BWR Owners' Group Introduction & Overview

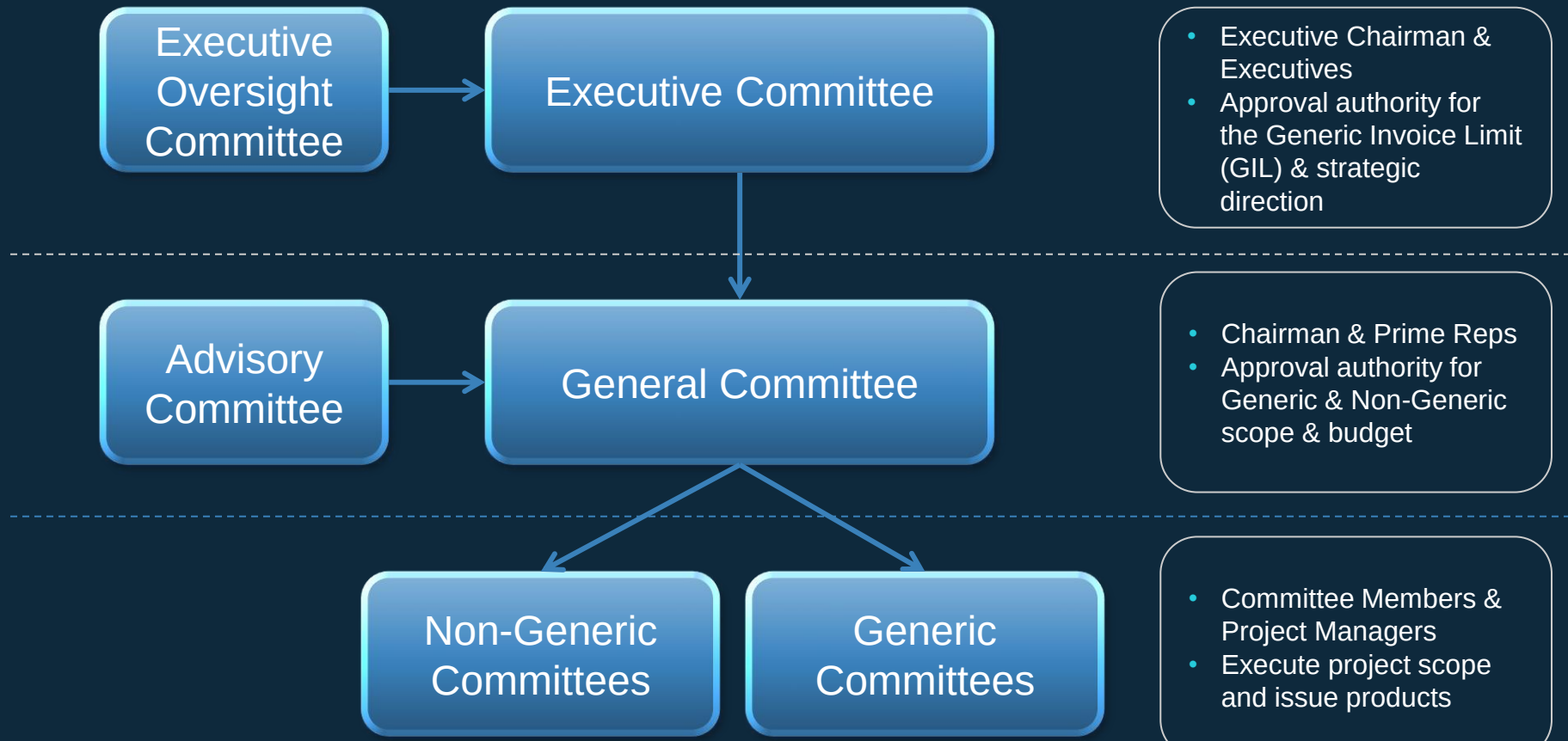
Tim Hanley (Exelon) – BWROG Executive Committee Chairman

BWROG Executive Oversight Committee & NRC Meeting
December 1, 2021

BWROG Mission

- The mission of the Boiling Water Reactor Owners' Group (BWROG) is to provide a forum, in the spirit of partnership with GE-Hitachi Nuclear Energy, which allows its member utilities to maintain and improve plant safety, achieve higher plant reliability, minimize and share costs, facilitate regulatory interaction, and effectively apply limited technical resources for mutual resolution of issues applicable to two or more members. (Ref. BWROG Charter Sec. II)
  - The BWROG is a utility lead organization designed to benefit the utility members. The member utilities decide what activities get worked and the timeline for those activities.

