March 13, 2013

MEMORANDUM TO: Anthony J. Mendiola, Chief
Licensing Processes Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

FROM: Sheldon D. Stuchell, Sr. Project Manager ***/RA/***
Licensing Processes Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF MARCH 5, 2013, PUBLIC MEETING REGARDING THE POTENTIAL FOR QUASI-LAMINAR INDICATIONS IN REACTOR PRESSURE VESSEL FORGINGS

On March 5, 2013, a Category 2 public meeting was held by the U.S. Nuclear Regulatory Commission (NRC) staff to allow an exchange of information concerning the possibility of NRC licensees discovering quasi-laminar indications (planar-type indications oriented nearly parallel to the inner and outer surfaces of the reactor vessel) in reactor pressure vessel (RPV) ring forgings. A large number of quasi-laminar indications were found in 2012 during ultrasonic inspections of two RPVs in Europe.

The probable cause analysis of the quasi-laminar indications in the European RPVs concluded the likely cause of the indications is hydrogen flaking, which occurs during the forging process, and is not an in-service degradation mechanism. The NRC is working with U.S. licensees to assess the potential existence and impact of quasi-laminar indications in RPV forgings in domestic plants. The NRC staff presented technical information defining the issue and announced plans to issue an Information Notice. Industry representatives also presented technical information and indicated that they plan to perform probabilistic fracture mechanics and complementary continuum damage mechanics analyses. Additionally, the industry is facilitating the collection of RPV forging fabrication inspection records to determine whether any forgings in domestic plants had evidence of hydrogen flaking. Industry is also reviewing the type of non-destructive testing equipment and procedures that were used during construction in an effort to document that construction inspections would have been capable of identifying hydrogen flaking. The industry is also evaluating current technology for forging inspection.

The NRC staff solicited input with regard to the material presented and discussed at the meeting, as well as any lessons learned on quasi-laminar flaws, that might lead to suggested improvements in Sections III and XI of the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code*. Sections III and XI differ in the examinations that are required and the acceptance criteria that apply and Section XI allows for evaluation for acceptance of any flaws detected during examinations. Discussion topics included clarification of the definitions of “reportable” and “recordable” indications, as defined by ASME. There was also discussion on when nondestructive examination examiners were required to document their findings, and whether those written findings became part of the permanent documentation record.

It was identified that the documentation requirements vary based on vendor or plant-specific procedures. The industry representatives stated that they will advise the NRC of their recommendations for improvements to the ASME Code, if any, as they progress through their activities on this topic.

A list of attendees is enclosed. The slide presentations presented by the NRC staff and the industry representatives can be found in the Agencywide Documents Access and Management System at Accession Numbers ML13059A225, ML13 067A407, and ML13 067A391.

Project No. 669

Enclosure:
List of Attendees

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List of Attendees

Public Meeting with U.S. Nuclear Regulatory Commission (NRC) staff to Discuss Potential Quasi-Laminar Indications in Reactor Pressure Vessel Forgings

March 5, 2013

NAME	AFFILIATION	E-MAIL	PHONE
Michael Benson	NRC	Michael.benson@nrc.gov	301-251-7492
Jana Bergman	Scientech	jbergman@curtisswright.com	301-471-3705
Scott Boggs	Florida Power & Light/ Nextera	Scott.boggs@fpl.com	561-694-4207
Mike Case	NRC	Michael.Case@nrc.gov	301-251-7619
Al Csontos	NRC	Aladar.Csontos@nrc.gov	301-251-7640
Bob Davis	NRC	Robert.Davis@nrc.gov	301-415-4028
Anthony DeArdo	University of Pittsburgh	deardo@pitt.edu	412-624-9737
Anne Demma	Electric Power Research Institute (EPRI)	ademma@epri.com	650-855-2026
Matt Devan	AREVA	Matt.devan@areva.com	434-832-3160
Steven Downey	NRC	Steven.downey@nrc.gov	301-415-8512
Robin Dyle	EPRI	rdyle@epri.com	205-426-5371
Marjorie Erickson	PEAI Consulting	Erickson@peaiconsulting.com	202-256-0127
Carolyn Fairbanks	NRC	Carolyn.Fairbanks@nrc.gov	301-415-6719
Yonggang Fang	NRC (foreign assignee)	fangyonggang@hotmail.com	301-415-5312
Eric Focht	NRC	Eric.focht@nrc.gov	301-251-7649
Bill Freebairn	Platts Nucleonics Week	William_freebairn@platts.com	202-383-2164
Ron Gamble	Sartrex, Inc	sartrex@aol.com	240-750-4566
Glenn Gardner	Dominion	glenn.a.gardner@dom.com	860-440-0373
Kris Garg	Constellation Nuclear	Krishan.garg@cengllc.com	410-470-3293

