

#### **Pakistan Nuclear Regulatory Authority**

# Presentation 5.3 Management of Training Programs at PNRA

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Regional Meeting on the
Management of Training Systems for Nuclear and Radiological
Safety
6-10 November 2023, Philippines



#### **Outline**

 Formal training schemes (initial and specialized) for different job positions in PNRA

 Formal training requirements identified as prerequisites for various job positions at PNRA

Updates in content of training and refresher training



# Training Schemes (Initial and Specialized) for different Job Positions



### **Competence Needs Assessment**

- PNRA carried out Competence Needs Assessment of its employees in 2005, 2011. It has been repeated recently.
- Around fifty training courses were identified in core regulatory competencies, during these TNA studies.



#### **Directorate of Nuclear Safety (NSD)**

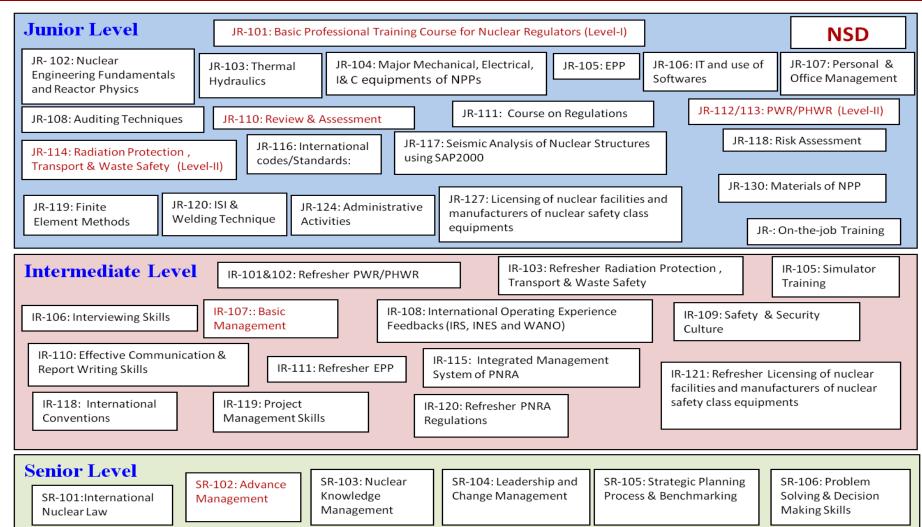
#### NSD is mainly responsible for licensing/ authorization of

- nuclear installations (NPPs)
- manufacturer of nuclear safety class equipment activities and
- Designer, service providers (NDT)
- Establishing and maintaining regulatory framework for regulating the above areas
- Review and assessment of licensees' submissions
- Inspections and enforcement of manufacturers of nuclear safety class equipment

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# **Training Program for NSD**





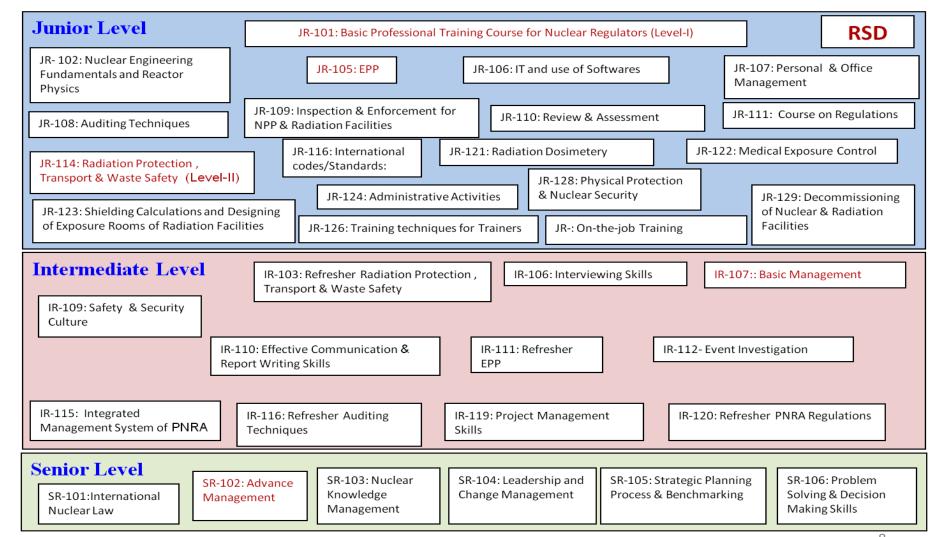
#### **Directorate of Radiation Safety (RSD)**

