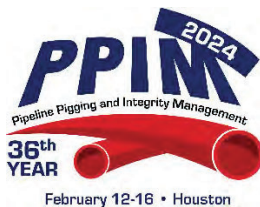


PSMS-Contractor Safety Program Integration, Tool, and Assessment Pilot

Laurie Knape, CSP, ASP, CLCS, QMS, AStd
American Petroleum Institute (API)



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Abstract

In this paper, API will provide an overview of the PSMS Assessment Program and changes made since its inception, an examination of the key learnings from assessment outputs to date, and a description of how the program is providing a feedback mechanism to improve industry initiatives to help operators implement RP 1173.

The American Petroleum Institute (API) represents all segments of the natural gas and oil industry, aiming to accelerate safety and environmental progress across operations while meeting global demand for affordable, reliable, and cleaner energy. Through API and partnership with the U.S. Pipeline and Hazardous Materials Safety Administration (PHMSA), state pipeline regulators, pipeline industry organizations, pipeline operators, and other interested stakeholders developed API Recommended Practice (RP)

1173: *Pipeline Safety Management Systems*. API RP 1173 is designed as a framework to assist operators and contractors, regardless of size or scope of work, create a management system structure to systematically manage pipeline safety and continuously measure progress to improve overall pipeline safety performance. The core principle of API RP 1173 is the "Plan-Do-Check-Act" cycle, and it requires an operator to periodically review their pipeline safety management system (PSMS) to the requirements of RP 1173 on a triennial cycle.

In collaboration with industry partners, API developed the not-for-profit Pipeline SMS Assessment Program in 2019 and fully launched the offering in January 2020. In the three years since its inception, API has facilitated 14 assessments of pipeline operators' safety management systems against the requirements of RP 1173. In doing these 14 assessments, the process for completing assessments has been tested by operators of vastly different sizes, carrying a wide array of products, from very small steam utility operators to large liquids operators with operating regions across North America.

The industry has also identified specific trends relevant to API RP 1173 implementation in conducting these assessments. Specifically, it has created awareness around some areas pipeline operators continue to struggle with in creating a holistic PSMS

- 1) ensuring that field-level personnel understands how their roles relate to safety performance relative to the company's PSMS;
- 2) incorporating learnings from external events into their PSMS so that similar incidents do not occur;
- 3) incorporating relevant and standardized PSMS requirements into agreements with service companies, and;
- 4) delineating what RP 1173 requirements mandate programmatic governance or policy within their PSMS (an industry learning).

Who We Are: American Petroleum Industry and API Energy Excellence

American Petroleum Industry:

“API represents all segments of America’s natural gas and oil industry, which supports more than 11 million U.S. jobs and is backed by a growing grassroots movement of millions of Americans. Our nearly 600 members produce, process, and distribute the majority of the nation’s energy, and participate in API Energy Excellence®, which is accelerating environmental and safety progress by fostering new technologies and transparent reporting. API was formed in 1919 as a standards-setting organization and has developed more than 800 standards to enhance operational and environmental safety, efficiency, and sustainability.

Although our focus is primarily domestic, in recent years our work has expanded to include a growing international dimension, and today API is recognized around the world for its broad range of programs.” These programs include advocacy, research, statistics, standards, certification, events, training, and API Energy Excellence (launched in 2021) [1].

API Energy Excellence:

"The natural gas and oil industry is unified in our commitment to accelerating safety and environmental progress across its operations, while meeting global demand for affordable, reliable and cleaner energy. Meeting this demand requires safe and responsible production, transportation, refining and exports. Under API Energy Excellence, API members commit to accelerating safety and environmental progress by adhering to 13 core elements that serve to continuously improve our performance as an industry. API members apply these elements to safeguard our employees, environment and the communities in which they operate." [1]. Midstream members of API can prove conformance to the requirements of API Energy Excellence by implementing a robust Safety Management System, consistent with API Recommended Practice (RP) 1173: *Pipeline Safety Management Systems*, 1st Edition [2]. This standard, coupled with the implementation tools published on www.pipelinesms.org, represents a crucial way pipeline and other midstream companies reinforce their status as responsible operators [3].

