

**British Columbia Oil and Gas Commission**

**Assessment Protocols for the  
Evaluation of Integrity Management  
Programs for Pipeline Systems**

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# 1. Introduction

Integrity Management Programs (IMP's) have been a regulatory requirement in British Columbia since they were introduced in the 1999 edition of *CSA Z662 – Oil and Gas Pipeline Systems*. Annex N of that standard provides the basis for all IMP's for pipeline systems regulated by the Commission.

The OGC expects that every permit holder designing, constructing, operating, maintaining or abandoning pipeline infrastructure within the province of British Columbia shall have fully developed and implemented IMP's meeting the requirements set out in the Protocols. To ensure compliance, all companies must have access to the most current edition of the standard *CSA Z662 – Oil and Gas Pipeline Systems*.

The *Assessment Protocols for the Evaluation of Integrity Management Programs for Pipeline Systems* (the Protocols) have been developed based on the requirements of Annex N and follow the structure set out in that Annex. All permit holders regulated by the OGC are required to complete a self assessment using the protocols and to file that assessment by xx September 2010. A sample of a completed protocol is available on the Commission website at (link).

The OGC will use the results of the self assessment to plan verification and audit activities. Permit holders selected for these activities will receive 2 months advance notification during which time they must review and update their self assessment and provide copies of their IMP to the Commission for review.

Permit holders selected for verification and audit shall be issued a final report identifying areas of compliance, areas of non-compliance and opportunities for enhancement. Where non-compliance is noted, permit holders may be directed to comply and, where necessary, enforcement actions may be taken as appropriate.

## 2. Definitions

The terminology used within these protocols is consistent with CSA Z662 and the *B.C. Oil and Gas Activities Act* (the Act) and subordinate regulations. Where there is a difference between definitions, the definitions in the Act or the subordinate regulations apply.

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## **3. Program Requirements**

### **3.1 Format**

Integrity management programs must be documented in a format suitable for submission and review by the Commission. Programs are preferred in electronic format; however, hard copies will also be accepted.

#### **Protocol Requirements:**

- Permit holders must have a documented program for integrity management.

#### **Regulatory References:**

*CSA Z662 - Clause 10.14*  
*CSA Z662 – Annex N – Clause N.3*  
*Information Letter #OGC 06-12*

#### **Permit Holder Documents and References:**

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## **3.2 Information Management**

Integrity management programs must include methods for creating, identifying, obtaining, reviewing, analyzing, synthesizing and otherwise incorporating all information necessary for assuring the integrity of pipeline systems included under the integrity management program.

### **Protocol Requirements:**

- All information required for the IMP must be summarized in written form within the program documentation;
- The IMP must describe how the information is used;
- The IMP must identify how the information is gathered, maintained and otherwise managed; and
- The IMP must assign responsibility for collection and management of the information.

### **Regulatory References:**

*CSA Z662 - Clause 10.14*  
*CSA Z662 – Annex N – Clause N.3*  
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## 4. Program Scope

Integrity management programs must encompass the entire pipeline system under the permit holders control which is regulated by the Commission. Program requirements may vary between individual pipeline segments and facilities but must be documented within the IMP. A description of the entire pipeline system and the scope of the integrity management program must be included within the program documentation.

### Protocol Requirements:

- The IMP documentation must include a description of the entire pipeline system.

### Regulatory References:

*CSA Z662 - Clause 10.14*  
*CSA Z662 – Annex N – Clause N.4*  
*Information Letter #OGC 06-12*

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## 5. Policies, Organization and Objectives

### 5.1 Policies

The permit holder must establish, implement and maintain a documented integrity related corporate policy.

#### **Protocol Requirements:**

- There must be a documented and well communicated (internally) policy statement encompassing integrity management including the scope and objectives of the IMP.

#### **Regulatory References:**

*CSA Z662 - Clause 10.14*  
*CSA Z662 – Annex N – Clause N.5*  
*Information Letter #OGC 06-12*

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## **5.2 Organization**

The permit holder must document and keep current the assignment of roles and responsibilities associated with the development, implementation and maintenance of the IMP.

