

Presentation 5.6 Role of different learning techniques at PNRA

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Regional Meeting on the

Management of Training Systems for Nuclear and Radiological Safety

6-10 November 2023, Philippines





This presentation will describe:

- Different learning techniques (other than classroom training) available for the capacity building of regulatory staff
- The role of learning techniques for following three types of regulatory professionals at PNRA :
 - Nuclear and radiation safety inspectors
 - Nuclear safety licensing specialists
 - Nuclear and radiological safety reviewers and assessors



Role of other learning techniques (other than formal training course / workshop) at PNRA



Other Learning Techniques

- PNRA is benefiting from various learning techniques other than class room training as follows:
 - Training at local organizations
 - Attachment with NPP Operation group
 - Bilateral arrangement with vendor country China
 - Government funds through various public sector development projects (SNRS, NSAP, CNS, DAPP Project)
 - IAEA TC Projects scientific visits and fellowships arranged for competence development
 - IAEA Pakistan Nuclear Security Cooperation
 Program for capacity building



Stakeholders for other Learning Techniques

- In this presentation, we will focus on the competence development of following specialists through other learning techniques:
 - Safety Inspectors
 - Licensing Specialists
 - Safety Assessors

CB of Nuclear Safety Inspectors (1/2)

- An authorized inspector is required to possess a valid inspector card
- The criteria for issuance of inspector card include:
 - Participation in at least two major inspections (operating plants like periodic inspections, QA, waste, RFO, Drills), under the supervision of authorized inspectors during construction, manufacturing, commissioning and operation phases of NPP.
 - Participation in at least ten general surveillances inspections (like MCR visits, floor visits) under the supervision of authorized inspectors during constructions, manufacturing, commissioning and operation phases.



- The supervisor provides continuous guidance, coaching, mentoring and other instructions to the candidate
- A panel including Director General (Inspection & Enforcement) conducts interview of the candidate
- Inspector card is issued on the best performance of the candidate in the interview
- So, PNRA is fully utilizing the methodology of coaching, mentoring, OJT, work review, observation, interview for grooming of the nuclear safety inspector



- The criteria for issuance of inspector card to a Research Reactors (RRs) Inspector include:
 - Participation in at least two major inspection, under the supervision of an authorized inspector during construction, manufacturing, commissioning and operation phases of RRs
 - Participation in at least ten general surveillance inspections under the supervision of an authorized inspector during construction, manufacturing, commissioning and operation phases RRs.



- The criteria for issuance of inspector card to Radiation Safety Inspector includes participation under the supervision of authorized inspectors in:
 - 30 regulatory inspections of the diagnostic facilities like, X-ray, Angiography, Mammography, Fluoroscopy, CT Scan etc.
 - O5 regulatory inspections in Radiotherapy (Brachytherapy, Teletherapy, LINAC etc).
 - 10 regulatory inspections of the Irradiators, industrial Radiography, Oil Well Logging, Nuclear Gauge etc.

CB of Physical Protection Inspectors

- The criteria for issuance of inspector card to Physical Protection Inspector includes performing of following inspections under the supervision of authorized inspector:
 - 6 inspections on physical protection of nuclear power plants or research reactors.
 - 10 inspections on physical protection of radiation facilities having Cat 1 radioactive sources.



CB of Licensing Specialists (1/3)

- The Directorate of Nuclear Safety (NSD) is responsible for the development of regulatory framework, licensing / authorization of nuclear installations, manufacturers of nuclear safety class equipment and service providers (NDT).
- NSD has developed its on-job orientation program for new team members. The main features of this learning program include:
 - Self-study of various modules, and
 - Rotation among different working groups.



CB of Licensing Specialists (2/3)

Self-study is comprised of five modules:

- Module-I is on NSD management system
- Module-II is on regulatory framework related to nuclear installations and regulatory functions
- Module-III is on format and contents of major licensing submissions (like SARs, Programs...)
- Module-IV is on periodic reports those issued by the licensees as well as issued by NSD
- Module-V is on inspection process and codes related to equipment manufacturers and service providers



CB of Licensing Specialists (3/3)

- Rotation among different groups the concerned officer is required to work in different groups within NSD to familiarize with routine working
- The officer is interviewed at the end by a panel of Director and group heads
- Good performance in the interview is a pre-requisite for placement in a certain group
- So the methodology of self-study, coaching, mentoring, interviews and observation is being utilized for the capacity building of the licensing specialists.



CB of Safety Assessors (1/2)

- PNRA has established in-house TSO called Center for Nuclear Safety (CNS) which is responsible for review and assessment of licensing submissions (SAR) and other supporting technical documents
- It also performs audit calculations of deterministic and probabilistic safety analysis, severe accident, tsunami/ seismic/ structure and stress analyses
- A new team member is required to work for 3-4 years to develop thorough understanding of regulatory framework, safety codes and standards, PSA and computer codes
- The candidate also performs self-study in parallel along with experienced team members.
- The candidate provides assistance to group head or senior team member during review and assessment activities



- After working for 3-4 years, the candidate may be placed as a member of the review team engaged in major licensing submission e.g. Safety Analysis Report (SAR).
- Thus, on the Job learning program for a new team member of TSO comprised of a mix of coaching, mentoring, interviews, supervised work performance, reviews, observation
- This CB program has enabled PNRA assessors to conduct review and assessment of C-series and Kseries plants, designers, manufacturers and service providers without any external support.



