ENTERGY

ENN
ENGINEERING
STANDARD

ENN-EP-S-001 Rev. 0 Effective Date: 3/19/04

IWE General Visual Containment Inspection

Applicable Site(s):

IP1 ☐ IP2 ☒ IP3 ☒ JAF ☒ PNPS ☒ VY ☒

Safety Related: X Yes

____ No

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Print Name/Signature/Date

Approved by: Robert Penny Date: 3/8/4
Engineering Standard Owner

Requirements and Revision Summary

Revision No.	Date	Changes
0		Original issue

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1.0 PURPOSE

1.1 This engineering standard is written to document the requirements to perform the IWE visual containment examination. The visual examination is performed to assess the general condition of the containment and to detect evidence of degradation that may affect structural integrity or leak tightness. This examination satisfies the requirements of the ASME Boiler and Pressure Vessel Code, 1992 Edition, 1992 Addenda, Section XI, Subsection IWE examination Category E-A, Item No. E1.11 and 1998 Edition up to 2000 Addenda, Section XI, Subsection IWE Examination Category E-A, Item No. E1.10.

1.2 This engineering standard applies to personnel examining components identified in the site specific Containment In-service Inspection Program Plan (CIIPP) identified in references 2.14, 2.15, 2.21,2.22 and 2.23.

1.3 This procedure applies to class MC components consisting of the containment structure and connecting penetrations, appurtenances and parts that form the containment leak tight boundary. The components in the boundary includes:

1.3.1 Drywell and Drywell head

1.3.2 Suppression Chamber (Torus) exterior surface

1.3.3 Suppression Chamber vapor phase surface

1.3.4 Containment surfaces (including reinforcing structures such as stiffening rings, manhole frames, and reinforcement around openings)

1.3.5 Suppression Chamber submerged surfaces (at Pilgrim for Detailed Visual Examination only)

1.3.6 Drywell vent system including vent piping, vent header, and downcomers (at Pilgrim Detailed Visual Examination only)

1.3.7 Drywell exterior and penetrations

1.3.8 Containment dome/wall/basement liner

1.3.9 Penetration sleeves

1.3.10 Personnel Air lock/Equipment Hatch

1.3.11 Fuel Transfer Tube

2.0 REFERENCES

2.1 10CFR50 Appendix J

2.2 ASME Boiler and Pressure Vessel Code, Section XI, "Rules for In-service Inspection of Nuclear Power Plant Components, Subsection IWE and IWL, 1992 Edition, 1992 Addenda.

2.3 IP2 RR-49; NRC SER TAC NO. MA6949, dated 2/4/00

2.4 IP2 RR-43 and RR-48; NRC SER TAC NO. MA6235, dated 10/7/99

2.5 10 CFR50.55a, "Codes and Standards"

2.6 ASME Boiler and Pressure Vessel Code, Section XI, Subsection IWE, Rules for In-service Inspection of Nuclear Power Plant Components, 1998 Edition, up to 2000 Addenda

2.7 IP3 RR-3-24; NRC SER TAC NO. MA 9757, dated 5/17/2001

2.8 American Society of Testing Material (ASTM) D 610-95, "Standard Test Method for Evaluating Degree of Rusting on Painted Steel Surfaces".

2.9 ASTM D 660-93, "Standard Test Method for Evaluating Checking of Exterior Paints".

2.10 ASTM D 661-93, "Standard Test Method for Evaluating Degree of Cracking of Exterior Paints".

2.11 ASTM D 714-87, "Standard Test Method for Evaluating Degree of Blistering of Paints".

2.12 ASTM D 772-86, "Evaluating Degree of Flaking (scaling) of Exterior Paints".

2.13 Appendix A to Document ID #9.1450.044-S-001, "Design Margins of the IP2 Containment STEEL LINER" RAYTHEON Engineers & Constructors

2.14 2-RPT-00003, Rev. 0, "IP2 Containment In-service Inspection Program, First Containment Interval (09/09/96-05/09/08)".

