UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 46 TO FACILITY OPERATING LICENSE NO. DPR-40

OMAHA PUBLIC POWER DISTRICT

FORT CALHOUN STATION, UNIT NO. 1

DOCKET NO. 50-285

## Introduction

By application transmitted by letter dated August 22, 1977, Omaha Public Power District (the licensee) requested changes to the Technical Specifications appended to Facility Operating License No. DPR-40 for the Fort Calhoun Station, Unit No. 1. The proposed changes would establish surveillance requirements for steam generator tubes and delete inservice inspection and testing requirements which are replaced by the Fort Calhoun Inservice Inspection and Testing Program.

## Steam Generator Inspection Program

On July 18, 1974, we requested that the licensee submit proposed Technical Specification changes that would establish requirements for a program of steam generator tube inspection. To provide guidance in developing an inspection program at that time, the licensee was to refer to Regulatory Guide 1.83, "Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes", dated June 1974 (R.G. 1.83). The licensee submitted proposed Technical Specifications for inservice inspection of steam generator tubes at Fort Calhoun, Unit No. 1, on November 20, 1974. Revision 1 to R.G. 1.83 was issued in July 1975 after receiving comments from the industry. By letter dated October 28, 1976, as revised on March 23, 1977, and August 22, 1977, the licensee proposed Technical Specifications which reflect the provisions of R.G. 1.83, Rev. 1, with exceptions as discussed with the NRC staff.

The Technical Specifications proposed for the Fort Calhoun, Unit No. 1. steam generator tube inspections are, therefore, in general agreement with R.G. 1.83, Rev. 1, dated July 1975, but deviate in those areas where we have determined that the overall inspection program would be enhanced over that covered in R.G. 1.83, Rev. 1.

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The licensee's proposed changes, as modified by discussions with the NRC staff, will implement steam generator tube inservice inspection requirements.

I. Evaluation - Steam Generator Inspection Program

Surveillance Requirements for Steam Generator Tubes

Structures, systems, and components important to safety of a nuclear power plant are designed, fabricated, constructed, and tested so as to provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public. To continuously maintain such assurance, General Design Criterion 32 requires that components which are part of the reactor coolant pressure boundary (RCPB) be designed to permit periodic inspection and testing of important areas and features to assess their structural and leaktight integrity. The steam generator tubing is part of the RCPB and is an important part of a major barrier against fission product release to the environment. It also acts as a barrier against steam release to the containment in the event of a Loss of Coolant Accident (LOCA). For this reason, a program of periodic inservice inspection is being established to assure the continued integrity of the steam generator tubes over the service life of the plant.

Generally, the major elements of the steam generator tube inservice inspection program for Fort Calhoun, Unit No. 1, consist of specified: (a) sample selection, (b) examination methods, (c) inspection intervals, (d) acceptance criteria, and (e) reporting requirements. Each of these major elements of the program is separately evaluated below.

1. Sample Selection

The proposed sampling is generally patterned after R.G. 1.83, Rev. 1, "Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes". However, there are some deviations from R.G. 1.83 that we require to improve the program and/or reduce the potential radiation exposure of personnel who perform the inspections. The licensee's program includes these additional requirements. Deviations from R.G. 1.83 supplementary sampling requirements are evaluated below:

a. Regulatory Position C.5.a, "Supplementary Sampling Requirements" recommends that if the eddy current

inspection results during an inservice inspection indicate any tubes with previously undetected imperfections of 20% or greater depth, additional steam generators, if any, should be inspected. In other words, because of a single tube in one steam generator with previously undetected imperfection of 20% or greater depth but still well below the plugging limit, all steam generators in the plant should be inspected. Although the detection of any defect warrants further inspection to determine the extent of degradation in the steam generators, we believe that this inspection should be expanded initially to determine the extent of any further degradation in the one steam generator under inspection. If the expanded inspection indicates more extensive defect conditions, then expansion to the other steam generator is required. This approach will provide careful stepwise expansion of inspection based on the results of successive steps, while tending to minimize the exposure of inspection personnel resulting from initial positioning of inspection equipment in a steam generator. This inspection approach, as specified in the licensee's proposed Technical Specifications, is appropriate for this facility in which system characteristics are such that both steam generators are expected to perform in a similar manner.

b. Revision 1 of R.G. 1.83 requires additional inspections if the initial inspection results indicate that more than 10% of the inspected tubes have detectable wall penetration of greater than 20% or that one or more tubes inspected have an indication in excess of the plugging limit. The additional inspections require a complete tube inspection of an additional 3% and, if required, a third inspection of 6% of the tubes. The requirements set forth in the Fort Calhoun Technical Specifications are acceptable because they require a second inspection doubling the number of tubes inspected in the first sample if 5% of the tubes show degradation of 20% wall thickness or more. Again, if more than 5% in the second sample of the tubes show a detectable penetration greater than 20% or 1% are defective tubes, a third sample is required again doubling the number of tubes inspected in the second sample. In the first sample, sampling is to

concentrate on areas of the tube array where prior inspections or experience have indicated potential problems, and full length traverse of each inspected tube is required. For a second or third sample, if required, the inspection may concentrate on areas of the tube array and portions of the tube in which the first sample or the second sample indicated potential problems.

Based on the considerations discussed above, we have concluded that the sample selection scheme proposed by the licensee is acceptable.

2. Examination Method

The proposed examination methods include nondestructive examination by eddy current testing. The specified methods are capable of locating and identifying stress corrosion cracks and tube wall thinning from chemical wastage, mechanical damage or other causes. Based on our review of these methods, and experience gained using these methods by the industry, we have concluded that the examination methods are acceptable.

3. Inspection Intervals

The proposed inspection intervals are compatible with those recommended in R.G. 1.83, Rev. 1, and thus, are acceptable.

4. Acceptance Criteria

The principal parameter used to determine whether any one steam generator tube is acceptable for continued service is the measured imperfection depth. A tube plugging limit has been established and defined in the proposed Technical Specifications as the imperfection depth beyond which the tube must be removed from service. The plugging limit, as modified by the NRC staff and concurred in by the licensee, is 40% of the nominal tube wall-thickness.

The plugging limit is based on (1) the minimum tube wall thickness needed to maintain steam generator tube integrity

during the limiting stress loadings associated with a LOCA combined with a Safe Shutdown Earthquake (SSE), and (2) an operational allowance to account for the time interval between inspections. Based on other evaluations made by the NRC staff[1], we have concluded that a minimum tube wall thickness of 50% is adequate to sustain all the forces associated with a LOCA combined with an SSE. To provide an additional margin of safety, an operational allowance of 10% has been added to the 50% tube thickness value. This allowance is considered adequate to ensure that tube integrity will be maintained until the next inservice inspection, taking into account the controlled secondary water chemistry conditions that are normally maintained at Fort Calhoun. Therefore, the acceptable tube wall thickness needed for continued service is 60%. The plugging limit is the difference between 60% and the full tube thickness or 40%. This limit will provide adequate protection against wastage - type corrosion or part-through wall cracks.

Based on our review, the acceptance criteria, as modified by the NRC staff and concurred in by the licensee, are acceptable.

5. Reporting of Inspection Results

Regulatory Position C.7.d of R.G. 1.83, states that a licensee should report to the Commission, for resolution and approval, proposed remedial action if the inspection results exceed the limits specified inthe Guide. It also states that additional sampling and more frequent inspection may be required. The proposed Technical Specifications clearly specify additional inspections the licensee must perform for those inspection results that fall in Technical Specification Categories C-1 and C-2. Immediate reporting of these results would not be required. Immediate reporting would be required only if the inspection results fall into the most severe Category, C-3, as described in Table 3.8 of the Technical Specifications.

We conclude that the above described reporting requirements, as proposed by the licensee and modified by us, are

[1] Supplemental Testimony of James P. Knight before the Atomic Safety and Licensing Appeal Board in the matter of Northern States Power Company, Dockets No. 50-282/306.

reasonable and will facilitate reporting of pertinent information without unnecessarily increasing plant downtime, and thus constitute an acceptable alternative method for meeting NRC reporting requirements.

II. Summary - Steam Generator Inspection Program

In summary, we have concluded that the proposed steam generator tube inservice inspection program will provide added assurance of the continued integrity of the steam generator tubes, and thus is acceptable.

Inservice Inspection and Testing Program

As required by 10 CFR 50.55a, the licensee updated the Inservice Inspection and Testing Program for the Fort Calhoun Station Unit 1 to the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, 1974 Edition and Addenda through the Summer 1975. The program, dated March 1977, as revised in August 1977 and September 1978, has been reviewed for compliance with the Regulation. Evaluations of those requirements which the licensee has determined to be impractical for the facility and for which relief from those requirements is being requested are given below.

