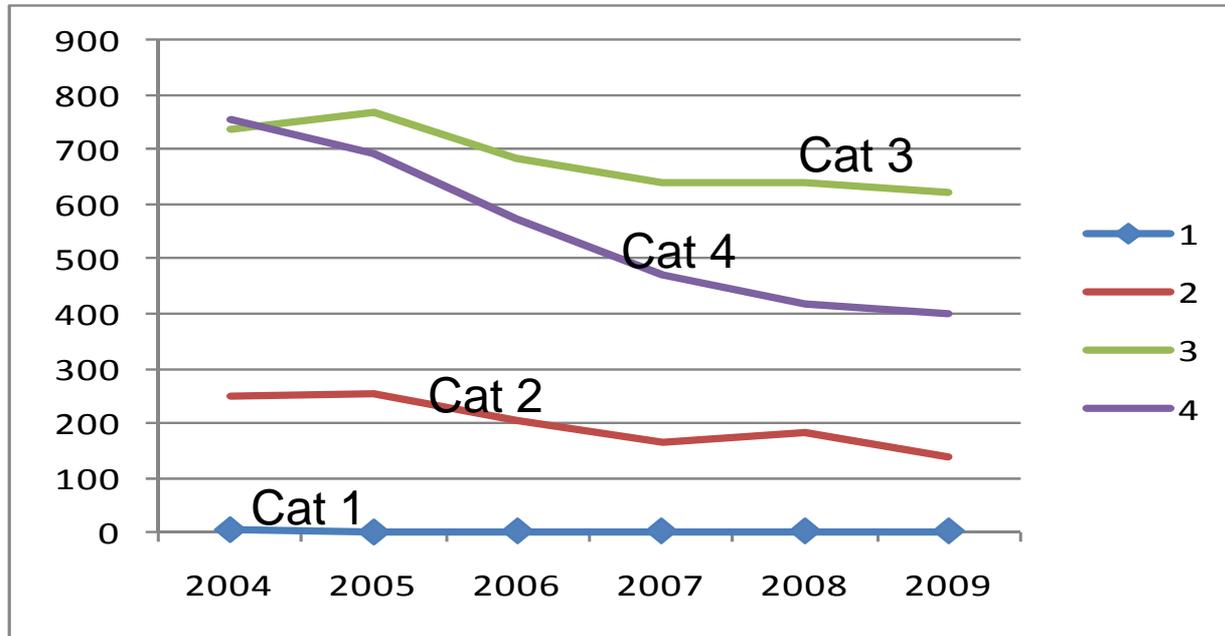


## ORPS trends 2004–2009: What's important now?

- Annual and Quarterly Trends by Frequency and Significance
- Reporting Criteria
- Patterns of Causal Attribution.
- Facility, Activity, ISM and QA Code
- Take-Aways to Consider

# Events per Year by Significance Category



Year	Sig 1	Sig 2	Sig 3	Sig 4	OE	R	Totals
2004	5	248	739	748	10	23	1773
2005	1	253	764	693	15	30	1756
2006	3	202	684	571	8	23	1491
2007	3	167	640	467	11	7	1295
2008	3	181	643	420	9	17	1273
2009	3	137	618	400	9	8	1175

