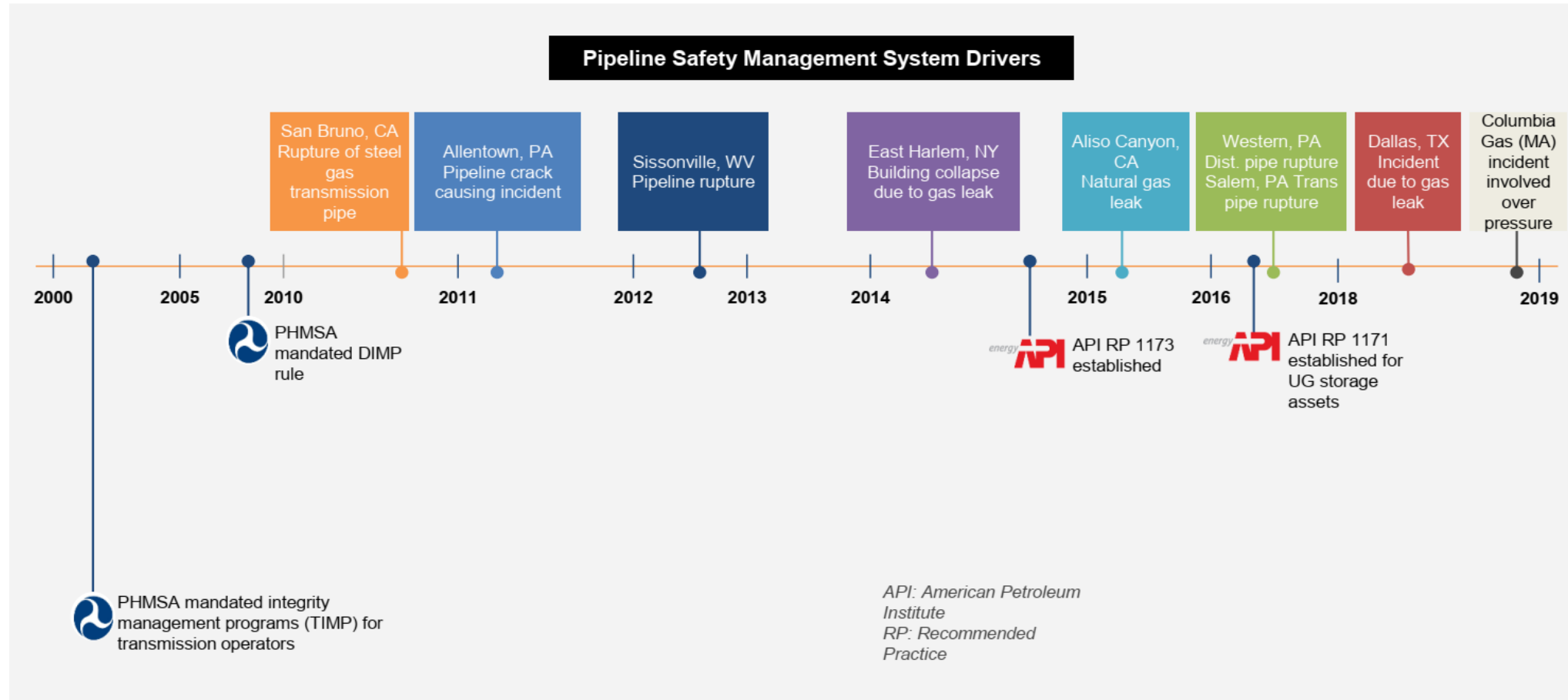


API 1173

Integrity Management for the Future



Past Incidents have emphasized the need for better safety management practices



Recent History of Incidents

- 2013 (29 March) ExxonMobil pipeline carrying Canadian Wabasca heavy crude from the Athabasca oil sands ruptured in Mayflower, Arkansas, about 25 miles northwest of Little Rock. Approximately 12,000 barrels (1,900 m³) of oil mixed with water had been recovered by March 31. Twenty-two homes were evacuated.[1] The United States Environmental Protection Agency (EPA) classified the leak as a major spill. A reported 5,000–7,000 barrels of crude were released.
- 2013 (20 August) Explosion of a natural gas pipeline southwest of Oklahoma City
- 2013 (8 October) Explosion of a natural gas pipeline near Rosston, Oklahoma
- 2014 (Jan 25) A Trans Canada pipeline about 15 miles south of Winnipeg ruptured and exploded. The incident prompted the precautionary closure of two nearby pipelines. The pipelines supply the main source of natural gas to more than 100,000 Xcel Energy customers in eastern North Dakota, northwestern Minnesota and western Wisconsin. The explosion happened near Otterburne, Manitoba, about 15 miles south of the provincial capital, Winnipeg. The area was evacuated as a precaution. No injuries were reported but the fire burned for more than 12 hours.
- 2014 (Feb) In Knifely, Adair County, Kentucky, a Columbia Gulf gas pipeline exploded at 1 a.m. flattening homes, burning barns, and causing one casualty. The 30-inch natural gas pipeline was about 100 feet from Highway 76 and buried 30 feet underground. When it exploded, large rocks and sections of pipeline flew into the air, leaving a 60-foot crater. Columbia Gulf, part of NiSource's Columbia Pipeline Group, owns and operates more than 15,700 miles of natural gas pipelines, one of the largest underground storage systems in North America. The pipeline that exploded was carrying natural gas from the Gulf of Mexico to New York.
- 2014 (Feb 11) A Hiland gas pipeline exploded about six miles south of Tioga, North Dakota. Hiland was "blowing" hydrates, ice-like solids formed from a mixture of water and gas that can block pipeline flow, out of the pipeline.
- 2014 (Mar 14) A Northern Natural Gas Company pipeline erupted near the intersection of county roads 20 and O, about six miles north of Fremont, Nebraska. A company spokesman said, "In the summer you can tell if you've got a gas leak by vegetation, sometimes it dies in the ground.