C.B via Attachments at plant site and simulator

- PNRA has made agreement with NPP licensee for attachment of its officers with various groups for CB
- Licensing specialists, safety assessors and inspectors are placed with different divisions of the NPP operating organization
- During construction activities they gain technical knowledge, during RFOs they see fuel loading/ unloading activities, they observe overhauling of RCP, NDT of SGTs, etc.



C.B via Attachments at plant site and simulator

- Some officers were attached with plant operation group to complete an initial 8-week simulator training
- They were then attached with the licensed operation crew for a period of 3 years to undergo plant operation training
- Few officers qualified for the award of operation license
- This was noted by the IRRS mission to Pakistan in 2014 as a good practice which states as:

"3 to 4 PNRA inspectors are well trained on the simulator along with the licensed operators. This type of training could be an example for other countries"

This has enabled PNRA to conduct licensing examination of NPP operating personnel



Attachments at medical centers

- Some officers responsible for licensing, inspection, and safety assessment of radiation facilities were attached with medical centers for on-job training
- Health Physicists are attached with NMCs for at least 3 months during final semester at Master studies to observe day to day activities being performed for patient treatment
- Some officers conduct R&D in NMCs



Training Arrangements at Local Institutes and Organizations



Local Institutes / Organizations

- Directorate of Human Resource Development (HRD) is responsible to keep liaison with local institutes / organizations for trainings
- Specialized technical training has been arranged in few institutes for inspectors, licensing specialists, safety assessors.
- These institutes include Pakistan Welding Institute (PWI), National Center for Non-Destructive Testing (NCNDT), PIEAS, KINPOE, Pakistan Institute of Management (PIM), Secretariat Training Institute (STI).



Bilateral Cooperation with Vendor Country



- In 1986, the Govt of Pakistan signed an agreement with Chinese Govt for cooperation in nuclear safety including:
 - Exchange of technical information
 - Holding of symposiums and seminars
 - Exchange and training of scientific and technical personnel
 - Award of fellowships to scientists and engineers

This was a very important step taken by the GOP to support the nuclear safety infrastructure in Pakistan



In December 1991, Pakistan and China signed an agreement to construct 325 MWe NPPs in Pakistan.

- NNSA/NSC (Nuclear Safety Centre) assisted DNSRP in:
- Arranging training courses for manpower in nuclear safety in Pakistan and China
- Placement of manpower at NSC for training on how to review and assess the PSAR
- Joint review and assessment of PSAR
- Placement of NSC inspectors at CHASHMA site during construction, installation and commissioning for joint surveillance



- Participation of NSC experts along with DNSRP at manufacturing facilities in China for inspection
- In 1997, the agreement between DNSRP and NNSA of China was extended for further five years
- In 2004, the technical support centre of PNRA and NSC signed an agreement for exchange of information and cooperation in nuclear safety and radiation protection.
- Under this agreement, NSC provided technical consultation and services to PNRA in review and inspection activities.



- In 2006, PNRA invited NNSA to conduct peer review of its technical support capabilities.
- A number of PNRA officers have benefitted from fellowships in different regulatory areas at NNSA through workshops / training courses organized in China
- This also include meeting on post Fukushima actions and sharing of knowledge and review experience of new nuclear power plants in China.



C.B through Vendor country

- PNRA signed a Memorandum of Understanding (MoU) for scientific and technical cooperation with:
 - National Nuclear Safety Administration (NNSA)/ Nuclear Safety Centre (NSC), and
 - China Nuclear Power Operation Technology Corporation Ltd. (CNPO)
- These organizations arrange trainings, workshops and provide placement opportunities for capacity building of PNRA officials in areas of regulatory interest.
- During the last 20 years, a number of PNRA officials have enhanced their competencies through such programs.



- In 2008, PNRA signed agreement with CNPO for the construction of scale down physical models of nuclear power plant components and to provide trainings to PNRA personnel in different areas of regulatory oversight (ISI)
- In March 2013, PNRA signed a new long-term cooperation agreement with CNPO for cooperation in training, consultation, scientific research, information exchange, development and technical support for nuclear power plant safety.



C.B through Vendor country

CNPO provided scale down models of NPP components like, RPV, Steam generator, PZR, fuel assembly and reactor coolant pump





Cooperation with IAEA



IAEA Comprehensive National Technical Cooperation Project

- The International Atomic Energy Agency (IAEA), under its TC program, supports Member States in the capacity building in regulatory domain through organizing trainings/workshops, fellowships, scientific visits.
- PNRA utilise these opportunities for the competence development of its employees.
- PNRA is benefiting from the IAEA ongoing National TC project "National Technical Cooperation Project PAK-2007: Strengthening and Enhancing Capabilities of Pakistan's National Institutions to Support a Safe, Reliable and Sustainable Nuclear Power Program".





- PNRA recognizes the importance of other learning techniques for the capacity building of its manpower
- PNRA has put in place comprehensive national and international arrangements for continuing specialized training of regulatory professionals
- These techniques have been very beneficial for enhancing its regulatory competence to perform functions like inspections, licensing, review and assessment
- These efforts have helped PNRA in taking its stature high