### **Protocol Requirements:**

- There must be an organizational chart identifying persons responsible for each/all aspects of the integrity management program;
- The roles of persons shall be defined within the IMP;
- There must be a single senior level permit holder employee responsible for the development, implementation and maintenance of the IMP; and
- Persons with roles and responsibilities identified within the IMP shall be aware of their responsibilities and familiar with completion of tasks required in their role.

### **Regulatory References:**

*CSA Z662 - Clause 10.14*  
*CSA Z662 – Annex N – Clause N.5*  
*Information Letter #OGC 06-12*

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### **5.3 Objectives**

The permit holder must define the objectives of the IMP and establish measures (performance indicators) used to assess the adequacy and effectiveness of the IMP.

#### **Protocol Requirements:**

- The IMP must define the performance indicators used to assess the adequacy and effectiveness of the IMP;
- The IMP must include the procedures for the derivation, review, consideration of the indicators;
- The responsibilities for derivation and review of the indicators must be defined; and
- There must be evidence showing that the indicators are being used and are effective in the delivery of the IMP.

#### **Regulatory References:**

*CSA Z662 - Clause 10.14*  
*CSA Z662 – Annex N – Clause N.5*  
*Information Letter #OGC 06-12*

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## 6. Records

The permit holder must establish, implement and maintain a records management program encompassing the creation, security, updating, retention, retrieval and deletion of all information and records necessary for the execution of the integrity management program.

### Protocol Requirements:

- There must be documented procedures for the management of records associated with the IMP including a description of all records to be managed. The procedures shall address:
  - (a) roles, responsibilities, authority;
  - (b) legal requirements of the document / record;
  - (c) content of the document / record versus the intended purpose;
  - (d) role / responsibility / accountability for creation, revision, updating (MOC / QA / QC);
  - (e) instructions for confidentiality / access;
  - (f) communication / distribution requirements;
  - (g) legal / company retention time and deletion / removal; and
  - (h) communication of the requirements to the documents / records department of the above, plus the intended location(s) of the document or record;
  
- There must be evidence that the following records (as a minimum) are included within the IMP;
  - (a) the location of the pipeline with respect to crossings and nearby land developments;
  - (b) class locations;
  - (c) the design of the pipeline, including limits on pressure, temperature, loading, and other operating conditions;
  - (d) the standards and specifications for the pipe, components, bolting, and coating materials;
  - (e) material test reports;
  - (f) joining and inspection records;
  - (g) coating and inspection records;
  - (h) terrain, soil type, backfill material, and depth of cover;
  - (i) pressure testing;
  - (j) cathodic protection system design and performance; and
  - (k) the methods used and the results obtained for the activities included in the pipeline integrity management program.

### Regulatory References:

CSA Z662 - Clause 10.14

CSA Z662 – Annex N – Clause N.6

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## 7. Competency

### 7.1 Training Program

The permit holder shall assess and document the training requirements for each position identified under 5.2.

Training Programs shall:

- (a) provide initial, ongoing, and periodic refresher training to satisfy competency needs;
- (b) provide orientation for contractors, new employees, those newly transferred, and those whose job functions change, as appropriate;
- (c) incorporate allowances for the evaluation of the effectiveness of training; and
- (d) maintain appropriate records of education, experience, training and qualifications.

#### **Protocol Requirements:**

- The IMP must identify required training (including where applicable the name of any course(s), the course provider(s), the course objectives and the course content) for each position identified under 5.2 of this document;
- The IMP must state the frequency of training where appropriate;
- Records of training for all employees occupying positions identified within the IMP must be available for review;
- The IMP must identify minimum training requirements for contractors and how those requirements are assessed;
- There must be a record of all training provided by the permit holder to outside parties; and
- There must be evidence or records showing that the permit holder has evaluated the training for effectiveness.

