



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 bis

Task 2 - Training Course
"Requirements and safety evaluation of PSA for NPP",
Ljubljana, May 20-24, 2012

Minutes

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Objective of the Training - The objective of the training course was to provide a comprehensive presentation and discussion of the objective, structure and content of the Probabilistic Safety Assessment (PSA) for a Nuclear Power Plant (NPP) including the discussion of specific technical topics and issues affecting the elaboration of a PSA of different levels and their quality. In addition the role of the nuclear regulator in defining the probabilistic safety requirements for a NPP, in performing the review of a PSA and in the use of PSA for decision making were presented and discussed.

The program of the Training Course is attached (Annex 1) and also the daily list of participants (Annex 2).

Synthesis of the training activity – After the welcome from the hosting organization Josef Stefan Institute (JSI), the training has been opened by the Technical Project Leader (TPL) (Mr. Madonna/ITER) who has given information about the EC INSC program for international co-



operation in the field of nuclear safety (EU funds), and presented the objective of the training and its program.

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 two full afternoon to practical applications 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, legislative framework and institutions for nuclear and radiation safety (EU Directives, ENSREG, etc.) the role and function of the regulator in establishing safety objectives and requirements (deterministic and probabilistic safety analysis) for the design of NPP has been presented. The new WENRA safety objectives for new NPP in EU were introduced.

Detailed presentations and discussions of the PSA and its specific aspects related to the its elaboration have been carried out during the training covering: PSA methodological aspects, Initiating events consideration and grouping, external hazards, system analysis and fault tree, modelling of Common Cause Failure (CCF) and human error data base, success criteria, event tree and quantification requirements, analysis of results, importance analysis, PSA for different NPP operational conditions and external events.

The regulatory organization for review and evaluation of the PSA has been presented considering the different phases of licensing process: design, construction and operation. 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 8 different lecturers for a total of 24 lectures /presentations and 2 practical application.

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

1. EU infrastructure for Radiation Protection and Nuclear Safety
2. Definition of safety objectives & criteria for NPP
3. Role, functions and responsibilities of the nuclear regulatory authority
4. Deterministic and probabilistic safety objectives and requirements for NPP
5. Objective, structure and content of PSA
6. Risk assessment, basic concepts of PSA versus DSA
7. Basic definitions and probability concepts
8. Methodological requirements and references for PSA
9. Initiating events
10. Event Tree development and quantification
11. Systems analysis and Fault Tree development
12. Modelling of common cause failure and human reliability
13. Data bases and operating experience



14. Sequence binning, quantification and minimal cut-sets
15. QA aspects for development of PSA
16. Analysis of results of PSA (importance, sensitivity, uncertainty)
17. External Events Risk Analysis
18. Seismic PSA
19. PSA for Low-Power and Shutdown conditions
20. International standards, references and guidance's for PSA
21. Regulatory requirements for PSA
22. Regulatory review of PSA
23. Regulatory use of PSA for 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.

Two practical applications have been carried out referring, respectively to Fault Tree analysis and Event Tree analysis.

Conclusions - The course has taken place and has been conducted in a very adequate and satisfactory way covering, with effective examples and experiences, the objectives, requirements and key issues of the PSA (and its methodology) for a NPP. Considering the provenience of the trainees, 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.

The team of attending trainees (12 people from Nuclear Regulatory Authority of 10 partner countries: Armenia, Belarus, Brazil, Egypt, Jordan, Mexico, Ukraine, Vietnam, Indonesia, Morocco) has shown to be very interested, motivated, attentive and demanding.

The trainees have shown to be satisfied for the program and the content of the training, they interacting actively with the trainers, asking questions, clarifications and expressing their view and considerations.

They thanked the EC for the opportunity given to participate and recommended this type of Training in future.

At the end of the course on Friday afternoon a detailed questionnaire has been submitted to the trainees to verify the degree of profit 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 dedicated folder.

ANNEXES

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

Ljubljana, 24.05.2013

Mr. Antonio Madonna	ITER-Consult (TPL)	
Mr. Gurgen Kanetsyan	NRSC (Armenia)	
Mr. Philip Speransky	Gosatombadzor (Belorussia)	
Mr. Kostiantyn Zapisotskyi	SNRIU (Ukraine)	
Mr. Abdellaziz Hajjani	Ministry of Energy, Mines, Water and Environment (Morocco)	
Ms. Lalla Maryem EL Kiram	Ministry of Energy, Mines, Water and Environment (Morocco)	
Ms. Thi Loan Nguyen	VARANS (Vietnam)	
Mr. Ahmed Sayed Ahmed Khedr	ENRRA (Egypt)	
Mr. Morad Khalid Ali Hamad	JNRC (Jordan)	
Ms. Sonia Maria Orlando Gibelli	CNEN (Brazil)	
Mr. Marcos Eduardo Costa Nunes	CNEN (Brazil)	
Ms. Iris Elidette Juarez Rivera	CNSNS (Mexico)	
Mr. Eko Hadiyono Riyadi	BAPETEN (Indonesia)	