



NRC Reactor Oversight Process Presented to Atomic Energy Regulatory Board (AERB) of India

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REACTOR OVERSIGHT PROCESS (ROP)

- ROP Regulatory Framework
 1. Performance Indicator
 2. Inspections:
 - Baseline
 - Supplemental
 - Event Response (Special Inspections; Augmented Inspection Teams; Incident Investigation Teams)
 - Resolution of Generic Issues (TIs)
 3. Significance Determination Process
 4. Assessment of Licensee Performance



REACTOR OVERSIGHT PROCESS (ROP)

- ROP Characteristics:

- OBJECTIVE

- Use of objective measures to improve safety performance assessment
- Use of quantifiable performance measures (PIs, SDPs)

- PREDICTABLE:

- Stakeholders know regulatory response to issues and indicators



REACTOR OVERSIGHT PROCESS (ROP)

- ROP Characteristics:

- UNDERSTANDABLE:

- Be able to understand NRC actions in response to licensee performance

- RISK-INFORMED:

- NRC resources are focused on those risk aspects of performance having the greatest impact on safe plant operation.



FEATURES OF ROP

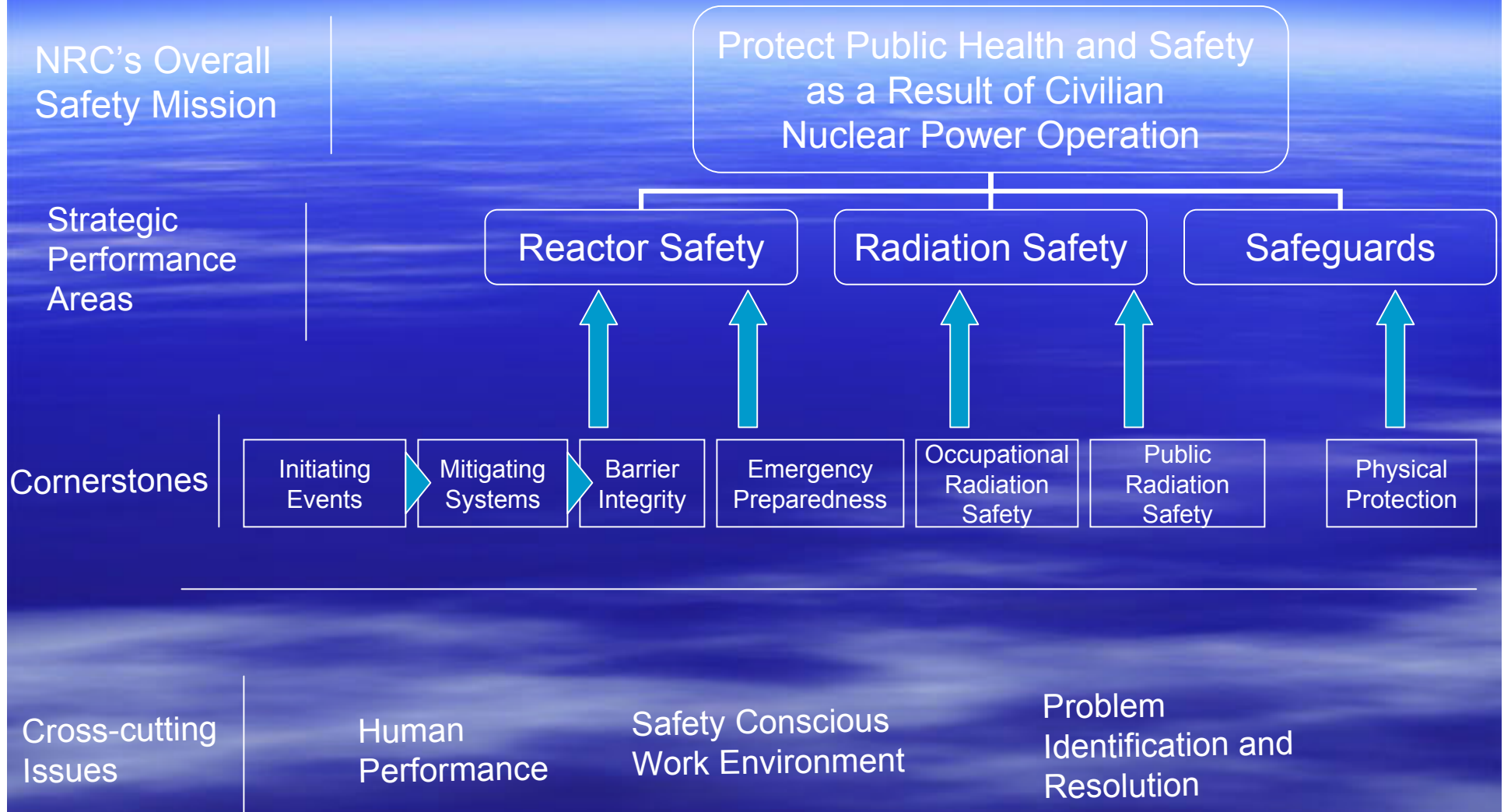
- Focuses Inspections on Activities Where Potential Risks Are Greater.
- Applies Greater Regulatory Attention to Facilities with Performance Problems While Maintaining a Base Level of Regulatory Attention on Plants that Perform Well.
- Makes Greater Use of Objective Measures of Plant Performance.
- Gives the Industry and Public Timely and Understandable Assessments of Plant Performance.
- Responds to Violations in a Predictable and Consistent Manner That Reflects the Safety Impact of the Violations.



