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# 2017 Materials Programs Technical Information Exchange Meeting PWROG Materials Committee Update

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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

2017 Materials Programs Technical Information Exchange Meeting  
**PWR Owners Group MSC Agenda**



- Significant Activities Since Last Information Exchange Meeting August 2016 – NRC Interaction
- PWROG MSC Focus Areas for 2017/2018
- Future PWROG MSC Meetings
- MSC PWROG Core/Planning Team Organization and Key Contacts

# Significant MSC Activities Since Last Information Exchange Meeting August 2016 – NRC Interaction



- Issued draft report PWROG-15109-P, Revision 0-A “PWR Reactor Pressure Vessel Nozzle Appendix G Evaluation” for MSC review and comment in June 2016. Report provided to EPRI/SIA in October 2016 for an independent review. Comments received and incorporated into the final version of the report. **Final issued in early May 2017. Pre-submittal meeting held on May 22, 2017.**
- Issued draft report PWROG-15089-P, Revision 0-A, “Plan for Transitioning RPV Integrity to Direct Fracture Toughness” for review and comment in late January 2016. The PWROG MSC and the program technical team met with the NRC in early March 2016 to present the plan. **Revised draft plan issued to the MSC in January 2017 incorporating NRC feedback.**

## Significant MSC Activities Since Last Information Exchange Meeting August 2016 – NRC Interaction

- Issued final report PWROG-15105-NP, Revision 0, “PWR RV Internals Cold-Work Assessment” (April 2016). The NRC made a formal request for the report for information only and the report was provided in June 2016. Meeting held with the NRC on September 7, 2016. **Staff Assessment received in January 2017.**
- Issued draft report PWROG-14048-P, Revision 1-A, "Functionality Analysis: Lower Support Columns" for review and comment mid-December 2016. The NRC made a formal request for the report for information only to support closing MRP-227 A/LAI 7 for CASS Lower Support Columns. **Final report provided to the NRC for information only in March 2017.**
- Met with the NRC on **March 28, 2017** to discuss WCAP-15029-P-A “Westinghouse Methodology for Evaluating the Acceptability of Baffle- Former-Barrel Bolting Distributions Under Faulted Load Conditions.

# PWROG MSC Focus Areas for 2017/2018



- **Work to Support Reactor Internals Activities (Bold NRC Interaction)**
  - ✓ **MSC-1519 - Address NRC Questions Regarding the NRC-Approved Methodology for Acceptable Bolting Pattern Analyses (ABPA)**
  - ✓ **MSC-1403 - Scale and Impact of Uncertainty in Fluence Determinations for Reactor Vessel Internals**
  - ✓ **MSC-1473 - Baffle-Former Bolt Operability Assessment for the Fleet**
  - ✓ MSC-1388 – Reactor Vessel Internals Industry Coordination
  - ✓ **MSC-1288 – PWR Materials Assessment**
  - ✓ **MSC-1287 - Core Barrel Welds Aging Management Strategy (Probability and Consequences of Failure)**
  - ✓ MSC-1286 – Evaluation of Potential Wear: Thermal Sleeve Flange
  - ✓ **MSC-1103 – Functionality Analysis: Westinghouse Lower Support Columns**
  - ✓ 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)

# PWROG MSC Focus Areas for 2017/2018

- **Work to Support Reactor Vessel Integrity (Bold NRC Interaction)**
  - ✓ MSC-1481 - Linde 80 Weld Low Upper-Shelf Toughness Fracture Mechanics Testing and Analysis
  - ✓ **MSC-1392 - Qualification/Refinement of Fluence Determination in Non-Traditional Reactor Vessel Beltline Locations**
  - ✓ **MSC-1323 - Reactor Vessel Integrity Industry Coordination and NRC Interaction**
  - ✓ **MSC-1319 - Implement Plan for Transitioning RV Integrity to Direct Fracture Toughness (see slides 7 and 8 for more detail)**
  - ✓ MSC-1207 – Proactively Drive Changes in Reactor Vessel Embrittlement Regulations
  - ✓ MSC-1200 - B&W Fabricated Reactor Vessel Materials and Surveillance Data Information
  - ✓ **MSC-1182 - Revision to BAW-1543 for Master Integrated Reactor Vessel Program**
  - ✓ **MSC-1091 – Demonstrate Excessive Appendix G Margins for PWR RPV Nozzles**
  - ✓ MSC-0943 - Reactor Vessel ISI 10 to 20 Year Interval Extension – Plant Specific Work

