UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

ENCLOSURE

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT 1

GRAND GULF NUCLEAR STATION, UNIT 1

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NUMBERS 50-313, 50-416, AND 50-382

1.0 INTRODUCTION

The *Code of Federal Regulations*, 10 CFR 50.55a, requires that inservice inspection (ISI) of certain components, including supports, and inservice testing (IST) of certain pumps and valves be performed in accordance with Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (the Code) and applicable addenda, except if alternatives have been authorized or relief has been requested by the licensee and granted by the Commission pursuant to paragraphs (a)(3)(i), (a)(3)(ii), (f)(6)(i) or (g)(6)(i) of 10 CFR 50.55a. In proposing alternatives or requesting relief, the licensee must demonstrate that (1) the proposed alternatives would provide an acceptable level of quality and safety; (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety; or (3) conformance would be impractical for its facility. NRC Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," provides alternatives to the Code IST requirements that the staff has determined are acceptable.

Section 50.55a(f)(4)(ii) and (g)(4)(ii) require that IST and ISI programs during 120-month intervals, beyond the initial interval, comply with the requirements of the latest edition and addenda of the Code incorporated by reference in paragraph (b) of Section 50.55a 12 months prior to the start of the 120-month interval. Section 50.55a(f)(4)(iv) and (g)(4)(iv) allow that IST and ISI may meet the requirements of later editions and addenda of the code that are incorporated in paragraph 50.55a(b), or portions thereof provided related requirements are met, subject to Commission approval.

As stated in 10 CFR 50.55a, the Commission is authorized to approve alternatives and to grant relief from ISI and IST requirements upon making the necessary findings. The NRC staff's findings with respect to authorizing the alternative requested as part of the licensee's ISI and IST program are contained in this safety evaluation (SE).

In its letter dated October 21, 1993, Entergy Operations, Inc. (EOI), submitted proposed alternatives to the requirements of 10 CFR 50.55a,

paragraphs (f)(4)(ii), (f)(4)(iv), (g)(4)(ii), and (g)(4)(iv), requesting that the proposal be prioritized as a cost-beneficial licensing action (CBLA). The CBLA requested approval of alternatives to the requirements for 120-month updates to later editions of the ASME Code for ISI and IST programs required by (f)(4)(ii) and (g)(4)(ii) and generic approval to use later editions incorporated into 10 CFR 50.55a(b), without further NRC approval, pursuant to (f)(4)(iv) and (g)(4(iv). In a letter dated April 14, 1994, Entergy requested an extension of the current 120-month intervals for Arkansas Nuclear One, Unit 1, Grand Gulf Nuclear Station, Unit 1, and Waterford Steam Electric Station, Unit 3, pending the staff's review of the CBLA request.

In meeting with Entergy representatives and Nuclear Energy Institute (NEI) representatives, April 18, 1994, the staff presented a proposed change to 10 CFR 50.55a as an alternative to Entergy's CBLA request. Entergy agreed that the staff's proposal would resolve their immediate concerns if extensions to the 120-month intervals for the three subject plants are approved, pending final rule changes to 10 CFR 50.55a. An evaluation of the proposed extensions follows.

2.0 PROPOSED ALTERNATIVE

EOI, licensee for Arkansas Nuclear One, Unit 1, Grand Gulf Nuclear Station, Unit 1, and Waterford Steam Electric Station, Unit 3, the subject plants, proposes to extend the current 120-month intervals for these three plants. The 120-month intervals are established in accordance with 10 CFR 50.55a and the ASME Code, Section XI, Subsection IWA. No extension is necessary for Arkansas Nuclear One, Unit 2, or the River Bend Nuclear Station, the remaining nuclear plants which Entergy Operations, Inc., operates. The extensions would result in the following changes:

Plant	Current End of 120-Month Interval	Requested End Date for 120-Month Interval
Arkansas Nuclear One, Unit 1	12/19/94	12/01/96
Grand Gulf Nuclear Station	07/01/95	01/01/97
Waterford 3	09/24/95	07/01/97

The requested extensions will include an additional refueling outage beyond that originally planned for the current 120-month intervals for each of the three plants. The extension will allow the licensee to continue using the current programs beyond the current ending date. The extensions cover the period required for processing the staff's proposed rule changes to 10 CFR 50.55a.

2.1 Licensee's Basis for Extension

The licensee's request states the following:

> This request is made under 10 CFR 50.55a(a)(3) which allows NRC to authorize alternatives to selected requirements contained in

10 CFR 50.55a. Specifically, we are requesting extension of the present 120-month ISI/IST period to a length corresponding to the dates shown above. This request is independent of any period extensions allowed under the ASME Code and would include continuation of existing approved reliefs through the end of the extended period. We understand that approval of our request would also imply shortening of a subsequent 120-month period if the licensed plant lifetime was not also extended. The choice of which subsequent period to shorten (if any) would be at the option of the individual plants.

