REGULATORY ANALYSIS FOR PROPOSED AMENDMENT TO 10 CFR 50.55a, "CODES AND STANDARDS"

1 Purpose and Structure of This Analysis

This analysis evaluates the proposed regulatory action of amending 10 CFR 50.55a to incorporate by reference the 2004 Edition of Section III and Section XI, Division 1 of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (BPV Code) and the 2004 Edition of the ASME Code for Operation and Maintenance of Nuclear Power Plants (OM Code). In addition, the NRC is proposing to remove certain obsolete requirements; require the use of two ASME Code Cases, N-722 and N-729-1, both with limitations; add non-destructive examination requirements to system leakage tests; and clarify a regulation associated with ASME Code Case N-648-1. This regulatory action is intended to maintain the safety of nuclear reactors, and make NRC activities more effective and efficient in accordance with NRC's performance goals.

ASME Codes are national voluntary consensus standards, and, as such, are required by the National Technology Transfer and Advancement Act of 1995, Pub. L. 104-113, to be used by government agencies unless the use of such a standard is inconsistent with applicable law or otherwise impractical; hence, a discussion on parts of the ASME Codes not being adopted is provided below.

New editions of the subject ASME Codes are issued every 3 years; addenda to the editions are currently issued yearly except in years when a new edition is issued. The regulations were last updated by a final rule dated October 1, 2004, (69 FR 58804), which incorporated by reference the 2001 Edition and 2002 and 2003 Addenda of Sections III and XI, Division 1, of the ASME BPV Code and the 2001 Edition and 2002 and 2003 Addenda of the ASME OM Code.

This analysis will not consider regulatory alternatives to incorporating the Code because this action complies with the Commission's staff requirements memorandum (SRM) of April 13, 2000, directing the staff to follow the NRC's longstanding policy of updating § 50.55a to incorporate by reference newer editions and addenda to the ASME BPV Code and OM Code. Nor does this analysis discuss alternatives to incorporating augmented reactor head inspection requirements because this action complies with the Commission's SRM of August 6, 2004 in which the Commission unanimously approved incorporating an upcoming ASME Code Case or a revision of the ASME Code into 10 CFR 50.55a. (This subsequently turned out to be Code Case N-729-1). This analysis discusses regulatory alternatives to requiring the use of a Code Case (N-722) for augmented inspections of components fabricated of Alloy 600/82/182. Next it examines the costs and benefits of incorporating the ASME and OM Codes and the Code Cases to licensees. It then discusses the parts of the ASME Code that are not being adopted or being limited in use, backfitting, and ends by stating the effect of this regulatory action on small entities.

2 Augmented Inspection Program of components of Alloy 600/82/182: alternatives to requiring the use of a Code Case

This section discusses regulatory alternatives to requiring the use of Code Case N-722 for augmented inspections of components of Alloy 600/82/182. The staff is proposing to incorporate the requirements of this Code Case with conditions, into 10 CFR Part 50.55a(g)(6)(ii). The Code Case provides clear and effective visual examination requirements

in a document issued under the ASME BPV Code, the standard for U.S. nuclear component inservice inspections. The Code Case requires performing direct visual examination of bare-metal surfaces of susceptible components during refueling outages. The frequency of these inspections depends upon the susceptibility of the components to primary water stress corrosion cracking (PWSCC). The staff is recommending this alterative because it finds that the requirements of ASME Code Case N-722, with conditions, will reasonably assure public health and safety against failures of the reactor vessel pressure boundary (RCPB) from PWSCC.

2.1 Alternative 1 - Take no action

Current ASME Section XI inspection requirements for reactor coolant system (RCS) components do not sufficiently ensure the detection of small amounts of leakage from PWSCC or any resulting boric acid corrosion. Code Case N-722 recommends inspections that greatly increase the probability that such leakage, and any resulting corrosion, will be detected before the the RCS pressure boundary degrades to an unsafe condition. However, the rules of this code case are not mandatory for licensees. A solution to address this safety problem would be for the ASME to incorporate the rules of Code Case N-722 into Section XI but the ASME is not pursuing such a task and has no schedule to do so. This alternative is unacceptable because it does not ensure adequate safety.

2.2 Alternative 2 - Issue an NRC Bulletin

Since 2002 the NRC has issued three bulletins on PWSCC of RCS components and on corrosion of RCS components that could result from leakage from PWSCC. Although these bulletins were highly effective for addressing specific issues, they were not intended to address the range of potential locations susceptible to PWSCC. Furthermore, bulletins are generally issued to collect information and are not an effective regulatory tool for long-term inspection programs.