1. Background and Understanding of API RP 1173: A Systematic Approach to Pipeline Safety Management

The oil and gas industry is responsible for delivering energy worldwide to a population that is only increasing its demand for products. It must ensure all is done to protect communities, employees, and the environment with safe pipeline operations. "For this reason, the U.S. National Transportation Safety Board (NTSB) recommended the industry develop guidance for safety management systems for energy pipeline operations. In addition, safety management systems (SMS) have proven to help in other industries, such as aviation, nuclear power, and chemical manufacturing".[4]

A. American Petroleum Industry – Recommended Practice 1173

“PSMS allows companies to take a principle and performance-based approach to managing complex pipeline operations for pipelines like other complex industries. A management system approach helps improve safety performance and ultimately moves the industry closer to zero pipeline incidents. For a management system to be effective, there must be clear communication throughout all levels of the organization, which also helps to sense the responsibility of all employees to contribute to the organization's safety performance.” [2].

Managing the safety of the complex processes involved in a pipeline's design, installation, operation, maintenance, and integrity requires coordinated actions to address multiple, dynamic activities, and circumstances. Pursuing the industry-wide goal of zero incidents requires a systematic and comprehensive effort. RP 1173 is the overarching framework for industry to implement a safety management system for pipeline operations.

Some expected benefits for implementing RP 1173 are: 1) helping to improve safety performance; 2) helping to track performance more effectively; 3) strengthened company safety culture (discussed explicitly in next section); 4) improved employee morale and retention, and; 5) enhanced company reputation. Also, establishing a PSMS will enable an operator to implement other relevant standards to operating pipelines, as these other standards are meant to supplement and fulfill broader SMS requirements and programs referenced in RP 1173:

- RP 1160 (Managing System Integrity for Hazardous Liquid Pipelines);
- RP 1174 (Onshore Hazardous Liquid Pipelines Emergency Preparedness and Response);
- RP 1175 (Pipeline Leak Detection – Program Management);
- RP 1177 (Quality Management System for Steel Pipeline Construction);
- RP 1130 (Computational Pipeline Monitoring for Liquid Pipelines);
- RP 1162 (Public Awareness Program for Pipeline Operators);
- RP 1161 (Pipeline Operator Qualification);
- Std 1163 (In-Line Inspection Systems Qualification);
- Bull 1178 (Integrity Data Management and Integration); and
- RP 1109 (Marking Liquid Petroleum Pipeline Facilities).

More information on RP 1173 and industry's efforts to help companies implement Pipeline SMS can be found at www.pipelinesms.org.

2. Safety Culture

A Pipeline SMS aims to enhance risk management and improve pipeline safety performance. A Pipeline SMS is intended to provide operators, contractors, and other industry stakeholders with the tools and knowledge they need to track and improve their safety performance across all operations. Regardless of the operator, contractor, or other industry stakeholders, positive safety culture is essential to an organization's safety performance. Organizational culture, broadly speaking, can be defined as the pattern of basic assumptions that a given group has invented, discovered, or developed in learning to cope with its problems of external adaptation and internal integration, and that have worked well enough to be considered valid, and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems. For the oil and gas industry, this definition has evolved to focus on safety, denoting a safety culture. A safety culture is an organizational culture that instills a collective set of values, attitudes, and beliefs personnel share concerning risk and safety. Many 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 – one that encourages reporting of safety incidences and near misses, and one that does not penalize personnel for bringing forward safety concerns, but rather encourages it.

Safety culture often contributes to safety incidents across construction, maritime, aviation, nuclear, and healthcare industries. Publications mentioning “safety culture” have increased over the past three decades since the term was coined in the Chernobyl incident, this was the first time the term safety culture was used. Often, culture is defined by the action a person takes when no one is looking. It is shaped through many factors, controlled, and those which are influenced, all of which produce outcomes. These outcomes can positively or negatively impact a company's safety culture and, ultimately, the effectiveness of their Pipeline SMS. Positive safety culture is a journey that operators, contractors, and industry stakeholders work diligently to instill into their companies.

