Pipeline Safety Management System Requirements

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Introduction

This Recommended Practice (RP) provides guidance to pipeline operators for developing and maintaining a pipeline safety management system. 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, and regulations.

Managing the Safety of Complex Processes

Safe and effective pipeline operation requires awareness and management of numerous linked activities. Major accidents rarely occur due to a safety breakdown of a single activity, but rather an alignment of weaknesses across multiple activities that enable compound conditions resulting in events of high consequences. Examples of operation activities include designing, constructing, operating, maintaining, and managing the pipeline through change over time. 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 determination of needs throughout the pipeline lifecycle, provision of sufficient human and financial resources, identification of 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, changing activities, and circumstances. Additionally, pursuing the industry-wide goal of zero incidents requires comprehensive effort. Similarly, making changes with intentionality will require systemic effort. Some efforts within a safety management system are directed to a specific need or activity. However, many process incidents are relatively infrequent, albeit with high consequences. Therefore, other elements of a safety management system address the need to perform safely over time, and to improve safety performance continuously. 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 pipeline safety management system.

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

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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 conforms 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 ensures protection of life and property and minimization of adverse environmental consequences.

g. Creation of a learning environment for continuous improvement is achieved by thorough investigation of incidents, non-punitive reporting systems, and the communication of lessons learned.

h. Periodic assessment of risk management effectiveness and pipeline safety performan ce improvement, as well as audits , are essential to ensure effective pipeline safety management system (PSMS) performance.

i. Communication between pipeline operating personnel throughout the organization and with service providers sharing information that s upports decision making and completion of planned tasks (process and procedures) is essential.

Plan-Do-Check-Act

The above principles are recurring values and activities , which 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 (Figure 1). This methodology can be applied to the management system as a whole as well as to all individual processes. The PDCA principle is at the core of many managem ent systems and its principal aim is to encourage the creation of strategies and plans, that are executed in line with guidelines, checked for quality and the results used to adjust the next generation of plans. This cycle is iterative and is maintained to achieve continuous improvement.

There are inputs to the cycle provided into processes within the elements and execution of the processes within elements yield outputs. 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 useful for the management system as a whole when planning data collection and analysis, to verify and prioritize threats or causes, and as a model for continuous improvement or when implementing any change.

