

USNRC

INTERNATIONAL REGULATORY DEVELOPMENT PARTNERSHIP

IRDP

TRAINING COURSES, WORKSHOPS, & CONSULTING SERVICES

NRC established the International Regulatory Development Partnership (IRDP) in 2008. The goal of IRDP is to assist countries considering nuclear power programs in their efforts to establish and maintain an effective nuclear safety and security regulatory authority. Implementation of the IRDP is supported by Advanced Systems Technology and Management (AdSTM, a contractor to NRC).

AdSTM has successfully developed and delivered various training modules for IRDP members that covers Nuclear Power Plants (NPPs) and Research and Test Reactors (RTRs) in regulatory program areas of Inspections, Regulatory Reviews, Safety Management and Fundamentals, Regulatory Agency Infrastructure Development and more. AdSTM staff of experienced nuclear professionals, consisting of former NRC managers, senior nuclear industry professionals, and academia,

are highly qualified to provide expert leadership and consultation services in all regulatory program areas; and reactor designs including advanced reactors. The table below shows a list of courses and workshops that AdSTM has developed/delivered on behalf of the US NRC since 2009. In general, training courses involve formal classroom instruction/lectures with breakout sessions designed to reinforce the lecture material. Workshops typically 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. AdSTM's provides bi-lateral consulting services that cover specific topics of interest to the member country and are a more free-flowing exchange of ideas and information.

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Inspections	Duration
Construction Inspections	3 days
Construction and Vendor Inspections (combined)	5 days
Vendor Inspections	4 days

Regulatory Reviews	Duration
How to Manage a Regulatory Review	1 day
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

Safety Management and Fundamentals	Duration
US Industry Codes and Standards Workshop	5 days
Nuclear Quality Assurance	1.5 days
Fundamentals of Reactor Safety (FORS)	2 to 3 days
Fundamentals of Reactor Regulation (FORR)	1.5 days
Practical Basics of Civil/Structural, Welding and Non-destructive Examination, Mechanical, and Electrical	2 days
Overview of Computer Codes Used to Review License Applications	1 to 2 days

Regulatory Agency Infrastructure Development	Duration
Nuclear Executive Workshop (NEW)	3.5 days
Probabilistic Risk Assessment	4.5 days

Miscellaneous	Duration
Fukushima Lessons Learned	1 Day
Research and Test Reactors (RTR)	4 days
RTR Inspections and Inspector Qualification Program	3.5 days
Small Modular Reactors (SMR)	4 days

INSPECTIONS

Construction Inspection

- Purpose:** This is an introductory course to provide developing regulatory agencies with basic knowledge about regulatory inspections with an emphasis on construction inspection.
- Scope:** This course discusses inspections in general with an emphasis on construction inspection and includes a discussion on enforcement. Inspection in general 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

Construction and Vendor Inspection Workshop

- Purpose:** This workshop is similar to the Construction Inspection course and is expanded to cover the area of vendor inspections. Each training session is followed by a participant breakout session that reinforces material presented during the workshop.
- Scope:** During this workshop instructors discuss nuclear quality assurance, construction inspection program attributes, regulatory enforcement, vendor inspection protocols, defect reporting for vendors, 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 Nuclear Regulatory Commission inspection related documents.
- Audience:** Regulatory Staff and Management
- Duration:** 5 days

Vendor Inspection Workshop

- 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

REGULATORY REVIEWS

How to Manage a Regulatory Review

- 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

Licensing Process Workshop

- Purpose:** This workshop focuses on the NRC 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:** New regulatory staff and management
- Duration:** 4 to 4.5 days

Reactor Site Application Review

- 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 reliability of off-site power, seismic hazards and the evacuation time estimates. The course is based on US regulation and IAEA standards. Domestic regulation references include 10CFR part 100, NRR Review Standard RS-002, applicable US NRC RGs and NUREGs, and ASCE/SEI standard.
- Audience:** Regulatory technical staff
- Duration:** 4.5 days

