

# Overview of Data Collection Operating Experience Support & Data Analysis Activities

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# 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

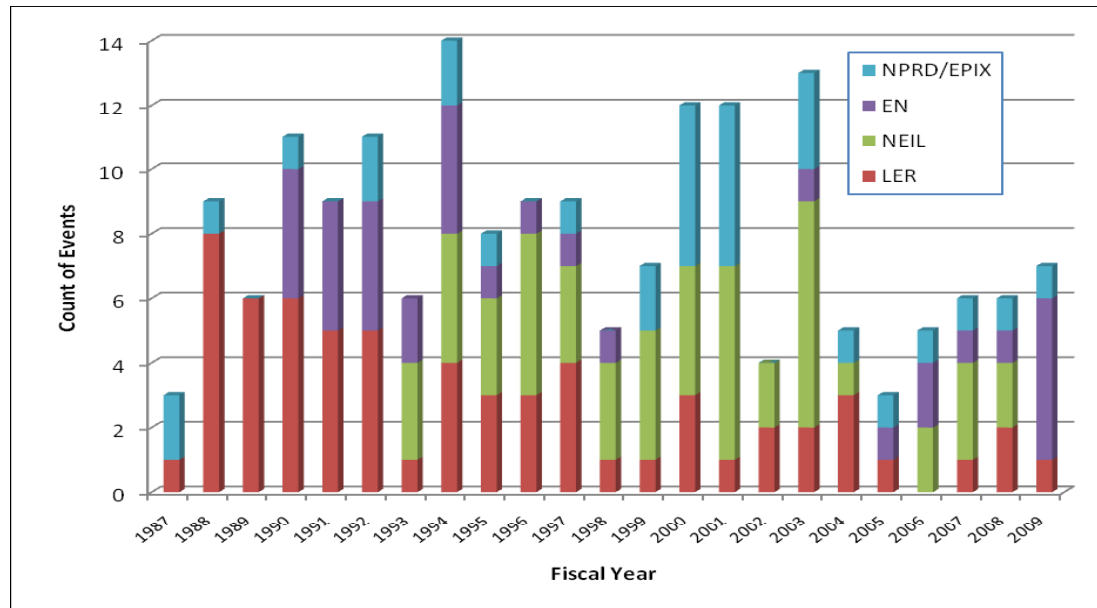
- NPRDS—Nuclear Plant Reliability Data System
  - Original industry reporting system mothballed in 1997
  - Included for historical reference in EPIX/ICES
- EPIX/ICES—Equipment Performance & Information Exchange/INPO Consolidated Events System
  - NRC acquires data via a multi-year contract with INPO
  - 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](http://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
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## Fire Events Data Base

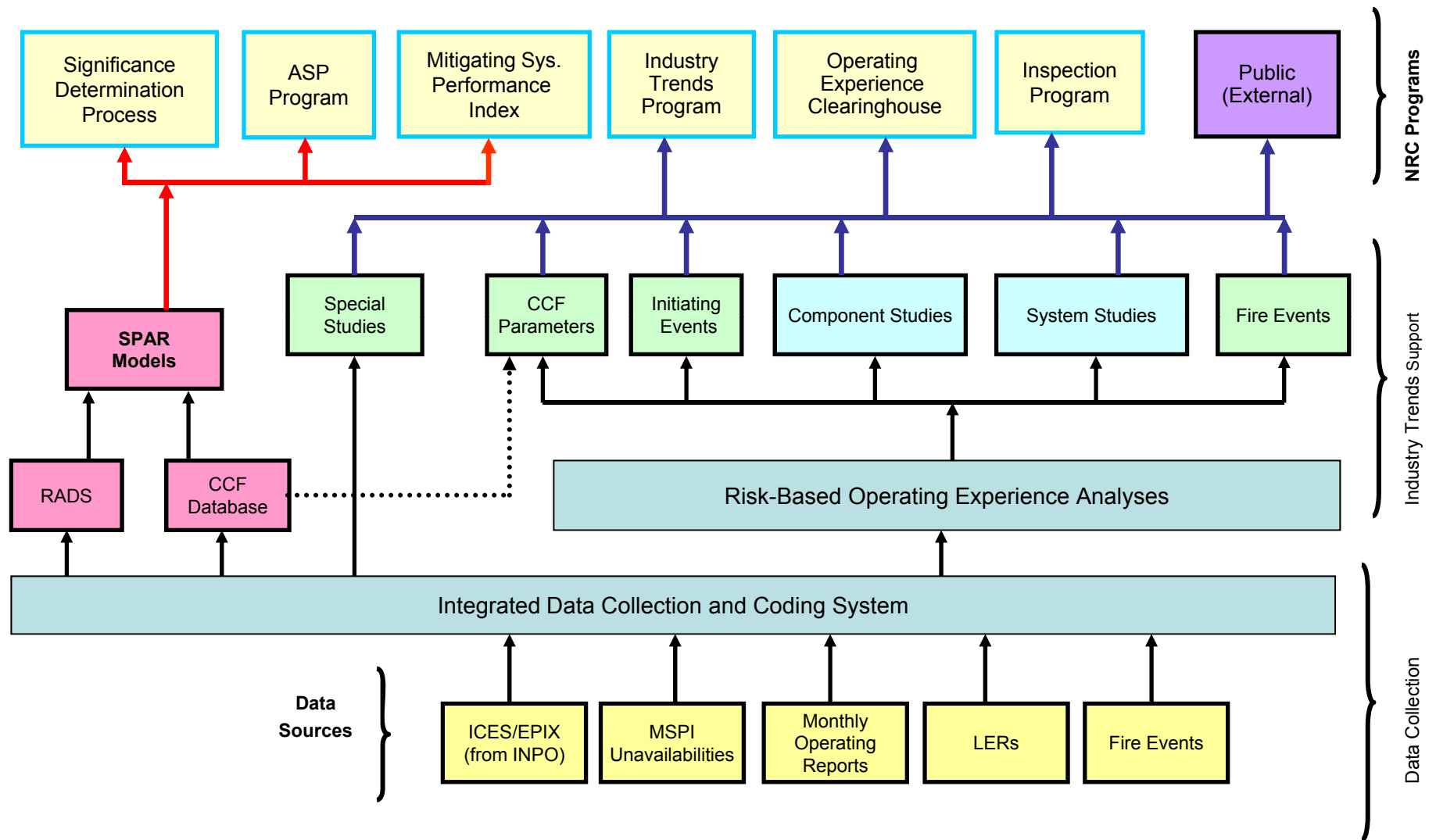
Annual update provides estimates of fire event frequencies



### 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 web browser window displaying the NRC website. The browser's address bar shows the URL <http://nrc.nel.gov/results/index.cfm>. The website header includes the NRC logo and the slogan "Protecting People and the Environment". A navigation menu contains links for "About NRC", "Nuclear Reactors", "Nuclear Materials", "Radioactive Waste", "Nuclear Security", and "Public Meetings & Involvement". 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." Below this, there are sections for "Parameter Estimates", "Trends and Insights", "Supplemental Information", and "Databases and Programs". A left sidebar lists various reactor safety focus areas. The footer contains a "Privacy Policy | Site Disclaimer" link and the date "Last revised Monday, August 23, 2010". The browser's taskbar at the bottom shows the Start button, a PowerPoint window, and the current website window.

**U.S. NRC**  
UNITED STATES NUCLEAR REGULATORY COMMISSION  
*Protecting People and the Environment*

**Reactor Operational Experience Results and Databases**

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

**System Notices**  
There are no system notices at this time.

**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)

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## 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