Regulatory Analysis for Proposed Rule: Incorporation by Reference of American Society of Mechanical Engineers Codes and Code Cases

NRC-2011-0088; RIN 3150-AI97

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation

Table of Contents

List of Tables

Abbreviations

ADAMS	Agencywide Documents Access and Management System
ASME	American Society of Mechanical Engineers
BLS	Bureau of Labor Statistics
BPV	boiler and pressure vessel
CASS	cast austenitic stainless steel
CC	Concrete Containment
CDF	core damage frequency
CFR	*Code of Federal Regulations*
CPI	Consumer Price Index
GALL	generic aging lessons learned
GDC	general design criteria
GL	generic letter
ISI	inservice inspection
IST	inservice testing
kg	kilogram
LERF	large early release frequency
LWR	light water reactor
MC	metal containment
MOV	motor-operated valve
NDE	nondestructive examination
NPV	net present value
NRC	U.S. Nuclear Regulatory Commission
NTTAA	National Technology Transfer and Advancement Act
OM	operation and maintenance
OM Code	Code for Operation and Maintenance of Nuclear Power Plants
OMB	Office of Management and Budget
POV	power-operated valve
PSI	preservice inspection
PWR	pressurized-water reactor
PWSCC	primary water stress-corrosion cracking
QAPD	quality assurance program description
RCPB	reactor coolant pressure boundary
Ref.	reference
RPV	reactor pressure vessel
RT	reference temperature
RTNSS	regulatory treatment of nonsafety systems
SRP	Standard Review Plan

t_n	nominal pipe wall thickness
TS	technical specifications
VT	visual testing

1. Introduction

This document presents the regulatory analysis for the proposed rule (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14065A203) (Ref. 8.9). The recommended regulatory action incorporates by reference within the proposed rule:

(1) the 2009 Addenda, the 2010 Edition, the 2011 Addenda, and the 2013 Edition to the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (BPV Code), Section III, Division 1 and ASME BPV Code, Section XI, Division 1

(2) the 2009 Edition and the 2011 Addenda to the ASME Operation and Maintenance of Nuclear Power Plants, "Division 1: Section IST Rules for Inservice Testing of Light-Water Reactor Power Plants" and the 2012 Edition to the ASME Operation and Maintenance of Nuclear Power Plants, Division 1: "OM Code: Section IST" (referred to collectively as the OM Code)

(3) ASME BPV Code Case N-770-2, "Alternative Examination Requirements and Acceptance Standards for Class 1 PWR Piping and Vessel Nozzle Butt Welds Fabricated with UNS N06082 or UNS W86182 Weld Filler Material With or Without Application of Listed Mitigation Activities Section XI, Division 1," ASME approval date: June 9, 2011 (with conditions on its use)

(4) ASME BPV Code Case N-729-4, "Alternative Examination Requirements for PWR Reactor Vessel Upper Heads With Nozzles Having Pressure-Retaining Partial-Penetration Welds Section XI, Division 1," ASME approval date: June 22, 2012 (with conditions on its use)

(5) ASME BPV Code Case N-824, "Ultrasonic Examination of Cast Austenitic Piping Welds From the Outside Surface Section XI, Division 1," ASME approval date: October 16, 2012 (with conditions on its use)

(6) ASME OM Code Case OMN-20, "Inservice Test Frequency"

(7) for the first time ASME NQA-1, "Quality Assurance Requirements for Nuclear Facility Applications," including the 1983 Edition through the 1992 Addenda to the 1989 Edition; the 1994 Edition; the 2008 Edition; and the 2009-1a Addenda to the 2008 Edition (with conditions on its use)

2. Statement of the Problem and Objective

ASME develops and publishes the BPV Code that contains requirements for design, construction, and inservice inspection (ISI) of nuclear power plant components, and the OM Code that contains requirements for inservice testing (IST) of nuclear power plant components. Until 2012, ASME issued new editions of the ASME BPV Code every 3 years and addenda to the editions annually, except in years when a new edition was issued. Similarly, the ASME periodically published new editions and addenda of the ASME OM Code. Starting in 2012, the ASME decided to issue editions of its BPV and OM Codes (no addenda) every 2 years with the BPV Code to be issued on the odd years (e.g., 2013, 2015) and the OM Code to be issued on the even years (e.g., 2012, 2014, etc.). The new editions and addenda typically revise provisions of the Codes to broaden their applicability, add specific elements to current provisions, delete specific provisions, and/or clarify them to narrow the applicability of the provision. The revisions to the editions and addenda of the Codes do not significantly change Code philosophy or approach.

It has been the U.S. Nuclear Regulatory Commission's (NRC's) practice to establish requirements for the design, construction, operation, ISI and IST of nuclear power plants by approving the use of editions and addenda of the ASME BPV and OM Codes (ASME Codes) in Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a, "Codes and Standards." The NRC approves or mandates the use of certain parts of editions and addenda of these ASME Codes in 10 CFR 50.55a through the rulemaking process of "incorporation by reference." Upon incorporation by reference of the ASME Codes into 10 CFR 50.55a, the provisions of the ASME Codes are legally binding NRC requirements as delineated in 10 CFR 50.55a, and subject to the conditions on certain specific ASME Codes' provisions that are set forth in 10 CFR 50.55a. The editions and addenda of the ASME BPV and OM Codes were last incorporated by reference into the regulations in a final rule dated June 21, 2011 (76 FR 36232) (Ref. 8.7), subject to NRC conditions.

2.1. Background

The general design criteria (GDC) for nuclear power plants contained in Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 or, as appropriate, similar requirements in the licensing basis for a reactor facility, provide bases and requirements for NRC assessment of the use of generally recognized codes and standards and the potential for, and consequences of, degradation of the reactor coolant pressure boundary (RCPB). The applicable General Design Criteria (GDC) include GDC 1, "Quality Standards and Records," GDC 14, "Reactor Coolant Pressure Boundary," and GDC 32, "Inspection of Reactor Coolant Pressure Boundary."

GDC 1 requires, in part, that:

> Structures, systems, and components important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety function to be performed. Where generally recognized codes and standards are used, they shall be identified and evaluated to determine their applicability, adequacy, and sufficiency and shall be supplemented or modified as necessary to ensure a quality product in keeping with the required safety function.

GDC 14 establishes that:

> The reactor coolant pressure boundary shall 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.

Additionally, GDC 32 establishes that:

> Components which are part of the reactor coolant pressure boundary shall be designed to permit (1) periodic inspection and testing of important areas and features to assess their structural and leak tight integrity, and (2) an appropriate material surveillance program for the reactor pressure vessel.

The National Technology Transfer and Advancement Act of 1995, Pub. L. 104-113 (NTTAA) (Ref. 8.5) mandated that:

> All Federal agencies and departments shall use technical standards that are developed or adopted by voluntary consensus standards bodies, using such technical standards as a means to carry out policy objectives or activities determined by the agencies and departments.

In carrying out this legislation, Federal agencies are to consult with voluntary consensus standards bodies and participate with such bodies in the development of technical standards when such participation is in the public interest and compatible with the agency mission, priorities, and budget resources. If the technical standards are inconsistent with applicable law or otherwise impractical, a Federal agency may elect to use technical standards that are not developed or adopted by voluntary consensus bodies.

Provisions of the ASME BPV Code have been used since 1971 as one part of the framework to establish the necessary design, fabrication, construction, testing, and performance requirements for structures, systems, and components important to safety. Various technical interests (e.g., utility, manufacturing, insurance, regulatory) are represented on the ASME standards committees that develop, among other things, improved methods for the construction and ISI of ASME Class 1, 2, 3, metal containment (MC) and concrete containment (CC) nuclear power plant components. This broad spectrum of stakeholders helps to ensure that the various interests are considered.

In 1990, the ASME published the initial edition of the OM Code that provides rules for IST of pumps and valves. The ASME Committee on Operation and Maintenance of Nuclear Power Plants (ASME OM Committee) developed and maintains the OM Code. The ASME Board on Nuclear Codes and Standards directive transferred responsibility for development and maintenance of rules for the IST of pumps and valves from the ASME Section XI Subcommittee on Nuclear Inservice Inspection to the ASME OM Committee and lead to the development of the OM Code. The ASME intended that the OM Code replace Section XI rules for IST of pumps and valves. The Section XI Committee no longer updates the Section XI rules for IST of pumps and valves that were previously incorporated by reference into NRC regulations.

Section 50.55a of the NRC regulations requires that nuclear power plant owners construct Class 1, Class 2, and Class 3 components in accordance with Section III, Division 1, of the ASME BPV Code. Regulations in 10 CFR 50.55a also require that owners perform ISI of Class 1, Class 2, Class 3, Class MC, and Class CC components in accordance with Section XI, Division 1, of the BPV Code, and that they perform IST of Class 1, Class 2, and Class 3 safety-related pumps and valves in accordance with the OM Code. Code Cases are developed to gain experience with new technology before incorporation into the ASME Code, permit licensees to use advancements in ISI and IST; provide alternative examinations for older plants, provide an expeditious response to user needs, and provide a limited, clearly focused alternative to specific ASME Code provisions.

2.2. Statement of the Problem

In this regulatory action, the NRC is conditioning the use of certain provisions of the 2009 Addenda, 2010 Edition, 2011 Addenda, and the 2013 Edition to the ASME BPV Code, Section III, Division 1 and the ASME BPV Code, Section XI, Division 1, including NQA-1 (with conditions on its use), as well as the 2009 Edition, 2011 Addenda and 2012 Edition to the ASME OM Code and Code Cases N-770-2, N-729-4, N-824, and OMN-20. In addition, the proposed regulatory action does not adopt (“excludes”) certain provisions of the ASME Codes.

If the NRC did not conditionally accept ASME editions, addenda, and Code Cases, the NRC would disapprove these entirely. The effect would be that licensees and applicants could submit a petition for rulemaking requesting the incorporation by reference of the full scope of the ASME Code editions and addenda which would otherwise be approved as proposed in this rulemaking (i.e., the request would not be simply for approval of a specific ASME Code provision with conditions). Alternatively, licensees and applicants could submit a larger number of requests for use of alternatives under 10 CFR 50.55a(z), or requests for exemptions under 10 CFR 50.12 , "Specific Exemptions," or 10 CFR 52.7, "Licenses, Certifications, and Approvals for Nuclear Power Plants." These alternative requests could also include similar broad-scope requests for approval to issue the full scope of the ASME Code editions and addenda. These requests would be an unnecessary additional burden for both the licensee and the NRC, inasmuch as the NRC has already determined that the ASME Codes and Code Cases that are the subject of this regulatory action are acceptable for use (in some cases with conditions).

2.3. Objective

The objective of this regulatory action is to incorporate by reference the 2009 Addenda, 2010 Edition, 2011 Addenda, and 2013 Edition to the ASME BPV Code, Section III, Division 1, and Section XI, Division 1, with conditions on their use. The NRC also proposes to amend its regulations to incorporate by reference the 2009 Edition, the 2011 Addenda, and the 2012 Edition to the ASME OM Code, with conditions on their use. The NRC also proposes to incorporate by reference, with conditions on its use, ASME BPV Code Cases N-729-4, N-770-2, N-824, and OMN-20. The NRC proposes to incorporate by reference for the first time ASME NQA-1, including several editions and addenda to NQA-1 from previous years with slightly varying titles. More specifically, the NRC proposes to incorporate by reference the 1983 Edition through the 1992 Addenda to the 1989 Edition; the 1994 Edition; the 2008 Edition; and the 2009-1a Addenda to the 2008 Edition, with conditions on their use.

3. Identification and Preliminary Analysis of Alternative Approaches

This section presents an analysis of the alternatives that the NRC considered with regard to conditioning the use of certain provisions of the ASME Code and the regulatory alternatives associated with Code Cases N-770-2, N-729-4, N-824, and OMN-20. The NRC staff identified two alternatives regarding the conditioning of the use of certain provisions of the ASME Code: (1) the no action alternative (i.e., status quo, regulatory baseline) and (2) incorporate by reference NRC-approved ASME BPV Code and ASME OM Code with conditions.

3.1. Alternative 1 – No Action

The no action alternative (i.e., status quo, regulatory baseline) is a non-rulemaking alternative. The no action alternative would not revise the NRC's regulations to incorporate by reference:

(1) the 2009 Addenda, the 2010 Edition, the 2011 Addenda, and the 2013 Edition to the ASME BPV Code, Section III, Division 1 and ASME BPV Code, Section XI, Division 1

(2) the 2009 Edition and the 2011 Addenda to the ASME *Operation and Maintenance of Nuclear Power Plants*, "Division 1: Section IST Rules for Inservice Testing of Light-Water Reactor Power Plants" and the 2012 Edition to the ASME *Operation and Maintenance of Nuclear Power Plants*, "Division 1: OM Code: Section IST" (OM Code)

(3) ASME BPV Code Case N-770-2, “Alternative Examination Requirements and Acceptance Standards for Class 1 PWR Piping and Vessel Nozzle Butt Welds Fabricated with UNS N06082 or UNS W86182 Weld Filler Material With or Without Application of Listed Mitigation Activities Section XI, Division 1,” ASME approval date: June 9, 2011 (with conditions on its use)

(4) ASME BPV Code Case N-729-4, “Alternative Examination Requirements for PWR Reactor Vessel Upper Heads With Nozzles Having Pressure-Retaining Partial-Penetration Welds Section XI, Division 1,” ASME approval date: June 22, 2012 (with conditions on its use)

(5) ASME BPV Code Case N-824, “Ultrasonic Examination of Cast Austenitic Piping Welds From the Outside Surface Section XI, Division 1,” ASME approval date: October 16, 2012 (with conditions on its use)

(6) ASME OM Code Case OMN-20, “Inservice Test Frequency”

(7) ASME NQA-1, “Quality Assurance Requirements for Nuclear Facility Applications,” including the 1983 Edition through the 1992 Addenda to the 1989 Edition; the 1994 Edition; the 2008 Edition; and the 2009-1a Addenda to the 2008 Edition (with conditions on their use).

The no action alternative would cause licensees and applicants that desire to use these ASME Code addenda, editions, or Code Cases to request and receive approval from the NRC for the use of alternatives under the 10 CFR 50.55a(z) section.

3.1.1. Take No Action on ASME Code Case N-729-4

Under the regulatory baseline, the NRC would not amend the current regulations to require the use of Code Case N-729-4.

Not requiring the use of Code Case N-729-4 would leave in place the current ASME examination frequencies and methods for reactor pressure vessel (RPV) upper head penetration nozzles and welds. In the June 21, 2011, update to 10 CFR 50.55a, the NRC added the required use of ASME Code Case N-729-1, “Alternative Examination Requirements for PWR Reactor Vessel Upper Heads With Nozzles Having Pressure-Retaining Partial-Penetration Welds, Section XI, Division 1,” with certain conditions. The required implementation of this Code Case with conditions enhanced the examination requirements in the ASME BPV Code, Section XI for RPV upper head penetration nozzles and welds to assure that ASME Code allowable limits will not be exceeded and that primary water stress corrosion cracking (PWSCC) will not lead to failure of the RPV upper head penetration nozzles or welds. However, ASME found that additional program changes were necessary to establish an effective long-term inspection program for RPV upper heads for pressurized-water reactors (PWRs).

3.1.2. Take No Action on ASME Code Case N-770-2

Under the regulatory baseline, the NRC would not amend the current regulations to require the use of Code Case N-770-2.

Not requiring the use of Code Case N-770-2 would leave in place the current ASME inspection requirements for butt welds. In the June 21, 2011, update to 10 CFR 50.55a, the NRC added the required use of ASME Code Case N-770-1, Alternative Examination Requirements and

Acceptance Standards for Class 1 PWR Piping and Vessel Nozzle Butt Welds Fabricated with UNS N06082 or UNS N86182 Weld Filler Material With or Without Application of Listed Mitigation Activities," with certain conditions. The required implementation of this Code Case with conditions provides inspection frequencies and methods for Alloy 82/182 butt welds that are unmitigated as well as butt welds that have been mitigated for PWSCC by any of several mitigation methods. However, this alternative does not establish an effective long term inspection program for ASME Code Class 1 butt welds in the RCPB, does not establish a new ASME Code Case Table 1 inspection item classifications for optimized weld overlay, and does not allow alternatives when complete inspection coverage cannot be met.

3.1.3. Take No Action on ASME Code Case N-824

Under the regulatory baseline, the NRC would not amend the current regulations to allow the use of Code Case N-824.

Not allowing the use of Code Case N-824 would leave in place the current ASME inspection requirements regulatory requirements for the examination of cast austenitic stainless steel (CASS), provided in 10 CFR 50.55a, do not provide sufficient guidance to assure that the CASS components are being inspected adequately. To illustrate that ASME Code does not provide adequate guidance, ASME Code, Section XI, Appendix III, Supplement 1 states "Cast materials may preclude meaningful examinations because of geometry and attenuation variables." For this reason, over the past several decades, licensees have been unable to perform effective inspections of welds joining CASS components. To allow for continued operation of their plants, licensees submitted hundreds of requests for relief from the ASME Code requirements for inservice inspection of CASS components to the NRC, resulting in a significant regulatory burden.

3.2. Alternative 2 – Incorporate by Reference ASME BPV and OM Codes and New and Revised Code Cases with Conditions

Alternative 2 consists of incorporating by reference certain provisions of the 2009 Addenda, 2010 Edition, 2011 Addenda, and the 2013 Edition to the ASME BPV Code, Section III, Division 1 and the ASME BPV Code, Section XI, Division 1, including NQA-1 (with conditions on its use), as well as the 2009 Edition, 2011 Addenda and 2012 Edition to the ASME OM Code into the *Code of Federal Regulations*. Under this alternative, the NRC would incorporate by reference, with conditions on its use, Code Cases N-729-4, N-770-2, N-824, and OMN-20 into 10 CFR 50.55a so that the provisions of the ASME Codes are legally binding NRC requirements as delineated in 10 CFR 50.55a, and subject to the conditions on certain specific ASME Code provisions that are set forth in 10 CFR 50.55a.

4. Estimation and Evaluation of Benefits and Costs

This section examines the benefits and costs expected to result from each proposed alternative relative to the regulatory baseline (Alternative 1). All costs and benefits are monetized, when possible. The total of costs and benefits is algebraically summed to determine whether the difference between the costs and benefits is a positive benefit. However, in some cases, benefits are not monetized because meaningful quantification is not possible.

4.1. Identification of Affected Attributes

This section identifies the components of the public and private sectors, commonly referred to as attributes that are expected to be affected by the alternatives identified in Section 3. The alternatives would apply to licensees and applicants of nuclear power plants and nuclear power plant design certifications. The NRC believes that nuclear power plant licensees will be the primary beneficiaries. An inventory of the impacted attributes was developed using the list provided in Chapter 5 of the NRC's "Regulatory Analysis Technical Evaluation Handbook" (Handbook) (Ref. 8.14).

The affected attributes are the following:

- Public Health (Accident). This attribute accounts for expected changes in radiation exposure to the public caused by changes in accident frequencies or accident consequences associated with the alternative (i.e., delta risk). A decrease in public radiological exposure is a decrease in risk (i.e., benefit); an increase in public exposures is an increase in risk (i.e., cost).

- Occupational Health (Accident). This attribute measures health effects, immediate and long-term, associated with site workers because of changes in accident frequency or accident consequences associated with the alternative (i.e., delta risk). A decrease in worker radiological exposure is a decrease in risk (i.e., benefit); an increase in worker exposures is an increase in risk (i.e., cost).

- Occupational Health (Routine). This attribute accounts for radiological exposures to workers during normal facility operations (i.e., non-accident situations). For a proposed action, there could be an increase in worker exposures; sometimes this will be a one-time effect (e.g., installation or modification of equipment in a hot area), and sometimes it will be an ongoing effect (e.g., routine surveillance or maintenance of contaminated equipment or equipment in a radiation area).

- Industry Implementation. This attribute accounts for the projected net economic effect on the affected licensees to implement the mandated changes. Costs include procedural and administrative activities to maintenance, inspection, or testing procedures. Additional costs above the regulatory baseline are considered negative and cost savings and averted costs are considered positive.

- Industry Operation. This attribute accounts for the projected net economic effect caused by routine and recurring activities required by the proposed alternative on all affected licensees. For example, an alternative that would allow a nuclear power plant licensee to use a Code Case without submitting an alternative request would provide a net benefit (i.e., averted cost) to the licensee.

  The effect on industry operation will be the changes to their design, fabrication, construction, testing, and inspection practices because of the new Code and NRC requirements included in this rule. Some of the changes result in an increase in burden and some of the changes result in a decrease in burden.

The Code Case requests and subsequent costs are considered sunk (i.e., already incurred) for issued design certifications, submitted design certifications under review, and submitted reactor applications to the NRC.

- NRC Implementation. This attribute accounts for the projected net economic effect on the NRC to place the proposed alternative into operation. NRC implementation costs and benefits incurred in addition to those expected under the regulatory baseline are included. To implement Alternative 2, the NRC incurs a cost in relation to Alternative 1 (i.e., regulatory baseline) for developing the proposed and final rule.

- NRC Operation. This attribute accounts for the projected net economic effect on the NRC after the proposed action is implemented. If the NRC does not approve changes to their design, fabrication, construction, testing, and inspection practices because of the new Code that a licensee or applicant wants to use, the licensee or applicant must request, under 10 CFR 50.55a(z), permission to use the updated ASME Code through a submittal of a request to apply the updated edition or addenda as an alternative to the ASME Code provisions. This submittal requires additional NRC staff time to evaluate the Code to determine its acceptability and whether any limitations or modifications should apply. Under Alternative 2, these alternative requests would not be required, which would result in a net benefit (i.e., averted cost) for the NRC.

  The NRC review costs for any Code alternative requests submitted to the NRC before the effective date of the final rule are considered sunk costs and are not considered further in this regulatory analysis.

- Improvements in Knowledge. This attribute accounts for improvements in knowledge by industry and NRC staff gaining experience with new technology before incorporation into the ASME Code, and permitting licensees to use advancements in ISI and IST. Improvements in ISI and IST may also result in the earlier identification of material degradation that if undetected could result in further degradation that eventually results in a plant transient.

- Regulatory Efficiency. This attribute accounts for regulatory and compliance improvements resulting from the implementation of Alternative 2 relative to the regulatory baseline.

- Other Considerations. This attribute accounts for considerations that are not captured in the preceding attributes. Specifically, this attribute accounts for how Alternative 2 meets specific requirements of the Commission, helps achieve NRC policy, and provides other advantages or detriments.

- Attributes with No Effects. Attributes that are not expected to be affected under any of the alternatives include the following: public health (routine), offsite property, onsite property, other government, general public, antitrust considerations, safeguards and security considerations, and environmental considerations addressing Section 102(2) of the National Environmental Policy Act of 1979.

4.2. Analytical Methodology

This section describes the process used to evaluate benefits and costs associated with the

proposed alternatives. The benefits include any desirable changes in affected attributes (e.g., monetary savings, improved safety, and improved security). The costs include any undesirable changes in affected attributes (e.g., monetary costs, increased exposures).

Of the 10 affected attributes, the analysis evaluates four attributes – industry implementation, industry operation, NRC implementation, and NRC operation – on a quantitative basis. Quantitative analysis requires a baseline characterization of the affected society, including factors such as the number of affected entities, the nature of the activities currently performed, and the types of systems and procedures that licensees or applicants would implement, or no longer implement, because of the proposed alternatives. The remaining six attributes are evaluated on a qualitative basis because of the unquantifiable benefits relating to consistent policy application and improvements in ISI and IST techniques and because of the uncertainties associated with monetizing the impacts on these attributes.

Assumptions made during the conduct of this analysis are documented throughout this regulatory analysis. For reader convenience, major assumptions and input data are provided in Appendix B.

4.2.1. Regulatory Baseline

This regulatory analysis provides the incremental impacts of the proposed rule relative to a baseline that reflects anticipated behavior in the event the NRC undertakes no regulatory or non-regulatory action. The regulatory baseline assumes full compliance with existing NRC requirements, including current regulations and relevant orders. This is consistent with NUREG/BR-0058, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," Revision 4 (Ref. 8.13), which states that "in evaluating a new requirement…, the staff should assume that all existing NRC and Agreement State requirements have been implemented." Section 5 of this regulatory analysis presents the estimated incremental costs and benefits of the alternatives relative to this baseline.

4.2.2. Affected Entities

All operating light-water nuclear power reactors and future operating nuclear power reactors could be affected by this proposed rule.

- *Nuclear facilities* – The analysis models 59 plant sites containing one or more operating U.S. light-water nuclear power reactor units in 2014, which reduces to 58 nuclear facilities in 2015 and 57 nuclear facilities in 2020.[1]

- *Operating reactor units* – The analysis models 100 U.S. light-water nuclear power reactor units in 2014, which reduces to 99 reactor units in 2015 and 98 reactor units in 2020.

- *Future operating reactor units* – The NRC staff assumes there are five future operating light-water nuclear power reactors that would be affected by the proposed final rule and considered in this analysis. The future nuclear power reactors are: Watts Bar Nuclear

[1] The NRC staff assumes that Vermont Yankee will close in 2014 based on Entergy's announcement and Oyster Creek will close in 2019 based on Exelon Corporation's announcement. See http://www.entergy.com/News_Room/newsrelease.aspx?NR_ID=2769 and www.exeloncorp.com.

Power Plant, Unit 2, assumed to begin operations in 2015; Vogtle Electric Generating Plant, Units 3 and 4, assumed to begin operations in 2017; and Virgil C. Summer Nuclear Station, Units 2 and 3, assumed to begin operations in 2017 and 2019, respectively.[2]

To account for new nuclear power reactors under construction that are anticipated to begin commercial operation after the proposed rule's effective date, the NRC modeled a hypothetical nuclear power reactor to analyze the specific costs and benefits. The NRC assumes that for safety system design features addressed by the ASME Code, there would be no significant differences between the future operating reactor units listed above and the modeled hypothetical nuclear power reactor. However, as the timing of a hypothetical reactor is speculative, the information is provided for information purposes only and is not included as part of the decision rationale.

4.2.3. Base Year

All monetized costs are expressed in 2014 dollars. Ongoing costs of operation related to the alternative are assumed no earlier than 30 days after the final rule is published in the *Code of Federal Regulations* unless otherwise stated, and are modeled on an annual cost basis.

Estimates are made for one-time implementation costs. The NRC assumes that these costs will be incurred in the first year of the analysis unless otherwise noted.

Estimates are made for recurring annual operating expenses. The values for annual operating expenses are modeled as a constant expense for each year of the analysis horizon. An annuity calculation was performed to discount these annual expenses to 2014 dollar values.

4.2.4. Discount Rates

In accordance with guidance from the Office of Management and Budget (OMB) Circular No. A-4 (Ref. 8.21) and NUREG/BR-0058, Revision 4 (Ref. 8.13), present-worth calculations are used to determine how much society would need to invest today to ensure that the designated dollar amount is available in a given year in the future. By using present-worth values, costs and benefits, regardless of when the cost or benefit is incurred in time, are valued to a reference year for comparison. The choice of a discount rate, and its associated conceptual basis, is a topic of ongoing discussion within the Federal Government. Based on OMB Circular No. A-4 and consistent with NRC past practice and guidance, present-worth calculations are presented using 3-percent and 7- percent real discount rates. A 3-percent discount rate approximates the real rate of return on long-term government debt, which serves as a proxy for the real rate of return on savings to reflect reliance on a social rate of time preference discounting concept. A 7-percent discount rate approximates the marginal pretax real rate of return on an average investment in the private sector, and is the appropriate discount rate whenever the main effect of a regulation is to displace or alter the use of capital in the private sector. A 7-percent rate is consistent with an opportunity cost[3] of capital concept to reflect the time value of resources directed to meet regulatory requirements.

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[2] The timing and certainty for operation of the Bellefonte Nuclear Station, Units 1 and 2, as well as other new operating licenses are too speculative to be included in this regulatory analysis.

[3] *Opportunity cost* represents what is foregone by undertaking a given action. If the licensee personnel were not engaged in revising procedures, they would be engaged in other work activities. The NRC estimates the

4.2.5. Cost/Benefit Inflators

The consequences for some attributes are estimated based on the values published in the NRC Regulatory Analysis Handbook (Ref. 8.14) or other sources as referenced, which are provided in prior year dollars. To evaluate the costs and benefits consistently, the consequences are inflated. The most common inflator is the Consumer Price Index for all urban consumers (CPI-U), developed by the U.S. Department of Labor, Bureau of Labor Statistics (BLS). Using the CPI-U, the prior year dollars are converted to the year 2014. The formula to determine the amount in 2014 dollars is:

$$\frac{CPI - U_{2014}}{CPI - U_{Base\ Year}}\ x\ Consequence_{Base\ Year} = Consequence_{2014}$$

Values of CPI-U used in this regulatory analysis are summarized in the following table.

Table 1 Consumer Price Index—All Urban Consumers Inflator

Base Year	CPI-U Inflator for Year 2014
2002	1.32
2005	1.22

Source: U.S. Department of Labor, Bureau of Labor Statistics, "Databases, Tables & Calculators by Subject: CPI Inflation Calculator (Ref. 8.6)

4.2.6. Labor Rates

For regulatory analysis purposes, labor rates are developed under strict incremental cost principles wherein only variable costs that are directly related to the implementation and operation and maintenance of the proposed requirement are included. This approach is consistent with guidance set forth in NUREG/CR-3568, "A Handbook for Value-Impact Assessment," (Ref. 8.7) and general cost-benefit methodology. The NRC incremental labor rate is $121 per hour and is equivalent to an annual rate of $166,000.[4]

The estimated incremental labor rate for an industry engineer is $96 per hour and for an industry technician is $68 per hour. These hourly rates are equivalent to an annual rate of $200,000 and $142,000, respectively. The industry incremental labor rate is calculated based on the Employer Costs for Employee Compensation data table available on the U.S. Bureau of Labor Statistics Web site (http://www.bls.gov) (Ref. 8.6). These tables were used to select an appropriate mean hourly labor rate plus fringe cost to perform the estimated procedural, licensing, and utility related work necessary during and following implementation of the proposed alternatives. In establishing this labor rate, wages paid for the individuals performing the work plus the associated fringe benefit component of labor cost (i.e., the time for plant

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opportunity cost of performing these incremental tasks throughout the analysis as the industry personnel's pay for the designated unit of time.

[4] The NRC labor rates presented here differ from those developed under the NRC's license fee recovery program (10 CFR Part 170). NRC labor rates for fee recovery purposes are appropriately designed for full cost recovery of the services rendered and as such include nonincremental costs (e.g., overhead, administrative, and logistical support costs).

management over and above those directly expensed) are considered incremental expenses and are included.[5]

4.2.7. Sign Conventions

The sign conventions used in this analysis are all favorable consequences are positive for the alternative and all adverse consequences for the alternative are negative. Negative values are shown using parentheses (e.g., negative $500 is displayed as ($500)).

4.2.8. Analysis Horizon

The average expiration date of the operating licenses for the 100 operating reactor units is October 2033, which results in 19 remaining years of operation. The average new reactor unit first year of commercial operation begins in year 2017 and with a 20-year license renewal would end commercial operation in year 2077.

