

# **NRC INSPECTION MANUAL**

IOLB

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MANUAL CHAPTER 1245, APPENDIX D2

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INSERVICE INSPECTION ADVANCED-LEVEL TRAINING

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## Introduction

Completion of the Reactor Engineering Inspector Technical Proficiency Qualification journal is strongly recommended before beginning activities or courses in this advanced-level training. You may complete the General Proficiency requirements contained in Appendix B and the Technical Proficiency requirements in C-2 together with requirements in this training standard.

Completion of Inservice Inspection (ISI) Advanced Level Training is recommended for inspectors leading inservice inspections and for other inspectors conducting ISI inspection activities. Inspectors with demonstrated experience may be grandfathered in the completion of this journal, as determined by the appropriate branch chief.

## Objectives of Advanced-Level Training

Inservice inspection (ISI) programs are designed to identify service-induced degradation that might lead to leakage or result in the loss of integrity of a structure, system or component (SSC). Since a variety of inspection techniques can be used to assess the structural and leakage integrity of a SSC, an NRC inspector should have a general knowledge of the various techniques that can be used.

The objectives of this advanced voluntary training are:

- To ensure the inspector is knowledgeable of the requirements pertaining to the ISI of nuclear power plant structures, systems and components (SSCs).

- To ensure the inspector is knowledgeable about ISI techniques such that he/she can determine whether the techniques used are adequate to detect potential degradation that may be affecting that SSC.

- To ensure the inspector is knowledgeable of staff positions and industry guidance related to ISI.

After completion of this training, the inspector should be capable of:

- Developing informed questions such that he/she can perform effective and efficient inspections.

- Communicating the finding of their inspections effectively and efficiently with management and with headquarters staff.

- Reliably identifying ISI issues that should be brought to the attention of more senior regional inspectors or technical experts in Headquarters.

It is not the intent of this training standard to make the inspector an expert in assessing the structural and leakage integrity of each SSC in the plant.

## Required Training Courses

Nondestructive Examination (NDE) Technology and Codes (NRC Course E-306)  
ASME Code Section XI – Inservice Inspection of Nuclear Power Plant  
Components (ASME Course PD-192)  
ASME Code Section IX – Welding and Brazing Qualifications (Course ASME PD-190)  
ASME Practical Welding Technology Course (ASME Course PD-359)

Additional training recommended to be completed within two years of qualification:

1. An advanced corrosion course (e.g. E-1116, Corrosion and Corrosion Control in LWRs)
2. A fracture mechanics course
3. A quality assurance course
4. An advanced course(s) in ultrasonic examination that would count toward the training hours and course materials of the ASNT Recommended Practice SNT-TC-1A and/or ANSI/ASNT CP-189 guidelines for certification as a Level II ultrasonic examiner. Training course(s) should focus on ultrasound for nuclear weld examinations and substantially cover application of phased array ultrasound techniques and Section XI Appendix VIII qualified techniques.
5. An advanced course(s) in eddy current testing that would count toward the training hours and course materials of the ASNT Recommended Practice ASNT SNT-TC-1A and/or ANSI/ASNT CP-189 guidelines for certification as a Level II eddy current examiner. Training course(s) should focus on steam generator and heat exchanger tubing and include interpretation of data to meet the standards for a Qualified Data Analyst (QDA) in accordance with the EPRI S/G Examination Guidelines, Appendix G, for certification as a Level IIA QDA.
6. An advanced course(s) in radiographic examination that would count toward the training hours and course materials of the ASNT Recommended Practice SNT-TC-1A and/or ANSI/ASNT CP-189 guidelines for certification as a Level II in radiography. Training should focus on radiographic film interpretation for pipe and vessel welds.

