

# NRC INSPECTION MANUAL

IRAB

---

## INSPECTION MANUAL CHAPTER 1245, APPENDIX C2

---

### REACTOR ENGINEERING INSPECTOR TECHNICAL PROFICIENCY TRAINING AND QUALIFICATION JOURNAL

Effective Date: July 1, 2022

## Table of Contents

Introduction .....	1
Required Reactor Engineering Inspector Training Courses .....	1
Engineering Individual Study Activity.....	2
(ISA-ENG-1) Introduction to a Plant Design and Licensing Bases .....	3
(ISA-ENG-2) The NRC’s Review of Temporary and Permanent Plant Modifications.....	6
(ISA-ENG-3) Introduction to 10 CFR 50.59, “Changes, Tests, and Experiments” .....	8
(ISA-ENG-4) Basic Codes, Standards, and Regulatory Guides for Engineering Support.....	10
(ISA-ENG-5) Significance Determination Process .....	18
(ISA-ENG-6) Maintenance Rule.....	21
(ISA-ENG-7) Operability .....	23
Engineering On-the-Job Activity .....	26
(OJT-ENG-1) Design Bases Inspection Activities .....	26
(OJT-ENG-2) Permanent Plant Modifications .....	30
(OJT-ENG-3) Inspection of Licensee Changes, Tests, and Experiments (10 CFR 50.59).....	32
(OJT-ENG-4) Security Plan and Implementation .....	34
(OJT-ENG-5) Radiation Protection Program and Implementation.....	37
Reactor Engineering Technical Proficiency-Level Signature Card and Certification .....	39
Form 1: Reactor Engineering Technical Proficiency-Level Equivalency Justification.....	40
Attachment 1: Revision History for IMC 1245 Appendix C2.....	Att1-1

## INTRODUCTION

Completion of IMC 1245, Appendix A is recommended before beginning activities or courses in this standard, but the trainee's branch chief can override this recommendation based on the trainee's experience. You may complete the General Proficiency requirements contained in Appendix B together with the Technical Proficiency requirements outlined in this journal.

Before signing up for any course, be sure that you have checked and have met any prerequisites.

### Required Reactor Engineering Inspector Training Courses

- Reactor Full Series (either boiling-water reactor (BWR) or pressurized-water reactor (PWR))
  - BWR Series R-304B, R-504B, and R-624B or
  - PWR Series R-304P, R-504P, and R-624P
- Basic Reactor Operations for alternate reactor type
  - R-104P, if you completed the BWR series
  - R-104B, if you completed the PWR series
- Power Plant Engineering (E-110) (In person TTC course or self-study course in the Talent Management System (TMS))
- Design Bases **Refresher** Training Course in TMS as **P**art of ISA-ENG-1
- 10 CFR 50.59 Refresher Training (course 254144 in TMS) as part of ISA-ENG-3
- Maintenance Rule Training Course in TMS as part of ISA-ENG-6

## Engineering Individual Study Activity

## Engineering Individual Study Activity

### (ISA-ENG-1) Introduction to a Plant Design and Licensing Bases

#### PURPOSE:

The purpose of this activity is to assist you in understanding the concepts of design and licensing bases and related documents. As a reactor engineering inspector, you will be required to verify the ability of one or more plant components or systems to perform as intended and as such, it will be necessary to determine the plant-specific licensing and design bases for Structures, Systems, and Components (SSC)s that will be inspected. This activity will assist you in identifying the plant-specific documents as well as the regulatory guidance documents related to the definition, interpretation, and implementation of a plant design/licensing bases. This activity will also introduce you to two NRC Inspection Procedures that are used by inspectors to verify the ability of SSCs to operate as designed and licensed by the NRC.

COMPETENCY AREA:        INSPECTION

LEVEL OF EFFORT:        50 hours

#### REFERENCES:

1. 10 CFR 50.2, "Definitions," Design Bases
2. 10 CFR 54.3, "Definitions," Current Licensing Basis
3. 10 CFR 50.34, "Conditions of License"
4. 10 CFR 50.71(e), "Requirements for Updating the Final Safety Analysis Report Periodically"
5. IMC 0326, "Operability Determinations" (Sections 04.01, 04.03)
6. NUREG-1275, Volume 14, "Causes and Significance of Design- Based Issues at U.S. Nuclear Power Plants"
7. NUREG -1913, "Design Control"
8. Regulatory Guide (RG) 1.186, "Guidance and Examples for Identifying 10 CFR 50.2 Design Bases," December 2000 (ADAMS Accession No. ML003754825)
9. Nuclear Energy Institute (NEI) 97-04, "Design Basis Program Guidelines," Appendix B (ML003771698)
10. 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," Appendix A, "General Design Criteria for Nuclear Power Plants"
11. Generic Letter 95-04, "Final Disposition of Systematic Evaluation Program Lessons-Learned Issues"

12. NRC staff safety evaluation report for a specific plant for the original operating license
13. NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants"
14. Inspection Procedure (IP) 71111.21M, "Design Basis Assurance Teams" and 71111.21N "Design Basis Assurance Inspection Programs"
15. TMS Training Course: "Design Basis Refresher Training"
16. **Selected Plant specific** documents such as:
  - Operating License
  - Tech Specs (TS)
  - Tech Specs Bases
  - Technical Requirements Manual (TRM)
  - Updated Final Safety Analysis Report (UFSAR)
  - Quality Assurance Program Manual (QAPM)
  - Fire Protection Plan (with the Fire Hazards Analysis, or FHA)
  - Emergency Plan (E-Plan)
  - Environmental Protection Plan
  - Cyber Security Plan
  - Security Plan
  - Core Operating Limits Report (COLR)
  - Offsite Dose Calculation Manual (ODCM)
  - NRC Orders (and exemptions that have been granted)

#### EVALUATION CRITERIA:

Upon completion of the tasks in this activity, you will be asked to demonstrate your understanding of the terms design-basis and licensing basis as applicable to a specific plant or to a specific SSC. You should also understand how the design and licensing bases are related to other NRC regulations as well as NRC or industry guidance documents and how the NRC verifies compliance with the plant licensing and design bases while implanting two inspection procedures. You should be able to discuss the following with your supervisor/evaluator:

1. Explain what is meant by the plant licensing bases and define the source documents that are used to develop a plant licensing basis.
2. Explain the term "Design Bases" and define the source documents that are used to develop the design-basis. Provide examples as necessary to explain the following:
  - (a) Design bases functions
  - (b) Design bases values or ranges
  - (c) Design requirements for SSC
  - (d) Information contained in the UFSAR

3. Describe the relationship between the licensing bases and the design bases. Provide an example of a licensing and design bases document. Describe how you would use these documents during an engineering inspection.
4. Explain the relationship between:
  - (a) the plant design bases and 10 CFR 50, Appendix B
  - (b) the design bases and 10 CFR 50.59 (Guidance in NEI 96-07, endorsed by RG 1.187)
  - (c) the design bases and NRC Commitments
5. Explain how the licensee developed and uses their licensee developed Design-Basis Documents. (If applicable for your reference site)
6. Identify how topical design issues (fire protection, flooding, are incorporated into a plant design and licensing bases).
7. Describe how activities outlined in Inspection Procedures (IP) 71111.21M, "Design Bases Assurance Teams" and 71111.21N "Design Bases Assurance Inspection Programs" verify compliance with the plant Design and Licensing bases.
8. Describe what the Systematic Evaluation Program (SEP) was designed to accomplish for plants that were constructed prior to issuance of the General Design Criteria, and how the SEP program may have impacted the plant licensing basis.

#### TASKS:

1. Read the references and complete the course in TMS to understand definitions and applications of design and licensing bases, their **interrelation** and relationships to other licensee documents, NRC regulations and guidance documents as well as industry guidance documents.
2. Select and review two issues documented in recent inspection reports involving design control violations. Identify the licensing bases and design bases as applicable for the SSCs addressed in each finding.
3. Meet with your supervisor, or the person designated to be your resource for this activity, and discuss the items listed under the evaluation criteria and results of the activity under task 2 above.

