ATTACHMENT 65001.11

CONSTRUCTION INSPECTION PROGRAM
INSPECTION OF ITAAC RELATED CONTAINMENT INTEGRITY AND CONTAINMENT PENETRATIONS

65001.11-01 INSPECTION OBJECTIVES

01.01 Verify that materials such as welding consumables, plate material, including pre-fabricated plate sections, and major prefabricated containment penetration assemblies were purchased in accordance with the approved design. .

01.02 Verify that materials such as welding consumables, plate material, and prefabricated containment penetrations are being properly stored and handled in accordance with approved procedures.

01.03 Verify that the installation and welding of plate material for the containment and containment penetration assemblies is accomplished in accordance with approved drawings, qualified procedures, and applicable codes and standards by qualified welders as specified in the design documents.

01.04 Verify that post-weld heat treatment (PWHT) is performed in accordance with the design specifications and applicable code requirements.

01.05 Verify that final NDE has been performed and found acceptable, in accordance with the applicable code.

01.06 For PWRs, upon completion of the containment liner and installation of all containment penetrations and major offsite manufactured assemblies, verify and monitor the process for erecting reinforcing bars and the placing of concrete.

01.07 Verify that major offsite fabricated assemblies have been fabricated and installed in accordance with the manufacturer's instructions and design engineering specifications.

01.08 Verify that all electrical and I&C penetrations are installed per their design specifications.

01.09 Verify that the exterior of the containment is treated in accordance with design engineering specifications.

01.10 Verify that the testing of the containment and the installed containment penetrations have been successfully completed to fulfill the requirements as specified in the design specification.

01.11 Verify that problems identified during the inspection are entered into the licensee/constructor corrective action program in accordance with program requirements.

This inspection procedure shall be performed prior to and during containment construction and containment penetration installation and during final testing of the completed containment including certification testing.

02.01 Verify that materials such as welding consumables, plate material, including pre-fabricated plate sections, and major prefabricated containment penetration assemblies were purchased in accordance with the approved design. Review a sample of Purchase Orders for these materials and verify conformance with design requirements and purchasing specifications. The inspector should inspect Purchase Orders for containment plate material and Purchase Orders for containment penetration assemblies and major prefabricated assemblies. For those items selected, review the documentation of site receipt inspections to ensure conformance with the Purchase Order.

Guidance. For containment plate material select the sample from a representative cross section of vendors and include plate material and any prefabricated plate assemblies. For containment penetrations the sample selection should include various sizes of electrical, I&C and mechanical penetrations from different vendors.

In the case of major prefabricated assemblies (containment opening hatch and personnel air lock) the inspector should verify the Purchase Order for each assembly for conformance with purchase order and design engineering specifications.

The Purchase orders should explicitly state the type of quality documentation required (e.g., Certified Material Test Report (CMTR) or Certificate of Compliance) in accordance with the design requirements. If a CMTR was required, the inspector should verify that chemical and physical test results, including heat treatment as applicable, comply with the material specification required by the design documents. Typical attributes included in receipt inspections are:

- Plate material or containment penetration assemblies are in conformance with purchase specification
- Marking and identification
- Evidence of damage
- Cleanliness at time of receipt
- Surface protection, closures and packaging and storage requirements
- Disposition of non-conforming items

02.02 Verify that materials such as welding consumables, plate material, and prefabricated containment penetrations are being properly stored and handled in accordance with approved procedures. From the sample selected in 02.01, verify that onsite storage is adequate and in accordance with applicable procedures.

Guidance. Welding consumables such as coated electrodes, bare weld rod and spools, and inserts require special handling and storage considerations because these materials are melted during the welding process and become part of the welded joint. Welding material storage procedures must contain requirements for environmental cleanliness and moisture control as contaminants like dirt, grease, and moisture can cause weld defects such as lack of fusion, porosity, and cracking due to hydrogen embrittlement.

Plate material, prefabricated containment penetrations and penetration materials and valves are often stored outside, exposed to the elements in lay-down areas located around the construction site. The surface to be welded should be reasonably smooth, and free of rust, scale, oil, grease, and other deleterious foreign materials, including moisture. Stainless steel components should be stored separately from carbon steel components as contact with carbon steel can contaminate the stainless steel and cause surface rust to appear. Likewise, contact with carbon steel chains should be avoided when rigging to lift stainless components. Any tape used on stainless steel material and components should be certified as containing low halogen and chlorides as these are known to promote cracking.

