



Managing to Outcomes

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December 1, 2005



NRC Strategic Objective

Enable the use and management of radioactive materials and nuclear fuels for beneficial civilian purposes in a manner that protects public health and safety and the environment, promotes the security of our nation, and provides for regulatory actions that are open, effective, efficient, realistic, and timely.



Reaching the Objective

- Regulations and Standards
- Licensing
- Inspection
- Enforcement
- Setting Goals and Measuring Outcomes



Safety Outcomes & Measures

Performance monitored and measured through use of graded approach

- Strategic Outcomes
- Performance Measures
- Abnormal Occurrence Criteria
- Reporting requirements/precursor metrics

Significant adverse trends are identified

Individual licensees with performance issues are identified



Strategic Outcomes

- Very high thresholds
 - No deaths resulting from acute radiation exposures
 - No inadvertent criticality events
 - No releases of radioactive materials that result in significant radiation exposures
 - No releases of radioactive materials that cause significant adverse environmental impacts
- No events that met these thresholds between FY 2001- 2005



Performance Measures

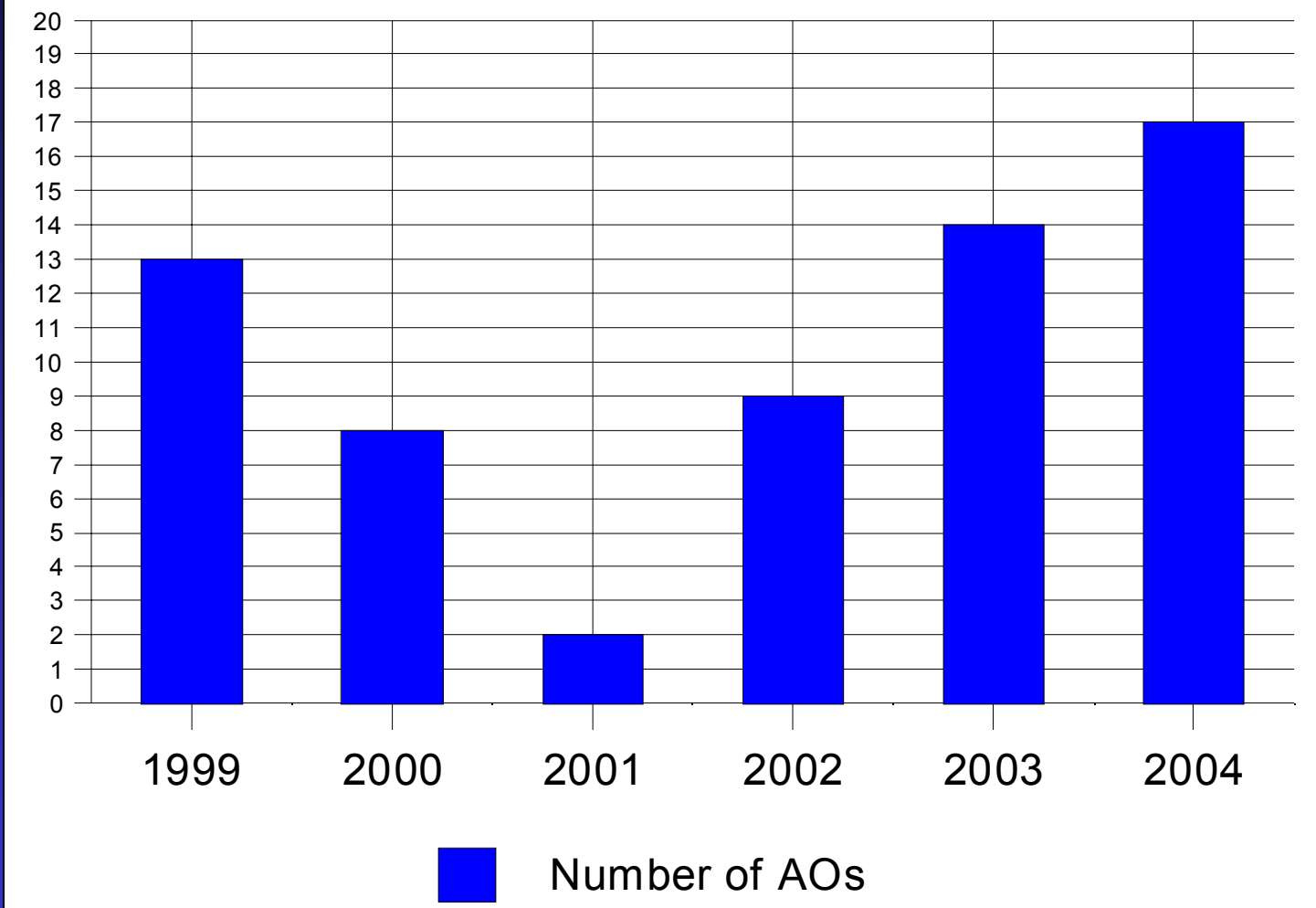
- Zero unrecovered losses or thefts of risk-significant radioactive sources (0 in 2005)
- Not more than five releases to the environment that exceed regulatory limits (0 releases in 2005)
- Less than 6 radiation exposures to the public and occupational workers that exceed the Abnormal Occurrence criteria for human exposure (1 exposure in 2005)



Abnormal Occurrences

- A higher level threshold to measure more significant events
- Only a few events that meet AO criteria (10 potential events in FY 2005, 6-year average prior to 2005 is 10.5 events per year)
- No significant trends identified

ABNORMAL OCCURRENCES FISCAL YEARS 1999 - 2004





Reportable Events/Precursor

- Less than 2.5 total events per 100 licensees per year that meet reporting requirements
 - Average 515 events per year
 - Estimated 21,609 total NRC and Agreement State licensees*
- Further Perspective: even lower rate of occurrence if equated to the number of actual uses/procedures performed per year by these licensees

* Based on 21,609 materials licensees (4,500 NRC and 17,109 Agreement State). See 2004 NRC Information Digest (NUREG-1350).



Examples of Actions Taken

- Radiography source cable failures. Report issued and licensees notified – no further events of this kind.
- Intra-Vascular Brachytherapy misadministrations (medical events). Modifications were made to the licensing requirements for these devices to address the root causes. The result has been a reduced number of these events.
- High frequency of lost or stolen portable gauges. In this case the result was a change in the regulations, requiring additional securing of gauges. Too early to evaluate impact.



Conclusions

- Safety measures have many uses for a regulator
 - Spotting negative industry trends and individual licensees with performance problems
 - Helping to identify areas where regulatory action such as rulemaking may be needed
 - Helping the regulator identify internal areas for improvement
- Standards alone are not enough, we must ensure they are effective by measuring outcomes and taking action when necessary.
- Safety measures must be continually re-evaluated to ensure they are appropriately sensitive



Threshold Definitions

Regulatory Release Limits

This performance measure is defined as any release that exceeds applicable regulations as defined in 10 CFR 20.2203(a)(3) and requires a 30 day written report i.e., any release that results in concentrations of radioactive material that exceeds 10 times any applicable limit in 10 CFR Part 20.



Threshold Definitions

- Abnormal Occurrence Criteria
 - Exposure Examples: Annual dose (TEDE) greater than 250 mSv or 2,500 mSv to an individual organ other than the lens of the eye bone marrow or gonads.
 - Medical Event Examples: $> 1\text{Gy}$ to major portion of bone marrow, lens of the eye, or gonads or $> 10\text{Gy}$ to any other organ; and either a dose 50% greater than prescribed or is the wrong pharmaceutical.