

ATTACHMENT 2

**REGULATORY ANALYSIS FOR FINAL RULE
FOR AMENDMENT TO 10 CFR 50.55a, "CODES AND STANDARDS"**

1. OBJECTIVE OF THE REGULATORY ACTION

The U.S. Nuclear Regulatory Commission (NRC) is amending its regulations to incorporate by reference a later edition and addenda of the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (BPV Code) and the ASME *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) to provide updated rules for construction, inservice inspection (ISI), and inservice testing (IST) of nuclear power plant components of light-water cooled nuclear power plants. The final rule identifies the latest edition and addenda of the ASME BPV and OM Codes that the NRC has approved for use, subject to certain limitations and modifications.

The regulations in 10 CFR 50.55a require that nuclear power plant owners (1) construct Class 1, 2, and 3 components in accordance with the provisions in Section III, Division 1, "Requirements for Construction of Nuclear Power Plant Components," of the ASME BPV Code; (2) inspect Class 1, 2, 3, metal containment (MC) and concrete containment (CC) components in accordance with the provisions in Section XI, Division 1, "Requirements for Inservice Inspection of Nuclear Power Plant Components," of the ASME BPV Code; and (3) test Class 1, 2, and 3 pumps and valves in accordance with the provisions in the ASME OM Code.

The regulations in § 50.55a also require that licensees revise their ISI and IST programs every 120 months to the latest edition and addenda of the ASME Code incorporated by reference in § 50.55a and in effect 12 months prior to the start of the new 120-month interval. At this time, the 1995 Edition with the 1996 Addenda is the latest edition and addenda of the ASME BPV and OM Codes incorporated by reference in § 50.55a.

This final rule amends the regulations in 10 CFR 50.55a to incorporate by reference the 1997 Addenda, 1998 Edition, 1999 Addenda, and 2000 Addenda of (1) Section III, Division 1, of the ASME BPV Code for the construction of Class 1, Class 2, and Class 3 components with no new modifications; (2) Section XI, Division 1, of the ASME BPV Code for inspection of Class 1, Class 2, Class 3, Class MC, and Class CC components subject to modifications and limitations; and (3) the ASME OM Code for testing of Class 1, Class 2, and Class 3 pumps and valves subject to a modification.

This regulatory analysis identifies the significant values and impacts associated with updating from the 1995 Edition with the 1996 Addenda to the 1997 Addenda, 1998 Edition, 1999 Addenda, and 2000 Addenda of the ASME BPV and OM Codes. The regulatory analysis does not address modifications and limitations that require licensees to use the existing Code provisions in the 1995 Edition with the 1996 Addenda of the ASME Code.

2. ESTIMATION AND EVALUATION OF THE VALUES AND IMPACTS

This section estimates the values and impacts associated with revising § 50.55a to incorporate by reference the 1997 Addenda, 1998 Edition, 1999 Addenda, and 2000 Addenda of the ASME BPV and OM Codes. Annual cost estimates have been multiplied by a factor of 7.02 to determine a present value assuming a 7-percent discount rate over a 120-month interval.

- (i) The 1998 Edition of Section XI of the ASME BPV Code revised the requirements in Tables IWB-2412-1, IWC-2412-1, and IWD-2412-1 to increase the maximum examinations that can be credited during the first inspection from 34 to 50 percent. This increase improves the efficiency of the ISI inspections and tests conducted during the first inspection period, and therefore decreases the cost of the inspections. The NRC estimates that it would take approximately 2,000 hours to conduct the inspections scheduled for the first inspection period, and the cost of these inspections would decrease from \$2,000 to \$1,900 an hour for a total savings of \$100 an hour as a result of the improved efficiency. Thus, the NRC estimates that increasing the maximum examinations credited during the first inspection from 34 to 50 percent would decrease the industry's cost approximately \$20,600,000 for each 120-month interval ($\$100/\text{hour} \times 2000 \text{ hours} \times 103 \text{ units}$). The present value is \$14,461,200 ($\$20,600,000/10 \text{ years (annual cost)} \times 7.02$).
- (ii) The 1998 Edition of Section XI of the ASME BPV Code deleted the requirement in IWE-2200(g) to perform a visual examination of paint and coatings reapplied to containment surfaces. The visual examination of paint and coatings reapplied to containment surfaces is now performed by other programs, and personnel who perform these inspections are no longer required to be qualified in accordance with Section XI requirements. Therefore, the deletion of the requirement in IWE-2200(g) will result in a cost savings because it will reduce the number of personnel that are required to maintain qualifications in accordance with the examination provisions in Section XI. The NRC estimates that licensees would be able to reduce the number of Section XI qualified examiners by 3 people over the 120-month interval. It costs approximately \$1,000 per year for 1 person to maintain the Section XI visual examination qualifications. Thus, the NRC estimates that eliminating the visual examination of paint and coatings reapplied to containment surfaces would decrease industry's cost approximately \$231,750 for each 120-month interval ($\$75/\text{hour} \times 3 \text{ people} \times 10 \text{ years} \times 103 \text{ units}$). The present value is \$162,689 ($\$231,750/10 \text{ years (annual cost)} \times 7.02$).
- (iii) The requirement in IWE-2420(c) of Section XI to reexamine areas containing flaws, areas of degradation, or repairs during three consecutive inspection periods was deleted in the 1998 Edition. The 1998 Edition states that when reexaminations reveal that the flaws or areas of degradation are essentially unchanged for the next inspection period, these areas no longer require reexamination. The revision to IWE-2420(c) will reduce the number of reexaminations that are conducted each inspection period, and the NRC estimates that approximately five fewer reexaminations would be conducted during each inspection period. It takes approximately 1 hour to conduct each reexamination, and there are 3 inspection periods every 120-month interval. The NRC estimates that revising the reexamination requirements for flaws, areas of degradation, or repairs would reduce the industry's cost approximately \$115,875 for each 120-month interval ($\$75/\text{hour} \times 5 \text{ hours} \times 3 \text{ inspection periods} \times 103 \text{ units}$). The present value is \$81,344 ($\$115,875/10 \text{ years (annual cost)} \times 7.02$).
- (iv) The provisions of Table IWE-2500-1, Examination Category E-A, Items E1.10 and E1.11, were revised in the 1998 Edition of Section XI to no longer require a torque test of each containment bolted connection. There are approximately 50 bolted containment connections in each unit, and it takes approximately 4 hours to perform a torque test on

