

NRC INSPECTION MANUAL

DR

INSPECTION PROCEDURE 49051

REACTOR COOLANT PRESSURE BOUNDARY PIPING QA REVIEW

PROGRAM APPLICABILITY: 2512

49051-01 INSPECTION OBJECTIVES

01.01 To determine whether the technical requirements detailed or referenced in Chapters 3 and 5 of the facility SAR associated with reactor coolant pressure boundary piping have been adequately addressed in the construction specifications, drawings, and work procedures, and whether the established system of management controls is adequate.

01.02 To determine whether quality assurance plans, instructions, and procedures for reactor coolant pressure boundary piping activities have been established in the facility QA Manual and implementing procedures and whether these documents conform with the QA program described in Chapter 17 of the facility SAR.

01.03 To determine whether specification or procedural controls associated with reactor coolant pressure boundary piping are adequate, and whether any potentially generic problems or other weaknesses exist within the preparing technical organization.

NOTE: This Procedure is concerned with inspecting the licensee's quality related documents (chiefly procedures) governing the conduct of safety-related work. Other construction inspection procedures address observation of work and quality records.

Inspection Schedule

May Be Started

Six months before start of primary piping installation.

Must Be Started

Must Be Completed

Before work is 10% complete.

49051-02 INSPECTION REQUIREMENTS

02.01 For each onsite organization with QA/QC responsibilities relative to reactor coolant pressure boundary piping (except welding and NDE), complete the inspection requirements of IE 35100 relative to reactor coolant pressure boundary piping. Depending on the facility contracting arrangements, it may be appropriate to perform certain parts of inspection procedure 50090 (Piping Support and Restraints) in conjunction with this procedure.

02.02 Determine whether the licensee and each contractor has an established program for ensuring that all craft, examination, and inspection personnel associated with the work covered by this inspection procedure are trained and qualified to perform their assigned tasks.

02.03 Determine whether the licensee has an established audit program (including plans, procedures, and schedules) for monitoring the personnel, work, and quality control functions for the work covered in this procedure.

02.04 Determine whether appropriate and adequate procedures are included or referenced in the QA Manual to assure that the following specific activities are controlled and performed according to NRC requirements and SAR commitments:

- a. Procedures requiring that the purchase documents identify the appropriate material specifications and any special requirements, and that these documents require material test reports/certification of the following:
 - (1) Chemical composition
 - (2) Physical characteristics and storage level classification
 - (3) Nondestructive examination results
 - (4) Heat treatment history (if applicable)
 - (5) Welding of prefabricated sections
- b. Inspection procedures covering receipt inspections and containing provisions for the following:
 - (1) Piping material in conformance with purchase specification
 - (2) Marking and identification
 - (3) Evidence of damage
 - (4) Cleanliness at time of receipt
 - (5) Surface protection, closures and packaging
 - (6) Disposition of non conforming items
- c. Inspection procedures (QC) covering storage and issue of the piping and related appurtenances and materials, and containing provisions for:
 - (1) Segregation of sizes and materials
 - (2) Storage identification and classification of items
 - (3) Storage conditions/protection
 - (4) Confirmation of issue of specified material
- d. Procedures covering the handling of the piping and related appurtenances and materials, and containing provisions to assure protection from physical damage or contamination while handling during receipt, storage, issue to the field, and installation.

- e. Inspection and/or work performance procedures covering installation of the piping and related appurtenances and materials, and containing provisions for the following:
 - (1) Location
 - (2) Clearances
 - (3) Grinding, cutting, bending, supporting, etc.
 - (4) Torquing of flange bolts and control of thread lubricants
 - (5) Piping system tolerances
 - (6) Cold spring
 - (7) Piping closure fit-up allowances
 - (8) Hydrostatic testing (except RCS which is reviewed during preoperational test phase)
 - (9) Installation records generated during work performance
 - (10) Hold points
 - (11) Removal of ARC strikes

- f. Inspection and work performance procedures for cleaning of the reactor coolant pressure boundary piping systems during construction containing provisions for the following:
 - (1) Cleaning materials--conformance with specifications, (including Chemical Requirements) concentration, temperature, and use,
 - (2) Cleanliness criteria and measurement methods,
 - (3) Removal and installation of metering devices, orifice plates, valve internals, etc., that are removed from system to facilitate flushing,
 - (4) Installation and removal of fine strainers, blind flanges, temporary piping, and dams
 - (5) Record-keeping requirements.

- g. Procedures covering design changes, including field changes, to ensure proper review and coordination among participating design organizations.

¹02.05 Complete Section 02.01 for an expanded sample of onsite organizations having QA/QC responsibilities relative to reactor coolant pressure boundary piping.

49051-03 INSPECTION GUIDANCE

¹ This requirement shall also be conducted if the licensee's performance is categorized by the SALP program as Category 3, or if Regional management at the Division Director level concludes that recent findings will likely result in a Category 3 rating during the next SALP evaluation unless immediate action is taken.

