Pipeline Safety Management System Requirements

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Table of Contents

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Introduction

This Recommended Practice (RP) provides guidance to pipeline operators for developing and maintaining a pipeline safety management system (PSMS). The elements of this RP are structured to minimize nonconformity with other pipeline safety processes and procedures. While this RP may include some elements of other management systems (such as those particular to environmental management, occupational health, personnel safety management, financial management, or insurance risk management), it does not include all requirements specific to those systems. This RP may be used either in conjunction with or independent of other industry-specified documents. Finally, this RP builds upon and augments existing requirements and is not intended to duplicate requirements of any other consensus standards or regulations.

Managing the Safety of Complex Processes

Safe and effective pipeline operation requires awareness and management of many linked activities. Examples of operational activities include designing, constructing, operating, maintaining, and managing the pipeline. Major accidents with high consequences rarely occur due to a safety breakdown of a single activity but instead occur because of an alignment of weaknesses across multiple activities. While safety efforts may be applied individually to each activity, more effective safety performance is achieved when viewing the linked activities as processes that are better dealt with holistically.

Managing processes requires different skills than managing individual activities. Pipeline process management includes determining needs throughout the pipeline lifecycle, provisioning sufficient human and financial resources, identifying the proper sequence of a series of activities, monitoring and measuring the effectiveness of the activities performed, and applying changes or corrections to those activities as needed.

Safety Management Systems

Managing the safety of a complex process requires a system of efforts to address multiple, dynamic, activities and circumstances. Pursuing the industry-wide goal of zero incidents requires comprehensive, systemic effort. Some efforts within a safety management system are directed to a specific need or activity. However, many process incidents are relatively infrequent but can lead to serious consequences. Therefore, other elements of a safety management system address the need to continuously operate safely and improve safety performance. These indirect broader efforts include:

a. demonstrating management commitment,

b. structuring pipeline safety risk-management decisions,

c. increasing confidence in risk prevention and mitigation,

d. providing a platform for sharing knowledge and lessons learned, and

e. promoting a safety-oriented culture.

Building on these efforts yields the following principles on which to base a safety management system recommended practice:

a. Commitment, leadership, and oversight from top management are vital to the overall success of a PSMS.

b. A safety-oriented culture is essential to enable the effective implementation and continuous improvement of safety management system processes and procedures.

c. Risk management is an integral part of the design, construction, maintenance, and operation of a pipeline.

d. Pipelines are designed, constructed, operated, and maintained in a manner that complies with Federal, state, and local regulations, and conform to applicable industry codes and consensus standards with the goal of reducing risk, preventing releases, and minimizing the occurrence of abnormal operations.

e. Defined operational controls are essential to the safe operation and maintenance of pipelines.

f. Incident response improves the likelihood of protection of life and property and minimizes adverse environmental consequences.

g. The creation of a learning environment for continuous improvement is achieved by investigating incidents thoroughly, fostering non-punitive reporting systems, and communicating lessons learned.

h. Periodic assessment of risk management effectiveness and pipeline safety performance improvement, as well as audits, is essential to ensure effective PSMS performance.

i. Pipeline operating personnel throughout the organization must effectively communicate and collaborate with one another. Further, communicating with service providers to share information that supports decision making and completing planned tasks (processes and procedures) is essential.

Plan-Do-Check-Act

The above principles are recurring values and activities that are repeated to achieve continuous assessment and improvement. The Plan–Do–Check–Act (PDCA) cycle is a four–step model for carrying out these efforts within ten elements (Figure 1). This methodology can be applied to the management system as a whole as well as to all individual elements and processes within the system. The PDCA principle is at the core of many management systems, and its principal aim is to encourage creating strategies and plans, executing those strategies and plans in line with guidelines, checking those actions for quality, and using those results to adjust the next generation of plans. This cycle is iterative and is maintained to achieve continuous improvement.

There are inputs (e.g., data, information, and resources) to processes within the elements yielding outputs (e.g., prioritized work, reduced risk, and ultimately improved safety performance).) The pipeline operator defines PSMS inputs and outputs within the execution of each of the essential elements. The inputs and outputs from the PSMS are reviewed periodically.

The PDCA is useful when starting a new improvement project; when developing a new or improved design of a process, product, or service; or when defining a repetitive work process.

The PDCA is also useful for the management system as a whole as a model for continuous improvement and when planning data collection and analysis, when selecting and prioritizing threats or causes, and when implementing any changes.

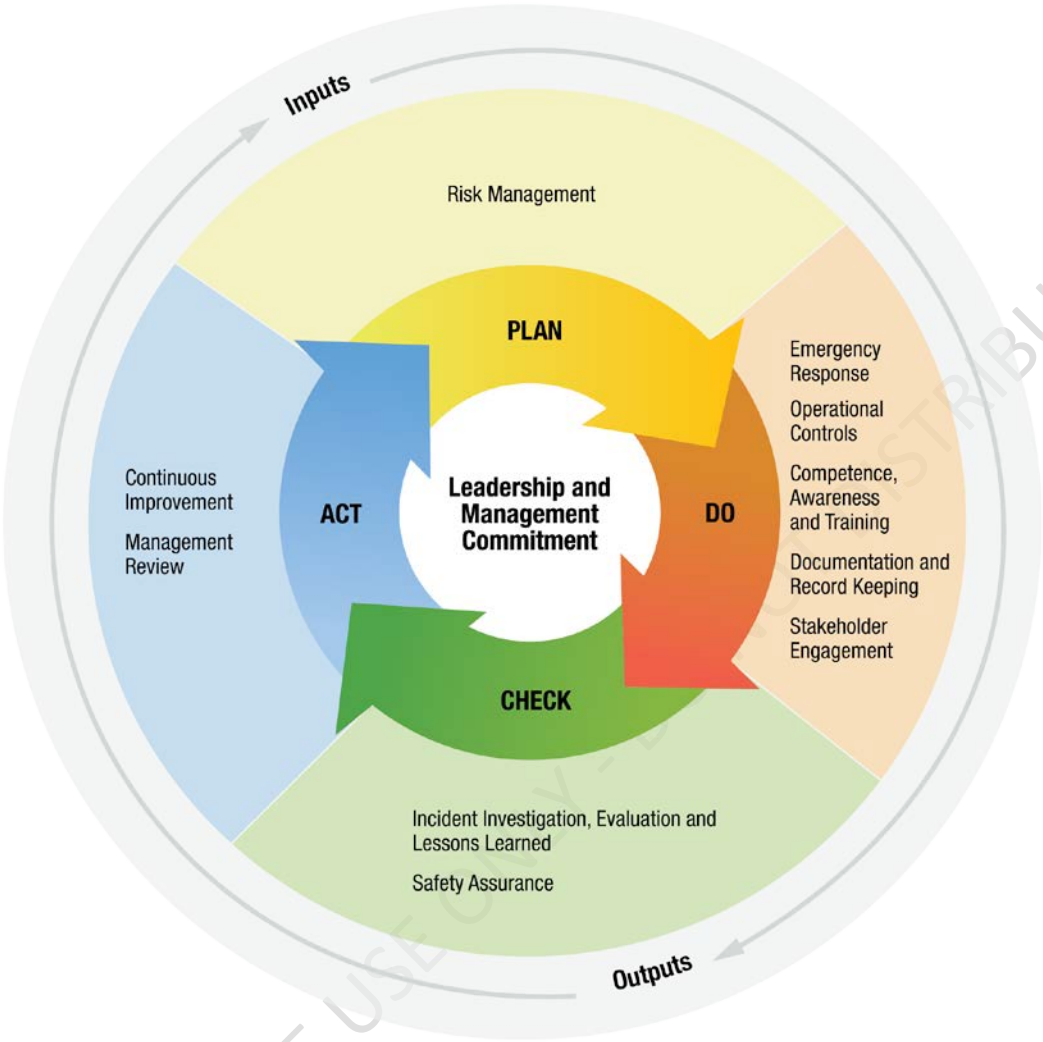

Figure 1: Plan–Do–Check–Act (PDCA) Cycle

(NOTE The placement of elements and sub-elements is provided as an example. The designation and placement of particular elements and sub-elements may differ among operators. Some elements bridge across multiple aspects of PDCA.)