From 2004/5 – 2008/9

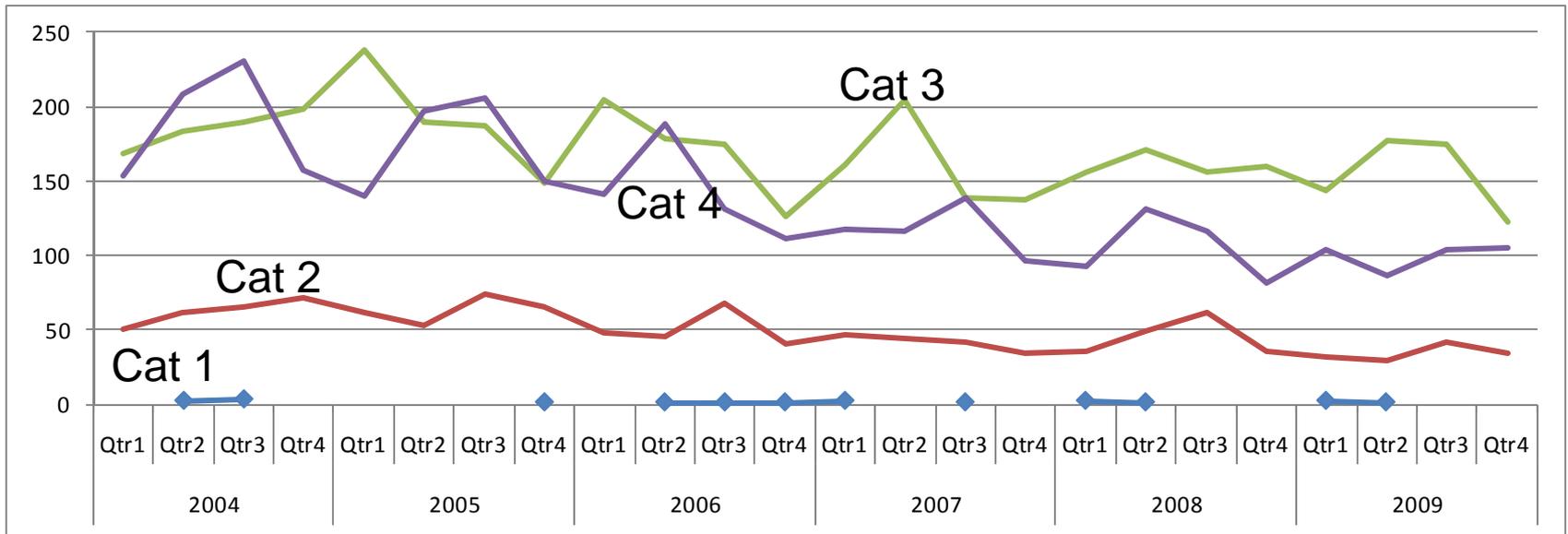
Cat 1 steady

Cat 2 down ~40%

Cat 3 down ~17%

Cat 4 down ~43%

# Events per quarter by Significance Category



Cat 3 events appear to spike ~20-25% in the 1<sup>st</sup> or 2<sup>nd</sup> quarters of each year. Why? Are these seasonal fluctuations due to vacation or work scheduling?

Reduced Cat 4 reporting appears to precede increases in Cat 3 events. Would encouraging more Cat 4 reporting lead to better performance?

