Recommended Practice for Steel Pipeline Construction Quality Management Systems

API RECOMMENDED PRACTICE 1177
FIRST EDITION, NOVEMBER 2017

AMERICAN PETROLEUM INSTITUTE

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Background

This document is a framework for a quality management system (QMS) for onshore pipeline construction. While this document may be used for facility and station construction, that is not the focus of the document. The QMS developed for onshore pipeline projects shall include and document the following, which are discussed in more detail throughout this recommended practice:

— defined project quality objectives and personnel accountability;

— processes to establish and maintain the appropriate project organizational structure;

— processes to establish and maintain the appropriate training and qualification of internal and contracted personnel;

— processes to facilitate and verify quality throughout project design, contracting, procurement, manufacturing, fabrication, and construction;

— processes to prevent, detect, mitigate, and eliminate potential and actual nonconformance with project procedures, specifications, and referenced standards ,or noncompliance with regulations, as well as verification and documentation of actions taken and the outcome;

— assessment of the achievement of quality objectives throughout the construction project; and

— methods to measure each process's effectiveness and enact continuous improvement of the QMS.

This framework can be used to develop a stand-alone QMS or to integrate quality management into an organization's existing corporate management system. In this document, "organization" is defined as the entity using this document to develop its own QMS for pipeline construction.

The organization may be the owner company, operating company, engineering and/or construction contractor, supplier, or other stakeholder in pipeline construction that has its own QMS. Typically, the owner/operating company will utilize contractors and suppliers on a pipeline construction project, which have their own QMS in alignment with this document. When the QMS is developed, the term "organization" should be replaced with the responsible entities, such as operating company, owner-company, contractor, or supplier. Elements of this RP can be met in aggregate by the organizations constructing the pipeline.

Additionally, some processes covered in this framework may already be implemented by an organization; for example, change management. Existing processes may be modified to address the quality concerns identified in this framework.

To be applicable to the wide range of organizations within the pipeline industry, the RP was developed to be flexible and scalable. The RP was developed for use by organizations of varying size and scope. While the QMS elements will apply to each organization, the application of these elements are to be appropriate for the size of the organization, the scope of the project, and the risk to the public and environment.

Each pipeline construction project is unique. While typical pipeline construction activities are included in this document, they may not be all-inclusive. Other construction activities may be relevant and should be addressed on a project-by-project basis, utilizing the principles of this RP. Likewise, it is recognized that the identified construction activities may not be applicable to every pipeline construction project. It is the organization's responsibility to consider unique quality issues applicable to their projects and address them accordingly through their organization-specific QMS.

Much of the input to this document is based on information provided in the PHMSA/DNV GL OAPUS314MJRU (PP087506), Rev. 3, report, *Improving Quality Management Systems (QMS) for Pipeline Construction Activities*, dated September 2, 2015.

The management system principles are applied in a recurring manner to achieve continuous improvement. The Plan–Do–Check–Act (PDCA) cycle is a four-step model for carrying out these efforts (Figure 1).

This cycle can be applied to the management system as a whole, to individual construction projects, and to individual elements and processes within the system. Continuous improvement is at the core of many management systems, and its principal aim is to encourage creating strategies and plans, executing those strategies and plans in line with guidelines, evaluating those actions for conformity, and using those results to adjust the next generation of plans. This cycle is iterative.

The components of the PDCA cycle are:

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

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

Check: This step entails the review of the results compared with established objectives. Those results are compared to the expected goals to ascertain any differences and deviations in implementation from the plan.

Act: This step is where the organization takes actions to improve process performance. This may include corrective actions focusing on significant differences between actual and planned results.

Continuous improvement occurs when the PDCA cycle is repeated.

