

P S M S

PipelineSMS.org

Pipeline Safety Management Systems A Contractor's Guide

Pipeline SMS Contractor's Guide
November 2022, 1st Edition



A Contractor's Guide

Foreword

The Recommended Practice 1173, *Pipeline Safety Management Systems*, First Edition, July 2015 released by the American Petroleum Institute (API) establishes a pipeline safety management system standard for organizations that operate hazardous liquids and natural gas pipelines jurisdictional to the United States Department of Transportation.

While this standard is not mandated by regulation, strong support towards its full adoption exists. Stakeholder groups who have adopted, encouraged or contributed to industry Pipeline SMS advancement consists of pipeline operators, contractors, industry trade associations, members of the public, as well as government agencies such as the National Transportation Safety Board, Pipeline and Hazard Materials Safety Administration and others at federal, state and local levels.

The Pipeline SMS Industry Team releases the *Pipeline Safety Management Systems: A Contractor's Guide*, First Edition, November 2022, to provide contractors with general guidance as they work to implement or improve their current safety management systems. The Industry Team serves to facilitate implementation of API's Recommended Practice (RP) 1173, Pipeline Safety Management Systems (Pipeline SMS) among the energy pipeline industry and contractor community. RP 1173 defines a "contractor" as person(s) doing work on behalf of the pipeline operator, including all levels of subcontractors. This includes a people with a wide range of responsibilities and authorities united for the purpose of performing a function or process on behalf of the pipeline operator. Examples of contracted services may include, but are not limited to design and engineering, operations and maintenance, construction, and other functions or processes on behalf of the pipeline operator. This guide is not intended to supersede and replace any existing agreements between parties.

This guide is scalable and flexible. Adjustments have been made to ensure the guide considers other complimentary practices or information such as the API RP 1177, *Steel Pipeline Construction Quality Management Systems*, published in November 2017, the American Gas Association's whitepaper entitled *Contractor Construction Quality Management Guide (November 2016)*, the Industry Collaborative practices by pipeline operators, GTI Energy Operations Technology Development *Pipeline SMS Study: The Contractor's Role*, a process based approach to pipeline safety management systems, and Distribution Contractors Association and American Pipeline Contractors Association, *Pipeline Construction Safety Management Systems (2021)*. These documents support the requirements referenced in RP 1173 and may be additional resources for contractors.

API is not affiliated with or endorsed by any of the organizations referenced in this document, and information from these organizations is incorporated by way of example only. This guide is not an API standard and is only intended to be used as a guidance document to assist contractors in applying themes present with API RP 1173. Nothing contained in this guide should be construed as a granting of any right, by implication or otherwise, for the manufacture, sale, or use of any method, apparatus, or product covered by letters patent. Every effort has been taken to assure the accuracy and reliability of the information contained in this publication; however, API makes no representation, warranty, or guarantee in connection with this publication and hereby expressly disclaims any liability or responsibility for loss or damage resulting from its use or for the violation of any federal, state, or municipal regulation with which this publication may conflict.

Suggested revisions for improvement are invited and should be submitted to the American Petroleum Institute, 200 Massachusetts Avenue NW, Suite 1100, Washington, DC 20001-5571 USA. +1 202-682-8000. Email at PipelineSMS@api.org.



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One Industry, One Goal

The goal of a Pipeline SMS is to mature risk management capabilities and continuously improve safety efforts at any stage of safety programs, from companies of 5 to 5,000 employees. A Pipeline SMS is intended to provide pipeline operators, contractors, and other industry stakeholders with the tools and understanding they need to comprehensively track and improve their safety performance.



Our industry stands united with the common goal of operating with zero incidents.

The benefits are tangible. Managing the safety of complex processes involved in the design, installation, operation, maintenance, and integrity of a pipeline requires coordinated actions to address multiple, dynamic activities and circumstances. Pursuing the industry-wide goal of zero incidents requires a systematic and comprehensive effort. Some common benefits of implementing a Pipeline SMS are: improved safety performance, strengthened company culture, reduced injuries, stronger employee morale and retention, as well as enhanced company reputation. Increasingly, Pipeline SMS is being shared with investors, insurers, regulatory agencies and other financial communities.

It is scalable and flexible. The application of Pipeline SMS is intended to be flexible, scalable, and to maximize the effectiveness of implementing pipeline safety processes or procedures. It is flexible, accommodating an organization's existing safety processes while also helping those new to Pipeline SMS to implement new or complimentary programs. It is also scalable, recognizing the diversity in an organization's size, sophistication and scope.



What is Pipeline SMS?

Every day, the oil and gas industry delivers essential energy across America through millions of miles of infrastructure spanning multiple states, diverse landscapes and climate zones. These networks consist of hundreds of appurtenances, such as fittings or valves, that are often controlled through advanced supply technologies. Supporting these complex networks are thousands of workers, engineers, contractors, support staff and management. Each of these aspects and groups can help reduce hazards and risks for safer and more effective pipeline operations. From the wellhead to consumer, a Pipeline SMS provides a systematic approach for building upon existing processes and establishing new processes that continuously improve the safety of workers, communities and the environment.



SMS is common within industrial sectors such as nuclear, aviation, maritime and chemical manufacturing. These industries use a tailored framework to manage their unique safety hazards and risks.

In 2015, the **American Petroleum Institute** (API) issued the first edition of API Recommended Practice (RP) 1173, *Pipeline Safety Management Systems*.

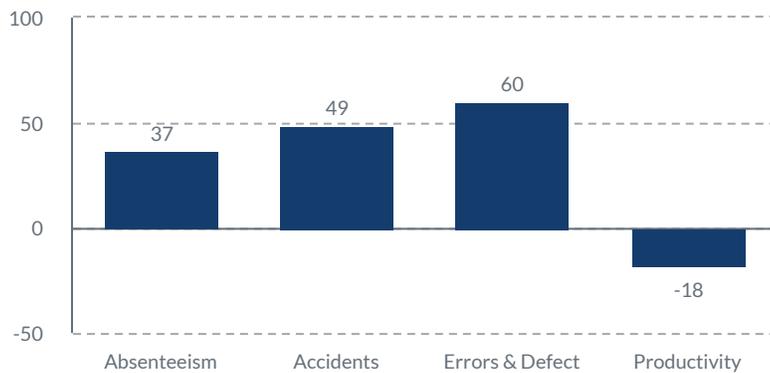
This pipeline industry-specific practice provides guidance to pipeline operators for developing and maintaining a Pipeline SMS. It details a framework shaped through a multi-year collaborative effort by the U.S. Pipeline and Hazardous Materials Safety Administration (PHMSA), National Transportation Safety Board (NTSB), state regulators, pipeline operators and expert members of the public.



The National Safety Council encourages all companies to consider the adoption of a safety management system due to the increasing evidence that they are effective in reducing risk of workplace incidents, injuries and fatalities. The American Petroleum Institute (API) Recommended Practice (RP) 1173 Pipeline Safety Management Systems provides an SMS tailored framework for pipeline operators and industry partners.