The proposed extensions would provide an acceptable level of quality and safety for the following reasons:

- Each EOI facility currently operates under acceptable (albeit earlier) ASME code requirements. Implementation of these code requirements provide an acceptable level of quality and safety.

- ASME code changes which constitute a substantial safety benefit (e.g., augmented examination of the reactor vessel) are separately addressed by rulemaking (e.g., 50.55a(g)(6)(ii)(A)) and are unaffected by the proposed extension to the 120-month period.

- During the extended period, should an affected EOI facility identify a code change from a later approved code edition which is of substantial safety benefit and is not addressed through rulemaking, that change will be implemented at the earliest opportunity commensurate with its importance to safety.

2.2 Evaluation

The 120-month intervals specified in paragraphs (f)(4)(ii) and (g)(4)(ii) were originally specified as 20-month intervals for inservice testing program updates and 40-month intervals for inservice inspection program updates. By rule changes to 10 CFR 50.55a effective November 1, 1979 (reference Federal Register Volume 44, Page 57912), the interval for revising programs was made consistent with the inservice inspection interval in Section XI of the ASME Code (paragraph IWA-2400, "Inspection Intervals"). The "Statements of Consideration" for the rule change state that:

> Such a change makes the regulation more practical to implement and saves time and effort for both the NRC and the licensee without an increased risk to the public health and safety. Extending the period for revising the program is not considered a significant relaxation of safety requirements since Section XI is a relatively mature code and new code changes generally deal with practical considerations of implementation or the application of new

developments. New code changes do not normally modify the safety aspects of the code. Further, as stated in § 50.55a, the Commission may impose new code requirements at any time if safety considerations so dictate.

In the 1989 Edition of Section XI of the ASME Code, Paragraph IWA-2430, "Inspection Intervals," specifies the establishment of inspection intervals for a total plant life of 40 years following placement of the power unit into commercial service. The inservice examinations and system pressure tests required by IWB, IWC, IWD, and IWE [IWE has not yet been incorporated into 10 CFR 50.55a for inspection of containments] are to be completed during each of the inspection intervals for the service lifetime of the power unit. The inspections shall be performed in accordance with the schedule of Inspection Program A of IWA-2431, or optionally, Inspection Program B of IWA-2432 and it is not required that the inspection intervals of IWB, IWC, IWD, and IWE conform to the same inspection program. A change to the inspection program may be made in the first 3 years of the service of the power unit. IWA-2430(c) and IWA-2430(d) allow extension of each inspection interval by as much as 1 year, with provisions for decreasing intervals other than the first interval under Inspection Program A, provided adjustments do not cause successive intervals to be altered by more than 1 year from the original pattern of intervals.

The inspection frequency for inservice testing of pumps and valves shall be in accordance with the requirements of IWP and IWV. The inspection frequency for examination and testing of component supports shall be in accordance with the requirements of IWF. The inspection intervals for component replacements, additions, and alternations that may be required during the service lifetime of the power unit shall coincide with remaining intervals, as determined by the calendar years of power unit service at the time of replacements, additions, or alterations. Schedules for Inspection Programs A and B (IWA-2431 and IWA-2432) are specified as follows:

Inspection Program A The inspection intervals shall comply with the following except as may be modified by IWA-2430(c):

1st Inspection Interval — 3 years following initial start of power unit commercial service.

2nd Inspection Interval — 7 years following the 1st inspection interval.

3rd Inspection Interval — 13 years following the 2nd inspection interval.

4th Inspection Interval — 17 years following the 3rd inspection interval.

Inspection Program B The inspection intervals shall comply with the following, except as modified by IWA-2430(d):

1st Inspection Interval — 10 years following initial start of power unit commercial service.

3rd Inspection Interval — 10 years following the 1st inspection interval.

4th Inspection Interval — 10 years following the 3rd inspection interval.

Inspection Program B is currently used by the subject plants, with intervals based on 10 years. Currently, Arkansas Nuclear One, Unit 1, is in the second inspection interval with ISI and IST programs developed using the 1980 Edition, with addenda through the Winter 1981 Addenda, of Section XI of the ASME Code. Grand Gulf Nuclear Station, Unit 1, is in the first inspection interval with ISI and IST programs developed using the 1977 Edition, with addenda through the Summer 1979 Addenda, of Section XI of the ASME Code. The IST program, however, states that it has been updated using the 1980 Edition, with addenda through the Winter 1981 Addenda, of Section XI of the ASME Code. Waterford Steam Electric Station, Unit 3, is also in the first inspection interval with ISI and IST programs developed using the 1980 Edition, with addenda through the Winter 1981 Addenda, of Section XI of the ASME Code.