# Transitioning RV Integrity to Direct Fracture Toughness - MSC-1319 (1/2)



- Concept presented to NRC on March 2016, updated plan presented at August 2016 EPRI Materials Reliability Conference
  - NRC feedback incorporated and Phase 1 funded
- The purpose of Phase 1 of the overall program (this PA is Phase 1) is to prepare a topical report that will be submitted for NRC approval in 2018
  - Acceptable method for any licensee to use irradiated fracture toughness data to improve or demonstrate margin in P-T curves
- The ultimate use of this approved topical report will:
  - Reduce the number of plants that need to update P-T curves through 60 years
  - Enable the use of 60-year P-T curves through 80 years of operation or improve P-T curves by increasing operating window
  - Mitigate future issues
  - Reduce uncertainty
  - Demonstrate RV integrity margin

# Transitioning RV Integrity to Direct Fracture Toughness - MSC-1319 (2/2)



## Phase 1 (Prepare methodology topical)

- Present to NRC to obtain feedback – COMPLETE: March 2, 2016
- Prepare methodology topical for submittal and approval (ASME Code Case N-830)
  - ✓ Margin term (measurement uncertainty and material variability)
  - ✓ Chemistry adjustment procedure; MTR adjustment procedure

## Phase 2 (Test Matrix and Layout Diagrams)

- Develop final test matrix (MTR and benchmark materials) with utility input

## Phase 3 (Machine Mini-CTs, Irradiate in MTR and Test)

- Machine and precrack 16 mini-CTs for each selected unirradiated material
- Irradiate in MTR to selected fluence at selected temperature; Test per ASTM E1921
- Machine and precrack and test 12-16 mini-CTs from each selected existing benchmark PWR irradiated material

## Phase 4 (Assess Data)

- Use test data to develop estimation methods for materials not available for testing

## Plant Specific

- Develop new P-T curves following approved methodology with applicable adjustments and margins
- License amendment referencing approved topical (with exemption to 10CFR50 App G)



# PWROG MSC Focus Areas for 2017/2018

- **Work to Support Pressure Boundary Activities**
  - ✓ MSC-1472 - Qualification of a Lamb Wave Technique for the Inspection of Small Diameter Tubing” for BMIs - Follow On Work
  - ✓ MSC-1294 - Development of Contingency Weld Repair Design for Applicable Dissimilar Metal Welds Joining Alloy 600 Branch Connection Nozzles to Primary Loop Piping (B&W and Palisades only)
  - ✓ MSC-1283 - Evaluation of Applicable Dissimilar Metal Welds Joining Alloy 600 Branch Connection Nozzle to Primary Loop Piping (B&W and Palisades only)
  - ✓ MSC-0551 - Development of Generic Recommendations to Address ID-Initiated and OD-Initiated SCC of PWR Stainless Steel Pressure Boundary Components (Phase 3)

# PWROG MSC Focus Areas for 2017/2018

- **Work to Support SLR Activities**

- ✓ MSC-1500 - Subsequent License Renewal: WCAP-14535A, “Topical Report on Reactor Coolant Pump Flywheel Inspection Elimination” and WCAP-15666-A, “Extension of Reactor Coolant Pump Motor Flywheel Examination”
- ✓ MSC-1499 - Scoping of Updates Suggested in PA-MS-C-1300 Reports
- ✓ MSC-1498 - Subsequent License Renewal: WCAP-13045, “Compliance to ASME Code Case N-481 of the Primary Loop Pump Casings of Westinghouse Type Nuclear Steam Supply Systems”
- ✓ MSC-1497 - Subsequent License Renewal: WCAP-15338-A, “A Review of Cracking Associated with Weld Deposited Cladding in Operating PWR Plants”
- ✓ MSC-1300 - PWROG Subsequent License Renewal