# Primary Criteria Contributing to Cat 4 Spikes

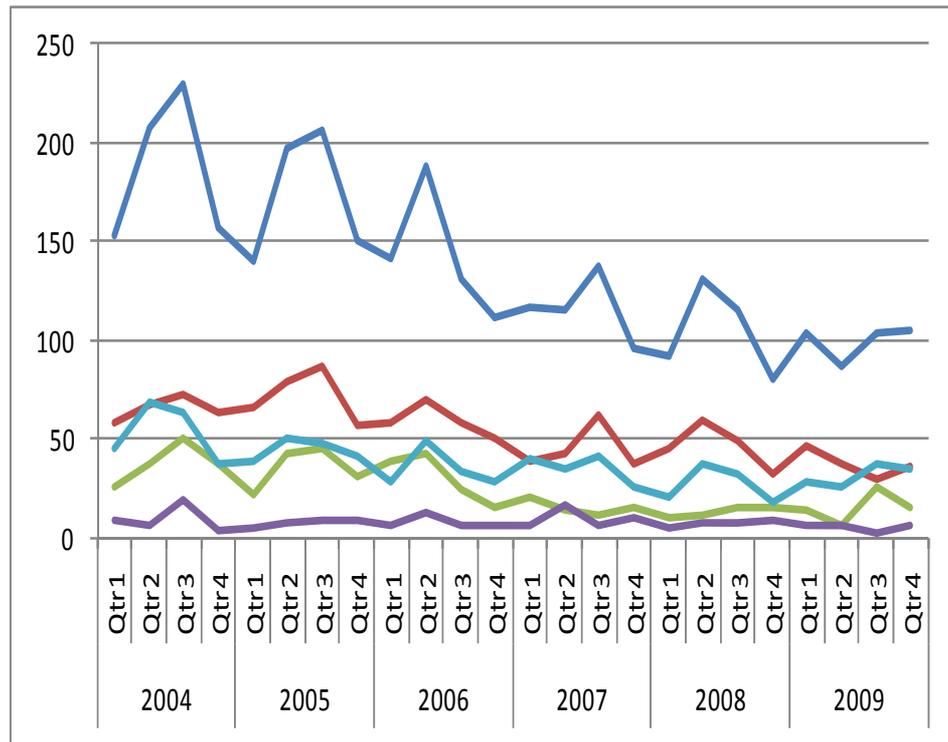
Total Cat 4 Events

Management. Concerns

Facility Safety

Contamination & Rad Control

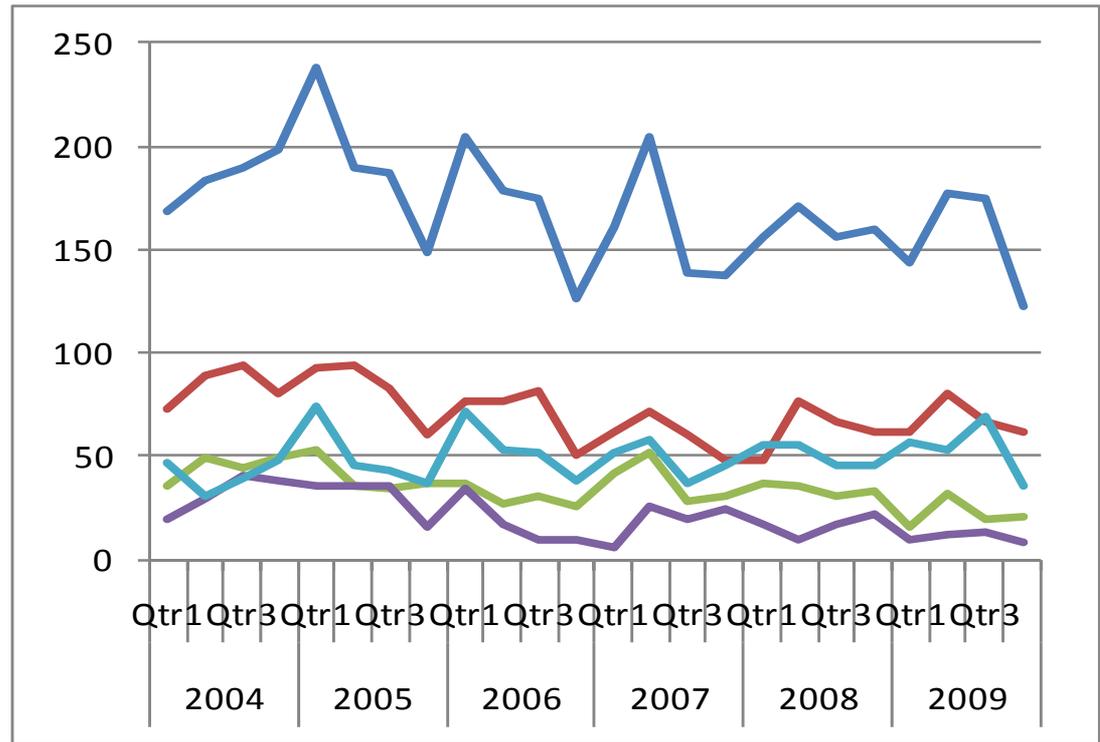
Noncompliance Notifications



# Primary Criteria Contributing to Cat 3 Spikes

Total Cat 3 Events

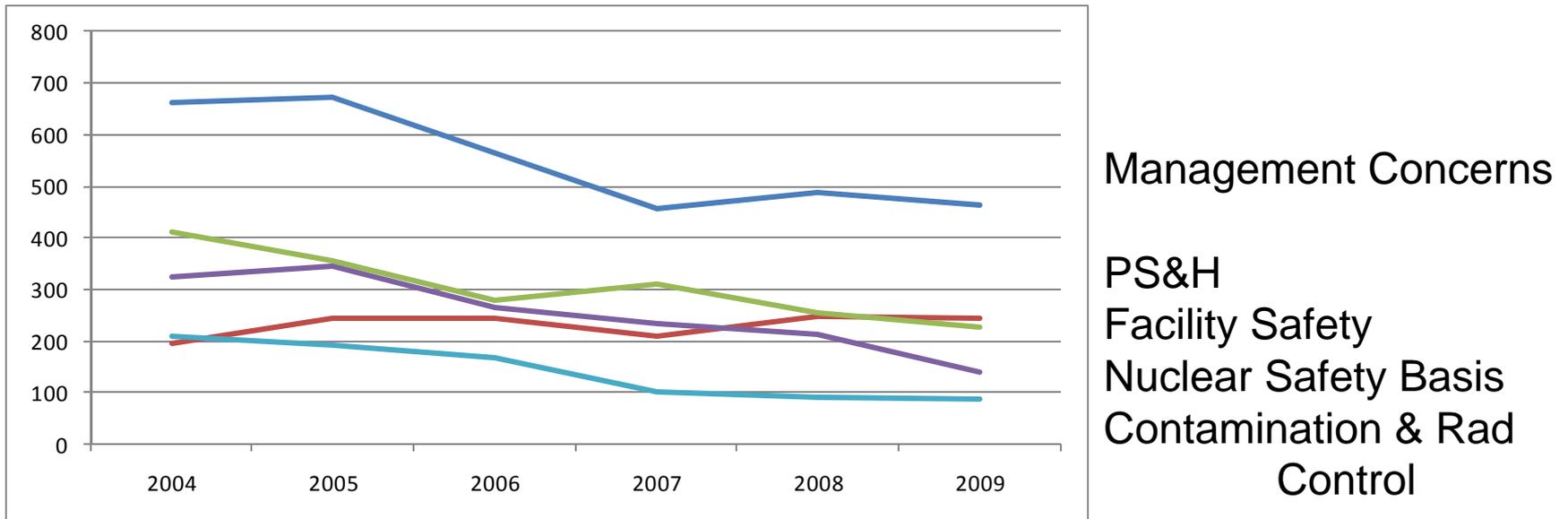
Management. Concerns  
Personnel Safety & Health  
Nuclear Safety Basis  
Facility Safety



# Frequency and Significance: Take-Aways

- Cat levels 3 and 4 may have seasonal spikes. Are they related? Why? Are they simply artifacts of population with vacation and work scheduling? Should we adjust our management focus seasonally?
- Although overall trends are down, it appears that decreases Cat 4 event reporting, may be precursors to increases in Cat 3 events. The criteria for Cat 4 events are soft, making reporting somewhat optional. Would encouraging more Cat 4 reporting lead to improved performance?
- Now let's look at Reporting Criteria (event types).

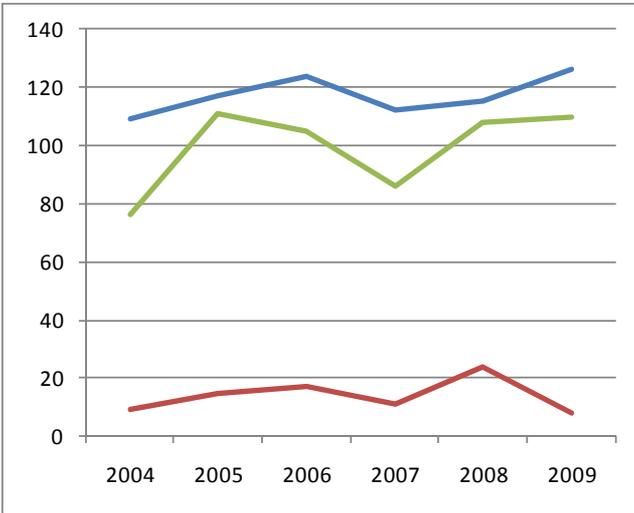
## Events per Year by Reporting Criteria, 10 Major Groups, Top 5 Shown.



Personnel Safety and Health (PS&H): only major group increasing.  
All other groups appear to be trending downward.