#### **RSD** is mainly responsible to

- Establish and maintain regulatory framework for radiation safety, protection of patients and emergency preparedness and response
- Review and assessment of licensees' submissions;
- Maintain and operate the Nuclear and Radiological Emergency Coordination Centre; and
- Assess safety performance of radiation facilities against Performance Objectives and Criteria (PO&Cs).



# **Training Program for RSD**





# Directorate of Transport and Waste Safety (WSD)

#### **WSD** is mainly responsible to

- Establish and maintain regulatory framework for transport, waste, spent nuclear fuel, and decommissioning;
- License / certify transport packages including spent fuel cask, radioactive waste pre-disposal & disposal facilities, independent spent nuclear fuel storage facilities and decommissioning activities;
- Review and assess licensees' submissions.



# **Training Program for WSD**

Junior Level		JR-101: Basic Profes	sional T	raining Course for Nu	uclear Regu	ulators (Level	-I)		WSD	
JR- 102: Nuclear Engineering Fundamentals and Reactor Physics	JR-105:	EPP JR-10	6: IT an	d use of Softwares		R-107: Persoi Management		ce		
JR-108: Auditing Techniques		ection & Enforcemen ation Facilities	for	JR-110: Review	& Assessm	ent	JR-111:	Course on Reg	gulations	
JR-114: Radiation Protection , Transp & Waste Safety (Level-II)	311 211	5: International /Standards:		JR-122: Medical Ex	kposure Co	ontrol	JR-124: A	Administrative	e Activities	
JR-126: Training techniques for Trainers	JR-128: I Nuclear	Physical Protection & Security		JR-129: Decommis Nuclear & Radiatio	_		JR-: O	n-the-job Tra	ining	
Intermediate Level		IR-103: Refresher Ra Transport & Waste		Protection,		R-106: Interv	iewing Skil	Is		
IR-107:: Basic Management		09: Safety & Irity Culture		IR-110: Effective Communication & IR-112-IR-110: Report Writing Skills				2- Event Inves	Event Investigation	
IR-115: Integrated Management Sy of PNRA	R-116: Refresher Audi echniques	ing	ng IR-119: Project Management Skills			IR-120: Refresher PNRA Regulation				
Senior Level				-						
SR-101:International Nuclear Law		SR-103: Nuclear Knowledge Management		104: Leadership and ange Management		5: Strategic P ss & Benchm	_	SR-106: Pr Solving & Making Sk	Decision	



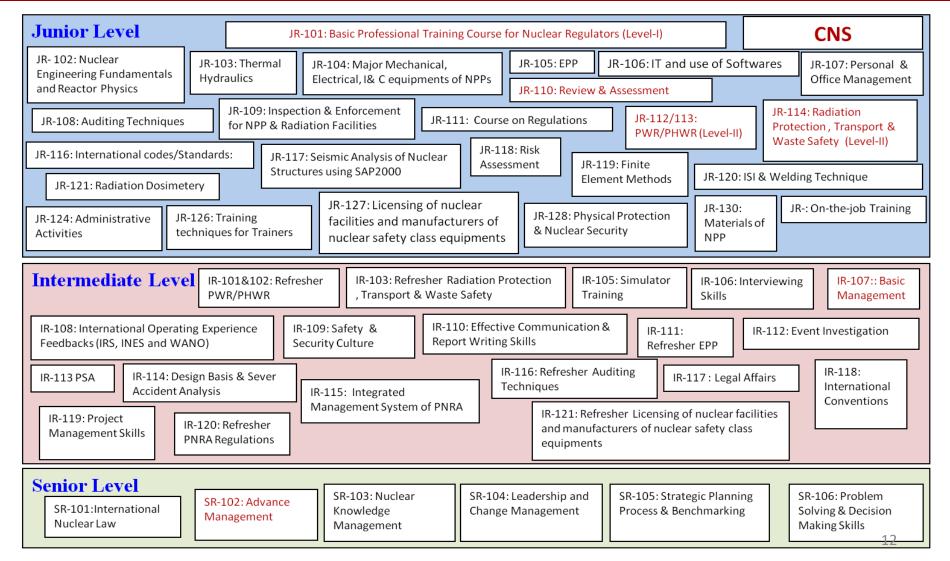
#### **Centre for Nuclear Safety (CNS)**

