BC Oil & Gas COMMISSION

Compliance Assurance Protocol Integrity Management Program for Facilities

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Version 1.0

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Introduction

An Integrity Management Program (IMP) provides a systematic approach using a documented process that specifies the practices used by the permit holder to ensure safe, environmentally responsible, and reliable service for an asset. An IMP is an integral part of an overarching management system, such as a Safety & Loss Management System (SLMS).

Permit holders for oil and gas facilities under the British Columbia Oil and Gas Commission's (Commission) jurisdiction shall develop and implement an integrity management program for facilities (IMPF), that includes policies, processes and procedures to:

- Set relevant company policies and performance objectives,
- Proactively identify hazards, evaluate risks, identify and implement risk mitigations measures, and conduct inspection, maintenance, and monitoring activities,
- Establish clear responsibilities and accountabilities,
- Have trained and competent personnel, and,
- Manage documentation, reporting, evaluation and continual improvement.

These permit holders must anticipate, prevent, mitigate, and manage hazards and risks associated with the entire life cycle of their facilities.

Regulatory Standards and References

The regulatory requirements for IMPF are based on the following Acts, Regulations, and Standards.

- Part 1 of the BC Oil and Gas Activities Act (OGAA)[1] defines "Pipeline" as piping through which petroleum, natural gas, or produced water, etc. is conveyed and includes installations and facilities associated with the piping. Section 7 (c) of BC Pipeline Regulation (PR) [2] requires a pipeline to be operated in accordance with a pipeline integrity management program.
- Section 3 of PR states that a pipeline permit holder must design, construct, operate or maintain a pumping station, compressor station, or an oil storage tank associated with a pipeline in accordance with CSA Z662[3].

[1] BC Oil and Gas Activities Act (OGAA), 2015.
[2] BC Pipeline Regulation (PR), 2014.
[3] CSA Z662-15, Oil & Gas Pipeline Systems, 2015.

- The Drilling & Production Regulation (DPR)[4] states:
  - In section 78, that a facility permit holder must operate and maintain the facility piping system in accordance with CSA Z662, if it is designed and constructed in accordance with that standard.
  - In section 50, that a permit holder must take every reasonable precaution to prevent loss or waste of oil, gas or water in drilling, producing and processing operations, and, in storing, piping or distributing, oil or gas must not be used wastefully or allowed to leak or escape from natural reservoirs, wells, tanks, containers or pipes.

- Oil and Gas Pipeline Systems standard, CSA Z662 Clauses that outline IMPF are defined below:
  - Clause 2.2 of CSA Z662-15 defines 'Pipeline System' as 'pipelines, stations, and other facilities required for the measurements, processing, storage, gathering, transportation, and distribution of oil & gas industry fluids'.
  - Clause 3.2 of CSA Z662-15 on 'Pipeline System Integrity Management Program' states that operational controls required by Clause 3.1.2 (f) (v) shall be in the form of an integrity management program.
  - As per the Clause 9.1.5 of CSA Z662-15, operating companies shall inspect piping exposed to the atmosphere at the intervals as per their operating and maintenance (O&M) manuals. If there is vibrating service present, inspection of welds for cracks, particularly at points of restraints where piping is attached to equipment and near anchors, shall be carried out as per their O&M manuals.
  - Clause 10.5 of CSA Z662-15 states that operating companies shall operate and maintain their pipeline systems (that include associated facilities as per the CSA Z662 definition of 'pipeline system') in accordance with documented procedures that meet requirements of Clause 10.5.1.2.
  - Clause 10.9 of CSA Z662-15 stipulates operational and maintenance requirements for compressor and pump stations, above ground tanks and pressure vessels, underground storage, pipe-type storage vessels, pressure control, pressure-limiting and pressure relieving systems, valves, and vaults. The clause also makes reference to various standards, such

[4] Amendments to the BC Drilling & Production Regulation (DPR), 2015.

as, API 510[5], API RP 572[6], API RP 576[7], API 653[8], API 2610[9] and CSA B51[10] for relevant guidance.
    - Clauses 10.9.2.1, 10.9.3.1, 10.9.3.2 and 10.9.6.2 of CSA Z662-15, operating companies are required to carry out scheduled inspections, as a minimum, for the following type of facilities: above ground steel tanks, underground storage tank, underground pipe for the storage, and pipeline valves.
    - Secondary containment for above ground tanks shall be inspected periodically and maintained in accordance with Clause 10.9.2.5 of CSA Z662.

- The Commission's Liquefied Natural Gas Facility Regulation (LNGFR) requirements are defined below:
    - Section 8 and Section 22 of LNGFR[11] requires an LNG facility permit holder to develop and implement an Integrity Management Program, in accordance with CSA Z276-15[12],
    - Subsection 3(1)(d) of the LNGFR requires the permit holder to establish facility hazards through hazard identification study as well as carry out a process hazard analysis and a safety integrity study prior to construction of the facility.

- The IMPF requirements for LNG facilities based on CSA Standard Z276 are outlined below:
    - Clause 13.2 of CSA Z276 states each operating company of an LNG facility shall have a documented operation and maintenance procedures and a training program based on experience, its knowledge of its LNG plants, and the conditions under which the procedures will be used. Clauses 13.2 to 13.6 of the standard contains requirements, including minimum standards, for the safe operation and maintenance of LNG plants and for personnel training,
    - Clause 13.4.1.2 of CSA Z276 states operating companies shall carry out periodic inspections or tests, or both as required, with generally accepted engineering practices and as often as is necessary to ensure that each component is in good operating condition. Clause 13.4.1.1 states

[5] API 510, Pressure Vessel Inspection Code: In-service Inspection, Rating, Repair and Alteration, 2014.
[6] API RP 572, Inspection of Pressure Vessels, 2009.
[7] API RP 576, Inspection of Pressure-relieving Devices, 2009.
[8] API 653, Tank Inspection, Repair, Alteration, and Reconstruction, 2014.
[9] API 2610, Design, Construction, Operation, Maintenance & Inspection of Terminal and Tank Facilities, 2010.
[10] CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code, 2014.
[11] BC LNG Facility Regulation (LNGFR), 2014.
[12] CSA Z276-15, Liquefied Natural Gas (LNG) – Production, storage, and handling, 2015.

inspection findings shall be documented and suitable mitigation shall be implemented for any abnormal conditions, and,

- Clause 13.4.6.2 (e) and (f) of the CSA Z276 states operating companies shall carry out periodic inspections and testing of the LNG storage tank system, including foundation, for ensuring structural integrity and safety of LNG storage tank system.

If a permitted facility, such as a gas processing plant, is designed and constructed in accordance with ASME B31.3[13], the Commission expects the permit holder to operate the facility with documented operating procedures, and to ensure that the facility is maintained in a condition that minimizes hazards. The Commission expects that this will involve an Integrity Management Program.