#### **Regulatory References:**

*CSA Z662 - Clause 10.14*  
*CSA Z662 – Annex N – Clause N.7*  
*Information Letter #OGC 06-12*

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## **7.2 Competency**

The permit holder must identify the necessary competencies for each position identified under 5.2 and must demonstrate how the competencies for the individuals occupying each position are developed, maintained and evaluated.

### **Protocol Requirements:**

- The IMP must include documentation setting out the required competencies for each position identified under section 5.2 of this document;
- The IMP must describe how competency is established and maintained for each position identified under section 5.2;
- There must be a section within the IMP describing how the permit holder evaluates competency; and
- There must be evidence showing that competencies have been evaluated and are being continually assessed.

### **Regulatory References:**

*CSA Z662 - Clause 10.14*  
*CSA Z662 – Annex N – Clause N.7*  
*Information Letter #OGC 06-12*

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## 8. Change Management

The permit holder must develop, implement and assess a program to monitor changes that affect the integrity of pipeline systems and the management of pipeline integrity.

### Protocol Requirements:

- There must be documented procedures for the management of all changes to the IMP;
- The program shall create records for all changes to the IMP;
- The program shall include a description of:
  - The change including reference to the problem or situation that led to the change;
  - The alternatives considered or evaluated (if any) and the methods used for the evaluation;
  - The technical basis for the chosen change including evidence of risk assessment or risk evaluation;
  - Signed approval for the change;
  - A description of the implementation process for the change including both internal and external communications as appropriate;
  - Follow-up evaluation to confirm the change has been implemented and to evaluate the effectiveness of the change.

### Regulatory References:

*CSA Z662 - Clause 10.14*  
*CSA Z662 – Annex N – Clause N.8*  
*Information Letter #OGC 06-12*

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## 9. Investigations

The permit holder shall record and investigate any accidents, incidents and near-misses affecting or having the potential to affect the integrity of pipeline systems.

### Protocol Requirements:

- There must be established procedures to record all accidents, incidents and near-misses and (where required) to report them to the OGC;
- There must be written procedures for investigation to determine the root causes of accidents, incidents and near-misses, and to identify follow-up and corrective actions where appropriate;
- The IMP must record the corrective actions taken to prevent recurrence;
- Any changes to the IMP based on the corrective actions shall be documented and managed according to section 8 of this document;
- Key results of the investigations shall be shared internally and with other parties, as appropriate; and
- There must be evidence reflecting the analysis of the incident reports improves the effectiveness of the pipeline IMP.

### Regulatory References:

*CSA Z662 - Clause 10.14*  
*CSA Z662 – Annex N – Clause N.9*  
*Information Letter #OGC 06-12*

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## 10. Hazard Identification

The permit holder must identify any potential hazards that can lead to an accident or incident.

### Protocol Requirements:

- There must be evidence that a formal process is in place to identify hazards for new and existing pipeline systems.
- The hazards to be taken into consideration in the IMP shall include factors in the list below, or other factors such as the nine categories of threats suggested in *ASME B31.8S Managing System Integrity of Gas Pipelines*:
  - (a) corrosion;
  - (b) cracking;
  - (c) external interference;
  - (d) material, manufacturing or construction;
  - (e) weather-related or geotechnical factors;
  - (f) equipment malfunction; and
  - (g) incorrect operational procedure;
- Data shall be collected and integrated in order to identify hazards and perform a risk assessment as outlined in section 11 of this document; and
- The method and data used in hazard identification must be documented.

### Regulatory References:

*CSA Z662 - Clause 10.14*  
*CSA Z662 – Annex N – Clause N.10*  
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# 11. Risk Assessment

The permit holder shall develop a methodology for the determination of risk posed by each hazard identified under section 10. Risk assessments can range from fully qualitative to fully quantitative and shall be documented. Standards of acceptability shall be developed and mitigation methods shall be established and implemented where appropriate.