2.15 IP3-RPT-VC-03071, Rev. 4, "IP3 Containment In-service Inspection First Ten Year Class MC and CC Program"

2.16 IP3-CALC-VC-03067, "Reactor Containment-Minimum Liner Thickness"

2.17 IP3-RPT-STR-03398, Rev. 0,"ASME Section XI, IWE MC and Metallic Liners of Class CC Components Inspection"

2.18 EP-ML-2002-054, "IWE Remote Visual Equipment Qualification", 7/17/02

2.19 Appendix E to Report SL-5408, Rev. 0, "ISI Acceptance Criteria for Containment Liner Thickness"

2.20 ENN-DC-105, "Configuration Management"

2.21 PP 7024, "VY Containment In-service Inspection Program (IWE)"

2.22 JAF-RPT-PC-04088, "JAF First Containment In-service Inspection Interval Program Plan"

2.23 QA 20.03, "PNPS First Ten Year Interval IWE Containment Inspection Program"

2.24 QA ITI 50.90, "Visual Examination of IWE Components"

2.25 QA ITI 50.91, "IWE Augmented Examinations"

2.26 ENN-AD-103, "Records management and Document Control Activities"

3.0 DEFINITIONS

3.1 Accessibility – Visual access by line of sight with adequate lighting from permanent plant structures, equipment, or components, provided these surface areas do not require augmented examination.

3.2 Arc strike - A loss or displacement of base metal, caused by the introduction of an electric current of sufficient intensity to change phase from solid to liquid. Arc strikes are rounded depressions in the base metal with some discoloration.

3.3 Blisters - Large or small, round or hemispherical projections of the coating from the surface and are either dry or liquid filled. The usual cause of the condition is the penetration of moisture through an area of poor adhesion.

3.4 Chalking - A surface phenomenon that appears soft or powdery. The cause is a breakdown in coating binder, which disintegrates, leaving the surface covered with pigment.

3.5 Checking - Small breaks in coating surfaces that are formed as coating ages and becomes harder and more brittle. Checking, for the most part, is a formulation related reaction, where the resins and pigments do not properly combine.

3.6 Chipping – Small void in coating system, caused by impact from foreign object.

3.7 Class MC components - This term applies to pressure retaining metallic components (including their integral attachments) within the boundaries established in the site specific CIIPP for inspection under requirements of ASME Section XI, Subsection IWE as modified by 10 CFR 50.55a. For the purpose of this procedure, all metallic components subject to examination under IWE by 10 CFR 50.55a shall be referred to as Class MC components regardless of the design classification of the component.

3.8 Corrosion - The degradation of a substance (usually metal) or its properties because of a reaction with the environment.

3.9 Cracking (coating) - A non-linear line running through the coating system. Cracking is caused by expansion or contraction throughout the film (layer) and the film and the substrate (primer or metal surface).

3.10 Cracking (metal) - A base metal indication, fissure or separation, either linear or non-linear. The crack will have length and depth.

3.11 Dent - The movement/displacement of the base material from its original plane, without signs of metal stress or paint/coating distress.

3.12 Discoloration - Change in color of the coating, fading. Cause could be age, heat, dye or pigment bleeding or surface contamination (dye penetrant, grease, dirt, etc.).

3.13 Engineering Evaluation - An evaluation done for a reportable condition to determine if the structural integrity or leak tightness of the containment is jeopardized.

3.14 Flaking - (Also referred to as scaling or peeling) – the detaching of one layer of a coating from another or from the base metal. Flaking is generally preceded by cracking, checking, or blistering and is the result of loss of adhesion, usually due to stress strain factors.

3.15 General corrosion - An approximately uniform wastage of a surface of a component, through chemical or electrochemical action, free of deep pits or cracks.

3.16 General Visual Exam - A visual examination performed either directly or remotely to assess the general condition of the accessible primary containment surfaces and to detect evidence of degradation that may affect structural integrity or leak tightness.

3.17 Gouge - A loss of base metal caused by impact with a foreign object. Base metal may have sharp edges or be pushed to the far edge of the area of impact.

3.18 Integral attachments - Those structural attachments that have a containment pressure retaining function or are in the containment vessel's support load path and are welded, cast, or forged integrally to the inside or outside surface of the containment pressure boundary.

3.19 Leak–tightness - Ability of a component to maintain a prescribed maximum leakage rate under service conditions.

3.20 Non-integral attachment - (Also referred to as nonstructural, temporary or minor permanent attachments) those structural attachments that do not perform a containment pressure retaining function nor are in the containment vessel's support load path. Non-integral attachments include such items as insulation supports, nameplates, locating and lifting lugs, lighting supports, shear plates or rings, retainer rings, and walkway supports.

3.21 Pitting - Localized corrosion that generally produces sharply defined open or closed cavities in a metal surface.

3.22 Relevant Condition - A condition observed during a visual examination that requires supplemental examination, corrective measure, and correction by repair/replacement, or analytical evaluation.

3.23 Responsible Individual - Individual responsible for implementation of the containment IWE inspection program as described in the program plan, references 2.14, 2.15, 2.21, 2.22, and 2.23.

