

INDUSTRY PERFORMANCE TRENDS – IMPROVING, DECLINING, OR STABLE?



OFFICE OF NUCLEAR REACTOR REGULATION

MONITORING INDUSTRY PERFORMANCE

The NRC evaluates industry performance in a number of different ways. One of those ways is the Industry Trends Program, which uses a number of different performance indicators and the output of the Accident Sequence Precursor Program to look for possible negative trends. Another way is the Reactor Oversight Process Action Matrix, which places plants in different performance columns based on performance indicators and inspection findings. In 2007, these two inputs provided very different results, as is depicted on the following graphs...

INDUSTRY TRENDS PROGRAM

Based on the results of the Industry Trends Program (ITP), the staff did not identify any statistically significant trends in industry safety performance through the end of FY 2007. Most of the graphs show a stable or improving trend and the results from 2007 appear to continue that trend.

The ITP provides a means to assess whether the nuclear industry is maintaining the safety performance of operating reactors, and to identify significant trends in safety performance. Its specific objectives are:

- Collect and monitor industry-wide data that can be used to assess whether the nuclear industry is maintaining the safety performance of operating plants and to provide NRC feedback to its nuclear reactor safety inspection and licensing programs;
- Assess the safety significance and causes of any statistically significant adverse industry trends, determine if the trends represent an actual degradation in overall industry safety performance, and respond appropriately to any safety issues that may be identified;
- Communicate industry-level information to Congress and other stakeholders in an effective and timely manner; and
- Support the NRC's performance goal of ensuring safety while enhancing openness in the agency's regulatory processes.

Information about the ITP can be found on the NRC's public website at: http://www.nrc.gov/reactors/operating/oversight/industry-trends.html

There are currently 14 industry performance indicators. The 8 indicators shown to the right are:

- Automatic Scrams While Critical: The number of unplanned automatic scrams that occurred while the
 affected reactor was critical.
- attected reactor was crSignificant Events:

greater than or equal to 1×10 -6 to be a precursor.

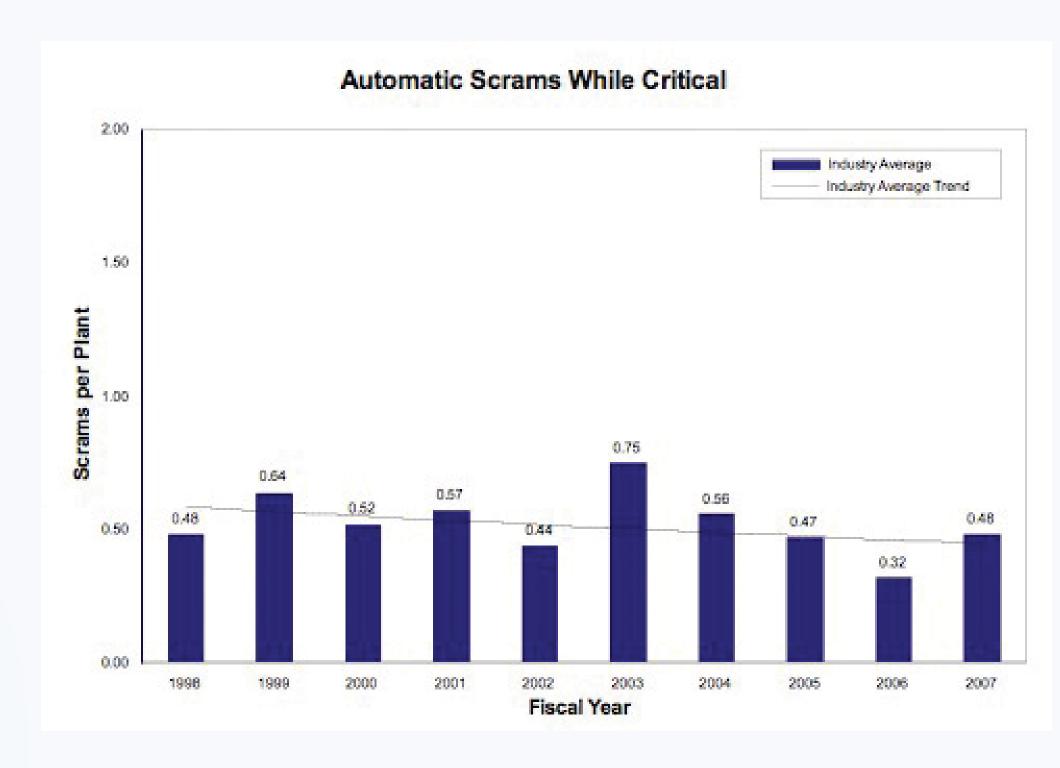
- A Yellow or Red Reactor Oversight Program (ROP) finding or performance indicator
 An event with a Conditional Core Damage Probability (CCDP) or increase in core damage probability
- (Δ CDP) of 1x10-5 or higher
- 3. An Abnormal Occurrence as defined by Management Directive 8.1, "Abnormal Occurrence Reporting Procedure"
- 4. An event rated two or higher on the International Nuclear Event Scale
 Safety System Failures (SSF): Any events or conditions that could prevent the fulfillment of the safety
- function of structures or systems.
 Forced Outage Rate (FOR): The number of forced outage hours divided by the sum of unit service
- hours and forced outage hours.
- Collective Radiation Exposure (CRE): The total radiation dose accumulated by unit personnel.
- Unplanned Power Changes: Total unplanned power changes at all plants each year multiplied by 7000 hrs, divided by the total critical hours for all plants each year.
- Reactor Coolant System Leakage: Sum of maximum percentage of Technical Specification RCS leakage
- within each year at all plants, divided by the total number of plants with data.