## ISI Guidance Documents

### Inspection Procedures

49001 Inspection of Erosion-Corrosion/Flow Accelerated-Corrosion Monitoring Programs  
50001 Steam Generator Replacement Inspection  
50002 Steam Generators  
55050 Nuclear Welding General Inspection Procedure  
55100 Structural Welding General Inspection Procedure  
57050 Nondestructive Examination Procedure Visual Examination  
57060 Nondestructive Examination Procedure Liquid Penetrant  
57070 Nondestructive Examination Procedure Magnetic Particle  
57080 Nondestructive Examination Procedure Ultrasonic Examination  
57090 Nondestructive Examination Procedure Radiographic Examination  
61715 Verification of Containment Integrity  
61720 Containment Local Leak Rate Testing

62002 Inspection of Structures, Passive Components, and Civil Engineering Features at Nuclear Power Plants  
62003 Inspection of Steel and Concrete Containments at Nuclear Power Plants  
70307 Containment Integrated Leak Rate Test - Procedure Review  
70313 Containment Integrated Leak Rate Test  
70323 Containment Leak Rate Test Results Evaluation  
71111.08 Inservice Inspection Activities  
71111.22 Surveillance Testing  
73051 Inservice Inspection - Review of Program  
73052 Inservice Inspection - Review of Procedures  
73753 Inservice Inspection  
73755 Inservice Inspection - Data Review and Evaluation

#### Temporary Instructions (TIs)

2515/150, Revision 3: Reactor Pressure Vessel Head and Vessel Head Penetration Nozzles (NRC Order EA-03-009)  
2515/172: Reactor Coolant System Dissimilar Metal Butt Welds

#### Inspection Manual Part 9900 Technical Guidance

Mechanical: Steam Generator Tube Primary-to-Secondary Leakage  
ASME III & XI: Code Interpretations, Use of Engineering Judgment, Flaw Evaluation  
ASME IX: Welder Qualification  
ASME XIA: System Pressure Tests  
RG158: Qualification of Personnel Involved with Inspections  
SGTube: Steam Generator Plugs and Sleeving Repairs

#### Industry Guidance

MRP-126: "Materials Reliability Program: Generic Guidance for Alloy 600 Management"  
MRP-139: "Materials Reliability Program: Primary System Piping Butt Weld Inspection and Evaluation Guideline," Revision 1  
MRP-117: "Materials Reliability Program Inspection Plan for Reactor Vessel Closure Head Penetrations in U.S. PWR Plants"  
BWRVIP-03: TR-105696-R9 Revision 9: BWR EPRI Vessel and Internals Project, Reactor Pressure Vessel and Internals Examination Guidelines  
BWRVIP-160: BWR Vessel and Internals Project, BWRVIP Inspection Trends, 2006 Update  
EPRI "Steam Generator Management Program: Pressurized Water Reactor Steam Generator Examination Guidelines," most recent revision  
EPRI "Steam Generator Integrity Assessment Guidelines," most recent revision

#### ISI Requirements

10 CFR 50.55a  
ASME Code (Section II, III, V, and XI)  
Standard Technical Specifications 3.0 incorporated with TSTF-449 Vol 1, B 3.4.20, and Section 5.5.9 (Steam Generator Program)  
Standard Technical Specifications 3.0 incorporated with TSTP-449 Vol 2, B 3.4.20  
10 CFR 50 Appendix A (GDC: 14, 30, 32) and B