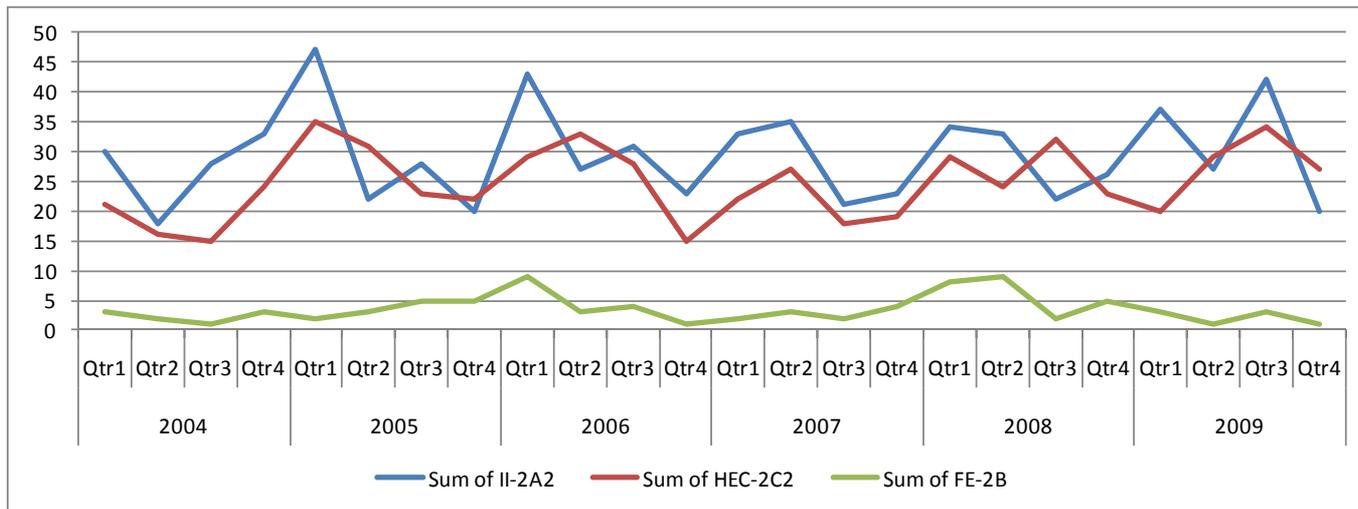
Management Concerns (MC): largest major reporting group, ~2 times  
the next largest groups, PS&H and Facility Safety.

# Reporting Criteria: PS&H

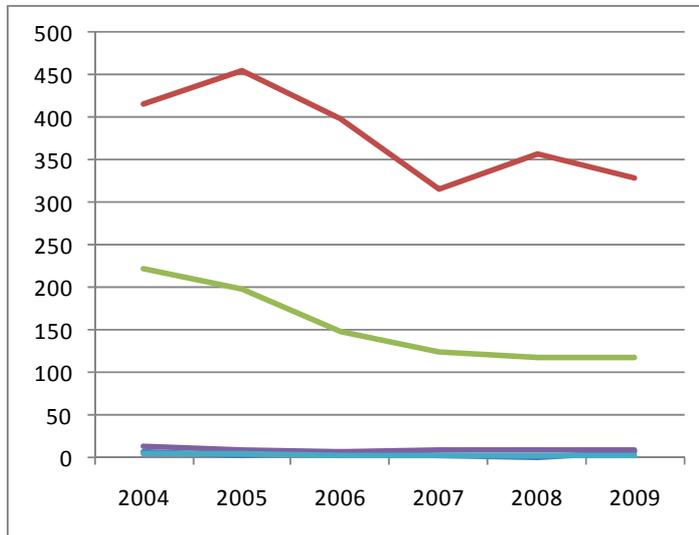


Within PS&H, two sub-groups, Injuries and Illnesses (I&I) and Hazardous Energy Control (HEC) events, appear to have an upward trend over these years.

Looking at these trends quarterly, it appears that I&I and HEC track closely and spike about annually in the 1<sup>st</sup> or 2<sup>nd</sup> quarter. However, 2009 has 2 I&I spikes.



# Reporting Criteria: Management Concerns



## 5 Sub-groups

10(2) – Not meeting other criteria

10(3) – Near Misses

10(1) – Type A or B

10(4) – Local Official Interest

10(5) – Offsite Public Interest

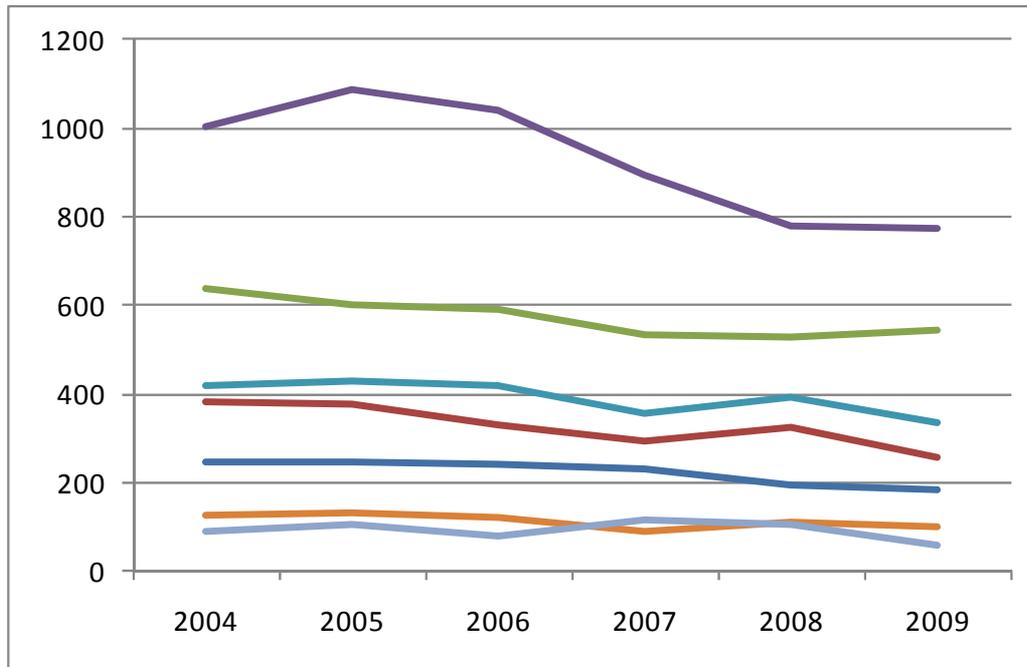
Events not meeting any other criteria, 10(2), is larger than all other major reporting criteria groups, and Near Misses, 10(3), is larger than all but three other major groups. 10(2) and 10(3) account for ~40% of all events reported.

