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# BWR OWNERS' GROUP

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Secretary of the Commission
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Attention: Docketing and Services Branch

Subject: **BWR OWNERS' GROUP COMMENTS ON PROPOSED RULEMAKING "CODES AND STANDARDS FOR NUCLEAR POWER PLANTS; SUBSECTION IWE AND SUBSECTION IWL"**

References: 1) BWROG-93129, L. A. England (BWROG) to G. Bagchi (NRC), "BWROG Model Containment Inspection Program," November 5, 1993

2) W. T. Russell (NRC) to L. A. England (BWROG), February 3, 1994

This letter and its attachments provide the BWR Owners' Group (BWROG) comments on the proposed rulemaking on containment inspection criteria noticed in **Federal Register**, Volume 59, page 979, dated January 7, 1994.

1) The NRC is aware of the substantial effort already made by the BWROG to develop inspection guidelines that address containment integrity issues. The BWROG and NRC, at the NRC's initiative, have established a long term dialogue (since 1989) on the topic of augmented in-service inspections of BWR steel containments (this dialogue was correctly focused, for BWRs, on certain Mark I and Mark II steel containment designs; this is discussed further in Attachment 1 to this letter). The BWROG shares the NRC's goal in ensuring containment integrity, considering the importance of the containment to public health and safety as one part of the BWR's defense-in-depth. The BWROG aim has been to achieve that goal through an approach that is technically sound and cost-beneficial, and which recognizes plant-specific differences in containment design, circumstances and actions already taken. The BWROG consequently developed a detailed Model Containment Inspection Program (CIP) which was submitted to the NRC at NRC/NRR request in the reference letter.

   The BWROG Model CIP addresses all of the containment integrity issues. It is the position of the BWROG that the Model CIP will assure identification for appropriate resolution of potential containment shell degradation well before the degradation affects containment integrity.

   Additional regulations are not needed to ensure that containment integrity is maintained because adequate regulations (General Design Criteria 16 and 53, 10 CFR 50 Appendix J) already exist and licensees are committed to these requirements under their license conditions,

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Technical Specifications, FSARs and other docketed commitments. If, as stated in the **Federal Register**, specific guidance is needed on how to conduct the necessary inspections, the BWROG Model CIP should be considered as a suggested alternative to the requirements contained in Subsection IWE of the ASME Code.

2) In January 1993 the NRC established a Regulatory Review Group (RRG) which was chartered to conduct a disciplined review of power reactor regulations and the related processes, programs, and practices, with special attention to be paid to the potential for using performance-based rather than prescriptive requirements and guidance. In August 1993 the RRG issued its conclusions on regulations, specifically including 10 CFR 50.55a. This regulation was clearly classified as "prescriptive," and the RRG concluded that it was feasible to make the regulation performance-based. However, on the contrary, this proposed rulemaking is adding more prescriptive requirements to 10 CFR 50.55a and would require inspections of components that have not experienced degradation. The BWROG Model CIP, on the other hand, is a performance-based program that satisfies the RRG recommendations as well as the technical concerns. The BWROG Model CIP focuses on areas where degradation has been experienced and also provides a means of detemining whether a corrosion concern exists at other containment locations. There have been only two occurrences of significant containment degradation for BWRs, and the BWROG Model CIP explicitly addresses both cases. The BWROG has not attempted to diminish the significance of these cases but instead has taken proactive steps to address the issue for similar BWRs.

