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May 17, 1984

Director of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Attn: Mr. Steven A. Varga, Chief
Operating Reactors Branch No. 1
Division of Licensing
Washington, DC 20555

Reference: Beaver Valley Power Station, Unit No. 1
Docket No. 50-334, License No. DPR-66
IST Pumps and Valves

Gentlemen:

On February 14 through 17, 1984, Mr. Donald Caphton of your Region I office conducted an inspection of the Beaver Valley Power Station to review our request for relief from certain requirements in ASME Code Section XI, Inservice Testing of Pumps and Valves. As a result of this review, a Request for Additional Information, dated March 8, 1984, was addressed to the Beaver Valley Power Station and responses are set forth in Attachment "A". Attachment "B" represents our requests for relief from ASME XI with appropriate justifications.

Very truly yours,

J. J. Carey
Vice President, Nuclear

Attachment

cc: Mr. W. M. Troskoski, Resident Inspector
U. S. Nuclear Regulatory Commission
Beaver Valley Power Station
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ATTACHMENT A

ITEM 1 Inside and Outside Recirculation Spray Pumps

Inside Pumps: RS-P-1A and RS-P-1B
Outside Pumps: RS-P-2A and RS-P-2B

Provide a description of your modification proposals and the bases to show how these modifications will enable wet testing during refueling outages in accordance with requirements of ASME Section XI, Subsection IWP, to determine the hydraulic and mechanical characteristics and any degradation of these pumps. NOTE: If any relief is requested from Subsection IWP for specific test requirements or quantities, provide a technical basis for each request and a basis to show that the pumps will be adequately tested to demonstrate their required levels of performance and safety function.

Response

Inside Recirculation Spray Pumps: RS-P-1A and RS-P-1B

Beginning with the 4th refueling outage scheduled to begin in October 1984, the Inside Recirculation Spray Pumps will be run in the recirculation mode every refueling outage. In order to perform this test, the normal flow path will be blocked to prevent containment from being sprayed. In addition, a temporary dike will be installed around the containment sump to prevent unnecessary flooding of containment. Since this test arrangement disables the recirculation spray system, this test can only be performed during refueling outages.

The proposed testing will measure all of the applicable quantities listed in Table IWP-3100-1 except for the observation of proper lubricant level. This observation will not be made since these pumps are self-lubricated by the fluid being pumped.

Due to maintenance activities and modifications performed on the Recirculation Spray system since pre-operational testing, new reference valves for the pumps will be established in accordance with the code during the first inservice test.

We believe that this proposed testing will allow us to evaluate the hydraulic and mechanical characteristics of these pumps and permit detection of pump degradation thereby fulfilling the intent of the code.

Outside recirculation spray pumps are addressed in Attachment B, Item 1.

ITEM 2 (See attachment B)

ITEM 3 Valves to be Tested at Cold Shutdown and Refueling

Provide a corrected list and correlation of old and new valve numbers for the feed water valves that have been renumbered.

Response

The corrected list of valves to be tested at cold shutdown and refueling includes the following valves:

1FW-622	1FW-623	1FW-624
1FW-625	1FW-626	1FW-627

These valves were installed under DCP 130. In March 1980, when the relief request was sent to the NRC, it was thought that their mark numbers would be 1FW-387 through 1FW-392. However, when they were installed, the Stone and Webster assigned numbers were used - 1FW-622 through 1FW-627.

ITEM 4 Valves Requiring Pressure Isolation Verification

The condition of each of the following valves is important to maintain redundant isolation capability and system integrity.

RH-720A	RH-720B	RH-700
RH-701	SI-850B	SI-850D
SI-850F	SI-10*	SI-11*
SI-12*	SI-15	SI-16
SI-17	SI-20	SI-21
SI-22	SI-23*	SI-24*
SI-25*	SI-48	SI-49
SI-50	SI-51	SI-52
SI-53	SI-83	SI-84
SI-100	SI-101	SI-102
CH-170	RC-556A	RC-556B
RC-556C		

* Isolation Valves Identified as Event V valves.

For each of the listed valves, state whether or not full compliance with IWV-3420, Valve Leak Rate Test, is achieved, and, if not describe:

1. your alternate testing method and frequency for each valve, clearly demonstrating an acceptable seat leakage condition of the valve,
2. the leakage rate detection capability of the alternate method,
3. the permissible leakage rate,
4. the procedure to be used to analyze and compare with previous measurements, and,

5. the corrective action, if different from IWV-3420(g), to be taken if the individual valve leakage rates exceed the permissible leakage rates.