The NRC staff assumes that incorporation of Code Cases would occur within three cycles of issuing a new edition of the Code or within 6 years, whichever would occur first. A 6-year period for the effective use of Code Case, a relatively short period, was used for two reasons. First, because ASME updates the edition of the Code every 2 years, it is likely that those Code Cases used by industry would be incorporated into the Code. Second, as the alternatives within this regulatory analysis have up-front costs with benefits that accrue in later years through averted costs (e.g., licensees and applicants no longer need to submit a Code alternative request), shorter time horizons place heavier emphasis on the implementation costs than on its benefits.

4.3. Data

The data and assumptions used in analyzing the quantifiable impacts associated with each proposed alternative are discussed in this analysis. Information on attributes affected by the proposed regulatory framework alternatives is obtained from experienced NRC staff and other sources as referenced. The NRC considers the potential differences between the new requirements and the current requirements and incorporates the proposed incremental changes into this regulatory analysis.

5. Presentation of Results

This section presents the quantitative and qualitative results by attribute of Alternative 2 relative to the regulatory baseline. As described in the previous sections, costs and benefits are quantified where possible and can have either a positive or a negative algebraic sign, depending on whether the proposed alternative has a favorable or adverse effect relative to the regulatory baseline (Alternative 1). A qualitative discussion is provided for those attributes not

[5] A representative industry nuclear engineer level 11 hourly labor rate of $36.34 (2002 dollars) and an industry mechanical engineering technician level 8 hourly labor rate of $27.94 (2005 dollars) are used, which is from the Bureau of Labor Statistics Employer Costs for National Compensation Survey data set. These hourly rates were inflated to 2014 dollars using values of CPI-U. A multiplier of 2.0, which includes fringe and indirect management cost, was then applied and resulted in an incremental industry engineer hourly labor rate of $96 and an incremental technician hourly labor rate of $68. (http://data.bls.gov/pdq/querytool.jsp?survey=nc)

easily represented in monetary values. Although this *ex ante* cost-benefit analyses[6] provides useful information that can be used when deciding whether to select an alternative, the analysis is based on estimates of the future costs and benefits. Whether or not the estimates hold in the future, the process of conducting regulatory analyses has value in and of itself, as it helps decisionmakers think in depth about specific alternatives and their associated results.

The NRC Regulatory Analysis Guidelines (Ref. 8.13) state that the NRC's periodic review and endorsement of consensus standards such as new versions of the ASME Codes and associated Code Cases is a special case. This is because consensus standards have already undergone extensive external review and have been endorsed by industry. In addition, endorsement of the ASME Codes and Code Cases has been longstanding NRC policy. Licensees and applicants participate in the development of the ASME Codes and Code Cases and are aware that periodic updating of the ASME Code is part of the regulatory process. Code Cases are ASME-developed alternatives to the ASME BPV and OM Codes that licensees and applicants may voluntarily choose to adopt without an alternative request if approved through incorporation by reference in the NRC's regulations. Finally, endorsement of the ASME Codes and Code Cases is consistent with the NTTAA, inasmuch as the NRC has determined that there are sound regulatory reasons for establishing regulatory requirements for design, maintenance, ISI, and IST and examination by rulemaking.

In a typical incorporation of new versions of ASME Codes and associated Code Cases, the NRC endorsements can involve hundreds, if not thousands, of individual provisions. Evaluating the benefit *vis-à-vis,* the cost of each individual provision in this regulatory analysis, would be prohibitive, and the value gained by performing such an exercise would be limited. Thus, the scope of this regulatory analysis does not evaluate individual requirements of the consensus standards that are proposed to be incorporated by reference without any conditions.

5.1. Public Health (Accident)

Industry practice to adopt the latest ASME BPV and OM Codes and associated Code Cases may incrementally reduce the likelihood of a radiological accident in a positive, but not easily quantifiable, manner. Pursuing Alternative 2 would continue to meet the NRC goal of maintaining safety by continuing to provide NRC approval of the latest ASME Code editions and addenda and to allow use of Code Cases to gain experience with new technology before incorporation into the ASME Code. The allowed use of Code Cases permit licensees to use advancements in ISI and IST provide alternative examinations for older plants, provide an expeditious response to user needs, and provide a limited, clearly focused alternative to specific ASME Code provisions. Improvements in ISI and IST may also result in the earlier identification of material degradation that if undetected could result in further degradation that eventually results in a plant transient. As such, Alternative 2 maintains the same level or may provide an incremental improvement in safety when compared to the regulatory baseline.

Alternative 2 relative to the regulatory baseline (Alternative 1) meets the NRC goal of ensuring the protection of public health and safety and the environment by continuing to provide NRC approval of the latest ASME Codes and associated Code Cases that allow the use of the most current methods and technology and may decrease the potential for an accident and thus decreases the overall risk to the public health.

[6] An *ex ante cost-benefit analysis* is prepared before a policy, program, or alternative is in place and can assist in the decision about whether resources should be allocated to that alternative.

Alternative 2, in relation to the regulatory baseline, may decrease the probability of an accident as it ensures that plant safety systems are designed with equipment relied upon to remain functional during and following design-basis accidents and are essential to maintain plant parameters within acceptable limits established for a design basis event. Therefore, the proposed rule would prevent a potential introduction of a reduction in margin of safety or the introduction of a new failure mode or a common cause failure mode not previously evaluated that would present an undue hazard, via an accident, to public health and safety and the environment.

Alternative 2, in relation to the regulatory baseline, may decrease the probability of an accident as it would meet the criteria stated in the latest ASME Codes and associated Code Cases for major safety systems or protection system modifications, replacements or installations which address safety issues associated with major changes to the underlying basis of safety systems and protection systems that could adversely affect dependability and reliability arising from potential new failure modes at the system level.

5.2. Occupational Health (Accident and Routine)

The NRC practice to review the latest ASME BPV and OM Codes and associated Code Cases that are incorporated by reference into the regulations assures that the mandated ASME Code requirement and approved Code alternatives result in an acceptable level of quality and safety. Pursuing Alternative 2 would continue to meet the NRC goal of maintaining safety by continuing to provide NRC approval of the latest ASME Code editions and addenda and to allow use of Code Cases to gain experience with new technology before incorporation into the ASME Code, permit licensees to use advancements in ISI and IST, provide alternative examinations for older plants, provide an expeditious response to user needs, and provide a limited, clearly focused alternative to specific ASME Code provisions. The use of ASME Code Cases may affect occupational health in a positive, but not easily quantifiable, manner. For example, the advancements in ISI and IST may result in an incremental decrease in the likelihood of an accident resulting in worker exposure or may result in an incremental decrease in worker radiological exposures during routine inspections or testing when compared to the regulatory baseline.

5.3. Industry Implementation

This attribute accounts for the projected net economic effect on the affected licensees to implement the mandated changes. Additional costs above the regulatory baseline are negative and cost savings and averted costs are positive.

5.3.1. Program Revision to Quality Assurance Program Description to Incorporate the NQA-1 Program

The proposed 10 CFR 50.55a rule that incorporates by reference the 2008 Edition and the 2009-1a Addenda of NQA-1 is optional for licensees to implement. The existing 10 CFR 50.54(a)(3) regulations allow licensees to make changes to a previously accepted quality assurance program description (QAPD) included or referenced in the Safety Analysis Report without prior NRC approval, provided the change does not reduce the commitments in the program description as accepted by the NRC. Regulations in 10 CFR 50.54(a)(4) state that the licensees who make changes to the QAPD that reduce the commitments, must submit these changes to the NRC for review and approval before implementation. Therefore, the

implementation of this proposed rule does not incur additional cost to industry implementation, because it is already required under existing 50.54(a)(4) requirements.

Table 2 Industry Implementation: Optional NQA-1 Program Provision for Operating Plants

Year	Activity	No. of affected entities	Labor hours	Hourly Rate	Implementation Cost (2014 dollars)		
					Undiscounted	3% NPV	7% NPV
2016	Program revision to QAPD to incorporate the NQA-1 Program	52	200	$96	($998,400)	($941,088)	($872,041)
				Total:	**($998,000)**	**($941,000)**	**($872,000)**

Note: Table totals are rounded to the nearest thousand dollars.

However, if requiring the use of NQA-1, it would require all licensees that do not currently use the program to modify their procedures and submit that information before implementation. The NRC assumes that 52 of the reactors would be required to update their programs. Therefore, the 52 units that do not currently use the NQA-1 program would be required to modify their procedures and submit to the NRC and would take 200 hours per unit to implement. Therefore, the overall estimated cost ranges are ($872,000) based on a 7-percent net present value (NPV) and ($941,000) based on a 3-percent net present value). Therefore, not mandating NQA-1 provides an estimated cost savings of $872,000 (7-percent NPV).

5.3.2. Procedure Revision to Incorporate Concrete Containment Examinations

5.3.2.1. *Concrete Containment Examinations – ISI Summary Report*

The NRC proposes to add paragraph (b)(2)(viii)(H) to specify the information that must be provided in the ISI Summary Report required by IWA-6000, when inaccessible concrete surfaces are evaluated under the new code provision IWL-2512. This new condition would replace the existing condition (b)(2)(viii)(E) when using the 2007 Edition with the 2009 Addenda through the 2013 Edition of Subsection IWL. Because licensees already perform equivalent actions under existing condition (b)(2)(viii)(E) when using the 2007 Edition this change has negligible impact.

5.3.2.2. *Concrete Containment Examinations – Aging Management*

The proposed condition in 10 CFR 50.55a(b)(2)(viii)(I) imposes a condition on the technical evaluation requirements in the new article IWL-2512(b), for consistency with NUREG-1801, Revision 2, “Generic Aging Lessons Learned (GALL) Report,” with regard to aging management of below-grade concrete. This condition applies only to holders of renewed licenses under 10 CFR 54, “Requirements for Renewal of Operating Licenses for Nuclear Power Plants,” during the period of extended operation (i.e., beyond the expiry date of the original 40-year license) of a renewed license when using IWL-2512(b) of the 2007 Edition with 2009 Addenda through the 2013 Edition of Subsection IWL. The impact is that the licensees for the 58 sites that contain reactor units with renewed licenses under 10 CFR 54 will have to perform more frequent inspections and technical evaluations during the period of extended operation. The estimated costs to update inspection procedures to reflect this requirement would require 20 hours of engineering work. Therefore, the estimated cost of updating the inspection procedures for all operating reactors would cost ($97,000) based on a 7-percent NPV and ($105,000) based on a 3-percent NPV.

Table 3 Industry Implementation: Update Concrete Containment Examination Procedures for Operating Plant Sites

Year	Activity	No. of affected sites	Labor hours	Hourly Rate	Implementation Cost (2014 dollars)		
					Undiscounted	3% NPV	7% NPV
2016	Update Concrete Containment Examinations procedures	58	20	$96	($111,360)	($104,967)	($97,266)
				Total:	**($111,000)**	**($105,000)**	**($97,000)**

Note: Table totals are rounded to the nearest thousand dollars.

New power reactor units that begin commercial operation in year 2017 and renew its license under 10 CFR 54 have to perform more frequent inspections and technical evaluations during the period of extended operation. The estimated costs to update inspection procedures to reflect this requirement would require 20 hours of engineering work performed by year 2057. Therefore, the estimated cost of updating the inspection procedures for the two AP1000 reactor sites would be ($200) based on a 7-percent NPV and ($1,100) based on a 3-percent NPV. Watts Bar Unit 2 examination procedures are assumed to be similar to those of Watts Bar, Unit 1, and would have no incremental update costs.

Table 4 Industry Implementation: Concrete Containment Examinations for New Plants

Year	Activity	No. of affected entities	Labor hours	Hourly Rate	Implementation Cost (2014 dollars)		
					Undiscounted	3% NPV	7% NPV
2057	Update Concrete Containment Examinations procedures	2	20	$96	($3,840)	($1,077)	($209)
				Total:	**($3,800)**	**($1,100)**	**($200)**

Note: Table totals are rounded to the nearest hundred dollars.

5.3.3. Procedure Revision to Incorporate NDE Personnel Certification

The proposed condition in 10 CFR 50.55a(b)(2)(xviii)(D) prohibits applicants and licensees from using the ultrasonic examination nondestructive examination (NDE) personnel certification requirements in Section XI, Appendix VII and subarticle VIII-2200 of the 2011 Addenda and 2013 Edition of the ASME BPV Code and prohibits the use of an accelerated Appendix VII training process for certification of ultrasonic examination personnel based on training and prior experience. Instead, the NRC requires applicants and licensees to use Table VII-4110-1 in the 2010 Edition, and VIII-2200, Appendix VIII prerequisites for ultrasonic examination personnel requirements in the 2010 Edition. This proposed condition does not result in a change from the requirements contained within the regulatory baseline.

5.3.4. Procedure Revision to Incorporate Steam Generator Preservice Examinations

The proposed condition in 10 CFR 50.55a(b)(2)(xxx) clarifies the current requirement in IWB-2200(c) pertaining to steam generator tube preservice inspections (PSIs). Preservice requirements for ASME Class 1 components are provided in IWB-2200, and IWB-2200(c) currently states, “Steam generator tube examination shall be governed by the plant Technical Specifications (TS).” However, there are no preservice examination requirements for steam generators defined in plant TS. Preservice examination requirements for steam generators are not within any of the categories described in 10 CFR 50.36, “Technical Specifications,” for the content of TS. Because IWB-2200(c) requires the steam generator tube examinations be

performed in accordance with plant TS, and TS contain no rules for PSI of steam generator tubing, the NRC is clarifying the PSI requirements for steam generator tubes.

The proposed clarification is consistent with industry guidelines and the staff position outlined in Standard Review Plan (SRP) Section 5.4.2.2, “Steam Generator Program.” The proposed requirement is instead of the requirements of IWB-2200(c) and requires that a full-length examination of 100 percent of the tubing in each steam generator be performed prior to plant startup with a newly installed steam generator. This proposed condition does not result in a change from the requirements contained within the regulatory baseline.

5.3.5. Procedure Revision to Prohibit Use of Mechanical Clamping Devices

The proposed condition in 10 CFR 50.55a(b)(2)(xxxi) prohibits the use of mechanical clamping devices on Class 1 piping and portions of piping systems that form the containment boundary. In the 2010 Edition of the ASME BPV Code, a change was made to include mechanical clamping devices under the small items exclusion rules of IWA-4131. Currently in the 2007 Edition/2008 Addenda of Section XI under IWA-4133, “Mechanical Clamping Devices Used as Piping Pressure Boundary,” mechanical clamping devices may be used only if they meet the requirements of Mandatory Appendix IX of Section XI of the ASME BPV Code. This prohibition does not result in a change from the requirements contained within the existing regulatory baseline.

5.3.6. Procedure Revision to Incorporate Summary Report Submittal Requirements

The proposed condition in 10 CFR 50.55a(b)(2)(xxxii) requires licensees using the 2010 Edition and later editions and addenda of Section XI to continue to submit Summary Reports as required in IWA-6240 of the 2009 Addenda, which is consistent with current timeframes. This proposed condition does not result in a change from the requirements contained within the existing regulatory baseline.

5.3.7. Procedure Revision to Prohibit Use of Risk-Informed Allowable Pressure Methodology

The proposed condition in 10 CFR 50.55a(b)(2)(xxxiii) prohibits the use of Appendix G, Paragraph G-2216 in ASME BPV Code, Section XI, which was included for the first time in the 2011 Addenda of the ASME BPV Code, and requires the continued use of the deterministic methodology of Section XI, Appendix G to generate pressure-temperature (P-T) limits. This prohibition does not result in a change from the requirements contained within the existing regulatory baseline.

5.3.8. Procedure Revision to Add Acceptance Standards for the Disposition of Flaws in Class 3 Components

The proposed condition in 10 CFR 50.55a(b)(2)(xxxiv) requires that when using the 2013 Edition of the ASME BPV Code, Section XI, the licensee shall use the acceptance standards of IWD-3510 for the disposition of flaws in Category D-A components (i.e., welded attachments for vessels, piping, pumps, and valves) to correct an apparent discrepancy between the provisions in IWD-3410 and IWD-3510. This clarification provides necessary

consistency in requirements between IWD-3410 and IWD-3510 and does not result in a change from the requirements contained within the existing regulatory baseline.

5.3.9. *Procedure Revision to Specify Use of Reference Temperature in the K_{Ia} and K_{Ic} Equations*

The proposed condition in 10 CFR 50.55a(b)(2)(xxxv) specifies that when licensees use the 2013 Edition of the ASME BPV Code, Section XI, Appendix A, paragraph A-4200, if T_0 is available, then RT_{T0} may be used in place of RT_{NDT} for applications using the K_{Ic} equation and the associated K_{Ic} curve, but not for applications using the K_{Ia} equation and the associated K_{Ia} curve. This proposed insertion is consistent with Code Case N-629, "Use of Fracture Toughness Test Data to Establish Reference Temperature [RT] for Pressure Retaining Materials," which was accepted by the NRC without conditions. This condition does not result in a change from the requirements contained within the existing regulatory baseline.

5.3.10. *Procedure Revision to Incorporate Fracture Toughness of Irradiated Material Requirements*

The proposed condition in 10 CFR 50.55a(b)(2)(xxxvi) requires licensees using ASME BPV Code, Section XI, 2013 Edition, Appendix A, paragraph A-4400, to obtain NRC approval before using irradiated T_0 and the associated RT_{T0} in establishing fracture toughness of irradiated materials. The estimated costs to update procedures to reflect this proposed condition would require 20 hours of engineering work for each current operating power plant site. Therefore, the estimated cost of updating procedures for all operating reactors would cost ($97,000) based on a 7-percent NPV and ($105,000) based on a 3-percent NPV.

Table 5 Industry Implementation: Fracture Toughness Provision (Operating Plants)

Year	Activity	No. of affected entities	Labor hours	Hourly Rate	Implementation Cost (2014 dollars)		
					Undiscounted	3% NPV	7% NPV
2016	Procedure revision to incorporate fracture toughness of irradiated material requirements	58	20	$96	($111,360)	($104,967)	($97,266)
				Total:	**($111,000)**	**($105,000)**	**($97,000)**

Note: Table totals are rounded to the nearest thousand dollars.

A new or hypothetical power reactor unit that begins commercial operation after year 2016 would issue its initial ISI and IST procedures in compliance with this provision and would incur no incremental costs.

5.3.11. *Procedure Revision to Incorporate the Ultrasonic Examination Provisions of Code Case N-824*

The proposed condition in 10 CFR 50.55a(b)(2)(xxxvii) allows licensees to use the provisions of ASME Code Case N-824, "Ultrasonic Examination of Cast Austenitic Piping Welds From the Outside Surface Section XI, Division 1," as conditioned, when implementing inservice examinations in accordance with the ASME BPV Code, Section XI requirements.

The current regulatory requirements for the examination of CASS, provided in 10 CFR 50.55a, do not provide sufficient guidance to assure that the CASS components are being inspected adequately. For this reason, over the past several decades, licensees have been unable to perform effective inspections of welds joining CASS components. To allow for continued

operation of their plants, licensees have submitted hundreds of requests for relief from the ASME Code requirements for inservice inspection of CASS components to the NRC, resulting in a significant regulatory burden. Based on the improvements in ultrasonic inspection technology and techniques for CASS components, the ASME approved Code Case N-824 (N-824) on October 16, 2012, which describes how to develop a procedure capable of meaningfully inspecting welds in CASS components. Using this technology and techniques, CASS materials less than 1.6-inches thick can be reliably inspected for flaws 10-percent through-wall or deeper if encoded phased-array examinations are performed using proper ultrasonic frequencies, inspection angles, and inspection unit probe sizes. Additionally, for thicker welds, flaws greater than 30-percent through-wall in depth can be detected using low frequency encoded phased array ultrasonic inspections.

The estimated costs to update, qualify, and approve inspection procedures to reflect this proposed condition would require 200 hours of engineering work at each operating plant site. A training module to certify inspectors would require 200 hours to develop. New ultrasonic inspection equipment is required at each reactor site to perform certification training and to perform these inspections at a cost of $25,000 per site.

Therefore, the estimated cost of updating procedures, developing a training module, and procuring the equipment required for these examinations for all operating and new reactors would cost $3,210,000 based on a 7-percent NPV and $3,470,000 based on a 3-percent NPV.

Table 6 Industry Implementation: Code Case N-824 Optional Provision (Operating Plants)

Year	Activity	No. of affected entities	Labor hours	Hourly Rate	Equipment Cost	Implementation Cost (2014 dollars)		
						Undiscounted	3% NPV	7% NPV
2016	Procedure Revision to Incorporate the Ultrasonic Examination Provisions of Code Case N-824	58	200	$96		($1,113,600)	($1,049,675)	($972,661)
2016	Develop training module for the Ultrasonic Examination Provisions of Code Case N-825	58	200	$96		($1,113,600)	($1,049,675)	($972,661)
2016	Ultrasonic Examination equipment to implement Code Case N-826	58			$25,000	($1,450,000)	($1,366,764)	($1,266,486)
				Total:		**($3,680,000)**	**($3,470,000)**	**($3,210,000)**

Note: Table totals are rounded to the nearest ten thousand dollars.

A new or hypothetical power reactor unit that begins commercial operation after year 2016 and chooses to use this Code Case N-824 would issue its initial ISI and IST program in compliance with this provision and would incur no incremental costs.

5.3.12. Procedure Revision to Incorporate Motor-Operated Valve Testing Requirements

The proposed condition in 10 CFR 50.55a(b)(3)(ii) imposes four supplemental requirements on the use of Mandatory Appendix III, “Preservice and Inservice Testing of Active Electric Motor Operated Valve Assemblies in Light-Water Reactor Power Plants,” in the 2009 Edition of the ASME OM Code. Mandatory Appendix III represents the incorporation of ASME OM Code Case OMN-1, “Alternative Rules for Preservice and Inservice Testing of Active Electric Motor-Operated Valve Assemblies in Light-Water Reactor Power Plants,” and Code Case OMN-11, “Risk-Informed Testing for Motor-Operated Valves [MOV],” into the OM Code. The four supplemental requirements proposed in 10 CFR 50.55a(b)(3)(ii) are (A) MOV diagnostic test interval, (B) MOV testing impact on risk, (C) MOV risk categorization, and (D) MOV stroke time.

5.3.12.1. *Procedure Revision for Mandatory Appendix III Motor-Operated Valve Diagnostic Test Interval*

The ASME OM Code (2009 Edition and later) specifies the use of mandatory Appendix III with periodic exercising and diagnostic testing in lieu of quarterly stroke-time testing of MOVs within the scope of the IST program. Mandatory Appendix III represents the incorporation of ASME OM Code Case OMN-1 and Code Case OMN-11 into the OM Code. Regulatory Guide 1.192, "Operation and Maintenance Code Case Acceptability, ASME OM Code," (Ref. 8.16) accepts the voluntary use of Code Cases OMN-1 and OMN-11 with specific conditions.

All licensees currently implementing the ASME OM Code are required by 10 CFR 50.55a(b)(3)(ii) to establish a program to ensure that safety-related MOVs continue to be capable of performing their design-basis safety functions. Also, all licensees are currently implementing MOV programs in response to GL 96-05, "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves," (Ref. 8.12) that include periodic testing to verify MOV design-basis capability. The estimated costs to update procedures to reflect OM Code, Appendix III would require 20 hours of engineering work. The estimated costs to update procedures to reflect OM Code, Appendix III, would require 20 engineering hours for each current operating power reactor site. Therefore, the estimated cost of updating procedures for all operating and new reactors would cost ($97,000) based on a 7-percent NPV and ($105,000) based on a 3-percent NPV.

Table 7 Industry Implementation: Mandatory MOV Diagnostic Test Provision (Operating Plants)

Year	Activity	No. of affected entities	Labor hours	Hourly Rate	Implementation Cost (2014 dollars)		
					Undiscounted	3% NPV	7% NPV
2016	Revise Inspection and Test Procedures to reflect OM Code Appendix III requirements	58	20	$96	($111,360)	($104,967)	($97,266)
				Total:	**($111,000)**	**($105,000)**	**($97,000)**

Note: Table totals are rounded to the nearest thousand dollars.

A new or hypothetical power reactor unit that begins commercial operation after year 2016 would issue its initial ISI and IST procedures in compliance with this provision and would incur no incremental costs.

5.3.12.2. *Program Revision for Mandatory Appendix III MOV Testing Impact on Risk*

All licensees currently must ensure that the potential increase in core damage frequency (CDF) and large early release frequency associated with the extension is acceptably small (see Commission's Safety Goal Policy Statement (Ref. 8.18)) when extending exercise test intervals for high risk MOVs beyond a quarterly frequency. The estimated costs to update procedures to reflect OM Code, Appendix III would require 20 hours of engineering work. The estimated costs to make the conforming change for this requirement in 10 CFR 50.55a(b)(3)(ii) would require 8 engineering hours for each current operating power reactor site. Therefore, the estimated cost of updating procedures for all operating reactors would cost ($39,000) based on a 7-percent NPV and ($42,000) based on a 3-percent NPV.

Table 8 Industry Implementation: Mandatory MOV Testing Impact on Risk Provision (Operating Plants)

Year	Activity	No. of affected entities	Labor hours	Hourly Rate	Implementation Cost (2014 dollars)		
					Undiscounted	3% NPV	7% NPV
2016	Revise test procedures for motor-operated valve testing	58	8	$96	($44,544)	($41,987)	($38,906)
				Total:	**($45,000)**	**($42,000)**	**($39,000)**

Note: Table totals are rounded to the nearest thousand dollars.

A new or hypothetical power reactor unit that begins commercial operation after year 2016 would issue its initial ISI and IST program in compliance with this provision and would incur no incremental costs.

5.3.12.3. *Program Revision for Mandatory Appendix III MOV Risk Categorization*

The proposed condition in 10 CFR 50.55a(b)(3)(ii) imposes that all licensees currently implementing the ASME OM Code must ensure that safety-related MOVs are categorized according to their safety significance using the methodology described in Code Case OMN-3, "Requirements for Safety Significance Categorization of Components Using Risk Insights for Inservice Testing of LWR Power Plants," subject to the conditions discussed in Regulatory Guide 1.192 (Ref. 8.16), or using an MOV risk ranking methodology accepted by the NRC on a plant-specific or industry-wide basis in accordance with the conditions in the applicable safety evaluation. The estimated costs to update procedures to reflect OM Code, Appendix III would require 20 hours of engineering work. The estimated costs to make the conforming change for this requirement in 10 CFR 50.55a(b)(3)(ii) would require 8 engineering hours for each current operating power reactor units. Therefore, the estimated cost of updating procedures for all operating and new reactors would be ($39,000) based on a 7-percent NPV and ($42,000) based on a 3-percent NPV.

Table 9 Industry Implementation: Mandatory MOV Risk Categorization Provision (Operating Plants)

Year	Activity	No. of affected entities	Labor hours	Hourly Rate	Implementation Cost (2014 dollars)		
					Undiscounted	3% NPV	7% NPV
2016	Program Revision for Mandatory Appendix III MOV Risk Categorization	58	8	$96	($44,544)	($41,987)	($38,906)
				Total:	**($45,000)**	**($42,000)**	**($39,000)**

Note: Table totals are rounded to the nearest thousand dollars.

A new or hypothetical power reactor unit that begins commercial operation after year 2016 would issue its initial ISI and IST procedures with the updated references and would incur no incremental costs.

5.3.12.4 *MOV Stroke Time*

The proposed condition in 10 CFR 50.55a(b)(3)(ii) specifies that all licensees, when applying Paragraph III-3600, "MOV Exercising Requirements," of Appendix III to the ASME OM Code, shall verify that the stroke time of the MOV satisfies the assumptions in the plant safety analyses. Paragraph III-3600 in Appendix III to the ASME OM Code requires that abnormal

characteristics (operational, design, or maintenance conditions) be evaluated as part of MOV exercising in consideration of the appropriate exercise frequency. As a lesson learned from the implementation of ASME OM Code Case OMN-1, the NRC staff has determined that a condition is necessary to ensure that licensees verify that the stroke time of the MOV satisfies the assumptions in the safety analyses consistent with plant Technical Specifications. The staff has discussed this clarification with the industry group on Technical Specifications. In that Appendix III currently requires that abnormal characteristics be considered during MOV exercising, the staff does not consider that this condition will result in a resource impact on licensees.

5.3.13. Procedure Revisions to Incorporate Supplemental Requirements on the Use of ASME OM Code for New Reactors

The proposed condition in 10 CFR 50.55a(b)(3)(iii) imposes four supplemental requirements on the use of the provisions in the ASME OM Code for new reactors. These requirements involve (A) periodic verification of the design-basis capability of power-operated valves (POVs) other than MOVs already addressed in Appendix III to the ASME OM Code, (B) bi-directional testing of check valves, (C) monitoring flow-induced vibration from hydrodynamic loads and acoustic resonance to identify potential adverse flow effects, and (D) assessment of the operational readiness of pumps, valves, and dynamic restraints within the scope of regulatory treatment of nonsafety systems (RTNSS) for applicable reactor designs.

The licensees' cost to make the conforming changes to inspection procedures for this requirement in 10 CFR 50.55a(b)(3)(iii) is estimated to require 40 hours of work by a technician and 40 hours of work by an engineer. The estimated total industry implementation cost for the 10 CFR 50.55a(b)(3)(iii) requirements ranges would cost ($21,000) based on a 7-percent NPV and ($24,000) based on a 3-percent NPV.

Table 10 Industry Implementation: Supplemental Requirements Provision (New Plants)

Year	Activity	No. of affected entities	Technician Labor hours	Supervisor Labor hours	Technician Hourly Rate	Engineer Hourly Rate	Implementation Cost (2014 dollars)		
							Undiscounted	3% NPV	7% NPV
2017	Procedure Revisions to Incorporate Supplemental Requirements on the Use of ASME OM Code for New Reactors	4	40	40	68	$96	($26,240)	($24,013)	($21,420)
						Total:	**($26,000)**	**($24,000)**	**($21,000)**

Note: Table totals are rounded to the nearest thousand dollars.

This provision is not applicable to the current generation of operating power plants or the Watts Bar Unit 2 new reactor unit. As a result, these reactor units incur no incremental costs.

5.3.14. Procedure Revision to Incorporate Squib Valve Surveillance Requirements for New Reactors

Subsection ISTC in the 2012 Edition of the ASME OM Code supplements the preservice and inservice surveillance requirements in the previous editions and addenda of the ASME OM Code for squib valves in new reactors. The combined licenses for Vogtle Units 3 and 4 and V.C. Summer Units 2 and 3 include conditions for preservice and surveillance requirements for their squib valves. The supplemental provisions for squib valves in new reactors in Subsection ISTC in the 2012 Edition of the ASME OM Code are consistent with the license conditions currently imposed on Vogtle Units 3 and 4 and V.C. Summer Units 2 and 3 (Ref. 8.1, 8.2, 8.3, and 8.4). Therefore, the incorporation by reference of the supplemental squib valve provisions

in the 2012 Edition of the ASME OM Code into 10 CFR 50.55a will not result in new technical requirements for those reactors. However, plant procedures may need to be updated to reflect the squib valve provisions in the 2012 Edition of the ASME OM Code. The licensees' cost to make the conforming changes to inspection procedures for this requirement is estimated to require 2 engineering hours. The estimated total industry implementation cost to incorporate squib valve surveillance requirements would cost ($600) based on a 7-percent NPV and ($700) based on a 3-percent NPV.

