
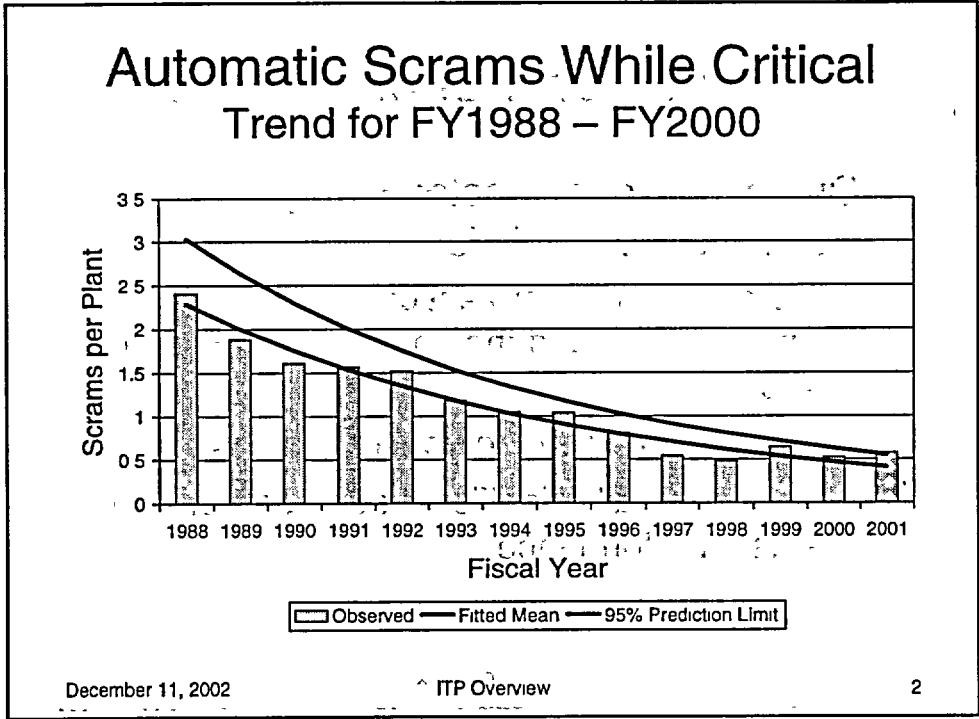


Industry Trends Program Overview



Thomas H. Boyce, NRR
Dale M. Rasmuson, RES
U.S. Nuclear Regulatory Commission

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Outline of Presentation

- Industry Trends Program (ITP)
- Current Performance Indicators
- Performance Indicator Characteristics
- Industry Initiating Event Indicator
- Industry Trend Thresholds

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Reactor Safety Performance Goals

- One of the four Reactor Safety Performance Goals is:
 - Maintain safety, protection of the environment, and the common defense and security
- One of the five performance measures is:
 - No statistically significant adverse trends in safety performance

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Industry Trends Program

- The ITP is designed to complement the Reactor Oversight Process (ROP)
- The purposes of the ITP are:
 - Provide additional assurance that the nuclear industry is maintaining the safety of nuclear reactors
 - Enhance stakeholder confidence in the efficacy of the NRC regulatory processes

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ITP Objectives

- Collect and monitor industry-wide data to assess whether the nuclear industry is maintaining safety performance of operating plants and to provide feedback to the ROP
- Assess the safety significance and causes of any statistically significant adverse trends
- Communicate industry-level information to Congress and other stakeholders

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Overall Objective

- Commission asked staff to develop “risk-based” thresholds for industry trends as soon as practical
- The purpose of this request is to replace the performance goal of “no statistically significant adverse industry trends” with one based on thresholds, (e.g., no more than one event per year identified as a significant precursor of a nuclear accident [CCDP > 10^{-3}])