Purpose and Scope

The purpose of this protocol is to provide guidance to facility owners and operators outlining the Commission's requirements and expectations with regards to developing, implementing and maintaining an integrity management program for facilities (IMPF). This will:

- Ensure safe, environmentally responsible, and reliable operation, and,
- Manage the risks over the entire lifecycle, i.e., planning, design, construction, operation, maintenance, and decommissioning stages.

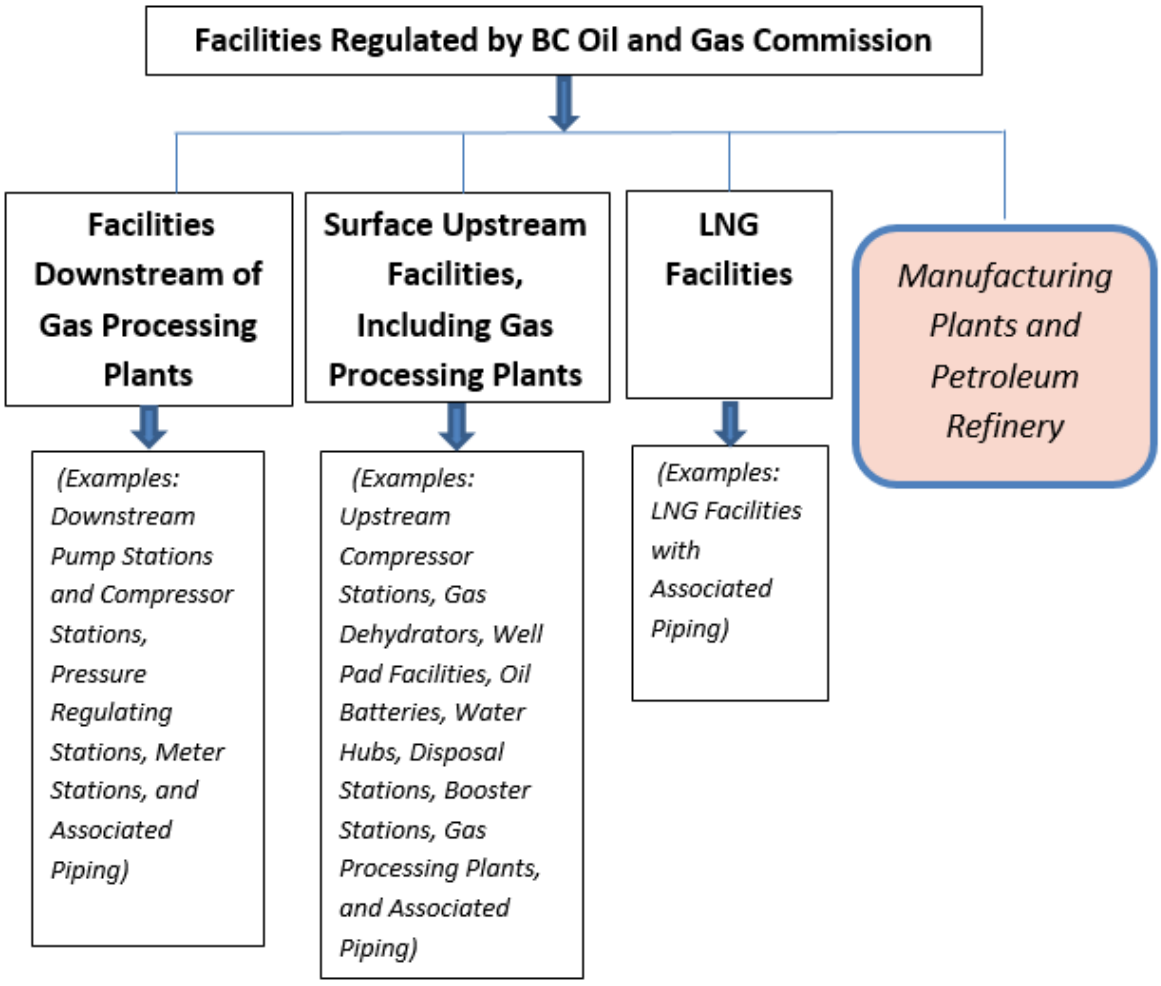
The requirements and expectations within this compliance assurance protocol apply to all facilities within the jurisdiction of BC Oil and Gas Commission. Figure 1 is a non-exhaustive list of facilities covered under this IMPF protocol. The protocol makes provision for inclusion of facilities, such as, manufacturing plants or petroleum refineries, once the Commission has a regulation in place for these types of facilities.

The IMPF shall encompass all types of facility assets owned and operated by the permit holder. It is expected that an IMPF is an overarching document that outlines the processes for facilities that are formally managed through IMPF process. It will refer, as appropriate, to any processes, databases, and information for facilities managed through other programs and systems that may already exist within a company.

The IMPF requirement applies to all third-party operated facility assets licensed to a permit holder.

13 ASME B31.3 Process Piping

Figure 1: Types of Facilities Covered by the IMPF



Flexibility and Scalability

All aspects of the IMPF are intended to be scalable for facility operators of varying size and scope. In cases where a permit holder is already operating under its own IMPF procedures, the permit holder shall ensure that the existing program/system meets all of the requirements outlined in this protocol. The IMPF is intended to be applied with flexibility to account for the existing internal programs and processes that already cover issues relating to the IMPF. This protocol serves as a basis of comparison and review between the Commission's protocol and the permit holder's programs/systems.

Terminology

The terminology used within this protocol is consistent with CSA Z662-15, CSA Z276-15, as well as other referenced standards and recommended practices, including the Oil and Gas Activities Act (OGAA) and subordinate regulations. Where there is a difference between terminologies, the definitions in OGAA and the subordinate regulations apply.

Within this protocol, the imperative terms “shall” and “must” have been used to refer to expectations /requirements that are mandatory. The permit holder must indicate how they meet mandatory regulatory requirements and the relevant CSA, ASME, API and other standards. The non-imperative term “should” implies that described requirements are non-mandatory. Permit holders may describe how they address such non-mandatory requirements within their IMPF, but there is no mandatory requirement to do so.