Typical considerations for inspecting adequacy of storage areas are as follows:

- Improper storage classification.
- Determination of the status of protective mechanisms at the time of site receipt and initial storage.
- Adequacy of dunnage for plate material, containment penetration assembly components, and major prefabricated assemblies during storage.
- Continued adequacy of end caps for containment penetration assemblies protective coverings for weld preparation areas.
- Weather protection in the form of canvas or plastic coverings. (In most deficiencies, the original protective covering was adequate, but inattention to damage and normal "wear and tear" led to substandard or unacceptable protective provisions.)
- Sites near salt water should receive special attention to assure that protective storage measures are considerate of salt water damage (Chloride Contamination).
- Storage areas located on sandy soil or near sandy beaches require special attention to avoid the entry of wind-driven sand particles into plate material and containment penetration assemblies and assembly components.
- Inadequate or illegible material identification (damage by handling and/or environment).
- Storage of stainless steel pipe on dunnage treated with fire retardants may expose the piping to excessive halogens or chlorides.

- Fire-retardant coatings applied to structural steel may have high halogen or chloride contents. Adjacent stainless steel materials and components should be protected from these compounds.

02.03 Verify that the installation and welding of plate material for the containment and containment penetration assemblies is accomplished in accordance with approved drawings, qualified procedures, and applicable codes and standards by qualified welders as specified in the design documents. Select several in-process welds for detailed review. Further guidance on welding can be found in IP 65001.B.

Guidance. The combination of welds selected should represent various stages of the welding process (e.g., weld joint preparation, fit-up, root pass, final pass), various weld processes (e.g., SMAW, GTAW, GMAW), and various material types and pipe size (generally those materials designated in the applicable edition of the ASME Boiler and Pressure Vessel Code, Section IX). Emphasis should also be given to welds that, because of their physical location are difficult to accomplish.

The inspector should review the applicable welding procedures in detail to verify that the procedures are properly qualified in accordance with the codes and standards specified in the design documents. For those welds selected, verify that the welder(s) is properly qualified for the piping material, electrode / process, and position and that the welder's identity is recorded via stamping the weld or by other means such as documentation.

The welding process is generally controlled by a traveler which will specify the steps in completing the weldment, materials to be used, and will also document QC inspections and step completion. Verify that welding procedures, detailed drawings and instructions if applicable, and weld data sheets are at the work station or readily available. Material traceability has been a significant issue at some construction sites in the past. The inspector should verify that the containment plate material and the containment penetration assemblies and/or materials and welding consumables are of the specified type and grade and are adequately and uniquely identified (such as by heat number) in the traveler or accompanying documentation.

The inspector should verify the following:

- The containment liner plate sections are being installed at the proper location in the plant in accordance with approved drawings. If a plate joint fit-up is specified, verify the installation is within in the tolerance provided in the specification. Inspection should include verification that plate-to-plate gap and overall structure requirements are in compliance with drawing and code requirements.

- Weld joint geometry is as specified in the drawings and surfaces to be welded have been prepared, cleaned, and inspected in accordance with applicable procedures.

- NDE such as visual inspection, magnetic particle (MT) or dye penetrant (PT) examination of the surfaces to be welded has been performed and found acceptable in accordance with the specified code.

- Components to be welded are assembled and held in place within specified gap

and alignment tolerances and that alignment is within limits allowed by the drawings or code. Cold springing of plate sections should be avoided. Any observed cold spring of containment plate sections during installation must be in accordance with allowance provided in the approved procedures, or by engineering evaluation and analysis.

- Tack welds and temporary attachments such as bridging bars or fit-up clips have been performed by qualified welders, in accordance with qualified WPS.

- Gas purging, if specified, is used in accordance with the applicable procedure and that protection is provided to shield the welding operation from adverse environmental conditions.

- Preheat and interpass temperature, if specified, is maintained in accordance with applicable procedure requirements. The interpass temperature for welding austenitic stainless steels and high nickel alloys should not exceed 350^{o} F.

