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BNL-NUREG-25449
INFORMAL REPORT

RECOMMENDATIONS TO THE STAFF

ON

COOPER NUCLEAR STATION

INSERVICE INSPECTION AND TESTING PROGRAM

REVISION 1

R.E. HALL AND W.C. OSBORNE
ENGINEERING AND ADVANCED REACTOR SAFETY DIVISION

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DEPARTMENT OF NUCLEAR ENERGY BROOKHAVEN NATIONAL LABORATORY
UPTON, NEW YORK 11973

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NOTICE

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BROOKHAVEN NATIONAL LABORATORY RECOMMENDATIONS TO THE NRC STAFF ON THE SAFETY EVALUATION REPORT OF COOPER NUCLEAR STATION, NEBRASKA PUBLIC POWER DISTRICT INSERVICE INSPECTION & TESTING PROGRAM FOR THE 1977-1980 PERIOD

(SUBMITTAL DATED AUGUST 1977)
Revision 1

Executive Summary

At the request of the Nuclear Regulatory Commission's Division of Operating Reactors staff, the Reactor Engineering Analysis Group of Brookhaven National Laboratory (BNL) has conducted a review of the Inservice Inspection and Testing program (ISI/IST) of the Cooper Nuclear Station Docket No. 50-298. This evaluation is based upon the ISI/IST program as described in Nebraska Public Power District's submittal of July 1977 and amended by J. Polant's letter to D. Davis of the NRC dated January 26, 1978, and submittal dated July 18, 1978 from J. Polant to Ippolito. In addition to the above documents, the Licensee's responses to initial questions dated 2/24/78 and 6/2/78 and comments from a meeting with the management of Cooper, the NRC staff and BNL, 6/7/78, were reviewed to the requirements of ASME Section XI.

Mr. W.C. Osborne, consultant to BNL, and Mr. R.E. Hall were the principals involved in this evaluation and have based their conclusions on numerous discussions with the NRC staff so as to achieve a program wide consistence of review. It has been found that the program, as reviewed and modified by this analysis is in compliance to the extent possible with the requirements set forth in Section XI of the 1974 Edition and Addenda through the Summer 1975 of the ASME Boiler and Pressure Vessel Code as required by 10CFR50.55a(g).

Thirty-three requests for relief were reviewed and evaluated, twenty-one under Inservice Inspection program and twelve within the Inservice Testing program of the Cooper station. Approval has been recommended on fourteen ISI in addition one relief request for pumps and ten for valves under IST are recommended to be approved. Six code deviations are considered to be not acceptable and therefore the relief request is recommended to be rejected.

The evaluation of the hydrostatic test of the class 3 off-gas system and the discussion of all valves performing a pressure isolation function remains as open items at this time.

BNL has evaluated the requests and recommended relief from specific requirements which were determined to be impractical for this facility because of limited access, design, geometry, and materials of construction of some components. Several other requests for relief from the requirements should be denied based on our evaluation.

This report includes the relief request specific evaluations that are recommended to be included in the NRC's Safety Evaluation Report on the subject of ISI/IST for the Cooper Nuclear Station. These recommendations are a result of the above described review and do not constitute a completeness evaluation of the Cooper program.

I. INSERVICE INSPECTION PROGRAM

1. Relief Requested

Exempt from volumetric examination the longitudinal and circumferential pressure retaining Code Category B-A welds in the vessel beltline region located between the top of the biological shield to the bottom head-to-shell weld.

The specific welds are:

VC-BA-2
VLA-BA-1, 2, 3
VLB-BA-1, 2, 3

Code Requirement

Volumetric examination of the shell longitudinal and circumferential welds is required. Examination shall cover at least 10% of the length of each longitudinal weld and 5% of the length of each circumferential weld during the inspection interval. Examinations may be performed at or near the end of the inspection interval.

Basis of Requesting Relief

Access to the reactor beltline region is not possible. The reactor vessel is insulated with permanent reflective insulation and surrounded by a concrete biological shield. The annular space between the inside diameter of the insulation and the outside diameter of the reactor vessel is a nominal 2 inches. There is no working space to remove the insulation panels from the vessel, which precludes both direct and remote examination of the outside surface. The interior surface is clad and the vessel internals, shroud and jet pumps make an internal volumetric examination of these welds impractical for a meaningful examination. The reactor vessel is monitored for radiation damage in the beltline region. This program, reference NEDO-10115 and APED-5490,67A PE2 May 1967 Class I and Station Surveillance Procedure 7.4.9 meet the intent of 10CFR Part 50, Appendix H. This program will provide data to monitor radiation damage to the vessel beltline materials throughout the vessel's service life. The vessel was designed and fabricated in accordance with the rules of Section III, 1965 Edition of the ASME Boiler and Pressure Vessel Code.

