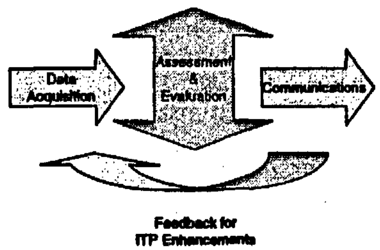
Industry Trends Program Workshop



Indicator Development Team

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Agenda

- Background
- Industry Trends Program (ITP)
- Initiating Event (IE) Trends and Assessment
- Baseline Risk Indicator (BRIE) [previously called Integrated Industry Initiating Event Indicator (IIIEI)]
  - Technical basis
  - Example results
  - Uncertainty/variability and sensitivity runs
  - Thresholds for the BRIE
- Technical Discussion
- Implementation Discussion
- Summary and wrap-up

Background

- NRC published 7 industry performance indicators (PIs) in the annual PI report through 1999
- ASP results published in annual report through 1998
- ROP process started in FY 1999
- Performance report to Congress (GPRA)
- Responsibility for industry PIs transferred from RES to NRR late 2000

ATTACHMENT 3

Background (cont.)

- NRR formally organized the Industry Trends Program in 2001
- ITP currently uses the 7 PIs and trends from the Accident Sequence Precursor (ASP) Program
- ITP reports annually to the Commission
  - SECY-01-0111 (6/2001)
  - SECY-02-0058 (4/2002)
  - SECY-03-0057 (4/2003)

Performance Goals & Reporting

- NRC has 4 Performance Goals
- For Maintain Safety Goal, 5 measures
  - No statistically significant adverse industry trends in safety performance
  - Significant events ($\leq 1\ 10^{-3}$ ASP Event)
  - Additional measures for exposures, releases, security
- NRC uses qualified set of ITP indicators to report against measure to Congress

ITP Policy

- Identify and evaluate indicators of industry performance for adverse trends and to communicate this trend information in a predictable and measured manner to enhance commercial reactor safety and NRC oversight processes.

Industry Trends Program

- The ITP is designed, in part, to complement the Reactor Oversight Process (ROP)
- The ITP focuses on multi-plant/ multi-site performance, while the ROP focuses on plant-specific performance
- ITP complements generic communications and generic safety issues processes

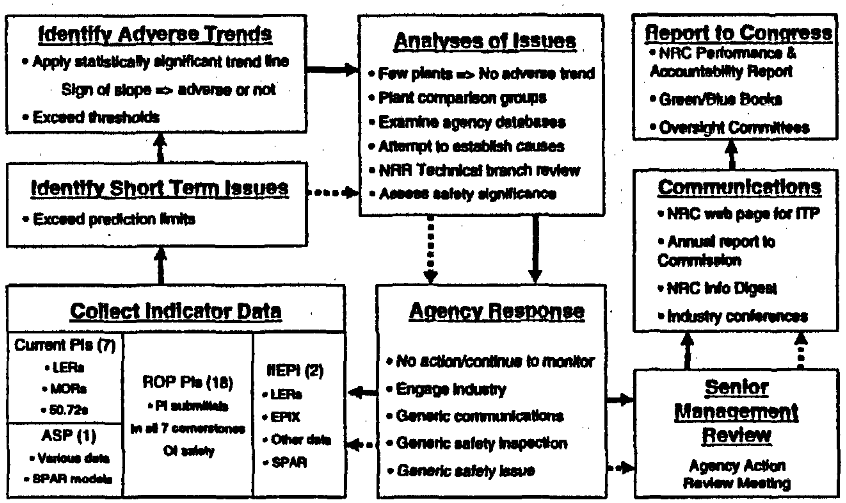
ITP Purposes

- Provide one means to assure that the nuclear industry is maintaining the safety of nuclear reactors
- Enhance stakeholder confidence in the efficacy of the NRC regulatory processes

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 and other NRC processes
- Assess the safety significance and causes of any statistically significant adverse trends
- Communicate industry-level information to Congress and other stakeholders

ITP Process



Industry Performance Indicators

ROP Cornerstone	Current PIs	ROP PIs (Industry)	Other
Initiating Events	Automatic Scrams	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)	ASP
Barrier Integrity		RCS Activity RCS Leakage	ASP
Emergency Preparedness		Drill/Exercise Performance ERO Drill Participation Alert and Notification System	
Occupational Radiation Safety	Collective Radiation Exposure	Occupational Exposure Control	
Public Radiation Protection		Radiological Effluents	
Safeguards		Personnel Screening Personnel Reliability	

BRIE Development

- Indicators are only counts without significance
  - Risk significance of IEs can be calculated (i.e., BRIE) from risk model weighting factors

Some initiating events (IEs) too infrequent to regulate plant-level performance using the ROP
  - However, these IEs can be used in the ITP to monitor industry-level performance
  - Monitoring 10-15 risk-significant IEs can provide better insights than current set of industry indicators
- Numerous indicators may not be understandable
  - Roll up indicator (i.e., BRIE) can simplify communications to Congress/stakeholders

BRIE Concept

- Two-tiered approach
  - IE-level: Monitor 10-15 most risk-significant IEs across all plants
    - Monitor individual IEs using statistical techniques
    - NRC investigates when prediction limit is exceeded or a potential trend starts to appear
  - Cornerstone-level
    - Roll up indicator to simplify report of IEs to Congress
    - Threshold derived from the NRC's safety goal

IE-level Monitoring

- Potential ways to monitor the individual IEs:
  - Quarterly: Monitor for changes in IE occurrence using predictive distributions and prediction limits (focus is on current performance)
  - Annually: Monitor for trends and prediction limits (focus is on multi-year performance)

Cornerstone-level Monitoring

- Use the BRIE to monitor the total risk from the individual IEs
  - Assess annually
  - Use thresholds set by an expert panel to judge performance
  - Use in the report to Congress

Development Schedule

- Review of the draft report – June 2003
- Public Workshop – July 30, 2003
- Comment Resolution – August 2003
- Final Report – September 2003
- ACRS Briefing – December 2003
- Commission Paper – Jan./Feb. 2004