FIVE KEY OUTCOMES OF ROP

- **Safety:** Ensure protection of public health and safety and the environment by establishing regulatory oversight framework that ensures continued safe operation.
- **Security:** Ensure the secure use and management of radioactive materials
- **Openness:** Ensure openness in our regulatory process.
- **Effectiveness:** Ensure NRC actions are effective, efficient, realistic, and timely. Focus resources on the most risk significant issues
- **Management:** Ensure excellence in agency management to carry out the NRC's strategic objectives.

REGULATORY FRAMEWORK





REACTOR SAFETY CORNERSTONES

- Initiating Events – Focus on Minimizing The Occurrences of Events That Could Lead to an Accident.
- Mitigating Systems – Focus on Assuring the Ability of Safety Systems to Respond and Lessen the Severity of an Accident.
- Barrier Integrity – Focus on Maintaining Barriers to the Release of Radioactivity in an Accident.
- Emergency Preparedness – Focus on Plans by Licensees and Government to Shelter or Evacuate Affected Population in the Event of an Accident.



RADIATION SAFETY AND SAFEGUARDS CORNERSTONES

- Public Protection – Focus on Public Protection from Radioactive Exposures due to Routine Reactor Operations
- Occupational Worker Protection – Focus on Protection of Worker Health from Radioactive Exposures due to Routine Reactor Operations
- Physical Protection – Focus on Protection Against Sabotage

