NRC Meeting on ASME Section XI IWE General Visual Examination

March 23, 2023





Problem Statement



Industry has been performing Containment General Visual Examination for nearly 30 years without removing insulation

ASME XI examinations and containment penetration integrated leak rate testing have ensured safety

Requiring insulation removal imposes a new requirement for no clear requisite safety benefit

AGENDA



- Overview and Purpose of ASME Section XI Subsection IWE
- ASME Section XI IWE General Visual Examinations
 - IWE–2311 General Visual Examination Purpose
 - Paths from General Visual Exam to Augmented Exams
- NRC Inspections of ASME XI IWE Examinations
 - Code and Regulatory Requirements to Remove Insulation
- Summary of Industry Position

ASME Section XI Subsection IWE



Overview and Purpose of ASME Section XI Subsection IWE

- ASME Code, Section XI, Subsection IWE requirements apply to Class MC pressure-retaining components, and to metallic shell and penetration liners of Class CC pressure-retaining components in light-water-cooled plants
- Subsection IWE provides requirements for preservice and inservice examination, inspection, repair/replacement activities, and postrepair/replacement pressure testing
- These requirements, in conjunction with periodic leak rate tests performed in accordance with 10 CFR 50, Appendix J, provide continued assurance of the structural and leak-tight integrity of metallic pressure-retaining portions of the primary containment



IWE-2311 General Visual Examination Purpose

- **IWE-2311** requires that general visual examinations be performed *"to determine the general condition of containment surfaces and detect evidence of degradation."*
- IWE-2310(d) requires that "Visual examinations shall be performed, either directly or remotely, by line of sight from floors, platforms, walkways, ladders, or other permanent vantage points, unless temporary access is required by the inspection plan."

Note: IWE-2310(d) has remained essentially unchanged since the 2000 Addenda.



- IWE-1232(c) defines inaccessible surface areas as those where "visual access by line of sight from permanent vantage points is obstructed by permanent plant structures, equipment, or components, provided these surface areas do not require examination in accordance with the inspection plan or IWE-1240".
- IWE-1241 identifies surface areas that require examination in accordance with Table IWE-2500-1, Examination Category E-C.

Note: If an insulated surface area is subject to conditions described in IWE-1241, insulation must be removed to the extent necessary to make the surface area accessible for the VT-1 visual examinations required by Examination Category E-C.



- IWE-2420(b) requires that conditions accepted by engineering evaluation be reexamined during the next inspection period in accordance with Table IWE-2500-1 (E-C).
- IWE-2420(c) requires that when conditions are identified that could indicate the presence of, or result in, flaws or degradation in inaccessible areas, [as defined in IWE-1232(c)], the inaccessible areas shall be examined, to the extent possible.
- IWE-2420(d) requires that Category E-C examinations be performed until such time that conditions remain essentially unchanged for at least one inspection period. If criteria are met, then E-C examinations may be discontinued. Category E-A examinations continue to be performed during each inspection period.



- IWE-2500(d) requires that an engineering evaluation be performed to determine the acceptability of an inaccessible area "When conditions exist in accessible areas that could indicate the presence of, or result in, degradation in an inaccessible area."
 - Note: If during the General Visual Examination adverse conditions are detected on surface areas adjacent to insulated surfaces, the requirement of IWE-2500(d) is applicable and an engineering evaluation is required to determine the acceptability of the insulated surfaces. Removal of insulation would likely be required for this evaluation.



• **IWE-3122.3(b)** requires that surface areas accepted by engineering evaluation be examined in accordance with IWE-2420.

Note: Removal of insulation may be required to evaluate the condition of insulated surfaces. Also, when General Visual Examinations detect conditions that exceed the acceptance standards of IWE-3000, additional examinations are also required by IWE-2430.

Regulatory Requirement



- 10 CFR 50.55a(b)(2)(ix)(A) requires that licensees provide the following information in the ISI Summary Report required by IWA-6000 when conditions exist in accessible areas that could indicate the presence of or could result in degradation to such inaccessible areas [IWE-2500(d)].
 - (i) A description of the type and estimated extent of degradation, and the conditions that led to the degradation;
 - (ii) An evaluation of each area, and the result of the evaluation; and
 - (iii) A description of necessary corrective actions.

