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Annual Materials Programs Information Exchange Meeting

June 2015

PWROG Materials Committee Update

Chris Koehler, Chairman PWROG MSC (Xcel Energy)

Washington, DC

P R E S S U R I Z E D W A T E R R E A C T O R O W N E R S G R O U P

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PWR Owners Group MSC Agenda

- Significant Activities Since Last Information Exchange Meeting June 2014
- Areas of Coordination & Strategic Planning with EPRI MRP
- PWROG MSC Focus Areas for 2015-2016
- Future PWROG MSC Meetings
- MSC PWROG Core/Planning Team Organization and Key Contacts

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Significant Activities Since Last Information Exchange Meeting June 2014

Generic Projects

- NRC Staff has indicated they will be requesting PWROG-15003, “Materials Orientation Toughness Assessment” (MOTA), for information.
- Responded to RAIs on WCAP-17096, “Reactor Internals Acceptance Criteria Methodology”.

Cafeteria Projects

- Key programs (PA-MS-C-0983 site specific, PA-MS-C-0942, PA-MS-C-1103, PA-MS-C-1091 and PA-MS-C-1300) – See slides 8-12.
- Submitted WCAP-14048, “Lower Support Column Functionality” to the NRC for information.
- Submitted WCAP-17451 “Guide Card Wear” to the NRC for information.

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Areas of Coordination & Strategic Planning with EPRI MRP

- **Reactor Vessel Integrity**

- ✓ Participating in ASTM E10.02 to remove conservatism from sigma term of consensus ETC.
- ✓ Following BTP 5-3 non-conservatism issue. Second focus group meeting took place in January 2015.
- ✓ Industry/NRC Reactor Vessel Integrity meeting held on February 19, 2015.
- ✓ Working to demonstrate generically that nozzles are never controlling for P-T limits.

- **Reactor Internals**

- ✓ Coordinating with EPRI MRP on MRP-227 LAI/RAI Responses. Meeting with NRC staff to discuss the next revision of MRP-227-A held at the end of March 2015.
- ✓ Supporting utilities in plant-specific Applicability Determinations, including MRP-191, Fluence, and Cold Worked Stainless.
- ✓ PWROG call with NRC on a statistical approach for assessing CASS material in PWR Reactor Internals took place on May 27, 2015.



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Areas of Coordination & Strategic Planning with EPRI MRP

- **Stainless Steel Degradation**
 - ✓ Working with the EPRI MRP on the development of I&E guidance for ID and OD initiated SCC of PWR SS pressure boundary components.

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PWROG MSC Focus Areas for 2015-2016

- **Work to Support MRP-227-A - Reactor Internals – Ongoing Programs**
 - ✓ PA-MSC-1299 – Guide Card Wear RAI Support
 - ✓ PA-MSC-1288 – PWR Materials Assessment
 - ✓ PA-MSC-1198 – Clevis Bolt Fabrication and Inspection Status
 - ✓ PA-MSC-1122 - Reactor Vessel Internals Industry Coordination
 - ✓ PA-MSC-1103 - Functionality Analysis: Westinghouse Lower Support Columns
 - ✓ PA-MSC-0983 - Support for Applicant Action Items 1, 2, and 7 from the Final Safety Evaluation on MRP-227, Revision 0 (Working on plant specific requests)
 - ✓ PA-MSC-0473 - Reactor Internals Acceptance Criteria Methodology & Data Requirements (working to complete A-version of report)

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PWROG MSC Focus Areas for 2015-2016

- **Work to Support Reactor Vessel Integrity– Ongoing Programs**
 - ✓ PA-MSC-1207 – Proactively Drive Changes in Reactor Vessel Embrittlement Regulations
 - ✓ PA-MSC-1123 - Reactor Vessel Integrity Industry Coordination and NRC Interaction
 - ✓ PA-MSC-1091 – Demonstrate Excessive Appendix G Margins for PWR RPV Nozzles
 - ✓ PA-MSC-0938 – Update of Surveillance Capsule Fluence Summary Report WCAP-14044

- **Other Programs – Ongoing Programs**
 - ✓ PA-MSC-1300 – PWROG Subsequent License Renewal
 - ✓ PA-MSC-1294 - Development of Contingency Weld Repair Design for Applicable Dissimilar Metal Welds Joining Alloy 600 Branch Connection Nozzles to Primary Loop Piping
 - ✓ PA-MSC-1283 - Evaluation of Applicable Dissimilar Metal Welds Joining Alloy 600 Branch Connection Nozzle to Primary Loop Piping (B&W and Palisades only)
 - ✓ PA-MSC-1182 - Revision to BAW-1543 for Master Integrated Reactor Vessel Program