I. INSERVICE INSPECTION PROGRAM

A. CLASS 1 COMPONENTS

1. Request relief from performing 100% volumetric examinations of those nozzle-to-reactor vessel welds on which supports are located. (Item B1.4, Examination Category B-D from Table IWB-2500)[1]

Code Requirement

The extent of examination of each nozzle shall cover 100% of the volume to be inspected as shown in Figure IWB-2500D.[1] All nozzles shall be examined during each inspection interval, a ten-year period.

Licensee Basis for Requesting Relief

The nozzle-to-vessel welds cannot be 100% volumetrically examined since the nozzle supports present an interference to currently available equipment. Equipment development is underway to provide inspection of the nozzle weld behind the supports. When equipment is available, consideration will be given to 100% volumetric examination of nozzle-to-vessel welds. The welds will be examined volumetrically to the extent possible and according to the schedule designated in the Examination Plan.

Evaluation

The vessel support design prevents a 100% volumetric examination of the nozzle-to-vessel welds. The licensee has stated that the welds and base metal will be examined in accordance with the Code but only 50% - 70% of the required volume. The NRC staff has determined that the volume accessible for examination from the nozzle-to-vessel external surface in addition to the volume examined from the nozzle-to-vessel internal surface will cover a sufficient amount of the volume required to be examined to provide a high degree by assurance that inservice flaws either do not exist or will be detected in the vessel-to-nozzle weld and base metal.

(1) ASME Section XI Code, 1974 Edition

Other required tests and inspections of the nozzle-to-vessel weld, i.e., hydrostatic and visual, will further increase the degree of assurance that the structural integrity of the pressure boundary is maintained. The NRC staff concludes that the limited external volumetric examination will not significantly alter the capability of detecting unacceptable inservice flaws in the nozzle-to-vessel weld and base metal and therefore relief from the 100% volumetric examination requirement may be granted.

2. Request relief from performing 100% volumetric examination for the nozzle-to-shell welds and the inside radius section on the surge line connection to the pressurizer. (Item B2.2, Examination Category B-D from Table IWB-2600)

Code Requirement

The extent of examination of each nozzle shall cover 100% of the volume to be inspected as shown in Figure IWB-2500D. All nozzles shall be examined during each inspection interval.

Licensee Basis for Requesting Relief

The nozzle-to-shell weld and inside radiused section of the surge line connection cannot be completely inspected volumetrically due to interference from the heater penetrations.

Evaluation

The design of the surge line connection to the pressurizer presents interference with surrounding heater penetrations. This interference makes it impractical to volumetrically examine 100% of the nozzle weld and base metal and the inside radiused section. The licensee has stated that the examination will be performed over 97% of the required volume and we conclude that this examination will provide an acceptable level of assurance of the nozzle-to-shell weld and base metal integrity. Relief from the 100% examination requirement may be granted.

3. Request relief from the examination requirements of ASME Section XI for the following items designated to be inspected in Section XI.

| Code Items | Examination Category | Component |
|---|---|---|
| B2.5, B2.6, B2.7 | B-G-1 | Pressurizer Bolting |
| B3.4, B3.5, B3.6 | B-G-1 | Steam Generator Bolting |
| B4.2, B4.3, B4.4 | B-G-1 | Class 1 Piping Bolting |
| B6.1, B6.2, B6.3 | B-G-1 | Class 1 Valve Bolting |
| B4.1 | B-F | Safe end in branch piping |

Code Requirement

The examinations (volumetric, volumetric and surface, or visual, based on item No.) performed during each inspection interval shall cover 100% of the bolts, studs, nuts, bushings, and threads in base metal and flange ligaments between threaded stud holes for pressure-retaining bolting two-inches and larger in diameter. (B-G-1) For pressure-retaining dissimilar metal welds, the examinations (volumetric and surface) performed during each inspection interval shall cover the circumference of 100% of the welds. (B-F)

Licensee Basis for Requesting Relief

There is no bolting greater than 2 inches diameter in the facility for the pressurizer, steam generator, class 1 piping, and class 1 valves. Also, there are no safe ends in branch piping.

Evaluation

The licensee is in compliance with Code requirements and therefore relief is not necessary.

4. Request relief from the volumetric examination of centrifugally cast stainless steel piping and the cast stainless elbows of the primary pressure boundary (Item 4.5, Examination Category B-J from Table IWB-2600).

Code Requirement

The examinations preformed during each inspection interval shall cover all of the area of 25% of the circumferential joints including the adjoining 1 ft. sections of longitudinal joints and 25% of the pipe branch connection joints.

Licensee Basis for Requesting Relief

The primary piping is fabricated from centrifugally cast stainless steel pipe and cast stainless steel elbows. Experience has shown that these materials and welds are not always amenable to ultrasonic examination. Techniques have been developed to substantially overcome this problem. Volumetric examination will be performed to the extent practical and according to the schedule designated in the Examination Plan. Should other specialized ultrasonic examination techniques become practical which are more effective, they will be incorporated in the Examination Plan. The ultrasonic examinations presently used will be supplemented by surface examinations where possible and where they will provide additional assurance that the integrity of the primary pressure boundary is being maintained.

Evaluation

The material characteristics of centrifugally and conventionally cast stainless steel severely attenuates ultrasound. The licensee has stated that ultrasonic techniques have been developed to substantially overcome the problems associated with ultrasonics and cast materials. We have determined that the technique to be used is adequate for examination of the inner portion (root) of the weld but will not provide adequate results for full volumetric examination of the weld and base metal. We have therefore concluded and the licensee has agreed that the ultrasonic technique used to examine the welds will be supplemented by a surface examination, where possible, to ensure that any discontinuities which may be present at the outer surfaces are detected and evaluated. The licensee has also agreed to incorporate in his Examination Program other specialized and practical volumetric examination techniques which become available and are more effective than those presently in use. The ultrasonic examination technique used, supplemented by surface examination as well as the required pressure testing of the primary piping, will subject the piping and elbows to examination and test methods which should reveal any Code unacceptable flaws and therefore provide an adequate level of assurance of the structural integrity of the primary pressure boundary. Therefore relief from the full volumetric examination requirement may be granted.

5. Request relief from full volumetric examination of the integrally welded supports of the Class 1 pumps. (Item B5.4, Examination Category B-K-1 from Table IWB-2500).

Code Requirement

The examinations performed during each inspection interval shall cover 25% of the integrally welded supports.

Licensee Basis for Requesting Relief

The feasibility of volumetric examination has not yet been determined. The examination will be performed if feasible and according to the schedule designated in the Examination Plan. If extensive grinding is not required to prepare the surface of the pump casing adjacent to the weld for surface examination, surface examination will be performed to supplement the volumetric examination.

Evaluation

Because of the pumps and support design, the volumetric examination requirement is not practical to meet. The licensee has stated that volumetric examination will be performed from the support side

but not from the pump side and that surface examination will be performed to supplement the volumetric examination if extensive grinding is not required to prepare the surface of the pump. Because of the weld geometry and loading conditions, the most likely inservice defect would appear on the surface of the weld or base metal and would be revealed by the examination proposed by the licensee. The NRC staff concludes that the proposed examination will provide assurance of the supports' structural integrity and therefore relief from volumetric examination as requested by the licensee may be granted.

6. Request relief from volumetric examination of the reactor coolant pump casing welds and, unless the pump is disassembled for maintenance, visual examination of the internal surface of the pump casing. (Items B5.6 and B5.7, Examination Categories BL-1 and BL-2).

Code Requirement

The volumetric examinations performed during each inspection interval shall include 100% of the pressure-retaining welds in at least one pump in each group of pumps performing similar functions in a system. The internal pressure boundary surfaces of one pump in each group of pumps performing similar functions in the system shall be examined visually during each inspection interval. The examination may be performed at or near the end of the inspection interval.

Licensee Basis for Requesting Relief

There is currently no known technique available to volumetrically inspect the pump casing welds. Research is underway to overcome this problem. When proven techniques are available, consideration will be given to the inclusion of these welds in the inspection program. An external surface examination of pump surfaces and welds is not considered possible due to the roughness of the castings. An internal surface examination is impractical due to the high exposures that would be involved. (The exam would require a minimum of 16 man-hours; the radiation levels can be expected to be about 5R/hr area and 7R/hr contact.) The licensee's position is that a visual examination, performed only if the pump is disassembled for maintenance permitting such inspection, is judged to be adequate based upon design, fabrication and accessibility considerations.

Evaluation

Because of the pumps' design, material of construction, and the inaccessibility to the areas of concern, it is impractical at this time to volumetrically examine the reactor coolant pump casing welds and obtain meaningful results. The licensee has stated that research is underway to overcome the problems associated with meeting the Code requirement and that consideration to include

proven techniques into the inspection program will be given when these techniques are available. The licensee is presently committed to perform system pressure and leakage tests and to monitor system leakage of the reactor coolant system prior to and during plant operation. We have determined that these tests provide adequate assurance of the pump casing structural integrity because any defects of major significance should result in detectable leakage during pressure tests which are performed prior to reactor operation after each refueling outage. Therefore, relief from the requirements may be granted.