## Regulatory Guides

- 1.14 Reactor Coolant Pump Flywheel Integrity
- 1.26 Quality Group Classifications and Standards for Water-, Steam-, and  
Radioactive-Waste-Containing Components of Nuclear Power Plants
- 1.31 Control of Ferrite Content in Stainless Steel Weld Metal
- 1.34 Control of Electroslag Weld Properties
- 1.35 Inservice Inspection of UngROUTED Tendons in Prestressed Concrete Containments
- 1.3.5.1 Determining Prestressing Forces for Inspection of Prestressed Concrete  
Containments
- 1.43 Control of Stainless Steel Weld Cladding of Low-Alloy Steel Components
- 1.44 Control of the Use of Sensitized Stainless Steel
- 1.45 Reactor Coolant Pressure Boundary leakage Detection Systems
- 1.50 Control of Preheat Temperature for Welding of Low-Alloy Steel
- 1.65 Materials and Inspections for Reactor Vessel Closure Studs
- 1.71 Welder Qualification for Areas of Limited Accessibility
- 1.83 Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes
- 1.84 Design, Fabrication, and Materials Code Case Acceptability, ASME Section III
- 1.85 Materials Code Case Acceptability
- 1.90 Inservice Inspection of Prestressed Concrete Containment Structures with Grouted  
Tendons
- 1.94 Quality Assurance Requirements for Installation, Inspection, and Testing of Structural  
Concrete and Structural Steel During the Construction Phase of Nuclear Power  
Plants
- 1.116 Quality Assurance Requirements for Installation, Inspection, and Testing of  
Mechanical Equipment and Systems
- 1.121 Bases for Plugging Degraded PWR Steam Generator Tubes
- 1.147 Inservice Inspection Code Case Acceptability □ ASME Section XI, Division 1
- 1.150 Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice  
Examinations
- 1.163 Performance-Based Containment Leak-Test Program
- 1.178 An Approach for Plant-Specific Risk-Informed Decisionmaking: Inservice Inspection  
of Piping
- 1.193 ASME Code Cases Not Approved for Use

Staff positions/observations – Refer to the References Section of Inspection Procedure  
71111.08, “Inservice Inspection Activities”

## ISI Inspector Individual Study Activities

## Advanced ISI Training

Topic: (ISA-ISI-1) ASME Code Sections and Code Cases

Purpose: The purpose of this ISA is to acquaint you with the organization and requirements pertaining to the ISI program contained in the ASME Code, applicable code cases, and 10 CFR 50.55a.

Competency  
Area: INSPECTION AREA TECHNICAL EXPERTISE  
REGULATORY FRAMEWORK

Level  
Of Effort: 50 Hours

References:

1. ASME Section II, III, V, IX, XI
2. Regulatory Guide 1.147
3. Regulatory Guide 1.84
4. Regulatory Guide 1.193
5. Regulatory Guide 1.26
6. 10 CFR 50.55a
7. Section XI Code Case N-513-x
8. Generic Letter 90-05
9. Regulatory Issue Summary 2005-20, Rev 1
10. NRC Inspection Manual Part 9900: Technical Guidance parts C.10, C.11, and C.13

Evaluation  
Criteria: Upon completion of the tasks in this activity, you will be asked to demonstrate your understanding of Section XI of the ASME Code, 10 CFR 50.55a, and other pertinent references as they pertain to the following:

1. The scope of 10 CFR 50.55a.
2. The process for licensees to obtain approval for relief from ISI requirements and the use of code cases.
3. Submission of a licensee's ISI program to NRR.
4. The role of the Authorized Nuclear Inspector.
5. The three types of non-destructive examinations used during ISI and the specific techniques that fall under each of these categories.
6. The differences between a Level I, Level II, and Level III examiner.
7. The repair and replacement requirements contained in ASME Section XI article IWA-4000 (or IWA-7000 as applicable).



8. The various types of system pressure tests and the general requirements associated with them including the examinations performed during these tests and their limitations.
9. The records and reports that must be submitted in accordance with ASME Section XI article IWA-6000 and 10 CFR 50.55a.
10. The Quality Group Classifications identified in Regulatory Guide 1.26 and the nuclear class 1, 2, and 3 classifications identified in ASME Section XI.
11. Describe the general organization of ASME Section XI Subsection IWB, IWC, IWD, IWE, IWF, and IWL and the materials/components to which these requirements apply.
12. The use of Section XI Appendix VIII qualified UT techniques, the relationship between Appendix VIII and the Performance Demonstration Initiative (PDI), and how to determine when Appendix VIII requirements are applicable.
13. Temporary non-Code repairs.
14. The difference between a code of record and a code of construction.
15. RIS 2005-20 and associated sections of IM Part 9900 Technical Guidance.