Compliance Assurance Process

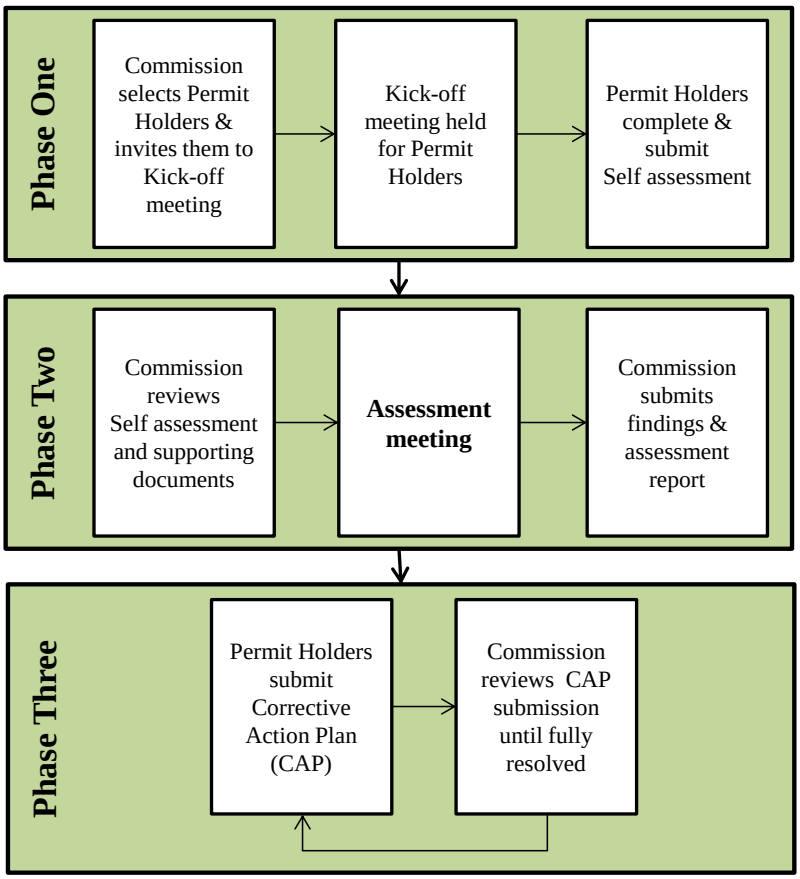
This protocol outlines the Commission’s expectations and requirements for IMPF and standardizes the Commission’s expectations for developing, documenting and implementing an IMPF. This Protocol is based on the framework for an IMP outlined in the CSA Z662-15, as well as the contents presented in CEPA’s Recommended Practice for an IMPF and other references[14] [15] [16] [17] [18] [19]. This IMPF protocol mandates that all facility permit holders regulated by the Commission are required to participate in the IMPF compliance assurance process.

The Commission can request permit holders to participate in an IMPF compliance assurance process, in part or fully, at any time based on its risk-based selection criteria.

The compliance assurance process involves three phases illustrated in Figure 2 below.

[14] Pipeline Performance Measures reporting for NEB regulated Companies, 2013.
[15] Guidelines for Mechanical Integrity Systems, Centre for Chemical Process safety of AIChE, 2006.
[16] AB – 512 – Owner-User Pressure Equipment Integrity Management Requirements, 2013.
[17] CAPP Safety Guide for Small, Portable Oil & Gas Production Facilities, 2014.
[18] National Energy Board (NEB) Management System and Protection Program Audit Protocol, 2013.
[19] CSA Z767 Process Safety Management (Ballot Draft)

Figure 2: Compliance Assurance Process – Phases



Phase One

Each year a number of permit holders are selected based on the Commission's risk-based criteria. The Commission notifies the selected permit holders at the beginning of the calendar year of their selection and requirement to participate in the IMPF compliance assurance process. During the first phase, the selected permit holders are strongly recommended to attend a kick-off meeting, where the Commission's IMPF compliance assurance process and requirements are communicated in detail to the selected permit holders. During this phase the permit holders are required to complete and submit a self-assessment of their IMPF to the Commission within a specified time. The permit holders are given approximately two months to submit the completed self-assessment reporting document to the Commission.

Phase Two

In the second phase of the compliance assurance process, the Commission will hold an approximate one-day compliance assessment (verification) meeting with the permit holder's representatives. During this meeting the facility integrity management program is evaluated to determine if a permit holder's IMPF complies with the applicable legislation and standards, as well as any regulatory imposed conditions. The Commission will review the company's self-assessment and any planned corrective actions along with time lines to complete. This phase may require more than one meeting. During this assessment meeting, the Commission confirms the assessment scope, carries out systematic review of processes, records, and documents to verify compliance, and identifies any assessment findings.

The findings include compliance and good practices (along with their supporting evidence), areas where additional information may be required, opportunities for improvement, and observed non-compliances.

Findings of observed non-compliance are outlined and confirmed at the end of the assessment meeting. The Commission will issue the summary of findings identified as non-compliances and an assessment report will be produced after the assessment meeting.

Compliance and non-compliance are defined below:

Compliance (C)

A particular element fulfills the requirements outlined under the compliance assurance protocol. The permit holder has demonstrated that its IMPF program, processes, or procedures meet the regulatory requirements.

Non-Compliance (NC)

A particular element does not fulfill the requirements outlined under the compliance assurance protocol. The permit holder has not demonstrated that its IMPF program, processes, or procedures meet the regulatory requirements.

Depending on the criticality of any findings from Phase Two or independent of the annual IMPF process, the Commission may assess certain elements of a permit holder's IMPF in further depth.

Phase Three

The third phase of the assessment process requires permit holders to develop and implement corrective actions (any changes needed to programs, processes, procedures, or instructions) to address identified non-compliance findings and submit a corrective action plan (CAP) to the Commission. A CAP must also outline a schedule for implementation. The Commission monitors and assesses corrective actions until they are fully resolved. The Commission may arrange compliance verification assessments to ensure that corrective actions defined within the CAP have been implemented.

The permit holders that do not provide the required documentation/records within agreed timelines for any of the phases will be subject to the Commission's compliance and enforcement actions, which can include orders or administrative penalties, as applicable.

The Commission's compliance assurance protocol is maintained by the Integrity Group. For further information please contact integrityengineering@bcogc.ca.

Framework

The Commission's compliance assurance process for IMPF aligns with the management systems approach and applies to the entire life cycle of facilities, as illustrated in Figure 3. The relation between the various life cycle phases and the impacts of various activities on integrity need to be identified. All hazards (including potential hazards) to the integrity of the facilities shall be identified. Risks shall be determined and controlled (through prevention and mitigation strategies) throughout the life-cycle phases of the facilities and risk shall be reviewed at handover from each phase through the integrity life cycle.

Program and other evaluations may be conducted at different corporate levels, at a system level to gauge one facility's performance against other facilities within the organization, or for selected facility assets with similar characteristics. Effective program evaluations shall include all aspects of a Permit holder's IMPF.