7. Request relief from the volumetric and/or surface examination of inaccessible piping welds which are identified as follows (Category (B-J):

| Figure No.* | Line No. | Weld No. |
|---|---|---|
| A-22 | 12in.-SI-12 | 16 |
| A-25 | 12in.-SI-24 | 16 |
| A-27 | 6in.-SI-14 | 10 |
| A-27 | 6in.-SI-14 | 11 |
| A-32 | 3in.-HPH-22 | 1 |
| A-32 | 3in.-HPH-22 | 3 |
| A-38 | 2in.-HPH.2-12 | 5 |
| A-42 | 12in.-SDC-20 | 7 |

Code Requirement

The examination performed during each inspection interval shall cover all of the area of 25% of the circumferential joints including the adjoining 1 ft. sections of longitudinal joints and 25% of the pipe branch connection joints.

Licensee Basis for Requesting Relief

The welds listed above are inaccessible because they are located in walls or floors.

Evaluation

Access to volumetrically and/or surface examine these welds is not available because of the location of the welds in walls and floors. The licensee has stated that the areas of the welds identified above as being inaccessible will be visually inspected during pressure and hydrostatic testing for signs of leakage. Inspections required by Section XI of other accessible welds in the system will provide assurance that degradation which would compromise the pressure boundary integrity has not occurred. The licensee will continue to meet the percentage examination requirement for the affected systems during this inspection interval. We therefore conclude that the inspections which will be performed in lieu of those required will provide adequate assurance of the system's integrity and relief from the Code requirements may be granted.

* From the 10-Year Inservice Examination Plan, Fort Calhoun Station, Unit No. 1, dated October 1978.

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B. CLASS 2 COMPONENTS

1. Request relief from volumetric examination of the inaccessible welds which are identified below (Category C-F):

| Figure No.* | Line No. | Weld No. |
|---|---|---|
| B 12 | 12in.-LPSI-12 | 4 |
| B 13 | 12in.-LPSI-14 | 7 |
| B 13 | 12in.-LPSI-14 | 10 |
| B 13 | 12in.-LPSI-14 | 11 |
| B 14 | 12in.-LPSI-22 | 10 |
| B 15 | 12in.-LPSI-24 | 4 |

Code Requirement

Volumetric examination shall cover 100% of the welds specified in IWC-2411 during a 40-year period.

Licensee Basis for Requesting Relief

The welds listed above are inaccessible because they are located in walls or floors. Areas on either side of the walls or floors containing these piping welds will be examined for signs of leakage during the pressure testing of the piping system.

Evaluation

Access to volumetrically and/or surface examine these welds is not available because of their location in walls and floors. The licensee has stated that the areas of the welds identified above as being inaccessible will be visually inspected for signs of leakage during the pressure test. This examination and other volumetric examinations of other accessible welds in this and other similar systems will provide assurance that degradation which would compromise the pressure boundary integrity has not occurred during the inspection period. We therefore conclude that relief from the Code requirement may be granted.

2. Request to comply with the Summer 1976 Addenda of Section XI in regard to pressure-retaining bolting. (Items C1.4, C2.4, C3.2, and C4.2 Examination Category C-D).

* From the 10-year Inservice Examination Plan, Fort Calhoun Nuclear Station, Unit No. 1, dated October 1978.

Code Requirement

Visual and either surface or volumetric examination shall be performed on pressure-retaining bolting exceeding one-inch diameter. Visual examinations performed during each inspection interval shall cover 100% of the bolts, studs, nuts, bushings, and threads in base material and flange ligaments between threaded stud holes. Nondestructive examinations shall be performed on 10% of the bolting in each joint, but not less than two bolts or studs per joint. (1975 Addenda of 1974 Edition of Section XI).

Volumetric examination performed during each inspection interval shall include 100% of bolts and studs exceeding 2-inch diameter at each bolted connection of pressure-retaining components required to be inspected. This examination may be performed on bolting in place under load or upon disassembly of the connection. (1976 Addenda of 1974 Edition of Section XI).

Licensee Basis for Requesting Relief

The licensee proposes to comply with the Summer 1976 Addenda which modifies the bolting examination requirements to examine only the pressure-retaining bolting exceeding 2 inches in diameter. Since the Summer 1976 and all subsequent addenda to the Section XI Code have adopted the 2-inch diameter and greater examination requirement, the potential for failure and the consequences thereof appear to be of little concern. The Code requirement of the Summer 1975 addenda is deemed to be impractical in relation to the level of safety achieved by performing the examination versus the manpower and monetary expenditures involved.

Evaluation

The licensee has stated and we agree that the Code requirement for examining pressure-retaining bolting of the smaller diameters is impractical and burdensome and not warranted in relation to the degree of safety added by the requirement. The Summer 1976 Addenda, which the licensee proposes to use, has limited the examination of pressure-retaining bolting to those exceeding 2-inch diameter. We find the change in the bolting examination requirements acceptable and conclude that relief from the requirements of the 1974 Edition of Section XI may be granted as requested by the licensee.

3. Request to use the system hydrostatic test requirements of Article IWC-5000 of the 1977 Winter Addenda of the 1977 Edition of Section XI for Class 2 components with the exception of the steam and feedwater systems which will be governed by the requirements of Technical Specification 2.1.1(7).

Code Requirement

The system hydrostatic test pressure shall be at least 1.25 times the system design pressure and conducted at a test temperature not less than 100°F (1974 Edition). The system hydrostatic test pressure shall be at least 1.10 times the system pressure $P_{sv}$ for systems with Design Temperature of 200°F or less, and at least 1.25 times the system pressure $P_{sv}$ for systems with Design Temperature above 200°F. The system pressure $P_{sv}$ shall be the lowest pressure setting among the number of safety or relief valves provided for overpressure protection within the boundary of the system to be tested. (Winter 1977 Addenda)

Licensee Basis for Requesting Relief

The majority of the Class 2 piping systems, subject to the Section XI pressure testing, can be tested only when the plant is in a cold shutdown condition. While in this mode, there does not exist a means of heating the piping systems above ambient temperatures. Providing a means of heating long piping systems to 100°F is considered impractical, within the meaning of 10 CFR 50.55a.

The minimum temperature requirement for performing a system hydrostatic pressure test was established to meet the requirements specified by fracture prevention criteria. Since the Fort Calhoun ferritic components' ambient room temperatures are sufficiently above brittle fracture temperatures (NDT typically ≤ -20°F), heating the systems to 100°F is unnecessary. For the austenitic steel components, the NDT temperature is typically -325°F, far below any possible testing temperature. Again, heating the austenitic materials to 100°F is unnecessary.

Preservice hydrostatic tests were performed at ambient temperatures and it is the judgment of the licensee that hydro-testing at ambient temperatures is still acceptable.

Evaluation

Based on the information given above, we conclude that meeting the minimum temperature requirement (100°) for hydrostatic testing Class 2 piping systems, except the steam and feedwater systems, is impractical, without technical justification and that testing these systems at ambient (above 50°F) room temperature will not pose a condition for brittle fracture of the materials. Using the hydro-

static test requirements of Article IWC-5000 of the 1977 Edition of Section XI is therefore acceptable and relief from the hydrostatic test requirements of the 1974 Edition may be granted.

C. CLASS 3 COMPONENTS

1. Request relief from pressure test requirements of IWD-2600 (b) for the buried raw water lines from the intake struc e to the auxiliary building.

Code Requirement

In the case of buried components (e.g., underground piping), valves shall be provided to permit isolation of the buried portions of piping for the purpose of conducting a system pressure test in lieu of the visual examination. A loss of system pressure during the test shall constitute evidence of component leakage.

Licensee Basis for Requesting Relief

The design of the system does not allow for pressure testing the buried portions of the system since the isolation valves in this system are butterfly-type valves and are not capable of tight shut-off of the system. The installation of tight shut-off type valves would require major modifications to this system.

Evaluation

Pressure testing of these welds is recognized as impractical because the design of the system does not contain provisions for tight shut-off. Since the system operates at low pressure (26 psi - 40 psi), is equipped with flow instruments capable of detecting significant leaks, and there exists a redundant system, we conclude that assurance of adequate flow of raw water will be provided under normal and abnormal conditions and that relief from the required pressure test may be granted.

D. ULTRASONIC EXAMINATION

1. Request to use 100% of the reference level as the evaluation criterion for indications detected during ultrasonic examination of piping welds.

Code Requirement

Ultrasonic examination shall be conducted in accordance with the provisions of Appendix I. Where Appendix I is not applicable, the provisions of Article 5 of Section V shall apply. All indications which produce a response greater than 20% of the reference level shall be evaluated.