A. What does an effective safety culture look like?

Positive safety culture is one where employees and contractors collaborate, have shared positive attitudes toward compliance and exceeding minimum standards, stop work immediately if a situation seems unsafe, feel responsible for safety, and take action to report safety concerns, and do so immediately without fear of punitive consequences.

Often, these principles are memorialized in a company's safety policy or company values statements. This demonstrates to both external stakeholders and internal personnel that safety is a top priority.

3. API Pipeline SMS Third Party Assessment Program

API formally launched the Pipeline SMS Third-Party Assessment Program on January 1, 2020, as a tool to assist operators with measuring progress and the maturity of safety systems, to facilitate the identification of good practices, and to facilitate information sharing across the pipeline industry. The assessment program uses the industry tools the Pipeline SMS Industry Team created, allowing for seamless integration of the assessment program with the rest of the industry efforts [5,6].

Despite ongoing challenges related to COVID-19, API started facilitating these assessments in person in 2021, compared to the hybrid remote/virtual model used in 2020. The Pipeline SMS Third-Party Assessment Program conducted four assessments in 2021, bringing the total assessments completed to date to eight by the end of the year.

API's Pipeline SMS Assessment Program uses independent third-part experts in their fields to build an assessment team that visits the headquarters of a site to conduct policy and programmatic reviews of the topical areas found in RP 1173. That same team then visits field sites and conducts field verifications so that operators can get a better sense of how well their policies and principles are being implemented by field personnel. A typical assessment lasts two weeks (2.5 days at an operator's headquarters location; 2.5 days in the following week for field verifications at various field sites), with receiving a draft report approximately one week after conclusion of the field verification component of the assessment.

For contractors, the assessment lasts one week (2.5 days at the contractor's headquarters location, typically no field verifications). The report outlines notable practices that have been implemented in support of their Pipeline SMS, Opportunities to Increase PSMS Effectiveness, and Observations. Observations are areas where assessors found a gap between RP 1173 requirements and the management system. These assessments are conversational in nature, with the goal being for the SMEs to work hand in hand with assessors to dig into their management system requirements and facilitate the review of their programs. It is not a check-the-box audit that is punitive in nature, something our assessees have found to be extremely beneficial and helpful in providing feedback to their programs. Some assessees have stated they are considering modeling their internal management system assessments after the API Pipeline SMS Third-Party Assessments.

The assessments conducted through 2023 were completed with a diverse group of operators seeking to evaluate their maturity toward RP 1173 and glean insights into good practices across the industry to aid in their implementation efforts. Operators participating in the API Pipeline SMS Third-Party Assessment Program represent the following subsegments of the pipeline industry:

- large hazardous liquids operators
- small hazardous liquids operators
- large gas distributors
- small gas distributors
- small steam piping utility operator

The wide range of operator types using the program indicates the wide range of applicability of RP 1173 and the assessment program. It also validates that the API Pipeline SMS Third-Party Assessments are flexible in allowing for the large variation in

the sizes of operators, contractors, and types of products transported the opportunity to use the assessments to further mature their programs.

4. Assessment Program Adjustments from Inception to Current

The Pipeline SMS Assessment Protocol was developed using the existing Pipeline SMS Implementation Team approved tools found on PipelineSMS.org to ensure consistency and seamless integration with existing implementation efforts. During our pilot assessments in 2019, we used normative key performance indicators (KPIs) found in the industry-approved evaluation tool (pipelinesms.org) to partially assess maturity and/or effectiveness of an operator's PSMS. This process was complicated, hard to agree upon, and not all operators used or agreed with these KPIs. Ultimately, the results would not be consistent nor accurately represent the industry-approved maturity model. Therefore, a decision was made to remove normative KPI scoring and evaluation from API PSMS Assessments.