## Protocol Requirements:

- The IMP must incorporate procedures to ensure that current data for each pipeline segment is used for risk assessment;
- The permit holder must choose the appropriate risk analysis method to estimate the consequence and probability based on pipeline system complexity and information availability;
- There shall be evidence demonstrating how risks are used within the IMP (e.g. prioritization);
- A risk matrix must be developed to define tolerable and intolerable risk;
- The permit holder must take steps to reduce risk where the chosen threshold of tolerability is exceeded;
- Where a second risk analysis is performed to determine a tolerable risk level for a hazard that was initially assessed as intolerable, there must be evidence indicating that a more rigorous risk analysis approach and more accurate and detailed information has been used;
- Plans and strategies used for risk reduction shall consider the options outlined in section 12 of this document;
- The data, methods, assumptions and rationale used and the personnel responsible for risk assessment shall be documented.

## Regulatory References:

*CSA Z662 - Clause 10.14*  
*CSA Z662 – Annex N – Clause N.11*  
*Information Letter #OGC 06-12*

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## 12. Hazard Mitigation Options

Where risk assessment indicates a hazard is intolerable, the permit holder must take actions to reduce the risk to a tolerable level. Consequence or probability/frequency may be reduced to reduce overall risk.

### Protocol Requirements:

- The permit holder shall document the methods used for hazard mitigation for each type of hazard addressed within their IMP;
- The options to reduce the frequency and consequence of operating errors, external interference, natural hazards, metal loss, cracking, material, manufacturing, and construction defects outlined in *Clause N.12* of CSA Z662 shall be considered; and
- Hazard mitigation methods must be approved by the person responsible for the IMP or their delegate and such approval shall be documented.

### Regulatory References:

*CSA Z662 - Clause 10.14*  
*CSA Z662 – Annex N – Clause N.12*  
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## 13. Program Planning

A planning process must be included within the IMP which establishes short term plans for assessment, evaluation and mitigation as well as long term plans. Assessment frequencies for pipeline systems, types of equipment and other components shall be documented and supported within the program plans.

### Protocol Requirements:

- The planning process must be defined and shall include a description of accountable persons, data requirements, decision points, review time periods, change management, performance monitoring, and continual improvement;
- The planning of integrity management activities shall include consideration of the following:
  - (a) known conditions, damage, or imperfections (e.g., corrosion or manufacturing imperfections, that might lead to failure incidents);
  - (b) the potential growth of any damage or imperfections;
  - (c) the options selected to manage identified hazards;
  - (d) inspections and analyses to refine the estimates of risk;
  - (e) the options selected to reduce the estimated risk level;
  - (f) inspections, testing, patrols, and monitoring;
  - (g) recommendations from previous integrity reviews and activities;
  - (h) the failure and external interference incident history of the operating company; and
  - (i) the failure and external interference incident experience of the pipeline industry.
- There must be a documented decision-making process that considers all specific conditions and risks associated with the pipeline system for the implementation of the integrity management activities;
- There must be evidence indicating that all hazards identified under section 10 are considered in the IMP planning;
- The IMP must have a continuous process for ongoing integrity assessment to review and update various components of the IMP; and
- The method and rationale used to prioritize integrity management activities must be documented.

### Regulatory References:

CSA Z662 - Clause 10.14  
CSA Z662 – Annex N – Clause N.13  
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## 14. Inspection and Monitoring

The permit holder must inspect and monitor the condition of the pipeline system on a regular basis for the protection of the public, the environment and the pipeline system. The determination of inspection and monitoring frequency shall be part of the program planning described under section 13.

### Protocol Requirements:

- The IMP must encompass and document the methods, procedures, frequency and data of inspections, testing, patrols, and monitoring;
- When the recommended timing or frequency of inspection, testing, patrols and monitoring is not specified in CSA Z662, the company shall determine the timing based on the current condition and history of the pipeline and the company's experience;
- The methods selected for inspections, testing, patrols, and monitoring must be appropriate for the type of anomalies and defects expected; and
- There must be evidence that the following records (as a minimum) are included within the inspection and monitoring documents of the IMP:
  - (a) the dates when performed;
  - (b) the methods and equipment used;
  - (c) the results and observations;
  - (d) an evaluation of the acceptability of the results and observations;
  - (e) recommendations; and
  - (f) implementation of recommendations.

