

# Getting to the Root Causes of Non-Compliance: A Prescription for Prevention

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# Objectives

- To emphasize how stakeholders *really* evaluate radiation safety programs and the important role compliance plays in this assessment
- To *objectively* identify the common violations issued to permit holders in Texas
- Show how this data can be put to use for *prevention* by identifying the root causes of non-compliance
- Make you an offer you *can't* refuse!



# Health and Safety Outcome Measures

- *Systemic*: ultimate program outcomes
  - ✓ number of injuries, illnesses, fatalities
  - ✓ OSHA 200 log or equivalent
  
- *Organic*: indicators of program design and implementation
  - ✓ numbers of unsafe conditions, practices, behaviors, attitudes
  - ✓ regulatory compliance



# A Word About Inspections *(to the regulated community)*

- The public and the radiation safety profession benefit from the compliance inspection process.
- These works are intended to make permit holders aware of the common deficiencies, so they can be avoided.
- This should not be done to the exclusion of other important safety tasks!



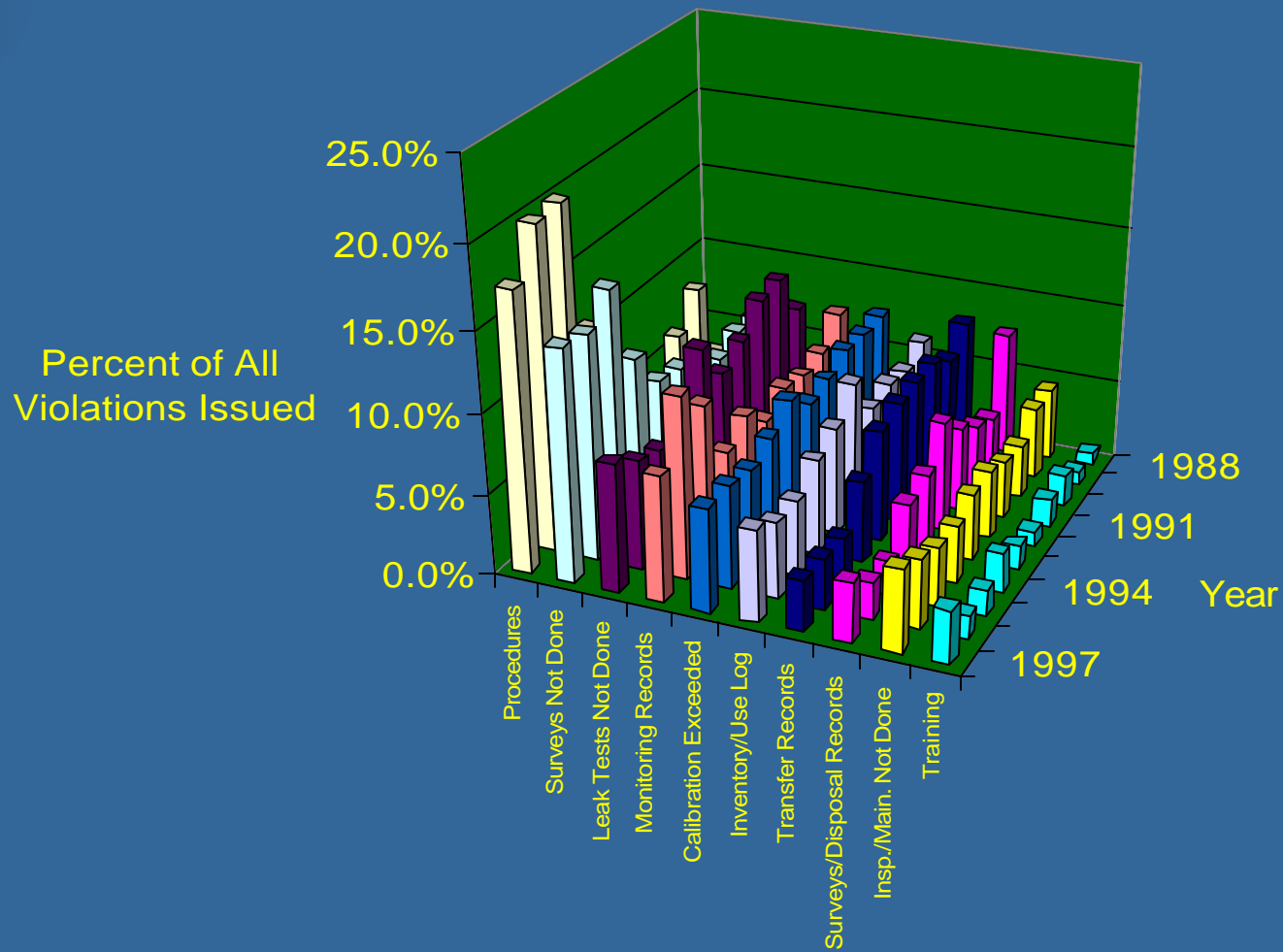
## Licensees: Top Ten Violations 1988-1997