Table 11 Industry Implementation: Squib Valve Surveillance Provision (New Plants)

Year	Activity	No. of affected entities	Labor hours	Hourly Rate	Implementation Cost (2014 dollars)		
					Undiscounted	3% NPV	7% NPV
2017	Program Revision Incorporate Squib Valve Surveillance Requirements for New Reactors	4	2	$96	($768)	($703)	($627)
				Total:	**($800)**	**($700)**	**($600)**

Note: Table totals are rounded to the nearest hundred dollars.

This provision is not applicable to the current generation of operating power plants or the Watts Bar Unit 2 new reactor unit. As a result, these reactor units incur no incremental costs.

5.3.15. Procedure Revision to Prohibit the Use of Subsection ISTB (2011 Edition)

The proposed condition in 10 CFR 50.55a(b)(3)(vii) prohibits the use of Subsection ISTB in the 2011 Addenda of the OM Code because the addenda expanded the acceptable range of a pump comprehensive test but did not require a pump periodic verification program as specified in Mandatory Appendix V in the 2012 Edition of the OM Code. The proposed condition is expected to have no impact on licensees because they may use Subsection ISTB in the 2012 Edition of the OM Code.

5.3.16. Program Revision to Incorporate Mandatory Appendix V on Pump Periodic Verification Program

The 2012 Edition of the ASME OM Code specifies the use of Mandatory Appendix V, "Pump Periodic Verification Test Program." Mandatory Appendix V establishes the requirements for implementing a pump periodic verification test. The test verifies that pumps that are in a licensee's inservice testing (IST) program can meet the required (differential or discharge) pressure as applicable, at its highest design-basis accident flow rate. The test, if required, must be performed once every 2 years. If a pump does not have a specific design-basis accident flow rate in the licensee's credited safety analysis, or if a pump's comprehensive test flow rate and (differential or discharge) pressure bound the pump's design-basis accident flow rate and (differential or discharge) pressure, a pump periodic verification test is not required. The licensees' cost to make the conforming changes to inspection procedures for this requirement is estimated to require 8 engineering hours per plant site with the current operating fleet performing this work during the first year the final rule is effective and new reactor units performing this work during their first year of commercial operation. The estimated total industry implementation cost to incorporate this requirement would cost ($40,800) based on a 7-percent NPV and ($44,100) based on a 3-percent NPV.

Table 12 Industry Implementation: Mandatory Appendix V Provision (Operating and New Plants)

Year	Activity	No. of affected entities	Labor hours	Hourly Rate	Implementation Cost (2014 dollars)		
					Undiscounted	3% NPV	7% NPV
2016	Program Revision to Incorporate Mandatory Appendix V on Pump Periodic Verification Program	58	8	$96	($44,544)	($41,987)	($38,906)
2017	Program Revision to Incorporate Mandatory Appendix V on Pump Periodic Verification Program	3	8	$96	($2,304)	($2,108)	($1,881)
				Operating Reactor Subtotal	*($44,500)*	*($42,000)*	*($38,900)*
				New Reactor Subtotal	*($2,300)*	*($2,100)*	*($1,900)*
				Total:	**($46,800)**	**($44,100)**	**($40,800)**

Note: Table totals are rounded to the nearest hundred dollars.

5.3.17. Risk-Informed Inservice Testing of Pumps and Valves Request for Alternative Submittal to Use Subsection ISTE

The proposed condition in 10 CFR 50.55a(b)(3)(viii) requires that licensees may not implement the risk-informed approach for IST of pumps and valves specified in Subsection ISTE, "Risk-Informed Inservice Testing of Components in Light-Water Reactor Nuclear Power Plants," in the ASME OM Code, without first obtaining NRC authorization to use Subsection ISTE as an alternative to the applicable IST requirements in the ASME OM Code pursuant to 10 CFR 50.55a. The NRC staff estimates that one licensee would be interested in applying Subsection ISTE to its IST program. That licensee would need to submit a request for an alternative to the ASME OM Code to apply Subsection ISTE with appropriate justification. This request would describe the scope of the risk-informed IST program, the methodology to be applied in risk ranking its components, the methodology used to categorize components according to their safety significance, the risk-informed IST approach to pump, MOV, pneumatically and hydraulically operated valve, and pump periodic verification testing. The staff estimates that it would require 2,000 hours evenly divided over 2 years for a licensee to complete the request for the alternative and respond to requests for additional information in response to the NRC review. Therefore, the estimated cost for a single licensee to obtain approval of their alternative submittal to use subsection ISTE is ($162,000) based on a 7-percent NPV and ($178,000) based on a 3-percent NPV.

Table 13 Industry Implementation: Subsection ISTE Optional Provision (Operating and New Plants)

Year	Activity	No. of affected entities	Labor hours	Hourly Rate	Implementation Cost (2014 dollars)		
					Undiscounted	3% NPV	7% NPV
2016	Obtain authorization to use Subsection ISTE (Risk-informed IST)	1	1000	$96	($96,000)	($90,489)	($83,850)
2017	Obtain authorization to use Subsection ISTE (Risk-informed IST)	1	1000	$96	($96,000)	($87,854)	($78,365)
				Operating Reactor Subtotal	*($192,000)*	*($178,300)*	*($162,200)*
				New Reactor Subtotal			
				Total:	**($192,000)**	**($178,000)**	**($162,000)**

Note: Table totals are rounded to the nearest thousand dollars.

5.3.18. Procedure Revision to Incorporate Subsection ISTF, OM Code Pump Testing Requirements for New Reactors

Subsection ISTF, "Inservice Testing of Pumps in Light-Water Reactor Nuclear Power Plants – Post 2000 Plants," OM Code, 2011 Addenda specifies IST requirements for pumps within the scope of the ASME OM Code for post-2000 plants. The term "post-2000 plants" refers to nuclear power plants that were issued (or will be issued) a construction permit, or combined license for construction and operation, on or following January 1, 2000. Subsection ISTF provides essentially the same IST requirements as existing Subsection ISTB for pumps in current operating nuclear power plants with one exception. In particular, pumps in new reactors will undergo an inservice test every quarter rather than Group A or B tests every quarter and comprehensive tests every 2 years as performed at current operating plants.[7] Vogtle Units 3 and 4 and V.C. Summer Units 2 and 3 have a passive design without safety-related pumps. Watts Bar Unit 2 is not a post-2000 plant by the ASME OM Code definition so this provision does not apply to Watts Bar Unit 2. For a hypothetical new reactor, the staff estimates that it would require 20 engineering hours to develop and issue guidance for this requirement. Therefore, the estimated cost for a single licensee to incorporate this requirement would cost ($1,800) based on a 7-percent NPV and ($1,900) based on a 3-percent NPV.

Table 14 Industry Implementation: Subsection ISTF Pump Testing Provision (Hypothetical New Reactor)

Year	Activity	No. of affected entities	Labor hours	Hourly Rate	Implementation Cost (2014 dollars)		
					Undiscounted	3% NPV	7% NPV
2015	Procedure Revision to Incorporate Subsection ISTF, OM Code Pump Testing Requirements for Hypothetical New Reactor	1	20	$96	($1,920)	($1,864)	($1,794)
				Total:	**($1,900)**	**($1,900)**	**($1,800)**

Note: Table totals are rounded to the nearest hundred dollars.

5.3.19. Code Case OMN-20 Time Period Extension

The proposed condition allows the use of Code Case OMN-20 before incorporation into the next update of Regulatory Guide 1.192, and incorporation by reference into 10 CFR 50.55a. The Code Case is an optional provision that allows time periods fewer than 2 years to be extended by up to 25 percent for any given pump or valve inservice test. Time periods greater than or equal to 2 years may be extended by up to 6 months for any given pump or valve inservice test. Currently a licensee must submit one relief request for every 10-year inservice test interval in order to use Code Case OMN-20 for the pumps and valves in their program. Providing this time period extension is a benefit because the OM Code does not have extension provisions for pump or valve inservice tests that align to plant technical specification extension provisions. The licensees' cost to make the conforming changes to plant documentation for this requirement is estimated to require 8 engineering hours per unit with the current operating fleet performing this work during the first year the final rule is effective and new reactor units performing this work during their first year of commercial operation. The cost of modifying the plant procedures to implement Code Case OMN-20 is estimated to be the same amount as submitting a request to allow an extension of the surveillance time period. Therefore, there will be no net industry cost from the regulatory provision to allow the use of Code Case OMN-20.

[7] A Subsection ISTF inservice test is equivalent to a Subsection ISTB comprehensive test.

5.3.20. Program Revision to Inservice Testing Requirements

The proposed change to revise 10 CFR 50.55a(f)(3)(iii)(A) and (B) for Class 1 pumps and valves, 10 CFR 50.55a(f)(3)(iv)(A) and (B) for Class 2 and 3 pumps and valves, and 10 CFR 50.55a(f)(4) for IST standards requirement for operating plants is to align the scope of pumps and valves for IST with the scope defined in the ASME OM Code and in the NRC SRP Section 3.9.6, "Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints" (Ref. 8.19). This clarification provides necessary consistency in scope of pumps and valves defined in the IST program, in the ASME OM Code, and in SRP Section 3.9.6. This clarification does not result in a change from the requirements contained within the existing regulatory baseline.

5.3.21. Procedure to Incorporate Cast Austenitic Stainless Steel Material Examination Requirements

This proposed condition adds 10 CFR 50.55a(g)(6)(ii)(F)(11) to address examination requirements through cast stainless steel materials and to establish a deadline of January 1, 2019, for requiring the use of Appendix VIII qualifications to meet the inspection requirements of paragraph -2500(a) of ASME Code Case N-770-2. The requirements for volumetric examination of butt welds through cast stainless steel materials are currently being developed as Supplement 9 to the ASME BPV Code, Section XI, Appendix VIII. In accordance with Appendix VIII for supplements that have not been developed, the requirements of Appendix III apply. Appendix III requirements are not equivalent to Appendix VIII requirements. For the volumetric examination of ASME Class 1 welds, the NRC proposes to require the use of an Appendix VIII qualified procedure to meet the examination requirements of paragraph -2500(a) of ASME Code Case N-770-2 for examinations of ASME Code Class 1 piping and vessel nozzle butt welds through cast stainless steel materials.

The estimated costs to prepare, qualify, and approve inspection procedures to reflect this proposed condition would require a total of 160 hours of engineering work to revise two plant inspection procedures. A training module to certify inspectors would require 24 hours to develop and issue and the creation of a sufficient number of training mockups to allow for qualification of equipment, procedures, and personnel at each pressurized-water reactor (PWR) site. These mockups are estimated to cost $30,000 per site. Licensees would also need to purchase the specialized phased array search unit, electronics, and scanners estimated to cost $120,000 per site. The current operating fleet would perform this work during the first year after the final rule is effective. New PWR reactor units co-located at operating PWR plant sites are assumed to use the shared site training facilities and would not incur additional costs. Each PWR licensee is expected to certify two inspectors. Each inspector would receive 8 hours of training and practice on cast austenitic stainless steel (CASS) components. The estimated total industry implementation cost to incorporate this requirement would cost ($5,300,000) based on a 7-percent NPV and ($5,900,000) based on a 3-percent NPV.

Table 15 Industry Implementation: Cast Stainless Steel Material Examination Provision (Operating and New Plants)

Year	Activity	No. of affected entities	Labor hours	Hourly Rate	Equipment & Material Cost	Implementation Cost (2014 dollars)		
						Undiscounted	3% NPV	7% NPV
2016	Procedure Revision to Incorporate Cast Stainless Steel Material Examination Requirements	38	160	$96		($583,680)	($550,174)	($509,809)
2016	Develop training module to certify inspectors to perform cast stainless steel material examinations	38	24	$96		($87,552)	($82,526)	($76,471)
2017	Create training mockups to allow for qualification of equipment, procedures, and personnel	38			$30,000	($1,140,000)	($1,043,261)	($930,580)
2017	Purchase the specialized phased array search unit, electronics, and scanners	38			$120,000	($4,560,000)	($4,173,046)	($3,722,318)
2018	Initial inspector training and practice on CASS components	65	16	$96		($99,840)	($88,707)	($76,167)
2018	Initial inspector training and practice on CASS components	1	16	$96		($1,536)	($1,365)	($1,172)
					Operating Reactor Subtotal	*($6,470,000)*	*($5,940,000)*	*($5,320,000)*
					New Reactor Subtotal	*($2,000)*	*($1,000)*	*($1,000)*
					Total:	**($6,500,000)**	**($5,900,000)**	**($5,300,000)**

Note: Table totals are rounded to the nearest hundred thousand dollars.

5.3.22. Procedure Revision to Clarify Examination Coverage Requirements for Butt Welds Joining Cast Stainless Steel Material

This proposed condition adds 10 CFR 50.55a(g)(6)(ii)(F)(12) to clarify the examination coverage requirements allowed under Appendix I of ASME Code Case N-770-2 for butt welds joining cast stainless steel material. Under current ASME BPV Code, Section XI, Appendix VIII requirements, the volumetric examination of butt welds through cast stainless steel materials is under Supplement 9. The ASME BPV Code Committee is still developing Supplement 9 rules. Therefore, it is currently impossible to meet the requirement of Paragraph I.5.1 for butt welds joining cast stainless steel material.

The material of concern is the weld material susceptible to primary water stress corrosion cracking (PWSCC) adjoining the cast stainless steel material for Class 1 PWR Piping and Vessel Nozzle Butt Welds. Appendix VIII qualified procedures are available to perform the inspection of the susceptible weld material, but they are not qualified to inspect the cast stainless steel materials. Therefore, this provision would allow licensees to implement a stress-improvement mitigation technique for butt welds joining cast stainless steel material with use of an examination volume that is qualified by Appendix VIII procedures to the maximum extent practical; including 100 percent of the susceptible material volume. This technique would remain applicable until an Appendix VIII qualified procedure for the inspection through cast stainless steel materials is available in accordance with condition 10 CFR 50.55a(g)(6)(ii)(F)(*11*).

The estimated costs to update procedures to reflect this proposed technique would require 20 hours of engineering work. The current PWR operating fleet would perform this work during the first year the final rule is effective and new PWR reactor units would perform this work during their first year of commercial operation. The estimated total industry implementation cost to incorporate this requirement would cost ($65,000) based on a 7-percent NPV and ($71,000) based on a 3-percent NPV.

Table 16 Industry Implementation: Butt Welds Examination Provision (Operating and New Plants)

Year	Activity	No. of affected entities	Labor hours	Hourly Rate	Implementation Cost (2014 dollars)		
					Undiscounted	3% NPV	7% NPV
2016	Procedure Revision to Clarify Examination Coverage Requirements for Butt Welds Joining Cast Stainless Steel	38	20	$96	($72,960)	($68,772)	($63,726)
2017	Procedure Revision to Clarify Examination Coverage Requirements for Butt Welds Joining Cast Stainless Steel	1	20	$96	($1,920)	($1,757)	($1,567)
				Operating Reactor Subtotal	*($70,000)*	*($70,000)*	*($60,000)*
				New Reactor Subtotal	*($2,000)*	*($2,000)*	*($2,000)*
				Total:	**($75,000)**	**($71,000)**	**($65,000)**

Note: Table totals are rounded to the nearest thousand dollars.

5.3.23. Procedure to Incorporate Encoding of Ultrasonic Volumetric Examinations

This proposed condition adds 10 CFR 50.55a(g)(6)(ii)(F)(*13*) to address the encoding of specific ultrasonic volumetric examinations at PWRs. This proposed condition addresses a human performance gap in which inspections using a conventional non-encoded examination missed flaws in ASME Class 1 dissimilar metal welds and in weld overlays. The recent examinations that failed to identify significant flaws can be avoided by the use of encoded ultrasonic examinations. Encoded ultrasonic examinations electronically store both the positional and ultrasonic information from the inspections. Encoded examinations allow the inspector to evaluate the data and search for indications outside of a time-limiting environment to assure that the inspection was conducted properly and to allow sufficient time to analyze the data. Additionally, the encoded examination would allow for an independent review of the data by other inspectors or an independent third party. This proposed condition would require that all ultrasonic volumetric examinations of non-mitigated or cracked mitigated dissimilar metal butt welds in the RCPB, within the scope of ASME Code Case N-770-2, have encoded examinations.

The estimated costs to prepare, qualify, and approve inspection procedures for use at PWRs to reflect this proposed condition would require 200 hours of engineering work at each PWR site. A training module to certify inspectors would require 100 hours to develop. The NRC staff estimated that the costs to create training mockups to allow for qualification of equipment, procedures, and personnel are $5,000 per PWR site. The current operating fleet would perform this work during the first year the final rule is effective and new reactor units would perform this work during their first year of commercial operation. The estimated total industry implementation cost to incorporate this requirement would cost ($1.15 million) based on a 7-percent NPV and ($1.24 million) based on a 3-percent NPV.

Table 17 Industry Implementation: Encoding Ultrasonic Volumetric Examinations Provision (Operating and New PWRs)

Year	Activity	No. of affected entities	Labor hours	Hourly Rate	Equipment & Material Cost	Implementation Cost (2014 dollars)		
						Undiscounted	3% NPV	7% NPV
2016	Procedure Revision to Incorporate Encoding of All Ultrasonic Volumetric Examinations	38	200	$96		($729,600)	($687,718)	($637,261)
2016	Develop training module to certify inspectors to perform encoding of all ultrasonic volumetric examinations	38	100	$96		($364,800)	($343,859)	($318,630)
2016	Create training mockups to allow for qualification of equipment, procedures, and personnel for encoding of all ultrasonic volumetric examinations	38			$5,000	($190,000)	($179,093)	($165,953)
2017	Procedure Revision to Incorporate Encoding of All Ultrasonic Volumetric Examinations	1	200	$96		($19,200)	($17,571)	($15,673)
2017	Develop training module to certify inspectors to perform encoding of all ultrasonic volumetric examinations	1	100	$96		($9,600)	($8,785)	($7,836)
2017	Create training mockups to allow for qualification of equipment, procedures, and personnel for encoding of all ultrasonic volumetric examinations	1			$5,000	($5,000)	($4,576)	($4,081)
					Operating Reactor Subtotal	*($1,280,000)*	*($1,210,000)*	*($1,120,000)*
					New Reactor Subtotal	*($34,000)*	*($31,000)*	*($28,000)*
					Total:	**($1,320,000)**	**($1,240,000)**	**($1,150,000)**

Note: Table totals are rounded to the nearest ten thousand dollars.

5.3.24. Clarification of Valve Position Verification Requirements

This proposed condition adds 10 CFR 50.55a(b)(3)(xi) to specify that when implementing OM Code, Subsection ISTC-3700, licensees shall develop and implement a method to verify that valve operation is accurately indicated by supplementing valve position indicating lights with other indications, such as flow meters or other suitable instrumentation, to provide assurance of proper obturator position. This is not a new requirement, but rather a clarification of the intent of the ASME OM Code. The OM Code specifies obturator movement verification in order to detect certain internal valve failure modes consistent with the definition of 'exercising' found in ISTA-2000 (i.e., demonstration that the moving parts of a component function). Verification of the ability of an obturator to change or maintain position is an essential element of valve operational readiness determination, which is a fundamental aspect of the OM Code. This staff position is further discussed in NUREG-1482, Revision 2, paragraph 4.2.7 (Ref. 8.20).

5.4. Industry Operation

This attribute accounts for the projected net economic effect caused by routine and recurring activities required by the proposed alternative on all affected licensees. Under Alternative 2, a licensee of a nuclear power plant would not need to submit an alternative request under the new 10 CFR 50.55a(z) or a relief request under 10 CFR 50.55a(f) or (g) to receive permission to use a later edition or addenda of the ASME Code as an alternative to the ASME Code provisions, which provides a net benefit (i.e., averted cost) to the licensee.

The use of later editions and addenda of the ASME BPV and OM Code and applicable Code Cases is beneficial to the NRC nuclear power plant licensees and applicants for several reasons. Later editions and addenda of the ASME BPV and OM Code and applicable

Code Cases may introduce the use of advanced techniques, procedures, and measures. Code Cases are also suited for use in areas where the application of risk-informed principles indicates that there are too many examinations or tests or that occupational exposure can be reduced. Alternative 2 has the advantage that, on implementation of the final rule, licensees and applicants will be able to voluntarily request to use a more recent edition or addenda of the ASME BPV and OM Code using the provisions in 10 CFR 50.55a(f)(4)(iv) and (g)(4)(iv).[8]

Submission of an alternative request to the NRC is not a trivial matter. Once ASME issues a Code Case, the licensee or applicant must make a determination as to the applicability of the Code Case to its facility and the benefit derived therein. If the licensee or applicants determine that use of the Code Case would be beneficial and it has not been approved by the NRC, a request for the use of the Code alternative must be prepared, and appropriate levels of licensee or applicant management must review and approve the request before submission to the NRC. A review of Code alternate requests submitted to the NRC over the last 5 years identified that these submittals ranged from a few pages to several hundred pages with an average of approximately 32 pages with average technical complexity. Therefore, the NRC estimates that a Code Case submittal requires an average of 300 hours of effort to develop the technical justification and an additional 80 hours to perform research, review, approve, process, and submit the document to the NRC for use of alternatives under 10 CFR 50.55a(z). The NRC assumes that licensees or applicants would decide whether an alternative request should be sought by weighing the cost against the benefit to be derived. In some cases, licensees may decide to forfeit the benefits of using a Code Case, whether in terms of radiological considerations or burden reduction.

A review of past Code alternative request submittals has determined that plant owners submit a Code alternative request that covers multiple units and multiple plant sites. In 2013, 13 Code alternative requests were submitted on coverage-related relief requests containing CASS components. If Alternative 2 is not adopted, the NRC estimates that, on average, this volume of Code alternative request submittals would remain at this level or possibly increase by an additional seven submittals per year. This increased number of submittals could continue until ASME incorporates the Code Case into a new edition of the BPV Code. The NRC staff estimates that incorporation of Code Cases would occur within 2 cycles of issuing a new edition of the Code or within 6 years. Under Alternative 2, a licensee of a nuclear power plant would no longer be required to submit a Code alternative request under the new 10 CFR 50.55a(z) which would provide a net benefit (i.e., averted cost) to the licensee. As shown in Table 18, the implementation of Alternative 2 would result in 7 additional Code Case submittals that would not need to be prepared each year under the new 10 CFR 50.55a(z). The NRC estimates the industry operation cost for operating nuclear power plants ranges from $1.38 million (7-percent NPV) to $1.59 million (3-percent NPV), yielding a net positive savings for Alternative 2.

[8] Regulations in 10 CFR 50.55a(f)(4) and (g)(4) establish the effective ASME Code edition and addenda to be used by licensees in performing inservice testing (IST) of pumps and valves and inservice inspections (ISI) of components (including supports), respectively. NRC regulatory issue summary 2004-12 (Ref. 8.17) clarified the requirements for IST and ISI programs when using later editions and addenda of the ASME Code.

Table 18 Industry Operation: Averted Code Case Relief Request Costs

Year	Activity	No. of Actions per year	Hours per Action	Hourly Rate	Averted Industry Operation Cost(2014 dollars)		
					Undiscounted	3% NPV	7% NPV
2015	Code Case relief request preparation and submission	7	380	$96	$255,360	$247,922	$238,654
2016	Code Case relief request preparation and submission	7	380	$96	$255,360	$240,701	$223,041
2017	Code Case relief request preparation and submission	7	380	$96	$255,360	$233,691	$208,450
2018	Code Case relief request preparation and submission	7	380	$96	$255,360	$226,884	$194,813
2019	Code Case relief request preparation and submission	7	380	$96	$255,360	$220,276	$182,068
2020	Code Case relief request preparation and submission	7	380	$96	$255,360	$213,860	$170,157
2021	Code Case relief request preparation and submission	7	380	$96	$255,360	$207,631	$159,025
				Total:	**$1,790,000**	**$1,590,000**	**$1,380,000**

Note: Table totals are rounded to the nearest ten thousand dollars.

As shown in Table 19, a new reactor submitting a Code alternative request in the first year after commencing commercial operation in year 2018 would incur a cost that ranges from $28,000 (7-percent NPV) to $32,000 (3-percent NPV), yielding a net positive savings for each Code alternative request submittal for a new reactor.

Table 19 Industry Operation: Averted Costs for Code Case Submittal (New Reactor)

Year	Activity	No. of Actions	Hours per Action	Hourly Rate	Averted Industry Operation Cost(2014 dollars)		
					Undiscounted	3% NPV	7% NPV
2018	Code Case relief request preparation and submission	1	380	$96	$36,480	$32,412	$27,830
				Total:	**$36,000**	**$32,000**	**$28,000**

Note: Table totals are rounded to the nearest thousand dollars.

5.4.1. Maintenance of Quality Assurance Program Description

The proposed 10 CFR 50.55a rule that incorporates by reference the 2008 Edition and the 2009-1a Addenda of NQA-1 is optional for licensees to implement. The existing 10 CFR 50.54(a)(3) regulations allow licensees to make changes to a previously accepted quality assurance program description (QAPD) included or referenced in the safety analysis report without prior NRC approval, provided the change does not reduce the commitments in the program description as accepted by the NRC. Regulations in 10 CFR 50.54(a)(4) state that the licensees who make changes to the QAPD that reduce the commitments, must submit these changes to the NRC for review and approval before implementation. Therefore, the inclusion of this proposed rule provision into the plant's QAPD does not incur additional cost to industry operation, because a similar requirement exists in 10 CFR 50.54(a)(4).

5.4.2. Concrete Containment Examinations

5.4.2.1. *Concrete Containment Examinations – ISI Summary Report*

The NRC proposes to add paragraph (b)(2)(viii)(H) to specify the information that must be provided in the ISI Summary Report required by IWA-6000, when inaccessible concrete

surfaces are evaluated under the new code provision IWL-2512. This new condition would replace the existing condition (b)(2)(viii)(E) when using the 2007 Edition with the 2009 Addenda through the 2013 Edition of Subsection IWL. Because licensees already perform equivalent actions under existing condition (b)(2)(viii)(E) when using the 2007 Edition, this change has negligible impact to industry operation costs.

5.4.2.2. *Concrete Containment Examinations – Aging Management*

The proposed condition in 10 CFR 50.55a(b)(2)(viii)(I) imposes a condition on the technical evaluation requirements in the new article IWL-2512(b), for consistency with NUREG-1801, Revision 2, "Generic Aging Lessons Learned (GALL) Report" (Ref. 8.10) with regard to aging management of below-grade concrete. This condition applies only to holders of renewed licenses under 10 CFR Part 54 during the period of extended operation (i.e., beyond the expiry date of the original 40-year license) of a renewed license when using IWL-2512(b) of the 2007 Edition with 2009 Addenda through the 2013 Edition of Subsection IWL. The impact is that licensees will have to perform more frequent inspections or technical evaluations during the period of extended operation. The staff assumed that 10 additional hours of evaluation or inspection of below-grade concrete, on average, is performed each outage by all holders of renewed licenses. This estimate may vary on a plant-specific basis based on groundwater and soil properties (e.g., pH, chlorides, sulfates) or the history of degradation experienced. The staff recognizes that currently licensees evaluate the result of their inspections periodically to determine the extent and rate of any degradation of the structures. Furthermore, if a licensee's monitoring program detects degradation, additional degradation-specific condition monitoring and increased frequency of assessments are performed until the licensee's corrective actions are complete and the licensee is assured that the containment can fulfill its intended functions. The first outages after the final rule effective date are assumed to occur in 2017 in which half of the 71 units with extended licenses participate[9]. The remaining units perform their inspection in 2018. This examination cycle continues on a 2-year outage cycle until January 2037 when the current extended nuclear power plant operating licenses expire, on average. The estimated industry operation cost to perform these inspections over the remaining term of the current operating plant extended licenses would cost ($240,000) based on a 7-percent NPV and ($320,000) based on a 3-percent NPV.

[9] The timing for incorporating this Code version into the unit's ISI program is a simplifying assumption. Generally, licensees would not implement this change until they updated their ISI program at the end of their current 10-year interval.

Table 20 Industry Operation: Concrete Containment Examinations Provision (Operating Reactors)

Year	Activity	Number of Reactors	Additional inspections	Hours per inspection	Hourly Rate	Industry Operation Cost (2014 dollars)		
						Undiscounted	3% NPV	7% NPV
2017	Concrete containment examinations and evaluations	35.5	10	1	$68	($24,140)	($23,437)	($22,561)
2018	Concrete containment examinations and evaluations	35.5	10	1	$68	($24,140)	($22,754)	($21,085)
2019	Concrete containment examinations and evaluations	35.5	10	1	$68	($24,140)	($22,092)	($19,705)
2020	Concrete containment examinations and evaluations	35.5	10	1	$68	($24,140)	($21,448)	($18,416)
2021	Concrete containment examinations and evaluations	35.5	10	1	$68	($24,140)	($20,823)	($17,211)
2022	Concrete containment examinations and evaluations	35.5	10	1	$68	($24,140)	($20,217)	($16,086)
2023	Concrete containment examinations and evaluations	35.5	10	1	$68	($24,140)	($19,628)	($15,033)
2024	Concrete containment examinations and evaluations	35.5	10	1	$68	($24,140)	($19,056)	($14,050)
2025	Concrete containment examinations and evaluations	35.5	10	1	$68	($24,140)	($18,501)	($13,131)
2026	Concrete containment examinations and evaluations	35.5	10	1	$68	($24,140)	($17,962)	($12,272)
2027	Concrete containment examinations and evaluations	35.5	10	1	$68	($24,140)	($17,439)	($11,469)
2028	Concrete containment examinations and evaluations	35.5	10	1	$68	($24,140)	($16,931)	($10,718)
2029	Concrete containment examinations and evaluations	35.5	10	1	$68	($24,140)	($16,438)	($10,017)
2030	Concrete containment examinations and evaluations	35.5	10	1	$68	($24,140)	($15,959)	($9,362)
2031	Concrete containment examinations and evaluations	35.5	10	1	$68	($24,140)	($15,495)	($8,749)
2032	Concrete containment examinations and evaluations	35.5	10	1	$68	($24,140)	($15,043)	($8,177)
2033	Concrete containment examinations and evaluations	35.5	10	1	$68	($24,140)	($14,605)	($7,642)
					Total:	**($410,000)**	**($320,000)**	**($240,000)**

Note: Table totals are rounded to the nearest ten thousand dollars.

Assuming that the five new reactors apply for an extended license, operation cost to perform these inspections over the 20-year term of the operating plant extended licenses would cost ($1,000) based on a 7-percent NPV and ($8,000) based on a 3-percent NPV.

