

BWROG Overview

Dennis Madison (SNC – BWROG Executive Chairman)

BWROG Executive Oversight
Committee / NRC Meeting
Washington, DC
July 23, 2015



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Topics



BWROG Organizational Structure

BWROG Leadership

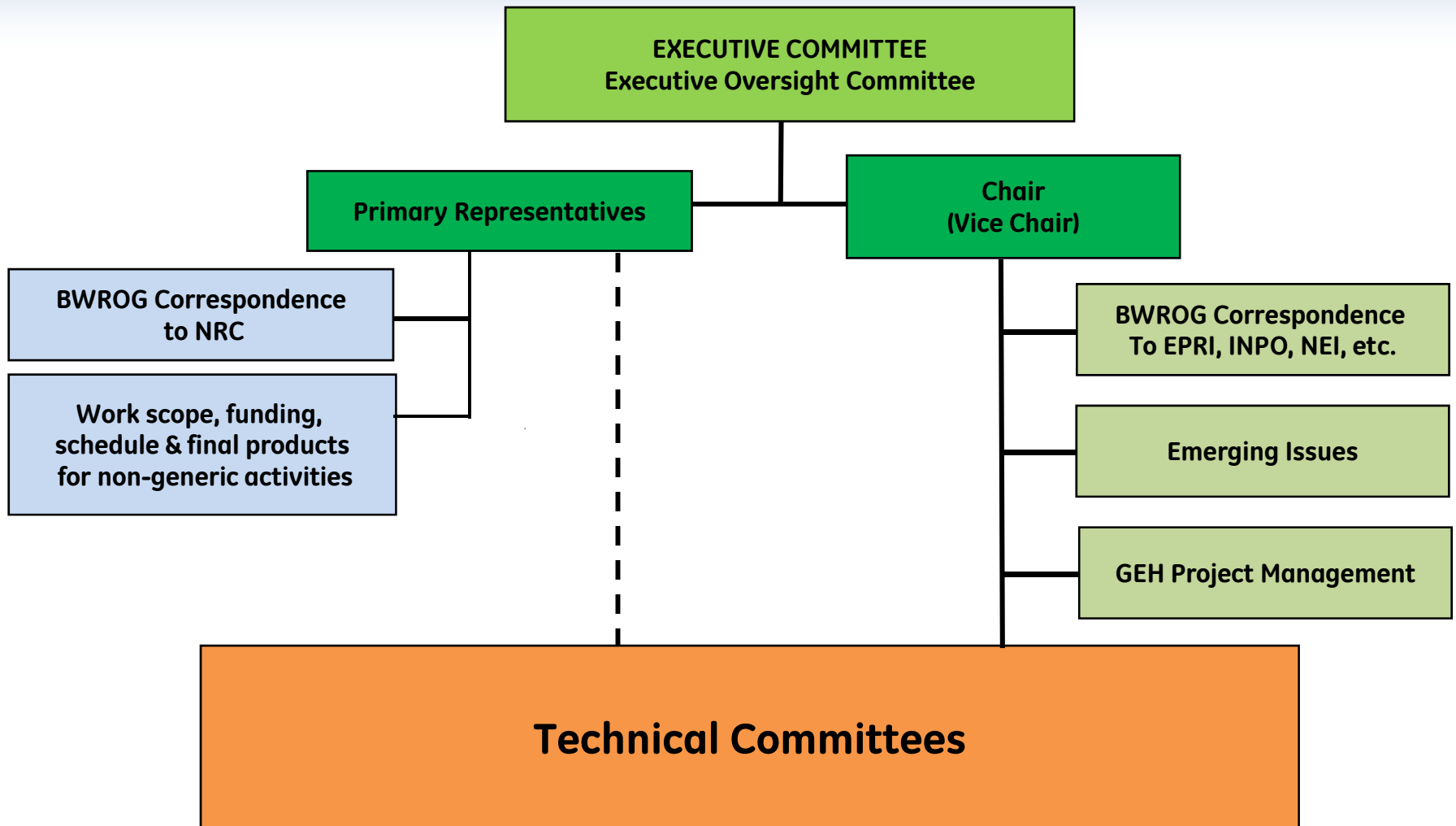
BWROG Members

BWROG Technical Committees

Industry Issues Impacting BWROG Priorities

Key BWROG Activity Updates

BWROG - Organization Structure



BWROG Leadership



Dennis Madison



Executive Chair

Dave Czufin



Executive Vice Chair

Lesa Hill



General Chair

John Grubb



General Vice Chair

Greg Holmes



Program Manager

BWROG Leadership (cont.)