The components of the PDCA cycle are:

Plan: This step entails establishing the objectives and processes necessary to deliver results in accordance with the organization's policies and the expected goals. By establishing output expectations, the completeness and accuracy of the process is also a part of the targeted improvement.

Do: This step is the execution of the plan designed in the previous step.

Check: This step entails the review of the results compared with established objectives. Comparing those results to the expected goals to ascertain any differences; looking for deviation in implementation from the plan.

Act: This step is where a pipeline operator takes actions to continually improve process performance, including corrective actions on significant differences between actual and planned results, analyzes the differences to determine their root causes, and determines where to apply changes that will include improvement of the process or product.

Reflecting the cyclical nature of PDCA and the dynamic/evolutionary nature of the management system, the entire process begins again from the start. Each pass through these four steps results in opportunities to improve. In addition, the scope to which PDCA is applied may be refined to plan and improve subsequent iterations of the cycle with more detail.

Goal of this Document and its Safety Management System Framework

The goal of this document is to provide pipeline operators with a framework to review an existing PSMS or develop and implement a new PSMS. Newly developing or improving a PSMS will enhance effectiveness of risk management and enable continual improvement of pipeline safety performance. The framework builds upon an operator's existing pipeline safety management programs by drawing upon industry experiences, lessons learned, and existing standards. The intent of the framework is to comprehensively define managerial elements that can identify, manage and reduce risk throughout the entirety of a pipeline's lifecycle and, at the earliest stage, help prevent or mitigate the consequences of an unintended release or abnormal operations.

NOTE "Pipeline" is defined in Section 3 to address, more broadly, pipeline systems.

Particular emphasis is placed on increased proactivity, thinking of what can go wrong in a systemic manner, clarifying safety responsibilities throughout the pipeline operator's organization (including contractor support), the important role of senior management and leadership at all levels, encouraging the non-punitive reporting of and response to safety concerns, and providing safety assurance by regularly evaluating operations to identify and address risks. These factors work together to make safety programs and processes more effective, comprehensive, and integrated.

Flexibility

The framework is to be applied with flexibility to account for the current state of development of particular elements of management systems within a company. In cases where an operator is already operating under its own comprehensive PSMS, this framework serves as a basis of comparison and review between the industry recommended practice and the operator's system. Other operators may have some number of individual established safety systems but no comprehensive PSMS. For them, this RP provides a means to integrate and add to those efforts to establish a comprehensive PSMS. Still other operators may have no formal safety systems. For those operators, adoption of the recommended framework would be a starting point to build a PSMS, while learning from more advanced operators. In all cases, operators are intended to have the flexibility to apply this RP as appropriate to their specific circumstances.

Scalability

The framework is also intended to be scalable for pipeline operators of varying size and scope. The number of employees at a liquid pipeline operator can range from a handful to thousands. A local gas distributor or municipal operator may have only a few employees. An interstate transmission pipeline company may have entire divisions of subject matter experts. The 10 essential elements comprising the framework apply to organizations of any size and sophistication. Specific application of those elements to the operations and processes of a given operator will reflect the scale of that operator. The framework elements and principles underlying it are broadly applicable, and strongly recommended, for energy pipeline operators of all sizes. It is the clear view of the committee generating this document that the level of detail in each pipeline operator's PSMS should be appropriate for the size of their operations and the risk to the public and the environment. For very small operators with a handful of employees, adoption of all provisions within this RP may not be practical. However, even small operators can build on selected provisions herein.

Essential Elements for a PSMS

As described in greater detail below, the essential elements for any PSMS implemented under this RP shall include:

1. Leadership and Management Commitment
2. Stakeholder Engagement
3. Risk Management
4. Operational Controls
5. Incident Investigation, Evaluation and Lessons Learned
6. Safety Assurance
7. Management Review and Continuous Improvement
8. Emergency Preparedness and Response
9. Competence, Awareness and Training
10. Documentation and Record Keeping

Engaging employees in safety decisions using these elements should enhance the safety of themselves, their fellow employees, contractor personnel, neighbors along the pipeline right-of-way and the wider public.

Safety Culture

A positive safety culture is essential to an organization's safety performance regardless of its size or sophistication. Safety culture is the collective set of attitudes, values, norms, and beliefs that a pipeline operator's employees and contractor personnel share with respect to risk and safety. A positive safety culture is one where employees and contractor personnel collaborate; have positive attitudes towards compliance (meeting and exceeding minimum standards); feel responsible for public safety, for each other's safety, and for the health of the business; and fundamentally believe in non-punitive reporting.

The number and complexity of pipeline operational activities create the need to both manage safety systematically using a PSMS and require a positive safety culture. A positive safety culture can exist without a formal PSMS, but an effective PSMS cannot exist without a positive safety culture. Therefore, operators should actively work to improve and assess their safety culture.

Maintaining a positive safety culture requires continual diligence throughout an organization to address issues including complacency, fear of reprisal, over confidence, and normalization of deviance. Examples of indicators of a positive safety culture within an organization are listed below.

The organization:

— embraces safety (personnel, public, and asset) as a core value,

— ensures everyone understands the organization's safety goals,

— fosters systematic consideration of risk, including what can go wrong,

— inspires, enables, and nurtures change when necessary,

— allocates adequate resources to ensure individuals can successfully accomplish their PSMS responsibilities,

— encourages employee engagement and ownership,

— fosters mutual trust at all levels, with open and honest communication,

— promotes a questioning and learning environment,

— reinforces positive behaviors and why they are important ,

— encourages two-way conversations about learnings and commits to apply them throughout the organization, and

— encourages non-punitive reporting and ensures timely response to reported issues.

Adopting and implementing a PSMS will strengthen the safety culture of an organization. Leaders, managers, and employees acting to make safety performance and risk reduction decisions over time will improve pipeline safety as a value, thereby strengthening the safety culture of an organization. With this RP, operators are provided an enhanced framework to manage and reduce risk and enable continual improvement in pipeline safety performance. The individual elements, when executed as deliberate, routine, and intentional processes, result in improved communication and coordination, which yield a cohesive system and a stronger safety culture.

Recommended Practice for Pipeline Safety Management System Requirements

1 Scope

This recommended practice (RP) establishes the base requirements of pipeline safety management systems (PSMS) for organizations that operate pipelines for use in the hazardous liquids and gas industries.