- 2014 (May 26) A Viking gas pipeline explosion near Warren, Minnesota shot a fireball over 100 feet in the air. Roads within a two-mile radius were blocked off. Authorities suspected natural causes because there was still frost in the ground and the soil was wet.
- 2017 (November 16) TransCanada's Keystone Pipeline leaked 5,000 barrels of crude in northeastern South Dakota. Officials don't believe the leak affected any surface water bodies or threatened any drinking water systems.
- 2018 (June 7) A landslide caused a newly installed natural gas pipeline to rupture and explode in Marshall County, WV along TransCanada's Midstream Pipeline at 4:20 a.m., releasing \$437,250 worth of natural gas. Flames from the ruptured pipeline were visible for miles, but no one was injured in the explosion.
- 2018 (September 13) Suspected over-pressurization of natural gas pipes by Columbia Gas caused multiple explosions and fires in 3 towns in Massachusetts (Andover, Lawrence, and North Andover), leaving 1 dead.
- 2019 (October) the Keystone pipeline ruptured causing over 383,000 gallons of oil to contaminate surrounding wetlands in North Dakota. By mid-November, state regulators raised the reported acreage of contaminated land to about 209,100 square feet of wetlands.(North Dakota)
- 2019 (August 1) An Enbridge natural gas pipeline ruptured causing a massive explosion in Lincoln County, Kentucky, leaving 1 person dead and 5 hospitalized. The explosion and resulting fire destroyed railroad tracks and at least 5 homes in a nearby trailer park.

Sissonville, WV



Texas Eastern Rupture Delmont, PA



API Steps In

- In 2015, the pipeline industry completed the development of a framework for Pipeline Safety Management Systems (Pipeline SMS) designed specifically for pipeline operators.
- This American Petroleum Institute Recommended Practice 1173 was developed by pipeline operators, for pipeline operators.
- The American Petroleum Institute has been one of the main areas of recommended practice for the industry and the elements of the safety management in both upstream and midstream segments.

Consensus Standard



Recommended Practice

- The RP establishes a Pipeline Safety Management System (PSMS) framework for organizations that operate hazardous liquids and gas pipelines. These are typically focused on the jurisdictions under the US Department of Transportation.
- RP provides pipeline operators with safety management system requirements that when applied provide a framework to reveal and manage risk, promote a learning environment, and continuously improve pipeline safety and integrity

What Pipeline SMS is NOT!