Licensee Basis for Requesting Relief

Evaluation of indications at 20% of the reference level increases the number of indications which have to be evaluated by a very significant amount. To evaluate and record the numerous indications would require examination personnel to stay longer periods of time in radiation areas.

Evaluation

Evaluating indications at or above the 20% reference level places a great burden on the licensee because of the numerous and structurally insignificant indications which would have to be evaluated. Examination personnel would be required to remain in radiation areas for longer periods of time evaluating indications which would not increase the level of safety of the facility. We have concluded that the 100% reference level evaluation criterion is sufficiently reliable for detection of defects warranting evaluation except those indications at 20% DAC or greater which are interpreted to be cracks. We have determined and the licensee has agreed that the ultrasonic procedure will contain the following items:

a. All indications at or above 50% DAC shall be recorded.
b. All indications 100% DAC or greater shall be recorded and evaluated in accordance with the rules of Section XI.
c. Indications 20% DAC or greater which are interpreted to be a crack must be identified and evaluated to the rules of Section XI.

Based on the above, relief from the 20% reference level criterion may be granted.

II. PUMP TESTING PROGRAM

A. Low Pressure Safety Injection Pump SI-1A, B
Containment Spray Pumps SI-3A, B, C
High Pressure Safety Injection Pumps SI-2A, B, C

1. Relief is requested from measuring inlet and differential pressure.

Code Requirement

Inlet and differential pressure measurements are required monthly during normal plant operation.

Licensee Basis for Requesting Relief

System does not include instrumentation for measuring these parameters.

Alternate Testing

Inlet pressure to these pumps will be taken from the static head pressure of the safety injection and refueling water tank. Outlet pressure will be measured at the discharge of the pumps and pressure differential will be calculated.

Evaluation

We agree that the required measurements are impractical within the limitation of design of these pumps and that the alternate testing proposed will not result in a decrease in the level of plant safety. Modification of design to conform to the Code requirements would not significantly add any additional increase in the level of plant safety and therefore is not warranted. We conclude that relief from the requirement may be granted because the alternate method will provide the information needed to assess the hydraulic characteristics of the pumps.

2. Relief is requested from the code requirement of measuring the pump parameters on a monthly basis. The requested frequency is to conduct these tests on a quarterly basis.

Code Requirement

The testing interval for measuring pump parameters, except bearing temperature, is on a monthly basis during normal plant operation.

Licensee Basis for Requesting Relief

The pumps operate infrequently, and degradation is more likely to result from usage than from periods of inactivity.

Monthly testing imposes a manpower hardship that is not commensurate with an increase in quality or safety. Each test of the eight safety injection and containment spray pumps requires 30 man-hours.

Monthly testing subjects the persons conducting the test to adverse working conditions such as high noise levels, temperature, and humidity for extended periods of time. Two men are required in the pump rooms at all times during the test. The pump rooms typically have a radiation level of 10 mrem/hr. resulting in a total exposure of 0.3 man-rem during the performance of each test. In addition, running the pumps represents a noise hazard.

During the test, each pump is unavailable to perform its safeguard function.

The safety injection and containment spray pumps are low-maintenance, low-failure rate items. The containment spray pumps SI-3A, B and C operate essentially only during tests. Maintenance records show these pumps have not required repair in six years. The high pressure safety injection pumps SI-2A, B and C are operated only during tests, to fill safety injection tanks during plant operation, and to fill the reactor cavity during refueling. Maintenance records show that one seal was replaced in six years. The low pressure safety injection pumps operate during tests and as shutdown cooling pumps during cold shutdown periods. These pumps operate for considerably longer periods than the other pumps, and maintenance records indicate that each pump has required seal repair once. Thus, the plant maintenance records tend to support the belief that the pumps are reliable and degradation is the result of use. Monthly testing requires that each pump be run eight (8) hours longer per year than quarterly testing would require.

Little or no additional increase in the level of safety or quality would accompany monthly testing because the pumps are historically reliable; redundant components exist for each pump; the pumps are lined up for their safety function and are essentially inactive during normal operations. Monthly tests further detract from a level of safety by subjecting workers to unnecessary radiation exposure, harsh working conditions, and by increasing the wear on the pumps.

Evaluation

We have determined that the operating history of these pumps does not supply an adequate data base to justify the conclusions drawn that more frequent testing tends to degrade the pump while providing no additional assurance of pump operability. We feel that the first six (6) years of pump operation will not provide a reliable base to extrapolate a failure pattern for a forty (40) year plant life.

We conclude that the burden of conducting the pump test at the code required monthly interval expressed in the basis, and the pump maintenance history do not provide reasonable assurance that the level of plant safety will not be reduced by quarterly testing of pumps; therefore, this relief is not granted.

B. Component Cooling Pumps

1. Relief is requested from measuring inlet and differential pressure and flow rate.

Code Requirement

Monthly inlet and differential pressure and flow rate measurements are required during normal plant operation.

Licensee Basis for Requesting Relief

The system does not include instrumentation for measuring the pressure or flow parameters and adding this equipment is estimated to cost thousands of dollars. The level of safety of the plant is not significantly decreased by not performing this testing due to the following: 1) redundancy in the component cooling system pumps, 2) the raw water pumps can be realigned to cool all of the critical heat loads in case of a pump failure and 3) the discharge pressure, vibration level and bearing temperature will be measured at the required intervals to monitor possible pump degradation.

Evaluation

Because of the system design, we conclude that the cost and time involved in adding additional pressure and flow rate measurement equipment will not be justified by a commensurate increase in the level of plant safety. The redundancy of the component cooling pumps and the fact that if a failure of all these pumps occurs, the essential heat loads can be cooled by the raw water pumps, establishes a reasonable assurance that the level of plant safety is not significantly reduced by this relief. We therefore find that this relief may be granted.

2. Relief is requested from observing bearing lubricant level.

The bearings for the component cooling pumps are pre-packed and sealed type bearings. We interpret this requirement in the Code does not apply to packed and sealed bearings as in many cases the bearings would be damaged or destroyed by checking the lubricant. Measurement of bearing temperature will provide adequate assurance of proper lubricant level. A relief is not required.

C. Boric Acid Pumps CH-4A, B

Relief is requested from measuring inlet and differential pressure.

Code Requirement

Inlet and differential pressure are required to be measured monthly during normal plant operation.

Licensee Basis for Requesting Relief

The system does not include instrumentation for measuring these parameters.

Alternate Testing

The boric acid pumps will be aligned to inject into a fixed resistance system. The inlet pressure will be measured from the boric acid tank level. The outlet pressure will be measured and the differential pressure calculated.

Evaluation

The alternate testing proposed by the licensee accomplishes measurement of the pump differential pressure which the Code requires.

We have determined that the alternate testing proposed will provide adequate data to detect changes in the hydraulic characteristics of the pumps and that plant modifications to conform to Code requirements would add an insignificant increase in the level of plant safety.

We conclude that the alternate testing is acceptable and that relief from the requirement may be granted.

D. Raw Water Pumps AC-10A, B, C, D

1. Relief is requested from measuring inlet and differential pressure and flow rate.

Code Requirement

Inlet and differential pressure and flow rate measurements are required monthly during normal plant operation.

Licensee Basis for Requesting Relief

The system does not include instrumentation for inlet and differential pressure measurements and flow rates are not considered accurate due to river water fouling.

Alternate Testing

The licensee has agreed that the pump discharge pressure and motor amperage will be measured on a monthly basis and compared to the following performance standards.

An amperage acceptance value to be determined by acceptance testing.
Discharge pressure 26 through 40 psig

Evaluation

We have determined that the alternate testing proposed by the licensee will provide adequate information to detect changes of the pumps' hydraulic characteristics and to give an early indication of pump degradation as intended by the tests required by the Code. Due to conditions such as changes in the river level, fouling of flow instrumentation and sand accumulation in pump inlet, the required measurements for pump parameters will not yield useful information if installed. We conclude that this request for relief and alternate testing are acceptable and will not reduce the level of plant safety.

2. Relief is requested from bearing temperature measurements on the bottom bearings of raw water pumps.

Code Requirement

Bearing temperature measurement is required once yearly during inservice testing.

Licensee Basis for Requesting Relief

The lower bearings are submerged in water and are inaccessible for temperature measurements.

Evaluation

The measurement of bearing temperatures of these pumps is impractical because of the pumps design. We conclude that measurement of vibration amplitude, along with the other required parameters, will provide sufficient information to determine the mechanical characteristics, including bearing degradation, of the pumps and that relief from the bearing temperature measurement may be granted.

III. Valve Testing Program

A. General

1. Leak Testing of Valves which Perform a Pressure Isolation Function

There are several safety systems connected to the reactor coolant pressure boundary that have design pressures that are below the reactor coolant system operating pressure. There are redundant isolation valves forming the interface between these high and low pressure systems to prevent the low pressure systems from being subjected to pressures which exceed their design limits. In this role, the valves are performing a pressure isolation function.