BWROG Org Structure



- Executive Chairman & Executives
- Approval authority for the Generic Invoice Limit (GIL) & strategic direction

- Chairman & Prime Reps
- Approval authority for Generic & Non-Generic scope & budget

- Committee Members & Project Managers
- Execute project scope and issue products

BWROG Leadership

Tim Hanley	Exelon	Executive Chair
Steve Douglas	TVA Tennessee Valley Authority	Executive Vice Chair
Denver Atwood	Southern Nuclear	General Chair
Mike Durr	TVA Tennessee Valley Authority	General Vice Chair
Greg Holmes	GE Hitachi	Program Director

BWROG Executive Oversight Committee

- Tim Hanley (Exelon - Executive Chair)
- Steve Douglas (TVA - Executive Vice Chair)
- Peter Gardner (Xcel Energy – BWROG CNO Sponsor)
- Ken Knaide (PSEG – EOC At-Large Member)
- Shawn Gibby (Duke Energy – EOC At-Large Member)
- James Burke (GEH – EOC At-Large Member)

BWROG Membership

Domestic (Members)	
DTE Energy	NPPD
Duke Energy	PSEG
Energy Harbor	Southern Nuclear
Energy Northwest	Talen Energy
Entergy	TVA
Exelon	Xcel Energy
International (Members)	
CFE	JAPC
Chubu	KKL
Chugoku	Tohoku
Hokuriku	TEPCO
Iberdrola	
Conditional (Members)	
J-Power	

BWROG Committees (2021)

** Non-Generic Committees*

Core Committee	• Emergency Procedures • Integrated Risk-Informed Regulation • Licensing • Reactivity Controls Review	• Reload Analysis & Core Management
Plant Performance	• BWR Water Chemistry • I&C Maintenance • Operations Significant Event Review* • Outage Management	• Rad Pro / ALARA • Refueling Performance • Valve Technical Resolution Group • Reactor Recirc ASD/VFD Performance*
System Improvement	• Control Rod Drive • ECCS • Feedwater • Offgas*	• Reactor Recirc • Reactor Water Clean Up • Turbine Generator & Aux*
Special Topic	• 50.69 Programs & Process • 50.69 Supply Chain • BWR6 Rod Control & Info System* • BWR Parts Obsolescence*	• 2021 Chemical Evaluation Workshop • RCIC Expanded Ops • R.G. 1.183 Rev1 – AST • Target Rock 2-Stage SRV Performance*

BWROG PMO Organization

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GEH BWROG Program Manager
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- Executive Committee
- General Committee
- International / Conditional Member Program
- Potential Issue Review Team (PIRT)

Richard Rusin

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- BWR/6 Rod Control & Information System
- BWR I & C Maintenance
- Licensing
- Operations Significant Event Review
- Radiation Protection/ALARA
- Turbine Generator & Auxiliaries System Improvement
- Valve Technical Resolution Group

Robert Hartwick

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- 50.69 Programs & Process
- 50.69 Supply Chain
- BWR Parts Obsolescence
- BWR Water Chemistry
- Chemical Evaluation Workshop
- Reload Analysis & Core Management
- Target Rock SRV Performance Improvement

Phillip Ellison

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- ECCS System Improvement
- Emergency Procedures
- Feedwater System Improvement
- Offgas System Improvement

James Konrad

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- ASD/VFD Performance
- Integrated Risk-Informed Regulation
- Reactor Recirc System Improvement
- Refueling Performance
- RG. 1.183 Revision AST

Terri Farthing

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- CRD Performance Improvement
- Outage Management
- RCIC Expanded Operating Band
- Reactivity Controls Review
- RWCU System Improvement

Project Administrators

Corina Bystry (International Program)	T: (910) 819-1812	Corina.Bystry@ge.com
Melissa Howell (Finance)	T: (910) 819-6770	Melissa.Howell@ge.com
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Stacy Kincaid (Meeting Logistics)	M: (910) 232-2677	Stacy.Kincaid@ge.com

