

Materials Degradation/Aging Action Plan Committee (MAPC)

Bill Pitesa (Duke), MAPC Executive Chair Scot Greenlee (Exelon), MAPC Technical Chair Kurt Edsinger (EPRI), MAPC Program Manager David Czufin (TVA), PMMP Chairman Tim Hanley (Exelon), BWRVIP Executive Chairman Leo Martin (Duke), NDE APC Chairman Steve Swilley (EPRI), Director NDE Robin Dyle (EPRI), Senior Technical Executive Industry/NRC Executive Meeting on Materials Program



Agenda

- Introductions and opening comments
- Review of Action Items
- Industry Presentations
 - NDE Leo Martin
 - LTO/SLR Scot Greenlee
 - BWRVIP Tim Hanley
 - PWROG MSC Scot Greenlee
 - SGMP David Czufin
 - MRP David Czufin
 - MAPC Scot Greenlee
- NRC presentations/comments
- Review Action Items
- Public Comment
- Adjourn

Programs to Manage Materials Issues

EPRI Materials Programs

- BWR Materials (BWRVIP)
- PWR Materials (MRP)
- Steam Generator (SGMP)
- Primary Systems Corrosion Research (PSCR)
- Welding & Repair Technology Center (WRTC)
- Other Coordinated EPRI Programs
 - NDE
 - Water Chemistry Control
- PWR Owners Group
 - Materials Subcommittee (MSC)



Materials Organizational Structure



*NDE APC coordinates with Materials APC and PWR Owners Group **Materials Subcommittee has a representative on Materials APC



NDE

Leo Martin – Duke Chair, NDE Action Plan Committee



Overview

- Leo Martin is the new NDE Action Plan Committee Chairman
- Communication between NRC and industry is good
 - Annual meetings in January have proven valuable for detailed technical exchanges
 - Quarterly phone calls assure ongoing alignment
- Only significant operating experience is from Calvert Cliffs
 - In February 2016, Calvert Cliffs identified that the measured through-wall depth of a previously reported axial flaw in a pressurizer safety relief dissimilar metal weld (DMW) had increased from 8% or 0.10" (2.5 mm) through-wall to 81.6% or 1.02" (25.4 mm) through-wall since the last examination in 2010



Industry Actions

- An industry group consisting of members of the Boiling Water Reactor Vessel and Internals Project (BWRVIP), the Materials Reliability Program (MRP), and the NDE IC, was formed to address fleet applicability
 - <u>March 2016</u> Review of Root Cause
 - Determined that primary root cause was due to scanner issues during the collection of the 2006 pre and post MSIP[®] data
 - <u>March April 2016</u> Industry Survey
 - Performed fleet survey to determine how many licensees have reported inservice related flaw(s) in dissimilar metal welds that have been mitigated using MSIP[®] or Induction Heat Stress Improvement (IHSI), and have not been subsequently overlaid
 - <u>May 2016</u> Issued Industry Recommendations
 - The NDE Integration Committee (IC) issued letter NDE 20160509-001 that includes specific recommendations for the review of previously collected data

Status

Survey Results

- There are a total of 10 welds in the US fleet that have existing flaws in dissimilar metal welds that have been mitigated with MSIP[®]
- Of these 10 welds, 5 have been examined since the issuance of Revision 1 of the DM guideline in May of 2013
- With the exception of the Calvert Cliffs experience, no flaws have exhibited negative changes

Response to Recommendations

- The utilities with the five remaining welds have committed to following the recommendations
- Data has been reviewed on three of the remaining five welds and no issues have been identified
- The remaining two welds are currently scheduled for examination in spring of 2017



LTO/SLR

Scot Greenlee – Exelon Technical Chair, MAPC for Mike Gallagher – Exelon Chair, LTO Action Plan Committee



EPRI LTO Program Goals and Objectives

- Technical basis for *decision* to operate through extended life time
 - Supports business case for life extension and refurbishments
- Technology to manage plant assets throughout the lifetime
 - Aging management, asset management and risk management
 - Addresses safety, performance and costs
- Supports US Subsequent License Renewal (SLR)
 - Close coordination and collaboration with DOE-LWRS Program, NEI LR Tasks Force and Owners Groups
- Supports International implementation of IGALL Aging Management Programs



