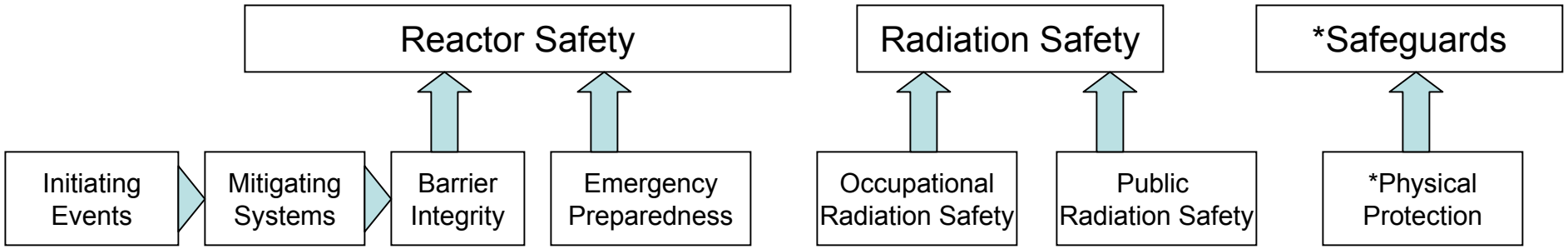
Risk Insights for Inspection Planning

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

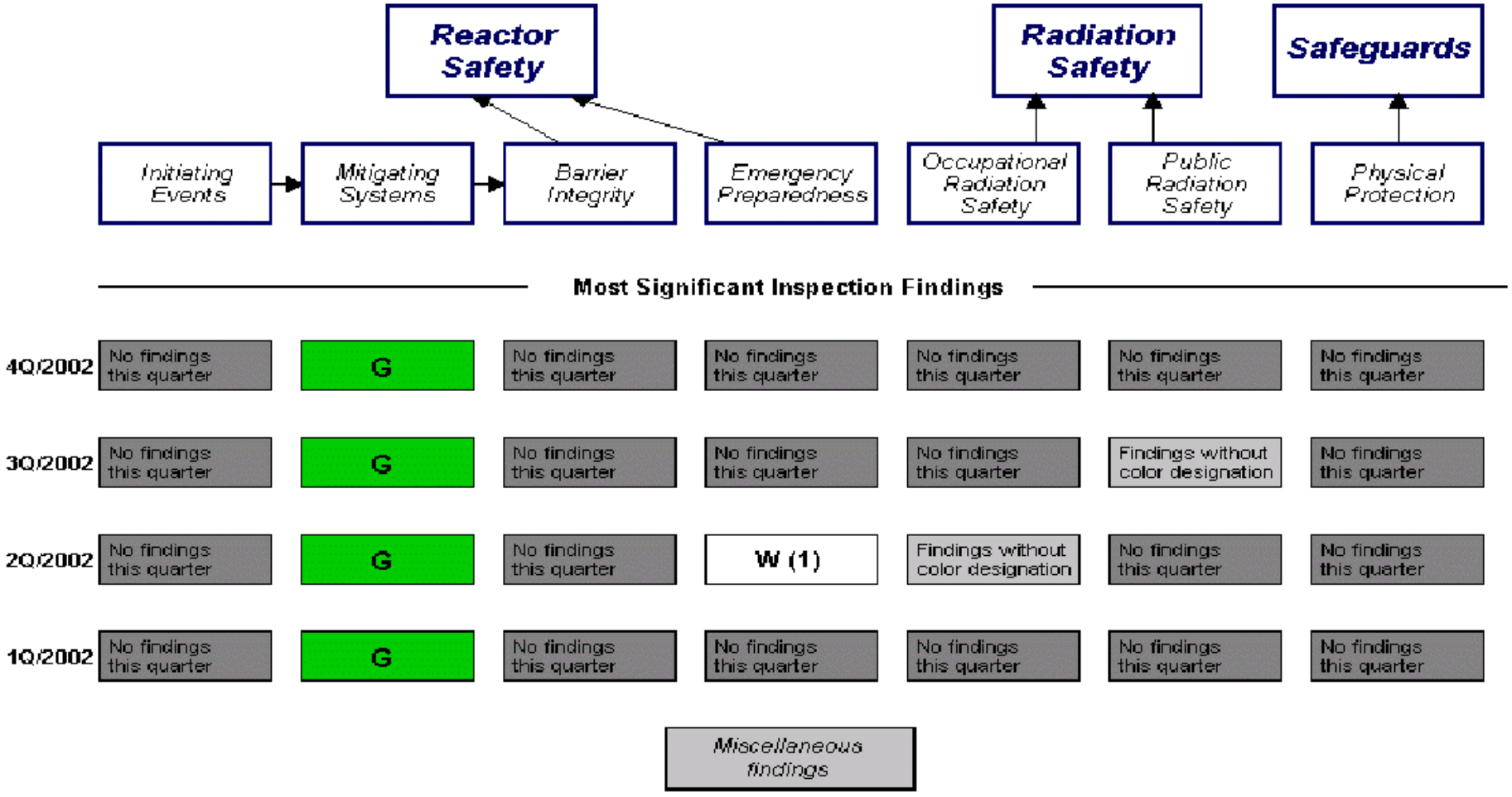
Security Access Authorization
Security Search
Security Response
Security Plan Change

