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Implementing New Elements into an Existing PSM System

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Abstract

This paper will present an approach for successfully implementing a new element(s) into a site or company's existing process safety management (PSM) system. This approach includes steps for:

(1) developing a new element

(2) integrating new element activities into existing elements

(3) implementing new Risk Based Process Safety (RBPS) elements, and

(4) monitoring new elements or activities.

Specific examples for implementing RBPS elements such as Process Safety Culture, Compliance with Standards, Process Safety Competency, Stakeholder Outreach, Conduct of Operations, Measurement and Metrics, and/or Management Review and Continuous Improvement will be provided.

This approach and the examples presented will be drawn from *Guidelines for Implementing Process Safety Management, 2nd Edition* (CCPS), which is due for publication in the summer of 2015.

INTRODUCTION

A new CCPS book, *Guidelines for Implementing Process Safety Management, 2nd Edition* has gone to the publisher, and should be published by the end of this year.

The CCPS Technical Steering Subcommittee overseeing this guideline was chartered to review and update the 1994 CCPS book, *Guidelines for Implementing Process Safety Management Systems*.[1] This guideline was written to reflect the lessons learned about implementing process safety management (PSM) since that original publication, and provide guidance and a road map for the possible PSM implementation situations of:

- implementing a new PSM system,
- implementing new elements into an existing system, or
- improving an existing PSM element or system,

at least one of which may apply to companies new to PSM or to those with mature PSM systems. In addition, this guideline provides practical examples (see the appendices) and tools (see the CD accompanying the book) to aid in PSM implementation.

In this guideline, the committee uses and references the "next generation" PSM system framework published in the 2007 CCPS book, *Guidelines for Risk Based Process Safety*.[2] The risk based process safety (RBPS) approach recognizes that all hazards and risks are not equal; consequently, it advocates that more resources should be focused on more significant hazards and higher risks. The approach is built on four pillars:

1. Commit to process safety
2. Understand hazards and risk
3. Manage risk
4. Learn from experience

These pillars are further divided into 20 RBPS elements. The 20 RBPS elements built and expanded upon the original 12 elements proposed in *Guidelines for Technical Management of Chemical Process Safety* (1989)[3] and further refined in *Plant Guidelines for Technical Management of Chemical Process Safety* (1992).[4] Thus, they reflect 15 years of PSM implementation experience and well-established best practices from a variety of industries.

The RBPS book also stresses the principle that PSM management systems should be simplified to the lowest order of complexity while maintaining a fitness-for-purpose objective. Consequently, issues to consider when determining the degree of management system rigor required include:

- the perception of the complexity, hazard, and risk involved with the process, facility, and/or organization;
- the demand for the management system results and the resources required to deliver them; and
- the current facility and/or company process safety culture.

With fitness-for-purpose in mind, the PSM management systems can then be designed, implemented, and maintained to correct and/or improve the system activities.

Therefore, this guideline continues CCPS's efforts to encourage the adoption of a risk based approach to managing process safety in the chemical and allied process industries, so that it becomes an integral part of the effort to continually improve the already impressive process safety performance of these industries.

Finally, this guideline also addresses the important related topics of:

- determining process safety implementation and performance status,
- preparing for PSM system change,

- integrating PSM/HSE with the business management system, and
- managing process safety performance.

In this paper, we chose to focus on Chapter 5 of the guideline, "Integrating New Elements into an Existing PSM System," since the guidance in this chapter has particularly broad application.