#### **CNS** is mainly responsible to

- Perform review and assessment of licensing submissions of nuclear installations;
- Performs audit calculations of deterministic and probabilistic safety analysis, stress/structure/ tsunami and EPZ submitted by the licensees
- Perform R&D in safety analysis.
- Support PNRA departments in inspections of nuclear installations and radiation facilities.



# **Training Program for CNS**





#### Regional Nuclear Safety Directorate I

# RNSD-I is located in Islamabad and is mainly responsible for:

- Review & assessment, licensing, inspection & enforcement of radiation facilities
- Review & assessment and inspection & enforcement of research reactors, MPF and waste disposal facilities;
- Licensing of operating personnel of RRs & MPF;



# **Training Program for RNSD-I**

Junior Level			JR-101: Ba	sic Professio	nal Trainin	g Course for	Nuclear R	egulators (Level	l-I)	RNSD	)-I
JR- 102: Nuclear Engineer Fundamentals and Reacto Physics		JR-103: Thermal Hydraulics		JR-105: EPP		JR-106: IT and use o			7: Personal & Office gement		
JR-108: Auditing Techniqu	ies	Enforcer	JR-109: Inspection & Enforcement for NPP & Radiation Facilities		JR-110: Review & Assessment		JR-111: Course on Regulations		ation Protect (Level-II)	ion , Transport &	
JR-116: International codes/Standards:	JR-121:	Radiation Dosimetery		JR-122: Medical Exposure Control				alculations and Designing of Radiation Facilities		JR-124: Administrat Activities	
JR-125: Research Reactor Safety	facil	ities and m	ng of nuclear anufacturers of class equipments	of N	129: Decor Iuclear & F ilities	nmissioning adiation	JR	-130: Materials PP Components		: On-the-job Training	3
Intermediate Le	evel		efresher Radiatio : & Waste Safety	n Protectior	,	IR-106	: Interview	ring Skills	IR-107:: B	Basic Management	
IR-108: International Ope Feedbacks (IRS, INES and		erience	IR-109: Safety Security Cultur		IR-110: E Writing S	fective Com kills	municatio	n & Report	IR-111: Ref	fresher EPP	
IR-112- Event Investigation	on _	IR-115: In System of	tegrated Manage PNRA	ement			6: Refreshe	er Auditing	IR-1 Affa	17 : Legal irs	
IR-118: International Conventions	M	-119: Proje anagemen ills	1 10 100	: Refresher F	NRA Regu	ations		efresher Licensi turers of nuclea			
Senior Level SR-101:International Nuclear Law	SR-102: A Managen		SR-103: Nucle Knowledge Management	Ch	-104: Lead ange Mana	ership and agement		5: Strategic Plan ss & Benchmark	-	SR-106: Problem Solving & Decision Making Skills	

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#### Regional Nuclear Safety Directorate II

RNSD-II is located in Chashma and is responsible for regulatory inspections and enforcement of NPPs

- Review & assessment of licensing submission of NPPs
- Licensing of plant operating personnel;
- Review & assessment, licensing, inspection & enforcement of radiation facilities