Requirements and Expectations

The Commission's requirements and expectations for IMPF, based on a management system approach, are classified into 16 components:

Planning

1. Leadership Commitment
   - Scope
   - Policy and Commitment
   - Goals and Objectives
   - Planning

2. Risk Assessment and Management
   - Process Knowledge and Information
   - Hazard Identification
   - Risk Assessment
   - Risk Tolerance
   - Risk Reduction and Management
   - Risk Assessment Review and Update

Implementing

3. Communication Process
4. Organizational Structure, Roles and Responsibilities
5. Training and Competency
6. Document and Records Management
7. Managing Change
8. Operational Controls

Checking and Evaluating

Risk Management

9. Inspection, Monitoring and Maintenance
10. Evaluation and Fitness-for-Service Assessment
11. Modification and Repair

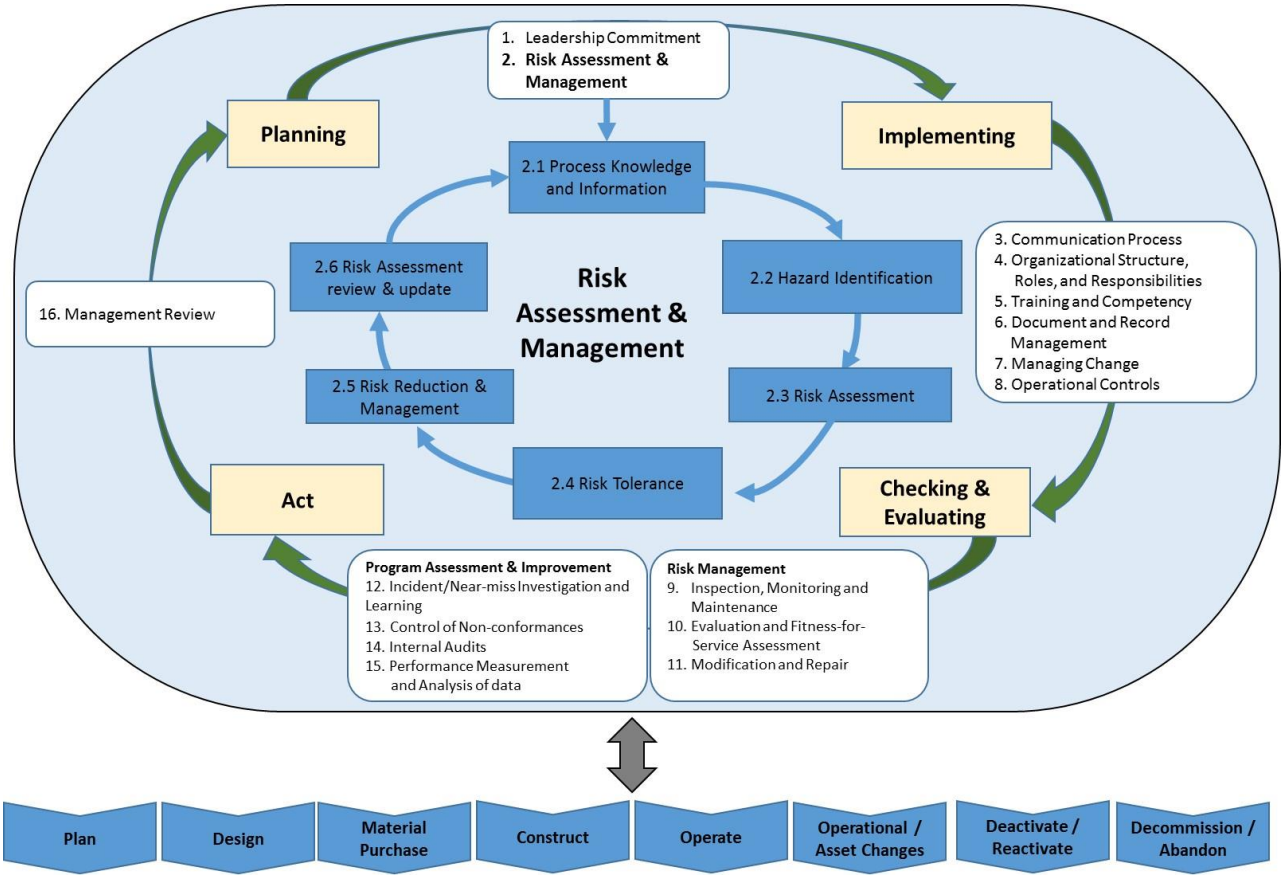
Program Assessment and Improvement

12. Incident/Near-miss Investigation and Learning
13. Control of Non-conformances
14. Internal Audits
15. Performance Measurement and Analysis of Data

