

**USNRC**

# **INTERNATIONAL REGULATORY DEVELOPMENT PARTNERSHIP**

**IRDP**

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## **TRAINING COURSES, WORKSHOPS, & CONSULTING SERVICES**

In 2008, the United States Nuclear Regulatory Commission (USNRC) established the International Regulatory Development Partnership (IRDP). The goal of IRDP is to assist both countries that have nuclear power programs and countries considering nuclear power programs in their efforts to establish and maintain an effective nuclear safety and security regulatory authority.

The IRDP has successfully developed and delivered training modules covering nuclear power plants (NPPs), research and test reactors (RTRs), and advanced reactor designs (Small Modular Reactors – SMRs). These training modules cover such regulatory program areas as inspections, regulatory reviews, safety management and fundamentals, and regulatory agency infrastructure development. Since 2009, the IRDP program has developed and conducted training courses and workshops covering topics spanning the USNRC licensing

process to specific topics of interest. In general, training courses involve classroom instruction/lectures with small breakout sessions designed to reinforce the lecture material. Workshops are more interactive, which involve a mix of classroom instruction with practical exercises or breakout sessions. Workshops are structured to be less formal with more emphasis on developing an understanding of the presented material. All courses/workshops can be easily modified in scope and duration to meet the individual needs of IRDP members. In addition, the IRDP provides bi-lateral consulting services that cover specific topics-of-interest to the member country and are tailored to be more of a free-flowing exchange of ideas and information, which and may include suggestions or recommendations, if requested. A consultation report is provided to the member country at the conclusion of the consult.

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<b>Inspections</b>	<b>Duration</b>
Construction Inspections	3 days
Vendor Inspections	4 days
Construction and Vendor Inspections (combined)	5 days
Nuclear Power Plant Resident Inspector Role and Inspection Activities	3 - 4 days
<b>Regulatory Reviews</b>	<b>Duration</b>
How to Manage a Regulatory Review	1 day
USNRC Licensing Process	4 days
Reactor Site Application Reviews	4.5 days
Reactor Construction Permit Application Reviews	5 days
Power Uprate Reviews	3.5 days
Environmental Reviews for Nuclear Power Plants	3 days
<b>Safety Management and Fundamentals</b>	<b>Duration</b>
US Industry Codes and Standards	5 days
ASME Operation and Maintenance for Nuclear Power Plants Code	3 days
Fundamentals of Reactor Safety	3 days
Fundamentals of Reactor Regulation	1.5 days
Fundamentals of Reactor Safety and Regulations	5 days
Practical Basics of Civil/Structural, Welding and Non-destructive Examination, Mechanical, and Electrical	3 days
Overview of Computer Codes Used to Review License Applications	4 days
Nuclear Quality Assurance	1.5 days
<b>Regulatory Agency Infrastructure Development</b>	<b>Duration</b>
Nuclear Executive Workshop (NEW)	3.5 days
Probabilistic Risk Assessment	4.5 days
<b>Miscellaneous</b>	<b>Duration</b>
Research and Test Reactors	4 days
RTR Inspections and Inspector Qualification Program	4 days
RTR On-the-Job Inspection Training	4.5 days
Emergency Planning for Research and Test Reactors	3 days
IAEA/USNRC Small Modular Reactors	4 days

# INSPECTIONS

## Construction Inspections

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**Purpose:** This is an introductory course to provide – covers the areas of inspection activities, types of inspections, effective inspection attributes, and documenting inspection results. The construction inspection portion of the course, by the far the largest portion, contains discussions on objectives of construction inspection, key inspection areas, inspection completion milestones, inspection procedures, prevalent areas and recent concerns, prioritization of inspection activities, and training and qualification of inspection personnel.

Another feature of the course is a significant discussion of quality assurance and how it relates to construction inspection activities. The enforcement portion of the course addresses enforcement concepts and principles, associated processes, and assessment and disposition of violations. A number of breakout sessions are included throughout the course to enhance the learning experience and to assess the effectiveness of knowledge transfer.

**Audience:** Regulatory Staff and Management

**Duration:** 3 days

## Vendor Inspections

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**Purpose:** This workshop provides developing regulatory agencies with basic knowledge about regulatory vendor inspections that are performed both for manufacturing and design.