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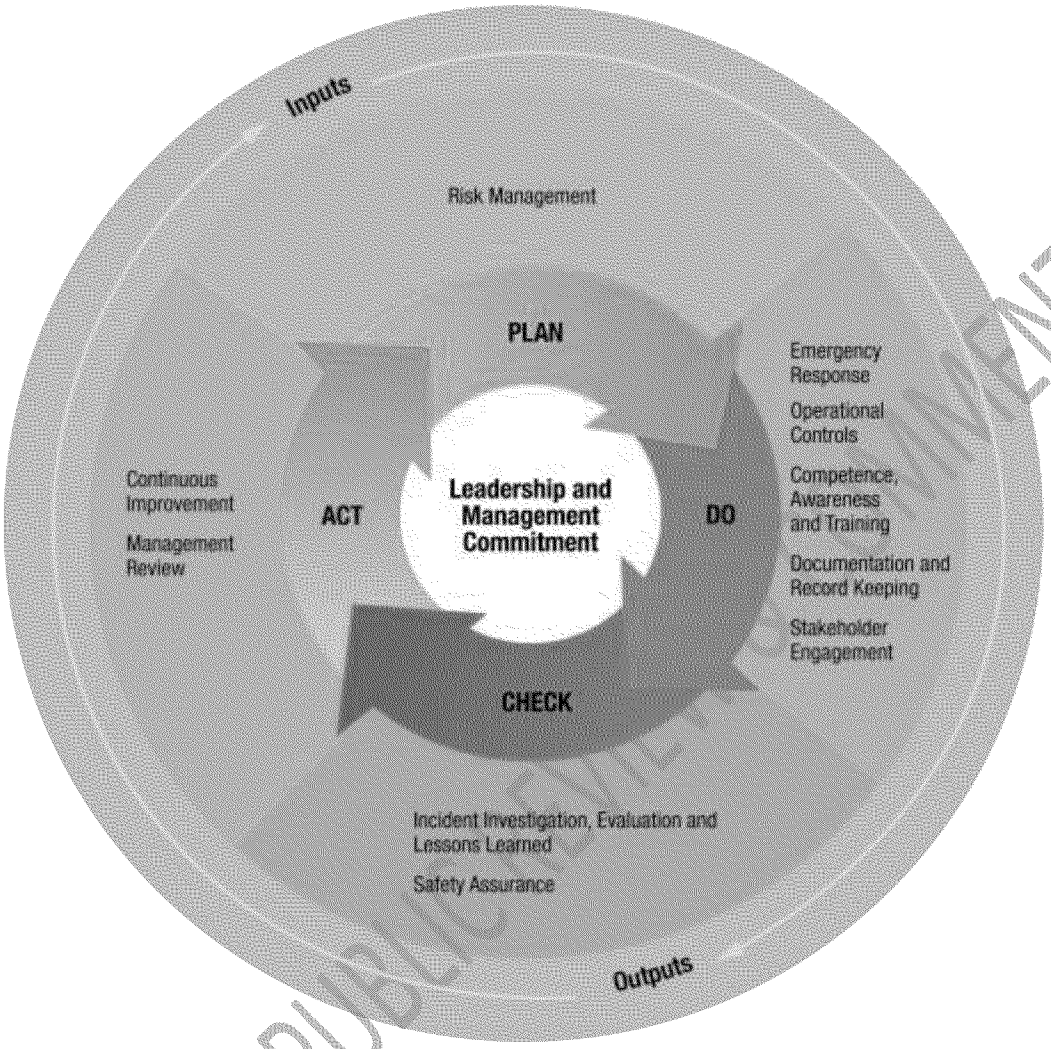

Figure 1: Plan–Do–Check–Act (PDCA) Cycle

(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 policy 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; look ing for deviation in implementation from the plan.

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Act: This step is where a pipeline operator takes actions to continually improve process performance; requests 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 dynamic/evoluti onary 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 with more detail subsequent iterations of the cycle.

Goal of this Document and its Safety Management System Framework

The goal of this document is to provide pipeline operators a framework to review an existing PSMS or develop and implement a new pipeli ne safety management system. New or improved usage of a PSMS will enhance effectiveness of risk management and enable continu al 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 framework is comprehensive in its intent to define the managerial elements to reveal and mitigate safety issues in lifecycle of a pipeline including design, construction, operation, maintenance, integrity management , and abandonment of pipelines at the earliest stage to either prevent, mitigate or both the consequences of a release or other abnormal operations.

NOTE "Pipeline" is defined in Section 3 to address more broadly, pipeline systems. Includes parts of physical facilities through which oil or gas moves in 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.

Particular emphasis is placed on increased proactivity, thinking of error more systemically, clarify ing safety responsibilities throughout the pipeline operator's organization including contractor support, the important role of senior management, encouraging reporting of and responding to safety concerns in a non - punitive manner, and providing safety ass urance by regularly evaluating operations to identify and address risks. These factors work 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 deve lopment of particular elements of management systems within a company. In cases where an operator is already operating under its own comprehensive pipeline safety management system, 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 pipeline safety management system. For them, this RP provides a means to integrate and add to those efforts to establish a comprehensive safety management system. Still other operators may have no formal safety systems. For those operators, adoption of the recommended framework would be broader and more comprehensive. 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 to pipeline operators of varying size and scope . The number of employees at a liquid p ipeline 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 ten 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

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is the clear view of the committee generating this document that the level of detail in each pipeline operator's SMS should be appropriate for the size of their operations and the risk to the public and the environment.

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

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).

A pipeline operator's application of these elements will yield information to improve risk management and safety performance. Leaders, managers and employees acting on this information to make safety and risk reduction decisions will increase their engagement with pipeline safety and make it of highest value.