Close coordination with IAEA and international R&D partners



SLR GALL

- EPRI completed review of documents that may be impacted for SLR
 - Schedule developed and endorsed by Executive Advisors
 - Supports lead plants for SLRA
- Industry / EPRI provided comments on GALL-SLR
- Process for comment review and resolution has been effective
- A technical issues still under discussion planned for discussion on July 28, 2016
 - AMP XI.M16A PWR internals inspection gap analysis
 - AMP XI.M11B recommendation for baseline volumetric inspection of PWR bottom-mounted nozzles (BMN)
 - AMP XI.M31 recommendation for surveillance capsules



AMP XI.M11B, Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion

- GALL-SLR recommends a baseline volumetric inspection of PWR bottom-mounted nozzles (BMN) using "a qualified volumetric examination method"
- 10CFR50.55a mandates use of Code Case N-722 which requires bare-metal visual (BMV) examinations
- MRP-206 serves as tech basis for N-722
- The risk evaluations that support MRP-206 show that periodic inspections as defined by this I&E guideline provide:
 - Reasonable assurance against nozzle ejection and significant head wastage
 - An extremely low frequency of damage to the nuclear fuel core associated with the potential for age-related degradation of nickel-based alloy BMNs
 - Performing a program of periodic volumetric exams of the BMN tubes in addition to the N-722-1 requirements was shown in the safety assessments to have relatively little additional benefit

AMP XI.M11B, cont'd

- Ultrasonic examinations (UT) interrogate tubing material, not the attachment j-weld
- B&W units cannot be examined via UT
- Inspections to-date have revealed two domestic units with minor indications attributed to weld defects and no base metal wastage
- Efforts to develop and implement a qualified UT program such as use Section XI Appendix VIII would be excessive in cost versus value
- NRC has made no efforts to mandate more than N-722-1 and its BMV examination in the regulations, implying adequacy for safety
- Therefore, the imposition of qualified volumetric examinations via the GALL-SLR is unwarranted



AMP XI.M31, Reactor Vessel Material Surveillance

- This AMP is complex and industry provided 14 pages of comments on this AMP alone
- The staff has worked diligently in the public meetings to understand industry's comments and offered NRC's perspective - Many items have been resolved
- One unresolved item is the GALL-SLR position that an RPV surveillance capsule be tested during the SLR period
- The need for testing a capsule in the SLR period has not been established



AMP XI.M31, cont'd

- Many plants will have tested all of their capsules by the end of the first license renewal period. PWR plants are likely to have 5 or 6 capsules with substantial lead factors that enabled the already pulled capsules to provide data at fluence values in excess of SLR peak values
- The GALL SLR position will result in these plants inserting another capsule during the SLR period. This capsule will result in one additional data point:
 - that is already within the range of fluence values already provided by the existing surveillance results.
 - when 5 or 6 data points are already available, is very unlikely to have any discernable effect on chemistry factors or embrittlement trend observations.
- For weld heats that are present in multiple reactors, in excess of 10 data points may already exist. This even further negates the value of testing additional capsules
- Insertion of a capsule is expensive and is not without risk but would offer little technical benefit and negligible improvement in safety
- Industry's position is if a capsule has been examined in the prior 60 years of operation with a capsule fluence between 1-2 times the maximum ID fluence projected for the RPV for 80 years of operation, then withdrawal and testing of additional surveillance capsules during the subsequent period of extended operation should not be required





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Tim Hanley – Exelon Chair, BWRVIP Executive Committee



Overview Outline

- Current Members and Organization
- 2016 BWRVIP Major Tasks
- 2016 BWR Operating Experience
- Status of Key Topics with NRC
- Contact Information





Current Members and Organization



2015 BWRVIP Member Utilities

- DTE Energy
- Duke Energy
- Energy Northwest
 - Entergy
 - <u>A</u> Exelon
 - FirstEnergy
- NextEra Energy
 - NPPD
 - PPL
- PSEG Nuclear
- Southern Nuclear Company
- Tennessee Valley Authority
 - Xcel Energy