2.3 Alternative 3 - Endorse an Industry Program to Address Issue

The industry's Materials Reliability Program (MRP) participated in the development of Code Case N-722 and also has its own ongoing program to develop guidelines on additional inspection requirements for RCS components susceptible to PWSCC and any resulting corrosion. However, the technical adequacy of this program, when it becomes finalized, is not guaranteed. The NRC staff's review of a higher priority MRP program for managing PWSCC in nickel-based alloy butt welds resulted in a number of significant comments and recommendations and so the staff may similarly respond to additional MRP guidelines for the inspection of RCS components susceptible to PWSCC. The content of the guidelines and the MRP schedule for completing this program are uncertain, as are the schedule and resolution of any staff comments. The MRP has indicated that additional guidelines for managing PWSCC will be issued as "mandatory" requirements under the NEI-03-08 industry initiative. NRC inspections would be the only way to monitor implementation if the staff were to rely on the MRP program. The staff believes that this alternative has many shortcomings.

3 Regulatory Impact - Qualitative/Quantitative Costs and Benefits

This regulatory analysis will examine the costs and benefits to licensees of incorporating the 2004 Edition of the ASME Codes. First, however, it discusses disaggregation.

3.1 Disaggregation

According to Section 4.3.2, "Criteria for the Treatment of Individual Requirements" of the Regulatory Analysis Guidelines (hereafter referred to as Guidelines), in evaluating a proposed regulatory initiative, the NRC usually performs a regulatory analysis for the entire rule to determine whether or not it is cost justified. However, aggregating or bundling different requirements in a single analysis could potentially mask the inclusion of an unnecessary individual requirement. In the case of a rule that provides a voluntary alternative to current requirements, the net benefit from the relaxation of one requirement could potentially support a second unnecessary requirement that is not cost justified. Therefore, under the Guidelines, when analyzing and making decisions about regulatory initiatives that are composed of individual requirements, the NRC must determine if it is appropriate to include each individual requirement (disaggregation).

The Guidelines further state that a special case involves the NRC's periodic review and endorsement of consensus standards, such as new versions of the ASME Code because they tend to be noncontroversial and have already undergone extensive external review and been endorsed by industry. In addition, endorsement of the ASME Code has been longstanding NRC policy. Licensees participate in the development of the ASME Code and know when receiving their operating licenses that updating the ASME Code is part of the regulatory process. Finally, endorsement of the ASME Code is consistent with the National Technology Transfer and Advancement Act, inasmuch as the NRC has determined that there are sound regulatory reasons for establishing regulatory requirements for design, maintenance, inservice inspection and inservice testing by rulemaking.

Evaluating the benefits and costs of each individual provision in a regulatory analysis would be a monumental task and the value gained by performing such an exercise would be limited. These NRC endorsements can typically involve hundreds, if not thousands, of individual provisions. Thus, although regulatory actions endorsing these consensus standards must be addressed in a regulatory analysis, it is not necessary for the regulatory analysis to address the individual provisions of the consensus standards. Therefore, disaggregation will not be discussed further.

3.2 Costs and Benefits

Incorporation by reference of more recent editions and addenda of Section III, Division 1, of the ASME BPV Code does not affect a plant that has received a construction permit or an operating license or an approval of a design, because the edition and addenda to be used in constructing a plant are, by rule, determined by the date of the construction permit, and are not changed thereafter, except voluntarily by the licensee. However, incorporation by reference of more recent editions and addenda of Section XI, Division 1 of the ASME BPV Code, and the ASME OM Code affects licensees differently. That is, licensees are required by §§ 50.55a(f) and (g) to update their IST and ISI programs every 120 months to a more recent edition and addenda

of Section XI, Division 1 of the ASME BPV Code, and the ASME OM Code. Therefore, this draft regulatory analysis addresses the expected costs and benefits of implementing the changes of the 2004 Edition Section XI, Division 1 of the ASME BPV Code and the ASME OM Code (e.g., non editorial changes).

The costs and benefits of licensees' updating their ISI and IST programs to a new edition and addenda of the ASME Code every 120 months are difficult to quantify because neither the NRC staff nor ASME performs detailed quantified cost and benefit analyses of the individual changes to the ASME Code. The burden associated with revising ISI and IST programs and procedures every 120 months versus the cost savings associated with implementing new, more cost-effective methods for ISI and IST in newer editions and addenda of the ASME Code has not been determined. However, the staff notes that considerations of increased safety versus cost are implicit in the ASME consensus process. Although the Code revisions may not be rigorously analyzed for costs versus benefits, the costs and benefits are implicitly weighed in the course of their development.

Further, ISI requirements that assure the integrity of the RCS boundary and containment relate to defense-in-depth considerations that do not lend themselves to cost/benefit analyses. Moreover, RCS components degrade as they age, and ISI programs are relied upon to manage the effects of aging of components. Cost/benefit analyses are also not well suited to assess the appropriateness of new requirements that address aging of components because of the many uncertainties associated with the effects of aging.

