



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

September 22, 1988

Docket Nos. 50-327
and 50-328

Mr. S. A. White
Senior Vice President, Nuclear Power
Tennessee Valley Authority
6N 38A Lookout Place
1101 Market Street
Chattanooga, Tennessee 37402-2801

Dear Mr. White:

SUBJECT: DEFINITION OF OPERABLE AND EXEMPTION FROM APPENDIX J TYPE C
TESTING FOR THE CONTAINMENT AND RESIDUAL HEAT REMOVAL SPRAY
SYSTEM CHECK VALVES (TAC R00394, R00395 AND R00425) - SEQUOYAH
UNITS 1 AND 2

This letter provides the basis for the NRC staff's acceptance of your justification for continued operation of Sequoyah Unit 2 from July 8, 1988 until the staff took action on your request dated July 11, 1988 for an exemption. This request was for an exemption from the Appendix J Type C testing of the four spray check valves in the Containment Spray System (CSS) and the Residual Heat Removal Spray System (RHRSS) for Sequoyah Unit 2. This request was extended to Sequoyah Unit 1 in your letter dated August 8, 1988. Enclosed is the exemption from Appendix J Type C testing for the CSS and RHRSS check valves for Sequoyah Units 1 and 2.

On July 8, 1988, it was determined during discussions with your staff that these check valves are containment isolation valves but are not Type C tested in accordance with Appendix J. Questions on the CSS valves had arisen during the staff's Safety System Quality Evaluation (SSQE) Inspection on the CSS from June 20 to July 1, 1988 but were not resolved until the exit interview for the SSQE Inspection on July 8, 1988. The NRC staff was informed by your staff on July 8, 1988 that the two check valves in the RHRSS were in the same situation as the two check valves in the CSS.

These check valves are located in the dome of the containment above the four spray headers for the CSS and RHRSS. There is one check valve for each spray header. The CSS is used to spray water into containment within seconds of high pressure in the containment. The purpose of the spray is to reduce the pressure and radioactive iodine concentrations in the containment during a loss-of-coolant accident (LOCA). The RHRSS is used during the LOCA if either train of the CSS is inoperable and if either train of RHR is not needed for its primary purpose of cooling the core.

General Design Criteria (GDC) 56 requires that containment penetrations for systems that connect directly to the containment atmosphere have containment isolation capability. The containment isolation design of the CSS and the

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RHRSS have been evaluated against GDC 56 by the staff. The isolation design for each train of the CSS and RHRSS is a check valve inside containment and a remote manual valve outside containment with a seal water system. This seal water system is a water leg maintained during normal operation in each riser outside containment between the remote manual valve and the check valve.

The evaluation of the CSS and RHRSS against GDC 56 is documented in Section 3.6 of the staff's Safety Evaluation Report (SER), NUREG-1232, Volume 2. This NUREG was issued with the staff's letter dated May 18, 1988. The staff concluded in the SER that the containment isolation valve design for the CSS and RHRSS was acceptable.

Appendix J of 10 CFR Part 50 defines the testing required for containment isolation valves for the valves to be considered operable as defined in the Sequoyah Technical Specifications. This testing per Appendix J is the Type C testing or is the verification that the installed isolation valve seal-water inventory is sufficient to assure the sealing function for 30 days. The remote manual valves are tested in accordance with Appendix J but the check valves are not. The CSS and RHRSS were not designed to permit Type C testing of these check valves. One of the four check valves is disassembled each refueling outage and inspected.

You pointed out in the exit interview for the SSQE Inspection that the staff in its SER concluded that the testing of the containment isolation valves for the CSS and RHRSS was acceptable. A review of the SER showed that the specific testing of the spray check valves was not discussed in the SER; therefore, there is a question as to what the staff accepted. Also, an SER in and of itself is not the mechanism by which the staff grants an exemption to the regulations. This is also true for the inspection report to which you referred during the exit interview.

After discussions with your staff onsite, it was pointed out by TVA that the staff had granted an exemption to Type C testing of containment isolation check valves in the Upper Head Injection System (UHIS), a system similar in design and construction in this respect to the CSS and RHRSS. Within the UHIS, there are valves which were not designed to be Type C tested. The staff concluded, in its letter dated January 15, 1988 granting the exemption, that (1) the combination of a water seal resulting from the accumulator head in the UHIS and the accumulator gas pressure, (2) a safety grade closed system into which leakage, if any, would flow, and (3) inspection and testing, to verify the system integrity, provide an adequate basis to assure that the containment isolation valves will not be a source of containment leakage in the event of an accident even though these UHIS valves are not tested in accordance with Appendix J.