- A regulatory requirement-it is NOT incorporated by reference into the pipeline safety regulations
- A one size fits all approach
- A one and done or “check the box” activity
- A quick fix approach to pipeline safety



Implementation of SMS

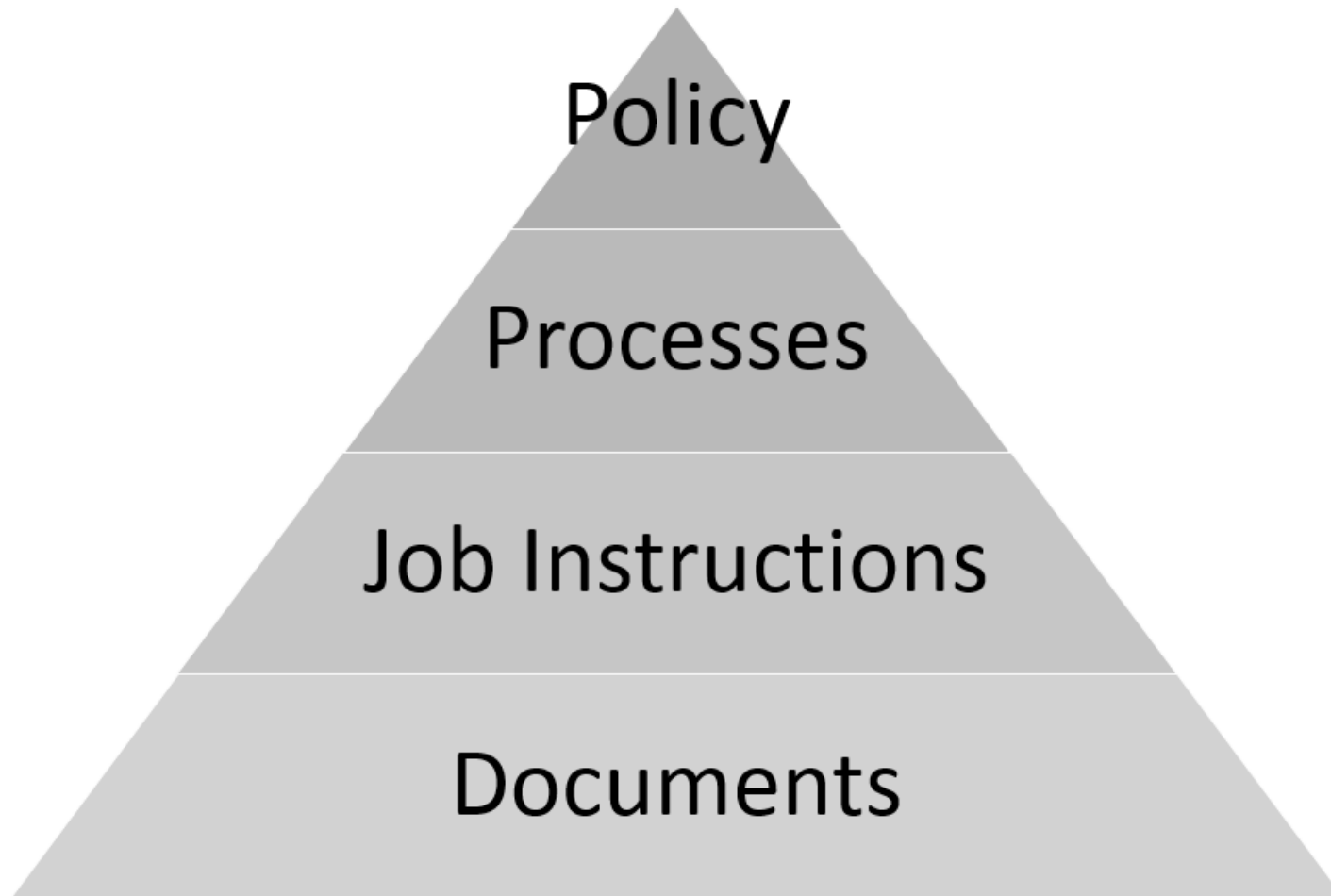
- Many industries have looked to SMS to reduce accidents and improve daily operations:
 - Aviation Industry
 - Chemical Industries
 - Storage Facilities
- Common Elements and Frame Work
 - ISO 9001
 - ISO 14001
 - ANSI Z10