> Procedures	11%	> Inventories	6%	
> Absent surveys	10%	> Transfer records	6%	
> Leak testing	8%	> Disposal records	4%	
> Personnel monitoring	7%	> Main program	4%	
> Instrument calibration	7%	> Training	2%	
			<b>Total<sup>†</sup></b>	<b>65%</b>

**<sup>†</sup>Annual Top Ten Varied from 55% to 75% of all NOVs**



# Licensee: Top Ten Violations By Year 1988-1997



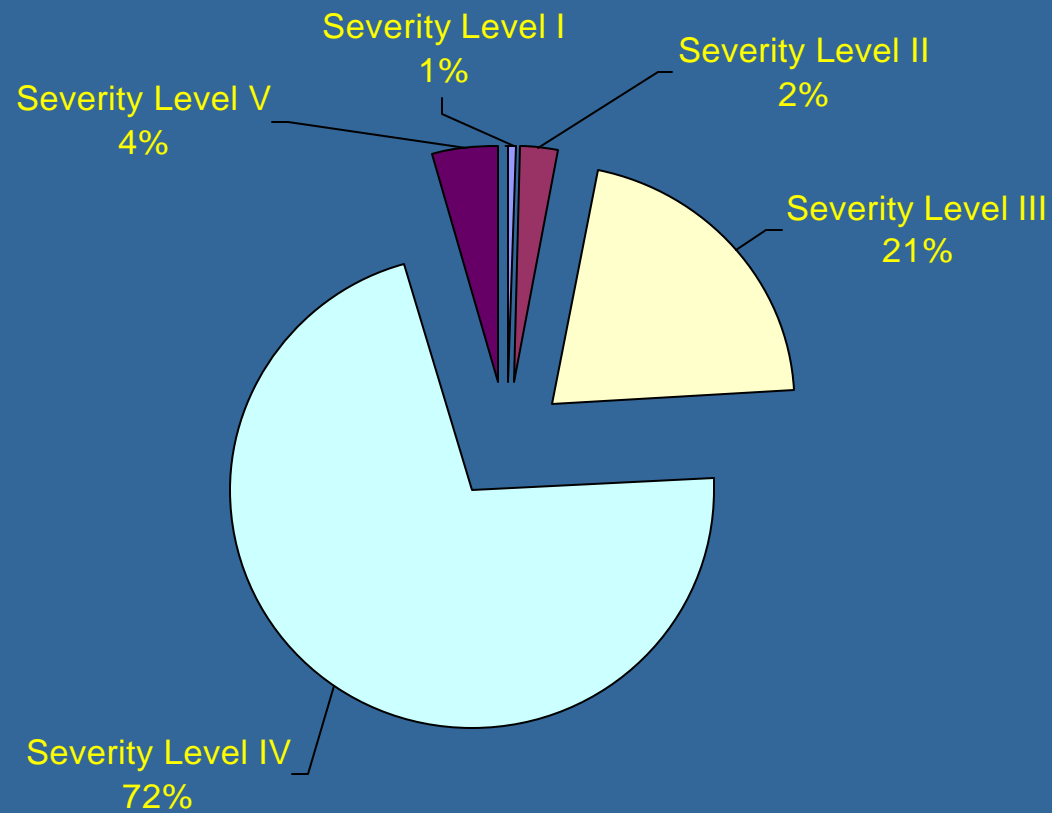


# Licensee NOV's by Regulatory Citation: 25 TAC 289

- > 202(e) Radiation protection program 17%
  - > 201(g) Sealed source leak test 16%
  - > 202(p) Surveys and monitoring 11%
  - > 201(o) General public dose limits 8%
  - > 201(d) Receipt, transfer, disposal records 8%
- > Top five account for 60% of total, based on 1999 data.