Thanks! Any Questions

Emergency Procedure Committee Update

Steve Douglas (TVA) – Executive Committee Vice Chair

BWROG Executive Oversight Committee & NRC Meeting
December 1, 2021

Topics to be Discussed

- Brief History of Emergency Procedure Committee
- Conduct of Committee Business
- EPG/SAG Rev. 4 Implementation Status
- Workshops with NRC

BWROG – Emergency Procedures Committee

- Purpose
  - Revise, maintain and socialize the EPGs/SAGs and related documents
  - Advise the BWROG on issues related to emergency and severe accident response strategies
- Products
  - Emergency Procedure and Severe Accident Guidelines (EPGs/SAGs)
  - Technical Support Guidelines (TSGs)
  - FLEX Support Guidelines (FSGs)
  - SAMG Computer Based Training (CBT)

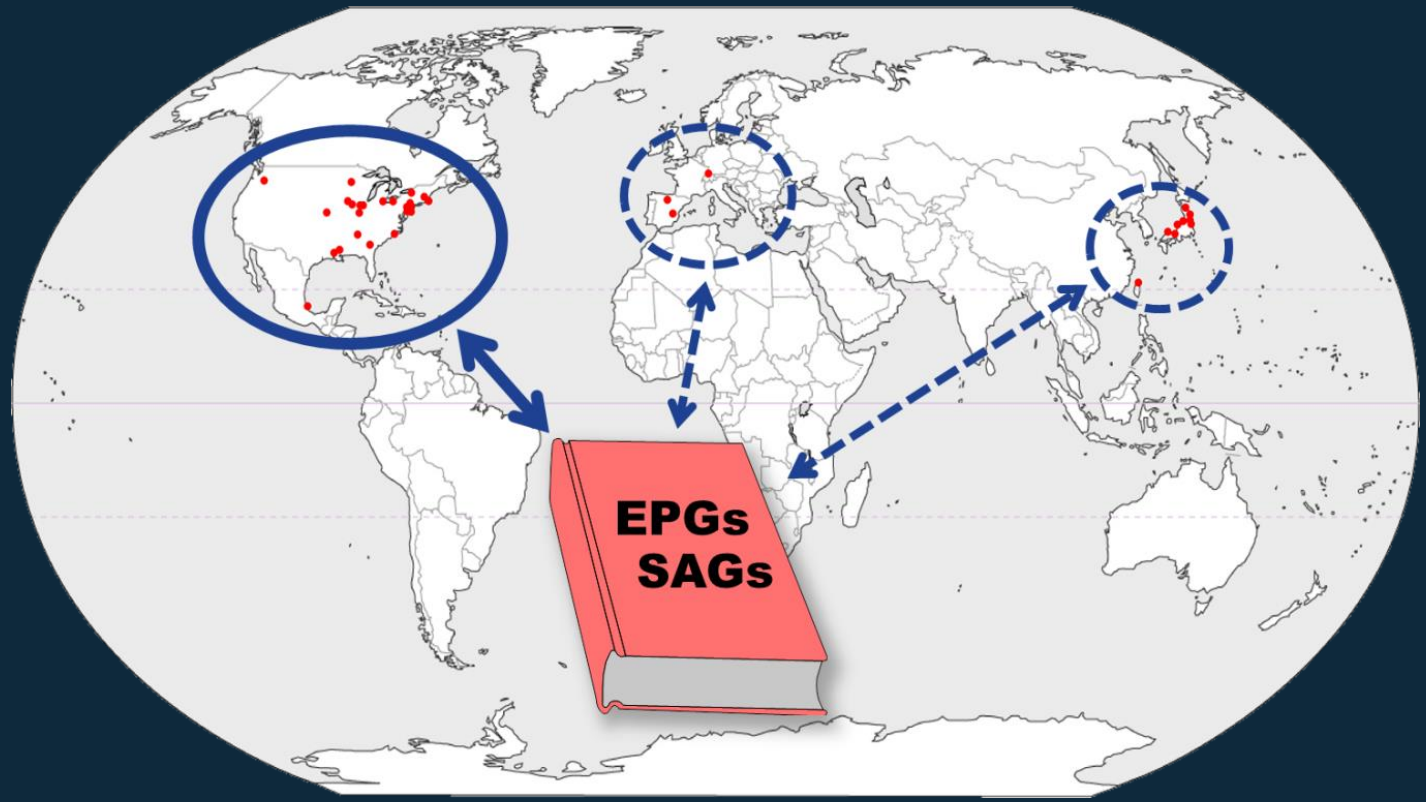
U.S. Commitment Documents

- NUREG-0737 Item I.C.1, “Guidance for the Evaluation and Development of Procedures for Transients and Accidents” & NRC Generic Letter 88-20 & Supplements – Post-TMI severe accident management Inception
- NEI 91-04, “Severe Accident Issue Closure Guidelines” – Industry initiatives for severe accident management which led to the creation of generic Severe Accident Guidelines
- INPO IER L1-13-10, “Nuclear Accident at the Fukushima Daiichi Nuclear Power Station” - Focuses attention on responsibility
- ACAD 15-10, “Guidelines for the Training and Qualification of Emergency Response Personnel” - Foundation for ERO Programs
- Order EA-13-109, Phase 2, “Order to Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions” – Revises Severe Accident Strategy
- 10CFR50.155, “Mitigation of Beyond-Design-Basis Events (MBDBE)” Rule Making & NSIAC Commitments – Renews industry commitment to Beyond Design and Severe Accident Events & timely plant specific updates to Owner’s Group SAGs