This RP provides pipeline operators with an enhanced framework to reveal and manage risk, promote a learning environment, and continually improve pipeline safety and integrity by using a PSMS. At the foundation of a PSMS is the operator's existing pipeline safety system. The requirements of this RP are comprehensive and define the elements needed to identify and address safety for a pipeline's lifecycle. The elements herein comprise what is to be done, not how to do it. The document does not explicitly address personnel safety, environmental protection, and security, but the elements herein can be applied to those aspects of an operation.

Information marked "NOTE" are not requirements but are provided for guidance in understanding or clarifying the associated requirement.

NOTE This document defines the requirements of a safety management system applicable to pipelines. When the document refers to a requirement of a safety management system, it can mean a requirement specified by this pipeline safety management system or a safety management system in use by an operator that meets the intent of this document.

2 Normative References

The Bibliography includes references a pipeline operator may consider in developing or refining a PSMS.

3 Terms, Definitions, and Abbreviations

3.1 Terms and Definitions

For the purposes of this document, the following definitions apply:

3.1.1
accountability
Answerable for the correct and thorough completion of work.

3.1.2
allocation
Assignment, distribution, or apportionment.

3.1.3
audit
An examination of conformity with this RP and implementation of the PSMS. An audit may be performed by external professionals or internal personnel not involved in the operations being audited.

3.1.4
authority
Assigned power to control work by an organization, including power to delegate.

3.1.5
compliance
Act or process of satisfying the legal and other applicable requirements of a regulation or regulatory body.

3.1.6
conformance
meets a specified requirement

3.1.7
contractor
a person doing work on behalf of the pipeline operator, including contractors and all levels of subcontractors.

3.1.8
corrective actions
The steps established either to correct nonconforming aspects of the PSMS identified during an audit or evaluation, or actions taken to mitigate threats recognized during day-to-day activities.

3.1.9
effectiveness
Extent to which planned activities are completed and planned results achieved.

[adapted from BS EN ISO 9000:2005, 3.2.14]

3.1.10
employee
A person who is employed by the pipeline operator.

3.1.11
evaluation
An assessment of the effectiveness of risk management and progress made toward improving pipeline safety performance.

3.1.12
gas
Natural gas, flammable gas, toxic or corrosive gas; liquefied petroleum gas and liquefied natural gas when vaporized and transported through a pipeline.

3.1.13
hazardous liquids
Petroleum, petroleum products, anhydrous ammonia and carbon dioxide.

3.1.14
inspection
Demonstration through observation or measurement that an activity or product conforms with specified requirements.

3.1.15
key performance indicator (KPI)
Quantifiable measure that an organization uses to gauge or compare performance.

3.1.16
goal
Desired state or result.

3.1.17
leadership
Establishing clear vision translated into policies and objectives; sharing them with others so they will follow willingly; providing information, knowledge, and methods to realize the objectives; and coordinating and balancing competing interests of all stakeholders.

3.1.18
legal requirement
Statutory or regulatory obligations imposed on a pipeline operator.

3.1.19
management [*noun*]
Person or group of people, as defined by the pipeline operator, who directs and controls all or part of a facility, location, department, or other function; has fiscal responsibility for the organization; and is accountable for ensuring compliance with legal and other applicable requirements.

NOTE For some pipeline operators, top management and management are the same.

3.1.20
management system
A framework of elements that an organization uses to direct and control work to achieve its objectives in an intentional and continuous manner.

3.1.21
near miss
An unplanned sequence of events that could have resulted in harm or loss if the conditions were different or if the events were allowed to progress.

NOTE: CCPS, Risk-Based Process Safety

3.1.22
non-punitive reporting
Acting to encourage employees and contractor personnel to report and only punishing a person for reporting when he/she acts in a reckless manner; demonstrates a pattern of carelessness or noncompliance; or puts themselves, their co-workers, the public, or the pipeline at risk by intentionally violating essential safety rules.

3.1.23
objective
Subordinate step that supports a goal.

3.1.24
organization
A group of people and facilities with an arrangement of responsibilities and authorities; united for the purpose of operating a pipeline.

3.1.25
outsource
Function or process that is performed by a contractor on behalf of the operator.

3.1.26
person
Any individual participating in developing, implementing, evaluating, or improving the PSMS.

3.1.27
pipeline
That which includes physical facilities through which hazardous liquids or gas moves in pipeline transportation, including pipe, valves, fittings, flanges (including bolting and gaskets), regulators, pressure vessels, pulsation

dampeners, relief equipment, and other appurtenances attached to pipe, pumps and compressor units, metering stations, regulator stations, and fabricated assemblies.

NOTE Adapted from B31.4 and B31.8 definitions.

3.1.28
pipeline operator
Organization that operates a pipeline.

3.1.29
pipeline safety
Protection of the pipeline against physical failure, human error, organizational failure, damage, or other undesirable events as well as the mitigation of recognized threats.

NOTE This can take the form of protecting people or property from events or exposure to circumstances that cause unintended releases or abnormal operating conditions.

3.1.30
procedure
Documented method that must be followed to perform an activity under controlled conditions to achieve conformity to specified requirements.

3.1.31
process
A series of interrelated or interacting activities or steps with anticipated outputs applied in operation of a pipeline.

3.1.32
responsibility
Obligation to complete work

3.1.33
risk
Situation or circumstance that has both a likelihood of occurring and a potentially negative consequence.

3.1.34
risk analysis
Methodology for predicting the probability and consequence of a threat to the pipeline system.

3.1.35
risk management
Systematic application of management policies, processes, procedures, finite financial and human resources, and practices to the tasks of identifying, analyzing, assessing, preventing, and mitigating risk in order to protect employees and contractor personnel, the general public, the environment, and the pipeline.

3.1.36
risk management plan
Document that describes the objectives and associated activities that the pipeline owner or operator intends to execute in order to manage risk.

3.1.37
resources
Infrastructure, technology, equipment, materials, personnel with specialized skills, and financial resources that are applied to achieve objectives.

3.1.38
safety assurance

Demonstration of the proper application of the PSMS and progress toward effective risk management and improved pipeline safety performance.

3.1.39
safety culture
The collective set of attitudes, values, norms, and beliefs that the operator's employees and contractor personnel share with respect to risk and safety.

3.1.40
service
Performance of an activity by one function or organization for another.

3.1.41
stakeholder
Person or group having an interest in the operator's performance, success, or the impact of the operator's activities.

3.1.42
system
An integrated set of elements, including people, hardware, software, information, procedures, facilities, services, and support facets, that are combined in an organizational or support environment to accomplish a defined objective.

3.1.43
target
Desired KPI value or measurable indication of achievement of an objective.

3.1.44
threat
A condition, or physical or organizational occurrence that could cause harm to a pipeline, the operator's personnel and contractors, or the organizational culture.

3.1.45
top management
A person or group of people who direct and control the organization at the highest level.

NOTE Top management can include an organization's chairman, president, executive director, city manager, and their direct reports.

3.2 Abbreviations

For the purposes of this document, the following abbreviations shall apply.