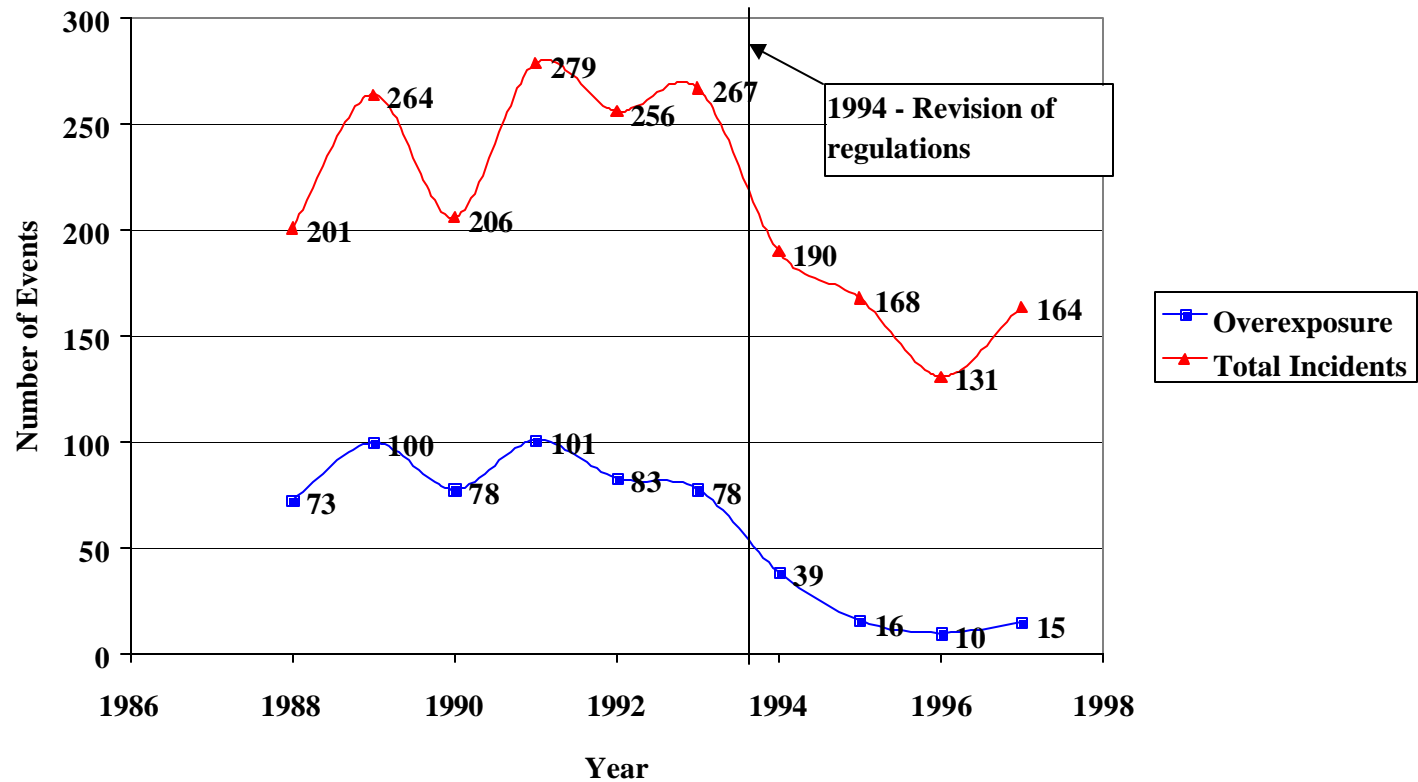
# Licensee Violations Severity Level Distribution 1988-1997





# Educational Value

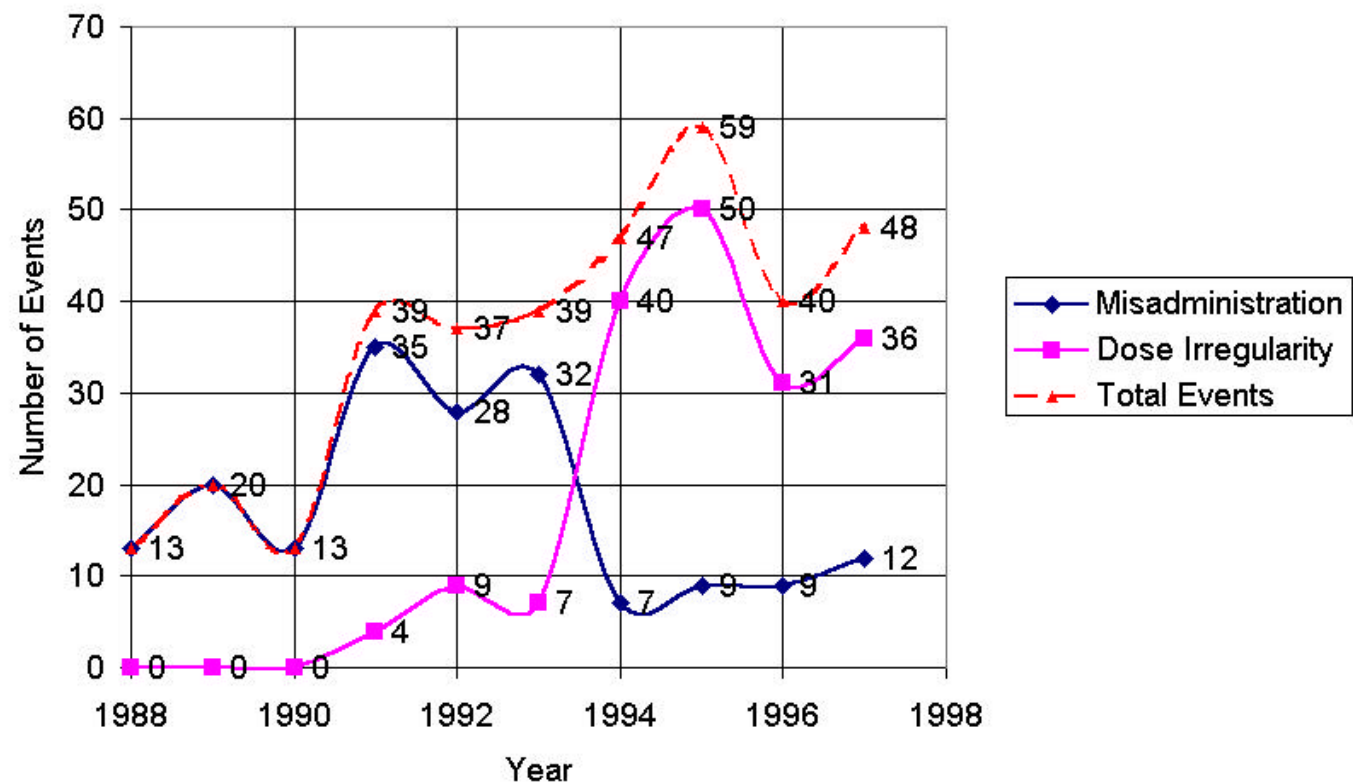
Figure 2: Summary of overexposure and total incidents reported to the Texas Department of Health, Bureau of Radiation Control from 1988 to 1997.