We have accepted your justification for continued operation (JCO) of Sequoyah Unit 2, that the CSS and RHRSS do not need to be Type C tested to be considered operable. This acceptance is based on the NRC staff agreement on July 8, 1988 with TVA's statement that the CSS and RHRSS meet the same conditions for an

Mr. S. A. White

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exemption to Type C testing as does the UHIS for which an exemption has been granted. You documented this JCO in your letter dated July 11, 1988 in which you requested an exemption to Type C testing of these check valves. After reviewing your letter, the staff concluded that this letter documents an acceptable JCO for Unit 2 until the staff completed its evaluation of your request. However, the staff has issued a Notice of Violation on September 16, 1988 regarding this issue prior to July 8, 1988. As stated above, the Commission has issued the enclosed exemption from Appendix J Type C testing for the CSS and RHRSS check valves.

Sincerely,

Original signed by
James G. Partlow

James G. Partlow, Director
Office of Special Projects

Enclosure:
Exemption

cc w/enclosure: See next page

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Mr. S. A. White

-4- Sequoyah Nuclear Plant

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)	
TENNESSEE VALLEY AUTHORITY)	Docket No. 50-327
(Sequoyah Nuclear Plant, Units 1 and 2)))	Docket No. 50-328

EXEMPTION

I.

The Tennessee Valley Authority (the licensee) is the holder of Facility Operating License Nos. DPR-77 and DPR-79 which authorize operation of the Sequoyah Nuclear Plant, Units 1 and 2, respectively. The licenses provide that, among other things, the facility is subject to all rules, regulations, and orders of the Commission now or hereafter in effect.

The Sequoyah facility consists of two pressurized water reactors located at the licensee's site in Hamilton County, Tennessee.

II.

One of the conditions of all operating licenses for water-cooled power reactors, as specified in 10 CFR 50.54(o), is that primary reactor containments shall meet the containment leakage test requirements set forth in 10 CFR Part 50, Appendix J. These test requirements provide for periodic verification by tests of the leak-tight integrity of the primary reactor containment, and systems and components which penetrate containment of water-cooled power reactors, and establish the acceptance criteria for such tests. Specifically, Type C tests are intended to measure containment isolation valve leakage rates.

Containment isolation for the Sequoyah Containment Spray System (CSS) and Residual Heat Removal Spray System (RHRSS) spray lines penetrating containment,

consists of a check valve (CV) inside containment and a normally closed motor operated valve (MOV) and sealed water system outside containment for each spray line. The sealed water system is a water leg maintained in each riser between each MOV and the spray CV. The containment isolation design for the CSS and RHRSS are discussed in Section 3.6.1 of the staff's Safety Evaluation Report (SER) on Sequoyah, NUREG-1232, Volume 2, dated May 1988. This NUREG was issued by the staff in its letter dated May 18, 1988.

Both the CSS and RHRSS have two independent spray lines. After a pipe break inside the containment, the CSS is automatically actuated when the containment pressure exceeds 2.81 pounds per square inch gauge (psig). The normally closed motor-operated valves automatically open and spray flow is provided by the CSS pumps. The RHRSS is a manually actuated system which is used if containment pressure exceeds 9.5 psig with more than an hour elapsed since the start of the accident. The RHRSS supplements the CSS for spraying containment.

The current valve types and arrangements of the CSS and RHRSS meet the requirements of 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 56. Individual leak rate testing requirements for the CSS and RHRSS containment isolation valves, as stated above, are provided by 10 CFR Part 50, Appendix J. The typical Type C test for the CSS inboard containment isolation CVs (valves 72-547 and 72-548) and the RHRSS inboard containment isolation CVs (valves 72-555 and 72-556) cannot be performed according to the requirements set forth in 10 CFR Part 50, Appendix J. The Sequoyah Nuclear Plant, Units 1 and 2, designs do not provide a block valve downstream of each of the subject CVs before the spray rings. Therefore, the only method available to leak rate test these CVs is to pressurize the entire containment. Pressurizing the entire

containment requires a specific configuration for the entire plant, and preparatory time to achieve that configuration requires an intensive effort over a 14 to 21 day time period. Furthermore, to satisfy the test frequency requirements of Appendix J, containment pressurization for leak testing the subject CVs would have to be performed no less frequently than once every 24 months and would, therefore, be impractical. Consequently, by submittal dated July 11, 1988, the licensee requested an exemption from the Type C leak testing requirements of 10 CFR Part 50, Appendix J for the subject CVs for Sequoyah Unit 2 only.