API American Petroleum Institute

ISO International Organization for Standardization

KPI key performance indicator

MAOP maximum allowable operating pressure

MOC management of change

MOP maximum operating pressure

PDCA plan-do-check-act

PSMS pipeline safety management system

RP recommended practice

4 Essential Pipeline Safety Management System Elements

The essential elements for any PSMS shall include the following:

1. Leadership and Management Commitment (Section 5)
2. Stakeholder Engagement (Section 6)
3. Risk Management (Section 7)
4. Operational Controls (Section 8)
5. Incident Investigation, Evaluation, and Lessons Learned (Section 9)
6. Safety Assurance (Section 10)
7. Management Review and Continuous Improvement (Section 11)
8. Emergency Preparedness and Response (Section 12)
9. Competence, Awareness, and Training (Section 13)
10. Documentation and Record Keeping (Section 14)

NOTE 1 At the operator level, these elements may not appear distinctly in a single document but should be identifiable in a clear and mandated process within the operator's procedures.

NOTE 2 Each element is developed in subsequent sections.

5 Leadership and Management Commitment

5.1 General

The pipeline operator shall establish and maintain a PSMS and build a shared understanding of safety culture. The pipeline operator shall articulate expectations, including publishing a commitment to safety, safety responsibilities of personnel at all levels, policies, goals and objectives. The pipeline operator shall improve upon the PSMS and measure its effectiveness and maturity in accordance with the requirements of this document.

5.2 Goals and Objectives

Top management shall establish goals and objectives for its PSMS. The objectives shall be measurable and consistent with overall safety policies and objectives. Top management shall also create a culture within the organization that encourages openness and two-way dialogue so learnings from incidents and events can ultimately reduce the risk of recurrence. The health of this culture should be assessed and leadership commitment needs to be visible to address areas of concern and opportunity.

5.3 Planning

Management shall ensure that:

a) processes and procedures are defined to support execution of each PSMS element;

b) a process is defined to address regulatory and legislative requirements for pipeline safety and the impact on the PSMS;

c) plans, processes, and procedures are integrated to ensure that data, results, and findings are shared across relevant elements, processes, teams, employees and contractors; and

d) budgets and resource planning, including for personnel and supporting technology requirements, are developed to design, implement and improve the PSMS.

5.4 Responsibilities of Leadership

5.4.1 Top Management

Top management shall lead and demonstrate its commitment to the development, implementation, continuous improvement, and evaluation of the maturity of its PSMS by:

a. establishing and maintaining policies, goals, and objectives;

b. promoting a positive safety culture and assessing how this culture is changing over time;

c. ensuring that the elements set forth in this RP are in place, with clear accountability for implementation and with a clear connection between objectives and day-to-day activities;

d. fostering risk management processes that reveal and mitigate risk, making compliance and risk reduction routine;

e. leading a resource allocation process;

f. establishing high-level performance measures;

g. identifying the executive(s) accountable for implementation and continuous improvement, and managers responsible for each element of the PSMS;

h. communicating commitment to the PSMS with internal and external stakeholders;

i. ensuring that dependent and interrelated functions within the organization are sharing information and working to achieve the policies and objectives;

j. establishing appraisal, recognition, and discipline policy that promotes the PSMS;

k. promoting engagement and leadership at all levels of the organization;

l. promoting an environment of mutual trust; and

m. conducting periodic management reviews of the PSMS and evaluating recommended changes to incorporate into the PSMS.

5.4.2 Management

Management, supported by top management, shall:

a. establish, implement, evaluate, and improve processes, procedures, systems, and training to meet policies and objectives;

b. ensure there is a clear connection between objectives and day-to-day work activities, including those needed to meet the requirements of this document;

c. assess, evaluate, and continuously improve the safety culture;

d. ensure that risk management occurs routinely revealing risk, by establishing intentional actions designed to assure compliance, and manage risk by making decisions that will enhance the safety culture over time;

e. develop, implement, and continuously improve processes that apply resources to projects defined in the budget and emerging risks throughout the year;

f. identify, seek, and allocate resources sufficient for safe, environmentally sound, reliable, and efficient operations;

g. share learnings so that future failures are prevented or mitigated.

h. establish performance measures that address each element of the PSMS;

i. ensure that data, results, and findings are shared and integrated among relevant operator and contractor processes, and that ongoing communications about operations occur routinely with employees and contractors;

j. identify personnel responsible for PSMS elements, supporting initiatives, and oversight; and

k. conduct annual management reviews of the PSMS that evaluate and recommend changes to the organization's PSMS.

5.4.3 Employees

Employees supported by management and top management shall:

a. follow the procedures set forth by the organization,

b. identify and reveal risks,

c. identify improvements to processes and procedures, consider fellow employees, contract personnel and public safety when addressing an abnormal condition or, nonconforming process or procedures, and

d. recognize cascading failures early on and take action to prevent a catastrophic event.

5.5 Responsibility, Accountability, and Authority

Responsibilities, accountabilities, and authorities in developing, implementing, and continuously improving the PSMS shall be defined, documented, and communicated throughout the pipeline operator's organization. Accountability for resource allocation shall be assigned to (an) executive(s) with appropriate authority.

5.6 Making Communication, Risk Reduction, and Continuous Improvement Routine

Top management shall ensure processes are in place to foster deliberate communication and continuous improvement. Processes shall provide a means to alert when scheduled management system requirements become due and notify top management if not completed. Monthly, quarterly, or annual reviews of important management system processes shall be conducted. While not intended to be exhaustive or prescriptive, consideration shall be given to scheduling at least annual reviews to ensure top management knowledge in the following areas:

a. Resource Allocation Process—Each operating unit, along with top management, will identify and review assets, systems, and other resources needed to operate in a safe, environmentally sound, and efficient manner.

b. Review the PSMS and whether improvements should be made.

c. Operations performance review.

d. Audit and Evaluation Plan—Decide the schedule and locations for the coming year.

e. Incentive Compensation—Top management shall review operations performance and compliance with the PSMS in the allocation of performance compensation.

f. Pipeline System Assessment—Review the pipeline system's condition and determine which parts of the system are critical.

g. Pipeline Asset Integrity—Top management is updated by senior integrity managers on known threats, assessment and repair effectiveness, and adequacy of the plan(s).

h. Progress and processes to reduce risk; communicate incident investigation findings and lessons learned; construction progress – scope, schedule and cost; efficiency and productivity enhancements; progress on employee and contractor safety programs; and review of leading indicators and their meanings.

6 Stakeholder Engagement

6.1 General

The pipeline operator shall maintain a process and a plan for communication and engagement with internal and external stakeholders regarding risk identification and management, safety performance, and, as appropriate, other management system elements. The plan shall identify the organization's stakeholders, both internal and external, and the communication responsibilities of pipeline operator personnel.

The stakeholder engagement plan shall identify specific objectives and the personnel responsible for sharing and receiving information. The operator shall identify the types of information it seeks and how it is valuable.

NOTE The operators' goal with the plan is to create an understanding of how stakeholder engagement occurs and the timing or scheduling of these opportunities.

6.2 Internal

The pipeline operator shall establish processes to communicate the importance of meeting requirements of the PSMS to appropriate functions within the organization. Employees and contractors shall understand the policies, goals objectives and procedures pertinent to their work that are driven by the PSMS.

The pipeline operator shall maintain a process for employees and contractor personnel to raise concerns to management and make recommendations for improvements in risk identification, prevention, and mitigation. Management shall promote an environment encouraging two-way communication. Management shall also implement a process for communicating and applying lessons learned.