Tasks:

1. Review the Table of Contents and Introduction for each ASME section II, III, V, IX and XI.
2. Review ASME Section XI Glossary (Article IW-9000), particularly definitions of indication, imperfection, flaw, discontinuity, defect, relevant condition, Authorized Nuclear Inservice Inspector.
3. Review Regulatory Guides 1.147, 1.84, 1.193, and 1.26 (quality group classifications).
4. Review Section XI Appendix VIII and 10 CFR 50.55a requirements pertaining to the use of Appendix VIII.
5. After reviewing the references in sufficient detail to perform adequately in accordance with the requirements of the Evaluation Criteria, meet with your supervisor, or the person designated to be your resource for this activity to discuss the answers to the questions listed in the Evaluation Criteria.

Documentation: ISI Inspector Advanced-Level Signature Card Item ISA-ISI-1

## Advanced ISI Training

Topic: (ISA-ISI-2) Industry Initiatives for Material Degradation

Purpose: The purpose of this ISA is to acquaint you with various industry initiatives that address material degradation mechanisms, inspection programs and techniques that evaluate degradation and techniques for mitigating the effects of material degradation.

Competency  
Area: INSPECTION AREA TECHNICAL EXPERTISE

Level  
Of Effort: 50 Hours

- References:
1. MRP-126: "Materials Reliability Program: Generic Guidance for Alloy 600 Management"
  2. MRP-139: "Materials Reliability Program: Primary System Piping Butt Weld Inspection and Evaluation Guideline," Revision 1
  3. BWR Vessel and Internal Program (BWR VIP) listed in the ISI Guidance Documents Section
  4. Generic Letter 89-08, "Erosion/Corrosion-Induced Pipe Wall Thinning"

- Evaluation  
Criteria:
- Review the references in sufficient detail to demonstrate:
1. Understanding of industry initiatives in regards to study and mitigation of material degradation mechanisms.
  2. Understanding of examination guidelines for reactor pressure vessels and internals.
  3. Describe industry operating experience with PWSCC, IGSCC and erosion/corrosion and flow accelerated corrosion.

- Tasks:
1. Review MRP-126 and MRP-139.
  2. Review BWR VIPs listed in the reference listing.
  3. Review GL-89-08.
  4. Obtain and review a licensee's flow accelerated corrosion (FAC) inspection program.
  5. Meet with your supervisor, or the person designated to be your resource for this activity to discuss any questions you may have as a result of this activity

and to demonstrate that you can meet the evaluation criteria for this activity.

Documentation: ISI Inspector Advanced-Level Signature Card Item ISA-ISI-2

## Advanced ISI Training

Topic:	(ISA-ISI-3) Reactor Pressure Vessel Head Penetrations
Purpose:	The purpose of this ISA is to acquaint you with the history of reactor pressure vessel head penetration degradation, regulatory requirements for inspection, and inspection techniques employed during reactor pressure vessel head inspections.
Competency Area:	INSPECTION AREA TECHNICAL EXPERTISE ASSESSMENT AND ENFORCEMENT
Level Of Effort:	50 Hours
References:	All the documents listed in the ISI Guidance Documents Section are appropriate for this activity as well as those specifically listed below in the "Tasks" Section.
Evaluation Criteria:	<p>Review the references in sufficient detail to demonstrate:</p> <ol style="list-style-type: none"><li>1. Knowledge of the requirements for inspection of Reactor Pressure Vessel Heads for PWRs.</li><li>2. Capabilities and limitations of ultrasonic inspections systems.</li><li>3. Basic understanding of various inspection techniques used by licensee's in inspection of Reactor Pressure Vessel Heads for PWRs.</li></ol>
Tasks:	<ol style="list-style-type: none"><li>1. Review NRC Order EA-03-009 Revision 1.</li><li>2. Review Section XI code case N-729-x and 10 CFR 50.55a(g)(6)(ii)(d).</li><li>3. Obtain and review RPVH Penetration information from the ISI Best Practices website (<a href="http://www.internal.nrc.gov/RES/projects/ISI/">http://www.internal.nrc.gov/RES/projects/ISI/</a>).</li><li>4. Review and discuss with an ISI inspector NUREG/CR-5985/PNL-8919, "Evaluation Of Computer-Based Ultrasonic Inservice Inspection Systems."</li><li>5. Review MRP-117: "Materials Reliability Program Inspection Plan for Reactor Vessel Closure Head Penetrations in U.S. PWR Plants.</li><li>6. Meet with your supervisor, or the person designated to be your resource for this activity to discuss any questions you may have as a result of this activity and to demonstrate that you can meet the evaluation criteria for this activity.</li></ol>
Documentation:	ISI Inspector Advanced-Level Signature Card Item ISA-ISI-3