Response

The following valves are tested in full compliance with IWV-3420.

[SI-10], [SI-11], [SI-12], [SI-23], [SI-24], [SI-25]
These valves are the Event V valves identified by the station operating supervisor. As such, they are leak tested by OST 1.11.16, "Leakage Testing RCS Pressure Isolation Valves", which is in full compliance with subsection IWV-3420 of the Code.

[SI-48], [SI-49], [SI-50], [SI-51], [SI-52] and [SI-53] are tested in accordance with the code in full compliance with IWV-3420 by OST 1.11.4, "Accumulator Check Valve Test".

[SI-83] and [SI-84] are tested with water to 40.3 psig and since they are check valves, IWV-3420(c)(5) permits them to be tested at lower differential pressure. Therefore, these valves are tested in full compliance with IWV-3420 by BVT 1.3 - 1.47.11, "Safety Injection and Charging System Valve Leak Test".

[CH-170] is leak tested with water to 40.3 psig. This valve is a check valve, however, so full compliance with IWV-3420 is achieved by BVT 1.3 - 1.47.11, "Safety Injection and Charging System Valve Leak Test".

[MOV-RC-556A], [MOV-RC-556B] and [MOV-RC-556C] are in the fill header from the charging system to the reactor coolant system. These valves will be leak tested; however, the test method has not been completed. The test method and acceptance criteria will be complete October 1, 1984.

The following valves were reviewed to determine whether or not they perform a pressure isolation function. Our review indicates that these valves do not perform a pressure isolation function and are not Cateogy A valves. Since these valves are not Category A, the leak requirements of IWA 3420 do not apply.

[MOV-SI-850B], [MOV-SI-850D] and [MOV-SI-850F] are 3/4 inch normally closed valves in a test line. Because of their position in the test line, IWV-1300 excludes them from the testing requirements of the code. Therefore, these valves will not be leakage tested. However, if they leak-by, a change in the accumulator pressure and level would be observed and the operator would receive and alarm to indicate a changing condition.

[SI-15], [SI-16], [SI-17], [SI-20], [SI-21] and [SI-22]
These check valves are not the boundary between high and low pressure systems. According to station drawings RM-41A and RM-41B, the piping classification up and downstream of the valves is the same. It does not change until all the associated piping exits the containment. Furthermore, valve leak testing is performed on the associated redundant containment isolation valves each refueling

outage in accordance with 10CFR50, Appendix J, which is an acceptable alternative for the types of valves in question per IWV-3420.

Therefore, since [SI-15], [SI-16], [SI-17], [SI-20], [SI-21] and [SI-22] do not act as pressure isolation valves and the leak tests performed on the containment isolation valves provide confidence that pressure isolation capability is maintained, present Category C valve classification should be considered valid. As a result, these valves will not be leak tested to meet Category A requirements.

[SI-100], [SI-101] and [SI-102]
These check valves are not the boundary between high and low pressure systems. According to station drawings RM-41A and RM-41B, the piping classification up and downstream of the valves is the same. Also, these valves are the second valves back from the RCS. The first valves in the system, [SI-23], [SI-24] and [SI-25], are leak tested in accordance with the code by OST 1.11.16, "Leakage Testing RCS Pressure Isolation Valves". Also included in the line are valves [SI-94] and [SI-95] which are leak tested every refueling in accordance with 10CFR50, Appendix J.

[SI-100], [SI-101] and [SI-102] are classified as Category C valves only and as such, they will not be leak tested to meet Category A requirements.

[MOV-RH-720A], [MOV-RH-720B], [MOV-RH-700] and [MOV-RH-701]
These valves will not be leak tested since alternate methods for detecting leakage are available to verify valve integrity. Currently continuous leakage pressure monitoring exists with Annunciator A1-125, "RHR Pump Discharge Pressure High" at a setpoint of 550 psig. Under normal plant operating conditions, this annunciator is not in the alarm state. Therefore, any leakage past these valves would be monitored by the receipt of this alarm.

As added assurance to the continuous monitoring provided for by Annunicator A1-125, relief valve [RV-RH-721] with a setpoint of 600 psig would direct the discharge of any leakage to the Pressurizer Relief Tank (PRT). If any leakage occurred, the amount would be indicated by a corresponding level increase in the PRT.