6.3 External

The pipeline operator shall maintain a process and a plan for two-way communication with external stakeholders. The process shall address providing information, engaging regulatory bodies, and handling of feedback from representatives of the public. The pipeline operator shall identify external stakeholders through ongoing use of appropriate company and public processes, events, social media, or other methods. The objectives are to provide a means through which stakeholders can acquaint themselves with the company and the company can be acquainted with stakeholders who want to maintain an ongoing dialogue regarding safety and asset-related concerns. The communication process should address a high-level view of company safety operations, the current focus of risk management efforts, and measures the operator uses to gauge safety performance.

To the extent possible, the pipeline operator shall identify personnel who are available to the public to receive and exchange information regarding pipeline safety matters, particularly where stakeholders can provide the

operator with information about changing risk in the physical environment surrounding the pipeline. Operators shall develop and execute plans to share safety performance with those that live, work, and play in proximity to their pipelines and identify personnel who can receive input regarding concerns about information transparency.

NOTE 1 Examples include members of the public; local, state, and Federal regulators; industry organizations; shippers; shareholders; emergency responders; law enforcement; and others as identified by the company. This includes peer-to-peer information sharing within the industry.

NOTE 2 Refer to API Recommended Practice 1162 – Public Awareness Programs for Pipeline Operators

7 Risk Management

7.1 General

The pipeline operator shall maintain (a) procedure(s) for the performance of risk management. The operator shall maintain a description of the assets comprising the pipeline, including the surrounding environment, to identify threats to pipeline safety.

The operator shall analyze risk considering the threat occurrence likelihood and consequence. The operator shall evaluate pipeline safety risk and make decisions on how to manage it through preventive controls, monitoring, and mitigation measures. Safety assurance sub-elements, including audits, data analysis, and performance evaluation are used to monitor the effectiveness of risk management.

NOTE 1 Risk management is used to understand and evaluate threats throughout the pipeline life cycle and their interrelationships along particular pipelines. Risk management steps are undertaken to reduce risk and ultimately achieve the goal of zero incidents.

NOTE 2 The term “threat,” meaning threats to pipeline safety, is used in this document in a similar way that “hazard” is used in other industries. The intent in identifying threats or hazards is to define “what can go wrong?” Threats in this context are broader than the set typically considered for pipeline integrity.

NOTE 3 The term “threat” can be applied broadly in a PSMS, such as a threat to a safety culture (NEB Statement on Safety Culture), or a threat to the knowledge and experience of an organization through retirements and attrition. These threats can be assessed using risk assessment and managed with prevention and mitigation measures.

7.2 Data Gathering and Quality

The pipeline operator shall maintain an inventory of the physical assets of the pipeline and environment in proximity to the pipeline that is required to define safe operating conditions (e.g., MOP and MAOP) as well as maintenance.. Recognizing that where there are historical gaps in data, the operator shall work to close gaps through on-going work related to operations, maintenance and pipeline integrity.

These data serve as the foundation of risk management. shall include available data over the pipeline lifecycle and shall be updated based on work performed and as needed during the life of the pipeline. Incident data, including the cause of incidents, shall be included as appropriate. The pipeline operator shall conduct a regular review to identify data gaps and evaluate data quality as part of risk assessment, consistent with continuous improvement.

7.3 Risk Identification and Assessment

Risks to pipeline safety that could result in an unintended release or abnormal operating conditions shall be identified, based on data and information, as well as knowledge and experience with similar facilities. The operator shall maintain a process to identify threats that are posed by operations and the operating environment, including changes in conditions that could occur between assessments. The process shall identify locations where multiple threats are potentially interactive and thereby increase risk. An assessment of threats, being mindful of "what can go wrong?” shall be completed at least annually.

Risk assessment shall consider the likelihood and severity of threats using any one of a variety of risk management tools. Risk assessments shall be performed periodically to identify and understand the collective threats and support the selection of prevention and mitigation measures to minimize the likelihood of the occurrence and consequences of an unintended release and the likelihood of abnormal operating conditions.

7.4 Risk Prevention and Mitigation

Risk prevention and mitigation measures to reduce the likelihood and consequences of a release shall be identified and evaluated. Information to consider shall include, at a minimum:

a) a review of equipment operability, including control systems and materials;

b) a review of procedures, authorities, responsibilities, and accountabilities;

c) a review of training, drills, and scenario development to improve situational awareness;

d) a review of incident response preparation, including response time adequacy and the ability to coordinate and stage an Incident Command System with response personnel internal and external to the organization;

e) the identification of high consequence areas for emergency planning, including sites where there may be mobility impaired people.

In selecting measures to reduce risk, preference shall be given to prevention measures that eliminate or reduce the likelihood and consequences of incidents. Operators shall implement the selected measures and evaluate their impact on risk.

7.5 Periodic Analyses

Risk assessments shall be reviewed and updated, at least annually, using data and information gained from operations and maintenance, inspection and testing, integrity-related work, and incident investigations.

7.6 Analysis Report

Risk analysis results shall be reviewed, at least annually, with top management, including selected risk mitigation methods and their intended effectiveness. Records of top management's review of risk analysis shall be maintained.

8 Operational Controls

8.1 Operating Procedures

8.1.1 Content of Operating Procedures

The pipeline operator shall maintain procedures for the safe operation of each facility consistent with the pipeline operator's safety policies and objectives. The procedures shall:

a. Identify operating conditions and define processes for the following phases of operation, including (as applicable):

    1) initial start-up,

    2) normal operation,

    3) temporary operations, as the need arises,

    4) emergency operations, including emergency shutdowns,

5) normal shutdown, and

6) start-up or restoration of service following maintenance or outage.

b. Identify operating limits relating directly to safety.

8.1.2 Completion of Operating Procedures

For new and modified facilities, the operating procedure described in Section 8.1.1 shall be in place prior to start-up.

8.1.3 Review

Operating procedures shall be reviewed to identify improvements and lessons learned. The frequency of the review shall be based on the levels of risk identified, but no less often than annually. Changes to the procedures shall be documented.

8.2 Safe Work Practices

The pipeline operator shall maintain procedures that address safe work practices to ensure the safe conduct of operating, maintenance, and emergency response activities and the control of materials that impact pipeline safety. Pipeline operating personnel shall follow written procedures. In cases where an employee believes that following a procedure will cause an unsafe condition, he/she shall have authority to stop work and get permission to deviate. Deviations should be documented for future analysis. Pipeline operating personnel shall never leave a question of safety unresolved, raising concerns through designated processes.

8.3 System Integrity

8.3.1 General

The pipeline operator shall ensure that pipeline systems subject to this document shall be designed, manufactured, fabricated, installed, operated, maintained, inspected, and tested to maintain safety in a manner consistent with the specified requirements, regulations, and applicable standards.

8.3.2 Manufacturing and Construction

The pipeline operator shall maintain (a) quality control procedure(s) to ensure that materials and construction are in accordance with the design and purchase specifications.

8.3.3 Manufacturing and Construction Inspection

The pipeline operator shall maintain inspection procedures to ensure that the manufacturing and installation of equipment conforms with design and purchase specifications and the manufacturer's instructions prior to start-up.

8.3.4 Maintenance

The pipeline operator shall maintain procedures to control maintenance activities.

8.3.5 Testing and Inspection

The pipeline operator shall maintain inspection and testing procedures for pipeline safety-related equipment.

8.4 Management of Change (MOC)

8.4.1 General

The pipeline operator shall maintain a procedure for management of change (MOC). For each MOC, the pipeline operator shall identify the potential risks associated with the change and any required approvals prior to the introduction of such changes.