Parts of the longitudinal seams VLA-BA-1, 2 & 3 appear to be accessible from openings around the recirculation riser nozzles N2A, N2E and N2H respectively; however, UT scanning surface area would require a minimum of 17 inches from the weld. This surface area is only available for a few inches closest to the nozzles. When the nozzle welds (Category B-D) are examined, these few inches shall be scanned to the extent possible.

Additionally, the vessel flange weld, VCB-BC-5, a more highly stressed weld, shall be 100% examined volumetrically once during each inspection interval. Also the areas of these welds shall be inspected visually from the reactor vessel inside surface to the extent practical using a remote television camera during the inspection required for Categories B-N-1 and B-N-2.

Evaluation

Imposition of the Code requirements would subject the licensee to extreme hardships in necessitating removal of portions of the concrete biological shield and the permanently installed insulation to perform the required examination of the welds listed form the vessel outside surface. Utilizing the results of the surveillance program to monitor material change from neutron irradiation and the guidelines in Regulatory Guide 1.99 to establish operating limitations will insure that the reactor vessel will be operated in accordance with 10 CFR Part 50, Appendix G requirements.

It is recommended that should an unacceptable flow be detected by any of the examinations of the vessel welds, the welds listed be examined 100% volumetrically.

Other methods of volumetric examination with the existing limitations which will produce meaningful results have not been fully developed at this time. Licensee has agreed that when a proven technique with acceptable repeatability is commercially available to the nuclear industry, that technique will be evaluated for use.

It is concluded that the vessel design, ongoing surveillance program of the reactor vessel materials in the beltline region, and the augmented examination requirements are adequate for providing an acceptable level of safety and assurance that the vessel structural integrity will not be compromised during the inspection interval.

2. Relief Requested

Exempt from volumetric examination the following Code Category B-B pressure retaining welds in the vessel.

Vessel	Bottom Head
DWG No. 27	DWG No. 26
VCB-BB-1,3,5	HMB-BB-1.2,3,4,5,6
VLC-BB-1,2,3	VCB-BB-1

Code Requirement

Volumetric examination of the shell longitudinal and circumferential welds is required. Examination shall cover at least 10% of the length of each longitudinal weld and 5% of the length of each circumferential weld during the inspection interval. Examinations may be performed at or near the end of the inspection interval.

Basis for Requesting Relief

The biological shield prohibits access to these welds. The clearance between the Shield Wall and the Reactor Pressure Vessel varies from approximately 14-1/4" to 12-3/4". Insulation is installed between the shield wall and the vessel. The clearance between the insulation and the reactor Pressure Vessel varies from 7/8" to 1-7/8". The Insulation is only removable in the area of the nozzles.

A partial examination from the outside of VCB-BB-4 may be possible. Also, meridional welds HMB-BB-1,2,3,4,5,6 are accessible for examination from the outside for a distance of approximately six inches between the support skirt to vessel weld and the bottom heat circumferential weld HMC-BB-1. These welds will be examined to the extent possible.

Evaluation

Imposition of the Code requirements would subject the licensee to extreme hardships in necessitating removal of portions of the concrete biological shield and the permanently installed insulation to perform the required examination of the welds listed from the vessel outside surface. In addition:

For VCB-BB-1; Not accessible from ID - Bottom head to vessel weld there is no access provision for below the core UT examinations.

For VCB-BB-3; Not accessible from ID - Circumferential shell weld is at same elevation as top of shroud making weld inaccessible.

For VLC-BB-1, 2, 3; Not accessible from ID. Partially accessible from OD of weld VCB-BB-4 (Elev. 963.07'). It appears that examination may be performed from the OD surface with access from the biological (sacrificial) shield whose elevation is 961.89'. A best effort examination.

For HMB-BB-1, 2, 3, 4, 5, 6; Not accessible from ID surface because of vessel internals. Partially accessible from vessel OD. Access to these meridional welds is just above the support skirt weld. Approximately 6" of each meridional weld can be examined from the support skirt to vessel weld extending towards the bottom head circumferential weld HMC-BB-1.

For VCB-BB-1; Not accessible from ID - Circumferential shell to bottom head weld is not accessible because of vessel internals.

It is recommended that should an unacceptable flaw be detected in any Category B-B welds, the welds listed be examined 100% volumetrically.

It is concluded that the examinations that can be made plus the additional partial examinations to be made on a best effort basis are adequate for providing an acceptable level of safety during the inspection interval.

3. Relief Requested

Exemption from the requirement for Code Category B-L-2, to disassemble pumps solely for the purpose of visually examining pump internals.