# **Training Program for RNSD-II**

Junior Level	JR-101: Ba	asic Prof	fessional Tra	ining Cou	rse for	Nuclear Regu	lators (Level	-1)	JR-105	S: EPP	JR-106: IT and use of Softwa		RNSD-II	
	R- 102: Nuclear Engineering Fundamentals and Reactor Physics					JR-104: Majo I& C equipm		Mechanical, Elect ts of NPPs		JR-110: Review & Asse			JR-112: PWR (Level-II)	
JR-107: Personal & Office Management	sit 100. Additing reciniques					pection & Enforcement for ation Facilities							L8: Risk Assessment	
JR-114: Radiation Protec Transport & Waste Safe	JR-115: Phys & Nuclear Se			JR-116: I						JR-119: Finite Element Methods				
JR-120: ISI & Welding Technique								JR-127: Licensing of nuclear facilities and manufacturers of nuclear safety class equipments						
JR-121: Radiation Dosimetery	R-124: Adm	inistrati	ive Activities		JR-12	9: Decommis	sioning of Nu	clear	& Radiat	ion Facili	ties		130: Materials of Components	
Intermediate I		IR-10	1: Refresher	PWR		103: Refreshe Insport & Was		rotec	tion ,		R-104: Refreshe rotection & Nu			
IR-106: Interviewing Ski	ills	IR-107:: Basic Management IR-109: Safety & Securit												
IR-116: Refresher Audi Techniques	ting	IR-108: International Operating Experience Feedbacks (IRS, INES and WANO)  IR-110: Effe Report Write						ctive Communication & IR-112- Event Investi						
IR-117 : Legal Affairs		R-119: P Nanagen	roject ment Skills	IR-120: Refresher PNRA Regulations  IR-121: Refres of nuclear fac manufacture						nd		: Integr gement:	ated System of PNRA	
IR-118: International C	Convention	s							equipme					
Senior Level  SR-101:International Nuclear Law		102: Adv nageme	nt	SR-103: Nu Knowledge Managem	е		4: Leadershij ge Managem				egic Planning nchmarking	Sol	-106: Problem ving & Decision aking Skills	



#### Regional Nuclear Safety Directorate III

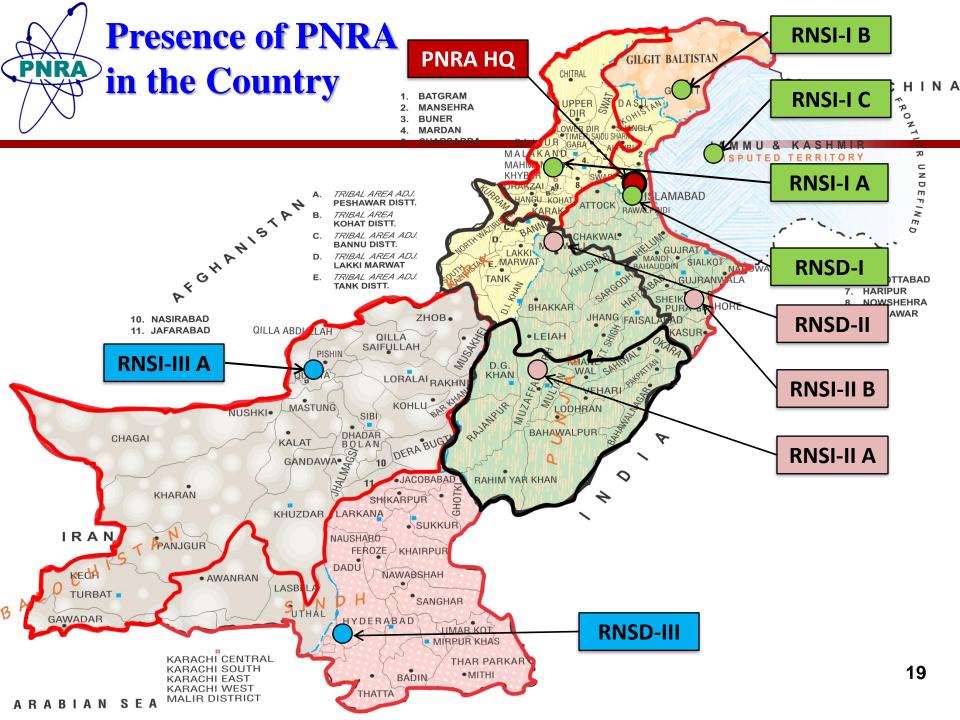
RNSD-III is located in Karachi and is responsible for regulatory inspections and enforcement of NPPs

- Review & assessment of licensing submissions of NPPs
- Licensing of plant operating personnel
- Review & assessment, licensing, inspection & enforcement of radiation facilities located in Sindh Province and Baluchistan Province.