3) In the Backfit Statement supporting the proposed rulemaking, the NRC maintains that a backfit analysis is not needed based on 10 CFR 50.109(a)(4)(i), which states: "[A backfit analysis is not required if]...a modification is necessary to bring a facility into compliance with a license or the rules or orders of the Commission, or into conformance with written commitments by the licensee". However, 10 CFR 50.109(a)(7) states: "If there are two or more ways to achieve compliance with a license or the rules or orders of the Commission, or into conformance with written commitments by the licensee, or there are two or more ways to reach a level of protection which is adequate, then ordinarily the applicant or licensee is free to choose the way which best suits its purposes. However, should it be necessary or appropriate for the Commission to prescribe a specific way to comply with its requirements or to achieve adequate protection, then cost may be a factor in selecting the way, provided that the objective or compliance or adequate protection is met." The BWROG submitted its Model CIP at NRR's request prior to issuance of the proposed rulemaking, as already noted. The BWROG believes that the Model CIP is a practical and equivalent ("equivalent" in the sense that it addresses all of the containment integrity issues) alternative to Subsection IWE. The BWROG requests that its Model CIP be considered by the NRC prior to adoption of the proposed rulemaking, so that the NRC can compare the costs of the two alternatives before prescribing one over the other, per 10 CFR 50.109(a)(7).

4) The BWROG wishes to clarify one issue pertinent to the rulemaking. In Reference 2, Mr. Russell states: "The BWROG's proposed model containment inspection program (CIP) departs from the requirements of Subsection IWE, especially for the inspection of areas of the

containment that are not easily accessible." The actual difference is that the BWROG Model CIP recommends inspection, when warranted, of normally inaccessible areas such as the sand cushion region, whereas Subsection IWE permits exemption from inspection of these areas. A detailed review of the BWROG Model CIP will illustrate its other advantages, and with the discussion in the preceding paragraphs provides another reason that such a review should be performed prior to adoption of the proposed rulemaking.

5) Attachment 1 provides additional comments on the proposed rulemaking. Attachment 2 provides detailed comments on Subsection IWE, and Attachment 3 provides a comparison of the BWROG Model CIP and the requirements of Subsection IWE. Attachment 4 is copy of Reference 1 and should also be considered as a part of the BWROG comments on the proposed rulemaking.

The comments/positions provided in this letter and its attachments have been endorsed by a substantial number of the members of the BWROG; however, it should not be interpreted as a commitment of any individual member to a specific course of action. Each member must formally endorse the BWROG position for that position to become that member's position.

Please contact either C. V. (Bud) Syx (BWROG Containment Inspection Committee Chairman, 205-877-7433), W. A. (Bill) Zarbis (GE - BWROG Projects, 408-925-5070) or the undersigned if we can be of any assistance. As we have stated in our previous letters, we would be happy to meet with you to discuss this topic further and continue the work toward development of mutually acceptable inspection guidance.

Very truly yours,

L. A. England

L. A. England, Chairman
BWR Owners' Group

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Attachments: As Stated

cc: R. A. Pinelli, BWROG Vice Chairman
BWROG Executive Oversight Committee
BWROG Primary Representatives
BWROG Containment Inspection Committee
J. Perry, NEI
S. J. Stark, GE
W. A. Zarbis, GE

ATTACHMENT 1

BWROG COMMENTS ON PROPOSED RULEMAKING

1. The proposed rulemaking would require licensees to expedite implementation of the containment examinations and complete the expedited examinations in accordance with Subsections IWE and IWL within five years of the effective date of the rule. This requirement does not recognize that many plants either already operate or plan to operate on 24-month cycles. Because most of the Subsections IWE and IWL requirements must be performed from inside the containment, they can only be performed during planned refueling outages. The proposed expedited implementation schedule would require licensees operating on a 24-month cycle to implement all requirements within only two (2) refueling outages. Considering the extent of current outage inspection requirements and the need to reduce outage lengths, additional time (up to four outages) should be allowed for implementation of new requirements.

2. In the Background discussion, the NRC refers to "the increasing rate of occurrences of degradation," and states that "almost one-half of these occurrences were found by the NRC." The evidence cited in SECY-93-328, "Issuance of Proposed Amendment to 10 CFR § 50.55a to Incorporate by Reference the ASME Boiler and Pressure Vessel Code (ASME Code), Section XI, Division 1, Subsection IWE and Subsection IWL," does not support this.

3. Based on the arguments below, the proposed rulemaking is not justified and current regulations are sufficient. However, if additional guidance for implementing the current regulations is needed to preclude variability in containment inspections, then the BWROG Model CIP is the best method for doing so.