Initiating Event Trends and Prediction Limits

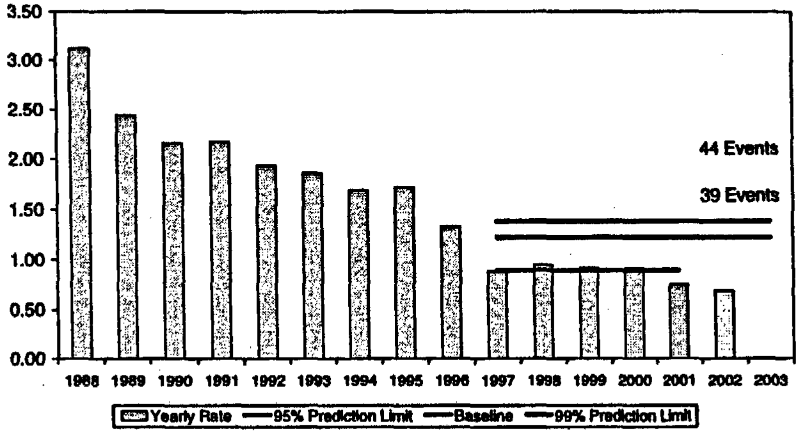
Initiating Events for BWRs

- 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

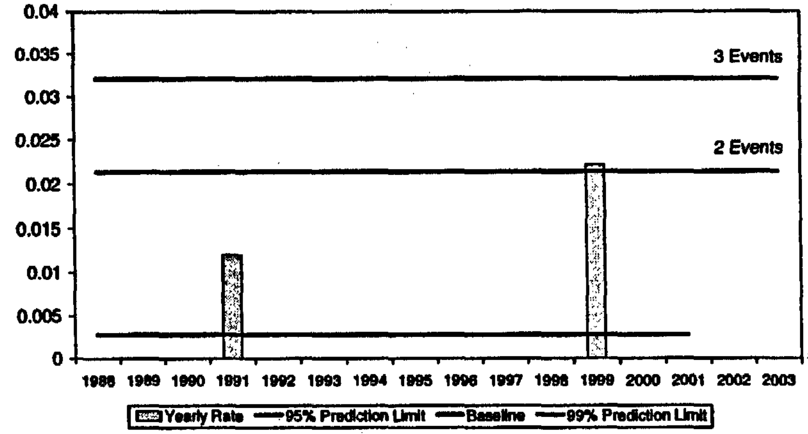
Initiating Events for PWRs

- 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

BWR General Transients



Loss of Vital DC Bus



Example Scenarios

- Loss of offsite power
  - Large increase in LOSP events in one year
    - Events occurred because of unexpected increase in severe storms on east coast
  - ITP could do the following:
    - Provide information to inspectors for affected plants
    - Examine the inspection procedure for Preparation for Adverse Weather
    - Might issue an Information Notice to all licensees giving lessons learned
- Increase in general transients
  - ITP could do the following:
    - Review the LERs to ascertain causes
    - Create a Temporary Instruction directing inspectors to look at what was found from the LER review
    - Possibly issue an Information Notice to all licensees

Baseline Values

- Obtained from operating experience over an interval on which the trend is basically constant (trend parameter is not statistically significant)
- For initiating events with few occurrences, the interval is 1988-2001.
- For I.E.'s with more frequent occurrences, the interval is shorter, but includes at least 4 years
- Used for obtaining predictive distribution (individual IEs) and constrained noninformative prior distribution for Bayesian updates (integrated indicator)

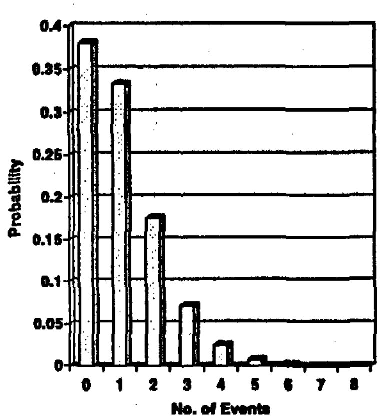
Predictive Inference

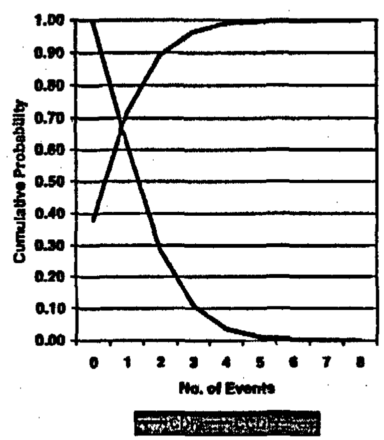
- Most statistical methods focus on estimating or learning about relevant properties of model parameters
- Predictive inference focuses on calculating inferences for the unseen part of the population (called future observations) given the sample data from that population
- Predictive inference often has a clearer interpretation than parametric inference
- A predictive distribution is used for this purpose

Predictive Distribution
(Events in Time)

- For events in time, a predictive distribution is the negative binomial or the gamma-Poisson distribution, a generalization
  - Observe number of events in past exposure time
  - Predict number of events in future exposure time

Predictive Distribution Example
Loss of Offsite Power





IE Prediction Limits
(for one year)

Initiating Event	Expected No. of Events	95% PL	99% PL
Loss of AC Bus	2.6	7	8
Loss of DC Bus	0.3	2	3
LOSP	1.2	4	6
Small LOCA	0.4	3	4
Loss of Feedwater	9.5	16	19

BWR IE Prediction Limits
(for one year)

Initiating Event	Expected No. of Events	95% PL	99% PL
Loss of Inst. Air	0.3	3	3
General Transients	28.4	39	44
Loss of Heat Sink	6.0	12	14
Suck Open SRV	0.7	3	4

PWR IE Prediction Limits
(for one year)

Initiating Event	Expected No. of Events	95% PL	99% PL
Loss of Inst. Air	0.8	3	5
General Transients	50.0	61	67
Loss of Heat Sink	6.0	12	14
Stuck Open SRV	0.2	2	3
SGTR	0.3	2	3

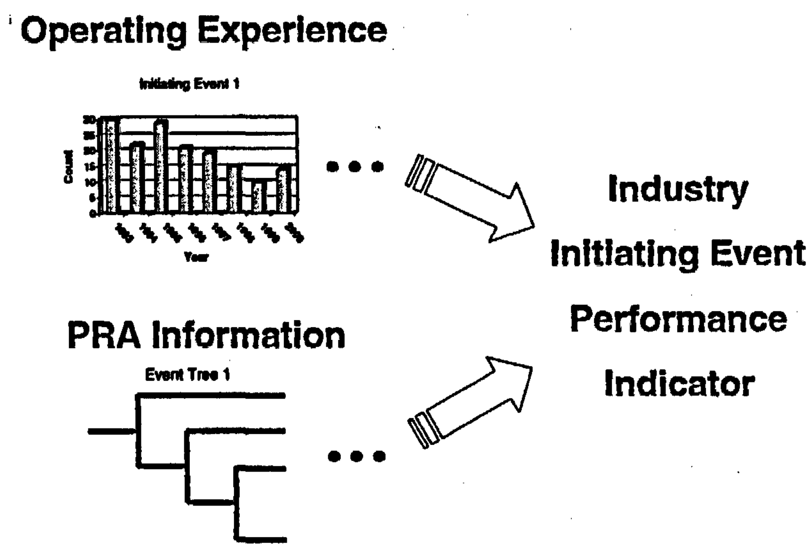
Industry Initiating Event Performance Indicator (IIEPI)

Indicator Characteristics

- Used as performance measures in the annual performance report to Congress
- Complementary to the plant-specific ROP
- Provides industry information for an ROP cornerstone
- Uses industry data available from current NRC programs
- Related to or tied closely to risk (e.g., CDF or ΔCDF)
- Utilizes risk-informed measures for assessing their significance (e.g., safety goal, RG 1.174)

Philosophy

- Trending individual initiating events does not capture their 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