ANSI Z 10 and Comparable Standards

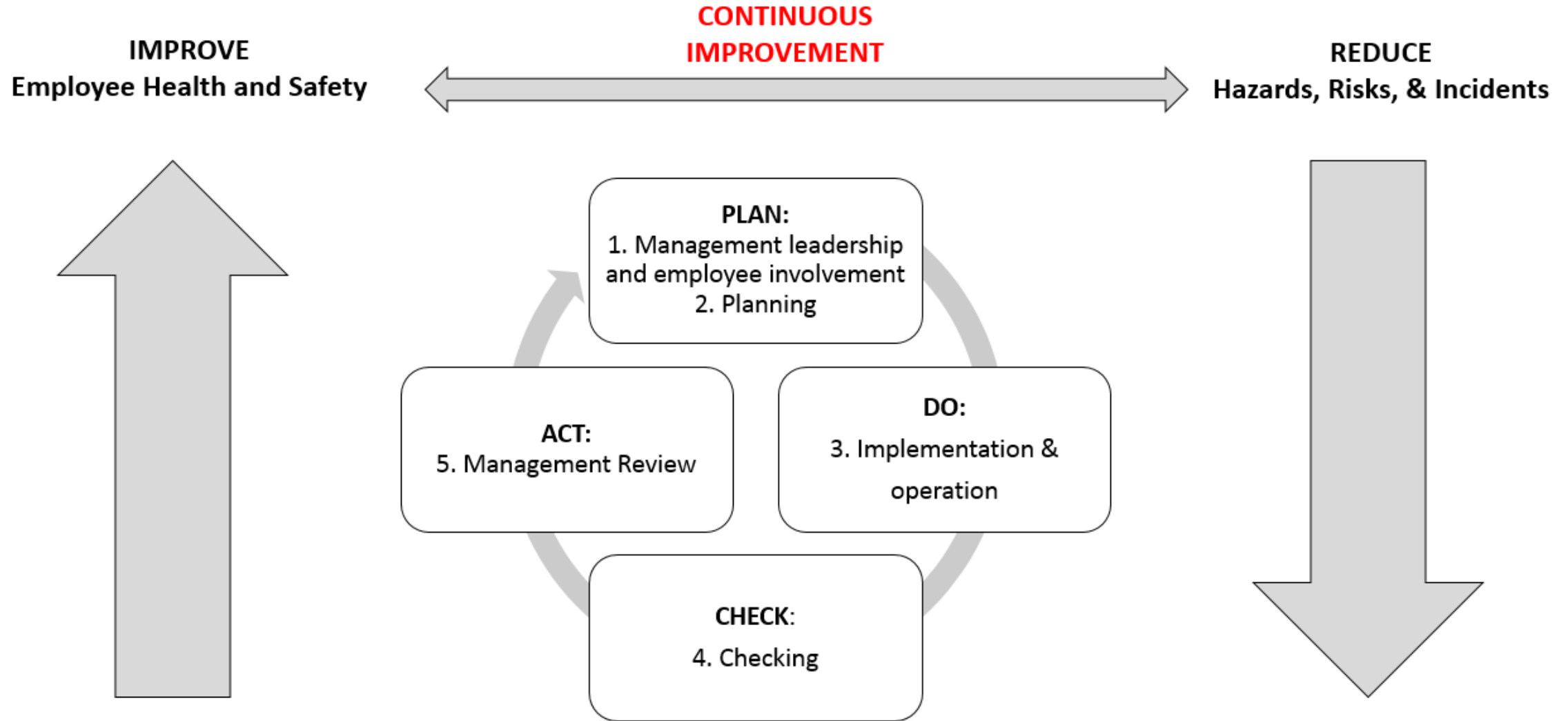


Table 1 Comparing Management Standards

ANSI Z10	ILO-OSH 2001	OHSAS 18001	ISO 14001
Management leadership and employee participation	Policy	General requirements	General requirement
Planning	Organizing	Policy	Policy
Implement and operations	Planning and implementation	Planning	Planning
Eval/correct actions	Evaluation	Implement and operation	Implement and operation
Management Review	Action for improvement	Check and correct act.	Check and correct act.
		Management review	Management review



Typical
Hierarchy



Risk Reduction

API 1173 combines 3 critical elements:

- Process Safety
 - Layers of protection for safe work
 - Consistency
- Asset Management
 - Accountability
 - Evaluation, prioritization, mitigation or risks
- Organizational Culture
 - Employee empowerment
 - Risk reporting and identification

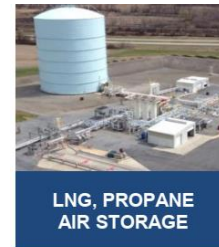
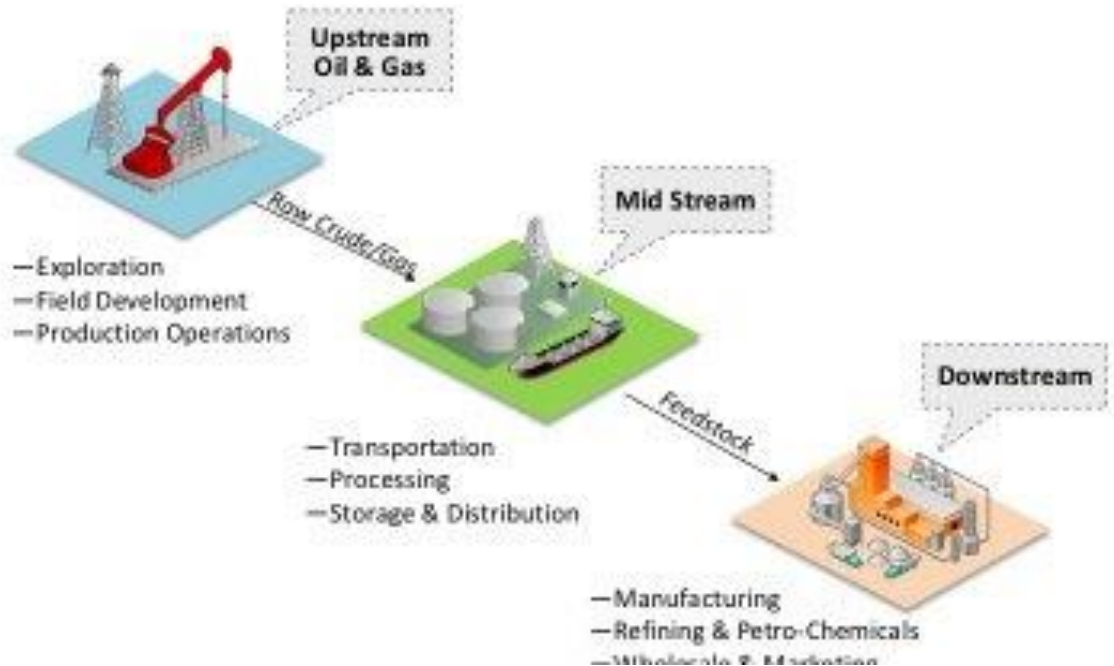


10 Elements of the Standard

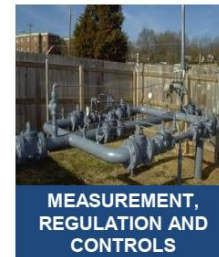


Affected Asset Locations

The Global Oil & Gas Value Chain



Supplemental natural gas facilities including liquefied natural gas (LNG), propane air plants, and underground storage facilities used to provide peaking supplies on the coldest days



Facilities that measure gas flow, regulate gas pressures and monitor flows and pressures in the distribution system



Pipelines that transport natural gas from upstream suppliers to distribution systems



Pipelines that transport natural gas from transmission pipelines to customer service lines



Pipelines and meters that transport natural gas from the distribution main to the customer meter



Facilities downstream of the meter owned and operated by the customer, including piping, valves, appliance regulators and appliances

Implementing the Standard Phase 1

- 3-5 year Structure and Implementation Planning
- Planning and Design (1-2 years)
 - Set SMS goals and objectives (start with governance plan)
 - Communicate and educate staff at all levels
 - Adopt safety culture assessment (Travelers Safety View)
 - Integrate the SMS into all levels of the organization
 - Implement field safety measures (pre-job briefs, safety checklists, research)

