

PWR Owners Group

Executive Committee / NRC Meeting – March 2013



Jack Stringfellow (SNOC)
PWR Owners Group Chairman

AGENDA

- | | | |
|------|---|---|
| 1:45 | Introductions and Opening Remarks | Randy Edington, APS
Dan Dorman, NRC |
| 1:50 | PWR Owners Group Report <ul style="list-style-type: none">• PWROG Organization• Review Actions from Previous Year• Topical Report Status | Jack Stringfellow, SNOC

Rob Slough, Luminant |
| 2:05 | Discussion of Key Industry Topics <ul style="list-style-type: none">• PWROG Topics and NRC Perspective• NRC Topics and PWROG Perspective | PWROG/NRC |
| 3:00 | <i>BREAK</i> | |
| 4:30 | Review of Action Items | C. Holderbaum, PMO
Jonathan Rowley, NRC |
| 4:45 | Closing Remarks | |

PWROG Organization Update

- **PWROG Officers**

- Randy Edington (APS)
- Tom Tynan (SNOC)
- Jack Stringfellow (SNOC)

Exec. Committee Chairman

Exec. Committee Vice-Chairman

PWROG Chairman

- **Subcommittee Chairmen**

- Kurt Flaig (Dominion)
- Rob Slough (Luminant)
- Jeff Brown (APS)
- Roy Linthicum (Exelon)
- Pete Dellarco (Dominion)
- Ed Fernandez (APS)