each bolted connection. The NRC estimates that eliminating the torque tests of containment bolted connections would reduce the industry's cost approximately \$1,545,000 for each 120-month interval ($\$75/\text{hour} \times 4 \text{ hours} \times 50 \text{ bolted connections} \times 103 \text{ units}$). The present value is \$1,084,590 ($\$1,545,000/10 \text{ years (annual cost)} \times 7.02$). Eliminating the torque test would also reduce occupational exposure. The NRC currently estimates workers incur and occupational exposure of approximately 20 millirem when performing a torque test on each containment bolted connection. There are approximately 50 containment bolted connections in each unit. The NRC estimates that the revised requirement would reduce occupational exposure across the industry by 1 person-rem per unit per 120-month interval ($20 \text{ millirem} \times 50 \text{ units}$). Thus, the industry's occupational dose cost savings per 120-month interval per unit would be on the order of \$206,000 ($1 \text{ person-rem} \times \$2,000 \times 103 \text{ units}$). The present value is \$144,612 ($\$206,000/10 \text{ years (annual cost)} \times 7.02$).

- (v) The 1998 Edition of Section XI of the ASME BPV Code eliminated the requirement to visually examine containment seals and gaskets that was previously in Table IWE-2500-1, Category E-D, Items E5.10 and E5.20. The NRC estimates that it takes 1 person 12 hours during each 120-month interval to examine containment seals and gaskets, and that the elimination of this requirement would reduce the industry's costs approximately \$92,700 for each 120-month interval ($\$75/\text{hour} \times 12 \text{ hours} \times 103 \text{ units}$). The present value is \$65,075 ($\$92,700/10 \text{ years (annual cost)} \times 7.02$). The elimination of the examination of containment seals and gaskets would also reduce occupational exposure to the personnel who examine the drywall head seals in Mark I and Mark II containments. The NRC currently estimates that workers incur an occupational exposure of approximately 100 millirem when examining drywall head seals in the 24 units with a Mark I containment design and 7 units with a Mark II design. Thus, the NRC estimates the revised requirement would reduce occupational exposure by 3.1 person-rem during each 120-month interval ($100 \text{ millirem} \times 31 \text{ units}$). The industry's occupational dose cost savings for each 120-month interval would be on the order of \$6,200 ($3.1 \text{ person-rem} \times \$2,000$). The present value is \$4,352 ($\$6,200/10 \text{ years (annual cost)} \times 7.02$).
- (vi) The final rule revised the existing § 50.55a(b)(2)(xiv) to allow licensees to use the annual practice described in VII-4240 of Supplement VII of Section XI, 1999 Addenda and 2000 Addenda. This reduces the annual training for a UT examiner from 18 hours to 8 hours (10 hours/year). The NRC estimates that there are 5 UT examiners per unit. Thus, revising the training requirement will reduce the industry's cost by approximately \$386,250 for each 120-month interval ($\$75/\text{hour} \times 5 \text{ people} \times 10 \text{ years} \times 103 \text{ units}$). The present value is \$271,148 ($\$386,250/10 \text{ years (annual cost)} \times 7.02$).
- (vii) The 1995 Addenda of Section XI revised IWA-5213(a) to eliminate the provisions requiring system pressure and temperature conditions to be maintained for 4 hours on insulated systems or components, or 10 minutes on noninsulated systems or components, prior to conducting system leakage tests. Section 50.55a(b)(2)(xx) in this final rule requires a 10-minute holding time after attaining test pressure for Class 2 and Class 3 components that do not normally operate during operation, but does not require any hold time for the remaining Class 2 and Class 3 components provided that the system has been in operation for at least 4 hours for insulated components or 10 minutes for noninsulated components. The NRC estimates that system leakage tests are