Industry Initiating Event Performance Indicator

- Addresses the first cornerstone of safety (initiating events) from an industry perspective
- Is complementary to the plant-specific ROP
- Is related to core damage frequency
- Allows combined trending of frequent and infrequent initiating events with different risk importances
- Does not require any new data be submitted by licensees

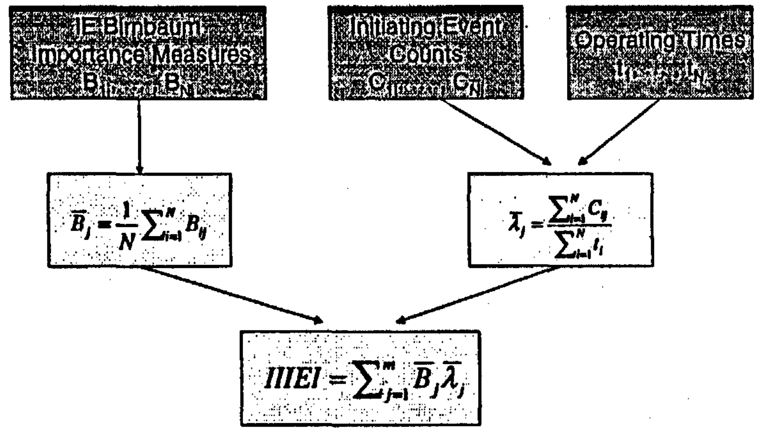
IIEPI Scope

- Focuses on the most risk-significant internal initiating events
- Does not include fire, flood, seismic initiating events, or other external or shutdown initiating events
- Does not address containment failure

What is the IIEPI?

- The IIEPI is the product of the industry initiating event frequency times the associated industry average conditional core damage probability (Birnbaum importance measure) summed over the set of risk important initiating events
- One integrated indicator for BWRs and another for PWRs

IIEPI Calculations



IIEPI Equation

$$IIEPI = \sum_{i=1}^{m} B_i \lambda_i$$

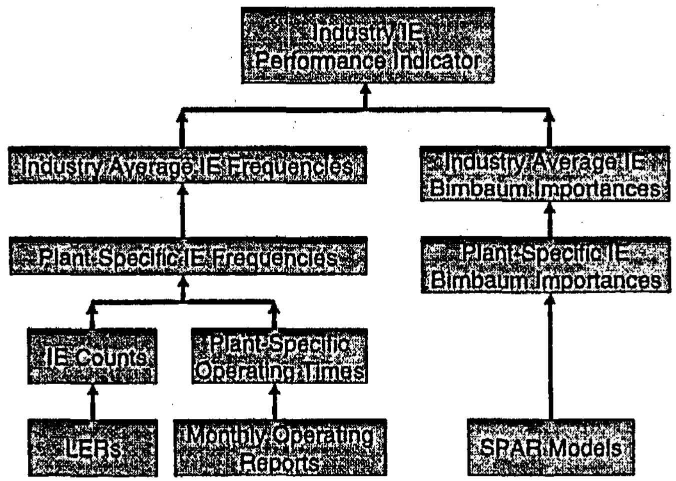
where

B_i = industry average risk weighting factor (Birnbaum importance measure) for initiating event i

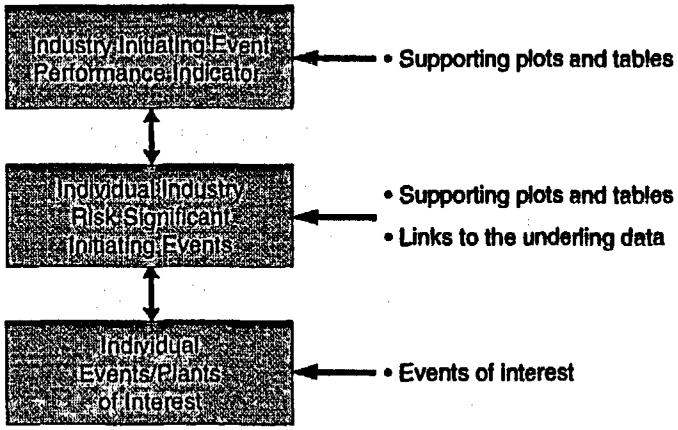
λ_i = industry initiating event frequency

m = number of initiating events

IIEPI Data Sources



Indicator Hierarchy



Current Performance

- Current performance is estimated using
  - A constrained non-informative prior distribution based on the baseline value
  - One or more years of data (events and reactor critical years)
- The difference between the current value and the baseline can be positive or negative since the current value can be less than or greater than the baseline value.

Example Results

BWR IIEPI Summary

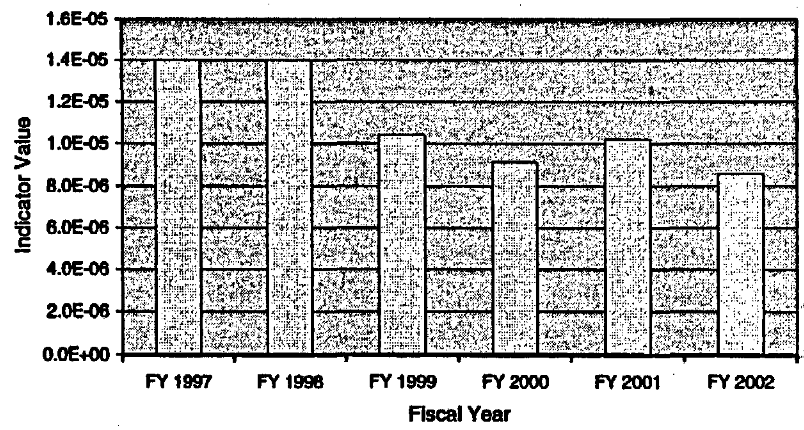
Initiating Event	Average Importance	Baseline Frequency	Baseline CDF	Percent of Mean	N_{Mean}	N_{95}
IE-SLOCA	5.62E-05	0.0047	2.62E-07	2.5%	0.4	21.3
IE-TRANS	1.36E-06	0.8950	1.22E-06	11.6%	28.6	167.0
IE-LOHS	8.44E-06	0.1900	1.60E-06	15.3%	6.1	29.9
IE-LOFW	1.45E-05	0.1020	1.49E-06	14.2%	9.7	49.5
IE-LOSP	3.22E-04	0.0125	4.03E-06	38.4%	1.2	3.6
IE-LODC	2.70E-04	0.0030	8.00E-07	7.6%	0.3	5.9
IE-VAC	0.00E+00	0.0275	0.00E+00	0.0%	2.6	–
IE-LOIA	8.20E-06	0.0108	8.86E-08	0.8%	0.3	55.7
IE-SORV	4.71E-05	0.0213	1.00E-06	9.5%	0.7	7.5
Total	–	–	1.05E-05	100.0%	–	–