Reactor Construction Permit Application Review

Purpose:	To familiarize regulatory staff and management with the 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:	Introductory topics include the overall review process, documents to be reviewed, key references, fundamental safety objectives and functions, main safety and radiological acceptance criteria, definition of plant operational conditions, and general review guidance (including risk-informed review prioritization). This is followed by a discussion of key generic design and safety requirements including defense-in-depth, single-failure criterion, redundancy, diversity, design for internal and external hazards, utilization of codes and standards, and equipment qualification. A comprehensive treatment of the scope and methodology employed in probabilistic safety analysis (Levels I and II), severe accident analysis, and deterministic analysis is then provided. A discussion of the various classifications assigned to safety-related equipment follows. Several case studies of highly safety-significant systems with diverse primary safety functions are then used to illustrate system-specific safety-requirements, design features, and key technical issues associated with each system. In conclusion, the subject of safety management is addressed, including the quality assurance (QA) program, the various sub-programs which comprise the overall QA program, and considerations such as staffing, training, and the adoption of a plant-wide safety culture. Principle references include 10 CFR 50 and NUREG-0800 (SRP). Other references: NUREG/CR-6042, Reg. Guide 1.70, IAEA No. NS-R-1, etc.
Audience:	Regulatory technical staff, licensee staff
Duration:	5 days

Extended Power Uprate (EPU) Application Review

Purpose:	To provide an overview of all elements of the NRC's Review Standard RS-001. The workshop uses examples from one NRC EPU review (Turkey Point, June 2012) to illustrate how the NRC 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:	In developing this workshop AdSTM made extensive use of NRC written guidance and safety evaluations. Reference materials are provided for use by other regulatory authorities. AdSTM staff insights are augmented by recent discussions with NRC staff. The views expressed are based on NRC 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

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 nuclear power plants in the United States (U.S), which includes the U.S. National Environmental Policy Act (NEPA) of 1969 and NRC'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 U.S. Nuclear Regulatory Commission (NRC) 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 Workshop

Purpose: This workshop covers the regulatory use of industry codes and standards, nuclear quality assurance, and then describes the major mechanical, electrical, I&C, and civil/structural codes and standards. The workshop uses animation, quizzes, and exercises to reinforce lecture material.

Scope: The scope of this workshop covers the process by which Codes and Standards are written, approved and issued. It also describes why industry and the regulator use Codes and Standards. 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 in 10 CFR 50, Appendix A, "General Design Criteria." Additionally, the scope of the course includes a discussion of ASME NQA-1, "Nuclear Quality Assurance" and many mechanical, electrical, and civil/structural codes and standards.

Audience: Regulatory technical staff and management

Duration: 5 days

Nuclear Quality Assurance

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, 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 and applicable IAEA Standards.

Audience: Regulatory technical staff

Duration: 1.5 days

Fundamentals of Reactor Safety

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:	2 to 3 days

Fundamentals of Reactor Regulation

Purpose:	This is an introductory course to provide developing regulatory agency with basic knowledge of the reactor regulatory activities.
Scope:	“Fundamentals of Reactor Regulation” covers the basic concepts governing effective nuclear safety regulation. It includes concepts such as the safety responsibility of nuclear operators, the independence of the regulator, the functions of a regulatory body and activities of the regulatory staff. It describes the types of documents that are submitted by applicants and licensees and the types of review the regulators will conduct.
Audience:	Regulatory staff
Duration:	1.5 day

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

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 an understanding of the practical aspects of the civil and structural, welding and nondestructive examination, mechanical, and electrical disciplines. It uses an extensive amount of pictorial viewgraphs with substantial discussion of practical knowledge that is derived more from experience than from textbooks.
Audience:	Regulatory technical reviewers, project managers, and other staff who may not have a classical engineering degree.
Duration:	2 days