8.4.2 Types of Change

The types of changes that a MOC procedure addresses shall include:

1. technical,
2. physical,
3. procedural, and
4. organizational.

This procedure shall consider permanent or temporary changes. The process shall incorporate planning for the effects of the change for each of these situations.

8.4.3 Elements of MOC Procedure

A MOC procedure shall include the following:

1. reason for change,
2. authority for approving changes,
3. analysis of implications,
4. acquisition of required work permits,
5. documentation (of change process and the outcome of change),
6. communication of change to affected parts of the organization,
7. time limitations, and
8. qualification and training of personnel (including contractors).

NOTE 1 Refer to ASME B31.8S for gas transmission pipelines and API 1160 for hazardous liquid pipelines.

NOTE 2 Application of MOC may trigger use of risk assessment to evaluate the impact of change on overall risk.

8.5 Use of Contractors

When a pipeline operator elects to outsource activities on the pipeline affected by the PSMS, it shall define and document the process for:

a. communicating requirements of the PSMS activities and processes to be conducted by the contractor,, including scope, boundaries, and applicable standards and procedures;

b. defining responsibility, accountability and authority for managing the outsourced activities;

c. incorporating work and findings into the operator's operations;

d. training and orientation on safety policies;

e. evaluating contractor safety performance;

f. communicating risks at the work site; and

g. communicating the MOC procedure.

9 Incident Investigation, Evaluation, and Lessons Learned

9.1 Investigation of Incidents

9.1.1 General

The pipeline operator shall maintain a procedure for investigating incidents and near misses that led, or could have led, to a loss of life or serious injury. Incident investigations shall be initiated as promptly as possible considering the need to secure the incident scene, protect people and the environment, and maintain and recover important evidence and testimony.

9.1.2 Investigation

The investigation of an incident shall include the following:

a. identification of the cause of the incident and any contributing factors;

b. investigation findings and lessons learned;

c. an evaluation and review of the effectiveness of all emergency response procedures and processes implemented as relevant to the incident;

d. any recommendations for pipeline safety performance improvement, including changes to processes and procedures that are identified as a result of the investigation; and

e. any recommendations for transferring lessons learned from the investigation to the risk assessment and control processes, including a review of the consequence and likelihood of failure, current procedures, training, and resource allocation.

9.2 Follow-up and Communication of Lessons Learned

The pipeline operator shall establish a procedure to determine and document the response to each finding and lesson learned from the incident investigation. The pipeline operator shall ensure that actions to implement risk assessment and pipeline safety performance improvement recommendations are tracked and completed.

The procedure shall ensure that the cause, contributing factors, recommendations to prevent recurrence, and lessons learned are communicated to personnel who need to know. The operator may share lessons learned externally through peer-to-peer interactions. Records of the investigation and resulting actions shall be maintained for possible use in subsequent risk assessments.

9.3 Learning from Past Events

The pipeline operator shall establish a process to periodically reevaluate past incident investigations of high consequence and significant near-miss events. This process should focus on:

a. Generating new lessons learned from past events'

b. Evaluating the effectiveness of organizational learning from the known lessons learned

9.4 Learning from External Events

The pipeline operator shall establish a process for evaluating events external to its operations to identify opportunities to learn from those events. The process shall consider learning from procedural, technological, and organizational standpoints. This process should include peer-to-peer interaction as well as interactions with regulators, the affected public, including landowners, public officials, and emergency planning and response personnel.

NOTE 1 Examples of lessons learned include relevant reported releases, publically available information on failures, and results of incident investigations.

NOTE 2 Examples of sources of external events include: NTSB Investigations of pipeline failures, PHMSA advisory bulletins and failure reports, and Common Ground Alliance Damage Incident Reporting Tool System Reports for information on damages to pipelines.

10 Safety Assurance

10.1 General

The pipeline operator shall demonstrate the proper application of its PSMS and progress toward effective risk management and improved pipeline safety performance.

10.2 Audit and Evaluation

10.2.1 General

As part of the safety assurance process, the pipeline operator shall use audits to ensure the PSMS conforms to the requirements of this document, including how it applies to service providers and contractors. Based on those audits and other forms of evaluation discussed below, the operator shall assess the effectiveness of its risk management and progress made toward improving pipeline safety performance.

The pipeline operator shall maintain procedures for planning, conducting, and documenting both audits and evaluations. Planning of audits and evaluations shall consider the results of previous audits and evaluations, the level of safety risk posed by the process being audited or evaluated, and the business criticality of the process being audited or evaluated.

10.2.2 Audits

The pipeline operator shall perform audits to examine its conformity with this RP and the implementation of its PSMS. The audits shall verify that the pipeline operator's PSMS is implemented, maintained, and conforms to the requirements of this document. It is critical that the operator discerns that the PSMS elements and processes are in place and effective.

The pipeline operator shall identify the audit criteria, scope, frequency, and methods used to assess the application of and compliance with the requirements of the PSMS. Risk and complexity of operations are key drivers in the prioritization and frequency of audits. The pipeline operator shall conduct a comprehensive audit at least every three years.

An audit may be performed by external professionals or internal personnel not involved in the work of the PSMS or the operations being audited. Examples may include personnel of a separate operating unit, an organization's compliance unit, an organization's internal audit group, or external parties such as professional auditors, subject matter experts, or peer operators.

10.2.3 Evaluations

A pipeline operator shall perform evaluations to assess the effectiveness of its risk management and progress made toward improving pipeline safety performance. Evaluations shall review processes and procedures and the maturity of their implementation.

Evaluations shall consider the results of stakeholder engagement under Section 6; risk analysis under Section 7; management of change under Section 8; any incident investigations, findings, recommendations, and lessons learned, both internal and external, under Section 9; audits under Section 10; management reviews under Section 11; emergency response issues under Section 12; personnel issues under Section 13; as well as near-miss experiences and abnormal operating data, as appropriate.

10.2.4 Audit and Evaluation Review and Closure

Management shall define response times for addressing identified findings of audits and evaluations. The management responsible for the area being audited or evaluated shall ensure that findings are addressed within the defined response times. The results of internal audits and the status of corrective actions shall be reported in the management review (see 11.1.2). Records of internal audits shall be maintained.

10.3 Reporting and Feedback System

The pipeline operator shall establish and maintain a non-punitive reporting and feedback process for employees and contractors. The need for an anonymous reporting system should also be considered after reviewing the benefits and drawbacks of an anonymous system. Data and information obtained from the implementation of the process shall be monitored to identify new and emerging risks to consider in risk evaluation and to evaluate performance of risk mitigation.

10.4 Analysis of Data

The pipeline operator shall maintain a procedure for the identification, collection, and analysis of data related to pipeline safety system performance and to demonstrate the suitability and effectiveness of the PSMS. The analysis shall include data generated from operations and maintenance, integrity management, monitoring and measurement, audits and evaluations (see 10.2), management reviews (see 11), and other relevant sources.

The pipeline operator shall use data to evaluate where to make improvements to the PSMS.