The Difference Maker

Over the past decade, research studies conclude key insights about the role of culture within an organization's business and safety performance. Safety culture is a collective set of values, attitudes, and beliefs that employees share concerning risk and safety. Many contractors and other industry stakeholders may have a positive safety culture without a formal Pipeline SMS; however **an effective Pipeline SMS cannot exist without a positive safety culture.**



Organizational Culture studies by the Queens School of Business and the Gallup Organization. Harvard Business Review.

49 % more accidents

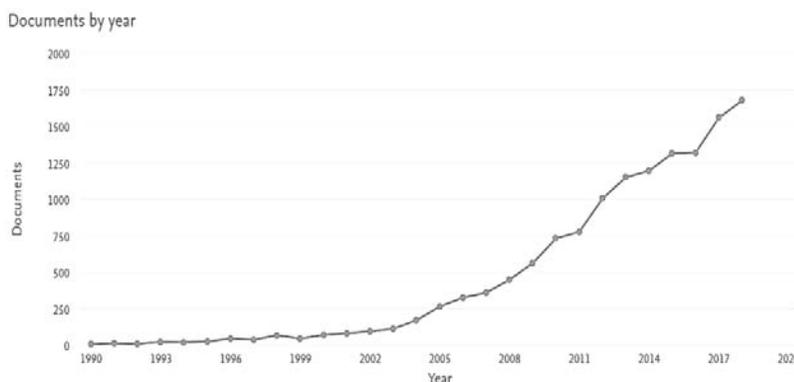
Workplace studies revealed a disengaged work culture can contribute to 37% higher absenteeism, 49% more accidents, 60% more errors and defects and 18% lower productivity.



Corporate Culture studies by Duke University. Harvard Business Review.

92 % of leaders believe culture matters

92 percent of surveyed executives thought that improving culture would improve company value. Only 16 percent felt that their culture is exactly what it should be.



Safety Culture: An Integration of Existing Models and a Framework for Understanding Its Development. Sage Journals.

Relevance of Safety Culture

Safety culture is often implicated as a contributor of safety incidents across industries such as construction, maritime, aviation and healthcare. Publications mentioning "safety culture" have increased over the past two decades.

Diligence is Key

Often, culture is defined by the action a person takes when "no one is looking". A positive safety culture is inherent to an effective Pipeline SMS. A strong safety culture positively shapes an organization's risk management capabilities, thereby helping mitigate risks and maintain safe outcomes. Pipeline operators and contractors with strong safety cultures work diligently to continuously improve the safety of workers, communities and the environment.

An effective, positive safety culture within an organization:

Safety communication, risk reduction, and continuous improvement are routine.

- Embraces safety as a core value that drives daily business operations.
- Obtains adequate resourcing to maintain and improve safety.
- Continuously promotes employees' understanding of safety expectations and goals.
- Encourages two-way communication amongst employees and leadership at all levels.
- Maintains a systematic consideration of risk for workers, public and the environment.
- Provides a work environment in which employees are encouraged to report and communicate safety concerns.
- Empowers staff to stop work when a perceived unsafe condition or behavior may result in an unwanted event.



What does it look like?

A positive safety culture is one where pipeline operators and contractors collaborate, share positive attitudes toward compliance and exceeding minimum standards, commission the stopping of work immediately if a situation seems unsafe, embrace responsibility for safety and take action to report safety concerns immediately without a fear of punitive consequences.

How It Works

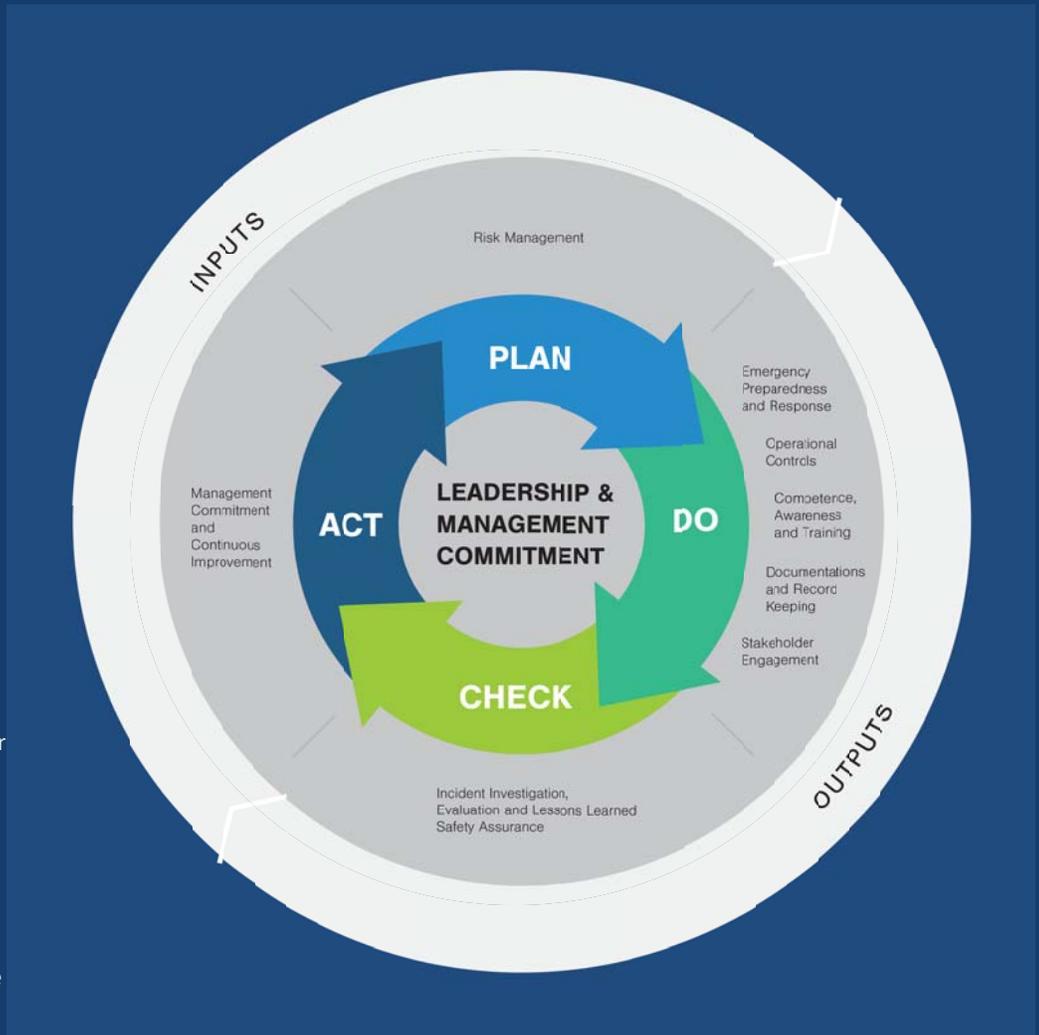
Continuous improvement and learning from experience are core pipeline industry values. The industry goal of zero incidents requires continuous learning over time. A reliable, established framework for continuous improvement is the Plan - Do - Check - Act (PDCA) model. The four step cycle is a central component for multiple industrial sectors, including the oil and gas sector. Contractors can apply this model to their overall Pipeline SMS as well as each of the Pipeline SMS Elements. For example, contractors may use this model to capture incidents and near misses, analyze, develop and introduce improvements designed to prevent or mitigate recurrence. They may also use the model for improving their overall Pipeline SMS program for future years.