IMPLEMENTING NEW ELEMENTS – BASIC STEPS

When a site/company elects to phase in certain elements initially and others later, or subsequently decides to add new elements to the existing PSM system, the following basic steps normally apply:

1. **Develop the design specification for the new element.** Keep in mind that the design specification for each PSM element will depend on the level of detail required for each element.
2. **Create element workflows (as appropriate).** If the steps involved in implementing the element activities, or if the interactions among the steps and the workgroups involved in the implementation activities are quite complex, developing a workflow is beneficial.
3. **Estimate the element workloads and necessary resources.** Without an adequate understanding of the workloads and resources required by the new elements and their impact on the overall PSM system, the new elements are likely to fail.
4. **Develop the written programs and procedures for the element.** A PSM system and its individual elements must be described in written programs and procedures to be sustainable.
5. **Roll out the element.** The steps culminating in the rollout of a new PSM element may include (a) gathering implementation input from all stakeholders; (b) pilot testing the element in phases (depending on its size and complexity); (c) developing an implementation plan with a defined scope and approach; (d) confirming the need for and availability of any special tools/resources; (e) confirming that the written procedures are refined, tested, and ready; and (f) developing and delivering training on the new element to personnel who need to be aware of or involved in its application.
6. **Monitor implementation and initial performance.** Additional monitoring of the initial implementation and performance of the new element may be appropriate.

Finally, keep in mind that the effort and resources required for accomplishing each of these steps will obviously be less, and may be much less than for implementing a whole new system. In some cases, it may even be decided that one or more of the above steps is not adding value due to the scope of the effort/resources involved.

INTEGRATING NEW ELEMENT ACTIVITIES INTO EXISTING ELEMENTS

Integrating new element activities into existing PSM elements is a more evolutionary change that may be needed due to factors such as organizational structure changes, poor performance of an element (based on monitoring), and suggestions for improvement. In addition, determining that some of the "expanded" elements and associated activities in the RBPS model would be good additions may be a driver for such changes.

Once again, the steps listed above apply, but the effort and resources required will generally be less than for implementing a new system, and not all the steps will be necessary. In addition, if the organization's safety culture and the element implementation are strong, even less effort and resources should be required.

It is important, however, not just to continue "adding to the load" of the organization unless the anticipated results are worth the additional effort. Therefore, adding new element activities should only be done after (1) evaluating the cost/benefit of the activity and (2) considering whether there are any existing activities that are no longer needed or will be replaced, and therefore can be stopped.

IMPLEMENTING NEW RBPS ELEMENTS

The implementation of new risk based process safety (RBPS) elements into an existing PSM system represents a unique challenge and opportunity for an organization. For example, if the existing system is focused on regulatory compliance, these can represent a large expansion of the system. In addition, the new RBPS elements from *Guidelines for Risk Based Process Safety*[1] (subsequently referred to as the "RBPS book") listed below (i.e., elements that are not in the OSHA/EPA regulatory model or the 1995 CCPS model) primarily deal with "soft," people-related areas rather than "hard," process-related or technical areas, and therefore are likely to require different implementation approaches:

- Process safety culture
- Compliance with standards
- Process safety competency
- Stakeholder outreach
- Conduct of operations
- Measurement and metrics
- Management review and continuous improvement

The RBPS book suggests an implementation approach for RBPS elements where the degree of rigor designed into each work activity is tailored to risk, tempered by resource considerations, and tuned to the facility's culture. Thus, the degree of rigor that should be applied to a particular work activity will vary for each facility, and likely will vary between units or process areas at a facility. Therefore, to implement new RBPS elements, the following steps are recommended:

1. Assess the risks at the facility, investigate the balance between the resource load for RBPS activities and available resources, and examine the facility's culture. [See the RBPS book for more information on this step.]
2. Estimate the potential benefits that may be achieved by addressing each of the key principles for each RBPS element to be implemented.
3. Based on the results from steps 1 and 2 above, decide which essential features described in the RBPS book are necessary to properly manage risk.
4. For each essential feature that will be implemented, determine how it will be implemented and select the corresponding work activities described in the corresponding

chapter of the RBPS book. Note that this list of work activities cannot be comprehensive for all industries; PSM implementers will likely need to add work activities or modify some of the work activities listed in the chapters.

