

# **Measuring and Monitoring ISM System Improvements**

**ISM Champions Meeting April 24-27**

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## **Background:**

- 48 DEAR 970.5223-1 (“ISM Clause”) requires the contractor to describe how (ISM) system effectiveness will be measured.
- The former Safety Management Implementation Team (SMIT) attempted (but did not complete) to develop a set of safety performance metrics that could be used to measure ISM system effectiveness.
- At present, DOE sites use a multitude of different performance metrics to measure system effectiveness and support annual ISM declarations. For the most part these performance metrics are not normalized and are not consistently applied at all DOE sites.
- DNFSB/TECH-36 (ISM: The Foundation for an Effective Safety Culture) recommends the development of “a process for evaluating the effectiveness of ISM”.

## **Summary:**

- The Objective of ISM is to protect the public, worker and environment (48 DEAR 970.5223-1; P 450.4). DOE has not developed a comprehensive approach for measuring ISM System effectiveness. Without this approach it is difficult for the Department to determine: 1) if it is meeting the Objective of ISM (i.e., protection of the public, worker and environment), 2) the status of ISM (i.e., is safety performance improving, declining or static), and 3) if improvement actions (such as DNFSB 2004-1 Implementation Plan, ISM annual declarations, etc., etc.) are resulting in long term (safety) performance improvement. (Bottom line: how do we ensure we are improving?)

## **Workshop Objectives:**

1. Identify through a brainstorming session concepts leading to:
  - A. Comprehensive measures of ISM effectiveness
  - B. Common approach for normalizing data for use in trending and comparison
  - C. Approach to customize measures for sites/projects
2. Define basic Plan of Action and associated milestones for ISM improvement goals.

## **Use of Meeting Time:**

Audience will be asked to complete simple brainstorming sessions on measures, normalizing, and customization and results will be analyzed for presentation at 4:30 Outbrief. (Materials needed: 3 pieces of blank paper per participant)

## **Brainstorming Results from EM Session on Measuring and Monitoring ISM System Effectiveness**

### **Performance Measures Ideas**

- OSHA Recordable Rates
- DART Rates
- Hospitalizations
- Fatalities
- Chemical exposures above limits
- Radiation exposures (uptakes)
- Skin contaminations
- Near misses
- Total ORPs (minus positive/legacy events)
- LO/TO violations
  - Shocks/Arc Flash
  - Inadequate safe to work check
  - Procedure noncompliance
- Vehicle accidents
- Rad/Chem transportation events
- DSA/TSR violations
- Criticality noncompliances
- Fires
- Radioactive material loss
- Unplanned offsite release of radioactive material
- Chemical spills/releases
- Environmental noncompliances
  - Air, water, RCRA
  - NOVs
- Corrective actions not completed in “X” days
- Ineffective corrective actions
- Employee concerns not closed in “X” days
- Inadequate activity level hazard ID & control

### **Normalization Approaches**

- Hours worked/time
- Number of work evolutions/# of packages
- Number of noted deficiencies divided by:
  - # of nuclear facilities
  - # of employees
  - # of entries
  - # of rad workers

- # of LO/TO (or tags)
  - # of miles driven
  - # of permits
  - # of reviews/inspections
  - Earned value
  - Cost/budget
- Repeats vs. total number
- Percentages can be used as measure (similar to error rate)

### **Issues**

- Cost of new data
- Failure to report
- Need a “Just Culture” so people want to report
- Differences in mission
- Data overload
- How will data be used & by whom
- Legacy issues
- Process to report data
- Must ensure data quality
- Must compare “Apples to Apples”
- Must have qualified people to look at data
- Statistical significance of data (Control Charts)
- Data collection consistency
- Need positive as well as negative indicators
- Need leading as well as lagging indicators
- Will data be used to manage sites and/or compare sites
- “What Gets Measures Gets Done”

### **Considerations**

- Data to improve – not penalize
- Data for senior line management
  - Other lower level metrics needed
- Both leading and lagging indicators
- Subcontractor vs. contractor
- Need to consider severity/consequence
- Bin by work category (ops, research, main.)
- Need to measure worker involvement
- Need to measure lessons learned transfer
- Self identified def. vs. external identified
- Error precursor measurements
- Changes in scope/budget
- Implementation of new requirements

- Measure equipment damage
- Use statistical control band analysis
- Need to specify systemic vs. isolated
- Need to consider age of facilities
- Legacy issues
- Should have positive as well as negative indicators
- Need to establish baseline & then trend data

## **Proposed Plan of Action**

### Team:

Michael Weis (EM)

Jim Tarpinian (SC)

Geoff Beausoleil (NE)

Phil Hill (NNSA)

### **Corporate ISM Performance Indicators (PIs) for ISM System Effectiveness**

(Note: Corporate PI's; sites and contractors may have others)

- Communicate initiative to Deputy Secretary, PSOs, FEMs & EH-1 to obtain concept concurrence (working with EH)
- Compile PIs currently used by PSOs and contractors
- Solicit input from EFCOG regarding corporate PIs from DOE work, private industry & Dash Board
- Develop a draft set of DOE corporate PIs
- Develop normalization techniques for draft set of corporate PIs
- Present draft set of corporate PIs (including normalization) at September 2006 ISM Champions meeting
- Develop plan to implement/use corporate PIs.