**Scope:** This hybrid course includes information related to vendor inspection extracted from the construction and vendor inspection course, as well as aspects extracted from the Codes and Standards course. A significant amount of new material was added to cover the conduct of vendor inspections. The participant's learning experience about practical aspects of vendor inspections is reinforced through eight exercises where a variety of recent USNRC vendor inspection reports are examined and discussed. Topics covered during the workshop include: Vendor Inspection Principles; Inspector Access; Application of Codes and Standards; Importance of Nuclear Quality Assurance; Planning, Conducting, and Documenting Inspections; Counterfeit, Fraudulent, Suspect Items; and International Initiatives.

**Audience:** Regulatory Staff and Management

**Duration:** 4 days

## Construction and Vendor Inspections (combined)

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- Purpose:** This workshop is similar to the Construction Inspection course and is expanded to cover the area of vendor inspections. Each key training module is followed by a classroom discussion and/or breakout session that reinforces material presented during the workshop.
- Scope:** During this workshop instructors discuss general inspection topics, inspection program development, nuclear quality assurance, construction inspection program attributes, regulatory enforcement, typical construction problem areas and inspection prioritization, new reactor construction experience, vendor inspection protocols, defect reporting for vendors, the Nuclear Procurement Issues Committee, and training and qualification for regulatory personnel. The workshop covers attributes that lead to effective inspections (e.g., qualified inspectors and adequate inspection procedures) and how to develop inspection programs for both nuclear power plant construction as well as regulatory oversight of vendors providing equipment and services for use in the nuclear power plant. During the weeklong workshop, the instructors provided illustrative examples from USNRC inspection related documents.
- Audience:** Regulatory Staff and Management
- Duration:** 5 days

## Nuclear Power Plant Resident Inspector Role and Inspection Activities

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- Purpose:** This workshop provides regulatory agencies with information about the practices of the USNRC Nuclear Power Plant (NPP) resident inspectors and their role and responsibilities for implementing the Reactor Oversight Program inspection activities. For regulatory agencies that have instituted a resident/site inspector function the workshop can be conducted in a benchmarking mode to compare the host regulatory agency and the USNRC NPP resident inspector practices.
- Scope:** This workshop includes detailed presentations and discussions related to the routine inspection and related oversight activities of USNRC resident inspectors. USNRC resident inspector inspection procedures and protocols are presented, including discussions of the bases and evolution of the resident inspector program. The participant's learning experience about practical aspects of resident inspections is reinforced through NPP in-plant and plant simulator walk-downs if access to those facilities can be made available by the host regulatory agency. Topics covered during the workshop include: Overview of the USNRC Resident Inspector Program; Site Inspector Qualifications and Resources; Reports and other documents produced by site inspectors; Working relationships with specialist inspectors/reviewers from headquarters and the inspector's involvement in licensing; Expectations and practices for communication with and reporting to headquarters; USNRC NPP Inspection Manual Chapter 2515 operational inspection program with a focus on the associated baseline inspection procedures typically performed by resident inspectors (Appendix A) and Plant Status resident inspector activities (Appendix D); inspector response to transients/accident/emergency situations and event follow-up USNRC Inspection Procedure (IP) 71153;

Practices for resident inspector attendance at licensee meetings; Activities and procedures for inspections of the main control room (IMC 2515 Appendix D-07); Activities and procedures for inspections of unplanned outages and related IPs 71153 and 71111.20; Activities and procedures for inspections during planned outages and related IPs 71111.20, 71111.19, and 71111.22; preparation for and conduct of in-plant and simulator walkdowns where access to those facilities is coordinated by the host regulatory agency.

Audience: Regulatory Staff and Management

Duration: 3 days – Classroom Training.

4 days – Classroom Training, and benchmarking and facility walk downs.

## REGULATORY REVIEWS

### How to Manage a Regulatory Review

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Purpose: The purpose of this course is to provide a one-day high level perspective on the necessary attributes that must be in place to manage a regulatory review for the siting, safety review, construction and licensing of a nuclear power plant.

Scope: The course will provide executive decision makers the information that they will need to plan, manage, supervise and implement a program that results in the successful completion of a regulatory review needed to license a nuclear power plant. This course will include managing reviews for such topics as site application and preliminary safety analysis report reviews required for a construction permit and will include such topics as Project Management, Document Management, Human Resource Development, Staffing, Training and Qualification, Schedules, Resource Estimates, and the Review Process. The course will be an excellent tool that will allow for more detailed courses to be presented in tandem.

