowest leakage rate.

6.2.6.2 Containment Penetration Leakage Rate Tests (Type B Tests)

Each of the following containment penetrations will be tested with a Type B test.

a. Personnel access hatches (refer to Section 3.8.2)

b. Equipment hatch (refer to Section 3.8.2)

c. Fuel transfer tube (refer to Section 3.8.2)

d. Electrical penetrations (refer to Section 8.3)

These penetrations are provided with double seal closures and connections to allow for pressurization between the seals. Each penetration is designed to withstand the calculated peak containment pressure while maintaining its seal. Equipment and personnel hatches have provisions for test clamps to ensure seating of the internal seal during testing.

The test pressure for Type B tests is the calculated peak pressure for the containment, Pa. The combined leakage rate for all Type B and C tests must be less than 0.6 L_a (maximum allowable leakage rate). The individual leakage rates and testing performed on the Type B penetration are described in Chapter 16.0.

The test equipment utilized to perform the Type B tests is the same equipment used for Type C tests. The test equipment is described in Section 6.2.6.3. The test procedure will be the same as the one used for Type C tests.

Type B tests are performed in accordance with Appendix J to 10 CFR 50, with the following addition and exception:

a. An additional test method may be used. This method measures the air flow rate to maintain the test volume at a constant pressure.

b. The equipment and personnel hatches will be tested at 6-month intervals. However, when containment integrity is required, the door seals for the air locks which have been opened are tested after each opening, except when the air lock is being used for multiple entries, then at least once every 72 hours. In any event, the air locks will be tested prior to exceeding a cold shutdown condition.