# Educational Value

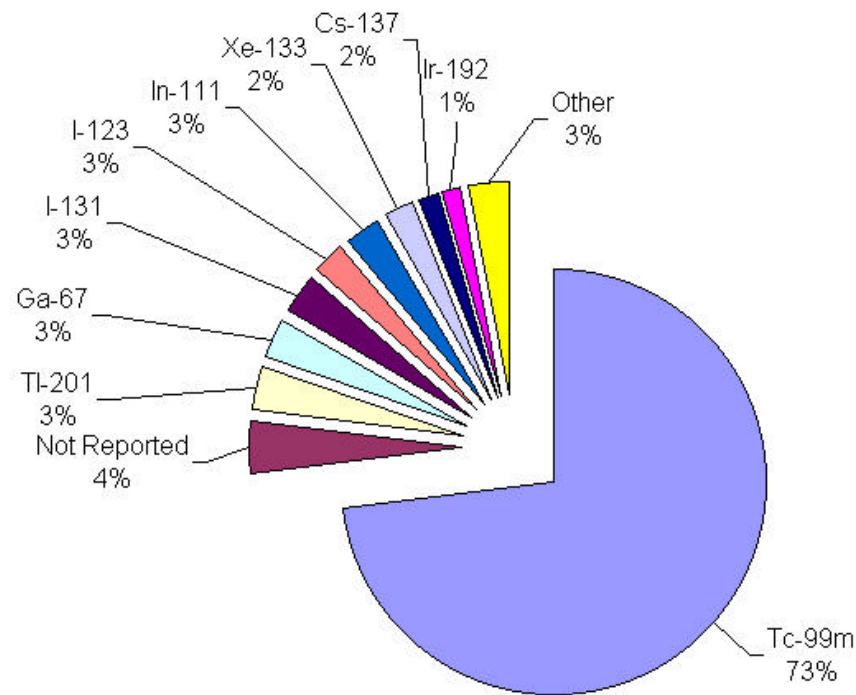
Figure 1: Dose irregularities, misadministrations, and total misapplication events reported in Texas from 1988 to 1997 (n=355).





# Educational Value

Summary of reported misadministrations and dose irregularities from 1988 to 1997 in Texas by radionuclide (n=355).