#### DOCUMENTATION:

Engineering Proficiency-Level Qualification Signature Card Item ISA-ENG-1

## Engineering Individual Study Activity

### (ISA-ENG-2) The NRC's Review of Temporary and Permanent Plant Modifications

#### PURPOSE:

The purpose of this activity is to acquaint you with the activities used by NRC inspectors when they review both temporary and permanent plant modifications installed at power reactor facilities. As a reactor engineering inspector, you will be required to understand how hardware design changes or changes to the operating requirements of a system can potentially impact the plant's design and licensing bases, as well as the performance capability of structures, systems, and components (SSCs). The learning activities obtained in this ISA will support the learning activities in ISA-ENG-3. As such this ISA, and ISA-3 should be performed in parallel or closely together.

COMPETENCY AREAS:      INSPECTION

LEVEL OF EFFORT:          32 hours

#### REFERENCES:

1. NUREG-1397, "An Assessment of Design Control Practices and Design Reconstitution Programs in the Nuclear Power Industry"
2. NEI 96-07, Revision 1, "Guidelines for 10 CFR 50.59 Implementation"
3. IP 71111.17T, "Evaluations of Changes, Tests, or Experiments"
4. IP 71111.18, "Plant Modifications"

#### EVALUATION CRITERIA:

Upon completion of the tasks in this activity, you will be asked to demonstrate your understanding of permanent and temporary plant modifications and the NRC's continuing role in monitoring design changes to power reactor facilities by successfully performing the following:

1. State the NRC's inspection objectives for the reviews of both permanent and temporary plant modifications and indicate why they are important.
2. Discuss the major sections of both permanent and temporary modification documents at your reference site. (Include in your discussion, the purpose(s) of each major Section and what regulatory requirements apply).
3. Discuss how licensees control modifications both before and after implementation, including affected design documents and plant procedures.



4. Define the following terms:

- (d) configuration management
- (e) current licensing bases
- (f) design
- (g) design bases
- (h) design bases document
- (i) design change
- (j) design control
- (k) design margin
- (l) design output
- (m) engineering design bases
- (n) essential design documents
- (o) fully documented and auditable design

5. Explain why the NRC is concerned about agreement between the design change of a modification and the safety evaluation contained in the modification package. Be able to explain the phrase “outside the design bases” and when a licensee must obtain a license amendment for a design change.

6. Identify at least five different changes to a structure, system or component that would comprise the category “permanent plant modifications” and the reason(s) per NEI 96-07, Revision 1, “Guidelines for 10 CFR 50.59 Implementation” **and** why they are classified as such.

7. Name at least five different changes to a structure, system or component that would comprise the category “temporary plant modifications” and the reason(s) per NEI 96-07, Revision 1, “Guidelines for 10 CFR 50.59 Implementation,” **and why** they are classified as such.

8. Identify which Reactor Oversight Program cornerstones are verified by the independent reviews of permanent and temporary plant modifications.

9. List the following:

- (a) types of design documents that may be affected by modifications
- (b) types of plant procedures that could be affected by modifications

TASKS:

1. Read the references in sufficient detail to perform adequately in accordance with the requirements of the evaluation criteria.
2. Meet with your supervisor, or the person designated to be your resource for this activity and discuss the items listed under the evaluation criteria.

DOCUMENTATION:

Engineering Proficiency-Level Qualification Signature Card Item ISA-ENG-2

## Engineering Individual Study Activity

### (ISA-ENG-3) Introduction to 10 CFR 50.59, "Changes, Tests, and Experiments"

#### PURPOSE:

The purpose of this activity is to acquaint you with how to review safety evaluations that are used to determine if a power reactor facility change, test, or experiment requires NRC approval before implementation. As a reactor engineering inspector, you will be required to understand how design changes that involve hardware modifications or different operating requirements can potentially impact the plant's design and licensing bases, as well as the performance capability of safety systems and components. Because the learnings developed in this ISA depended, in part, on the activities outlined in ISA-2 this ISA and ISA-2 should be performed in parallel or closely together.

The purpose of this activity is to do the following:

1. Familiarize you with the NRC regulations governing changes, tests, and experiments for commercial nuclear power facilities.
2. Enable you to demonstrate an ability to conduct an inspection under 10 CFR 50.59, "Changes, Tests, and Experiments," in accordance with IP 71111.17T.

COMPETENCY AREA:        INSPECTION

LEVEL OF EFFORT:        32 hours

#### REFERENCES:

1. 10 CFR 50.59, "Changes, Tests, and Experiments"
2. RG 1.187, "Guidance for Implementation of 10 CFR 50.59, Changes, Tests, and Experiments," November 2000
3. NEI 96-07, Revision 1, "Guidelines for 10 CFR 50.59 Implementation"
4. Regulatory Issue Summary (RIS) 2001-03, "Changes, Tests, and Experiments"
5. RIS 2001-09, "Control of Hazard Barriers" (guidance on the applicability of 10 CFR 50.59 to barriers)
6. Current regional or office guidance for processing potential violations of 10 CFR 50.59
7. IP 71111.17T, "Evaluations of Changes, Tests, or Experiments"
8. IP 71111.15, "Operability Determinations and Functionality Assessments"
9. NEI 97-04, Revised Appendix B, Guidance and Examples for Identifying 10 CFR 50.2 Design Bases

10. TMS Training Course: “10 CFR 50.59 Refresher Training”

11. IMC 0335, “10 CFR 50.59, Changes, Tests, and Experiments”

#### EVALUATION CRITERIA:

At the completion of this activity, you should be able to do the following:

1. State the criteria when a licensee may make changes to the facility or procedures or perform tests or experiments without obtaining prior NRC approval. Identify the 10 CFR 50.59 process owner in NRR.
2. State the meaning of key terms used in this regulation: updated final safety analysis report (UFSAR), changes, facility, procedures, tests, and experiments.
3. Describe when a licensee can apply section 10 CFR 50.65(a)(4) of the Maintenance Rule to perform maintenance, testing or corrective actions in lieu of the requirements of 10 CFR 50.59.
4. Explain when compensatory measures employed to facilitate installation of a temporary or permanent modification may require an analysis per 10 CFR 50.59.
5. Describe the applicable NRC regulation governing when a licensee may make changes to the fire protection program of a facility.

#### TASKS:

1. Review the references listed above.
2. Review at least two recently documented examples of violations of 10 CFR 50.59.
3. Meet with your supervisor and demonstrate your understanding of 10 CFR 50.59, including your ability to satisfy the above evaluation criteria.
4. With the assistance of your training coordinator/supervisor, evaluate two changes, tests, or experiments that were examined as part of an NRC inspection report, to determine why the licensee was able to perform them without prior NRC approval.
5. Complete the 10 CFR 50.59, training course in TMS.

#### DOCUMENTATION:

Engineering Proficiency-Level Qualification Signature Card Item ISA-ENG-3

## Engineering Individual Study Activity

### (ISA-ENG-4) Basic Codes, Standards, and Regulatory Guides for Engineering Support

#### PURPOSE:

The purpose of this activity is to introduce you to the basic NRC codes, Regulatory Guides (RG)s, and associated industry standards commonly used by engineering inspectors. This activity will also acquaint you with the requirements (codes), RGs, and accepted methodologies (industry standards) that licensees may use to accomplish various safety-related activities. Finally, this activity will prepare you to determine an individual licensee's commitment to RGs and standards.

COMPETENCY AREA:        INSPECTION

LEVEL OF EFFORT:        40 hours

#### REFERENCES:

See attached listings of general and discipline-related references.

#### EVALUATION CRITERIA:

At the completion of this activity, you should be able to do the following:

1. State the general code sections commonly used by engineering inspectors and discuss the topics included in these sections.
2. Discuss the relationship between RGs and industry standards.
3. Identify the RGs and associated industry standards that address the quality assurance criteria in Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," in 10 CFR Part 50.
4. Discuss the topics included in the RGs and industry standards associated with your engineering discipline.
5. Discuss how these references are used during engineering inspection activities, and what can or cannot be done if a licensee is not properly following a standard.