Regulatory Requirement



10 CFR 50.55a(b)(2)(ix)(A)

Notes:

- 1. This condition, in addition to the IWE-2500(d) requirement, ensures that an appropriate level of rigor is applied when evaluating the acceptability of containment surfaces that are considered inaccessible for visual examination. The required information must be submitted to the NRC following each refueling outage.
- 2. 10 CFR 50.55a(b)(2)(ix) imposes conditions on the use of Subsection IWE to address NRC concerns with the ASME Code requirements for metal containment examination. However, these conditions do not include requirements for removal of insulation for containment visual examinations. Note that § 50.55a(b)(2)(xxvii) does include conditions that require insulation removal for Class 1, 2, and 3 components.

NRC Inspections of ASME XI IWE Examinations



- NEI found 63 NRC reports in the last 10 years that referenced "IWE" or "general visual" with 32 of those reports including specifics regarding some level of inspection of the IWE General Visual Examination
- Some of the 32 reports included details such as:
 - *"For the general visual examinations, the inspectors ensured that difficult to access areas or areas made visible by maintenance activities were included within the scope of the visual examination. Additionally, the inspectors verified the basis for declaring some containment areas as inaccessible for visual examination by comparing the basis against previous containment visual examination records."*
- NEI found no reports that documented questions, concerns, or issues, nor unresolved issues or violations, for insulation not being removed for the IWE General Visual Examination except for Quad Cities
- The NRC has clearly inspected the implementation of the IWE General Visual Examination over at least the past 10 years without raising a question or issue with licensees not removing insulation for this examination, except for Quad Cities

Code and Regulatory Requirements to Remove Insulation



- The ASME Code does not explicitly address removal of insulation for General Visual Examinations, but insulation is required to be removed to the extent necessary to perform the following examinations required by Subsection IWE
 - Category E-C Item E4.11 VT-1 examinations of surfaces defined in IWE-1241
 - Category E-C Item E4.12 UT thickness measurements of surfaces defined in IWE-1241
 - Category E-G Item E8.10 VT-1 examination of pressure-retaining bolted connections
 - Note: Insulation removal may also be required to support engineering evaluations of inaccessible surface areas [IWE-2500(d)]. See Flowchart following the next slide for additional information.

Code and Regulatory Requirements to Remove Insulation



- In CFR 50.55a does not address removal of insulation for performing examinations in accordance with Subsection IWE
 - Conditions imposed by 10 CFR 50.55a(b)(2)(ix) do not include requirements that clarify when insulation removal is necessary to comply with the NRC's regulation.

Code and Regulatory Requirements to Remove Insulation





ASME Section XI IWE General Visual Examinations



NRC Endorsed Examination Requirements (2019 Edition)

- **IWE-1220** specifies exemptions from examination requirements, including *"inaccessible portions of containment..."*
- **IWE-1231** addresses accessible surface areas and requires, in part, that *"surface areas identified in IWE-1240"* shall remain accessible for visual examination.

Note: 10 CFR 50.55a(g)(4) exempts licensees from the accessibility provisions of IWE-1231, acknowledging the limitations of the original plant design, geometry, and materials. NRC confirmed this exception in the 1996 rule making. This exemption also applies to IWE-1232(a) and (b), except for repair/replacement activities performed after initial plant construction.

Summary of Industry Position



- Licensees have not removed containment insulation to perform the 10 CFR 50, Appendix J, V.A. examinations, or the IWE general visual examinations required by Table IWE-2500-1, Examination Category E-A, Item E1.11
 - 10 CFR 50.55a(g)(4) exempts licensees from the accessibility provisions of IWE-1231, and IWE-1232(a) and (b) [except for repair/replacement activities], acknowledging the limitations of the original plant design, geometry, and materials
- ASME and NRC requirements are very specific where insulation removal is required for Section XI IWE examinations, while neither specify removal of insulation for IWE-2500-1 (E-A) general visual examination
- 32 of 63 NRC outage inspections covering IWE for the past 10 years included some level of review of the IWE General Visual Exam with no questions, concerns, or observations for not removing insulation, nor unresolved issues or violations, except for Quad Cities
- NRC's recent position is new or different from the NRC-endorsed Code, approved interpretation and code clarification, decades of industry practice, and decades of NRC enforcement history
- Imposing a new or different interpretation will require changes to SSCs and plant procedures

Questions