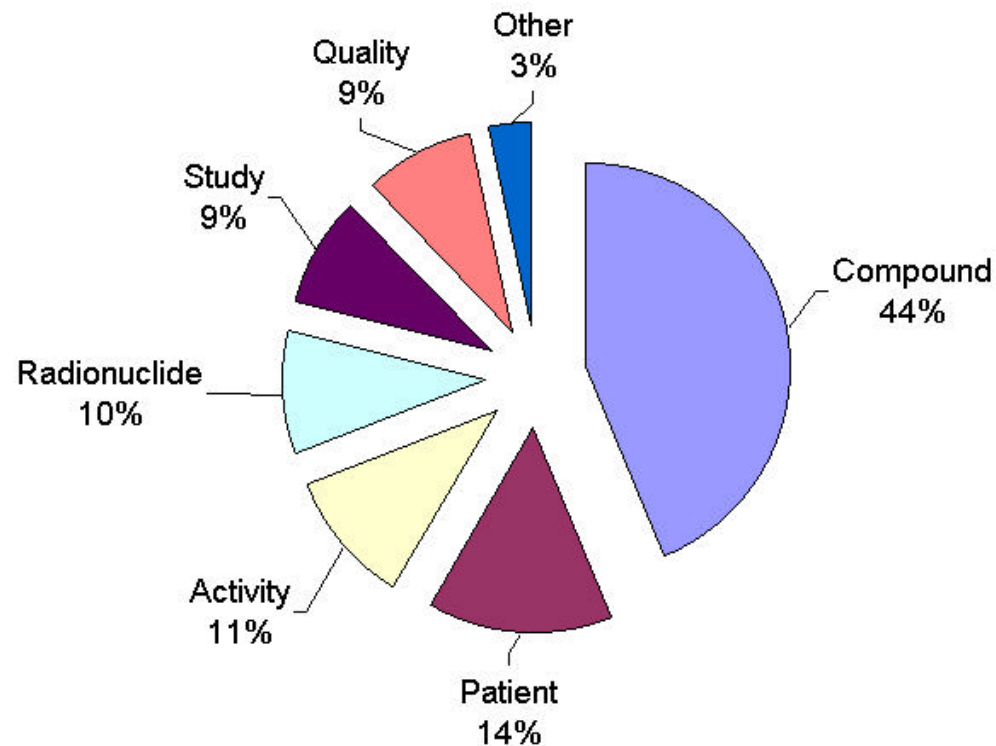


Other includes: I-125, Co-57, Au-198, P-32, Sr-89.



# Educational Value

Summary of reported misadministrations and dose irregularities from 1988 to 1997 by application process variable (n=355).