Audience: Senior regulatory management and government officials with limited time and availability to fully attend multiple day courses.

Duration: 1 day

## USNRC Licensing Process

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- Purpose:** This workshop focuses on the USNRC processes and decisions involved in initial licensing and licensing actions during plant operation. It also provides IAEA perspectives. The purpose is to provide the participants knowledge and insights that they can use in developing or enhancing their regulatory infrastructure for NPP licensing.
- Scope:** This workshop focuses on initial licensing such as review and approval of an application to construct or to operate a nuclear power reactor. It describes the processes and activities supporting regulatory decisions during plant operation such as license amendment requests, change of license basis information, exemptions, etc. It addresses the laws, regulations and guidance that typically govern licensing processes and decisions.
- This workshop provides perspectives on development of the human resources necessary to fulfill the regulator's licensing and oversight responsibilities. It describes the roles, responsibilities, and work ethics of regulatory staff in licensing review and oversight. The format of the workshop is a combination of lecture, discussion and exercises. It requires the active participation of the trainees.
- Audience:** Regulatory staff and management
- Duration:** 4 days

## Reactor Site Application Review

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- Purpose:** To familiarize foreign regulatory technical staff with requirements for reactor siting and the technical guidance for review of a site application to determine whether site characteristics are acceptable for placement of a nuclear reactor.
- Scope:** Covers important aspects of siting, including the likelihood and severity of non-seismic natural and man-made hazards, seismic hazards, and the preparation of the emergency plan. It presents basic concepts, detailed regulatory guidance and practical examples, including specific methods for conducting reviews. Particular emphasis is on the risk significant areas such as site flooding hazard, seismic hazards, and the evacuation time estimates. The course is based on US regulations and guidance supported by applicable IAEA standards. Domestic regulatory references include 10 CFR Part 50 (reactors), 10 CFR Part 100 (siting), NUREG-0800 (Standard Review Plan), NRR Review Standard RS-002, applicable USNRC Regulatory Guides and NUREG documents, and several industry standards. The workshop includes an exercise designed to engage participants in a regulatory review of flooding hazards at a recently licensed nuclear power plant.
- Audience:** Regulatory management and technical staff who may become involved in the review of power reactor siting applications.
- Duration:** 4.5 days

## Reactor Construction Permit Application Review

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Purpose:	To familiarize regulatory staff and management with a wide spectrum of technical and regulatory elements, which are incorporated in a construction permit application, and to provide guidance that will assist the staff in performing an effective and efficient review of the application.
Scope:	The course structure is designed to introduce students to basic introductory topics such as: the overall review process, fundamental safety objectives and functions, main safety and radiological acceptance criteria, and general review guidance (including risk-informed review prioritization). Once there is a general understanding of these topics, instruction will expand to include more detailed discussions on key design and safety requirements including defense-in-depth, single-failure criterion, redundancy, and diversity. The course instructors will discuss the scope and methodology employed in probabilistic safety analysis (Levels I and II) and deterministic analysis. Case studies of safety-significant systems with diverse primary safety functions will be used to illustrate system-specific safety-requirements, design features, and key technical issues associated with each system. The workshop will conclude by discussing the subject of safety management, including the quality assurance (QA) program and considerations such as staffing, training, and the adoption of a plant-wide safety culture. Principle references include 10 CFR 50, Regulatory Guide 1.70 and NUREG-0800 (Standard Review Plan). Where appropriate, cross-reference to applicable IAEA documents is provided (e.g., IAEA No. NS-R-1).
Audience:	Regulatory technical staff, licensee staff
Duration:	5 days

## Extended Power Uprate (EPU) Application Review

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Purpose:	To provide an overview of all elements of the USNRC's Review Standard RS-001. The workshop uses examples from one USNRC EPU review (Turkey Point, June 2012) to illustrate how the USNRC performed an actual review using RS-001. The workshop provides resources and background information for future use by a regulatory staff. The workshop describes US operating experience for plants approved for an extended power uprate. The workshop includes class participation on power uprate licensing and RS-001 elements.
Scope:	This course makes extensive use of USNRC written guidance and safety evaluations. Reference materials are provided for use by other regulatory authorities. Instructor insights are augmented by discussions with USNRC staff. The views expressed are based on USNRC information and are enhanced by the extensive experience of the instructors.
Audience:	Regulatory technical staff
Duration:	3.5 days

## Environmental Reviews for Nuclear Power Plants

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**Purpose:** This course is designed to assist IRDP members in understanding the process for evaluation of environmental impacts for new nuclear power plants. In this course, the instructors will discuss the application of environmental laws and guidance to the licensing of NPP in the United States, which includes the U.S. National Environmental Policy Act (NEPA) of 1969 and USNRC's regulation - 10 CFR Part 51. In addition, the instructors will address the range of environmental impacts related to the construction and operation of a nuclear power plant. Students will be instructed on the USNRC processes for performing environmental reviews and for developing environmental reports such as an Environmental Impact Statement (EIS). The instructors will also provide information about guidance from the International Atomic Energy Agency (IAEA).