conducted on approximately 20 insulated systems per unit during each 120-month interval. It is estimated that it takes 3 people to conduct a system leakage test during the 4-hour hold time, for a total of 12 additional hours (3 people x 4 hours) to conduct each system leakage test. Thus, § 50.55a(b)(2)(xx) would increase the industry's cost approximately \$1,854,000 for each 120-month interval (\$75/hour x 12 hours x 20 systems x 103 units). The present value is \$1,301,508 ($\$1,854,000/10$ years (annual cost) x 7.02).

- (viii) The 1999 Addenda to Section XI decreased the rate of search unit movement from 6 to 3 inches/second when conducting ultrasonic (UT) examinations of piping systems in accordance with Mandatory Appendix III-2420. Decreasing the rate of search unit movement would improve the accuracy of UT examinations, but it would also increase the amount of time required to conduct UT examinations, as well as the cost of the UT examinations. The NRC estimates that it costs approximately \$1,500,000 per unit during each 120-month interval to conduct UT examinations of piping required by Section XI, and decreasing the rate of search unit movement from 6 to 3 inches/second would increase this cost by 1 percent. Thus, decreasing the rate of search unit movement would increase the industry's cost approximately \$1,545,000 for each 120-month interval ($\$1,500,000 \times .01 \times 103$ units). The present value is \$1,084,590 ($\$1,545,000/10$ years (annual cost) x 7.02).
- (ix) Section 50.55a(b)(2)(xxi)(B) in the final rule requires licensees to use the requirements of Table IWB-2500-1, Examination Category B-G-2, Item B7.80, of the 1995 Edition in lieu of the 1997 Addenda, the 1998 Edition, the 1999 Addenda, and the 2000 Addenda. The 1995 Addenda incorporates the provisions of Code Case N-547, "Alternative Examination Requirements for Pressure Retaining Bolting of Control Rod Drive Housings." Code Case N-547 deletes the examination of control rod drive (CRD) bolting whenever the CRD housing is disassembled. The NRC estimates that it takes 1 person 1 hour each outage to conduct the examination of the CRD bolting, and there are 6 refueling outages in each 120-month interval. Thus, § 50.55a(b)(2)(xxi)(B) would increase the industry's cost approximately \$46,350 for each 120-month interval ($\$75/\text{hour} \times 1 \text{ hour} \times 6$ refueling outages x 103 units). The present value is \$32,538 ($\$46,350/10$ years (annual cost) x 7.02).
- (x) Section 50.55a(b)(3)(vi) in the final rule permits an exercise interval of 2 years for manual valves within the scope of the ASME OM Code. The 1998 Edition of the ASME OM Code specified an exercise interval of 3 months for manual valves within the scope of the Code. The NRC estimates that there are approximately 15 manual valves in each unit, and that it takes approximately 1 hour to exercise each manual valve. The NRC estimates that extending the exercise interval from 3 months to 2 years would decrease number of exercises for each manual valve from 40 exercises during a 120-month interval (4 exercises/year x 10 years) to 5 exercises during a 120-month interval (1 exercise/2 years x 10 years) for a total of 35 fewer exercises. Thus, § 50.55a(b)(2)(xxi)(B) would decrease the industry's cost approximately \$4,055,625 for each 120-month interval ($\$75/\text{hour} \times 35$ exercises x 15 manual valves/unit x 103 units). The present value is \$2,847,049 ($\$4,055,625/10$ years (annual cost) x 7.02).