Implementing the Standard Phase 2

- Execution (years 2-4)
 - Executing operational measures to increase safety and minimize risk
 - Implement governance plan principles that steers the SMS
 - Formalize training process and sms principles
 - Continue to push field controls and measures
 - Ensure Incident Investigation processes and procedures are in place (root cause analysis)
 - Continue safety culture assessments and share results

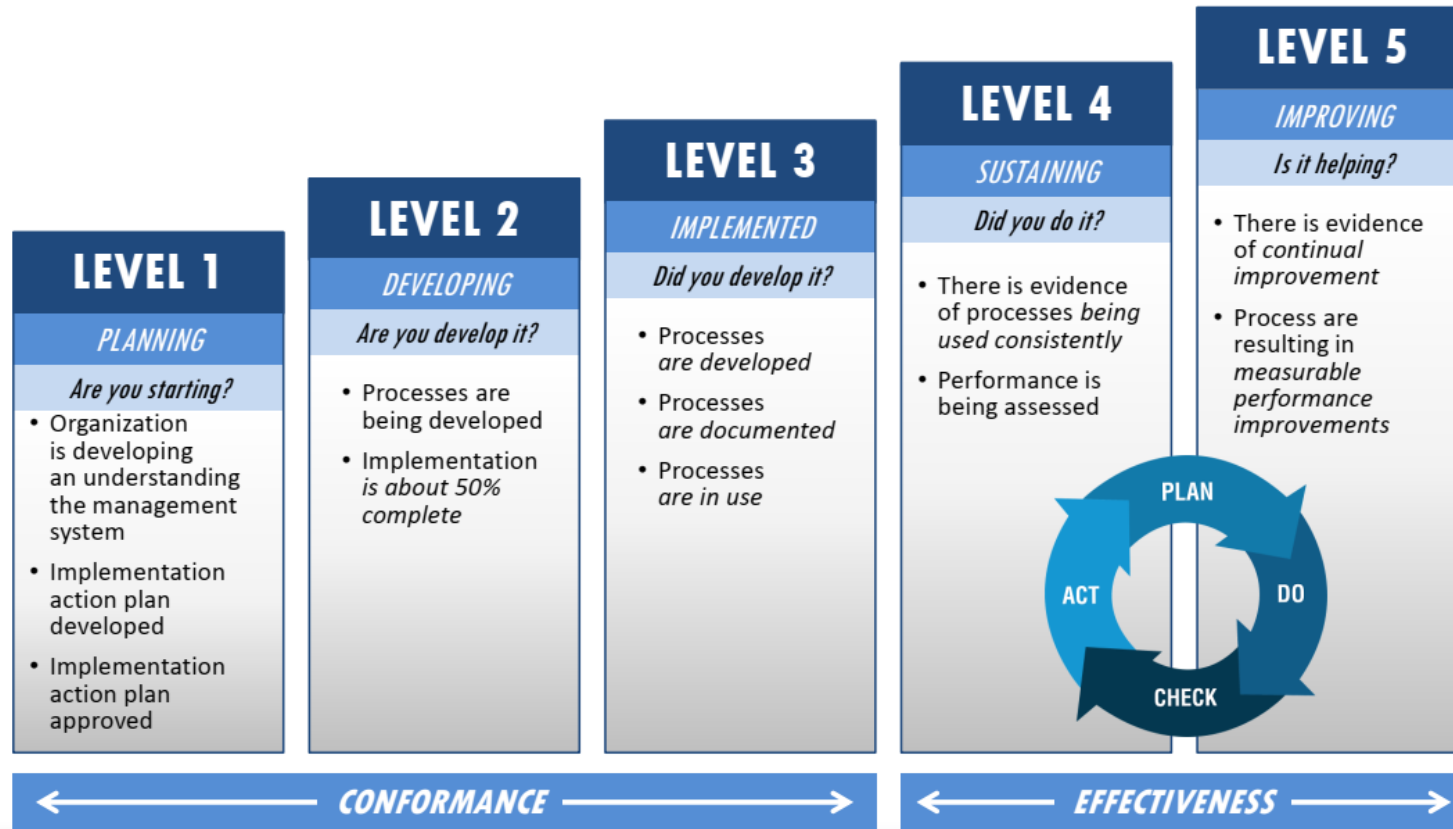
Implementing the Standard Phase 3 and Beyond

- Continuous Improvement (Years 4-on-going)

In this phase your organization measures maturity and other targeted safety metrics to identify gaps and improve

- Measure SMS progress and formalize a process to understand where improvements are needed
- Begin SMS gap closure process
- Evidence of processing being used constantly
- Evidence of continuous improvement
- Processes are resulting in measurable performance improvements.