# **Training Program for RNSD-III**

Junior Level	JR-101: Basic P	rofessional Tra	ining Co	urse for Nuc	ear Reg	ulators (Level-I)		JR-105: EPP		)6: IT and of Softwar	es	RNSD-III
JR- 102: Nuclear Engineering Fundamentals and Reactor Physics  JR-103: Thern Hydraulics			rmal	JR-104: Major Mechanical, Electrical I& C equipments of NPPs				JR-110: Review & Assessment			t	JR-112&113: PWR & PHWR(Level-II)
JR-107: Personal & JR-108: Auditing Techniques				09: Inspectio & Radiation		orcement for s	JR-	JR-111: Course on Regulations JR-118: Risk				18: Risk Assessment
JR-114: Radiation Protection Transport & Waste Safe	,		otection JR-116: International codes/Standards:				JR-117: Seismic Analysis of Nuclear Structures using SAP2000				JR-119: Finite Element Methods	
JR-120: ISI & Welding Technique	JR-122: Med Exposure Co				lations	and Designing	fa	JR-127: Licensing of nuclear facilities and manufacturers of nuclear safety class equipment				JR-: On-the-job Training
JR-121: Radiation Dosimetery	Radiation JR-124: Administrative Activities									R-130: Materials of NPP Components		
Intermediate I	PWR	)1&102: Refres /PHWR	her			er Radiation Pro aste Safety	tectio	IR-104: Refresher Ph Protection & Nuclear				
IR-106: Interviewing Sk	ills	IR-107:: Basic Management IR-109: Safety & Se						,		IR-11	11: R€	efresher EPP
IR-116: Refresher Audit		it 100. International operating Experience					rive Communication & ng Skills			IR-112- Event Investigation		
Techniques  IR-117: Legal Affairs		19: Project IR-120: Refresher PNRA of nuclea						Refresher Licensing ar facilities and cturers of nuclear			_	rated System of PNRA
IR-118: International (	Conventions					safety cl	ass ec	quipments				
Senior Level  SR-101:International Nuclear Law	SR-102: A Manager	nent	SR-103: I Knowled Managei	ge		04: Leadership a		SR-105: Strat Process & Be			So	R-106: Problem olving & Decision laking Skills





### Personnel Qualification and Position Authorization



#### **Tiered Approach**

- The TNA study identified a number of courses out of which some are considered to be the core courses.
- It is recommended that all regulatory staff, no matter what the nature of regulatory activities they are engaged in, should attend the core courses Level-I and Level-II



#### **Level-I Course**

- It is the basic professional training course useful for personnel in the beginning of their regulatory careers.
- PNRA has designed and conducted multiple times the Level-I courses, taking into account the IAEA BPTC training material, to cover:
  - Nuclear and Radiation Safety
  - Regulatory Control
  - Physical Protection & Nuclear Security
  - Interpersonal Skills
  - Organizational Rules and Codes



#### **Level-II Course**

- After a year of work experience, the regulatory officials have to attend Level-II training course relevant to their assigned work area.
- Following Level-II Courses have been designed and conducted many times for junior regulators:
  - Professional Training Course on PWR NPPs Systems
  - Professional Training Course on Radiation Protection and Waste and Transport Safety
  - Professional Training Course on Physical Protection and Security of Nuclear Installations
  - Professional Training Course on PHWR NPPs Systems



#### Designation of Senior Engineer or Senior Scientific Officer

- University graduates inducted into PNRA are designated as Assistant Engineers (AE) or Scientific Officers (SO)
- PNRA promotion rules, in addition to length of service and performance requirements, specify that only those AEs and SOs would be eligible for promotion to Senior Engineer or Senior Scientific Officer who have attended Level-I and Level-II
- This requirement is applicable for all categories of regulatory professionals – licensing specialists, inspectors, reviewers & assessors, etc.