Executive Oversight Committee

Dennis Madison, SNC

Oscar Limpias, Entergy

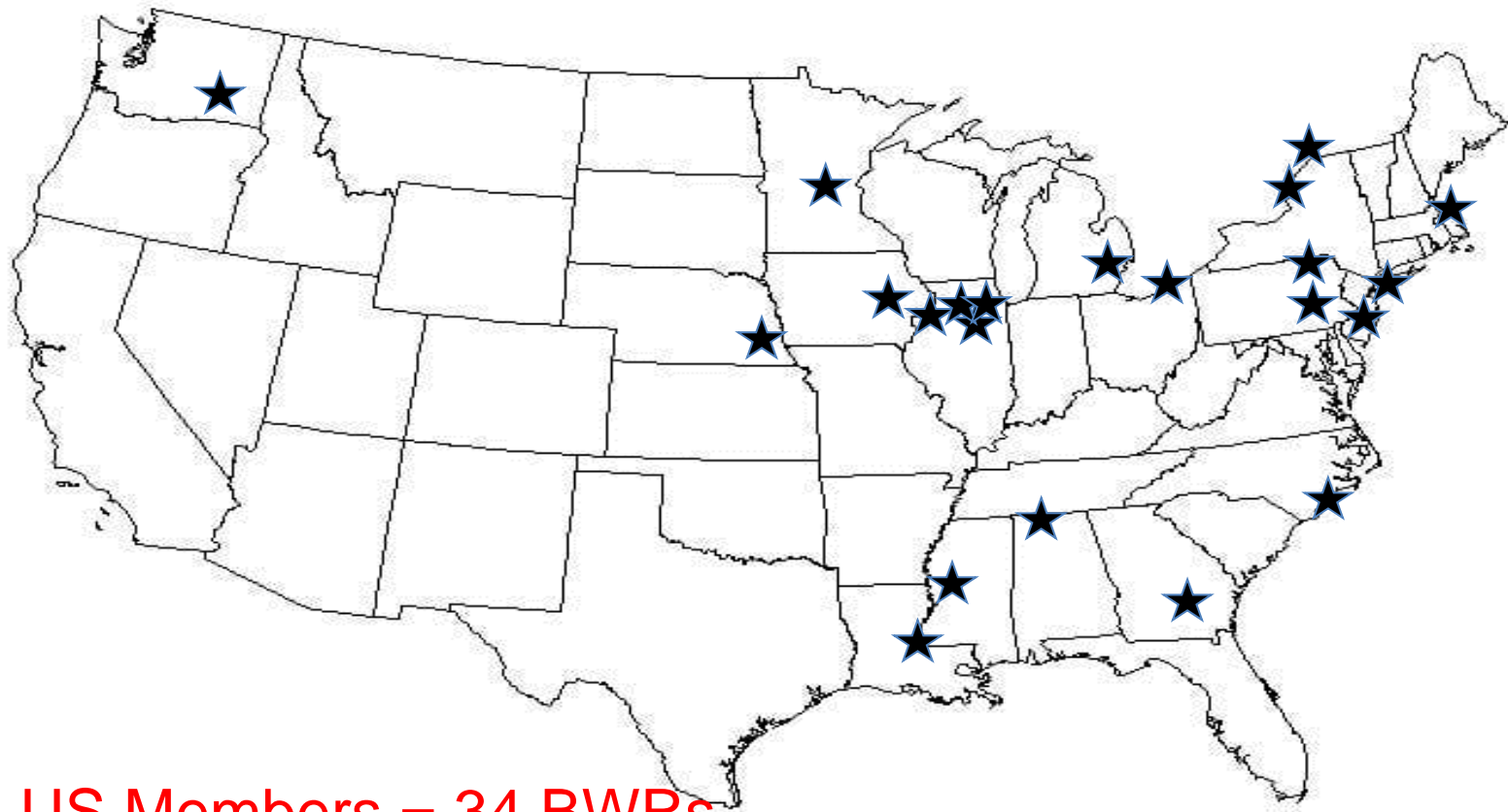
David Czufin, TVA

Ken Knaide, PSEG

Tim Hanley, Exelon

Glen Watford, GEH

BWROG Members - Domestic U.S.