Use of these elements works to involve employees in safety decisions concerning themselves, fellow employees, neighbors along the pipeline and the larger public nearby and the pipeline asset itself. Employee involvement and engagement results in making safety programs and process more effective, comprehensive, and integrated.

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, which pipeline operator's employees share with respect to risk and safety. Employees sharing positive attitudes, values, norms, and beliefs about risk and safety are essential to safe operations. The number and complexity of pipeline operational activities create the need both to manage safety systematically using a PSMS and also requires a positive culture of safety.

Maintaining a positive safety culture requires continual diligence throughout an organization to address complacency, fear of reprisal, and arrogance, among others. 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 culture goals,

— inspires, enables, and nurtures culture change when necessary,

— allocates adequate resources to ensure individuals can successfully accomplish their safety management system responsibilities,

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

Adopting and implementing a safet y management system 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.

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Recommended Practice for Pipeline Safety Management System Requirements

1 Scope

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

This RP specifies requirements of a safety management system for a pipeline operator to demonstrate its ability to consistently provide products and services in a manner that meet customer and legal requirements.

This RP provides pipeline operators with an enhanced framework to reveal and m anage risk, promote a learning environment , and continual improvement of pipeline safety and integrity utilizing a safety management system. At its foundation is the operator's existing pipeline integrity system. The requirements are comprehensive and define the elements needed to identify and address safety for the pipeline lifecycle. The elements 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 The 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 pipeline safety management system.

3 Terms, Definitions, and Abbreviations

3.1 Terms and Definitions

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

3.1.X
accountability
Answerable for the correct and thorough completion of work.

3.1.X
audit
A review by internal or external profess ionals not involved in the work. It may include evaluation of compliance of the pipeline operator's system with this RP and/ or the implementation of the PSMS.

3.1.X
allocation
Assignment, distribution or apportionment.

3.1.X
authority
Assigned power to control work by organization, including power to delegate.

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

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

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

3.1.X
evaluation
A review or assessment of the pipeline operator's implementation of the PSMS designed to identify and correct potential failures before they occur. This can be performed by persons external to the process or by actual users.

3.1.x
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.x
key performance indicator
KPI
Quantifiable measure that an organization uses to gauge or compare performance.

3.1.x
goal
Desired state or result.

3.1.x
legal requirement
Obligation imposed on an pipeline operator, including those that are statutory or regulatory

3.1.x
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 the 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.x
management system
A framework of processes and procedures used to ensure that an organization can fulfill all tasks required to achieve its objectives.

3.1.x
non-punitive
Acting to encourage employees to report and only punish employees for reporting except when the employee 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.x
objective
Subordinate step that supports a goal.

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

3.1.x
person
Any individual participating in developing, implementing, or evaluating the PSMS.

3.1.x
petroleum
Crude oil, condensate, natural gasoline, natural gas liquid, and liquefied petroleum gas.

3.1.x

petroleum products

Flammable, toxic, and/or corrosive products obtained from distilling and processing of crude oil, unfinished oils, natural gas liquids, blend stocks , and other miscellaneous hydrocarbon compounds. For this RP this definition includes biofuels.

3.1.x
pipeline
That which i ncludes parts of physical facilities through which oil or gas moves in 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.x
pipeline safety
Protection of the pipeline against physical failure, human error, organizational failure, damage or any other undesirable event as well as the control of recognized hazards to achieve an acceptable level of risk.

NOTE This can take the form of being protected from the event or from exposure to something that causes losses which can include protection of people or of possessions.

3.1.x
procedure
Documented method that must be followed to perform an activity under controlled conditions to achieve conformity and desired outcomes.

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

3.1.x
responsibility
Obligation to complete work; person who completes work.

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

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

3.1.x
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, the general public, the environment, and pipeline.

3.1.x
risk management plan
Document that describes the objectives and associated activities that the pipeline owner or operator intends to executive in order to that address risk management.