- Welding equipment, including power cables and gas lines, are in good condition and that ammeters and voltmeters used for automatic welding have been calibrated in accordance with applicable procedure requirements.

- Procedures specify appropriate holding and baking temperatures and out-of-oven exposure time for each class of coated electrode. Procedures for maintaining welding consumable cleanliness and limiting electrode moisture pickup are strictly adhered to.

- Procedures for weld rod control maintain identification after the welding materials are issued to the welder and are strictly adhered to. Rod stubs are controlled and disposed of in accordance with the procedures.

- Interpass cleaning, grinding (especially starts and stops) and backgouging, if applicable are conducted in accordance with the applicable procedure.

- Temporary attachments, arc strikes and weld splatter are removed and inspected in accordance with specified procedures.

- Minor weld material removal such as by light grinding and rewelding is generally permissible during the welding process. Repairs performed after the weld is completed and as a result of final visual or other NDE method finding the weld unacceptable shall be accomplished in accordance with approved repair procedures and shall be documented. Any repairs or modifications to ASME Code-stamped components shall be properly documented in the applicable Code data report as required by ASME Sections III and XI.

- The welding process preheat and interpass temperatures do not damage degradable materials (e.g., cable or instrumentation lines) inside containment penetrations.

02.04 Verify that post-weld heat treatment (PWHT) is performed in accordance with the

design specifications and applicable code requirements. Select several welds requiring post-weld heat treatment over the course of the containment plate installation and the containment penetration installation phase of construction. Direct observation is preferred however, since most welds do not require post weld heat treatment, a review of records is acceptable.

Guidance. The need for PWHT is generally determined by the material type and thickness. For example, carbon steel, low alloy piping such as ASME SA106 typically requires PWHT when the thickness is 1-1/2" or greater when ASME is the applicable code however, PWHT is required when the thickness is greater than 3/4" when B31.1 is the applicable code.

The PWHT procedure shall be in accordance with the applicable code and specify essential parameters such as number and placement of thermocouples, heat up and cool down rate, and soak time and temperature. The PWHT documentation should support that these variables were controlled throughout the process. Typically, chart recorders are used to demonstrate that the heat treat operation was successfully completed.

Often, Charpy impact qualification is required for weldments requiring PWHT. It is essential that the inspector verify that both the base metal and weld material were properly qualified in accordance with the applicable code for PWHT. Governing codes generally require that final NDE of the weld joint be performed after PWHT.

02.05 Verify that final NDE has been performed and found acceptable, in accordance with the applicable code. Observe NDE in progress on several welds when this procedure is performed. Examiners must be qualified for the method and procedure that they are performing. If NDE is not being performed during the inspection, perform a record review. In addition, review the radiographs of three welds.

Guidance. The inspector should verify the following:

- The sample should contain a range of NDE methods such as liquid penetrant (PT), magnetic particle (MT), ultrasonic (UT), and radiography (RT).

- The NDE procedure is in accordance with the applicable code as specified in the design specification.

- The NDE is performed in strict accordance with the procedure. Typical issues with NDE performance are:

- Inadequate cleaning of the surface for PT and MT. False indications may result if surface contaminants are present. Verify adequate dwell time for penetrant application and that the temperature of the weld surface is within that qualified for the procedure.

- Inadequate magnetic field due to a defective yoke. Yoke strength should be demonstrated at intervals specified in the procedure. If prods are utilized, verify that the spacing and current are in accordance with the procedure. Any arc marks caused by prods must be removed.

- UT is the method most sensitive to examiner performance and interpretation. The inspector should verify that those doing UT are properly qualified by training, experience and test demonstration; and the UT equipment complies with the procedure and that all variables are strictly controlled.

- For RT, verify that isotope source strength, film type, source to film distance, and exposure times are in accordance with the procedure. Verify that image quality indicators are the correct type and thickness and that the required sensitivity and radiograph density meet the applicable code requirement.