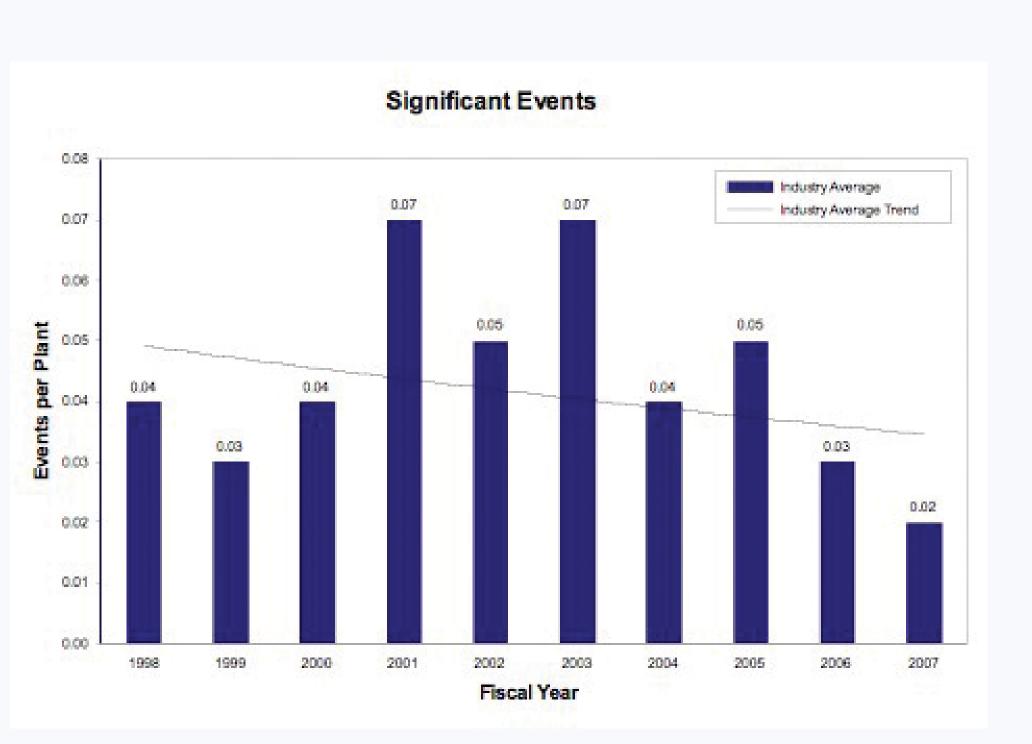
 Alert and Notification System Reliability: Total number of successful alert and notification system tests at

