



# Fourth International Conference

on

## Fatigue of Nuclear Reactor Components

28<sup>th</sup> September – 1<sup>st</sup> October 2015

Seville, Spain

DRAFT PROGRAM Rev. 5 (as of 21<sup>st</sup> July 2015)

Registration and information: <a href="http://www.conferencefatiguesevilla2015.com">http://www.conferencefatiguesevilla2015.com</a>			
Sessions		Topic Areas	Abstracts #
	DAY 1	Opening of the Conference	
G	DAY 1	General Fatigue Program Overview	5, 60, 32, EPRI
I	DAY 1	Environmental fatigue	42, 59, 16, 10, 12, 8, 31, 11, 9, 4
II	DAY 1	Thermal fatigue	27, 52, 56, 62
III	DAY 2	Assessing and Predicting Fatigue	50, 7, 21, 15, 37, 55, 46
IV	DAY 2	Codes and standards	19, 61, 33, 20, 47
PANEL	DAY 2	Panel Discussion Sessions G, I, II, III and IV	
POSTER	DAY 2	57, 48, 49, 53, 1, 36, 18, 3, 44, 29, 28, 2, 63, 6, 26, 58, 34, 64, 65, 7	
V	DAY 3	Component performance and testing	24, 25, 38, 41, 54, 43, 30, 39, 40, 22, 13, 23, 14
VI	DAY 3	Fatigue monitoring and crack detection methods	35, 51, 45, 17
PANEL	DAY 3	Panel Discussion Sessions V and VI	

## DAY 0. Monday 28<sup>th</sup> September

18:00-20:00 Registration

19:00-21:00 Welcome cocktail

## DAY 1. Tuesday 29<sup>th</sup> September

8:00-9:00 Registration

9:00 Opening of the Conference

9:00-9:05 Opening of the Conference. Mr. Carlos Castelao, CSN local organizer

9:05-9:15 Welcome address. Ms. Rosario Velasco, CSN Vicepresident

9:15-9:25 Welcome OECD/NEA. Mr. Javier Reig, Head of the CSNI/NEA

9:25-9:30 Conference General Remarks. Mr. Carlos Castelao, CSN local organizer

**9:30-10:50 SESSION G: General Fatigue Program Overview (85 minutes)**

9:30-9:50	5	Development and Application of Fatigue Assessment procedures and Consideration of Environmentally Assisted fatigue Effects in the European Framework. S. H. Reese; W. Mayinger. EON.
9:50-10:10	60	Overview of Fatigue Evaluation Methods in Japan (preliminary). Prof. T. Shoji. Tohoku University.
10:10-10:30	EP	<b>EPRI General views on fatigue (Abstract pending)</b>
10:30-10:50	32	CODAP Project Operating Experience Insights Related to Fatigue Mechanisms. Riznic et al. NEA.

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**10:50-11:15 Coffee break (25 minutes)**  
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**11:15-13:00 SESSION Ia: Environmental Fatigue**

5 presentations, 20' each

11:15-11:35	42	Corrosion fatigue evaluation: Czech proposal for WWER-440 nuclear power plants. L. Vıcek. Institute of Applied Mechanics Brno.
11:35-11:55	59	Consideration of the mismatch between environmental fatigue behaviour of laboratory specimens and plant components in real environment. J. Solin et al. VTT, AREVA.
11:55-12:15	16	An Overview of the ASME Working Group, Environmental Fatigue Evaluation Methods, Fatigue Action Plan. K. Wright. Rolls-Royce.
12:15-12:35	10	INCEFA-PLUS (INcreasing Safety in NPPs by Covering gaps in Environmental Fatigue Assessment). K. Mottershead et al. Amec Foster Wheeler.
12:35-12:55	12	Environmentally Assisted Fatigue Assessment in Time Limited Aging Analyses for Extended Operation in a Spanish PWR Plant. M. Baladía et al. G. TECNATOM.