Plan – The ‘Plan’ step is the establishment of the objectives and processes necessary to deliver results in accordance with the organization’s policies and the expected goals. Planning includes establishing expectations and setting key performance indicators to measure Pipeline SMS effectiveness.

Do – The ‘Do’ step is the portion of the cycle where activities are performed. Each activity aligns with organization’s policies, processes and procedures identified in the ‘Plan’ step.

Check – The ‘Check’ step is when the system or work activity is inspected for conformance to standards, congruence to procedures and for the maturity of the Pipeline SMS and safety culture. ‘Check’ also monitors key performance indicators (KPIs) established in the ‘Plan’ step. It can provide a quantifiable way to measure improvement.

Act –The ‘Act’ step is where management collects data generated in the ‘Check’ step and evaluates actual performance against the objectives set in the ‘Plan’ step. A common question in this step is – Did the performance match our expected outcomes? Those answers provide input for management’s review while directing ‘Act’ areas for the next generation of planning. The management review may also include adjustments to objectives and goals, as needed, for the next PDCA cycle.



10 Pipeline SMS Elements



Leadership and Management Commitment



Risk Management



Emergency Preparedness and Response



Operational Controls



Competence, Awareness and Training



Documentation and Record Keeping



Stakeholder Engagement



Incident Investigation, Evaluation and Lessons Learned



Safety Assurance



Management Review and Continuous Improvement



Plan - Do - Check - Act

The Plan - Do - Check - Act continuous improvement model provides a four step cycle for carrying out activities related to the Pipeline SMS Elements. This method may be applied to an entire management system as well as individual elements and processes within an organization. This model is also useful when planning data collection and analysis for the selection and prioritization of risk or corrective actions.

The model's purpose is to encourage strategic thinking and planning (Plan), executing of strategies and plans within their respective guidelines (Do), checking those actions for intended results (Check) and utilizing those results for adjusting in the next generation of plans (Act).

The Non-Starter

Without leadership commitment, a pipeline safety management system does not stand a chance.

Leadership commitment to Pipeline SMS sets the tone and expectation for an organization's safety performance. Top Management, consisting of the most senior leaders within the organization, are responsible for communicating their company's Pipeline SMS commitment to internal and external stakeholders. Often, this communication is accompanied by established Pipeline SMS goals and measurable objectives for the organization at all levels. Commitment is fortified with Top Management's support in ensuring adequate resources are assigned to tasks ranging from finances to procedures and processes to accomplish the organization's goals.

Top Management Responsibilities

- ✓ **Visible**
 - ✓ **Active**
 - ✓ **Measurable**
 - ✗ **Autocratic**
 - ✗ **Passive**
 - ✗ **Task oriented**
- Establishes Pipeline SMS goals and measurable objectives for the organization.
 - Promotes engagement and leadership at all levels of the organization.
 - Drives the identification and review of assets, systems, and other resources needed to operate in a safe, environmentally sound and efficient manner.
 - Encourages a positive safety culture and drives constant assessment to understand how the culture is changing over time.
 - Identifies executive(s) accountable for implementation and continuous improvement, and manager(s) responsible for each of the ten (10) Pipeline SMS Program Elements.
 - Leads the organization in making Pipeline SMS communication, risk reduction and improvement routine.
 - Fosters risk management processes that reveal and manage risk, making compliance and risk reduction routine.
 - Nurtures an environment of mutual trust.

Shared Responsibility

Leadership is not the exercise of authority, but one's capacity to increase the sense of ownership among those around them.

Management Responsibilities

- Ensures there is clear connection between Pipeline SMS goals and objectives and day-to-day work activities.
- Guarantees that risk management occurs routinely by establishing intentional actions designed to assure compliance, reveal and manage risk.
- Develops, implements, and continuously improves processes that apply resources to planned work and emerging risks over time to achieve Pipeline SMS goals and objectives.
- Identifies and assigns responsibilities for the ten (10) Pipeline SMS Program Elements, supporting initiatives and oversight.
- Identifies, seeks and allocates resources sufficient for safe, environmentally sound, reliable and efficient operations.
- Upholds a culture of learning through sharing relevant data, results, findings and lessons learned while integrating learnings into processes to the extent necessary for Pipeline SMS.
- Assesses, evaluates and continually improves the safety culture.
- Develops and implements processes, including training, to ensure employees attain requisite competence to fulfill their job responsibilities.

All Employees Responsibilities

- Follows company processes and procedures to meet goals and objectives, staying aware of cascading failures early on and taking action to prevent a catastrophic event.
- Stops work if or when the safety of employees, the public, pipeline or environment is in question.
- Identifies and reveals risks to management through a two-way dialogue. An example is an employee sharing with management an abnormal operating condition discovered on the job site.
- Identifies improvements to safety processes and procedures, considering fellow employees, subcontract personnel, and the public when addressing an abnormal condition or nonconforming process or procedure.

ROB DARDEN, EXECUTIVE VICE PRESIDENT
DISTRIBUTION CONTRACTORS ASSOCIATION

"DCA fully supports the concept of top-to-bottom approaches to safety management. Pipeline safety management systems are critical to ensuring that all employees, from the CEO to the backhoe operator, are fully aware of the protocols and procedures needed to keep our pipelines efficiently running in such a way that keeps our communities and workers safe, while enhancing environmental protection. In addition, an 'open door' policy is afforded to any worker who identifies a risk or opportunity that should be considered to maintain a safe and reliable pipeline network."



A Questioning Mindset

The practice of risk management is not a stand alone practice performed by a single individual. It is a series of actions supported by many contributors. An entire workforce influences how pipeline work is executed and hazards are managed on a daily basis. It can involve actions such as the development of processes, the evaluation of procedures and the use of data for decision making. The practice of risk management should continuously build understanding and confidence in management’s commitment to safety.

The element requires contractors to confirm, develop and document their company procedures for effective risk management. It is important for pipeline operators and their contractors to work together to understand contractual obligations and responsibilities related to this topic.



KEY CATEGORIES

Data Collection & Analysis - How will data be collected, stored and analyzed? Is incident data, including cause of incidents, captured? How might a customer operator be involved?

Risk Identification - How will hazards and threats be recognized by employees through a questioning mindset of *What Can Go Wrong?*

Risk Assessment - How will hazards and threats be prioritized or assessed? How might the likelihood and severity of consequence be considered?