Analysis

Licensing

Systems & Equipment

Risk Management

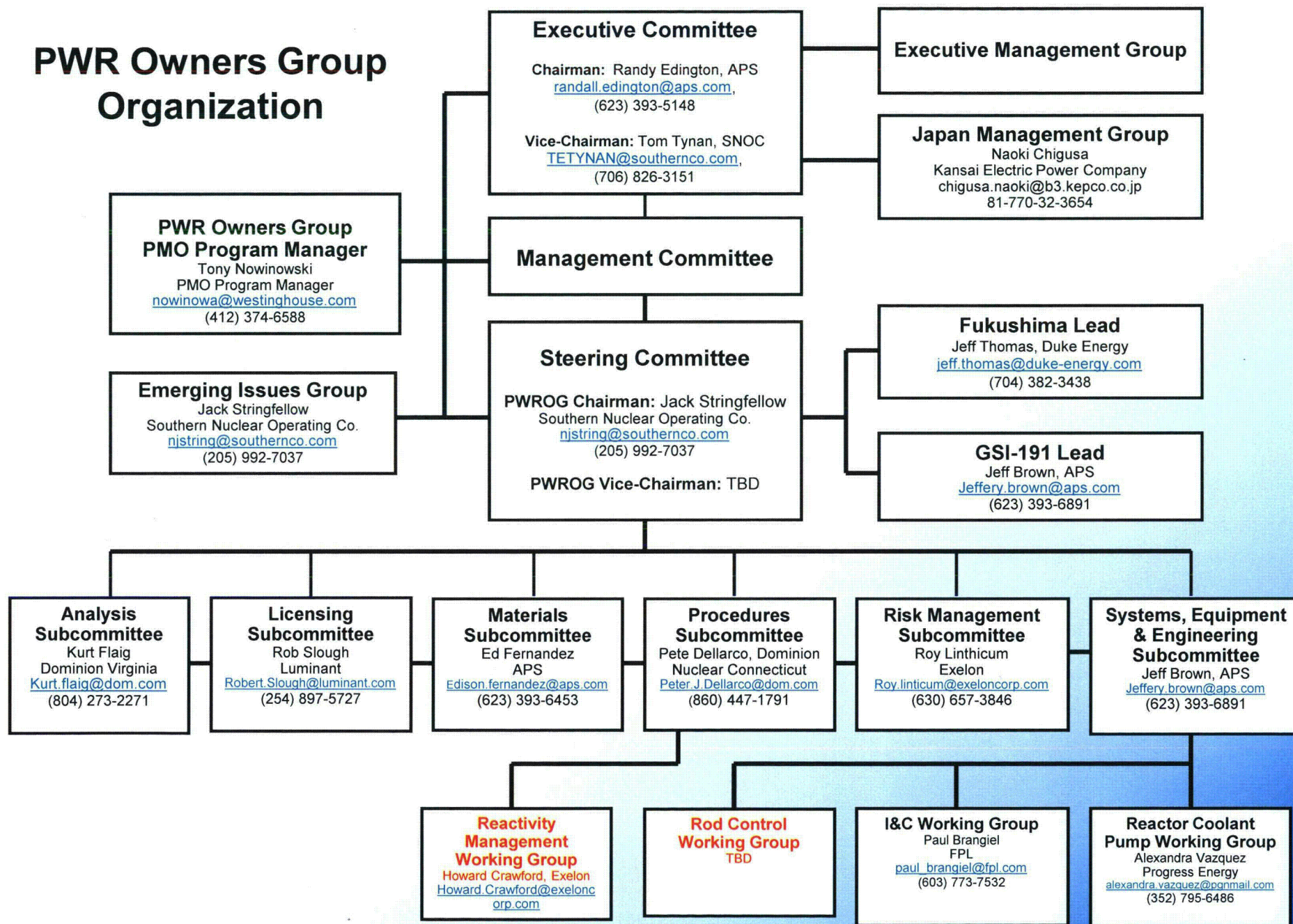
Procedures

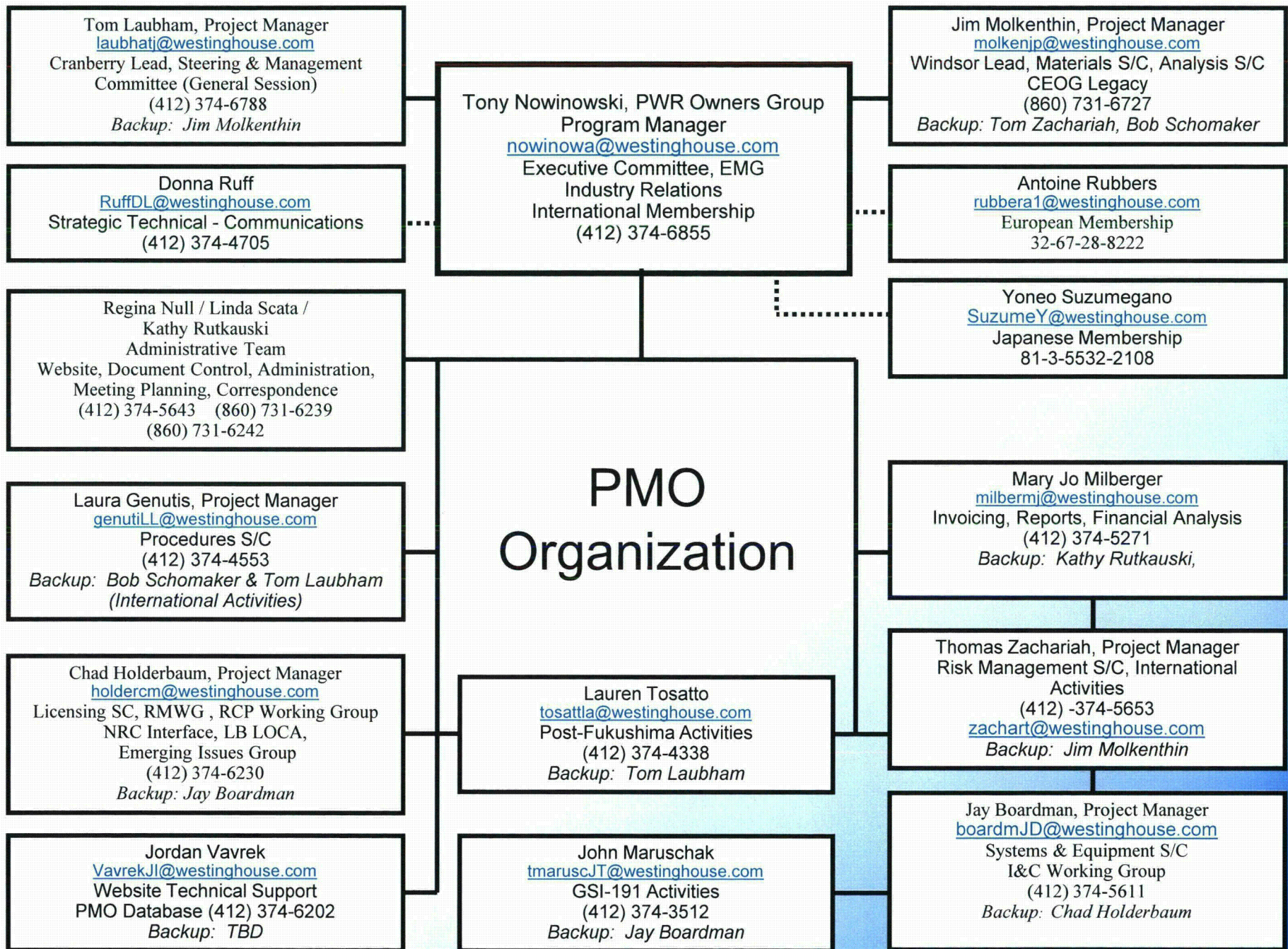
Materials

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PWR Owners Group Organization





Review Actions from Previous Year

- **PWROG Actions – None**
- **NRC Actions:**
 - Monitor the Financials on Topical Reports to ensure they are in line with acceptance letter estimates. NRC to notify PWROG as soon as possible if they feel the estimates will be exceeded.

PWROG Topical Report Summary



Rob Slough, Luminant
Licensing Subcommittee Chairman

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PWROG Topical Report Summary

Topical Reports Approved Since 2005

2005	2
2006	3
2007	6
2008	5
2009	1
2010	3
2011	1
2012	1
2013	0
<hr/>	
Total	22

- **Topical Reports Currently Under Active NRC Review: 5**
– (4WEC / 1 AREVA)

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PWROG Topical Report Summary

Topical Reports Approved in Previous 24 months

Report	NSSS	Title	SE	Cost
WCAP-17100	W	PRA Model for the Westinghouse Shut Down Seal	4/29/11	\$152,781
WCAP-17236	Misc	Risk-Informed Extension of the Reactor Vessel Nozzle Inservice Inspection Interval	5/23/12	\$151,508*

*Includes costs for NRC review of approved version TR (new process)
- \$11,468 Invoiced for A version Review in 3Q12 and 4Q12

PWROG Topical Report Summary

Topical Reports – Cost to Date

Status as of 4Q12

TR#	NSSS	Title	NRC Fees
16793	W	Evaluation of Long-Term Cooling Considering Particulate and Chemical Debris in the Recirculating Fluid (GSI-191)	EXEMPT
17308	All	Treatment of Diesel Generator (DG) Technical Specification Frequency and Voltage Tolerances	\$20,852