### Designation of Principal Engineer or Principal Scientific Officer

- PNRA promotion rules, in addition to length of service and performance requirements, also specify that only those Senior Engineers or Senior Scientific Officers would be eligible for promotion to Principal Engineer or Principal Scientific Officer who have completed Basic Management Course
- This requirement is applicable for all categories of regulatory professionals – licensing specialists, inspectors, reviewers & assessors, etc.



### Designation of Senior Principal Engineer or Chief Scientific Officer

- PNRA promotion rules, in addition to length of service and performance requirements, also specify that only those Principal Engineers or Principal Scientific Officers would be eligible for promotion to Principal Senior Engineer or Chief Scientific Officer who have completed Senior Officers Management Course from PIEAS University
- This requirement is applicable for all categories of regulatory professionals – licensing specialists, inspectors, reviewers & assessors, etc.



# Pre-requisite training for authorized inspectors

- An authorized inspector is required to possess a valid inspector card
- Criteria is applicable to all categories of inspectors NPP safety, research reactors, radiation safety and physical protection
- The criteria for inspector card includes the successful completion of:
  - PNRA level-I & level-II (or equivalent) professional training courses.
  - Training Course on PNRA Regulations
  - Training Course on Inspection & Enforcement Techniques.

Ensuring that trainee inspectors meet the criteria and record-keeping of credentials of each authorized inspector are maintained by the Directorate General of Inspection and Enforcement.



### **Refresher Training**



#### **Update of specific trainings**

- Inclusion of new facilities in the regulatory net and updates in regulatory framework necessitate revision of training modules and retraining
- PNRA organized training course on 1100MWe PWR plant Systems for inspectors and safety assessment group at the plant construction site to understand the new systems and new features of the plants
- Promulgation of new regulations or revision in existing ones necessitate revision of Training Course on PNRA Regulations which has been run and re-run many times
- Feedback to revise training courses is submitted to NISAS as well as to the Board of Directors. So update of the training is ensured.



# Re-appearance of experienced officials in initial and mandatory courses (1/2)

- A specific percentage of experienced regulatory professionals who have attended Level-I, Level-II, PNRA Regulations and I&E Techniques are allowed to attend whole or part of the training event as refresher
- Training courses on PNRA Rules of Business and Policies and IT Skills have been repeated many times. Senior professionals are encouraged to attend
- HRD regularly arranges trainings at other national institutes in interpersonal skills (communication, speaking, writing, office management, time management, etc.) for fresh and experienced officers



# Re-appearance of experienced officials in initial and mandatory courses (2/2)

- PNRA Management has mandated the compulsory conduct of Level-II in Radiation Protection even if there are no fresh participants in the course.
- Keeping in view that the end objective of regulatory activities is radiation protection, all experienced regulators, even if their domains are NPP safety or nuclear security, have been mandated to attend Level-II in RP to refresh their RP knowledge and learn advances in specialized topics like dose constraints, radiological engineering, shielding calculations, etc.



#### **Refresher Training for Licensees**

**Every three years or sooner some courses are conducted** for licensees. Many courses are repeated as refresher:

- Training Course on PNRA Regulations
- Training Course on Radiation Safety for Industrial Radiographers
- Training Course on Radiation Safety for RPOs
- TC on QA in Radiotherapy (for medical physicists and BMEs)
- TC on QA in Medical Imaging (ditto)
- TC on Radiation Shielding Calculations for Medical Facilities (also attended as refresher by PNRA officials)



#### Conclusion

- PNRA has systematically instituted training schemes for different job positions (Licensing Specialists, Safety Assessor, Inspector) in both nuclear and radiation safety
- The link between personnel qualification and position authorization is established for different job positions (Licensing Specialists, Safety Assessor, Inspector) in both nuclear and radiation safety