It is our view that the isolation redundancy provided by these valves regarding their pressure isolation function is important. We consider it necessary to provide assurance that the condition of each of these valves is adequate to maintain this redundant isolation and system integrity. For this reason we believe that some methods, such as leak testing, should be used to assure their condition is sufficient to maintain this pressure isolation function.

In the event that leak testing is selected as the appropriate procedure for reaching this objective, we believe that the following valves should be categorized as A or AC and leak tested in accordance with IWV-3420 of Section XI of the applicable edition of the ASME Code. These valves are: HCV-347, HCV-348, SI-196, SI-195, SI-194, SI-207, SI-208, SI-199, SI-198, SI-197, SI-211, SI-212, SI-202, SI-201, SI-200, SI-216, SI-215, SI-208 SI-204, SI-203, SI-220, SI-219.

We have discussed this matter and identified the valves listed above with the licensee. The licensee has agreed to review leak testing these valves in accordance with IWV-3420 of the applicable edition of the ASME Code and to categorize these valves with the appropriate designation. If the licensee determines that leak testing is not necessary because there are other methods that they have and will use to determine each valve's condition, they will provide to the NRC for evaluation, on a valve by valve basis, the details of the method used that clearly demonstrates the condition of each valve. The licensee has agreed to provide the above information by July 1, 1979.

2. Subsection IWV-3410(a) of the Section XI Code (which discusses full stroke and partial stroke requirements) requires that Code Category A and B valves be exercised once every three months, with exceptions as defined in IWV-3410(b) (1), (e) and (f). IWV-3520(a) requires that

Code Category C valves be exercised once every three months, with exceptions as defined in IWV-3520(b). In the above cases of exceptions, the Code permits the valves to be tested at cold shutdown where:

(a) It is not practical to exercise the valves to the position required to fulfill their function or to the partial position during power operation.

(b) It is not practical to observe the operation of the valves (with fail-safe actuators) upon loss of actuator power.

IWV-3520 requires that normally open valves be part-stroke exercised quarterly and full stroked at cold shutdowns. A relief has been requested by the licensee for normally open power operated valves which are only full stroked at cold shutdowns. It should be noted that in this SER, if relief is requested for a normally open valve to be exercised at cold shutdowns, it is understood that the valve must remain open and cannot be part-stroked.

The licensee has stated that none of the Category A or B power operated valves listed on the following pages can be part-stroked because of the design logic of the operating circuits. These circuits are such that when an open or close signal is received the valve must complete a full stroke before the relay is released to allow the valve to stroke in the other direction. We find that the above relief request from part-stroking is warranted and should be granted because the required function of the valves involves only full open or full closed positions. These valves will be full stroked at a frequency which will assure adequate reliability.

3. Inservice valve testing at cold shutdown is defined as: Valve testing should commence not later than 48 hours after shutdown and continue until complete or plant is ready to return to power. Completion of all valve testing is not a prerequisite to return to power. Any testing not completed at one cold shutdown should be performed during the subsequent cold shutdowns to meet the Code required testing frequency.

4. The Code states that, in the case of cold shutdowns valve testing need not be performed more often than once every three months for Category A and B valves and once every nine months for Category C valves. It is our position that the code is inconsistent and that Category C valves should be tested on the same schedule as Category A and B valves. The licensee has agreed to modify his note on cold shutdown to read, "In the case of frequent cold shutdowns, valve testing will not be performed more often than once every three (3) months for Category A, B and C valves."

5. Changes to the Technical Specifications

In a November 1976 letter to the Omaha Public Power District, we provided an attachment entitled "NRC Staff Guidelines for Excluding Exercising (Cycling) Tests of Certain Valves During Plant Operation." The attachment stated that when one train of a redundant system such as in the Emergency Core Cooling System (ECCS) is inoperable, nonredundant valves in the remaining train should not be cycled since their failure would cause a loss of total system function. For example, during power operation in some plants, there are stated minimum requirements for systems which make up the ECCS which allow certain limiting conditions for operation to exist at any one time and if the system is not restored to meet the requirements within the time period specified in a plant's Technical Specifications, the reactor is required to be put in some other mode. Furthermore, prior to initiating repairs all valves and interlocks in the system that provide a duplicate function are required to be tested to demonstrate operability immediately and periodically thereafter during power operation. For such plants this situation would be contrary to the NRC guideline as stated in the document mentioned above.

The licensee has agreed to review the Ft. Calhoun Technical Specifications and to consider the need to propose Technical Specification changes which would have the effect of precluding such testing.

If, after making this review, the licensee determines that the TS should not be changed because the guidelines are not applicable or cannot be followed, the licensee will submit to the NRC the reasons that led to their determination for each potentially affected valve. In the licensee submittal, the potentially affected sections of the TS, in addition to the valves, will be identified. The licensee will submit the above information by July 1, 1979.

6. Safety Related Valves

This review was limited to those Class 1, 2 and 3 valves of Section XI of the ASME code that were safety related. Safety related valves are defined as those that are needed to mitigate the consequences of an accident and/or to shutdown the reactor and to maintain the reactor in a shutdown condition.

It should be noted that the licensee may have included nonsafety related valves in their Inservice Test Program as a decision on the licensee's part to expand the scope of their Inservice Test Program.

B. Category A Valves

1. Relief Request

The licensee has proposed to exercise the following Category A valves at refueling outages:

a. HCV-241 Reactor coolant pump controlled bleed off isolation.

b. HCV-206 Containment penetration M7 isolation.

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

These valves cannot be closed when the reactor coolant system is pressurized. Controlled bleed-off flow must be maintained to prevent damage to the reactor coolant pump seals.

Evaluation

In view of the need for maintaining flow to the reactor coolant pump seals to preclude failure of the pumps and prevent leakage of primary coolant during normal operation and cold shutdowns, the quarterly stroke requirements of ASME Code Section XI is impractical for these valves. For this reason and the reasons set forth in section B.8 below, we find that the proposed relief is acceptable and should be granted.

2. Relief Request

The licensee has proposed to exercise the following Category A valves at refueling outages:

a. TCV-202 RCS loop 2A letdown isolation and temperature regulation.

b. HCV-204 Containment penetration M2 isolation and letdown control.

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

Closing these valves would result in termination of the charging and letdown flows. This would also isolate the boronometer, process radiation monitor, and reactor coolant system purification and would cause a pressure transient in the primary system.

Evaluation

Inasmuch as continuous operation of the letdown system is necessary to maintain the required water chemistry, and proper water inventory (i.e., interruption of the charging or letdown flows of the CVCS during normal operation and cold shutdowns would introduce pressure transients to the primary system), the quarterly stroke requirement of Section XI for these valves is impractical. For this reason and the reasons set forth in section B.8 below, we find that the proposed relief request is warranted and should be granted.

3. Relief Request

The licensee has proposed to exercise the following Category A valves at refueling outages:

| | | |
|---|---|---|
| a. | PCV-742A | Containment purge air isolation. |
| b. | PCV-742B | Containment purge air isolation. |
| c. | PCV-742C | Containment purge air isolation. |
| d. | PCV-742D | Containment purge air isolation. |
| e. | HCV-881 | Containment hydrogen purge isolation. |
| f. | HCV-882 | Containment hydrogen purge isolation. |
| g. | VA-290 | Containment hydrogen purge isolation. |
| h. | VA-299 | Containment hydrogen purge isolation. |

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

These valves provide a direct path for release of contaminants from the containment. Cycling these valves will result in a potential release of contaminants.

Evaluation

These valves are containment isolation valves that are closed during normal operations and cold shutdowns. Inasmuch as these valves are in the position required to fulfill their function, the quarterly stroke requirement is impractical for these valves. Moreover, since operability of these valves is not required for safety reasons but, instead, their safety function is performed when the valves remain in their closed position, operability testing of these valves on a quarterly bases would not be meaningful and, in fact, should be avoided. We, therefore, find that the proposed relief request is warranted and should be granted.

4. Relief Request

The licensee has proposed to exercise the following Category A valves at refueling outages:

| | | |
|---|---|---|
| a. | HCV-425A | Containment penetration M39 component cooling system isolation. |
| b. | HCV-425B | Containment penetration M39 component cooling system isolation. |
| c. | HCV-425C | Containment penetration M39 component cooling system isolation |
| d. | HCV-425D | Containment penetration M39 component cooling system isolation. |

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

These valves cannot be cycled during power operation since flow is needed at all times to the SI tank leakage coolers. This cools the SI check valve leak-off and prevents damage to the CVCS resins.

Evaluation

In view of the need to maintain cooling water to cool the safety injection leakage to prevent damage to the CVCS resins during normal operation and cold shutdowns, the quarterly stroke requirement for these valves is impractical. For this reason and the reasons set forth in section 8.8 below, we find that the proposed relief requests are warranted and should be granted.