## Advanced ISI Training

Topic: (ISA-ISI-4) Boric Acid Corrosion Control

Purpose: The purpose of this ISA is to acquaint you with the inspection activities contained in Inspection Procedure 57050, "Visual Testing Examination," and with the NRC staff and industry positions related to the boric acid corrosion control program.

Competency  
Area: INSPECTION AREA TECHNICAL EXPERTISE  
ASSESSMENT AND ENFORCEMENT

Level  
Of Effort: 50 Hours

References: 1. Inspection Procedure 57050, "Visual Testing Examination"  
2. As listed in the Tasks Section below.

Evaluation  
Criteria: Review the references in sufficient detail to demonstrate:

1. Knowledge of inspection procedures and industry guidance concerning boric acid inspection programs.
2. Knowledge of effects of boric acid corrosion and susceptible penetrations on the reactor vessel head.
3. Describe industry operating experience with boric acid corrosion (including the Davis-Besse event).

Tasks:

1. Review and discuss with an experienced ISI inspector, WCAP 15988-NP, "Generic Guidance for an Effective Boric Acid Inspection Program for Pressurized Water Reactors."
2. Review and discuss with an experienced ISI inspector, GL-88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants."
3. Complete the on-line training course entitled "Effects of Corrosion." This course is accessed through the NRC Training and Development web site.
4. Meet with your supervisor, or the person designated to be your resource for this activity to discuss any questions you may have as a result of this activity and to demonstrate that you can meet the evaluation criteria for this activity.

Documentation: ISI Inspector Advanced-Level Signature Card Item ISA-ISI-4

## Advanced ISI Training

Topic: (ISA-ISI-5) Steam Generator Examinations

Purpose: The purpose of this ISA is (1) to familiarize you with inspection activities in Inspection Procedure 71111.08, "Inservice Inspection Activities," and (2) to familiarize you with NRC staff and industry positions related to the inspection of steam generator tubes.

Competency  
Area: INSPECTION AREA TECHNICAL EXPERTISE  
ASSESSMENT AND ENFORCEMENT

Level  
Of Effort: 50 Hours

References: As listed in the Tasks Section below.

Evaluation  
Criteria: Review the references in sufficient detail to demonstrate:

1. Knowledge of inspection procedures and industry guidance concerning steam generator inspection programs.
2. Knowledge of the factors and conditions that cause degradation of steam generator tubes.
3. Guidelines and standards used to evaluate degraded steam generator tubes.
4. Acceptable repair techniques for steam generator tubes.

Tasks

1. Review and discuss with an experienced ISI inspector, EPRI "Pressurized Water Reactor Steam Generator Examination Guidelines."
2. Review and discuss with an experienced ISI Inspector, EPRI, "Steam Generator Integrity Assessment Guidelines."
3. Review and discuss with an experienced ISI Inspector the Standard Technical Specifications applicable to steam generator tube inspections.
4. Review and discuss with an experienced ISI Inspector, IP 71111.08 sections associated with steam generator inspections.
5. Review and discuss Inspection Manual Chapter 0609, Appendix J, with an experienced inspector.
6. Meet with your supervisor, or the person designated to be your resource for this activity to discuss any questions you may have as a result of this activity and to demonstrate that you can meet the evaluation criteria for this activity.

Documentation: ISI Inspector Advanced-Level Signature Card Item ISA-ISI-5

## ISI Inspector On-the-Job Activities



## Advanced ISI Training

Topic: (OJT-ISI-1) NDE and Welding Inspection

Purpose: The purpose of this OJT is to acquaint you with the organization and requirements pertaining to the ISI program contained in the ASME Code and applicable code cases.