17261	W	Justification for a Technical Specification Action for Two Inoperable RTS or ESFAS Instrumentation Channels	\$137,567
10192	B&W	BWNT LOCA – BWNT Loss of Coolant Accident Evaluation Model for Once-Through Steam Generator Plants	\$34,333
17100-S1	W	PRA Model for the Westinghouse Shut Down Seal: Supplemental Information for All Domestic Reactor Coolant Pump Model	\$0 (submitted 1/13)

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PWROG Topical Report Summary

Topical Reports Submitted for Review and Approval

Status as of 3/1/13

WCAP	NSSS	Title	Draft SE
17100 Sup 1	<u>W</u>	PRA Model for the Westinghouse Shut Down Seal: Supplemental Information for All Domestic Reactor Coolant Pump Model <ul style="list-style-type: none">• <i>Topical Report Submitted to the staff on 1/15/2013</i>• <i>Awaiting Acceptance Letter from NRC</i>• <i>Post submittal meeting scheduled with the staff for 3/25/13</i>	TBD

PWROG Topical Report Summary

Topical Reports Submitted for Review and Approval

Status as of 2/21/13

WCAP	NSSS	Title	Draft SE
16793 R2	ALL	<p>Evaluation of Long-Term Cooling Considering Particulate and Chemical Debris in the Recirculating Fluid (GSI-191)</p> <ul style="list-style-type: none"><i>The Draft Safety Evaluation (SE) on WCAP-16793-NP, Revision 2, was received on January 29; PWROG comments are due back to NRC by February 27; the utility submittals on planned resolution path are due 30 days after issuance of the Final SE.</i><i>PWROG supported a meeting with NRC in November 2012 to present test plans for fiber size distribution benchtop tests and for chemical effects/water chemistry testing.</i><i>A follow-up public meeting is being scheduled for early April 2013.</i>	01/13