#### TASKS:

1. Read Appendix B to 10 CFR Part 50 and review a selected licensee's quality assurance manual. Review a sample of licensee implementing procedures (such as those associated with engineering inspections, design control and corrective action) in accordance with an evaluation criterion to explain how a typical licensee meets the requirements.

2. Review the references in the attached list of general references as well as those listed for your specific discipline.
3. Locate the listing of RGs on the NRC external Web page.
4. Review an UFSAR to identify the licensee's commitments to particular RGs and standards. Discuss what happens if a licensee is implementing a code/standard, but the NRC does not approve/endorse the code/standard in its entirety.
5. Discuss with experienced inspectors any questions you have concerning the topics of the references or their application to inspection activities.
6. Meet with your supervisor to demonstrate your familiarity with the applicable references and discuss how you would apply the references during the conduct of engineering inspection activities.

#### DOCUMENTATION:

Engineering Proficiency-Level Qualification Signature Card Item ISA-ENG-4

#### REFERENCES FOR ISA-ENG-4

Note: The below documents are provided for informational purposes only. Since plants have been built to different requirements, inspectors must first verify that a plant has agreed to follow the below references before applying the documents to a particular licensee.

#### General

10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," Appendix A, "General Design Criteria for Nuclear Power Plants"

10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants"

10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors"

10 CFR 50.49, "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants"

10 CFR 50.55a, "Codes and Standards"

10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants"

<u>RGs</u> <u>(Appendix B to 10 CFR Part 50)</u>	<u>American National Standards</u> <u>Institute (ANSI) Standards</u>
1.28 .....	ASME NQA-1
1.33 .....	ANSI 18.1
1.37 .....	ANSI N45.1
1.38 .....	ANSI N45.2.2B1972
1.39 .....	ANSI N45.2.3
1.30 .....	ANSI N45.2.4
1.94 .....	ANSI N45.2.5
1.116 .....	ANSI N45.2.8
1.54 .....	ANSI N101.4

ANSI/American Nuclear Society (ANS) 58.14, "Safety and Pressure Integrity Classification Criteria for LWR"

RG 1.26, "Quality Group Classifications and Standards for Water, Steam, and Radioactive Waste Containing Components of Nuclear Power Plants"

RG 1.29, "Seismic Design Classification"

RG 1.100, "Seismic Qualification of Electrical and Mechanical Equipment for Nuclear Power Plants"

RG 1.155, "Station Blackout"

RG 1.186, "Guidance and Examples for Identifying 10 CFR 50.2 Design Bases"  
(ML003754825)

NEI 97-04, "Design Bases Program Guidelines," Appendix B (ML003771698)

## Electrical

RG 1.6, "Independence Between Redundant Standby (Onsite) Power Sources and Between Their Distribution Systems" (ML0037739924)

RG 1.30, "Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electric Equipment (Safety Guide 30)" (ANSI N45.2.4/Institute of Electrical and Electronics Engineers (IEEE) 336)

RG 1.32, "Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants" (IEEE 308)

RG 1.40, "Qualification Tests of Continuous-Duty Motors Installed Inside the Containment of Water-Cooled Nuclear Power Plants" (IEEE 334)

RG 1.47, "Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems"

RG 1.53, "Application of the Single-Failure Criterion to Nuclear Power Plant Protection Systems" (IEEE 279 and IEEE 379)

RG 1.63, "Electric Penetration Assemblies in Containment Structures for Light-Water-Cooled Nuclear Power Plants" (IEEE 317)

RG 1.73, "Qualification Tests of Electric Valve Operators Installed Inside the Containment of Nuclear Power Plants"

RG 1.75, "Physical Independence of Electric Systems" (IEEE 384)

RG 1.81, "Shared Emergency and Shutdown Electric Systems for Multi-Unit Nuclear Power Plants"

RG 1.89, "Qualification of Class 1E Equipment for Nuclear Power Plants" (IEEE 323)

RG 1.106, "Thermal Overload Protection for Electric Motors on Motor-Operated Valves"

RG 1.128, "Installation Design and Installation of Large Lead Storage Batteries for Nuclear Power Plants" (IEEE 484)

RG 1.129, "Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Nuclear Power Plants" (IEEE 450)

RG 1.131, "Qualification Tests of Electric Cables, Field Splices, and Connections for Light-Water-Cooled Nuclear Power Plants" (IEEE 383)

RG 1.180, "Guidelines for Evaluating Electromagnetic and Radio-Frequency Interference in Safety-Related Instrumentation and Control Systems"

#### Instrumentation and Control

RG 1.11, "Instrument Lines Penetrating Primary Containment"

RG 1.12, "Instrumentation for Earthquakes"

RG 1.30, "Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electric Equipment" (ANSI N45.2.4/IEEE 336)

RG 1.32, "Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants" (IEEE 308)

RG 1.47, "Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems"

RG 1.53, "Application of the Single-Failure Criterion to Nuclear Power Plant Protection Systems" (IEEE 279 and IEEE 379)

RG 1.62, "Manual Initiation of Protective Actions"

RG 1.63, "Electric Penetration Assemblies in Containment Structures for Light-Water-Cooled Nuclear Power Plants" (IEEE 317)

RG 1.75, "Physical Independence of Electric Systems" (IEEE 384)

RG 1.89, "Qualification of Class 1E Equipment for Nuclear Power Plants" (IEEE 323)

RG 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident"

RG 1.105, "Instrument Set Points" (Instrument Society of America (ISA) S67.04)

RG 1.151, "Instrument Sensing Lines" (ISA S67.02)

Electric Power Research Institute (EPRI) TR-102348, "Guideline on Licensing Digital Upgrades" (ML02080169)

IEEE 7-4.3.2-1993, "IEEE Standard Criteria for Digital Computers in Safety Systems of Nuclear Power Generating Stations"

IEEE 1050-1996, "Guide for Instrument and Control Equipment Grounding in Generating Stations"

IEEE 338-1987, "IEEE Standard Criteria for Periodic Testing of Nuclear Power Generating Station Class 1E Power and Protection Systems"

IEEE 279-1971, "IEEE Standard Criteria for Protection Systems for Nuclear Power Generating Stations"

IEEE 308-2020, "IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations"

#### Mechanical

RG 1.1, "NPSH for ECCS & Containment Heat Removal System Pumps" (Safety Guide 1)

RG 1.9, "Design, Qualification & Testing of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants"

RG 1.26, "Quality Group Classifications and Standards for Water, Steam, and Radioactive Waste Containing Components of Nuclear Power Plants"

RG 1.27, "Ultimate Heat Sink for Nuclear Power Plants"

RG 1.82, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident"

RG 1.84, "Design, Fabrication, and Materials Code Case Acceptability, ASME Section III"

RG 1.85, "Materials Code Case Acceptability - ASME Section III, Division 1" (incorporated into RG 1.84)

RG 1.102, "Flood Protection for Nuclear Power Plants"

RG 1.116, "QA Requirements for Installation, Inspection and Testing of Mechanical Equipment and Systems"

RG 1.137, "Fuel Oil Systems for Standby Diesel Generators"

RG 1.140, "Design, Inspection, and Testing Criteria for Air Filtration and Adsorption Units of Normal Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants"

RG 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1"



RG 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants"

American Society of Mechanical Engineers (ASME) OM CODE(year), "Code for Operation and Maintenance of Nuclear Power Plants" (Section ISI, "Rules for Inservice Testing of Light-Water Reactors"; Subsection ISTA, "General Requirements"; ISTB, "IST of Pumps"; ISTC, "IST of Valves"; Appendix I, "IST of Pressure Relief Devices"; Appendix II, "IST of Check Valves")

ASME OM-S/G-(year), "Standards and Guides for Operation and Maintenance of Nuclear Power Plants"

NUREG-1482, "Guidelines for Inservice Testing at Nuclear Plants"

### Civil

ASME OM CODE-(year), "Code for Operation and Maintenance of Nuclear Power Plants" (Section ISI, "Rules for Inservice Testing of Light-Water Reactors," Subsection ISTD, "Inservice Examination and Evaluation of Snubbers")