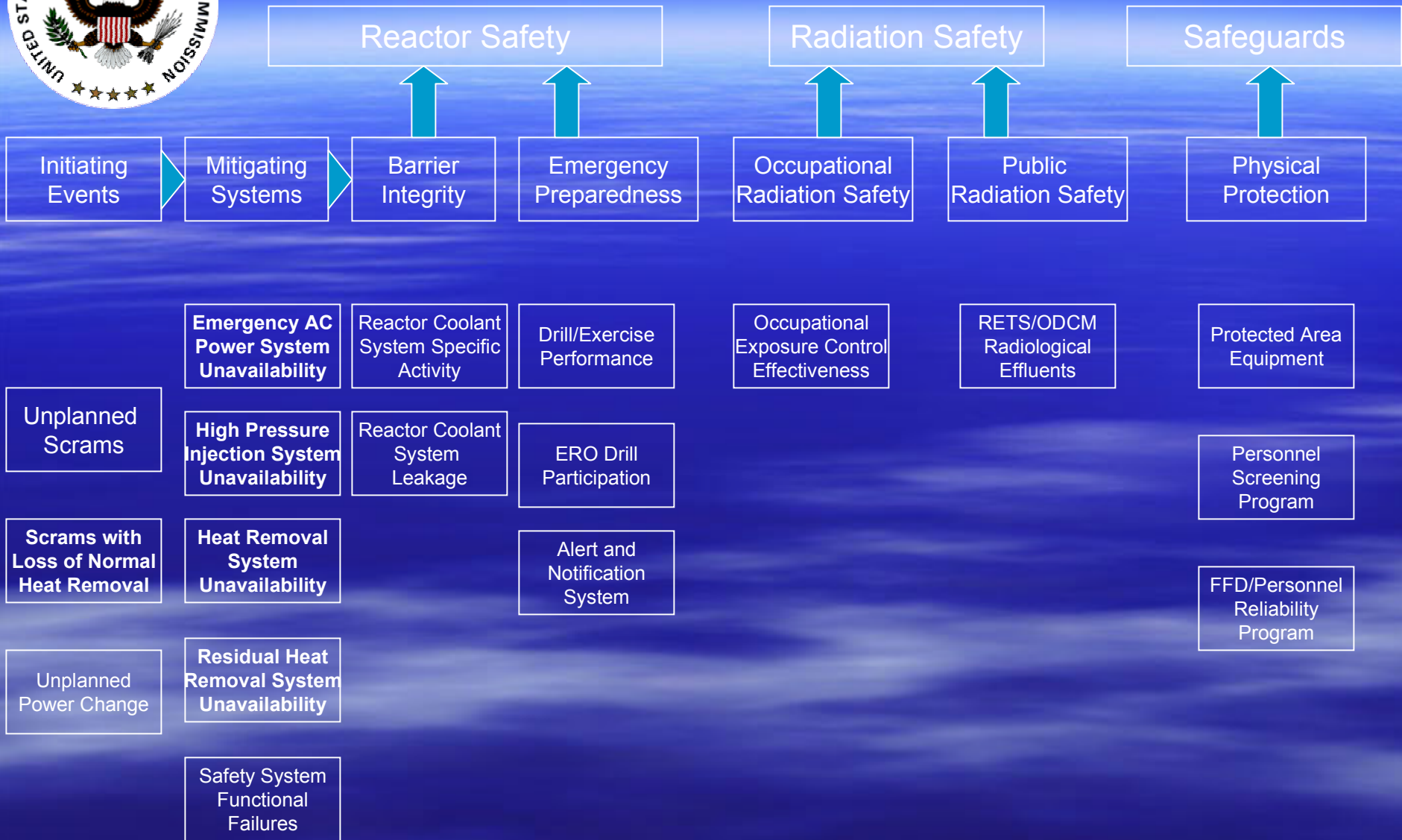


USE OF RISK INFORMATION

- ROP Based on a Dual System of Performance Indicators (PIs) and Focused Inspections
- Risk Information Used to Identify PIs, and Establish Thresholds for Regulatory Action Commensurate with Safety Significance
- Risk Information Used to Focus the Inspection Program on Issues Important to Safety
- The Significance Determination Process (SDP) Developed to Assess the Safety Significance of Inspection Findings to Determine the Appropriate Regulatory Response



Performance Indicators in the Seven Cornerstones





PERFORMANCE INDICATOR PROGRAM CHALLENGES

- Development and Implementation of the Mitigation System Performance Index (MSPI)
- Frequently asked question (FAQ) process
- Scram with loss of normal heat removal PI
- Reactor coolant system leakage PI



BASELINE INSPECTION PROGRAM

- Minimum Level of Inspections (Baseline) Conducted at All Plants Regardless of Performance.
- Three Basic Parts:
 - Inspection in Areas Which Performance Indicators Are Not Identified or Do Not Fully Cover a Cornerstone.
 - Performance Indicator Verification.
 - Problem Identification and Resolution Inspection
- Inspection Findings (not PIs) Must Involve a Licensee Performance Deficiency



Baseline Inspections Conducted in the Seven Cornerstones



- Adverse Weather
- Evaluation of Changes/Tests
- Equipment Alignment
- Fire Protection
- Heat Sink
- Inservice Inspection
- Licensed Operator Requalification
- Maintenance Rule Implementation
- Maintenance Rule Risk Assessment/Work Control
- Personnel Performance During Nonroutine Plant Evolutions
- Operability Evaluations
- Operator Workarounds
- Permanent Plant Modifications
- Post-Maintenance Testing
- Refueling & Outage Activities
- Safety System Design & Performance Capability**
- Surveillance Testing
- Temporary Plant Modifications
- PI Verification
- Identification and Resolution of Problems
- Event Follow-up

- Exercise Evaluation
- Alert and Notification System
- Emergency Response Organization
- Emergency Action And Plans
- Emergency Preparedness
- Drill Evaluation

- Occupational Radiation Control
- Access Control
- Radiation Monitoring
- Instrumentation
- Public Radiation Safety
- Radiation Effluents Treatment
- Radiation Transportation
- Environmental Monitoring

- Security Access Authorization
- Security Search
- Security Response
- Security Plan Change

* Physical Protection Inspections is not publicly available and the associated inspection findings are not integrated into the Action Matrix Summary.



OTHER INSPECTIONS

- Supplemental Inspections as Required for Declining Performance
- Event Response or Degraded Condition Inspections When Necessary (Special Inspections (SIs); Augmented Inspection Team (AITs); Incident Investigation Team (IITs))
- Inspections When Needed for Resolution of Generic Issues (e.g., Temporary Instructions).