# 2017 Materials Programs Technical Information Exchange Meeting

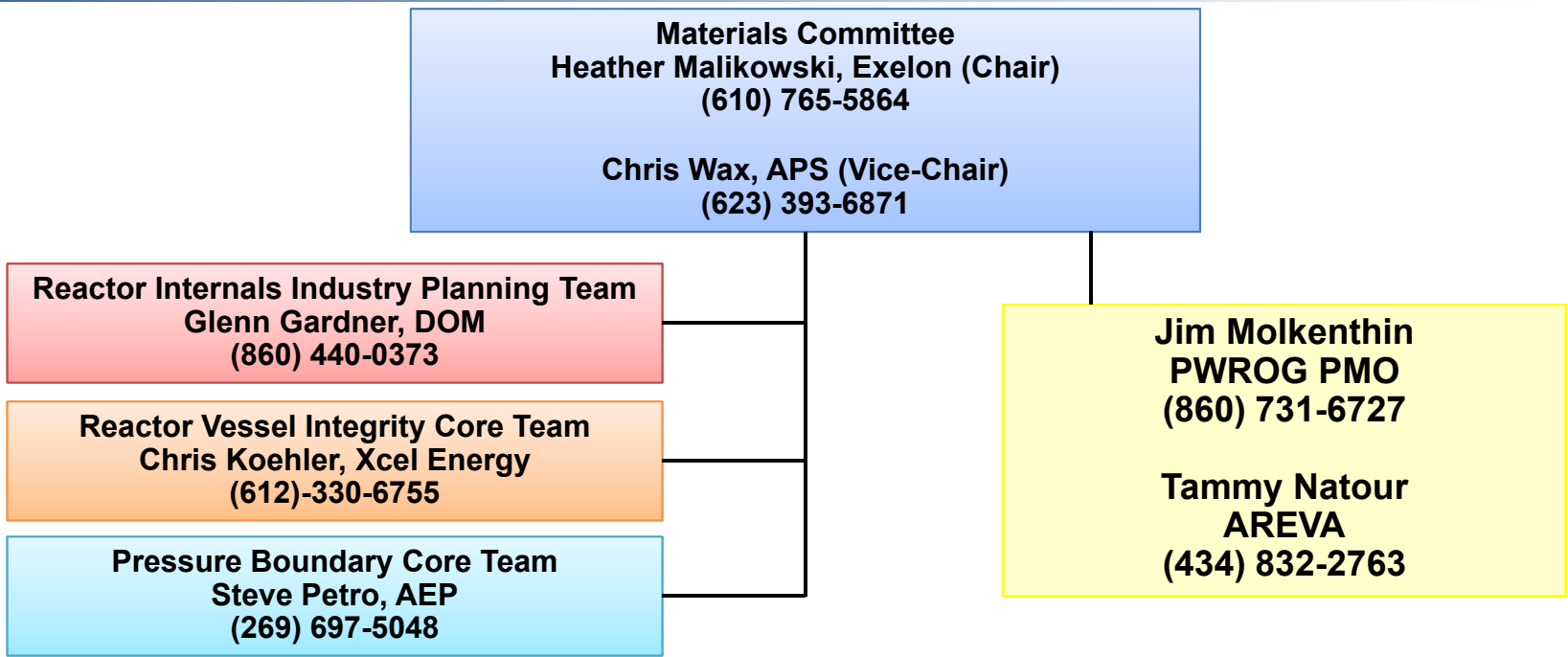
## **Future PWROG MSC Meetings (2017)**



**August 14-17, 2017**  
**Baltimore, MD (Joint)**

**December 4-7, 2017**  
**Marco Island, Florida (Joint)**

# 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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