If the licensee updated the three programs using the most recent edition of Section XI of the ASME Code 1989 Edition, which was incorporated in 10 CFR 50.55a(b) effective September 8, 1992, would be used (Federal Register, Volume 57, page 34666). The most significant change in the requirements for IST relates to an expanded scope for safety and relief valves through the reference to the ASME Operations and Maintenance Standard, Part 1 (OM-1), "Requirements for Inservice Performance Testing of Nuclear Power Plant Pressure Relief Devices," first referenced in the 1986 Edition of Section XI of the ASME Code which was incorporated by reference in 10 CFR 50.55a(b) May 5, 1988 (Federal Register Volume 53, page 16051). Two other changes relate to the use of reference values for monitoring degradation of power-operated valves and the addition of velocity units of measurement for pump vibration.

The changes related to ISI that have occurred through rule changes since the incorporation of the 1977 Edition, with addenda through the Summer 1979 Addenda, are generally discussed in the "Statements of Consideration" for the final rule as noted below:

Effective Date	Federal Register Reference	Discussion of Changes Related to ISI
02/01/82	46 FR 63208	(1) Incorporated by reference the Winter 1979 Addenda, 1980 Edition, Summer 1980 Addenda and the Winter 1980 Addenda of Section III and the Winter 1979 Addenda, the 1980 Edition and the Winter 1980 Addenda to Section XI of the ASME Boiler and Pressure Vessel (B&PV) Code. (2) Changes to Section XI noted in the "Statements of Consideration" include the following: - Section XI requires that a system hydrostatic test be performed after all inservice repairs and replacements to Class 1 systems and components. - Section XI allows the practical exam, required for Nondestructive Examination (NDE) qualification to be given by the American Society for Nondestructive Testing (ASNT) rather than the employer.

Effective Date	Federal Register Reference	Discussion of Changes Related to ISI
03/09/83	48 FR 5532	(1) Incorporated by reference the Summer Winter 1981 Addenda of Section XI of the ASME B&PV Code. (2) Paragraph IWB-2413, "Inspection Program for Steam Generator Tubing, of Section XI was revised to defer requirements for the examination of steam generator tubing to the requirements contained in the NRC plant Technical Specifications. (3) Paragraph IWB-3112 of Section XI was revised to make the acceptance standards of Section III and the preservice acceptance standards of Section XI more compatible. Paragraph IWB-3112 permits flaws that are identified as construction flaws to be evaluated according to Articles NB-2500 and NB-5300, provided that the flaws were detected during the inspections conducted during construction and were recorded. If the preservice examination indicates the flaws exceed the requirements of Articles NB-2500, NB-5300, and Table IWB-3410-1, the component will be considered unacceptable for service. (4) Subsection IWE, "Requirements for Class MC Components of Light-Water Cooled Power Plants," was added to Section XI by these addenda. However, § 50.55a presently only incorporated those portions of Section XI that address the ISI requirements for Class 1, 2, and 3 components and their supports. The requirements of IWE were not imposed in this change.

Effective Date	Federal Register Reference	Discussion of Changes Related to ISI
05/14/84	49 FR 9711	(1) General revision to § 50.55a designed to update NRC requirements after 10 years of experience and make them more consistent with pertinent national standards by (a) adding specific references to parts of Section III of the ASME B&PV Code which apply to the construction of Classes 2 and 3 components, (b) deleting obsolete references and provisions, and (c) simplifying the procedure for authorizing alternatives to certain NRC requirements.
10/28/85	50 FR 38971	(1) Incorporated all editions through the 1983 Edition and all addenda through the Summer 1983 Addenda for Section XI. (2) Editorial changes to delete obsolete (outdated) requirements. (3) Revised design for access to enable ISI and IST of Class 1 components.
05/05/88	53 FR 8845	(1) Incorporated the editions and addenda through the 1986 Edition of Section XI. (2) Placed a limitation on the use of paragraph IWV-3640 to use the Winter 1985 Addenda for certain types of welds. NRC acceptance criteria were provided in Generic Letter 84-11, "Inspections of BWR Stainless Steel Piping." (3) Limited applicability of existing modification pertaining the ISI of pressure retaining welds in Class 2 piping for residual heat removal systems, emergency core cooling systems, and containment heat removal systems up to the 1983 Edition with addenda up through the Summer 1983 Addenda.
09/08/92	57 FR 34666	(1) Incorporated the 1986/1987/1988 Addenda and 1989 Edition of Section XI. (2) Imposed an augmented examination of reactor vessel shell welds with a specified schedule.

Of the changes in both the IST and ISI area, only the reactor vessel shell weld examinations was augmented and imposed on an accelerated schedule. Therefore, the requirements in 10 CFR 50.55a(g)(6)(ii)(A) for the schedular implementation of the reactor vessel examinations is not affected by the extension, as is stated in the licensee's basis for the alternative (see Section 2.1 above). The examinations must be completed on the schedule that was imposed in the September 8, 1992, final rule for each of the three plants.

