

Overview of Data Collection Operating Experience Support & Data Analysis Activities

John C Lane
Performance & Reliability Branch
Division of Risk Analysis
Office of Nuclear Regulatory Research

Topics of Discussion

- Who uses the data?
- Where does the data come from?
- How is it organized?

End Users of Data

RES

- SPAR Model Developers
- Accident Sequence Precursor Program

NRR

- Mitigating System Performance Index
- Industry Trends Program
- Operating Experience Clearinghouse
- Baseline Risk Index for Initiating Events (BRIIE)

Regional Inspectors

- Significance Determination Process/SRAs

Industry/Public

- Reference Material for plant-specific PRA models
- LERSearch

Sources of Data

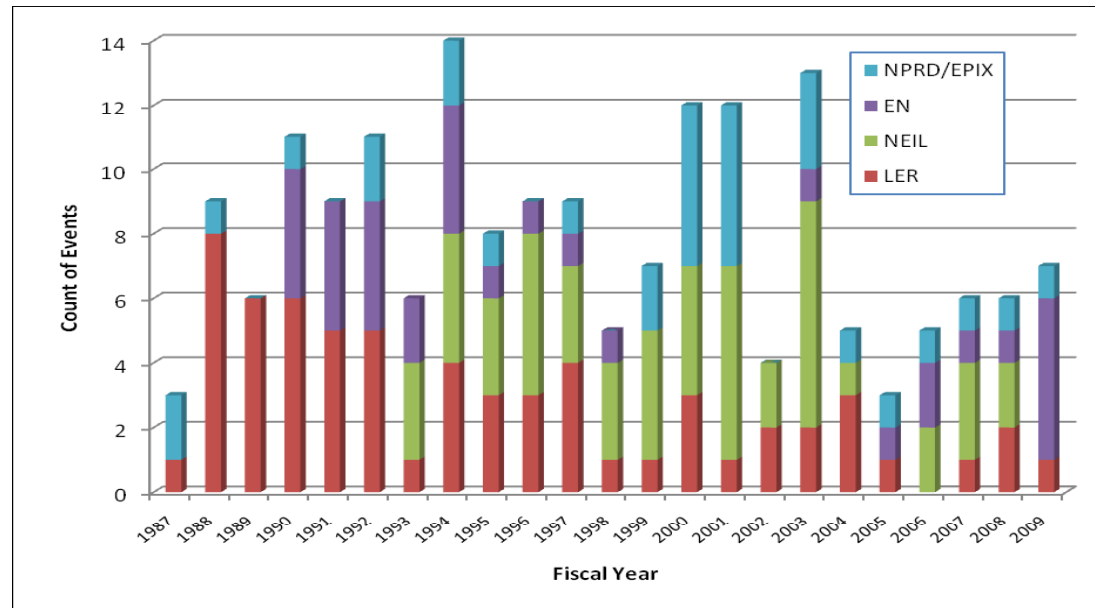
- NPRDS—Nuclear Plant Reliability Data System
 - Original industry reporting system mothballed in 1997
 - Included for historical reference in EPIX/ICES
- EPIX/ICES—Equipment Performance & Information Exchange/INPO Consolidated Events System
 - NRC acquires data via a multi-year contract with INPO
 - EPIX/ICES designed to
 - Improve plant performance by sharing failure, reliability and OpE information on components important to safety and reliability
 - Supports risk-informed operational decisions
 - Supports Maintenance Rule compliance (10CFR50.65)
 - Support compliance with MSPI
 - Developed based upon input from:
 - Utility Managers
 - Systems Engineers
 - Maintenance Rule coordinators
 - PRA practitioners
- www.inpo.org

