



Perspectives on FLEX, PRA Configuration Control & the NRC's SPAR models

EPRI Risk Technology Meeting: January 9, 2023

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AGENDA

FLEX/Mitigating Strategies

Observations and PRA Aspects

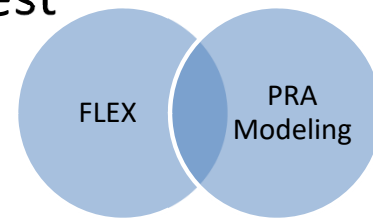
PRA Configuration Control Tabletops:

Perspectives Thus Far – The Good & The Opportunities & The Inspection Ideas

SPAR: KM/KT

FLEX and the Mitigating Strategies:

- Staff perspectives on PWROG reliability data
- Substantial progress has been made by industry in developing best practices and preventive maintenance strategies
- Equipment Failures in 2021 & 2022
 - Continued battery failures (Callaway, Comanche Peak, STP & LaSalle)
 - FLEX EDG or Marine Turbine Generator failures (Susquehanna, ANO, Perry)
 - Design issue with pumps/generators being wired incorrectly (Waterford).
 - Output breaker issues (Clinton, Riverbend)
- Status of FLEX/Mitigating Strategies incorporation in PRA models



PRA Configuration Control Table-Top: Perspectives Thus Far – The Good, The Opportunities, and The Inspection Ideas

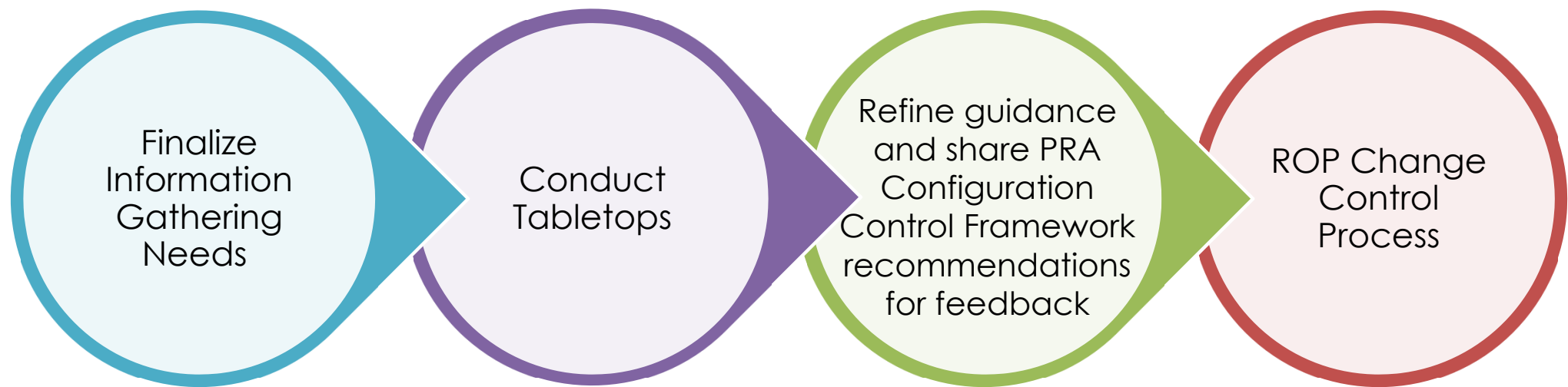
Key Messages

- The existing oversight process is adequate to ensure implementation of programs informed by PRA models.
- However, we believe that there is a current gap in the oversight of PRA Configuration Control programs.
- A **balanced approach** of focused inspections/safety enhancements within the existing ROP baseline inspection program of PRA changes and upgrades are being proposed to monitor appropriate implementation of configuration control programs for licensee PRA models that support risk-informed decision-making.