American Welding Society (AWS) DI.1, "Structural Welding Code"

American Concrete Institute (ACI) 311, "Recommended Practice for Concrete Inspection"

ACI 318, "Building Code Requirements for Reinforced Concrete"

ACI 349.3, "Evaluation of Existing Nuclear Safety Related Concrete Structures"

ACI 214-77, "Recommended Practice for Evaluation of Strength Test Results of Concrete," 1983

ACI 304R-89, "Guide for Measuring, Mixing, Transporting, and Placing Concrete"

ACI 309R-87, "Guide for Consolidation of Concrete"

ACI 347R-88, "Guide to Formwork for Concrete"

RG 1.12, "Nuclear Power Plant Instrumentation for Earthquakes"

RG 1.35, "Inservice Inspection of UngROUTED Tendons in Prestressed Concrete Containments,"

RG 1.35.1, "Determining Prestressing Forces for Inspection of Prestressed Concrete Containments"

RG 1.59, "Design-Bases Floods for Nuclear Power Plants"

RG 1.60, "Design Response Spectra for Seismic Design of Nuclear Power Plants"

RG 1.61, "Damping Values for Seismic Design of Nuclear Power Plants"

RG 1.76, "Design-Bases Tornado for Nuclear Power Plants"

RG 1.102, "Flood Protection for Nuclear Power Plants"

RG 1.117, "Tornado Design Classification"

RG 1.122, "Development of Floor Design Response Spectra for Seismic Design of Floor Supported Equipment or Components"

RG 1.127, "Inspection of Water Control Structures Associated with Nuclear Power Plants"

RG 1.132, "Site Investigations for Foundations of Nuclear Power Plants"

RG 1.136, "Materials, Construction, and Testing of Concrete Containments (Articles CC-1000, -2000, and -4000 through -6000 of the "Code for Concrete Reactor Vessels and Containments")"

RG 1.138, "Laboratory Investigations of Soils for Engineering Analysis and Design of Nuclear Power Plants"

RG 1.142, "Safety Related Concrete Structures for Nuclear Power Plants"

RG 1.165, "Identification and Characterization of Seismic Sources and Determination Safe Shutdown Earthquake Ground Motion"

RG 1.166, "Pre-Earthquake Planning and Immediate Nuclear Plant Operator Post-Earthquake Actions"

RG 1.167, "Restart of a Nuclear Power Plant Shut Down by a Seismic Event"

ANSI N14.6, "Special Lifting Devices for Shipping Containers Weighing 10000 Pounds or More"

ANSI N45.2.5, "Supplemental QA Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel"

ANSI/ANS 58.2, "Design Bases for Protection of LWR Power Plants Against the Effects of Postulated Pipe Rupture"

ASME Boiler and Pressure Vessel (B&PV) Code, Sections III, V, IX, and XI

#### Metallurgical/Welding

AWS D1.7, "Structural Welding Code"

RG 1.31, "Control of Ferrite Content in Stainless Steel Weld Metal"

RG 1.43, "Control of Stainless-Steel Weld Cladding of Low-Alloy Steel Components"

RG 1.44, "Control of the Use of Sensitized Stainless Steel"

RG 1.50, "Control of Preheat Temperature for Welding of Low-Alloy Steel"

RG 1.54, "Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants"

RG 1.71, "Welder Qualification for Areas of Limited Accessibility"

RG 1.84, "Design and Fabrication Code Case Acceptability"

RG 1.85, "Materials Code Case Acceptability"

RG 1.147, "Inservice Inspection Code Case Acceptability"

RG 1.150, "Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations"

RG 1.178, "An Approach for Plant-Specific Risk-Informed Decision-Making Inservice Inspection of Piping"

EPRI, "PWR Steam Generator Examination Guidelines"

EPRI, "Steam Generator Integrity Assessment Guidelines"

ASME B&PV Code, Sections III, V, IX, and XI

Generic Letter 90-05, "Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping"

#### Industry Standards

Industry standards endorsed by the above RGs

ASME B&PV Code, Sections III, V, and VIII

Engineering Individual Study Activity  
(ISA-ENG-5) Significance Determination Process

PURPOSE:

The Significance Determination Process (SDP), as described in Appendix A to IMC 0609, aids NRC inspectors and staff in determining the safety significance of inspection findings. The SDP outcomes for inspection findings and the performance indicator information are both used as inputs to the power reactor assessment program. The purpose of this activity is for you to gain the requisite knowledge, understanding, and practical ability to use the Significance Determination Process for findings at power.

COMPETENCY AREAS:      INSPECTION  
                                 TECHNICAL AREA EXPERTISE  
                                 REGULATORY FRAMEWORK

LEVEL OF EFFORT:            40 hours

REFERENCES:

1. IMC 0609, "Significance Determination Process"
2. IMC 0609, Attachment 1, "Significance and Enforcement Review Process"
3. IMC 0609, Attachment 2, "Process for Appealing NRC Characterization of Inspection Findings (SDP Appeal Process)"
4. IMC 0609, Attachment 4, "Initial Characterization of Findings"
5. IMC 0609, Attachment 5, "Inspection Finding Review Board"
6. IMC 0609, Appendix A, "The Significance Determination Process (SDP) For Findings At-Power"
7. IMC 0612, "Issue Screening"
8. Site-specific SDP Workspace and Plant Risk Information eBook (PRIB) accessed from the site-specific Standardized Plant Risk Analysis Model
9. IMC 0308, Attachment 3 "Technical Bases for Significance Determination Process "

## EVALUATION CRITERIA:

At the completion of this activity, you should be able to do the following:

1. Explain the purpose, objectives, and applicability of the SDP.
2. Describe and discuss the objectives of the Initiating Events (IE), Mitigating Systems (MS), and Barrier Integrity (BI) cornerstones found in IMC 0612.
3. Process findings using the screening questions for IE, MS, and BI Cornerstones in Attachment 4 to IMC 0609.
4. Define the safety significance and give examples of Green, White, Yellow, and Red findings.
5. Discuss the Significance and Enforcement Review Panel (SERP) and (Issue Finding Review Board) (IFRB) processes and purposes. Discuss the information contained in a SERP package and the inspector's role during the SERP as described in IMC 0609, Attachment 1.
6. Discuss the process for appealing NRC characterization of inspection findings (i.e., the SDP appeal process), as described in IMC 0609, Attachment 2.
7. Explain the relationship between the licensee performance deficiency and the associated degraded condition, and how the SDP examines the risk increase from the degraded condition.
8. Explain why the proximate cause, not the root cause of the performance deficiency, is used to assess significance. Also discuss the importance of the initial inspection effort to correctly characterize the performance deficiency.

## TASKS:

1. Read the referenced section of IMC 0609, with a particular focus on Appendix A. In addition, be aware of other Appendices such as B through M which contain the Significance Determination Process for specific topical areas such as Radiation Protection, Security, Fire Protection and Shutdown Operations.

Go to the Reactor Oversight Process website and review a sample of Green, White, Yellow, and Red findings in the initiating event, mitigating system and barrier integrity cornerstones.

2. In conjunction with your supervisor or training coordinator, locate two Green findings that are applicable to your area of inspection expertise, and perform the following:
  - (a) Describe the nexus between the inspection finding and the degraded condition.
  - (b) Assess the indicated findings using IMC 0609, Attachment 4 and proceed to the applicable Appendix as directed. Describe why the findings were determined to be Green.

- (c) Identify the attributes that would have caused the issue to be greater than Green e.g. extended out of service time, multiple trains impacted, multiple barriers degraded.
  - (d) Reassess the risk assuming these attributes. Do not perform the additional detailed risk evaluation if applicable; however, discuss possible outcomes with a regional Senior Reactor Analyst. Be able to justify your determination.
  - (e) Discuss your results with your supervisor or a qualified inspector.
3. Whenever possible, attend an IFRB and/or a (SERP). If you are unable to attend an IFRB/SERP, review IMC 0609, Attachment 1 and an actual IFRB/SERP package to develop an understanding of the IFRB/SERP purpose, process, and the contents of the IFRB/SERP package. Discuss the rationale for the outcome/resolution of the panel with a qualified inspector.
  4. Meet with your supervisor or a qualified inspector to discuss any questions you may have as a result of this training activity.