Sources of Data

- LERs—Licensee Event Reports
 - Submitted by U.S. nuclear plant licensee as required by regulation 10CFR50.73 within 60 days of a reportable event
 - Plant shutdown resulting from a Tech Spec requirement
 - Operations or plant conditions prohibited by Tech Specs
 - Safety barriers degraded
 - A previously unanalyzed condition
 - A natural phenomena posing a threat to the facility
 - Manual or automatic reactor scram
 - Inadvertent actuation of the Containment Isolation System, ECCS, emergency diesel generators, Containment Heat Removal System
 - Operations or plant conditions prohibited by Tech Specs
 - Safety barriers degraded
 - A previously unanalyzed condition
 - A natural phenomena posing a threat to the facility
 - Manual or automatic reactor scram
 - Inadvertent actuation of the Containment Isolation System, ECCS, emergency diesel generators, Containment Heat Removal

Fire Events Data Base

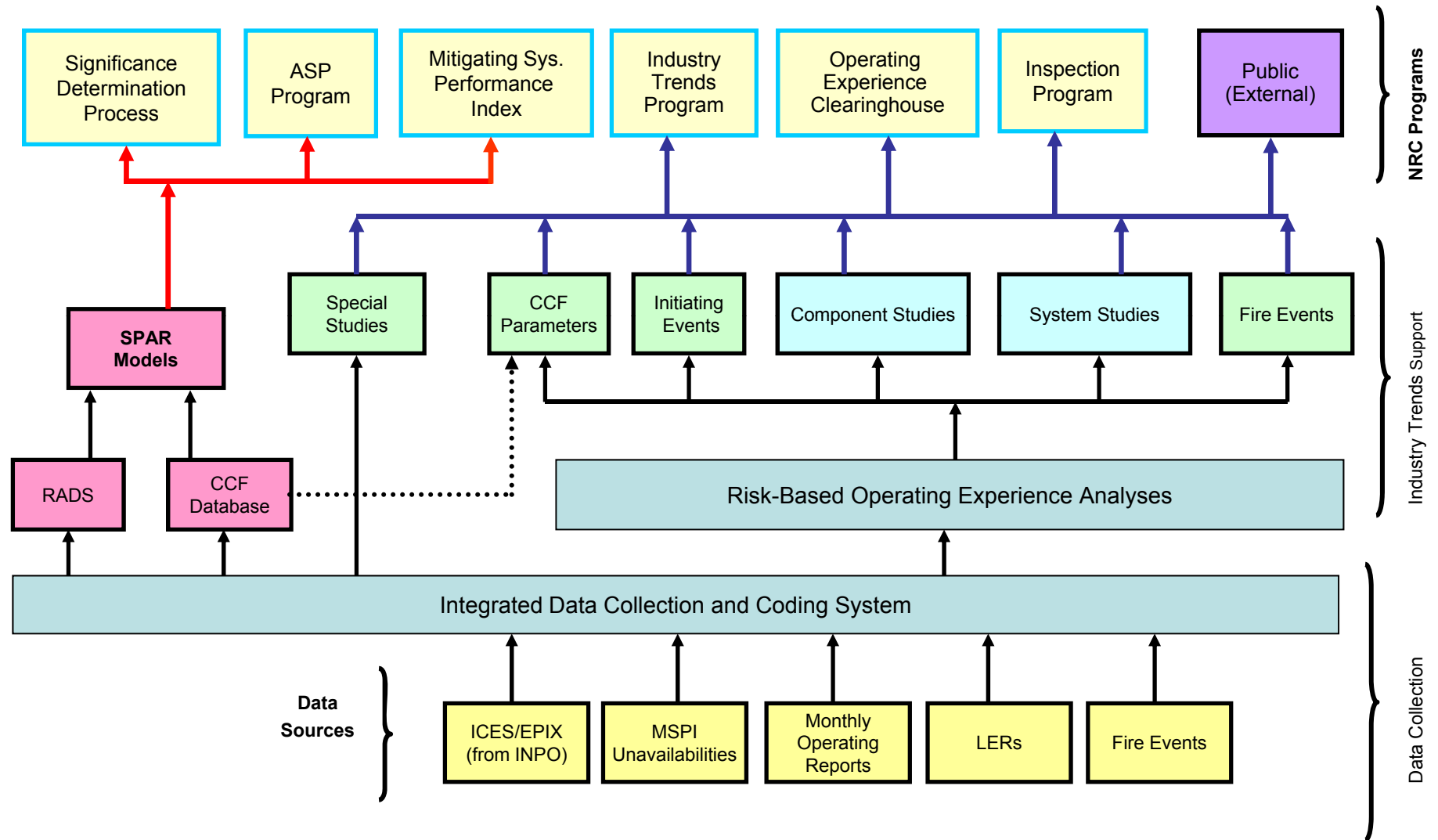
Annual update provides estimates of fire event frequencies



