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Comments on Performance Metrics

Developmental Workshop on Performance Metrics

June 27, 2013 at the California Public Utilities Commission

R.11-02-019: Order Instituting Rulemaking to Adopt New Safety and Reliability

Regulations

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Suggested Safety Performance Metrics

Below are comments supporting the adoption of specific safety performance metrics. Some of these metrics were discussed at the June 27 workshop. Some are currently used by utilities and industries as *leading* or *lagging* indicators of safety performance. In the context of process safety, The Center for Chemical Process Safety defines *Lagging Metrics* as a retrospective set of metrics that are based on incidents that meet the threshold of severity that should be reported as part of the industry-wide process safety metric. *Leading Metrics* are a forward looking set of metrics which indicate the performance of the key work processes, operating discipline, or layers of protection that prevent incidents.[1]

Five particular metrics are suggested below. Examples are included for how each metric may be implemented.

1. **Safety Culture Metric (Leading Metric)**

    a. Survey different classes and locations of workers using a standard set of questions on a defined schedule

    i. Example: Survey 1/3 of workers annually

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[1] http://www.aiche.org/sites/default/files/docs/pages/CCPS_ProcessSafety_Lagging_2011_2-24.pdf

b. Numerically score responses

    i. Example: Adopt a numerical "Safety Culture Perception Index". The Contra Costa County Industrial Safety Ordinance requires industrial facilities to assess safety culture. See Appendix A for sample survey questions and a sample numerical safety culture index that Contra Costa provides as guidelines for industrial facilities. Similar survey questions may by tailored for the utility industry. The Navy and other organizations use surveys to assess safety culture.[2]

c. Report on average numerical survey scores by worker class and location

d. Report on metric trends

2. Incident Metric (Lagging Metric)

a. Define incident types and criteria for classification as an incident. Include contract workers and the public in this metric.

    i. Examples:

        1. Fatalities and injuries requiring in-patient hospitalization

        2. Property damage exceeding $50,000

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[2] http://cchealth.org/hazmat/pdf/iso/section_f.pdf

http://cchealth.org/hazmat/pdf/iso/attachment_e.pdf

https://www.safetyclimatesurveys.org/mainpage.aspx

http://www.dupont.com/products-and-services/consulting-services-process-technologies/operation-risk-management-consulting/uses-and-applications/safety-perception-survey.html

3. Incidents resulting in significant public attention or media coverage

   b. Report annually on quantity of incidents by incident type.

   c. Report on metric trends

3. **Lost Work Day Metric (Lagging Metric)**

   a. Example: Number of injuries that result in Lost Work Days per 1000 employees

   b. Report on metric trends

4. **Past Due Actions (Backlog) Metric (Leading Metric)**[3]

   a. Define "Actions"

      i. Example: Work Orders, including Maintenance, Repairs, Audits, Inspections, Upgrades, and Corrective Actions, including Corrective Actions identified from Root Cause Analyses

   b. Define "Past Due"

      i. Example: Company defined past due date for each Work Order

   c. Define Staffing Levels

      i. Example: Define quantity of workers by worker classification

   d. Report annually on number of past due actions relative to number of actions broken down by category and location.

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[3] http://www.aiche.org/sites/default/files/docs/pages/CCPS_ProcessSafety_Lagging_2011_2-24.pdf

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e. Report annually on staffing levels by worker classification

f. Report on metric trends

    i. Past Due Actions (Backlog) and Staffing Level metrics are reported together as supplemental indicators of adequate staffing.

5. Root Cause Analysis Program Effectiveness (Lagging and Leading Metric)

a. Define Criteria for Events or Conditions that warrant a Root Cause Analysis ("RCA Triggers")[4]

    i. RCA Trigger Examples:

        1. Incidents as defined in the Incident Metric described earlier

        2. "Near Misses" as defined by the company

            a. Example: An undesired event that under slightly different circumstances could have resulted in harm to people, damage to property, equipment, or environment.[5]

            b. Example: Lockout/Tagout process failures. An incident did not occur, but it could have.

        3. Recurring work low priority orders that, when aggregated together, are significant.

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[4] CPUC General Order 167: See Appendix B

[5] http://www.aiche.org/sites/default/files/docs/pages/CCPS_ProcessSafety_Lagging_2011_2-24.pdf

      a. Example: Low priority leak repairs

b. Report annually on the number of RCA Triggers

c. Report annually on the number of RCA Triggers by root cause category. Typically events and conditions that trigger a Root Cause Analysis, have multiple root causes.

d. Report annually on the number of Root Cause Analyses completed

e. Report annually on the number of Root Cause Analysis Corrective Actions completed compared to the number of Corrective Actions identified in the Root Cause Analyses

f. Report on metric trends

      i. Example: Number of RCA Triggers by root cause category

While some metrics may not be suitable for direct comparison between utilities, trends in metrics at a particular company will provide information to the company and regulators on the effectiveness and performance of company programs in improving safety.