Should additional classification related to 10(2) and 10(3) be created to assist with analysis and improvement?

## Reporting Criteria: Take-Aways

- Why are I&I and HEC events trending upward? Why do they track together, and why do 50%-100% spikes seem to occur in the 1<sup>st</sup> or 2<sup>nd</sup> quarters of each year?
- Management concerns is the largest reporting group, by far, and most MC events don't fit other reporting criteria. Do the criteria need to be amended to aid in analysis and improvement?
- Now let's examine Causal Attribution.

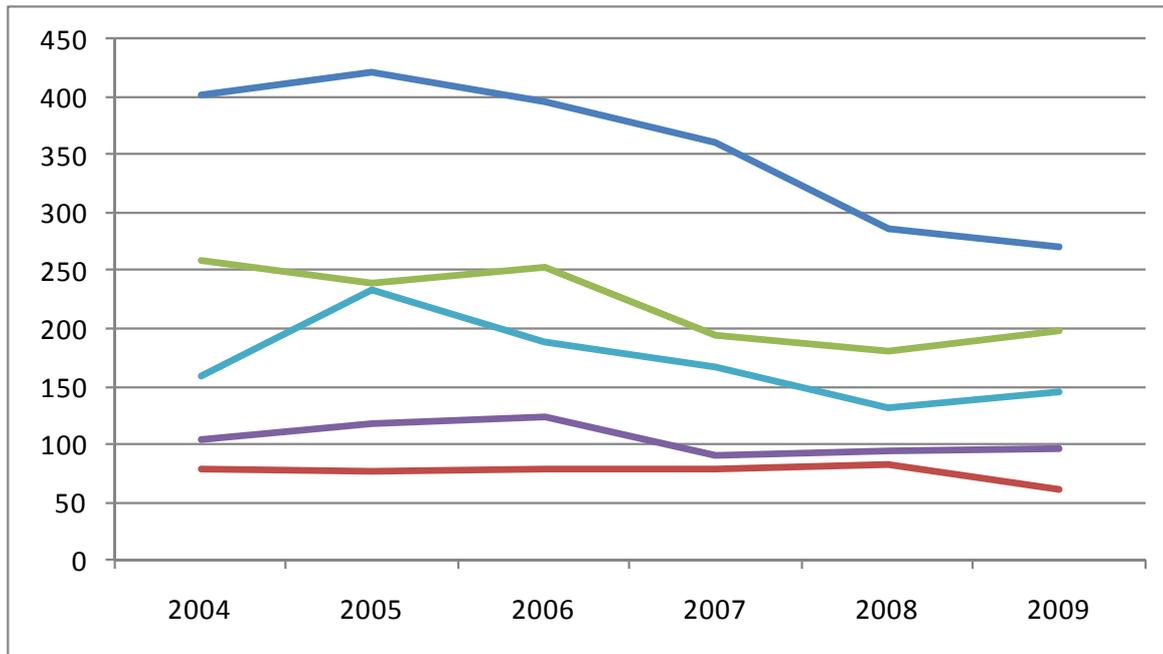
# Causal Attribution, 7 “A” Level Causal Factors



A4-Management  
A3-Human Performance  
A5-Communications  
A2-Equipment/Materials  
A1-Design/Engineering  
A6-Training  
A7-Other, Ext. Phenomena

Management, human performance (HP) and communications issues are the most frequently cited causal factors. However, management has shown the greatest decrease. HP is the only factor with an increase in 2009.