Competency

Area: INSPECTION AREA TECHNICAL EXPERTISE  
PROBLEM ANALYSIS  
ASSESSMENT AND ENFORCEMENT  
COMMUNICATION  
INSPECTION

Level

Of Effort: 50 hours

References: All the references used in the ISAs and those listed in the ISI Guidance Documents Section are appropriate for this activity. Most of the efforts in this OJT will rely on licensee procedures and related regulatory documents (Technical Specifications, Orders, FSAR, etc.). Any references used other than licensee procedures will be used to determine the regulatory stance that has been historically applied by the NRC for a given situation. References selected should support the actual inspection efforts.

Evaluation

Criteria:

1. Describe required elements of an ISI program and be able to identify what interval and period the licensee is in at the time of the OJT.
2. Identify the NDE samples required by IP 71111.08, and describe key elements of each type of NDE inspection identified in ASME Section XI.
3. Describe the capabilities and limitations of the NDE inspections you observed (specific technique limitations and/or limitations due to component design or location), and identify the advantages and disadvantages of each.
4. Describe the licensee's indication evaluation process and whether the indications were evaluated in accordance with the procedure requirements and industry and NRC guidance.
5. Describe the licensee's flaw acceptance criteria.
6. Describe the ASME Code requirements utilized by the licensee in its welding process:
  - a. The interaction between Sections II, III, IX, and XI where welding is concerned.

- b. The difference between Essential, Supplementary Essential, and Non-Essential variables, and how to identify what each is for a welding process.
  - c. Similarities and differences between qualification of a welder/weld operator and qualification of a weld procedure.
- 7. Discuss the use of ASME Section II and the licensee's quality assurance program as it pertains to control of material in the welding process.
- 8. Choose a relief request submitted by the licensee within the last year pertaining to welding activities and discuss the following:
  - a. Exceptions requested by the licensee
  - b. Use of code cases within the relief request
  - c. The NRC's Safety Evaluation Report

Tasks:

- 1. Review the licensee's ISI Program (ASME Section XI program).
- 2. Review a sample of the licensee's NDE procedures for commonly used NDE techniques:
  - a. UT – PDI qualified
  - b. UT – other than PDI qualified
  - c. PT
  - d. MT
  - e. VT-2
  - f. VT-3
- 3. Observe the calibration of an UT system.
- 4. Review a copy of the licensee's Written Practice, and verify that qualifications for a sample of NDE Technicians are adequate for the following forms of NDE:
  - a. UT – PDI qualified
  - b. UT – non-PDI qualified
  - c. PT
  - d. MT
  - e. VT-2
  - f. VT-3
- 5. Observe the licensee's performance of several different NDE activities and compare the activities against licensee procedures.
- 6. Compare recordable indications to IWX-3000 or applicable acceptance criteria and verify if the licensee dispositioned the indications appropriately in accordance with ASME Code requirements.

7. Review welding packages for completeness. Verify WPS/PQRs against the ASME Code.
8. Review recent corrective action documents related to welding and NDE.
9. Meet with your supervisor, or the person designated to be your resource for this activity to discuss any questions you may have as a result of this activity and to demonstrate that you can meet the evaluation criteria for this activity.

