



U.S. NRC

UNITED STATES NUCLEAR REGULATORY COMMISSION

Protecting People and the Environment

***Addressing New Reactors in the Reactor
Oversight Process (ROP) -***

**ROP Working Group Public Meeting
September 16, 2015**

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Meeting Purpose

- To discuss the staff's proposed approach for addressing new reactors (i.e. AP1000) in the ROP
- To discuss initial thoughts for developing Performance Indicators (PIs) and thresholds for new reactors
- To solicit and discuss feedback from industry and other stakeholders regarding the staff's proposed approach and any other related considerations
- To discuss next steps and milestones including stakeholder participation



Commission SRM - June 2014

- Commission disapproved the staff's Recommendation 1, to develop an integrated risk-informed approach using qualitative measures to supplement the risk evaluations
- Commission approved the staff's Recommendation 2, to develop appropriate PIs and thresholds for new reactors
- The Commission also provided specific PI and SDP direction
- Overall structure of existing ROP should be preserved
- Staff should notify Commission through the annual ROP self-assessment report if they identify any further needed changes based on operating experience with new plants



Objective

Enhance the ROP, within the existing framework, to include new reactor considerations, recognizing the differences in safety systems and operational philosophy



NRC Proposed Approach

- Develop a set of ground rules mostly from recent Commission guidance on new reactor oversight
- Identify and review areas of the ROP to address new reactor SSC functional differences such as passive safety systems and digital I&C
- Develop an SSC performance verification matrix to evaluate each new reactor SSC
- Recommend changes to the ROP to cover new reactor designs (changes or additions to PIs, Inspections, SDP, and other processes)



Ground Rules

- Maintain ROP goal – Focus on plant activities important to safety and the ability to respond to declining plant performance – NUREG 1649
- The Commission reaffirms that the existing safety goals, safety performance expectations, subsidiary risk goals and associated risk guidance (such as the Commission’s 2008 Advanced Reactor Policy Statement and Regulatory Guide 1.174), key principles and quantitative metrics for implementing risk-informed decision making, are sufficient for new plants. – SRM-SECY-10-0121
- New reactors with these enhanced margins and safety features should have greater operational flexibility than current reactors. – SRM-SECY-10-0121



Ground Rules (contd)

- The Commission noted that the overall structure of the existing ROP should be preserved. – SRM-SECY-13-0137
- The staff should develop guidance to address circumstances that are unique to new reactors, for example due to uncertainty of the reliability of passive systems, structures and components (SSCs) or other SSCs with limited operational experience. – SRM-SECY-13-0137
- The SDP should continue to place emphasis on the use of the existing quantitative measures of the change in plant risk for both operating and new reactors. – SRM-SECY-13-0137



Ground Rules (contd)

- The staff should enhance the significance determination process (SDP) by developing a structured qualitative assessment for events or conditions that are not evaluated in the supporting plant risk models. – SRM-SECY-13-0137
- The Commission has approved the staff's Recommendation 2, to develop appropriate Performance Indicators (PIs) and thresholds for new reactors, specifically those PIs in the Initiating Events and Mitigating Systems cornerstones, or develop additional inspection guidance to address identified shortfalls to ensure that all cornerstone objectives are adequately met. – SRM-SECY-13-0137
- Any additional direction or constraint we need to consider?



ROP Areas Affected

- ROP Framework
 - Unchanged – Same seven cornerstones and goals
- Assessment Program
 - Unchanged – PIs and findings inform Action Matrix response
- Cornerstones Affected
 - IE, MS, and BI (Reactor Safety, most risk-informed)
 - Consider if cornerstone objectives apply to new reactors
- PI Program
 - Changes needed per SRM and transition plan (RI-09A)
- Inspection Program
 - Changes needed per transition plan (RI-10)
- Significance Determination Process
 - Changes needed per SRM and transition plan (RI-11)



SSC Performance Verification Matrix

NOTE:
This matrix is for illustration purposes only.

