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Driving Performance Improvements with the use of Key Performance Indicators

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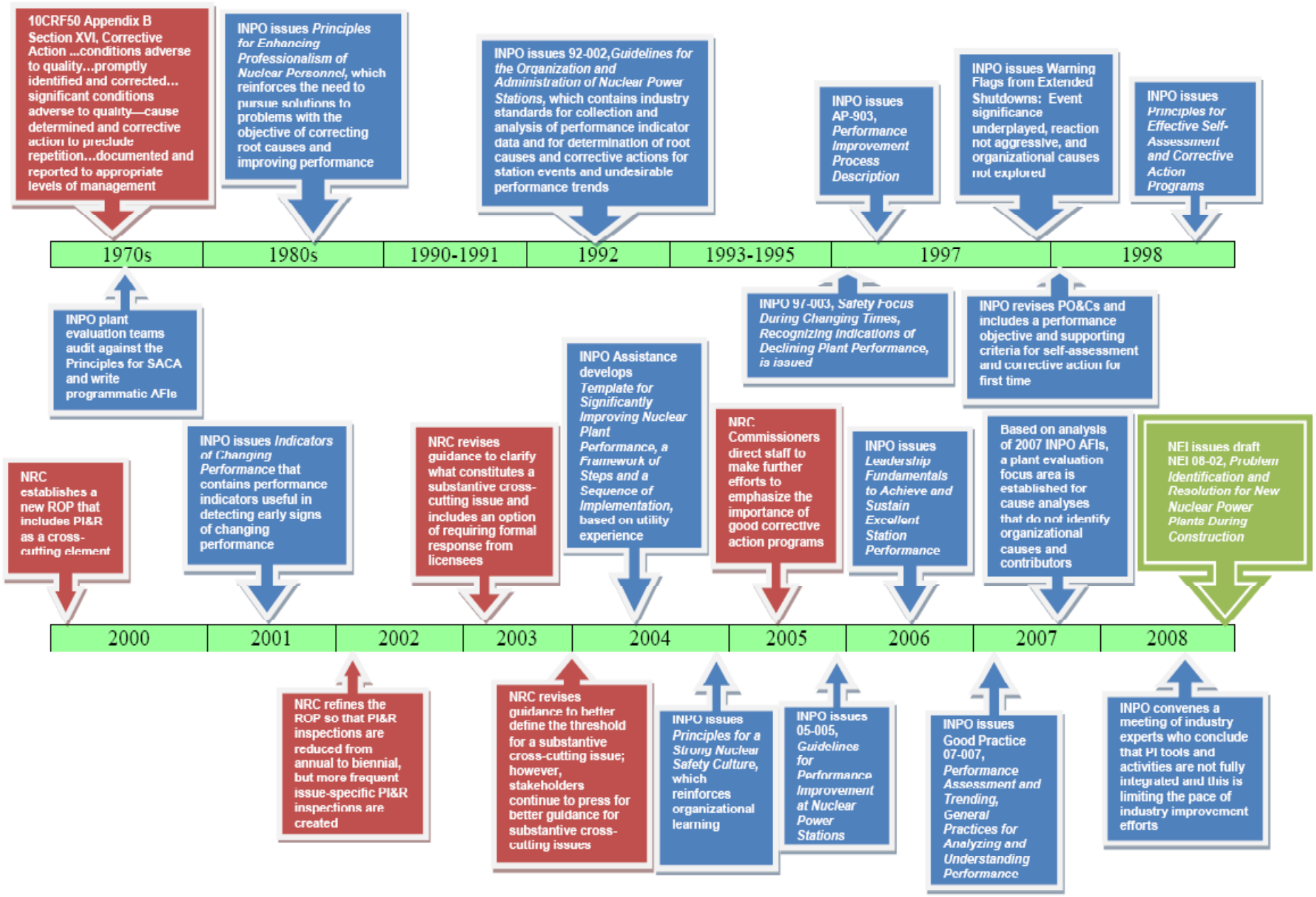
Driving Performance Improvements

- History of Industry Performance Indicators.
- Progress in Meeting Industry Performance Indicators.
- Calvert Cliffs Implementation of data tracking for performance indicators and performance improvements.
- Industry need to continue with improvements driven by challenging performance indicators.