Course instructors will address the potential environmental impacts from the construction and operation of NPP on the following: land use, water use and quality, aquatic and terrestrial ecology, socioeconomics, environmental justice, cultural and historic resources, meteorology and air quality, radiological effluents, and postulated reactor accidents. In addition, the potential impacts of the nuclear fuel cycle, transportation, and decommissioning on the environment will be discussed so the students have a basic understanding of the environmental impacts over the life cycle of the NPP. The instructors will discuss how to perform the review, the use of acceptance criteria, and the application of monitoring and mitigation measures. The instructors will describe the site selection process, starting with the evaluation of alternatives and concluding with the selection of a preferred alternative - final site selection. The instructors will also lead the participants through a series of exercises to fully understand the environmental review process and the potential environmental impacts for potential sites.

**Audience:** The primary audience of the course includes the management and technical staff of the regulatory agencies responsible for evaluating and reviewing those environmental impacts. This might include staff from the agencies or ministries responsible for regulating nuclear safety and protection of the environment.

**Duration:** 3 days

# SAFETY MANAGEMENT AND FUNDAMENTALS

## US Industry Codes and Standards

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- Purpose:** This workshop provides participants with a working knowledge of Industry Codes and Standards used in the regulatory process with emphasis and insights on the Industry Codes and Standards that are fundamental to the design, fabrication, qualification and testing of systems, structures and components and the regulatory use of industry codes and standards including nuclear quality assurance. The workshop uses animation, quizzes, and exercises to reinforce lecture material.
- Scope:** The scope of this workshop includes a discussion of the process by which Codes and Standards are written, approved and issued. It also describes how Codes and Standards are adopted and used by the USNRC and the mutual benefits to industry and the regulator gained by using Codes and Standards developed by professional societies such as ASME, IEEE and ASCE. The technical content of the course begins with an introduction to fundamental concepts used in the design of nuclear power generating facilities such as, redundancy, diversity and independence and how these principles are addressed by the USNRC in its regulations such as 10 CFR 50, Appendix A, “General Design Criteria for Nuclear Power Plants” and in USNRC Regulatory Guides that endorse specific industry standards. Additionally, the scope of the course includes a discussion of ASME NQA-1, 10 CFR 50, Appendix B, “Nuclear Quality Assurance for Nuclear Power Plants and Reprocessing Facilities.” The course presents an overview of many mechanical, electrical, and civil/structural codes and standards used in the design and operation of nuclear power plants.
- Audience:** Regulatory technical staff and management
- Duration:** 4 days

## ASME “Operation and Maintenance” for Nuclear Power Plants Code

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- Purpose:** Nuclear power plants must have the ability to ensure that components relied on to safely shutdown the reactor, maintain it a safe shutdown condition and mitigate the consequences of an accident are operationally ready to perform their specified safety function(s). Regulatory agencies must also assure that these components are able to perform their specified safety function(s) when required by plant conditions. Compliance with the ASME “Operation and Maintenance for Nuclear Power Plants” Code (OM Code) is required by the US Nuclear Regulatory Commission of all operators of nuclear power plants to provide this regulatory assurance. This workshop describes the OM Code requirements that assure these components are operationally ready to perform their specified function(s) and the limitations and modifications placed on the use of the OM Code by the USNRC.