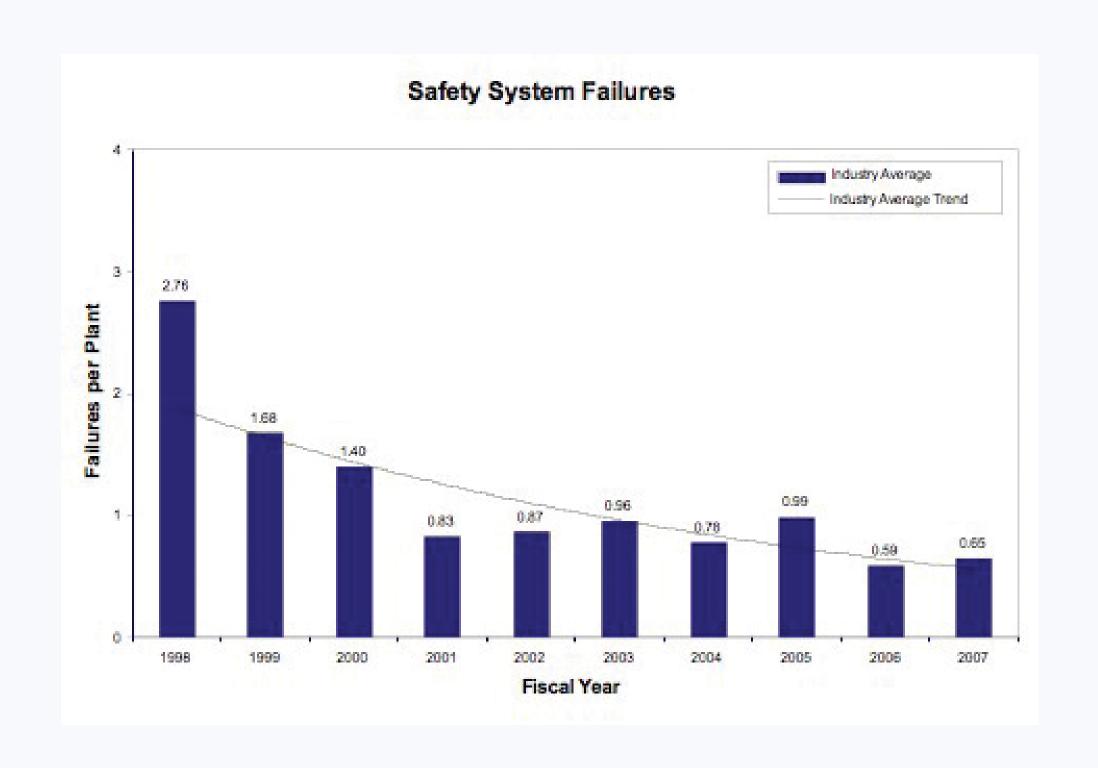
all plants each year multiplied by 100, divided by the total number of tests at all plants each year.