3.1.x
resources
Personnel with specialized skills, infrastructure, technology, equipment, materials, and financial resources applied to achieve objectives.

3.1.X
safety culture
The collective set of attitudes, values, norms, and beliefs which the operator's employees share with respect to risk and safety.

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

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

3.1.x
target
Supports objectives; desired KPI value, measurable indication of achievement of objective.

3.1.x
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 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
MOC	management of change

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PDCA plan-do-check-act

PSMS pipeline safety management system

4 Essential Pipeline Safety Management System Elements

The essential elements for any pipeline safety management system (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 high level personnel, policy and goals. The pipeline operator shall improve upon the PSMS and measure its effectiveness and maturity in accordance with the requirements of this document and measure its effectiveness.

5.2 Goals and Objectives

Top management shall establish goals and objectives for its pipeline safety management system. The objectives shall be measurable and consistent with overall safety policy and objectives.

NOTE Examples of objectives of a PSMS may include achieving zero incidents, describing and promoting a safety culture, and revealing and managing risks.

5.3 Planning

Management shall ensure that:

a) plans of the PSMS are developed and carried out;

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

c) plans, processes and procedures are integrated ensuring that data, results , and findings are shared among relevant processes;

d) resource planning is carried out through development of budgets, including personnel , and supporting technology requirements to develop and implement the pipeline safety management system;

e) through these mechanisms, establish the initial framework of safety culture.

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 policy, goals, and objectives;

b. promoting a positive safety culture;

c. ensuring that the elements set forth in this RP are in place, with clear accountability for implementation, with a clear line of sight from objectives to day-to-day activities;

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

e. leading a resource allocation process;

f. establishing high-level performance measure;

g. identifying the executive(s) accountable for implementation and continuous improvement, and managers responsible for each element of its pipeline safety management system;

h. ensuring that the commitment to the PSMS is adequately communicated to internal and ext ernal stakeholders;

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

j. establishing an appraisal , reward, and discipline policy that promotes the pipeline safety management system;

k. recognizing 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 and improve processes, procedures, systems , and training to meet policies and objectives;

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b. ensure there is a clear line of sight from objectives to day -to-day work activities, including those needed to meet requirements of this document, for each relevant function and level within the pipeline operator's organization;

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;

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

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

g. establish performance measures reflective of the top level measures and address each element of the pipeline safety management system;

h. ensure that data, results , and findings are shared and integrated among relevant processes and that ongoing communications about operations occur routinely;

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

j. conduct annual management reviews of the pipeline safety managemen t system, evaluating , and recommending changes to the organization's pipeline safety management system.

5.4.3 Employees

Employees supported by management and top management shall:

a. follow the procedures set forth by the organization,

b. identify improvements to processes and procedures,

c. identify and reveal risks, and

d. consider fellow employees and public safety when addressing an abnormal condition or nonconformance process or procedures.

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 allocation of resources 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 cause intentional 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 t hat enhance top management knowledge in the following areas.

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

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

c. Operations performance review.

d. Audit or Evaluation Plan—Decide the schedule and locations for the coming year's cold eye review.

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 condition and determine which parts of the pipeline system are critical.

g. Integrity Management—Top management will be updated by senior integrity managers know threats, assessment effectiveness, repair criteria, and adequacy of the plan. Formal meetings include top management, typically presidents and operating vice presidents.

h. Progress and processes to reduce risk, 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 for communication and engagement with internal and external stakeholders regarding risk identification and management and, as appropriate, other management system elements. The plan shall identify the organization's stakeholders, both internal and external, and the responsibilities of pipeline operator personnel to communicate.

The stakeholder engagement plan shall identify positions and locations in the organization that have responsibilities for receiving and sharing information regarding pipeline safety and the specific functions that the organization seeks to accomplish in those areas. 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 relevant functions within the pipeline operator's organization. As appropriate, employees and contractors shall understand the PSMS policy, objectives, processes, and procedures pertinent to their work.