* Physical Protection Inspections are currently being revised to address new security requirements post 9/11

Examples of Baseline Inspections

- Performance Indicator Verification
- Resident Baseline Inspections
  - Fire Protection
  - Maintenance and Surveillance
  - Operability Evaluation
- Region Led Baseline Inspections
  - Team Inspections
    - Problem Identification and Resolution (PI&R)
  - Emergency Planning
  - Operator Training
  - Security
  - Radiological Controls

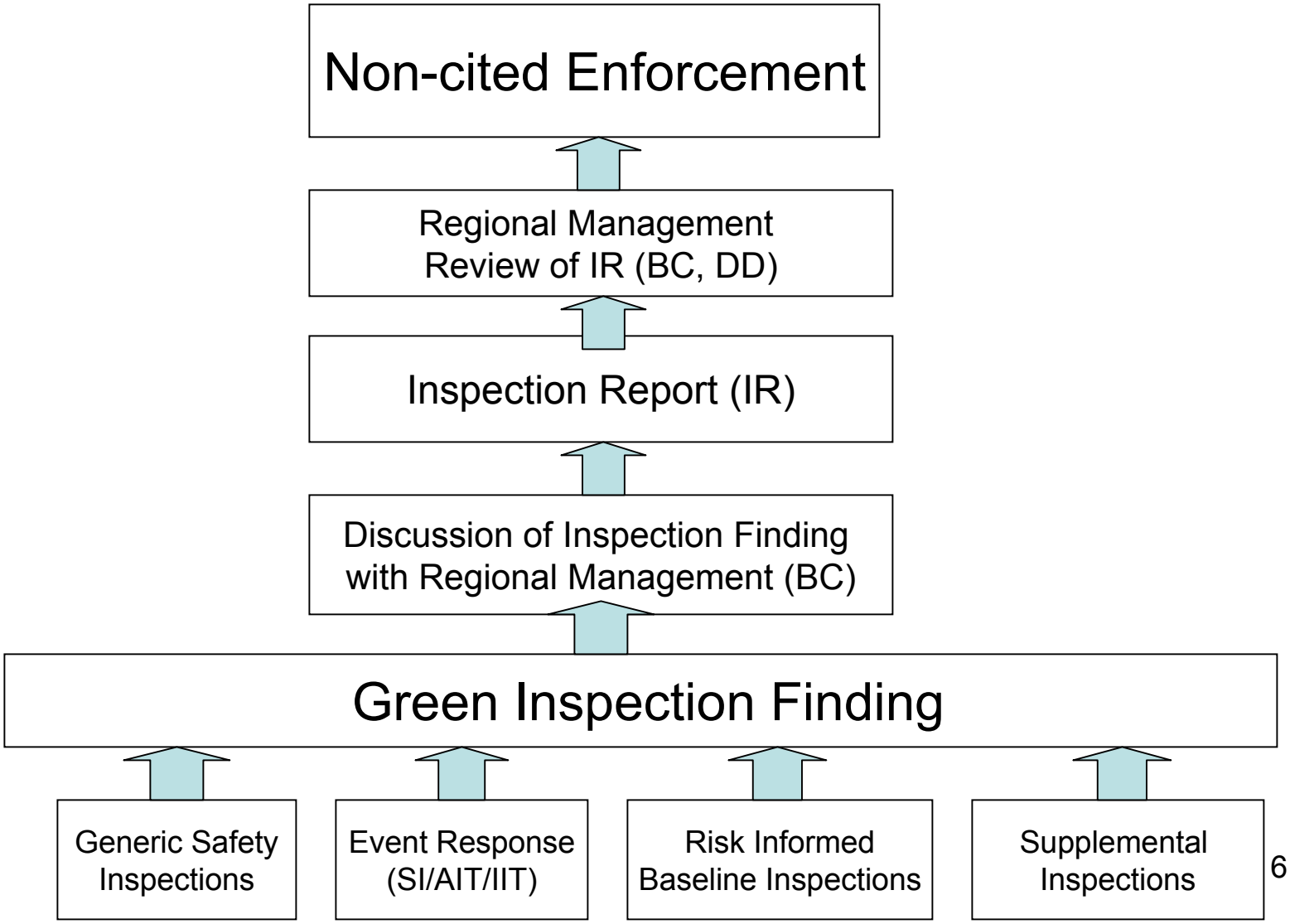
Inspection Results



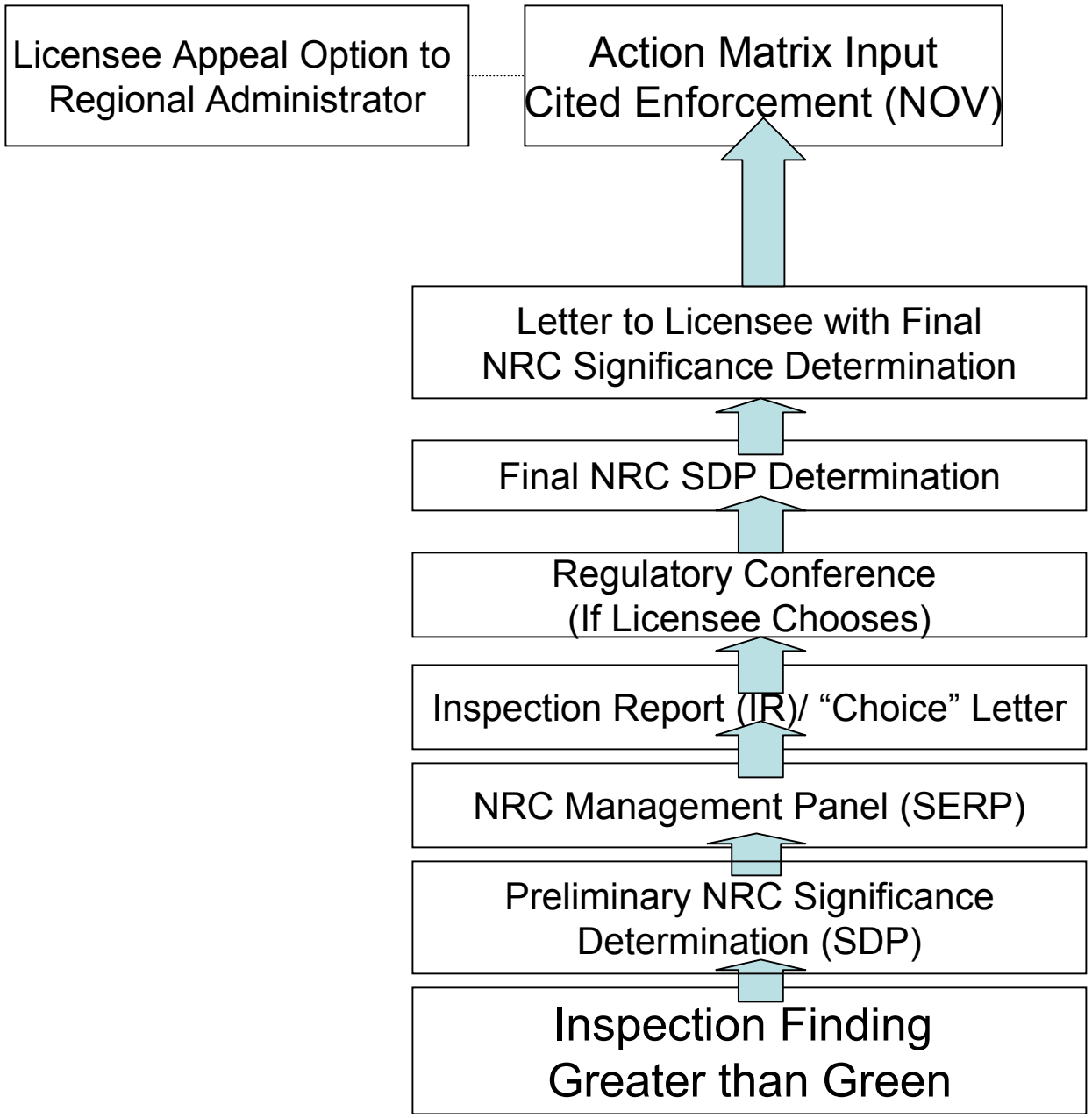
Methods to Oversee Inspection Program

- Management visits to sites