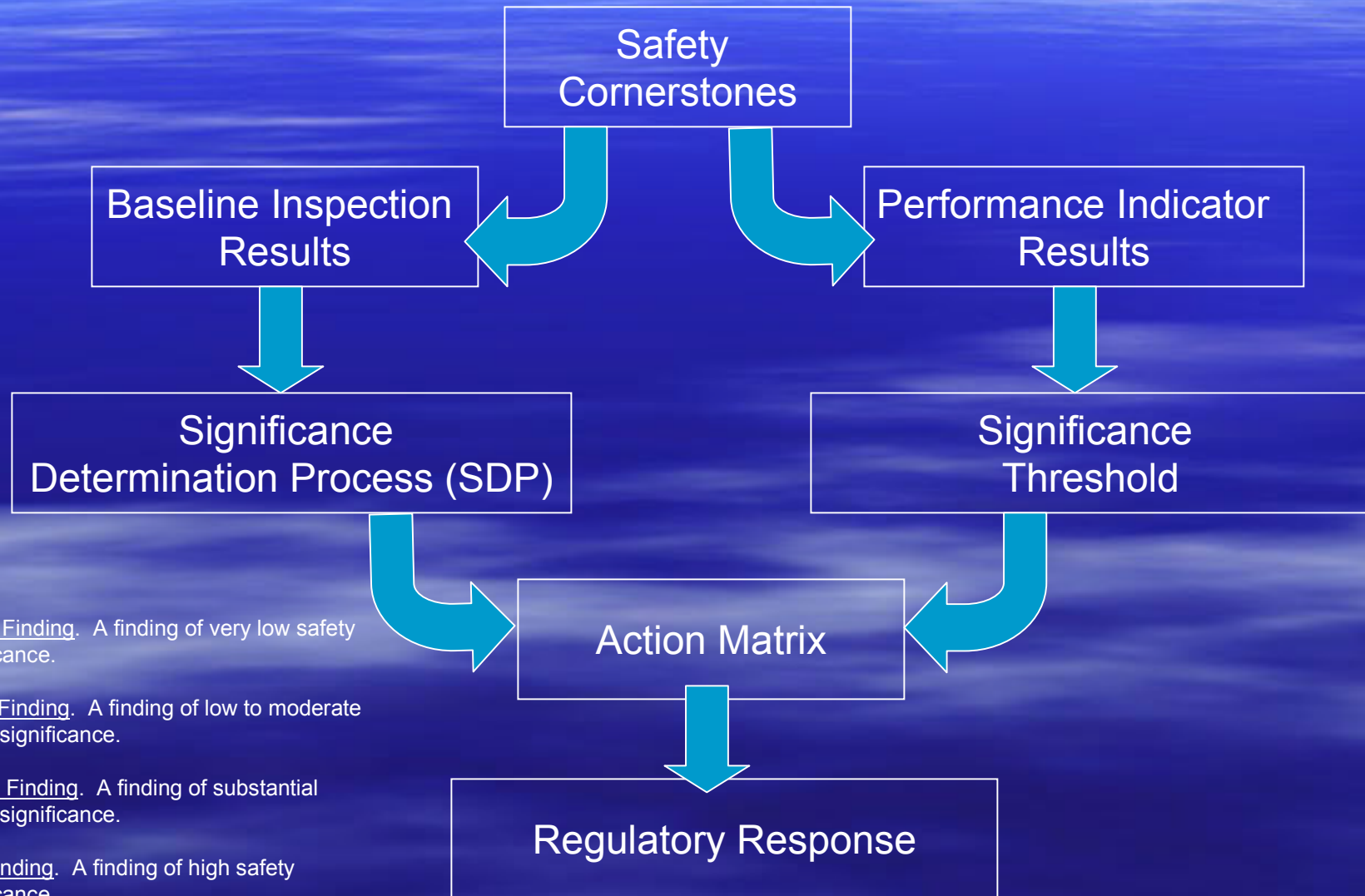
BASELINE INSPECTION PROGRAM CHALLENGES

- Response to Office of Inspector General's audit of baseline inspection program – in progress
- Fire Protection Inspection guidance (under development for NFPA 805, associated circuits, and manual actions)
- Revision of Inspection Program in response to Davis-Besse Lessons Learned Task Force Recommendations
- Improving Engineering Team Inspections



Determining Safety Significance

Strategic Performance Areas



Green Finding. A finding of very low safety significance.

White Finding. A finding of low to moderate safety significance.

Yellow Finding. A finding of substantial safety significance.

Red Finding. A finding of high safety significance.



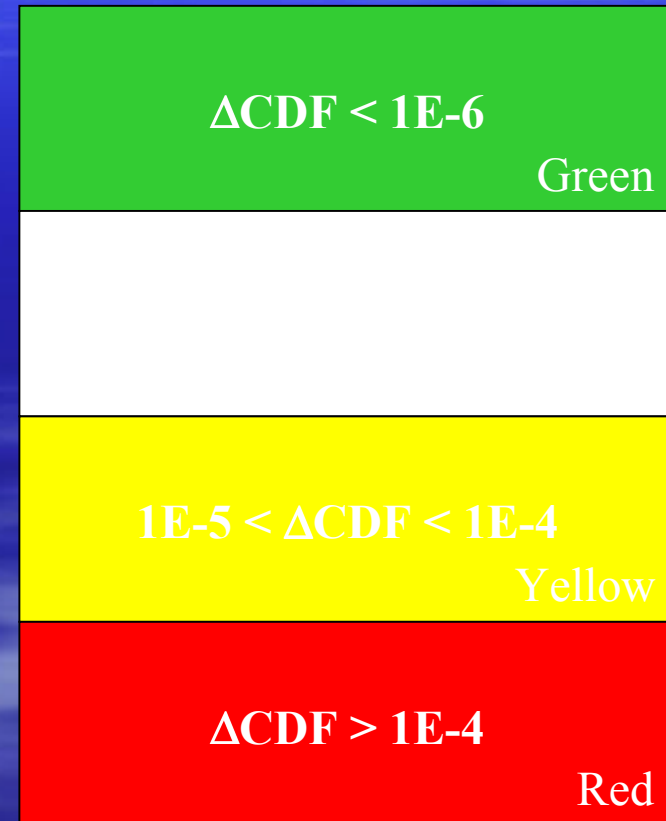
SIGNIFICANCE DETERMINATION PROCESS

- Characterizes the Significance of an Inspection Findings Using Three Phases
- Provides a Framework for Communicating the Potential Significance of Inspection Findings.
- Provides a Basis for Assessment of Licensee Performance and Enforcement Actions Associated with an Inspection Finding
- SDPs for Reactor Safety for Full Power and for Shutdown, Containment Integrity (LERF), and Fire Protection are Based on PSA models
- Other SDPs are Deterministic in Nature (e.g., Operator requalification issues)



LEVEL OF SIGNIFICANCE ASSOCIATED WITH PERFORMANCE INDICATORS AND INSPECTION FINDINGS

- Green - very low risk significance – baseline inspection
- White - low to moderate risk significance – supplemental inspection (95001)
- Yellow - substantive risk significance – supplemental inspection (95002)
- Red - high risk significance – supplemental inspection (95003)