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**13:00-14:30 Catered lunch (90 minutes)**  
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**14:30 -16:10 SESSION I.b: Environmental Fatigue**

5 presentations, 20' each

14:30-14:50	8	Environmentally-assisted fatigue assessment – the European view of the state of the art for stainless steels in LWR environments. K. Mottershead et al. Amec Foster Wheeler.
14:50-15:10	31	Testing to Address Environmentally Assisted Fatigue Degradation in LWR Plants. K. Ahluwalia et al. EPRI.
15:10-15:30	11	Alternative Approaches for ASME Code Simplified Elastic Plastic Analysis. S. Ranganath; Nathan Palm. XGEN Engineering, EPRI.
15:30-15:50	9	Mechanistic Studies on Environmentally Assisted Fatigue crack growth in light water reactor environments. D. Tice et al. Amec Foster Wheeler.
15:50-16:10	4	Quantitative Comparison of Environmental Fatigue Methods. F.H.E. de Haan et al. NRG, Petten.

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**16:10-16:30 Coffee break (20 minutes)**  
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**16:30-17:50 SESSION II: Thermal Fatigue**

4 presentations, 20' each

16:30-16:50	27	Analysis and Impact of Recent Thermal Fatigue Operating Experience in the USA. M. McDevit et al. EPRI.
16:50-17:10	52	Short crack behaviour of austenitic stainless steels in simulated PWR primary water during fatigue damage and monotonic deformation. C. Shim et al. Tohoku University.
17:10-17:30	56	Effect of Shoulder Extension Control on Fatigue Endurance Testing of Stainless Steels. C. Austin et al. Rolls-Royce.
17:30-17:50	62	Thermal fatigue at elevated temperatures for 316L and P91 thick-walled steel tubes. K. Nilsson et al. EC, JRC, Institute for Energy and Transport.

**18:00 End of the first day**

**DAY 2 (Wednesday 30<sup>th</sup> September)****8:30-10:10 SESSION III.a: Assessing and Predicting Fatigue**

5 presentations, 20' each

8:30-8:50	50	Fatigue Design Curves for Austenitic Stainless Steels Grades 1.4541 and 1.4550 in German KTA 3201.2. X. Schuler et al. Institute MPA.
8:50-9:10	7	Fatigue Evaluation of Nuclear Plant Components with Environmental Effects. D. Fdez. de Rucoba et al. Fundación Centro Tecnológico de Componentes (CTC).
9:10-9:30	21	A Study on Creep-fatigue Models for P91 Steel Design Rules. S. Holmström et al. JRC.
9:30-9:50	15	Development of a Fatigue Usage Gradient Factor. S. Gosselin; N. Palm. LPI, Inc., EPRI.
9:50-10:10	37	Fatigue Crack Growth Rate of Type 347 and Type 347N Stainless Steels under the PWR Water Conditions. S. Hong et al. KAERI.

**10:10-10:30 Coffee break (20')****10:30-11:10 SESSION III.b: Assessing and Predicting Fatigue**

2 presentation, 20' each

10:30-10:50	55	Evaluation of Implicit Reliability Level Associated with Fatigue Design Criteria of Nuclear Class-1 Piping. J. Mishra et al. SRI India.
10:50-11:10	46	Industry's First NRC Approved Appendix L Flaw Tolerance Evaluation to Manage Environmental Fatigue in a Surge Line. J. Correa. Structural Integrity Associates Inc.

**11:20-13:00 SESSION IV: Codes and Standards**

5 presentations, 20' each

11:20-11:40	19	Nuclear Fatigue Rules Codes & Standards: status, gaps and needs. C. Faidy.
11:40-12:00	61	Code Evolution in European Research for Innovative Nuclear Reactors. K. Nilsson. JRC, Institute for Energy and Transport.
12:00-12:20	33	Overview of Recent Modification Proposals In Fatigue in the RCC-M Code. T. Metais et al. EDF, AREVA.
12:20-12:40	20	Development Status of Design Fatigue Curves. S. Asada et al. Toshiba Co., Kansai E.P.
12:40-13:00	47	Impact of the Newly-Revised Environmentally Assisted Fatigue Guidance in NUREG/CR-6909. J. Correa. Structural Integrity Associates Inc.