In 2020, a roundtable was held to conduct an evaluation on the assessment program as part of API's process for Plan-Do-Check-Adjust (PDCA) on system programs. The outcomes of this meeting formed the current API Pipeline SMS Third-Party Assessment Program. The Operator Assessment Tool contains 50 expectations based on the RP 1173 elements, sub-elements, and 234 "Shall" statements and requirements of RP 1173. The Assessment Tool rates each statement on a scale of 1 to 3 for conformity (1 for Planning, 2 for Developing, 3 for Implemented/Conforming) and provides additional ratings for effectiveness at Level 4 for Sustaining and Level 5 for Improving [7]. The Contractor Assessment Tool considers a set of 56 shall statements identified by industry as foundational to a contractor's safety management system. The industry team published *Pipeline SMS: A Contractor's Guide* in November 2022 to support contractors in their SMS journey. The guide maps each of the 56 requirements to the RP.

Additionally, API changed the logistical model by which we conduct assessments. Early in assessments, API sent out our teams of assessors to conduct headquarters visits to review policies, procedures, and recordkeeping, and additionally had those assessors visit field sites in the same week. This resulted in a significant amount of lost time and compressed field verifications. Starting in 2021, API moved to an assessment model that has assessors visit headquarters of operators in one week, followed by field verifications the following week. This allows a few things to occur more seamlessly:

- 1) Assessors can spend more time in the field the following week (normally 2.5 days)
- 2) Assessors can evaluate outputs from the headquarters visits to prioritize specific areas of interest for the field assessments.
- 3) Assessors have less fatigue and are therefore more effective during interviews
- 4) Assessors can facilitate a closing conference after returning from the field assessments with more complete information to successfully convey assessment results to company leadership.

These changes to the program represent meaningful continuous improvement by the program to make these assessments as efficient and productive as possible.

5. Benchmarking

“Benchmarking enables operators and contractors to determine which processes and procedures could benefit from improvement and which areas these improvements might yield. Finally, by benchmarking their performance against themselves and the industry on an ongoing basis, companies gauge how effective their improvement efforts are over time. The [API] PSMS assessment has the only benchmarking consistent across the operator and Industry, allowing the operator to develop appropriate KPI’s, performance measures, identify new or inform current stakeholders, and articulate strengths and weaknesses to address areas for improvement. Benchmarking is intended to allow industry leaders to gauge how quickly RP 1173 is being implemented by industry and give individual operators and contractors a sense of how they compare to their peers. If a company scores lower than their peers in a certain area, feedback can be used to explore good practices that may be published on the topic to allow them to focus efforts on these identified areas allowing them to improve their SMS more quickly. API encourages all participants to review good practices in the industry and good practices shared by our assessors as part of their assessments.” [3].

In 2022, API conducted its tenth assessment, a key milestone that enables API to publish the statistical analysis of results from these assessments to those who have participated to date. The benchmarking is blinded and anonymous in nature and established statistical ‘box and whisker’ charts of performance from the overall assessment down to the sub-element (the major headings under each section within RP 1173) categories evaluated as part of an assessment. This allows a site to gauge at the internal program level how well their processes and procedures compare to their peers, and as compared to the requirements of RP 1173.

Additionally, these analyses allow industry to gauge where industry should focus efforts to increase performance in particular areas moving forward.

Currently, there has not been enough data collected to demonstrate Contractor benchmarking results. Once 10 assessments have been completed we will be able to begin contractor benchmarking.