Further justification for these alternate methods can be found in your previous approval of Relief Request 30 through 33 which classified these valves as Category B and the staff guidance information previously provided which exempts passive gate valves from the testing requirements of Section XI. Therefore, for these reasons cited, compliance with IWV-3420, Category A Valve Leak Rate Testing, should not be required for these valves.

ITEM 5 <u>Event V Piping Configuration</u>

Beaver Valley, Unit No. 1 drawing RM-38A, shows a piping interface where high pressure piping is connecting with low pressure piping at 10-inch valves RH-720A and RH-720B. The low pressure piping

(line 6" RH-14-152) also leads outside of containment to the refueling water storage tank. The high pressure piping side of valves RH-720A and RH-720B are each in series with a check valve SI-52 and SI-53, respectively, and a cold leg of the reactor.

The piping configuration described above matches the criteria designated by the NRC as an Event V piping configuration, i.e., the primary coolant system connects to a high pressure check valve, a motor operated valve and to low pressure piping that eventually leads outside of containment. Refer to Event V piping configurations described in Section 2.0 of the TER dated October 24, 1980, an enclosure to the order, S.A. Varga to C. N. Dunn dated April 20, 1981.

Provide any technical basis you may have to justify excluding coverage of the Event V piping configuration from Technical Specification Table 4.4-3, where the high pressure piping interface at valves RH-720A and RH-720B connects with low pressure piping that runs to the refueling water storage tank.

Response

In order to evaluate this configuration, additional reviews describing the Event V piping configuration were performed. Included was the Reactor Safety Study (RSS), (WASH 1400), the original request that licensees evaluate for Event V configurations dated February 23, 1980 and paragraph 2.0 of the Technical Evaluation Report (TER) dated October 24, 1980 which was attached to our Order of April 20, 1981.

The TER provided additional examples of configurations with specific criteria to determine if an Event V arrangement exists. The TER did not provide any further description of the Event V failure mechanics or provide sufficient detail to evaluate downstream piping and its potential for transferring radioactive materials outside of containment. WASH 1400 addresses the failure of check valves that isolate low pressure piping from the reactor coolant system (RCS). This event requires multiple failures to occur in the form of the failure of both in-series check valves. The RSS also assumes the low pressure piping to fail at a point outside containment resulting in a direct path for radioactive release to atmosphere, thus bypassing the radioactivity removal systems. The February 23, 1980 letter to all licensees further describes this event as possibly including a locked open MOV, outside containment, with the high pressure-low pressure interface existing at the downstream side of the MOV. In this configuration, the multiple failure of the check valves leads to a direct path outside containment to low pressure piping and the leakage path cannot be isolated because the MOV is locked open.

We have reviewed the piping configuration discussed above in your item 5 to determine if it meets the Event V configuration. Based on the background information contained in the source documents, WASH 1400 and the February 23, 1980 letter, we have concluded that this is not an Event V piping configuration. While the series arrangement of SI-52 with MOV-RH-720A and SI-53 with MOV-RH-720B

are similar to the configuration given in the TER, they are not the same since each MOV is in the closed position with power removed from its motor operator during power operation. Also, the MOV and the low pressure piping is inside containment and are protected from overpressurization by a relief valve set to lift at 600 psig and the RHR pump seals. This low pressure piping also has a closed manual isolation valve installed in the piping system prior to the piping leaving containment. This overpressure protection results in potential releases from the low pressure piping being contained within containment. The combination of the closed MOV and the pressure relief path remaining inside containment prevents this configuration from meeting the Event V definition.

To provide additional assurances on the integrity of the components, the following is presented for your consideration. Both SI-52 and SI-53 are tested each refueling to determine leak tightness in accordance with the criteria given in ASME Subsection IWV-3420. (See response to Item 4) Any leakage past the MOV's would result in a gradual pressure increase of the low pressure piping which would be detected by the installed pressure switch which annunciates at 550 psig in the control room. Due to the piping arrangement, the SI accumulators maintain approximately 600 psi between the SI check valves and the RHR MOVs. This in effect represents in-situ pressure testing of the MOVs to 600 psig. Finally, the containment isolation valve, RH-14, is tested in accordance with 10CFR50, Appendix J to determine if there is any valve leakage.

Therefore, we do not consider the subject piping arrangement as meeting the Event V configuration and adequate testing and the normal system characteristics represent sufficient means for determining the leak tightness of the subject valves. On this basis, it is not necessary to include these components in Technical Specification Table 4.4-3.