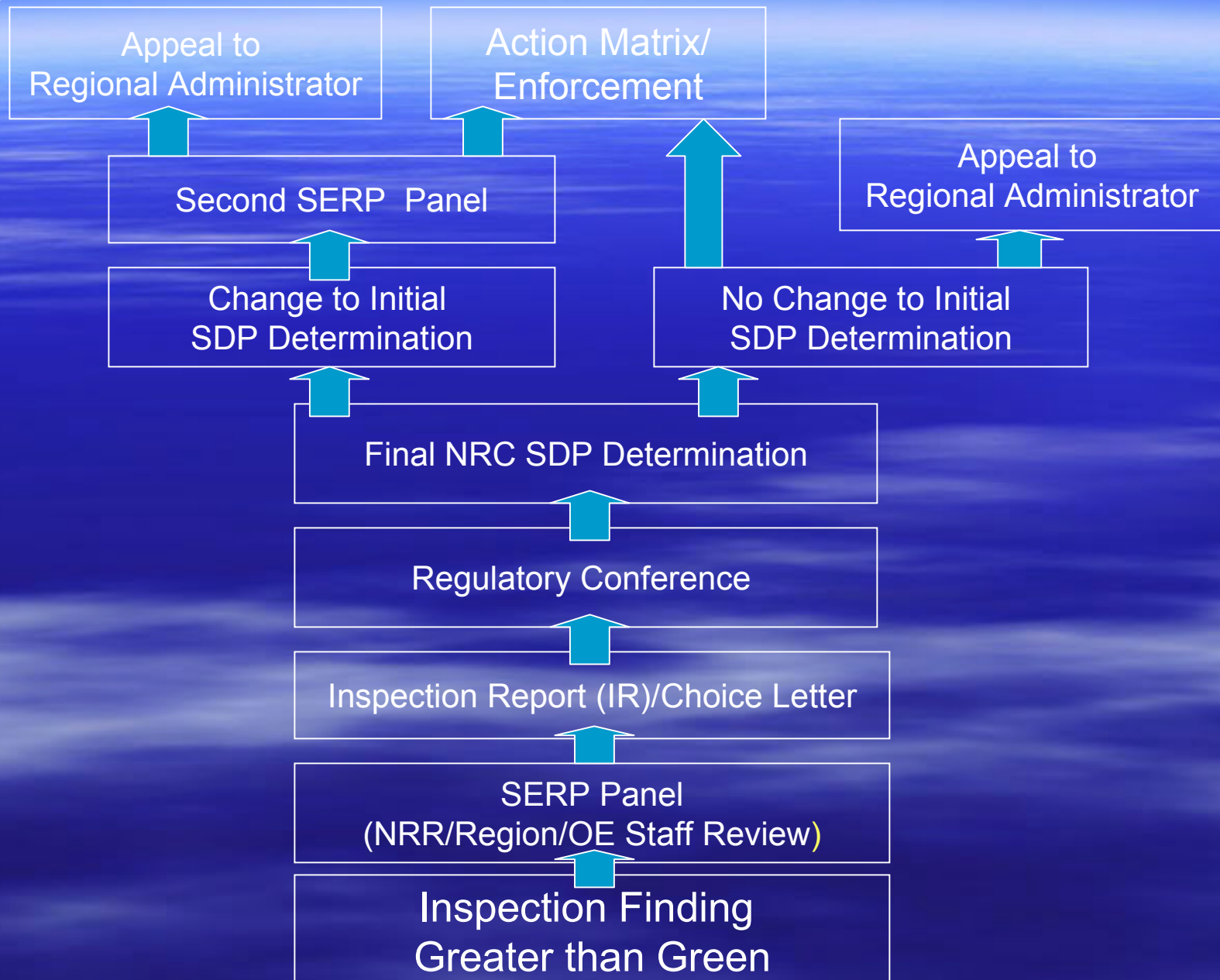


GREEN INSPECTION FINDINGS

- Safety Significance Is Very Low and Does Not Generally Warrant Further NRC Attention.
- Green Findings are Within the “Licensee Response Band.”
- Licensees Are Still Required to Return to Compliance with the Regulation and Their License Commitments.



Inspection Finding Flowchart For Greater than Green Findings





ASSESSMENT

- Performance Indicators and Inspection Findings Combine for an Overall Assessment of Plant Performance
- Action Matrix Used to Assess Performance and Determine Regulatory Actions
- Mid-Cycle and End of Cycle Assessments Performed for Each Licensee



ACTION MATRIX CONCEPT

Licensee Response	Regulatory Response	Degraded Cornerstone	Multiple/Rep. Degraded Cornerstone	Unacceptable Performance
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Increasing Safety Significance