Table 21 Industry Operation: Concrete Containment Examinations Provision (New Reactors)

Year	Activity	Number of Reactors	Additional inspections	Hours per inspection	Hourly Rate	Industry Operation Cost (2014 dollars)		
						Undiscounted	3% NPV	7% NPV
2055	Concrete containment examinations and evaluations	1	10	1	$68	($680)	($202)	($42)
2056	Concrete containment examinations and evaluations	0	10	1	$68	$0	$0	$0
2057	Concrete containment examinations and evaluations	3	10	1	$68	($2,040)	($572)	($111)
2058	Concrete containment examinations and evaluations	2	10	1	$68	($1,360)	($370)	($69)
2059	Concrete containment examinations and evaluations	3	10	1	$68	($2,040)	($539)	($97)
2060	Concrete containment examinations and evaluations	2	10	1	$68	($1,360)	($349)	($61)
2061	Concrete containment examinations and evaluations	3	10	1	$68	($2,040)	($508)	($85)
2062	Concrete containment examinations and evaluations	2	10	1	$68	($1,360)	($329)	($53)
2063	Concrete containment examinations and evaluations	3	10	1	$68	($2,040)	($479)	($74)
2064	Concrete containment examinations and evaluations	2	10	1	$68	($1,360)	($310)	($46)
2065	Concrete containment examinations and evaluations	3	10	1	$68	($2,040)	($452)	($65)
2066	Concrete containment examinations and evaluations	2	10	1	$68	($1,360)	($292)	($40)
2067	Concrete containment examinations and evaluations	3	10	1	$68	($2,040)	($426)	($57)
2068	Concrete containment examinations and evaluations	2	10	1	$68	($1,360)	($276)	($35)
2069	Concrete containment examinations and evaluations	3	10	1	$68	($2,040)	($401)	($49)
2070	Concrete containment examinations and evaluations	2	10	1	$68	($1,360)	($260)	($31)
2071	Concrete containment examinations and evaluations	3	10	1	$68	($2,040)	($378)	($43)
2072	Concrete containment examinations and evaluations	2	10	1	$68	($1,360)	($245)	($27)
2073	Concrete containment examinations and evaluations	3	10	1	$68	($2,040)	($357)	($38)
2074	Concrete containment examinations and evaluations	2	10	1	$68	($1,360)	($231)	($23)
2075	Concrete containment examinations and evaluations	3	10	1	$68	($2,040)	($336)	($33)
2076	Concrete containment examinations and evaluations	2	10	1	$68	($1,360)	($218)	($20)
					Total:	**($35,000)**	**($8,000)**	**($1,000)**

Note: Table totals are rounded to the nearest thousand dollars.

5.4.3. NDE Personnel Certification

The proposed condition in 10 CFR 50.55a(b)(2)(xviii)(D) prohibits applicants and licensees from using the ultrasonic examination nondestructive examination (NDE) personnel certification requirements in Section XI, Appendix VII and subarticle VIII-2200 of the 2011 Addenda and 2013 Edition of the ASME BPV Code and prohibits the use of an accelerated Appendix VII training process for certification of ultrasonic examination personnel based on training and prior experience. Instead, the NRC requires applicants and licensees to use Table VII-4110-1 in the 2010 Edition, and VIII-2200, Appendix VIII prerequisites for ultrasonic examination personnel requirements in the 2010 Edition. This proposed condition does not result in a change from the routine and recurring activities contained within the regulatory baseline.

5.4.4. Steam Generator Preservice Examinations

The proposed condition in 10 CFR 50.55a(b)(2)(xxx) clarifies the current requirement in IWB-2200(c) pertaining to steam generator tube preservice inspections (PSI). Preservice requirements for ASME Class 1 components are provided in IWB-2200, and IWB-2200(c) currently states, "Steam generator tube examination shall be governed by the plant Technical Specifications (TS)." However, there are no preservice examination requirements for steam generators defined in plant TS. Preservice examination requirements for steam generators are not within any of the categories described in 10 CFR 50.36 for the content of TS. Because IWB-2200(c) requires the steam generator tube examinations be performed in accordance with plant TS, and TS contain no rules for PSI of steam generator tubing, the NRC is clarifying the PSI requirements for steam generator tubes.

The proposed clarification is consistent with industry guidelines and the staff position outlined in SRP Section 5.4.2.2, "Steam Generator Program." The proposed requirement is instead of the requirements of IWB-2200(c) and requires that a full-length examination of 100 percent of the tubing in each steam generator be performed prior to plant startup with a newly installed steam generator. This proposed condition does not result in a change from the routine and recurring activities contained within the regulatory baseline.

5.4.5. Control the Use of Mechanical Clamping Devices

The proposed condition in 10 CFR 50.55a(b)(2)(xxxi) prohibits the use of mechanical clamping devices on Class 1 piping and portions of piping systems that form the containment boundary. In the 2010 Edition of the ASME BPV Code, a change was made to include mechanical clamping devices under the small items exclusion rules of IWA-4131. Currently in the 2007 Edition/2008 Addenda of Section XI under IWA-4133, "Mechanical Clamping Devices Used as Piping Pressure Boundary," mechanical clamping devices may be used only if they meet the requirements of Mandatory Appendix IX of Section XI of the ASME BPV Code. This prohibition does not result in a change from the routine and recurring activities contained within the existing regulatory baseline.

5.4.6. Summary Report Preparation and Submittal

The proposed condition in 10 CFR 50.55a(b)(2)(xxxii) requires licensees using the 2010 Edition and later editions and addenda of Section XI to continue to submit Summary Reports as required in IWA-6240 of the 2009 Addenda, which is consistent with current timeframes. This proposed condition does not result in a change from the routine and recurring activities contained within the existing regulatory baseline.

5.4.7. Prohibit Use of Risk-Informed Allowable Pressure Methodology

The proposed condition in 10 CFR 50.55a(b)(2)(xxxiii) prohibits the use of Appendix G, Paragraph G-2216 in ASME BPV Code, Section XI, which was included for the first time in the 2011 Addenda of the ASME BPV Code, and requires the continued use of the deterministic methodology of Section XI, Appendix G, to generate P-T limits. This prohibition does not result in a change from the routine and recurring activities contained within the existing regulatory baseline.

5.4.8. Disposition of Flaws in Class 3 Components

The proposed condition in 10 CFR 50.55a(b)(2)(xxxiv) requires that when using the 2013 Edition of the ASME BPV Code, Section XI, the licensee shall use the acceptance standards of IWD-3510 for the disposition of flaws in Category D-A components (i.e., welded attachments for vessels, piping, pumps, and valves) to correct an apparent discrepancy between the provisions in IWD-3410 and IWD-3510. This clarification provides necessary consistency in requirements between IWD-3410 and IWD-3510 and does not result in a change from the routine and recurring activities contained within the existing regulatory baseline.

5.4.9. Procedure Revision to Specify Use of Reference Temperature in the K_{Ia} and K_{Ic} Equations

The proposed condition in 10 CFR 50.55a(b)(2)(xxxv) specifies that when licensees use the 2013 Edition of the ASME BPV Code, Section XI, Appendix A, paragraph A-4200, if T_0 is available, then RT_{T0} may be used in place of RT_{NDT} for applications using the K_{Ic} equation and the associated K_{Ic} curve, but not for applications using the K_{Ia} equation and the associated K_{Ia} curve. This proposed insertion is consistent with Code Case N-629, "Use of Fracture Toughness Test Data to Establish Reference Temperature for Pressure Retaining Materials," which was accepted by the NRC without conditions. This condition does not result in a change from the routine and recurring activities contained within the existing regulatory baseline.

5.4.10. Fracture Toughness of Irradiated Material Requirements

The proposed condition in 10 CFR 50.55a(b)(2)(xxxvi) requires licensees using ASME BPV Code, Section XI, 2013 Edition, Appendix A, paragraph A-4400, to obtain NRC approval before using irradiated T_0 and the associated RT_{T0} in establishing fracture toughness of irradiated materials. The estimated one-time costs to update procedures to reflect this proposed condition were included in Section 5.3.10. This condition does not result in a change from the routine and recurring activities contained within the existing regulatory baseline.

5.4.11. Ultrasonic Examination Using Code Case N-824 Techniques

The proposed provision in 10 CFR 50.55a(b)(2)(xxxvii) allows licensees to use the provisions of ASME Code Case N-824, "Ultrasonic Examination of Cast Austenitic Piping Welds From the Outside Surface Section XI, Division 1," as conditioned, when implementing inservice examinations in accordance with the ASME BPV Code, Section XI requirements.

As noted previously in Section 5.3.11, because the CASS components at PWRs are not currently being inspected adequately, licensees must submit alternative requests from the ASME Code requirements for inservice inspection of CASS components to the NRC. If Alternative 2 is adopted, the alternative requests would be reduced to those situations in which examinations using the encoded phased-array techniques are impractical due to component geometry, metallurgical considerations, or access limitations. The staff assumed that the licensee requires 10 hours to prepare the basis for determination including appropriate drawings, descriptions, and results of limited nondestructive examination applied for each weld included in the submitted relief request. The staff estimates that 30 welds, on average, are included in the relief request. Using this examination technique, the staff expects the number of welds included in the relief request to decrease to 10 welds, on average. The staff also expects that the incremental time to examine welds in CASS components will increase by 1 hour per

weld, or 30 hours per the Ten-Year Inservice Inspection Interval. As shown in the following table, the implementation of Alternative 2 would result in fewer items included in submitted relief requests. The NRC estimates the industry operation cost for operating PWRs range from $430,000 based on a 7-percent NPV to $740,000 based on a 3-percent NPV yielding a net benefit for Alternative 2. Industry operation cost for new PWRs range from $28,000 based on a 7-percent NPV to $54,000 based on a 3-percent NPV yielding a net benefit for Alternative 2.

Table 22 Industry Operation: Code Case N-824 Ultrasonic Examination Optional Provision (Operating and New Reactors)

Year	Activity	No. of affected entities	No. of actions per entity	Hours/Action		Hourly Rate		Industry Operation Cost (2014 dollars)		
				Technician	Engineer	Technician	Engineer	Undiscounted	3% NPV	7% NPV
2028	Relief request preparation and submission averted (Operating plants)	65	1		200	$68	$96	$1,248,000	$825,075	$483,996
2028	Setup, perform, and document ultrasonic weld exam (Operating plants)	65	30	1		$68	$96	($132,600)	($87,664)	($51,425)
2017	Relief request preparation and submission averted (New plants)	1	1		200	$68	$96	$19,200	$17,571	$15,673
2017	Setup, perform, and document ultrasonic weld exam (New plants)	1	30	1		$68	$96	($2,040)	($1,867)	($1,665)
2027	Relief request preparation and submission averted (New plants)	1	1		200	$68	$96	$19,200	$13,074	$7,967
2027	Setup, perform, and document ultrasonic weld exam (New plants)	1	30	1		$68	$96	($2,040)	($1,389)	($847)
2037	Relief request preparation and submission averted (New plants)	1	1		200	$68	$96	$19,200	$9,728	$4,050
2037	Setup, perform, and document ultrasonic weld exam (New plants)	1	30	1		$68	$96	($2,040)	($1,034)	($430)
2047	Relief request preparation and submission averted (New plants)	1	1		200	$68	$96	$19,200	$7,239	$2,059
2047	Setup, perform, and document ultrasonic weld exam (New plants)	1	30	1		$68	$96	($2,040)	($769)	($219)
2057	Relief request preparation and submission averted (New plants)	1	1		200	$68	$96	$19,200	$5,386	$1,047
2057	Setup, perform, and document ultrasonic weld exam (New plants)	1	30	1		$68	$96	($2,040)	($572)	($111)
2067	Relief request preparation and submission averted (New plants)	1	1		200	$68	$96	$19,200	$4,008	$532
2067	Setup, perform, and document ultrasonic weld exam (New plants)	1	30	1		$68	$96	($2,040)	($426)	($57)
2077	Relief request preparation and submission averted (New plants)	1	1		200	$68	$96	$19,200	$2,982	$270
2077	Setup, perform, and document ultrasonic weld exam (New plants)	1	30	1		$68	$96	($2,040)	($317)	($29)
							Operating Reactor Subtotal	*$1,120,000*	*$740,000*	*$430,000*
							New Reactor Subtotal	*$120,000*	*$54,000*	*$28,000*
							Total:	**$1,240,000**	**$790,000**	**$460,000**

Note: Table totals are rounded to the nearest ten thousand dollars.

5.4.12. Mandatory Appendix III Inservice Testing of Motor-Operated Valves

Mandatory Appendix III specifies motor-operated valves (MOVs) exercising on a 2-year interval and MOV diagnostic testing on an interval from 3 to 10 years, rather than the current Code requirement of quarterly stroke-time testing of MOVs within the IST program scope. Mandatory Appendix III incorporates ASME OM Code Case OMN-1 and Code Case OMN-11 into the OM Code. Regulatory Guide 1.192 (Ref. 8.16) accepts the voluntary use of Code Cases OMN-1 and OMN-11 with specific conditions.

All nuclear power plant licensees implementing the ASME OM Code are required by 10 CFR 50.55a(b)(3)(ii) to establish a program to ensure that safety-related MOVs continue to be capable of performing their design-basis safety functions. All licensees are currently implementing MOV programs in response to GL 96-05 (Ref. 8.12), which includes periodic diagnostic testing to verify MOV design-basis capability. Therefore, the number of MOV exercise tests would decrease from four per year to one every 2 years with an MOV diagnostic

test every 5 years, on average. The estimated benefit from implementing the ASME OM Code would range from $1.7 million (3-percent NPV) to $1.1 million (7-percent NPV).

As shown in Table 23, Alternative 2 would result in fewer MOV exercise tests. The NRC estimates the industry operation cost for operating nuclear power plants range yields a net benefit of from $2.0 million based on a 7-percent NPV to $2.8 million based on a 3-percent NPV.

Table 23 Industry Operation: MOV Inservice Testing Provision (Operating Reactors)

Year	Activity	No. of affected units	No. of tests per year	No. of MOVs per unit	Hours per MOV	Technician Hourly Rate	Industry Operation Cost (2014 dollars)		
							Undiscounted	3% NPV	7% NPV
2016	Quarterly MOV exercise tests averted	99	4	50	0.25	$68	$336,600	$317,278	$293,999
2016	Biannual MOV exercise test	49.5	1	50	0.25	$68	($42,075)	($39,660)	($36,750)
2016	MOV diagnostic test on 5-year test interval	99	1	50	1	$68	($336,600)	($317,278)	($293,999)
2017	Quarterly MOV exercise tests averted	99	4	50	0.25	$68	$336,600	$308,037	$274,766
2017	Biannual MOV exercise test	49.5	1	50	0.25	$68	($42,075)	($38,505)	($34,346)
2018	Quarterly MOV exercise tests averted	99	4	50	0.25	$68	$336,600	$299,065	$256,791
2018	Biannual MOV exercise test	49.5	1	50	0.25	$68	($42,075)	($37,383)	($32,099)
2019	Quarterly MOV exercise tests averted	99	4	50	0.25	$68	$336,600	$290,354	$239,991
2019	Biannual MOV exercise test	49.5	1	50	0.25	$68	($42,075)	($36,294)	($29,999)
2020	Quarterly MOV exercise tests averted	98	4	50	0.25	$68	$333,200	$279,050	$222,025
2020	Biannual MOV exercise test	49	1	50	0.25	$68	($41,650)	($34,881)	($27,753)
2021	Quarterly MOV exercise tests averted	98	4	50	0.25	$68	$333,200	$270,922	$207,500
2021	Biannual MOV exercise test	49	1	50	0.25	$68	($41,650)	($33,865)	($25,938)
2021	MOV diagnostic test on 5-year test interval	98	1	50	1	$68	($333,200)	($270,922)	($207,500)
2022	Quarterly MOV exercise tests averted	98	4	50	0.25	$68	$333,200	$263,031	$193,925
2022	Biannual MOV exercise test	49	1	50	0.25	$68	($41,650)	($32,879)	($24,241)
2023	Quarterly MOV exercise tests averted	98	4	50	0.25	$68	$333,200	$255,370	$181,239
2023	Biannual MOV exercise test	49	1	50	0.25	$68	($41,650)	($31,921)	($22,655)
2024	Quarterly MOV exercise tests averted	98	4	50	0.25	$68	$333,200	$247,932	$169,382
2024	Biannual MOV exercise test	49	1	50	0.25	$68	($41,650)	($30,992)	($21,173)
2025	Quarterly MOV exercise tests averted	98	4	50	0.25	$68	$333,200	$240,711	$158,301
2025	Biannual MOV exercise test	49	1	50	0.25	$68	($41,650)	($30,089)	($19,788)
2026	Quarterly MOV exercise tests averted	98	4	50	0.25	$68	$333,200	$233,700	$147,945
2026	Biannual MOV exercise test	49	1	50	0.25	$68	($41,650)	($29,212)	($18,493)
2026	MOV diagnostic test on 5-year test interval	98	1	50	1	$68	($333,200)	($233,700)	($147,945)
2027	Quarterly MOV exercise tests averted	98	4	50	0.25	$68	$333,200	$226,893	$138,266
2027	Biannual MOV exercise test	49	1	50	0.25	$68	($41,650)	($28,362)	($17,283)
2028	Quarterly MOV exercise tests averted	98	4	50	0.25	$68	$333,200	$220,284	$129,221
2028	Biannual MOV exercise test	49	1	50	0.25	$68	($41,650)	($27,536)	($16,153)
2029	Quarterly MOV exercise tests averted	98	4	50	0.25	$68	$333,200	$213,868	$120,767
2029	Biannual MOV exercise test	49	1	50	0.25	$68	($41,650)	($26,734)	($15,096)
2030	Quarterly MOV exercise tests averted	98	4	50	0.25	$68	$333,200	$207,639	$112,866
2030	Biannual MOV exercise test	49	1	50	0.25	$68	($41,650)	($25,955)	($14,108)
2031	Quarterly MOV exercise tests averted	98	4	50	0.25	$68	$333,200	$201,591	$105,483
2031	Biannual MOV exercise test	49	1	50	0.25	$68	($41,650)	($25,199)	($13,185)
2031	MOV diagnostic test on 5-year test interval	98	1	50	1	$68	($333,200)	($201,591)	($105,483)
2032	Quarterly MOV exercise tests averted	98	4	50	0.25	$68	$333,200	$195,720	$98,582
2032	Biannual MOV exercise test	49	1	50	0.25	$68	($41,650)	($24,465)	($12,323)
2033	Quarterly MOV exercise tests averted	98	4	50	0.25	$68	$333,200	$190,019	$92,133
2033	Biannual MOV exercise test	49	1	50	0.25	$68	($41,650)	($23,752)	($11,517)
						Total:	**$3,920,000**	**$2,880,000**	**$2,000,000**

Note: Table totals are rounded to the nearest thousand dollars.

Performing a similar analysis for the new reactors and assuming that the five new reactors apply for an extended license, the operation cost to perform these tests over the 60-year term of the operating plant extended licenses would result in a net benefit (averted cost) range of $132,000 based on a 7-percent NPV to $287,000 based on a 3-percent NPV.

Table 24 Industry Operation: MOV Inservice Testing Provision (New Reactors)

Activity	Industry Operation Cost (2014 dollars)		
	Undiscounted	3% NPV	7% NPV
Biannual MOV exercise test	($130,050)	($55,995)	($26,270)
MOV diagnostic test on 5-year test interval	($238,000)	($103,536)	($50,218)
Quarterly MOV exercise tests averted	$1,037,000	$446,117	$208,700
Total:	**$669,000**	**$287,000**	**$132,000**

Note: Table totals are rounded to the nearest thousand dollars.

5.4.13. ASME OM Code Supplemental Requirements Testing for New Reactors

The proposed condition in 10 CFR 50.55a(b)(3)(iii) imposes four supplemental requirements on the use of the provisions in the ASME OM Code for new reactors with combined licenses issued under 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants." These requirements involve (A) periodic verification of the design-basis capability of power-operated valves (POVs) other than MOVs already addressed in Appendix III to the ASME OM Code, (B) bi-directional testing of check valves, (C) monitoring flow-induced vibration from hydrodynamic loads and acoustic resonance to identify potential adverse flow effects, and (D) assessment of the operational readiness of pumps, valves, and dynamic restraints within the scope of regulatory treatment of nonsafety systems (RTNSS) program for applicable reactor designs. These supplemental requirements are currently applied to each new reactor during the licensing process based on Commission policy papers for the design and operation of new reactors. Therefore, no additional incremental costs will be imposed on new reactor licensees as a result of specifying these requirements in 10 CFR 50.55a.

5.4.14. ASME OM Code Requirements for Squib Valve Surveillance for New Reactors

Subsection ISTC in the 2012 Edition of the ASME OM Code supplements the preservice and inservice surveillance requirements in the previous editions and addenda of the ASME OM Code for squib valves in new reactors. The combined licenses for Vogtle Units 3 and 4 and V.C. Summer Units 2 and 3 include conditions for preservice and surveillance requirements for their squib valves (Ref. 8.1, 8.2, 8.3, and 8.4). The supplemental provisions for squib valves in new reactors in Subsection ISTC in the 2012 Edition of the ASME OM Code are consistent with the license conditions currently imposed on Vogtle Units 3 and 4 and V.C. Summer Units 2 and 3. Therefore, the incorporation by reference of the supplemental squib valve provisions in 2012 Edition of the ASME OM Code into 10 CFR 50.55a will not result in new technical requirements for those reactors. No additional implementation costs will result from the ASME OM Code requirements for squib valve surveillance in new reactors.

5.4.15. Subsection ISTB (2011 Edition) Testing

The proposed condition in 10 CFR 50.55a(b)(3)(vii) prohibits the use of Subsection ISTB in the 2011 Addenda of the OM Code because the addenda expanded the acceptable range of a pump comprehensive test but did not require a pump periodic verification program as specified in Mandatory Appendix V in the 2012 Edition of the OM Code. The proposed condition does not result in a change from the routine and recurring activities contained within the regulatory baseline.

5.4.16. Mandatory Appendix V on Pump Periodic Verification Tests

The 2012 Edition of the ASME OM Code specifies the use of Mandatory Appendix V, "Pump Periodic Verification Test Program," Mandatory Appendix V establishes the requirements for implementing a pump periodic verification test. The test verifies that pumps that are in a licensee's IST program can meet the required (differential or discharge) pressure as applicable, at its highest design-basis accident flow rate. The test, if required, must be performed once every 2 years. If a pump does not have a specific design-basis accident flow rate in the licensee's credited safety analysis, or if a pump's comprehensive test flow rate and (differential or discharge) pressure bound the pump's design-basis accident flow rate and (differential or discharge) pressure, a pump periodic verification test is not required.

The staff estimates that there are 30 pumps in a plant's IST program, on average, and about 5 of those 30 pumps will require a periodic verification test once every 2 years. The staff estimates that each pump periodic test requires one hour to setup, perform, and document the test. The estimated industry operation cost to perform these pump periodic verification tests over the remaining term of the current operating plant extended licenses under Alternative 2 would cost ($162,000) based on a 7-percent NPV and ($226,000) based on a 3-percent NPV.

Table 25 Industry Operation: Mandatory Appendix V Pump Verification Test Provision (Operating Reactors)

Year	Activity	No. of affected units	No. of pumps tested	Test duration (hrs)	Technician Hourly Rate	Industry Operation Cost (2014 dollars)		
						Undiscounted	3% NPV	7% NPV
2016	Pump periodic verification test	99	5	1	$68	($33,660)	($31,728)	($29,400)
2018	Pump periodic verification test	99	5	1	$68	($33,660)	($29,906)	($25,679)
2020	Pump periodic verification test	98	5	1	$68	($33,320)	($27,905)	($22,203)
2022	Pump periodic verification test	98	5	1	$68	($33,320)	($26,303)	($19,393)
2024	Pump periodic verification test	98	5	1	$68	($33,320)	($24,793)	($16,938)
2026	Pump periodic verification test	98	5	1	$68	($33,320)	($23,370)	($14,794)
2028	Pump periodic verification test	98	5	1	$68	($33,320)	($22,028)	($12,922)
2030	Pump periodic verification test	98	5	1	$68	($33,320)	($20,764)	($11,287)
2032	Pump periodic verification test	98	5	1	$68	($33,320)	($19,572)	($9,858)
					Total:	**($301,000)**	**($226,000)**	**($162,000)**

Note: Table totals are rounded to the nearest thousand dollars.

Performing a similar analysis for the new reactors and assuming that the five new reactors apply for an extended license, the operation cost to perform these tests over the 60-year term of the operating plant extended licenses would result in a negative net benefit (net cost) range of ($400) based on a 7-percent NPV to ($3,000) based on a 3-percent NPV.

Table 26 Industry Operation: Mandatory Appendix V Pump Verification Test Provision (New Reactors)

Year	Activity	No. of affected units	No. of pumps tested per unit	Test duration (hrs)	Technician Hourly Rate	Industry Operation Cost (2014 dollars)		
						Undiscounted	3% NPV	7% NPV
2017	Pump periodic verification test	5	5	1	$68	($1,700)	($1,556)	($1,388)
2019	Pump periodic verification test	5	5	1	$68	($1,700)	($1,466)	($1,212)
2021	Pump periodic verification test	5	5	1	$68	($1,700)	($1,382)	($1,059)
2023	Pump periodic verification test	5	5	1	$68	($1,700)	($1,303)	($925)
2025	Pump periodic verification test	5	5	1	$68	($1,700)	($1,228)	($808)
2027	Pump periodic verification test	5	5	1	$68	($1,700)	($1,158)	($705)
2029	Pump periodic verification test	5	5	1	$68	($1,700)	($1,091)	($616)
2031	Pump periodic verification test	5	5	1	$68	($1,700)	($1,029)	($538)
2033	Pump periodic verification test	5	5	1	$68	($1,700)	($969)	($470)
2035	Pump periodic verification test	5	5	1	$68	($1,700)	($914)	($411)
2037	Pump periodic verification test	5	5	1	$68	($1,700)	($861)	($359)
2039	Pump periodic verification test	5	5	1	$68	($1,700)	($812)	($313)
2041	Pump periodic verification test	5	5	1	$68	($1,700)	($765)	($274)
2043	Pump periodic verification test	5	5	1	$68	($1,700)	($721)	($239)
2045	Pump periodic verification test	5	5	1	$68	($1,700)	($680)	($209)
2047	Pump periodic verification test	5	5	1	$68	($1,700)	($641)	($182)
2049	Pump periodic verification test	5	5	1	$68	($1,700)	($604)	($159)
2051	Pump periodic verification test	5	5	1	$68	($1,700)	($569)	($139)
2053	Pump periodic verification test	5	5	1	$68	($1,700)	($537)	($121)
2055	Pump periodic verification test	5	5	1	$68	($1,700)	($506)	($106)
2057	Pump periodic verification test	5	5	1	$68	($1,700)	($477)	($93)
2059	Pump periodic verification test	5	5	1	$68	($1,700)	($450)	($81)
2061	Pump periodic verification test	5	5	1	$68	($1,700)	($424)	($71)
2063	Pump periodic verification test	5	5	1	$68	($1,700)	($399)	($62)
2065	Pump periodic verification test	5	5	1	$68	($1,700)	($376)	($54)
2067	Pump periodic verification test	5	5	1	$68	($1,700)	($355)	($47)
2069	Pump periodic verification test	5	5	1	$68	($1,700)	($335)	($41)
2071	Pump periodic verification test	5	5	1	$68	($1,700)	($315)	($36)
2073	Pump periodic verification test	5	5	1	$68	($1,700)	($297)	($31)
2075	Pump periodic verification test	5	5	1	$68	($1,700)	($280)	($27)
2077	Pump periodic verification test	5	5	1	$68	($1,700)	($264)	($24)
					Total:	**($15,300)**	**($3,000)**	**($400)**

Note: Table totals are rounded to the nearest hundred dollars.

5.4.17. Subsection ISTE (2012 Edition) for Risk-Informed Inservice Testing of Pumps and Valves

It is difficult to estimate with any certainty the incremental cost-benefits for nuclear power plant licensees who implement risk-informed inservice testing of pumps and valves on a generic basis. This is because the incremental cost-benefits depend on the number of licensees adopting this approach, the cost-benefit of the methodology approved, the number of pumps and valves characterized as low risk, and the number of years that the licensees would derive benefits. A benefit could be the elimination or reduced frequency of recurring inservice inspection and repair or replacement of components and the reduction in personnel training and maintenance costs. Furthermore, there could be other unquantifiable benefits, such as reduced outage time arising from reduced testing requirement for low-risk pumps and valves and greater flexibility in maintenance scheduling while maintaining equivalent level of safety.

Under Alternative 2, nuclear power plant licensees are allowed to adopt this allowable provision. Individual licensees may choose to do so if they determine that the benefits in terms of ongoing savings and the focus of the plant's IST program on risk significant components result in plant safety benefits that outweigh the one-time implementation costs. Nuclear power plant licensees not adopting Subsection ISTE (2012 Edition) would see no change in costs or benefits as they continue to perform IST under the existing regulatory baseline.

5.4.18. Subsection ISTF, OM Code Pump Testing for New Reactors

Subsection ISTF, OM Code, specifies IST requirements for pumps within the scope of the ASME OM Code for new reactors. The term "new reactors" refers to nuclear power plants that were issued (or will be issued) a construction permit, or combined license for construction and operation, on or following January 1, 2000. Subsection ISTF provides essentially the same IST requirements as existing Subsection ISTB for pumps in current operating nuclear power plants with one exception. In particular, pumps in new reactors will undergo inservice pump testing every quarter rather than Group A or B tests every quarter and comprehensive tests every 2 years as performed at current operating plants. Vogtle Units 3 and 4 and V.C. Summer Units 2 and 3 have a passive design without safety-related pumps. Watts Bar Unit 2 is not a new reactor (post-2000 plant) by the ASME OM Code definition. Therefore, there is no expected industry incremental operation cost from any of the assumed new reactors.

5.4.19. Code Case OMN-20 Time Period Extension

The proposed condition allows the use of Code Case OMN-20 before incorporation into the next update of Regulatory Guide 1.192 (Ref. 8.16), and incorporation by reference into 10 CFR 50.55a. The Code Case allows time periods fewer than 2 years to be extended by up to 25 percent for any given pump or valve inservice test. Time periods greater than or equal to 2 years may be extended by up to 6 months for any given pump or valve inservice test. Currently a licensee must submit one alternative request for every 10-year inservice test interval in order to use Code Case OMN-20 for the pumps and valves in their program. Although this provision is optional, it does provide scheduling flexibility. As a result, the NRC staff estimates that all licensees will use Code Case OMN-20. The estimated time for the licensee staff to prepare and submit each alternative request is 400 hours and these requests for all reactor units are assumed to be submitted in years 2016 and 2026 for the operating power reactors. The averted costs associated with the estimated industry operation cost to prepare and submit OMN-20 time period extension requests over the remaining term of the current operating plant licenses under Alternative 2 would cost ($4,990,000) based on a 7-percent NPV and ($6,220,000) based on a 3-percent NPV.

Table 27 Industry Operation: Code Case OMN-20 Time Period Extension Optional Provision (Operating Reactors)

Year	Activity	No. of affected entities	Labor hours	Hourly Rate	Implementation Cost (2014 dollars)		
					Undiscounted	3% NPV	7% NPV
2016	Prepare and submit OMN-20 Time Period Extension Request	99	400	$96	$3,801,600	$3,583,373	$3,320,465
2026	Prepare and submit OMN-20 Time Period Extension Request	98	400	$96	$3,763,200	$2,639,433	$1,670,906
				Total:	**$7,560,000**	**$6,220,000**	**$4,990,000**

Note: Table totals are rounded to the nearest ten thousand dollars.