Code Requirements

One pump casing internals in each group of pumps performing similar functions in the system shall be examined during each inspection interval.

Basis for Requesting Relief

Pump casing internals shall be visually examined only when disassembled for maintenance, malfunction or repair.

Evaluation

If at least one pump in each group of pumps is opened and the casing internals examined in conjunction with the repair or maintenance work once during an inspection interval, it is judged that the intent of the Code will have been satisfied. However, if such an examination has not taken place, it shall be necessary to so examine one pump before entering the next inspection interval. This request for relief should be rejected.

4. Relief Requested

Exemption from the requirement for Code Category B-M-2, to disassemble valves exceeding four inch nominal pipe size solely for the purpose of visually examining valve body internals.

Code Requirements

One valve body internals in each group of valves exceeding four inch of the same constructional design and that perform similar functions in the system shall be examined during each inspection interval.

Basis for Requesting Relief

Valve body internals shall be visually examined only when disassembled for maintenance, malfunction or repair.

Evaluation

If at least one valve in each group of valves is opened and the internals examined in conjunction with the repair or maintenance work once during an inspection interval, it is judged that the intent of the Code will have been satisfied. However, if such an examination has not taken place, it shall be necessary to so examine one valve in each group before entering the next inspection interval. This relief request should be rejected.

5. Relief Requested

Exemption from volumetric examination of control rod drive housings per IWB-1220(b)(1).

Code Requirement

Components may be exempted from examination if under the postulated conditions of loss of coolant from the component during normal reactor operation, the reactor can be shut down and cooled down in an orderly manner assuming makeup is provided by the reactor coolant makeup system only. However, in no instance may the size exemption be more than three inch nominal pipe size.

Basis for Requesting Relief

Analysis shows (reference R. C. Hooper, G. E. to L. C. Lessor, CNS, 6/5/78) that the reactor can be cooled down in an orderly manner using only the reactor coolant makeup system when there is a complete break in a two inch water line.

Evaluation

The control rod drive housings are six inch nominal pipe size but due to the internal mechanism the area unobstructed to flow is equivalent to a 1.8 inch nominal pipe diameter. Each housing has a stop to prevent it and the mechanism from being separated completely from the vessel in the event of the complete failure of a circumferential weld. Therefore, the requirements of IWV-1220(b)(1) have been met and the Code requirements to exempt these components satisfied.

6. Relief Requested

Exempt Class 2 RHR Heat Exchanger nozzles N4A and N4B from volumetric examination and substitute a surface examination.

Code Requirement

Subject welds shall be 100% volumetrically examined.

Basis for Requesting Relief

The RHR Heat Exchanger Nozzles N4A and N4B cannot be inspected volumetrically. This is a lap joint design and the nozzle to vessel weld is under cylindrical reinforcing pad. The fillet welds, pad to vessel and pad to nozzle, shall be subjected to a 100% surface examination using liquid penetrant.

Evaluation

The RHR Heat Exchanger Nozzles, N4A and N4B, construction precludes the required 100% volumetric examination. Due to the reinforcing pads and their attachment fillet welds, the main nozzle to vessel weld is not exposed. In addition, the geometry is such that a meaningful volumetric examination is not possible. Therefore, these two welds cannot be examined as specified by the code. The alternate surface examinations of the pad to

vessel and pad to nozzle weld are the only inspection feasible, and will provide an acceptable level of safety. Accordingly, relief is recommended.

7. Relief Request

Relief requested from the 20% recording level of ultrasonic indications as specified in Section V, Article 5, to allow using a 50% recording level.

Code Requirement

ASME Section V, Article 5, T525.1(c), T537.

T525.1(c) - Evaluation of Indications - Any discontinuity which causes an indication in excess of 20 percent of the height of the first back reflection or any discontinuity which prevents the production of a first back reflection of 50 percent of the calibration amplitude shall be investigated to the extent that the operator can evaluate the shape, identity, and location of all such reflectors in terms of acceptance-rejection standards of the referencing Code Section.

T-537 - Evaluation of Indications - All indications which produce a response greater than 20 percent of the reference level shall be investigated to the extent that the operator can evaluate the shape, identity, and location of all such reflectors in terms of the acceptance-rejection standards of the referencing Code Section.

Basis for Requesting Relief

Methods and techniques have improved to show that the minimum recording sensitivity for the critical flawsize is far above the 20% of primary reference level sensitivity recording level now required.