Intl

- BKW FMB Energie AG Switzerland
- Chubu Electric Power Company Japan
- Chugoku Electric Power Company Japan
- Comision Federal de Electricidad Mexico
 - Horizon UK
 - Iberdrola Generation Spain
 - JAPC Japan
 - Kernkraftwerk Leibstadt Switzerland
 - Nuclenor Spain
 - OKG Aktiebolag Sweden
 - Ringhals AB Sweden
 - Taiwan Power Company Taiwan
- Tokyo Electric Power Company Japan



2016 BWRVIP Organization







2016 BWRVIP Major Tasks



2016 BWRVIP Major Tasks

Address Jet Pump Flow-Induced Vibration Issues

- Complete BWRVIP's Full Scale Jet Pump Testing of BWR4's Jet Pump Design including supporting Vendor demonstrations
- Support Hatch 1 and Dresden 3 with surveillance capsule activities
- BWRVIP SLR activities
- Extension of ISP for Subsequent License Renewal (SLR)





2016 BWR Operating Experience



2016 BWR Operating Experience

- BWR 4 Spring Outage
 - Thin "Engineered" overlay showed an indication during repair activities.
 - Staff contacted by the utility
 - BWRVIP held Emergent Issue call and provided input to the utility
 - Full Structural Weld Overlay repair implemented as planned
 - BWRVIP surveyed the U.S. BWR fleet to see if any overlays of similar design and materials existed and found there were none



2016 BWR Operating Experience

- BWR 4 Summer Forced Outage due to drywell leakage
 - -Identified an ICMH leak near bottom flange
 - -BWRVIP held Emergent Issue call and provided input to the utility
 - -First of a kind leak location and repair
 - -Utility performed a weld overlay on the affected area
 - -The utility's root cause analysis still in progress; upon completion, the BWRVIP will review it for any generic implications





Status of Key NRC Topics



Status of Key Topics with NRC

- The BWRVIP appreciates the staff issuing the following:
 - BWRVIP-18, Revision 2, Core Spray I&E Guidelines Safety Evaluation
 - BWRVIP-183, Top Guide Grid Beam I&E Guidelines Safety Evaluation
 - Hope Creek's surveillance capsule (ISP) extension letter to PSEG
 - BWRVIP-234, Thermal Aging & Neutron Embrittlement of CASS Safety Evaluation



Status of Key Topics with NRC

 The BWRVIP is anticipating the release of the updated "FAVOR" code for several PFM (Probabilistic Fracture Mechanics) related activities.
(*This is to be discussed by Scot Greenlee*)



PWROG Materials Committee

Scot Greenlee – Exelon Technical Chairman, Materials Action Plan Committee





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2016 Materials Programs Executive Information Exchange Meeting PWROG Materials Committee Update

Scot Greenlee (Exelon)

Technical Chairman of the Materials Action Plan Committee

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



2016 Materials Programs Executive Information Exchange Meeting PWR Owners Group MSC Agenda

- Key Strategic Areas Core/Planning Team Organization
- PWROG MSC/NRC Interactions
- PWROG MSC Areas of Coordination & Strategic Planning with MRP
- PWROG MSC Focus Areas for 2016/2017



2016 Materials Programs Executive Information Exchange Meeting Key Strategic Areas / Core Team Organization



PRESSURIZED WATER REACTOR OWNERS GROUP

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2016 Materials Programs Executive Information Exchange Meeting **PWROG MSC/NRC Interactions**



- PWROG-15032-NP, Revision 0, "Statistical Assessment of PWR RV Internals CASS Materials", provided to the NRC for information
 - The NRC made a formal request for the report for information only. Report was submitted in January 2016.
 - Meeting held with the Staff on May 5, 2016. The dialogue with the NRC was favorable.
- Final SE received on WCAP-17096, "Reactor Internals Acceptance Criteria Methodology"
 - Final SE received in March 2016. The PWROG has worked to eliminate or simplify compliance demonstration where possible for some of the SE requirements.
 - Working on "A" version of report, which is now scheduled to be completed by the end of August 2016.



