



**THE NATIONAL BOARD
BODY OF KNOWLEDGE
FOR**

**AUTHORIZED NUCLEAR
INSPECTORS (CONCRETE)**

Approved by:  7/14/15
Executive Director (date of approval)

*Denotes Revisions

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THE NATIONAL BOARD

BODY OF KNOWLEDGE FOR

AUTHORIZED NUCLEAR INSPECTOR (CONCRETE)

The National Board has developed this Body of Knowledge to outline duties and responsibilities for individuals performing inspections during the construction phase of nuclear components, parts, and appurtenances fabricated and assembled in accordance with the *ASME Boiler and Pressure Vessel Code, Section III, Division 2*.

OBJECTIVES

An individual responsible for inspection of nuclear components, parts, and appurtenances during the construction phase should have knowledge, and the ability to apply that knowledge, of the following:

- Code Structure and Content
- Classification of Nuclear Items
- Responsibilities and Duties
- Quality Assurance Programs
- Construction and Design Documents
- Fabrication/Construction
- Materials, Concrete Constituents, and Services
- Welding and Heat Treatment
- Concrete and Concrete Constituent Examination and Testing
- Pressure Testing
- Calibration of Measurement and Test Equipment
- ASME Section III, Division 2, Certification and Stamping Requirements
- Record Requirements

REFERENCE MATERIAL

Familiarity with the following reference material is necessary for understanding the objectives in this Body of Knowledge.

- ASME Section III, Div. 1 Subsections NCA and NE
- ASME Section III, Div. 2
- ASME Section V, *Nondestructive Examination*
- ASME Section IX, *Welding and Brazing Qualifications*
- Title 10 of the U.S. Code of Federal Regulation, Part 50.55a Codes and Standards
- Title 10 of the U.S. Code of Federal Regulation, Part 50, Appendix B, Quality Assurance Requirements
- ACI 304 R, *Guide for Measuring, Mixing, Transporting, and Placing Concrete*
- ACI 347 R, *Guide to Formwork for Concrete*
- ASME NQA-1, *Quality Assurance Requirements for Nuclear Facility Application*
- ASME QAI-1, *Qualifications for Authorized Inspection*
- ASNT SNT-TC-1A, *Personnel Qualification and Certification in Nondestructive Testing*
- *RCI-1, NB-263, *Rules for Commissioned Inspectors*

BODY OF KNOWLEDGE OUTLINE

This outline provides information regarding the listed objectives of this Body of Knowledge, and further describes the duties and responsibilities of the Authorized Nuclear Inspector (Concrete).

1. Code Structure and Content

Understanding of *ASME Boiler and Pressure Vessel Code* and *American Concrete Institute* structure and ability to locate the appropriate requirements within the code books and related documents.

2. Classification of Nuclear Items

Ability to identify nuclear components, containments, parts, and appurtenances, along with understanding of applicable definitions.

3. Responsibilities and Duties

Understanding of requirements for:

- Authorized Inspection Agency Personnel;
- Plant Owners;
- Designer Organizations;
- Component and Part Manufacturers; and
- Material Organizations.

4. Quality Assurance Programs

Understanding of quality assurance program requirements for:

- Owners;
- Certificate Holders;
- Designer Organizations; and
- Material Organizations (metallic and non-metallic).

5. Construction and Design Documents

Familiarity with the preparation, content, and approval of design and construction documents, such as:

- Design Specifications;
- Construction Specifications;
- Design Reports;
- Construction Reports;
- Concrete Mix Designs;
- Rebar Splice Reports; and
- Structural Integrity Test Reports.

6. Fabrication/Construction

Ability to verify compliance of fabrication/construction and installation in accordance with applicable code requirements, such as:

- Cutting and Edge Preparation;
- Limits on Cold Forming, Fitting, and Aligning;
- Concrete Batching, Mixing, and Placing;
- Form Cleanliness;
- Reinforcing Bar Placement, Splicing, and Bending;
- Tendon and Tendon Conduit Placement, Protection, and Size;

- Liner Plate, Piping, and Penetration Alignment; and
- Dimensional Verification.

7. *Materials, Concrete Constituents, and Services*

Verify compliance of material in accordance with applicable code requirements, such as:

- Markings And Permitted Marking Methods;
- Material Certifications;
- Material Repairs;
- Concrete Constituents Acceptance and Storage;
- Examinations, Tests, and Treatments for Material; and
- Procurement of Materials and Services.

8. *Welding and Heat Treatment*

Verify compliance with welding and heat treatment requirements of the applicable code, such as:

- Responsibilities;
- Permitted welding and heat treatment processes;
- Procedure qualification requirements;
- Welder qualification requirements;
- Cleaning of weld surfaces and alignment tolerances;
- Repair of weld defects; and
- Alternative Section III, Division 2, welding techniques.

9. *Concrete and Concrete Constituent Examination and Testing*

Verify compliance for examination and testing requirements, such as:

- NDE requirements;
- Fundamentals of Visual, Eddy Current, Radiographic, and Ultrasonic methods;
- Inspection and NDE Examination Procedure Qualification;
- Concrete Inspection and Testing Personnel Qualification; and
- Examination reporting requirements.

10. *Pressure Testing*

Verify compliance and requirements for the following tests and treatments:

- Impact testing and Charpy V Notch testing;
- Drop weight testing;
- Component Hydrostatic tests;
- Vacuum Box tests; and
- Structural integrity tests.

11. *Calibration of Measurement and Test Equipment (M&TE)*

Understanding of requirements for the calibration of M&TE which includes working and master standards, such as:

- Calibration frequencies;
- Calibration methods;
- Tolerances;
- Master standards;
- Identification; and
- Records.

12. ASME Section III, Division 1 and 2 Stamping and Certification Requirements

Ability to determine data report and associated stamping requirements which apply for a given type of construction.

13. Record Requirements

Ability to determine record preservation and transfer requirements, per ASME Section III, Division 2.