**13:00-14:30 Catered lunch (90')**

**14:30-15:45 PANEL DISCUSSION SESSIONS I, II, III and IV**

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**15:45 – 16:05 Coffee break (20')**

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**16:05 – 17:30 POSTER SESSION (See last two pages for titles and authors)**

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**17:30 End of the second day. (With the social event afterwards, we need at least 30' to get ready)**

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**Social event: Attendees and accompanying persons will be picked up at the hotel entrance at 18:00.**

**18:00-20:00 Guided visit to Los Reales Alcázares (or alternative)**

**20:00-23:00 Official dinner**

## DAY 3 (Thursday 1<sup>st</sup> October)

### 9:00-10:40 SESSION V.a: Component Performance and Testing

5 presentations, 20' each

9:00-9:20	24	Low cycle fatigue behavior in air and in nominal PWR primary environment at 300°C of a 690 Ni-base alloy. W. Chitty et al. AREVA NP SAS.
9:20-9:40	25	Cyclic deformation and fracture behaviour of lath martensitic steel. P. Verma et al. Centre of Advance Study, Dep. Of Met. Eng. Indian Institute of Technology.
9:40-10:00	38	Thermal stress investigation by wall temperature measurements for mixing flow at T-junction. K. Miyoshi et al. Institute of Nuclear Technology Japan.
10:00-10:20	41	Improving Crack Probability of Detection Based on Correlation of Fatigue Results in Full Sized Piping System Components. M. Shelton. Jacobs.
10:20-10:40	54	Real-time, noninvasive characterization of irregular temperature and flow velocity distributions that can cause high cycle thermal fatigue. D. Galbally et al. Innomeric, Dep. Of Mechanical Engineering, ICAI, Iberdrola Generación Nuclear.

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### 10:40-11:00 Coffee break

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### 11:00-12:40 SESSION V.b: Component Performance and Testing

5 presentations, 20' each

11:00-11:20	43	Mean stress effect on fatigue life and dislocations microstructures of 316L austenitic steel at high temperature in air and water environment. P. Spätting et al. Laboratory for Nuclear Materials, Paul Scherrer Inst., Physics of Materials Brno.
11:20-11:40	30	Study and methodology development for cyclic loading application to probabilistic fatigue analyses. O. Cronvall. VTT.
11:40-12:00	39	Fatigue damage assessment by crack growth prediction for Type 316 stainless steel. M. Kamaya et al. Institute of Nuclear Safety System Inc., Japan Nuclear Safety Institute.
12:00-12:20	40	Experimental and numerical analyses of turbulent mixing of coolant streams in a mixing tee. P. Karthick et al. Institute of Nuclear Technology and Energy Systems (IKE).
12:20-12:40	22	AdFaM (Advanced Fatigue Methodologies) Project – Effects of Elevated Temperature Holds on Fatigue of Stabilised and Non-Stabilised Austenitic Stainless Steels. E. Karabaki et al. EON, VTT, AREVA, Rolls-Royce.

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### 12:40-14:10 Lunch (90')

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**14:10-15:10 SESSION V.c: Component Performance and Testing**

3 presentations, 20' each

14:10-14:30	13	Fatigue Behaviour of Dissimilar Weld and Cladding Material of Nuclear Components. X. Schuler et al. Materials Testing Institute (MPA)
14:30-14:50	23	Experimental Evaluation of fatigue in welded austenitic stainless steel pipe components. M. Dahlberg et al. Inspecta Technology AB, TS Ingenjörstatistik.
14:50-15:10	14	Environmental Effects on the Fatigue Behaviour of Nuclear Materials. X. Shuler et al. Materials Testing Institute (MPA).