Documentation: ISI Inspector Advanced-Level Signature Card OJT-ISI-1

## Advanced ISI Training

Topic:	(OJT-ISI-2) Reactor Pressure Vessel Penetrations Volumetric Inspection and Boric Acid Corrosion Control Program
Purpose:	The objective of this OJT is to prepare the inspector to review and evaluate a licensee's performance in assessing the condition of the vessel head penetrations. This OJT will familiarize the inspector with (1) inspection activities in Inspection Procedure 71111.08, "Inservice Inspection Activities," and (2) NRC staff and industry positions related to the inspection of vessel head penetrations.
Competency Area:	INSPECTION AREA TECHNICAL EXPERTISE PROBLEM ANALYSIS ASSESSMENT AND ENFORCEMENT COMMUNICATION INSPECTION
Level Of Effort:	50 hours
References:	All the references used in the ISAs and those listed in the ISI Guidance Documents Section are appropriate for this activity. Most of the efforts in this OJT will rely on licensee procedures and related regulatory documents (Technical Specifications, Orders, FSAR, etc.). Any references used other than licensee procedures will be used to determine the regulatory stance that has been historically applied by the NRC for a given situation. References selected should support the actual inspection efforts.
Evaluation Criteria:	Upon completion of this OJT, you should be able to: <ol style="list-style-type: none"><li>1. Describe industry experience with vessel head degradation.</li><li>2. Describe the scope and extent of the inspections including the inspections of the weld and nozzle base material.</li><li>3. Describe the requirements for performing examinations of the vessel head penetrations including personnel and technique qualification.</li><li>4. Describe the capabilities and limitations of the inspections performed.</li><li>5. Describe the licensee's indication evaluation process and whether the indications were evaluated in accordance with the procedure requirements and industry and NRC guidance.</li><li>6. Describe the licensee's flaw acceptance criteria and repair process.</li></ol>

- Tasks
1. Read the references in sufficient detail to perform adequately in accordance with the requirements of the Evaluation Criteria.
  2. Perform the tasks outlined in the RPVH section of IP 71111.08.
  3. Observe an NDE technician perform data acquisition.
  4. Review electronic data results with an NDE analyst.
  5. Review the licensee's head susceptibility calculations (both effective degradation years and reinspection years).
  6. Review at least two licensee boric acid evaluations.
  7. Conduct a boric acid walk-down.
  8. Review a licensee's boric acid program.
  9. Review corrective action documents related to boric acid.
  10. Meet with your supervisor, or the person designated to be your resource for this activity to discuss any questions you may have as a result of this activity and to demonstrate that you can meet the evaluation criteria for this activity.

Documentation: ISI Inspector Advanced-Level Signature Card Item OJT-ISI-2

## Advanced ISI Training

Topic: (OJT-ISI-3) Steam Generator Tube Inspection

Purpose: The objective of this OJT is to prepare the inspector to review and evaluate licensee's performance in assessing the condition of the steam generator tubes. This OJT will familiarize the inspector with (1) inspection activities in Inspection Procedure 71111.08, "Inservice Inspection Activities," and (2) NRC staff and industry positions related to the inspection of steam generator tubes.

Competency

Area: INSPECTION AREA TECHNICAL EXPERTISE  
PROBLEM ANALYSIS  
ASSESSMENT AND ENFORCEMENT  
COMMUNICATION  
INSPECTION

Level

Of Effort: 50 hours

References: All the references used in the ISAs and those listed in the ISI Guidance Documents Section are appropriate for this activity. Most of the efforts in this OJT will rely on licensee procedures and related regulatory documents (Technical Specifications, Orders, FSAR, etc.). Any references used other than licensee procedures will be used to determine the regulatory stance that has been historically applied by the NRC for a given situation. References selected should support the actual inspection efforts.

Evaluation

Criteria: Upon completion of this OJT, you should be able to:

1. Describe industry experience with steam generator tube degradation.
2. Describe the requirements for performing examinations of the steam generator tubes including personnel and technique qualification.
3. Describe the capabilities and limitations of the inspections performed.
4. Describe the licensee's indication evaluation process and whether the indications were evaluated in accordance with the procedure requirements and industry and NRC guidance.
5. Describe the licensee's flaw acceptance criteria and repair process.
6. Describe the licensee's last operational assessment and identify how it influenced the length of operation in between steam generator inspections as well as the type and extent of inspections planned for the current outage.
7. Review corrective action documents related to SG tube examinations.

8. Describe the licensee's condition monitoring assessment. If it was not complete at the time of the inspection, discuss the licensee's plans/expectations for the condition monitoring assessment based on inspection results to date.

Tasks:

1. Monitor an NDE Technician during data acquisition.
2. Review electronic data results with an NDE analyst.
3. Review the licensee's steam generator degradation assessment.
4. Review the last steam generator operational assessment conducted by the licensee.
5. Review the licensee's condition monitoring assessment.
6. Review the licensee's repair criteria for degraded tubes.
7. Meet with your supervisor, or the person designated to be your resource for this activity to discuss any questions you may have as a result of this activity and to demonstrate that you can meet the evaluation criteria for this activity.