- NRR review of regional inspection reports
- Regional peer reviews of inspection reports
- Managers attending inspection exit meetings
- Debrief sessions with inspectors
- Periodic all hands inspector counterpart meetings

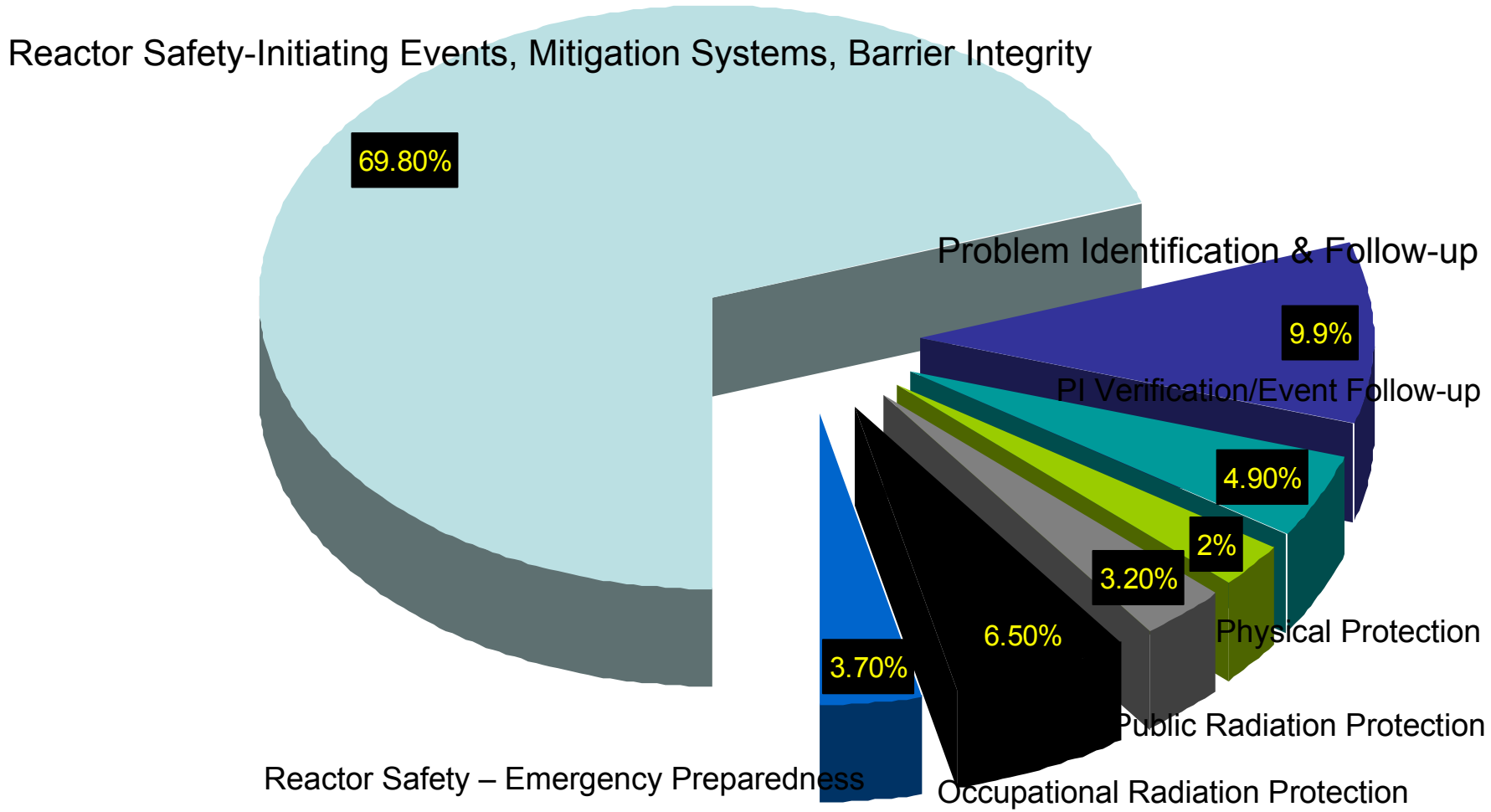
Inspection Finding Flowchart for Green (Very Low Significance) Findings