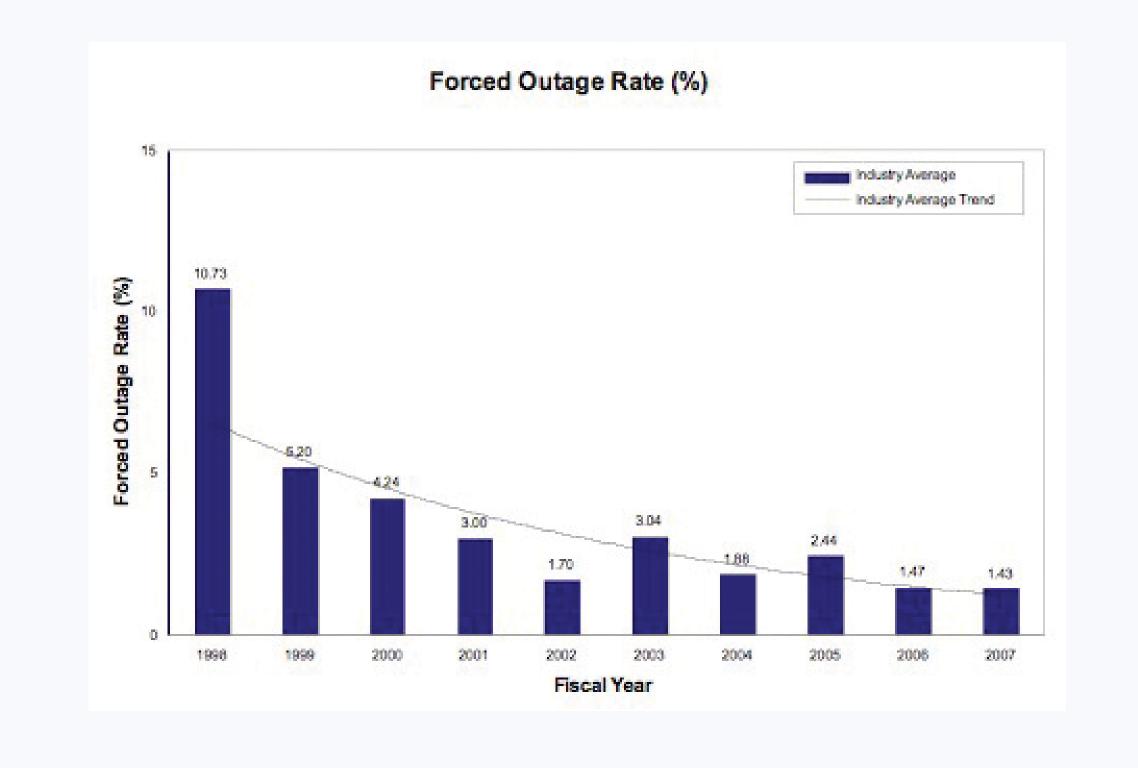
Also shown is the Accident Sequence Precursor (ASP) total precursors graph. The ASP program considers an event with a conditional core damage probability (CCDP) or increase in core damage probability (ΔCDP)

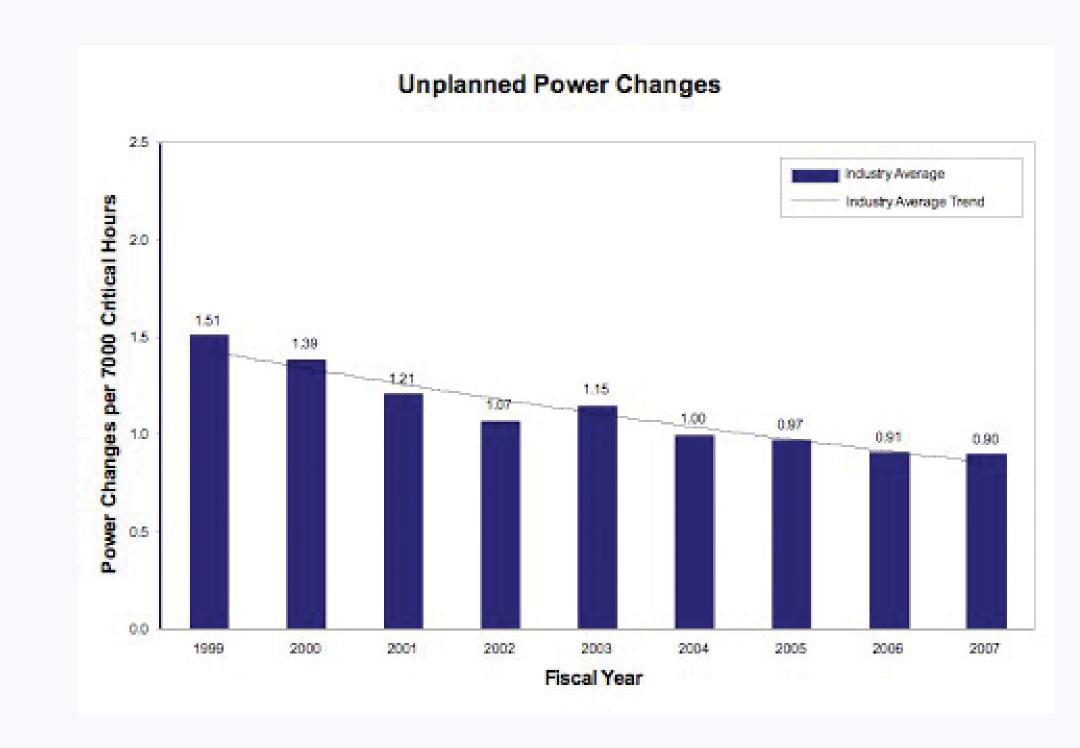
The graph depicting the occurrence rate of total precursors by fiscal year shows the occurrence rate for all precursors by FY during the period FY 2001 – FY 2006. A review of the data for that period reveals that (1) the mean occurrence rate of all precursors does not exhibit a trend that is statistically significant for the period FY 2001 – FY 2006, and (2) the analysis detected a statistically significant decreasing trend for precursors with a CCDP or Δ CDP greater than or equal to $1\times10-4$ during this same period. The staff chose FY 2001 as the starting point for trend analyses to provide a data period with a consistent ASP program scope and to align it with the first full year of the ROP.