5. For each work activity that will be implemented, determine the level of rigor that will be required. Each work activity listed in the RBPS book chapters is followed by two to five implementation options that describe an increasing degree of rigor.
6. Apply the six steps summarized in the "Implementing New Elements – Basic Steps" section, as appropriate, to design, develop, roll out, and monitor implementation of the new element and the associated work activities.

Guidance on implementing each of these new RBPS elements and some implementation examples are provided in the following sections (note that some of the information is borrowed from the RBPS book). Detailed discussions of each element are provided in the corresponding RBPS book chapters, which provide an element overview, key principles and essential features, possible work activities, examples of ways to improve effectiveness, element metrics, management review, and references.

Process Safety Culture (Leadership, Commitment, and Accountability)

Process safety culture has been defined as "the combination of group values and behaviors that determine the manner in which process safety is managed."[5] More succinct definitions include "how we do things around here," "what we expect here," and "how we behave when no one is watching."

Implementation of a new process safety culture element can involve many steps and will require several years to fully implement in a moderate to large organization. Some of the steps to consider include the following:

<u>Collect culture evaluation evidence</u>

1. Conduct a broad, confidential survey of employees at all levels to assess perceived cultural strengths and weaknesses (for example, with questions based on the 12 essential features of a sound process safety culture [see Chapter 3 of the RBPS book]).
2. Conduct follow-up interviews with a cross-section of the organization to identify possible underlying causes of the survey results.
3. Perform work observations to assess how well employees at all levels and in all types of work "follow the rules."
4. Assess the organization's performance based on PSM and HSE leading indicators.

<u>Assess HSE technical performance</u>

5. Review information sources such as incidents and incident investigation results, audits and assessments, and action item completion history that relate to both HSE technical performance and process safety culture.

<u>Identify and address cultural strengths/weaknesses</u>

6. Assemble, collate, and analyze all of the above information to:
   a. identify cultural strengths/weaknesses (e.g., as compared to the 12 RBPS essential features of a sound process safety culture) and
   b. identify contributing causal factors for the identified strengths/weaknesses.
7. Determine ways to address the identified cultural weakness, as well as to maintain or build on the strengths.
8. Roll out the program throughout the organization.
9. Monitor results and follow through to continuously improve.
10. Repeat steps 1 through 9 every 2 to 3 years, until a sound process safety culture is established and sustainable.

Cultural change

One way to gain insight into your organization is to assess how it "operationalizes" safety. In other words, is it reactive, dependent, independent, or interdependent in terms of its attitude toward safety? The DuPont Bradley Curve shown in Figure 1 graphically illustrates this concept. It provides additional detail on each of these four attitudes and how they should relate to safety performance and safety culture.