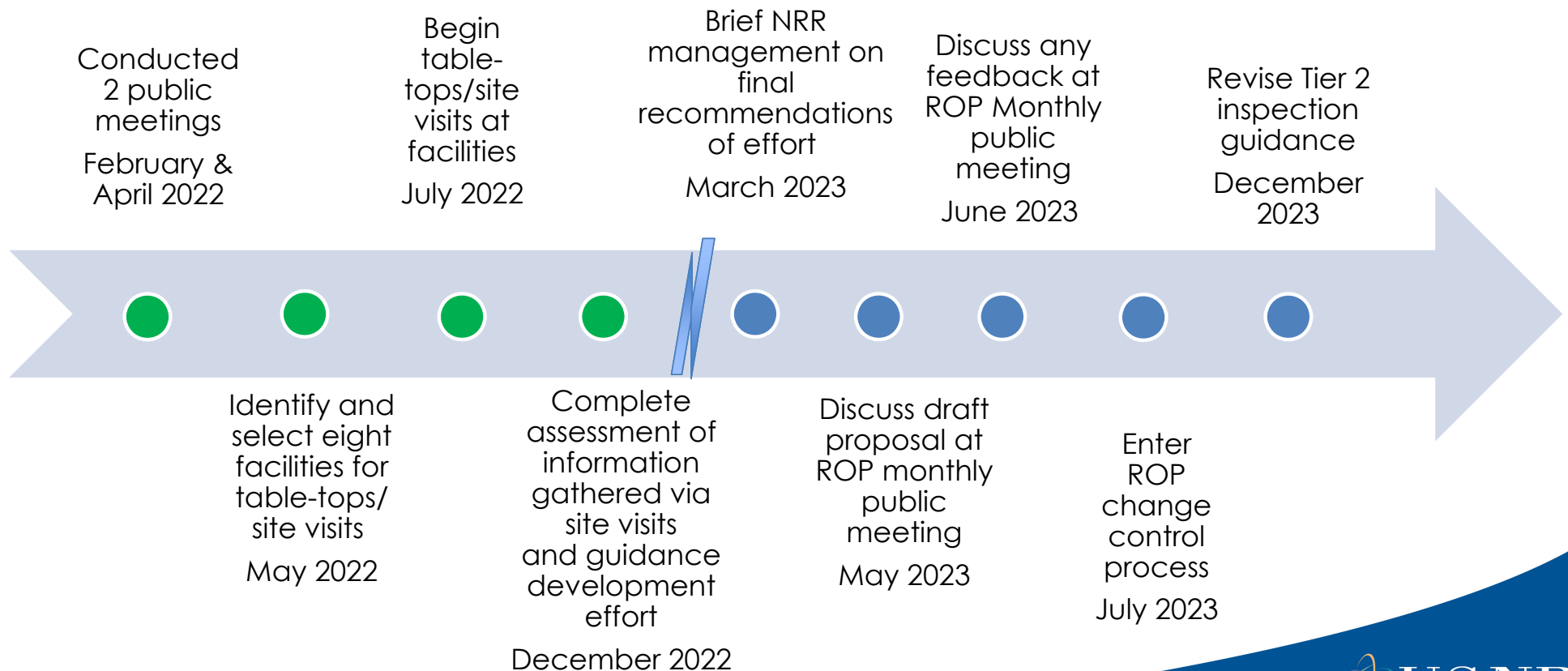
Key Messages (Cont'd)

- PRA Configuration Control framework will be informed and developed by the NRC working group recommendations, based on the information gathering and guidance development efforts, as well as with industry and the public through multiple public meetings.
- All eight tabletops have been completed:
 - Based on the reviews conducted to date, NRC staff have confirmed licensees are meeting the consensus standard but identified several observations on how licensees are implementing their programs
 - Based on the team's findings and observations of all eight tabletops, the team will propose recommendations to enhance oversight activities for approval
 - The approach we are taking in addressing this initiative demonstrates our commitment to our principles of good regulation of openness.

High-Level Plan



Overall Plan



Observations from Tabletops: The Good...

- Understanding of Licensee's PRA Configuration Control Programs
 - Monitoring of Engineering Changes
- Exercise potential inspection guidance with licensee's PRA staff
- Representative picture of PRA Configuration Control program implementation
- Licensee's support, responsiveness, and feedback

Observations from Tabletops: The Opportunities...