For the new reactors, the alternative requests are assumed to be submitted beginning in year 2017 and every 10 years until license expiration for the extended license in year 2077. The averted costs associated with the estimated industry operation cost to prepare and submit OMN-20 time period extension requests over the remaining term of the new plant licenses (which includes a 20-year license renewal period) would cost ($310,000) based on a 7-percent NPV and ($570,000) based on a 3-percent NPV under Alternative 2.

Table 28 Industry Operation: Code Case OMN-20 Time Period Extension Optional Provision (New Reactors)

Year	Activity	No. of affected entities	Labor hours	Hourly Rate	Implementation Cost (2014 dollars)		
					Undiscounted	3% NPV	7% NPV
2017	Prepare and submit OMN-20 Time Period Extension Request	5	400	$96	$192,000	$175,707	$156,729
2027	Prepare and submit OMN-20 Time Period Extension Request	5	400	$96	$192,000	$130,743	$79,673
2037	Prepare and submit OMN-20 Time Period Extension Request	5	400	$96	$192,000	$97,285	$40,502
2047	Prepare and submit OMN-20 Time Period Extension Request	5	400	$96	$192,000	$72,389	$20,589
2057	Prepare and submit OMN-20 Time Period Extension Request	5	400	$96	$192,000	$53,864	$10,466
2067	Prepare and submit OMN-20 Time Period Extension Request	5	400	$96	$192,000	$40,080	$5,321
				Total:	**$1,150,000**	**$570,000**	**$310,000**

Note: Table totals are rounded to the nearest ten thousand dollars.

5.4.20. Program Revision to Inservice Testing Requirements

This proposed condition does not result in a change from the routine and recurring activities contained within the regulatory baseline.

5.4.21. Cast Austenitic Stainless Steel Material Examination Requirements

This proposed condition adds 10 CFR 50.55a(g)(6)(ii)(F)(11) to address examination requirements through cast stainless steel materials and to establish a deadline of January 1, 2019, for requiring the use of Appendix VIII qualifications to meet the inspection requirements of paragraph -2500(a) of ASME Code Case N-770-2.

Based on previously submitted ISI relief requests, there are between 400 and 1,400 class 1 piping welds and between 1,700 and 2,000 class 2 welds in a PWR unit depending on design. Of this weld population, between 400 and 500 class 1 welds and approximately 1,500 class 2 welds require volumetric examination. Most PWRs use a risk-informed system that reduces these numbers to a population of 150 total welds in their 10-year interval inspection pool.

The staff estimates that the inspection requirements of this provision requires an additional 15 minutes per weld to perform and document the inspection. All PWR licensees would begin performing these inspections in 2019. The estimated total industry implementation cost to incorporate this requirement would cost ($1,200) based on a 7-percent NPV and ($1,700) based on a 3-percent NPV.

Table 29 Industry Operation: Cast Austenitic Stainless Steel Material Examination Provision (Operating and New PWRs)

Year	Activity	No. of affected entities	No. of weld inspections	Technician Labor hours	Hourly Rate	Implementation Cost (2014 dollars)		
						Undiscounted	3% NPV	7% NPV
2019	Perform and document CASS material inspections	65	150	0.25	$68	($1,105)	($953)	($788)
2029	Perform and document CASS material inspections	65	150	0.25	$68	($1,105)	($709)	($401)
2019	Perform and document CASS material inspections	1	150	0.25	$68	($17)	($15)	($12)
2029	Perform and document CASS material inspections	1	150	0.25	$68	($17)	($11)	($6)
2039	Perform and document CASS material inspections	1	150	0.25	$68	($17)	($8)	($3)
2049	Perform and document CASS material inspections	1	150	0.25	$68	($17)	($6)	($2)
2059	Perform and document CASS material inspections	1	150	0.25	$68	($17)	($4)	($1)
2069	Perform and document CASS material inspections	1	150	0.25	$68	($17)	($3)	($0)
					Operating Reactor Subtotal	*($2,200)*	*($1,700)*	*($1,200)*
					New Reactor Subtotal	*($100)*	*$0*	*$0*
					Total:	**($2,300)**	**($1,700)**	**($1,200)**

Note: Table totals are rounded to the nearest hundred dollars.

5.4.22. Examination Coverage Requirements for Butt Welds Joining Cast Stainless Steel Material

Under current ASME BPV Code, Section XI, Appendix VIII requirements, the volumetric examination of butt welds through cast stainless steel materials is under Supplement 9. The ASME BPV Code committee is still developing supplement 9 rules. Therefore, it is currently impossible to meet the requirement of Paragraph I.5.1 for butt welds joining cast stainless steel material.

This provision would allow PWR licensees to implement a stress improvement mitigation technique for butt welds joining cast stainless steel material with use of an examination volume that is qualified by Appendix VIII procedures to the maximum extent practical; including 100 percent of the susceptible material volume. This technique would remain applicable until an Appendix VIII qualified procedure for the inspection through cast stainless steel materials is available in accordance with condition 10 CFR 50.55a(g)(6)(ii)(F)(*11*).

As described in Section 5.4.21, most PWR units use a risk-informed system that reduces these numbers to a population of 150 total welds in their 10-year interval inspection pool. The first outages after the final rule effective date is assumed to occur in 2017 in which half of the operating units perform their inspection during their scheduled outage. The remaining units perform their inspection in 2018 during their scheduled outage. This examination cycle continues on a 2-year outage cycle until January 2033 when the current nuclear power plant operating licenses expire, on average. The estimated industry operation cost to perform these inspections over the remaining term of the current operating plant extended licenses would cost ($810,000) based on a 7-percent NPV and ($1,090,000) based on a 3-percent NPV.

Table 30 Industry Operation: Butt Weld Inspection Provision (Operating PWR Reactors)

Year	Activity	Number of Reactors	No. of weld inspections	Hours per inspection	Hourly Rate	Industry Operation Cost (2014 dollars)		
						Undiscounted	3% NPV	7% NPV
2017	Perform and document butt weld inspections	32.5	150	0.25	$68	($82,875)	($80,461)	($77,453)
2018	Perform and document butt weld inspections	32.5	150	0.25	$68	($82,875)	($78,118)	($72,386)
2019	Perform and document butt weld inspections	32.5	150	0.25	$68	($82,875)	($75,842)	($67,651)
2020	Perform and document butt weld inspections	32.5	150	0.25	$68	($82,875)	($73,633)	($63,225)
2021	Perform and document butt weld inspections	32.5	150	0.25	$68	($82,875)	($71,489)	($59,089)
2022	Perform and document butt weld inspections	32.5	150	0.25	$68	($82,875)	($69,407)	($55,223)
2023	Perform and document butt weld inspections	32.5	150	0.25	$68	($82,875)	($67,385)	($51,610)
2024	Perform and document butt weld inspections	32.5	150	0.25	$68	($82,875)	($65,422)	($48,234)
2025	Perform and document butt weld inspections	32.5	150	0.25	$68	($82,875)	($63,517)	($45,079)
2026	Perform and document butt weld inspections	32.5	150	0.25	$68	($82,875)	($61,667)	($42,129)
2027	Perform and document butt weld inspections	32.5	150	0.25	$68	($82,875)	($59,871)	($39,373)
2028	Perform and document butt weld inspections	32.5	150	0.25	$68	($82,875)	($58,127)	($36,797)
2029	Perform and document butt weld inspections	32.5	150	0.25	$68	($82,875)	($56,434)	($34,390)
2030	Perform and document butt weld inspections	32.5	150	0.25	$68	($82,875)	($54,790)	($32,140)
2031	Perform and document butt weld inspections	32.5	150	0.25	$68	($82,875)	($53,194)	($30,038)
2032	Perform and document butt weld inspections	32.5	150	0.25	$68	($82,875)	($51,645)	($28,073)
2033	Perform and document butt weld inspections	32.5	150	0.25	$68	($82,875)	($50,141)	($26,236)
					Total:	**($1,410,000)**	**($1,090,000)**	**($810,000)**

Note: Table totals are rounded to the nearest ten thousand dollars.

For the new PWR unit, the staff estimates a population of 150 total welds in their 10-year interval inspection pool. Watts Bar Unit 2 first outage after the final rule effective date is assumed to occur in 2019. This outage examination cycle continues on a 2-year outage cycle until January 2077 when Watts Bar Unit 2 operating license is assumed to expire based on the licensee applying and receiving an extended license. The operation cost to perform these inspections over the 60-year term of the extended license would cost ($16,000) based on a 7-percent NPV and ($34,000) based on a 3-percent NPV.

Table 31 Industry Operation: Butt Weld Inspection Provision (New PWR Reactors)

Year	Activity	Number of Reactors	No. of weld inspections	Hours per inspection	Hourly Rate	Industry Operation Cost (2014 dollars)		
						Undiscounted	3% NPV	7% NPV
2019	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($2,334)	($2,082)
2021	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($2,200)	($1,818)
2023	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($2,073)	($1,588)
2025	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($1,954)	($1,387)
2027	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($1,842)	($1,211)
2029	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($1,736)	($1,058)
2031	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($1,637)	($924)
2033	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($1,543)	($807)
2035	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($1,454)	($705)
2037	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($1,371)	($616)
2039	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($1,292)	($538)
2041	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($1,218)	($470)
2043	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($1,148)	($410)
2045	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($1,082)	($358)
2047	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($1,020)	($313)
2049	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($961)	($273)
2051	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($906)	($239)
2053	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($854)	($209)
2055	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($805)	($182)
2057	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($759)	($159)
2059	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($715)	($139)
2061	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($674)	($121)
2063	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($636)	($106)
2065	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($599)	($93)
2067	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($565)	($81)
2069	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($532)	($71)
2071	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($502)	($62)
2073	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($473)	($54)
2075	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($446)	($47)
2077	Perform and document butt weld inspections	1	150	0.25	$68	($2,550)	($420)	($41)
					Total:	**($77,000)**	**($34,000)**	**($16,000)**

Note: Table totals are rounded to the nearest thousand dollars.

5.4.23. Encoding of Ultrasonic Volumetric Examinations

This proposed condition would require that specific ultrasonic volumetric examinations of non-mitigated or cracked mitigated dissimilar metal butt welds in the reactor coolant pressure boundary, within the scope of ASME Code Case N-770-2, have encoded examinations.

The staff estimates that 30 welds in a PWR plant's ISI program, on average, fall into the population requiring encoded examinations every outage. The staff estimates that encoding would require 3 additional technician hours to perform, on average. Complex encoded examinations could significantly exceed this estimate. The first outages after the final rule effective date are assumed to occur in 2017 in which half of the 65 PWR operating units participate. The remaining units perform their inspections in 2018. This examination cycle continues on a 2-year outage cycle until January 2033 when the current nuclear power plant operating licenses expire, on average. The estimated industry operation cost to perform these inspections over the remaining term of the current operating plant extended licenses would cost ($1.94 million) based on a 7-percent NPV and ($2.62 million) based on a 3-percent NPV.

Table 32 Industry Operation: Encoding Ultrasonic Volumetric Examinations Provision (Operating PWR Units)

Year	Activity	Number of Reactors	No. of weld inspections	Hours per inspection	Hourly Rate	Industry Operation Cost (2014 dollars)		
						Undiscounted	3% NPV	7% NPV
2017	Perform encoded weld inspections	32.5	30	3	$68	($198,900)	($193,107)	($185,888)
2018	Perform encoded weld inspections	32.5	30	3	$68	($198,900)	($187,482)	($173,727)
2019	Perform encoded weld inspections	32.5	30	3	$68	($198,900)	($182,022)	($162,362)
2020	Perform encoded weld inspections	32.5	30	3	$68	($198,900)	($176,720)	($151,740)
2021	Perform encoded weld inspections	32.5	30	3	$68	($198,900)	($171,573)	($141,813)
2022	Perform encoded weld inspections	32.5	30	3	$68	($198,900)	($166,576)	($132,535)
2023	Perform encoded weld inspections	32.5	30	3	$68	($198,900)	($161,724)	($123,865)
2024	Perform encoded weld inspections	32.5	30	3	$68	($198,900)	($157,013)	($115,762)
2025	Perform encoded weld inspections	32.5	30	3	$68	($198,900)	($152,440)	($108,188)
2026	Perform encoded weld inspections	32.5	30	3	$68	($198,900)	($148,000)	($101,111)
2027	Perform encoded weld inspections	32.5	30	3	$68	($198,900)	($143,690)	($94,496)
2028	Perform encoded weld inspections	32.5	30	3	$68	($198,900)	($139,504)	($88,314)
2029	Perform encoded weld inspections	32.5	30	3	$68	($198,900)	($135,441)	($82,536)
2030	Perform encoded weld inspections	32.5	30	3	$68	($198,900)	($131,496)	($77,137)
2031	Perform encoded weld inspections	32.5	30	3	$68	($198,900)	($127,666)	($72,091)
2032	Perform encoded weld inspections	32.5	30	3	$68	($198,900)	($123,948)	($67,374)
2033	Perform encoded weld inspections	32.5	30	3	$68	($198,900)	($120,338)	($62,967)
					Total:	**($3,380,000)**	**($2,620,000)**	**($1,940,000)**

Note: Table totals are rounded to the nearest ten thousand dollars.

For the new PWR unit, the staff estimates a population of 30 welds in the plant's PWR ISI program require encoded examinations every outage. Watts Bar Unit 2 first outage is assumed to occur in 2019. This outage examination cycle continues on a 2-year outage cycle until January 2077 when the Watts Bar Unit 2 operating license is assumed to expire based on its licensee applying and receiving an extended license. The operation cost to perform these inspections over the 60-year term of the extended license would cost ($39,000) based on a 7-percent NPV and ($81,000) based on a 3-percent NPV.

Table 33 Industry Operation: Encoding Ultrasonic Volumetric Exams Provision (New Reactors)

Year	Activity	Number of Reactors	No. of weld inspections	Hours per inspection	Hourly Rate	Industry Operation Cost (2014 dollars)		
						Undiscounted	3% NPV	7% NPV
2019	Perform encoded weld inspections	1	30	3	$68	($6,120)	($5,601)	($4,996)
2021	Perform encoded weld inspections	1	30	3	$68	($6,120)	($5,279)	($4,363)
2023	Perform encoded weld inspections	1	30	3	$68	($6,120)	($4,976)	($3,811)
2025	Perform encoded weld inspections	1	30	3	$68	($6,120)	($4,690)	($3,329)
2027	Perform encoded weld inspections	1	30	3	$68	($6,120)	($4,421)	($2,908)
2029	Perform encoded weld inspections	1	30	3	$68	($6,120)	($4,167)	($2,540)
2031	Perform encoded weld inspections	1	30	3	$68	($6,120)	($3,928)	($2,218)
2033	Perform encoded weld inspections	1	30	3	$68	($6,120)	($3,703)	($1,937)
2035	Perform encoded weld inspections	1	30	3	$68	($6,120)	($3,490)	($1,692)
2037	Perform encoded weld inspections	1	30	3	$68	($6,120)	($3,290)	($1,478)
2039	Perform encoded weld inspections	1	30	3	$68	($6,120)	($3,101)	($1,291)
2041	Perform encoded weld inspections	1	30	3	$68	($6,120)	($2,923)	($1,128)
2043	Perform encoded weld inspections	1	30	3	$68	($6,120)	($2,755)	($985)
2045	Perform encoded weld inspections	1	30	3	$68	($6,120)	($2,597)	($860)
2047	Perform encoded weld inspections	1	30	3	$68	($6,120)	($2,448)	($751)
2049	Perform encoded weld inspections	1	30	3	$68	($6,120)	($2,307)	($656)
2051	Perform encoded weld inspections	1	30	3	$68	($6,120)	($2,175)	($573)
2053	Perform encoded weld inspections	1	30	3	$68	($6,120)	($2,050)	($501)
2055	Perform encoded weld inspections	1	30	3	$68	($6,120)	($1,932)	($437)
2057	Perform encoded weld inspections	1	30	3	$68	($6,120)	($1,821)	($382)
2059	Perform encoded weld inspections	1	30	3	$68	($6,120)	($1,717)	($334)
2061	Perform encoded weld inspections	1	30	3	$68	($6,120)	($1,618)	($291)
2063	Perform encoded weld inspections	1	30	3	$68	($6,120)	($1,525)	($255)
2065	Perform encoded weld inspections	1	30	3	$68	($6,120)	($1,438)	($222)
2067	Perform encoded weld inspections	1	30	3	$68	($6,120)	($1,355)	($194)
2069	Perform encoded weld inspections	1	30	3	$68	($6,120)	($1,278)	($170)
2071	Perform encoded weld inspections	1	30	3	$68	($6,120)	($1,204)	($148)
2073	Perform encoded weld inspections	1	30	3	$68	($6,120)	($1,135)	($129)
2075	Perform encoded weld inspections	1	30	3	$68	($6,120)	($1,070)	($113)
2077	Perform encoded weld inspections	1	30	3	$68	($6,120)	($1,009)	($99)
					Total:	**($184,000)**	**($81,000)**	**($39,000)**

Note: Table totals are rounded to the nearest thousand dollars.

5.4.24. Clarification of Valve Position Verification Requirements

This proposed condition does not result in a change from the routine and recurring activities contained within the regulatory baseline.

5.5. NRC Implementation

To implement Alternative 2, the NRC incurs a cost in relation to the regulatory baseline (Alternative 1) for developing the final rule. The staff estimates the development of the proposed and final rule that took place over 2014 and 2015 would require 870 hours and 700 hours, respectively. Table 34 shows the estimated cost for developing and issuing the final rule (2014 dollars). The NRC implementation cost to develop and issue the proposed and final rule would cost ($185,000) based on a 7-percent NPV and ($188,000) based on a 3-percent NPV.

Table 34 NRC Implementation Costs: Develop and issue proposed and final rule

Year	Activity	Hours/ Action	Hourly Rate	NRC Implementation (2014 dollars)		
				Undiscounted	3% NPV	7% NPV
2014	Develop and issue proposed and final rule	870	$121	($105,270)	($105,270)	($105,270)
2015		700	$121	($84,700)	($82,233)	($79,838)
			Total:	**($190,000)**	**($188,000)**	**($185,000)**

Note: Table totals are rounded to the nearest thousand dollars.

5.5.1. Quality Assurance Program Description Review

The proposed 10 CFR 50.55a rule that incorporates by reference the 2008 Edition and the 2009-1a Addenda of NQA-1 is optional for licensees to implement. The existing 10 CFR 50.54(a)(3) regulations allow licensees to make changes to a previously accepted quality assurance program description (QAPD) included or referenced in the Safety Analysis Report without prior NRC approval, provided the change does not reduce the commitments in the program description as accepted by the NRC. Regulations in 10 CFR 50.54(a)(4) state that the licensees who make changes to the QAPD that reduce the commitments, must submit these changes to the NRC for review and approval before implementation. Therefore, the implementation of this proposed rule does not incur additional cost to NRC implementation, because it is already required under existing 50.54(a)(4) requirements.

However, should the NRC require the use of NQA-1, all licensees that do not currently use the program would need to modify their procedures and submit that information to the NRC for review before the revised program is used. The NRC estimates that 52 of the power reactor licensees would be required to update their programs. The staff estimates the NRC review would take 40 hours per program to review and issue a safety evaluation. The NRC implementation cost to perform these review and issue safety evaluations would cost ($514,000) based on a 7-percent NPV and ($576,000) based on a 3-percent NPV.

Table 35 NRC Implementation Costs: Review QAPD Submittal and Issue Safety Evaluation

Year	Activity	No. of Actions	Hours per Action	Hourly Rate	NRC Implementation (2014 dollars)		
					Undiscounted	3% NPV	7% NPV
2017	Review QAPD submittal and issue a safety evaluation	52	100	$121	($629,200)	($575,807)	($513,615)
				Total:	**($629,000)**	**($576,000)**	**($514,000)**

Note: Table totals are rounded to the nearest thousand dollars.

5.5.2. Procedure Revision To Incorporate Concrete Containment Examinations

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.3. Procedure Revision To Incorporate NDE Personnel Certification

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.4. Procedure Revision To Incorporate Steam Generator Preservice Examinations

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.5. Procedure Revision To Prohibit Use of Mechanical Clamping Devices

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.6. Procedure Revision To Incorporate Summary Report Submittal Requirements

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.7. Procedure Revision To Prohibit Use of Risk-Informed Allowable Pressure Methodology

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.8. Procedure Revision To Add Acceptance Standards for the Disposition of Flaws in Class 3 Components

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.9. Procedure Revision To Specify Use of Reference Temperature in the K_{Ia} and K_{Ic} Equations

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.10. Procedure Revision To Incorporate Fracture Toughness of Irradiated Material Requirements

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.11. Procedure Revision To Incorporate the Ultrasonic Examination Provisions of Code Case N-824

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.12. Procedure Revision To Incorporate Motor-Operated Valve Testing Requirements

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.13. Procedure Revisions To Incorporate Supplemental Requirements on the Use of ASME OM Code for New Reactors

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.14. *Procedure Revision To Incorporate Squib Valve Surveillance Requirements for New Reactors*

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.15. *Procedure Revision to Prohibit the Use of Subsection ISTB (2011 Edition)*

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.16. *Program Revision To Incorporate Mandatory Appendix V on Pump Periodic Verification Program*

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.17. *Risk-Informed Inservice Testing of Pumps and Valves Request for Alternative Submittal To Use Subsection ISTE*

To implement this provision, the NRC would incur a cost in relation to the regulatory baseline (Alternative 1) for developing the associated guidance documents for this program. The NRC estimates the development of the proposed and final guidance documents, expected to occur in years 2015 and 2016, would require 420 hours and 350 hours, respectively. Furthermore, the NRC staff estimates that one licensee would be interested in applying Subsection ISTE to its IST program. That licensee would submit a request for an alternative to the ASME OM Code to apply Subsection ISTE with appropriate justification for NRC review. The staff estimates that the submittal would require 180 hours for the NRC staff to review and approve the request. The staff assumes this review occurs in year 2017. Table 36 shows the estimated cost for developing and issuing the guidance document and approving the submitted alternative submittal for subsection ISTE ranges from ($102,000) based on a 7-percent NPV to ($109,000) based on a 3-percent NPV).

Table 36 NRC Implementation: ISTE Risk-informed Inservice Testing Provision

Year	Activity	No. of Actions	Hours per Action	Hourly Rate	NRC Implementation (2014 dollars)		
					Undiscounted	3% NPV	7% NPV
2015	Develop and issue risk informed inservice testing	1	420	$121	($50,820)	($49,340)	($47,495)
2016	guidance	1	350	$121	($42,350)	($39,919)	($36,990)
2017	Review ISTE submittal and issue a safety evaluation	1	180	$121	($21,780)	($19,932)	($17,779)
				Total:	**($115,000)**	**($109,000)**	**($102,000)**

Note: Table totals are rounded to the nearest thousand dollars.

5.5.18. *Procedure Revision To Incorporate Subsection ISTF, OM Code Pump Testing Requirements for New Reactors*

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.19. Code Case OMN-20 Time Period Extension

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.20. Program Revision to Inservice Testing Requirements

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.21. Procedure To Incorporate Cast Austenitic Stainless Steel Material Examination Requirements

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.22. Procedure Revision To Clarify Examination Coverage Requirements for Butt Welds Joining Cast Stainless Steel Material

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.23. Procedure To Incorporate Encoding of Ultrasonic Volumetric Examinations

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.5.24. Clarification of Valve Position Verification Requirements

The staff does not expect the NRC to incur any incremental implementation costs associated with this activity.

5.6. NRC Operation

When the NRC receives an alternative request, the NRC requires additional NRC staff time to evaluate the acceptability of the request relative to the criteria currently NRC approved. Under Alternative 2, the additional 15 alternative request submittals per year would not be required. As shown in Table 37, the NRC estimates that each submittal would require 90 hours to perform the technical review including resolving technical issues and 30 hours to document the evaluation and respond to the licensee on their request. The cost, results in an NRC averted cost that ranges from $510,000 based on a 7-percent NPV to $610,000 based on a 3-percent NPV. By incorporating by reference the Code Case in the *Code of Federal Regulations*, this allows a nuclear power plant licensee to use a more current Code edition or addenda or applicable Code Case without submitting an alternative request for NRC review and therefore provides a net benefit (i.e., averted cost).

Table 37 NRC Operation Costs: Averted Code Alternative Request Review (Operating and New Reactors)

Year	Activity	No. of Actions	Hours per Action	Hourly Rate	Averted Industry Operation Cost(2014 dollars		
					Undiscounted	3% NPV	7% NPV
2016	Review Code Case relief request submittal and issue safety evaluation (operating plants)	7	120	$121	$101,640	$95,805	$88,776
2017	Review Code Case relief request submittal and issue safety evaluation (operating plants)	7	120	$121	$101,640	$93,015	$82,969
2018	Review Code Case relief request submittal and issue safety evaluation (operating plants)	7	120	$121	$101,640	$90,306	$77,541
2019	Review Code Case relief request submittal and issue safety evaluation (operating plants)	7	120	$121	$101,640	$87,676	$72,468
2020	Review Code Case relief request submittal and issue safety evaluation (operating plants)	7	120	$121	$101,640	$85,122	$67,727
2021	Review Code Case relief request submittal and issue safety evaluation (operating plants)	7	120	$121	$101,640	$82,643	$63,296
2022	Review Code Case relief request submittal and issue safety evaluation (operating plants)	7	120	$121	$101,640	$80,236	$59,155
				Total:	**$710,000**	**$610,000**	**$510,000**

Note: Table totals are rounded to the nearest ten thousand dollars.

As shown in Table 38, a new reactor submitting a Code alternative request in the first year after commencing commercial operation in year 2018 would incur an NRC review cost that ranges from $11,000 based on a 7-percent NPV to $13,000 based on a 3-percent NPV, yielding a net positive savings for each averted Code alternative request submittal review for a new reactor.

Table 38 NRC Operation Costs: Averted Code Alternative Request Review (Hypothetical Reactor)

Year	Activity	No. of Actions	Hours per Action	Hourly Rate	Averted Industry Operation Cost(2014 dollars		
					Undiscounted	3% NPV	7% NPV
2018	Review Code Case relief request submittal and issue safety evaluation (new plants)	1	120	$121	$14,520	$12,901	$11,077
				Total:	**$15,000**	**$13,000**	**$11,000**

Note: Table totals are rounded to the nearest thousand dollars.

The NRC review costs for any Code Case reliefs submitted to the NRC before the effective date of the final rule are considered sunk costs and are not considered further in this regulatory analysis.

5.6.1. Quality Assurance Program Description Review

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.2. Concrete Containment Examinations

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.3. NDE Personnel Certification

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.4. Steam Generator Preservice Examinations

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.5. Control the Use of Mechanical Clamping Devices

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.6. Summary Report Review

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.7. Control Use of Risk-Informed Allowable Pressure Methodology

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.8. Review Disposition of Flaws in Class 3 Components

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.9. Review Use of Reference Temperature in the K_{Ia} and K_{Ic} Equations

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.10. Review Fracture Toughness of Irradiated Material Requirements

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.11. Review Ultrasonic Examinations Using Code Case N-824

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.12. Review Mandatory Appendix III Motor-Operated Valve Inservice Testing Results

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.13. Review ASME OM Code Supplemental Requirements Test Results for New Reactors

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.14. Procedure Revision to Incorporate Squib Valve Surveillance Requirements for New Reactors

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.15. Review Subsection ISTB (2011 Edition) Test Results

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.16. Review Mandatory Appendix V Pump Periodic Verification Program

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.17. Review Subsection ISTE Risk-Informed Inservice Testing of Pumps and Valves

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.18. Review Subsection ISTF, OM Code Pump Testing Results for New Reactors

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.19. Review Code Case OMN-20 Time Period Extension

The proposed condition allows the use of Code Case OMN-20 before incorporation into the next update of Regulatory Guide 1.192 and incorporation by reference into 10 CFR 50.55a. The Code Case allows time periods shorter than 2 years to be extended by up to 25 percent for any given pump or valve inservice test. Time periods greater than or equal to 2 years may be extended by up to 6 months for any given pump or valve inservice test. Currently a licensee must submit one relief request for every 10-year inservice test interval in order to use Code Case OMN-20 for the pumps and valves in their program. The NRC staff estimates that all licensees will use Code Case OMN-20. The estimated time for the NRC staff to review and concur on each alternative request is 100 hours and these requests are assumed to be submitted in years 2016 and 2026 for all operating power reactor units. For the new reactors, the requests are assumed to be submitted in years 2017, 2027, 2037, 2047, 2057, and 2067.

As shown in the following table, the averted NRC costs to review the Code Case request submittals and issue safety evaluations would have costs that range from $1.67 million based

on a 7-percent NPV to $2.14 million based on a 3-percent NPV. Of these total averted costs, operating power reactor review averted costs would range from $1.57 million based on a 7-percent NPV to $1.96 million based on a 3-percent NPV. New power reactor review averted costs would range from $100,000 based on a 7-percent NPV to $180,000 based on a 3-percent NPV.

Table 39 NRC Operation: Review OMN-20 Code Case Alternative Request and Issue Safety Evaluation

Year	Activity	No. of Actions	Hours per Action	Hourly Rate	Averted Industry Operation Cost(2014 dollars		
					Undiscounted	3% NPV	7% NPV
2016	Review Code Case OMN-20 alternative request submittal and issue safety evaluation (operating plants)	99	100	$121	$1,197,900	$1,129,136	$1,046,292
2026	Review Code Case OMN-20 alternative request submittal and issue safety evaluation (operating plants)	98	100	$121	$1,185,800	$831,696	$526,509
2017	Review Code Case OMN-20 alternative request submittal and issue safety evaluation (new plants)	5	100	$121	$60,500	$55,366	$49,386
2027	Review Code Case OMN-20 alternative request submittal and issue safety evaluation (new plants)	5	100	$121	$60,500	$41,198	$25,105
2037	Review Code Case OMN-20 alternative request submittal and issue safety evaluation (new plants)	5	100	$121	$60,500	$30,655	$12,762
2047	Review Code Case OMN-20 alternative request submittal and issue safety evaluation (new plants)	5	100	$121	$60,500	$22,810	$6,488
2057	Review Code Case OMN-20 alternative request submittal and issue safety evaluation (new plants)	5	100	$121	$60,500	$16,973	$3,298
2067	Review Code Case OMN-20 alternative request submittal and issue safety evaluation (new plants)	5	100	$121	$60,500	$12,629	$1,677
			Operating Reactor Subtotal		*$2,380,000*	*$1,960,000*	*$1,570,000*
			New Reactor Subtotal		*$360,000*	*$180,000*	*$100,000*
				Total:	**$2,750,000**	**$2,140,000**	**$1,670,000**

Note: Table totals are rounded to the nearest ten thousand dollars.

5.6.20. Program Revision To Inservice Testing Requirements

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.21. Procedure To Incorporate Cast Austenitic Stainless Steel Material Examination Requirements

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.22. Procedure Revision To Clarify Examination Coverage Requirements for Butt Welds Joining Cast Stainless Steel Material

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.23. Procedure To Incorporate Encoding of Ultrasonic Volumetric Examinations

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.6.24. Clarification of Valve Position Verification Requirements

The staff does not expect the NRC to incur any incremental operation costs associated with this activity.

