



## 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”

## Training Course

# NPP mechanical structures & components requirements and seismic safety

organized by ITER-Consult

Rome – November 2-6, 2015

## Course Objective

The training course will provide a comprehensive description of approaches and methods for mechanical structural analysis and requirements in a NPP. It will cover:

- current NPP technology, basic conception, design process and safety design requirements for main nuclear components in LWRs with focus on primary and secondary circuit, layout, operational conditions, static and dynamic loading conditions, reactor pressure vessel fragility, fracture mechanics, pressurized thermal shock issues;
- safety classification; seismic classification; plant design conditions, service levels and margins, design basis transients and accidents; design basis earthquake, floor response spectra, requirements of ASME code for main primary and secondary components, piping and pipe restraints, types of supports and restraints and related requirements, introduction to LBB application and related leak detection systems.

The course will present the available computer codes for licensing safety review and independent assessment. Attention will be given to seismic design, seismic analysis and seismic qualification.

The requirements for in service inspections will be presented as well as the scope and approach for regulatory inspections of safety classified mechanical components and structures during fabrication, construction and operation.

The content of SAR for mechanical structures and components with related requirements for safety analyses will be presented and discussed. Reference standards for design will be provided. Practical application sessions are included in the training program.



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## Course Daily Program

Monday 2 <sup>nd</sup> November 2015	
08.30 - 09.00	Registration
9.00 – 13.00	Welcome Organizational aspects, Training objective, Training program
	EU infrastructure for Nuclear and Radiation Safety - <i>A. Madonna (ITER)</i>
	Regulator's role and functions - <i>A. Madonna (ITER)</i>
13.00 – 14.00	Lunch
14.00 – 17.45	Mechanical structures and components technology in NPPs - <i>M. Reale, (Ansaldo)</i>
	Design safety requirements for mechanical structure and components in a NPP - <i>M. Reale (Ansaldo)</i>
	Content of Safety Analysis Report for mechanical structures and components - <i>M. Reale (Ansaldo)</i>

Tuesday 3 <sup>rd</sup> November 2015	
9.00 – 13.00	Safety classification and safety requirements for mechanical components and structures – <i>D. Mazzini (ITER)</i>
	Seismic classification and design requirements – <i>Gv. Pino (ITER)</i>
	Normal and Accident design loading actions on mechanical components and verification methodology – <i>D. Mazzini (ITER)</i>
13.00 – 14.00	Lunch
14.00 – 17.45	Leak before Break Criteria – <i>W. Hienstorfer (TÜV SÜD ET)</i>
	Technical norms and international standards for design and construction – <i>W. Hienstorfer (TÜV SÜD ET)</i>
	Static and dynamic analysis of mechanical components – <i>W. Hienstorfer (TÜV SÜD ET)</i>

Wednesday 4 <sup>th</sup> November 2015	
9.00 – 13.00	Overpressure protection of safety components in a NPP - <i>Gv. Pino, D. Mazzini (ITER)</i>
	Environmental and seismic qualification of safety-related components – <i>D. Mazzini (ITER)</i>
	Regulatory inspections procedures during fabrication and construction – <i>N. Cipriani (ISPRA)</i>
13.00 – 14.00	Lunch
14.00 – 17.45	<b>Practical Application n.1</b>

Thursday 5 <sup>th</sup> November 2015	
9.00 – 13.00	Pressurized thermal shock in LWR and related safety measures – <i>W. Hienstorfer (TÜV SÜD ET)</i>
	Reactor Pressure Vessel fragility issue and fracture mechanics analysis – <i>W. Hienstorfer (TÜV SÜD ET)</i>
	Anchorage and restraints for mechanical components and interaction with civil structures – <i>W. Hienstorfer (TÜV SÜD ET)</i>
13.00 – 14.00	Lunch
14.00 – 17.45	<b>Practical Application n. 2</b>

Friday 6 <sup>th</sup> November 2015	
9.00 – 13.00	Nuclear Components: The Design Specification - <i>F. Magris (Ansaldo)</i>
	Nuclear Components: The Design Process - <i>F. Magris (Ansaldo)</i>
	Nuclear Components: Seismic Load and Aircraft Impact - <i>F. Magris (Ansaldo)</i>
13.00 – 14.00	Lunch
14.00 – 17.45	Course summary
	Questionnaire
	Opinion from trainees
	Training Minutes