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PWROG Topical Report Summary

Topical Reports Submitted for Review and Approval

Status as of 3/1/13

WCAP	NSSS	Title	Draft SE
17261	<u>W</u>	Justification for a Technical Specification Action for Two Inoperable RTS or ESFAS Instrumentation Channels <ul style="list-style-type: none"><i>WCAP submitted to the staff via OG-12-16 on 1/11/12</i><i>Draft concerns from NRC received on 5/29/12 and subsequent phone call held with staff to discuss concerns in Fall 2012.</i><i>Acceptance not granted on Topical and additional information must be supplied in order for acceptance review to begin.</i><i>Meeting scheduled with staff week of 3/29/13 to discuss additional questions and PWROG draft responses</i>	TBD

PWROG Topical Report Summary

Topical Reports Submitted for Review and Approval

Status as of 3/1/13

WCAP	NSSS	Title	Draft SE
17308	All	Treatment of Diesel Generator (DG) Technical Specification Frequency and Voltage Tolerances <ul style="list-style-type: none">• <i>WCAP submitted to the staff via OG-12-162 on 5/1/12</i>• <i>Acceptance letter received 7/16/2012</i>• <i>Draft RAIs received from the staff in January 2013</i>• <i>Formal RAIs expected March 2013</i>	11/13

PWROG Topical Report Summary

Topical Reports Submitted for Review and Approval

Status as of 2/21/13

BAW	NSSS	Title	Draft SE	TSTF
10192	B&W	BWNT LOCA – BWNT Loss of Coolant Accident Evaluation Model for Once-Through Steam Generator Plants <ul style="list-style-type: none"><i>Responses to the supplemental information requested by the staff during acceptance review was submitted and feedback from NRC indicated that the review would not be initiated until a need is identified by a utility.</i><i>Staff currently has higher priorities and the review of this Topical report is currently on hold.</i>	TBD	N/A

PWROG Topical Report Summary

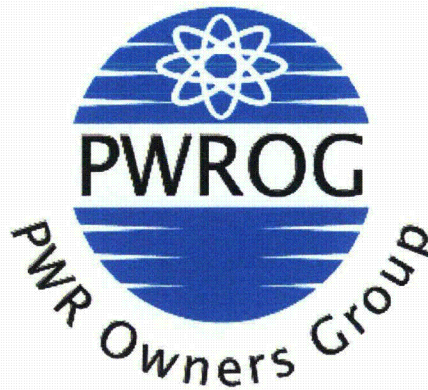
Topical Reports to be Submitted

Report Title	Evaluation (E) or information (I)?	Fiscal Year	Plants?
Improved FQ Technical Specification Development	E	2013	W&CE
Risk Initiative 6: Systems That Impact CDF and LERF	E	2014	W
Risk Initiative 1: Technical Specification Required Action Endstates – Mode 3	E	2014	All
GSI-191 Boric Acid Precipitation	E	2014	All
GSI-191 In Vessel Effects	E	2014	All
Post-LOCA Long Term Cooling Boric Acid Control Analyses - Evaluation Model Requirements and Assessment Base	E	2015	All

PWROG Topics for Discussion

- **Post Fukushima Response**
- **PWROG Program to Address NRC GSI-191**

PWROG Post Fukushima Response



Jeff Thomas, Duke Energy
PWROG Fukushima Utility Lead

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PWROG Post Fukushima Response

PWROG Role in ELAP/FLEX

- Submitted the following reports to the NRC, for information only, so plants could use as a reference in Implementation Plan Submittals due February.
 - WCAP-17601-P, “Reactor Coolant System Response to the Extended Loss of AC Power Event for Westinghouse, CE and B&W NSSS Designs”
 - PWROG Core Cooling Management Interim Position Paper (OG-12-482)
- Issued OG-12-515, “Final PWROG Generic FLEX Support Guidelines and Interfaces (Controlling Procedure Interface and Recommended Instruments) in December 2012.
 - NSSS specific procedure change packages will be completed in April 2013 (PA-PSC-0965).
- Submitted WCAP-17100-P/NP Supplement 1, “PRA Model for the Westinghouse Shut Down Seal: Supplemental Information for All Domestic Reactor Coolant Pump Model,” to the NRC on January 15 for review and acceptance for referencing in regulatory actions.
(*SHIELD survivability for all RCP models to 168 hours*)