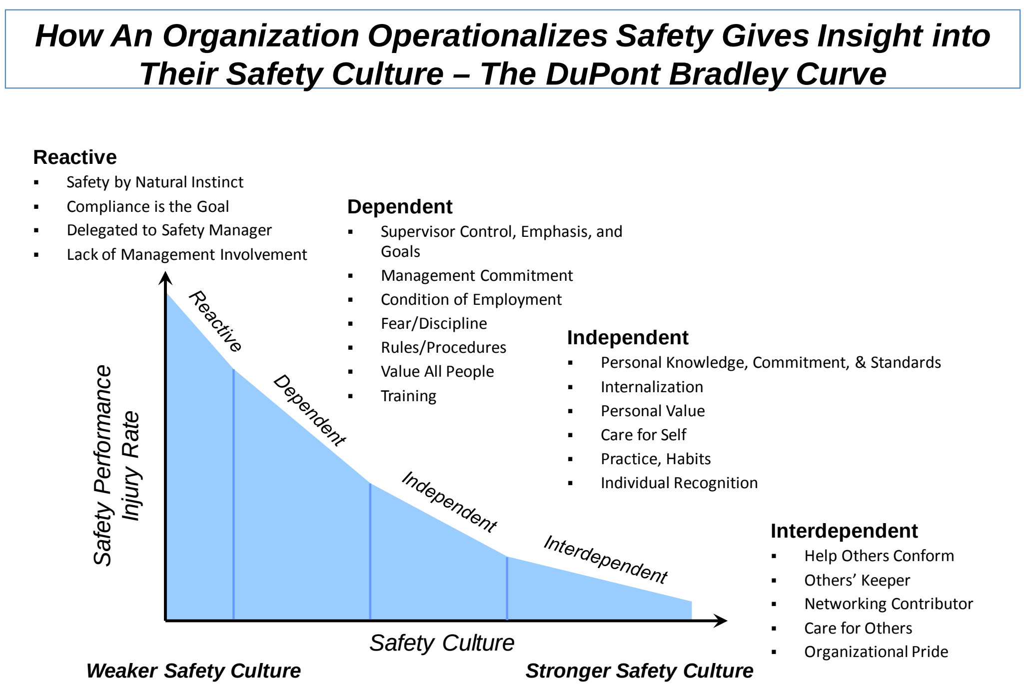

Figure 1. The DuPont Bradley Curve

Another culture model, which introduces the Energy Institute's "Winning Hearts and Minds" program,[6] is shown in Figure 2.

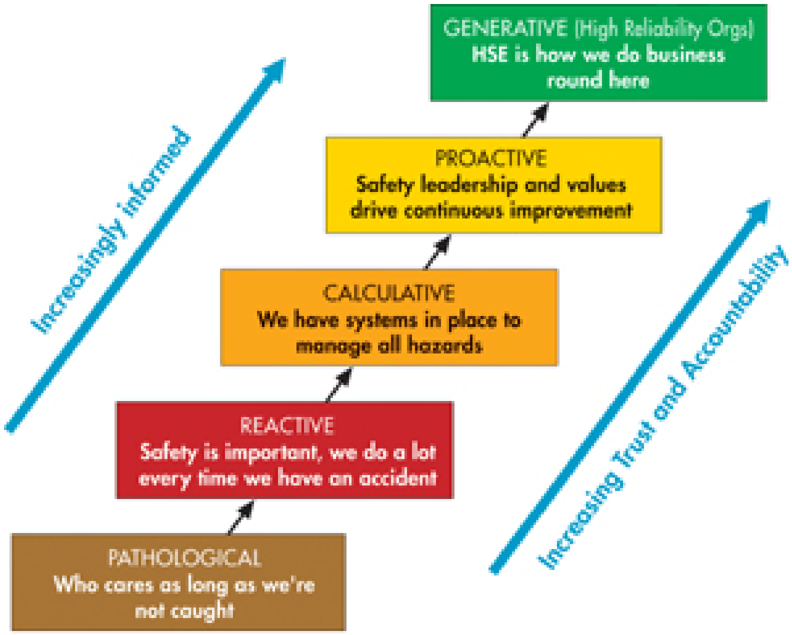

Figure 2. The HSE Culture Ladder

Compliance with Standards

The RBPS compliance with standards (CWS) element describes a process for maintaining adherence to applicable codes, standards, regulations, and laws (standards), the attributes of a standards system, and the steps an organization might take to implement the CWS element.

Note: In this paper, we are using the term "standards" generically and broadly to apply to applicable standards of all types.

Another common term important to the CWS element is recognized and generally accepted good engineering practices (RAGAGEPs). A RAGAGEP is a consensus code, standard, or guideline that provides the engineering practices for the design, fabrication, installation, maintenance, and/or inspection/testing of equipment. A RAGAGEP can be mandatory (e.g., regulatory or insurance), suggested, or common practice. Without a good RAGAGEP program, the effectiveness of compliance efforts and the safety of operations may be reduced.

Following are steps to ensure that thorough consideration of the applicable and appropriate RAGAGEPs has taken place:

1. Develop a general knowledge of RAGAGEPs.
2. Identify which RAGAGEPs may apply to your equipment, chemicals, or processes.
3. Assess the applicability and scope of each candidate RAGAGEP.