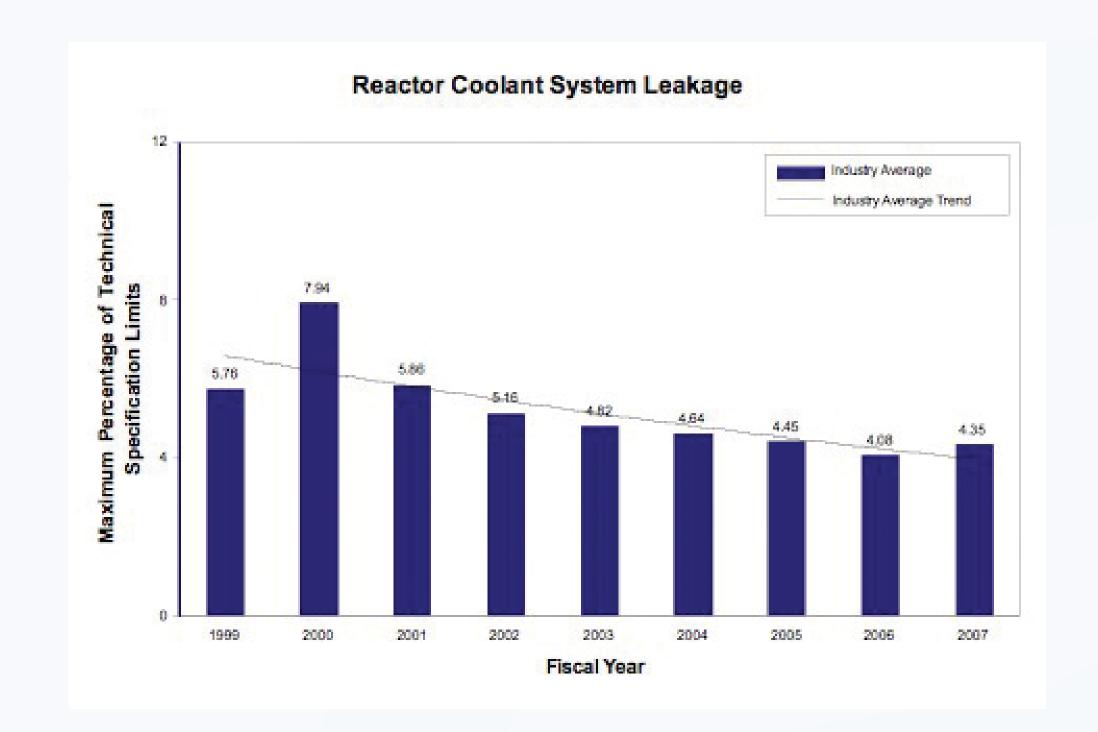


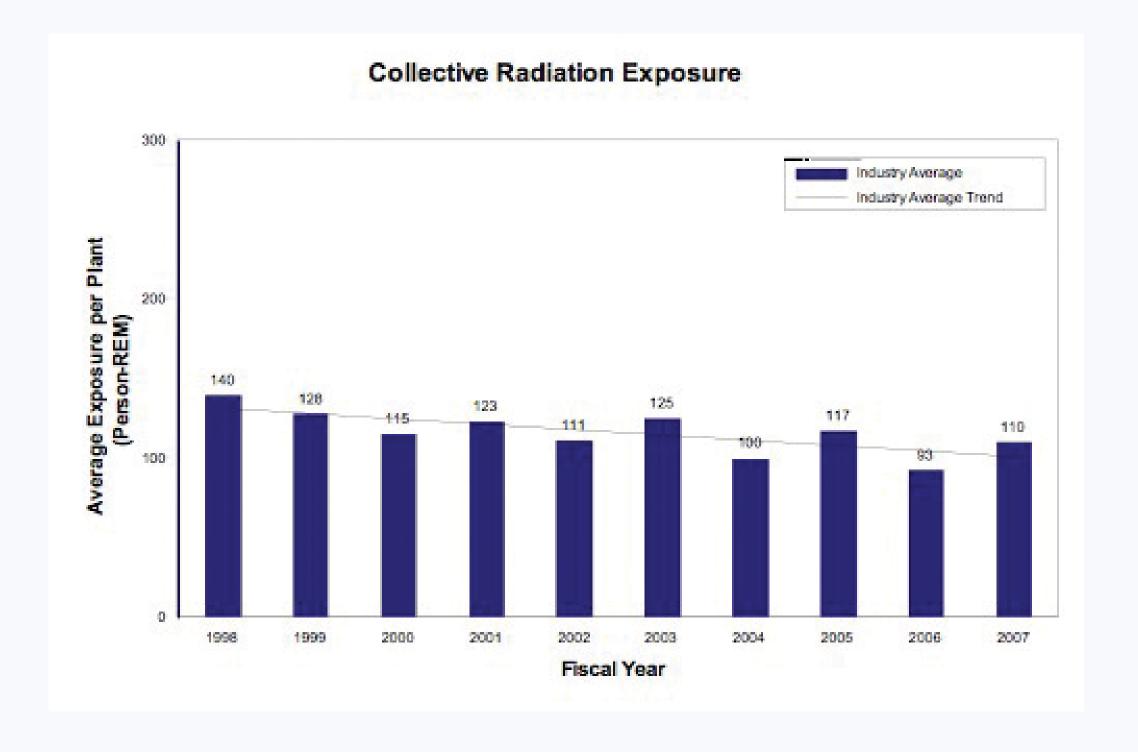


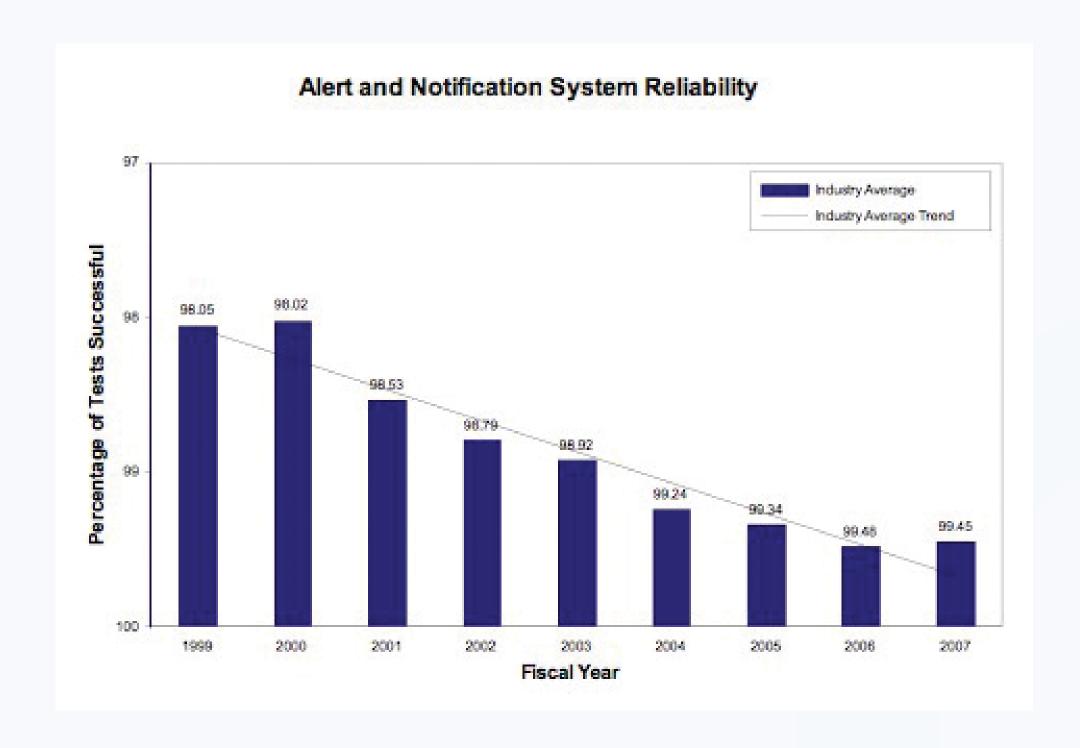