Inspection Finding Flowchart For Greater than Green Findings



Distribution of Direct Inspection Hours by Cornerstone (FY 2002)



Inspection Program Challenges

- Effectiveness of early communication on event response actions
- NRC communication of cross-cutting area issues
- Effectiveness of NRC inspections of licensee corrective action programs (Problem Identification and Resolution)
- Improving use of operating experience to guide inspections
- Improve auditing of the documentation of inspection findings
- Revise physical protection cornerstone inspection procedure
- Continue evolutionary improvements, including using lessons learned, while meeting ROP objectives

National Summary

Performance Indicator Results (at end of ROP Cycle 3)

- Green 1835
- White 5
- Yellow 0
- Red 0

Total Inspection Findings (ROP Cycle 3)

- Green 783
- White 30
- Yellow 1
- Red 2

National Summary of Plant Performance

• Licensee Response	56
• Regulatory Response	37
• Degraded Cornerstone	6
• Multiple/Repetitive Degraded Cornerstone	3
• Unacceptable	0
• Total Plants	102

*Davis-Besse is in the IMC 0350 process

NRC Conducts Safety Inspections

NRC Residence and Regional Inspectors Conduct A Baseline Inspection Program To Monitor Plant Safety Performance in Each of the Strategic Performance Areas

Baseline Inspection Program

- Minimum Level of Inspection 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
  - Licensee Problem Identification and Resolution Program

Baseline Inspection Program

Cornerstone Procedures

Problem Identification and Resolution Procedure

Performance Indicator Verification Procedure

Event Follow-up Procedure

EVENT/CONDITION RISK ANALYSIS

Important NRC Programs

- NRC Event Response/Followup
- Significance Determination Process (SDP) in the NRC Revised Oversight Process
- RES Accident Sequence Precursor (ASP) Program

EVENT/CONDITION RISK ANALYSIS

Initiating Event vs Plant Condition

- Initiating Events
  - Short Term (within days of the event)
    - Event Response Procedure
  - Long Term
    - Refined risk analysis (NRR)
    - ASP (RES)
  - Performance Indicator

- Conditions
  - Short Term
    - SDP (conditions associated with plant performance)
  - Long Term
    - ASP (RES)
  - Maintenance Rule and Performance Indicator