5.7. Improvements in Knowledge

Alternative 2 relative to the regulatory baseline (Alternative 1) would improve knowledge by industry and NRC staff gaining experience with new technology and permitting licensees to use advancements in ISI and IST. Improvements in ISI and IST may also result in the earlier identification of material degradation that if undetected could result in further degradation that eventually results in a plant transient. On-the-job learning also increases worker satisfaction. Developing greater knowledge and common understanding of the Code plus eliminating unnecessary work better enables industry and NRC staff to produce desired on-the-job results, which leads to pride in performance and increased job satisfaction.

5.8. Regulatory Efficiency

Alternative 2 relative to the regulatory baseline (Alternative 1) would increase regulatory efficiency because of the resulting consistency between the ASME Codes and NRC regulations. Licensees and applicants that wish to use more current editions or addenda of the ASME Code would not be required to submit 10 CFR 50.55a(z) alternative requests to the NRC for review and approval. This would provide licensees with flexibility and would decrease licensee's uncertainty when making modifications or preparing to perform ISI or IST.

Additionally, Alternative 2 is consistent with the provisions of the NTTAA that encourages Federal regulatory agencies to consider adopting voluntary consensus standards as an alternative to *de novo* agency development of standards affecting an industry. Alternative 2 is also consistent with the NRC policy of evaluating the latest versions of consensus standards in terms of their suitability for endorsement by regulations. Finally, Alternative 2 is consistent with the NRC's goal to harmonize with international standards to improve regulatory efficiency for both the NRC and international standards groups.

The NRC does not recommend Alternative 1 for the following two reasons:

(1) Licensees may submit a large number of requests for alternatives to use more current editions or addenda of the ASME Code and applicable Code Cases under 10 CFR 50.55a(z). This process would result in increased regulatory burden to licensees, and the NRC.

(2) The NRC's role as an effective industry regulator would be undermined because the ASME periodically publishes and revises its Code. Under Alternative 1, outdated material would remain incorporated by reference in the *Code of Federal Regulations*.

5.9. Other Considerations

5.9.1. National Technology Transfer and Advancement Act of 1995

Alternative 2 is consistent with the provisions of the National Technology Transfer and Advancement Act of 1995, Pub. L. 104-113 (Ref. 8.1), and implementing guidance in U.S. Office of Management and Budget (OMB) Circular A-119 (February 10, 1998) (Ref. 8.22), which encourages Federal regulatory agencies to consider adopting voluntary consensus standards as an alternative to *de novo* agency development of standards affecting an industry.

5.9.2. Continues NRC Practice of Incorporation by Reference of ASME Code Editions and Addenda into the Code of Federal Regulations

Alternative 2 continues the NRC's practice to establish requirements for the design, construction, operation, ISI and IST of nuclear power plants by approving the use of editions and addenda of the ASME BPV and OM Codes in the 10 CFR 50.55a, "Codes and Standards."

Given the existing data and information, Alternative 2 is the most effective way to implement the updated ASME Code. The updates would amend 10 CFR 50.55a to incorporate by reference the following ASME Code Editions, Addenda, and Code Cases:

- the 2009 Addenda, 2010 Edition, 2011 Addenda, and 2013 Edition to the ASME BPV Code, Section III, Division 1

- the 2009 Addenda, 2010 Edition, 2011 Addenda, and 2013 Edition to the ASME BPV Code, Section XI, Division 1

- the 2009 Edition, 2011 Addenda, and 2012 Edition to the ASME OM Code

- ASME BPV Code Case N-770-2, "Alternative Examination Requirements and Acceptance Standards for Class 1 PWR Piping and Vessel Nozzle Butt Welds Fabricated with UNS N06082 or UNS W86182 Weld Filler Material With or Without Application of Listed Mitigation Activities, Section XI, Division 1"

- ASME BPV Code Case N-729-4, "Alternative Examination Requirements for PWR Reactor Vessel Upper Heads With Nozzles Having Pressure-Retaining Partial-Penetration Welds Section XI, Division 1"

- ASME BPV Code Case N-824, "Ultrasonic Examination of Cast Austenitic Piping Welds From the Outside Surface Section XI, Division 1"

- ASME OM Code Case OMN-20, "Inservice Test Frequency
- ASME Standard NQA-1, "Quality Assurance Requirements for Nuclear Facility," 1983 Edition through the 1992 Addenda to the 1989 Edition, 1994 Edition, 2008 Edition, and 2009-1a Addenda to the 2008 Edition (together the ASME Codes)

5.9.3. Risk-Informed Inservice Testing

Alternative 2 risk-informed approach is embodied in the following provisions of the ASME OM Code:

- 10 CFR 50.55a(b)(3)(ii) OM condition: MOV testing
- 10 CFR 50.55a(b)(3)(iii)(D) New reactor high risk nonsafety systems
- 10 CFR 50.55a(b)(3)(viii) Subsection ISTE for risk-informed inservice testing of pumps and valves

These ASME OM Code provisions establish risk-informed approaches that are used to maintain nuclear power plant safety and are consistent with the NRC's efforts to risk-inform its regulatory activities. The risk-informed approach (1) is consistent with the defense-in-depth philosophy, (2) provides reasonable assurance that necessary safety functions will be performed, (3) provides reasonable confidence that any increases in core damage frequency (CDF) or large early release frequency (and therefore risk) are small, (4) is consistent with the safety goal policy statement, and (5) utilizes a performance measurement strategy.

5.9.4. Increase Public Confidence

Alternative 2 incorporates the current ASME Edition, Addenda, and Code Cases for the design, construction, operation, ISI and IST of nuclear power plants by approving the use of later editions and addenda of the ASME BPV and OM Codes in the 10 CFR 50.55a. This alternative allows licensees to use risk-informed, performance-based approaches, and the most current methods and technology to design, construct, operate, examine, and test nuclear power plant components, while maintaining NRC oversight of these activities, which increases public confidence.

5.9.5. Reliable Assessment of Cast Austenitic Stainless Steel Materials

5.9.5.1. *Equipment Reliability*

The ability to provide a reliable assessment of CASS materials is important for life extension and license renewal activities. There remains a level of concern with CASS components because of the possibility of thermal embrittlement over time and the limitations of current volumetric inspection techniques. Establishing a robust aging management approach for CASS components improves knowledge of material condition of those components exposed to reactor coolant environments and improves the current state that is currently constrained by a lack of data, operating experience, and proven nondestructive examination (NDE) solutions.

5.10. Disaggregation

In order to comply with the guidance in Section 4.3.2, "Criteria for the Treatment of Individual Requirements," of the Regulatory Analysis Guidelines (Ref. 8.13), the NRC performed a screening review to determine if any of the individual requirements (or set of integrated requirements) of the final rule would be unnecessary to achieve the objectives of the rulemaking. The NRC determined that the objectives of the rulemaking are to incorporate by reference standards; provide updated rules for the design and construction of safety-related systems; and impose conditions on the use of the updated rules. Furthermore, the NRC concludes that each of the proposed rule's requirements would be necessary to achieve one or more objectives of the rulemaking. The results of this determination are set forth in Table 40.

Table 40 Disaggregation

Revised Requirements	Regulatory Goals		
	Incorporate by reference standards	**Provide updated rules for design, construction, operation, ISI, and IST**	**Impose conditions on the use of updated rules**
10 CFR 50.55a(a)(1)(i)(E) Rules for Construction of Nuclear Facility Components - Division 1	X	X	
10 CFR 50.55a(a)(1)(ii)(C) Rules for Inservice Inspection of Nuclear Power Plant Components – Division 1	X	X	
10 CFR 50.55a(a)(1)(iii)(B) ASME Code Case N-729-4	X	X	
10 CFR 50.55a(a)(1)(iii)(C) ASME Code Case N-770-2	X	X	
10 CFR 50.55a(a)(1)(iii)(D) ASME Code Case N-824	X	X	
10 CFR 50.55a(a)(1)(iv)(B) Operation and Maintenance of Nuclear Power Plants, Division 1: Section IST Rules for Inservice Testing of Light-Water Reactor Power Plants	X	X	
10 CFR 50.55a(a)(1)(iv)(C) Operation and Maintenance of Nuclear Power Plants, Division 1: OM Code: Section IST	X	X	
10 CFR 50.55a(a)(1)(v) ASME Quality Assurance Requirements	X	X	
10 CFR 50.55a(a)(1)(v)(A) ASME NQA-1, Quality Assurance Program Requirements for Nuclear Facilities	X	X	
10 CFR 50.55a(a)(1)(v)(B) ASME NQA-1, Quality Assurance Requirements for Nuclear Facility Applications	X	X	
10 CFR 50.55a(b)(1) Conditions on ASME BPV Code, Section III		X	X
10 CFR 50.55a(b)(1)(ii) Section III condition: Weld leg dimensions		X	X
10 CFR 50.55a(b)(1)(iii) Section III condition: Seismic design of piping		X	X
10 CFR 50.55a(b)(1)(iv) Section III condition: Quality assurance		X	X
10 CFR 50.55a(b)(1)(vii) Section III condition: Capacity certification and demonstration of function of incompressible-fluid pressure-relief valves		X	X
10 CFR 50.55a(b)(2) Conditions on ASME BPV Code, Section XI		X	X
10 CFR 50.55a(b)(2)(vi) Section XI condition: Effective edition and addenda of Subsection IWE and Subsection IWL		X	X
10 CFR 50.55a(b)(2)(viii) Section XI condition: Concrete containment examinations		X	X

Revised Requirements	Regulatory Goals		
	Incorporate by reference standards	Provide updated rules for design, construction, operation, ISI, and IST	Impose conditions on the use of updated rules
10 CFR 50.55a(b)(2)(viii)(H) Concrete containment examinations: eighth provision		X	X
10 CFR 50.55a(b)(2)(viii)(I) Concrete containment examinations: ninth provision		X	X
10 CFR 50.55a(b)(2)(ix) Section XI condition: Metal containment examinations		X	X
10 CFR 50.55a(b)(2)(ix)(D) Metal containment examinations: fourth provision		X	X
10 CFR 50.55a(b)(2)(x) Section XI condition: Quality assurance		X	X
10 CFR 50.55a(b)(2)(xviii)(D) NDE personnel certification: fourth provision		X	X
10 CFR 50.55a(b)(2)(xxi)(A) Table IWB-2500-1 examination requirements: first provision		X	X
10 CFR 50.55a(b)(2)(xxx) Section XI condition: Steam Generator Preservice Examinations		X	X
10 CFR 50.55a(b)(2)(xxxi) Section XI condition: Mechanical clamping devices		X	X
10 CFR 50.55a(b)(2)(xxxii) Section XI condition: Summary Report submittal		X	X
10 CFR 50.55a(b)(2)(xxxiii) Section XI condition: Risk-Informed Allowable Pressure		X	X
10 CFR 50.55a(b)(2)(xxxiv) Section XI condition: Disposition of flaws in Class 3 components		X	X
10 CFR 50.55a(b)(2)(xxxv) Section XI condition: Use of RT_{T0} in the K_{Ia} and K_{Ic} equations		X	X
10 CFR 50.55a(b)(2)(xxxvi) Section XI condition: Fracture Toughness of Irradiated Materials		X	X
10 CFR 50.55a(b)(2)(xxxvii) Section XI condition: Code Case N-824		X	X
10 CFR 50.55a(b)(3) Conditions on ASME OM Code		X	X
10 CFR 50.55a(b)(3)(i) OM condition: Quality assurance		X	X
10 CFR 50.55a(b)(3)(ii) OM condition: Motor-Operated Valve (MOV) testing		X	X
10 CFR 50.55a(b)(3)(ii)(A) MOV diagnostic test interval		X	X
10 CFR 50.55a(b)(3)(ii)(B) MOV testing impact on risk		X	X
10 CFR 50.55a(b)(3)(ii)(C) MOV risk categorization		X	X
10 CFR 50.55a(b)(3)(ii)(D) MOV stroke time		X	X

Revised Requirements	Regulatory Goals		
	Incorporate by reference standards	Provide updated rules for design, construction, operation, ISI, and IST	Impose conditions on the use of updated rules
10 CFR 50.55a(b)(3)(iii) OM condition: New Reactors		X	X
10 CFR 50.55a(b)(3)(iii)(A) New reactor power-operated valves		X	X
10 CFR 50.55a(b)(3)(iii)(B) New reactor check valves		X	X
10 CFR 50.55a(b)(3)(iii)(C) New reactor flow-induced vibration		X	X
10 CFR 50.55a(b)(3)(iii)(D) New reactor high risk nonsafety systems		X	X
10 CFR 50.55a(b)(3)(iv) OM condition: Check valves (Appendix II)		X	X
10 CFR 50.55a(b)(3)(iv)(A) Check valves: first provision		X	X
10 CFR 50.55a(b)(3)(iv)(B) Check valves: second provision		X	X
10 CFR 50.55a(b)(3)(iv)(C) Check valves: third provision		X	X
10 CFR 50.55a(b)(3)(iv)(D) Check valves: fourth provision		X	X
10 CFR 50.55a(b)(3)(v) OM condition: Subsection ISTD		X	X
10 CFR 50.55a(b)(3)(v)(A) Snubbers: first provision		X	X
10 CFR 50.55a(b)(3)(v)(B) Snubbers: second provision		X	X
10 CFR 50.55a(b)(3)(vi) OM condition: Exercise interval for manual valves		X	X
10 CFR 50.55a(b)(3)(vii) OM condition: Subsection ISTB		X	X
10 CFR 50.55a(b)(3)(viii) OM condition: Subsection ISTE		X	X
10 CFR 50.55a(b)(3)(ix) OM condition: Subsection ISTF		X	X
10 CFR 50.55a(b)(3)(x) OM condition: Code Case OMN-20		X	X
10 CFR 50.55a(b)(3)(xi) OM condition: Clarification of Valve Position Verification Requirements		X	X
10 CFR 50.55a(f) Inservice testing requirements		X	
10 CFR 50.55a(f)(3)(iii)(A) Class 1 pumps and valves: first provision		X	X
10 CFR 50.55a(f)(3)(iii)(B) Class 1 pumps and valves: second provision		X	X
10 CFR 50.55a(f)(3)(iv)(A) Class 2 and 3 pumps and valves: first provision		X	X
10 CFR 50.55a(f)(3)(iv)(B) Class 2 and 3 pumps and valves: second provision		X	X
10 CFR 50.55a(f)(4) Inservice testing standards requirement for operating plants		X	X

Revised Requirements	Regulatory Goals		
	Incorporate by reference standards	Provide updated rules for design, construction, operation, ISI, and IST	Impose conditions on the use of updated rules
10 CFR 50.55a(g)(6)(ii)(D) Augmented ISI requirements: Reactor vessel head inspections		X	X
10 CFR 50.55a(g)(6)(ii)(F) Augmented ISI requirements: Examination requirements for Class 1 piping and nozzle dissimilar-metal butt welds		X	X

5.11. Summary

This regulatory analysis identified both quantifiable and nonquantifiable benefits and costs that will emerge from incorporating the most recent regulatory guides listing NRC-approved Code Cases by reference into the *Code of Federal Regulations*. Although quantifiable benefits and costs appear to be more tangible, the staff urges decisionmakers not to discount benefits and costs that are unquantifiable. Such benefits or costs can be just as important as or even more important than benefits or costs that are quantified and monetized.

5.11.1. Quantified Net Benefit

As shown in Table 41, the estimated quantified incremental cost for Alternative 2 relative to the regulatory baseline over the remaining term of the affected entities' operating licenses outweigh the benefits by a range from approximately $3.7 million (7-percent NPV) to $2.4 million (3-percent NPV). The average net benefit estimated for each reactor unit (based on 105 new and operating reactor units) range from approximately ($35,000) based on 7-percent NPV to $23,000 based on 3-percent NPV.

Table 41 Total Costs

Attribute	Total Costs (2014 dollars)		
	Undiscounted	3% NPV	7% NPV
Industry Implementation	($13,230,300)	($12,314,100)	($11,208,600)
Industry Operation	$10,550,400	$7,989,300	$6,088,400
Total Industry Cost	**($2,700,000)**	**($4,300,000)**	**($5,100,000)**
NRC Implementation	($934,000)	($873,000)	($801,000)
NRC Operation	$3,465,000	$2,763,000	$2,191,000
Total NRC Cost	**$2,500,000**	**$1,900,000**	**$1,400,000**
Net Benefit	**($200,000)**	**($2,400,000)**	**($3,700,000)**

Note: Table totals are rounded to the nearest hundred thousand dollars.

Table 41 also shows that Alternative 2 is cost-beneficial for the NRC but is not cost-beneficial for industry for all discount rates evaluated.

As discussed in sections 5.3.1, 5.3.9, 5.3.11, 5.3.19, and 5.3.22, these proposed provisions provide an allowed method to comply with the ASME Code and are optional for each nuclear

power plant licensee to adopt. As shown in Table 42, the estimated total cost for Alternative 2 excluding the benefits and costs of these optional provisions outweigh the benefits by $5.6 million (7-percent NPV) to $5.8 million (3-percent NPV). The average net benefit estimated for each reactor unit (based on 105 new and operating reactor units) range from approximately ($51,000) based on (7-percent NPV) to $52,000 (3-percent NPV).

Table 42 Total Costs Excluding Optional Provisions

Attribute	Total Costs (2014 dollars)		
	Undiscounted	3% NPV	7% NPV
Industry Implementation	($8,477,300)	($7,832,100)	($7,061,600)
Industry Operation	$3,160,400	$2,069,300	$1,448,400
Total Industry Cost	**($5,300,000)**	**($5,800,000)**	**($5,600,000)**
NRC Implementation	($305,000)	($297,000)	($287,000)
NRC Operation	$715,000	$623,000	$521,000
Total NRC Cost	**$410,000**	**$326,000**	**$234,000**
Net Benefit	**($4,900,000)**	**($5,500,000)**	**($5,400,000)**

Note: Table totals are rounded to the nearest hundred thousand dollars.

The total industry cost is a summation of the implementation and operation costs. The total incremental industry costs are grouped into three categories: operating reactors, new reactors and a hypothetical reactor. The estimated total incremental industry costs for operating reactors ranges from ($4.1 million) based on a 7-percent discount rate to ($3.3 million) based on a 3-percent discount rate. Therefore, there is an overall industry net cost for operating reactors of that amount. The estimated total incremental industry costs for new reactors ranges from $0.4 million based on a 7-percent discount rate to $0.8 million based on a 3-percent discount rate, which results in a net benefit for new reactors. Finally, the estimated total industry costs for the hypothetical reactor in addition to new reactor costs ranges from ($1,800) based on a 7-percent discount rate to ($1,900) based on a 3-percent discount rate monetized to the first year of commercial operation of that hypothetical reactor.

Table 43 Total Net Benefit by Reactor Grouping

Operating Reactors Group

Attribute	Operating Reactor Costs (2014 dollars)		
	Undiscounted	3% NPV	7% NPV
Operating Reactor Implementation	($13,976,500)	($13,014,300)	($11,851,100)
Operating Reactor Operation	$11,976,800	$9,742,300	$7,726,800
Operating Reactor Net Benefit	**($2,000,000)**	**($3,270,000)**	**($4,120,000)**

New Reactors Group

Attribute	New Reactor Costs (2014 dollars)		
	Undiscounted	3% NPV	7% NPV
New Reactor Implementation	($185,900)	($170,900)	($156,700)
New Reactor Operation	$2,038,600	$1,010,000	$552,600
New Reactor Net Benefit	**$1,850,000**	**$840,000**	**$400,000**

Hypothetical New Reactor Group

Attribute	Hypothetical New Reactor Costs (X year dollars)		
	Undiscounted	3% NPV	7% NPV
Hypothetical Reactor Implementation	($1,900)	($1,900)	($1,800)
Hypothetical Reactor Operation	$0	$0	$0
Hypothetical Reactor Net Benefit	**($1,900)**	**($1,900)**	**($1,800)**
Net Benefit (all groups)	**($200,000)**	**($2,400,000)**	**($3,700,000)**

Note: Group totals are rounded to the nearest ten thousand dollars. Table net benefit totals are rounded to the nearest hundred thousand dollars

5.11.2. Nonquantified Benefits

In addition to the quantified costs discussed in Section 5.11.1, public health (accident), occupational health (accident and routine), improvements in knowledge, regulatory efficiency, and other considerations produce a number of nonquantified benefits for industry and the NRC, which are summarized below.

5.11.2.1. *Advancements in ISI and IST*

Advancements in ISI and IST may provide an incremental reduction of the likelihood of a radiological accident, incrementally decrease the likelihood of post-accident plant worker exposure, and incrementally decrease plant worker radiological exposures during routine inspections or testing. The NRC approval of later editions and addenda of the ASME Code and associated Code Cases may contribute to plant safety by providing alternative examination methods that may result in the earlier identification of material degradation that if undetected could result in further degradation and result in a plant transient. These alternative methods may provide increased assurance of plant safety system readiness and may prevent through inspection and testing the introduction of a new failure mode or common cause failure mode not previously evaluated.

5.11.2.2. *Reduction in Public Health Radiation Exposures*

Industry practice to adopt ASME BPV and OM Code Cases that are incorporated by reference into the regulations may incrementally reduce the likelihood of a radiological accident in a positive, but not easily quantifiable, manner. Pursuing Alternative 2 would continue to meet the NRC goal of maintaining safety by continuing to provide the NRC approval of later editions and addenda of the ASME Code and associated Code Cases to permit licensees to use advancements in ISI and IST; provide alternative examinations for older plants, provide an expeditious response to user needs, and provide a limited, clearly focused alternative to specific ASME Code provisions. Improvements in ISI and IST may also result in the earlier identification of material degradation that if undetected could result in further degradation that eventually results in a plant transient. As such, Alternative 2 maintains the same level or may provide an incremental improvement in safety when compared to the regulatory baseline, which may result in an incremental decrease in public health radiation exposures.

5.11.2.3. *Reduction in Worker Radiation Exposures*

The NRC approval of later editions and addenda of the ASME Code and associated Code Cases may reduce occupational radiation exposures in a positive, but not easily quantifiable, manner. For example, the advancements in ISI and IST may result in an incremental decrease in the likelihood of an accident resulting in worker exposure or may result in an incremental decrease in worker radiological exposures during routine inspections or testing when compared to the regulatory baseline.

5.11.2.4. *Improvements in ISI and IST Knowledge*

The NRC approval of later editions and addenda of the ASME Code and associated Code Cases may improve knowledge by industry and NRC staff by gaining experience with new technology before incorporation into the ASME Code, and permitting licensees to use advancements in ISI and IST. Improvements in ISI and IST may also result in the earlier identification of material degradation that if undetected could result in further degradation that eventually results in a plant transient.

5.11.2.5. *Improvements in Worker Morale*

Furthermore, the opportunity for staff to improve their knowledge results in increased job satisfaction. The NRC approval of later editions and addenda of the ASME Code and associated Code Cases may develop greater knowledge and common understanding of the Code and eliminating unnecessary work better enables industry and NRC staff to produce desired on-the-job results, which leads to pride in performance and increased job satisfaction.

5.11.2.6. *Consistent with National Technology Transfer and Advancement Act of 1995 and Implementing Guidance*

Alternative 2 is consistent with the provisions of the National Technology Transfer and Advancement Act of 1995, Pub. L. 104-113 (Ref. 8.1), and implementing guidance in U.S. OMB Circular A-119 (Ref. 8.22), which encourages Federal regulatory agencies to consider adopting voluntary consensus standards as an alternative to *de novo* agency development of standards affecting an industry.

5.11.2.7. *Effective Industry Regulator*

The timely incorporation by reference of current addenda and editions of the ASME Code into the *Code of Federal Regulations* and the review and approval of Code Cases maintains the NRC's role as an effective industry regulator. This role would otherwise be undetermined if outdated material would remain incorporated by reference in the *Code of Federal Regulations*.

5.11.2.8. *Continues NRC Practice of Incorporation by Reference of ASME Code Editions and Addenda into the Code of Federal Regulations*

Alternative 2 continues the NRC's practice to establish requirements for the design, construction, operation, ISI (examination) and IST of nuclear power plants by approving the use of later editions and addenda of the ASME BPV and OM Codes (ASME Codes) in 10 CFR 50.55a.

5.11.2.9. *Maintain Consistency with NRC's Risk-Informed Approach*

The NRC's risk-informed approach is embodied in Alternative 2 through the incorporation by reference in the *Code of Federal Regulations* the following provisions of the ASME Code:

- 10 CFR 50.55a(b)(3)(ii) OM condition: MOV testing
- 10 CFR 50.55a(b)(3)(iii)(D) New reactor high risk nonsafety systems
- 10 CFR 50.55a(b)(3)(viii) Subsection ISTE for risk-informed inservice testing of pumps and valves

These ASME Code provisions establish risk-informed approaches that are used to maintain nuclear power plant safety and are consistent with the NRC's efforts to risk-inform its regulatory activities. The risk-informed approach (1) is consistent with the defense-in-depth philosophy, (2) provides reasonable assurance that necessary safety functions will be performed, (3) provides reasonable confidence that any increases in CDF or large early release frequency (and therefore risk) are small, (4) is consistent with the safety goal policy statement, and (5) utilizes a performance measurement strategy.

5.11.2.10. *Increase Public Confidence*

Alternative 2 incorporates the current ASME Edition, Addenda, and Code Cases for the design, construction, operation, ISI (examination) and IST of nuclear power plants by approving the use of editions and addenda of the ASME BPV and OM Codes (ASME Codes) in 10 CFR 50.55a. This alternative allows licensees to use risk-informed, performance-based approaches, and the most current methods and technology to design, construct, operate, examine, and test nuclear power plant components, while maintaining NRC oversight of these activities.

5.11.2.11. *Increase Cast Austenitic Stainless Steel Material Component Reliability*

The ability to provide a reliable assessment of CASS materials is important for life extension and license renewal activities. There remains a level of concern with CASS components

because of the possibility of thermal embrittlement over time and the limitations of current volumetric inspection techniques. Establishing a robust aging management approach for CASS components improves knowledge of material condition of those components exposed to reactor coolant environments and improves the current state that is currently constrained by a lack of data, operating experience, and proven NDE solutions.

5.11.3. Nonquantified Costs

As discussed in sections 5.4 and 5.6, the NRC staff believes that incorporating by reference the most recent ASME Code editions and addenda and NRC approved Code Cases into the *Code of Federal Regulations* would decrease industry and NRC operation costs. If the NRC staff underestimated the number or the complexity of these eliminated submittals, than the averted costs would increase proportionally, causing the quantified net cost of Alternative 2 to decrease toward a more net-beneficial determination.

5.12. Safety Goal Evaluation

Safety goal evaluations apply only to regulatory initiatives considered to be generic safety enhancement backfits subject to the substantial additional protection standard at 10 CFR 50.109(a)(3). A safety goal evaluation determines whether a regulatory requirement should not be imposed generically on nuclear power plants because the residual risk is already acceptably low.

Regulations in 10 CFR50.55a require nuclear power plant licensees to construct ASME BPV Code Class 1, 2, and 3 components under the rules provided in Section III, Division 1, of the ASME BPV Code; inspect Class 1, 2, 3, Class MC, and Class CC components under the rules provided in Section XI, Division 1, of the ASME BPV Code; and test Class 1, 2, and 3 pumps and valves under the rules provided in the ASME OM Code. From time to time, the NRC amends 10 CFR 50.55a to incorporate by reference later editions and addenda of Section III, Division 1, of the ASME BPV Code; Section XI, Division 1, of the ASME BPV Code; and the ASME OM Code.

5.12.1. Section A. Incorporation by Reference of Later Editions and Addenda of Section III, Division 1 of ASME BPV Code

Incorporation by reference of later editions and addenda of Section III, Division 1, of the ASME BPV Code is prospective in nature. The later editions and addenda do not affect a plant that has received a construction permit, an operating license, or a combined license, or a design that has been approved. This is because the edition and addenda to be used in constructing a plant are, by rule, determined based on the date of the construction permit or based on the date of the combined license and are not changed, except voluntarily by the licensee. Thus, incorporation by reference of a later edition and addenda of Section III, Division 1, does not constitute a “backfitting” as defined in 10 CFR 50.109(a)(1).

5.12.2. Section B. Incorporation by Reference of Later Editions and Addenda of Section XI, Division 1, of the ASME BPV and OM Codes

Incorporation by reference of later 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 for the following reasons:

- The NRC's longstanding policy has been to incorporate later versions of the ASME Codes into its regulations; thus, licensees know when receiving their operating licenses that such updating is part of the regulatory process. This is reflected in 10 CFR 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 10 CFR 50.55a, that is in effect 12 months before the start of a new 120-month ISI and IST interval. Thus, when the NRC endorses a later version of a code, it is implementing this longstanding policy.

- ASME BPV and OM Codes are national consensus standards developed by participants with broad and varied interests, in which all interested parties including the NRC and nuclear utility personnel participate. This consideration is consistent with both the intent and spirit of the backfit rule (i.e., the NRC provides for the protection of the public health and safety, and does not unilaterally impose undue burden on applicants or licensees).

5.12.3. Other Circumstances in Which the NRC Does Not Apply the Backfit Rule to the Endorsement of a Later Code

Other circumstances in which the NRC does not apply the backfit rule to the endorsement of a later code are as follows:

- When the NRC takes exception to a later ASME BPV or OM Code provision, and merely retains the current existing requirement, prohibits the use of the later code provision, or limits the use of the later code provision, the backfit rule does not apply because the NRC is not imposing new requirements. However, the NRC provides the technical and/or policy bases for taking exceptions to the code in the Statement of Consideration for the rule.

- When an NRC exception relaxes an existing ASME BPV or OM Code provision but does not prohibit a licensee from using the existing code provision, the backfit rule does not apply.

5.12.4. Safety Goal Evaluation Result

Based on the reasons described, a safety goal evaluation is not appropriate for this regulatory analysis.

6. Decision Rationale

Table 44 provides the quantified and qualified costs and benefits for Alternative 2. For the quantitative analysis, best estimate values are used.