PWR IIEPI Summary

Initiating Event	Average Importance	Baseline Frequency	Baseline CDF	Percent of Mean	N_{Mean}	N_{95}
IE-SLOCA	2.52E-03	0.0047	1.17E-05	32.2%	0.4	2.2
IE-TRANS	2.01E-06	0.7640	1.54E-06	4.2%	47.9	739.8
IE-LOHS	1.88E-06	0.0974	1.84E-06	5.1%	6.1	85.2
IE-SGTR	7.90E-04	0.0044	3.45E-06	9.5%	0.3	5.2
IE-LOFW	1.88E-05	0.1025	1.93E-06	5.3%	9.7	125.8
IE-LOSP	3.25E-04	0.0125	4.07E-06	11.2%	1.2	10.3
IE-LODC	2.99E-03	0.0030	8.84E-06	24.3%	0.3	2.2
IE-VAC	0.00E+00	0.0275	0.00E+00	0.0%	2.6	–
IE-LOIA	8.35E-05	0.0122	1.02E-06	2.8%	0.8	28.1
IE-SORV	6.36E-04	0.0031	1.97E-06	5.4%	0.3	9.1
Total	–	–	3.64E-05	100.0%	–	–

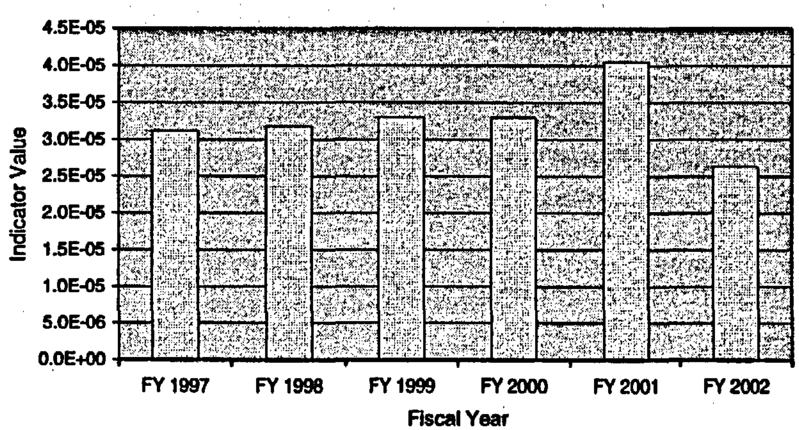
BWR IIEPI (CDF)

(3-Year Bayesian Update)



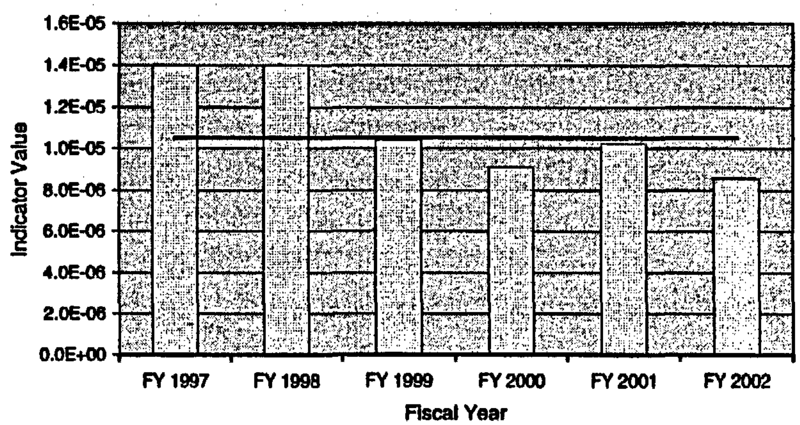
PWR IIEPI (CDF)

(3-Year Bayesian Update)

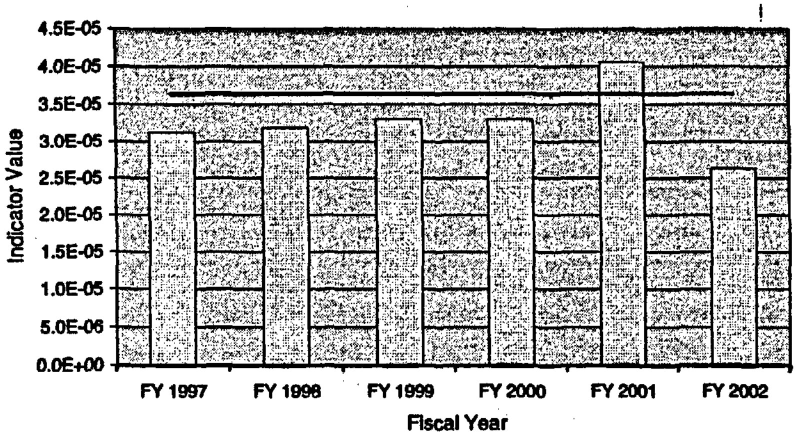


BWR IIEPI (CDF)

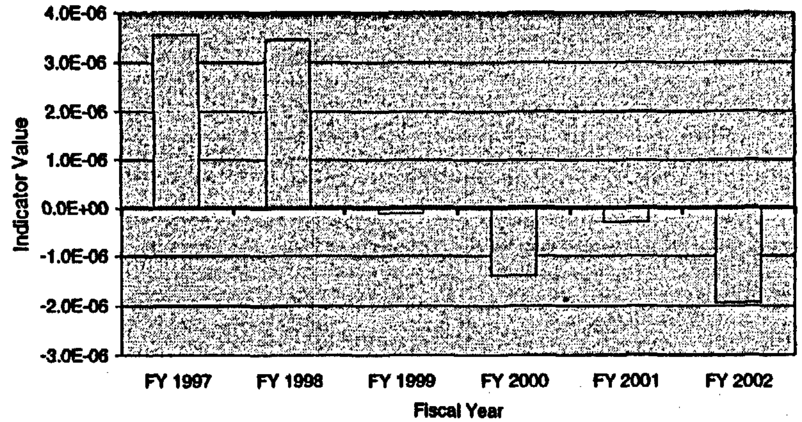
(3-Year Bayesian Update)



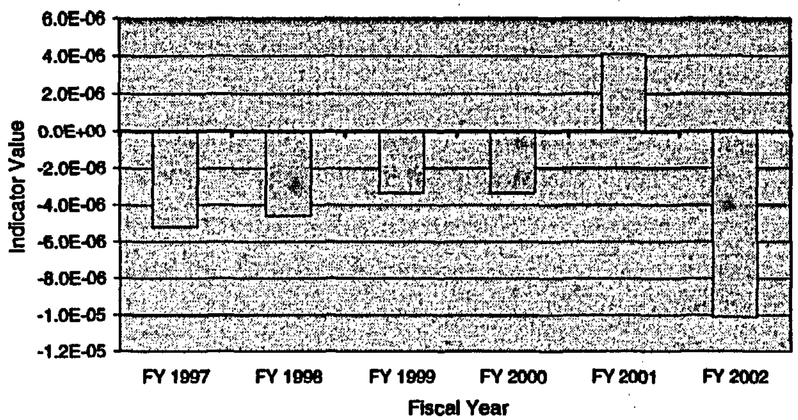
PWR IIEPI (CDF)
(3-Year Bayesian Update)



BWR IIEPI (ΔCDF)
(3-Year Bayesian Update)



PWR IIEPI (ΔCDF)
(3-Year Bayesian Update)