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**15:10 -15:30 Coffee break (20')**

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**15:30-16:50 SESSION VI: Fatigue Monitoring and Crack Detection**

4 presentations, 20' each

15:30-15:50	35	Improving Ultrasonic Examination Procedures for Detection of Thermal Fatigue. J. Spanner. EPRI.
15:50-16:10	51	Fatigue Monitoring of Equipment and Pipelines at Russian NPPS. Rubtsov V.S.; Korableva S.A. SEC NRS, Russia.
16:10-16:30	45	Life at 80 – Technical Challenges for Long Term Operation. J. Correa. Structural Integrity Associates Inc.
16:30-16:50	17	A Total Life Approach for Fatigue Design to a Target Reliability. K. Wright et al. Rolls-Royce.

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**16:50-17:45 Panel discussion Sessions V-VI**

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**17:45-18:00 Conference Closure (15 minutes)**

## POSTER SESSION ABSTRACTS

16:05 – 17:30 DAY 2

ID number	Title
57	A Procedure to Predict Fatigue Life in Light Water Reactor 304 Stainless Steel. T.FO. Erinoshio et al. Dep. of Mechanical Engineering, University of Bristol.
48	SI: FatiguePro 4.0 as part of a Fatigue Management Program. J. Correa. Structural Integrity Associates Inc.
49	Design and Implementation of a Fatigue Management Program. J. Correa. Structural Integrity Associates Inc.
53	Fatigue Monitoring System for NPP in KHNP. M. Boo et al. Korea Hydro and N.Power.
1	Fatigue Analysis of Auxiliary Feedwater Line under consideration of stratification loads and EAF influence. B. Jouan et al. AREVA Gmbh, Axpo Poer AG (Swiss).
36 (*)	Thermal Stress Evaluation by Using Computational Fluid Dynamics Analysis Result and Green's Function for a Nuclear Piping. M. Boo et al. KEPCO.
18	Effect of Boundary Conditions in Fatigue Thermal Analyses Using Monitoring Systems. R. Cicero et al. Inesco Ingenieros, Innometrics, Iberdrola Generación Nuclear.
3 (*)	Fatigue monitoring: Methods of realistic load determination and fatigue assessment. T. Gilman et al. AREVA GmbH. Westinghouse.
44	Mechanical analysis for CRDM upper canopy seal weld Overlay. L. Pan. China GNP Group
29	Continuous assessment of low cycle fatigue on WWER NPP units - Revaluation of loop-pressurizer connecting piping for maximal thermal stratification. Joch L. et al. Institute of Applied Mechanics Brno.
28	Fatigue assessment of water hammer impact on essential service water pipelines in diesel-generator unit. Krautschneider R. et al. Institute of Applied Mechanics Brno.
2	Considering Environmental Effects on Fatigue in the context of Long Term Operation of Doel 1&2 and Tihange 1 NPP. M. De Smet. GDF-SUEZ Tractebel Engineering.
63 (*)	Assessment of Resistance of VVER-440 Reactor Pressure Vessel Against Low Cycle Fatigue. F. Peter et al. UJV.
6	Operational Excellence by comprehensive temperature measurements and fatigue assessments. S. H. Reese et al. EON, Siemprelkamp Prüf und Gutachtergesellschaft.
26	Improvement in Fatigue Life of Particle Separator by Optimizing Local Design and Manufacturing Methods. M. McDevitt et al. EPRI.
58 (*)	An analysis of nuclear plant leak-related events related to vibration-induced piping and tubing leaks. G. Schweitzer et al. INPO.
34 (*)	A Device for Studying Very High-cycle Fatigue at Asymmetric Push-Pull Mode. M. Bruchhausen et al. JRC.

64	Experimental methods for direct strain controlled low cycle fatigue tests in simulated PWR water. T. Seppänen et al. VTT Technical Research Centre of Finland.
65	Fatigue of stainless steel in simulated PWR operational conditions – LCF experiments in hot water. J. Alhainen et al. VTT, EON, EON Kernkraft GmbH.
7	Fatigue Evaluation of Nuclear Plant Components with Environmental Effects. D. Fdez. de Rucoba et al. Fundación Centro Tecnológico de Componentes (CTC).
(*)	Abstracts 58, 3, 34, 36, 63 are proposed as “reserve” presentations, just in case of cancellations or not shows.