Risk Prevention & Mitigation - How will measures be identified and selected for corrective action to appropriately address risk factors? Examples of information to be considered include: reviews of training, drills and scenarios development, equipment operability, materials, event learnings, reviews of procedures, authorities, responsibilities, and accountabilities.

Periodic Review - How will reviews be conducted and analysis be performed for risk identification, assessment, prevention, and mitigation?

Risk Management Tools - How will decisions be made using risk management tools? Will customer operator risk assessments and/or Corrective Action Programs be used?

Risk Program Performance - How will the performance of risk mitigation be assessed?

Ready to Respond

Preparation for potential incidents helps provide a more realistic sense of vulnerability, allows companies to build capacity to absorb certain failures, reduces impact and sharpens an organization's clarity on the range of consequences should an incident occur. Proactive planning and preparation for an incident increases competence for response and improves overall safety culture.

Pipeline operators are required to develop and maintain procedures to effectively respond to a pipeline incident. Contractors must be prepared to respond in accordance with their contractual responsibilities related to emergency preparedness and response.

A strong contractor emergency preparedness and response plan complies with all applicable procedures, policies, laws and regulations. Contractor emergency response plans should address the following actions:



Safe Practice

Operations and maintenance procedures help minimize human error and promote safe employee actions. Quality control procedures ensure adherence to established standards for pipeline materials, equipment and construction. Defined operational controls are essential to the safe design, construction, operation and maintenance of pipelines. Operational controls for Pipeline SMS consist of operating procedures, system integrity and management of change.

Operating Procedures: A pipeline operator maintains written procedures that address safe work practices when conducting operations, maintenance and emergency response activities. Contractors working on behalf of pipeline operators must follow these written procedures. Additionally, all employees and contractor personnel have both responsibility and authority to raise concerns or improvement opportunities for new or existing processes. In cases where a worker believes that following a procedure will cause an unsafe condition, she/he shall possess the responsibility and authority to stop work and seek the appropriate permission to deviate.

System Integrity: A pipeline operator shall ensure pipeline systems are designed, manufactured, fabricated, installed, operated, maintained, inspected and tested subject to applicable requirements, recommendations and applicable standards. It is important that contractors reasonably obtain a comprehensive understanding of their job site, materials and knowledge specifications prior to performing work.

Management of Change: Procedures for management of change (MOC) help pipeline operators identify the potential risks associated with any given change impacting its pipeline operations. MOC ensures that all approvals, impacts and required activities are fully understood prior to the introduction of any change into pipeline operations. The types of changes that a MOC procedure addresses are technology, equipment, procedural and organizational. No change is considered 'ready for implementation' unless all requirements, such as approvals and other conditions, are met as established by MOC procedures.

Pursuant to Pipeline SMS, pipeline operators will evaluate their contractor's safety performance and demonstration of continuous improvement. This responsibility encourages two-way conversation with contractors about improvements and changes that may impact business operations. Any identification for improvement resulting from lessons learned must follow the organization's MOC procedures.



Operating Procedures

Safe work practices for operations, maintenance, emergency response activities and the control of materials that impact pipeline safety begin with strong communication and proactive job/project initiation. This helps contractors and pipeline operators identify key roles, responsibilities, processes and operating conditions prior to the commencement of work.

Depending on the work plan and the phase of pipeline operations in which the work or job is taking place - a variety of resources, tools, personnel and materials may be used. Common pipeline phases include initial start-up, normal operation, temporary operation, emergency operation, normal shutdown, and restoration. As a result of these complexities, conducting pre-job/project meetings with key stakeholders is imperative. Below are some examples of key roles and Pipeline SMS related responsibilities of a contractor who may be planning to commence a pipeline excavation project.

WORKERS

- Adheres to policy and procedures.
- Exercises stop work for any safety or compliance issues.
- Confirms qualification to perform “covered tasks” complying with Part 192, Subpart N – *Qualification of Pipeline Personnel*.
- Wears required personal protective equipment (PPE) on the job site.
- Identifies and communicates to management hazards and threats.

FIELD LEADER

- Verifies that all workers have and use applicable PPE.
- Reinforces stop work expectations for safety or compliance issues.
- Verifies that all workers have appropriate qualifications, training and competence for tasks being performed.
- Oversees pipeline safety regulations and ensuring adherence to design and material specifications.
- Ensures that all relevant and applicable work area protection is in place on the job site.

SUPERVISOR/PROJECT MGR

- Ensures all employees understand policy, procedure, and specifications required to safely perform all job tasks.
- Reinforces stop work expectations for safety or compliance issues.
- Verifies all workers are adhering to proper PPE requirements consistent with applicable policies and procedures.
- Assures compliance with pipeline safety regulations and ensures that appropriate materials, resources and tools are available for safe execution of assigned task(s).

INSPECTOR

- Conducts reviews to verify conformance to applicable policies, procedures and regulations.
- Reinforces stop work expectations for safety or compliance issues.
- Gathers, reads, comprehends and interprets project contracts, plans and specifications.
- Identifies and documents any non-conformances with plans, specifications, policies and procedures.
- Participates in MOC through identifying and communicating all relevant information with the appropriate personnel.

SAFETY

- Verifies that standard operating practices are in place and appropriate for the safe execution of work.
- Confirms that stop work expectations are exercised as required.
- Confirms project-specific site safety plans are in place, accessible and understood by those on the job.
- Assures job-safety analysis and hazard recognition programs are followed.
- Investigates incidents and provides corrective action recommendations to management.
- Participates in inspections and audits.
- Facilitates safety meetings.

Operating Procedures

Prior to any task being performed, contractors should have a **clear and comprehensive understanding** of the tasks to be performed, required qualifications and knowledge necessary for safe practice. Training, qualification and requisite competence must be verified with the customer operator prior to the start of work.

Contractors who perform a thorough verification of training, qualification and competency exhibit steadfast behavior in:

- Understanding required qualifications of all personnel on the job, including those who qualify to perform covered tasks without supervision and those which are not.
- Reviewing all qualifications, training and competence at the time of personnel change.
- Confirming the qualification of all personnel performing covered tasks, including addressing changes in qualification status, expired qualifications and new qualifications.

Examples of Covered Tasks

Plastic Pipe Joining

- Verification of documentation of fusion qualifications.
- Time period since individual last performed fusion or mechanical joining process.
- Assurance that the individual's work has not resulted in joint failures above specified limits.
- Verification that fusion equipment is approved for use and in working order.

Locating & Marking

- Identification of qualification method.
- Time period since individuals last performed the locating and marking of lines.
- Assurance that the individual's work has not resulted in increased safety risks from mislocates or failures to mark.
- Time since the individual was last tested.
- Ensure that applicable locating procedures are available.

Hot Tap Welding

- Identification of qualification method.
- Time period since individuals last performed welding process of hot tapping and stopping.
- Assurance that the individual work has not resulted in weld failures.
- Time since the individual was weld-tested.
- Ensure that applicable welding procedures are available.