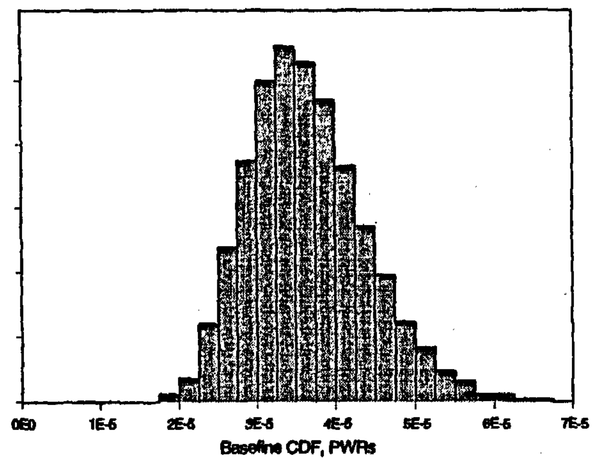


Uncertainty/Variability and Sensitivity Assessment

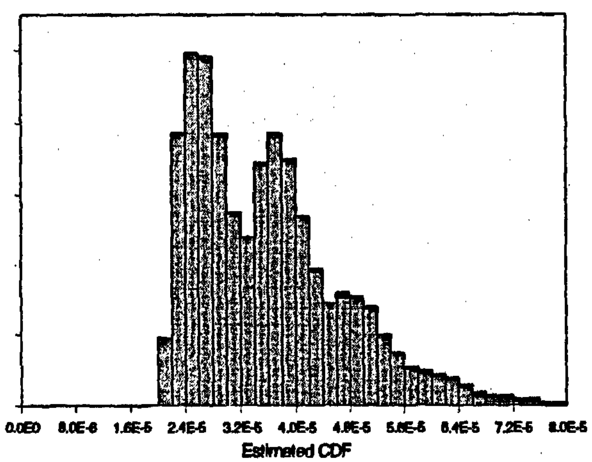
IIEPI Characteristics

- IIEPI is
  - A function of counts of events
  - Used to estimate CDF or ΔCDF
- Two sources of variability/uncertainty
  - Random variation of the counts around their true frequencies ("aleatory")
  - Uncertainty in the underlying frequencies ("epistemic")
- Uncertainty in the Birnbaum importances has been considered

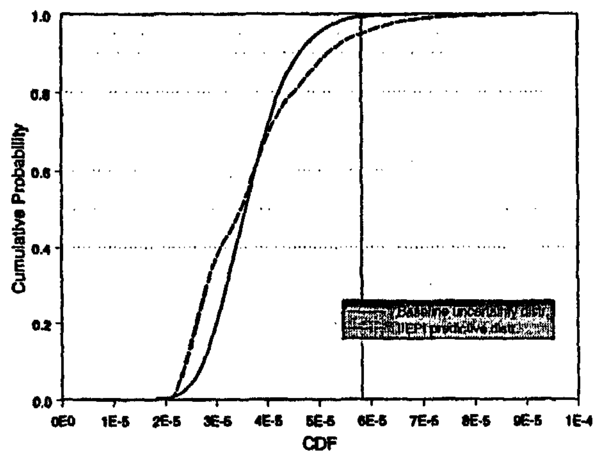
PWR Baseline Distribution



PWR IIEPI Predictive Distribution



Previous Two Distributions Compared

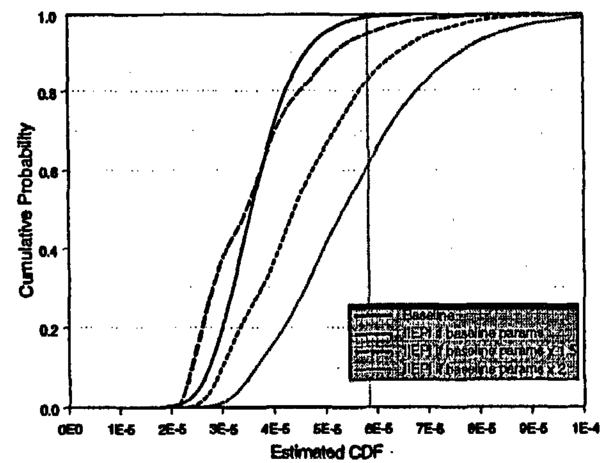


Sensitivity Studies

- Sensitivity studies are needed to show behavior of the IIEPI when conditions are not at baseline.
- Two kinds of deviation from baseline have been considered:
  - All parameters increase by the same factor (1.5 or 2) over the baseline
  - Frequencies of the most important IEs increase
    - LOSP for BWRs and SLOCA and LDCBus for PWRs
    - Increase by a factor of 2 or 3
    - All other frequencies remain at baseline
- Technical detail
  - In sensitivity studies, underlying frequencies are assumed
  - Only random variation of the counts is present

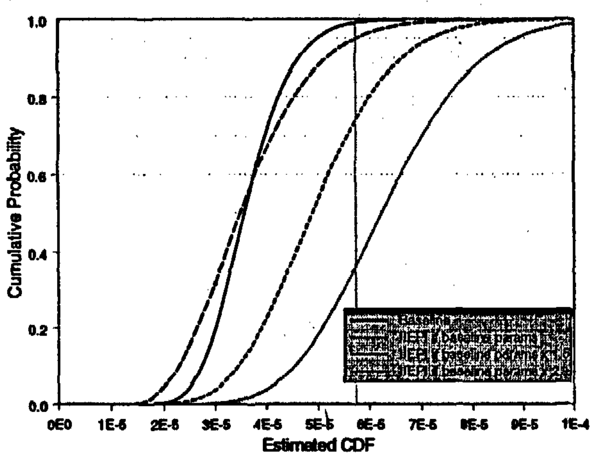
PWR IIEPI Sensitivity Studies

(using 1-year Bayesian update)



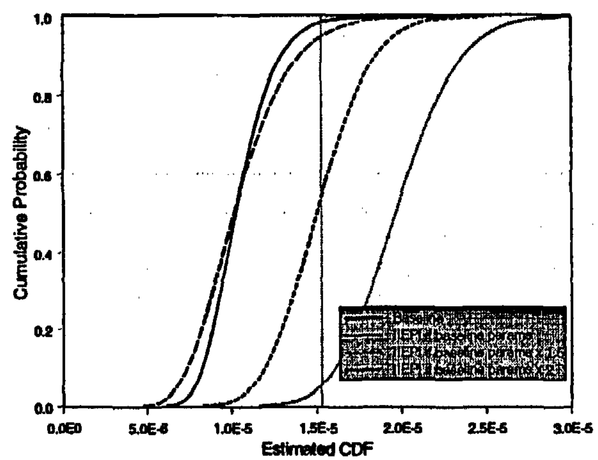
PWR IIEPI Sensitivity Distributions

(using 3-year Bayesian update)