The Code provisions being endorsed through this action rely on record-keeping and reporting requirements already approved in 10 CFR 50.55a. Thus, there are no new record-keeping or reporting requirements associated with this action.

In conclusion, the assessment to justify this regulatory action must be primarily based on judgment rather than specific cost estimates. Still, some data does exist that can be used for estimates of costs and benefits of changes (i.e., non editorial changes) in the 2004 Edition of Section XI of the ASME BPV Code and the ASME OM Code as analyzed below. Estimates are quantitative where the data exists; and qualitative where it does not.

3.2.1 Section XI of the ASME BPV Code

Of all the changes to Section XI, only three affect costs and benefits.

3.2.1a Alternative examination requirements for PWR Control Rod Drive (CRD) Housing Welds

Paragraph IWB-2500(b), Examination Category B-O of Table IWB-2500-1, Figure IWB-2500-18, Table IWB-3410-1 and IWB-3523 of the 2004 Edition of Section XI of the ASME BPV Code provide alternative examination requirements for PWR CRD housing welds and add new examination requirements for in-core-instrumentation (ICI) housing welds larger than 2-inch nominal pipe schedule (NPS). Recent experience, CRD designs, and operational practices indicate that the potential exists for transgranular stress corrosion cracking in these housing welds. This potential is limited to PWRs, because they could trap oxygenated water in these

penetrations during normal plant start-up. Thirty one plants have CRD housing welds and 8 plants have ICI housing welds that would be subject to examination under this action.

Reporting requirements. It is estimated that this change would increase reporting requirements for 31 plants by 1 hr/plant/10 years and for 8 plants by 0.5 hrs/plant/10 years. At less than $105/hour for the reporting expenditure, the cost per plant would be negligible.

Record keeping requirements. This change is estimated to increase record keeping requirements for 31 plants by 2 hr/plant/10 years and for 8 plants by 2 hrs/plant/10 years. At less than $100/hour, the cost per plant would be negligible.

Safety. The provision would increase safety owing to standard approach provided by the Code.

Examination Cost. The change is estimated to increase nondestructive examination costs for 31 plants at a cost of up to $1000 per weld. Eight plants with in-core instrumentation welds would also have an additional cost of up to $1000 per weld. (Generally only a small number of CRD housing welds (usually 1 to 2) are examined each 10 year interval.) The total cost increase to the industry could range up to $47,000 over a 10 year period.

Radiation Exposure. Radiation exposure is estimated to increase by 0.1 rem/10 years for each of 31 plants and 0.2 rem/10 years for each of 8 plants.

3.2.1b Evaluation Methods and Acceptance Criteria for Alloy 600 PWR Reactor Vessel Head Penetration Nozzles

Paragraphs IWB-3660, IWB-3661, IWB-3662, Figure IWB-3662-1, IWB-3663, Table IWB-3663-1, and Appendix O of the 2004 Edition of Section XI of the ASME BPV Code add new requirements to the fracture mechanics evaluation of planar flaws in PWR reactor vessel head penetrations caused by stress corrosion cracking. The new requirements do not apply to nozzles larger than 8 inches outside diameter, nor to partial-penetration J-groove welds. The revision permits nonleaking flaws to remain in service that are not expected to jeopardize the structural integrity of the nozzle. The revision incorporates the provisions of Case N-694, "Evaluation Procedure and Acceptance Criteria for PWR Reactor Vessel Upper and Bottom Head Penetrations, Section XI, Division 1."

The benefits of this change are qualitative. The change increases safety, and reduces repair cost significantly owing to the standard approach provided by the Code change. It reduces downtime and radiation exposure owing to the Code revision versus a flaw repair.

3.2.1c Appendix VII, Table VII-4110-1, VII-4121, VII-4122, and VII-4123, NDE Level III Qualifications

This revision eliminates the nuclear experience requirements for Level III ultrasonic examiners. Other NDE methods, such as surface examination and radiography do not require this additional experience. The benefits of this revision are qualitative. This revision does not affect reporting requirements, safety, cost, or downtime. It eliminates the need to verify nuclear experience, reduces requirements, and may reduce radiation exposure by not requiring

experienced and qualified ultrasonic personnel to acquire nuclear experience before certification.

3.2.2 ASME OM Code

The revisions to the OM Code, except for one (evaluated below), will not affect reporting or recordkeeping requirements or cause the cost to licensees to implement the OM Code requirements to either increase or decrease significantly.

