
INSPECTION PROCEDURE 69020 APPENDIX D

INSPECTION OF PIPING AT NON-POWER PRODUCTION AND UTILIZATION FACILITIES

Effective Date: March 25, 2025

PROGRAM APPLICABILITY: IMC 2550

69020.D-01 INSPECTION OBJECTIVES

- 01.01 To determine if work and related activities associated with safety-related piping at non-power production and utilization facilities (NPUF) are being performed in accordance with regulatory requirements, the licensing basis, specifications, drawings, and work procedures.
- 01.02 To determine if the applicant/licensee's system for preparing, reviewing, and maintaining records relative to safety-related piping activities is functioning properly and if the records reflect work accomplishment consistent with specifications and procedures.
- 01.03 To verify the as-built condition of safety-related piping meets the specified design requirements, specifications, and drawings.
- 01.04 To determine if the implementation of the quality assurance program (QAP) related to work activities for safety-related piping is effective and to verify that deviations from requirements are appropriately resolved.

69020.D-02 INSPECTION REQUIREMENTS

- 02.01 For the safety-related piping selected for inspection, determine if appropriate and adequate procedures in the following areas are compatible with the QAP and prescribe adequate methods to meet the specifications:
 - a. purchase documents identifying material specifications and any special requirements, including material test reports/certification
 - b. receipt inspections
 - c. inspections covering storage and issuance of the piping and related appurtenances
 - d. handling of the piping and related appurtenances to ensure protection from physical damage or contamination while handling
 - e. installation of the piping and related appurtenances
 - f. design changes, including field changes, to ensure proper review and coordination among participating design organizations
 - g. inspection and work performance for cleaning piping

- 02.02 Determine if the applicant/licensee has an established audit program (including plans, procedures, and audit schedule) for assessing the adequacy of work control functions and requirements for piping construction activities. Determine if examination, inspection, and test personnel associated with performing tests and inspections of piping activities are qualified and/or certified to perform their assigned work.
- 02.03 Determine if the following safety-related piping activities are being controlled and accomplished in accordance with the requirements of the documents reviewed in Section 02.01, above:
- a. purchase documents identifying material specifications and any special requirements, including material test reports/certification
 - b. inspections covering storage and issuance of the piping and related appurtenances
 - c. handling of the piping and related appurtenances to ensure protection from physical damage or contamination while handling
 - d. installation of the piping and related appurtenances
 - e. design changes, including field changes, to ensure proper review and coordination among participating design organizations
 - f. inspection and work performance for cleaning piping
 - g. configuration management
- 02.04 Review the documentation generated for the safety-related piping construction activities. Determine if the applicant/licensee/contractor system for documenting safety-related work is functioning properly. Records should be complete, reviewed by quality control, engineering personnel, or designee, and readily retrievable. Review safety-related records in the following areas:
- a. receipt inspection and material certification (if applicable)
 - b. installation inspection
 - c. nonconformance/deviation record(s)
 - d. training/qualification records of craft, and quality inspection personnel (as required)
 - e. configuration management records

69020.D-03 INSPECTION GUIDANCE

General Guidance

Inspectors should review the facility description in the safety analysis report (SAR) or equivalent and be familiar with the requirements for piping receipt, fabrication, erection, inspection, and testing of safety-related piping systems being constructed at the site. The purpose of these inspections is to verify that the assumptions and critical attributes reviewed during the licensing review process remain valid; the design was appropriately translated to construction specifications; the licensee/applicant constructed the facility in accordance with these specifications; and any changes made to the design described in the SAR comply with the licensee's configuration management program.

Inspectors should also be familiar with the licensee's QAP and use IP 69021, "Inspections of Quality Assurance Program Implementation During Construction of Non-Power Production and Utilization Facilities," to perform "vertical slice" inspections as described in the body of this IP. Inspectors should complete this appendix by inspecting the attributes listed in this appendix with

a focus on safety-related piping. Inspectors should also coordinate this appendix with inspection of pipe supports and restraints (Appendix E of this IP) for efficiency, if possible.

Inspectors should contact the applicant/licensee prior to the on-site inspection to help determine what piping(s) are to be inspected. Observation during in-progress construction/installation of the piping is desirable but not required. If necessary, inspectors may select completed piping systems for inspection. Inspectors should not attempt to inspect all piping systems on the site but may expand if significant concerns with the applicant/licensee's control of piping installation/construction arise. Samples should include components or systems within risk-significant areas of the facility.

Inspectors should collect applicant/licensee procedures, piping specifications, and work completion records in advance, if possible. If unable to review these documents in advance of the on-site inspection, then the licensee should be notified that these documents, and any other relevant documents, should be available when the inspector(s) arrives at the site.