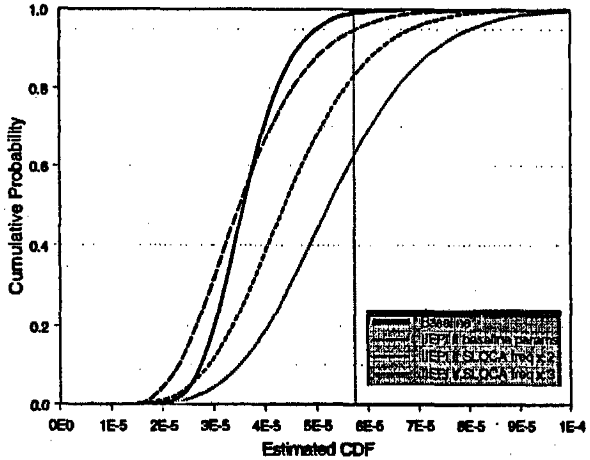
BWR IIEPI Sensitivity Studies

(using 3-year Bayesian update)



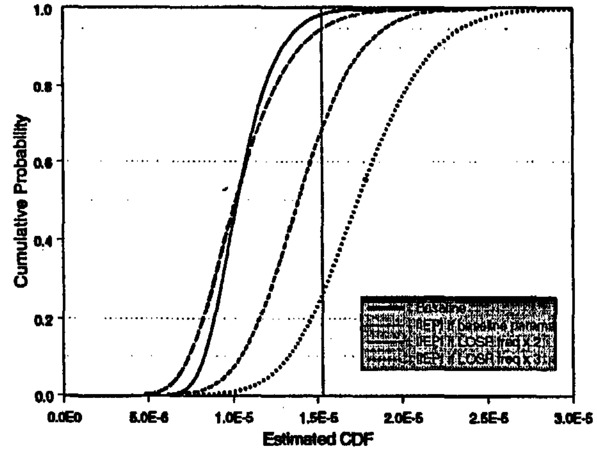
PWR IIEPI Sensitivity Studies

(SLOCA IE and 3-year Bayesian update)



BWR IIEPI Sensitivity Studies

(LOSP and 3-year Bayesian update)



Baseline IE Performance

Initiating Event	Starting Year	Critical Years	No. of Events	Baseline Mean
Loss of DC Bus	1988	1182.3	32	0.0275
Loss of AC Bus	1988	1182.3	3	0.003
LOSP	1997	439.4	5	0.0125
Small LOCA	1988	1182.3	5	0.0047
Loss of Feedwater	1993	785.4	80	0.012

Baseline BWR IE Performance

Initiating Event	Starting Year	Critical Years	No. of Events	Baseline Mean
Loss of Inst. Air	1994	231.5	2	0.0108
General Transients	1997	146.9	131	0.895
Loss of Heat Sink	1996	176.2	33	0.0190
Suck Open SRV	1993	258.2	5	0.0213

Baseline PWR IE Performance

Initiating Event	Starting Year	Critical Years	No. of Events	Baseline Mean
Loss of Inst. Air	1990	696.1	8	0.0122
General Transients	1998	239.0	182	0.764
Loss of Heat Sink	1991	641.9	62	0.0974
Suck Open SRV	1988	800.6	2	0.0031
SGTR	1988	800.6	3	0.0044

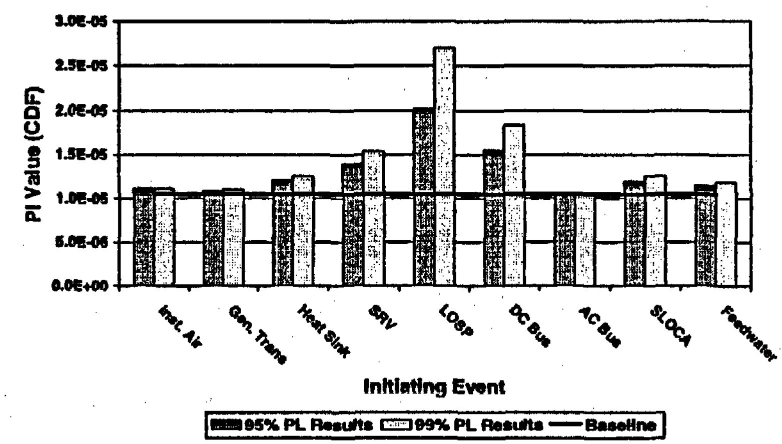
BWR Baseline CDF Breakdown

Initiating Event	Mean	Percent	Birnbaum
LOSP	4.03E-6	38.4%	3.22E-4
Loss of Heat Sink	1.60E-6	15.3%	8.44E-6
Loss of Feedwater	1.49E-6	14.2%	1.45E-5
General Transient	1.22E-6	11.6%	1.36E-6
Suck Open SRV	1.00E-6	9.6%	4.71E-5
Loss of DC Bus	7.99E-7	7.6%	2.70E-4
Small LOCA	2.61E-7	2.5%	5.62E-5
Loss of Inst. Air	8.85E-8	0.8%	8.20E-6
IIEPI Total (CDF)	1.05E-5		

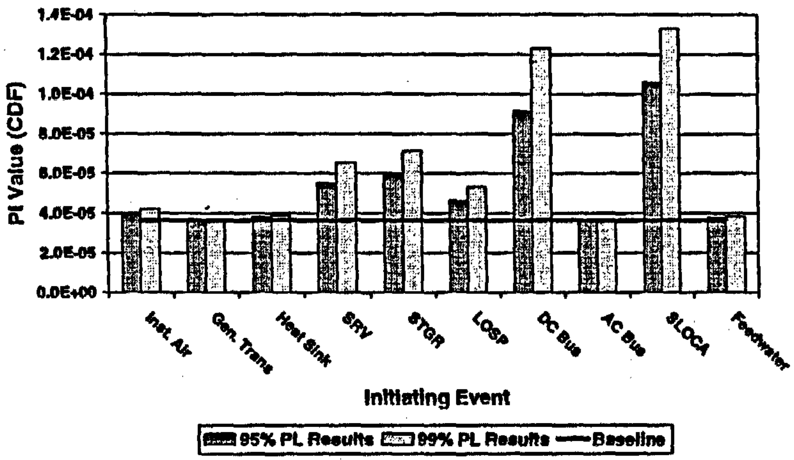
PWR Baseline CDF Breakdown

Initiating Event	Mean	Percent	Birnbaum
Small LOCA	1.17E-5	32.2%	2.52E-3
Loss of DC Bus	8.85E-6	24.3%	2.99E-3
LOSP	4.07E-6	11.2%	3.25E-4
SGTR	3.45E-6	9.5%	7.89E-4
Suck Open SRV	1.99E-6	5.5%	6.36E-4
Loss of Feedwater	1.93E-6	5.3%	1.89E-5
Loss of Heat Sink	1.84E-6	5.0%	1.89E-5
General Transients	1.54E-6	4.2%	2.02E-6
Loss of Inst. Air	1.02E-6	2.8%	8.35E-5
IIEPI Total (CDF)	3.64E-5	100.0%	

BWR Prediction Limits (CDF)