BWROG EPC Members

EPC Membership:

- U.S. BWRs
- Japan BWRs
- Mexico BWRs
- Spain BWR
- Switzerland BWR



EPC Issue Resolution Process

The EPC has a well-defined structure for identifying and resolving issues with its products:

- EPG/SAG issue identification and resolution is an organized process for tracking issues that arise with development and implementation of the guidelines
- Any EPC member or sponsoring utility may propose a new issue. The issue draft is sent to the EPC Chairman for review and distribution to the EPC
- The EPC issue resolution process is designed to maintain the quality of the committee's products and to facilitate a uniform understanding of the EPGs/SAGs, TSG, FSG & CBT and their bases
- Consensus must be reached prior to the approval of any change to the EPGs/SAGs, TSG, FSG & CBT
- The EPC Chairman may elevate issues to the BWROG Potential Issue Review Team (PIRT) for a resolution

U.S. Rev 4 Implementation

- Scope – Implementation Issues being Identified and Resolved for:
  - Emergency Operating Procedures (EOPs) and Severe Accident Management Guidelines (SAMGs)
  - EOPs for cold shutdown and refueling conditions
  - SAMGs for refueling conditions
  - Technical Support Guidelines & TSG Appendix A calculations
- Rev 4 Implementation Schedule
  - Complete within 2 refueling outages or 3 years, whichever is longer, from Revision 4 publication (June 2018)
- Current Status - All sites complete with two exceptions
  - One site received an extension to Dec 31st, 2021
  - One site is on the 2 refueling outages schedule (June 2022)