3.24 Rusting - The presence of oxidation in the form of iron oxide on steel.

3.25 Structural Integrity - The ability of a structure of component to withstand prescribed design loads.

3.26 Undercutting (coating) - Appears as a raised coated rust bloom. Undercutting is actually rust forming under the coating and acting as a wedge to push the coating off the metal surface. The undercutting may crack the coating surface.

3.27 Wear - A gradual removal of a substance caused by friction. In paint or coating the wear may appear as a different color or thickness. In base metal the wear areas may appear brighter in appearance or as a low area.

4.0 RESPONSIBILITIES

4.1 WPO Engineering Programs or Site Engineering has the responsibility to develop and maintain the Containment IWE program. This may include establishing basis for program content, issuing inspection scope and providing implementation support (scheduling, coordination of inspection, maintaining inspection procedures, etc.). The examination will be performed at intervals specified in the site specific CIIPP.

4.2 The Responsible Individual (RI), or designee, from the Engineering Programs group or Site Engineering has the responsibility to evaluate the examination results. The individual is experienced in evaluating the condition of Class MC components.

4.3 Engineering Personnel and/or Certified Inspectors shall perform the examination in accordance with the requirements of Table IWE-2500-1 as delineated in the site specific CIIPP. Inspectors shall be qualified in accordance with site-specific requirements.

5.0 DETAILS

5.1 General Instructions

5.1.1 The General Visual examination shall be performed either directly or remotely with sufficient illumination and resolution to assess the general condition of the accessible Containment surfaces (inside and outside). The examination shall be documented using Attachments 7.1, 7.5, and 7.6 or site-specific documentation. Equipment demonstration and validation reports should be maintained or referenced in the work order; in the inspection report identified in section 6.0 or other appropriate site process.

5.1.1.1 Inaccessible areas are not required to be examined unless specifically identified as an inaccessible area requiring examination by either the site specific CIIPP or the RI.

5.1.1.2 Accessible areas requiring examination are defined in the site specific CIIPP.

5.1.1.3 ISI-IWE drawings in the site specific CIIPP define the components and boundaries for inspection.

5.1.2 Examiners shall visually examine non-coated and coated surface areas to be inspected and document the examination results, which require evaluation on the IWE General Visual Examination Evaluation Form (Attachment 7.2).

5.1.2.1 Painted or coated areas shall be examined for evidence of flaking, blistering, peeling, discoloration, and other signs of distress.

5.1.2.2 Non-coated areas shall be examined for evidence of cracking, discoloration, wear, pitting, excessive corrosion, gouges, surface discontinuities, dents, and other signs of surface irregularities.

> Note: Bolted connections need not be disassembled for performance of general Visual examination.

5.1.2.3 Pressure retaining bolting (if required in site CIIPP) shall be examined for defects that may cause the bolted connection to violate either leak tightness or structural integrity.

5.1.3 If no indications exceeding the inspection criteria of Sections 5.3, 5.4, 5.5 and 5.6 are noted, the examination is complete. The closeout of the General Visual examinations will be documented in the form of Work Orders written expressly for the performance of the General Visual examinations or other site-specific documentation.

Following completion of the examinations the detailed results should be documented in an inspection report or other site-specific process. This report will contain a summary of the inspection, including Attachments 7.1 through 7.6 and any pictures, videotapes, CR's, etc. It will cover the IWE examinations performed during the period.

5.1.4 If the examiners note indications which need further evaluation:

5.1.4.1 The IWE General Visual Examination Evaluation Form (Attachment 7.2) shall be completed. The forms shall be immediately brought to the RI's attention. The RI shall evaluate the results and determine acceptability; or request a

detailed visual, VT-1, examination (or additional examinations as determined by the RI, i.e. UT).

Note: The objective of this examination is to provide sufficient data to the RI to conduct an evaluation. When a detailed visual, VT-1, (or additional examinations) are required, access to the area to be examined must be sufficient to allow for valid measurements of the dimensional data required for the evaluation.

5.1.5 At the direction of the RI, the examination personnel will note the condition of the surfaces requiring examination. Areas of specific interest may be photographed and/or videotaped. This will serve as a reference condition to be compared with the results of the next inspection.

5.2 Evaluation of Results

Note: The inspection criteria are presented as a guide for IWE examination personnel to determine when an existing condition is acceptable or requires further evaluation. The guide is not intended to be all-inclusive. It relies upon the inspectors' general knowledge of material conditions. When a questionable condition is encountered, the IWE examination personnel should always be conservative and request an evaluation.