#### DOCUMENTATION:

Engineering Proficiency-Level Qualification Signature Card Item ISA-ENG-5

Engineering Inspector Individual Study Activity  
(ISA-ENG-6) Maintenance Rule

PURPOSE:

The NRC requires that licensees operate their facilities in compliance with 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," (i.e., the Maintenance Rule). This activity will provide you with a working knowledge of the Maintenance Rule, including its background, history, and how the industry implements the requirements of the rule.

COMPETENCY AREA:        INSPECTION

LEVEL OF EFFORT:        34 hours

REFERENCES:

1. 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants"
2. Regulatory Guide 1.160, Revision 4, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants"
3. NRC Enforcement Manual, Part II, Section 2.1.10, "Actions Involving the Maintenance Rule"
4. NUMARC 93-01, Revision 4F, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," issued April -2018 by the Nuclear Energy Institute
5. NEI 18-10 Rev 0, "Monitoring the Effectiveness of Nuclear Power Plant Maintenance" issued July 2019
6. Maintenance Rule implementation documents for the facility designated by your supervisor
7. Maintenance Rule SharePoint site: <https://usnrc.sharepoint.com/teams/NRR-Maintenance-Rule>
8. Maintenance Rule Training (web-based) course in TMS
9. Maintenance Rule 2.0 Knowledge Management Training Session in Nuclepedia at: [https://nuclepedia.usalearning.gov/index.php?title=Coordinated\\_Regional\\_%28React%29\\_KM/training\\_Initiative#HQ\\_KM\\_Topics](https://nuclepedia.usalearning.gov/index.php?title=Coordinated_Regional_%28React%29_KM/training_Initiative#HQ_KM_Topics)

## EVALUATION CRITERIA:

At the completion of this activity, you should be able to do the following:

1. For a facility designated by your supervisor, identify which structures, systems, and components (SSCs) are classified as (a)(1), discuss the reason these SSCs are monitored in the (a)(1) status, and describe the recovery plan for each SSC.
2. Discuss the different categories in which SSCs may be scoped by the licensee.
3. Discuss what actions are required if the requirements of various aspects of the Maintenance Rule are not met.
4. Discuss the function and responsibilities of the expert panel.
5. Describe the maintenance rule process changes that NEI 18-10 introduced to the nuclear industry.

## TASKS:

1. Complete the Maintenance Rule Training course in TMS. Discuss the results of the knowledge checks with your supervisor or training coordinator.
2. Obtain a copy of the Maintenance Rule procedures for a facility designated by your supervisor. Review the Maintenance Rule procedures/documents listed in the reference section to become knowledgeable about the criteria listed in the above section.
3. Watch the maintenance rule 2.0 knowledge management session in Nuclepedia/Microsoft Stream.
4. For a site designated by your supervisor, obtain the scoping and performance information for at least one SSCs that is listed as a(1) and one that is listed as a(2) under the maintenance rule. Review how the performance criteria were developed. Compare and contrast the information and discuss the differences with your supervisor or a qualified engineering inspector.
5. Meet with your supervisor or a qualified engineering inspector to discuss any questions that you may have as a result of this activity and demonstrate that you can meet the evaluation criteria listed above.

## DOCUMENTATION:

Engineering Proficiency-Level Qualification Signature Card Item ISA-ENG-6



## Engineering Individual Study Activity

### (ISA-ENG-7) Operability

#### PURPOSE:

This ISA provides an overview of the process that licensee use to ensure structures, systems and components (SSCs) that are described in the technical specifications and credited for safe operation at nuclear power plants are capable of performing their specified safety function. Operability determination is continuous and primarily consists of observations, verification by surveillance testing and assessments of conditions which may impact the performance of a specified safety function. Whenever a condition has a substantive impact on the ability of an SSC to perform its specified safety function licensees should be able to demonstrate to the reasonable assurance standard that the affected SSC will perform the required specified safety function. It is important that NRC operations inspectors can effectively understand the bases for the licensee decision that the SSC remains operable; and that unrecognized increases in risk have not occurred.

This activity will familiarize you with the overall approach for reviewing operability determinations (evaluations) and the reference materials available to assist you in these reviews.

COMPETENCY AREA:        INSPECTION

LEVEL OF EFFORT:        20 hours

#### REFERENCES

1. Regulatory Issues Summary (RIS) 2005-20, Rev 2 "Revision to NRC Inspection Manual Part 9900 Technical Guidance, Operability Determinations & Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety"
2. IMC 0326, "Operability Determinations "
3. Inspection Procedure (IP) 71111.15, "Operability Determinations and Functionality Assessments"
4. Reference or assigned site (licensee) procedures addressing operability determinations
5. Information Notice (IN) 97-78, "Crediting of Operator Actions in Place of Automatic Actions and Modifications of Operator Actions, Including Response Time," dated October 23, 1997
6. Regulatory Issues Summary (RIS) 2001-09, "Control of Hazard Barriers," dated April 2, 2001

7. GL 90-05, "Guidelines for Performing Temporary Non-Code Repair of ASME Code Class 1, 2 and 3 Piping." dated October 10, 1990

#### EVALUATION CRITERIA:

Upon completion of the tasks, you should be able to do the following:

1. Discuss the following terms and provide examples of each:
  - (a) operable/operability
  - (b) presumption of operability
  - (c) substantive functional impact
  - (d) specified function—specified safety function
  - (e) timing of operability determinations
  - (f) single failure
  - (g) consequential failure
  - (h) required support system
  - (i) compensatory measures
  - (j) current licensing bases
  - (k) reasonable assurance/expectation
2. Describe the licensee's process to address operability issues for safety or safety support systems.
3. Describe what the applicable NRC guidance indicates should be included in formal operability determinations.
4. Discuss the actions that should be taken if a licensee is unable to demonstrate equipment operability.
5. Perform the inspection described in IP 71111.15, including effective review of the technical adequacy of an operability evaluation and development of a conclusion on whether the operability is justified.

#### TASKS:

1. Locate the listed references for your facility. **NRC** documents can be located in the Electronic Reading Room on the NRC external Website.
2. Review the references to develop an understanding of the actions specified in the NRC guidance and licensee procedures to be completed when an operability question is identified.
3. Review at least two recently completed operability evaluations involving a risk-significant system, support system, or component. Compare the evaluations to the reference material guidance.
4. Verify that the licensee considered other existing degraded conditions as compensatory measures and determine whether the measures are in place, will work as intended, and are appropriately controlled. Verify that the licensee's intended long-term resolution of any conditions meets the regulatory guidance.

5. Meet with your supervisor or a qualified operations inspector to discuss the operability evaluations. Discuss some questions you could ask to help you verify that the evaluations properly support the operability decision. In addition, discuss any questions that you have as a result of this activity and demonstrate that you can meet the evaluation criteria listed above.

DOCUMENTATION:

Engineering Technical Proficiency-Level Qualification Signature Card Item ISA-ENG -7

Engineering On-the-Job Activity  
Engineering On-the-Job Activity

(OJT-ENG-1) Design Bases Inspection Activities

PURPOSE:

The purpose of this activity is to do the following:

1. Familiarize yourself with activities commonly performed by an inspector while participating as a member of an engineering inspection team.
2. Observe and perform portions of an engineering inspection, as assigned by the team leader, using inspection procedures (IP)s 71111.21M and N.
3. Provide you with the opportunity to locate and identify the design and licensing bases requirements for a risk-significant component and determine if those requirements are met and maintained.