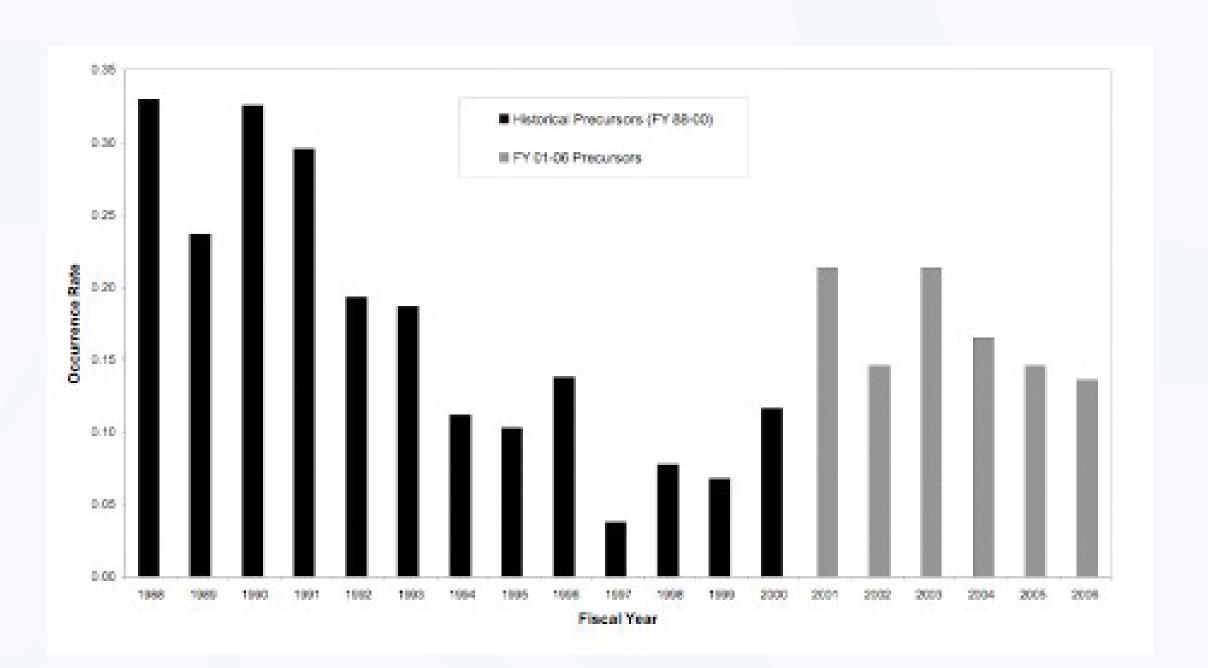












Total precursors—occurrence rate, by fiscal year. Data for FY 1988 – FY 2000 are shown for historical perspective. No trend line is shown because no statistically significant trend (p-value = 0.20) is detected for the FY 2000 – FY 2006 period.