5. Relief Request

The licensee has proposed to exercise the following Category A valves at refueling outages:

| | | |
|---|---|---|
| a. | HCV-438A | Containment penetration M19 component cooling system isolation. |
| b. | HCV-438B | Containment penetration M19 component cooling system isolation. |
| c. | HCV-438C | Containment penetration M18 component cooling system isolation. |
| d. | HCV-438D | Containment penetration M18 component cooling system isolation. |

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

Closing these valves during power operation would result in damage to the reactor coolant pump seals.

Evaluation

In view of the need to maintain cooling water, during normal operation and cold shutdowns, to cool the reactor coolant pump seal water and lube oil to prevent damage to reactor coolant pump seals which would result in reactor coolant pump damage, the quarterly stroke requirement for these valves is impractical. For this reason and the reasons set forth in section 8.8 below, we find that the proposed relief requests are warranted and should be granted.

6. Relief Request

The licensee has proposed to exercise the following Category A valves at cold shutdowns and refueling outages:

| | | |
|---|---|---|
| a. | HCV-467A | Containment penetration M15 component cooling system isolation. |
| b. | HCV-467B | Containment penetration M15 component cooling system isolation. |

c. HCV-467C Containment penetration M11 component cooling system isolation.

d. HCV-467D Containment penetration M11 component cooling system isolation.

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

Closing these valves would result in isolation of cooling to the nuclear detector wells. This would result in exceeding the concrete temperature upper limits of Technical Specification 2.13.

Evaluation

Since the interruption of coolant to the nuclear detector well cooling units would result in the concrete exceeding its Technical Specification upper temperature limit, the quarterly stroke requirement for these valves is impractical. For this reason and the reasons set forth in section 3.3 below, we find the proposed relief request is warranted and should be granted.

7. Relief Request

For Category A valves HCV-2916, HCV-2936, HCV-2956, and HCV-2976, full-stroke exercising and leak testing will be done at refueling outages.

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

Stroking these valves will drain the accumulators.

Evaluation

These normally closed valves are only used for draining and filling accumulators. They receive a safety injection signal to close in the event of a LOCA. Stroking the valve will drain the accumulator. Therefore, we agree that these valves should not be exercised during normal operation or cold shutdowns. For this reason and for the reasons set forth in section 3.3 below, we find that exercising during refueling outages is acceptable.

8. Conclusion for Valves in 8.1 Through 8.7

The Category A valves listed in relief requests 8.1 through 8.7 are either passive and/or redundant valves. The optimum test interval for operability testing passive and/or redundant valves was determined by the staff using actual valve failure rate data and standard probabilistic techniques, to be in the range of three months to 27 months. Refueling intervals, which have been proposed as the exercise interval for the valves in 8.1 through 8.7, occur every 12 to 18 months which is within the optimum range for operability testing of these valves.

Furthermore, the ASME Code, which requires testing be done quarterly and which has been adopted in 10 CFR §50.55a, also allows testing at cold shutdowns if quarterly testing is impractical. Cold shutdowns can occur at intervals up to refueling outages. Therefore, changing the test interval from quarterly to refueling does not differ significantly from the Code permitted change from quarterly to cold shutdown testing.

Based on the considerations discussed above the staff concludes that the alternate testing frequencies proposed above will give the reasonable assurance of valve operability intended by the Code and that the relief thus granted will not endanger life or property or the common defense and security.

9. Relief Request

The licensee has requested relief from stroking the following category A/E valve:

a. SI 185 SI Accumulator fill line isolation

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

This valve is used to isolate the fill line for the safety injection tanks (accumulators). The valve is locked closed and therefore, not subject to a stroke test.

Evaluation

The safety function of this valve is to form a leak limiting barrier. This valve is a containment isolation valve which is closed, its safety position, and not required to open to mitigate the consequences of an accident or safely shutdown the plant. Therefore, the operability of this valve is inconsequential with regard to the safety function which it performs. We conclude that the quarterly stroke and stroke time measurement are meaningless for passive valves, that the requested relief will not endanger life or property or the common defense and security and that the relief should be granted.

10. Relief Request

The licensee has requested relief for these valves from the stroke requirement and the stroke time measurement requirement:

| | | |
|---|---|---|
| a. | HCV-1559B | Containment penetration M80 demineralized water isolation. |
| b. | HCV-1559A | Containment penetration M80 demineralized water isolation. |
| c. | HCV-1560A | Containment penetration M79 demineralized water isolation. For quench tank. |
| d. | HCV-1560B | Containment penetration M79 demineralized water isolation. For quench tank. |

Code Requirement

The exercising requirements are noted in paragraph III.A.2. The stroke time of all power operated valves shall be measured to the nearest second or 10% of the maximum allowable stroke time, whichever is less, whenever such a valve is full-stroke tested.

Licensee Basis for Requesting Relief

Cycling these valves would decrease containment integrity. These valves are not required to be opened during power operation.

Evaluation

The safety function of these valves are to form leak limiting barriers. These valves are containment isolation valves which are closed, their safety position, and not required to open to mitigate the consequences of an accident or to safely shutdown the plant. Therefore, the operability of these valves is inconsequential with regard to the safety function which they perform. We conclude that the quarterly stroke and stroke time measurement are meaningless for passive valves that the requested relief will not endanger life or property or the common defense and security and that the relief should be granted.

11. Relief Request

The licensee has requested relief for this valve from the stroke requirement and from the stroke time measurement requirement:

a. HCV-1749 Containment penetration M74 compressed air isolation.

Code Requirement

The exercising requirements are noted in paragraph III.A.2. The stroke time of all power operated valves shall be measured to the nearest second or 10% of the maximum allowable stroke time, whichever is less, whenever such a valve is full-stroke tested.

Licensee Basis for Requesting Relief

Cycling this valve during power operation could result in a breach of containment integrity. Operating this valve could result in air leakage into the containment, contributing to excess pressure build-up in the containment. This valve is to remain closed during power operation and is not required to open during power operation.

Evaluation

The safety function of this valve is to form a leak limiting barrier. This valve is a containment isolation valve which is closed, its safety position, and not required to open to mitigate the consequences of an accident or safely shutdown the plant. Therefore, the operability of this valve is inconsequential with regard to the safety function which it performs. We conclude that the quarterly stroke and stroke time measurement are meaningless for passive valves that the requested relief will not endanger life, property or the common defense and security and that the relief should be granted.

C. Category B Valves

1. Relief Request

The licensee has proposed to exercise the following valves at refueling outages:

a. LCV-101-1 Pressurizer level control.

b. LCV-101-2 Pressurizer level control.

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

These valves cannot be cycled during power operation since they would isolate the CVCS letdown and charging and thereby cause pressure transients.

Evaluation

Inasmuch as continuous operation of the letdown system is required to maintain the required water chemistry, and proper water inventory (i.e., interruption of the charging or letdown flows of the CVCS during normal operation or cold shutdowns would introduce pressure transients to the primary system), the quarterly stroke requirement of Section XI for these valves is impractical. For this reason and the reasons set forth in section C.10 below, we find that the proposed relief request is warranted and should be granted.

2. Relief Request

The licensee has proposed to exercise the following valves at cold shutdowns and refueling outages:

a. HCV-1385 Main feedwater isolation to the steam generators.

b. HCV-1386 Main feedwater isolation to the steam generators

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

These are the main feedwater pipe isolation valves and cannot be cycled during power operation. To do so would result in a reactor trip.

Evaluation

We agree with the licensee that exercising these valves would trip the reactor and concur that the quarterly stroke requirement for these valves is impractical. For this reason and the reasons set forth in section C.10 below, we find that the proposed relief request is warranted and should be granted.

3. Relief Request

The licensee has proposed to exercise the following valves at refueling outages:

a. HCV-258 Concentrated boric acid gravity feed isolation.

b. HCV-265 Concentrated boric acid gravity feed isolation.

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

These valves are kept closed during power operation to prevent concentrated boric acid from being fed directly to the charging pumps and subsequently injected into the primary loop.

Evaluation

The stroking of these valves would borate the primary system by injecting concentrated boric acid through the gravity feed line. Inasmuch as boration of the primary system during normal operation would cause reactivity transients and possibly shutdown the plant and during cold shutdowns would delay start-up, the quarterly stroke requirement for these valves is impractical. For this reason and the reasons set forth in section C.10 below, we find that the proposed relief request is warranted and should be granted.

4. Relief Request

The licensee has proposed to exercise the following valve at refueling outages:

a. HCV-268 — Permits direct feed of concentrated boric acid solution to the charging pump suction header.

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

This valve cannot be cycled during power operation since that would result in emergency boration of the reactor coolant system. To prevent such boration, both boric acid pumps would have to be isolated. This is in conflict with Technical Specifications 2.2.(2)b. and d.