19 US Members = 34 BWRs

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BWROG Members International/Conditional



13 US/International Utilities = 25 BWRs

International Members

Chubu - Japan

Chugoku - Japan

Hokuriku - Japan

JAPC - Japan

TEPCO - Japan

Tohoku - Japan

TPC - Taiwan

International Members

CFE - Mexico

Iberdrola - Spain

KKL - Switzerland

Conditional Members

South Texas Project - USA

J Power – Japan

Horizon Nuclear - UK

2015 Technical Committees



BWR Water Chemistry

ECSS Suction Strainers

Emergency Procedures

Integrated Risk Informed
Regulation

Risk Informed ECSS
Suction Strainers

Reactivity Controls Review

Reload Analysis and Core
Management

Licensing

Fukushima Response

Scram Frequency Reduction

Finite Break Opening Time

2015 Technical Committees (cont.)



BWR6 RC&IS

Control Rod Drive Performance

Feedwater Heater Level Controls

Feedwater System Improvement

HPCI-RCIC System Improvement

BWR I&C Maintenance

MSIV Test Pressure Correlation

Offgas System Improvement

Outage Management

Primary System Decon

Radiation Protection/ALARA

Refueling Performance

RHR System Improvement

Reactor Recirculation

RWCU System
Improvement

Turbine Generator & Aux
System Improvement

Valve Technical Resolution
Group

Industry Issues Impacting BWROG Priorities



Priorities based on safety significance and supporting reliable plant operations

Schedules and resources adjusted to best meet members' needs and regulatory feedback

Key issues requiring significant BWROG resources:

- Fukushima Response
- ECCS Suction Strainers
- Finite Break Opening Time



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Fukushima Response Committee Update

Randy Bunt (SNC) – Fukushima Response
Committee Chairman

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Topics



- FRC Current Year Scope
- Severe Accident Regulatory Action Overview
- Mitigating Strategies Rulemaking
- Committee Future Activities

FRC Current Year Scope



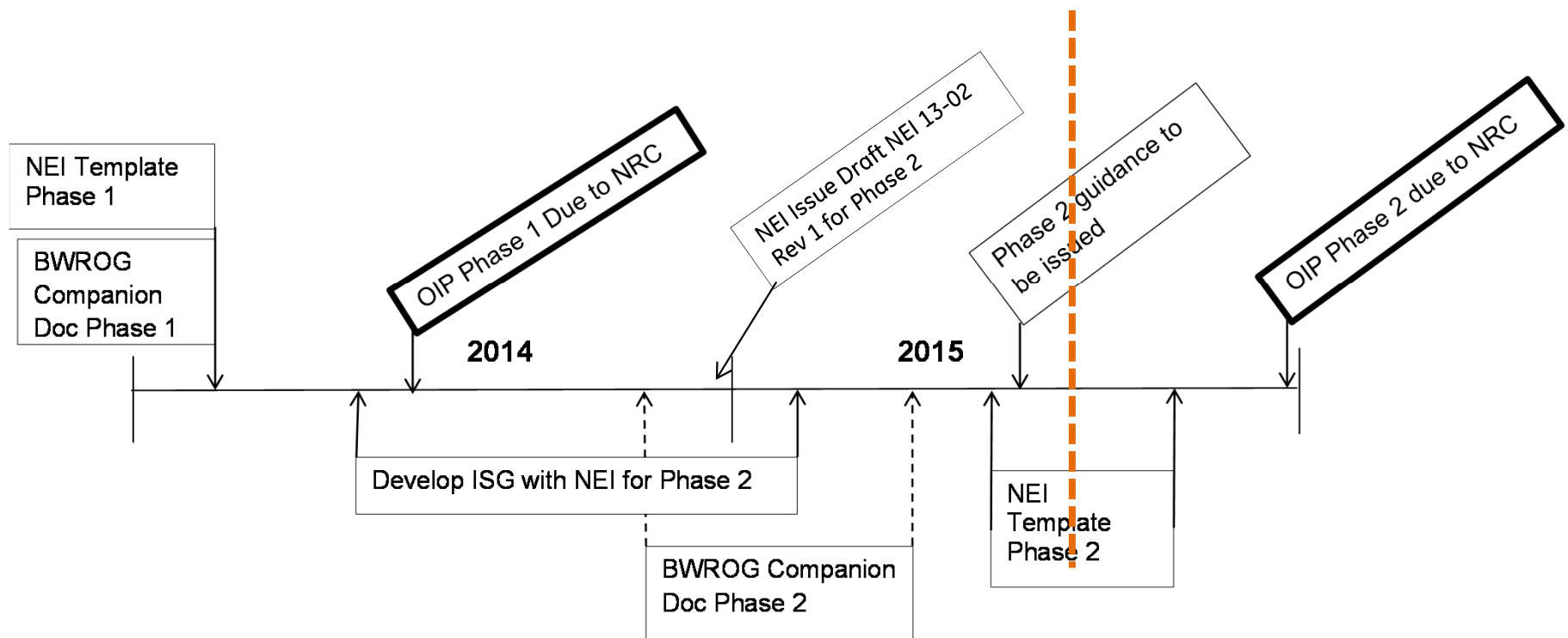
Major FRC activities for 2015 include:

- Support of utility responses to the NRC Orders
- Extended station blackout implementation procedure guidance and implementation
- Support of rulemaking efforts for the resolution of the containment release reduction strategies
- Implementation activities

Severe Accident Regulatory Action Overview



NRC Order 13-109, SA Hardened Vent: Schedule



SA Order Phase 2 Status



JLD-ISG-2015-01 endorsed NEI 13-02 Rev 1 with non-technical exceptions and clarifications

Industry working on template for Phase 2 Overall Integrated Plan (OIP)

Pilot plants' Phase 2 OIPs to be presented in public meetings in summer 2015

All phase 2 OIPs submitted by 12/31/15

NRC audits of Phase 2 OIPs prior to 2016 issuance of ISEs

Conceptual engineering being developed

SA Order Response Key Topics



Phase 1 – Severe Accident Wetwell Vent; Plans submitted June 30, 2014

**Phase 2 – Drywell Vent or Reliable Alternative
Implementation Due: 2017-19 (Plans Due: Dec 2015)**

**Order Att. 2 §B.1 DW Vent
SADV (>1000F)
Plant specific analysis
required**

**Order Att. 2 §B.2 Reliable Alternative
Severe Accident Water Addition (SAWA)
[Containment Protection per EPRI Evaluation and BWROG Pilot Table Top]**

**Severe Accident Drywell Vent
(SADV)
(545F)**

**O
R**

**Severe Accident Water Management
(SAWM)
[SADV NOT REQUIRED]**

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SA Order Response Key Topics (cont.)



BWROG Technical Products developed to demonstrate that wetwell vent capability is preserved by throttling water addition rate

Severe Accident Water Addition (SAWA)

- Provides water to reactor vessel or drywell post-core damage to mitigate temperature effects on containment

Severe Accident Water Management (SAWM)

- Preserves wetwell vent path by managing external water injection

Containment Protection and Release Reduction (CPRR) Rulemaking



Water management is the key safety element of the strategy (supported by analyses – EPRI, BWROG, NRC RES)