   - It is apparent from Table 3 of Enclosure 2 to SECY-93-328 that instances of containment degradation are already being detected and addressed.

   - Although the NRC cites 21 instances of corrosion in steel containments since 1986, only 2 BWR cases have involved significant levels of corrosion. The BWROG Model CIP is designed to detect the occurrence of similar corrosion in other BWRs, while also providing a means of determining whether a corrosion concern exists at other locations in the containment.

   - The most likely cause of BWR Mark I steel containment failure is failure of the drywell bellows (see Appendix E of Attachment 4 to this letter). The best method of detecting a flaw in the drywell bellows is through the Appendix J testing. The BWROG Model CIP is intended to be implemented in conjunction with the periodic testing requirements of 10 CFR 50 Appendix J.

   - The proposed rulemaking would require inspections of components that have not experienced degradation. The BWROG Model CIP, on the other hand, is a performance-

based program that focuses on areas where degradation has been experienced and also provides a means of detemining whether a corrosion concern exists at other locations. The BWROG believes its Model CIP both satisfies the NRC concern for a standard level of inspections and establishes the appropriate level of inspections.

4. The proposed rulemaking makes no distinction between the various containment designs and would apply to BWR Mark I, II and III containment types. Mark III containment types should be exempted from the inspection requirements because they have not experienced significant corrosion and also because, based on the characteristics of the containment design, even significant corrosion would not be expected to affect containment integrity and functionality. Likewise, some Mark I containments and most Mark II containments are not subject to the same drywell corrosion mechanism that caused the single instance of significant BWR drywell degradation. Therefore, imposition of the inspection requirements contained in the proposed rulemaking does not appear justified for these plants. The proposed rulemaking should consider the unique aspects of the various BWR containment designs and accordingly exempt those plants for which the Subsection IWE/IWL requirements are not applicable or not needed. Otherwise, for those plants a backfit analysis should be performed because the compliance exception to the backfit rule [10 CFR 50.109(a)(4)(i)] is not applicable.

5. The proposed rulemaking makes no allowances for plants with features designed to mitigate corrosion, such as the application of corrosion-resistant primers to susceptible surfaces. Many plants were also built with a corrosion allowance - additional margin above the design margin to account for corrosion. These plants should be exempted from the inspection requirements because corrosion effects were explicitly considered in their design basis. Otherwise, for those plants a backfit analysis should be performed because the compliance exception to the backfit rule [10 CFR 50.109(a)(4)(i)] is not applicable.

6. The proposed rulemaking does not allow credit for prior licensee activities taken to address containment integrity. Many licensees voluntarily conducted inspections in response either to the identification of corrosion issues at other plants or to other regulatory guidance, such as Generic Letter 87-05. Credit for previous examinations, even if not performed under a routine in-service inspection program, should be permitted to avoid unnecessary duplication of these exams.

7. There are numerous concerns with the requirements of Subsection IWE. These concerns are detailed in Attachment 2 of this letter.

ATTACHMENT 2

BWROG COMMENTS ON SUBSECTION IWE

This attachment provides comments on Subsection IWE. The BWROG believes that the Model Containment Inspection Program (CIP) described in Attachment 4 satisfies the NRC concerns, and addresses the same technical issues as Subsection IWE but in a cost-effective manner. Attachment 3 provides a comparison of Subsection IWE to the BWROG Model CIP.

In the proposed rulemaking, the NRC has proposed additions to the requirements of Subsections IWE and IWL to address areas where the NRC believes additional requirements are needed. The concerns identified below also need to be addressed, to enable consistent application of the requirements if the rulemaking is adopted and to avoid the numerous questions and relief requests that may otherwise result.

1) Paragraph (b) of IWE-2430, Additional Examinations, requires that if additional flaws or areas of degradation are found in the first expanded scope, all of the remaining examinations within the same category shall be performed to the extent specified in Table IWE-2500-1 for the inspection interval. This requirement is more restrictive than even Class 1 component examinations and is therefore not reasonable.