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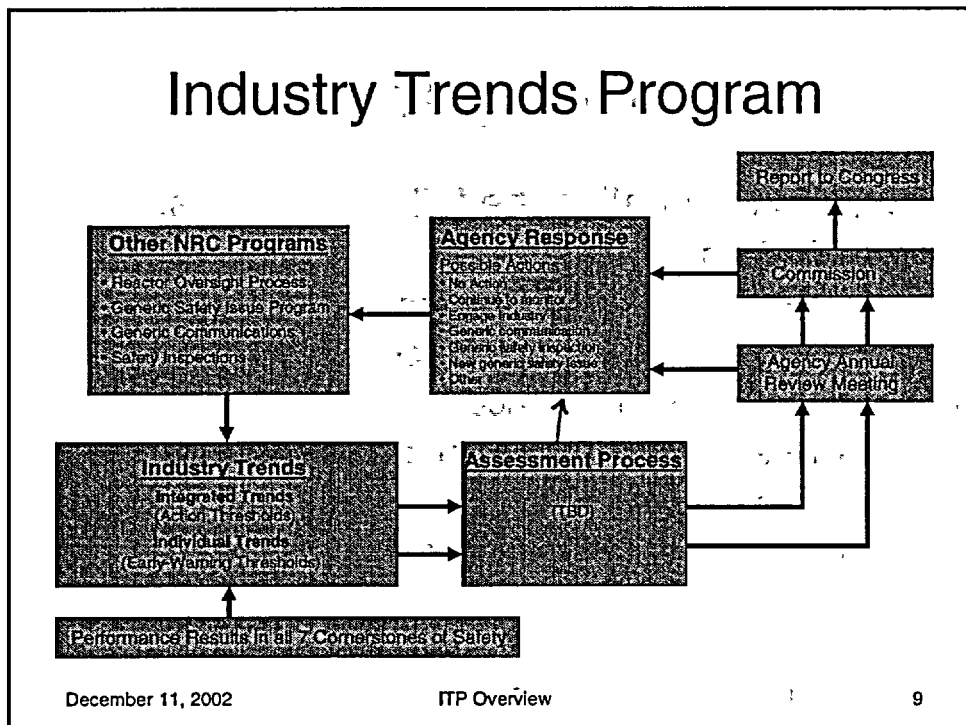
Kinds of Thresholds

- Action Threshold
 - Used to measure degrading industry performance, similar to thresholds used in ROP process
 - Used with the integrated indicator
- Early-Warning Threshold
 - Used to alert NRC to a change in individual industry trends that may indicate a degradation in industry safety performance
 - Used for individual initiating event trends in monitoring industry safety performance

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Performance Indicators

ROP Cornerstone	Ex-AEOD	ROP PIs	Other
Initiating Events	Automatic Scrams Significant Events	Unplanned Scrams Scrams with Loss of heat removal Unplanned power changes	ASP 15 Initiating Events
Mitigating Systems	Safety System Actuations Safety System Failures Equipment Forced Outages Forced Outage Rate	Unavailability of HPCI, HPCS, RCIC, EP, RHR (BWR) HPSI, AFW, EP, RHR (PWR)	
Barrier Integrity		RCS Activity RCS Leakage	
Emergency Preparedness		Drill/Exercise Performance ERO Drill Participation Alert and Notification System	
Occupational Radiation Safety		Occupational Exposure Control	
Public Radiation Protection	Collective Radiation Exposure	Radiological Effluents	
Safeguards		Personnel Screening Personnel Reliability	

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Industry Trends

- RES is updating the following trends:
 - Initiating Events
 - Common-Cause Failures
 - Accident Sequence Precursors
 - System Performance
 - Reactor Oversight Process PIs
 - Fire Events
 - Component Performance

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Indicator Characteristics

- Be used as performance measures in the annual performance report to Congress
- Are complementary to the plant-specific ROP
- Provide industry information for an ROP cornerstone
- Use industry data available from current NRC programs
- Are related to or tied closely to risk (e.g., CDF or Δ CDF)
- Utilize risk-informed measures for assessing their significance (e.g., safety goal, RG 1.174)

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Initiating Events for BWRs

- Loss of Offsite Power
- Loss of Vital AC Bus
- Loss of Vital DC Bus
- Small / Very Small LOCA
- Loss of Feedwater
- BWR General Transients
- BWR Loss of Instrument Air
- BWR Loss of Heat Sink
- BWR Stuck Open Relief/Safety Valve

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Initiating Events for PWRs

- Loss of Offsite Power
- Loss of Vital AC Bus
- Loss of Vital DC Bus
- Small / Very Small LOCA
- Loss of Feedwater
- PWR General Transients
- PWR Loss of Instrument Air
- PWR Loss of Heat Sink
- PWR Stuck Open Relief/Safety Valve
- Steam Generator Tube Rupture

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Integrated Initiating Event Indicator