Table 44 Summary of Totals

Net Monetary Savings (or Costs) – Total Present Value	Non-Monetary Benefits or (Costs)
Alternative 1: No Action $0	**Qualitative Benefits and Costs:** None
Alternative 2: Incorporate by Reference ASME BPV and OM Codes and New and Revised Code Cases With Conditions **Industry: (required provisions)** ($5.1 million) using a 7% discount rate ($4.3 million) using a 3% discount rate **NRC: (required provisions)** $1.4 million using a 7% discount rate $1.9 million using a 3% discount rate **Net Benefit: (required provisions)** ($3.7 million) using a 7% discount rate ($2.4 million) using a 3% discount rate	**Qualitative Benefits:** • **Advancements in ISI and IST:** May provide an incremental reduction of the likelihood of a radiological accident, incrementally decrease the likelihood of post-accident plant worker exposure, and incrementally decrease plant worker radiological exposures during routine inspections or testing. • **Public Health (Accident):** May incrementally reduce the likelihood of a radiological accident in a positive, but not easily quantifiable, manner. Pursuing Alternative 2 would continue to meet the NRC goal of maintaining safety by continuing to provide NRC approval of the use of later editions and addenda of the ASME Code and applicable Code Cases to permit licensees to use advancements in ISI and IST; provide alternative examinations for older plants, provide an expeditious response to user needs, and provide a limited, clearly focused alternative to specific ASME Code provisions. Improvements in ISI and IST may also result in the earlier identification of material degradation that if undetected could result in further degradation that eventually results in a plant transient. As such, Alternative 2 maintains the same level or may provide an incremental improvement in safety when compared to the regulatory baseline, which may result in an incremental decrease in public health radiation exposures • **Occupational Health (Accident & Routine)**: The use of later editions and addenda of the ASME Code and applicable Code Cases may reduce occupational radiation exposures in a positive, but not easily quantifiable, manner. The advancements in ISI and IST may result in an incremental decrease in the likelihood of an accident resulting in worker exposure or may result in an incremental decrease in worker radiological exposures during routine inspections or testing when compared to the regulatory baseline. • **Improvements in ISI and IST Knowledge**: Gain experience with new technology and ISI

Net Monetary Savings (or Costs) – Total Present Value	Non-Monetary Benefits or (Costs)
Alternative 2 (continued)	and IST advancements. On-the-job learning increases worker satisfaction. Eliminating unnecessary work better enables staff to produce desired on-the-job results, which leads to pride in performance and increased job satisfaction • **Improvements in Worker Morale:** Developing greater knowledge and common understanding of the Code plus eliminating unnecessary work better enables industry and NRC staff to produce desired on-the-job results, which leads to pride in performance and increased job satisfaction • **Consistent with National Technology Transfer and Advancement Act (NTTAA) of 1995 and Implementing Guidance:** The rulemaking Alternative 2 is consistent with the provisions of the NTTAA and implementing guidance in U.S. Office of Management and Budget (OMB) Circular A-119, which encourages Federal regulatory agencies to consider adopting voluntary consensus standards as an alternative to *de novo* agency development of standards affecting an industry. Furthermore, the ASME Code consensus process is an important part of the regulatory framework. • **Effective Industry Regulator:** The timely incorporation by reference of current addenda and editions of the ASME Code into the *Code of Federal Regulations* and the review and approval of Code Cases maintains NRC's role as an effective industry regulator. This role would otherwise be undetermined if outdated material would remain incorporated by reference in the *Code of Federal Regulations*. • **Qualitative Costs:** If the NRC staff underestimated the number or the complexity of these eliminated submittals, than the averted costs would increase proportionally, causing the quantified net costs of Alternative 2 to decrease.

As shown in Table 44, Alternative 2 relative to the regulatory baseline would result in a net cost for industry of between ($5.1 million) based on a 7-percent net present value (NPV) and ($4.3 million) based on a 3-percent NPV. The estimated incremental industry cost per reactor unit ranges from ($49,000) based on a 7-percent NPV to ($41,000) based on a 3-percent NPV. The NRC benefits from the proposed rulemaking alternative because of the averted cost of not

reviewing and approving Code alternative requests on a plant-specific basis under the new 10 CFR 50.55a(z). The NRC net benefit ranges from $1.4 million based on a 7-percent NPV to $1.9 million based on a 3-percent NPV.

Alternative 2 also has the qualitative benefit of meeting the NRC goal of ensuring the protection of public health and safety and the environment through the NRC's approval of the use of later editions and addenda of the ASME Code and applicable Code Cases allows for the use of the most current methods and technology. This alternative would also support the NRC's goal of maintaining an open regulatory process because approving ASME Codes and Cases demonstrates the agency's commitment to participate in the national consensus standards process and maintains the NRC's role as an effective regulator.

The NRC has had a decades-long practice of approving and/or mandating the use of certain parts of editions and addenda of these ASME Codes in 10 CFR 50.55a through the rulemaking process of "incorporation by reference." Retaining the practice of approving and/or mandating the ASME Codes continues the regulatory stability and predictability provided by the current practice. Retaining the practice also assures consistency across the industry, and provides assurance to the industry and the public that the NRC will continue to support the use of the most updated and technically sound techniques developed by the ASME to provide adequate protection to the public. In this regard, these ASME Codes are voluntary consensus standards developed by participants with broad and varied interests and have already undergone extensive external review before being reviewed by the NRC. Finally, the NRC's use of the ASME Codes is consistent with the NTTAA, which directs Federal agencies to adopt voluntary consensus standards instead of developing "government-unique" (i.e., Federal agency-developed) standards, unless inconsistent with applicable law or otherwise impractical.

If the results of the regulatory analysis were based solely on quantified costs and benefits, then the regulatory analysis would show that the rulemaking is not justified because the total quantified benefits of the proposed regulatory action do not equal or exceed the costs of the proposed action. However, if the qualitative benefits (including the safety benefit, cost savings, and other non-quantified benefits) are considered together with the quantified benefits, then the benefits outweigh the identified quantitative and qualitative impacts.

7. Implementation Schedule

The final rule will become effective 30 days after its publication in the *Federal Register*.

8. References

8.1. Combined License – Vogtle Electric Generating Plant Unit 3, Southern Nuclear Operating Company Inc., Georgia Power Company, Oglethorpe Power Corporation, Municipal Electric Authority of Georgia, City of Dalton, Georgia, License No. NPF-91 (ADAMS Accession No. ML112991110)

8.2. Combined License – Vogtle Electric Generating Plant Unit 4, Southern Nuclear Operating Company Inc., Georgia Power Company, Oglethorpe Power Corporation, Municipal Electric Authority of Georgia, City of Dalton, Georgia, License No. NPF-92 (ADAMS Accession No. ML113060412)

8.3. Combined License - Virgil C Summer Nuclear Station Unit 2, South Carolina Electric and Gas Company, South Carolina Public Service Authority, License No. NPF-93 (ADAMS Accession No. ML113190393)

8.4. Combined License - Virgil C Summer Nuclear Station Unit 2, South Carolina Electric and Gas Company, South Carolina Public Service Authority, License No. NPF-94 (ADAMS Accession No. ML113190715)

8.5. National Technology Transfer and Advancement Act of 1995, Pub. L. 104-113, retrievable at http://www.gpo.gov/fdsys/pkg/PLAW-104publ113/pdf/PLAW-104publ113.pdf

8.6. U.S. Department of Labor, Bureau of Labor Statistics, "Databases, Tables & Calculators by Subject: CPI Inflation Calculator," retrievable at www.bls.gov

8.7. U.S. Nuclear Regulatory Commission, "A Handbook for Value-Impact Assessment, NUREG/CR-3568

8.8. U.S. Nuclear Regulatory Commission, "American Society of Mechanical Engineers (ASME) Codes and New and Revised ASME Code Cases; Final Rule," 76 FR 36232, June 21, 2011

8.9. U.S. Nuclear Regulatory Commission, "Federal Register Notice: Proposed Rule: Incorporation by Reference of American Society of Mechanical Engineers Codes and Code Cases," (ADAMS Accession No. ML14065A203)

8.10. U.S. Nuclear Regulatory Commission, "Generic Aging Lessons Learned (GALL) Report, NUREG-1801, Revision 2

8.11. U.S. Nuclear Regulatory Commission, "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping," Generic Letter 90-05, June 15, 1990 (ADAMS Accession No. ML12339A442)

8.12. U.S. Nuclear Regulatory Commission, "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves," Generic Letter 96-05, September 18, 1996 (ADAMS Accession No. ML11347A419)

8.13. U.S. Nuclear Regulatory Commission, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," NUREG/BR-0058, Revision 4, (ADAMS Accession No. ML042820192)

8.14. U.S. Nuclear Regulatory Commission, "Regulatory Analysis Technical Evaluation Handbook," NUREG/BR-0184, 1997 (ADAMS Accession No. ML050190193)

8.15. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," Revision 16 (ADAMS Accession No. ML101800536)

8.16. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.192, "Operation and Maintenance Code Case Acceptability, ASME OM CODE," June 2003 (ADAMS Accession No. ML030730430)

8.17. U.S. Nuclear Regulatory Commission, Regulatory Issue Summary 2004-12, "Clarification on Use of Later Editions and Addenda to the ASME OM Code and Section XI, July 28, 2004 (ADAMS Accession No. ML042090436)

8.18. U.S. Nuclear Regulatory Commission, "Safety Goals for the Operation of Nuclear Power Plants," 51 FR 28044, August 4, 1986, as corrected and republished at 51 FR 30028, August 21, 1986

8.19. U.S. Nuclear Regulatory Commission, Standard Review Plan (SRP) Section 3.9.6, "Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints" Revision 3 (ADAMS Accession No. ML070720041)

8.20. U.S. Nuclear Regulatory Commission, “Guidelines for Inservice Testing at Nuclear Power Plants: Inservice Testing of Pumps and Valves and Inservice Examination and Testing of Dynamic Restraints (Snubbers) at Nuclear Power Plants – Final Report,” NUREG-1482, Revision 2, 2013 (ADAMS Accession No. ML13295A020)

8.21. U.S. Office of Management and Budget, Circular No. A-4, “Regulatory Analysis,” September 2003

8.22. U.S. Office of Management and Budget, Circular No. A-119, “Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities, February 10, 1998

APPENDIX A – BACKFITTING AND ISSUE FINALITY

A.1 Overall Backfitting Considerations: ASME BPV and OM Codes

The American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (BPV Code) and *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) are national consensus standards developed by participants with broad and varied interests, in which all interested parties (including the U.S. Nuclear Regulatory Commission (NRC) and utilities) participate. A consensus process involving a wide range of stakeholders 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 (ISI), and inservice testing (IST) by rulemaking. The process also facilitates early stakeholder consideration of backfitting issues. Thus, the NRC believes that the NRC need not address backfitting with respect to the NRC's general practice of incorporating by reference updated ASME Codes.

A.1.1 Section III of the ASME BPV Code

Incorporation by reference of more recent editions and addenda of Section III 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. This is because the edition and addenda to be used in constructing a plant are, under Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a, "Codes and Standards," determined based on the date of the construction permit, and are not changed thereafter, except voluntarily by the licensee. The incorporation by reference of more recent editions and addenda of Section III ordinarily applies only to applicants after the effective date of the final rule incorporating these new editions and addenda. Thus, incorporation by reference of a more recent edition and addenda of Section III does not constitute "backfitting" as defined in 10 CFR 50.109(a)(1).

A.1.2 Section XI and OM Code

Incorporation by reference of more recent editions and addenda of Section XI of the ASME BPV Code and the ASME OM Code affects 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. As mentioned above, the NRC's longstanding regulatory practice has been to incorporate later versions of the ASME Codes into 10 CFR 50.55a. Under 10 CFR 50.55a, licensees shall 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 10 CFR 50.55a 12 months before the start of a new 120-month ISI and IST interval. Thus, when the NRC approves and requires the use of a later version of the Code for ISI and IST, it is implementing this longstanding regulatory practice and requirement.

Other circumstances where the NRC does not apply the Backfit Rule to the approval and requirement to use later Code editions and addenda 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 Backfit Rule does not apply because the NRC is not imposing new requirements.

(3) Modifications and limitations imposed during previous routine updates of 10 CFR 50.55a have established a precedent for determining which modifications or limitations are backfits, or require a backfit analysis (e.g., final rule dated September 10, 2008 [73 FR 52731], and a correction dated October 2, 2008 [73 FR 57235]). The application of the backfit requirements to modifications and limitations in the current rule are consistent with the application of backfit requirements to modifications and limitations in previous rules.

The incorporation by reference and adoption of a requirement mandating the use of a later ASME BPV Code or OM Code may constitute backfitting in some circumstances. In these cases, the NRC would perform a backfit analysis or documented evaluation in accordance with 10 CFR 50.109, "Backfitting." 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 (e.g., 61 FR 41303 [August 8, 1996]).

(2) When the NRC requires implementation of a 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 (e.g., 64 FR 51370 [September 22, 1999]).

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

A.2 Backfitting Discussion for Proposed Changes That Go beyond Those Required to Adopt the New ASME BPV and OM Code Addenda

This section discusses the backfitting considerations for all the proposed changes to 10 CFR 50.55a that go beyond the minimum changes necessary and required to adopt the new ASME Code Addenda into 10 CFR 50.55a.

A.2.1 ASME BPV Code, Section III

(1) Revise 10 CFR 50.55a(b)(1)(ii), "Weld leg dimensions," to clarify rule language and add Table 1, which clarifies prohibited Section III provisions in tabular form for welds with leg size less than 1.09 t_n. This proposed change would not alter the original intent

of this requirement and, therefore, would not impose a new requirement. Therefore, this proposed change is not a backfit.

(2) Revise 10 CFR 50.55a(b)(1)(iv), "Section III condition: Quality assurance," to require that when applying editions and addenda later than the 1989 Edition of Section III, the requirements of NQA-1, 1983 Edition through the 1994 Edition, 2008 Edition, and the 2009-1a Addenda are acceptable for use, provided that the edition and addenda of NQA-1 specified in either NCA-4000 or NCA-7000 is used in conjunction with the administrative, quality and technical provisions contained in the edition and addenda of Section III being used. This proposed revision clarifies the current requirements, and is considered to be consistent with the meaning and intent of the current requirements, and therefore is not considered to result in a change in requirements. Therefore, this proposed change is not a backfit.

(3) Add a new proposed condition as 10 CFR 50.55a(b)(1)(viii), "Use of ASME Certification Marks," to allow licensees to use either the ASME BPV Code Symbol Stamp or ASME Certification Mark with the appropriate certification designator and class designator as specified in the 2013 Edition through the latest edition and addenda incorporated by reference in 10 CFR 50.55a. This proposed condition would not result in a change in requirements previously approved in the Code and, therefore, is not a backfit.

A.2.2 ASME BPV Code, Section XI

(1) Revise 10 CFR 50.55a(b)(2)(vi), "Effective Edition and Addenda of Subsection IWE and Subsection IWL, Section XI;" to clarify that the provision applies only to the class of licensees of operating reactors that were required by previous versions of 10 CFR 50.55a to develop, implement a containment inservice inspection program in accordance with Subsection IWE and Subsection IWL, and complete an expedited examination of containment during the 5-year period from September 9, 1996, to September 9, 2001. This proposed revision clarifies the current requirements, is considered to be consistent with the meaning and intent of the current requirements, and is not considered to result in a change in requirements. Therefore, this proposed change is not a backfit.

(2) Revise 10 CFR 50.55a(b)(2)(viii), "Examination of Concrete Containments," so that when using the 2007 Edition with 2009 Addenda through the 2013 Edition of Subsection IWL, the conditions in 10 CFR 50.55a(b)(2)(viii)(E) do not apply, but the proposed conditions in new 10 CFR 50.55a(b)(2)(viii)(H) and 10 CFR 50.55a(b)(2)(viii)(I) do apply. This proposed revision would not require 10 CFR 50.55a(b)(2)(viii)(E) to be used when following the 2007 Edition with 2009 Addenda through the 2013 Edition of Subsection IWL because most of its requirements have been included in IWL-2512, "Inaccessible Areas." Therefore, this proposed change is not a backfit because the requirements have not changed. The revision to add the condition in 10 CFR 50.55a(b)(2)(viii)(H) captures the reporting requirements of the current 10 CFR 50.55a(b)(2)(viii)(E) which were not included in IWL-2512. Therefore, this proposed change is not a backfit because the requirements have not changed. The revision to add the condition in 10 CFR 50.55a(b)(2)(viii)(I) addresses a new code provision in IWL-2512(b) for evaluation of below grade concrete surfaces during the period of extended operation of a renewed license. The condition assures consistency with the GALL Report and applies to plants going forward using

the 2007 Edition with 2009 Addenda through the 2013 Edition of Subsection IWL. The requirements would remain unchanged from those of the GALL Report and, therefore, this change is not a backfit.

(3) Revise 10 CFR 50.55a(b)(2)(ix), "Examination of Metal Containments," to extend the applicability of the existing conditions in 10 CFR 50.55a(b)(2)(ix)(A)(2), 10 CFR 50.55a(b)(2)(ix)(B) and 10 CFR 50.55a(b)(2)(ix)(J) to the 2007 Edition with 2009 Addenda through the 2013 Edition of Subsection IWE. This proposed condition would not result in a change to current requirements, and is therefore not a backfit.

(4) Revise 10 CFR 50.55a(b)(2)(x), "Section XI Condition: Quality Assurance," to require that when applying the editions and addenda later than the 1989 Edition of ASME BPV Code, Section XI, the requirements of NQA-1, 1983 Edition through the 1994 Edition, the 2008 Edition, and the 2009-1a Addenda specified in either IWA-1400 or Table IWA 1600-1, "Referenced Standards and Specifications," of that edition and addenda of Section XI are acceptable for use, provided the licensee uses its Appendix B to 10 CFR Part 50 quality assurance program in conjunction with Section XI requirements. This proposed revision clarifies the current requirements, which the NRC considers to be consistent with the meaning and intent of the current requirements. Therefore, the NRC does not consider the clarification to be a change in requirements. Therefore, this proposed change is not a backfit.

(5) Add a new proposed condition as 10 CFR 50.55a(b)(2)(xviii)(D), "NDE Personnel Certification: Fourth Provision;" to prohibit the use of Appendix VII and subarticle VIII-2200 of the 2011 Addenda and 2013 Edition of Section XI of the ASME BPV Code. Licensees would be required to implement Appendix VII and subarticle VIII-2200 of the 2010 Edition of Section XI. This condition does not constitute a change in NRC position because the use of the subject provisions is not currently allowed by 10 CFR 50.55a. Therefore, the addition of this new proposed condition is not a backfit.

(6) Revise 10 CFR 50.55a(b)(2)(xxi)(A), "Table IWB-2500-1 Examination Requirements; First Provision," to modify the standard for visual magnification resolution sensitivity and contrast for visual examinations of Examination Category B-D components, making the rule conform with ASME BPV Code, Section XI requirements for VT-1 examinations. This proposed revision removes a condition that was in addition to the ASME Code requirements and does not impose a new requirement. Therefore, this change is not a backfit.

(7) Add a new proposed condition as 10 CFR 50.55a(b)(2)(xxx), "Steam Generator Preservice Examinations;" to require that instead of the preservice inspection requirements of Section XI, IWB-2200(c), a full length examination of 100 percent of the tubing in each newly installed steam generator shall be performed prior to plant startup. This proposed condition provides a clarification consistent with industry guidelines and the staff position in Standard Review Plan Section 5.4.2.2. Therefore, the addition of this new proposed condition is not a backfit.

(8) Add a new proposed condition as 10 CFR 50.55a(b)(2)(xxxi), "Mechanical Clamping Devices;" to prohibit the use of mechanical clamping devices in accordance with IWA-4131.1(c) in the 2010 Edition and IWA-4131.1(d) in the 2011 Addenda through 2013 Edition on small item Class 1 piping and portions of a piping system that forms the containment boundary. This condition does not constitute a change in NRC

position and would not affect licensees because the use of the subject provisions is not currently allowed by 10 CFR 50.55a. Therefore, the addition of this new proposed condition is not a backfit.

(9) Add a new proposed condition as 10 CFR 50.55a(b)(2)(xxxii), "Summary Report Submittal;" to clarify that licensees using the 2010 Edition or later editions and addenda of Section XI must continue to submit to the NRC the Preservice and Inservice Summary Reports required by IWA-6240 of the 2009 addenda of Section XI. This proposed condition would not result in a change in NRC's requirements insomuch as these reports have been required in the 2009 Addenda of Section XI and all previous editions and addenda. Therefore, the addition of this new proposed condition is not a backfit.

(10) Add a new proposed condition as 10 CFR 50.55a(b)(2)(xxxiii), "Risk-Informed Allowable Pressure;" to prohibit the use of ASME BPV Code, Section XI, Appendix G, Paragraph G-2216. The use of Paragraph G-2216 is not currently allowed by 10 CFR 50.55a. Therefore, the proposed condition does not constitute a new or changed NRC position on the lack of acceptability of Paragraph G-2216. Therefore, the addition of this new proposed condition is not a backfit.

(11) Add a new proposed condition as 10 CFR 50.55a(b)(2)(xxxiv), "Disposition of Flaws in Class 3 Components;" to require that when using the 2013 Edition of the ASME BPV Code, Section XI, the licensee shall use the acceptance standards of IWD-3510 for the disposition of flaws in Category D-A components. The condition is imposed to provide clarification and consistency in requirements between IWD-3410 and IWD-3510. This proposed change would not alter the original intent of this requirement and, therefore, would not impose a new requirement. This proposed change is not a backfit.

(12) Add a new proposed condition as 10 CFR 50.55a(b)(2)(xxxv), "Use of RT_{T0} in the K_{Ia} and K_{Ic} Equations;" to specify that when licensees use ASME BPV Code, Section XI 2013 Edition Nonmandatory Appendix A paragraph A-4200, if T_0 is available, then RT_{T0} may be used in place of RT_{NDT} for applications using the K_{Ic} equation and the associated K_{Ic} curve, but not for applications using the K_{Ia} equation and the associated K_{Ia} curve. Conditions on the use of ASME BPV Code, Section XI, Nonmandatory Appendices do not constitute backfitting inasmuch as those provisions apply to voluntary actions initiated by the licensee to use the "nonmandatory compliance" provisions in these Appendices of the proposed rule.

(13) Add a new proposed condition as 10 CFR 50.55a(b)(2)(xxxvi), "Fracture Toughness of Irradiated Materials;" to require licensees using ASME BPV Code, Section XI 2013 Edition Nonmandatory Appendix A paragraph A-4400, to obtain NRC approval before using irradiated T_0 and the associated RT_{T0} in establishing fracture toughness of irradiated materials. Conditions on the use of ASME BPV Code, Section XI, Nonmandatory Appendices do not constitute backfitting inasmuch as those provisions apply to voluntary actions initiated by the licensee to use the "nonmandatory compliance" provisions in these Appendices of the proposed rule.

(14) Add a new proposed condition as 10 CFR 50.55a(b)(2)(xxxvii), Code Case N-824, "Ultrasonic Examination of Cast Austenitic Piping Welds From the Outside Surface Section XI, Division 1," to allow the use of the Code Case as conditioned. Conditions

on the use of Code Case N-824 do not constitute backfitting, inasmuch as the use of this Code Case is not required by the NRC but instead is an alternative, which may be voluntarily used by the licensee (i.e., a "voluntary alternative").

A.2.3 ASME OM Code

(1) Add a new proposed condition as 10 CFR 50.55a(b)(3)(ii)(A) to require that licensees evaluate the adequacy of the diagnostic test interval for each MOV and adjust the interval as necessary, but not later than 5 years or three refueling outages (whichever is longer) from initial implementation of Appendix III of the ASME OM Code. This proposed condition represents an exception to a later OM Code provision but merely retains the current NRC requirement in Regulatory Guide 1.192, and is therefore not a backfit because the NRC is not imposing a new requirement.

(2) Add a new proposed condition as 10 CFR 50.55a(b)(3)(ii)(B) to require that licensees ensure that the potential increase in core damage frequency and large early release frequency associated with the extension is acceptably small when extending exercise test intervals for high risk MOVs beyond a quarterly frequency. This proposed condition represents an exception to a later OM Code provision but merely retains the current NRC requirement in Regulatory Guide 1.192, and is therefore not a backfit because the NRC is not imposing a new requirement.

(3) Add a new proposed condition as 10 CFR 50.55a(b)(3)(ii)(C) to require, when applying Appendix III to the ASME OM Code, that licensees categorize MOVs according to their safety significance using the methodology described in Code Case OMN-3 subject to the conditions discussed in Regulatory Guide 1.192, or using an MOV risk ranking methodology accepted by the NRC on a plant-specific or industry-wide basis in accordance with the conditions in the applicable safety evaluation. This proposed condition represents an exception to a later OM Code provision but merely retains the current NRC requirement in Regulatory Guide 1.192, and is therefore not a backfit because the NRC is not imposing a new requirement.

(4) Add a new proposed condition as 10 CFR 50.55a(b)(3)(ii)(D) to require that, when applying Paragraph III-3600, "MOV Exercising Requirements," of Appendix III to the OM Code, licensees shall verify that the stroke time of the MOV satisfies the assumptions in the plant safety analyses. This proposed condition retains the MOV stroke time requirement that was specified in previous editions and addenda of the ASME OM Code. The retention of this requirement is not a backfit.

(5) Add new proposed conditions as 10 CFR 50.55a(b)(3)(iii)(A) through 10 CFR 50.55a(b)(3)(iii)(D), "OM condition: New Reactors;" to apply specific conditions for IST programs applicable to licensees of new nuclear power plants in addition to the provisions of the ASME OM Code as incorporated by reference with conditions in § 50.55a. Licensees of "new reactors" are, as identified in the proposed paragraph: (i) holders of operating licenses for nuclear power reactors that received construction permits under this part on or after the date 12 months after the effective date of this rulemaking and (ii) holders of combined licenses (COLs) issued under 10 CFR Part 52, whose initial fuel loading occurs on or after the date 12 months after the effective date of this rulemaking. This implementation schedule for new reactors is consistent with the NRC regulations in § 50.55a(f)(4)(i). These proposed conditions represent an exception to a later OM Code provision but merely retain the current NRC

requirement, and are therefore not a backfit because the NRC is not imposing a new requirement.

(6) Revise 10 CFR 50.55a(b)(3)(iv), "OM condition: Check Valves (Appendix II)," to specify that Appendix II, "Check Valve Condition Monitoring Program," of the OM Code, 2003 Addenda through the 2012 Edition, is acceptable for use without conditions with the clarifications that (1) the maximum test interval allowed by Appendix II for individual check valves in a group of two valves or more must be supported by periodic testing of a sample of check valves in the group during the allowed interval, and (2) the periodic testing plan must be designed to test each valve of a group at approximate equal intervals not to exceed the maximum requirement interval. The regulation is being revised to extend the applicability of this existing NRC condition on the OM Code to the 2012 Edition of the OM Code. This does not represent a change in the NRC's position that the condition is needed with respect to the OM Code. Therefore, this proposed condition is not a backfit.

(7) Add a new proposed condition as 10 CFR 50.55a(b)(3)(vii), "OM Condition: Subsection ISTB;" to prohibit the use of Subsection ISTB in the 2011 Addenda to the ASME OM Code because the complete set of planned Code modifications to support the changes to the comprehensive pump test acceptance criteria was not made in that addenda. This proposed condition represents an exception to a later OM Code provision but merely limits the use of the later Code provision, and is therefore not a backfit because the NRC is not imposing a new requirement.

(8) Add a new proposed condition as 10 CFR 50.55a(b)(3)(viii), "OM Condition: Subsection ISTE;" to allow licensees to implement Subsection ISTE, "Risk-Informed Inservice Testing of Components in Light-Water Reactor Nuclear Power Plants," in the ASME OM Code, 2009 Edition, 2011 Addenda and 2012 Edition, where the licensee has obtained authorization to implement Subsection ISTE as an alternative to the applicable IST requirements in the ASME OM Code on a case-by-case basis in accordance with 10 CFR 50.55a(z). This proposed condition represents an exception to a later OM Code provision but merely limits the use of the later Code provision, and is therefore not a backfit because the NRC is not imposing a new requirement.

(9) Add new proposed conditions as 10 CFR 50.55a(b)(3)(ix), "OM Condition: Subsection ISTF;" to specify that licensees applying Subsection ISTF, 2012 Edition, shall satisfy the requirements of Mandatory Appendix V, "Pump Periodic Verification Test Program," of the ASME OM Code, 2012 Edition. The proposed condition also specifies that Subsection ISTF, 2011 Addenda, is not acceptable for use. This proposed condition represents an exception to a later OM Code provision but merely limits the use of the later Code provision, and is therefore not a backfit because the NRC is not imposing a new requirement.

(10) Add a new proposed condition as 10 CFR 50.55a(b)(3)(x), "OM condition: Code Case OMN-20," to allow licensees to implement Code Case OMN-20, "Inservice Test Frequency," in the ASME OM Code, 2012 Edition. This proposed condition allows voluntary action initiated by the licensee to use the Code Case and is therefore not a backfit.

(11) Add a new proposed condition as § 50.55a(b)(3)(xi), "OM condition: Valve Position Indication," to specify that when implementing ASME OM Code, Subsection

ISTC-3700, “Position Verification Testing,” licensees shall supplement the ASME OM Code provisions as necessary to verify that valve operation is accurately indicated. This proposed revision clarifies the current requirements, and is considered consistent with the meaning and intent of the current requirements, and therefore is not considered to result in a change in requirements. As such, this proposed change is not a backfit.

(12) Revise 10 CFR 50.55a(f), “Inservice Testing Requirements,” to clarify that the ASME OM Code includes provisions for preservice testing of components as part of its overall provisions for IST programs. No expansion of IST program scope is intended by this clarification. This proposed condition would not result in a change in requirements previously approved in the Code, and is therefore not a backfit.

(13) Revise 10 CFR 50.55a(f)(3)(iii)(A), “Class 1 Pumps and Valves: First Provision,” to state that the paragraph is applicable to pumps and valves that are within the scope of the ASME OM Code. This will align the scope of pumps and valves for inservice testing with the scope defined in the ASME OM Code and in SRP Section 3.9.6. This proposed condition would not result in a change in requirements previously approved in the Code, and is therefore not a backfit.

(14) Revise 10 CFR 50.55a(f)(3)(iii)(B), “Class 1 Pumps and Valves: Second Provision,” to state that the paragraph is applicable to pumps and valves that are within the scope of the ASME OM Code. This will align the scope of pumps and valves for inservice testing with the scope defined in the ASME OM Code and in SRP Section 3.9.6. This proposed condition would not result in a change in requirements previously approved in the Code, and is therefore not a backfit.

(15) Revise 10 CFR 50.55a(f)(3)(iv)(A), “Class 2 and 3 Pumps and Valves: First Provision;” to state that the paragraph is applicable to pumps and valves that are within the scope of the ASME OM Code. This will align the scope of pumps and valves for inservice testing with the scope defined in the ASME OM Code and in SRP Section 3.9.6. This proposed condition would not result in a change in requirements previously approved in the Code, and is therefore not a backfit.

(16) Revise 10 CFR 50.55a(f)(3)(iv)(B), “Class 2 and 3 Pumps and Valves: Second Provision,” to state that the paragraph is applicable to pumps and valves that are within the scope of the ASME OM Code. This will align the scope of pumps and valves for inservice testing with the scope defined in the ASME OM Code and in SRP Section 3.9.6. This proposed condition would not result in a change in requirements previously approved in the Code, and is therefore not a backfit.

(17) Revise 10 CFR 50.55a(f)(4), “Inservice Testing Standards for Operating Plants;” to state that the paragraph is applicable to pumps and valves that are within the scope of the ASME OM Code. This will align the scope of pumps and valves for inservice testing with the scope defined in the ASME OM Code and in SRP Section 3.9.6. This proposed condition would not result in a change in requirements previously approved in the Code, and is therefore not a backfit.