Evaluation

Evaluating indications at or above the 20 percent reference level places a great burden on the licensee. The reference level evaluation of judged sufficiently reliable for detection of defects warranting evaluation. As an interim measure, we recommend relief be granted from the 20% reference level evaluation criterion provided the following are incorporated in the ultrasonic examination procedure:

a. All indications 50% DAC or greater shall be recorded and evaluated in accordance with the rules of Section XI.

b. Indications 20% DAC or greater which are interpreted to be a crack must be identified and evaluated to the rules of Section XI.

8. Relief Requested

Reduction of the requirement to maintain test pressure and temperature for at least 4 hours prior to the performance of examinations to 10 minutes on uninsulated ASME Class 2 and 3 systems.

Code Requirement

Test pressure and temperature shall be maintained for 4 hours prior to performance of the examination.

Basis for Requesting Relief

All ASME Class 2 and 3 systems are uninsulated and exposed for visual examination. The test pressure and temperature shall be maintained for a minimum of 10 minutes and for such additional time as may be necessary to conduct the examination of the component (Reference ASME Section XI, IWA 5210, 1974 Edition, Winter 1975 Addenda).

Evaluation

The relief requested is consistent with current engineering judgement. To hold uninsulated systems at pressure for longer than a minimum of 10 minutes will make no significant additional contribution to the assurance of the integrity of the system. Accordingly relief request should be granted.

9. Relief Requested

Exempt from hydrostatic testing at Code specified temperature the Class 1 reactor feedwater system between first and second primary containment boundry to permit testing at ambient temperature.

Code Requirement

The Code in IWB-5222 specifies hydro test temperature not less than 100F except as may be required by IWA-5230(b) to meet the fracture toughness criteria applicable to ferritic materials of system components as specified by the enforcement authorities having jurisdiction at plant site.

Basis for Requesting Relief

Due to design, the portion of piping between the first and second primary containment isolation valves cannot be hydrostatically tested in conjunction with the vessel hydro. An external pressure source will need to be applied which will inject water at effectively ambient temperature. This material was, at installation, certified A-333 Grade 1, -20F Charpy, 15 ft.lbs. The initial preservice hydro test was made with cold water. This section of the line is protected by isolation valves on each side.

Evaluation

The initial certifications and acceptances test of the piping in question were:

Reference: Reactor Feed Class I - Isometric 2509-1 & 2

(1) Pipe: Seamless Carbon Steel, ASTM A-333-GR-1 & USAS B36.1, by electric furnace process with Charpy V" Notch impact tests @ -20%F and 15 ft-lbs.

(2) NDE: Radiograph - 100%
(a) All butt welds
(b) All branch connections over 4"

(3) Weld Procedure was qualified in accordance with Charpy requirements.

(4) Hydrostatic test at 2890 psig @ 70°F.

Since the request for code relief is based on the preoperational Hydrostatic Test at 70°F, which is a more conservative test temperature than that prescribed by the present code the relief is recommended. It should however be noted that at no time should the test be conducted in violation of minimum temperatures as determined by the NDTT criteria.

10. Relief Requested

Exempt from hydrostatic testing at Code specified pressure and temperature the Class 2, Core Spray and RHR system section from the discharge of the pumps to the first check valve to permit testing at 300 psig, ambient temperature during an inservice test.

Code Requirement

The system hydrostatic test pressure shall be at least 1.25 times the system design pressure (P_D) and conducted at a test temperature not less than 100°F except as may be required to meet the test temperature requirements of IWA-5230.

For components that are not required to function during reactor operation, the system test pressure shall not be less than 100% of the pressure developed during the conduct of a periodic system inservice test. In the case of storage tanks, the nominal hydrostatic pressure developed with the tank filled to its design capacity shall be acceptable as the system test pressure.

Basis for Requesting Relief

The seals in the RHR and Core Spray pumps cannot withstand the pressure of 1.25 times the system design pressure. The system will never be subjected to pressures above 300 psig.

Evaluation

Due to system design, in order to hydrostatically test the portion of piping from the pump discharge to the first check valve, it would also be necessary to pressurize the suction piping. The suction piping is designed for 150 psig and the discharge piping is designed for 500 psig; therefore, we would be overpressurizing the suction piping. There is no way to isolate the suction piping from the pump.

In addition, the pump manufacturer does not recommend that the pump be pressurized over 575 psig. Granting of this relief request should not affect the level of safety of the system.

11. Relief Requested

Exempt from hydrostatic testing at Code specified pressure the Class 2 RWCU System to permit testing at 1140 psig.

Code Requirement

1313 psig.

Basis for Requesting Relief

Unnecessary pressurization of the pump seals could cause a failure. The normal operating pressure of the system is 1140 psig. The manufacturer's recommended operating pressure is 1175 psig.