PWROG Post Fukushima Response

PWROG Role in ELAP/FLEX (*continued*)

- PWROG initiated four new projects to provide additional FLEX analysis
 - **PA-ASC-1104**, Low Pressure ELAP Boration/Depressurization Strategies
 - **PA-ASC-1105**, Develop Operator Guidance for Reactor Physics Behavior during ELAP
 - **PA-ASC-1106**, Develop Operator Guidance for Reflux Cooling Behavior during ELAP
 - **PA-ASC-1107**, ELAP RCS Makeup Strategy for B&W Plant Design
- PWROG has started a program to support implementation of FLEX equipment into plant specific PRA models
 - **PA-RMSC-0491** Implementation of FLEX Equipment in Plant Specific PRA Models

PWROG Post Fukushima Response

PWROG Role in Severe Accident Management Guidelines (SAMG)

- PWROG is the lead for developing enhanced PWR SAMGs
- EPRI Technical Basis Report (TBR) Update was published in November
 - PWROG provided extensive technical review and comment to EPRI on draft TBR. Worked closely on comment resolution.
- Phase 1 SAMG update is complete
 - Updates to current Westinghouse, CE, and B&W SAMG documents to incorporate TBR updates

PWROG Post Fukushima Response

PWROG Role in Severe Accident Management Guidelines (SAMG) – (*Continued*)

- Work has initiated on Phase 2 consolidation effort
- Rulemaking activities - PWROG commented on Recommendation 8 draft Regulatory Basis and is preparing for a meeting with the NRC in March to discuss ongoing work.
- PWROG and BWROG plan to work together to develop joint implementation guidance for On-site Emergency Response Capabilities
 - Will include human factors and programmatic aspects
 - Will be provided to NEI for transmittal to the NRC in 4Q2013

PWROG Post Fukushima Response

PWROG Role in Seismic

- PWROG supports the NEI Seismic Task Force
 - **PA-RMSC-0732**, PWROG Involvement in Post-Fukushima Seismic-Related Industry Activities
- PWROG also has recently approved projects that will support other aspects of Seismic PRAs and other External Event PRAs
 - **PA-RMSC-0859** PWROG Peer Reviews for PRA Peer Reviews for All Modes/All Events
 - **PA-RMSC-1020** Spent Fuel Pool PRA Guidance and Pilot Implementation

PWROG Post Fukushima Response

PWROG Role in Flooding

- PWROG is working closely with EPRI and NEI to provide technical support for development of Flooding Guidance.
- Key Documents Provided to Industry
 - WCAP-17700-NP, “Extended Flooding Considerations at Nuclear Power Plants: Consolidated White Papers Released Under PA-RMSC-0969/PA-SEE-1069 In Support of NEI-Fukushima Flooding Task Force (FTTF)”
 - WCAP-17705-NP, “An Overview of Methodologies for Developing and Interpreting Probabilistically Based Flood Hazard Curves”
 - WCAP-17630-P, “High Winds and External Floods Data and PRA Methodology”

PWROG Post Fukushima Response

PWROG Role in Flooding – (*Continued*)

- The PWROG has recently approved a project to continue our involvement in industry guidance development
 - **PA-RMSC-1011**, Implementation Guidance for External Flooding Integrated Assessment

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PWROG Post Fukushima Response

PWROG going forward...

- **Continue to provide industry leadership in addressing Post Fukushima needs**
 - Ensure appropriate technical and licensing support is in place
 - Continue to support FLEX, SAMG, Flooding and Seismic
 - Increase future focus on Licensing/Regulatory items and supporting Tier 2 & 3 items
- **Support industry meetings and coordinate with NEI, EPRI and BWROG through Building Block 7**
 - Maintain and update PWROG plan to address longer term support items based on interaction with the Industry Support Teams and the NRC.