Inspectors should choose one or more safety-related piping systems and review the areas listed in Sections 02.01 through 02.04 to the extent practical and may use their judgment in determining which areas to concentrate on if time is limited. However, inspectors should gain an understanding of the applicant/licensee's program to the extent necessary to determine if the applicant/licensee conforms to regulatory requirements. Not all the items in the inspection requirements section will be applicable or required in all situations for all safety-related structures and associated programs.

03.01 Inspection Requirement 02.01

- a. For the safety-related piping activities selected for inspection, review procedures, specifications, drawings, and other relevant design documents in the following areas to verify they conform to the commitments contained in the licensing basis:
 1. purchase documents identifying material specifications and any special requirements, including material test reports/certification
 2. receipt inspections
 3. inspections covering storage and issuance of the piping and related appurtenances.
 4. handling of the piping and related appurtenances to ensure protection from physical damage or contamination while handling
 5. installation of the piping and related appurtenances
 6. design changes, including field changes, to ensure proper review and coordination among participating design organizations
 7. inspection and work performance for cleaning piping

03.02 Inspection Requirement 02.02

- a. Review applicant/licensee's established audit program (including plans, procedures, and audit schedule) for assessing the adequacy of work control functions and requirements in their licensing basis in the area of safety-related piping activities.
- b. Review audit program to verify if examination, inspection, and if required, test personnel associated with performing tests and inspections of piping activities are qualified and/or certified to perform their assigned work.

- c. Verify records establish that the required audits were performed and that deficiencies identified during audits were appropriately resolved.

03.03 Inspection Requirement 02.03

Determine if the following activities are being controlled and accomplished in accordance with the requirements of the documents reviewed in Section 02.01, above:

- a. Purchase documents identifying material specifications and any special requirements, including material test reports/certification of the following:
 - 1. chemical composition,
 - 2. physical characteristics,
 - 3. nondestructive examination results,
 - 4. heat treatment history (if applicable), and
 - 5. welding of prefabricated sections.
- b. Inspections covering storage and issuance of the piping and related appurtenances including provisions for:
 - 1. segregation of sizes and types of material,
 - 2. storage identification,
 - 3. storage conditions/protection, and
 - 4. confirmation of issue of specified material.
- c. Handling of the piping and related appurtenances to ensure protection from physical damage or contamination while handling.
- d. Installation of the piping and related appurtenances to verify that the following meet applicable requirements:
 - 1. location;
 - 2. grinding, cutting, bending, etc.;
 - 3. piping system tolerances;
 - 4. cold spring;
 - 5. installation records to be generated during installation;
 - 6. type, size, location and adjustment of hangers, bellows, restraints, snubbers;
 - 7. clearances to prevent interference;
 - 8. hydrostatic testing (where required);
 - 9. hold points; and
 - 10. removal of arc strikes.
- e. Design changes, including field changes, to ensure proper review and coordination among participating design organizations. Determine if there have been significant design changes subsequent to the issuance of approved installation drawings. Review the implementation of the licensee's/contractor's design control measures, including the necessity for a revised stress analysis to determine if design control procedures were properly followed.

- f. Inspection and work performance for cleaning piping, including provisions for:
1. cleaning materials—conformance to specifications, 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; and
 5. record keeping requirements.

If possible, observe activities relative to safety-related piping, such as handling; cleanliness control; installation of pipe spools, fittings, and bellows; cutting; grinding; bending; supporting; cleaning and flushing; hydrostatic testing; and quality related inspections.

- g. Configuration management. For the activities observed during Inspection Requirement 02.03., verify if changes occurred during these construction activities and if the applicant/licensee properly controlled and documented these changes for engineering review, approval, and subsequent incorporation into the final as-built drawings. Verify these actions were completed in accordance with their procedures and quality assurance program.

03.04 Inspection Requirement 02.04

Determine if the piping activities, the applicant/licensee/contractor system for documenting safety-related work is functioning properly.

- a. Receipt Inspection and Material Certification. Receipt inspections, including provisions for ensuring:
1. piping materials are in conformance with purchase specifications, including special requirements,
 2. marking, identification, and storage level classifications,
 3. as received cleanliness and protection,
 4. receipt inspection reports are generated as required, and
 5. disposition of nonconforming items.
- b. Installation Inspection. Records confirm that specified materials and components were installed as specified and that the required construction inspections were performed, and acceptance criteria are defined.
- c. Nonconformance/Deviation Record. Records include current status of these items. Nonconformance reports include the status of corrective action or resolution, (e.g., determine if adequate corrective action is being taken when moisture density test results are not within tolerance or acceptance criteria.)
- d. Training/Qualification Records of Craft, and Quality Inspection Personnel. Records establish that quality inspection personnel are adequately qualified for their assigned duties and responsibilities and that craft personnel have been trained in their assigned tasks.