Appendix I-3410, "Class 1 main steam pressure relief valves with auxiliary actuating devices," would be revised to eliminate on-line stroke testing requirements for main steam pressure relief valves and could be applied in testing an estimated 3 valves per year per plant. The personnel savings is estimated at about 3 hours per valve. It is estimated that 18 plants would use this revision. (Only BWRs are affected and about one half of those already have relief from the requirements.) The annual burden reduction is estimated to be about $17,000 (3 valves/plant x 3 hours/valve x 18 plants x $105/hour). In addition, millions of dollars could be saved in power production by avoiding shutdowns caused by valves leaking from the on-line testing and delays in startup to perform the on-line stroking procedure.

3.2.3 Augmented Inspection Program: Codifying Code Cases N-722 and N-729

3.2.3a Alloy 600/82/182 Inspection Requirements

The effect of codifying ASME Code Case N-722, could significantly affect licensees owing to the number and variety of components requiring insulation to be removed or redesigned to permit bare-metal visual inspections and work in high radiological dose areas. In all, nineteen new inspection areas would have to be inspected under N-722.

The staff has conservatively estimated the per year cost and radiological dose exposure that a licensee would incur if it were required to perform all inspections detailed in Code Case N-722. The staff estimates a range in cost from approximately $30 thousand to $315 thousand per year and a one time cost for modifications ranging from no additional expenditure to $410 thousand. The staff estimates the radiological dose in a range from 0.36 to 4.8 person-rem per year with the high end of the range including a one time dose estimate for making modifications. These numbers are an overestimate because many licensees do not have all the component item numbers identified for inspection under Code Case N-722. The staff estimates do bound the values contained in the ASME White Paper on Code Case N-722 developed with the code case.

3.2.3b Reactor Vessel Head Inspection Requirements

The effect of codifying Code Case N-729-1 would be equivalent to that of complying with NRC order EA-03-009 and First Revised Order EA-03-009. Under the Order, licensees were required to implement an ongoing inspection program of the RPV head and head penetrations at specified intervals. This rulemaking would result in a continuing inservice inspection program for RPV head and associated penetrations, with inspections performed at specific intervals and of a specific type equivalent to those of the Order.

Likewise, the costs of the inspections would be equivalent. Under the Order, as provided in MRP-50, *Response to NRC Comments on MRP-44 Part 2*, dated June 2001, non-visual examinations cost between $1 million to $2 million per plant, per inspection, while visual examinations cost approximately $200 K per plant, per inspection. These cost estimates were verified by recent NRC employees from previous industry positions.

The radiological dose accumulation of the inspections would also be equivalent. Under the Order, as provided in MRP-50, *Response to NRC Comments on MRP-44 Part 2*, dated June 2001, non-visual examinations caused a radiological dose of 4 person-rem, while visual examinations caused a radiological dose of 6 person-rem. These dose estimates were considered high estimates for visual examinations by recent NRC employees from previous industry positions, owing to advances in visual examination dose reduction techniques.

Under Code Case N-729-1, as conditioned by the staff, a licensee of a plant with a high RPV upper head temperature would be required to perform visual and non-visual examinations each outage. The estimated cost to this type of licensee would be $2.2 Million and approximately 10 person-rem per year. However, a significant number of licensees in this category have chosen to replace their RPV upper head with more PWSCC resistant materials. These plants would be on a significantly reduced inspection frequency, and thus, would not incur this cost each outage. For a plant with a low RPV upper head temperature, visual and non-visual examinations would be required over a five or eight year interval, respectively, at an estimated cost of $0.3 Million and approximately 1.7 person-rem per year.

4 Parts of the ASME Code That Are Not Being Adopted or Having Limitations Added

No new limitations or modifications would be applied to ASME Section III or the OM Code (except for a minor editorial changes); therefore, this section will discuss the parts of Section XI of the ASME BPV Code that are not being adopted or are being limited.

4.1 10 CFR 50.55a(b)(2)(xii) - Mechanical Clamping Devices

Paragraph 50.55a(b)(2)(xiii) permits licensees to use the provisions of Code Case N-523-1, "Mechanical Clamping Devices for Class 2 and 3 Piping." The proposed revision would remove 10 CFR 50.55a(b)(2)(xiii) because Code Case N-523-2, which provides updated requirements to those of Code Case N-523-1, has been accepted in Regulatory Guide 1.147, Revision 14, which is incorporated by reference into 10 CFR 50.55a(g)(4)(i) and 10 CFR 50.55a(g)(4)(ii). There is no impact associated with this proposed modification.

4.2. 10 CFR 50.55a(b)(2)(xx) - System Leakage Tests

Paragraph 50.55a(b)(2)(xx) would be revised to require that after system leakage tests performed during repair and replacement activities by welding or brazing under the 2003 Addenda through the latest edition and addenda incorporated by reference in 10 CFR 50.55a(b)(2), NDE must be performed in accordance with IWA-4540(a)(2) of the 2002 Addenda of Section XI. This provision would require that (1) the NDE method and acceptance criteria of the 1992 edition or later of Section III be met prior to returning the system to service, and that (2) a system leakage test be performed in accordance with IWA-5000 prior to or as part of returning the system to service.