4. Document the approach.

The need for documentation cannot be emphasized too strongly. Proper documentation demonstrates that you have undertaken and completed a thorough consideration of the appropriate RAGAGEPs. The objective is to develop enough understanding to answer the following questions:

- Which organizations issue RAGAGEPs applicable to the industry and type of facility?
- Which organizations issue RAGAGEPs applicable to the chemicals or hydrocarbons handled at your facility?
- Which organizations issue RAGAGEPs applicable to the types of equipment in your facility?
- What are the scopes and applications of these organizations' RAGAGEPs?

Keep in mind that standards often provide alternate methods and frequently change, so applying some of the RAGAGEPs will require interpretation and judgment.

Common challenges for a RAGAGEP program, particularly in small facilities, include:

- developing RAGAGEP awareness among staff members,
- developing and maintaining a RAGAGEP knowledge base,
- dedicating the resources required to implement applicable RAGAGEPs,
- dealing with incomplete or no documentation (e.g., of equipment design or fabrication), and
- dealing with equipment not in compliance with RAGAGEPs.

When resources are severely limited, maintaining and using the level of expertise required to meet common accepted standards is a major challenge.

Once a CWS element and/or RAGAGEP program knowledge base has been established, it must be maintained. One common problem is losing this knowledge base when personnel change assignments or leave the company. This is particularly a problem for smaller facilities where only one or two people serve as the RAGAGEP experts. The following methods can be utilized to assist in maintaining the program:

- Incorporate ongoing awareness of applicable RAGAGEPs in written job descriptions, goals, objectives, and performance appraisals.
- Include RAGAGEPs in the initial training agenda for new employees.
- Instead of developing a single expert, develop experts in each engineering discipline.
- Provide opportunities for different individuals to attend RAGAGEP training courses.
- Develop a network of RAGAGEP experts from the corporate engineering department and local contractors.

Finally, consider striving for proactive compliance in your CWS element or RAGAGEP program. Proactive compliance can be defined as "staying ready so you do not have to get ready." It involves using the wide body of knowledge that is embedded in the codes, standards, and RAGAGEPs to (1) assist with the conduct of business in the most cost-effective and efficient manner and (2) help avoid losses. Proactive compliance sets the attitude that you will use a code to achieve a high level of accomplishment and achievement. It forces you to determine a positive course of action and then implement it.

Note: The "Mechanical Integrity Test and Inspection (MITI) Guide" on the CD accompanying the book (provided by Eli Lilly and Company) provides an example of implementing the CWS element using RAGAGEPs.

Process Safety Competency

Developing and maintaining a Process safety competency (PSC) element encompasses three interrelated actions: (1) continuously improving knowledge and competency, (2) ensuring that appropriate information is available to people who need it, and (3) consistently applying what has been learned.

Unlike some of the other RBPS elements, no simple answer exists as to "how" PSC is achieved. The single most important factor is a commitment by senior management to support efforts to learn and to share new information and insights among units at a facility, with sister facilities within the company, and potentially with other companies. Once the commitment is in place, opportunities to learn and interact with others abound. Some information will have to be passed along through mentorship and collaboration; both of these activities typically require active management support to ensure success. A closely related activity is succession planning, which is an intentional activity that helps ensure that key positions are staffed with individuals who possess specific knowledge and experience.

Note: "Vision 20/20",[7] developed by CCPS, looks into the not-too-distant future to describe how great process safety is delivered when it is collectively and fervently supported by industry, regulators, academia, and the community worldwide; driven by the five industry tenets; and enhanced by the four global societal themes. One of the five industry tenets is "Intentional Competency Development to ensure that all employees who impact process safety are fully capable of meeting the technical and behavioral requirements for their jobs." The bottom line: No matter how good the culture or management system is, or how well the company adheres to standards, it takes highly competent employees to implement those systems or standards. And that requires intentional competency development.