PWROG MSC Focus Areas for 2015-2016

Support for Applicant Action Items 1, 2, and 7 from the Final Safety Evaluation on MRP-227, Revision 0 (PA-MS-C-0983)

- The purpose of the program is to compile plant-specific reactor internals data to support utility responses on Applicant/Licensee Action Items 1, 2, and 7 from the final Safety Evaluation (SE) on MRP-227, Revision 0.
 - ✓ Participation by Westinghouse or CE owners in Tasks 3, 4 and 5 (Revision 0) and Tasks 6, 7, and 8 (Revision 1) of this program will allow utilities to take advantage of efficiencies in record searches and comparisons to MRP-191 failure modes, effects, and criticality analysis (FMECA).
 - ✓ Work recently completed for six units. 77% of the W and CE fleet is or has participated in Tasks 3-5 in or outside the PWROG. 53% of the W and CE fleet is or has participated in Tasks 6-8 in or outside the PWROG.

PWROG MSC Focus Areas for 2015-2016



Dynamic Response Models of Westinghouse and CE Internals (PA-MS-C-0942)

- The PWROG developed state of the art test data benchmarked dynamic response models of the Westinghouse internals.
 - ✓ The final deliverable was 360-degree finite element models of generic 2-, 3-, and 4-Loop Westinghouse-designs.
 - ✓ Models are readily adaptable to plant-specific variants, will provide a timely evaluation on inspection findings, and enable informed decisions on return to service and continued operation.
 - ✓ Provides a tool for real time evaluations in the as-found outage window and eliminates or reduces potential long term outage risks.
 - Program is complete.**

PWROG MSC Focus Areas for 2015-2016

Functionality Analysis: Lower Support Columns (PA-MS-C-1103)

- The PWROG developed a methodology for demonstrating functionality with respect to maintaining safety for the Westinghouse Lower Support Columns.
 - ✓ The final deliverable, utilizing a pilot application and considering catastrophic simultaneous failure of up to 50% of the columns, demonstrated that there is no likelihood of failure of the assembly and sufficient structural redundancy in the columns to provide reasonable assurance that the lower support structure will remain safe and functional through the period of operation.
 - ✓ Subsequent program steps will eliminate the need for plant specific evaluations across the Westinghouse and Combustion Engineering designs and result in significant cost savings throughout the fleet.
 - Revision 0 work complete.**

PWROG MSC Focus Areas for 2015-2016

Demonstrate Appendix G Margins for PWR RPV Nozzles and Beltline (PA-MS-C-1091)

- The purpose of the program is to identify and demonstrate the magnitude of the various margins related to assessment of the pressurized water reactor (PWR) reactor pressure vessel (RPV) inlet and outlet nozzles per 10 CFR 50, Appendix G. The intent is to show that compliance with 10 CFR 50, Appendix G, is assured by only explicitly assessing a 1/4T beltline flaw.
 - ✓ A letter presenting the master curve results and testing recommendations has been provided to the PWROG MSC.
 - ✓ Material Orientation Toughness Assessment (MOTA) work presented at the February 19, 2015 NRC meeting. Report in the process of being finalized.
 - ✓ Overall Draft Report due out by end of 2015.
 - To be discussed in greater detail later in the meeting**

PWROG MSC Focus Areas for 2015-2016

PWR Subsequent License Renewal (PA-MS-C-1300)

- The purpose of the first phase of the program is to review the PWROG reports referenced in the GALL that may need to be updated for SLR for 60 - 80 years of operation. In addition, PWROG reports referenced in the GALL that have SLR impacts will be reviewed.
 - ✓ Draft report issued in May 2015 for review and comment.
 - The report compiles the PWROG reports and the sections of those reports that have SLR impacts (including life-limiting language or assumptions).
 - Also included is a prioritization of the documents in order to address the SLR impacts.
 - After the plan has been reviewed by the Materials Committee, the plan will be discussed with the new NEI SLR Working Group for lead plants. The discussion with the NEI group will help ensure that the Materials Committee priorities/schedule will support the SLR lead plants' application schedule. It will also help ensure alignment with other schedules (NEI, EPRI, and DOE) as appropriate.