A. *Examination of Key Learnings from Benchmarking:*

Continuous improvement, a goal of zero incidents, and learnings from experience are key pipeline industry values. As such, the API PSMS Assessment Program upholds a learning culture by ensuring that relevant data, results, findings, and lessons learned are shared and integrated into other work streams so that blinded assessment outputs are considered in other areas, as appropriate. Some key initial learnings from the first PSMS Benchmarking Report are as follows:

- 1) **Field-Level Awareness of PSMS** – While corporate entities are working to ensure PSMS is implemented in their operations, there is a continuous improvement opportunity in ensuring that front line field personnel understand how the internal management system affects their day-to-day work. While these workers do not have to have awareness of the full Pipeline SMS and RP 1173 requirements, RP 1173 does require them to understand what areas of their work contribute to Pipeline SMS goals and requirements.
- 2) **Lessons Learned from External Events** – While companies often have robust learning requirements in their PSMS for learning from events internally, RP 1173 also requires entities to learn from other industry-wide incidents as well. These can take the form of industry shares, participation in industry events like conferences, and other avenues. API is currently exploring ways to assist industry in incorporating learnings from external events into their PSMS in a programmatic way, as required by RP 1173.
- 3) **PSMS and Contractor Requirements** – Industry is seeing more operators starting to require their contractors to prove conformance with some RP 1173 requirements. While this programmatic approach should be applauded, it is not without areas for improvement. Often, large contractors who work for different operators discover conflicting requirements that are not aligned. API's contractor framework aids contractors with implementing the 56 statements identified by industry, a subset of the 234 'shall' statements in RP 1173 that are conducive to their types of operations. This will be discussed in a later section.
- 4) **RP 1173 Requirements: written policy versus business practice** – One item our assessments have uncovered is that in RP 1173, in its attempt to be flexible and scalable, does not always explicitly state if company policies or written procedures are required to fulfill its requirements. This has led to the interpretation that general business practice can suffice in some areas. While this may be the case, it has created some confusion and API, and industry is discussing how best to address this in the future.

API is being proactive and adding value to the industry by continuously conducting webinars, training, and workshops, often to address some of these key areas identified in API Pipeline SMS Assessments, as well as other key areas identified by the Industry Team. These learning opportunities include operators, PSMS assessors, and other industry leaders as presenters or panelists. These learnings support operators and contractors in addressing challenging elements to implement. In 2023, API has conducted over fourteen engagements where good practices are shared, with many more planned in 2024.

Moreover, API facilitates discussions among the Pipeline SMS Industry Team. The Industry Team's guiding principle is to improve overall Pipeline SMS performance. One

way it has sought to do this is by providing tools to assist all operators [3,5,6]. Other ways include peer-to-peer sharing programs, mentoring programs, education programs, and other initiatives to encourage the adoption of API RP 1173 throughout each association's membership. In 2023, Industry has presented on PSMS KPIs/Metrics and Connecting PSMS to environmental and social governance (more in the next section).

B. Programmatic Assessment Learnings Incorporation:

More broadly, assessment outputs and these learnings are being considered by API policy committees and by API standards groups to ensure learnings from the assessment programs, as well as the good practices identified, are appropriately leveraged in other industry efforts. For example, as API stands up the API Standards' team responsible for updating RP 1173, the learnings discussed previously are already being incorporated into discussion points for the group to consider as part of revising the standard in the coming year. Additionally, more work is being considered to support contractors, both as part of the standard revision as well as from a programmatic standpoint through the possibility of a contractor/service provider survey, the contractor framework, and our newly released contractor assessment program.

6. 2022 and Beyond

A. Contractor Applicability of RP 1173

In 2022, based on the Interstate Natural Gas Association of America (INGAA) Contractor Survey, the PSMS Industry Team's goal is to increase pipeline SMS support for contractors and small operators. To do this, an effort was undertaken to develop an industry-led contractor framework that guides contractors in their Pipeline SMS adoption while providing flexibility and scale for the diversity of work that contractors perform. A framework was created with the Pipeline SMS Industry Team, Distribution Contractor's Association (DCA), Operators, and other industry trade associations. The vision for this framework is that guidance to contractors should be transparent, scalable, and flexible. It should provide contractors with an understanding of the value of Pipeline SMS for its employees, business, customers, and communities in which they work, while also outlining which RP 1173 requirements apply to their operations. The development process compared existing contractor guidance from operators, identified gaps across those requirements, and harmonized them accordingly with the support of both operators and contractors.