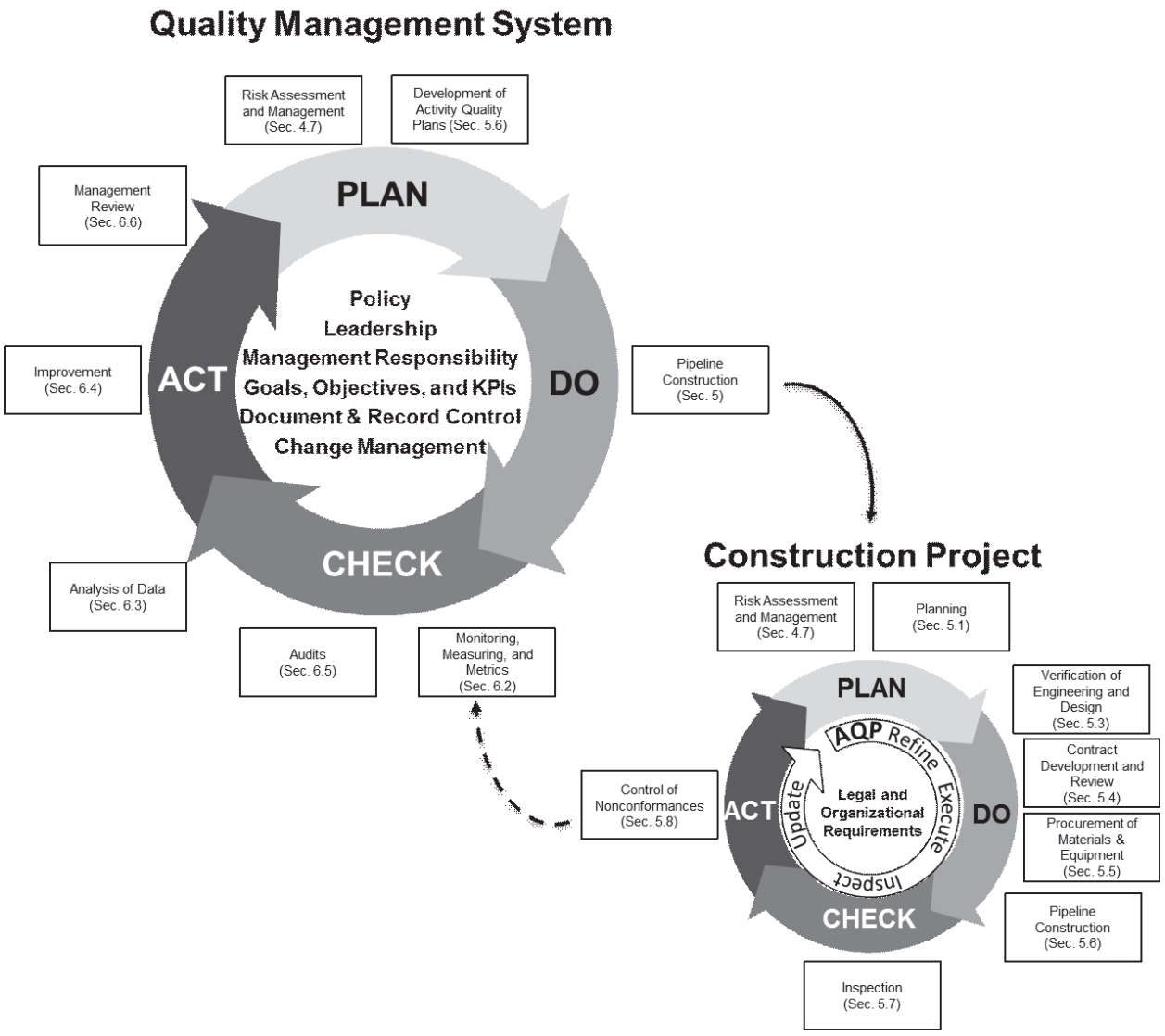

Figure 1—Continuous Improvement Cycle (PDCA)

Additional background information on QMS is contained in Annex A, Construction Quality Management Systems.

Recommended Practice for Steel Pipeline Construction Quality Management Systems

1 Scope

This recommended practice establishes minimum Quality Management System (QMS) processes for organizations that own, operate, construct, or provide construction-related services for onshore carbon and low-alloy steel pipelines used in the transportation of hazardous liquids, carbon dioxide, and gas. This recommended practice specifies the elements of a QMS to manage the construction process systematically from design verification, materials manufacturing, procurement, construction, inspection, and testing to initiation of operations.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the edition that is incorporated by reference in the code of federal regulations of the referenced document applies (including any addenda/errata).

API Standard 1104, *Welding of Pipelines and Related Facilities*

3 Definitions and Abbreviations

3.1 Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1
acceptance criteria
Specified limits of acceptability applied to process, service, or product characteristics.

3.1.2
activity quality plan
AQP
Document(s) that establishes procedures, minimum personnel qualifications, roles and responsibilities, inspection methods, and record requirements of construction activities. The intent of an AQP is to identify quality concerns and methods of control.

NOTE For pipeline construction, an activity quality plan is developed for each construction task (stringing, welding, backfilling, etc.).

3.1.3
as-built surveying
Process of collecting and documenting all of the pipeline attributes and their associated location and installation conditions along a pipeline.

3.1.4
backfilling
Replacement of the native soil in the trench surrounding the installed pipeline. Padding may be used in addition to backfilling.