U.S.NRC
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Protecting People and the Environment

Risk Assessment Tools and Processes in Operational Decision-Making:

An NRR Perspective – RIC 2007

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Presentation Outline

- Risk assessment tools and guidance
- Operational decision-making processes that use NRC risk assessment tools
- Obstacles in analysis and decision-making

Risk Assessment Tools and Guidance

(some primary sources that NRR staff use)

- SDP Phase 2 Notebooks with pre-solved cases (71 plant-specific notebooks, benchmarked twice)
- SPAR models with associated documentation
- EPRI Risk & Reliability Workstation
- Risk assessment standardization project (RASP) handbook
- NUREG/CR 6883, The SPAR-H Human Reliability Analysis Method
- NUREG-1792 Good Practices for Implementing HRA
- NUREG/CR-6823 Handbook of Parameter Estimation for PRA
- NUREG/CR-6928 Industry Average Performance for Components & Initiating Events at U.S. Commercial Nuclear Power Plants
- NUREG/CR-6850 and IMC609 Appendix F (fire risk assessments)
- Regulatory Guide 1.200 and associated ASME PRA standard
- Regulatory Guide 1.174 – risk-informed decision-making principles (e.g., defense-in-depth)
- Available plant-specific information and information from OpE (NRC's operating experience program)

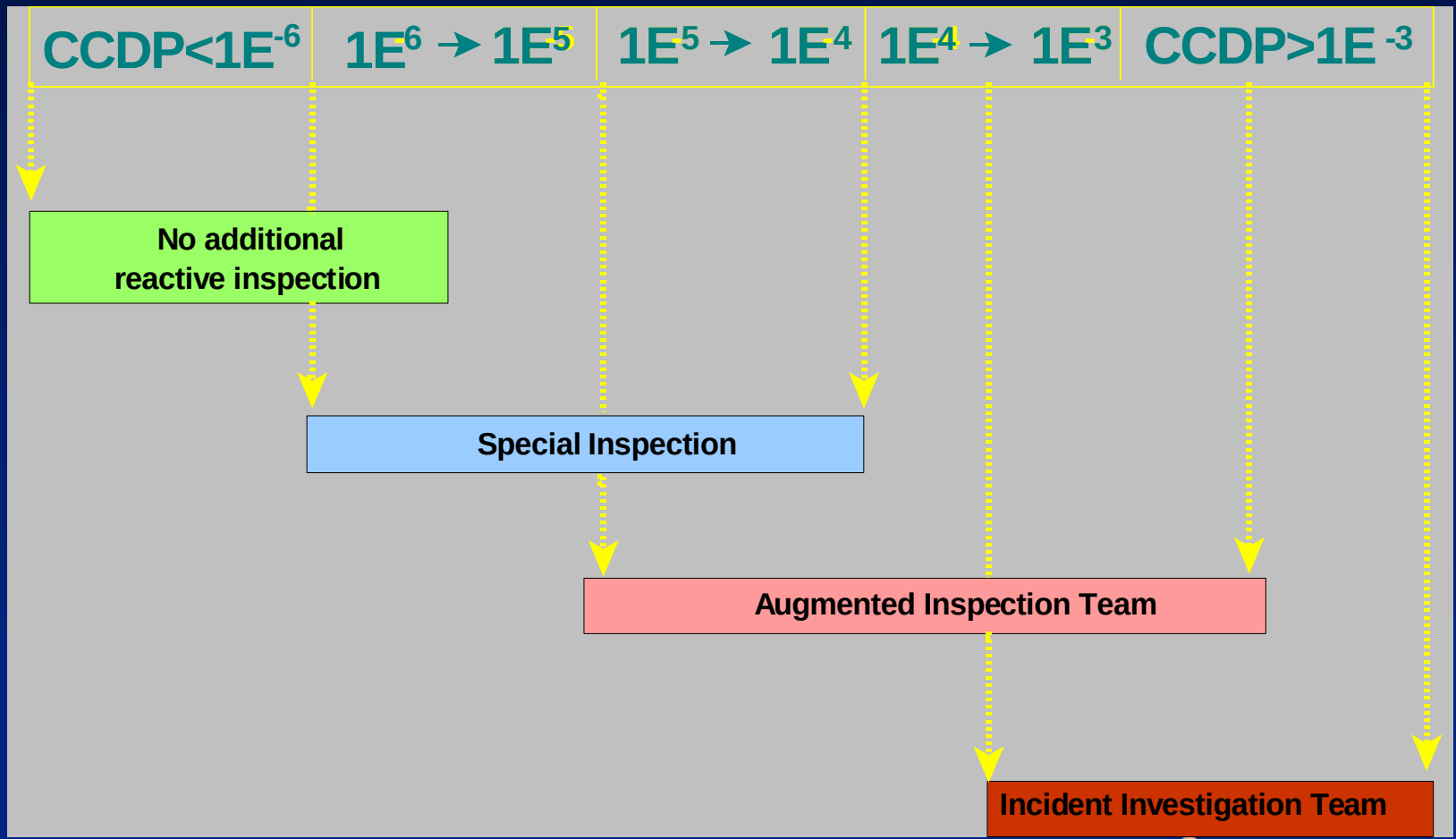
Risk-Informed Operational Decision-Making Processes

- Reactive inspections in response to events or conditions (Management Directive 8.3/IMC309)
- Significance Determination Process (IMC308 and 609)
- Notices of Enforcement Discretion requests (Regulatory Issue Summary 2005-001)
- Emergent and potentially significant safety issues (LIC-504)

Reactive Inspections

- NRR involved in Management Directive 8.3/IMC309 risk evaluations
- Deterministic criteria evaluated first
- Risk assessment to assist decision in level of agency response
- SPAR is the primary tool for at-power situations
- IMC-609 Appendix G & H tool used for shutdown assessment, SPAR low power & shutdown models used only if available (11 plant models)

Graded Event Response vs. Conditional Core Damage Probability (CCDP)



Specialized SDP Phase 3 Disciplines that use at-power SPAR Models and SDP Notebooks Information

- Customized shutdown risk models created as needed (e.g., Turkey Point and Columbia loss of RHR events)

- Fire protection risk assessments (e.g., North Anna and Ginna)

Process for SDP Phase 3 in Specialized Disciplines (NRR Analyses)

- Small team of PRA practitioners and senior reactor analysts (NRR and Regional members)
- Team visits site for 1 to 2 days to collect information, conduct interviews, walk-down plant equipment including main control room or simulator
- Customized event trees that borrow from at-power SPAR model as appropriate and with modifications
- Risk analysis receives a multi-party peer review
- Report issued to Regional office
- Significance & Enforcement Review Panel (SERP) convened if risk above 1E-6 for delta CDF or 1E-7 for delta LERF
- All communications between NRC and licensee go through the Regional office

Obstacles in Analysis & Decision-Making – from SDP Arena

- Risk-based versus risk-informed decisions
- Lack of meaningful discussion of PRA model uncertainties
- Engineering assumptions driving the PRA results (e.g., degraded equipment issues)
- Over reliance on special tests and analysis to demonstrate equipment survival
- Lack of definition of 'best available information'
- Licensee use of newly issued industry studies that have not been submitted for NRC review
- Use of MCR simulator runs after performance deficiency discovery – confusion between feasibility versus human reliability in modeling of operator actions
- Credit for maintenance repair recovery for specific failure mechanisms of equipment
- Less than adequate consideration of previous NRC work on generic issue
- Lack of available expertise (e.g., shutdown risk assessment)
- Disproportionate time & effort conducting risk assessments for issues that are not likely to be greater-than-white
- Communications: internal and external to NRC