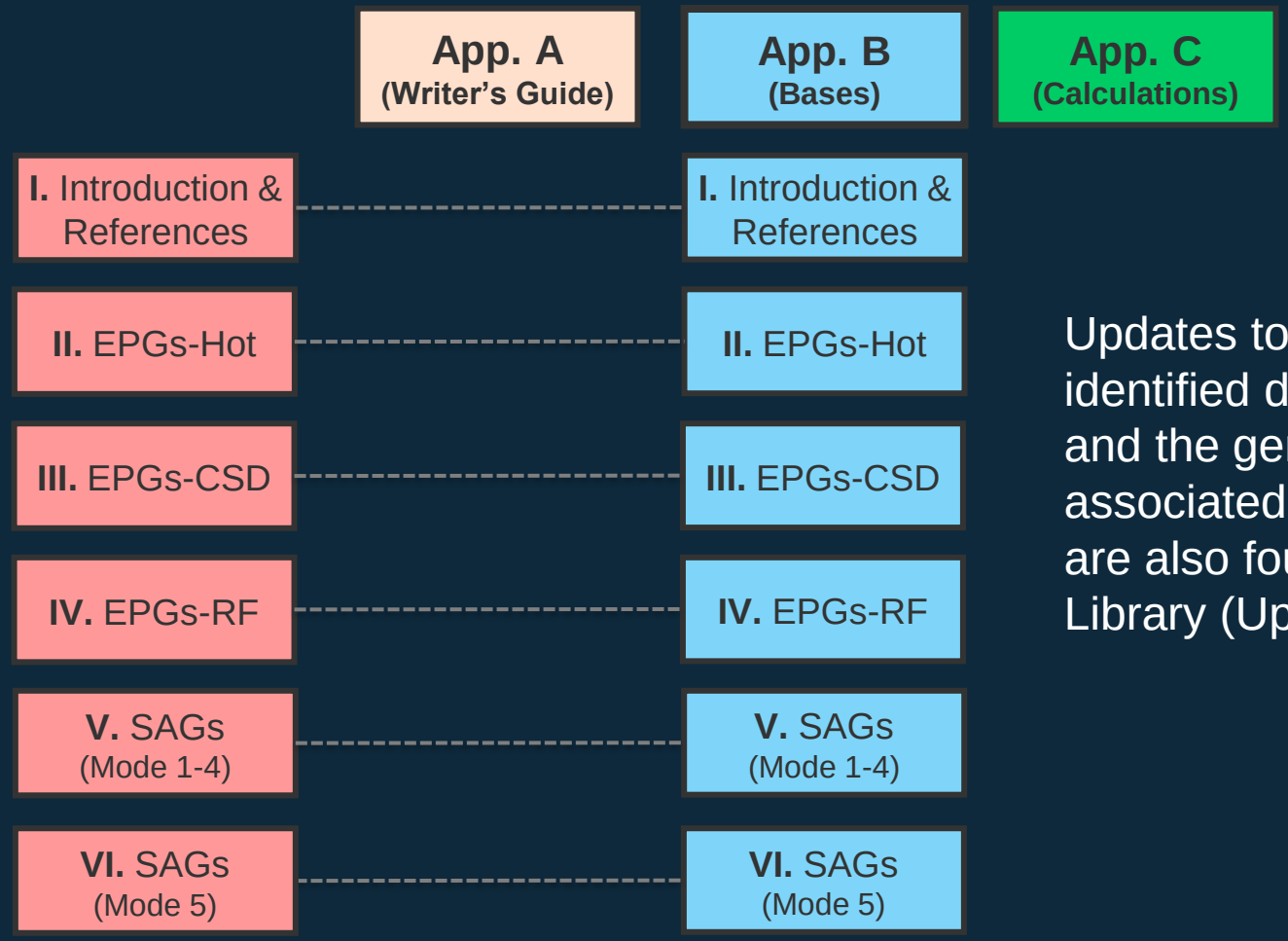
Workshops with NRC

- BWROG EPG/SAG Rev. 4 NRC Workshop
  - December 1-3, 2020
  - Industry and NRC personnel in attendance
  - Covered EPG/SAG Rev. 4 and TSG Rev. 1 issued June 1, 2018
- BWROG EPG/SAG Rev. 4 and TSG Rev. 1 Workshop
  - November 8-10, 2021
  - Includes most recent issues resolutions and enhancements
  - Industry and NRC personnel in attendance
  - Implementation issues were identified and resolved to support implementation on the required schedules.
  - Focused on areas NRC training had questioned
    - Contingency 1 Alternate Level/Pressure Control (ELAP/SBO)
    - Contingency 5 ATWS RPV Control
    - Different Calculations supporting action levels

Thank You

EPG/SAG Revision 4 Organization

A video of the BWR procedure hierarchy is found in the SharePoint Library and in the SOUL Material for this Workshop



Updates to Rev 4 that were identified during implementation and the generic flow charts associated with these revisions are also found in the SharePoint Library (Update 4.7)

Integrated Risk-Informed Regulation (IRIR) Committee

Robert Rishel (Duke Energy) – IRIR Committee Chair

BWROG Executive Oversight Committee & NRC Meeting
December 1, 2021

Topics to be Discussed

- ASME/ANS Standards and NRC Endorsement for Risk Applications
- IRIR Committee Activities of note for NRC

Standards for Risk Applications

ASME/ANS Standards and NRC Endorsement for Risk Applications

- PRA Standard and RG 1.200
  - Would like to remove the Low Power Shutdown portion of standard from NRC endorsement in RG 1.200 Rev 4
- Other Risk Informed Standards
  - Concern with NRC endorsement of Standards involving plant Structure Systems and Components (SSCs)
    - Issue is conflict or over-prescriptive requirements when compared to 50.69 alternate treatments.