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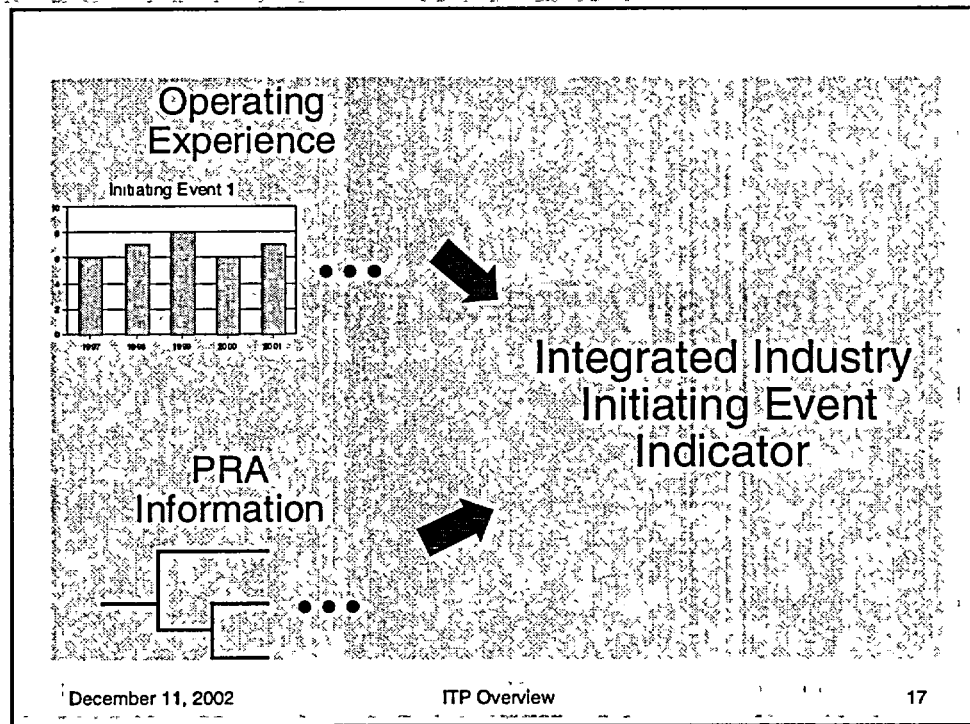
Philosophy

- Trending individual initiating events does not capture the risk importance
- Mitigating systems performance indicator (MSPI) has provided a way of combining risk information with operating experience
- MSPI approach can be used for initiating events

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What is the Integrated I.E. Indicator?

- The integrated industry indicator
 - Is average of the sum of the products of the current operating experience value for each initiating event and the appropriate risk weight obtained from PRAs
 - Is related to core damage frequency
 - Allows combined trending of frequent and infrequent events with different risk importances
- One indicator for BWRs and one for PWRs

Industry Trend Thresholds

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Threshold Characteristics

- Thresholds should have a rational basis that is well documented.
- Thresholds should be practical, that is, possible to determine and compare from data or other means with modest effort.
- Thresholds should be conceptually simple.
- Thresholds should be consistent with the existing regulatory framework.
- Thresholds should reflect risk (including associated uncertainties), safety, and regulatory perspectives.

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Plant-Specific Thresholds versus Industry Thresholds

- Combining plant-specific thresholds may not be meaningful for industry thresholds
 - Unplanned scram green/white threshold = 3 unplanned scrams per reactor
 - This implies an industry threshold of 300 unplanned scrams per year based on 100 reactors
- Industry thresholds must consider the industry performance as well as other factors
 - Industry unplanned scram average is about 0.6 scrams per reactor per year.

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Protocol for Setting Thresholds

- Develop risk and statistical information related to trends for input to an expert panel
- Provide associated safety and regulatory information for expert panel
- Expert panel sets thresholds based upon input and expert judgment

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Inputs for Expert Panel

- Start with values for the ROP indicators, values from risk-based performance indicator report, and/or risk insights from PRAs
- Assess current industry performance (e.g., trend, average)
- Estimate trend statistical characteristics (e.g., prediction intervals, Bayesian predictive distribution)
- Using these inputs pick a feasible value for the threshold
- Evaluate the threshold's risk implications using selected SPAR models, if appropriate
- Suggest threshold values based on principles from the threshold characteristics

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Thresholds for Integrated Indicator

- Thresholds may be set by an expert panel using the following considerations
 - Safety Goal
 - Regulatory Guide 1.174
 - Behavior of the integrated indicator
 - Simulations
 - Maximum value
 - Past operating experience trends for initiating events
 - Consistency with the ROP

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Technical Questions

- How many years should be included in the estimation of a trend?
- What level is appropriate for reporting to Congress?
- What level is appropriate for agency action to an adverse trend?
- Should some of the PIs be grouped?
- How does the safety goal influence setting thresholds?
- Should concepts in Reg. Guide 1.174 be used in setting thresholds?

ITP Process Flowchart