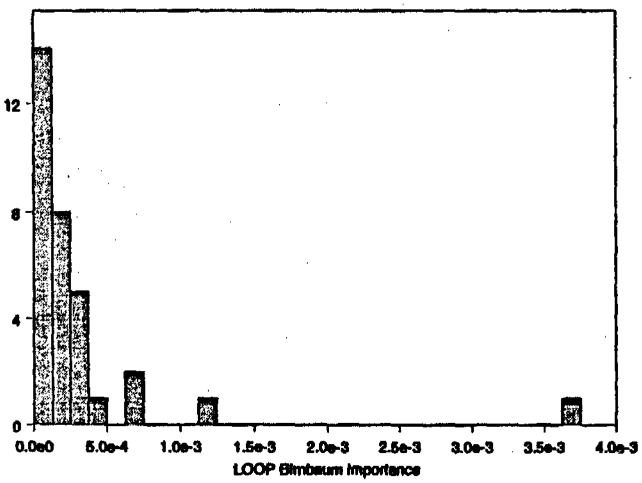


PWR Prediction Limits (CDF)

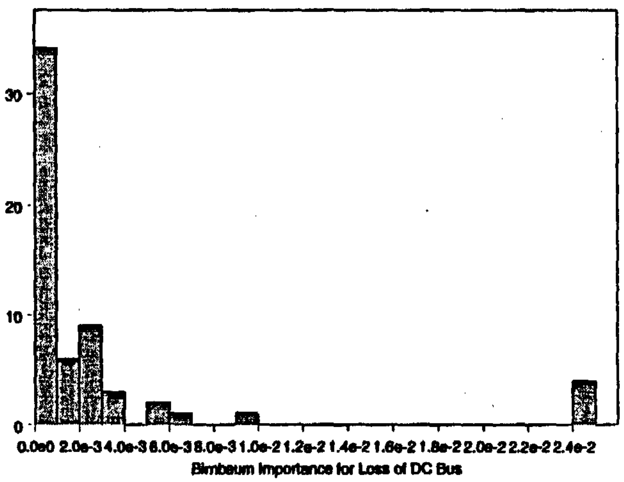


Birnbaum Importance Measures

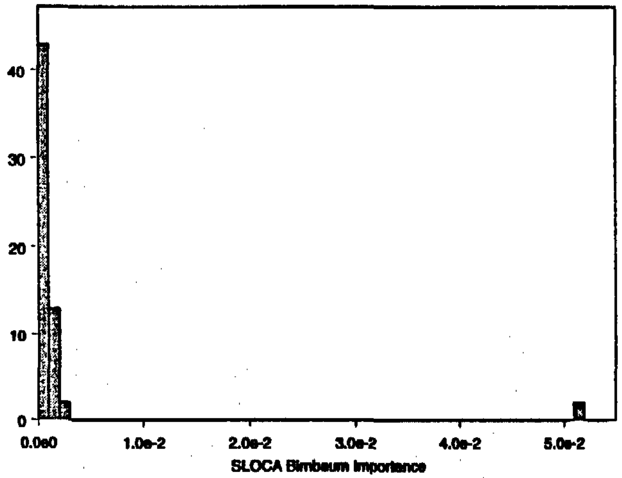
BWR LOSP Birnbaum Importance



PWR Loss of DC Bus Birnbaum Importance



PWR SLOCA Birnbaum Importance



Thresholds for the IIEPI

Thresholds for the IIEPI

- Thresholds may be established using the following information
  - Safety Goal and/or Regulatory Guide 1.174
  - Behavior of the integrated indicator
    - Simulations
    - Maximum value
    - Major contributors
    - Distributions of the Birnbaum importance measures
    - Past operating experience trends for initiating event
- An expert panel would be established to propose threshold values that satisfy policy and operational needs and objectives

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.

Kinds of Thresholds

- Thresholds for the IIEPI (BWR and PWR)
  - Used to measure degrading industry performance, similar to thresholds used in ROP process
  - Related to CDF or ΔCDF
  - Anchored to the safety goal or Reg. Guide 1.174
- Prediction Limits for Individual IE Trends
  - Used to alert NRC to an change in individual industry trends that may indicate a degradation in industry safety performance

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
- Suggest threshold values based on principles from the threshold characteristics

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

Plant-Specific Calculations

Plant-Specific I.E. Indicator

- The same concepts used to develop the IIEPI can also be used to develop plant-specific initiating event indicators
- This can be done without licensees submitting any data

Plant-Specific Results for ITP

- One alternative is to use the average of the plant-specific initiating event performance indicators for the ITP
- The plant-specific IEPI has some issues that need to be resolved
  - What IE frequency do we use for the rare IEs?

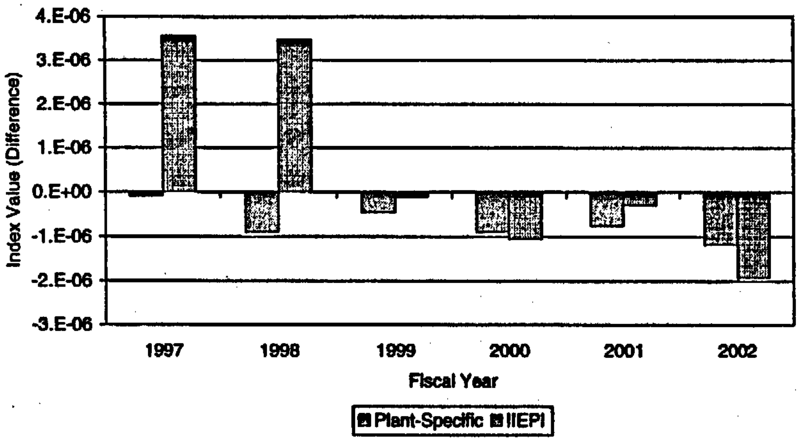
Observations

- The average value differs from the IIEPI
  - The two values can be of opposite sign in the ΔCDF formulation
  - The two values can vary by an order of magnitude or more
- Plant-specific values are driven by the Birnbaum importances
- Plant-specific values are strongly influenced by rare IEs

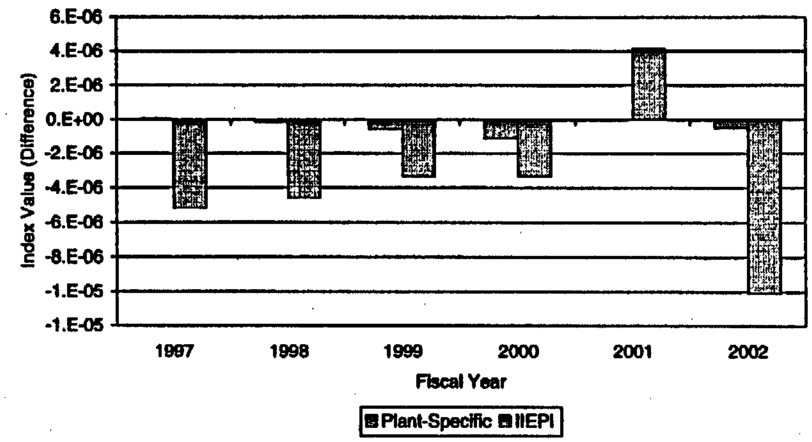
Conclusions

- Using plant-specific calculations can bias the industry perspective for the ITP
- Plant-specific calculations can be done for the more frequent IEs