- (xi) The 1998 Edition of the ASME OM Code, ISTC-5223, added a provision to allow testing of two check valves in series as a unit, provided that certain conditions are met. The NRC estimates that this revision would reduce costs for approximately 25 units that contain systems that do not permit individual testing of two check valves in series. For these units, modifying the systems to permit individual testing of two check valves in series would cost approximately \$100,000 per unit. Thus, testing of two check valves in series as a unit would decrease the industry's cost by approximately \$2,500,000 during each 120-month interval (\$100,000 x 25 units). The present value is \$1,755,000 ($\$2,500,000/10$ years (annual cost) x 7.02).
- (xii) Paragraph IWA-5110(c) was revised in the 1997 Addenda to Section XI to allow piping that penetrates containment to be exempted from periodic system pressure testing when the piping and containment isolation valves only perform a containment integrity function, and are connected to piping that is not in the scope of Section XI (the piping is not in a system required to mitigate accidents, shut down the plant, or maintain a shutdown condition). The NRC estimates that there are 10 segments of containment penetration in each unit that would be exempted from system pressure testing, and it would have taken approximately 25 hours to test each segment of piping under the old Code. Thus, the revision to IWA-5110(c) would reduce the industry's costs by approximately \$1,931,250 for each 120-month interval ($\$75/\text{hour} \times 10$ piping segments x 25 hours x 103 units). The present value is \$1,355,738 ($\$1,931,250/10$ years (annual cost) x 7.02).
- (xiii) Paragraph IWA-2316 was revised in the 1998 Edition of Section XI to eliminate the requirement that VT-2 examination personnel must receive annual training. The revised VT-2 qualification requirements state that VT-2 personnel must have 40 hours of plant walkdown experience, and 4 hours of one-time training in Section XI requirements and plant-specific procedures for VT-2 visual examination, and must pass a yearly vision test. The NRC estimates that each unit has 20 VT-2 qualified personnel who would have received 8 hours of annual training before IWA-2316 was revised in the 1998 Edition. Thus, the revision to the 1998 Edition of IWA-2316 would reduce the industry's cost by approximately \$12,360,000 for each 120-month interval ($\$75/\text{hour} \times 20$ people x 8 hours x 10 years x 103 units). The present value is \$ 8,676,720 ($\$12,360,000/10$ years (annual cost) x 7.02).

3. PRESENTATION OF RESULTS

The following table summarizes the NRC cost estimates discussed in the preceding Section 2, and represent present annual cost (annual cost x 7.02).

Requirement	Cost Reduction	Cost Increase
(i) Increase the Maximum Examinations Credited During the First Inspection from 34 to 50 percent (Tables IWB-2412-1, IWC-2412-1, and IWD-2412-1)	\$14,461,200	
(ii) Deletion of IWE-2200(g) Paint and Coating Exams	\$162,689	

(iii) Flaws, Areas of Degradation and Repairs Reexamination Requirements in IWE-2420	\$81,344	
(iv) Elimination of Bolted Connection Torque Tests	\$1,084,590	
(iv) Reduction of Occupational Exposure due to Deletion of Table IWE-2500-1 Bolted Connections Torque Tests	\$144,612	
(v) Deletion of Table IWE-2500-1 Containment Seal and Gasket Examinations	\$65,075	
(v) Reduction of Occupational Exposure due to Deletion of Table IWE-2500-1 Containment Seal and Gasket Examinations	\$4,352	
(vi) Reduction of UT Examiner Training	\$271,148	
(vii) Reinstatement of IWA-5213(a) Hold Times		\$1,301,508
(viii) Decreased Rate of Search Unit Movement When Conducting UT Examinations		\$1,084,590
(ix) Reinstatement of Table IWE-2500-1CRD Bolting Examination		\$32,538
(x) Extension of Manual Valve Exercise Frequency	\$2,847,049	
(xi) Testing 2 Check Valves in Series	\$1,755,000	
(xii) Elimination of Pressure Test for Containment Penetration Piping	\$1,355,738	
(xiii) Elimination of Annual VT-2 Training	\$8,676,720	
Subtotal	\$30,909,517	\$2,418,636
Total Cost Reduction	\$28,490,881	

4. CONCLUSION

The NRC staff finds that it is beneficial for licensees to update their ISI and IST programs to the 1998 Edition with the 1999 and 2000 Addenda of the ASME BPV and OM Codes. A number of Code revisions are beneficial because they reduce cost and/or occupational exposure. The values and impacts associated with revising § 50.55a to incorporate by reference the 1997 Addenda, 1998 Edition, 1999 Addenda, and 2000 Addenda of the ASME BPV and OM Codes indicate a cost savings of \$28,490,881, and meet the NRC's goal of maintaining safety by continuing to provide NRC review and endorsement of the latest editions and addenda of the ASME BPV and OM Codes. Revising § 50.55a reduces unnecessary regulatory burden and improves NRC efficiency and effectiveness by eliminating the need for licensees to submit plant-specific relief requests, and for the NRC to review those submittals when implementing improved technology or techniques in the later edition and addenda of the Code. The NRC's endorsement of technological advances and improved testing and inspection techniques in the ASME Code increases public confidence. Therefore, revising § 50.55a to incorporate by

reference the 1997 Addenda, 1998 Edition, 1999 Addenda, and 2000 Addenda of the ASME BPV and OM Codes supports the NRC's performance goals of maintaining safety, reducing unnecessary burden, increasing public confidence, and improving efficiency and effectiveness.

5. Impact on Small Entities

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