Evaluation

The Reactor Water CleanUp System functions during normal plant operation at 1140 psig and by pump manufacturer recommendation should not be pressurized to greater than 1175 psig during operation. To hydrostatic test the RWCU to the code required 1313 psig would violate the recommended pressure of the manufacturer. In addition, since the operating pressure is 1140 the system should not be exposed to greater pressures during plant operation. Thus, to require code implementation would not increase the level of system safety but might adversely affect the RWCU pump seals.

12. Relief Requested

Exempt from hydrostatic testing at Code specified temperature the Class 2 HPCI, RCIC and reactor feedwater system to permit testing at ambient temperature.

Code Requirement

The Code in IWC-5220 specifies a minimum hydrostatic test temperature of 100F unless necessary to meet the fracture toughness criteria applicable to ferritic materials of system component as specified by the enforcement authority having jurisdiction at plant site.

Basis for Requesting Relief

It is necessary to use external water with no heating capacity when conducting the hydrostatic test. Ambient temperature is approximately 70F. The system welds were all initially radiographed and hydrostatically tested with water at ambient temperature and found acceptable.

Evaluation

The initial certifications and acceptance tests of the HPCI and RCIC systems are:

Reference: Class II Reactor Feed - Isometric 2849-4

(1) Pipe: Seamless Carbon Steel, ASTM-A-106-GR-B & USAS B36.10, no Charpy.

(2) NDE: 100% Radiographed

(3) No Charpy Test requirements on Weld Procedure Specification (WPS)

(4) Hydrostatic test: 2890 psig @ 70°F.

Class II HPCI

(1) Pipe: Seamless Carbon Steel, ASTM-A-106-GR-B & USAS B36.10, no Charpy.

(2) NDE: 100% Radiographed

(3) No Charpy test requirements on WPS

(4) Hydrostatic Test:
(a) Suction Piping: 225 psig @ 70°F
(b) Discharge Piping: 2250 psig @ 70°F

Class II RCIC

(1) Pipe: Seamless Carbon Steel, ASTM-A-106-GR-B & USAS B36.10, no Charpy.

(2) NDE: 100% Radiographed

(3) No Charpy test requirements on WPS

(4) Hydrostatic Test:
(a) Suction Piping: 225 psig @ 70°F
(b) Discharge Piping: 2250 psig @ 70°F

The initial test was conducted at 70°F and due to the fact that an external water source is needed and a heating capability is not available relief is recommended. It should, however, be noted that at no time should the test pressure and temperature be in violation of minimum acceptable temperatures as determined by the NDTT criterion.

13. Relief Requested

Exempt from hydrostatic testing at Code specified pressure and temperature the Class 2, 1147 psig design portion of the main steam system to permit testing at maximum operating conditions of 960 psig and 540F.

Code Requirement

Pressure test system at 1.25 times system design pressure and 100F minimum. The test pressure may be reduced if testing at a higher temperature is required to meet fracture toughness requirements.

Basis for Requesting Relief

960 psig is the maximum operating pressure for the 1147 psig design portion of the main steam system. Testing to a higher pressure would necessitate filling the steam lines and HPCI and RCIC turbines with water and reanalysis would be required.

Evaluation

The turbine casings of the HPCI and RCIC pumps are not presently designed to withstand both the full internal pressure and the head of water that would be required if the code were to be met. Since during operation the class 2, 1147 psig design portion of the main steam system will only see 960 psig of steam, not water, the reduced pressure test should still assure system safety while circumventing possible turbine damage. Therefore, relief is recommended.

14. Relief Requested

Exempt from hydrostatic testing at Code specified pressure and temperature those portions of the Class 2 450 psig main steam exhaust on the discharge of the HPCI and RCIC steam lines to permit substitution of an inservice operation test only.

Code Requirement

Pressure test system at 1.25 times system design pressure at 100F minimum.

Basis for Requesting Relief

Requirements to perform anything other than an inservice test of the main steam exhaust on the discharge of the HPCI and RCIC steam lines is deemed impractical, in that testing to a higher pressure than system operation would necessitate filling the steam lines and HPCI and RCIC turbines with water. It is only possible to close one end of this system. The system is tested at 58 psig during an Appendix J test.

Evaluation

The HPCI system is relied upon to safeguard against a small break. It is backed up by the RHR/LPCI and no credit is taken for the RCIC system to safely shutdown the plant. It is recommended that the system operating pressure be measured and recorded. Exemption recommended.

15. Relief Requested

Exempt from hydrostatic testing at Code specified pressure and temperature the Standby Liquid Control System from the pump discharge to the Class 2 boundary to permit testing at maximum operating pressure of 1215 psig at ambient temperature.