System Integrity

Pipelines and their varying components require unique care from their design to operations, testing, inspection and shutdown. Pipeline SMS requires pipeline operators to assure their pipeline system's integrity through its asset life cycle. The life cycle of an asset generally includes phases such as design, manufacture, fabrication, installation, operation, maintenance, inspection and testing in accordance with specified requirements, regulations and applicable standards. Contractors support their customer operator's requirements through adherence to their customer's quality control measures, inspection requirements and testing procedures. Applicable to a contractor's scope of work, they must demonstrate competence in their knowledge to perform work safely. Examples of knowledge areas include construction and/or design specifications, purchase conditions and manufacturing instructions.

Review of Designs, Drawings and As-Built Documentation: Contractors are encouraged to meet with their customer operators to review construction drawings, contract specifications and design criteria to ensure that they have the most current information to perform work safely. Upon work commencing, routine information sharing between contractors and their customer operators is key. It can lead to additional information sharing related to shop drawing, design, or field changes during construction inclusive of minor or significant modifications made to the pipeline system. Additionally, contractors should strive to proactively communicate any potential deviations from original job scope or design with their customer operators. An example may include a request for a field design change requiring the contractor to submit a revised set of as-built drawings through the customer operator's MOC process.

Adherence to all specifications, policies and procedures: Contractors can take direct action to assure conformance to all job specifications, policies and procedures through the following:



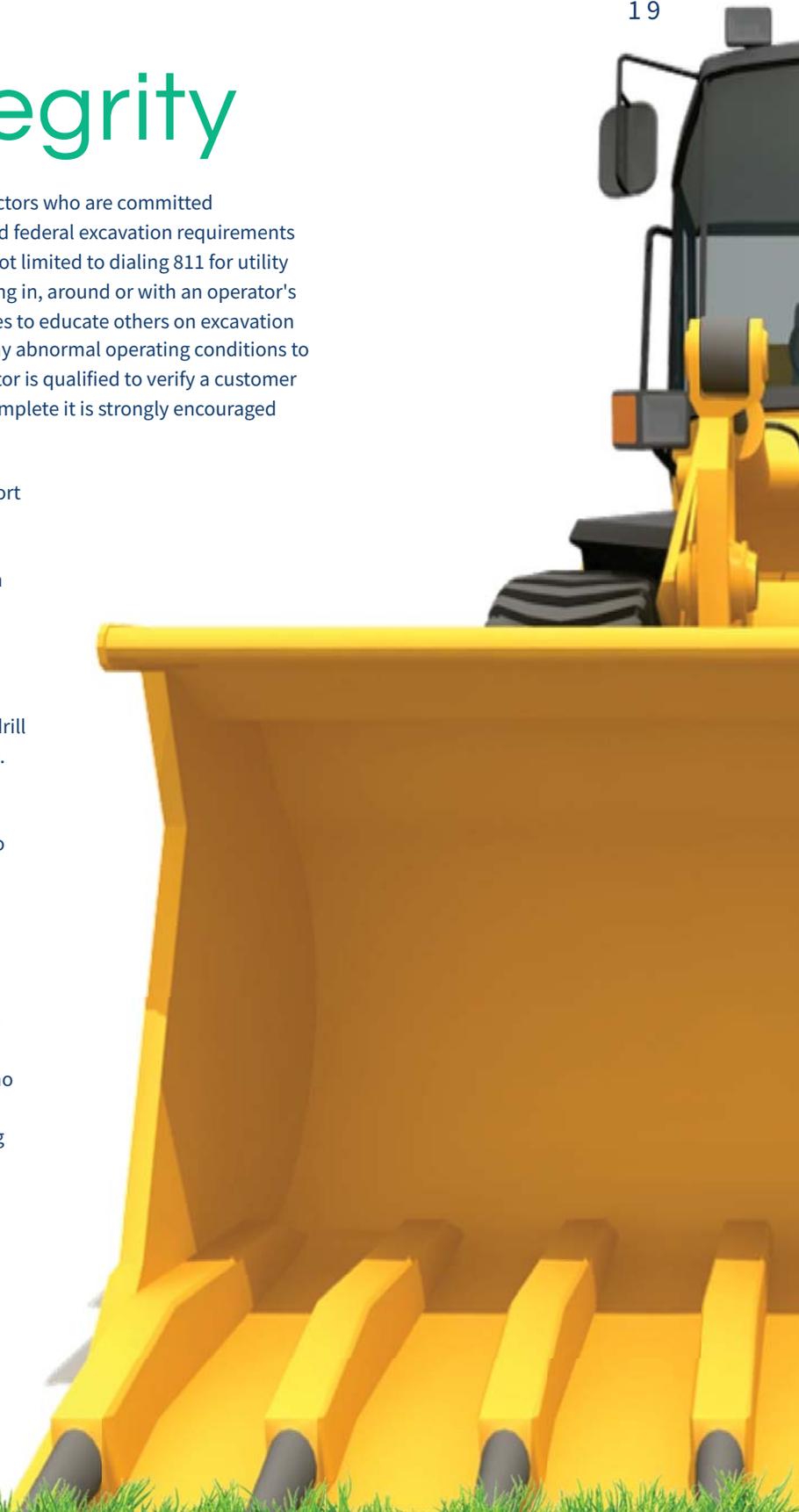
- Making available operating manuals, policies, procedures and specifications at the job site.
- Ensuring workers are competent in the customer operator's specifications and procedures for their assigned work.
- Adhering to requirements, policies and procedures.
- Verifying contractor's internal processes are consistent with their customer operator's requirements, policies and procedures.
- Where applicable, performing planned inspections, audits, and tests to ensure compliance with requirements, policies, and procedures.
- Creating access to understand and follow manufacturer's instructions.

System Integrity

Damage Prevention Measures and Traceability: Contractors who are committed to Pipeline SMS ensure compliance with all local, state and federal excavation requirements related to excavation damage prevention, including but not limited to dialing 811 for utility notification and using safe digging practices. When working in, around or with an operator's pipeline system, contractors should leverage opportunities to educate others on excavation damage prevention, verify operator records and report any abnormal operating conditions to the pipeline operator immediately. In the event a contractor is qualified to verify a customer operator's pipeline records as traceable, verifiable and complete it is strongly encouraged and in some cases required.

The examples below illustrate project controls that support Pipeline SMS in the areas of damage prevention and environmental protection when a contractor uses **directional drilling** to perform the installation of pipe on behalf of their customer operator.

- The bore/HDD entry/exit targets are consistent with construction drawings.
- Known or identified crossings or obstructions in the drill path have been test-holed and the elevations verified.
- Proper matting/support for all drill rigs and receiving equipment.
- Drill mud is approved and has the right consistency to support safe operations. Any changes are properly evaluated with the customer operator through appropriate Management of Change.
- Lubricating head(s) are functioning properly for a pullback.
- Pipe coating is appropriate for bore/drill construction and as specified by the customer operator.
- Visual inspection of exposed pipe is made to ensure no damage was made during pullback.
- A continuity test is conducted on tracer wire following pullback.
- Post-pullback testing is performed.