Increasing NRC Inspection Efforts

Increasing NRC/Licensee Management Involvement

Increasing Regulatory Actions



ACTION MATRIX

		Licensee Response Column	Regulatory Response Column	Degraded Cornerstone Column	Multiple Repetitive Degraded Cornerstone Column	Unacceptable Performance Column
Response	Results	All assessment inputs (performance Indicators (PI) and inspection findings) Green; cornerstone objectives fully met	One or two White inputs (in different cornerstones) in a strategic performance area; Cornerstone objectives fully met	One degraded cornerstone (2 White inputs or 1 Yellow input) or any 3 White inputs in a strategic performance area; cornerstone objectives met with minimal reduction in safety margin	Repetitive degraded cornerstone, multiple degraded cornerstones, multiple Yellow inputs, or 1 Red input ¹ ; cornerstone objectives met with longstanding issues or significant reduction in safety margin	Overall unacceptable performance; plants not permitted to operate within this band, unacceptable margin to safety
	Regulatory Conference	Routine Senior Resident Inspector (SRI) interaction	Branch Chief (BC) or Division Director (DD) meet with Licensee	DD or Regional Administrator (RA) meet with Licensee	EDO (or Commission) meet with Senior Licensee Management	Commission meeting with Senior Licensee Management
	Licensee Action	Licensee Corrective Action	Licensee corrective action with NRC oversight	Licensee self assessment with NRC oversight	Licensee performance improvement plan with NRC oversight	
	NRC Inspection	Risk-informed baseline inspection program	Baseline and supplemental inspection 95001	Baseline and supplemental inspection 95002	Baseline and supplemental inspection 95003	
Communications	Regulatory Actions	None	Document response to degrading area in assessment letter	Document response to degrading condition in assessment letter	10 CFR 2.204 DFI 10 CFR 50.54(f) letter CAL/Order	Order to modify, suspend, or revoke licensed activities
	Assessment Report	BC or DD review / sign assessment report (w/ inspection plan)	DD review / sign assessment report (w/ inspection plan)	RA review / sign assessment report (w/ inspection plan)	RA review / sign assessment report (w/ inspection plan) Commission informed	
	Public Assessment Meeting	SRI or BC meet with Licensee	BC or DD meet with Licensee	RA discuss performance with Licensee	EDO (or Commission) discuss performance with Senior Licensee Management	Commission meeting with Senior Licensee Management
Increasing Safety Significance →						

¹ It is expected in a few limited situations that an inspection finding of this significance will be identified that is not indicative of overall licensee performance. The staff will consider treating these inspection findings as exceptions for the purpose of determining appropriate actions.



Agency Action Review Meeting

- Annual Meeting Held with NRC Executive Management to Discuss Plants in Columns 4 and 5 of the Action Matrix
- Meeting is a Confirmatory Review of the Action Matrix Results
- Major Discussion Items Include:
 - Reactor Plant Performance and Review of NRC Actions
 - Reactor Oversight Process Self-Assessment
 - Analysis of Reactor Industry Trends
 - Discussion of Fuel Cycle and Other Material Facilities



ASSESSMENT CHALLENGES

- Develop Additional Guidance for Closing Inspection Findings at Multiple or Repetitive Degraded Cornerstone Plants
- Assessment of Substantive Cross-Cutting Issues
- Standardize the Assessment Process for Action Matrix Deviations



ENFORCEMENT OVERVIEW

Violations are Divided into Two Groups:

- 1 - Violations That Can Be Assessed by the SDP.
- 2 - Violations Subject to Traditional Enforcement Process.



SDP ASSESSED VIOLATIONS

- SDP Characterizes Risk Associated with Violation
- Low Risk Significant Violations Will Be Non-Cited and Entered into Licensee's Corrective Action Program
- Higher Risk Significant Violations Will Be Subject to Requirements of Action Matrix.