5.2.1 The inspection criteria (Sections 5.3, 5.4, 5.5 and 5.6) form the basis for accepting existing conditions in plants. These inspection criteria have been evaluated and acceptable by calculation or code and do not deter or compromise the structural integrity of the primary containment pressure boundary.

5.2.2 Indications which do not exceed the inspection criteria are not required to be reported and are considered acceptable without the RI's review.

5.2.3 The RI will determine if the conditions exceeding the inspection criteria are acceptable. A Condition Report (CR) shall be generated for all unacceptable conditions.

5.2.4 Acceptance evaluation for conditions exceeding the inspection criteria will be in accordance with site-specific requirements. Reference drawings and previous examination results should be utilized as necessary. The RI shall document the results of the acceptance review of the General Visual and, if required, detailed visual, VT-1, examination results.

5.3 Uncoated Surface Areas

5.3.1 If any of the relevant conditions listed below are present, further evaluation may be required. Initiate a CR as required by section 5.2.3. The condition must be recorded on the IWE General Visual Examination Evaluation Form (Attachment 7.2) or other site-specific document and forwarded to the RI for acceptance review.

5.3.1.1 Cracking in base metal

5.3.1.2 Discoloration resulting from age, heat, or corrosion

5.3.1.3 Wear that could exceed 10% of the nominal wall thickness

5.3.1.4 Pits, dents, or gouges of the base metal with depth that could exceed 10% of the nominal wall thickness of the material (e.g. 0.025 inches for a 0.25 inch nominal thickness)

5.3.1.5 Corrosion, which results in discernable, base metal loss that could exceed 10 % of the nominal wall thickness.

5.3.1.6 Discernable bulges

5.3.1.7 Arc strikes

5.3.1.8 Other conditions such as mechanical damage causing discernable degradation of the base metal

5.4 Coated Surface Areas

5.4.1 If any of the relevant conditions listed below are present, further evaluation may be required. Initiate a CR as required by section 5.2.3. The condition must be recorded on the IWE General Visual Examination Evaluation Form (Attachment 7.2) or other site-specific document and forwarded to the RI for acceptance review.

5.4.1.1 Any of the conditions listed in Section 5.3.1 for uncoated surfaces

5.4.1.2 Absence of coating

5.4.1.3 Blisters equal to or greater than size No. 6 as specified in ASTM D 714-87

5.4.1.4 Checking equal to or greater than standard No. 2 as specified in ASTM D 660-93

5.4.1.5 Cracking equal to or greater than standard No. 6 as specified in ASTM D 661-93

5.4.1.6 Flaking equal to or greater than standard No. 6 as specified in ASTM D 772-86

5.4.1.7 Rusting equal to or greater than Rust Grade 7 as specified in ASTM D 610 - 95

5.4.1.8 Other distress to the coating that may indicate degradation of the underlying base metal

5.5 Bolting Assemblies (As required in site CIIPP)

5.5.1 If any of the relevant conditions listed below are present, further evaluation may be required. Initiate a CR as required by section 5.2.3. The condition must be recorded on the IWE General Visual Examination Evaluation Form (Attachment 7.2) or other site-specific document and forwarded to the RI for acceptance review.

5.5.1.1 Bending, twisting, stretching or deforming of bolts or studs

5.5.1.2 Missing or loose bolts, studs, nuts, or washers

5.5.1.3 Fractured bolts, studs, or nuts

5.5.1.4 Degradation of protective coatings on bolting surfaces

5.5.1.5 Evidence of coolant leakage near bolting

5.5.1.6 Bolting degradation

5.5.1.7 Localized excessive corrosion

5.5.1.8 Misalignment of connection or bolting

5.6 Containment Supports (As required in site CIIPP)

5.6.1 If any of the relevant conditions listed below are present, further evaluation may be required. Initiate a CR as required by section 5.2.3. The condition must be recorded on the IWE General Visual Examination Evaluation Form (Attachment 7.2) or other site-specific document and forwarded to the RI for acceptance review.

5.6.1.1 Any signs of surface irregularities

5.6.1.2 Deformations or structural degradations of fasteners, clamps or other support items, and loss of integrity at bolted or welded connections.

5.6.1.3 Missing, detached, or loose support parts and bolting.

5.6.1.4 Arc strikes, weld spatter, paint, scoring, roughness, or general corrosion on close tolerance, machined or sliding surfaces.