COMPETENCY AREA: INSPECTION

LEVEL OF EFFORT: 80 hours in-office preparation  
200 hours onsite inspection

REFERENCES:

1. Inspection Procedures (IP) 71111.21M, "Design Bases Assurance Teams" and 71111.21N "Design Bases Assurance Inspection Programs".
2. IMC 1245, Appendix A, On-the-Job Activity 5, "Inspection Activities"
3. IMC 0611, "Power Reactor Inspection Reports"
4. Site-specific inspection plan (provided by team leader)
5. Site-specific design-bases documents (e.g., system descriptions, calculations, accident analyses, etc.)
6. Site-specific licensing bases (e.g., UFSAR, technical specifications, license amendments, and license amendment requests)
7. Licensee-provided preparation information (e.g., lists for applicable calculations, equipment history, problem reports, engineering evaluations, modifications, and procedures)
8. OpE gateway: <https://usnrc.sharepoint.com/teams/NRR-operating-experience-Branch>

## EVALUATION CRITERIA:

At the completion of this on-the-job (OJT) activity, you should be able to do the following:

1. Conduct inspection activities using Inspection Procedures (IP) 71111.21M, and 71111.21N
2. Locate and identify design and licensing bases information.
3. Demonstrate your familiarity with the design and licensing bases for the component(s) selected by the engineering team inspection plan by identifying critical parameters, performance criteria and/or program requirements.
4. Demonstrate your ability to identify critical equipment required to achieve the design bases function of the selected system(s) or component(s).
5. Demonstrate your ability to develop an individualized inspection plan for the discipline/component/operating experience/operator action you are assigned from the team inspection plan.
6. Discuss your conclusions regarding the capability of your assigned component(s) to achieve its design and licensing-bases functions. Provide the bases for that conclusion (e.g., evaluations, testing, performance history, etc.).
7. Explain your conclusions regarding the licensee's evaluation and implementation of corrective actions of your assigned operating experience.
8. Discuss your conclusions regarding the implementation of your assigned operator action and whether they can be performed in accordance with the plant's design bases. Provide the bases for that conclusion (e.g. simulator scenario, in plant walkdown, procedure review, etc.)
9. Demonstrate your capability to document your inspection findings consistent with IMC 0611.
10. Demonstrate your familiarity with SDP Group 1, 2, and 3 questions in IMC 0611 for an actual or simulated finding.

## TASKS:

1. Review Inspection Procedures (IP) 71111.21M, "Design Bases Assurance Teams," **and** 71111.21N "Design Bases Assurance Inspection Programs" for an overview of engineering team inspection activities. Discuss with the team lead or a team member, the purpose of the inspections in terms of the following:
  - (a) overall objective for each inspection
  - (b) number of inspectors and their areas of expertise
  - (c) duration of each inspection and the allocated resources
  - (d) how the inspection is risk-informed

2. Reviewing the list of the samples that were selected by the team, describe how the following aspects are addressed:
  - (a) inspection attributes
  - (b) system needs
  - (c) component condition and capability
  - (d) operating experience
  - (e) component inspection activity risk-significant operator actions
3. Develop a list of attributes that addresses the functional and operational capability of a selected component. For operator actions, develop a plan as to how a selected action will be assessed.
4. Perform the tasks listed in IMC 1245, Appendix A, On-the-Job Activity 5, "Inspection Activities," as applied to an inspection focused on Inspection Procedures (IP) 71111.21M, "Design Bases Assurance Teams" and 71111.21N "Design Bases Assurance Inspection Programs".
5. Review previous design and engineering program reports to improve your understanding of the implementation of Inspection Procedures (IP) 71111.21M, "Design Bases Assurance Teams" and 71111.21N "Design Bases Assurance Inspection Programs". Note that certain program inspection activities may require inspectors to obtain specialized training before engaging in full inspection activities. Consult the inspector team leader or your training supervisor regarding specialized training requirements.
6. Review site-specific design and licensing-bases documentation provided during preparation week to become familiar with the design and licensing bases for the components selected for review in the team inspection plan.
7. Develop an individualized inspection plan for the component/operating experience/operator action you are assigned. Determine if any system components have been identified as Operating Experience Smart Samples <https://usnrc.sharepoint.com/teams/NRR-OpE-Smart-Sample>.
8. Identify specific critical equipment required for the safety system to achieve its design and licensing-bases functions.
9. Review available information to determine if equipment is capable of achieving and maintaining its design function. Such information includes vendor manuals, specification documents, maintenance and testing documents, problem identification reports, etc.
10. Based on your inspection activity, assess if the component is capable of meeting its design function.
11. Based on your inspection activity, assess if the licensee's evaluation and implementation of corrective actions of your assigned operating experience was acceptable.
12. Based on your inspection activity, assess if the operator action can be performed in accordance with the plant's design bases.

13. Perform a walkdown of accessible portions of the selected components and its associated system.
14. For at least one observed or simulated finding that is a violation of 10 CFR 50 Appendix B Criterion III "Design Control," apply the SDP to the issue.
15. Meet with your supervisor or a qualified inspector designated by your supervisor and discuss the result of your activities. Each student/trainee shall observe or participate in at least one 71111.21M, "Design Bases Assurance Teams" and one 71111.21N "Design Bases Assurance Programs" inspection

DOCUMENTATION:

Engineering Proficiency-Level Qualification Signature Card Item OJT-ENG-1

Engineering On-the-Job Activity  
(OJT-ENG-2) Permanent Plant Modifications

PURPOSE:

The purpose of this activity is to do the following:

1. Familiarize you with activities commonly performed by an inspector while reviewing permanent plant modifications.

COMPETENCY AREA:        INSPECTION

LEVEL OF EFFORT:        40 hours

REFERENCES:

1. IP 71111.18, "Plant Modifications"
2. Criterion III, "Design Control," in Appendix B to 10 CFR Part 50
3. IMC 0611, "Power Reactor Inspection Reports"
4. ANSI Standard N45.2.11-1974, "Quality Assurance Requirements for the Design of Nuclear Power Plants"
5. NEI 97-04, Revised Appendix B, "Guidance and Examples for Identifying 10 CFR 50.2 Design Bases"
6. IP 71111.21M, "Design Basis Assurance" Teams

EVALUATION CRITERIA:

Complete the activities as outlined in this OJT and meet with your supervisor to discuss any questions you may have as a result of completing this activity. Upon completion of the tasks in this activity, you will be asked to demonstrate your understanding of how to conduct an inspection of plant modifications using **inspection procedures IP 71111.18 and IP 71111.21M** by doing the following:

1. Demonstrate your ability to select modifications for review that are risk significant.
2. For selected modifications, demonstrate your ability to identify the design safety function of the SSC and the design requirements.
3. For each modification, discuss the licensee's approach to assuring that the modification did not adversely impact the design, availability, reliability, or functional capability of the SSC.



4. Demonstrate an understanding of potential risk-significant plant configurations that could occur during modification implementation and identify the licensee's method for addressing them.
5. Demonstrate your ability to document your inspection findings consistent with IMC 0611.

## TASKS

1. For the modifications selected, determine the intended safety function and design requirements for the applicable SSC.
2. For the modifications selected, determine the motivation for the change (e.g., problem report, equipment failure, etc.) and verify that the modification resolved the problem.
3. Review testing and inspection documentation after the modification was installed and verify that the testing was adequate to assure that the functional capability or design function of the SSC was not degraded.
4. Review the plant configuration for modification implementation and testing. Review the licensee's actions to assure that the plant was not placed in a risk-significant configuration.
5. When possible, perform a field walkdown of the SSC modified and determine whether the final condition was designed and installed as stated in the modification documentation.
6. For a change in or substitution of component parts via the procurement or modification process, review equivalency evaluations that validate the adequacy of the replacement part(s).
7. Meet with your supervisor or a qualified inspector designated by your supervisor and discuss the result of your activities.

## DOCUMENTATION:

Engineering Proficiency-Level Qualification Signature Card Item OJT-ENG-2

## Engineering On-the-Job Activity

### (OJT-ENG-3) Inspection of Licensee Changes, Tests, and Experiments (10 CFR 50.59)

#### PURPOSE:

The purpose of this activity is to do the following:

1. Familiarize you with activities commonly performed by an inspector while inspecting licensee changes, tests, and experiments to determine if they may be accomplished before receiving NRC approval.
2. Observe and perform portions of an inspection of changes, tests, and experiments using IP 71111.17T.