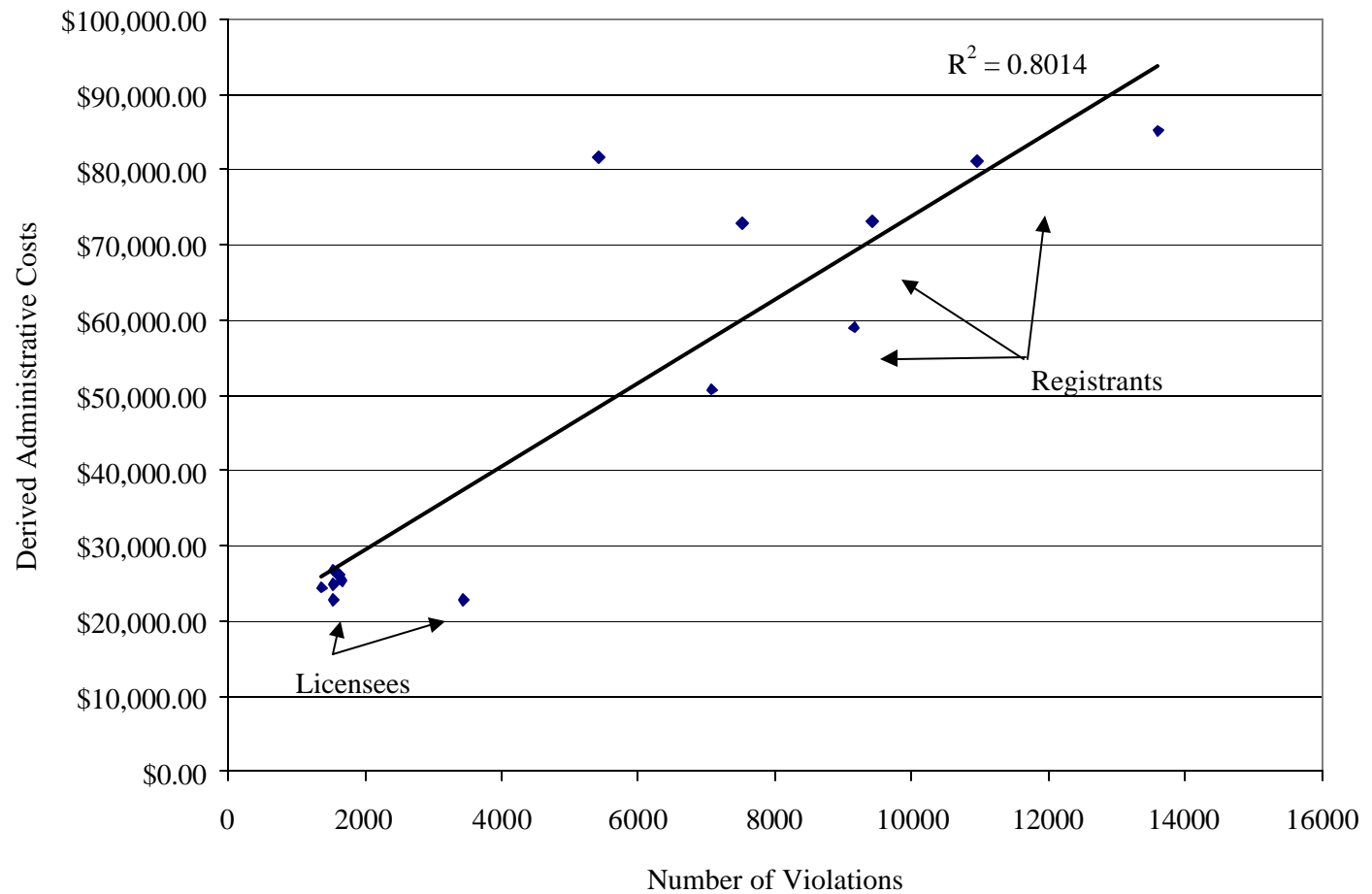


# What Does All This Cost?

- Estimating the administrative cost to the BRC associated with the issuance of violations:
  - ✓ baseline cost of inspection process
  - ✓ some added cost to issue and resolve NOV's
  - ✓ if this added cost could be estimated, then reductions through education could be quantified
- Cost to the permit holders not included, but equally important



# Estimating the Cost





# The EU (Emery Unit)!

*Administrative dollars per NOV saved, at STP*





# The Next Step: Root Cause Analysis

## *Ex: Sealed Source Leak Test NOV*

### > Problem

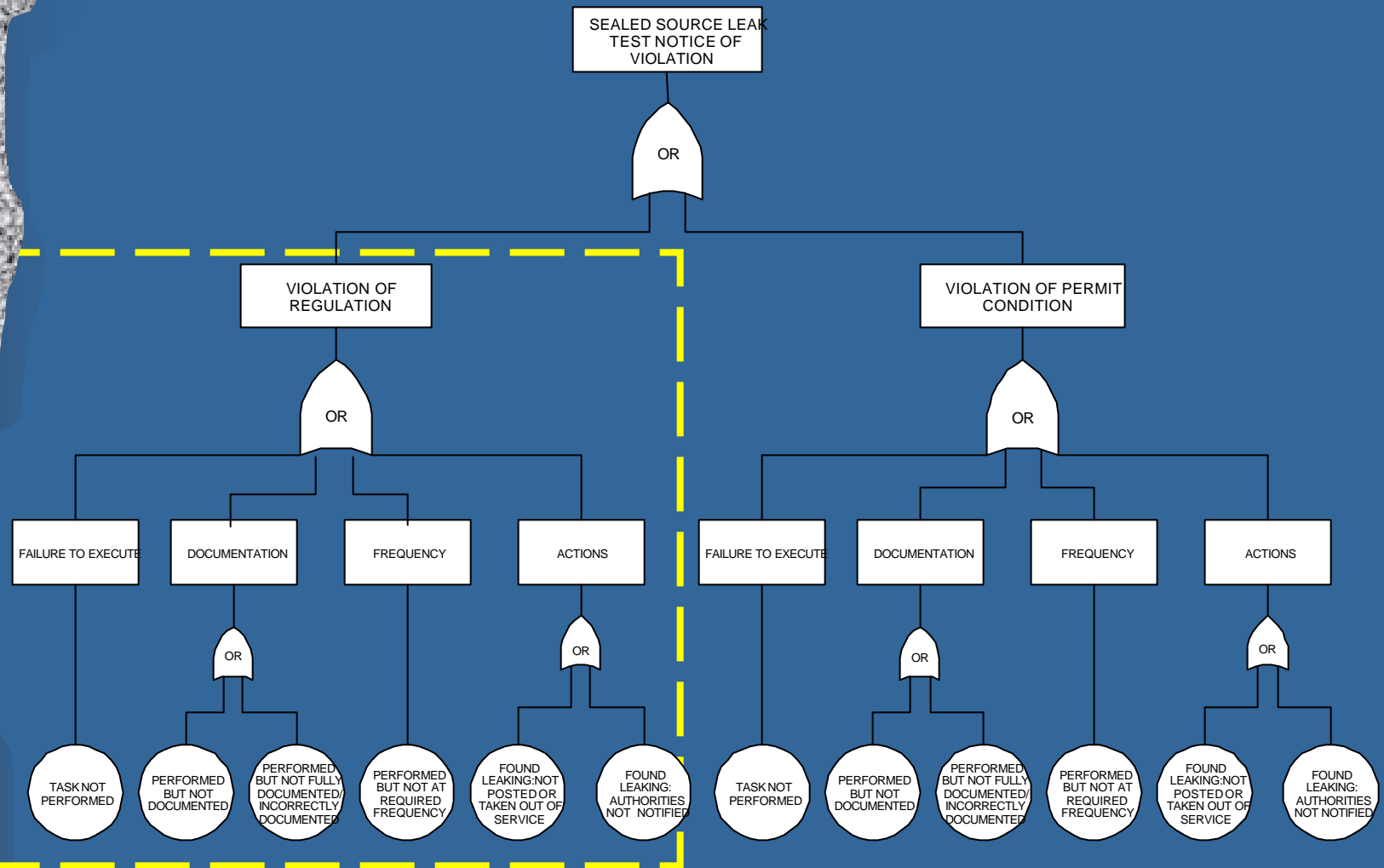
- ✓ Done or not done
- ✓ Ever? Or not at proscribed frequency?
- ✓ Time frame based on permit condition or regulation?
- ✓ Documentation incomplete?
- ✓ Found leaking, but not reported?