DETERMINISTIC CRITERIA FOR GRADED EVENT RESPONSE

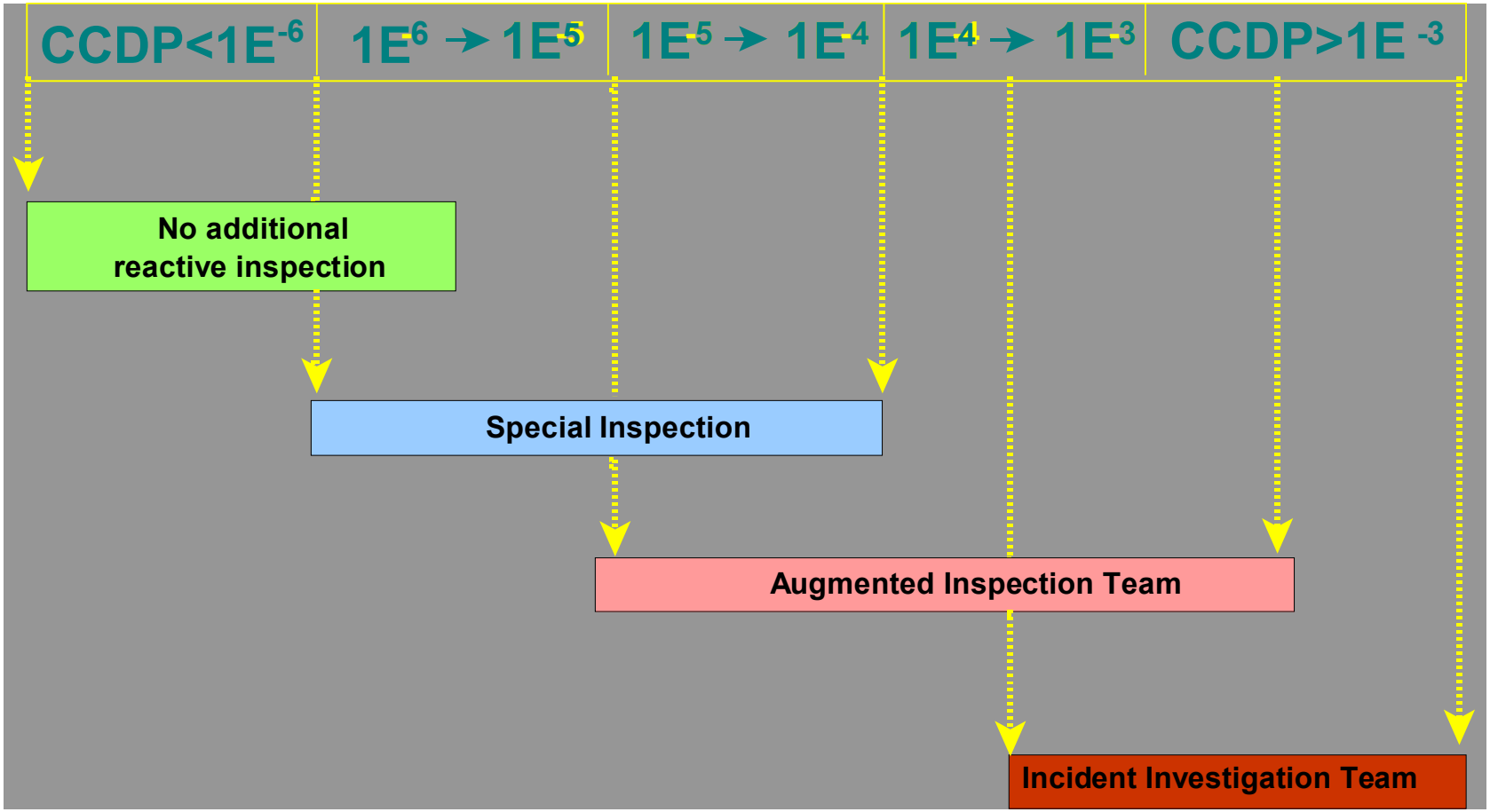
- Operations Exceed/not Included in Design Bases
- Major Deficiency in Design, Construction or Operation Having Potential Generic Safety Implications
- Significant Loss of Fuel Integrity, Primary Coolant Pressure Boundary, or Primary Containment Boundary
- Loss of Safety Function or Multiple Failures in Systems to Mitigate Event
- Possible Adverse Generic Implications
- Significant Unexpected System Interactions
- Repetitive Failures/Events Involving Safety-Related Equipment or Operations Deficiencies
- Concerns with Licensee Operational Performance