Evolution of Performance Improvement Excellence



Evolution of Performance Indicators

- The Institute for Nuclear Power Operators (INPO) developed the earliest plant performance indicators to strengthen and support utility efforts in attaining high levels of performance after the accident at Three Mile Island, Unit 2.

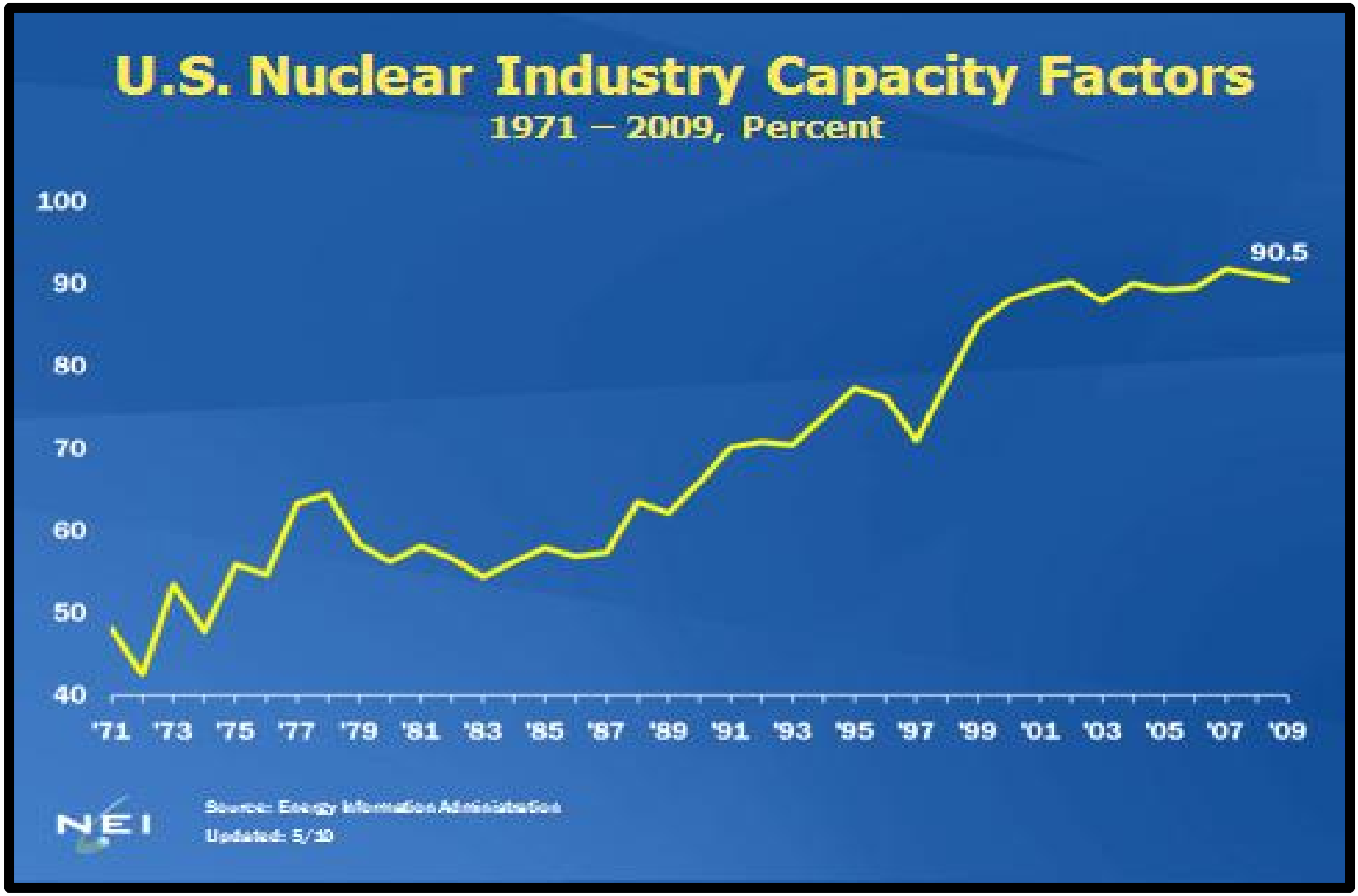
- 1986 the Nuclear Regulatory Commission (NRC) developed the Systematic Assessment of Licensee Performance (SALP)

- 1986 The World Association of Nuclear Operators (WANO) was established, after the accident at Chernobyl. By 1989 WANO adopted a refined set of INPO performance indicators, and in 1990 utilities had begun to collect and share WANO indicator data.