02.06 For PWRs, upon completion of the containment liner and installation of all containment penetrations and major offsite manufactured assemblies, verify and monitor the process for erecting reinforcing bars and the placing of concrete. Ensure that control of construction debris and liquids is in effect. Ensure that the owner has control of foreign materials (wood, rags, liquids, etc.) which could cause corrosion of the steel liner. Prior to placing concrete ensure that the containment liner is coated on the exterior surface in accordance with the design specifications. The inspector should verify that any exterior coatings or treatments are applied if required in accordance with the owner's guidance and engineering design specifications.

02.07 Ensure that major offsite fabricated assemblies, such as personnel airlock assemblies and equipment hatch assemblies, have been fabricated and installed in accordance with the manufacturer's instructions and design engineering specifications. After installation and prior to testing of these assemblies, ensure that the assembly has been protected from damage and is maintained in operable condition.

02.08 Ensure that all electrical and I&C penetrations are installed per their specifications, reference Inspection Procedures 65001.8, 65001.9 and 65001.10. Ensure that installed electrical and I&C penetrations have no visible damage and are ready to function in accordance with manufacturer's instructions and design engineering specifications.

02.09 Ensure that the exterior of the containment is treated in accordance with design engineering specifications. Ensure that any required coatings and preservatives on all containment surfaces are applied in accordance with design specifications and manufacturer's instructions.

02.10 Upon completion of containment construction, including all penetrations and major offsite fabricated assemblies, verify that the testing of the containment and the installed containment penetrations have been successfully completed to fulfill the requirements of 10 CFR 50, Appendix J Type A, Type B and Type C testing requirements and as specified in the design specification. The inspector should observe the performance of the Type A , B, and C tests, if used, during the construction and testing phases. These reviews should examine the final test results and the technical resolution of any observed or documented anomalies.

Guidance. The inspector should verify the following:

- That the local leakage testing procedure contains provisions which comply with the governing code (e.g., temperature requirements, test pressure, hold time, and

inspection methods).

- Pressure gages, recorders, and other test equipment are within the pressure range specified by the code and that calibration is current.

02.11 Problem Identification and Resolution. The inspector should confirm that problems identified during the inspection are entered into the licensee/constructor corrective action program in accordance with program requirements. The inspector should also confirm that licensee construction and testing procedures contain appropriate criteria defining what constitutes a non-conforming condition and what requires documentation in the corrective action process.

The inspector may review licensee actions to address similar or related problems that were previously identified, in order to check the extent of condition and confirm the effectiveness of the licensee's corrective measures. Ensure that the licensee's program procedures address the extent of condition for similar problems in other areas to avoid repetition of problem conditions.

Guidance. This inspection is to assure that problems are entered into the applicable process to assure corrective actions appropriate to the circumstances are developed and prioritized. Inspections of Quality Assurance Program implementation, effectiveness of Problem Identification and Resolution, and Self-Assessment will be performed under the IMC 2504 processes.

65001.11-03 RESOURCE ESTIMATE

Due to the length and complexity of the construction of the containment and the importance of the component, the average resource expenditure for this procedure is estimated to be 300 inspection hours per Unit.

65001.11-04 REFERENCES

Inspection Procedure 65001.B.01 Programmatic ITAAC Attributes for Welding

10 CFR 50, Appendix A, General Design Criteria 50, Primary Containment

10 CFR 50, Appendix J, Primary Containment Leakage Testing for Water-Cooled Power Reactors

10 CFR 50.55a Codes and Standards

NUREG/CR-5096, "Evaluation of Seals for Mechanical Penetrations of Containment Buildings." August 1988

NUREG/CR-3855, "Characterization of Nuclear Reactor Containments," June 1984

NUREG/CR-6154, "Experimental Results from Containment Piping Bellows Subjected to

Severe Accidents," Sept. 1994.

NUREG-1273, "Technical Findings and Regulatory analysis for GI II.E.4.3, "Containment Integrity Check," April 1988.

END

Attachment 1: Revision History for IP 65001.11

Attachment 1

Revision History For 65001.11

Commitment Tracking Number	Issue Date	Description of Change	Training Needed	Training Completion Date	Comment Resolution Accession Number
	08/19/08 CN 08-024	1. Initial issuance to support ITAAC related inspection under 10CFR52. 2. Researched commitments for 4 years and found none.	None	N/A	N/A