2) TABLE IWE-2500 - EXAMINATION CATEGORIES

   A) Examination Category E-A, Containment Surfaces

      i) This category requires visual examination (VT-3) of 100% of the accessible surface areas of the drywell and wetwell. Considering the size of the drywell and wetwell, this is a very large scope of work that will consume a significant amount of resources. 10 CFR 50 Appendix J, paragraph V.A., requires a general visual examination of the interior and exterior containment surfaces prior to each integrated leak rate test ILRT), and this is considered sufficient for determining general containment integrity for this category.

      ii) Some of these examinations will have to be performed remotely, and Table IWA-2210-1 requires that the VT-3 examination be demonstrated to be able to see remotely a lower case character (approximately 0.105 inches) with proper illumination. It may not be always possible to obtain this resolution.

      iii) Some of the examinations will have to be conducted from a crane, which will have an undue impact on outage schedules and personnel safety.

      iv) Examinations should be limited to known problem areas or areas which are considered susceptible to degradation based on an engineering evaluation of the relevant factors, such as design, construction practices, materials, coatings and environment.

v) Item E1.20 requires VT-3 of 100% of the accessible surfaces of the containment vent system. The scope of this requirement needs clarification. Item E1.12 requires VT-3 examination of 100% of the accessible areas of the containment structure, and the vent system should be a part of the area included under that item.

vi) Item E1.11 requires a "General Visual" and Paragraph IWE-3510.1 is referenced. This paragraph requires the examinations either be performed by or under the direction of a Registered Professional Engineer or another individual with equivalent experience and knowledge. This requirement is beyond what is needed here and beyond that required by analogous regulations. The requirement should be that personnel performing this work have the appropriate training, and are performing inspections in accordance with procedures and acceptance criteria.

B) Examination Category E-B, Pressure Retaining Welds

i) Item E3.10 and item E3.30 both encompass welds of pipes which penetrate the containment shell and therefore appear to be the same. However, the scope of item E3.30 includes 25% of the total number of welds, but item E3.10 includes only 25% of those welds subject to cyclic loads and thermal stresses. The entire containment structure is subject to cyclic loads and thermal stresses during startup and shutdown. Therefore clarification of the examination scope is required.

ii) Items listed in Category E-B require VT-1 examination, which requires the examiner to have access within 24 inches of the surface. This may require extensive scaffolding, but out of concern for personnel safety, remote visual examinations should be permitted.

iii) 10 CFR 50 Appendix J, paragraph V.A., requires a general visual examination of the interior and exterior containment surfaces prior to (ILRT), and this is sufficient for determining general containment integrity for this category.

C) Examination Category E-C, Containment Surfaces Requiring Augmented Examinations

i) Paragraph IWE-1240 defines those surface areas which require augmented examinations per this category. The areas included tend to be consistent with those already identified based on the experiences at other plants, and are also those addressed by the BWROG Model CIP. The other Examination Categories are adequately addressed by the general visual examination required by 10 CFR 50 Appendix J. It therefore does not seem necessary to require incorporation of the entire Subsection IWE, and the BWROG Model CIP should be considered as an acceptable alternative.

ii) Item E4.12 requires a one-foot by one-foot grid pattern for performing ultrasonic testing (UT) on areas identified for augmented examinations. Due to particulars of a

plant's design, such as the presence of reinforcing stiffeners, interferences may not allow a one square-foot grid. Requirements for UT thickness measurements should be deferred to the utility.

D) Examination Category E-D, Seals, Gaskets and Moisture Barriers

i) Items E5.10 and E5.20 should not be included in the examination scope. All openings containing seals or gaskets are subject to leak rate testing per either Technical Specifications or 10 CFR 50 Appendix J, which provide a better method of detecting degradation than a general VT-3 examination. Items E5.10 and E5.20 are therefore redundant and should be deleted.