Act

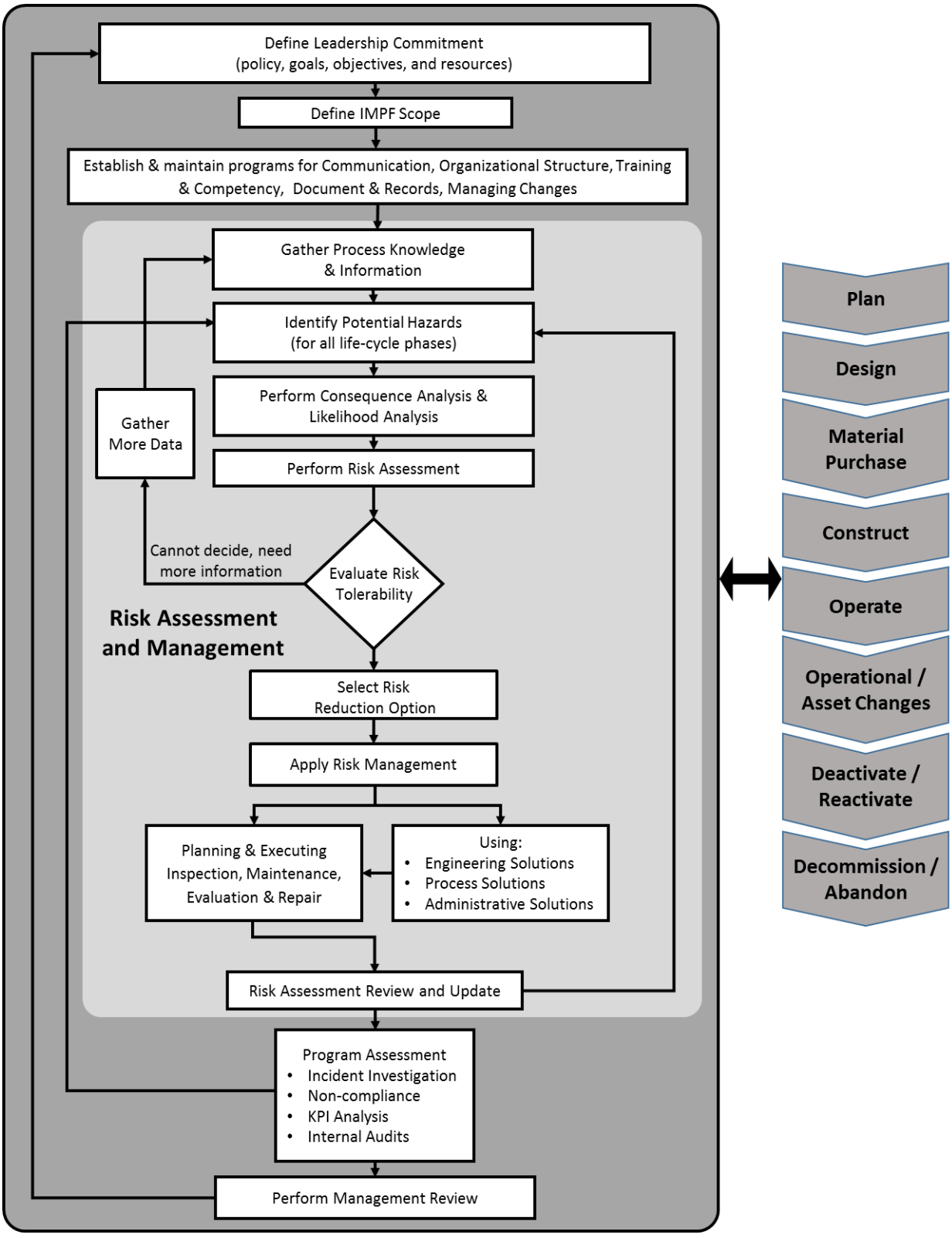
16. Management Review

Figure 3: Integrity management program for Facilities with Management Systems Approach



IMPF requirements and expectations related to risk management are graphically presented in Figure 4.

Figure 4: IMPF Requirements and Expectations with Risk Management



1.0 Leadership Commitment

1.1 Scope

The permit holder shall document, establish and maintain the IMPF, and ensure the effectiveness of the IMPF. The permit holder shall clearly identify the facilities/ equipment, and the processes managed under the IMPF. The permit holder's IMPF document shall clearly specify if it applies to third-party operated facility assets. The permit holder must ensure that third parties are fulfilling contractual agreement requirements with respect to facility integrity.

Any facilities covered by other programs or documentation within the scope of the IMPF shall be appropriately referenced. Any existing reliability programs and prescribed equipment management programs can be referenced by the IMPF, and may continue to exist with the appropriate linkages to IMPF processes.

1.2 Policy Commitment

The permit holder's senior leadership shall articulate policy and leadership commitment to its IMPF. The permit holder shall establish and maintain leadership commitment to its integrity management systems for facilities, overall goals and objectives, providing resources, fostering risk management processes, and implementing and continually improving the integrity management program, through a positive safety culture.

Senior leadership (a person or a group of people who direct and control the highest level as defined by permit holder), shall sign and communicate policy and commitment within the organization to ensure safety and integrity.

1.3 Goals and Objectives

The permit holder's senior leadership shall establish goals and objectives for its IMPF. The objectives shall be consistent with the overall safety policies and objectives (corporate direction). The objectives and targets shall be measurable and must link to the high level performance measures (key performance indicators).

1.4 Planning

The permit holder's management (a person or group of people who directs or controls all or part of the facility and has assigned responsibility and accountability for compliance with legal and other applicable requirements) shall ensure that:

- Processes and procedures are defined to support the execution of all the key components of the IMPF,
- The methods for collection, integration and analysis of information related to the processes and mechanisms appropriate to the type of facility and operation shall be considered and be consistent with Figure 3,
- A process is defined to identify and ensure conformance with up-to-date regulatory and legal requirements, external standards and codes,
- Plans, processes and procedures are integrated to ensure that data and results are shared (internally and externally), across relevant elements, processes, and teams as required, and,
- Resources (personnel and technological requirements) are planned and provided to develop, implement, and continually improve the IMPF.

2.0 Risk Assessment and Management

The permit holder must ensure that the facility inventory data is gathered and integrated to support the Risk Assessment. The Permit holder shall develop a documented process to identify hazards associated with their processes and to evaluate risk of those processes – to make certain that risks to employees, the public, and the environment are consistently controlled within the permit holder's risk tolerance. The levels of risk broadly tolerable or ALARP shall be defined and documented. The risks shall be reassessed on a periodic basis, whenever there is a change to facility operation or operating environment that is different than previous risk assessment situations.

The permit holder must apply risk assessment at the early stages of facility development to foster an inherently safer design at lower cost and lower risk.

Detailed risk assessments shall be carried out by personnel (internal or external) who have relevant and specialized industry experience and training in carrying out risk assessments.

2.1 Process Knowledge and Information

All data, from planning to commissioning phases, shall be gathered, maintained, and updated, and relevant information related to mitigation aspects shall be passed over to operational and integrity management personnel. The permit holder shall have information on the processes, material properties, and equipment design for all phases, from safe design, through construction, operation, maintenance, and decommissioning. Information related to processes and equipment could be:

- Design basis,
- Process chemistry,
- Plot plan,
- Electrical area classification,
- Process flow diagrams,
- Piping and instrumentation diagrams (P&IDs),
- Pressure relief systems (e.g., flare systems, depressurizing systems, relief devices),

- Description of control systems,
- Shutdown keys (emergency and regular operations),
- Hazardous effects of inadvertent mixing of different materials;
- Material and energy balances,
- Safe operating limits (e.g., levels, temperatures, pressures, flows, time, cycles, and compositions) and an evaluation of the safety consequences of deviations, and,
- Process risk assessments.

Information required for hazard identification of all materials used in the process could be related:

- General physical properties,
- Corrosivity,
- Reactivity,
- Flammability data,
- Polymerization characteristics,
- Decomposition data,
- Impurities data,
- Thermal and chemical stability data,
- Toxicity data including both acute and chronic effects, and,
- Special hazards, including
    - Shock sensitivity,
    - Pyrophoric properties,
    - Maximum deflagration or detonation pressure and flame speeds under all operating conditions, and,
    - Bio-hazards.

Facility permit holders shall identify the types of facilities and the standards and guidelines (such as API, ASME, CSA, other) to which they design, construct, and operate their facilities.

2.2 Hazard Identification

All hazards and hazardous scenarios at each life cycle phase shall be identified and documented using appropriate hazard identification techniques. The hazards considered in the hazard identification process shall be chosen based on a systematic hazards identification analysis that covers the entire facility and all materials, infrastructure, systems and activities.

A wide range of hazard identification techniques are available. The CSA Z662 as well as US DOE handbook[20] provide relevant guidance regarding the hazard identification process. Documentation could include a description of the scenario pathway (including event linkages and interdependencies), previous incidents at the facility, hazards that may be introduced as a result of changes made at the facility, or safeguards and controls that are in place to reduce the probability or magnitude of the consequence.