The extensions requested for the three plants exceed the 1 year allowed by Paragraph IWA-2430(d) of the 1989 Edition of the Code by no more than 1 additional year, with the extended period for each plant based on refueling outage schedules. Most ISI examinations and certain inservice tests are performed only during refueling outages. As noted in the licensee's basis for the request, approval of the extensions implies shortening of a subsequent 120-month interval if the licensed plant lifetimes of 40 years are not later extended through a license amendment. If such a license amendment is evaluated, ISI and IST results will be a factor in the basis for the amendment; therefore, any issues related to extension of the 120-month interval would be considered at that time.

The additional extension beyond that allowed by the Code will result in an interval end date that will (1) coincide with the completion of one outage beyond the expiration of the current 120-month intervals for each of the three plants, (2) allow a period of time for the licensee to determine the changes to the ISI and IST programs that will be necessary when a final rule is issued that addresses the original request in the CBLA, and (3) require a subsequent schedule change to shorten a later interval. While the extension would allow changing the examination schedule for the next two outages at each of the three plants, the overall schedule is not otherwise impacted by the change. Certain welds will be examined after an additional 6 months to 1 year operating time than if the current 120-month interval, with a 1 year extension allowed by the Code, were maintained.

The testing performed for IST will be continued throughout the entire period of time in accordance with the frequency of testing specified in IWP and IWV. Tests are generally conducted on a quarterly schedule, except as deferred to cold shutdown outages, or refueling outages where relief has been granted, where appropriate. Safety valves are tested on a 5-year schedule that is not impacted by this extension as the Code requirement includes a formula based on the number of refueling outages in a 5-year period (see Table IWV-3510-1). The safety and relief valves that were added to the scope of IST by the 1986 Edition of Section XI are those that provide overpressure protection for systems which are required for safe shutdown, maintaining safe shutdown, and mitigating the consequences of an accident. The valves would be setpressure tested once in a 5-year period (Class 1) or a 10-year period (Class 2 and Class 3); therefore, the extension would allow that certain of the valves in a particular grouping may be setpressure tested as much as 1 year later than if the extension was not approved, but no later than within 5 or 10 years, as appropriate, from the end of the extended interval. The expanded scope was not imposed on an accelerated schedule in 10 CFR 50.55a. The use of reference

values for establishing acceptance criteria for stroke timing power-operated valves is considered an improvement in the method, but the requirements in IWV-3410, along with the guidance in NRC GL 89-04, Attachment 1, Position 5, "Limiting Values of Full-Stroke Times for Power-Operated Valves," provide an adequate level of quality and safety for the current testing and will continue to be acceptable for an additional period of time. Similarly, the addition of velocity measurements in the later requirements for pump testing represents an improvement in the testing requirements; however, displacement (amplitude), as required in the earlier Code editions, continues to be an option. Therefore, the licensee could continue to monitor vibration in the same manner as is in current compliance under the 1980 Edition, with addenda through the 1981 Winter Addenda, for all three plants, even after updating to the 1989 Edition.

The NRC has indicated its intent to proceed with rulemaking as discussed in the April 18, 1994, meeting with EOI. Based on the low impact on the overall effect of the requested extensions, it would be a hardship without a compensating increase in the level of quality and safety to require the licensee to update the ISI and IST programs for the three plants prior to the issuance of the final rule change to 10 CFR 50.55a which addresses the CBLA issues. Such an imposition could result in the licensee being required to update the programs twice, thereby doubling the efforts necessary to accomplish the program development and implementation and negating any potential savings that might have been achieved by the CBLA. Allowing up to an additional year beyond that allowed by the Code for extension of the current intervals will not adversely affect the level of quality and safety provided by the ISI and IST programs for the reasons stated above and the extension will later be addressed by shortening a future 120-month interval. Additionally, the one change to 10 CFR 50.55a that imposed specific requirements on an accelerated schedule will continue to be required (reactor vessel shell weld examinations) and EOI has committed to implement any safety significant Code changes that may ensue in the interim period, as determined by EOI or the NRC through rule changes.

3.0 CONCLUSION

The alternative to extend the current 120-month intervals for Arkansas Nuclear One, Unit 1, Grand Gulf, Unit 1, and Waterford 3 for a period to include one additional refueling outage beyond the current end dates of the intervals is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on the hardship without a compensating increase in the level of quality and safety that would result if the Code requirements to allow only a 1-year extension were imposed. The approval is for an interim period up to the dates stated above for each unit, with a decrease in a subsequent interval to adjust for the period beyond 1 year authorized by this safety evaluation.

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Date: **August 2, 1994**