E) Examination Category E-F, Pressure Retaining Dissimilar Metal Welds

i) Item E7.10 requires the surface examination (liquid penetrant) of 50% of the total dissimilar metal welds included in the containment structure. When painting or coatings are removed, IWE would require that the surface be visually examined prior to removal of the paint or coating, as well as after the examination and reapplication of the paint or coating. Visual examination should be sufficient to detect any corrosion or degradation of these welds.

F) Examination Category E-G, Pressure Retaining Bolting

i) Bolt torque or tension tests each interval are not warranted. Pressure boundary bolted connections normally require specific procedures for installation and torquing. These procedural requirements are applicable each time the connection is made. Any leakage above the acceptance criteria would be identified during the ILRTs performed three times every ten year interval per 10 CFR 50 Appendix J. The requirements for bolt torque/tension tests each inspection interval are therefore redundant and should be deleted.

G) Examination Category E-P, All Pressure Retaining Components

i) Examination Category E-P is apparently a restatement of the leak rate test requirements of 10 CFR 50 Appendix J, and therefore is redundant and unnecessary.

3) ARTICLE IWE-5000 - SYSTEM PRESSURE TESTS

A) This article addresses leak rate testing of the containment, and is therefore unnecessary and confusing because leak rate testing is addressed by 10 CFR 50 Appendix J.

B) IWE-5240 references requirements for visual examination per IWA-5246, which was deleted in the latest addenda to the 1992 Edition of ASME Section XI. The reference therefore does not exist.

ATTACHMENT 3

BWROG POSITION ON APPLICABILITY OF
ASME SECTION XI, SUBSECTION IWE

The attached table provides a comparison of ASME Section XI, 1992 Edition, Subsection IWE inspection and test requirements to the BWROG Model Containment Inspection Program.

The ASME Section XI approach appears to require visual and volumetric examination of generic components or areas of the containment structure without considering the credible failure mechanisms or that the examinations will actually increase the confidence level in containment integrity. In comparison, the BWROG Model CIP is focused on inspecting "critical" areas for indications of moisture which could cause containment shell degradation. The Model CIP also acknowledges the importance of 10 CFR 50 Appendix J leakage rate testing to assure containment integrity is maintained. Model CIP selection of these critical areas is based on industry inspection/failure experience, probability of degradation affecting containment integrity, consequences of degradation, and the potential for degradation of other systems (e.g. refueling bellows) to containment degradation. Focusing inspections on critical areas and verifying operability of design features (e.g. sand cushion drains) ensures personnel radiation exposure is maintained in accordance with ALARA principles and that examinations which provide little benefit to ensuring/maintaining containment integrity are not undertaken.

The BWROG Model CIP provides a practical alternative to ASME Section XI, Subsection IWE requirements.

APPLICABILITY OF BWROG MODEL CONTAINMENT INSPECTION PROGRAM TO
ASME SECTION XI, 1992 EDITION, SUBSECTION IWE

| IWE ITEM NO. | IWE EXAM ITEM | IWE EXAM METHOD | IWE EXTENT & FREQUENCY | BWROG CIP ITEM NO. | BWROG PROGRAM APPLICABILITY |
|---|---|---|---|---|---|
| E1.11 | Containment vessel accessible surface areas | General visual | 100% Prior to each Type A test | 11 | Same, inspection is required by 10 CFR 50, App. J prior to each Type A test. |
| E1.12 | Containment vessel accessible surface areas | VT-3 | 100% each 10-yr. interval | 11 | Not justifiable(1). |
| E1.20 | Vent system accessible surface areas | VT-3 | 100% each 10-yr. interval | 11 | Not justifiable(1). |
| E3.10 | Containment penetration welds | VT-1 | 25% of total no. each 10-yr. interval | 11 | Not justifiable(2). |
| E3.20 | Flange welds (Category D) | VT-1 | 25% of total no. each 10-yr. interval | 11 | Not justifiable(2). |
| E3.30 | Nozzle-to-shell welds (Category D) | VT-1 | 25% of total no. each 10-yr. interval | 11 | Not justifiable(2). |
| E4.11 | Containment surface areas visible surfaces - augmented examination | VT-1 | 100% of susceptible surface areas each 40-month period | 1, 2, 3, 4, 5, 6, 8, 9, 10 | Primary examination methods include general visual inspection, functional testing of air gap/sand cushion drains and moisture content in sand cushion. Additional inspections are based on engineering evaluation of inspections/test results. |