SSC	IMPORTANCE (magnitude of CDF if SSC unavailable)	KEY SSC FUNCTIONS	IMPORTANT ATTRIBUTES	VERIFY BY PI?	VERIFY BY INSPECTION?	TREATMENT BY SDP
Passive RHR	MODERATE; 1E-5	Long term decay heat removal; transfers heat from RCS into IRWST *Redundant to non-safety-related normal RHR (RNS)	Passive challenges to PRHR: <ul style="list-style-type: none"> • Cracked tubes • Hx Fouling • High initial IRWST temp • Non-condensable gasses • Degraded insulation (lower thermal head) • Thermal stratification • Bypass flow caused by leaking valve 			



ROP Next Steps

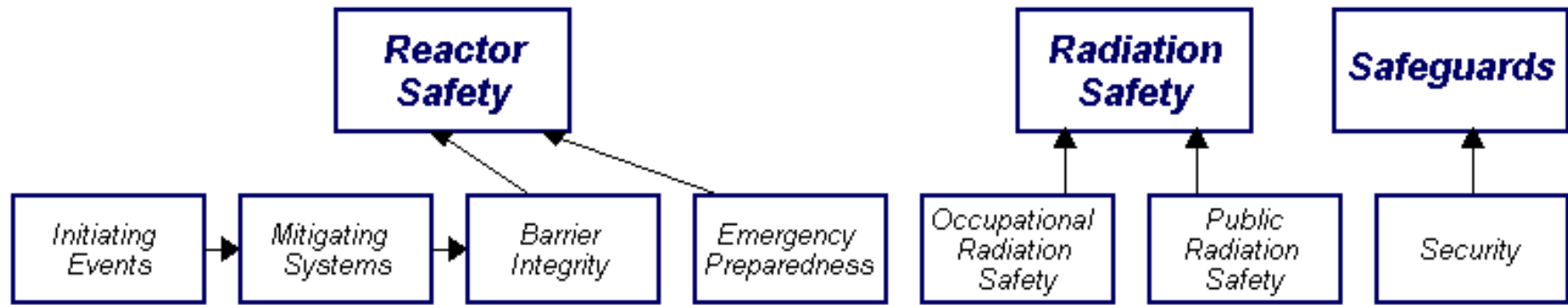
- Develop the SDP and PIs concurrently and holistically, along with the baseline inspection program
- Involve internal and external stakeholders, including NRR, NRO, Region II, ACRS, industry, and public (consider working groups)
- Run tabletops and/or pilot to validate proposals
- Provide the staff's plans and recommendations to the Commission at least one year before scheduled implementation
 - May produce single comprehensive paper