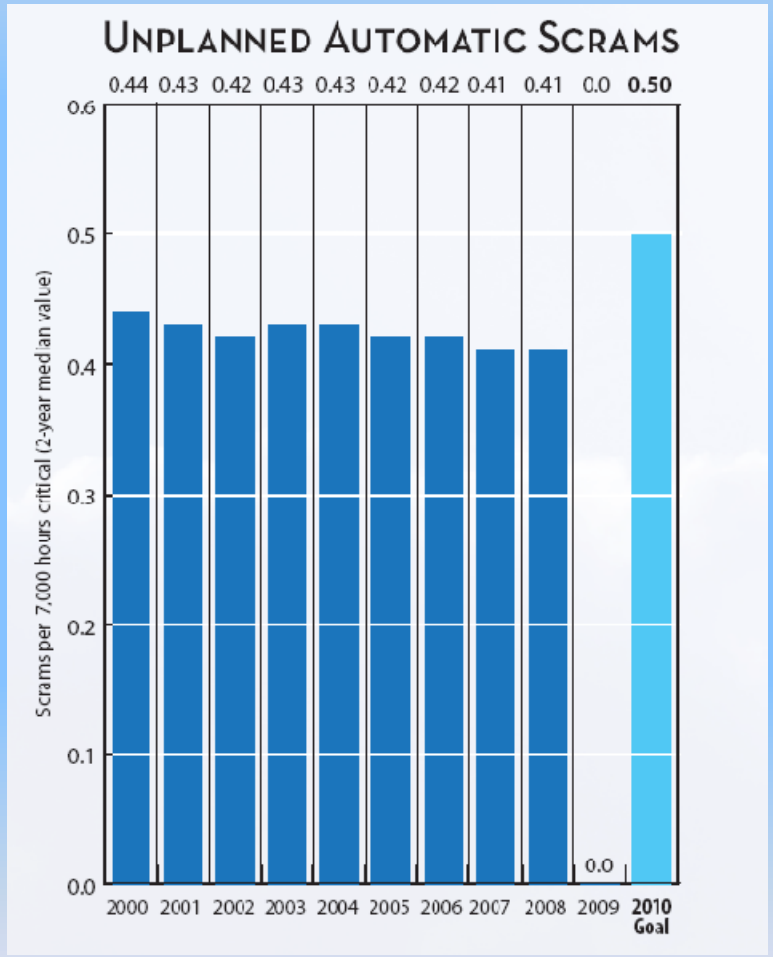
Evolution of Performance Indicators

- By 1990 – Deregulation in the US and restructuring of US electric utilities, created competition, producing an environment that gave utilities a strong incentive to operate their plants more safely and efficiently.
- Specific utility performance indicators were developed at each plant site in recognition of the many plant management and organizational factors that influence plant performance.
- In 2000 the NRC implemented a Revised Reactor Oversight Process (RROP), eliminating the SALP ratings. Objective performance indicators were developed for each important safety area cornerstone.

