



INSC Project MC3.01/13

EC Contract N° NSI/2014/343-969

“Training and Tutoring for experts of the NRAs and their TSOs for developing or strengthening their regulatory and technical capabilities”

TASK 2

Tutoring Module

on

“Reactor Safety technology and NPP Safety”

October – December, 2015

TÜV SÜD ET – Germany

Tutoring Programme

September 2015



**INSC Project MC3.01/13
EC Contract N° NSI/2014/343-969**

TASK 2

“Reactor Safety Technology and NPP Safety”

Duration: 2 months - October – December, 2015

Venue: TÜV SÜD ET – Mannheim - Germany

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The tutoring activity has been conceived as “on the job training” at TÜV SÜD ET – Germany in the area of reactor safety technology and NPP safety.

It will contribute to a real and practical “build-up” of knowledge allowing a sustainable transfer of approaches and methods.

Tutoring objective and expected achievements

Transfer of a consolidate knowledge and know-how in the context of nuclear reactor technology and nuclear safety of a NPP is the main objective of this tutoring.

Tutoring content:

The tutoring module (2 months for 2 tutees) is organized starting immediately after the one week training at TÜV SÜD ET on the same topic.

It will cover nuclear power reactor technology, safety conception, systems, layout, design safety conception of current available technologies as well as generation IV nuclear reactors, defense in depth, safety functions, accident analyses, operating experience, evaluation of different conceptions and design solutions.

In addition, it will include evaluation of design solutions with respect to safety objectives and safety principles and requirements, content of SAR and PSA to analyze the NPP safety level.

The regulatory approach, the role of an TSO and safety requirements during operation, including modification procedure, inspection and maintenance, fuel management, safety culture radwaste management will be covered as well as the decommissioning of NPP and nuclear facilities. Finally, periodic safety review, EU stress test and National action plans are included.

The tutoring will include:

- Familiarization with nuclear power reactor technologies (including Gen IV)
- Safety requirements for NPP design
- Safety concept, safety functions and related safety SSC, including defense-in-depth concept
- Postulated initiating events, design basis accidents and severe accidents
- Deterministic and probabilistic safety analysis
- Regulatory approach and safety requirements during operation, include radwaste management, and decommissioning
- Familiarization with periodic safety review and national action plan as defined for NPP in EU after the stress test
- Case study exercises
- Onsite visits will be organized as far as possible.

WEEKLY PROGRAM

TOPICS	Tutors
Part I – Reactor technology and Generation III and IV	
Generic Types of Reactors (e.g. PWR, BWR, RBMK, CANDU)	Sinan Özdür, Carsten Janning
Examples of Generation III Reactors (e.g. EPR, AP1000, ABWR, WWER)	
Generation IV Reactors	
Small Modular Reactors (SMR)	
Practical Work: Comparison of different reactor types	
Part II - Safety requirements for NPP design	
IAEA Safety requirements	Sinan Özdür, Dr.

WENRA Safety Reference Level and new Designs	Clemens Treier
EUR documents	
National Safety Requirements for NPP	
Practical Work: Comparison of different safety requirements	
Part III - Safety concept, safety functions and related SSC in a NPP	
Defense-in-depth concept	Renate Seidler, Dr. Jeanne Venker
Safety Functions	
Safety Classification of SSC	
Practical Work: Identification of Defense-in-depth elements, safety functions and components	
Part IV - Postulated initiating events, Design Basis Accidents and Severe Accidents	
Internal initiating events and accidents	Dr. Jeanne Venker, Dr. Robert Hampel
External initiating events and accidents	
Severe Accidents and SAMG	
Practical Work: Identification of events and accident sequence as well as lessons learnt	
Part V – Deterministic and Probabilistic Safety Analysis	
Deterministic Safety Analysis, e.g. LOCA	Dr. Dagmar Baumann, Dr. Oliver Bauer, Dr. Robert Hampel
PSA Level 1, 2, 3	
PSA Event analysis, e.g. sequence analysis, success criteria, quantification	
Practical Work: Applying PSA procedure	
Part VI – Regulatory approach and safety requirements during operation	
Regulatory authority and role of TSO	Sinan Özdür, Renate Seidler
Licensing procedure for modifications	
Plant inspection and maintenance	
Operational procedures	
Practical Work:	

- Comparison of safety assessments by TSO in different countries - Examples of safety assessments	
Part VII – Safety requirements during operation and decommissioning	
Fuel management	Lars Holt, Dr. Clemens
Safety Culture and Safety Management	Treier, Carsten
Notifiable Event	Janning, Dr. Bastian
Radwaste management	Schulz
Decommissioning NPP and nuclear facilities	
Part VIII – Periodic safety review, EU stress test and National action plans	
Content of periodic safety review	Carsten Janning,
EU Stress Test: Content and procedure	Frank Wittmann
National action plan	
Practical Work: Comparison of EU Stress Test for different countries/reactor types	

At the end of the Tutoring Module the Tutees will elaborate a common Report containing the following:

- **INTRODUCTION**
- **TUTORING OBJECTIVE**
- **TUTORING PROGRAM**
- **ACTIVITIES PERFORMED**
- **MAIN RESULTS**
- **CONCLUSIONS**

The Tutees Report will be agreed with the main tutoring coordinator.