Code Requirement

Pressure test system at 1.25 times system design pressure at 100F minimum.

Basis for Requesting Relief

The maximum operating pressure of the Standby Liquid Control system, pump discharge to Class 2 boundary, is limited by the safety relief valves in

the system set at 1240 psig. It is not prudent to gag or remove and blank off these valves that are tested in place. There is a potential for boron injection into the coolant if 1215 psig is exceeded. This is an austenitic system.

Evaluation

The code requirement can be met; however, by testing to the Code requirement of 1825 psig versus the 1215 psig as requested, a greater risk of injecting some of the Sodium Pentaborate Solution into the vessel exists. It is therefore desirable to leave the system configuration as it is.

The vessel pressure during injection could be no higher than the highest safety valve set at 1240 + 13 psig. The inservice inspection of the piping at 1215 psig would be a meaningful representation of the service of the system.

There is, therefore, no significant additional contribution to safety to be gained by exceeding 1215 psig. This relief request is recommended.

16. Relief Requested

Exempt the Class 3 Augmented Off Gas system from a hydrostatic pressure test.

Code Requirement

System test pressure shall be at least 1.10 times the system design pressure.

Basis for Requesting Relief

The Augmented Off Gas system has a design pressure inclusive of explosion criteria. It is impractical to perform a hydrostatic test of this system due to components in the system, i.e. charcoal beds and glycol coolers. An air test is also impractical due to design pressure and type of lagging installed. The system normally operates at atmospheric pressure and is lagged with permanent insulation.

Radiation is monitored to detect leaks. The performance of all components are monitored. Additionally, this is one train of a two train redundant system not needed for the safe operation or shutdown of the plant.

Evaluation

Since this is a monitored system and additionally is not required to safeguard the public in the event of an accident, the exemption request is recommended.

17. Relief Requested

Exempt from hydrostatic testing at Code specified pressure the Class 3 Fuel Pool Cooling system piping from the heat exchanger to the pool to permit testing at 140 psig operating pressure.

Code Requirement

System test pressure shall be at least 1.10 times the system design pressure.

Basis for Requesting Relief

Due to the essential cooling function of this system, removing it from service for the length of time required for a Code pressure test would be impractical.

Evaluation

After discussions with the licensee, it has been determined that the time the fuel pool cooling can be removed from service is from 7 hours to 39 hours depending on heat load. The highest heat load would be right after refueling and the lowest heat load would be just prior to refueling. Therefore, sufficient time is available to perform hydrostatic of those isolatable portions prior to refueling. Therefore, a system pressure test in accordance with IWD S200 has been agreed to by the licensee.

18. Relief Requested

Exempt from hydrostatic testing the Class 3 Off Gas system.

Code Requirement

System test pressure shall be at least 1.10 times system design pressure.

Basis for Requesting Relief

The Off Gas system is connected directly to the open stack of the elevated release point. In order to perform a pressure test it would necessitate filling the subject piping with water which is deemed impractical with respect to system design and material in the system, heating elements, and HEPA filters. An air test at 1.10 times the design pressure is impractical due to its being designed for an explosion and due to the volume of the system.

Additionally, a large part of the system is buried and it would be very difficult to determine the location of a leak if the entire system were subjected to a hydropressure test. There is no method of venting for a hydro test. This line is buried in sandy soil above the area water table. The pipe is protected by plant cathodic protection and all influent to the line is monitored. It is a steel pipe, tarred on the OD. The line could be pressurized and can be drained but the location of a leak is difficult.

Evaluation

NOTE: THE FOLLOWING STATEMENT HAS BEEN MADE BY THE LICENSEE IN THEIR LETTER OF JULY 18, 1978. THERE IS A NEED TO HAVE A SOILS INTERACTION EXPERT REVIEW THIS REQUEST.

"This part of the system is buried in sandy soil, has no method of venting, and contains air. There is a fan drawing the 'Air' from this pipe into the off gas stack, causing negative pressure or 'in' leakage of the buried pipe. A section of pipe just prior to the buried portion is monitored for Radioactivity (in addition to the normal off gas stack monitoring). Water through leak 'in' or condensation is collected and monitored through loop seals and pump system. For water which may leak out into the soil of radioactive material, a similar analysis has been made and is attachment 9. The whole segment is coated and is on the plant wide cathodic protection system."

19. Relief Requested

Exempt from hydrostatic testing at Code Specified pressure the low pressure Class 3 boundary of the Standby Liquid Control System from the Head Tank to the Standby Liquid Control Pumps, to permit testing at operating pressure and ambient temperature.

Code Requirement

System test pressure shall be at least 1.10 times system design pressure.