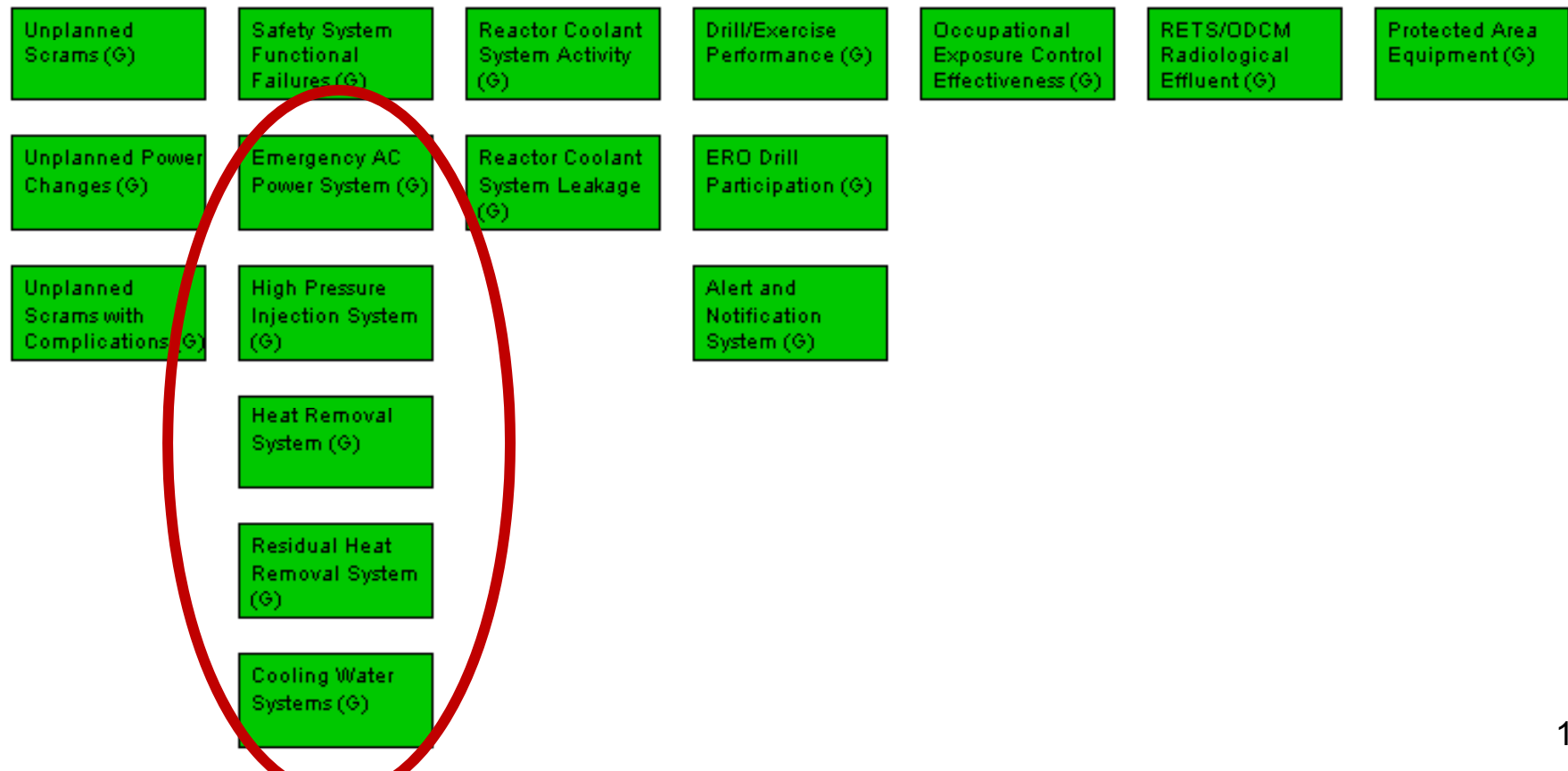
Specific PI Direction

SRM for SECY 2013-0137

- Develop appropriate PIs and thresholds for new reactors, specifically those PIs in the Initiating Events and Mitigating Systems cornerstones, - or -
- Develop additional inspection guidance as needed to address identified shortfalls to ensure that all cornerstone objectives are adequately met
- Develop, with appropriate stakeholder input, necessary updates to the PIs and submit them to Commission prior to power operation for the first new reactor units
- Further explore how the current Safety System Functional Failure (SSFF) PI would be applied to the passive safety-related components in new reactors



Performance Indicators





Current PI Findings

- **Most PIs determined to be adequate**
 - SECY 13-0137
 - Some minor additions to NEI 99-02 (e.g. Unplanned scrams with complications guidance)
- MSPI
 - Risk thresholds would be hard to meet
 - Can passive components be monitored?
 - Tanks not monitored for failures
 - Low squib valve surveillance frequency
 - Performance Limit backstop could play a more crucial role
 - **Overall, the existing MSPI is not adequate for Gen III+ reactors**



Suggested Ideas for PIs

- Changes to current MSPI
 - Performance limits
 - Modifications to the backstop
 - Review performance limit development
 - NUREG 1753
 - NUREG 1816
 - Risk informed scoping
 - Non-safety systems
 - Safety significance?
- New PIs
 - Digital I&C
 - DC power
 - Passive systems
- More inspections



Next Steps for PIs

- Accept ideas and proposals from staff and stakeholders
 - ROP Working Group White Papers
- Mitigating Systems PIs for new reactors working group
 - Internal vs. external
- Workshop