Appendix A

Example Safety Culture Surveys

The Navy conducts Safety Climate Assessment Surveys:[6]

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[6] https://www.safetyclimatesurveys.org/mainpage.aspx

Example Safety Culture Surveys

Contra Costa County provides Safety Culture Assessment Guidance for meeting the requirements of the Contra Costa Industrial Safety Ordinance:[7]

II. MY OPINIONS AND COMMENTS

Please review each statement below and select the number from 1 to 5 that best expresses your response to the statement. Please note that selecting number 3 in response to a question means either that you do not know or that you do not have an opinion.

Process Safety Reporting

Note: For each statement below, you should select "3" under the response labeled "?" only if you do not know or you do not have an opinion.

		Disagree / Tend to Disagree / ? / Tend to Agree / Agree
1.	This refinery provides adequate training on hazard identification, control and reporting....	① ② ③ ④ ⑤
2.	I have received training on hazard identification, control and reporting in the last 12 months.....	① ② ③ ④ ⑤
3.	I can report hazardous conditions without fear of negative consequences	① ② ③ ④ ⑤
4.	In general, workers don't bother to report minor process-related incidents, accidents, or near misses	① ② ③ ④ ⑤
5.	I believe a culture exists at this refinery that encourages raising process safety concerns....	① ② ③ ④ ⑤
6.	Corrective action is promptly taken when unsafe process safety conditions are brought to management's attention	① ② ③ ④ ⑤
7	I am confident that process safety issues are:	

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[7] http://cchealth.org/hazmat/pdf/iso/attachment_e.pdf

The above reference link includes an example for a numerical "Employee Perception Index"

Example safety culture assessment questions were developed as part of the Baker Panel investigation of the 2005 Texas City refinery explosion

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7. I am confident that process safety issues are:

   a. Thoroughly investigated .... ① ② ③ ④ ⑤

   b. Appropriately resolved .... ① ② ③ ④ ⑤

8. Workers are informed about the results of process related incident, accident, and
near miss investigations .... ① ② ③ ④ ⑤

9. I am satisfied with the process safety reporting system at this refinery............................ ① ② ③ ④ ⑤

10. I do not hesitate to report actions or conditions that raise a process safety concern,
even when a co-worker is involved... ① ② ③ ④ ⑤

Please provide any comments you have about Process Safety Reporting in the space below.

Safety Values / Commitment to Process Safety

Note: For each statement below, you should select "3" under the response labeled "?" only if you do not know or you do not have an opinion.

		Agree	Tend to Agree	?	Tend to Disagree	Disagree
11.	My supervisor puts a high priority on process safety through actions and not just empty slogans	①	②	③	④	⑤
12.	Refinery management puts a high priority on process safety through actions and not just empty slogans	①	②	③	④	⑤
13.	Operational pressures do not lead to cutting corners where process safety is concerned	①	②	③	④	⑤
14.	At this refinery, process safety improvement is a long-term commitment that is not compromised by short-term financial goals	①	②	③	④	⑤
15.	In my opinion, the people at my refinery with specific process safety responsibilities have the:					
	a. Authority to make changes	①	②	③	④	⑤
	b. Resources to make changes	①	②	③	④	⑤
16.	In my opinion, process safety programs at my refinery have:					
	a. An adequate number of people responsible for process safety	①	②	③	④	⑤
	b. Adequate funding	①	②	③	④	⑤

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Supervisory Involvement and Support

Note: For each statement below, you should select "3" under the response labeled "?" only if you do not know or you do not have an opinion.

		Disagree	Tend to Disagree	?	Tend to Agree	Agree

21. In my work group, process safety concerns are secondary to achieving production goals .... — ☐1 ☐2 ☐3 ☐4 ☐5

22. My supervisor sometimes asks me to operate an unsafe process .... — ☐1 ☐2 ☐3 ☐4 ☐5

23. My supervisor will support me if I refuse to participate in unsafe work.................. — ☐1 ☐2 ☐3 ☐4 ☐5

24. My supervisor encourages me to identify and report unsafe conditions .... — ☐1 ☐2 ☐3 ☐4 ☐5

25. My supervisor makes sure that procedures relating to the following activities are safe before such activities are initiated:

    a. Operations.. — ☐1 ☐2 ☐3 ☐4 ☐5

    b. Maintenance.. — ☐1 ☐2 ☐3 ☐4 ☐5

Procedures and Equipment

Note: For each statement below, you should select "3" under the response labeled "?" only if you do not know or you do not have an opinion.