Green

White

Yellow

Red

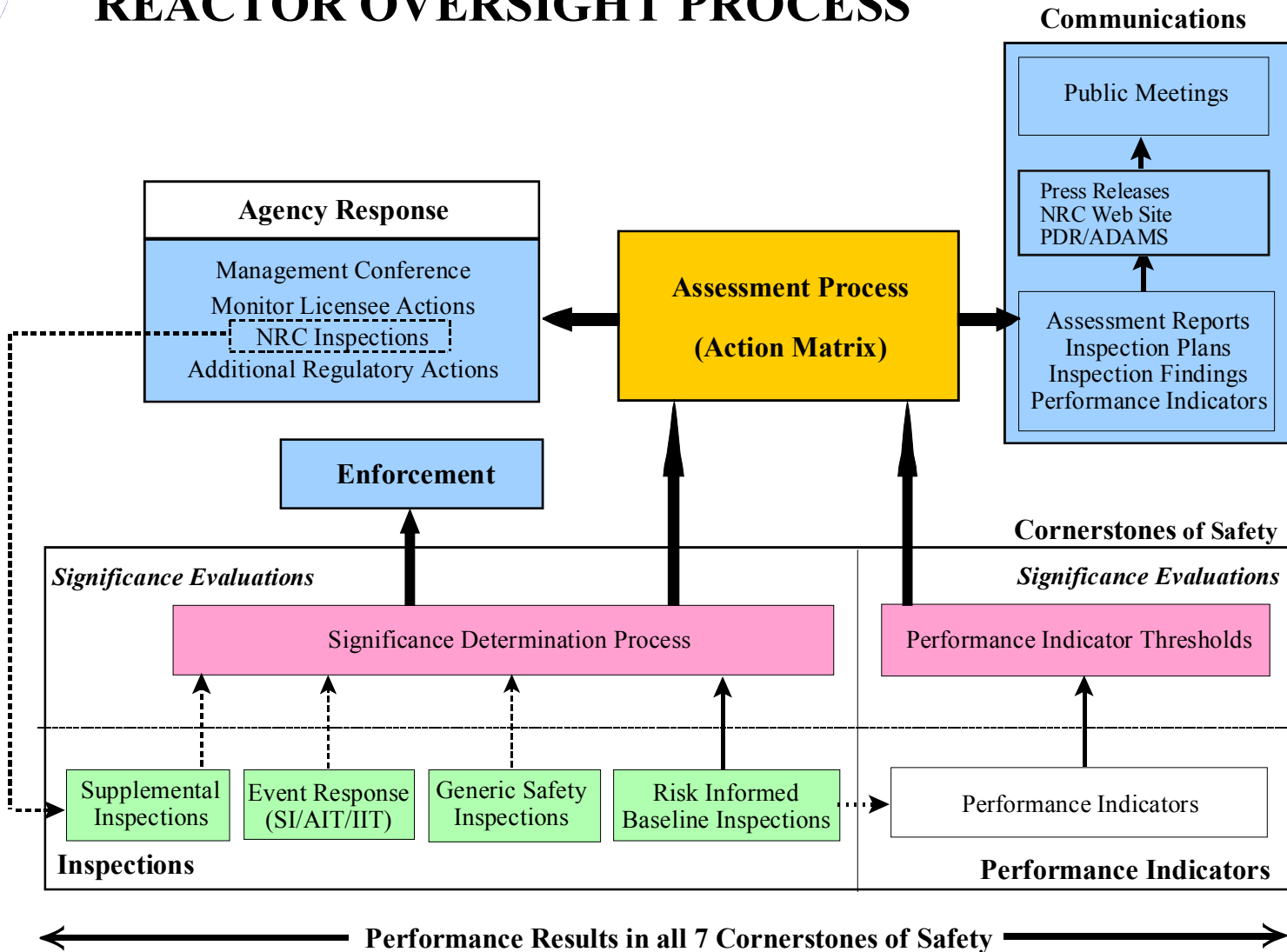


TRADITIONAL ENFORCEMENT ACTIONS

- Willfulness Including Discrimination.
- Actions That May Impact NRC's Ability for Oversight of Licensee's Activities.
- Actual Consequences Such as an Overexposure to Public or Plant Personnel or a Substantial Release of Radioactive Material.