2.2.1 Facility Projects

Hazard reviews shall be completed for appropriate stages in the design, construction and start up of the project/facility before proceeding to the next level.

- At the planning stage, hazard and risk associated with the siting and installation phase should be assessed (using methods such as HAZID, consequence analyses of major credible accident scenarios, and risk criteria).
- Siting decisions and plot plans should consider the associated hazards and mitigation such as distance from waterbodies, buffer zones, natural hazards, and transportation related hazards (using methods such as qualitative risk analysis, HAZOPs and determination of safety integrity level requirements, preliminary quantitative risk analysis or detailed consequence assessment).
- The design process should have appropriate reviews and approvals at various design stages (using methods such as qualitative risk analysis, detailed Quantitative Risk Assessment (QRA), detailed HAZOPs, and vendor HAZOPs). The design process should consider inherent safety, regulatory requirements, codes and standards and good engineering practices.
- Controls shall be in place to ensure fabrication, installation, and construction conform to design specifications, standards and codes,
- Controls shall be in place for managing changes to the project scope, design, construction, and approvals.
- As-built documentation shall reflect the exact details of the built facility to ensure that any future changes are being applied to known approved designs.

[20] Chemical Process Hazards Analysis, an US DOE Handbook – 1100, 2004.

2.2.2 Process Operations

The permit holder shall maintain a process to identify and document hazards associated with their processes and the hazardous scenarios associated with the activities of the facility, resulting from operations, operating environment, and changes to the operating conditions (using methods such as revised QRA, management of change HAZOPs, or revised hazards analyses).

Facilities and equipment where potential interaction of hazards can increase risk must be identified.

2.3 Risk Assessment

Risk is the combination of the consequence and the likelihood of an undesired event. After having identified all possible hazards and scenarios, the permit holder shall assess the collective hazards and the degree of risk associated with these hazards as a function of likelihood and severity.

Risk can be determined either qualitatively or quantitatively using appropriate techniques/approaches, such as, FMEA (Failure modes and effect analysis), FMECA (failure modes, effects and criticality analysis), RCM (reliability centred maintenance), RBI (risk-based inspection), Fault tree, Markov analyses, and Structural Reliability Analysis.

In general, four of the most critical factors in selecting risk assessment methods are availability of data, organizational maturity, goals, and the magnitude of the decision associated with the risk analysis.

2.4 Risk Tolerance

The Permit holder shall set the criteria for risk tolerance that is relevant and consistent with the policies, goals and objective of an IMPF and the company. Prior to establishing risk criteria, the permit holder should consult appropriate internal and external stakeholders and relevant standards and regulations.

2.5 Risk Reduction and Management

Based on the risk assessment process, a facility permit holder shall prioritize facilities or equipment and shall implement risk reduction and control measures to prevent, mitigate, and manage risk where a chosen threshold or tolerance is exceeded. The permit holder shall:

- Develop a schedule for risk reduction measures, and,
- Track the implementation of such measures to completion.

Reduction of risk through mitigation could be approached by:

- Taking measures to reduce the probability of occurrence & severity of a given hazard, and,
- Reducing potential consequences by influencing outcomes should an event occur.

Companies should review mitigation measures appropriate to their facilities and consider the following three main types of measures:

- Engineering solutions that manage risk primarily through technology or the facility/equipment design specifications:, e.g. valve seal design, facility equipment material specifications and upgrade, such as stainless steel or titanium,
- Process mitigation solutions that rely on managing facility/equipment operational conditions such as modifying operating parameters, like pressure or temperature, to mitigate internal corrosion and reduce consequence, and,
- Administrative mitigation solutions that are primarily procedural, such as training competency development, facility patrol and frequency, improved public awareness programs, site security and monitoring practices, and improved emergency response procedures.

2.6 Risk Review and Update

2.6.1 Risk Assessment and Review

Risk assessment shall be reviewed at least annually and updated as required:

- When design and operation of the system changes,
- When facility environment changes,

- In response to incident investigation or mitigation failure,
- Information gained from operations and maintenance, inspection and testing, and integrity evaluations,
- When significant risk is determined or uncertainty of data exists, the permit holder must:
    - Perform a more refined level of risk analysis in an attempt to reduce the possibility of risk level overestimation. Risk analysis refinement should include but is not limited to the following:
        - Selection of a more rigorous approach for the analyses and estimates,
        - Additional observations and analysis of the operating conditions, and,
        - Inspections to provide more accurate and detailed information about the presence, location and severity of identified hazards.

2.6.2 Risk Management Review

After risk reduction measures are selected and implemented, risk management results shall be reviewed at least annually to ensure that risk reduction measures are effective and risk is reduced to an acceptable level.

3.0 Communication Process

The permit holder shall establish and implement an effective process for internal and external communication to coordinate information essential to the IMPF. The information can be related, but not limited, to the following:

- Policy, targets, trends, KPI,
- Legal and regulatory requirements pertaining to IMPF,
- Design, construction and manufacturing related information,
- Hazard types & consequences,
- Potential damage and deterioration mechanisms,
- Normal and abnormal operating conditions and control measures,
- Operation and maintenance, including survey, inspection, condition monitoring, repair, and,
- Damage and failure incidents.

4.0 Organizational Structure, Roles and Responsibilities

The permit holder's IMPF shall include a suitable organizational structure, with well-defined responsibilities and authorities to establish and maintain an effective IMPF. The integrity management program shall involve personnel within a facility's maintenance, operations, and engineering departments. Key responsibilities of managers and supervisors in the integrity management program for facilities shall be to ensure:

- Knowledgeable personnel are performing appropriate activities using effective engineering and decision-making tools and methods,
- IMPF activities such as inspections are being executed and managed as planned, and,
- Appropriate controls are implemented and maintained within the integrity management system for all related activities.

5.0 Training and Competency

The permit holder shall establish, implement and maintain a process for developing competency requirements and enabling training of employees and contractors responsible for administrating and executing IMPF related activities, including operation and maintenance of the facilities. Training schedules and frequency must be maintained for all identified critical tasks by developing a training matrix for employees[21]. Competency is the demonstrated ability to apply training, experience and knowledge in the execution of duties.

The permit holder shall have an established and implemented process for verifying that employees and other persons working with or on behalf of the Permit holder are trained and competent to perform their duties in a safe manner. Methods for collection and maintenance of training records must be clearly documented.

The permit holder must have a process in place to evaluate and select contractors on the basis of ability and qualifications to perform specified duties. The evaluation process should include review of safety and environmental policies, procedures, past performance, ability and qualification check through audits, work-site inspections, and observations of performance as appropriate. The permit holder must also have a process in place to ensure that the performance requirements and expectations are defined and communicated to the contractor. The permit holder must have a process in place to monitor and assess contractors' performance, provide feedback and ensure that identified deficiencies are resolved.