Actions from FLEX and venting will influence requirements

Draft Regulatory Basis issued in SECY-15-0085

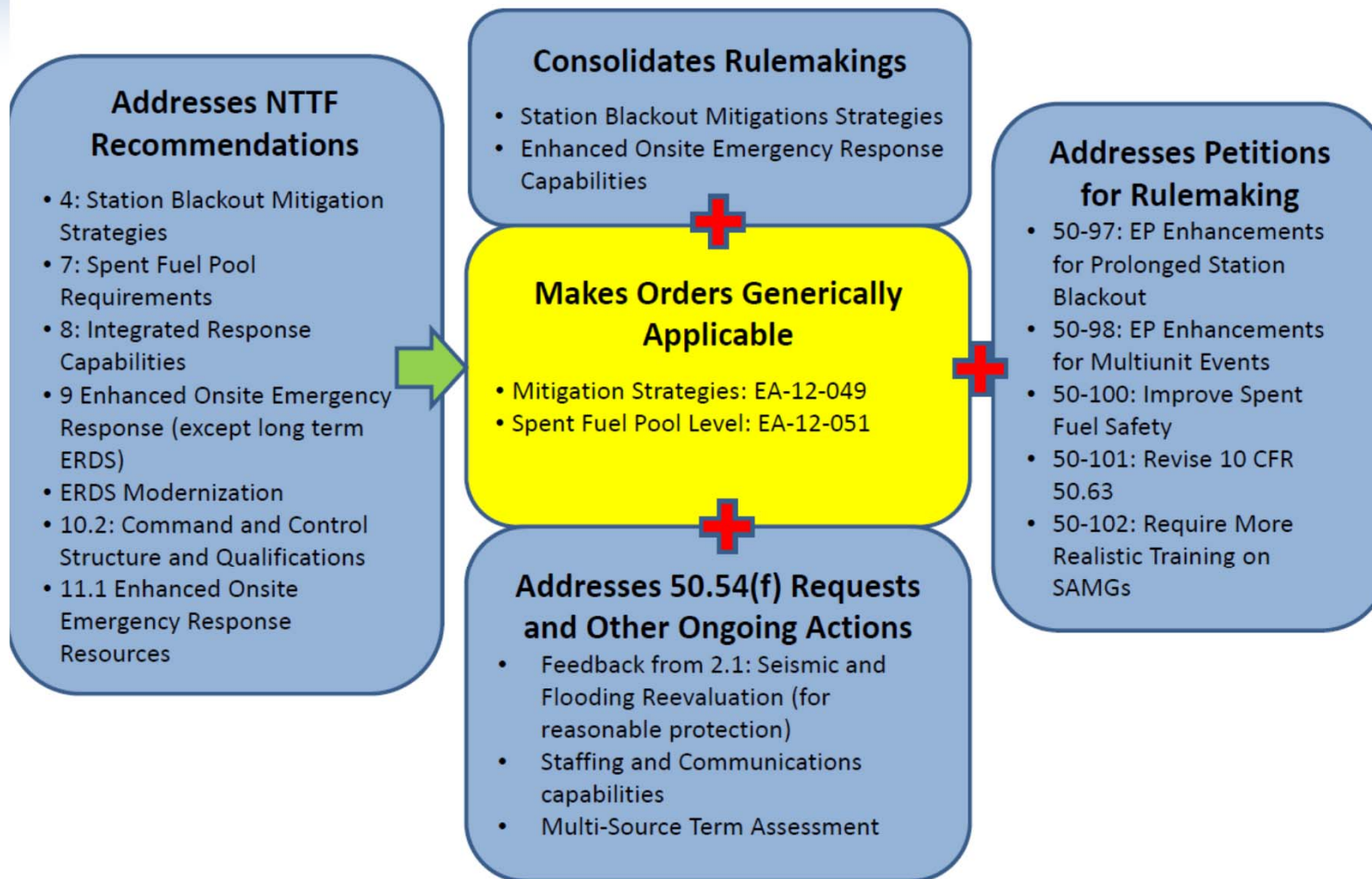
Draft Rule to be issued in September 2016

Final Rule in December 2017 to be issued with the implementation guidance

Mitigating Strategies Rulemaking



Addresses Multiple Ongoing Post-Fukushima Actions



Mitigating Strategies Rulemaking (cont.)



Supporting NEI Guidance Documents for MS Rulemaking:

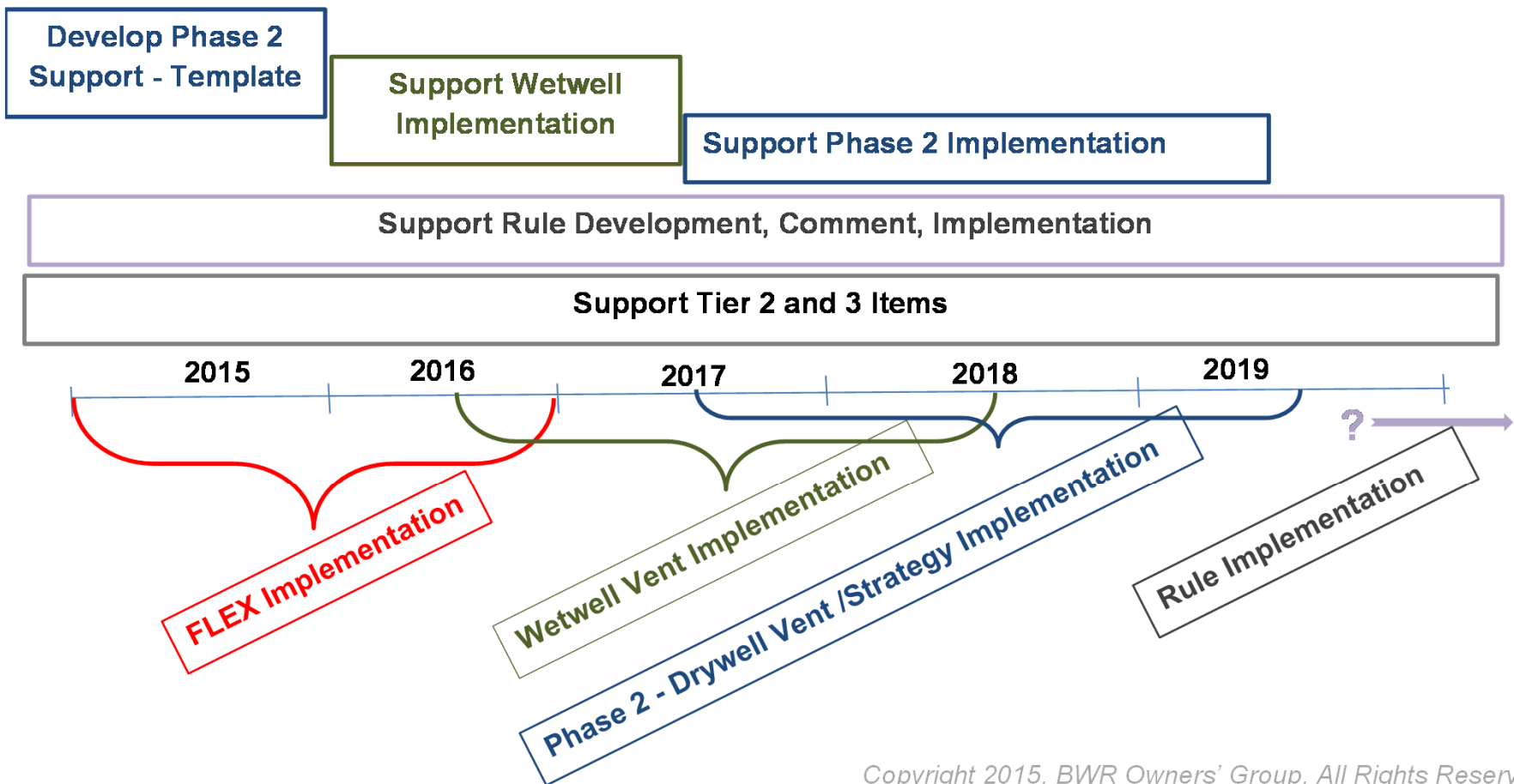
- NEI 12-06, FLEX
- NEI 12-02, SFP Level Indication
- NEI 12-01, EP Communications and Staffing
- NEI 13-06, EP response
- NEI 14-01, Integration of Procedures

Supporting updates to EPG/SAGs for lessons learned and implementation topics

Committee Future Activities



Fukushima Response Committee Future





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ECCS Suction Strainer Project Update

Steve Scammon (Energy Northwest) –
ECCS Suction Strainers Committee Chairman

Larry Naron (Exelon) –
ECCS Suction Strainers Risk-Informed Solutions
Committee Chairman