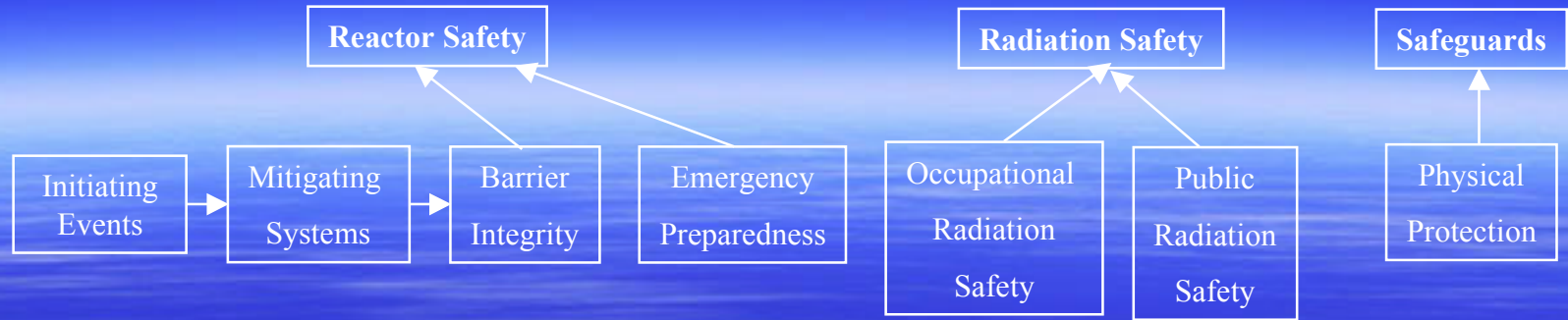


REACTOR OVERSIGHT PROCESS





Web Page - Plant Performance Summary



Performance Indicators Based on data through November 30, 1999

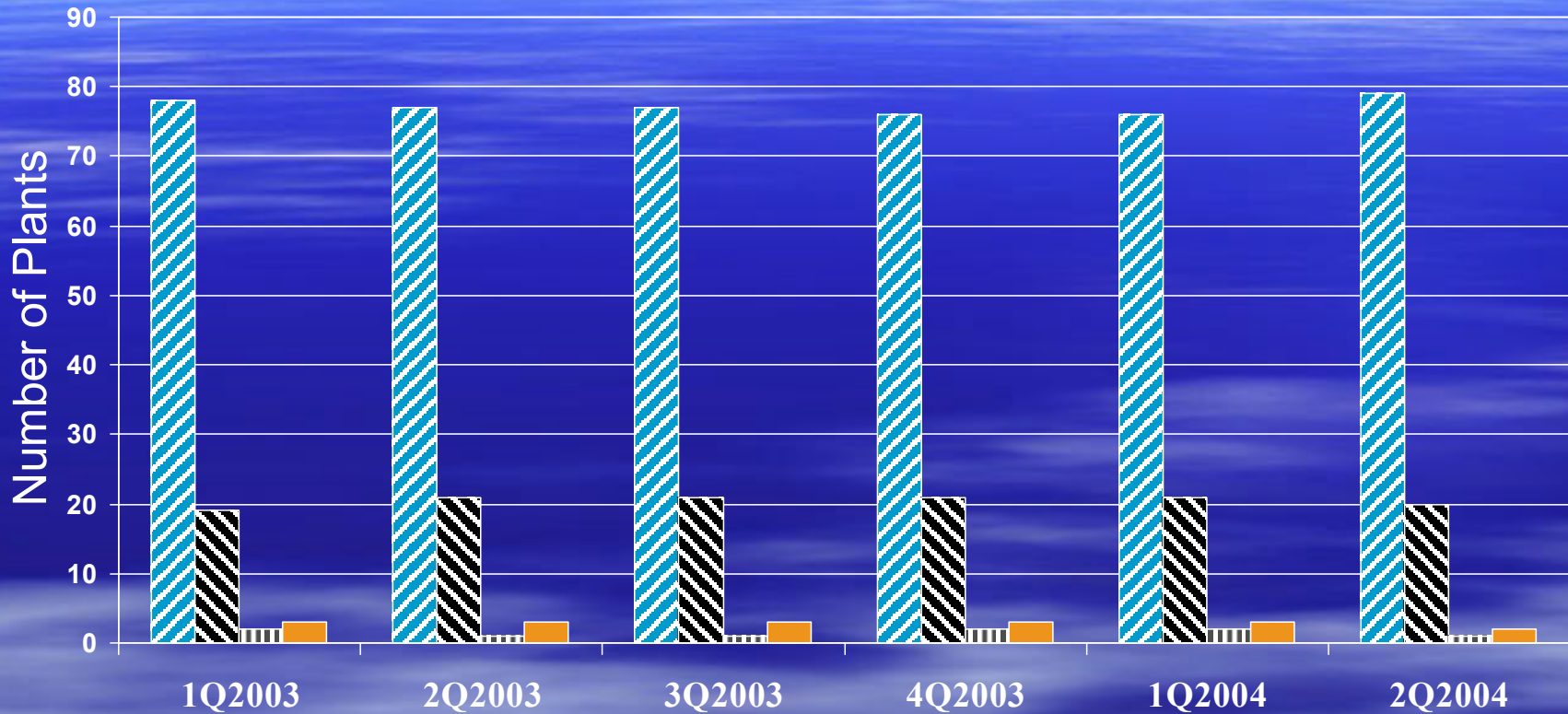
Unplanned Scrams	Emergency AC Power System Unavailability	Reactor Coolant System Specific Activity	Drill/Exercise Performance	Occupational Exposure Control Effectiveness	RETS/ODCM Radiological Effluents	Protected Area Equipment
Scrams with Loss of Normal Heat Removal	High Pressure Injection System Unavailability	Reactor Coolant System Leakage	ERO Drill Participation			Personnel Screening Program
Unplanned Power Change	Heat Removal System Unavailability		Alert and Notification System			FFD/Personnel Reliability Program
	Residual Heat Removal System Unavailability					
	Safety System Functional Failure					
<i>Initiating Events</i>	<i>Mitigating Systems</i>	<i>Barrier Integrity</i>	<i>Emergency Preparedness</i>	<i>Occupational Radiation Safety</i>	<i>Public Radiation Safety</i>	<i>Physical Protection</i>

Most Significant Inspection Findings





3Q/1999	No findings this quarter	Green	No findings this quarter	No findings this quarter	Green	No findings this quarter	No findings this quarter
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Assessment Action Matrix Results



Davis-Besse is under IMC-0350 process and is therefore not reflected in the Action Matrix

-  Licensee Response Column
-  Regulatory Response Column
-  Degraded Cornerstone Column
-  Multiple/Repetitive Degraded Cornerstone Column



Resources By Region:

	<u>Region I</u>	<u>Region II</u>	<u>Region III</u>	<u>Region IV</u>
Resident Inspectors	37	40	31	27
Region-Based Inspectors	73	68	69	53
Total:	110	108	100	80



Total Staff Effort Expended to Conduct Inspections at Operating Power Reactors

	<u>Initial ROP Implementation</u> <u>4/2/00-4/1/01</u>	<u>FY2001 Implementation</u> <u>9/24/00-9/22/01</u>	<u>FY2002</u> <u>9/23/01-9/21/02</u>	<u>FY 2003</u> <u>9/29/02-9/27/03</u>
Total Staff Effort (hours)	376,734 hrs.	370,579 hrs.	335,204 hrs	357,661 hrs
Total Staff Effort/Operating Site	5,623 hrs/site	5,531 hrs/site	5,003 hrs/site	5,338 hrs/site
*Total Staff Effort/Operating Site	4.3 person-year/site	4.3 person-year/site	3.84 person-year/site	4.1 person-year/site

* Using 1300 hrs/FTE conversion rate



REACTOR OVERSIGHT PROCESS (ROP)

QUESTIONS