Industry arguments to eliminate the nondestructive examination have been from an operational rather than a safety perspective. A safety assessment has not been provided to demonstrate that without volumetric examination, a system leakage pressure test alone provides a level of safety equivalent to a hydrostatic pressure test, only that a volumetric examination is excessively burdensome. NRC therefore concludes that to reasonably assure public health and safety, when performing a system leakage test in lieu of a hydrostatic test after repair/replacement activities, a nondestructive examination must be performed. It must be performed in accordance with the nondestructive examination provision in IWA-4540(a)(2) of the 2002 Addenda of Section XI because the agency has already accepted this provision by virtue of approving Code Case N-416-3 in Regulatory Guide 1.147, Revision 14. That provision states that, (a) The nondestructive examination method and acceptance criteria of the 1992 edition or later of Section III shall be met prior to return to service, and, (b) A system leakage test shall be performed in accordance with IWA-5000 prior to or as part of returning to service.

There is no impact associated with this modification.

4.3 10 CFR 50.55a(b)(2)(xxi) - *Table IWB-2500-1 Examination Requirements.*

Paragraph 50.55a(b)(2)(xxi)(A) states that "...A visual examination with enhanced magnification that has a resolution sensitivity to detect a 1-mil [0.001 inch] width wire or crack, utilizing the allowable flaw length criteria in Table IWB-3512-1, 1997 Addenda through the latest edition and addenda incorporated by reference in paragraph (b)(2) of this section, may be performed in place of an ultrasonic examination..."

Paragraph 10 CFR 50.55a(b)(2)(xxi)(A) would be revised to be consistent with the condition for Code Case N-648-1 in Regulatory Guide 1.147, Revision 14, which requires the assumption of a limiting flaw aspect ratio when using the allowable flaw length criteria in Table IWB-3512-1 during an enhanced visual examination. The proposed revision would state: "...A visual examination with enhanced magnification that has a resolution sensitivity to detect a 1-mil (0.001 inch) width wire or crack, using the allowable flaw length criteria in Table IWB-3512-1, 1997 Addenda through the latest edition and addenda incorporated by reference in paragraph (b)(2) of this section, *with a limiting assumption on the flaw aspect ratio (i.e., a/l=0.5, where a and l are the depth and length of the crack, respectively)*, may be performed instead of an ultrasonic examination...". This limitation is needed because visual examination cannot determine the depth of cracks. A visual examination requirement may be applied only when a limiting flaw aspect ratio of 0.5 is assumed. A flaw aspect ratio of less than 0.5 would not be conservative. As shown in Table IWB-3512-1, there are no flaw aspect ratios higher than 0.5.

There is no impact associated with this modification.

4.4 10 CFR 50.55a(b)(2)(xxviii) - Evaluation Procedure and Acceptance Criteria for PWR Reactor Vessel Head Penetration Nozzles.

In the 2004 Edition of ASME Section XI, IWA-3660 specifies evaluation procedure and acceptance criteria for flaws that are detected in upper and lower reactor vessel head penetration nozzles in PWRs. The procedure and acceptance criteria in IWB-3660 were adopted from Code Case N-694-1. Under IWB-3660, IWB-3662 specifies that the flaw shall be evaluated using analytical procedures such as those described in non-mandatory Appendix O,

"Evaluation of Flaws in PWR Reactor Vessel Upper Head Penetration Nozzles," to the ASME Code, Section XI. There is a typographical error in paragraph O-3220(b), equation S_R = [1 - 0.82R] $^{-22}$. The exponent should be -2.2, not -22. Paragraph 50.55a(b)(2)(xxviii) would be added to the regulation to ensure that the correct exponent is used. The exponent in Appendix O was shown to be erroneous by an NRC report, NUREG/CR-6721, "Effects of Alloy Chemistry, Cold Work, and Water Chemistry on Corrosion Fatigue and Stress Corrosion Cracking of Nickel Alloys and Welds," April 2001.

There is no impact associated with this modification.

5. Backfit Considerations

The NRC's Backfit Rule in 10 CFR 50.109 states that the Commission shall require the backfitting of a facility only when it finds the action to be justified under specific standards stated in the rule. Section 50.109(a)(1) defines backfitting as the modification of or addition to systems, structures, components, or design of a facility; or the design approval or manufacturing license for a facility; or the procedures or organization required to design, construct or operate a facility; any of which may result from a new or amended provision in the Commission rules or the imposition of a regulatory staff position interpreting the Commission rules that is either new or different from a previously applicable staff position after issuance of the construction permit or the operating license or the design approval.