Evaluation

The stroking of this valve would borate the primary system by injecting concentrated boric acid through the emergency boration line. Inasmuch as boration of the primary system during normal operation would cause reactivity transients and possibly shutdown the plant and during cold shutdowns would delay start-up, the quarterly stroke requirement for these valves is impractical. For this reason and the reasons set forth in section C.10 below, we find that the proposed relief is warranted and should be granted.

5. Relief Request

The licensee has proposed to exercise the following valves at refueling outages:

a. HCV-344 — Containment spray isolation.

b. HCV-345 — Containment spray isolation.

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

Cycling these valves could result in an inadvertent containment spray.

Evaluation

We agree with the licensee's basis and concur that the quarterly stroke requirement is impractical for these valves. For this reason and for the reasons set forth in section C.10 below, we find that the proposed relief request is warranted and should be granted.

6. Relief Request

The licensee has proposed to exercise the following valves at cold shutdowns and refueling outages:

a. HCV-1387 A, B Isolation of steam generator blowdown line.

b. HCV-1388 A, B Isolation of steam generator blowdown line.

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

These valves cannot be cycled during power operation since to do so would stop steam generator blowdown and disrupt the feedwater chemistry control.

Evaluation

In view of the need to maintain proper feedwater chemistry control to prevent corrosion of steam generator tubes, the quarterly stroke requirement for these valves is impractical. For this reason and the reasons set forth in section C.10 below, we find that the proposed relief request is warranted and should be granted.

7. Relief Request

The licensee has proposed to exercise the following Category B valves at cold shutdowns and refueling outages:

| | | |
|---|---|---|
| a. | HCV-2506A | Containment penetration M63 blowdown sample line isolation. |
| b. | HCV-2506B | Containment penetration M63 blowdown sample line isolation. |
| c. | HCV-2507A | Containment penetration M49 blowdown sample line isolation. |
| d. | HCV-2507B | Containment penetration M49 blowdown sample line isoaltion. |

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

Cycling these valves would result in isolation of the steam generator blowdown sampling in violation of Technical Specification 2.9(1)d. Continuous steam generator blowdown must be maintained for proper all-volatile chemistry control during power operation.

Evaluation

In view of the need for maintaining continuous blowdown from the steam generator for proper all-volatile chemistry control during power operation, and the fact that cycling these valves would isolate steam generator blowdown sampling, a violation of Technical Specification 2.9(1)d, the quarterly stroke requirement for these valves is impractical. For this reason and the reasons set forth in section C.10 below, we find that the proposed relief request is warranted and should be granted.

8. Relief Request

The licensee has proposed to exercise the following valves at cold shutdowns and refueling outages:

| | | |
|---|---|---|
| a. | HCV-1041A | Main steam header isolation. |
| b. | HCV-1042A | Main steam header isolation. |

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

Cycling these valves would trip the reactor.

Evaluation

These valves are the main steam isolation valves. We agree with the licensee that exercising these valves would trip the reactor and that the quarterly stroke requirement for these valves is impractical. For this reason and the reasons set forth in section C.10 below, we find that the proposed relief request is warranted and should be granted.

9. Relief Request

The licensee has proposed to exercise the following valves at cold shutdowns and refueling outages:

| | | |
|---|---|---|
| a. | 400 A, B, C, D | Component cooling isolation to containment air cooling and filtering Unit VA-1A. |
| b. | 401 A, B, C, D | Component cooling isolation to containment air cooling and filtering Unit VA-1B. |
| c. | 402 A, B, C, D | Component cooling isolation to containment air cooling and filtering Unit VA-8A |
| d. | 403 A, B, C, D | Component cooling isolation to containment air cooling and filtering Unit VA-8B. |

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

Cycling these valves during power operation would disrupt the balanced coolant flow to various heat exchangers. Resultant temperature oscillations could cause damage to some equipment, particularly the reactor coolant pump seals.

Evaluation

We agree with the licensee's basis and concur that the quarterly stroke requirement for these valves is impractical. For this reason and the reasons set forth in section C.10 below, we find that the proposed relief request is warranted and should be granted.

10. Conclusion for Valves C.1 Through C.9

The Category B valves listed in relief requests C.1 through C.9 are either passive and/or redundant valves. The optimum test interval for operability testing passive and/or redundant valves was determined by the staff using actual valve failure rate data and standard probabilistic techniques, to be in the range of three months to 27 months. Refueling intervals, which have been proposed as the exercise interval for the valves in C.1 through C.9 occur every 12 to 18 months which is within the optimum range for operability testing of these valves.

Furthermore, the ASME Code, which requires testing be done quarterly and which has been adopted in 10 CFR §50.55a, also allows testing at cold shutdowns if quarterly testing is impractical. Cold shutdowns can occur at intervals up to refueling outages. Therefore, changing the test interval from quarterly to refueling does not differ significantly from the Code permitted change from quarterly to cold shutdown testing.

Based on the considerations discussed above the staff concludes that the alternate testing frequencies proposed above will give the reasonable assurance of valve operability intended by the Code and that the relief thus granted will not endanger life or property or the common defense and security.

11. Relief Request

The licensee has proposed to exercise the following valve at refueling outages:

a. LCV-218-2 Volume control tank level control.

Code Requirement

Refer to paragraph III.A.2.

Licensee's Basis for Requesting Relief

This valve cannot be cycled during power operation since it would isolate the CVCS letdown and charging. Pressure transients could be expected.

Evaluation

Inasmuch as continuous operation of the letdown system is required to maintain the required water chemistry, and proper water inventory (i.e., interruption of the charging

or letdown flows of the CVCS during normal operation or cold shutdowns would introduce pressure transients to the primary system), the quarterly stroke requirement of Section XI for these valves is impractical.

An analysis by the staff of the effects of varying the testing interval for this valve from quarterly to refueling was performed. Based on the present knowledge and the assumptions made with regard to the contributions to the CVCS system unavailability of certain components in the CVCS, the contribution of this valve to the total CVCS unavailability is not significant and testing at refueling frequencies is adequate to assure valve operability. Based on the considerations discussed above, the staff concludes that the requested relief will not endanger life or property or the common defense and security and that such relief should be granted.

D. Category C Valves

1. Relief Request

For Category C valves SI-207, SI-211, SI-215, and SI-219, full-stroke exercising will be done at refueling outages.

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

Cycling these valves would lower the water level in safety injection tanks (accumulators).

Evaluation

Each of these check valves is one of the two check valves in series that isolate the safety injection tanks from the reactor coolant system. We agree that cycling these valves would lower the safety injection tank level, which is undesirable during normal operation. Furthermore, it is our position that any safety-related valve which could put the plant in an unsafe condition if failed should not be tested during normal plant operation. Since all four safety injection tanks must be available in the event of a LOCA, and a failure of one of these check valves could render a safety injection tank inoperative, these valves should not be cycled during normal operation. For this reason and the reasons set forth in Section D.5 below, we find that cycling at refueling outages is adequate and that the requested relief should be granted.

2. Relief Request

For Category C valves SI-208, SI-212, SI-216, and SI-220 full-stroke exercising will be done at refueling outages.

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

In order to cycle these valves, cold water would have to be injected into the reactor coolant system.

Evaluation

Each of these check valves is one of the two check valves in series that isolates the safety injection system (High Pressure Safety Injection (HPSI), LPSI, or SI tanks) from the reactor coolant system. We agree that to cycle these valves would require injecting cold water into the reactor coolant system, which is undesirable during power operation because it will trip the reactor. Furthermore, it is our position that any safety-related valve which could put the plant in an unsafe condition if failed should not be tested during normal plant operation. Since all four SI tanks must be available in the event of a LOCA, and a failure of one of these check valves could render an SI tank inoperative, these valves should not be cycled during normal operation. For this reason and the reasons set forth in Section D.6 below, we find that cycling at refueling outages is adequate and that the requested relief should be granted.

3. Relief Request

For Category C valves SI-194, SI-195, SI-196, SI-197, SI-198, SI-199, SI-200, SI-201, SI-202, SI-203, SI-204, and SI-205, full-stroke exercising will be done at refueling outages.

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

In order to cycle these valves (except SI-197 and SI-200), cooler water would have to be injected into the reactor coolant system. There are drains to the containment sump downstream of valves SI-197 and SI-200, but then the liquid radioactive waste system would have to be used on the water in the sump after the cycling of these two valves.

Evaluation

Each of these twelve check valves is one of the two check valves in series that isolates the LPSI or HPSI from the reactor coolant system. We agree that either injecting water into the reactor coolant system or the containment is undesirable during power operation because it will trip the reactor and, therefore, conclude that exercising on a quarterly basis is impractical. For this reason and for the reasons set forth in Section D.6 below, we find that exercising at refueling outages is adequate and that the requested relief should be granted.

4. Relief Request

For Category C valves SI-139 and SI-140, part-stroke exercising will be done every three months and full-stroke exercising will be done at refueling outages.