The Contractor Framework was published in Q4 2022, and the assessment tool is in beta stages of approval and implementation, API has already conducted a contractor assessment with 3 other assessments in progress. The Contractor Assessments use the approved Contractor Framework as a basis for the requirements that are being assessed by the program. API presented the framework and assessment offering to DCA (a trade association for contractors) in 2022 and received their feedback on the framework for incorporation into the final version.

The contractor program provides necessary standardization for the contractor/service providers. API has heard from many of these companies that some operators require vastly different SMS conformance requirements to work with them, and we think providing an out-of-the-box solution could help alleviate this burden while providing operators with a demonstrated, consistent approach that they can use to validate internal contractor/service provider requirements.

B. RP 1173 and Environmental and Social Governance (ESG)

The Pipeline SMS Assessment Program and Pipeline SMS Industry Team have also focused on connecting PSMS to environmental and social governance principles (ESG). Implementing an effective PSMS can support a company’s ESG goals. Specifically, some of the individual elements of RP 1173 can be mapped to ESG principles, seen in Figure 1.

ESG Components Paired with PSMS Elements



Figure 1. RP 1173 elements mapped to ESG principles

Industry plans to continue to work to build out industry guides and assistance materials to assist industry in connecting Pipeline SMS to ESG principles so that these efforts can complement one another and support operators’ broader goals and efficiency efforts. It is recognized that as operators mature their Pipeline SMS maturity efforts, ESG efforts are often furthered as a result as well, and operators should be taking credit for their implementation efforts.

Lastly, looking beyond 2024, The Pipeline SMS Third-Party Assessment Program continues to conduct program reviews, aligning with the PDCA cycle to ensure this industry tool continues to provide value by making necessary improvements as they are identified.

7. Conclusion

API is excited to ensure the global pipeline industry is kept abreast of this exciting new program that can help industry pinpoint and provide industry guidance for common areas that require more focus. We are also excited that the Pipeline SMS Assessment Program continues to attract more industry operators and contractors to conduct assessment.

API continues to evolve this program to meet industry needs and to provide value for our operators. For more information on Pipeline SMS or the API Pipeline SMS Third-Party Assessment Program, feel free to reach out to Laurie Knapel, knapel@api.org or PipelineSMS@api.org.

8. References:

- [1] American Petroleum Institute. "About API." <www.api.org/about>. Accessed 25 August 2022.
- [2] American Petroleum Institute. API Recommended Practice 1173: *Pipeline Safety Management Systems*, First Edition. 2015.
<https://global.ihs.com/doc_detail.cfm?document_name=API%20RP%201173&item_s_key=00651785>.
- [3] American Petroleum Institute. Pipeline SMS Plan-Planning Tools <<http://pipelinesms.org/get-started/plan/>>. Accessed 25 August 2022.
- [4] National Transportation Safety Board. "Safety Management Systems" <https://www.nts.gov/Advocacy/mwl/Pages/mwl-3>.
- [5] Schein, Edgar H. "Coming to a New Awareness of Organizational Culture." MIT Sloan Management Review Magazine. Volume 25, No. 2. Winter 1984.
<https://sloanreview.mit.edu/article/coming-to-a-new-awareness-of-organizational-culture/?use_credit=fecf2c550171d3195c879d115440ae45>. Accessed August 5, 2022.
- [6] American Petroleum Institute. "Pipeline SMS Do - Implementation Tools" <<http://pipelinesms.org/get-started/do/>> Accessed 25 August 2022.
- [7] American Petroleum Institute. "Pipeline SMS Check - Evaluation Tool" <<http://pipelinesms.org/get-started/check/>>. Accessed 25 August 2022.
- [8] American Petroleum Institute. "Pipeline SMS Maturity Model." <<http://pipelinesms.org/pipeline-sms-maturity-model/>>. Accessed 25 August 2022.