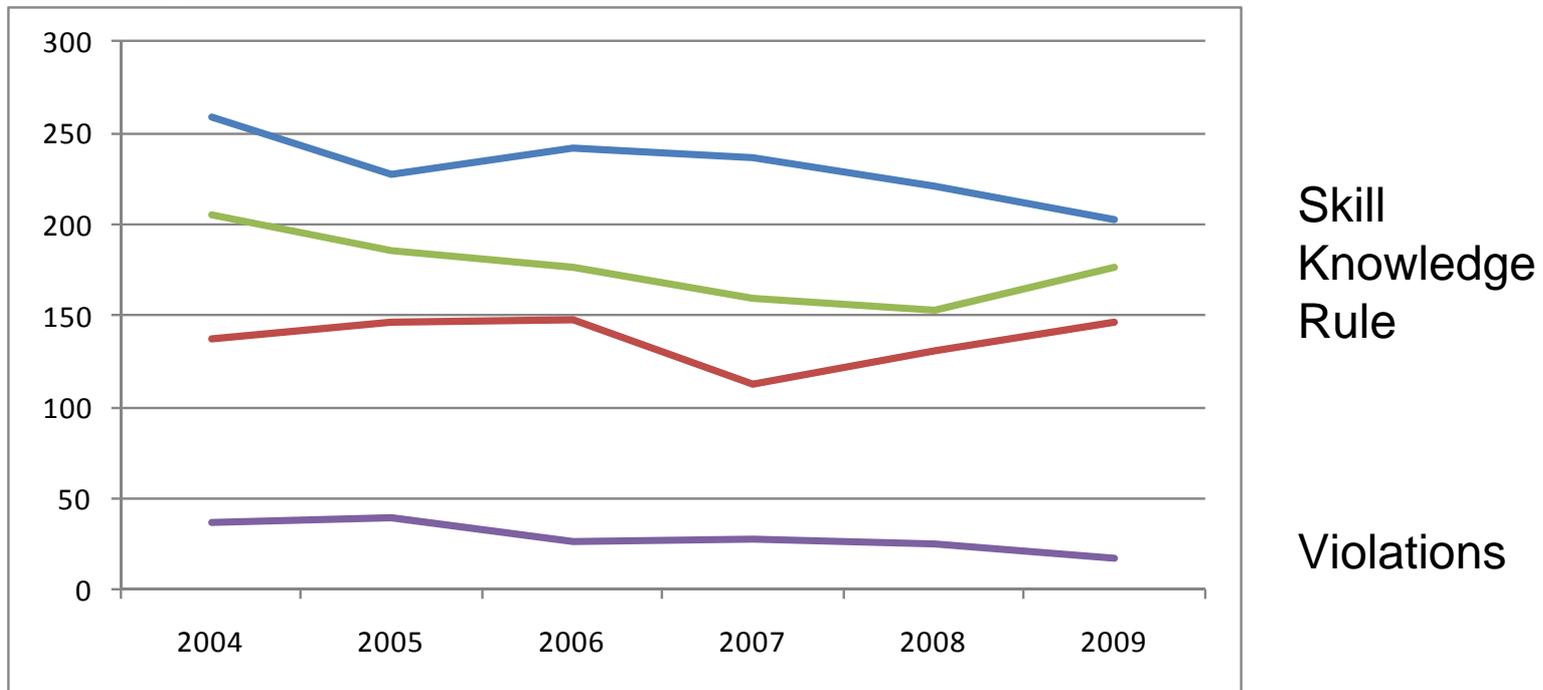
## Five Management Sub-Factors



MM – Mngt Methods  
WO&P- Work Org. & PIng  
CM- Change Management  
FLS-First Line Supervision  
RM-Resource Mngt

Management Methods are trending down, but Work Organization and Planning and Change Management may be trending upward.

# Top Three Human Performance Factors



May be too early to tell, but skill based errors appear to be decreasing, while rule and knowledge based errors are becoming more frequent. Why? Could this mean operations are becoming more complex or moving toward less familiar activities?

# Most Common “A” Level Causal Patterns for Cat 2 and Cat 3 events

<b>"A" Level Causes of 62% of Sig 2 Events</b>	
Management	132
Management & HP	104
Engineering	103
Mngt & HP & Communications	95
Mngt. & Comm.	60
Communications	51
HP & Comm.	50
Engineering & Management	41
Equipment and Materials	38

Management, Communications, Human Performance, and Engineering are prevalent in Cat 2 events.

<b>"A" Level Causes of 69% of Sig 3 Events</b>	
Equipment and Materials	638
Management & HP	472
Management	332
Human Performance (HP)	275
Mngt & HP & Communications	245
External Phenomena	202
Engineering	175
Mngt. & Comm.	153
Communications	136
HP & Comm.	132

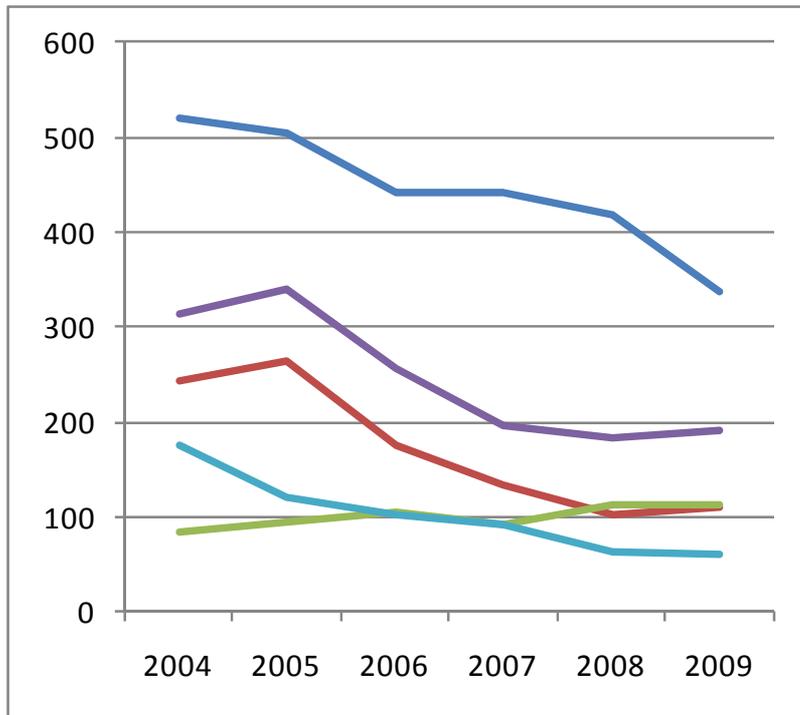
Equipment & Materials and External Phenomena are mostly associated with Cat 3 events.