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|---|---|---|---|---|---|
| E4.12 | Containment surface areas - surface area grid min. wall thickness locations | Volumetric | 100% of monitored locations each 40-month period | 2, 9 | Not required unless determined necessary by evaluation. Surface area grid dimensions based on findings. Alternatives to "volumetric" allowed, such as pit gages or ultrasonic thickness measurements (UT thickness is not a "volumetric" examination method). |
| E5.10 | Seals | VT-3 | 100% each 10-yr. interval | 13 | Seal integrity verified by Type A & B tests. |
| E5.20 | Gaskets | VT-3 | 100% each 10-yr. interval | 13 | Seal integrity verified by Type A & B tests. |
| E5.30 | Moisture barriers | VT-3 | 100% each 10-yr. interval | 2, 9 | Increased examination frequency based on difficulty to repair if extensive degradation was found. |
| E7.10 | Dissimilar metal welds | Surface (PT) | 50% of total no. each 10-yr. interval | 11 | Not required; dissimilar metal welds in containment structure are no more susceptible to degradation than other welds.(1) |
| E8.10 | Bolted connections | VT-1 | 100% each 10-yr. interval | N/A | Covered by plant inspection procedures and 10 CFR 50 App. J testing. |
| E8.20 | Bolted connections | Torque or tension test | 100% each 10-yr. interval | N/A | Not required.(1)(3) |
| E9.10 | Containment vessel pressure retaining boundary | System leakage test | Each repair, replacement, or modification | 11 | Same, as required by 10 CFR 50, App. J. |
| E9.20 | Penetration bellows | 10 CFR 50, App. J Type B test | 10 CFR 50, App. J | 12 | Same, as required by 10 CFR 50, App. J. |

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|---|---|---|---|---|---|
| E9.30 | Airlocks | 10 CFR 50, App J Type B test | 10 CFR 50, App. J | 13 | Same, as required by 10 CFR 50, App. J. |
| E9.40 | Seals & gaskets | 10 CFR 50, App. J Type B test | 10 CFR 50, App. J | 13 | Same, as required by 10 CFR 50, App. J. |

Notes:

(1) These areas are included in the general visual examination required by 10 CFR 50 Appendix J for evidence of structural deterioration, and Appendix J requires more frequent examination (3 times every 10 years). Examination in the detail required by IWE (structures, including stiffening rings, manhole frames, reinforcement around openings, and structural attachment welds) does not provide meaningful results, as it would not detect a flaw of the size that would cause the containment to fail the Type A test and provides no additional benefit over the general visual examination toward ensuring the structural integrity of the containment. Additionally, the probability of a failure occurring in these areas that would prevent the containment from performing its intended function during normal or upset conditions is 0% based on probabilistic risk assessment.

(2) The probability of detecting a defect (crack or pinhole) of a size that would prevent obtaining acceptable Type A test results is extremely low using visual examination methods because of the tremendous surface area of the containment system compared to the defect size required for failure. Also, cracks would tend to propagate from the inside surface outward on penetrations, making visual detection unlikely until the flaw is through-wall. The most viable means of detecting such a problem remains the Appendix J, Type A and B tests.

(3) Assembly of bolted connections associated with the safety related systems is typically controlled by plant maintenance procedures which identify general visual inspection and torquing requirements. Bolted connections associated with the primary containment (e.g. drywell head, equipment hatch, CRD hatch, suppression pool manways) are typically disassembled on a frequency equivalent to refueling outages. Appendix J Type A and/or B testing ensures integrity of bolted connections after each reassembly.