



Project	INSC Project MC.03/10
Title	Training and Tutoring for expert of the NRAs and their TSOs for developing or strengthening their regulatory and technical capabilities LOT 1: Training and Tutoring for Nuclear Regulatory Authorities and their TSO's: Nuclear Safety Regulation, Licensing and Enforcement.
Contract	N° 2011/261-585 (Contract between the EC and ITER-Consult)
Subject	Training Course n. 3

Task 2 - Training Course
"Design safety and safety evaluation for NPP-SAR",
Ljubljana, Nov. 19-24, 2012

Minutes

- **Objectives of the Training**
- **Synthesis of the training activity**
- **Conclusions**
- **Annexes**

Objective of the Training- The training course aimed at providing a comprehensive presentation and discussion of the objective, structure and content of the Safety Analysis Report (SAR) of a NPP including the discussion of specific technical topics and the role and organisation of the nuclear regulator in performing the SAR review.

The training has been carried out according to the attached program (Annex 1). The daily list of participants is also attached (Annex 2).

Synthesis of the training activity - The training has been opened by the TPL (Mr. Madonna/ITER) who has given information about the EC INSC program for international cooperation in the field of nuclear safety (EU funds), and presented the objective of the training and its program including a visit to Krsko NPP.

He has underlined the importance to conduct the training activity in an interactive way in order to ensure the best transfer of knowledge and to dedicate one full afternoon to a practical application carried out by the trainees in two working groups, reporting the results of the application and discussing them in a plenary session.



After the introduction of the EU infrastructure and legislative framework for nuclear and radiation safety, the role of the regulator in establishing safety objectives and requirements for the design of NPP has been presented together with the IAEA requirements for the design of a NPP.

Detailed presentations and discussions of specific aspects of the content of the SAR have been carried out during the training covering: safety objectives, principles, requirements and acceptance criteria for NPP; defence in depth; deterministic and probabilistic safety analyses; safety functions; internal and external events to be considered in the design; safety systems; safety and seismic classifications of structures, systems and components; redundancy; diversification; segregate; equipment qualification; accident analyses and radiological consequences for DBA, BDBA (DEC) and SA.

The regulatory organization for review and evaluation of the SAR, including the use of external support, has been presented considering the different phases of licensing process from design to construction and to operation, including the aspects of resolution of safety issues, decision making and regulatory oversight activity. The use of PSA during safety review of the NPP design has been underlined.

The specific lectures, according to the program, were mainly given by experts from JSI, SNSA and ITER involving 13 different lecturers for a total of 28 lectures /presentations and 1 practical application.

The following topics were presented in detail (see list of presentations in Annex III) and discussed:

- EU infrastructure for Nuclear Safety
- Definition of safety objectives & criteria for NPP
- IAEA design safety requirements for NPP
- Deterministic and probabilistic safety
- Objective, structure and content of SAR
- Different SAR for the different steps of the licensing process of a NPP
- NPP safety principles, safety requirements and acceptance criteria
- Safety functions and defence in depth
- Safety systems (frontline and support systems)
- Redundancy, independence, diversity
- Safety Classifications of SSC
- Seismic Classification SSC
- Environmental and seismic qualification
- Identification of list of safety important "parts" of the NPP
- Containment system
- Internal events (fire, flood, jet impingement,)
- External events (natural and non-natural)
- DBA and Beyond Design Basis Accidents
- Consideration of Severe Accidents



- Radiological consequences
- Regulatory review of SAR and use of PSA
- Regulatory approach and management of safety review and decision making

Each lecture was followed by a discussion with the trainees answering their questions and providing additional clarifications. During the lecture direct test of correct understanding of main aspects were conducted in electronic way collecting the trainees answer to questions displayed on the screen.

Each day and week was initiated and concluded with a summary of the activity planned and performed and related key aspects.

The practical application has been prepared and consisted in the evaluation of SAR content (an extract) with reference to the review of a design basis accident analysis (Main Steam Line Break MSLB accident in the EPR reactor) and to the review (with comparison) of the conception, requirements and acceptance criteria for the safety system "Emergency Core Decay Heat removal" in PWR reactors of two different generation (II and III).

Conclusions - The training activity has been carried out covering, with effective examples and experiences, the safety objectives, principles, requirements and acceptance criteria to be implemented in the design of a NPP and described with demonstration of their fulfilment in the SAR. The training has continuously focussed on the role, responsibility and review activity of regulatory authority. Practical application has been conducted with the direct involvement of the trainees for aspects related to regulatory review of SAR content.

A visit to NPP Krsko has given the opportunity to get direct evidence of the onsite organizational and operational activities and presentation of the operational and safety status of the NPP including the results of "stress tests", performed in 2011, and the follow-up action plan going to be implemented.

The team of attending trainees (13 people from Nuclear Regulatory Authority of 10 partner countries: Armenia, Belarus, Brazil, Egypt, Jordan, Mexico, Ukraine, Vietnam, Malaysia, Indonesia) has shown to be very interested, motivated, attentive and demanding.

The trainees manifested their satisfaction for the program and the content of the training, they had high interest for all the topics presented and discussed, interacting actively with the trainers, asking questions, clarifications and expressing their view and considerations.

They have thanked the EC for the opportunity given to participate.



At the end of the week a detailed questionnaire has been submitted to the trainees to verify the degree of profit they have achieved during course. The final opinion of each trainee has also been collected by the training coordinator to feedback for continuous improvement. The material of the training has been provided to the trainees in electronic and paper copy in a dedicated folder.

ANNEXES

- Annex 1 Training Program
- Annex 2 List of participants
- Annex 3 List of lectures/presentations

Ljubljana, 24.11.2012

Mr. A. Madonna	ITER (TPL)	
Mr. Levon Hovhannisyan	ANRA	
Mr. Aliaksandr Prykhodzka	GOSATOMNAD-ZOR	
Ms. Sviatlana Kachan	BNTU	
Mr. Kostiantyn Zapisotskyi	SNRIU	
Mr. Iurii Chepurnyi	SNRIU	
Mr. Muath Mohammad Jamal Darwish Saadeh	JNRC	
Mr. Luis Antonio Estrada Domínguez	CNSNS	
Mr. Abdul Qohhar Teguh Eko Prasetyo	BAPETEN	
Mr. Ahmed Sayed Ahmed Khedr	NCNSRC	Ahmed Khedr
Mr. Ridha Bin Roslan	AELB	
Mr. Richard Brandão Nogueira Vital	CNEN	
Ms. Thi Loan Nguyen	VARANS	
Mr. Joao De Deus Pinheiro Filho	CNEN	Joao Pinheiro