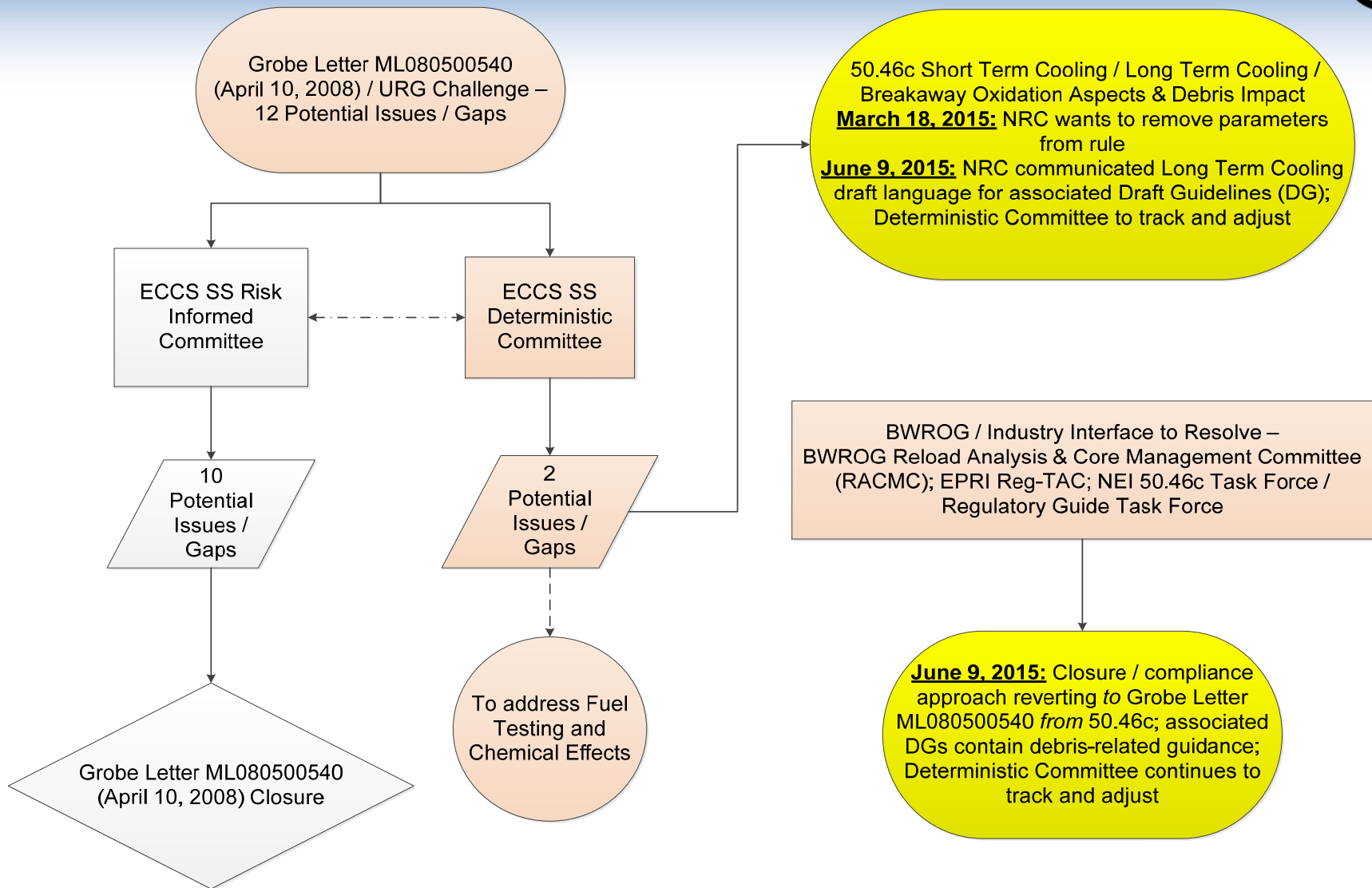
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ECCS Suction Strainers Committees



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ECCS Suction Strainers Committees



Completed first pilot plant with results showing the 10 of 12 Grobe potential issues are very low safety significance (RG1.174)

- 10 issues to be addressed by risk-informed methods
- 2 issues to be addressed by deterministic methods
 - Issue 2 – Downstream Effects (Fuel / In-vessel)
 - Issue 4 – Chemical Effects

ECCS Suction Strainers Committee – Deterministic



NRC interactions since June 2014

- Three (3) public meetings
- Four (4) public teleconferences
- Seven (7) documents submitted
- Staff visit to NWT (chemical effects test vendor)

ECCS Suction Strainers Committee – Deterministic (cont.)



Current Activities – Issue 2 Downstream Effects

- Testing requires coordinated elements of other issues (e.g., Debris Transport and Erosion, and Debris Characteristics)
- Reordering / rescheduling of the fuels Benchtop Testing and Full-Scale fuel testing programs
 - Expected receipt of NEDC-33608-P Safety Evaluation (SE) on / before December 31, 2015

ECCS Suction Strainers Committee – Deterministic (cont.)