ITEM 6 Additional Event V Piping Configurations

Our review of your submittal on Event V piping configuration has identified that your evaluation and response, as described in a C. Dunn letter to D. Eisenhut dated March 17, 1980, was based upon Event V criteria provided in a D. Eisenhut letter to all LWR licensees dated February 23, 1980. However, the Event V identification criteria was subsequently updated and sent to you by an NRC "Order for Modification of License Concerning Primary Coolant System Pressure Isolation Valves" dated April 20, 1981. Specifically, the updated Event V criteria was provided in paragraph 2.0 of the Technical Evaluation Report (TER), dated October 24, 1980, an attachment to the order.

Describe the valve configurations at Beaver Valley Unit 1 based upon the criteria in paragraph 2.0 of the TER, and indicate whether additional Event V isolation valve configurations exist within the Class I boundary of the high pressure piping connecting primary coolant system piping to low pressure system piping. You may exclude from your response those piping configurations described in

your March 17, 1980 letter and the TER, that are currently incorporated in Technical Specification Table 4.4-3.

Response

The prints of all the systems connected to the RCS were examined to determine if any additional Event V valve configurations exist at BVPS. No other areas of concern were found.

ATTACHMENT B

ITEM 1 Inside and Outside Recirculation Spray Pumps

Inside Pumps: RS-P-1A and RS-P-1B
Outside Pumps: RS-P-2A and RS-P-2B

Provide a description of your modification proposals and the bases to show how these modifications will enable wet testing during refueling outages in accordance with requirements of ASME Section XI, Subsection IWP, to determine the hydraulic and mechanical characteristics and any degradation of these pumps. NOTE: If any relief is requested from Subsection IWP for specific test requirements or quantities, provide a technical basis for each request and a basis to show that the pumps will be adequately tested to demonstrate their required levels of performance and safety function.

Response

Outside Recirculation Spray Pumps: RS-P-2A and RS-P-2B

Code Requirement:

An inservice test shall be conducted on all safety-related pumps, nominally once each month during normal plant operation. Each inservice test shall include the measurement, observation, and recording of all quantities in Table IWP-3100-1, except bearing temperature, which shall be measured during at least one inservice test each year.

Basis for Relief Request:

Relief is requested from the testing requirements of Section XI for the outside recirculation spray pumps.

These pumps are dry tested monthly for a maximum of 60 seconds to verify operability by observing the pumps have started when given a start signal. During this test, it is not possible to obtain the data required by subsection IWP. During refueling outages these pumps are wet tested in the recirculation mode so that speed, inlet pressure, differential pressure, flowrate, vibration amplitude and bearing temperature can be measured. However, due to the size of the recirculation line, the pumps must be shut down to prevent pump overheating and pump damage before stable bearing temperatures can be achieved. The current testing is the only type possible under present plant design.

Additional methods have been evaluated to permit continued operation of these pumps while testing during refueling outages. We have concluded that in order to prevent pump overheating before stable bearing temperatures can be achieved would require increasing the size of the recirculation line. At present, the method of testing these pumps (OST 1.13.7), "Recirculation Pump Auto Start and Flow Test" provides sufficient information for the

determination that the pumps are capable of performing as designed by comparison with the pumps pre-determined characteristics. This assures that no pump degradation has occurred. Since this determination can be made, the safety benefit gained through this modification would not justify the cost to implement this backfit. It is therefore concluded that the present methods of testing these pumps are adequate for determining the hydraulic and mechanical characteristics and any degradation of these pumps.

ITEM 2 Exercising of Check Valves Using Alternate Methods

Check valves:	1SI-48	1SI-52
	1SI-49	1SI-53
	1SI-50	1RW-197
	1SI-51	1RW-198

Explain how your testing meets the Section XI, Subsection IWV 3410, Valve Exercising Test, cold shutdown requirements for each of the above listed valves. If a flow test is the method of test, provide information to show that the full design flow is attained.

Response (1SI-48, 1SI-49, 1SI-50, 1SI-51, 1SI-52 and 1SI-53)

These valves are classified as category AC and are governed by Subsections IWV-3410 and IWV-3520.

Code Requirement IWV-3410 states in part:

"Valves shall be exercised to the position required to fulfill their function unless such operation is not practical during plant operation... Normally closed valves that cannot be operated during normal plant operation shall be specifically identified by the Owner and shall be full-stroke exercised during each cold shutdown.

Code Requirement IWV 3520 b states in part:

"Check valves shall be exercised to the position required to fulfill their function unless such operation is not practical during plant operation . . . Normally closed check valves that cannot be operated during normal plant operation shall be specifically identified by the Owner and shall be full-stroke exercised during each cold shut-down."