- PRA Configuration Control (PCC) vs. Peer Review Process:
 - PCC inspection will have an element of technical adequacy as part of effort per ASME standard
 - Through the course of a change review of PCC implementation, plant representation will remain a priority
 - PCC Upgrades, if selected, will be based on F&O reviews

Opportunities, Cont'd...

PCC Under Existing Regulatory Framework (Not Appendix B)

Potential Program Vulnerabilities:

- (Only) Knowledge based on w/ inconsistent implementation
- (General) Operations, Maintenance and Industry-Wide Operational History monitoring, less formal threat modeling, Engineering Changes

Observations:

Generic data not completed since 2010, last data update

Improved:

Industry-Wide experience (i.e., OPC) impact on Initiating Event Evaluated

on: Most initiators, data analysis, system

Inspection Enhancement – Initial Thoughts

Some possible ideas (So-Far):

- Comprehensive Engineering Team Inspection (CETI) (Internal Events, Internal Flooding & Other Approved Hazards)
 - Focused Engineering Inspection (FEI) Internal Fire
- Resident Inspector Baseline Procedures. All hazards.

SPAR - KM/KT

Updating & Benchmarking SPAR Models

Benchmarking against the licensee's models allows the SPAR models to reflect the as-built, as-operated plants

Increased use of risk insights highlights the need to maintain the plant-specific PRA tools to support licensing and inspection activities

Differences due to outdated models could lead to additional time/resource needed during oversight or licensing

Voluntarily provide PRA information to support INL and NRC updating of the SPAR models

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SPAR Models Update

FY2022

- Model update completed for **Diablo Canyon, Comanche Peak, South Texas Project, Harris, Monticello.**
- Added Internal Flooding Hazard: **David-Besse**
- Incorporated 2020 INL Industry Average Parameters Estimates into all SPAR Models

FY 2023

- **St. Lucie Unit 1** is currently being benchmarked by NRC and is anticipated to be completed by end October, early November
- **Calvert Cliffs Unit 1** is currently being benchmarked at INL and is anticipated to be complete by end of November
- **St. Lucie Unit 2 and Calvert Cliffs Unit 2** will start
- Additional SPAR models will be identified for benchmark based on provided information and date of last benchmark