Current Activities – Issue 4 Chemical Effects

- Takeaways / actionable items from the NWT meeting
 - Staff requests for BWR fleet data (e.g., Debris Source Term; Coatings Assessment; and Reactive Materials)
 - Incorporation of mutually agreeable content into future Chemical Effects tests
 - BWROG / NRC meeting August to discuss plant survey results

ECCS Suction Strainers Committee – Risk Informed



Goals

- Develop an analysis consistent with the NRC PRA Policy Statement to reduce unnecessary conservatisms
- Apply conventional analysis input and assumptions
- Provide an approach consistent with PWR methods to evaluate potential contributors to BWR ECCS suction strainer blockage
- Provide NRC with a response that characterizes the relative risk of the potential issues
- Enable NRC and Industry to apply their resources toward most safety significant issues
- Provide the complete response by 2Q 2016

ECCS Suction Strainers Committee – Risk Informed



NRC interactions since June 2014

- Four (4) public meetings
- Three (3) public teleconferences
- Draft evaluation results provided to staff

ECCS Suction Strainers Committee – Risk-Informed (cont.)



Current Activities

- Takeaways / actionable items from the June 10, 2015 public meeting
 - BWROG proposed a meeting to review risk-analysis assumptions / initial conditions
 - NRC Staff to review details of PRA during 1 ½ day meeting
 - August 11-12, 2015 at Alion Science offices
- Selected second pilot plant to evaluate, beginning 3Q 2015



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Finite Break Opening Time Committee (FBOT) Update

George Inch (Exelon) - Committee Chairmen

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Topics



Project Goals

Part 1 Licensing Basis

Part 2 Methodology – Development and Qualification

Part 3 FBOT Sensitivity Study

Part 4 - Screening Document

FBOT Committee Status

Project Goals



Application of Finite Break Opening Time (FBOT) (in place of instantaneous pipe separation) to site specific evaluations of various GE Hitachi Nuclear Energy (GEH) LOCA Acoustic (AC) load Safety Communications (SCs)

Part 1 Licensing Basis



Review of available regulatory documents, Nuclear Regulatory Commission (NRC) Safety Evaluation Reports (SERs) and BWR Licensing Basis (LB) documents

Licensing Basis survey of BWROG members was completed

Study conclusion is documented in a completed generic 10 CFR 50.59 evaluation

Conclusion: no LB is affected by use of FBOT in the disposition of the aforementioned SCs

Part 2 Methodology



Thermal Hydraulic Model

TRACG

- 1D Modeling supported by 3D Finite Element Modeling

Benchmark to Edwards Pipe

- Measured Acoustic Wave Propagation

Develop Base Model

- Break Modeling
- Nodalization

Finite Element (3D)

Choose Modeling Software

- CFD (CFX, Fluent)
- Acoustic Finite Element Models (ANSYS, Virtual Lab)

Benchmark to Edwards Pipe

- Measured Acoustic Wave Propagation

Develop Base Model

- Break Modeling
- Nodalization

Part 3 FBOT Sensitivity Study



Determine Significant Parameters Affecting AC Load Reduction due to Finite Break Opening Time

Define range of inputs that establish “best” case and “worst” case for groups of plants in Part 4

Determine sensitivity of structural response to the “best” case and “worst” case inputs as well as sensitivity to plant characteristics

Part 4 – Screening Document



Plant characteristics for plant grouping

Instructions for categorizing individual plant into appropriate group

Instructions for interpolating between “minimum” FBOT effect and “maximum” FBOT effect for individual plant application based on break opening times and operating conditions defined in Part 3

FBOT Committee Status



Part 1: Review complete: Conclusion FBOT can be applied using 10CFR50.59

- NRC briefed in March on conclusions
- NRC meeting June 24 summarized BWROG plans to implement FBOT

Part 2: Methodology effort expected to be complete 3Q 2015

Part 3: In progress - expect completion 1Q 2016

Part 4: Funding approved for completion in 2016

- Exploring opportunities to accelerate schedule



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BWROG Executive Summary



BWROG Executive Chairman closing comments

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