Note: CCPS Project 239 (*Guidelines for Process Safety Knowledge and Expertise*) will specifically address establishing and maintaining PSC within organizations.

Stakeholder Outreach

Stakeholder outreach (outreach) is a process for:

- seeking out individuals or organizations that can be, or believe they can be, affected by company operations and engaging them in a dialogue about process safety;

- establishing a relationship with community organizations, other companies, professional groups, and local, state, and federal authorities; and
- providing accurate information about the company's and the facility's products, processes, plans, hazards, and risks.

This process ensures that management makes relevant PSI available to a variety of organizations. This element also encourages the sharing of relevant information and lessons learned with similar facilities within the company and with other companies in the industry group. Finally, the outreach element promotes involvement of the facility in the local community and facilitates communication of information and facility activities that could affect the community.

Companies train key personnel to interact with important stakeholder groups during planned events and provide resources for all employees to use in their everyday encounters with the public. Crisis communication and outreach training is provided to senior management to help deal with episodic events.

Higher risk situations usually dictate a greater need for formality and thoroughness in the implementation of the outreach element. Conversely, companies having lower risk situations may appropriately decide to pursue outreach activities in a less rigorous fashion. In the case of the outreach element, risk takes on a two-fold meaning: (1) the risk of experiencing an incident and (2) the risk of experiencing an adverse stakeholder reaction as a result of a process safety issue at the facility or other facilities within the company or industry. A higher risk situation may demand a more formal risk communication program that provides detailed information to stakeholders and keeps them updated. In a lower risk situation, a general community outreach policy, via informal practices by trained key employees, may be sufficient.

Conduct of Operations and Operational Discipline

Conduct of operations (COO) is the execution of operational and management tasks in a deliberate and structured manner. It is also sometimes called operational discipline (OD) or formality of operations, and it is closely tied to an organization's culture. Conduct of operations institutionalizes the pursuit of excellence in the performance of every task and minimizes variations in performance. Workers at every level are expected to perform their duties with alertness, due thought, full knowledge, sound judgment, and a proper sense of pride and accountability.[8,9]

To develop an effective COO element program, an organization must start with an honest statement of its objectives and risk tolerance. Considering the outputs of other elements, the organization can then formulate an operations policy and document it, along with the procedures for its implementation. However, the program cannot be merely words on paper. Workers must be trained on the policies and procedures so that they understand the goals and expectations, the lines of authority, and their personal accountability. They must apply good reasoning and judgment (founded upon a sound process safety culture) in all situations, but particularly when action is required in situations not specifically addressed by policy or procedure.

Beyond that, the most critical, ongoing requirement is that management lead by example. If a procedure instructs workers to shut down the process under defined emergency conditions, but management praises operators who “ride it out” and avoid a shutdown, then operational discipline will suffer. COO and OD tolerate no deviation from approved procedures, even if the outcome of a deviation is inconsequential or desirable. Thus, management must hold workers accountable for their actions in all circumstances to avoid the normalization of deviation.

The CCPS book *Conduct of Operations and Operational Discipline*[10] provides extensive discussion and guidance on this element. In particular, Chapter 7 provides guidance on implementing and maintaining COO/OD systems. The key points from Chapter 7 are summarized in the Plan-Do-Check-Adjust (PDCA) process shown in Table 1 below.