Subsection (2) of the above paragraph states:

"Valves normally closed during plant operation, whose function is to open on reversal of pressure differential, shall be tested by proving that the disk moves promptly away from the seat when the closing pressure differential is removed and flow through the valve is initiated, or a mechanical opening force is applied to the disk."

Basis for Relief Request:

Relief is requested from full-stroke exercising of these valves (1SI-48 through 1SI-53) for the following reasons: These check valves are in the discharge path of the SI Accumulators to the cold legs. Their function is to open and allow flow from the accumulator when the closing differential pressure is removed. OST 1.11.15, "Safety-Injection Accumulator Check Valve Test" tests the function of these valves by creating a differential pressure and allowing flow. Successful completion of this test verifies the operability of these valves for performing their safety function.

In the Safety Evaluation Report performed by the NRC's contractor attached to the NRCs June 29, 1982 letter it was concluded that with the present piping configurations, only partial stroke exercising of these check valves is possible. However, we were to perform investigations of other methods for full-stroke exercising of these valves (e.g., manual exercising during refueling outages). Based on our review, we have concluded that the design of these check valves will not permit a manual full-stroke exercise test. Also, we have investigated disassembly of these valves to verify full stroke capability. These valves are installed in a high radiation area and represent considerable man-rem exposure for this type of examination, and is therefore considered unacceptable. Also, in order to disassemble these valves would require draining of the RCS loops. In the past, maintenance activities have necessitated draining the loops to the mid-loop level which has resulted in occasional air binding of the RHR pumps. Our present criteria for maintaining adequate RCS loop levels for meeting NPSH for the RHR pumps will not permit draining of the loops to a level adequate to disassemble these valves for inspection purposes.

In order to provide the ability to full-stroke exercise these valves, either manually or by providing new piping arrangements would require significant plant modifications. The present test methods are considered acceptable for determining operability of these valves. As such, a plant backfit of this type is not considered an acceptable option with respect to the safety benefit improvement versus the cost of the modification.

Response (1RW-197 and 1RW-198)

These valves are classified as category C and are goverend by Subsection IWV-3520 rather than IWV 3410.

Code Requirement IWV 3520 b states in part:

"Check valves shall be exercised to the position required to fulfill their function unless such operation is not practical during plant operation . . . Normally closed check valves that cannot be operated during normal plant operation shall be specifically identified by the Owner and shall be full-stroke exercised during each cold shut-down."

Subsection (2) of the above paragraph states:

"Valves normally closed during plant operation, whose function is to open on reversal of pressure differential, snall be tested by proving that the disk moves promptly away from the seat when the closing pressure differential is removed and flow through the valve is initiated, or a mechanical opening force is applied to the disk."

Basis for Relief Request:

Relief is requested from full-stroke exercising of these valves (1RW-197 and 1RW-198) for the following reasons: These check valves are partial stroke exercised by a flow test monthly per OSTs 1.30.2, 3 and 6, "Reactor Plant River Water Pump Tests", regardless of plant status. The OSTs measure the flow just before it enters the recirculation spray heat exchangers. The only path away from the heat exchangers is through the check valves which are in parallel non-isolable lines, therefore, the flow seen by both valves together is full design flow. With the present system design, the individual flow rate thru each valve cannot be verified. However, the above test does verify that at least one of the check valves open. In order to verify the operation of both valves, we are evaluating a method of obtaining accoustic measurements during refueling outages.

With the above test modification, both valves will be verified to open at least partially. Experience with other valves of similar construction in river water lines has shown that partial stroking of these valves is sufficient to detect degradation. Therefore, relief is requested from full stroke exercising these valves every refueling for the above mentioned reasons.

Additionally, performance of a flow test to determine if each valve disc is stroked sufficiently to demonstrate the ability to pass the design flow rate was considered. Due to the design of the system, it is not possible to isolate flow through one check valve in order to verify full design flow passing through the other valve. In order to accomplish this test, a modification to the existing system would have to be performed. It was concluded that modifications to this system could not be justified. This is based on the successful completion of the above referenced tests to demonstrate the ability of the recirculation spray system to pass design river water flow and our proposed evaluation for obtaining accoustic measurements of flow through each of these valves during refueling outages. This action is adequate to assure the systems capability to pass full design flow and therefore, any modifications will not significantly increase assurance of this system to fulfill its safety function and therefore are not considered viable with respect to the backfit criteria in evaluation of the benefit gained versus the cost for the modification.