## ASME “Operation and Maintenance” for Nuclear Power Plants Code (cont’d)

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Scope:	The scope of this workshop begins with an introduction in to the organization of the OM Code, a discussion on the distinction between a Code and a Standard and how they are used by the USNRC and review of the USNRC’s definition of “safety-related.” The workshop also provides insights into the purpose and use of ASME Code Cases by the USNRC and power reactor licensees. Included in the workshop is a detailed discussion of the OM Code requirements for the in-service and preservice testing that provides assurance that pumps, valves, and dynamic pipe restraints, are operationally ready to perform their specified function(s). The course also includes a discussion of the OM Code requirements that address the use of risk insights in the development of an in-service test program. The course concludes with a discussion of the limitations and modifications imposed by the USNRC on the use of the OM Code and how licensees comply with the USNRC requirement that they update their In-service Test Program at 10-year intervals.
Audience:	Regulatory technical staff, project managers, and management
Duration:	3 days

## Fundamentals of Reactor Safety

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Purpose:	This is an introductory course to provide developing regulatory agencies with basic knowledge on reactor safety fundamentals.
Scope:	“Fundamental of Reactor Safety” is an overview of the key technical concepts governing nuclear safety. It includes the basics of radiation and nuclear energy; fundamentals of reactor design and operation; postulated accidents; the potential extent of public health effects, the design and operational safeguards to prevent radiation releases and the provisions for emergency response.
Audience:	Regulatory technical staff
Duration:	3 days

## Fundamentals of Reactor Regulation

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Purpose:	This is an introductory course to provide developing regulatory agency with basic knowledge of the reactor regulatory activities.
Scope:	“Fundamental of Reactor Safety and Regulations” is intended to provide an overview of the approach the USNRC takes to license a NPP, as well as basic concepts associated with NPP safety and regulation. During the week-long workshop, the instructors will provide instruction and exercises that focused on these areas. In regard to reactor safety, the workshop covers reactor safety strategy, how design basis accidents are postulated, and the safety systems and operator actions used to mitigate these accident scenarios. In regard to reactor licensing, the workshop covers the licensing process used by the USNRC to grant a construction permit for an NPP as well as the relevant IAEA guidance on the same topic. The workshop also covers other major licensing activities, safety culture, and specific topics of interest to the regulator in the country where the workshop is presented. During the workshop, the instructors will provide illustrative examples from USNRC experiences.
Audience:	Regulatory staff
Duration:	1.5 days

## Fundamentals of Reactor Safety and Regulations

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Purpose:	This is an introductory course to provide developing regulatory agencies with basic knowledge on reactor safety fundamentals and reactor regulatory activities.
Scope:	“Fundamental of Reactor Safety and Regulations” is intended to provide an overview of the approach the USNRC takes to license a NPP, as well as basic concepts associated with NPP safety and regulation. During the week-long workshop, the instructors will provide instruction and exercises that focused on these areas. In regard to reactor safety, the workshop covers reactor safety strategy, how design basis accidents are postulated, and the safety systems and operator actions used to mitigate these accident scenarios. In regard to reactor licensing, the workshop covers the licensing process used by the USNRC to grant a construction permit for an NPP as well as the relevant IAEA guidance on the same topic. The workshop also covers other major licensing activities, safety culture, and specific topics of interest to the regulator in the country where the workshop is presented. During the workshop, the instructors will provide illustrative examples from USNRC experiences.
Audience:	Regulatory technical staff
Duration:	5 days

## Practical Basics of Civil/Structural, Welding and Non-destructive Examination, Mechanical, and Electrical

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Purpose:	This is an introductory course to provide new regulatory staff with a very basic background in civil/structural, mechanical, electrical, and welding disciplines.
Scope:	This course is designed to provide the audience with a basic understanding of the practical aspects of the civil and structural, welding and nondestructive examination, mechanical, and electrical disciplines. It uses an extensive suite of pictorial viewgraphs and videos, with substantial discussion of practical knowledge that is derived more from hands-on experience of the instructors than from textbooks or a typical university education. Students become familiar with the various types of nuclear power plant equipment, recognizing the equipment, and what function each performs in the nuclear power plant. Sample generic installation checklists are discussed. If a suitable nuclear power plant is available, then this workshop can be augmented to include a plant walk down. This would be a collaborative activity between the host country regulator, the power plant licensee, and the IRDP team. A small group of regulatory staff would have an opportunity to examine typical equipment using facility documentation and if appropriate, observe on-site staff perform their duties.
Audience:	Regulatory technical reviewers, inspection staff, project managers, and other staff who may not have a classical engineering degree
Duration:	3 days