		Disagree	Tend to Disagree	?	Tend to Agree	Agree

29. Interlocks, alarms, and other process safety-related devices are regularly:

    a. Tested.. — ☐1 ☐2 ☐3 ☐4 ☐5

    b. Maintained.. — ☐1 ☐2 ☐3 ☐4 ☐5

30. Disabled or failed process safety devices are restored to service as soon as possible .... — ☐1 ☐2 ☐3 ☐4 ☐5

31. Written operating procedures are:

    a. Regularly followed.. — ☐1 ☐2 ☐3 ☐4 ☐5

    b. Kept up to date.. — ☐1 ☐2 ☐3 ☐4 ☐5

32. Procedures exist at this refinery that instruct operators to take action as soon as possible if safety critical interlocks, alarms, or other process safety-related devices fail or become unavailable during operation... — ☐1 ☐2 ☐3 ☐4 ☐5

33. Maintenance checklists and procedures are:

    a. Easy to understand.. — ☐1 ☐2 ☐3 ☐4 ☐5

    b. Easy to use .... — ☐1 ☐2 ☐3 ☐4 ☐5

Worker Professionalism / Empowerment

Note: For each statement below, you should select "3" under the response labeled "?" only if you do not know or you do not have an opinion.

		Agree	Tend to Agree	?	Tend to Disagree	Disagree

36. I feel that I can influence the process safety policies implemented at this refinery .... ① ② ③ ④ ⑤

37. Workers at all levels of my refinery actively participate in:

    a. Hazard reviews and assessments .... ① ② ③ ④ ⑤

    b. Incident and accident investigations .... ① ② ③ ④ ⑤

38. When a process safety issue is involved, I can challenge decisions made by the following without fear of negative consequence:

    a. My supervisor .... ① ② ③ ④ ⑤

    b. Refinery management .... ① ② ③ ④ ⑤

39. Workers sometimes work around process safety concerns rather than report them .... ① ② ③ ④ ⑤

40. Creating unapproved shortcuts around process safety is not tolerated at my refinery ...... ① ② ③ ④ ⑤

41. I am informed when potentially dangerous processes are started .... ① ② ③ ④ ⑤

42. I am responsible for identifying process safety concerns at my refinery .... ① ② ③ ④ ⑤

43. I feel free to refuse to participate in work activities that are unsafe .... ① ② ③ ④ ⑤

44. Operators are empowered to take corrective action as soon as possible (including shutting down when appropriate) if safety critical interlocks, alarms, or other process safety-related devices fail or become unavailable during operation .... ① ② ③ ④ ⑤

Please provide any comments you have about Worker Professionalism / Empowerment in the space below.

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_____

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Process Safety Training

Note: For each statement below, you should select "3" under the response labeled "?" only if you do not know or you do not have an opinion.

		Agree	Tend to Agree	?	Tend to Disagree	Disagree

45. The training that I have received does not provide me with a clear understanding of the process safety risks at my refinery .... ① ② ③ ④ ⑤

46. I know how to access appropriate process safety resources if I need them .... ① ② ③ ④ ⑤

47. The following receive the necessary process safety training to do their job safely:

    a.   New workers .... ① ② ③ ④ ⑤

    b.   Experienced workers .... ① ② ③ ④ ⑤

    c.   My supervisor .... ① ② ③ ④ ⑤

    d.   Contractors .... ① ② ③ ④ ⑤

48. The process safety training that I have received allows me to recognize when a process should be shut down if safety critical interlocks, alarms or other process-safety devices fail or become unavailable during operation .... ① ② ③ ④ ⑤

49. The process safety training that workers receive at my refinery is adequate to prevent process-related incidents, accidents and near misses .... ① ② ③ ④ ⑤

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Appendix B

CPUC General Order 167, Maintenance and Operation Standards

for Electric Generating Facilities

Maintenance Performance Standard 4.

(Covers Root Cause Analysis)[8]

MS 4 - Problem Resolution and Continuing Improvement

Performance Standard

The company values and fosters an environment of continuous improvement and timely
and effective problem resolution.

Assessment Guidelines

A. Self-Assessment

Self-Assessment activities are used to compare actual performance to management's
expectations, and to identify and correct areas needing improvement. While self-
assessments, by definition, are driven from within, they may be used to measure internal
performance to external criteria, such as ISO, EPA or OSHA. Self-assessment is both a
discreet activity and a continuous process that includes such activities as:

Dedicated teams, with a specific chartered objective to assess certain program(s) or
element(s).

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[8] ftp://ftp.cpuc.ca.gov/ElectricGenerationPerf/Maintenance_Standards_Final_Renumbered.doc

Management monitoring of on-going performance through performance metrics or problem resolution process monitoring.

Discreet event investigations

B. **Problem Reporting, Root-Cause Analysis, and Corrective Actions**

A systematic approach and process is used to identify and report problems, determine the cause(s) and establish corrective actions to prevent recurrence. Attributes of successful programs include:

Encouraging employees to report problems at low thresholds of significance.

Using a graded approach to significance, and performing more extensive root cause determination to those problems having high significance, and trend and track those with low significance.

Trending capability on information such as "cause code" or equipment or process involved.

Tracking of corrective actions to closure.