2016 Materials Programs Executive Information Exchange Meeting **PWROG MSC/NRC Interactions – Cont'd**

- PWROG Report PWROG-15105-NP, Revision 0, "PWR RV Internals Cold-Work Assessment", provided to the NRC for information
 - The NRC made a formal request for the report for information only. Report was submitted in June 2016.
 - Plan to meet with the NRC in September 2016 timeframe.

Baffle-Former Bolt Focus Group

- Jointly presented with EPRI MRP at NRC public meeting on July 19th.



2016 Materials Programs Executive Information Exchange Meeting Areas of Coordination & Strategic Planning with EPRI MR

Reactor Vessel Integrity

- ✓ Participating in ASTM E10.02 to remove conservatism from sigma term of consensus ETC.
- ✓ Working to demonstrate generically that nozzles are never bounding for P-T limits.
- ✓ Developed plan to transition industry and regulation to Direct Fracture Toughness (Master Curve). Meeting held on March 2, 2016 with the NRC to present the overall plan.

Reactor Internals

- ✓ Coordinating with the EPRI MRP on the Baffle-Former Bolt Inspection Findings.
- ✓ Coordinating with EPRI MRP on MRP-227 LAI/RAI Responses.
- ✓ Supporting utilities in plant-specific Applicability Determinations, including MRP-191, Fluence, and Cold Worked Stainless Steel.
- ✓ Working with MRP and NRC on a statistical approach for assessing CASS material in PWR Reactor Internals. Face-to-face meeting held on May 5, 2016.

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.



2016 Materials Programs Executive Information Exchange Meeting **PWROG MSC Focus Areas for 2016/2017**

- Work to Support MRP-227-A Reactor Internals Ongoing Programs
 - ✓ PA-MSC-1473 Baffle-Former Bolt Technical Support for the Fleet
 - ✓ PA-MSC-1388 Reactor Vessel Internals Industry Coordination
 - ✓ PA-MSC-1299 Guide Card Wear RAI Support
 - ✓ PA-MSC-1288 PWR Materials Assessment
 - ✓ PA-MSC-1286 Evaluation of Potential Wear: Thermal Sleeve Flange
 - ✓ 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 WCAP-17096 report)



2016 Materials Programs Executive Information Exchange Meeting **PWROG MSC Focus Areas for 2016/2017 – Cont'd**

• Work to Support Reactor Vessel Integrity– Ongoing Programs

- PA-MSC-1392 Qualification/Refinement of Fluence Determination in Non-Traditional Reactor Vessel Beltline Locations
- ✓ 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



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SGMP

David Czufin – TVA Chair, PWR Materials Management Program



EPRI SGMP Organization





Steam Generator Task Force

- Steam Generator Management Program meets biannually with the NRC staff to discuss:
 - Ongoing research
 - World-wide operating experience
 - Technical issues
 - NEI 03-08 guidance
 - New requirements
 - Deviations
- Next meeting scheduled for August 16, 2016



SGMP Key Activities

- Completed generic inputs into plant-specific analyses for susceptibility to fatigue failure
- Continue to investigate the capabilities and uncertainties associated with a single pass automated data analysis system
- Published Revision 8 of the Examination Guidelines and Revision 4 of the Integrity Assessment Guidelines
- Investigate the microstructures of Alloy 600TT operating steam generators to assess indications potential for SCC progression.



Update on South Texas Operating Experience

- South Texas identified a small (0.09 volt) volumetric indication during fall 2015 inspection
- Indication was in a tube located in the low-flow region of the steam generator where hard sludge had formed collars on the tubes at the top of the tubesheet
- Indication was confirmed by several eddy current techniques
- Tube was taken out of service by plugging, inspection was expanded to all tubes with hard collars, and apparent cause was conducted
- Apparent cause ruled out all possible mechanisms except pitting or an NDE false call
- Utility is taking appropriate actions to monitor for pitting in future inspections



MRP

David Czufin – TVA Chair, PWR Materials Management Program



MRP Mission

- Significant materials issues in the late 1990s led to the formation of the Materials Reliability Program (MRP)
- The objective of the MRP is to resolve existing and emerging PWR materials performance, safety, reliability, operational and regulatory issues