Table 1. The PDCA Process Applied to COO/OD Implementation

PLAN: Analyze the situation and develop a plan	• Set a measurable objective toward the goal for the COO/OD effort • Identify the processes impacted by COO/OD • Select where to apply COO/OD • List the steps in each process as it currently exists • Map each process • Identify issues related to COO/OD implementation • Collect data on the current process • Generate implementation plans • Gain approval and support
DO: Implement the plan	• Implement the chosen solution on a trial or pilot basis (first pass through the PDCA cycle) • Implement the change throughout the organization (subsequent passes through the PDCA cycle)

CHECK:
Evaluate the results
	• Gather data on the modified system results
	• Analyze the results data
	• Achieved the desired goal?
	  o If YES, skip the Act step, revise the goal to the next objective for continuous improvement, update the plan, and repeat the PDCA cycle
	  o If NO, proceed to the Act step, modify the implementation plan, and repeat the cycle

ADJUST: Standardize the implementation (and continuously improve)	• Identify systemic changes and training needs for full implementation • Plan ongoing monitoring of the COO/OD system • Continue to look for incremental improvements to COO/OD

Measurement and Metrics

The measurement and metrics (metrics) element establishes performance and efficiency indicators to monitor the near-real-time effectiveness of the RBPS management system and its constituent elements and work activities.[11] This element addresses which indicators to consider, how often to collect data, and what to do with the information to help ensure responsive, effective RBPS management system operation.

A combination of leading and lagging indicators is often the best way to provide a complete picture of process safety effectiveness.[12] Outcome-oriented lagging indicators, such as incident rates, are generally not sensitive enough to be useful for continuous improvement of PSM systems because incidents occur too infrequently. Measuring PSM performance requires the use of leading indicators, such as the rate of improperly performed line-breaking activities.

Metrics can be established as a facility designs, corrects, or improves its PSM system.[13] Establishing metrics (in particular, the data-gathering and refreshing mechanisms) is simpler to do during the initial design and implementation of the system. Each RBPS book chapter has a section that contains a list of possible metrics proposed for that element's key principles (Section X.5, where X is the chapter number). PSM implementers can select from these examples or develop their own ideas. Typically, a small set of metrics is proposed, data are gathered, and the set is pilot tested to see if tracking the metric data helps identify management system degradation. This metrics experiment should last a minimum of several "metric refresh cycles" and, at most, until the next formal RBPS audit is conducted. At that time, the audit can show whether the metrics have been correctly projecting the performance of the PSM system.

Extensive additional information and guidance regarding measurement and metrics can be found in the following resources:

- A CCPS publication entitled "Process Safety Leading and Lagging Metrics . . . You Don't Improve What You Don't Measure." [12] It describes three categories of metrics:
    - Lagging metrics. Lagging metrics are 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. Leading metrics are a forward-looking set of metrics that indicate the performance of the key work processes, operating discipline, or layers of protection that prevent incidents
    - Near-miss and other internal lagging metrics. These metrics describe less severe incidents (i.e., below the threshold for inclusion in the industry lagging metric), or unsafe conditions that activated one or more layers of protection. Although these are actual events (i.e., lagging metrics), they are generally considered to be good indications of conditions that could ultimately lead to a more severe incident.

  The document strongly recommends that all companies incorporate each of these three types of metrics into their internal PSM system. Recommended metrics for each of these categories are included in the three primary sections of the document.

- The CCPS book *Guidelines for Process Safety Metrics*.[13] This book provides basic information on process safety performance indicators, including a comprehensive list of metrics for measuring performance and examples of how they can be successfully applied over both the short and long term. PSM implementers can use the guidance in this book to help identify appropriate metrics useful in monitoring performance and improving process safety programs.
- The CCPS book *Integrating Management Systems and Metrics to Improve Process Safety Performance*.[14] This book was written, in part, to capture the recent advances in understanding how process safety performance improvements can be measured with a combination of leading and lagging indicators. Since the management programs for the process and personal safety, health, environment, quality, and security (SHEQ&S) groups have developed separately in many organizations, these guidelines were written to help organizations identify common process safety metrics across the SHEQ&S groups. Integrating these metrics will reduce an organization's overall operational risks.
- *Developing Process Safety Indicators: A Step-by-Step Guide for Chemical and Major Hazard Industries*.[15] This Health and Safety Executive publication presents a six-step process for developing and implementing safety indicators: (1) establish the organizational arrangements to implement indicators, (2) decide on the scope of the indicators, (3) identify the risk control systems and decide on the outcomes, (4) identify critical elements of each risk control system, (5) establish a data-collection and reporting system, and (6) review.
- The Organisation for Economic Cooperation and Development (OECD) publication *Guidance for Industry, Public Authorities and Communities for Developing SPI Programmes Related to Chemical Accident Prevention, Preparedness and Response*.[16] The three chapters in this document are designed to help public authorities (including emergency response personnel) and organizations representing communities/public better understand safety performance indicators (SPI) and how to implement SPI programs. However, many of the approaches suggested can also be applied to implementing metrics programs in the petrochemical industry.
- ANSI/API RP 754, *Process Safety Performance Indicators for the Refining and Petrochemical Industries*.[17] This recommended practice describes possible metrics that are grouped into four tiers and address both leading and lagging indicators.