Basis for Requesting Relief

The low pressure Class 3 boundary of the Standby Liquid Control system has locked open valves to the Head Tank of the suction side of the Standby Liquid Control pumps. At no time during system operation will the system pressure exceed the head pressure of the supply tank, approximately 15 psig.

Evaluation

IWD-5200(b) exempts storage tanks from the 1.10 times design pressure requirement. This piping connects the storage tank, in this case the Head Tank, and the pump. Since a pressure of 15 psig cannot be exceeded, testing to a higher pressure will make no significant contribution to the assurance of the integrity of the system. Accordingly, relief requested is recommended.

20. Relief Requested

Exempt from hydrostatic testing at Code specified pressure the radwaste system to permit testing at operating pressure of 15 psig.

Code Requirement

System test pressure shall be at least 1.10 times system design pressure.

Basis for Requesting Relief

The maximum operating pressure of the Radwaste system, approximately 15 psig, is considered to be a meaningful pressure test for this carbon steel system. To test at design pressure times 1.10 would be very time consuming and, for a drainage system, would yield results of questionable value. Additionally, all accessible piping is observed each shift for signs of leakage.

Evaluation

There is no reason that this system cannot be tested in conformance with the Code and adherence to the Code is recommended.

21. Relief Requested

Relief requested from minimum temperature of 100°F during system pressure tests of Class 1 and 2 components to allow using ambient temperature, except for the Reactor Pressure Vessel hydrostatic test, which is in compliance with IWB-5000.

Code Requirement

IWB-5222(a): The system hydrostatic test shall be performed at a test pressure that for the component located at the highest elevation in the system is not less than 1.10 times the system nominal operating pressure (P_D) which corresponds with 100% rated reactor power, and at a test temperature not less than 100°F except as may be required to meet the test temperature requirements of IWA-5230.

IWC-5220(a): The system hydrostatic test pressure shall be at least 1.25 times the system design pressure (P_D) and conducted at a test temperature not less than 100°F except as may be required to meet the test temperature requirements of IWA-5230.

Basis for Requesting Relief

Testing would be performed by using an external pressure source. There is no means by which to heat up the system to the temperature required.

Evaluation

This request has been addressed for specific cases through the evaluation. As further identified areas are submitted, they will be reviewed on a case by case basis. At this time, this generic request for relief from code specified Hydrostatic Temperatures is not recommended.

II. Inservice Testing Program

1. Relief Requested

Exemption from measuring the inlet pressure, P_i, for the Standby Liquid Control Pumps.

Code Requirement

P_i shall be measured before each pump startup and during test and shall be within the limits specified by the Owner in the pump record.

Basis for Requesting Relief

The Standby Liquid Control Pumps are positive displacement pumps. The inlet pressure has little effect on the discharge pressure. Additionally, the system design assures at all times adequate inlet pressure to the pumps.

Evaluation

Inlet pressure is a minor part of total pump head in this instance, and the system does assure adequate pump inlet pressure. Relief request is recommended.

2. Inservice Testing of Pumps Which Perform a Safety Related Function

The Licensee identifies the Core Spray, Residual Heat Removal and the Standby Liquid Control Pumps as being supplied by the emergency power source and, hence, subject to the inservice testing requirements of Section XI of the Code. NRC guidelines amplify this by stating that pumps that perform a safety related function, i.e., necessary to safely shut down the plant and mitigate the consequences of an accident, and are provided with an emergency power source are to be included in the Code scope.

It is recommended that the service water pumps which are required to maintain the plant in a safe shutdown condition and have alternate emergency power sources be included in the inservice test program.

It is also recommended that the High Pressure Cooling Injection pumps which are steam turbine driven and required in the event of a small break be included in the program.

3. Relief Requested

The following valves shall be exercised at cold shutdown or "once per fueling cycle":

1) 18" RF-CV-13, 14, 15, 16
2) 1-1/2" SBLC-CV-12, 13
3) 28" RR-MO-53A, B
4) 4" RR-MO-54A, 54B

5) 3" RHR-MO-920, 921
6) 14" RHR-CV-20
7) 1" ACAD-MO-1301, 2, 3, 4, 5, 6, 8 and 1" ACAD-MO-1310, 11, 12
8) 6" RCIC-CV-11
9) 4" RHR-CV-21, 22

Code Requirement

Full strcke valves every three months. If not practical to full stroke during plant operation, part stroke and if not practical to part stroke, full stroke during cold shutdown.

Basis for Requesting Relief

Relief is not requested for the above indicated valves. The code allows three alternatives to be selected by the licensee, however, the NRC staff requires clarification and justification of all tests other than those conducted on a three month interval.