EVENT RISK ANALYSIS

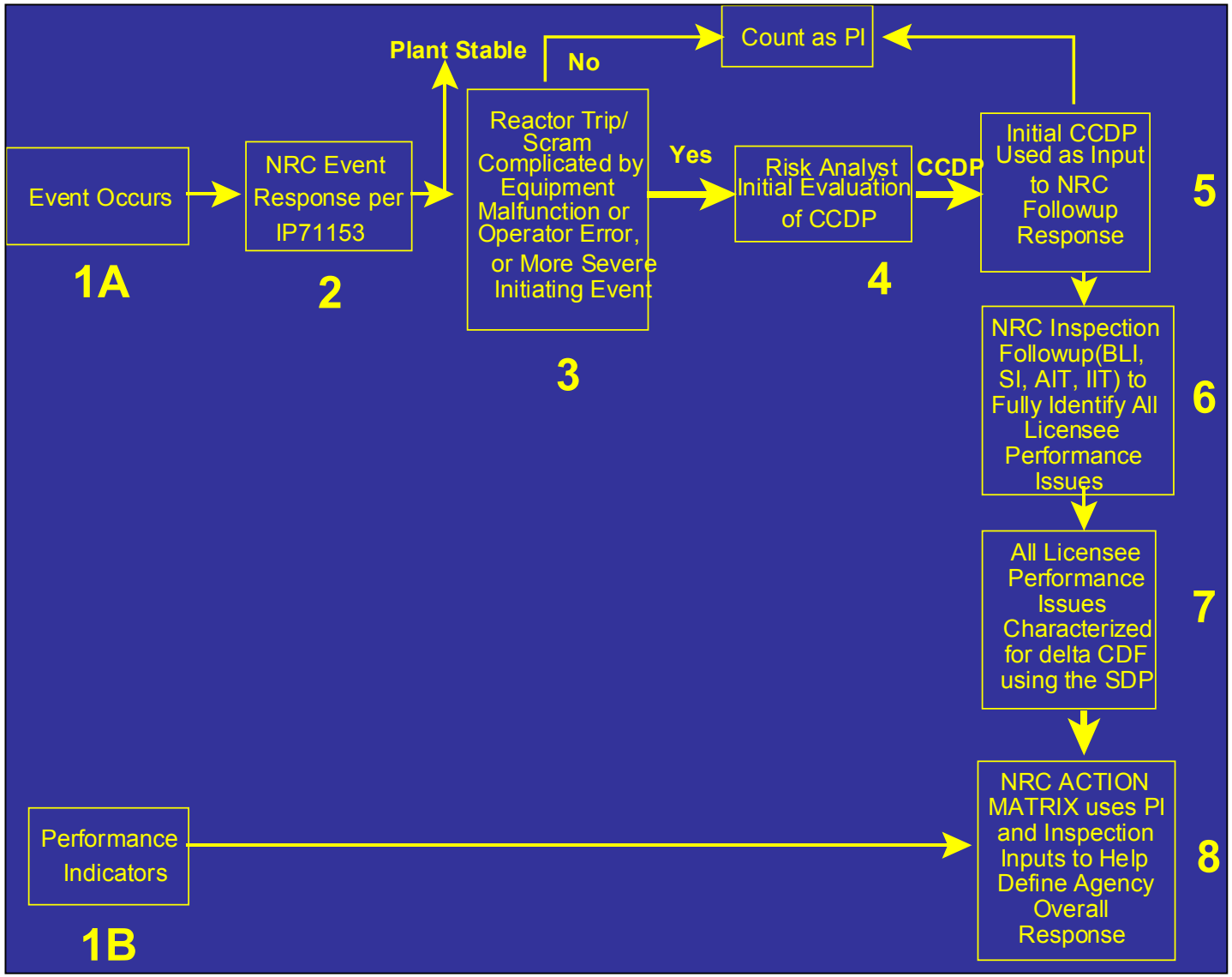
Event Response: Management Directive 8.3

- Quickly Determine Risk Significance of Actual Events that Occurred and Provide a Risk Input for Appropriate NRC Response
- Tools Used
  - Standardized Plant Analysis of Risk (SPAR) Models
  - Quantative and Qualitative Risk Insights from Previous Studies
  - Licensee's Plant-Specific PRA Results, if Available
- Risk Metrics Used:
  - Conditional Core Damage Probability (CCDP)
  - Conditional Large Early Release Probability (CLERP), if necessary
- Risk Analysts from NRR, RES, and the Region Involved Cooperatively for Consensus ("One Voice") Risk Input

GRADED EVENT RESPONSE VS. CONDITIONAL CORE DAMAGE PROBABILITY (CCDP)



Event Response Logic



THE RES ACCIDENT SEQUENCE PRECURSOR (ASP) PROGRAM

Long Term Event/Condition Risk Analysis

- Systematic Independent Review and Evaluation of Operational Events or Conditions that have Occurred
- To Provide a Safety Significance Perspective of Nuclear Power Plant Operational Experience
- Tools Used: SPAR Models, Modified as needed, and Simplified Event Trees for Events that SPAR Models are not Suitable
- Information Source: LERs, Inspection Reports, and etc.
- Risk Metrics Used: CCDP and CLERP
- Results Published Annually in NUREG/CR-4764

ASP Program Objectives

- Primary
  - Systematically Evaluate U. S. Nuclear Power Plant Operating Experience to Identify, Document, and Rank Those Operating Events That Were Most Significant in Terms of the Potential for Inadequate Core Cooling and Core Damage (Precursors).

- Secondary
  - Categorize the Precursors for Plant-Specific and Generic Implications.
  - Provide a Measure That Can Be Used to Trend Nuclear Plant Core Damage Risk.
  - Provide a Partial Check on Pra-predicted Dominant Core Damage Scenarios.