ENCLOSURE

NAME	AFFILIATION	EMAIL	PHONE
Jean-Claude Gauthier	AREVA France	Jean-claude.gauthier@areva.com	33734962842
Frank Gift	Westinghouse	giftfc@westinghouse.com	724-316-8024
Scot Greenlee	Exelon	Scot.Greenlee@exeloncorp.com	630-657-3800
Timothy Griesbach	Structural Integrity Association	tgriesbach@structint.com	408-833-7350
Bob Hardies	NRC	Robert.hardies@nrc.gov	301-415-5802
Tim Hardin	EPRI	thardin@epri.com	650-855-8776
Pat Hiland	NRC	Patrick.hiland@nrc.gov	301-415-3298
Michael Hoehn II	Ameren Missouri	mhoehn@ameren.com	314-225-1543
Joel Jenkins	NRC	Joel.Jenkins@nrc.gov	301-415-2955
Mark Kirk	NRC	Mark.Kirk@nrc.gov	301-251-7631
J. P. Lareau	Westinghouse	lareaujp@westinghouse.com	860-731-1605
Carl Larsen	INPO	larsencb@inpo.org	770-644-8416
Greg Makar	NRC	Gergory.Makar@nrc.gov	301-415-4034
Kris Mertens	Electrabel	mertensk@inpo.org	770-644-8907
Seung Min	NRC	Seung.min@nrc.gov	301-415-2045
Martin Morra	GE Global Research	morra@research.ge.com	518-387-4540
Carol Nove	NRC	Carol.nove@nrc.gov	301-251-7664
Nathan Palm	Westinghouse	palmn@westinghouse.com	412-374-2685
Jeff Poehler	NRC	Jeffrey.poehler@nrc.gov	301-415-8353
Y. R. (Joe) Rashid	Anatech	Joe.rashid@anatech.com	858-455-6350
Eric Reichelt	NRC	Eric.reichelt@nrc.gov	301-415-7632
Mark Richter	Nuclear Energy Institute (NEI)	mar@nei.org	202-739-8106
Mike Robinson	Duke Energy	Michael.Robinson@duke-energy.com	980-373-3522
Stacey Rosenberg	NRC	Stacey.rosenberg@nrc.gov	301-415-2357
Bernie Rudell	Constellation	bernie.rudell@cengllc.com	410-495-4815
Greg Selby	EPRI	gselby@epri.com	704-595-2595

NAME	AFFILIATION	E-MAIL	PHONE
William Server	ATI Consulting	wserver@ati-consulting.com	925-577-6496
Tom Sharkey	Dominion	Thom516@dom.com	804-273-3689
Gary Stevens	NRC	Gary.stevens@nrc.gov	301-251-7569
Rob Tregoning	NRC	Robert.tregoning@nrc.gov	301-251-7662
Dennis Weakland	Ironwood Consulting	weaklandd@gmail.com	412-974-3374
Tim Wells	Southern Nuclear	tgwells@southernco.com	205-992-7460

List of Teleconference Attendees

NAME	AFFILIATION	E-MAIL	PHONE
Dean Baker	TVA - Watts Bar	dcbaker@tva.gov	
Brian Burgos	Westinghouse		
Michael Burke	Westinghouse		
Jim Cirilli	Exelon PowerLabs	James.Cirilli@exelonpowerlabs.com	610-380-2451
Nicholas Day	Westinghouse		
Guy DeBoo	Exelon	guy.deboo@exeloncorp.com	
Stanley Focht	American Nuclear Insurers		860-682-1335
Greg Gerzen	Exelon	greg.gerzen@exeloncorp.com	
Mike Hacker	AREVA	Mike.Hacker@areva.com	434-832-3169
J. Brian Hall	Westinghouse		
Rich Jacko	Westinghouse	jackorj@westinghouse.com	412-256-1268
Xavier Jardí	EPRI	xjardi@guestresearcher.epri.com	650-855-8795
Christopher Koehler	Xcel Energy	Christopher.Koehler@XENuclear.com	612-330-6755
Frank Koontz	Tennessee Valley Authority - Watts Bar	fakoontz@tva.gov	423-365-1261
Heather Malikowski	Exelon	Heather.Malikowski@exeloncorp.com	
Mike McDevitt	EPRI	mmcdevitt@epri.com	949-374-0118
Kelly D'Urso	Westinghouse		
Tom Wolff	American Nuclear Insurers	TWolff@AmNucIns.com	860-682-1305
Hongqing Xu	Babcock & Wilcox Power	hxu@babcock.com	434-316-7689