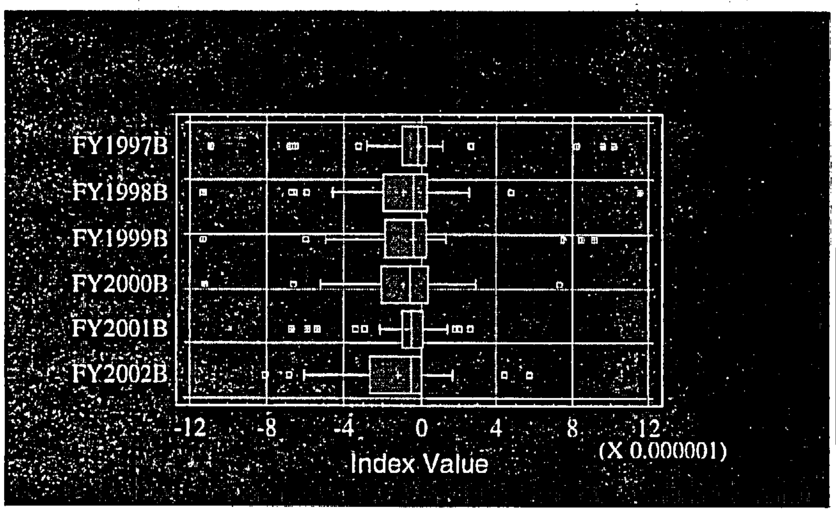
BWR IIEPI vs. Average of Plant-Specific IEPI



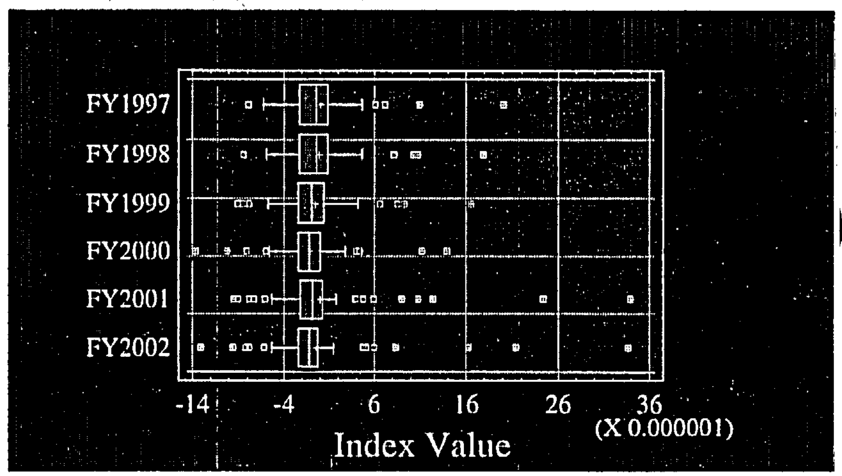
PWR IIEPI vs. Average of Plant-Specific IEPI



BWR Plant-Specific IEPI Results



PWR Plant-Specific IPEI Results



Plant-Specific Thresholds vs. 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.

Draft Report Review Comments

Draft Report Reviewers

- Draft report reviewed by
  - Internal NRC staff
    - Headquarters
    - Regions
  - External reviewers
    - NEI
    - Union of Concerned Scientists
    - EPRI
    - INPO
    - Owners Groups

Technical Questions

- Is Equation 5 rather than Equation 2 or 3 most appropriate for quantifying the IIEPI?
- Is the method for determining baseline performance adequate?
- Is the proposed method for calculating the current frequencies for the IEs appropriate?
- Should CDF or ΔCDF form of the indicator be used?
- Given the characteristics of the IIEPI and the simulation results, what might be appropriate CDF and ΔCDF thresholds for the IIEPI?
- How often should the initiating event baseline performance be updated?

Technical Questions (cont.)

- Should the industry-average Birnbaum importances be obtained from the SPAR models or from industry risk models?
- If the Birnbaum importance measures are obtained from the industry, how will the differences between the two models (industry and SPAR) be addressed?
- How often should the Birnbaum importance measures be updated?
- Is the treatment of uncertainties adequate?
- Should the thresholds be set so that no one event in a three-year period would cause the threshold to be exceeded?

Summary of NRC Comments

- It is inappropriate to use industry-level-average Birnbaum importances. Plant-specific information exists and can be used
- The rolled-up indicator is not useful because any rational response to it requires looking at lower level constituent indicators anyway
- The several purposes for the indicator are not easily addressed by a single rolled up quantity. The proposed formulation serves one objective but not others

NRC Summary (cont.)

- Why not factor in changes under the Mitigating Systems cornerstone as well?
- The formulation needs to discriminate against tripping industry indicators in only-a-few-plant scenarios
- What about LERF? An SDP-type process could furnish a LERF perspective based on this development
- What about external events?

External Comments

- UCS
  - ITP is important & good to improve
  - IIIEI not valuable since it does not monitor the right data - Instead, develop indicator for issues that resulted in plant shutdowns
  - If used, may mask plant-specific events
  - "Too Ouija-boardish"
  - Recommend NRC abandon IIIEI

External Comments (cont.)

- NEI
  - Continue to risk-inform ROP & regulations
  - Concept of IIIEI used to replace plant-level Scrams with Loss of Normal Heat Removal PI
  - Use of IIIEI for industry-level is inappropriate
    - Existing indicators sufficient
    - Unclear what CDF means for actions
    - Mix of indicators better than roll up indicator

Summary

Interactions with Stakeholders

- Briefed ACRS joint subcommittee in May 2002, Nov. 2002, and May 2003
- RES sent out draft report on the IIEPI for internal and external review
- Briefed ITP and IE indicator to Industry at public meetings on ROP
- Third annual ITP Commission paper issued in April 2003
- Briefed NRC management, AARM, and Commission on concept

Summary

- The ITP is developing a protocol for looking at the initiating events cornerstone of safety from an industry perspective
- Must involve multiple plants and multiple sites
- Protocol is a two-tier process
  - First tier monitors the individual initiating event occurrences and trends and focuses on performance
  - The second tier monitors the initiating events in an integrated way and focuses on risk

Two-Tiered Process

- Two-tiered approach addresses safety and performance
  - Individual IE trends and predictive distributions
    - Use prediction limits for the individual trends (performance)
    - Prediction limits help us assess if there has been a change in performance
  - Integrated indicator with thresholds
    - Use thresholds, anchored to the safety goal for the integrated indicator (safety)

Tier 1

- Monitor the individual initiating events in two ways:
  - Monitor the IE occurrence using predictive distributions and prediction limits quarterly (focus is on current performance)
  - Monitor the trends on an annual basis (focus is on multi-year performance)

Tier 2

- Use the IIEPI to monitor the risk-significant internal initiating events on an annual basis
  - Use thresholds set by an expert panel to judge performance
  - Use in the report to Congress

Development Schedule

- Review of the draft report – June 2003
- Public Workshop – July 30, 2003
- Comment Resolution – August 2003
- Final Report – September 2003
- ACRS Briefing – December 2003
- Commission Paper – Jan./Feb. 2004