03.01 See Section III of IE 35100

03.02 Completion of inspection requirements of this procedure and of IE 49061 (Safety-Related Piping) may be accomplished simultaneously. The organization(s) involved and work scheduling will partly determine whether the inspection (49051 and 49061) may be done at the same time. The inspector should use judgment in this area.

03.03 Applicable portions of the SAR (Sections 3.1, 3.2, and 17.1) licensee commitments to applicable regulatory guides should be reviewed to determine licensee commitments relative to construction and inspection requirements prior to performing this inspection. The inspector should then use these SAR sections during the review of the licensee's implementing construction specifications, drawings, work procedures, and QA implementing procedures. Most of this review can be completed during inspection preparation after these procedures have been obtained from the site.

03.04 The purpose of the inspection requirements in Section II is to verify that the licensee-contractor(s) have met the QA program requirements for receipt inspection, storage, handling, erection, installation, inspection, and testing of the reactor coolant pressure boundary piping. The intent of this procedure is to include all pertinent piping activities at the site except welding and non destructive examination. Piping included in this category is defined in 10 CFR 50.2(v).

03.05 Each of the items identified in Section 02 that is applicable to a particular facility must be inspected. The inspection items should be completed for selected onsite organizations that have responsibility for this piping.

03.06 The procedure involved will vary from site to site, and may take many forms, such as formal procedures, instruction, checklists, drawings, etc. Review the inspection procedures/lists and compare with the requirements in the principal codes (ASME B&PV Section III), construction specifications, industry standards, regulatory guides and the requirements of the NSSS supplier that are applicable. Evaluation should result in a sound indication that all quality-related inspections will be performed and will be based on appropriate criteria and, further, that the results of inspections will be transmitted to responsible quality assurance personnel.

03.07 Completion of IE 50091 satisfies requirements for safety-related pipe supports such as hangers, snubbers, and restraints. Completion of IE 55071 satisfies requirements for RCPB welding and nondestructive examinations. Hence, these items are not included in IE 49051.

03.08 Findings from this inspection activity should address each element as being satisfactory, being unresolved and requiring resolution, or being in violation and requiring correction. When significant inadequacies are identified in specifications or procedures indicating weakness within the preparing technical organization, the inspector should inform cognizant Regional supervision. The issue should be addressed at the appropriate level of licensee management.

03.09 Prevalent errors and recent concerns are areas in which the inspector should be alert to potential generic issues. These areas include:

- a. Improper storage classification.
- b. Determination of the status of protective mechanisms at the time of site receipt and initial storage.
- c. Adequacy of dunnage for piping and piping system components during storage.

- d. Continued adequacy of such things as end caps for piping and protective coverings for weld preparation areas.
- e. 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" lead to substandard or unacceptable protective provisions.)
- f. Sites near salt water should receive special attention to assure that protective storage measures are considerate of salt water damage (Chloride Contamination).
- g. Storage areas located on sandy soil or near sandy beaches require special attention to avoid the entry of wind-driven sand particles into piping components.
- h. Improper location of storage. In many instances, storage locations are selected without consideration for construction traffic patterns or possible falling objects and/or missiles. (See also 10 CFR 50, Appendix B, Criterion XIII, and Regulatory Guide 1.38.)
- i. Inadequate or illegible material identification (damage by handling and/or environment).
- j. Storage of stainless steel pipe on dunnage treated with fire retardants may expose the piping to excessive halogens or chlorides.
- k. Certain fire-retardant coatings that are supplied to structural steel may have high halogen and chloride contents, adjacent stainless steel pipe should be protected.

49051-04 REFERENCES

SAR, Chapters 1, 3, 5, 6 and 17, including pertinent codes and standards referenced in these chapters

Regulatory Guide 1.26, "Quality Group Classifications and Standards"

Regulatory Guide 1.28, "Quality Assurance Program Requirements (Design and Construction)"

Regulatory Guide 1.29, "Seismic Design Classification"

Regulatory Guide 1.37, "Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants"

Regulatory Guide 1.38, "Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants"

Regulatory Guide 1.39, "Housekeeping Requirements for Water-Cooled Nuclear Power Plants"

Regulatory Guide 1.58, "Qualification of Nuclear Power Plant Inspection, Examination, and Testing Personnel"

Regulatory Guide 1.144, "Auditing of Quality Assurance Programs for Nuclear Power Plants"

ANSI N45.2, "Quality Assurance Program Requirements for Nuclear Power Plants"

ANSI N45.2.1, "Cleaning of Fluid Systems"

ANSI N45.2.2, "Packaging, Shipping, Receiving, Storage, and Handling of Items for Nuclear Power Plants"

ANSI N45.2.3, "Housekeeping During the Construction Phase of Nuclear Power Plants"

ANSI N45.2.6, "Qualifications for Inspection, Examination and Testing Personnel"

ANSI N45.2.12, "Requirements for Auditing of Quality Assurance Programs for Nuclear Power Plants"

ANSI N45.2.23, "Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants"

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