Section 50.55a requires nuclear power plant licensees to construct ASME BPV Code Class 1, 2, and 3 components in accordance with the rules provided in Section III, Division 1, of the ASME BPV Code; inspect Class 1, 2, 3, Class MC, and Class CC components in accordance with the rules provided in Section XI, Division 1, of the ASME BPV Code; and test Class 1, 2, and 3 pumps, valves, and dynamic restraints (snubbers) in accordance with the rules provided in the ASME OM Code. This proposed rule would incorporate by reference the 2004 Edition of Section III, Division 1, of the ASME BPV Code; Section XI, Division 1, of the ASME BPV Code; and the ASME OM Code.

Incorporation by reference of more recent editions and addenda of Section III, Division 1, of the ASME BPV Code does not affect a plant that has received a construction permit or an operating license or a design that has been approved, because the edition and addenda to be used in constructing a plant are, by rule, determined on the basis of the date of the construction permit, and are not changed thereafter, except voluntarily by the licensee. Thus, incorporation by reference of a more recent edition and addenda of Section III, Division 1, does not constitute a "backfitting" as defined in § 50.109(a)(1).

Incorporation by reference of more recent editions and addenda of Section XI, Division 1, of the ASME BPV Code and the ASME OM Code affect the ISI and IST programs of operating reactors. However, the Backfit Rule generally does not apply to incorporation by reference of later editions and addenda of the ASME BPV Code (Section XI) and OM Code. The NRC's longstanding policy has been to incorporate later versions of the ASME Codes into its regulations. This is codified in § 50.55a which requires licensees to revise their ISI and IST programs every 120 months to the latest edition and addenda of Section XI of the ASME BPV Code and the ASME OM Code incorporated by reference into § 50.55a that is in effect 12 months prior to the start of a new 120-month ISI and IST interval. Thus, when the NRC

endorses a later version of the Code, it is implementing this longstanding policy and requirement.

Other circumstances where the NRC does not apply the Backfit Rule to the endorsement of a later Code are as follows.

(1) When the NRC takes exception to a later ASME BPV Code or OM Code provision but merely retains the current existing requirement, prohibits the use of the later Code provision, limits the use of the later Code provision, or supplements the provisions in a later Code, the Backfit Rule does not apply because the NRC is not imposing new requirements. However, the NRC explains any such exceptions to the Code in the Statement of Considerations and regulatory analysis for the rule.

(2) When an NRC exception relaxes an existing ASME BPV Code or OM code provision but does not prohibit a licensee from using the existing Code provision, the Backfilt Rule does not apply because the NRC is not imposing new requirements.

(3) Modifications and limitations imposed during previous routine updates of paragraph 50.55a have established a precedent for determining which modifications or limitations are backfits or require a backfit analysis (*e.g.*, final rule dated October 1, 2004 (69 FR 58804). The application of the backfit requirements to modifications and limitations in the current proposed rule are consistent with the application of backfit requirements to modifications and limitations in previous rules.

There are some circumstances in which the endorsement of a later ASME BPV Code or OM Code introduces a backfit. In these cases, the NRC would perform a backfit analysis or documented evaluation in accordance with paragraph 50.109. These include the following:

(1) When the NRC endorses a later provision of the ASME BPV Code or OM Code that takes a substantially different direction from the existing requirements, the action is treated as a backfit, *see, e.g.*, 61 FR 41303 (August 8, 1996).

(2) When the NRC requires implementation of later ASME BPV Code or OM Code provision on an expedited basis, the action is treated as a backfit. This applies when implementation is required sooner than it would be required if the NRC simply endorsed the Code without any expedited language, *see, e.g.*, 64 FR 51370 (September 22, 1999).

(3) When the NRC takes an exception to a ASME BPV Code or OM Code provision and imposes a requirement that is substantially different from the existing requirement as well as substantially different than the later Code, *see, e.g.*, 67 FR 60529 (September 26, 2002).

The backfitting discussion for the proposed revisions to 10 CFR 50.55a is set forth below:

1. Remove 10 CFR 50.55a(b)(2)(xi) concerning components exempt from examination

This change would remove an existing limitation on the use of 1989 Addenda and later editions and addenda of the ASME Code, Section XI, regarding the use of subarticle IWB-1220 in the examinations of welds in the inaccessible locations. Licensees have either committed to

perform augmented inspection or have followed the provisions of Generic Letter 88-01 and NUREG-0313 in examining the inaccessible welds. Therefore, this change is not considered as a backfit under 10 CFR 50.109.

2. Remove 10 CFR 50.55a(b)(2)(xiii) concerning the provisions of Code Case N-523-1, "Mechanical Clamping Devices for Class 2 and 3 Piping."