Evaluation

3.1 18" RF-CV-13, 14, 15, 16 - Reactor Feed Pump Discharge Isolation. It is impractical to isolate feedwater to the reactor during normal operation. In addition, to test the indicated valves at cold shutdown will not impair the system safety. Therefore, the request should be approved.

3.2 1-1/2" SBLC-CV-12, 13 - These valves are containment valves for the ABLC system. Since it would necessitate injecting into the vessel these valves are not testable during plant operation. Relief should be approved.

3.3 28" RR-MO-53A, 28" - RR-MO-53B are the discharge isolation valves on the Reactor Recirculation Pumps which cannot be stroked during normal plant operation. To test these valves at cold shutdown would not affect system safety, therefore, the request is recommended.

3.4 4" RR-MO-54A, 4" - RR-MO-54B are the Recirc. Pump Discharge Valve Bypass. General Electric recommends these valves remain open during normal operation, (see General Electric Service Information letter #104) and that operation in this mode will not affect the safety analysis as reviewed by the NRC. Based on the approved recommendations of the NSSS supplier, dated October 31, 1974, and the possibility of bypass pipe degradation if the valves are stroked during plant operation this request is recommended.

3.5 3" RHR-MO-920, 921 - These are the steam supply valves to Augmented Off Gas which cannot be isolated during normal operation without causing flow and pressure transients and thereby isolating Augmented Off Gas. Based on the safety implication of stroking these valves during plant operation, the request is recommended.

3.6 14" RHR-CV-20 - RHR-CV-20 is the emergency service water supply for core flooding. These normally closed valves are exercised when the associated lines are drained. If the valves were to be stroked during normal plant operation, service water would be injected into the RHR system and eventually into the vessel. This is not desirable and therefore, the request to stroke at cold shutdown, as per code requirements, is recommended.

3.7 1" ACAD-MO-1301, 2, 3, 4, 5, 6, 8 and 1" ACAD-MO-1310, 11, 12 - Presently the ACAD system, Atmospheric Containment Atmosphere Dilution, is not approved for operation and is only used as containment where the valves are normally shut and are not required to operate during an accident. When the ACAD system is approved by the NRC for operation, then the valves will be exercised every three months.

3.8 6" RCIC-CV-11 - To exercise this normally open check valve, which is in the line between the suppression chamber and the RCIC pump, would necessitate taking the RCIC pump our of service. The request is, therefore, recommended.

3.9 4" RHR-CV-21, 22 - These are normally closed check valves that can only be exercised during a cold shutdown and when the RCIC pump is not operating. Therefore, the request is recommended.

4. Category A Valves

NOTE: THIS ITEM WHICH REFERS TO PRESSURE ISOLATION VALVES IS TO BE COMPLETED BY NRC STAFF. A LIST OF VALVES IS TO BE DEVELOPED BY THE STAFF AND SUBMITTED TO CNS FOR THEIR CONSIDERATION BASED ON PRIOR AGREEMENT.

5. Relief Requested

Exemption from direct measurement of valve seat leakage as specified in the Code to permit using air as the test medium and the pressure decay method at 58 psig initial pressure.

Code Requirement

IWV-3420(d) specifies that valve seat leakage shall be measured directly through a downstream telltale or by measuring the feed to upstream side of valve required to maintain a constant pressure.

Basis for Requesting Relief

Licensee proposes to use the equation

$$L = \frac{dP}{dt} \frac{V}{P_s} 60$$

where L = leakage in scf/HR

$\frac{dP}{dt}$ = shape of a plot of pressure vs. time (psi/min)

V = volume of test volume, FT^3

P_s = standard pressure, psi

Licensee considers this a valid test and does not consider comparison tests identified by the Code as warranted.

Evaluation

The leakage formula is derived from the gas law using the simplifying assumption that the standard temperature equals the initial and final test temperatures. In leak testing of containment isolation valves at low pressure differentials the effect of the simplifying assumptions on the results are negligible. The results of a pressure decay test when using a gas as the test medium are as accurate as a direct measurement method and hence acceptable. All valves are tested at function pressure except for the Main Steam Isolation Valves which are tested at one half the function pressure; this exemption (from Appendix J of 10CFR50) was granted previously by the NRC, see Amendment 44 to DPR 46.

With respect to IWV-3410(c)(6), these valves qualify for use of reduced pressure testing without further adjustment for service and test media. The relief request is therefore recommended.

III. Conclusions

It has been found that the program, as reviewed and modified by this analysis is in compliance to the extent possible with the requirements set forth in Section XI of the 1974 Edition and Addenda through the Summer 1975 of the ASME Boiler and Pressure Vessel Code as required by 10CFR50.55a(g).

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