NRC developed a new Fire Events Database

- The new FEDB has been populated with fire data from event notifications and LERs from 1990 to present
- Industry, via a cooperative effort with EPRI, will add fire data going forward

RES Data Collection, Analysis, and Trending Programs



Data collection and industry trends support is provided by Idaho National Laboratory

RADS

(Reliability & Availability Data System)

Provides NRC staff and industry with:

- A source of *unit-specific* & *generic* component-level data on:
 - reliability (such as demand failure probability and rate of failure to operate)
 - train or component level data on unavailability (planned/unplanned unavailability) due to test and maintenance

RADS:

- Helps in the develop of risk-related performance indicators (SDP)
- Provides reliability parameters for SPAR models
- Helps focus NRC inspections on the most risk significant systems
- Aids in the review of requests for unit-specific licensing actions
- Monitors maintenance rule implementation
- Supports reliability analyses of selected risk-significant systems/components
- Used by industry in submitting applications for licensing actions

Studies & Analyses

The screenshot shows a Microsoft Internet Explorer browser window displaying the NRC Reactor Operational Experience Results and Databases website. The address bar shows the URL <http://nrc.nel.gov/results/index.cfm>. The browser's menu bar includes File, Edit, View, Favorites, Tools, and Help. The toolbar contains various icons for navigation and utility. The website's header features the NRC logo with the tagline "Protecting People and the Environment" and a navigation menu with links to About NRC, Nuclear Reactors, Nuclear Materials, Radioactive Waste, Nuclear Security, and Public Meetings & Involvement. A secondary navigation bar includes links to Index, Site Map, FAQ, Facility Info, Reading Rm, New, Help, Glossary, and Contact Us. The main content area is titled "Reactor Operational Experience Results and Databases" and includes a "System Notices" box stating "There are no system notices at this time." The page also features a "What's New in the 2009 Update Overview and Reference" section, a "Parameter Estimates" section with links to Industry Average Parameter Estimates, Common-Cause Failure Parameter Estimates, and Loss of Offsite Power, a "Trends and Insights" section with links to Initiating Events, System Studies, Component Performance, Common-Cause Failure Insights, International Common-Cause Failures, and Fire Events, a "Supplemental Information" section with links to Operating Time, Industry Performance Data, Other Documents, and Published Report List, and a "Databases and Programs" section with links to Common-Cause Failures (CCFDB) and Reliability and Availability Data System (RADS). The footer includes a "Privacy Policy | Site Disclaimer" link and a note that the page was last revised on Monday, August 23, 2010. The browser's status bar at the bottom shows "Slide 5 of 5", "blank", and a taskbar with icons for Start, Data Slides and Figures, Microsoft PowerPoint, and the NRC Reactor Operational Experience Results and Databases website.

NRC: Reactor Operational Experience Results and Databases - Microsoft Internet Explorer provided by USNRC

http://nrc.nel.gov/results/index.cfm

File Edit View Favorites Tools Help

★ Favorites NRC: Reactor Operational Experience Results and Da...