A.2.4 ASME Code Cases

A.2.4.1. Code Case N-729-4

Revise 10 CFR 50.55a(g)(6)(ii)(D), “Reactor vessel head inspections”:

On June 22, 2012, the ASME approved the fourth revision of Code Case N-729, (N-729-4). The NRC proposes to update the requirements of 10 CFR 50.55a(g)(6)(ii)(D) to require licensees to implement ASME Code Case N-729-4, with conditions. Code Case N-729-4 contains similar requirements as N-729-1; however, N-729-4 also contains new requirements to address previous NRC conditions, including changes to inspection frequency and qualifications. The new NRC conditions on the use of ASME Code Case N-729-4 address operational experience, clarification of implementation, and the use of alternatives to the Code Case.

The current regulatory requirements for the examination of pressurized-water reactor upper RPV heads that use nickel-alloy materials are provided in 10 CFR 50.55a(g)(6)(ii)(D). This section was first created by rulemaking, dated September 10, 2008, (73 FR 52730) to require licensees to implement ASME Code Case N-729-1, with conditions, in lieu of the inspections previously required by the ASME BPV Code, Section XI. The action did constitute a backfit; however, NRC concluded that imposition of ASME Code Case N-729-1, as conditioned, constituted an adequate protection backfit.

The General Design Criteria (GDC) for nuclear power plants (Appendix A to 10 CFR Part 50) or, as appropriate, similar requirements in the licensing basis for a reactor facility, provide bases and requirements for NRC assessment of the potential for, and consequences of, degradation of the reactor coolant pressure boundary (RCPB). The applicable GDC include GDC 14 (Reactor Coolant Pressure Boundary), GDC 31 (Fracture Prevention of Reactor Coolant Pressure Boundary), and GDC 32 (Inspection of Reactor Coolant Pressure Boundary). 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. GDC 32 specifies that components that are part of the RCPB have the capability of being periodically inspected to assess their structural and leak tight integrity.

The NRC concludes that ASME Code Case N-729-4, as conditioned, shall be mandatory in order to ensure that the requirements of the GDC are satisfied. Imposition of ASME Code Case N-729-4, with conditions, ensures that the ASME Code-allowable limits will not be exceeded, leakage will likely not occur, and potential flaws will be detected before they challenge the structural or leak tight integrity of the reactor pressure vessel upper head within current nondestructive examination limitations. The NRC concludes that the regulatory framework for providing adequate protection of public health and safety is accomplished by the incorporation of Code Case N-729-4 into 10 CFR 50.55a, as conditioned. All current licensees of U.S. pressurized-water reactors will be required to implement ASME Code Case N-729-4, as conditioned. The Code Case provisions on examination requirements for reactor pressure vessel upper heads are essentially the same as those established under ASME Code Case N-729-1, as conditioned. One exception is the condition in 10 CFR 50.55a(g)(6)(ii)(D)(3), which will require, for upper heads with Alloy 600 penetration nozzles, that bare metal visual examinations be performed each outage in accordance with Table 1 of ASME Code Case N-729-4. Accordingly, the NRC imposition of the ASME Code Case N-729-4, as conditioned, may be deemed to be a modification of the procedures to operate a facility

resulting from the imposition of the new regulation, and as such, this rulemaking provision may be considered backfitting under 10 CFR 50.109(a)(1).

The NRC continues to find that inspections of reactor pressure vessel upper heads, their penetration nozzles, and associated partial penetration welds are necessary for adequate protection of public health and safety and that the requirements of ASME Code Case N-729-4, as conditioned, represent an acceptable approach, developed, in part, by a voluntary consensus standards organization for performing future inspections. The NRC concludes that approval of ASME Code Case N-729-4, as conditioned, by incorporation by reference of the Code Case into 10 CFR 50.55a, is necessary to ensure that the facility provides adequate protection to the health and safety of the public and constitutes a redefinition of the requirements necessary to provide reasonable assurance of adequate protection of public health and safety. Therefore, a backfit analysis need not be prepared for this portion of the proposed rule in accordance with 10 CFR 50.109(a)(4)(ii) and 10 CFR 50.109(a)(4)(iii).

A.2.4.2. Code Case N-770-2

Revise 10 CFR 50.55a(g)(6)(ii)(F), "Examination Requirements for Class 1 Piping and Nozzle Dissimilar Metal Butt Welds":

On June 9, 2011, the ASME approved the second revision of Code Case N-770, (N-770-2). The NRC proposes to update the requirements of 10 CFR 50.55a(g)(6)(ii)(F) to require licensees to implement ASME Code Case N-770-2, with conditions. Code Case N-770-2 contains similar baseline and ISI requirements for unmitigated nickel-alloy butt welds, and preservice and ISI requirements for mitigated butt welds as N-770-1. However, N-770-2 also contains new requirements for optimized weld overlays, a specific mitigation technique, and volumetric inspection coverage. Further, the NRC conditions on the use of ASME Code Case N-770-2 have been modified to address the changes in the Code Case, clarify inspection coverage requirements, and require the development of inspection qualifications to allow complete weld inspection coverage in the future.

The current regulatory requirements for the examination of ASME Class 1 piping and nozzle dissimilar metal butt welds that use nickel-alloy materials is provided in 10 CFR 50.55a(g)(6)(ii)(F). This section was first created by rulemaking, dated June 21, 2011 (76 FR 36232), to require licensees to implement ASME Code Case N-770-1, with conditions. The NRC added 10 CFR 50.55a(g)(6)(ii)(F) to require licensees to implement ASME Code Case N-770-1, with conditions, in lieu of the inspections previously required by the ASME BPV Code, Section XI. The action did constitute a backfit; however, the NRC concluded that imposition of ASME Code Case N-770-1, as conditioned, constituted an adequate protection backfit.

The GDC for nuclear power plants (Appendix A to 10 CFR Part 50) or, as appropriate, similar requirements in the licensing basis for a reactor facility, provide bases and requirements for NRC assessment of the potential for, and consequences of, degradation of the RCPB. The applicable GDC include GDC 14 (Reactor Coolant Pressure Boundary), GDC 31 (Fracture Prevention of Reactor Coolant Pressure Boundary) and GDC 32 (Inspection of Reactor Coolant Pressure Boundary). 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. GDC 32 specifies that components that are part of the RCPB have the capability of being periodically inspected to assess their structural and leak tight integrity.

The NRC concludes that ASME Code Case N-770-2, as conditioned, must be imposed in order to ensure that the requirements of the GDC are satisfied. Imposition of ASME Code Case N-770-2, with conditions, ensures that the requirements of the GDC are met for all mitigation techniques currently in use for Alloy 82/182 butt welds because ASME Code-allowable limits will not be exceeded, leakage would likely not occur and potential flaws will be detected before they challenge the structural or leak tight integrity of piping welds. All current licensees of U.S. pressurized-water reactors will be required to implement ASME Code Case N-770-2, as conditioned. The Code Case provisions on examination requirements for ASME Class 1 piping and nozzle nickel-alloy dissimilar metal butt welds are somewhat different from those established under ASME Code Case N-770-1, as conditioned, and will require a licensee to modify its procedures for inspection of ASME Class 1 nickel-alloy welds to meet these requirements. Accordingly, the NRC imposition of the ASME Code Case N-770-2, as conditioned, may be deemed to be a modification of the procedures to operate a facility resulting from the imposition of the new regulation, and as such, this rulemaking provision may be considered backfitting under 10 CFR 50.109(a)(1).

The NRC continues to find that ASME Class 1 nickel-alloy dissimilar metal weld inspections are necessary for adequate protection of public health and safety, and that the requirements of ASME Code Case N-770-2, as conditioned, represent an acceptable approach developed by a voluntary consensus standards organization for performing future ASME Class 1 nickel-alloy dissimilar metal weld inspections. The NRC concludes that approval of ASME Code Case N-770-2, as conditioned, by incorporation by reference of the Code Case into 10 CFR 50.55a, is necessary to ensure that the facility provides adequate protection to the health and safety of the public and constitutes a redefinition of the requirements necessary to provide reasonable assurance of adequate protection of public health and safety. Therefore, a backfit analysis need not be prepared for this portion of the proposed rule in accordance with 10 CFR 50.109(a)(4)(ii) and 10 CFR 50.109(a)(4)(iii).

A.3 Conclusion

The NRC finds that incorporation by reference into 10 CFR 50.55a of the 2009 Addenda through 2013 Edition of Section III, Division 1, of the ASME BPV Code subject to the identified conditions; the 2009 Addenda through 2013 Edition of Section XI, Division 1, of the ASME BPV Code, subject to the identified conditions; the 2009 Edition through the 2012 Edition of the ASME OM Code subject to the identified conditions does not constitute backfitting or represent an inconsistency with any issue finality provisions in 10 CFR Part 52.

The NRC finds that the incorporation by reference of Code Cases N-824 and OMN-20 does not constitute backfitting or represent an inconsistency with any issue finality provisions in 10 CFR Part 52.

The NRC finds that the inclusion of a new condition on Code Case N-729-4 and a new condition on Code Case N-770-2 constitutes backfitting necessary for adequate protection.

APPENDIX B – MAJOR ASSUMPTIONS AND INPUT DATA

Data Element	Value	Unit	Source or Basis of Estimate
Key Analysis Dates			
Final Rule Effective Date	2016	year	NRC input
Analysis Base Year	2014	year	NRC input
Average new reactor unit first year of commercial operation	2017	year	Calculation of the average commercial operation commencement date of the five new reactor units. Information of the scheduled commercial operation dates of each new reactor unit obtained from http://www.southerncompany.com/about-us/our-business/southern-nuclear/home.cshtml, http://www.scana.com/en/investor-relations/news-releases/sceg-files-for-rate-adjustment-under-blra-2012.htm, and http://www.tva.gov/power/nuclear/pdf/wb2_q_summary_jan2014.pdf. These websites were last accessed on July 7, 2014.
Average new reactor unit first year of extended commercial operation	2057	year	Calculation of the average new reactor unit first year of extended commercial operation based on a 40 year operating license.
Watts Bar Unit 2 first year of commercial operation	2015	year	Information of the scheduled commercial operation dates of Watts Bar Unit 2 obtained from http://www.tva.gov/power/nuclear/pdf/wb2_q_summary_jan2014.pdf. This website was last accessed on July 7, 2014.
Number of entities			
Number of currently operating reactor units in year 2014	100	units	NRC, 2013-2014 Information Digest (NUREG-1350, Volume 25), "Appendix A: U.S. Commercial Nuclear Power Reactors - Operating Reactors" Web page, www.nrc.gov. Data current as of March 19, 2014. Available at: http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/#pubinfo, last accessed on July 7, 2014.
Number of currently operating reactor units in year 2015	99	units	Calculation. Based on NRC, 2013-2014 Information Digest (NUREG-1350, Volume 25), Appendix A (retrievable at www.nrc.gov) and Vermont Yankee closing in 2014 announcement (http://www.entergy.com/News_Room/newsrelease.aspx?NR_ID=2769).
Number of currently operating reactor units in year 2020	98	units	Calculation. Based on NRC, 2013-2014 Information Digest (NUREG-1350, Volume 25), "Appendix A (retrievable at www.nrc.gov) and Oyster Creek closing in 2019 announcement (www.exeloncorp.com).
Number of currently operating PWR units	65	units	NRC, 2013-2014 Information Digest (NUREG-1350, Volume 25), "Appendix A: U.S. Commercial Nuclear Power Reactors - Operating Reactors" Web page, www.nrc.gov. Data current as of March 19, 2014. Available at: http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/#pubinfo, last accessed on July 7, 2014.

Data Element	Value	Unit	Source or Basis of Estimate
Number of new PWR units under construction	1	units	NRC, 2013-2014 Information Digest (NUREG-1350, Volume 25), "Appendix A: U.S. Commercial Nuclear Power Reactors - Operating Reactors" Web page, www.nrc.gov. Data current as of March 19, 2014. Available at: http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/#pubinfo, last accessed on July 7, 2014.
Number of new reactor units under construction	5	units	NRC, "Combined License Holders for New Reactors" Web page, http://www.nrc.gov. Data current as of September 19, 2013. Available at: http://www.nrc.gov/reactors/new-reactors/col-holder.html, last accessed on July 7, 2014.
Number of Sites			
Sites with currently operating reactors in year 2014	59	sites	Calculation: [total number of sites with operating reactors]. Information on operating reactor sites was obtained from NRC, "Operating Nuclear Power Reactors (by Location or Name)" Web page, www.nrc.gov. Data current as of March 19, 2014. Available at: http://www.nrc.gov/info-finder/reactor/, last accessed on July 7, 2014.
Sites with currently operating reactors in year 2015	58	sites	Calculation: [total number of sites with operating reactors] - [sites with unit closed in year 2014]. Information on operating reactor sites was obtained from NRC, "Operating Nuclear Power Reactors (by Location or Name)" Web page, www.nrc.gov and Vermont Yankee closing in 2014 based on Entergy's announcement
Sites with currently operating reactors in year 2020	57	sites	Calculation: [total number of sites with operating reactors] - [sites with units closed in years 2014 through 2019]. Information on operating reactor sites was obtained from NRC, "Operating Nuclear Power Reactors (by Location or Name)" Web page, www.nrc.gov and closure of Vermont Yankee and Oyster Creek.
Sites with projected new reactors under a Part 52 license	2	sites	NRC, "Combined License Applications for New Reactors" Web page, www.nrc.gov. Data current as of April 17, 2014. Available at: http://www.nrc.gov/reactors/new-reactors/col.html, last accessed on July 7, 2014.
Sites with reactors under construction under a Part 50 license	1	site	NRC, 2013-2014 Information Digest (NUREG-1350, Volume 25), "Appendix A: U.S. Commercial Nuclear Power Reactors - Operating Reactors under Active Construction or Deferred Policy," August 2013. Available at: http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/#pubinfo, last accessed on July 7, 2014.
Sites with currently operating PWR reactors	38	sites	NRC, Information on operating reactor sites was obtained from NRC, "Operating Nuclear Power Reactors (by Location or Name)" Web page, www.nrc.gov. Data current as of March 19, 2014. Available at: http://www.nrc.gov/info-finder/reactor/, last accessed on July 7, 2014.
Sites with projected new PWR reactors	1	site	NRC, Watts Bar 2. Information on operating reactor sites was obtained from NRC, "Operating Nuclear Power Reactors (by Location or Name)" Web page, www.nrc.gov. Data current as of March 19, 2014. Available at: http://www.nrc.gov/info-finder/reactor/, last accessed on July 7, 2014.

Data Element	Value	Unit	Source or Basis of Estimate
Final Rule Applicability Period (Years)			
Final rule applicability term for currently operating reactors	17	years	Calculation of the average remaining licensed operating period of all currently operating reactors until license expiration. Information on the operating license expiration date of each reactor obtained from NRC, 2013-2014 Information Digest (NUREG-1350, Volume 25), "Appendix A: U.S. Commercial Nuclear Power Reactors - Operating Reactors" Web page, www.nrc.gov. Data current as of March 19, 2014. Available at: http://www.nrc.gov/info-finder/reactor/, last accessed on July 7, 2014.
Final rule applicability term for new reactor licenses	60	years	Assumption based on a 40 year operating license and a 20 year license renewal
No. of Licensees who are Impacted by the Provision			
Current Use of NQA-1 in QAPD			
No. of current operating licensees that currently use NQA-1 in QAPD	48	licensees	NRC estimate.
No. of current operating licensees that currently do not use NQA-1 in QAPD	52	licensees	Calculation of the total number of currently operating reactor units less the number of licensees that incorporate NQA-1 requirements in their QAPD.
No. of new licensees that use NQA-1 in QAPD	5	licensees	NRC estimate.
No. of new licensees that currently do not use NQA-1 in QAPD	0	licensees	Calculation of the total number of new reactor units less the number of new licensees that incorporate NQA-1 requirements in their QAPD.
Number of licensees that will apply Subsection ISTE	1	licensees	NRC estimate
Number of licensees impacted by Subsection ISTF, OM Code Pump Testing Requirements for New Reactors			
No. of new reactor units with a passive design	4	units	NRC input
No. of new reactor units impacted by Subsection ISTF	1	units	Calculation: [number of new reactors units] - [number of new reactor units with a passive design]
Number of licensees with extended licenses impacted by Concrete Containment Examinations	71	licensees	Calculation. NRC, 2013-2014 Information Digest (NUREG-1350, Volume 25), "Appendix A: U.S. Commercial Nuclear Power Reactors - Operating Reactors" Web page, www.nrc.gov of 72 reactor units minus 1 unit that announced its closure in 2014 (e.g., Vermont Yankee). Data current as of March 19, 2014. Available at: http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/#pubinfo, last accessed on July 7, 2014.
Average expiration date of extended licenses	01/25/2037	year	Calculation: [Average of expiration year for extended licenses] - [final rule effective year]. NRC, 2013-2014 Information Digest (NUREG-1350, Volume 25), "Appendix A: U.S. Commercial Nuclear Power Reactors - Operating Reactors" Web page, www.nrc.gov. Data current as of March 19, 2014. Available at: http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/#pubinfo, last accessed on July 7, 2014.

Data Element	Value	Unit	Source or Basis of Estimate
Industry One-Time Costs			
Program revision to QAPD to incorporate the NQA-1 Program	200	hours	NRC estimate. Program revision occurs within first year after rule is effective.
Update Concrete Containment Examinations procedures	20	hours	NRC estimate. Program revision occurs within first year after rule is effective.
Procedure revision to incorporate fracture toughness of irradiated material requirements	20	hours	NRC estimate. Procedure revision occurs within first year after rule is effective.
Procedure Revision to Incorporate the Ultrasonic Examination Provisions of Code Case N-824	200	hours	NRC estimate. Procedure revision occurs within first year after rule is effective.
Develop training module for the Ultrasonic Examination Provisions of Code Case N-824	200	hours	NRC estimate. Training module developed within first year after rule is effective.
Ultrasonic Examination equipment to implement Code Case N-824	25000	dollars	NRC estimate. T&E equipment procured within first year after rule is effective. Site basis.
Revise Inspection and Test Procedures to reflect OM Code Appendix III requirements	20	hours	NRC estimate. Procedure revision occurs within first year after rule is effective.
Revise test procedures for motor-operated valve testing	8	hours	NRC estimate. Procedure revision occurs within first year after rule is effective.
Program Revision for Mandatory Appendix III MOV Risk Categorization	8	hours	NRC estimate. Procedure revision occurs within first year after rule is effective.
Procedure Revisions to Incorporate Supplemental Requirements on the Use of ASME OM Code for New Reactors	40	hours	NRC estimate. Procedure revision occurs within first year of new reactor commercial operation.
Program Revision Incorporate Squib Valve Surveillance Requirements for New Reactors	2	hours	NRC estimate. Procedure revision occurs within first year of new reactor commercial operation.
Procedure Revision to Incorporate Subsection ISTB (2012 Edition)	0	hours	NRC estimate. Procedure revision occurs within first year of new reactor commercial operation.
Program Revision to Incorporate Mandatory Appendix V on Pump Periodic Verification Program	8	hours	NRC estimate. Procedure revision occurs within first year after rule is effective for operating plants and first year of commercial operation for new plants.
Risk-Informed Inservice Testing of Pumps and Valves Request for Alternative Submittal to Use Subsection ISTE	1000	hours/year for 2 years	NRC estimate. Procedure revision occurs within first year after rule is effective.
Procedure Revision to Incorporate Subsection ISTF, OM Code Pump Testing Requirements for Hypothetical New Reactor	20	hours	NRC estimate. Procedure revision occurs within first year after rule is effective for operating plants and first year of commercial operation for new plants.
Code Case OMN-20 Time Period Extension Plant Procedure Revision	8	hours	NRC estimate. Procedure revision occurs within first year after rule is effective for operating plants and first year of commercial operation for new plants.

Data Element	Value	Unit	Source or Basis of Estimate
Procedure Revision to Incorporate Cast Stainless Steel Material Examination Requirements	160	hours	NRC estimate. Procedure revision occurs within first year after rule is effective for operating plants and first year of commercial operation for new plants.
Develop training module to certify inspectors to perform cast stainless steel material examinations	24	hours	NRC estimate. Training module development occurs within first year after rule is effective for operating plants and first year of commercial operation for new plants.
Create training mockups to allow for qualification of equipment, procedures, and personnel	$30,000	dollars	NRC estimate. The development of a sufficient number of mockups is required to establish an Appendix VIII program for examination of ASME Code Class 1 piping and vessel nozzle butt welds through cast stainless steel materials. Significant time and resources are required to create mockups and to allow for qualification of equipment, procedures and personnel. Training mockups are developed beginning in 2017 on a site basis (covers both operating and new reactors).
Purchase the specialized phased array search unit, electronics, and scanners	$120,000	dollars	NRC estimate. Specialized equipment procured on a plant site basis.
Initial inspector training and practice on CASS components	16	hours	NRC estimate. 2 inspectors each receiving 8 hours of training and practice. Training occurs 1 year after training module and mockups are prepared and specialized test equipment is purchased
Procedure Revision to Clarify Examination Coverage Requirements for Butt Welds Joining Cast Stainless Steel	20	hours	NRC estimate. Procedure revision occurs within first year after rule is effective for operating plants and first year of commercial operation for new plants.
Procedure Revision to Incorporate Encoding of Ultrasonic Volumetric Examinations	200	hours	NRC estimate. Procedure revision occurs within first year after rule is effective for operating plants and first year of commercial operation for new plants.
Develop training module to certify inspectors to perform encoding of specific ultrasonic volumetric examinations	100	hours	NRC estimate. Training module development is performed on a site basis and costs are incurred in year 2017.
Create training mockups to allow for qualification of equipment, procedures, and personnel for encoding of specific ultrasonic volumetric examinations	$5,000	dollars	NRC estimate. Training mockups occur within first year after rule is effective for operating plants and first year of commercial operation for new plants.
Industry Recurring Costs			
5.4 Averted Code Case Relief Requests			
Code Case relief request preparation and submission	380	industry eng hours	NRC estimate
No. of averted code case relief submissions	7	submittals per year	NRC estimate
New reactor - code case submittal	1	submittals per year	NRC estimate

Data Element	Value	Unit	Source or Basis of Estimate
Concrete Containment Examinations			
Perform Concrete Containment Examinations inspections	10	additional inspections	NRC estimate. Applicable to operating units with renewed licenses under 10 CFR Part 54.
Concrete containment examinations and evaluations	1	hour per inspection	NRC estimate. Applicable to operating units with renewed licenses under 10 CFR Part 54.
Immediate ASME Code Repair or Replace	0	month	NRC input. Flaw is detected during an outage before plant restart
Deferred ASME Code Repair or Replace	26	month	Calculation; [Maximum deferral is 26 months]
Cost of repair or replacement	$10,000	dollars	Example cost
Code Case N-824 Ultrasonic Exams			
Relief request preparation and submission averted (Operating plants)	10	hours per weld	Need verification - NRC estimate based on 30 welds included in relief request for a total of 300 hours per relief request.
Relief request preparation and submission averted (New plants)	10	hours per weld	Need verification - NRC estimate based on 30 welds included in relief request for a total of 300 hours per relief request.
No. of ultrasonic weld examinations	30	welds	NRC estimate
No. of welds unsuccessfully examined and still require relief request	10	welds	NRC estimate
Setup, perform, and document ultrasonic weld exam (Operating plants)	1	hour	NRC estimate
Setup, perform, and document ultrasonic weld exam (New plants)	1	hour	NRC estimate
Inspection period	10	years	Need verification - assumed one inspection every 10 years
Mandatory Appendix III Inservice Testing of Motor-Operated Valves			
Quarterly MOV exercise tests averted	4	tests per year	NRC input.
Quarterly MOV exercise tests averted	0.25	hour	NRC estimate
No. of MOVs impacted	50	valves in program	NRC estimate
Biannual MOV exercise test	1	tests	Mandatory Appendix III new requirement
Biannual MOV exercise test duration	0.25	hour	NRC estimate
MOV diagnostic test duration	1	tests	Mandatory Appendix III new requirement
MOV diagnostic test on 5-year test interval	1	hour	NRC estimate
ASME OM Code Supplemental Requirements Testing for New Reactors			No additional requirements beyond current licensing provisions based on Commission policy for new reactors.

Data Element	Value	Unit	Source or Basis of Estimate
Mandatory Appendix V on Pump Periodic Verification Tests			
Pump periodic verification test	5	pumps	NRC estimate. There are 30 pumps in a plant's IST program of which 5 pumps require periodic verification testing.
Pump periodic verification test frequency	2	years	NRC estimate. Once every 2 years
Pump periodic verification test duration	1	tech hours	NRC estimate
Code Case OMN-20 Time Period Extension			
Prepare and submit time period extension Alternative Request	400	hours	NRC estimate. For operating reactors, submitted in years 2015 and 2025. For new reactors, submitted in years 2017, 2027, 2037, 2047, 2057, and 2067.
Cast Stainless Steel Material Examination Requirements			
Perform and document CASS material inspections	150	welds	NRC estimate based on previously submitted inservice inspection relief requests
Additional time to perform CASS material inspection	0.25	hr	NRC estimate
CASS material inspections begin	2019	year	NRC input
Examination Coverage Requirements for Butt Welds Joining Cast Stainless Steel Material			
Perform and document butt weld inspections	150	welds	NRC estimate based on previously submitted inservice inspection relief requests
Additional time to perform butt weld inspection	0.25	hr	NRC estimate
Butt weld inspections begin	2017	year	NRC assumption.
Butt weld inspection frequency	2	years	NRC assumption. Half the operating plants per year.
5.4.24. Encoding of Ultrasonic Volumetric Examinations			
Perform encoded weld inspections	30	welds	NRC estimate of the number of non-mitigated or cracked mitigated dissimilar metal butt welds in the reactor coolant pressure boundary, within the scope of ASME Code Case N 770-2
Additional time to perform an encoded weld inspection	3	hours	NRC estimate
Encoded weld inspection frequency	2	years	NRC estimate
NRC Implementation Costs			
5.5. NRC Implementation			
Develop and issue proposed and final Rule	870	2014 hours	NRC estimate. The NRC estimates of the labor to develop the proposed and final rule by year. Assumes no updates to inspection procedures needed.
Develop and issue proposed and final Rule	700	2015 hours	

Data Element	Value	Unit	Source or Basis of Estimate
5.5.1. Quality Assurance Program Description Review			
Review QAPD submittal and issue a safety evaluation	100	hours	NRC estimate. Average level of effort for review and prepare draft SER is 60 hours plus 40 hours to concur and issue.
5.5.17 Risk-Informed Inservice Testing of Pumps and Valves Request for Alternative Submittal to Use Subsection ISTE			
Develop and issue risk-informed inservice testing guidance	420	2015 hours	NRC estimate
Develop and issue risk-informed inservice testing guidance	350	2016 hours	NRC estimate
Review ISTE submittal and issue a safety evaluation	180	2017 hours	NRC estimate
NRC Operation Costs			
5.6 Averted Code Case Relief Requests (operating plants)			
Review Code alternative request submittal and issue safety evaluation (operating plants)	120	NRC eng hours	NRC estimate. The average NRC level of effort to review a typical coverage-related relief submittal and issue a safety evaluation is approximately 90 engineering review hours plus 30 hours for concurrence and issue. Complex relief requests involving CASS and dissimilar metal welds under Code Case N-770 can take twice as much technical review time and involve specialized contractor support.
No. of averted code case relief submissions	7	submittals per year	NRC estimate based on past experience (tied to industry averted code case relief requests above)
5.6 Averted Code Case Relief Requests (new plants)			
Review Code Case relief request submittal and issue safety evaluation (new plants)	120	NRC eng hours	NRC estimate. This is the same average NRC level of effort to review a typical coverage-related relief submittal and issue a safety evaluation as for operating plants.
No. of averted code case relief submissions	1	submittals per year	NRC estimate based on past experience (tied to industry averted code case relief requests above)
5.6.20 Review Code Case OMN-20 Time Period Extension			
Review Code Case OMN-20 alternative request submittal and issue safety evaluation (operating plants)	100	NRC eng hours	NRC estimate. The NRC level of effort to review an OMN-20 alternative request submittal and issue a safety evaluation is approximately 80 engineering review hours plus 20 hours for concurrence and issue.
Review Code Case OMN-20 alternative request submittal and issue safety evaluation (new plants)	100	NRC eng hours	NRC estimate. The NRC level of effort to review an OMN-20 alternative request submittal and issue a safety evaluation is approximately 80 engineering review hours plus 20 hours for concurrence and issue.

Data Element	Value	Unit	Source or Basis of Estimate
Labor Rates			
Industry engineer or plant supervisor	$96	dollars	A representative industry nuclear engineer level 11 hourly labor rate of $36.34 (2002 dollars) and an industry mechanical engineering technician level 8 hourly labor rate of $27.94 (2005 dollars) are used, which is from the Bureau of Labor Statistics Employer Costs for National Compensation Survey data set. These hourly rates were inflated to 2014 dollars using values of CPI-U. A multiplier of 2.0, which includes fringe and indirect management cost, was then applied and resulted in an incremental industry engineer hourly labor rate of $96 and an incremental technician hourly labor rate of $68.
Industry plant technician	$68	dollars	
NRC engineer	$121	dollars	NRC, Rulemaker@nrc.gov, “NRC Labor Rates for Use in Regulatory Analyses (as of October 2013),” January 2, 2014.

Data Element	Value	Unit	Source or Basis of Estimate
Labor Rates			
Industry engineer or plant supervisor	$96	dollars	A representative industry nuclear engineer level 11 hourly labor rate of $36.34 (2002 dollars) and an industry mechanical engineering technician level 8 hourly labor rate of $27.94 (2005 dollars) are used, which is from the Bureau of Labor Statistics Employer Costs for National Compensation Survey data set. These hourly rates were inflated to 2014 dollars using values of CPI-U. A multiplier of 2.0, which includes fringe and indirect management cost, was then applied and resulted in an incremental industry engineer hourly labor rate of $96 and an incremental technician hourly labor rate of $68.
Industry plant technician	$68	dollars	
NRC engineer	$121	dollars	NRC, Rulemaker@nrc.gov, "NRC Labor Rates for Use in Regulatory Analyses (as of October 2013)," January 2, 2014.

ADAMS Accession No: **PKG**: ML14141A281; **RA:** ML14170B104 *via email

OFFICE	NRR/DPR/PRMB/RAT	NRR/DPR/PRMB/RS	NRR/DPR/PRMB/BC	NRR/DPR/DD	NRR/DPR/D
NAME	FSchofer	GLappert	TInverso	AMohseni	LKokajko
DATE	5/28/2014	6/2/2014	7/14/2014	8/13/2014	8/15/2014
OFFICE	ADM/DAS/RADB/BC* Tech Editing	NRR/DE/D*	RES/D*	NRO/D*	OIS/CSD/FPIB*
NAME	CBladey (JShepherd for)	PHiland	BSheron (MCase for)	GTracy (JTappert for)	TDonnell
DATE	9/15/2014	9/9/2014	9/22/2014	9/18/2014	9/25/2014
OFFICE	OE/D*	OCFO/D*	OGC/RMR*	NRR/D	
NAME	PHolahan (KHanley for)	MWylie (AHoward for)	MSpencer (GMizuno for) NLO	WDean (MEvans for)	
DATE	9/3/2014	9/9/2014	8/4/2015	8/21/2015	

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