Note: *Integrating Management Systems and Metrics to Improve Process Safety Performance* provides examples of implementing this element.

Management Review and Continuous Improvement

Management review is the routine evaluation of whether management systems are performing as intended and producing the desired results as efficiently as possible. It is the ongoing due diligence review by management that fills the gap between day-to-day work activities and periodic formal audits, thereby allowing ongoing evaluation and guiding continuous improvement. Management reviews have many of the characteristics of a first-party audit as described in the RBPS book. They require a similar system for scheduling, staffing, and effectively evaluating all RBPS elements, and a system should be in place for implementing any resulting plans for improvement or corrective action and verifying their effectiveness.

Management reviews are conducted with the same underlying intent as an audit – to evaluate the effectiveness of the implementation of an entire RBPS element or a particular element task. However, because the objective of a management review is to spot current or incipient deficiencies, the reviews are more broadly focused and more frequent than audits, and they are typically conducted in a less formal manner.

Nevertheless, like an audit a management review should at least check the implementation status of one or more RBPS elements against established requirements. The management review team meets with the individuals responsible for managing and executing the subject element to (1) present program documentation and implementation records, (2) offer direct observations of conditions and activities, and (3) answer questions about program activities. The team attempts to answer such questions as:

- What is the quality of our program?
- Are these the results we want?
- Are we working on the right things?

Organizational changes, staff changes, new projects or standards, efficiency improvements, and any other anticipated challenges to the subject element are also discussed so that management can proactively address those issues.

Recommendations for addressing any existing or anticipated performance gaps or inefficiencies are proposed, and responsibilities and schedules for addressing the recommendations are assigned. Typically, the same system used to track corrective actions from audit findings is used to track management review recommendations to their resolution. The meeting minutes and documentation of each recommendation's resolution are maintained as required to meet programmatic needs.

Management review results should be monitored over time, and more frequent reviews should be scheduled if persistent problems are evident.

MONITORING NEW ELEMENTS OR ACTIVITIES

Another section of the new book discusses monitoring the initial implementation and performance of a new PSM system. Similarly, in addition to establishing ongoing measurement, management review, and auditing requirements for the new elements, you should also consider the need to:

- establish a plan/means for collecting PSM metrics and other feedback and data on the performance of the new elements,
- develop a plan for the initial conduct of PSM management reviews, and
- create a plan for the initial auditing of the PSM elements/activities.

Note: The guidance provided in Chapter 4 of the new book regarding each of these activities can be utilized to perform appropriate monitoring.

CONCLUSION

We hope that you find the information in this paper helpful in implementing new PSM elements in your site/company, a situation that may exist due to (1) desire to improve PSM performance by addressing these softer, "beyond compliance" elements and/or (2) pending (and likely) changes to PSM regulations that would require implementation of some of these elements.

Further, we hope you will find *Guidelines for Implementing Process Safety Management, 2nd Edition* even more helpful in conquering other present or future challenges in implementing PSM, and encourage you to obtain it, read it, and apply it in any of the situations it addresses.

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