Management issues are high in both lists and HP is almost always coupled with management and/or communications problems.

## Causal Attribution: Take-Aways

- Management is still the dominant causal factor in events, but overall management issues are trending down. Work Organization and Planning and Change Management increased in 2009. Why?
- HP is the 2<sup>nd</sup> most cited causal factor, and showed a slight increase in 2009 driven by increases in knowledge and rule based errors. HP issues are almost always coupled with management and/or communications issues (antecedents?). Should we explore these couplings further? Should we focus more on antecedent improvement, as a means of improving HP?
- Now, annual trends by Facility, Activity, ISM and QA codes.

# Facility Function Codes



Top 5 Facility Function Codes, ranked by frequency:

99G = BOP Infrastructure:  
largest, but declining.

8 = Nuclear Waste Ops/Disposal: Improved,  
but level.

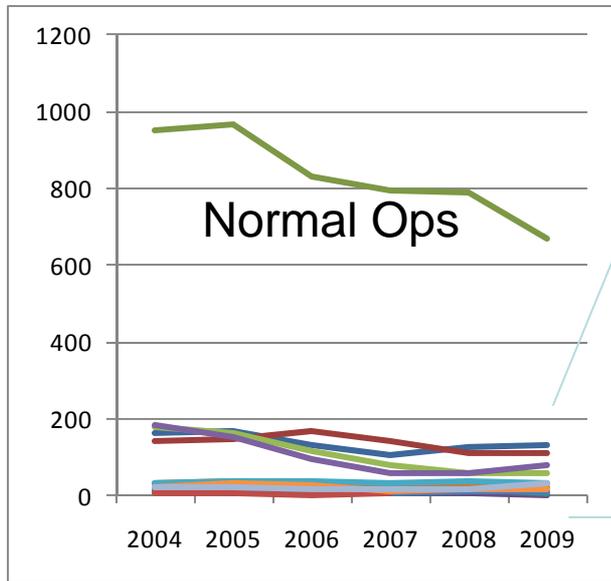
11 = ER Operations: Improved, but level.

17B = R&D Laboratories: Slight increase,  
but mostly level.

1 = Pu Processing and Handling: Improved,  
but level.

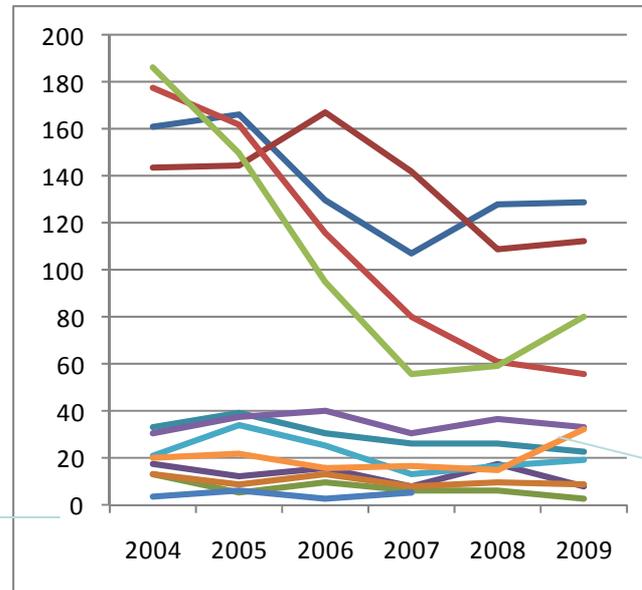
Balance of plant infrastructure, 99G, and nuclear waste operations, 8, are the dominant facility functions where events occur.

# Activity Categories



## Top 5 Activity Codes

The ~60% of events occur during Normal Operations.

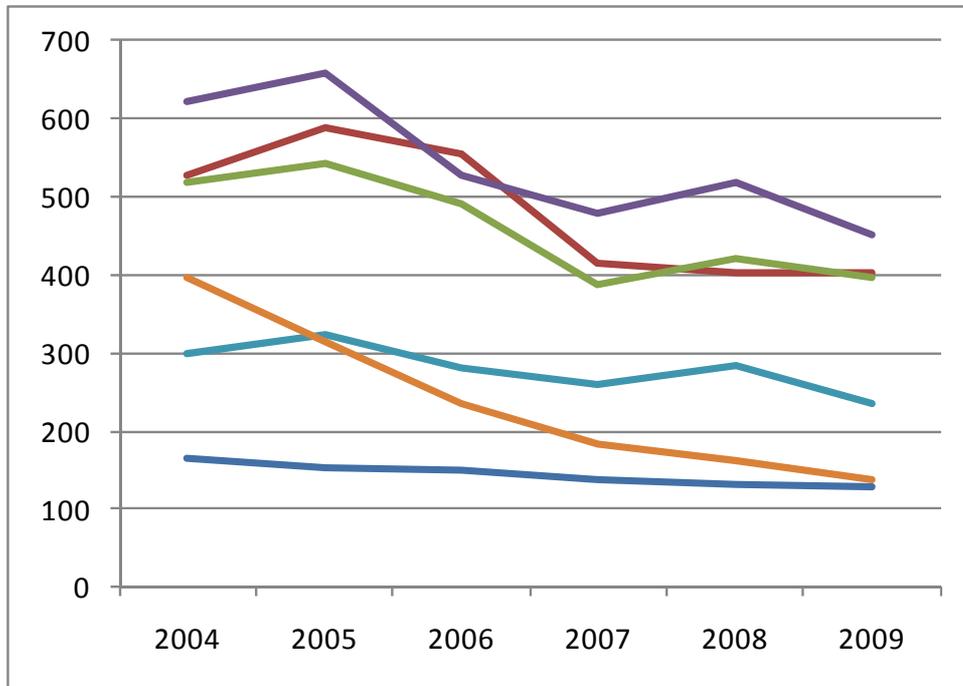


Construction  
Maintenance  
Facility D&D  
Insp. Monitoring  
Off-site  
Transportation