System Integrity

Pipeline Protection and Support: Contractors working on behalf of pipeline operators have a responsibility to provide protection and support of pipeline facilities, when applicable. Some common examples of actions may include:

- Using appropriate equipment and spacing of equipment for lowering pipe, including heavy equipment for moving the pipe, temporary supports while preparing to lower the pipe and equipment used to lift the pipe.
- Setting proper permanent supports in place, as necessary, for pipe or appurtenances in a trench.
- Removing all non-desired objects (rocks, debris, etc.) from trench and spoil that may damage a pipeline coating during and after work activities.
- Visually inspecting, where possible, pipeline coatings and applicable appurtenances for damage.
- Visually inspecting the inserted end of a pipe after installations to confirm if any damage occurred during pipe insertion.
- Ensuring all documents and records under contractor possession are legible, accurate and completed prior to the completion of work (i.e. locates, surveys, inspections, backfill, etc.).
- Coated pipe is delivered from trucks, trailers, or railcars with padded cradles and fasteners. The contractor ensures that coated pipe is unloaded, supported and racked to prevent damage to the coating. The pipe is inspected at the point of change of custody to confirm no defects or damage to pipe coating.
- Plastic pipe is handled according to manufacturer recommendations. This may include requirements to store the pipe in smooth, flat locations free of debris that could damage the pipe and limits on stacking heights for various pipe sizes. The pipe is stored to prevent anything from entering or contaminating the pipe. In this case, the contractor also adheres to all stacking/storing policies or specifications. Once materials are unloaded at the job site, the contractor takes precautions to prevent material damage before use. This may include proper stacking of pipe, dunnage or other material to raise pipe above surface level, spacers at the end of pipe joints, and prevention of debris, water, animals, and other contaminants from entering materials and pipe.

Monitoring Safety Practice and Performance: It is critical for contractors to maintain awareness of their job site safety plan until work has been safely completed. Examples may include the performance of daily hazard assessments on safety issues and concerns, quality inspections and calibration of equipment. Contractors who have a Pipeline SMS develop and maintain procedures to ensure safe work practices for every job and/or work activity; and use those tools to track their safety performance. Contractors monitoring safe practice and safety performance on the job site:

- Understand the customer operator's policy and procedures for their scope of work and seek clarification when unclear.
- Provide resources for reporting safety related events such as near misses personnel injuries, property damages, incidents, etc. for lessons learned evaluations. These representatives are the contacts for emergency responders and the customer operator for safety events.
- Promote safe practice for the protection and support of their customer's pipeline facilities such as ensuring excavation safety and providing the appropriate tools and resource to execute work safely.



Management of Change

Management of Change (MOC) is a key in operational controls for a Pipeline SMS. MOC focuses on the technical evaluation and understanding of a change while change management which deals with supporting people impacted by the change during their individual transitions from their current state to their future. MOC and change management are not mutually exclusive and successful organizations effectively use both.

When pipeline operators elect to outsource activities on a pipeline affected by Pipeline SMS, they are required to 'define and document' specific MOC processes. This requires significant collaboration between the contractor and their customer operator. Below are the following processes that must be defined, documented and communicated amongst pipeline operators and their contractors.

- Communication requirement of Pipeline SMS applicable to the contractor's scope of work.
- Responsibility, accountability, and authority for managing the outsourced activities.
- Incorporation of lessons learned into the pipeline operator's operations.
- Training and orientation on safety policies.
- Evaluation of contractor safety performance.
- Communication of risks at the work or job site.
- Communication of the Management of Change procedure.

Common examples of MOC activities in a Pipeline SMS are the tracking of changes to an operational procedure document, following approval protocols to deviate from a design plan within the field, evaluating adjustments to asset life cycle that includes safety elements associated with the design or engineering approach and understanding how a risk assessment may change after an operational change is implemented.



Requisite Learning

Management within an organization carries the responsibilities of assuring that all employees are trained, qualified and knowledgeable to perform assigned tasks and work duties. This is especially important in highly technical and specialized industries such as the oil and gas sector.

Contractors shall assure that their management, employees and subcontractors whose responsibilities fall within the scope of their Pipeline SMS have the requisite education, training, and experience they need to safely and proficiently perform those job duties. Contractors must document and maintain records of training and any applicable qualifications of covered tasks required to perform work. The aim of training should provide information and updates so that personnel can:

- Connect applicable Pipeline SMS Elements to their job requirements.
- Understand newly emerging or changing risks associated with daily work activities.
- Maintain awareness of safety practices and/or opportunity areas for improvement.
- Grasp clearly the potential consequences of failing to follow processes and procedures.

Pipeline operators and their contractors are strongly encouraged to collaborate to further define expectations on topics such training content, support needs, and documentation requirements.