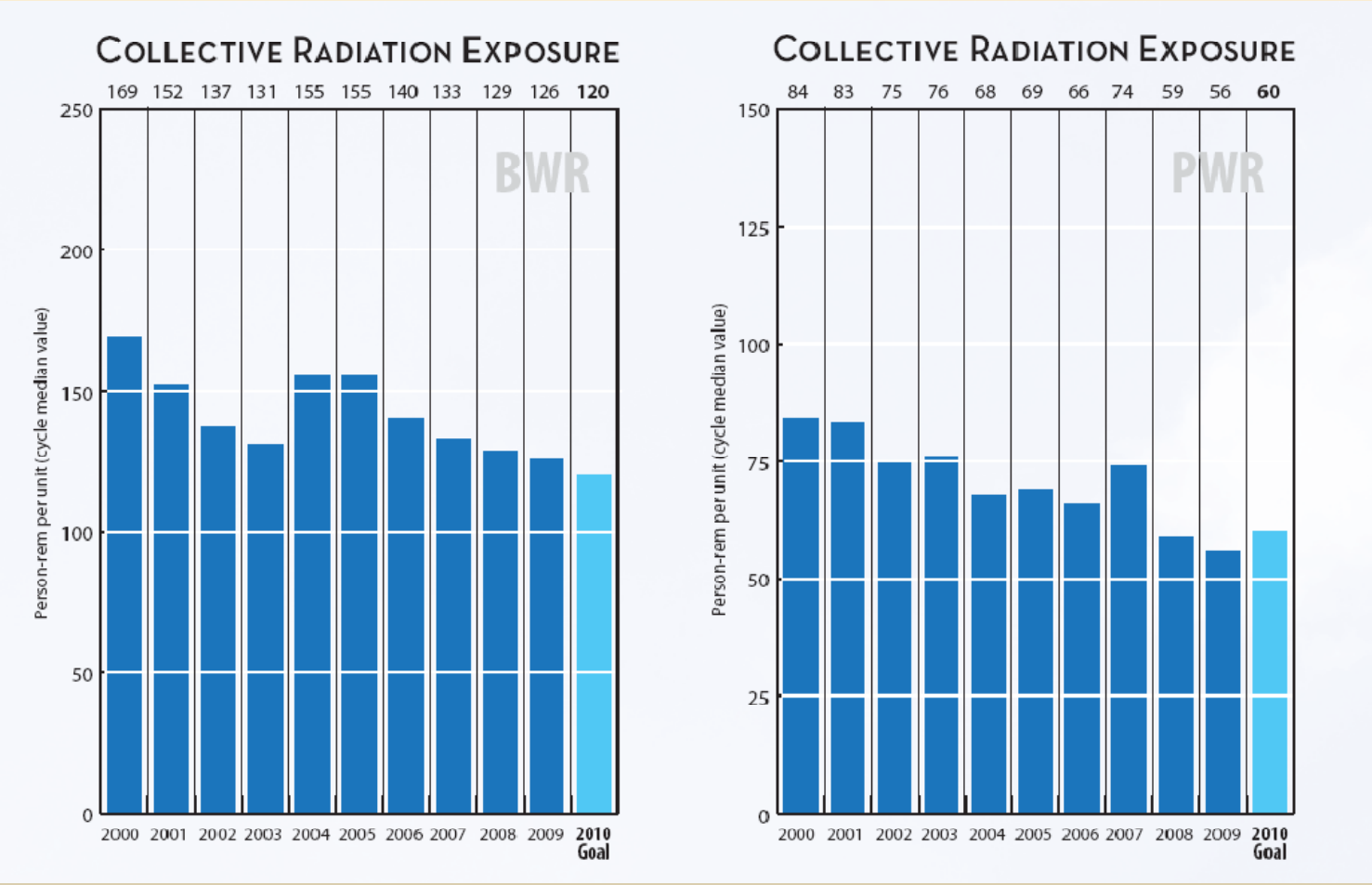
Industry Progress



Industry Progress



Industry Progress



Why do these Industry Indicators Improve Performance

- The effectiveness of INPO/WANO performance indicators is in part due to their ability to exert peer pressure on member sites.

- INPO actions are supported by its board of directors, which is composed entirely of nuclear utility executives. These executives set the industry goals for performance indicators once every five years.

- The numerical value assigned to a plant’s performance is a consideration in the reactor's insurance costs with the industry's collective insurance company.

Updates to Industry Indicators

- Long-term U.S. industry goals for performance indicators are established at five-year intervals to keep pace with performance improvements and industry changes.
- 2015 Industry goals have been developed for median Collective Radiation Exposure of 110 rem for BWRs, and 55 rem for PWRs.

Plant Specific Performance Indicators

- Performance Data Collection System
  Condition Reports, Corrective Actions, Observations, Operating Experience, benchmarking, self assessment.

- Performance Assessment Process that allows generation of key performance indicator data, trending data
- The key to success of lower tier indicators is that when gaps are identified managers take aggressive action to investigate and address the causes of declining performance at the individual indicator level.