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Future PWROG MSC Meetings

PWROG MSC Meeting Schedule for 2015

August 10-13, 2015

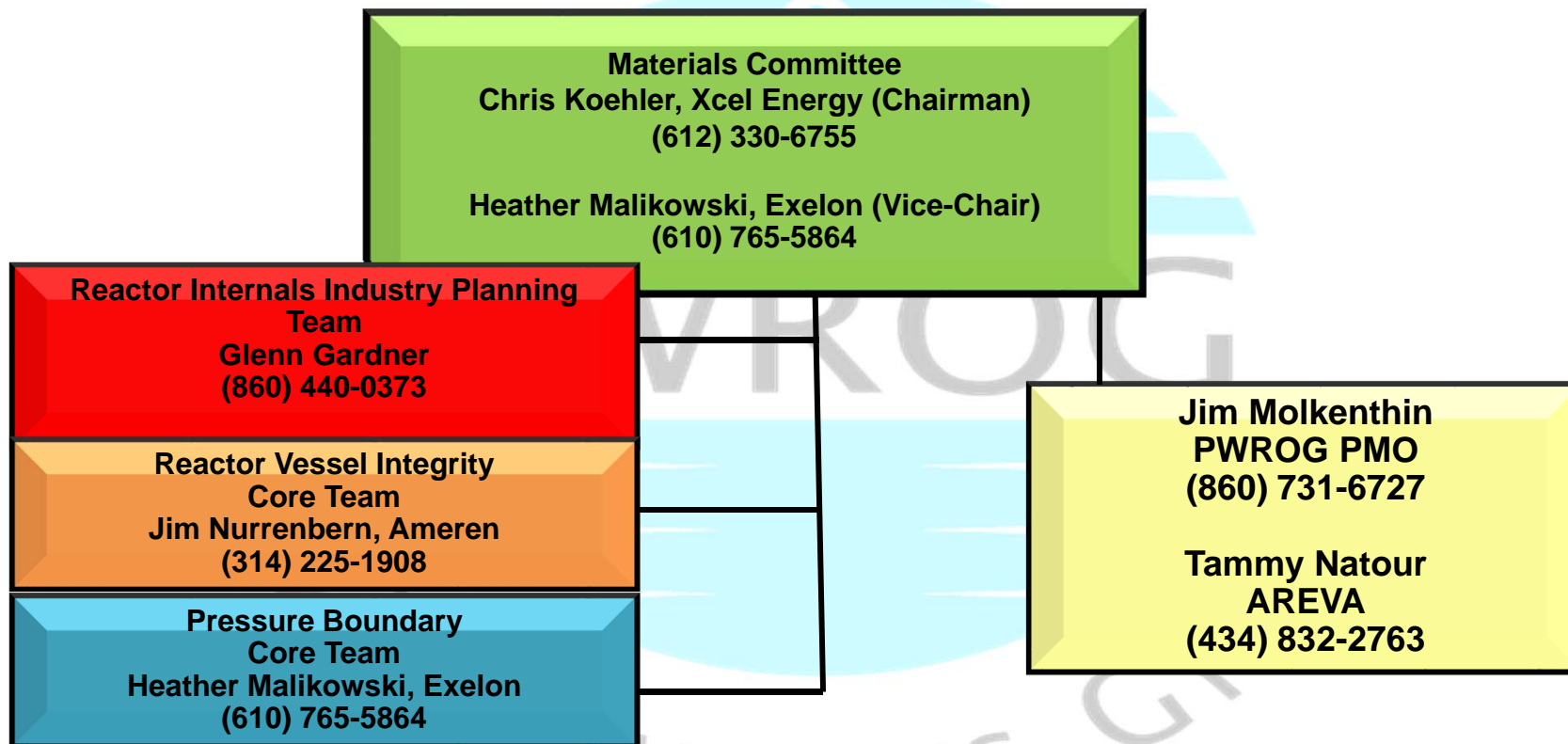
Baltimore, MD (Joint)

December 14-17, 2015

Marco Island, Florida (Joint)

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MSC PWROG Core/Planning Team Organization and Key Contacts



Questions?



The Materials Committee is established to provide a forum for the identification and resolution of materials issues including their development, modification and implementation to enhance the safe, efficient operation of PWR plants.



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