MRP Research Focus Areas

RFA	Description
1	Reactor Vessel Internals Assessment, Modeling and Inspection
2	Reactor Vessel Internals Irradiated Materials Testing
3	Alloy 600/690 Management, Mitigation, and Inspection
4	Reliability of CASS Pressure Boundary Components
5	Pipe Rupture Probability Assessment
6	Stainless Steel Degradation Mechanism Studies
7	Fatigue Management (Thermal and Vibration Fatigue)
8	Replacement Materials Testing (Alloy 690/52/152)
9	Reactor Pressure Vessel Integrity
10	Environmentally Assisted Fatigue



2016 MRP Deliverables (1 of 2)

Product ID	Title	ltem Type	Planned Completion Date	Status
3002007392	Materials Reliability Program: Topical Report for Primary Water Stress Corrosion Cracking Mitigation by Surface Stress Improvement (MRP-335 Rev. 3)	Report	2/29/2016	Completed on time
3002008359	Pressurized Water Reactor Materials Reliability Program: Effects of Surface Peening on the Inspectability of Nondestructive Evaluation	Report	4/15/2016	Completed on time
3002007383	Materials Reliability Program: Basis for ASME Section XI Code Case N-838—Flaw Tolerance Evaluation of Cast Austenitic Stainless Steel (CASS) Piping Components (MRP-362 Rev. 1)	Report	4/30/2016	Completed on time
3002008636	Materials Reliability Program: Development of Probability of Detection Curves for Ultrasonic Examination of Dissimilar Metal Welds (MRP-262, Rev. 2) Typical PWR Leak-Before-Break Line Locations	Report	5/2/2016	Completed on time
3002008082	Materials Reliability Program: Effect of Lithium Concentration on IASCC Initiation in Irradiated Stainless Steel (MRP-413)	Report	6/30/2016	Completed on time
3002008084	Materials Reliability Program: Specification Guideline for Primary Water Stress Corrosion Cracking Mitigation by Surface Stress Improvement (MRP-336, Rev. 1)	Report	6/30/2016	Completed on time
3002007897	Materials Reliability Program: Revised Technology for Reactor Vessel J-groove Weld Surface Examination (MRP-410)	Report	7/1/2016	Completed on time
3002007934	Materials Reliability Program: Administrative Procedures (MRP-130, Rev. 4)	Report	7/22/2016	Completed on time
3002007851	Materials Reliability Program: Summary of JSME Thermal Fatigue Assessment Guideline and Comparison with MRP Management Guideline (MRP-408)	Report	9/5/2016	On Schedule
3002007852	Materials Reliability Program: Benchmark of Thermal Fatigue Management in France (MRP-409)	Report	9/5/2016	On Schedule



2016 MRP Deliverables (2 of 2)

Product ID	Title	ltem Type	Planned Completion Date	Status
3002007850	Materials Reliability Program: Environmentally Assisted Fatigue Testing of Stainless Steel Under Non- isothermal and Complex Loadings (MRP-407)	Report	9/30/2016	On Schedule
3002007964	Materials Reliability Program: PWR Supplemental Surveillance Program (PSSP) Capsule Fabrication Report (MRP-412)	Report	9/30/2016	On Schedule
3002008083	Materials Reliability Program: Basis for Primary Water Stress Corrosion Cracking Mitigation by Surface Stress Improvement (MRP-267, Rev. 2)	Report	9/30/2016	On Schedule
3002007853	Materials Reliability Program: Management of Thermal Fatigue in Normally Stagnant Non-Isolable Reactor Coolant System Branch Lines (MRP-146, Rev. 2)	Report	10/30/201 6	On Schedule
3002007960	Materials Reliability Program: Screening, Categorization, and Ranking of Reactor Internals Components for Westinghouse and Combustion (MRP-191, Rev. 1)	Report	10/31/201 6	On Schedule
3002007849	Materials Reliability Program: PWSCC Growth Rate Testing of Alloys 690/52/152 Under Simulated Primary Water- An Update (MRP-406)	Update	11/18/201 6	On Schedule
3002007948	Materials Reliability Program: PWR Bottom Mounted Nozzle Exam Zone Definition & Basis Development (MRP-411)	Report	11/18/201 6	On Schedule
3002007955	Materials Reliability Program: Aging Management Strategies for Westinghouse and Combustion Engineering PWR Internal Components (MRP-232, Rev. 2)	Report	12/16/201 6	On Schedule
3002007933	Materials Reliability Program: Inspection Data Survey Report (MRP-219, Rev. 12)	Report	12/18/201 6	On Schedule
3002007951	Materials Reliability Program: Reactor Pressure Vessel Integrity Primer (MRP-278, Rev.1), A Primer on Theory and Applications	Report	12/18/201 6	On Schedule