Paragraph 10 CFR 50.55a(b)(2)(xiii) states that "Licensees may use the provisions of Code Case N-523-1, "Mechanical Clamping Devices for Class 2 and 3 Piping." Paragraph 10 CFR 50.55a(b)(2)(xiii) does not require, but provides an option for, licensees to use Code Case N-523-1. In 2000, ASME updated Code Case N-523-1 to N-523-2 without changes to technical requirements. Code Case N-523-2, "Mechanical Clamping Devices for Class 2 and 3 Piping," has been accepted in RG 1.147, Revision 14, which is incorporated by reference into paragraphs 10 CFR 50.55a(g)(4)(i) and 10 CFR 50.55a(g)(4)(ii). Code Case N-523-2 may be used by licensees without requesting authorization. According to RG 1.147, Revision 14, Code Case N-523-1 has been superseded by Code Case N-523-2. It is stated in RG 1.147, Revision 14, that "After the ASME annuls a Code Case and the NRC amends 10 CFR 50.55a and this guide [RG 1.147], licensees may not implement that Code Case for the first time. However, a licensee who implemented the Code Case prior to annulment may continue to use that Code Case through the end of the present ISI interval. An annulled Code Case cannot be used in the subsequent ISI interval unless implemented as an approved alternative under 10 CFR 50.55a(a)(3)..." The NRC has not annulled or prohibited the use of Code Case N-523-1 in RG 1.147, Revision 14. Licensees who have used Code Case N-523-1 may continue to use it. The NRC is not imposing new requirements by removing 10 CFR 50.55a(b)(2)(xiii). Therefore, the removal of 10 CFR 50.55a(b)(2)(xiii) is not a backfit.

3. Modify 10 CFR 50.55a(b)(2)(xv) to implement Appendix VIII of Section XI, the 1995 Edition through the 2004 Edition of the ASME BPV Code.

This change would update the edition of the ASME Code in 10 CFR 50.55a(b)(2)(xv), therefore, is not considered as a backfit under 10 CFR 50.109.

4. Add 10 CFR 50.55a(b)(2)(xx) to require nondestructive examination (NDE) provision in IWA-4540(a)(2) of the 2002 Addenda of Section XI when performing system leakage tests.

Subarticle IWA-4540(a)(2) of the 2002 Addenda of the ASME Code, Section XI, requires a nondestructive examination be performed in combination with a system leakage test during repair/replacement activities. Subarticle IWA-4540(a)(2) of the 2003 Addenda through later editions and addenda of the ASME Code, Section XI, does not specify a nondestructive examination after a system leakage test. The proposed addition would require, as part of repair and replacement activities, that a nondestructive examination be performed per IWA-4540(a)(2) of the 2002 Addenda of the ASME Code, Section XI, after a system leakage test is performed per subarticle IWA-4540(a)(2) of the 2003 Addenda through later editions and addenda of the ASME Code, Section XI.

As it is stated above, when the NRC takes exception to a later ASME BPV Code provision but merely retains the existing requirement, prohibits the use of the later Code provision, limits the

use of the later Code provision, or supplements the provisions in a later Code, the Backfit Rule does not apply because the NRC is not imposing new requirements. The addition retains the system leakage test requirement in IWA-4540(a)(2) of the 2003 Addenda through the later editions and addenda of the ASME Code, Section XI, but supplements it with the nondestructive examination of IWA-4540(a)(2) of the 2002 Addenda of the Code. The proposed addition does not represent a new staff requirement because the nondestructive examination requirement is specified in previous addenda of the Code. Therefore, this change is not considered as a backfit under 10 CFR 50.109.

5. Revise 10 CFR 50.55a(b)(2)(xxi) to be consistent with the NRC's imposed condition for Code Case N-648-1 in Regulatory Guide 1.147, Revision 14.

This change would align the conditions imposed on visual examinations in 10 CFR 50.55a(b)(2)(xxi) with the conditions imposed on Code Case N-648-1 in Regulatory Guide 1.147, Revision 14 (70 FR 5680; Sept 29, 2005). The imposed conditions do not represent a new staff position. Therefore, this change is not considered as a backfit under 10 CFR 50.109.

6. Add 10 CFR 50.55a(b)(2)(xxviii) to correct a typographical error regarding an exponent in the evaluation of PWR reactor vessel head penetration nozzles.

This change would correct a typographical error in an equation used in the flaw evaluation in the ASME Section XI. Therefore, this change is not considered as a backfit under 10 CFR 50.109.

7. Remove 10 CFR 50.55a(g)(6)(ii)(A) and associated subparagraphs on the augmented examination of the reactor vessel.

This change would remove a one-time examination requirement which has been completed by all current licensees, and, therefore, is not considered as a backfit under 10 CFR 50.109. Future licensees will be subject to other Code provisions that preclude the need for this one-time examination.