### > Root Cause

- ✓ Failure to execute
- ✓ Frequency
- ✓ Violation of regulation or permit condition
- ✓ Completeness
- ✓ Inappropriate actions

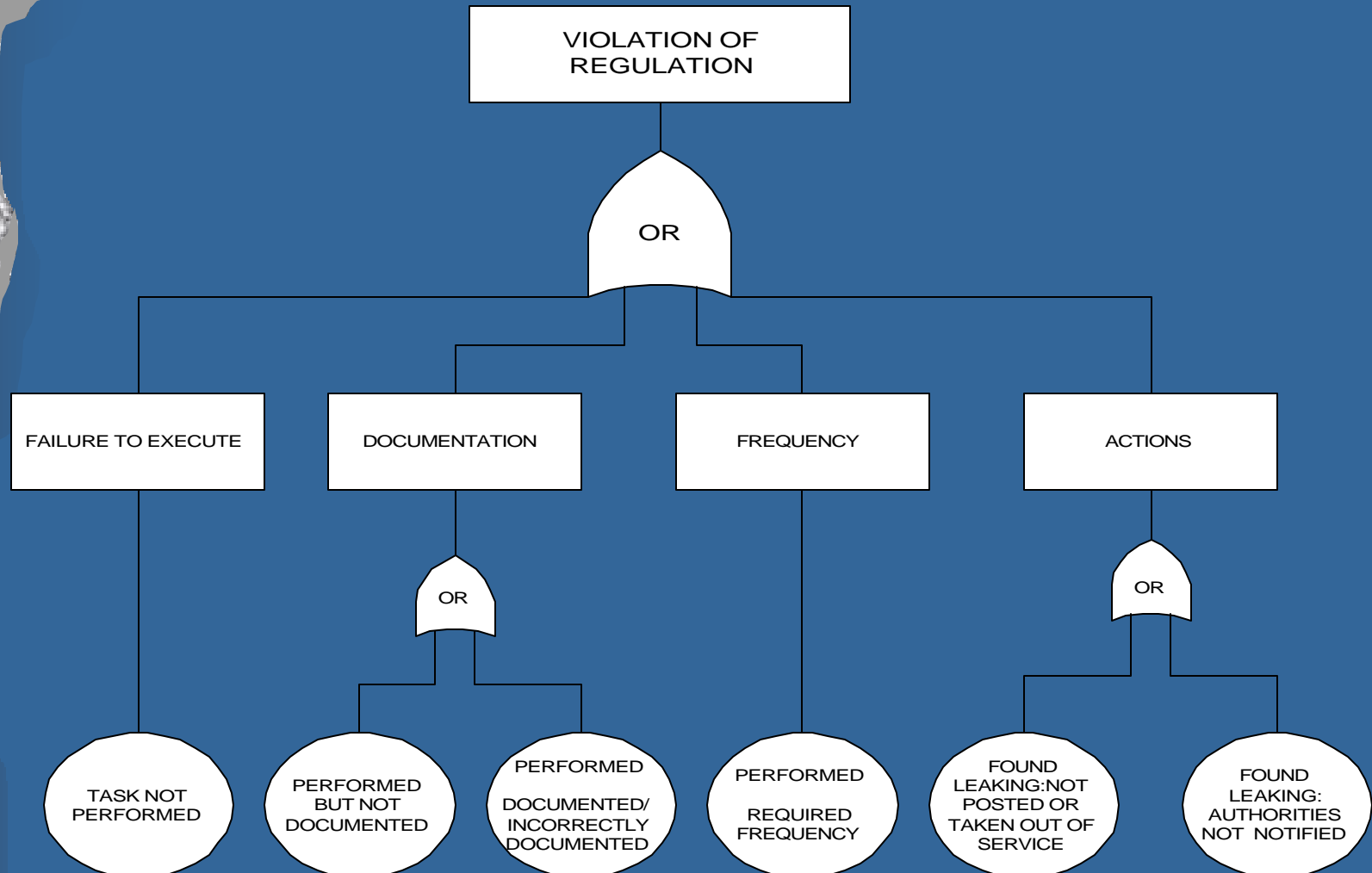


# Fault Tree Analysis: Sealed Source Leak Test NOV



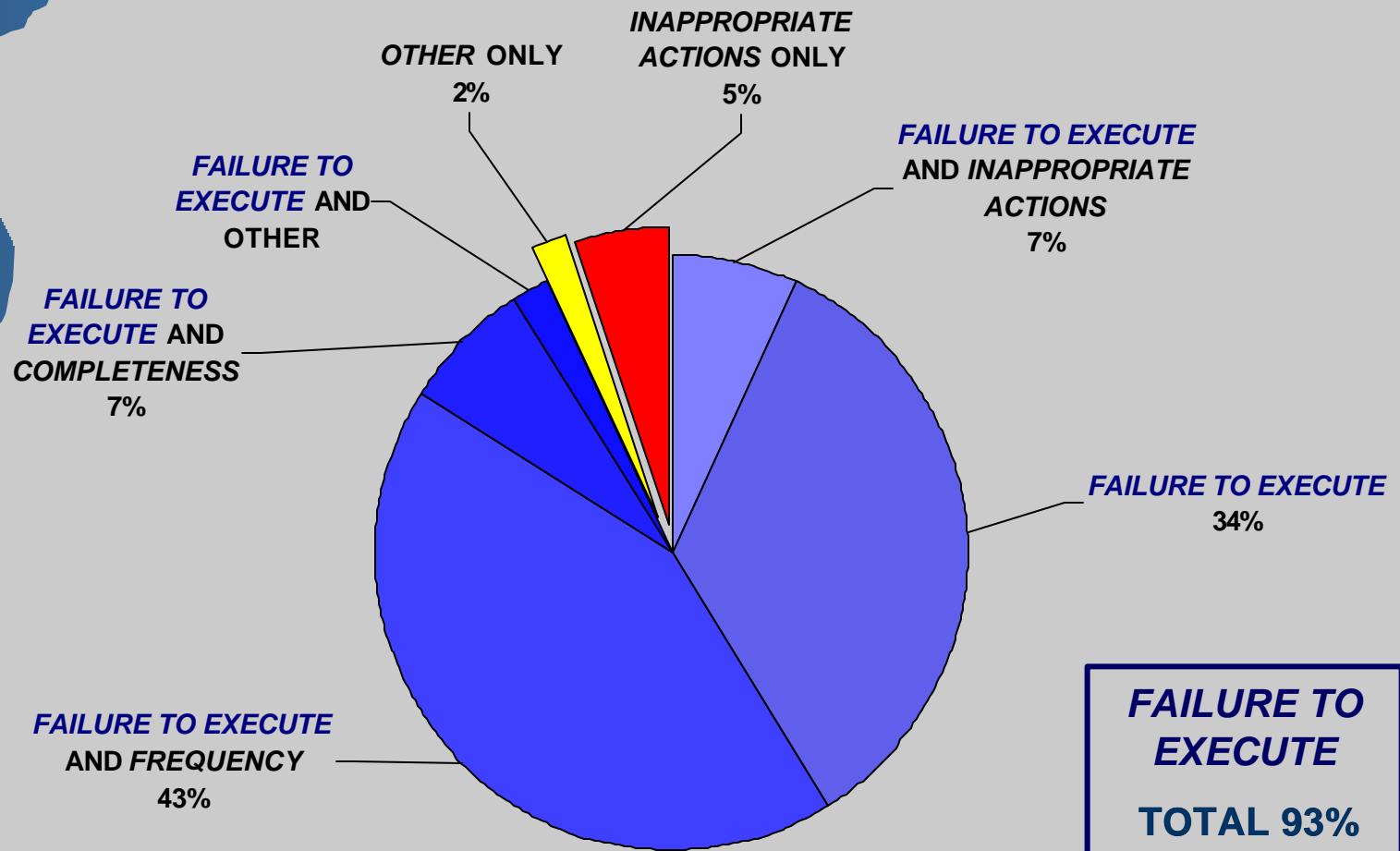


# Fault Tree Analysis: Sealed Source Leak Test NOV





# Results of Analysis





# Implications

- Consider the findings within the context of the regulator's common plea: read your permit!
  - ✓ Do the permit holders really know what they are supposed to do?
- What can be done to improve compliance?
  - ✓ create summaries of requirements inherent to permits and their identified regulations?
  - ✓ modify the way RSO's are trained?
  - ✓ re-structure permit inspection process?



# What About Other States?

- Are the trends shown here consistent?
- Are the root causes consistent?
- Could there be some basic, simple interventions?



# Proposal to OAS

- To facilitate comparisons, *here's the deal*:
  - ✓ identify number of licensees and average number of NOV's per permit inspection
  - ✓ we'll calculate an appropriate sample size and sampling strategy
  - ✓ you get the coding forms completed
  - ✓ "we" (grad student) will summarize and analyze as their research project
  - ✓ findings provided to you and OAS



# We Need to Stress That We're All in the Same Pool!



- By any measure, the radiation safety record is excellent!
- This success is due in part to the inspection process: hate it or love it, it benefits all.
- NOV outcome data can be valuable for prevention
- Emphasize the common goal and work together to achieve it!



# References

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