The pipeline operator shall maintain a process for employees to raise concerns to decision makers. Management shall promote an environment encouraging two-way communication. Management shall also implement a process for communicating lessons learned.

6.3 External

The pipeline operator shall maintain a process for communicating with external stakeholders. The communication process shall address the provision of information when required, the contact with regulatory bodies and the handling of feedback from representatives of the public. To the extent possible, the pipeline operator shall attempt to make visible a name and a face for personnel who are available to the public to receive and exchange information regarding pipeline safety matters, particularly where stakeholders can provide the operation with information about the environment surrounding the pipeline.

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NOTE This may include members of the public, local, state, and federal regulators, industry organizations, emergency responders, and law enforcement. This includes peer-to-peer information sharing within the industry.

7 Risk Management

7.1 General

The pipeline operator shall maintain a procedure for the performance of risk management. The operator shall maintain a description of the assets comprising the pipeline including the surrounding environment to identify risks to pipeline safety.

The operator shall analyze and evaluate these pipeline safety risks and make decisions on how to manage them through preventive controls and mitigation measures prioritized considering likelihood of occurr ence and consequence. Safety assurance sub -elements, including audit , analysis of data , and performance evaluation are used to monitor that risk management is working as intended.

NOTE Risk management is used to understand and evaluate risks 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.

7.2 Data Gathering and Evaluation of Quality

The pipeline operator shall maintain an inventory of the assets on the pipeline. The inventory shall include key parameters that are required to define safe operating conditions as well as safe operation and maintenance of the pipelines.

Data serving as the foundation of risk management shall include available data over the pipeline lifecycle, updated as needed. 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.

7.3 Risk Identification and Assessment

Based on data and information, expertise, and experience with similar facilities, risks to pipeline safety that could result in a release or abnormal operating conditions shall be identified. 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.

Risk assessment shall consider likelihood of occurrence and severity of consequence, using any one of a variety of risk management tools. Risk assessments shall be performed periodically to reveal and understand the risks and design controls to minimize th e likelihood of the occurrence and consequences of an unintended release and the likelihood of abnormal operating conditions.

NOTE Hazard is encompassed within identification of risk

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. Categories of measures to consider shall include, minimally:

— review of equipment operability including control systems and materials;

— review of procedures, authorities, responsibilities, and accountabilities;

— review of training, drills, and scenario development to improve situational awareness;

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— review of incident response preparation including adequacy of response times, coordination of staging an Incident Command System with response personnel internal and external to the organization; and

— identification of high consequences areas for emergency planning, including sites of limited or mobility impaired people.

In selecting measures to reduce risk preference shall be given to prevention measures that eliminate or reduce the likelihood, as well as consequence consistent with a goal of zero incidents. The operator shall ensure that measures selected are implemented and their impact on risk evaluated.

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 presented annually to top management. The risk findings sh all be presented along with risk mitigation steps selected and their intended effectiveness . Top management should meet periodically to review perceived risks, mitigation plans and effectiveness, and resource allocation. Records of the top management 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 that address operations for facilities to provide what is done for the safe operation of each facility consistent with the pipeline operator's safety policy and objectives . The procedure shall:

a. identify operating conditions and minimally 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;

b. identify operating limits, where safety considerations are present.

8.1.2 Completion of Operating Procedures

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

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8.1.3 Review

Operating procedures shall be reviewed to ensure that the procedures reflect current operating practices 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. 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, and maintained to maintain safety in a manner consistent with the specified requirements, regulations, and applicable standards.

8.3.2 Manufacturing and Fabrication

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

8.3.3 Installation

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

8.3.4 Maintenance Procedures

The pipeline operator shall maintain procedures to control maintenance activities.

8.3.5 Testing and Inspection

The pipeline operator shall maintain an 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 the 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 MOC addresses shall include:

1. technical,

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

Changes to the system shall include permanent or temporary. The process shall incorporate planning for each of these situations and consider the unique circumstances of each.