PIPELINE SMS MATURITY MODEL

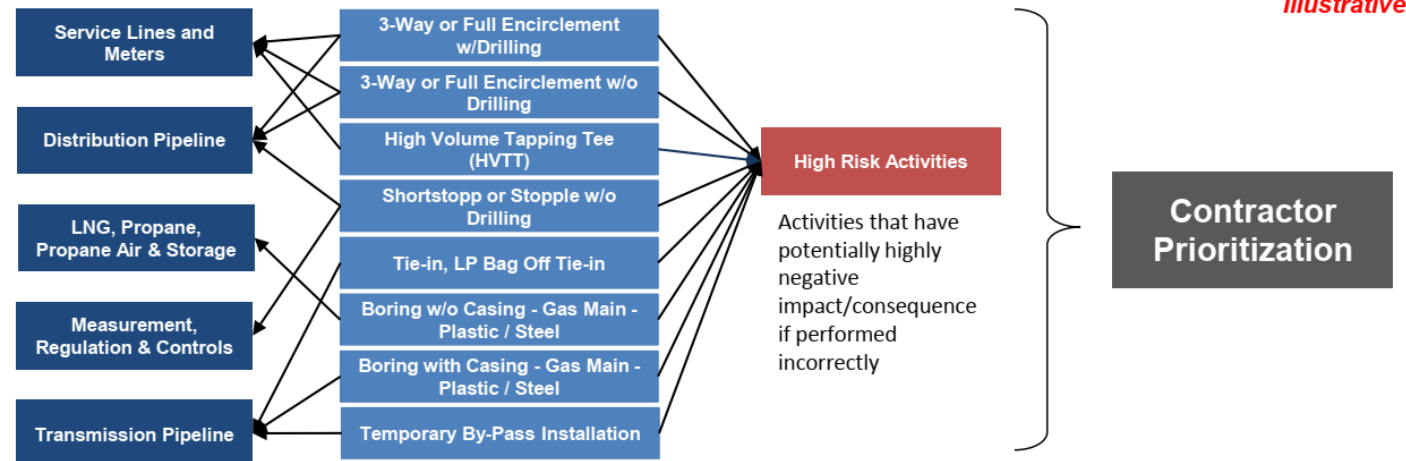


Implementation Model

Identification of Priority Contractors

Asset	Contractor Activities	Risk Rating Inputs	Contractors
Incorporated 6 asset classes based on Asset Review Workstream	Classified contractor work activities into level 2 activities based on WSP database	Used input from SMEs to assign contractor activities to asset classes and assign asset-dependent risk ratings to each activity	Utilized risk ratings by work type/activity across applicable assets to determine critical contractors

Contractor Asset Risk Methodology Overview



Who is going to be effected?

Pipeline SMS Tool Roadmap

START

GETTING STARTED

- Understand RP 1173
- Obtain management buy in
- Commit to RP 1173 implementation
 - Liquid operators see www.pipelinesms.org
 - Gas operators see
 - AGA members: [Commitment to Enhancing Safety](#)
 - INGAA members: [Commitment to Pipeline Safety](#)

PLANNING TOOL

- Summary of API RP 1173 requirements (71 questions)
- A gap analysis tool to compare an operator's existing system to the requirements of API RP 1173
- Documents action plans and responsibilities to close gaps
- Helps operators achieve Level 1 maturity (develop a plan, and begin work)

IMPLEMENTATION TOOL

- Summary of API RP 1173 requirements (71 questions)
- Evaluates and summarizes the operator's implementation status by question, element and overall
- Helps operators track development of programs to implement the RP

CONFORMANCE TOOL

- Comprehensive API RP 1173 requirements (all 234 *shall* statements from the RP)
- Evaluates and summarizes the Operator's conformance to API RP 1173 by *shall* statement, element and overall
- Helps operators ensure conformance with all *shall* statements in the RP
- Tool spans Levels 2-4 as conformance requires processes are in place and effective