COMPETENCY AREA: INSPECTION

LEVEL OF EFFORT: 40 hours

#### REFERENCES:

1. IP 71111.17T, "Evaluations of Changes, Tests, and Experiments"
2. Engineering Individual Study Activity ISA-ENG-3 on 10 CFR 50.59
3. IMC 1245, Appendix A On-the-Job Activity 5, "Inspection Activities"

#### EVALUATION CRITERIA:

Complete the activities as outlined in this OJT activity and meet with your supervisor to discuss any questions you may have as a result of completing this activity. Upon completion of the tasks in this activity, you will be asked to demonstrate your understanding of the baseline IP 71111.17T by doing the following:

1. Demonstrate your ability to satisfy the evaluation criteria of Entry-Level On-the-Job Activity 5, as applied to an inspection focused on IP 71111.17T.
2. Describe the changes, tests, or experiments that you reviewed and your evaluation of the licensee's ability to perform them without prior NRC approval and their effect, if any, on operability.

#### TASKS:

1. Perform the tasks listed in Entry-Level On-the-Job Activity 5, as applied to an inspection focused on the topic of 10 CFR 50.59 (IP 71111.17T).
2. For at least one observed or simulated finding, relating to 10 CFR 50.59, apply the SDP and the traditional enforcement processes.

3. Meet with your supervisor or a qualified inspector designated by your supervisor and discuss the result of your activities.

DOCUMENTATION:

Engineering Proficiency-Level Qualification Signature Card Item OJT-ENG-3

Engineering On-the-Job Activity  
(OJT-ENG-4) Security Plan and Implementation

PURPOSE:

The purpose of this activity is to familiarize you with a typical security plan for a nuclear facility. It will also familiarize you with actions that you should take if you encounter a security issue at a plant site.

COMPETENCY AREA:        INSPECTION

LEVEL OF EFFORT:        12 hours

REFERENCES:

1. Security plan for a selected facility
2. Licensee defensive strategy presentation for your assigned facility
3. 10 CFR Part 73.1, "Purpose and Scope"
4. 10 CFR Part 73.22, "Protection of Safeguards Information: Specific Requirements"
5. 10 CFR Part 73.55, "Requirements for Physical Protection of Licensed Activities in Nuclear Power Plants against Radiological Sabotage"
6. 10 CFR Part 73.58, "Safety/Security Interface requirements for Nuclear Power Reactors"
7. 10 CFR 50.54 "Conditions of Licenses" (p)(1) & (2)
8. IMC 2201, Appendix D, "Facility Status Reviews for Security and Safeguards Inspection Program"
9. 10 CFR 50.54 "Conditions of Licenses" (p)(1) & (2)

Caution: The licensee physical security plan and defensive strategy presentation contain Safeguards Information. Control appropriately in accordance with applicable regional or site requirements.

EVALUATION CRITERIA:

Upon completion of the tasks, you should be able to perform the following:

1. Describe how the site will implement 10 CFR Part 73.55 requirements through the establishment and maintenance of a security organization, the use of security equipment and technology, the training and qualification of security personnel, the implementation of predetermined response plans and strategies, and the protection of digital computer and communication systems and networks.
2. Describe the methods used by the site security force to maintain access control of the owner controlled, protected, and vital areas.
3. Explain the site-specific protective strategy including methods used to detect, assess, interdict, and neutralize threats up to and including the design bases threat of radiological sabotage as stated in 10 CFR 73.1.
4. Describe the requirements for the control and storage of Safeguards Information.
5. Demonstrate the appropriate procedures for escorting visitors and out of the protected and vital areas.

## TASKS

1. Review the references listed above, as appropriate, to develop an understanding of the site security system and how to contact the central or secondary alarm station or security shift supervisor.
2. Conduct a walkdown of the protected and vital areas to identify the various types of intruder-detection equipment used, defensive position locations, and ready room locations.
3. Discuss with a qualified security inspector, engineering inspector or the senior resident inspector at your reference site how the licensee will assess and manage the potential for adverse effects on safety and security, before implementing changes to plant configurations, facility conditions, or security.
4. Tour the central and secondary alarm stations. Discuss the duties and responsibilities of personnel stationed in those facilities with a qualified security inspector or resident inspector at your reference site.
5. Discuss inspector responsibilities related to site security and safeguards with your supervisor or a qualified operations or physical security inspector. Include practical circumstances that you may encounter, such as the loss of a security badge or the identification of an inattentive guard. In addition, discuss any questions that you may have as a result of this activity.
6. Discuss with a qualified NRC security inspector, or senior resident inspector, how licensees assess and manage the potential for adverse effects on safety and security, before implementing changes to plant configurations, facility conditions, or security.
7. Discuss with a qualified security inspector or senior resident inspector, your reference site's protective strategy.

8. Meet with your supervisor or a qualified inspector designated by your supervisor and discuss the result of your activities.

DOCUMENTATION:

Engineering Inspection Proficiency-Level Qualification Signature Card Item OJT-ENG-4

Engineering Inspector On-the-Job Activity  
(OJT-ENG-5) Radiation Protection Program and Implementation

PURPOSE:

The radiation protection program and implementing procedures are intended to ensure adequate protection of worker health and safety from exposure to radiation from radioactive material during routine nuclear reactor operation. Licensee procedures, 10 CFR Part 19, "Notes, Instructions and Reports to Workers: Inspection and Investigations," and 10 CFR Part 20, "Standards for Protection Against Radiation," address the as-low-as-reasonably-achievable (ALARA) program, external exposure, internal exposure, respiratory protection, posting and labeling, survey, and reporting requirements. This activity will provide you with a general understanding of the applicable regulatory requirements, the licensee's radiation protection program, and implementing procedures **and help you comply with licensee and NRC radiological requirements.**

COMPETENCY AREA:        INSPECTION

LEVEL OF EFFORT:        16 hours

REFERENCES:

1. Licensee procedures addressing the implementation of NRC inspections of the radiation protection program
2. Plant technical specifications
3. Plant UFSAR
4. 10 CFR Part 19, "Notices, Instructions and Reports to Workers: Inspection and Investigations"
5. 10 CFR Part 20, "Standards for Protection Against Radiation"
6. RG 8.38, "Control of Access to High and Very High Radiation Areas"
7. Radiation work permits used for NRC inspection activities

EVALUATION CRITERIA:

Upon completion of the tasks, you should be able to perform the following:

1. Describe the following terms and provide examples of each term:
  - (a) unrestricted area
  - (b) controlled area
  - (c) radiological restricted area
  - (d) radiation area

- (e) high radiation area
  - (f) technical specification locked high radiation area
  - (g) very high radiation area
  - (h) hot spots
  - (i) contaminated area
  - (j) hot or discrete particle area
  - (k) airborne radioactivity area
2. Explain the ALARA concept and its application to the performance of radiological work at your reference site.
  3. Describe the plant's overall administrative procedures for control of external, internal, and airborne exposure and its process for implementing the procedures during NRC inspections.
  4. Describe physical and administrative controls for contaminated areas, radiation areas, high radiation areas, technical specification locked high radiation areas, very high radiation areas, and airborne radioactivity areas.

#### TASKS:

1. Locate the listed references for a selected facility.
2. Review the references and licensee procedures to develop an overall understanding of the regulatory requirements and the implementation of the radiation protection program. Review the radiation work permit, which allows a visiting NRC inspector to complete the assigned inspection.
3. During a plant tour, identify at least one of each of the following: contaminated area, radiation area, high radiation area, technical specification locked high radiation area, very high radiation area, hot spots area, and an airborne radioactivity area. Observe the licensee's method of controlling access to each area and the types of radiation detectors used at the site. Understand the limitations of each detector type. i.e. what radiation types (e.g. beta/gamma) the instruments can detect.
4. Review at least one completed set of radiation survey results and explain how you will incorporate the survey results into your inspection activities.
5. Review the licensee procedures for radiation control. Review the actions required of an individual when contamination is detected before leaving a radiation-controlled area.
6. Meet with your supervisor or a qualified engineering inspector to discuss any questions that you may have as a result of these activities and demonstrate that you can meet the evaluation criteria.