[21] 49 CFR 192 – Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards

6.0 Document and Records Management

The permit holder shall establish, implement and maintain a process for managing documents and records needed for the effective implementation of IMPF activities during different stages of the facility life cycle, e.g., design, material selection, purchasing, construction, operation, maintenance, and decommissioning. The document and record management process shall encompass creation, security, updating, retention, retrieval and deletion of all information and records necessary for effective operation of the IMPF. It must apply to electronic and paper-based documents and records.

Responsibilities for document approval and re-approval shall be specified and shall identify appropriate controls to ensure that documents required by the IMPF include revisions and updates.

The process for records shall consider:

- Responsibilities and procedures for creating, gathering, updating, retaining, and deleting records,
- Evidence of past activities, events, changes, analyses and decisions,
- Index describing the types, forms and locations of records, and,
- Retention policy as otherwise required by legal and other applicable requirements.

Information related to location, construction records, operating conditions, inspection, testing and maintenance records, and facility incidents are considered as the minimum data necessary to support an IMPF.

Where records are incomplete due to asset transfers or other reasons, the permit holder shall acknowledge and provide information on how the IMPF manages in the absence of these records as well as how these records are being recovered.

7.0 Managing Change

The permit holder must develop and implement a systematic process for identifying, evaluating, controlling and documenting any change to facility design, specification, operations, standard, organization or activities and legal requirements to ensure that no unforeseen new hazards are introduced and that the risk of existing hazards to employees, public, or the environment is not unknowingly increased. This shall include the changes that are initiated and controlled by the operating company and also those that are not initiated and controlled by the permit holders.
Temporary or permanent changes initiated and controlled internally by the permit holder

- The ownership of a facility,
- The organization and personnel of the Operating Company,
- The organization and personnel who operate and maintain the facility,
- Facilities, equipment, process chemical, process technology and control systems,
- Facility operating status, such as idling, facility shutdown, or decommissioning can introduce “temporary” hazards not expected during normal operations;
- Operating conditions,
- Product characteristics, and,
- Methods, practices, and procedures related to facility integrity management.

Changes initiated and controlled by external stakeholders

- Standards and regulations related to facilities integrity management,
- Other installations (e.g., power lines) that cross piping and other equipment or facilities,
- Environmental factors, such as flood, fire, ground movement (if changes to the facility must be made to account for these factors), and
- Adjacent land use and development.

Not all changes are managed using the same procedure/process and therefore do not necessarily reside in the IMPF. Appropriate change control processes, such as Management of Change (MOC), shall be developed and implemented and the scope of MOC processes shall be clearly defined. The primary focus of MOC should be to manage risks related to design changes and modifications to equipment and process.

The MOC process shall address and document:

- Identification process for anticipated and actual changes,
- What constitutes a change (temporary or permanent) and what falls under replacement in kind, which is not subject to MOC,
- Reasons for change,
- Responsibilities and authorities for approving and implementing changes,
- Analysis of implications of the changes,
- Impact and risk of the changes,
- Communication method and associated records and documents,
- Timing of changes (approval and implementation), and,
- Close outs.

Changes that are managed through other corporate programs and processes shall be referenced to the IMPF as appropriate. For a change to be “replacement in kind” it should meet the original technical specifications of the system or equipment.

A process shall be developed and implemented for managing changes related to end of service requirements to dismantle, decommission, and dispose of equipment, and for operational waste.

8.0 Operational Controls

The permit holder shall establish and maintain procedures for the safe operation of each facility and address the initial start-up (new or modified facilities), normal operation, temporary operation, emergency operation, including shutdowns, normal shutdown, start-up and restoration following maintenance or outage, identifying operating limits, alarm management and control room operations. The permit holder shall ensure that the control room operators have the necessary tools, knowledge, training, and resources available to maintain safe operations of the facilities. The operational controls must also address hazards, risks, training, and communication.

To ensure integrity of facilities the permit holder must ensure that:

- Facilities have inherently safer designs,
- Facilities are manufactured, fabricated, installed consistent with applicable requirements, regulations, and standards,
- Quality control procedures are maintained for materials and construction, and,
- Inspection and construction inspection procedures and records are maintained.

9.0 Inspection, Monitoring and Maintenance

The permit holder shall document and maintain inspection, monitoring, and maintenance (IMM) programs that are appropriate for its facilities and are in accordance with the risk assessment process. Some inspection standards, such as API 570[22], now include provisions for determining inspection requirements based on risk. Also API Recommended Practice 580[23] encourages the use of risk-based techniques to define inspection and testing requirements.

Selection of IMM activities shall ensure that new hazards are not introduced and inspection and monitoring activities should follow specific regulations, standards, and codes. IMM activities vary from facility to facility depending on the type and complexity of the facility. Planning, scheduling, and frequency of IMM activities should consider parameters such as risk assessment results, effectiveness of inspection method and technology, previous integrity reviews, incident history, insufficient documentation, evaluation of anomalies, time dependent consideration, current state of facility/equipment, and industry data. The permit holder shall document schedules and ensure that the planned activities are carried out using relevant methods and procedures, and that incomplete work and issues are resolved. The permit holder shall ensure that the results of its IMM activities are integrated with data for its risk assessment and performance measures.

[22] API 570 – Piping Inspection Code, In-service Inspection, rating, repair and Alternation of Piping Systems, 2009.
[23] API RP 580 - Risk-based Inspection, 2009.

10.0 Evaluation and Fitness – for –Service Assessment

Through the execution of planned IMM activities, if any anomalies are identified, the permit holder shall carry out further inspections and investigations as appropriate, or undertake an Engineering Assessment (EA), such as Fitness-for-Service (FFS) Assessment, to evaluate severity of these anomalies. A Fitness-for-Service assessment is a multi-disciplinary approach to determine whether a facility asset is fit for continued service. The asset in question may contain flaws or other damage, or may be subjected to more severe operating conditions than anticipated by the original design. The asset may be subject to time-dependent damage mechanisms. The outcome of a FFS assessment is a decision to run as is, set future inspection intervals, re-rate, alter or repair the facility asset. The API Recommended Practice 579[24] is a leading FFS standard that provides procedures for performing proper evaluations for existing facilities and equipment used in the oil and gas industry. The document contains sections for assessing procedures for preventing damage mechanisms such as brittle fracture, general metal loss, local metal loss, pitting corrosion, blisters, laminations, weld misalignment, crack like flaws, creep damage, and fire damage. The CSA Z662 also provides relevant guidelines for evaluation of imperfections and anomalies found from the inspections. There are also other standards/technical documents that provide necessary guidelines to carry out an FFS.

[24] API RP 579/ASME FFS, Fitness-for Service, 2007.