8.4.3 Elements of MOC Process

A MOC process 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 parties,
7. time limitations,
8. qualification and training of staff.

NOTE 1 Refer to ASME B31.8S for gas transmission pipelines and API 1163 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 Outsourcing and Contractors

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

a. communicating requirements of the PSMS activities and processes to be conducted by the outsource organization, 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 policy;

e. evaluating contractor safety performance;

f. communicating risks at the work site;

g. communicating MOC.

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9 Incident Investigation, Evaluation, and Lessons Learned

9.1 Investigation of Incidents

9.1.1 General

The pipeline operator shall maintain a procedure for the investigation of incidents and near misses that the pipeline operators believe could have led to a significant consequence. Incident investigations shall be initiated as promptly as possible, considering the necessity of securing the incident scene and protecting people and the environment, as well as the need to maintain and recover important evidence and testimony. The investigation shall begin at the earliest possible time in order to learn from the incident, prevent a recurrence, and help prevent similar incidents.

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

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

e. any recommendations for transfer of the 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 lessons learned resulting 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 address the system required to ensure that the cause, contributing factors, and recommendations to prevent recurrence and lessons learned are communicated to personnel with a need to know. The operator may share lessons learned externally through peer-to-peer interactions at meetings of professional and trade associations.

Records of the investigation and after action reports shall be maintained for possible use in the next application of the risk assessment.

9.3 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 learnings from a process, procedural, technological, and organizational standpoints. This includes peer-to-peer interaction as well as with 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 damages to pipelines.

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

10 Safety Assurance

10.1 General

The pipeline operator shall plan and implement the monitoring, measurement, analysis , and improvement processes needed to enhance effectiveness of risk management and enable continual improvement of pipeline safety performance. As part of this safe ty assurance process, the pipeline operators shall ensure conformity of the PSMS to the requirements of this document, and to continually improve the effectiveness of the pipeline safety management system, including how it applies to service providers and contractors.

10.2 Audit and Evaluation

10.2.1 General

The pipeline operator shall maintain a procedure for planning, conducting , and documenting risk management and pipeline safety performance evaluations, as well as audits of the pipeline safety management system. Evaluations shall measure the effectiveness of risk management and progress made toward improving pipeline safety performance. Evaluations shall review processes and procedures and evaluate their implementation. Audits shall verify that the PSMS is effectively implemented and maintained, and conforms to the requirements of this document. Audits shall evaluate the effectiveness of the PSMS in part based upon the risk management and pipeline safety performance evaluations. Planning of audits and evaluations shall take into consideration the results of previous ones, level of risk posed and business criticality of the process being audited or assessed.

10.2.2 Audit and Evaluation of Performance

The pipeline operator shall identify the audit criteria, scope, frequency , and methods to assess the effectiveness of its overall risk management process and improvement in pipeline safety performance, as well as a ssess the effectiveness of its pipeline safety management system. Audits shall ensure that application of elements, of the PSMS, are producing the intended safety performance improvement. Audits of the conformity to the requirements of this document shall be conducted at least every three to five years based on risk and complexity of operations. The pipeline operator sh all perform evaluations of compliance with procedures based upon the PSMS at selected locations, annually.

The pipeline safety performance improvement evaluation shall consider any incident investigations, findings, recommendations, evaluations, and lessons learned under Section X, as well as any near-miss experiences and normal operating data.

Audits and evaluations shall be conduct ed by objective, impartial and competent personnel not conducting the work, where possible.

NOTE Audit and evaluation methods can be conducted by:

- an operating unit;
- an organization's compliance unit;
- an organization's internal audit group;
- external parties such as professional auditors, subject matter experts, or peer operators.

10.2.3 Audit and Evaluation Review and Closure

Management shall identify response times for addressing identified findings. The management responsible for the area being audited or assessed shall ensure that any necessary corrections and corrective actions

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follow the requirements of x.x. The results of internal audits and the status of corrective actions shall be reported in the management review (see x.x). Records of internal audits shall be maintained (see x.x).