## Normalization of EM ORPS Occurrences

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Representatives from EM and EH recently met as a team to define EM's expectations for normalizing ORPS data. The team determined that while many factors can be used to normalize data, the team decided to restrict the factors used to those provided directly by our contractors. This avoids using factors requiring engineering judgment or subjectivity, but would incorporate those considerations in the supporting analysis of the resulting normalization score. The selected normalization factors will only partially reflect the total safety performance. Normalization factors selected are presented below along with the normalization formula:

$$NS = \frac{(\text{total \# of events}) \times (\text{severity}) \times 10^6}{(\text{SPI}) \times (\text{ACWP})}$$

Where:

NS:	Normalization Score
ACWP:	Actual Cost of Work Performed
SPI:	Schedule Performance Index
# of events:	Total # of ORPS events for the reporting period
severity:	$\frac{\text{sum (event categorization} \times \text{weight factor)}}{\text{total \# of events}}$

The normalization factors are designed to consider 1) the relative size of a project for a given time period; 2) a measure of the work completed during a particular time period; and 3) the number and severity of the events that have occurred during that time period.

The above ORPS normalization formula was introduced by Dae Chung at the ISMS workshop in Albuquerque, New Mexico. The normalization formula was piloted using the following five Richland PBSs. Note: the Richland PBSs were chosen by random.

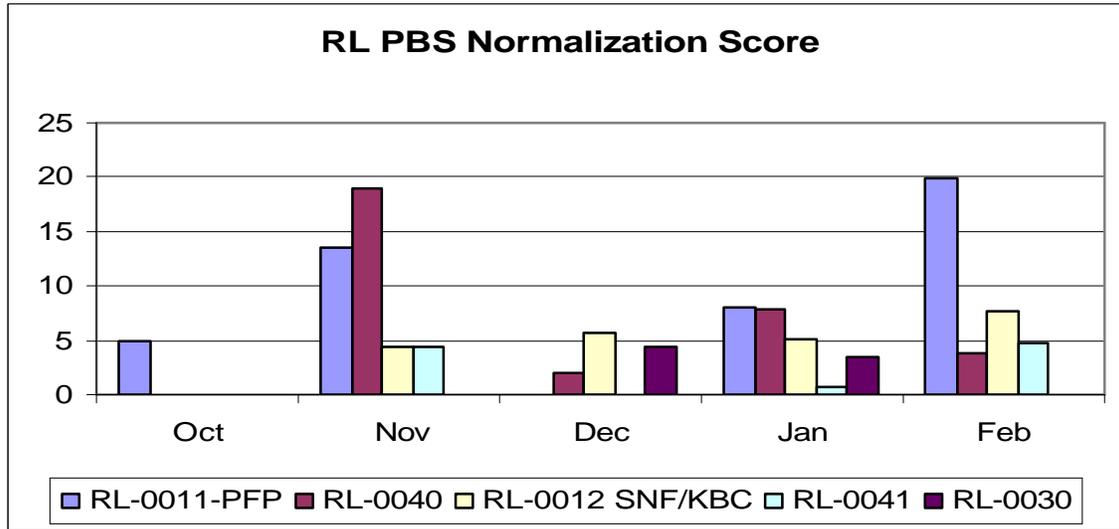
	Category 1	Category 2	Category 3	Category 4	Totals	NS
RL-0011-PFP	0	9	2	2	13	9.2
RL-0012 SNF/KBC	0	2	7	0	9	4.8
RL-0040	0	2	2	5	9	6.7
RL-0041	0	1	3	3	7	2
RL-0030	0	0	2	0	2	1.7

If we were to rank performance based strictly on number of occurrences PBS RL-0011-PFP would rank the worst and RL-0030 would rank best. The model agrees with this ranking with the exception of PBS RL-0012 and RL-0040. Basically, the model takes into consideration that even though PBS RL-0012 had a greater number of category-3 (cat-3) occurrences the difference in the significance of a cat 3 or cat 4 occurrence has been deemed by ORPS as not that relevant. In addition, even though there is a 15% difference in SPI values, the cost of PBS RL-0040 is nearly twice that of PBS RL-0012.

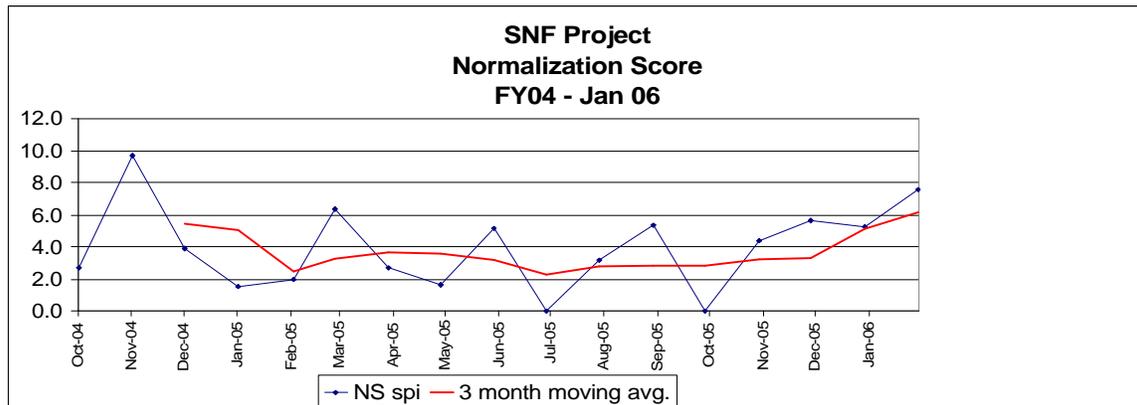
The relative size of the project is weighing heavily in the formula's denominator and is therefore the principle element in reversing the order of PBS RL-0012 and RL-0040.

Below are the five PBSs plotted by month and normalization score (NS):

PBS by month ...



Plotted over time ...



We will continue to refine the formula and welcome your comments.