## Top 10 Activity Codes (without Normal Ops)

A closer look at the other activity codes suggests that Construction, Facility D&D, and Off-site Transportation events have increased recently; all others are about level or trending downward.

# ISM Codes



ISM4-Perform work within controls

ISM2-Analyze the hazards

ISM3-Devl. & Impl. Controls

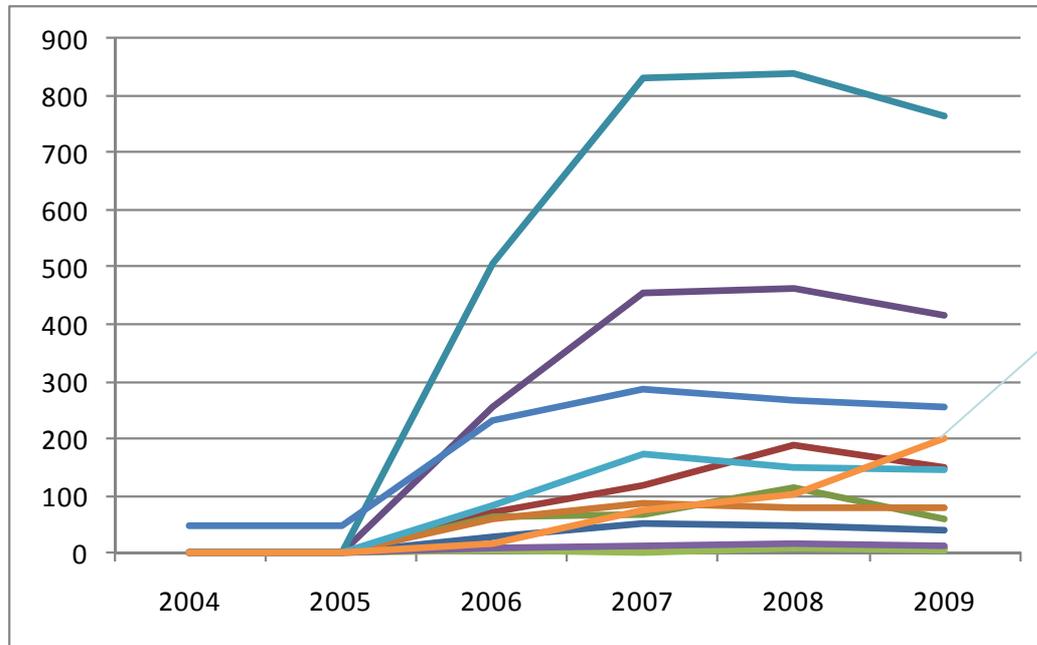
ISM5- Feedback & Impv.

ISM1- Define scope

ISM6- N/A

As most would expect, analyzing the hazards, developing and implementing controls and performing work within controls are the dominant ISM challenges.

## DOE Key Word – Quality Assurance



### Top 6 QA Deficiency Codes

14E-Work process

14D-Docs & Records

14L-No QA deficiency

14G-Procurement

14B-Training & Qual.

14H-Inspection & Test.

Deficiencies in work processes, documents and records are the dominant categories of deficiencies from a QA perspective.

However, procurement is an increasing trend. ~14% of events have no QA deficiency. How do these QA deficiencies relate to the ISM 2,3, and 4 issues?

# Facility, Activity, ISM and QA Take-Aways

- The highest percentages of events occur during normal operations in BOP infrastructure and nuclear waste operations/disposal facilities, but trends show improvement. However, events related to Construction, Facility D&D, and Off-site transportation activities appear to have increased recently.
- ISM2, 3, 4 issues and QA deficiencies in work processes, documents and records may be related and may warrant attention, as well as the upward trend in QA deficiencies with procurement.
- Recap.

# Recap: So what's important now?

## 5 Primary Take-Aways

1. Why do we have seasonal spikes, 20-25% overall , 50-100% in I&I and HEC, in the 1<sup>st</sup> and 2<sup>nd</sup> quarters. Why are I&I and HEC events trending up?
2. How do decreases in Cat 4 event reporting relate to increases in Cat 3 events one quarter later? Should we be encouraging more Cat 4 reporting?
3. Can we improve ORPS analysis with better characterization of the ~40% of all events classified as “not meeting any other criteria” and “near misses?”

## So what's important now?

4. HP causal factors show a slight increase, driven by increases in knowledge and rule based errors. Management and communications issues are the driving antecedents. Though overall management issues are trending downward, Management issues with Work Organization and Planning and Change Management are trending upward. QA deficiencies in work processes, documentation and records are major challenges. Should HPI focus more on antecedent improvement in these areas?
5. 45 % of all events occur in BOP-Infrastructure and Nuclear Waste Operations/Disposal facilities. Should these facilities receive more attention?