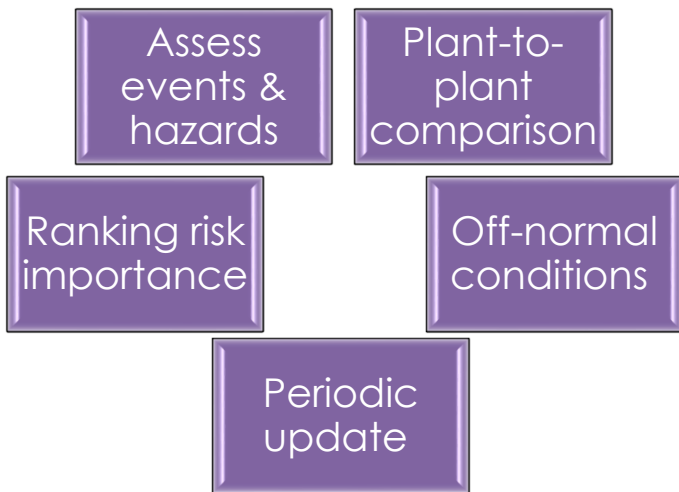
SPAR-DASH

Make risk information accessible to all NRC staff

Gather key risk results in an easy-to-use interactive dashboard

Remove barriers and support communication of risk insights

Support Be RiskSMART and our path to becoming a modern, risk-informed regulator

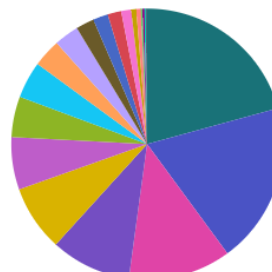


Plant CDF Summary

WEST 4LP

SPAR model version
8.80-20220501

CDF by Initiating Event



- IE Name
- LOOPWR
- LOACB-A
- TRANS
- ISL-RHR
- MLOCA
- LOOPGR
- ISINJ
- LOOPSC
- LOPPC
- SLOCA
- LONSW

CDF by Initiating Event Table

IE Name	Description	CDF	IE Frequency	CCDP	Perc CDF
XLOCA	REACTOR VESSEL RUPTURE INITIATING EVENT	1.0E-007	1.0E-007	1.0E+000	0.1
ISL-RHR	RHR PIPE RUPTURES	6.0E-007	5.8E-006	1.0E-001	1.0
LLOCA	LARGE LOCA	1.0E-007	5.8E-006	1.0E-002	0.2
ISL-LPI	ISLOCA IE 2 - CCM/LPI Interface	1.0E-008	1.0E-006	1.0E-002	0.0
MLOCA	MEDIUM LOCA	6.7E-007	1.0E-004	5.0E-003	0.8
ISL-HPI	ISLOCA IE 2 - CCM/HPI Interface	1.8E-009	1.0E-006	1.0E-003	0.0
LONSW	LOSS OF NUCLEAR SERVICE	1.0E-007	1.7E-004	1.0E-003	0.2

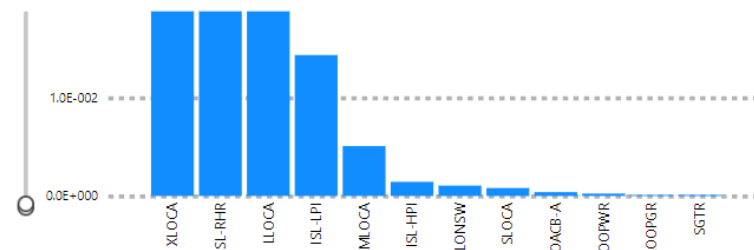
Current Case Type:

Nominal plant risk

CDF Increase (Condition - Nominal)

N/A

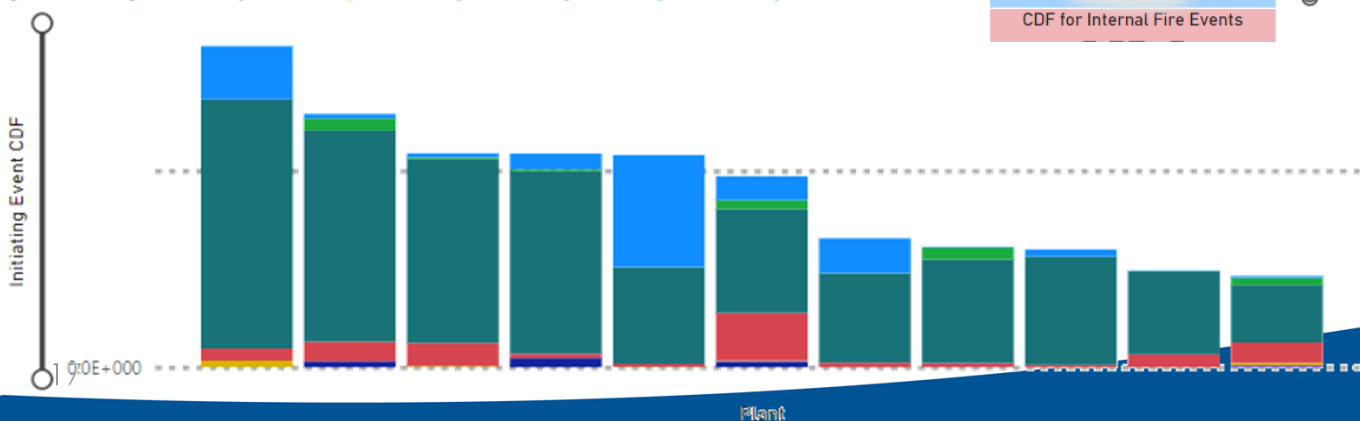
CCDP by Initiating Event



Cross-Plant Comparison: Core Damage Frequency by Hazard Category

Total Plant CDF by Hazard Category

- EXT-FLOOD
- EXT-HURR
- EXT-TORN
- EXT-WIND
- INTERNAL
- INT-FIRE
- INT-FLOOD
- SEISMIC



Questions?