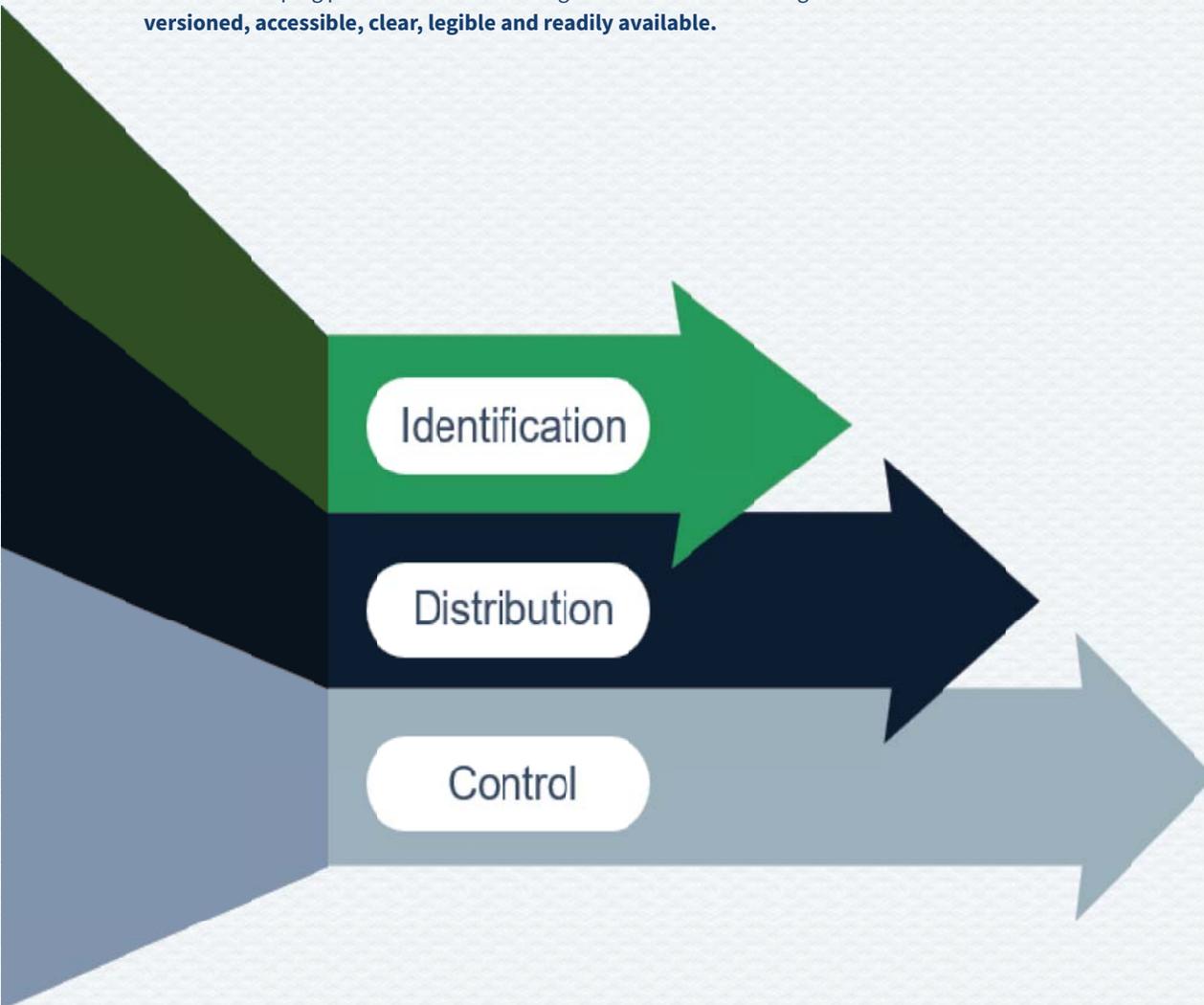


Records Matter

Data, information and communication are vital to driving Pipeline SMS. When a contractor has quality data, it is current, relevant and readily available for use in decision making and learning across the organization. This type of intelligence is supported through a high standard for documentation.

At a minimum, contractors should have a procedure to identify, distribute and control documents and records required by Pipeline SMS. The procedure may include specifics on responsibilities for document approval and any controls needed to effectively maintain these documents. Example controls may include revision status standards, obsolescence protocols, and quality assurance requirements.

Where appropriate, pipeline operators and their contractors are strongly encouraged to exchange information about documentation and recordkeeping processes to increase alignment with the following characteristics described below. Records should be **current, versioned, accessible, clear, legible and readily available**.



JESUS SOTO, CHIEF OPERATING OFFICER
MEARS GROUP

“Many contractors were eager to understand how to apply the PSMS framework when API 1173 first rolled out. As a result, the PSMS Industry Team was able to build upon many diverse, existing efforts such as the DCA template, contractor engagement practices by operators and unique industry expertise to develop a consistent PSMS Contractor's Guide for industry. This inclusive approach provides a practical direction that will help contractors on their journey of safety and quality continuous improvement.”



A Team Effort

Strong management leads to resilient safety culture. Good leaders know they cannot do it all by themselves. They actively seek, coordinate and balance the competing interests of others involved in areas of pipeline operation. Together, stakeholders and decision makers discuss and take the necessary steps to improve pipeline safety.

In a Pipeline SMS, a stakeholder is defined as **a person or organization, internal or external, who participates in and/or benefit from the processes established to implement and execute an effective Pipeline SMS.** Examples of contractor stakeholders may be:



Employees

Examples may include internal company personnel such as field workers, engineers, locators and other support staff.

Suppliers

These may include external suppliers for pipeline appurtenances such as pipe, valves or fittings and other tools. This may also include subcontractors.

Customers

This category may include pipeline operators who are contractor customers or pipeline customers who live or work in and/or around the job site.

Contractors have a diverse range of stakeholders to manage on a daily basis. Pipeline SMS requires the creation and regular management of a stakeholder engagement plan that identifies specific objectives and the personnel responsible for receiving and sharing information.

Internal Focus: The contractor should have a process for employees to raise concerns to management and make recommendations for improvement in risk identification, prevention and mitigation. Communication on the importance of stakeholder engagement shall be shared with appropriate functions of the company. As an output, employees should understand the policies, goals, objectives and procedures pertinent to their work that are driven by Pipeline SMS.

External Focus: Contractors should seek guidance from their customer operators to identify the needs and types of information to be shared externally to support this Pipeline SMS requirement.

Deep Dives

Safety culture is enhanced through the discovering, communicating, and acting upon safety lessons. Robust incident investigation, evaluations and lessons learned reinforce the commitment to safety performance improvement. These activities contribute to an environment where personnel are comfortable identifying and speaking up about risk and safety concerns, knowing that their actions will result in safety improvements. The timeliness of sharing information and tracking corrections demonstrates that safety is a top priority and complacency about risk is unacceptable.

Contractors have the responsibility to execute their established procedure(s) for investigating incidents, including near misses. A strong incident investigation allows an organization to fully understand why an incident occurred, develop effective corrective actions and minimize or eliminate similar future incidents.

At a minimum, a contractor's investigation procedure should capture:

- A detailed description of the events leading up to, during and after the incident.
- Identification of causes and any contributing factors.
- Documented review of compliance with all plans, specification, policies and procedures provided by the customer operator.
- Documented review and evaluation of emergency response procedures. Contractors are encouraged to communicate improvement opportunities to the customer operator.
- Recommendations for transferring lessons learned to the risk assessment and operational control processes.
- Recommendations for pipeline safety improvement, including processes and procedures that are identified from the investigation.

According to the United States Department of Labor's Occupational Safety and Health Administration, a proper incident investigation extends beyond the immediate causes of an incident to fully understand why an incident occurred, to develop effective corrective actions, and to minimize or eliminate serious consequences from similar future incidents.

Progress Pit Stops

Contractors should evaluate their PSMS application by conducting periodic evaluations of progress towards effective risk management and improved pipeline safety performance. This includes a structured review through the use of audits and evaluations of the contractor's application of its Pipeline SMS.



Audits and Inspections are a routine part of a contractor's safety assurance process. Effective audits determine whether a contractor Pipeline SMS is implemented, maintained, and conforms to Pipeline SMS requirements. Risk and complexity of contractor activities are key drivers to the prioritization and frequency of audits. Audits can be performed by external professionals or internal personnel. Examples include compliance teams, field inspectors, internal audit groups or external peer contractors or trade organizations.



Evaluation of Safety Culture can be broken into three main areas for a contractor's comprehensive review: 1) the methods used to assess the perception of the contractor's safety culture, 2) the tools used to evaluate the contractor's safety culture and 3) management's review of the results and findings. Some examples of methods include questionnaires, safety culture surveys, interviews and focus groups. Contractor's management reviews the results of evaluations in these three areas and defines action plans for improvement. Often policies, procedures, practices for risk based decision making, sharing of lessons learned, corrective action programs and non-punitive reporting are included in assessment activities as key supports of a safety program.