11.0 Modification and Repair

If the incidents or evaluation process for the monitoring and inspection activities and results (through an Engineering Assessment such as FFS) identifies situations for the facility where modification or repair are required, then the permit holder shall identify and document relevant corrective actions that are acceptable and appropriate for its facilities considering the service conditions. Repair methodology must be documented to execute the repair.

12.0 Incident / Near-miss Investigation and Learning

The permit holder shall document and implement its process to report and investigate any hazards, potential hazards, incidents or near misses, and incidents affecting or having the potential to affect the integrity of their facilities.

The permit holder shall establish, implement and maintain a process for incorporating lessons learned from incidents and near-misses within the organization and from across industry where warranted into standards, procedures, and processes to mitigate systemic development of similar circumstances and to improve the effectiveness of the IMPF. In addition, any mitigation/repair corrections resulting from near misses and incidents that are applied to local facilities shall be reviewed for applicability to a broader scope (either geographically or by equipment type).

Records of investigations shall be maintained and communicated as necessary.

13.0 Control of Non-conformance

The permit holder must establish and implement a process to regularly monitor and measure the conformance of its processes to the requirements of its IMPF. The permit holder shall define responsibility and authority for handling and investigating non-conformances, taking action to mitigate any impacts, and for initiating and completing corrective and preventive actions.

14.0 Internal Audits

The permit holder must develop and implement a process for auditing of its IMPF. A permit holder's process must define the responsibilities, scope, objectives, frequency, and schedule for internal audits. The process for completing corrective and preventive actions for non-conformances identified through internal audits shall be outlined. The process must also ensure auditor competency and independence.

15.0 Performance Measurement and Analysis of Data

The permit holder shall establish and maintain a documented process to identify metrics or key performance indicators (KPIs) to measure the effectiveness of its risk management and the effectiveness and adequacy of its IMPF. Process for periodically reviewing, evaluating and trending facility performance through relevant Key Performance Indicators (KPI) shall be established and maintained. KPIs shall be updated as required.
The permit holder shall develop and maintain both leading and lagging metrics (KPIs).

Leading indicators — process-oriented metrics that measure accomplishment and effectiveness of key work processes, programs, activities, operating discipline, or protective barriers to control risk and prevent incidents. These indicators provide insight into how well various components of the IMPF have been implemented and also give an indication of potential problems or deterioration in key safety systems early enough that corrective action can be taken.

Lagging indicators — outcome-oriented metrics that enable detection of events that have already occurred and can indicate potentially recurring problems. These indicators provide data about incidents and failures of IMPF activities as well as deficient performance of facility assets.

An appropriate mix of leading and lagging indicators performance metrics (KPIs) may include the following metric categories:

- IMPF program component implementation metrics identify potential organizational or program related inadequacies or failures that may contribute to incidents, thus leading indicator,
- Process / operational activity metrics (KPIs) monitor the surveillance and preventative actions undertaken; thus leading indicators,
- Operational deterioration metrics are operational and maintenance trends that indicate when integrity of the system is reduced, thus it could be leading or lagging,
- Failure measure indicate that the undesirable outcomes have occurred and the ultimate objective of the program has not been achieved, thus lagging. These indicators hopefully indicate progress towards goals.

The permit holder may follow the guiding principles outlined in API RP754[25] for developing performance metrics (KPIs).

Examples of facilities specific leading KPIs:

- Percentage of training and competency needs assessments completed to individuals in key integrity related roles,
- Percentage of training sessions completed with skills verification,
- Number of key IMPF roles with competency criteria defined,
- Percentage of employees who participate in continuing education and symposia for enhancement of safety knowledge and technological innovation,
- Measurement of employee morale and level of expertise,
- Percentage of new projects emphasizing on inherently safer design,
- Percent of facility asset attribute errors found (through audit),
- Percent of complete records related to all life cycle phases,
- Percent of incomplete records related to all life cycle phases,
- Percent of operational changes completed by the MOC process,
- Number of procedural changes managed through formal process for managing changes,
- Number of organizational changes managed according to the process,
- Percent of MOCs are communicated to all employees who could be potentially affected by the change,
- Percentage of facility types where hazard identification method has been identified and applied,
- Number of detailed risk assessments undertaken,
- Number of near-miss incidents,
- Number of incident investigations followed up with corrective actions demonstrating effective risk management solutions,
- Percentage of critical equipment/instrumentation that performs to specification when inspected or tested,
- Percentage of functional tests of critical instruments and alarms completed according to the defined schedule,
- Percentage of maintenance actions identified by inspection activities that are completed to the specified timescale,
- Total number of compressor stations where piping inspected in the year vs. total number of compressor stations where the piping was scheduled to be inspected, for routine staff inspection as well as for certified maintenance inspection,
- Number of facilities requiring repetitive maintenance,
- Number of facilities with deferred maintenance requirements,
- Number of severity faults detected by inspection, testing, and audits,
- Number (and locations) of repairs undertaken,
- Type (and locations) of repairs undertaken,
- Number and nature of unresolved safety issues.

Examples of facilities specific lagging KPIs:

- Total number of annual reportable incidents at facilities and the total number of facilities,
- Loss of containment by equipment or installation and geographic locations,
- Loss of containment associated with specific Facility Integrity programs,
- Number of business interruptions (above a predetermined threshold),
- Number of equipment failures (by equipment type).

16.0 Management Review

The Permit holder's IMPF shall be reviewed to determine the extent to which the performance goals and objectives have been met to assess program effectiveness.

Management shall formally review the adequacy, implementation and effectiveness of its integrity management program for facilities. The review shall be formal and documented and shall occur on a regular basis. The management review process must define the inputs, review methods, and responsibilities. Focus shall be on evaluating the adequacy and effectiveness of the IMPF to meet its stated goals and targets (through review of KPIs), implementation of the IMPF, compliance to company and regulatory requirements, and identification of corrective actions for continual improvement.

Consideration shall be given to:

- Goals and objectives,
- Changes and their effects of changes in the operating company, facilities and/or external factors,
- Results of the risk management process,
- Findings, status, and trends of corrective actions identified during internal and external audits,
- Status and trends of performance measures and KPIs,
- Frequency and trending of near misses,
- Results of incident investigation, evaluations and lessons learned,
- Regulatory, legal or standard changes that could affect the IMPF,
- Status and trends of integrity-related issues and recommendations identified during previous review and evaluations, operation, maintenance, or integrity-related work,
- Successes and problems experienced in detecting and preventing potential failure incidents, and,
- Opportunities for improvement and proposed changes to IMPF including policies and objectives.

Outputs from the management review shall include:

- Summary of assessment of the effectiveness of IMPF and risk management process,
- Decisions, and actions,
- Changes to required resources, and
- Improvements to processes and procedures to meet the requirements.

Senior management shall at least annually review and approve the output of management reviews, which shall be documented.