Documentation: ISI Inspector Advanced-Level Signature Card Item OJT-ISI-3

# ISI Inspector Advanced-Level Signature Card

Inspector Name: _____	Employee Initials/Date	Supervisor's Signature/Date
<u>A. Training Courses</u>		
E-306, Nondestructive Examination (NDE) Technology and Codes		
ASME Code Section XI - Inservice Inspection (PD-192)		
ASME Code Section IX – Welding Qualifications (PD-190)		
ASME Practical Welding Technology (PD-359)		
<u>B. Individual Study Activities</u>		
ISA-ISI-1 ASME Code Sections and Code Cases		
ISA-ISI-2 Industry Initiatives for Material Degradation		
ISA-ISI-3 Reactor Pressure Vessel Head Penetrations		
ISA-ISI-4 Boric Acid Corrosion Control		
ISA-ISI-5 Steam Generator Examinations		
<u>C. On-the-Job Training Activities</u>		
OJT-ISI-1 NDE and Welding Inspection	1)	
	2)	
	3)	
OJT-ISI-2 RPVH Penetrations Volumetric Inspection		
OJT-ISI-3 Steam Generator Tube Inspection	1)	
	2)	

Note that for OJT's 1 and 3 there are multiple initials/signature lines. The intent is for the inspector to accompany a minimum of 3 inservice inspections for NDE and Welding activities, and a minimum of 2 steam generator inspections. At least one inspection accompaniment for volumetric examination of RPVH penetrations should be completed.

Note that all training courses are one week, except for E-306, which is two weeks.

Supervisor's signature indicates successful completion of all required courses and activities listed in this training standard.

Supervisor's Signature \_\_\_\_\_ Date: \_\_\_\_\_



Form 1: ISI Inspector Advanced-Level Equivalency Justification

Inspector Name: _____	Identify equivalent training and experience for which the inspector is to be given credit
<u>A. Training Courses</u>	
E-306, Nondestructive Examination (NDE) Technology and Codes	
ASME Code Section XI - Inservice Inspection (PD-192)	
ASME Code Section IX – Welding Qualifications (PD-190)	
ASME Practical Welding Technology (PD-359)	
<u>B. Individual Study Activities</u>	
ISA-ISI-1 ASME Code Sections and Code Cases	
ISA-ISI-2 Industry Initiatives for Material Degradation	
ISA-ISI-3 Reactor Pressure Vessel Head Penetrations	
ISA-ISI-4 Boric Acid Corrosion Control	
ISA-ISI-5 Steam Generator Examinations	
<u>C. On-the-Job Training Activities</u>	
OJT-ISI-1 NDE and Welding Inspection	1)
	2)
	3)
OJT-ISI-2 RPVH Penetrations Volumetric Inspection	
OJT-ISI-3 Steam Generator Tube Inspection	1)
	2)

Note that for OJT's 1 and 3 there are multiple initials/signature lines. The intent is for the inspector to accompany a minimum of 3 inservice inspections for NDE and Welding activities, and a minimum of 2 steam generator inspections. At least one inspection accompaniment for volumetric examination of RPVH penetrations should be completed.

Supervisor's signature indicates successful completion of all required courses and activities listed in this training standard.

Supervisor's Signature \_\_\_\_\_ Date: \_\_\_\_\_

Attachment 1  
Revision History Sheet for IMC 1245 Appendix D-2

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment and Resolution Feedback Resolution Accession Number (Pre-Decisional, Non-Public)
N/A	07/08/09 CN-09-017	Initial issuance	None	ML091590710
N/A	ML15177A330 10/21/15 CN 15-020	This revision updates format and adds training, as "recommended," on ultrasonic examination, eddy current testing, and radiographic examination to more completely define an expert level of knowledge.	None	ML15195A203 Closed FF: 1245D2-1940 ML15078A281