Evaluation of Risk Management and Safety Performance are critical to a contractor's ability to assure effective risk management and intended progress made in pipeline safety performance. Analysis of data includes assessment of processes and procedures used to collect, store and analyze data to prioritize and manage risk. Evaluation of safety performance by the contractor examines performance data such as leading and lagging indicators, near misses and abnormal operating conditions to determine progress toward improving pipeline safety performance. Key Performance Indicators (KPIs) are often used to monitor improvement of each Pipeline SMS Element.



Evaluation of Pipeline SMS Maturity provides contractors with an opportunity to understand its growth and development of its system. Contractors should evaluate processes and procedures to determine strengths and weaknesses to support their maturity of their Pipeline SMS implementation.



In the Know

Management review of a Pipeline SMS and safety performance results is necessary to ensure awareness of progress in achieving performance goals and objectives. Top Management should conduct regular reviews to assess the effectiveness of their company's SMS, key decisions, actions, changes to required resources, and critical improvements to the processes and procedures required to achieve its goals.

During management reviews of safety performance and progression, leaders commonly review a balanced scorecard against Pipeline SMS goals, modify organizational objectives, establish adequate resourcing and discuss key safety risks and corrective actions.

G

Earns involvement, accountability and participation by Top Management.

O

Orders regular reviews by Top Management on Pipeline SMS are being completed.

A

Assures consideration for stakeholder feedback.

L

Lifts evaluation of Pipeline SMS to the highest levels in the organization.

S

Sponsors the innovative use of technology advancements to improve Pipeline SMS.

Additional Aid

As part of industry commitment to Pipeline SMS, the Industry Team, which includes contractors who build, maintain and repair natural gas and oil pipelines continue to collaborate to provide education, training and assistance to all industry stakeholders.

Provided below are several additional resources contractors can utilize as they work to implement or improve their current Pipeline SMS.

Pipeline SMS website

This Pipeline SMS website at PipelineSMS.org provides a myriad of support tools ranging from handouts to tools which assist stakeholders in their Pipeline SMS assessments.

Third Party Assessment Program

API's Pipeline SMS Third-Party Assessment Program provides a team of independent, third-party safety management system experts ("assessors") to assist in evaluating the conformity, effectiveness and maturity of a stakeholder's Pipeline SMS.

American Petroleum Institute

On API's website at www.api.org, recommended practices, literature and the latest Pipeline SMS related news and events can be found.

Pipeline SMS Industry Team

The Industry Team serves to facilitate implementation of API RP 1173, Pipeline Safety Management Systems, among the energy pipeline industry and contractor community.



PipelineSMS.org

Looking Ahead

The release of the first edition of the Pipeline SMS 'Contractor Guide' marks a significant milestone for industry progress towards full adoption of *Recommended Practice 1173*. This document will be reviewed periodically and amended, as necessary.



Created in partnership with Lola Link Consulting, LLC.



Appendix

This appendix contains references to a subset of 56 API RP 1173 shall statements that were distilled for use in the creation of the *Pipeline Safety Management Systems: A Contractor's Guide, First Edition, October 2022*. These references to requirements are not intended to supersede and replace any existing agreements between parties.

Leadership and Management Commitment, Responsibilities of Leadership, Top Management, Management, and Employees sections and subsections 5.2, 5.4.1 (b), 5.4.1 (d), 5.4.1 (g), 5.4.1 (h), 5.4.1 (k) and 5.4.1 (l).

Leadership and Management Commitment, Responsibilities of Leadership, Management sections and subsections 5.4.2 (b), 5.4.2 (c), 5.4.2 (d), 5.4.2 (e), 5.4.2 (f), 5.4.2 (h), 5.4.2 (i) and 5.4.2 (k).

Leadership and Management Commitment, Responsibilities of Leadership, Employee sections and subsections 5.4.3 (a), 5.4.3 (b), 5.4.3 (c) and 5.4.3 (d).

Leadership and Management Commitment, Making Communication, Risk Reduction, and Continuous Improvement Routine sections and subsections include 5.6 (a), 5.6 (b) and 5.6 (h).

Stakeholder Engagement, General sections and subsections 6.1.

Stakeholder Engagement, Internal sections and subsections 6.2.

Risk Management, General sections and subsections 7.2.

Risk Management, Risk Prevention and Mitigation sections and subsections 7.4 (a), 7.4 (b), 7.4 (c) and 7.4 (d).

Operational Controls, General sections and subsections 8.1.

Operational Controls, Management of Change, General sections and subsections 8.3.1.

Operational Controls, Use of Contractors sections and subsections 8.4 (c) and 8.4 (e).

Incident Investigation, Evaluation, and Lessons Learned, Investigation sections and subsections 9.1.2 (a), 9.1.2 (b), 9.1.2 (d) and 9.1.2 (e).

Safety Assurance, Audit and Evaluation sections and subsections 10.2.3 and 10.2.4.

Competence, Awareness, and Training sections and subsections 13 and 13 (b).

Documentation and Record Keeping, Control of Documents sections and subsections 14.1.

References

First Edition, API RP 1177, 1st Edition, July 2015 - Recommended Practice for Pipeline Safety Management Systems

First Edition, July 2015. API RP 1177, 1st Edition, November 2017 - Recommended Practice for Steel Pipeline Construction Quality Management Systems

November 2016, American Gas Association, Distribution Construction & Maintenance Committee - Construction Quality Management Task Group, *AGA White Paper Contractor Construction Quality Management Guide*.

October 2022, GTI Energy, Operations Technology Development, "Pipeline SMS study: The Contractor's Role", project *A Process-Based Approach to Pipeline Safety Management Systems*.

2021. Distribution Contractors Association and American Pipeline Contractors Association, *Pipeline Construction Safety Management Systems*.

API Recommended Practice 1162, Public Awareness Programs for Pipeline Operators, 2010.

Common Ground Alliance, Damage Incident Reporting System Reports for information on damages to pipelines.

2022 Industry Collaborative, Shall statements for member operator information on application of RP 1173 for contractors.

Bisbey, T. M., Kilcullen, M. P., Thomas, E. J., Ottosen, M. J., Tsao, K., & Salas, E. (2021). Safety Culture: An Integration of Existing Models and a Framework for Understanding Its Development. *Human Factors*, 63(1), 88–110. <https://doi.org/10.1177/0018720819868878>

James Heskett (November 2021). Harvard Business School. *How Long Does It Take to Improve an Organization's Culture?* <https://hbswk.hbs.edu/item/how-long-does-it-take-to-improve-an-organizations-culture>

Seppälä, Emma, Cameron, Kim. (December 2015). Harvard Business Review. *Proof That Positive Work Cultures Are More Productive*. <https://hbr.org/2015/12/proof-that-positive-work-cultures-are-more-productive>

National Safety Council. (2010). *Position/Policy Statement Safety Management Systems*. <https://www.nsc.org/getattachment/585ae6bd-2e19-49ac-8ceb-5fda1bd10f07/W-Safety-Management-Systems-111>

United States Department of Labor. Occupational Safety and Health Administration. *Incident Investigation*. <https://www.osha.gov/incident-investigation>