5.6.1.5 Misalignment of supports

5.6.1.6 Improper clearances of guides and stops

5.6.1.7 Wear which visibly reduces the cross-sectional area of the support

5.6.1.8 Abnormal corrosion which reduces the load bearing capacity of the support

5.6.1.9 Crack like or linear surface flaws

5.6.1.10 Evidence of clamp or non-integral attachment movement, damage, or movement of component insulation due to support movement

6.0 RECORDS

An ASME, Section XI, IWE MC Components Inspection Report or other site-specific process shall be used to document all examinations, findings, and evaluations. If a report is written, it shall be referenced in the Work Orders used to implement the examinations.

The report shall include Attachments 7.1 through 7.6.

The ASME, Section XI, IWE MC Component Inspection Report is a controlled record, and is transmitted to Administrative Services in accordance with ENN-AD-103C-105, "Document Control and Configuration Management Activities".

7.0 ATTACHMENTS

Note: Site approved equivalents are acceptable for use in lieu of the following attachments.

7.1 General Visual Examination Checklist for Coated and Uncoated Surfaces

7.2 IWE General Visual Examination Evaluation Form

7.3 Qualification of Equipment

7.4 Personnel Qualification Form

7.5 General Visual Examination Checklist for Bolting Assemblies

7.6 General Visual Examination Checklist for Containment Supports

ATTACHMENT 7.1 **GENERAL VISUAL EXAMINATION CHECKLIST FOR COATED AND UNCOATED SURFACES**

Yes = exceeds the recording criteria
No = does not exceed the recording criteria

Component Number or Zone Number	Identified Conditions for Coated and Uncoated Surfaces																Other conditions
	Nicks, dents, pits, bulges, gouges, arc strikes		Metal cracking		Metal corrosion, discoloration, wear, no coating		Blistering (coating)		Checking (coating)		Cracking (coating)		Flaking (coating)		Rust staining		
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	

Examination performed by:_____ Date: _____

Quality Record

ATTACHMENT 7.2, IWE GENERAL VISUAL EXAMINATION EVALUATION FORM

Sheet 1 of 1

Component Number or Zone Number (*)
Existing Condition Being Evaluated
Evaluation of Existing Condition
Evaluation Performed By:
Evaluation Approved By:

Quality Record

ATTACHMENT 7.3 QUALIFICATION OF EQUIPMENT

Introduction:

Demonstration of remote examination equipment is required to be performed prior to executing General Visual examinations when the use of remote equipment is required. This demonstration needs to be performed once at the beginning of this examination to qualify the light source and the remote equipment used. The commitments of each site specific Relief Request or Technical Position are to be utilized when qualifying the equipment.

Performance Qualification:

Type of equipment used:

Maximum examination distance:

Description of demonstration:

Demonstration distance:

Demonstration performed by: Date:

Demonstration witnessed by (ANII): Date:

Quality Record

ATTACHMENT 7.4 PERSONNEL QUALIFICATION FORM

Inspection Personnel Qualification Form for General Visual Examination

Name: _____

Education: _____

_____

Experience: _____

_____

Eye Exam: _____

On the basis of the above, I have determined that the subject individual is capable of performing General Visual Examinations at IP2, IP3, JAF, Pilgrim, and/or Vermont Yankee as required by ASME Section XI 1992 Edition, 1992 Addenda, or 1998 Edition, no Addenda, Subsection IWE, Subparagraph IWE-3510.1

This qualification expires one year from the date of the eye examination.

_____ _____

Responsible Individual Date

Quality Record

ATTACHMENT 7.5 **GENERAL VISUAL EXAMINATION CHECKLIST FOR BOLTING ASSEMBLIES**

Yes = exceeds the recording criteria

No = does not exceed the recording criteria

Component Number or Zone Number	Identified Conditions for Bolting Assemblies												Comments
	Bending, twisting, or deforming		Missing or loose bolts, studs, etc.		Fractured bolts, studs, or nuts		Degradation of protective coating		Evidence of coolant leakage		Localized excessive corrosion		
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	

Examination performed by:_____ Date: _____

Quality Record

ATTACHMENT 7.6 **GENERAL VISUAL EXAMINATION CHECKLIST FOR CONTAINMENT SUPPORTS**

Yes = exceeds the recording criteria
No = does not exceed the recording criteria

Component Number or Zone Number	Identified Conditions for Containment Supports												Comments
	Surface irregularities/deformation		Missing or loose bolts, parts, etc.		Corrosion		Misalignment/ improper clearances		Wear which reduces cross-sectional area		Linear or cracklike surface flaws		
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	

Examination performed by:_____ Date: _____

Ref. Drawings for JAF: 3.72-6C, 3.72-9E, and 3.72-17

Quality Record