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

To fully open these check valves would require pumping cooler water into the reactor coolant system. The recirculation lines that are used for testing the LPSI and HPSI pumps are not large enough to allow enough flow to fully open the check valves.

Evaluation

These two check valves are in the discharge lines of the safety injection and refueling water tank and they prevent back flow to this tank. We agree with the licensee that injecting cold water into the reactor coolant system during power operation, as would result from full-stroking is undesireable and we, therefore, conclude that full-stroking on a quarterly basis is impractical.

If either of these two valves should fail to open when needed, enough flow would be provided through the other valve to mitigate the consequences of a LOCA. Apart from this fact, assurance of the operability of these valves will be provided by the proposed quarterly partial stroking. For these reasons and the reasons set forth in Section D.6 below, we find that the requested relief should be granted.

5. Relief Request

Exclude Category C check valves SI-100, SI-102, SI-108, SI-113, SI-115, SI-121, SI-129, SI-135, SI-143, and SI-149 from the ASME Section XI three-month exercising requirement. Instead, valves SI-100 and SI-113 will be part-stroked quarterly, and all ten valves will be full-stroked at refueling outages.

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

In order to full-stroke these valves, cold water would have to be injected into the reactor coolant system.

Evaluation

Valves SI-139, SI-143, SI-149 are on the containment spray pump discharge lines; SI-121 and SI-129 are on the LPSI pump discharge lines; SI-102, SI-108, and SI-115 are on the HPSI pump discharge lines; and SI-100 and SI-113 are on the HPSI pump suction lines. Testing the HPSI pumps using the 3" recirculation lines to the safety injection and refueling water tank allows valves SI-100 and SI-113 to be part-stroked. However, the discharge valves for all three set of pumps are downstream of the recirculation lines and cannot be part-stroked during the pump mini-flow test. The HPSI discharge check valves cannot be exercised without injecting cold water into the reactor coolant system. Such action during power operation would cause a reactor trip. The containment spray pump and LPSI pump discharge check valves cannot be exercised because these pumps cannot overcome primary system pressure. For these reasons and those set forth in Section D.6 below, we find that the licensee's proposed exercising of these ten check valves is adequate to assure their operability and that the proposed relief should be granted.

6. Conclusion for Valves in D.1 Through D.5

The Category C valves listed in relief requests D.1 through D.6 are either passive and/or redundant valves. The optimum test interval for operability testing passive and/or redundant valves are determined by the staff using actual valve failure rate data and standard probabilistic techniques, to be in the range of three months to 27 months. Refueling intervals, which have been proposed as the exercise interval for the valves in D.1 through D.5 occur every 12 to 18 months which is within the optimum range for operability testing of these valves.

Furthermore, the ASME Code, which requires testing be done quarterly and which has been adopted in 10 CFR §50.55a, also allows testing at cold shutdowns if quarterly testing is impractical. Cold shutdowns can occur at intervals up to refueling outages. Therefore, changing the test interval from quarterly to refueling does not differ significantly from the Code permitted change from quarterly to cold shutdown testing.

Based on the considerations discussed above the staff concludes that the alternate testing frequencies proposed above will give the reasonable assurance of valve operability intended by the Code and that the relief thus granted will not endanger life or property or the common defense and security.

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7. Relief Request

The licensee has proposed to delete the following valves from the testing requirements of Section XI:

a) SI 175 Containment spray header isolation check valve

b) SI 176 Containment spray header isolation check valve

Code Requirement

Category C valves shall be exercised at least once every three months.

Licensee Basis for Requesting Relief

Relief is requested from the testing requirements of Section XI due to impracticality because the system design does not permit stroking the valves without spraying down the containment vessel. Not stroking the valves poses no safety impact for the following reasons:

(1) Adequate heat removal from containment can be achieved during a Design Basis Accident (DBA) by use of only one (1) containment spray header and three (3) containment spray pumps. Hence, only one (1), but not both of the check valves is required to open.

(2) The containment air filtration and cooling [illegible] fully redundant to the [illegible]tainment spray [illegible]

(3) The containment air filtration and cooling [illegible] contains redundant components. During a DBA, sufficient iodine removal is effectuated with 50% of the system operating and sufficient pressure reduction accomplished with any three air coolers operating.

Evaluation

We agree with the licensee's basis and concur that the testing requirements of Section XI are impractical for these valves. Therefore, we have determined that the proposed relief will not decrease the level of plant safety or endanger life, property or the common defense and security and thus should be granted.

8. Relief Request

For Category C valves SI-159 and SI-160, request relief from exercising requirements.

Code Requirement

Refer to paragraph III.A.2.

Licensee Basis for Requesting Relief

In order to fully open these check valves, the containment floor must be filled with water. Furthermore, these valves are in redundant lines; if either check valve fails to open in the recirculation mode, there would be sufficient flow through the other line to safely cool the reactor.

Evaluation

These check valves, redundant to each other and independent, are physically located in the recirculation piping immediately downstream of the containment sump and are used to block any direct flow of emergency coolant from the refueling water storage tank to the containment sump. At least one of these valves must open to provide for the long term recirculation of spilled coolant from the sump to the reactor core following a LOCA. ASME Code requirements for the inservice testing of these valves were not in existence at the time the plant was designed and constructed; therefore, no provisions had been made for in-service testing these valves. We agree that with the present piping arrangements it is impractical to test these valves to ASME Code requirements.

However, we have determined, and the licensee has agreed, that these valves have a vital safety function and that ways be investigated by the licensee for performing operability tests of these valves.

The licensee has proposed (Omaha Public Power District letter dated 12/8/78) that one of the following two approaches will be used at the next refueling outage to demonstrate the operability of these valves:

a) A modification will be performed to permit periodic flow testing of these valves or

b) SI-159 will be removed, inspected and tested. The results of this inspection can be used to determine the need for inspecting SI-160 and the need for further inspections.

The results of the inspection/test will be submitted to the staff for review, along with recommendations for future inspection and testing as deemed appropriate.

We carried out an investigation to determine if there exists any mechanism of failure which could, over an extended time period such as the interval to the next refueling (scheduled for February 1980) as proposed by the licensee, result in the failure of the check valves to operate when required. Some obvious mechanisms examined were scale or crud buildup in the stagnant water within the line ultimately inhibiting or failing the check valves. Because of the purity of the water the plant maintains and stainless steel construction of the line, these type failures do not appear probable. There were no other apparent mechanisms of failure found other than the expected random failures of the check valves.

An examination of Licensee Event Reports (SER's) pertaining to check valves, performance of a failure mode and effects analysis on the check valves to identify parts failure modes and a visual examination of the installed valves were made in pursuit of the data needed to make the determination mentioned above.

Since there were no other apparent failure mechanisms found other than the expected random failures of the check valves, the staff has determined that the effect on safety of extending the test interval until the next refueling is insignificant and therefore concludes there is reasonable assurance that temporary relief until the next refueling will not endanger life or property or the common defense and security and that such relief should be granted.

9. Relief Request

The licensee has proposed to delete the following valve from the testing requirements of Section XI:

a) CH-198 Charging line reverse flow check valve

Code Requirement

Category C valves shall be exercised at least once every three months.

Licensee Basis for Requesting Relief

Relief is requested from testing requirements of Section XI due to impracticality because the system was designed without a method for verifying the position of the check valve. Not verifying the stroking of this valve poses no safety problem because this system is designed to inject borated water, for a minimum of two hours post-LOCA, through this valve. After that period, the function of this valve is to close so as to block back-leakage. However, by that time the containment pressure will have decreased enough that this line will not be a significant leakage path.

Evaluation

We agree with the licensee's basis and concur that the testing requirements of Section XI are impractical for this valve. We find that the proposed relief will not decrease the level of plant safety or endanger life or property or the common defense and security and thus should be granted.

IV. Summary - Inservice Inspection and Testing

The licensee has submitted information to support his determinations that certain ASME Section XI Code (1974 Edition through Summer 1975) requirements are impractical to implement at the Fort Calhoun Station Unit 1 Facility. We have evaluated the licensee's bases for his determinations and find that relief from the specific Code requirements requested may be granted except that for quarterly testing of pumps, request II.A.2. We have also granted interim relief for the exercising requirements for valves SI-159 and SI-160, request .. .D.8, for the reasons given in the evaluation. Based on the foregoing, we find that the relief requested is authorized by law, will not endanger life or property or the common defense and security and is in the public interest considering the burden on the licensee that could result if the relief were not granted. We conclude that the revised Inservice Inspection and Testing Program meets the requirements of 10 CFR 50.55a(g).

Environmental Consideration

We have determined that this amendment does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendment involves an action which is insignificant from the standpoint of environmental impact and, pursuant to 10 CFR §51.5(d)(4), that an environmental impact statement, or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

Conclusion

We have concluded, based on the considerations discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the amendment does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: July 2, 1979