## Overview of Computer Codes Used to Review License Applications

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Purpose:	Nuclear regulatory agencies must maintain the capability to apply technical data and analysis to a wide variety of decision processes. For the most part, these technical issues are dealt with by means of binding regulations, technical guidance documents and engineering codes and standards. In addition, regulators frequently need to apply computer code capabilities to confirm the results of licensee analyses. This workshop describes the ways in which the USNRC applies technical computer codes to enhance the conduct of their regulatory responsibilities.
Scope:	The workshop begins with an overview of the use of technical information in regulatory processes, and how computer codes are used to enhance those processes. There is a discussion and some examples of how computer codes contribute to each type of decision that regulators must make, such as licensing, inspection, enforcement, emergency response and generic issue resolution. The workshop also describes how computer code capabilities are verified, validated and maintained in a useable state. Much of the workshop is focused on the capabilities of eight specific computer codes which are frequently used in the regulatory process and gives examples of how they have been applied. Finally, the workshop provides guidance on how other countries can gain useful access to these codes.
Audience:	Regulatory technical reviewers, project managers, and management
Duration:	4 days

## Nuclear Quality Assurance

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- Purpose:** The purpose of this course is to familiarize participants with the basic concepts of nuclear quality assurance, the importance of quality assurance and how the principles are applied in the various phases of the life-cycle of a nuclear power generation facility including siting, design, equipment procurement, construction, commissioning, and operation.
- Scope:** The scope of this course covers in detail the eighteen criteria in 10 CFR 50, Appendix B, “Quality Assurance” and how they are applied during the life-cycle of a nuclear power generating facility. The scope also covers the evolution of ASME NQA-1 Standard, Nuclear Quality Assurance from the ASME N45.2 series of standards and describes the content of NQA-1. Included in this discussion is how the regulator uses NQA-1, as well as applicants for licenses, licensees, equipment vendors and design organizations. Additionally, the scope of the course includes discussion on ISO-9000, comparison of ISO-9000 provisions with nuclear quality assurance requirements and standards, and applicable IAEA Standards.
- Audience:** Regulatory technical staff
- Duration:** 1.5 days

## REGULATORY AGENCY INFRASTRUCTURE DEVELOPMENT

### Nuclear Executive Workshop (NEW)

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- Purpose:** The Nuclear Executive Workshop is designed for use at meetings of nuclear safety professionals who represent diverse perspectives on the development of regulatory capabilities. The workshop is presented to regulators from several countries in a given region of the world. Workshops within a given country might bring together stakeholders with diverse interests, such as the regulatory agency, the Ministry responsible for development of nuclear energy, the electric utility companies and other industry groups.

The workshop has four objectives:

1. To provide training on the fundamental concepts of nuclear reactor regulation and how they apply to the organization of a regulatory agency.
2. To foster teamwork among organizations with a stake in nuclear regulation.
3. To arrive at a consensus on the best approaches to developing regulatory structures within the local legal framework and cultural norms.
4. To assign action items for executives to work on following the workshop.

## Nuclear Executive Workshop (NEW) (cont'd)

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**Scope:** The workshop runs for three- and one-half days and focuses on development of regulatory capabilities. The topics cover a wide range of issues related to the organization, staffing and training of a regulatory agency, and the development of a regulatory program. In each topic area, there are three types of sessions: training sessions, breakout sessions and general sessions

The training sessions impart information gleaned from regulatory policies and practice in countries with developed regulatory programs. The information imparted in training sessions is supplemented by the distribution of the following guidance documents:

1. G-OI-OS: Generic Guidance on Organizational Structure for a Reactor Regulatory Program.
2. G-OI-ST: Staffing, Training, & Technical Support for Startup of a Reactor Regulatory Program.
3. G-OI-QP: Qualification Program for Reactor Licensing and Inspection Staff.

Training sessions are followed by breakout sessions, in which participants discuss the topics covered in training, formulate views on how they apply this training to their particular cases, and other topics of interest. In the general sessions, the breakout sessions report on their discussions.