Overview of Computer Codes Used to Review License Applications

Purpose:	This course will present the basic types of analysis performed by regulatory staff in reviewing license applications, e.g., thermal-hydraulic, neutronic, containment analyses, atmospheric dispersion, etc. It will discuss the types of codes used and approaches for regulatory review and/or independent analysis. It would include meaningful examples.
Audience:	Regulatory technical reviewers, project managers, and management
Duration:	1-2 days

REGULATORY AGENCY INFRASTRUCTURE DEVELOPMENT

Nuclear Executive Workshop (NEW)

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:

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

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:

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

Nuclear Executive Workshop (cont'd)

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 Workshop

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 NRC 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 Probabilistic Risk Assessment (PRA) Fundamentals Workshop is a 4.5-day workshop with an integrated exercise and exam. The workshop covers PRA fundamentals and highlights associated principles, programs, applications, and quality. Students are introduced to fundamental PRA concepts including the definition of risk approaches to risk assessment (PRA and other approaches) basic PRA terminology, objectives, limitations, and strengths of PRA.

The workshop covers the basic structure of a PRA, the mathematics involved, the spectrum of inputs to 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. The exam review, which includes interactive oral presentations by the students, further contributes to their developing knowledge and application of PRA.

Audience: Regulatory Staff and Management

Duration: 4.5 days

MISCELLANEOUS

Fukushima Lessons Learned

- Purpose:** This workshop provides information on the accident at the Fukushima Daiichi Nuclear Power Plant complex that occurred in March of 2011, and the follow-up activities by the US Nuclear Regulatory Commission (NRC) to study the accident, and to obtain the lessons learned in order to make appropriate regulatory changes in the NRC requirements and oversight of the US nuclear power industry.
- Scope:** This workshop will provide an overview of the sequence of events, and discuss the activities and recommendations made by the NRC “Near Term Task Force” that was activated to provide the Commission recommendations as to what regulatory changes should be considered for US requirements. In addition, the Commission decisions as to how the recommendations would be dispositioned, and the status of implementation of new requirements will be discussed, including the initiatives of the US nuclear industry to meet the new requirements. The workshop will allow time for questions and discussion of how the US decisions may or may not be valid for consideration by the country or countries participating in the workshop.
- Audience:** Regulatory staff and management
- Duration:** 1 day

Research and Training Reactors Workshop

- Purpose:** This workshop provides a general familiarity with non-power reactor designs, facilities, equipment, operating characteristics, technical specifications, inspection requirements, and current areas of concern to the NRC. It is modeled in part after the 1-week NRC course R-106, “Research and Test Reactors.”
- Scope:** This workshop will cover the history of research and test reactor (RTR) development, different RTR technologies, the purpose and utilization of RTRs, RTR regulation, regulatory reviews, inspections, and possibly some security aspects. It will address all phases of RTR regulation including design, siting, construction, operation, license renewal, and decommissioning. The workshop will focus on US regulations and guidance, including US codes and standards, but it will also discuss IAEA requirements and guidance.
- Audience:** Regulatory staff and management
- Duration:** 4 days

RTR Inspections and Inspector Qualification Program

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 provides an introduction to the unique aspects involved with inspection of research and test reactors (RTR). 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 United States. 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 (NRC 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 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. Also covered is the process for qualification of the inspectors themselves (NRC 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.
Audience:	Regulatory Staff and Management
Duration:	3.5 days

IAEA Small Modular Reactor (SMR) Workshop

Purpose:	This introductory workshop is a collaborative effort between the IAEA, NRC and other international contributors, as appropriate. This workshop provides information on U.S. and international SMR designs that are scheduled for near-term licensing by the NRC 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.

IAEA Small Modular Reactor (SMR) Workshop (cont'd)

The workshop will also present information on the NRC licensing process in 10 CFR Part 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 NRC 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 NRC 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



Jack Ramsey

USNRC IRDP Manager
Jack.Ramsey@nrc.gov



Sergey Katsenelenbogen

AdSTM Sr. Vice President
sergey.k@adstm.com

Tammy Way

AdSTM IRDP Director
tammy.way@adstm.com

www.irdp-online.org