



## **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**

**“Regulatory requirements and safety evaluation of NPP”**

June 13<sup>th</sup> – August 5<sup>th</sup>, 2016

NRG – The Netherlands

#### **Tutoring Programme**

*June 2016*



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

**TASK 2 – Tutoring Module on “Regulatory requirements and safety evaluation of NPP”**

**Duration: 2 month - June 13th – August 5th, 2016**

**Venue: NRG – The Netherlands**

**Address: Utrechtseweg 310 Arnhem**

**NRG Contact person: W. Postma, tel: +31 (0)6 30 39 33 97 email: w.postma@nrg.eu**

**Tutoring objective and expected achievements**

Objective of the tutoring will be to ensure an optimum of transfer of know-how and develop capability in understanding the objectives, the reference internal and external events, the requirements to perform and the regulatory use of the PSA.

**Tutoring content:**

The tutoring activity is conceived as “on the job training” for review of the content of NPP PSA (level 1 and level 2), related requirements and use by the NRA. It will contribute to a real and practical “build-up” of knowledge allowing a sustainable transfer of approaches and methods.

The course will include the familiarization with the following topics:

- PSA objective
- PSA structure
- PSA methodologies, models and key issues
- PSA data base
- Regulatory requirements for PSA
- Regulatory review of PSA
- Regulatory use of PSA in risk based decision making

The course will show how the PSA can be used to identify weakness in the design and prioritize improvements.

The tutoring will include onsite visits.

**Achievement**

Consolidate knowledge for review of the content of NPP PSA (level 1 and level 2), related requirements and use by the NRA.

## WEEKLY PROGRAM

The tutoring is made of one month devoted to technical, methodological, modelling and data base aspects and one month devoted to use of PSA by the Regulator during licensing process, oversight of operation of a NPP and decision making.

During the tutoring activity the tutees will be asked to elaborate and report review analysis and prepare a final common Tutoring Report.

<b>1<sup>st</sup> Week</b>	<b>Tutors</b>
Introduction: <ul style="list-style-type: none"> <li>- What is NRG</li> <li>- Work plan</li> <li>- End report</li> <li>- Practical issues</li> </ul>	Anton Prins
Thermo hydraulics: <ul style="list-style-type: none"> <li>- PSA success criteria and underpinning T-H analysis</li> <li>- Available software</li> <li>- Choice of software: what software in which situation</li> <li>- Uncertainties, pitfalls</li> </ul> Exercises: <ul style="list-style-type: none"> <li>- Reactor operational transients</li> <li>- Accident scenario's</li> </ul>	Marek Stempniewicz
<b>2<sup>nd</sup> Week</b>	<b>Tutors</b>
Level 2: <ul style="list-style-type: none"> <li>- L1/L2 interface</li> <li>- Plant Damage States</li> <li>- CET/DET</li> <li>- L2 phenomena</li> <li>- Source terms</li> </ul>	Hans Brinkman
Digital I&C <ul style="list-style-type: none"> <li>- Failure modes</li> <li>- Diagnostic coverage</li> <li>- Diversity</li> <li>- Modelling issues</li> </ul> Exercise <ul style="list-style-type: none"> <li>- Construct the basis for a model for an example digital I&amp;C system</li> </ul>	Wietske Postma

3 <sup>rd</sup> Week	Tutors
<p>Reliability input data:</p> <ul style="list-style-type: none"> <li>- Plant specific data collections</li> <li>- Bayesian update and zero failure problem</li> <li>- Analysis of data from different sources</li> <li>- Data ranges in IAEA IPSART report</li> </ul> <p>Exercise:</p> <ul style="list-style-type: none"> <li>- Data analysis from failure events to failure rate or demand probability for PSA</li> </ul>	Jan Schuller
4 <sup>th</sup> Week	Tutors
<p>Theory and exercises:</p> <ul style="list-style-type: none"> <li>- Simple fault tree construction</li> <li>- Accident sequence development</li> <li>- Dependent failure analysis</li> <li>- Human Reliability analysis</li> </ul>	Jan Schuller
5 <sup>th</sup> Week	Tutors
<p>L3:</p> <ul style="list-style-type: none"> <li>- Introduction to Level 3 (with the Dutch approach as basis)</li> </ul> <p>Safety Monitor:</p> <ul style="list-style-type: none"> <li>- Theory, use and on-site demonstration</li> </ul>	Hans Brinkman / Plant personnel
6 <sup>th</sup> Week	Tutors
<p>Theory and exercises:</p> <ul style="list-style-type: none"> <li>- Accident sequence quantification</li> <li>- Criticality, Sensitivity, Uncertainty</li> <li>- Quality assurance</li> </ul> <p>Exercise:</p> <ul style="list-style-type: none"> <li>- Evaluation of accident sequence development against ASME RA-Sb 2013</li> </ul>	Jan Schuller
7 <sup>th</sup> Week	Tutors
<p>Theory and exercises:</p> <ul style="list-style-type: none"> <li>- External Events</li> <li>- Analysis of Internal Fire</li> <li>- Evaluation of seismic and flooding analysis</li> <li>- Review external hazards analysis against ASME/ANS</li> </ul>	Jan Schuller

8 <sup>th</sup> Week	Tutors
<ul style="list-style-type: none"><li>- Licensing process, basic licensing principles (Dutch situation as base line)</li><li>- Safety assessment/ licensing decisions:</li></ul> <p>Exercise:</p> <ul style="list-style-type: none"><li>- Review safety case</li><li>- Peer review and fit for purpose: IAEA TECDOC 832 and 1511</li></ul> <p>Finalizing report</p>	Hans Brinkman

At the end of the Tutoring Module the Tutees will prepare 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.

-----