Potential Non-Conservatism in BTP 5-3

- MRP/BWRVIP and PWROG evaluated potential nonconservatisms in BTP
 - MRP/BWRVIP evaluated the conservatism of the BTP methods and assessed safety significance of non-conservatisms
 - PWROG's "Material Orientation Offset Approach" (MOTA) showed existing P-T curve methods for PWRs have available conservative margin to offset BTP in most cases
- Evaluation found some BTP methods are potentially nonconservative, depending on product form
- Performed probabilistic fracture mechanics (PFM) analyses to assess risk of continued use of existing BTP through 60 years
 - Risk to vessel integrity is negligible; no safety benefit to be gained from revising vessel P-T limits to address BTP non-conservatisms
 - One exception: 1 BWR used BTP B1.1(4) for a beltline nozzle, the impact of which cannot be assessed by PFM, and will likely require plantspecific effort to address
- Awaiting final disposition from the NRC



Regulatory Interface

- Received a fee waiver for NRC's review of "Materials Reliability Program: Pressurized Water Reactor (PWR) Internals Inspection and Evaluation Guidelines (MRP-227-Rev. 1)."
- Development work for MRP-227 Rev 2 to address GALL SLR has established an acceptable timeline with NRC to maintain generic reference of MRP-227-A in GALL SLR
- MRP-335, R3, the technical basis for optimized inspection intervals for Alloy 600 locations based on PWSCC mitigation by peening has been submitted to the US NRC for a safety evaluation (SE). Awaiting the SE.
- In parallel, peening mitigation has been incorporated into Section XI of the ASME Code by revisions to the code cases for DMWs, and RPVHPNs. The final code case is expected to be approved in August 2016.
- The initial implementation of peening in the US PWR fleet was successfully completed in spring 2016. Another plant will peen reactor coolant inlet/outlet and BMN nozzles in the fall of 2016. Additional peening mitigation projects at PWR plants in the US are under contract.



Baffle Former Bolt Issue

- Degradation of baffle former bolts (BFBs) was anticipated
- The aging management program for PWR reactor internals, MRP-227-A, requires inspection of the BFBs
- In March and April of 2016, 2 plants identified potential degradation in larger populations of BFBs than anticipated
- In response to the OE a Baffle Former Bolt Focus Group (BFB FG) was created
- The BFB FG is to focus on BFB degradation and includes participants from:
 - Utilities
 - EPRI
 - PWROG
 - Vendors (AREVA, Westinghouse, others)



Baffle Former Bolt Focus Group

- The BFB FG held its first meeting May 19, 2016
- The FG defined 6 focus areas of work

Focus Area	Lead Organization		
#1 – Extent of Condition, Interim Guidance, Technical Interfacing with the NRC	MRP		
#2 – Plant/Fleet Operating Experience Assessment	PWROG		
#3 – Repair/Replacement	PWROG		
#4 – Inspection/NDE	MRP		
#5 – Irradiated Testing Support	MRP		
#6 – Aging Management Assessment	MRP		

 The BFB FG met with NRC July 19, 2016 to provide a current status, results of the NSS Vendor safety assessments and plans for the future including potential interim guidance



Other actions related to BFBs

- A letter was provided to all PWR site vice-presidents on June
 - 1, 2016 by the PMMP chair to:
 - Insure broad awareness of the OE
 - Confirm Westinghouse TB 12-5 validity
 - Announce the BFB FG
- NSSS Vendors completed safety assessments
 - Westinghouse Nuclear Safety Advisory Letter NSAL-16-1 (7/5/16)
 - AREVA Customer Service Bulletin No. 16-02 (7/14/16)
- Based on OE and NSSS vendor evaluations, PMMP approved interim guidance for the plants deemed most susceptible