Breakout sessions: The central focus of the workshop is on the breakout sessions. There are five breakout sessions during the workshop. The topics for these breakouts follow the lines of the training sessions. General areas of discussion in the five breakout sessions will be as follows:

- Session 1: Legal framework; Phases of oversight
- Session 2: Regulatory concepts; Regulatory functions
- Session 3: Regulatory activities; Organizational structure
- Session 4: Submittal and evaluations; Staffing; Technical support
- Session 5: Training; Staff Qualification

**Audience:** Regulatory, Licensee, other stakeholder decision makers, 10-20 participants.

**Duration** 3.5 days

## Probabilistic Risk Assessment

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- Purpose:** This is an introductory workshop to provide developing regulatory agencies with basic knowledge about probabilistic risk assessments (PRAs). This workshop is based on the USNRC P-105, "PRA Basics for Regulatory Applications" and, in general, is augmented to be applicable to internal regulators. The workshop is designed to be a start at developing PRA expertise and can be supported by a spectrum of follow-on courses.
- Scope:** The PRA Fundamentals Workshop is a 5-day workshop with integrated exercises. The workshop covers PRA fundamentals and highlights associated principles, programs, applications (including risk-informed regulatory applications), and quality. Students are introduced to fundamental PRA concepts including basic PRA terminology and definitions, objectives, limitations, and strengths of PRA.
- The workshop covers the basic structure of an internal and external even Level-1 to Level-3 PRA, the mathematics involved, the spectrum of inputs to a PRA, sources of input information, and the PRA outputs. It provides a healthy perspective of what the outputs do and do not mean. The workshop emphasizes how to apply the outputs in harmony with the results of traditional engineering or deterministic safety assessment for responsible risk-informed decision making. The exercises are designed to encourage student interaction amongst themselves and with the instructors, in order to provide practical involvement from the basic structure level to the application level.
- Audience:** Regulatory Staff and Management
- Duration:** 5 days

# MISCELLANEOUS

## Research and Training Reactors

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- Purpose:** This workshop provides a general familiarity with non-power reactor designs, facilities, licensing, technical specifications, inspection requirements, and current regulatory issues related to research and test reactors (RTRs). It is modeled in part after the 1-week USNRC course R-106, "Research and Test Reactors."
- Scope:** This workshop will cover the different RTR technologies, the purpose and utilization of RTRs, RTR regulation, regulatory reviews, inspections, and emergency planning. It will address all phases of RTR regulation including design, siting, construction, operation, license renewal, and decommissioning. The workshop will review the requirements and development of a facility Safety Analysis Report for a RTR as described in NUREG-1537. RTR emergency preparedness will be discussed including planning, training and action levels. Operator licensing will be reviewed in depth with respect to exam preparation, format and conduct. The workshop will focus on US regulations and guidance, including US codes and standards, but it will also discuss IAEA guidance. Aging issues at US RTRs will be discussed including remedial actions taken. Significant current events or violations that have occurred at US RTRs are reviewed with respect to cause, corrective actions taken and severity as appropriate.
- Audience:** Regulatory staff and management
- Duration:** 4 days

## RTR Inspections and Inspector Qualification Program

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- Purpose:** The purpose of this course is to provide regulatory staff with the requirements, expectations, and qualifications of inspecting research and test reactors in the United States.
- Scope:** This course introduces the unique aspects involved with inspection of RTRs. These facilities differ substantially from traditional nuclear power plants in terms of thermal power, equipment, and risk. As such, inspection programs for RTRs take on a distinct approach in the US. This course provides the audience with information on the foundations (both in law and regulation) and technical justification of this approach. Topics covered include background on the regulatory environment, differences in inspection programs for large (> 2 MWth) and small (< 2 MWth) RTRs (USNRC Inspection Procedures 69001 through 69013), guidance on the conduct of inspections, review of the format of inspection reports, discussion of the process for determining noncompliance and the process for determining the consequence of a violation. Specific examples of the types of records and information reviewed include the emergency plan, procedures, staffing, limiting conditions of operation, radiation protection, review and audits, logs and records, design changes, maintenance, ageing management, and fuel handling.

## RTR Inspections and Inspector Qualification Program (cont'd)

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Also covered is the process for qualification of the inspectors themselves (USNRC Inspection Manual Chapter 1245), including discussion of the mastery of material expected (inspector competencies), the process for on-the-job training, examination, and post-qualification education. Additionally, the course is structured to provide interaction with the audience by roleplaying inspection interviews as well as reviewing fabricated records, the accumulation of which results in an inspection report delivered by the end of the course.

A mock walk down/inspection is performed in collaboration with the local regulator and licensee, if the host country has a research reactor that is available for this exercise. The walk down/inspection is carried out in the same manner as a US RTR inspection including entrance interview, records review, facility inspection, observation of operations (if possible), interviews with staff and exit interview all subject to time permitting.

Audience: Regulatory Staff and Management

Duration: 4 days

## RTR On-the-Job Inspection Training

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Purpose: To provide regulatory staff with an on-site mock inspection at a US RTR.