10.3 Reporting and Feedback System

The pipeline operator shall establish and maintain an anonymous non-punitive reporting and feedback process for employees and contractors. 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 pipeline safety management system. The analysis shall include data generated from operations and maintenance, integrity management, monitoring and measurement, audits and evaluations (see x.x), management reviews (see x.x), and other relevant sources.

The pipeline operator shall use data to evaluate where improvements to the PSMS can be made.

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 pipeline safety management system. The operator shall maintain and monitor, minimally, fatalities, injuries, and property damage resulting from unplanned releases.

NOTE These KPIs reflect the outcomes of execution of the pipeline safety management system.

The pipeline operator shall establish precursor KPIs, those measures demonstrating risk reduction.

NOTE These are often referred to as leading measures. Examples include number of integrity evaluations completed (including mileage), number of near-term repairs made (including conditions warranting immediate action), and number of preventive and mitigation actions implemented, among others.

The pipeline operator shall establish process KPIs, i.e. those measures that demonstrate completion or improvement of elements, and supporting processes and procedures.

NOTE These are often referred to as proactive measures. Examples include number of improvement initiatives planned and number completed, number of processes improved and number of procedures modified and improved, among others.

The pipeline operator shall define the frequency with which to review the KPIs and the basis for trending performance to identify adverse trends and take corrective action.

10.6 Evaluation of Safety Culture

A PSMS cannot be effective without a positive safety culture. It's believed that a strong safety culture can exist without a formal safety management system, but an effective safety management system cannot exist without a positive safety culture. Therefore, operators should actively work to improve and assess their safety culture. This enables operators in their efforts to evaluate and improve safety culture.

10.7 Evaluation of Maturity

The pipeline operator shall establish a method to evaluate the maturity of its pipeline safety management system. The pipeline operator shall also maintain a method to evaluate the extent to which the development,

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deployment, and trends in performance 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 and use of data across the system).

The pipeline operator shall consider benchmarking with other operators, and review and evaluation of publically available information in evaluating the maturity of its pipeline safety management system.

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. This review shall include assessing opportunities for improvement and the need for changes to the pipeline safety management system, including the pipeline safety policy and objectives.

11.1.2 Input Requirements

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

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

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

c. performance measures and KPIs (see x.x);

d. the list of risks and results of the risk management assessments (see x.x);

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

f. results of internal and external audits and assessments (see x.x);

g. changes that could affect the pipeline safety management system, including changes to legal, regulatory, and other applicable requirements (see x.x);

h. stakeholder feedback (see x.x);

i. the status of previously identified corrective and preventive actions (see x.x); and

j. the evaluation of PSMS maturity (x.x).

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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 required changes to the processes and any decisions and actions, required resources and improvement to processes and procedures in meeting requirements. Recommendations for improvement shall be integrated into the next iteration of the PSMS plan, and supporting processes.

Top management shall review and approve the output of management reviews. Management reviews shall be documented (see x.x).

11.2 Continuous Improvement

Management shall ensure enhancement of risk management effectiveness and improvement in pipeline safety performance are continuous through utilization of a pipeline safety management system. Management shall continually improve the effectiveness of the PSMS through the use of the pipeline safety policy and objectives, audit and assessment results, analysis of data, 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.

12 Emergency Preparedness and Response

The pipeline operator shall maintain procedure s 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 procedure shall include minimally, the following elements:

a. determination of potential types o f 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;

i. periodic review and updating of the plan.

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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 pipeline safety management system, the pipeline operator shall identify required skills, competencies and experience ensure that operating personnel have the requisite competence.

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

The pipeline operator shall establish a training schedule to ensure that personnel and contractors are updated and aware of:

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

b. accountabilities, responsibilities, and authorities in executing with the requirements of the pipeline safety management system;

c. newly emerging or changing risks, problems in execution of the pipeline safety management system, and opportunities to improve processes and procedures;

d. 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 that the 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 otherwise 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 pipeline safety management system.

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.