Index | Site Map | FAQ | Facility Info | Reading Rm | New | Help | Glossary | Contact Us

Google Custom Search Search Options

U.S. NRC
UNITED STATES NUCLEAR REGULATORY COMMISSION

Protecting People and the Environment

About NRC Nuclear Reactors Nuclear Materials Radioactive Waste Nuclear Security Public Meetings & Involvement

Home > Nuclear Reactors > Operating Reactors > Operational Experience > Results and Databases

Reactor Operational Experience Results and Databases

This area contains updated results for a variety of previously published studies conducted by the office of Nuclear Regulatory Research.

System Notices

There are no system notices at this time.

What's New in the 2009 Update Overview and Reference

Parameter Estimates

- Industry Average Parameter Estimates
- Common-Cause Failure Parameter Estimates
- Loss of Offsite Power

Trends and Insights

- Initiating Events
- System Studies
- Component Performance
- Common-Cause Failure Insights
- International Common-Cause Failures
- Fire Events

Supplemental Information

- Operating Time
- Industry Performance Data
- Other Documents
- Published Report List

Databases and Programs

- Common-Cause Failures (CCFDB)
- Reliability and Availability Data System (RADS)

Privacy Policy | Site Disclaimer
Last revised Monday, August 23, 2010

Slide 5 of 5 "blank"

Start Data Slides and Figures Microsoft PowerPoint - [...] NRC: Reactor Operati...

11:37 AM

Initiating Event Studies

- Unexpected reactor trips during power operations are reviewed annually
- Each event is categorized according to the initial event and is noted if other risk-significant events occurred
- The collected data are analyzed for time dependence, reactor-type dependence, and between-plant variance
- Dependencies and trends are reported, along with the raw counts and the best estimate for initiating event frequencies
- Primary Reference: "Rates of Initiating Events at U.S. Nuclear Power Plants: 1987-1995" (NUREG/CR-5750)
- The latest evaluation is based on the operating experience through 2012 as reported in Licensee Event Reports (LERs)

The IE report displays occurrence rates for categories of events that contribute to the NRC's Industry Trend program (16 initiating event groupings)

- Loss of offsite power
- Loss of vital AC bus
- Loss of vital DC bus
- Very small LOCA
- Loss of Component Cooling Water
- Loss of feedwater
- Partial Loss of Service Water
- BWR loss of instrument air
- BWR stuck open SRV
- BWR loss of heat sink
- BWR general transients
- PWR loss of instrument air
- PWR steam generator tube rupture
- PWR stuck open SRV
- PWR loss of heat sink
- PWR general transients

Annual System Study Updates

Boiling Water Reactor (BWR) Systems:

- High Pressure Coolant Injection (HPCI) System
- High Pressure Core Spray (HPCS) System
- Isolation Condenser (IC) System
- Reactor Core Isolation Cooling (RCIC) System

Pressurized Water Reactor (PWR) Systems:

- Auxiliary Feedwater (AFW) System
- High Pressure Safety Injection (HPSI) System

Common Systems:

- Emergency Power System

Annual Component Studies Updates

Tasks:

- a.) Risk-based analysis of operating data
- b.) Engineering analysis of trends

Provides insights into the performance of components on an industry-wide basis

- Emergency Diesel Generators (EDG)
- Turbine-Driven Pumps (TDP)
- Motor-Driven Pumps (MDP)
- Air-Operated Valves (AOV)
- Motor-Operated Valves (MOV)

Common Cause Failure Studies

- Studies are performed on the set of common-cause failures (CCF) of:
 - emergency diesel generators
 - motor-operated valves
 - motor-driven pumps
 - circuit breakers
- Original insight studies are documented in "Common-Cause Failure Event Insights" (NUREG/CR-6819), Volumes 1 through 4
- The Common-Cause Failure Database is a data collection and analysis system that includes:
 - a method for identifying CCF events
 - coding and classifying the events for use in CCF studies
 - a computer system for storing and analyzing the data