#### DOCUMENTATION:

Engineering Inspector Proficiency-Level Qualification Signature Card Item OJT-ENG-5



Reactor Engineering Technical Proficiency-Level  
Signature Card and Certification

Inspector Name:	Employee Initials/Date	Supervisor's Signature/Date
<b>A. Training Courses</b>		
10 CFR 50.59 <b>Refresher Training</b> (course 254144 in TMS)		
Design Bases <b>Refresher</b> Training course in TMS		
Maintenance Rule course in TMS		
Power Plant Engineering (TMS or TTC)		
Reactor Full Series (either BWR or PWR)		
Basic Reactor Operations for alternate reactor type		
<b>B. Individual Study Activities</b>		
ISA-ENG-1 Introduction to a Plant Design and Licensing Bases		
ISA-ENG-2 The NRC's Review of Temporary and Permanent Plant Modifications		
ISA-ENG-3 Introduction to 10 CFR 50.59 Evaluations of Changes, Tests, and Experiments		
ISA-ENG-4 Basic Codes, Standards, and Regulatory Guides for Engineering Support		
ISA-ENG-5 Significance Determination Process		
ISA-ENG-6 Maintenance Rule		
ISA-ENG-7 Operability		
<b>C. On-the-Job Training Activities</b>		
OJT-ENG-1 Design Bases Inspection Activities		
OJT-ENG-2 Permanent Plant Modifications		
OJT-ENG-3 Inspection of Licensee Changes, Tests, and Experiments (10 CFR 50.59)		
OJT-ENG-4 Security Plan and Implementation		
OJT-ENG-5 Radiation Protection Program and Implementation		

Supervisor's signature indicates successful completion of all required courses and activities listed in this journal and readiness to appear before the Oral Board.

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

This signature card and certification must be accompanied by the appropriate Form 1, Reactor Engineering Technical Proficiency-Level Equivalency Justification if applicable. (The electronic signature card, which is located on the Digital City SharePoint website is also acceptable.) Record completion in TMS by sending a request to [TrainingSupportResource@nrc.gov](mailto:TrainingSupportResource@nrc.gov).

Copies to: Inspector  
Supervisor

Form 1: Reactor Engineering Technical Proficiency-Level Equivalency Justification

Inspector Name: _____	Identify equivalent training and experience for which the inspector is to be given credit
<u>A. Training Courses</u>	
10 CFR 50.59 <b>Refresher Training</b> (course 254144 in TMS)	
Power Plant Engineering (TMS or TTC)	
Design Bases <b>Refresher</b> Training course in TMS	
Maintenance Rule course in TMS	
Reactor Full Series (either BWR or PWR)	
Basic Reactor Operations for alternate reactor type	
<u>B. Individual Study Activities</u>	
ISA-ENG-1 Introduction to a Plant Design and Licensing Bases	
ISA-ENG-2 The NRC's Review of Temporary and Permanent Plant Modifications	
ISA-ENG-3 Introduction to 10 CFR 50.59 Evaluations of Changes, Tests, and Experiments	
ISA-ENG-4 Basic Codes, Standards, and Regulatory Guides for Engineering Support	
ISA-ENG-5 Significance Determination Process Reactor Inspection Findings for At-Power Situations	
ISA-ENG-6 Maintenance Rule	
ISA-ENG-7 Operability	
<u>C. On-the-Job Training Activities</u>	
OJT-ENG-1 Design Bases Inspection Activities	
OJT-ENG-2 Permanent Plant Modifications	
OJT-ENG-3 Inspection of Licensee Changes, Tests, and Experiments (10 CFR 50.59)	
OJT-ENG-4 Security Plan and Implementation	
OJT-ENG-5 Radiation Protection Program and Implementation	

Supervisor's Recommendation      Signature/Date \_\_\_\_\_

Division Director's Approval      Signature/Date \_\_\_\_\_

Attachment 1: Revision History for IMC 1245 Appendix C2

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment Resolution and Closed Feedback Form Accession Number (Pre-Decisional, Non-Public Information)
N/A	ML062400496 10/31/06 CN 06-032	To update reference lists and incorporate minor editorial changes. Completed 4 year historical CN search	None	N/A
N/A	ML073530651 01/10/08 CN 08-001	To add G-204 as a post qualification training requirement and to update ISA-ENG-1 and OJT-ENG-1 to reflect the new Component Design Bases Inspection Approach	None	ML073510727
N/A	ML090360461 07/08/09 CN 09-017	Updates ISA-ENG-3 and ISA-ENG-5 and moves post-qualification and refresher training requirements into Appendix D-1. Specifically, ISA-ENG-3 is updated to remove the task to take Web-based 50.59 training that is no longer available on the Web. ISA-ENG-5 is updated to reference the current location of the SDP initial screening criteria.	None	ML091590710
N/A	ML11175A324 12/29/11 CN 11-044	This revision adds ISA-6 on the Maintenance Rule, adds training on the OpE gateway and OpE smart samples to OJT-1, and adds key radiation protection terms to OJT-5.	None	ML11326A208
N/A	ML12251A050 12/19/12 CN 12-029	This revision updates training on the SDP in ISA-5 to reflect recent changes to IMC 0609, "Significance Determination Process." Specifically, references to the At-Power SDP (0609, Appendix A) Phases 1, 2, and 3 were replaced and references and scenarios were updated.	None	ML12290A180
N/A	ML15181A328 10/21/15 CN 15-020	This revision updates format, references in ISA-6 (Maintenance Rule), and removes writing guidance in ISA-5 (SDP), including two scenarios that are out-of-date.	None	ML15195A163

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment Resolution and Closed Feedback Form Accession Number (Pre-Decisional, Non-Public Information)
N/A	ML16301A158 12/19/16 CN 16-034	This revision adds training on 10 CFR 50.59 to ISA-3, updates ISA-5 (SDP) and OJT-4 (security plan) and relaxes the prerequisite (to complete Appendix A before beginning this qualification standard) to a "recommendation" the branch chief can override.		ML16301A347
N/A	ML18047A127 08/23/18 CN 18-029	This revision accounts for the creation of IMC 0611.		ML18065A653 Closed FF: 1245C2-2264 ML18134A020
N/A	ML20112F348 11/09/20 CN 20-061	<p>This revision removed references to obsolete applications and expired websites. It also added a new ISA that introduces engineering inspectors to the concept of Operability. This change also updated the titles of inspection procedures and office instructions. Estimated training hours were adjusted for several ISA and OJT activities based upon feedback received during the review process.</p> <p>The SDP examples contained in ISA-5 were removed. In their place, the ISA will now allow the trainee's supervisor to substitute SDP examples that may be more recent and relevant to an inspector's area of technical expertise.</p> <p>Both ISA-1 and OJT-1 were significantly revised to focus the learning activity in ISA-1 towards understanding the concepts that comprise a plant design and licensing bases.</p> <p>(continued next page)</p>	None	<p>ML20112F453</p> <p>Closed FF 1245C2-2229 ML18134A027</p> <p>Closed FF 1245C2-2246 ML18134A056</p>

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment Resolution and Closed Feedback Form Accession Number (Pre-Decisional, Non-Public Information)
		<p>OJT-4 was updated to reflect changes in the review and assessment of site security programs.</p> <p>Feedback forms 1245C2-2229 and 1245C2-2246 which noted that this training guide did not reflect changes to the engineering inspection program were addressed in this revision.</p>		
N/A	ML21166A347 06/16/22 CN 22-013	<p>This change updated expired websites, added the new names of NRC offices, and updated the qualification card signoff sheet to include the need to update TMS with inspector qualification status. This change also removed a sentence in the introduction section of the document that stated Appendix A had to be completed before commencement of this ISA, since this sentence appeared to conflict with an earlier statement in the document that said such performance could be acceptable.</p> <p>A note was added to ISA-4 to indicate that not all of the references may be applicable to a licensee.</p> <p>A number of adjustments were made to several ISAs and OJTs to clarify and help focus learning objectives.</p>	None	ML21173A076