PWROG Program to Address NRC GSI-191



Jeff Brown, APS
SEE Subcommittee Chairman

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PWROG Program to Address NRC GSI-191

PWROG In-vessel Fiber Program Overview

- Program Objective
- Organization and Program Development
- Technical Program
- Plant Data and Assumptions
- Program Status
- Expectations
- Schedule

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PWROG Program to Address NRC GSI-191

Program Overview

- Establish defensible acceptance criteria to ensure long term core cooling
 - PWROG GSI-191 deterministic in-vessel fiber program supports resolution of the in-vessel issues for Option 2 plants
 - Program results will provide higher limits than WCAP 16793, R2
 - Limits applicable to groups of plants as opposed to a single bounding limit
 - Higher limits will minimize insulation modifications and will provide margins for future operability issues

PWROG Program to Address NRC GSI-191

Organization and Program Development

- Revised program initiated as a result of PWROG Executive Management Group direction
- Technical oversight (Tiger Team) formed and conceptual program developed
- PWROG sponsored programs for testing / analysis
- Program includes diverse expert review and assessment
- Industry collaboration and NRC communication

PWROG Program to Address NRC GSI-191

Technical Program – Overview

Initial Program Development

- Tiger Team conceptual program plan
- Independent 3rd party review



Final Program Development and testing/analyses

- Phenomena Investigation Ranking
- Fiber characterization testing
- Integrated water/chemistry – scaled head loss testing
- Thermal-hydraulic analyses
- Full fuel assembly verification head loss testing
- Boric acid precipitation testing (parallel path)



Program Completion

- Issue WCAP

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PWROG Program to Address NRC GSI-191

Technical Program – (*Continued*)

- Fiber characterization testing
 - Program objective is to establish representative fiber length distribution for input to FA head loss testing
 - Test results representative of full range of screen designs
 - Test to establish dependence on geometry, flow, chemistry
 - Nukon, mineral wool, ceramic fiber, and Temp-mat
 - Initial preparation using NEI methodology