### Regulatory References:

*CSA Z662 - Clause 10.14*  
*CSA Z662 – Annex N – Clause N.14*  
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## 15. Use of Inspection and Monitoring Data

When the inspection and monitoring data indicates the presence of conditions that might lead to a failure incident, the permit holder shall implement corrective measures or change the operating parameters such that continued operation is acceptable as determined by an engineering assessment conducted in accordance with CSA Z662.

### Protocol Requirements:

- Detailed visual inspection, mechanical measurement, non-destructive inspection (if needed) and evaluation must be performed to validate inspection and monitoring data obtained from internal inspection devices;
- Based on the results of validation as outlined above, the permit holder may prioritize further assessment activities by calibrating the data through an engineering assessment;
- The engineering assessment shall take the following into consideration:
  - (a) knowledge and experience of the performance capabilities and limitations of the inspection method;
  - (b) mechanism or mode of imperfection formation, growth, and failure;
  - (c) the type of imperfection that might correspond to the reported indications;
  - (d) the accuracy of reported dimensions and characteristics needed for evaluating such imperfections;
  - (e) the likelihood of unreported defects (e.g. cracking) being associated with an imperfection indication;
  - (f) the piping design, construction and material properties;
  - (g) service history and future service conditions;
  - (h) appropriateness of repair methods; and
  - (i) consequences of failure;
- The IMP must have a formal and documented process to ensure that engineering assessments are conducted and reviewed by qualified personnel and/or contractors;
- There must be evidence demonstrating that the company integrates and analyzes all appropriate information and data in determining monitoring programs and corrective actions; and
- The integrity management activities planned to reduce risks must be evaluated in a timely manner after the inspection and monitoring data indicates a need for re-evaluation (e.g. unsatisfactory leak detection performance).

### Regulatory References:

CSA Z662 - Clause 10.14  
CSA Z662 – Annex N – Clause N.15  
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## 16. Mitigation and Repair

The permit holder must take corrective measures from the options discussed in section 12 of this document to mitigate or repair significant or intolerable risk conditions identified by activities carried out under the IMP or identified by other means.

### Protocol Requirements:

- The IMP must have an action plan to repair or remediate conditions with significant risks and assign responsibilities to the appropriate personnel;
- The effectiveness of the mitigation and repair must be evaluated through inspection, monitoring and risk assessments; and
- All the procedures and rationale for mitigation and repair must be documented.

### Regulatory References:

*CSA Z662 - Clause 10.14*  
*CSA Z662 – Annex N – Clause N.16*  
*Information Letter #OGC 06-12*

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## 17. Audit and Continual Improvement

The permit holder shall self-audit its IMP periodically to ensure that all of the components of the IMP have been properly implemented and maintained, and identify opportunities where the IMP can be improved and strengthened.

### Protocol Requirements:

- The IMP must consider the estimated life cycle of the pipeline system and how the IMP can address emerging issues during that life cycle;
- The IMP documentation must include a description of the performance measures used to provide insight into the IMP effectiveness;
- On a regular basis, the IMP must have a formal and documented process to review the effectiveness of the IMP and to ensure that the IMP remains suitable for achieving the company's stated policy and objectives required in accordance with section 5;
- Periodic reports on the IMP performance must be prepared and distributed to the responsible personnel;
- The IMP must have a follow-up system to verify completion and track outstanding conditions evaluated from engineering assessments, risk assessments and inspection; and
- Records of internal audit and management review results shall be retained and available for reference.

### Regulatory References:

*CSA Z662 - Clause 10.14*  
*CSA Z662 – Annex N – Clause N.17*  
*Information Letter #OGC 06-12*

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