VOLUNTARY API THIRD-PARTY AUDIT PROGRAM

- API-administered audit program for conformance to API RP 1173
- Yields an objective evaluation and score
- Appropriate at Level 3 maturity or beyond as effectiveness will be considered

EFFECTIVENESS TOOL

- Helps operators evaluate the effectiveness of their programs in achieving the objectives of the RP (Is it helping?)
- Appropriate at Level 3 maturity or beyond as Effectiveness can be measured once the Pipeline SMS is in place



PEER-TO-PEER SHARING CAN BE CONDUCTED AT ANYTIME



For more information on Pipeline SMS tools or questions regarding Pipeline SMS, please see www.pipelinesms.org or contact API at PipelineSMS@api.org

Where do I start?

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RP 1173 Section	RP 1173 Citation	API RP 1173 Requirement	Level 4 (Sustaining)	Comments
5	5.1-1	Has the pipeline operator established and maintained a PSMS and built a shared understanding of safety culture?	- There is documentation to demonstrate the PSMS procedures and processes are being followed. - Personnel affected by the PSMS can demonstrate that they understand the PSMS safety requirements and that safe practices are incorporated into their day-to-day activities.	
5	5.1-2	Has top management communicated expectations by documenting the pipeline operator's policies, goals, and commitment to safety, as well as identifying safety responsibilities of personnel at all levels?	- Interviewed personnel demonstrate understanding of the company's policies, goals, and commitment to safety. - Personnel at all levels are aware of their responsibilities to maintain and improve workplace safety, and the safety requirements specific to their roles.	
5	5.1-3	Has the pipeline operator improved upon the PSMS and measured its effectiveness and maturity in accordance with the requirements of this document?	- There are revision records of the PSMS based on recommendations from top management, management review, employee input, etc. - The effectiveness and maturity of the PSMS have been evaluated during management review. - Top management is aware of the current status of the PSMS implementation and areas for improvement.	
5	5.2-1	Has top management established and documented the goals and objectives for the PSMS?	- PSMS goals and objectives address all elements listed in API 1173. - There is evidence that top management is measuring the performance of the organization against the PSMS goals and objectives. - Interviews with employees demonstrate that the PSMS goals and objectives are known/understood or the employees know how to find them.	

Implementation Scores Effectiveness Scores Summary 234 Shall Statements Informative Liquid Informative Gas T Informative Gas D

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Planning and Execution

Benchmarking

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	A	B	C	D
1				
2	Short Question Name	Element # / Requirement / Section #	Score	Comments
3				"Shall" #
4	Operating Procedures	4. Operational Controls - Section 8 Operations procedures (operating, maintenance, emergency response, control of materials), consistent with the Operator's safety policies and objectives and which consider safe operating limits, which operations personnel follow and have responsibility / authority to raise concerns, get permission to deviate, and stop work meanwhile, are in writing for the following topics: - o initial start-up (new or modified facilities) - o normal operation - o temporary operations, as the need arises - o emergency operations, including emergency shutdowns - o normal shutdown - o start-up or restoration of operations following maintenance or outage		8.1-1 8.1-2 8.1-3 8.1-4 8.1.2 8.1.2.a.1 8.1.2.a.2 8.1.2.a.3 8.1.2.a.4 8.1.2.a.5 8.1.2.a.6 8.1.2.b
5	Operating Procedure Review	Operating procedures are routinely reviewed according to risk (at least annually) to identify improvements and lessons learned, and document changes.		8.1.3-1 8.1.3-2 8.1.3-3
6	Construction Quality Management	Systems are in place to ensure the design, purchasing, control of materials, manufacturing, fabrication, and installation of PSMS-covered pipeline systems occurs per the specified requirements, specifications, regulations, and applicable standards, with QC / inspection.		8.1-1 8.2.1 8.2.2 8.2.3
7	Maintenance	Procedures are in place for operating and maintenance activities, including inspection and testing of safety devices.		8.2.1 8.2.4 8.2.5
	Management of Change	A Management of Change (MOC) procedure is in place for changes to technology, equipment, procedures, or		8.3.1-1
Implementation Scores Effectiveness Scores Summary 234 Shall Statements Informative Liquid Informative Gas T Informative Gas D				



Questions?