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14.3 Safety Management System Documents

The PSMS documentation shall include:

a. statements of the safety policy 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 pipeline safety management system

d. identification of regulatory, and other applicable requirements.

e. other records identified by the pipeline operator needed to show the effective operations of the pipeline safety management system.

14.4 Procedures

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

15 Conclusion

15.1 General

Implementation of the PSMS elements strengthens the safety culture , providing greater resiliency. 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 within the safety culture and these combined aspects reflect the stren gth 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 the element is essential to developing and supporting improved safety and a positive safety culture. While establishing pipeline safety policy is essential, it is the implementation of the processes to meet the objectives that is the expression of management commitment that employees observe. The constant practice of acting on assessments and evaluations, the improvement of plans and processes, allocation of resources and maintaining line of sight of safety critical functions and findings that results in the perception among employees that safety is valued. Further, assessing implementation and maturity of each of the elements in this PSMS will provide indicators of how the organizations safety culture is evolving.

This element provides for the establishment of the vision of safety for the organization and its performance. In executing, the leadership demonstration that it recognizes excellent performance through incentives is extremely powerful, followed by the expectation that everyone will support the code of practice. Clear accountability and performance objectives drive employees to prog ress toward the vision. Safety is seen to be integral to all business decisions. Explicit is the responsibility and obligation for all employees to stop work they consider unsafe and to never leave a question about safety unresolved.

By preparing the workforce to recognized adverse situations and enable them to respond directly at every level, the operator prepares them for the day -to-day challenges of operation to a catastrophic event. The result is instilling an important sense of confidence and resolve in the workforce.

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15.3 Contribution of Stakeholder Engagement

The practice of this element is an opportunity to demonstrate 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 be viewed as helping maintain a heightened sense of vigilance in identifying risk and contributing to sharing in 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, leads to employee s' understanding and confidence in management's commitment to safety. Management allocation of resources to evaluate and manage risk is a most visible demonstration of commitment. Following their leadership's engagement, employees will be guided in making safety a priority.

Employees sense that the actions they take to maintain company 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 v alue they bring to managing risk. They will see that every action or decision made on behalf o f 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 the workforce that organization is fully committed to safety.

15.5 Contribution of Operational Controls

Operational controls lead to greater certainty that the pipeline system perfor ms as expected. The greater sense of certainty about all aspects of operations contributes to the perception that there is an intentional commitment to safety . Employees share t his sense of purpose and influence 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 e nsure 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 practice invests more org anizational effort into assuring that the right information is gathered from events and applied to managing risk. The application of learning from events becomes reality. The timeliness of sharing information and tracking correction demonstrates the positi ve sense that safety is a top priority and complacency about risk i s unacceptable. Employees take away the importance of learning and making improvements throughout the organization. Equally important is the takeaway that management encourages and insists on the sharing of safety concerns. This contributes to an environment in which employees are comfortable about identifying 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 new or renewed focus on safety assurance is a form of defense in depth that takes 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 and reporting on issues of concern and receiving feedback. The opportunity is here to evaluate the culture of trust and open ness in the organization, vital to growing a more resilience organization. The quality and independence of the assessment and audit process conveys vigilance in general and responsiveness to employees 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.

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15.8 Contribution of Management Review

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

15.9 Contribution of Emergency Preparedness and Response

While advances in the application of SMS and other advances in supporting elements lead to improved performance, operators cannot anticipate every event. The workforce knows this reality. The practice of planning for the full range of emergencies is appreciated. Appreciated even more is the planning that leads to full understanding of potential scenarios which can befall the operator, the extent of response resources involved and the necessary interfaces, and expectations about the time ly exercise of authorities. 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 the workforce. Employees see competency as critical to sustainability of the organization and its success. Investment in building competency, like continuous learning, builds trust and confidence that management and leadership care about safety, its employees and the public. When competencies are defined, identified gaps in qualifications are addressed and skills sets refreshed, employees perceive that the supp ort they need is provided. 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 com mitment and discipline . If it 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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