Interim Guidance

- Consistent with the requirements of MRP-227 and MRP-228 as currently prescribed, the following interim guidance is issued under NEI 03-08 as "Needed" guidance.
 - All plants identified as Tier 1a plants in Westinghouse NSAL 16-1 shall perform an ultrasonic examination (UT) volumetric inspection of the full population of baffle-former bolts at the next scheduled refueling outage
 - Plants identified as Tier 1b in Westinghouse NSAL 16-1 shall complete a visual VT-3 examination of the full population of baffleformer bolts at the next scheduled refueling outage. If degradation is detected the plant shall complete actions consistent with Tier 1a plants, if no degradation is detected during the visual VT-3 examination, an ultrasonic examination (UT) consistent with Tier 1a plants' guidance shall be completed during the second refueling outage after issuance of this interim guidance



Future Actions

- BFB FG will continue working (details shared with staff 7/19)
- Issue additional NEI 03-08 Interim Guidance Fall 2016
 - Additional considerations for Tier 1 plants including bolt replacement
 - Guidance for the remainder of the fleet as appropriate
- Monitor ongoing OE over next 2 years and update guidance as appropriate
- BFB FG will update PMMP August 30
- Ongoing interaction with NRC via existing quarterly calls or meeting as necessary
- Ultimately update MRP-227 to reflect all new guidance



MAPC

Scot Greenlee – Exelon

Technical Chairman, Materials Action Plan Committee



Additional Materials Topics

CASS

- BWRVIP-234 SE was released
- MRP has provided information regarding PWR reactor internals
- Proposed generic screening criteria have been submitted for NRC review
- Industry awaits NRC's responses for PWR internals and the generic screening criteria
- Probabilistic Fracture Mechanics (PFM)
 - Last year NRC indicated plans for guidance on the use of PFM
 - PFM evaluations continue in industry by owners, vendors, as part of Code activities, etc.
 - Staff is likely to receive generic or plant-specific submittals using PFM
 - What is the expected date for NRC's guidance to be available?



FAVOR Code

- FAVOR is widely used by NRC and industry
- August 2014 EPRI identified and informed NRC of a potential software bug
- NRC & ORNL investigated, concurred that a bug existed, and revised the code; a beta version of the fixed FAVOR was issued in Fall 2015
- Final version release was "imminent" in February 2016
- At the May 2016 code meetings NRC reported ORNL is using the new version of FAVOR to perform BTP 5-3 analyses
- EPRI is awaiting the FAVOR release to address RPV issues:
 - Appendix G small surface flaw and BWR leak tests (issues raised by NRC)
 - Critical work on BTP 5-3 affecting MRP-401/BWRVIP-287
- We request the release of FAVOR be made a priority



Document Screening Tool

- The materials program use NEI 03-08 topical reports to manage issues across the fleet
- The requirements in these documents go beyond NRC regulations
- Some but not all have been reviewed and approved by NRC
- A generic screening tool has been developed to determine when materials topical reports will be submitted for review
- A copy of the screening tool was shared with NRC for comment – no comments or suggestions were received.
- Current plans are to complete final reviews and endorse the tool in the August 2016 executive meetings



Delivering the Nuclear Promise

- Industry has started a strategic endeavor know as Delivering the Nuclear Promise: Advancing Safety, Reliability, and Economic Performance
- The strategic plan and its goals have been developed by chief nuclear officers from across the industry, with governance by utility chief executive officers
- Industry action teams have been established in multiple disciplines, each sponsored by an industry executive
- This plan will ensure that safe and reliable operations continues to be the primary focus of all electric companies with nuclear energy technology and will address any improvements upon those tenets that can be made
- EPRI support will come though fulfillment of its mission -advancing safe, reliable, affordable, and environmentally responsible electricity for society through global collaboration, thought leadership, and science and technology innovation.





Together...Shaping the Future of Electricity