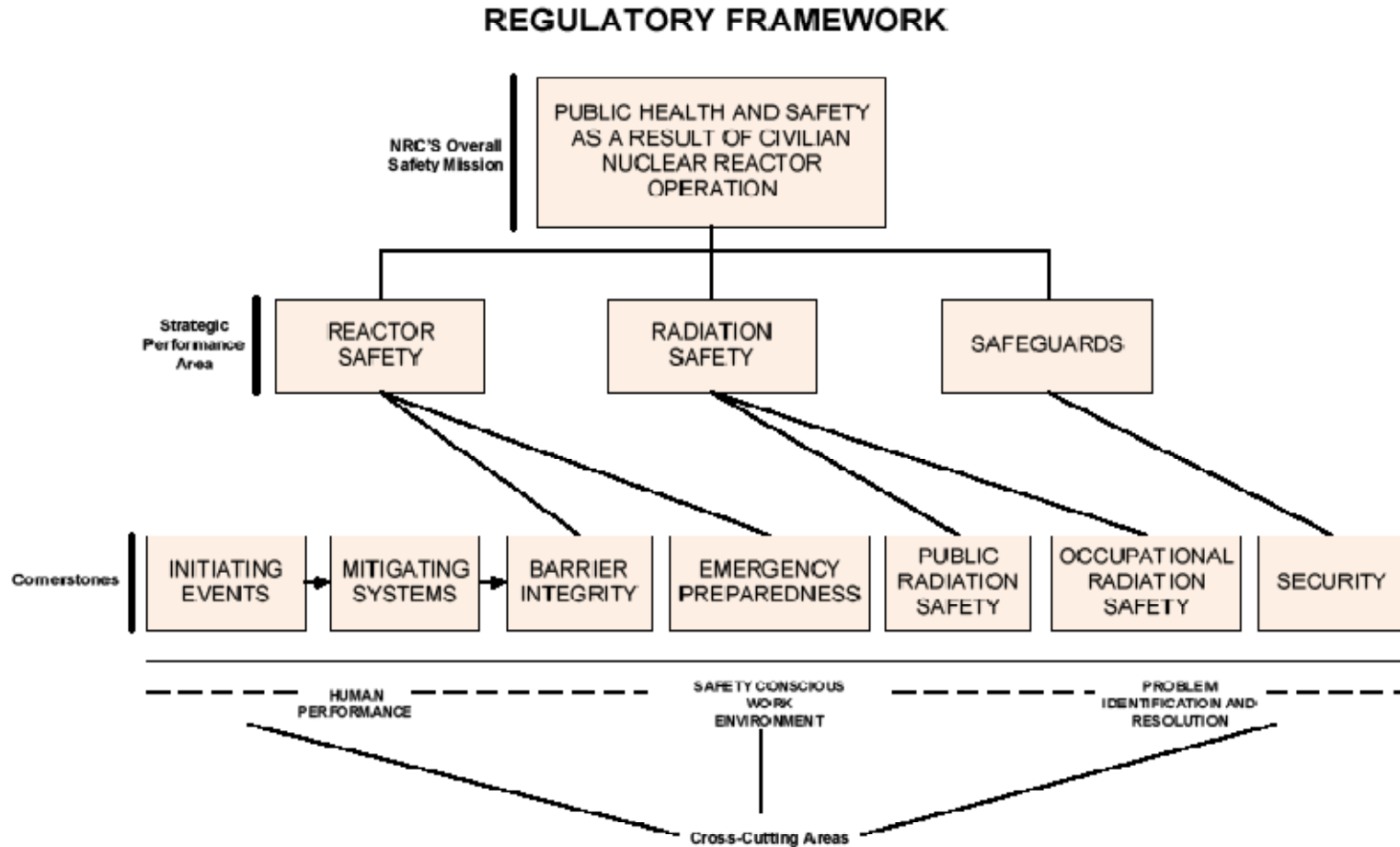
BACKUP SLIDES



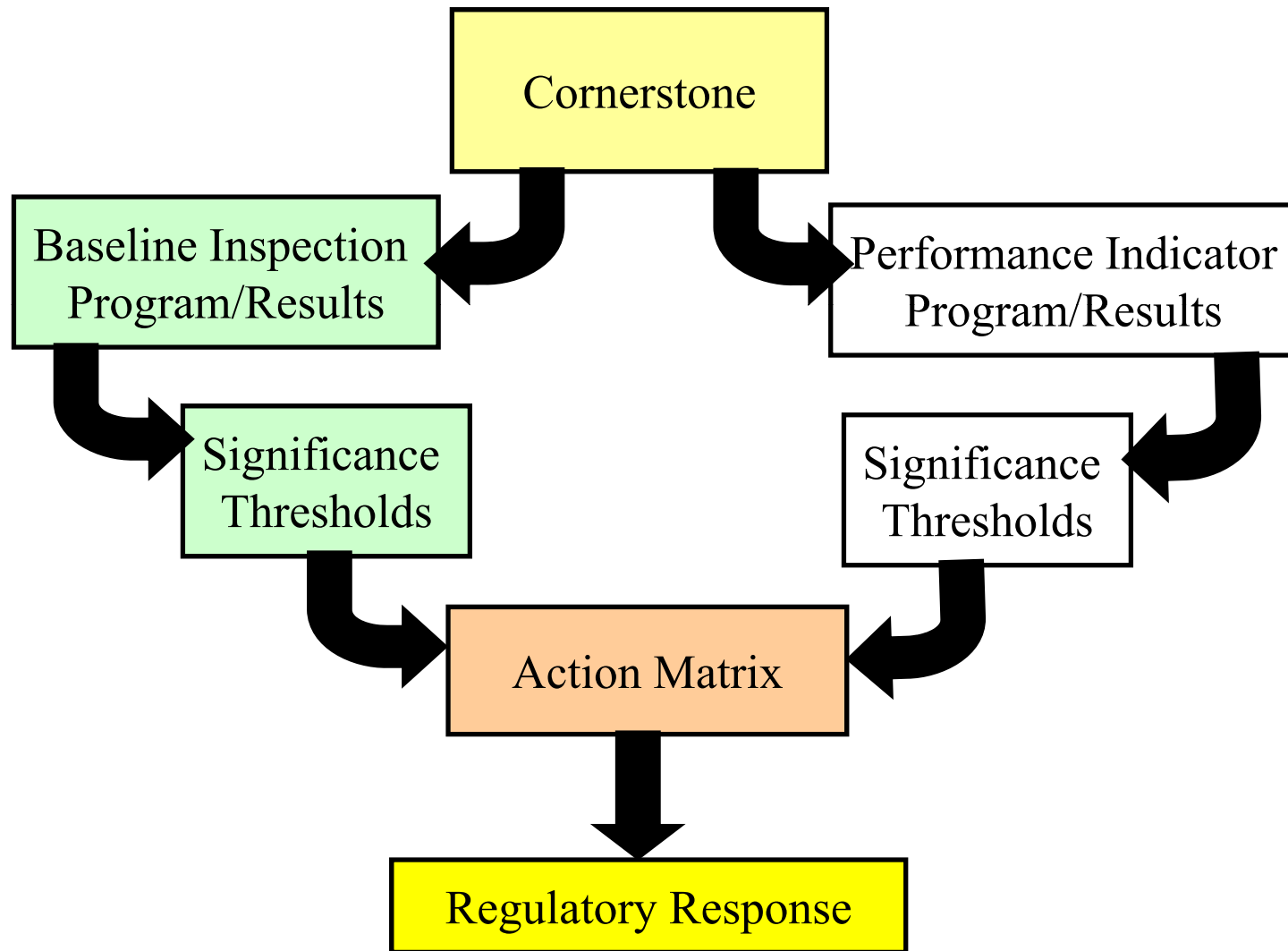
Milestones

- Series of public meetings and tabletop exercises through 2nd quarter 2017, as necessary
 - Consider next meeting and potential frequency
- Produce draft SECY(s), discuss in public meeting, and brief ACRS in 3rd quarter 2017
- Revise SECY as needed in 4th quarter 2017
- SECY to Commission in 1st quarter 2018
- Finalize guidance documents by 4th quarter 2018
- NOTE: Current dates based on anticipated operation of first units in December 2019 (this date is unofficial and could change)

Exhibit 1: REGULATORY FRAMEWORK



Reactor Oversight Process





Acronyms

ACRS – Advisory Committee on Reactor Safeguards

BI – Barrier Integrity

IE – Initiating Events

I&C – Instrumentation and Controls

MS – Mitigating Systems

NRO – Office of New Reactors

NRR – Office of Nuclear Reactor Regulation

PI – Performance Indicators

RI – Readiness Issue

ROP – Reactor Oversight Process

SDP – Significance Determination Process

SECY – Commission Papers

SRM – Staff Requirements Memoranda

SSC – Structures, Systems, and Components