IRIR Committee Activities of Note for NRC

Human Reliability Analysis

- Comparison of common Human Failure Events found in most BWR PRAs using the IDHEAS methodology against current industry practices
  - FLEX HRA is not in scope

Data Improvement of PRA working with staff and INL

- ADVs and Safety Valves in BWRs failure to close
  - Number of failures to close where mission of RCIC and HPCI are compromised
  - BWR IRIR data collection on number of actual challenges
    - How many valve cycles occur with a loss of off-site power or other transients
- HPCI and RCIC run hours and failures
  - BWROG looking to update the INL with information obtained
    - RCIC and HPCI are more reliable than INL data reflects

Thank You

BWROG Licensing and TSTF Update

Ryan Joyce (Southern Nuclear) – Licensing Committee Chair

BWROG Executive Oversight Committee & NRC Meeting
December 1, 2021

Topics to be Discussed

- TSTF-582, RPV WIC [Reactor Pressure Vessel Water Inventory Control] Enhancements
- TSTF-576, Revise Safety/Relief Valve Requirements

TSTF-582, RPV WIC Enhancements

TSTF-542, Reactor Pressure Vessel Water Inventory Control (RPV WIC) Background:

- Approved Dec 20, 2016
- Major rewrite of the Mode 4 and 5 Emergency Core Cooling System (ECCS) requirements
- Instead of "one-size-fit-all" approach to Mode 4 and 5 ECCS requirements, provides graded requirements
- Requirements based on DRAIN TIME
  - Hypothetical amount of time it could take to drain to the top of the active fuel
  - Assumptions used for calculating DRAIN TIME given in TS Definition
  - Based on plant configuration for a particular evolution
- Standby gas treatment system and secondary containment requirements based on calculated DRAIN TIME
- Adopted by all BWRs

TSTF-582, RPV WIC Enhancements

TSTF-582, RPV WIC Enhancements, Background:

- Approved August 13, 2020
- Provides various enhancements to TSTF-542
  - Relaxation of overly restrictive requirements
  - Provides alternate TS requirements
  - Various “clean-up” items
- Based on collection of industry Operating Experience (OE)
- Current status:
  - Approved for 11 sites
  - Under NRC review at 7 sites
  - Three sites have not submitted. (One of the three did a partial adoption before TSTF-582 was approved.)

TSTF-582, RPV WIC Enhancements

Feedback from licensees indicates:

- Savings in outage time and dose
- Allowed additional work to be performed that improved plant safety
- Significant improvement in equipment lineups
- Improvements in instrumentation outages and calibrations
- Simplified protection and operability requirements
- Facilitated replacement of reactor recirculation pump & motor

TSTF-576, Revise Safety/Relief Valve Requirements

- Removes individual safety/relief valve (S/RV) setpoints from TS
- Requires licensee to verify the Overpressure Protection System (consisting of individual S/RVs acting as a collective system) would protect RCS safety limit
- Licensee experience provides high confidence that S/RVs collectively capable of protecting safety limit even if multiple S/RVs are outside TS tolerance
- Would require assessments similar to what licensees already perform for licensee event reports (LERs) when S/RVs open outside tolerance

TSTF-576, Revise Safety/Relief Valve Requirements

Timeline:

- Extensive discussions with NRC prior to submittal
  - August 27, 2019 – Draft TSTF-576 provided to NRC
  - September 12, 2019 – Pre-submittal meeting with TSTF and NRC
  - October 21, 2019 – Revised draft TSTF-576 provided to NRC
  - December 2, 2019 – Second pre-submittal meeting with TSTF and NRC
- Formally submitted December 13, 2019
- NRC provided Request for Additional Information (RAI) May 11, 2020
  - August 11, 2020 – Draft RAI response and revised Traveler provided to NRC
  - October 13, 2020 – TSTF-NRC teleconference to discuss NRC comments
  - December 7, 2020 – “Tabletop” demonstration on application of TSTF-576
  - February 1, 2021 – Revised draft RAI response and revised Traveler provided to NRC
  - April 12, 2021 – NRC provided comments
  - May 13, 2021 – TSTF-NRC teleconference to discuss NRC comments
- TSTF formally responded to RAI and provided revision of traveler on June 23, 2021

TSTF-576, Revise Safety/Relief Valve Requirements

Current Status:

- NRC stated they cannot accept the Traveler as-written
- November 23, 2021 – TSTF-NRC teleconference to discuss NRC concerns
- >$200,000 NRC review fees incurred

Thank You