8. Add Paragraph (D) to 10 CFR 50.55a(g)(6)(ii) - Augmented inspection of PWR Reactor Vessel Heads

The requirements in paragraph D, which impose ASME Code Case N-729-1 with conditions, were already imposed on existing licensees under NRC First Revised Order EA-03-009. Therefore, this requirement is not considered a backfit under 10 CFR 50.109(a)(1).

9. Add Paragraph (E) to 10 CFR 50.55a(g)(6)(ii) - Augmented Inspection of Class 1 Components Fabricated with Alloy 600/82/182 Materials

The NRC proposes to add 10 CFR 50.55a(g)(6)(ii)(E) to require augmented inspections of Class 1 components fabricated with Alloy 600/82/182 materials. The augmented inspection will consist of the requirements in Code Case N-722 which specifies inservice inspection for PWR ASME Code Class 1 components containing materials susceptible to PWSCC and NRC imposed conditions to the Code Case to require additional NDE when leakage is detected and expansion of the inspection sample size if a circumferential PWSCC flaw is detected. The

intent of conditioning the Code Case is to identify leakage of and prevent unacceptable cracks and corrosion in Class 1 components, which are part of RCPB. The proposed requirements may considered backfitting under 10 CFR 50.109(a)(1). However, the NRC believes that the requirements are necessary for compliance with Commission requirements and/or license provisions. Therefore a backfit analysis need not be prepared under the "compliance" exception in 10 CFR 50.109(a)(4)(i). The following discussion constitutes the documented evaluation to support the invocation of the compliance exception.

Failure of the RCPB could result in unacceptable challenges to reactor safety systems that, combined with other failures, could lead to the release of radioactivity to the environment. Based on PWSCC experience in PWRs, the NRC concludes that there is a reasonable likelihood that PWR licensees would not be in compliance with appropriate regulatory requirements and current licensing basis with respect to structural integrity and leak-tightness throughout the term of the operating license, should PWSCC occur in their plants. The general design criteria (GDC) for nuclear power plants (Appendix A to 10 CFR Part 50) provide the regulatory requirements for the NRC's assessment of the potential for, and consequences of, degradation of the RCPB. The applicable GDCs include GDC 14 and GDC 31. GDC 14 specifies that the RCPB be designed, fabricated, erected, and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture. GDC 31 specifies that the probability of rapidly propagating fracture of the RCPB be minimized.

The nuclear plants that were licensed before GDC were incorporated in 10 CFR Part 50 also would not be in compliance with their licensing basis which requires maintenance of the structural and leakage integrity of the RCPB.

Leakage of primary system coolant as a result of PWSCC in Alloy 600/82/182 material is a non-compliance with GDC 14 and 31 and licensing bases because there have been many cases of leakage as a result of PWSCC of Alloy 600/82/182 material in PWRs. Therefore, leakage as a result of PWSCC has not been shown to be of extremely low probability (i.e. a non-compliance with GDC 14). In addition, the operating experience has shown that the crack growth rate of PWSCC in Alloy 600/82/182 material can be rapid. If PWSCC is not detected and removed, a crack, especially a circumferential crack in a pipe, would increase the probability of rapidly propagating fracture of RCPB (i.e, a violation of GDC 31). Therefore, PWSCC in Alloy 600/82/182 material, if undetected, would be detrimental to the structural and leakage integrity of the RCPB. Code Case N-722 with conditions provides inspection requirements to detect PWSCC so that licensees can repair or replace the affected components, thereby maintaining the structural and leakage integrity of the RCPB, assuring an extremely low probability of abnormal leakage, and the minimizing the probability of a rapidly propagating fracture of the RCPB.

The NRC concludes that licensees will not be in compliance with GDC and their licensing basis for structural and leakage integrity of Class 1 components that were made of Alloy 600/82/182 material throughout the term of their license (including any renewal periods) absent the imposition of Code Case N-722 with conditions. The NRC concludes, therefore, that the proposed 10 CFR 50.55a(g)(6)(ii)(E) is a compliance backfit under 10 CFR 50.109(a)(4)(i).

6 Conclusion

The NRC staff finds that it is beneficial to incorporate by reference into § 50.55a the 2004 Edition of Section III, Division 1, of the ASME BPV Code subject to the modifications and limitations identified; Section XI, Division 1, of the ASME BPV Code subject to modifications and limitations; the ASME OM Code subject to no new modifications or limitations; and Code Cases N-722 and N-729-1, both with limitations.

7 Impact on Small Entities

In accordance with the Regulatory Flexibility Act of 1980, 5 U.S.C. 605(b), the Commission has certified that this rule will not have a significant economic impact on a substantial number of small entities. This proposed rule would affect only the licensing and operation of nuclear power plants. The companies that own these plants do not fall within the scope of the definition of small entities set forth in the Regulatory Flexibility Act or the size standards established by the NRC (10 CFR 2.810).