*** Accident Sequence Precursor (ASP) program changes in FY 2001 (e.g., inclusion of significance determination process findings and external initiated events) significantly increased the number of precursors identified compared to those identified in previous years. These increases in scope have resulted in the reporting of a higher number of lower-risk precursors. In addition to the increases in ASP program scope, the increased number of outlier events (e.g., the 11 grid-related loss-of-offsite-power events in FY 2003 and FY 2004 as well as the 11 control rod drive mechanism housing cracking events between FY 2001 and FY 2003) accounts for the observed change.

REACTOR OVERSIGHT PROCESS ACTION MATRIX

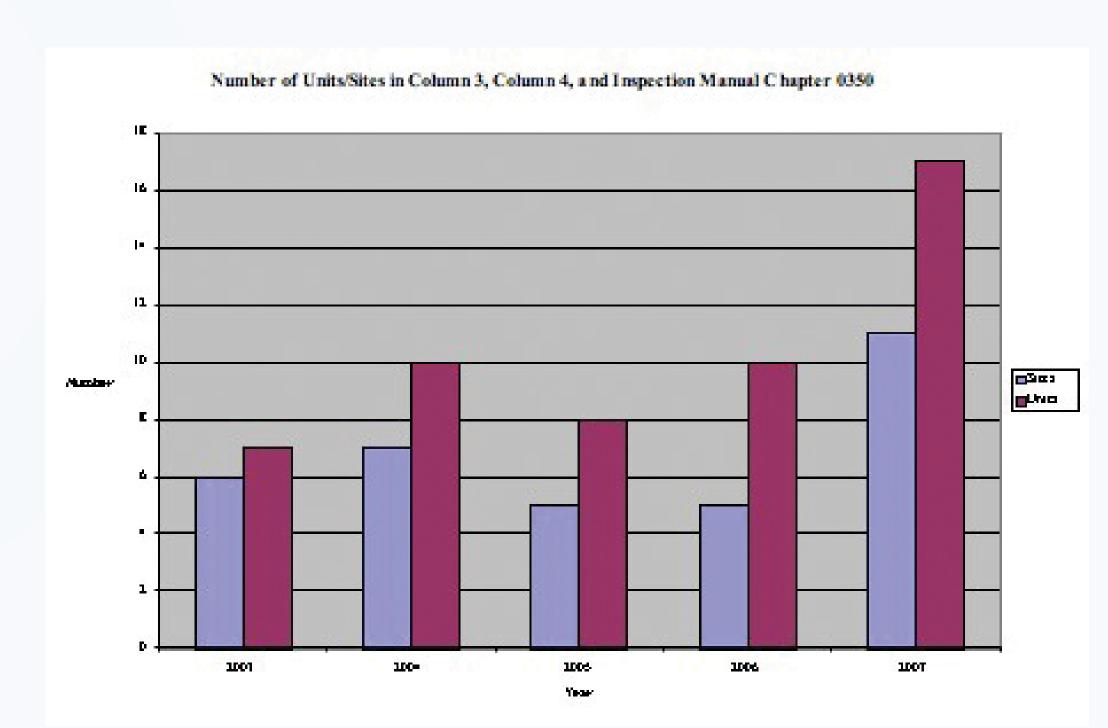
The NRC staff's review of the Reactor Oversight Process (ROP) Action Matrix results shows possible declining industry performance. In 2007, there were 17 reactors, representing 12 sites, in Columns 3 or 4 of the ROP Action Matrix. This is the highest number of reactors/sites in Columns 3 or 4 since the creation of the ROP in 2000.

Why the increase?

There are a number of different reasons why the 17 plants ended up in Columns 3 or 4. Some of these reasons include:

- Implementation of the Mitigating Systems Performance Indicator
- Risk-significant diesel generator issues
- Emergency preparedness issuesGas intrusion issues
- Breaker issues

Information about the ROP can be found on the NRC's public website at: http://www.nrc.gov/NRR/OVERSIGHT/ASSESS/



DIRECTION FOR 2008?

Is this an early sign of declining industry performance?

While industry trends indicate no statistically significant adverse trend in performance, the ROP shows a record number of plants with increased oversight. Although it is too soon to draw any conclusions on the cause of this divergence, the NRC staff will be closely monitoring industry performance in 2008 to ensure continued public health and safety for residents living around the nation's nuclear power plants.