10.5 Performance Evaluation

The pipeline operator shall establish and maintain a procedure to identify key performance indicators (KPIs) to measure the effectiveness of risk management and to improve pipeline safety performance. KPIs shall also be

developed to track the effectiveness and adequacy of the PSMS. The operator shall maintain and monitor, at a minimum, fatalities, injuries, and property damage resulting from planned as well as unplanned releases; these are referred to as lagging KPIs. The pipeline operator shall establish leading KPIs, which are those measures demonstrating risk reduction. The pipeline operator shall establish process KPIs, i.e., those measures that demonstrate completion or improvement of elements and their supporting processes and procedures. The pipeline operator shall define the frequency with which to review the KPIs and trend performances to identify adverse trends and take corrective action.

NOTE KPIs reflect the outcomes of execution of the PSMS. Leading KPIs are often referred to as precursor or leading measures. Examples include the number of integrity evaluations completed (including mileage), the number of near-term repairs made (including conditions warranting immediate action), and the number of preventive and mitigation actions implemented. Process KPIs are often referred to as proactive measures. Examples include the number of improvement initiatives planned and the number completed, the number of processes improved, and the number of procedures modified and improved.

10.6 Evaluation of Safety Culture

The pipeline operator shall establish methods to evaluate the safety culture of its organization. Operators shall assess the health of their safety culture using methods that assess employee perception of the safety culture. Methods to assess the perception of the culture include but are not limited to questionnaires, interviews, and focus groups. Policies, operating procedures, continuous vigilance and mindfulness, reporting processes, sharing of lessons learned and employee and contractor engagement support an operator's safety culture. Observations and audits of how each of these are being applied in the daily conduct of operations provide indications of the health of an organization's safety culture, including conformance with policies, adherence to operating procedures, practicing vigilance and mindfulness, utilizing reporting processes, integrating lessons learned and engagement of employees and contractors. Failure in application of these provides an indication of potential deterioration of the safety culture. Management shall review the results and findings of perception assessments, observations and audits and define how to improve application of the supporting attributes.

10.7 Evaluation of Maturity

The pipeline operator shall establish a method to evaluate the maturity of its PSMS. The method should allow the operator to objectively determine the strengths of its personnel and processes that support each of the elements of the PSMS as well as areas needing improvement. The method should be flexible to provide the right level of focus on the elements depending on the operator's stage of development, even if it is an early stage, with subsequent periodic reviews. The operator may begin by simply determining whether:

a. a conceptual approach has been developed,

b. deployment has been undertaken,

c. results have been measured, and

d. continuous improvement initiatives have been undertaken that are focused on greater effectiveness.

As the PSMS matures, pipeline operators shall maintain a method to evaluate the extent to which the development and deployment of the PSMS, and means to measure performance (e.g., KPIs), are:

a. comprehensively applied (applied system wide),

b. systematically applied (applied in a uniform, consistent way), and

c. integrated (applied drawing upon the collective experience of personnel and use of data across the system).

The pipeline operator shall consider benchmarking with other operators and review and evaluation of publically available information when evaluating the maturity of its PSMS.

11 Management Review and Continuous Improvement

11.1 Management Review

11.1.1 General

The pipeline operator's PSMS and safety performance shall be reviewed at least annually by top management to evaluate whether the performance goals and objectives have been met (see 5.6)

11.1.2 Input Requirements

The management review shall be guided by products of the elements of the PSMS, including reviews of:

a. the goals and objectives that the management system is intended to help achieve (see 5.2);

b. the status and effectiveness of corrective actions resulting from previous management reviews;

c. performance measures and KPIs (see 10.5);

d. the results of the risk management (see 7);

e. results and recommendations of any incident investigation, evaluation, and lessons learned (see 9);

f. results of internal and external audits and evaluations (see 10.2);

g. changes that could affect the PSMS, including changes to legal, regulatory, and other applicable requirements (see 5.3);

h. stakeholder feedback (see 6.2 and 6.3);

i. the evaluation of PSMS maturity (see 10.7).

j. opportunities for improvement and the need for changes to the PSMS, including the pipeline safety policies and objectives (see 11.2).

11.1.3 Output Requirements

The output from the management review shall include a summary assessment of the effectiveness of the PSMS and any resulting improvements in risk management effectiveness and pipeline safety performance. The assessment shall include any decisions and actions, changes to required resources, and improvements to the processes and procedures made to meet requirements. Recommendations for improvement shall be integrated into the next iteration of the PSMS plan and supporting processes.

11.2 Continuous Improvement

Management shall ensure risk management effectiveness and improvement in pipeline safety performance are continually enhanced by using a PSMS. Management shall continually improve the effectiveness of the PSMS by using the pipeline safety policies and objectives, audit and assessment results, data analysis, and management review to identify corrective and preventive actions.

11.3 Evaluation of Technology

Management shall include ways to evaluate improvements in technology and how it is tested and applied within the organization.

11.4 Top Management Review

Top management shall, at least annually, review and approve the output of management reviews. Management reviews shall be documented.

12 Emergency Preparedness and Response

The pipeline operator shall maintain procedures for responding effectively to a pipeline incident. Emergency preparedness and response plans shall be in place and ready for immediate implementation. The plans shall be accessible and communicated to all personnel and contractors. The plans should be based on applicable laws and regulations.

The emergency preparedness and response procedures shall include, minimally, the following elements:

a. determination of potential types of emergencies (spills, releases, weather events, security threats, fires, utility losses, pandemics, and civil disturbances);

b. internal and external notification requirements;

c. identification of response resources and interfaces;

d. recognition and use of Unified Command/Incident Command Structure;

e. safety, health, and environmental protection processes;

f. communication plan;

g. training and drills, including involvement of external agencies and organizations;

h. lessons learned and improvement process; and

i. periodic review and updating of the plan.

13 Competence, Awareness, and Training

The pipeline operator shall ensure that personnel whose responsibilities fall within the scope of the PSMS have an appropriate level of competence in terms of education, training, knowledge, and experience. Where external resources, including contractors, are used to support the PSMS, the pipeline operator shall ensure that operating personnel have the requisite competence, skills, and experience.

The pipeline operator shall define the need for and provide training to enable development and implementation of the PSMS elements. Training shall include refresher training and raising awareness where executing the safety assurance and continuous improvement sub-elements reveal opportunities to improve processes and procedures. Records of training shall be maintained.

The pipeline operator shall establish a training schedule to ensure that personnel and contractors who have accountabilities, responsibilities, and authorities in executing the requirements of the PSMS are updated and aware of:

a. applicable elements of the PSMS that affect their job requirements;

b. newly emerging or changing risks, problems in execution of the PSMS, and opportunities to improve processes and procedures; and

c. potential consequences of failure to follow processes or procedures.

14 Documentation and Record Keeping

14.1 Control of Documents

The pipeline operator shall maintain a procedure for the identification, distribution, and control of documents required by its PSMS. The procedure shall specify responsibilities for document approval and re-approval and shall identify the controls needed to ensure that the documents required by the PSMS, including revisions, translations, and updates:

a. are reviewed and approved for adequacy prior to issue and use,

b. identify changes and revision status,

c. remain legible and readily identifiable, and

d. are available where the activity is being performed.

Obsolete documents shall be removed from all points of issue or use, or shall otherwise be identified to ensure against unintended use if they are retained for any purpose.

14.2 Control of Records

The pipeline operator shall maintain a procedure to identify the controls and responsibilities needed for the identification, collection, storage, protection, retrieval, retention time, and disposition of records.

Records shall be established and controlled to provide evidence of conformity to requirements and the pipeline operator's PSMS.