Constellation Energy Nuclear Group Integrated Database - ePIC

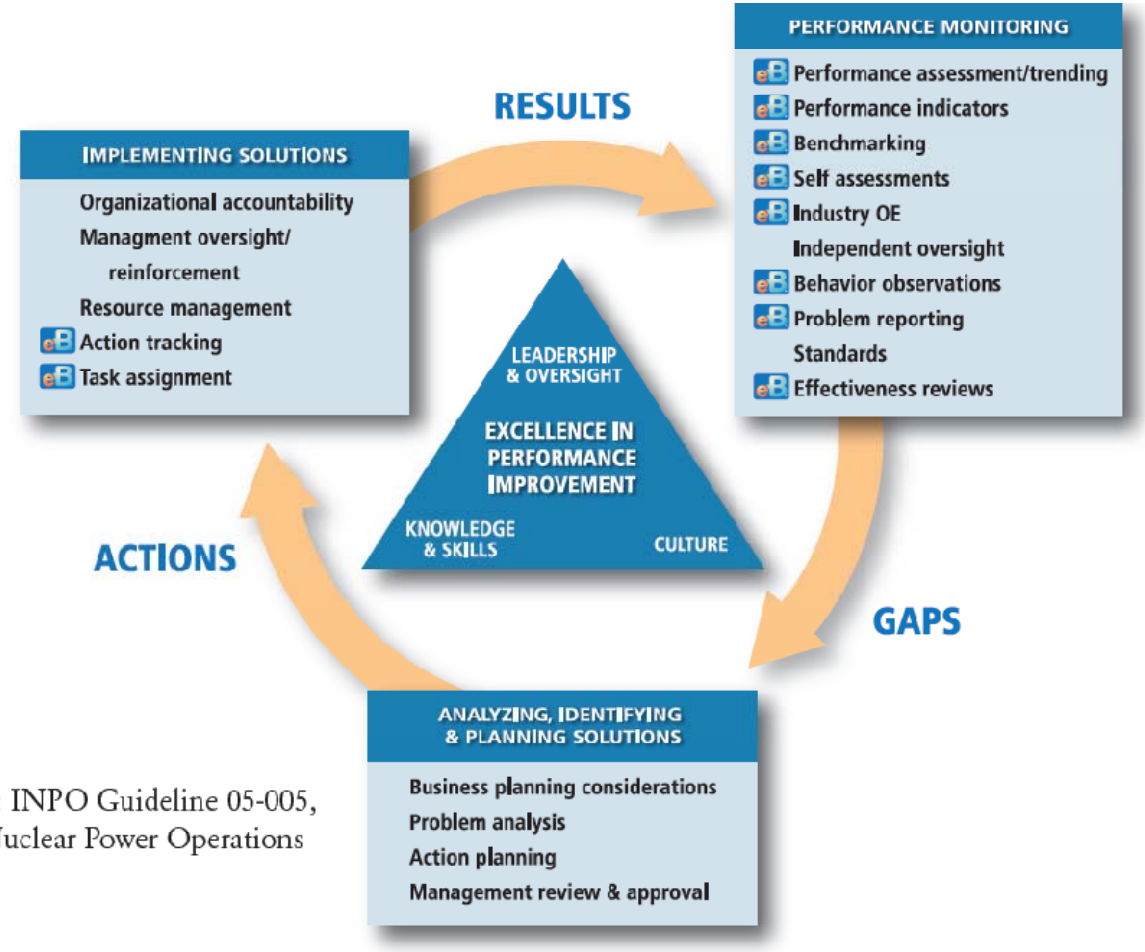


Figure 1 Source: INPO Guideline 05-005,
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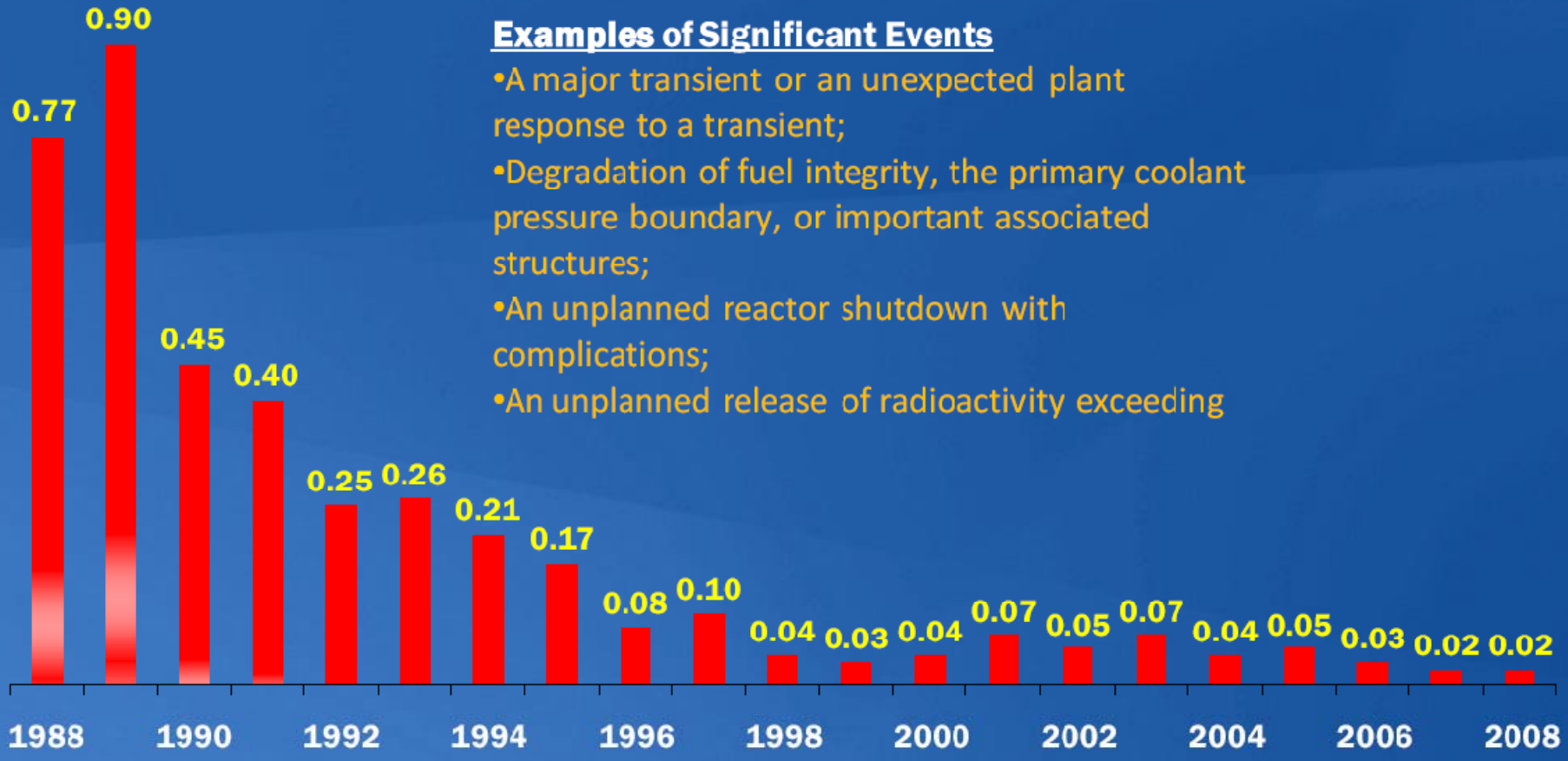
Significant Events at U.S. Nuclear Plants:

Annual Industry Average, Fiscal Year 1988-2008



Examples of Significant Events

- A major transient or an unexpected plant response to a transient;
- Degradation of fuel integrity, the primary coolant pressure boundary, or important associated structures;
- An unplanned reactor shutdown with complications;
- An unplanned release of radioactivity exceeding

NEI

Source: NRC Information Digest, 1988 is the earliest year data is available.
Updated: 4/10

Future of KPIs

- 80% of accidents involve culture, management, and/or human performance issues. Important to identify precursors to poor performance.
- INPO held a meeting in 2008 to begin development of human performance indicators.
- In 2011 new INPO indicators will be implemented for Emergency Planning, Work Management, and Corrective Actions. I
- In 2012 INPO will implement a new RP Index that includes a weighted compilation of collective radiation exposure, high radiation area controls, unplanned dose events, radioactive material found outside the RCA or protected area, and personnel contaminations.

Future of KPI's

- The interconnectivity of some of the indicators will be vital to industry improvements. Example - Chemistry Effectiveness Indicator (CEI) direct impact from source term on the Collective Radiation Exposure (CRE) Indicator. This indicator needs to address source term impact on outage dose.

Success with Performance Indicators

Important that we as an interconnected, interdependent, international nuclear community:

- Promote excellence rather than regulatory compliance,
- Promote close relationships with utility members
- Promote helping to improve nuclear power industry performance.

We as nuclear power plant operators have a dual responsibility: an *individual* responsibility to guarantee the nuclear safety of our own plants and a *collective* responsibility to work together to improve performance and continually upgrade the safety of operating plants worldwide. The use and sharing of performance indicator data helps the industry to accomplish this responsibility.