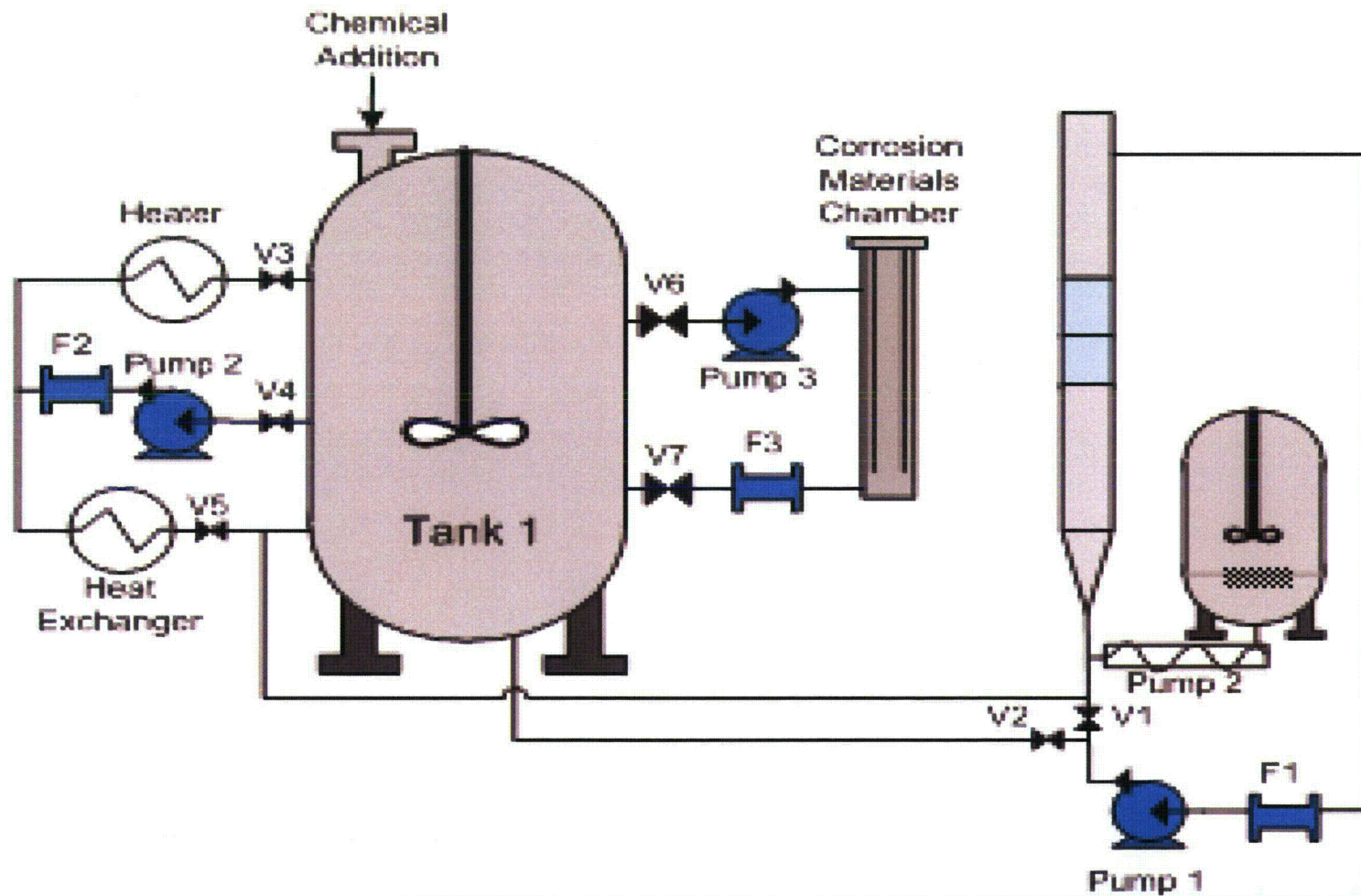
PWROG Program to Address NRC GSI-191

Technical Program – (*Continued*)

- Integrated water / chemistry tests and scaled head loss testing
 - Plant survey data identified that plants are much more diverse, leading to smaller bins and more groups of plants to consider
 - Program refinements
 - Expansion of autoclave testing to identify problematic sump fluid chemistry
 - Incorporation of high temperature scaled head loss testing
 - Parallel expansion of flow loop to permit concurrent testing
 - Head loss validation testing in full scale FA test loop

PWROG Program to Address NRC GSI-191

Technical Program – (Continued)



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PWROG Program to Address NRC GSI-191

Technical Program – (*Continued*)

- Thermal-hydraulic analyses
 - LOCA analysis objective is to determine effects of core inlet blockage on the ECCS core cooling function and to inform FA testing program
 - Analyses to be completed representing appropriately grouped system designs
 - Model includes alternate core bypass flow paths and / or steam generator spillover (hot-leg breaks)
 - Analyses predicated on conservative assumptions and initial conditions

PWROG Program to Address NRC GSI-191

Program Status

- Fiber characterization testing
 - Testing on-going
 - First test matrix results are being evaluated
- Integrated water/chemistry and head loss program
 - Autoclave tests in process
 - Initial autoclave test results under review
 - High temperature flow loop design review in progress

PWROG Program to Address NRC GSI-191

Program Status – (*Continued*)

- Thermal-hydraulic analyses
 - B&W plant design – Alternate flow paths are a viable option if core inlet is blocked
 - W plant designs w/ up-flow baffles – Analysis results are promising that most plants will be able to demonstrate alternate flow paths are viable as well
 - W plants w/ down-flow baffles – Analyses in progress
 - CE plants may be more challenging
 - W (COBRA-TRAC) and AREVA (RELAP) methods are showing similar results

PWROG Program to Address NRC GSI-191

Expectations

- Thermal hydraulic analyses indicate that significantly lower core flows needed for core cooling
- In-situ corrosion product formation expected to demonstrate prototypical materials
- Test program will produce defensible results based on appropriate technical development
- All plant groups are expected to realize increased allowable in-vessel fiber load

PWROG Program to Address NRC GSI-191

Schedule

Milestone	Start	Completion
NRC Status	April, 2013	
PIRT	On-going	March, 2013
Fiber Characterization	On-going	April, 2013
Thermal-hydraulics	On-going	July, 2013
Autoclave Testing	On-going	June, 2013
Integrated Testing	June, 2013	January, 2014
Confirmatory Testing	January, 2014	February, 2014
Boric Acid Precipitation (Design)	On-going	April, 2013