Records shall remain legible, identifiable, and retrievable. Records shall be retained for a minimum of five years or as required by legal and other applicable requirements, whichever is longer.

14.3 Pipeline Safety Management System Documents

The PSMS documentation shall include:

a. statements of the safety policies and objectives;

b. procedures established for the PSMS as required by this document and/or the pipeline operator;

c. documents and records, of work required by the PSMS;

d. identification of regulatory, and other applicable requirements; and

e. other records identified by the pipeline operator needed to show the effective operations of the PSMS..

14.4 Procedures

All procedures referenced within this document shall be established, documented, implemented, and maintained for continued suitability.

15 Executing a Pipeline Safety Management System Strengthens Safety Culture

15.1 General

Implementing PSMS elements strengthens an organization's safety culture. The ongoing practice of caring about safety strengthens the overall organization's belief in its value, acting as a unifying force to improve safety performance.

The execution of the elements depends on the actions of every individual and organizational unit at all levels of the organization. Each of the elements can be expected to contribute to different aspects of the safety culture, and these combined aspects reflect the strength of the culture. The PSMS, with all its discrete elements, supports the culture, and the culture feeds back into the management system in a continuous process, yielding an increasingly mature organization.

15.2 Contribution of Leadership and Management Commitment

Management leading and demonstrating their responsibilities as outlined in this element are essential to improved safety and a positive safety culture. While establishing pipeline safety policies is essential, it is the commitment of management in implementing the processes to meet the objectives of a PSMS. Employees will understand that safety is valued if they see management in the constant practice of acting on assessments and evaluations, improving plans and processes, allocating resources, and maintaining connections between objectives of safety critical functions and findings. Further, assessing the implementation and maturity of each of the elements in this PSMS will provide indicators of how the organization's safety culture is evolving.

During execution, leadership recognizing excellent performance through incentives is extremely powerful and contributes to the expectation that everyone will support the code of practice. Clear accountability and performance objectives drive employees to progress toward the goals. Safety is seen to be integral to all business decisions. There is a clear responsibility and obligation for all employees to stop work they consider unsafe and to never leave a question about safety unresolved.

By preparing and enabling every level of employees to recognize adverse situations and respond directly, they will be ready for unusual day-to-day operational challenges when an actual or a potential catastrophic event occurs. This preparation and freedom to act will bring an important sense of confidence and resolve to an operator's employees.

Leaders ensure the workforce effectively learns from past incidents and approaches current operation from the perspective of what might go wrong. This type of mindset enables employees to have a greater capacity to notice cascading events early on and to take actions to prevent a catastrophic event.

15.3 Contribution of Stakeholder Engagement

This element demonstrates the comprehensiveness of the organization's commitment to safety by engaging all people within proximity to the pipeline or with an interest in it. Through the engagement process, the operator is more thorough in its management of risk and more expansive in its partnerships for safety performance. Stakeholders can help maintain a heightened sense of vigilance in identifying risk and contribute to their own protection.

15.4 Contribution of Risk Management

The practice of risk management, and particularly the thoroughness of the process and the responsiveness to employee-identified risks, builds their understanding and confidence in management's commitment to safety. Management's allocation of resources to evaluate and manage risk visibly demonstrates that commitment. Following their leadership's engagement, employees will be guided in making safety a priority.

Employees sense that the actions they take to maintain the pipeline system are important. As they are closest to the pipeline system and are an important source of information about it, they "own" it and should be

respected for the value they bring to managing risk. They will see that every action or decision made on behalf of the system-at-large connects to public safety and the wellbeing of the system, with the same discipline as with personal safety. Further, the thorough practice of the risk management element provides the opportunity to build trust in employees that their organization is fully committed to safety.

15.5 Contribution of Operational Controls

Operational controls lead to greater certainty that the pipeline operator and pipeline system perform as expected. A greater sense of certainty about all aspects of operations contributes to the perception that there is an intentional commitment to safety. Employees share this sense of purpose, and it influences how they interact with each other and how they participate in owning and reinforcing this value. Employees will know that the practice of safety tasks is important. Employees will have confidence that they can stop work and ensure that problems are resolved.

15.6 Contribution of Incident Investigation, Evaluations and Lessons Learned

Expanding the framework for this element reinforces the commitment to safety performance improvement. Taking a more robust approach to this element invests more organizational effort into assuring that the right information is gathered from events and is applied to managing risk. “Lessons learned” becomes more than a clichéd phrase and instead is an integral part of the organization’s PSMS. The timeliness of sharing information and tracking corrections demonstrates the positive sense that safety is a top priority and complacency about risk is unacceptable. Employees understand the importance of learning and making improvements throughout the organization. Equally important is the understanding that management encourages and insists on the sharing of safety concerns. This contributes to an environment in which employees and contractor personnel are comfortable about identifying and speaking up about risk. This element provides the opportunity to put emphasis on the urgency of communicating risk information up, down, and across the organization.

15.7 Contribution of Safety Assurance

A focus on safety assurance is a form of defense-in-depth, i.e., multiple layers of safety assurance in managing risk. Applying the multiple layers demonstrates commitment to improved performance to a higher level. This element ensures the operator checks and validates that risk management processes are systematic and disciplined. This element specifically speaks to the critical nature of employee engagement, reporting, and feedback on issues of concern. The opportunity is here to evaluate the culture of trust and openness in the organization, which is vital to growing a more resilient organization. The quality and independence of the assessment and audit process conveys vigilance in general and shows responsiveness to employee concerns about safety. This element provides for rigor that should result in increased organizational confidence and positive peer attitudes, which feed motivation for engaging with safety.

15.8 Contribution of Management Review

While perhaps less visible to all employees than the practice of the other elements, this element is nonetheless essential to the visibility of commitment and is a reflection of the importance of accountability for safety. Top management defines opportunities for continuous improvement. The sense of discipline from the practice of the element, following up on the other elements of the SMS, is exemplified by management and, as a result, conveys a sense of safety as a priority—the actions executives exhibit in their own performance is noticed by employees.

15.9 Contribution of Emergency Preparedness and Response

While applying PSMS and working on its supporting elements lead to improved performance, operators cannot anticipate every event. Employees, contractor personnel and outside stakeholders know this reality. They appreciate planning for a full range of emergencies. They appreciate planning for a full range of emergencies, especially when planning to leads to a better understanding of potential scenarios. Being prepared leads to good safety culture characteristics: resiliency and a realistic sense of vulnerability. Without a sense of vulnerability, it is impossible to maintain vigilance.

15.10 Contribution of Competency, Awareness, and Training

The practice of assuring competency at all levels is a form of investment in an organization's employees. Employees see competency as critical to the sustainability of the organization and its success. Investment in building competency, like continuous learning, builds trust and confidence that management care about safety, their employees and contractor personnel, and the public. When competencies are defined, identified gaps in qualifications are addressed, and skills sets are refreshed, employees perceive that they are getting the support they need. They are then able to accept and carry out safety responsibilities. This practice contributes to the sense of security in the organization.

15.11 Contribution of Documentation and Record Keeping

Like the practice of other operational controls, this element leads to greater certainty that the pipeline system will perform as expected. This element is an opportunity to demonstrate commitment and discipline. If something is not written down, it doesn't exist. Procedures and work practices are essential documents. Work products of each PSMS element are essential records.

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