- e. Configuration Management Records. Review and evaluate a selected sample of configuration management records, and determine if:
 - 1. Records associated with design and field changes, as well as related work and IP changes, reflect that timely review and evaluation of design and field change documents have been performed by personnel who are qualified.
 - 2. Records of periodic inspections ensure that only the most recent approved documents, including design changes, were used in the field.
 - 3. Design changes are subject to adequate design control, including consideration of the impact of the change on the overall design and on as built records.
 - 4. Records of nonconformance's to design requirements include preparation of a nonconformance report even if the nonconformance is resolved through the design-change process.

03.05 Additional Guidance

Note: Determine if enough adequately-qualified quality-control inspection personnel, if required, are at the construction site, commensurate with the work in progress, and adequately performing their assigned duties through the established organizational structure.

- a. "Material Test Report" is a generic expression meaning a report of test results to confirm that material, chemical and physical properties are consistent with the applicable specification. Vendor terms used, which can be identified with the expression "Material Test Report," include:
 - 1. ladle analysis (sample of molten metal);
 - 2. check analysis (sample of solidified metal);
 - 3. CTR (Chemical Test Report or Certified Test Report); and
 - 4. MTR (Material Test Report—usually includes chemical and physical tests).
- b. The generic terms CTR and MTR should not be confused with the term "Certification." A "Certification" is a document issued in lieu of actual quality documentation records stating that the quality requirements contained in specifications and purchase orders have been met.
- c. "Quality Release Form" and "Certificate of Equipment" are examples of generic designations for forms used by manufacturers to serve as certifications of quality (in lieu of original quality documentation) for components and equipment.
- d. Prevalent errors and concerns. This section is included to provide background for inspectors on what past problems of a generic nature have been identified and is for information only.
 - 1. The status of protective measures at the time of site receipt and initial storage of piping and piping system components.

2. Adequacy of dunnage for piping and piping system components during storage. Dunnage treated with fire retardants may expose pipe to excessive levels of halogens and chlorides.
3. Continued adequacy of such things as end caps for piping and protective coverings for weld prep areas.
4. Weather protection in the form of canvas or plastic covering. In most deficient cases, the original protective covering was adequate, but inattention to damage and normal “wear and tear” led to substandard or unacceptable protective covers.
5. Storage areas located on sandy soil require special attention to avoid the entry of wind driven sand particles into piping components.
6. Improper location of storage. In some instances, storage locations are selected without consideration for construction traffic patterns, or possible falling objects and/or missiles.
7. Inadequate or illegible piping identification. (Damaged by handling and/or environment.)
8. Power grinders used for weld preparation of pipe that result in violation of minimum wall thickness.
9. Piping runs containing mud, sand, and other foreign material.
10. Incorrect size orifices installed in pump recirculation lines.
11. Surfaces for welding not properly free of paint, oil, rust, or other material that is detrimental to welding.
12. Drawings or other records fail to show evidence of actual piping components installed in pipeline or are not a current revision.
13. Piping changes without proper design change authorization.
14. Repairs of linear indications on pipe spool pieces not properly performed as to testing for wall thickness and blending uniformly into the surrounding surfaces.
15. Controls over the installation/removal of cleaning and flushing devices are inadequate.
16. Refer to Inspection and Enforcement (IE) Bulletin 79 14 for additional concerns relating to as-builts.

69020.D-04 RESOURCE ESTIMATE

The appendices, or sections of the appendices, and inspection samples and hours, applicable to a specific facility should be in the range of 40–80 hours. Inspection preparation, including review of licensing basis, safety analysis report (SAR), and applicable codes and standards is not included in this estimate.

69020.D-05 PROCEDURE COMPLETION

This inspection procedure appendix is complete when one sample is complete. Refer to Section 69020-05, "Procedure Completion," of IP 69020, "Inspection of Safety Related Items (and Services) During Construction of Non-Power Production and Utilization Facilities," for details on what constitutes a completed inspection sample. Inspectors are not expected to complete every activity in the appendices of this IP. Instead, inspectors should prioritize inspection activities based on 1) importance of the activity to safety, 2) availability of the on-site activity at the time of the inspection, and 3) available inspection resources. An appendix to this IP need not be completed if there are no safety-related items (or services) covered by that appendix at an NPUF.

69020.D-06 REFERENCES

Refer to licensing basis requirements for applicable codes and standards for each fuel facility.

NRC Inspection and Enforcement (IE) Bulletin 79-14, "Seismic Analysis for As-Built Safety-Related Piping Systems"

END

List of Attachments:

Revision History for IP 69020 Appendix D

Attachment 1 – Revision History for IP 69020 Appendix D

| Commitment Tracking Number | Accession Number Issue Date Change Notice | Description of Change | Description of Training Required and Completion Date | Comment and Feedback Resolution Accession Number (Pre-Decisional, Non-Public) |
|----------------------------|---|--|--|---|
| N/A | ML24264A196 03/25/25 CN 25-005 | Procedure was rewritten for conformance with changes to IMC 2550 and is now a standalone appendix to IP 69020. | N/A | N/A |