Scope: Participants will conduct an On-the-Job inspection exercise at a US RTR for a practical application of USNRC inspection protocols for a typical RTR. The participants will implement the assigned portions of USNRC Inspection Procedure (IP) 69001, "Class II Research and Test Reactors." Participants will perform a combination of reactor facility examinations and walk-downs, observations of reactor operations, observations and interviews of facility staff as they carry out their normal duties, review of the facility operating license and implementing facility procedures, and review of selected facility records. At least one violation will be manufactured with the intent that participants will discover it during the course of the inspection.

During the inspection exercise, the IRDP instructors will provide instruction, mentoring, background information, and facilitate interactive dialogues with the participants that will focus on USNRC and RTR facility practices relevant to RTR inspections and regulatory oversight practices.

Audience: Regulatory Staff and Management

Duration: 4.5 days

## Emergency Planning for Research and Test Reactors

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- Purpose:** To provide regulatory staff a basic knowledge and understanding of research and test reactors emergency plans, and emergency planning.
- Scope:** This course introduces the USNRC approach that it takes on emergency plans and emergency planning at research and test reactors, including the necessary provisions for coping with radiological emergencies. The fundamental aspects of the content of emergency plans are reviewed, including relevant guidance documents and standards such as: ANSI/ANS 15.16 Emergency Planning for Research Reactors, which is endorsed by the USNRC in Regulatory Guide 2.6, Emergency Planning for Research and Test Reactors; Appendix E to 10 CFR Part 50; NUREG-0849, USNRCs Standard Review Plan for Review and Evaluation of Emergency Plans for Research and Test Reactors; NUREG-1537, USNRCs Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors, pertaining to content, and the process for making changes as described in 10 CFR 50.54(q).
- In addition, the requirements for implementation of emergency plans at research and test reactors are covered including reviews, drills, inventory, procedures and interfacing with first responders. Examples of typical emergency drills are provided and discussed throughout the course. Differences between research and test reactor and nuclear power reactors are discussed as well as the recognition of the safety-security interface. The workshop will cumulate in a table-top emergency exercise where students will perform the roles and responsibilities of emergency personnel during a hypothetical research reactor radiological emergency/accident.
- Audience:** Regulatory staff, inspection staff, project managers
- Duration:** 3 days

## IAEA/USNRC Small Modular Reactor

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- Purpose:** This introductory workshop is a collaborative effort between the IAEA, USNRC and other international contributors, as appropriate. This workshop provides information on US and international Small Modular Reactor (SMR) designs that are scheduled for near-term licensing by the USNRC and/or international regulatory agency. Advanced reactors are also discussed but at a higher level of detail. The workshop will provide an overview of the SMR reactor technologies and their enhanced safety and security features. In addition, international regulators will be invited to present on their respective licensing process and/or proposed approach for licensing SMRs and advanced reactors in their countries.
- Scope:** This workshop will present information on the current SMR designs that are based on improvements in the presently licensed light-water-reactor (LWR) designs. It will discuss the technical enhancements to the SMR designs that improve safety, security and flexibility in siting and applications. Financial considerations inherent in SMRs will also be discussed to show how they are influencing international demand and markets for SMRs.
- The workshop will also present information on the USNRC licensing processes in 10 CFR Parts 50, the two-step process and 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants,” which incorporates a combined construction and operating license (COL) approach to licensing. It will provide an overview of the environmental and safety reviews necessary for certification of the SMR designs. The USNRC uses a Standard Review Plan (SRP), NUREG-0800, to review licensing applications for reactor designs. The workshop will discuss how NUREG-800 was revised in 2014 to provide general review guidance for SMRs. This licensing overview will also provide information on how the USNRC will use risk-insights, design-specific review standards, existing analytical codes, and industry codes and standards.
- Finally, the workshop will focus on why SMR deployment will be a global enterprise and how it will benefit from international collaboration on providing a framework for effective licensing and regulatory reviews. Discussions will center on what international collaborations are underway to assist in SMR development and licensing.
- Audience:** Regulatory staff and management
- Duration:** 4 days



**Mugeh Afshar-Tous**

Branch Director

USNRC Office of International Programs

NRC-InternationalAssistance@nrc.gov



**Tammy Way**

AdSTM IRDP Director

tammy.way@adstm.com

***[www.irdp-online.org](http://www.irdp-online.org)***