By submittal dated August 8, 1988, the licensee withdrew their July 11, 1988 exemption request and submitted the same exemption request for both Sequoyah Units 1 and 2 with revised justification. The licensee withdrew its proposed testing of the Unit 2 CVs during the regularly scheduled Type A integrated containment leak rate test and requested an exemption from any containment leak rate testing for the Units 1 and 2 CVs. The licensee provided an explanation of the impracticalities of leak rate testing these check valves including testing them during the Type A containment leak rate test. At the time the Sequoyah operating licenses were issued, containment isolation for the CSS and RHRSS lines penetrating the primary containments were provided by a CV inside the containment and a closed system outside the containment for each line. The MOV and sealed water system that is located outside the containment (one in each line) was not originally considered a containment isolation valve. As discussed in Section 3.6 of NUREG-1232, Volume 2, containment isolation for the CSS and RHRSS is provided by a CV inside containment and the normally closed MOV and sealed water system located outside the containment.

The licensee addressed the possible single failures in the CSS and RHRSS and concluded that the sealed system meets the criteria of Appendix J test pressure (Paragraph III.C.2) and acceptance criteria (Paragraph III.C.3) and that operability of the CVs is ensured for all conditions without leak rate testing the CVs. The licensee also addressed the impracticalities of leak rate testing the CVs. These impracticalities included the cost (including engineering design, planning construction, plant down time) to add block valves to the CV piping and the impact on the plant to add these CVs to the Type A containment leak rate test. The latter would require draining and then refilling the sealed water system and affecting the time to conduct the Type A test.

In order to ensure that no containment leakage could occur through these penetrations, a water seal is maintained between the outboard MOV and the CV in each line. The MOVs in both the CSS and RHRSS are leak rate tested every 18 months in accordance with paragraphs III.C.2 and III.C.3 of Appendix J. This is required by the Units 1 and 2 Technical Specifications for the CSS. The licensee, by its application dated August 10, 1988, has proposed these same requirements to be incorporated into the Units 1 and 2 Technical Specifications for the RHRSS. The leak test ensures that an adequate water inventory can be maintained for 30 days. To meet the requirements for a water seal in Appendix J, the seal pressure must be maintained at 1.1 Pa. This is 13.2 psig at Sequoyah, which corresponds to about 30 feet of water. The MOVs are located at elevation 714 feet. The water seal is in a vertical section of piping and is normally maintained at an elevation of approximately 830 feet. This provides a head of approximately 116 feet of water in each spray line. This portion of these systems, as stated above, is a closed system in that it does

not communicate directly with the environment. Thus, any leakage past the CVs would be retained in the piping system of the CSS or RHRSS. Also, in the post-accident condition, these systems are water-filled and contain additional water seals as a result of the piping layout. The licensee has stated that assuming a worst case containment atmosphere with multiple failures where all pumps are not running and all valves fail open (including the subject CVs), the water leg in the CSS and RHRSS piping will be equal to the post-loss-of-coolant-accident (post-LOCA) water level inside the containment, which is above elevation 693 feet. This provides approximately 40 feet of head to prevent leakage of containment atmosphere. Therefore, the staff concludes that testing of these valves provides no increase in safety because any leakage is precluded from reaching the environment by the water seal and in conjunction with the closed systems and MOVs outside containment, the design provides an acceptable alternative in achieving the underlying purpose of the rule and the exemption is warranted.

III.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12, the exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. The Commission has determined that special circumstances as provided in 10 CFR 50.12(a)(2)(ii) are present, justifying the exemption from Appendix J, Type C testing for the CSS and RHRSS -- namely, that application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule, which is to ensure the valves and other penetrations of containment would not be a source of leakage of containment atmosphere into

the environment in the event of an accident, because, in addition to each MOV, there exists a water seal and a closed safety grade system outside containment for each spray line, thereby providing redundant isolation.

The Commission hereby grants the exemption from the requirements of 10 CFR Part 50, Appendix J for Type C testing to the licensee for operation of the Sequoyah Nuclear Plant, Units 1 and 2; in that the CSS and RHRSS can be acceptably isolated using the present configuration, as described in Section II above, in the event of a Design Basis Accident.

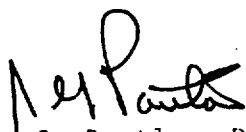
Pursuant to 10 CFR 51.32, the Commission has determined that the issuance of this exemption will have no significant impact on the environment (53 FR 36926, September 22, 1988).

For further details with respect to this action, see the request for exemption dated July 11, 1988, superseded by letter dated August 8, 1988, which is available for public inspection at the Commission's Public Document Room, Gelman Building, 2120 L Street, N.W., Washington, D.C., and at the Chattanooga-Hamilton County Library, 1001 Broad Street, Chattanooga, Tennessee 37402.

This exemption is effective upon issuance.

Dated at Rockville, Maryland, this 22nd day of September, 1988.

FOR THE NUCLEAR REGULATORY COMMISSION


James G. Partlow, Director
Office of Special Projects