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Shell Scotford Upgrader

**Pipeline Integrity Management
SCT-PEI-528**

Issued	March 01, 2016
Last Revised	
Revision Due Date	March 01, 2017

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1.0 Revision Log

Rev. No.	Date Yr/mo/day	Description	Revised By	Revision Approval
00	2016/03/01	Reviewed and updated, aligned Procedure # with M	T Reynolds	M Gupta

2.0 Competency Table

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Job Role	Competency Requirement Level		
	Awareness	Knowledge	Skill
Sr. & Area Inspector			X
Corrosion Engineer		X	
Inspection / Static Equip. Engineer		X	
NDE Contractor	X		
Process Engineer	X		
Operation Engineer		X	
Production Specialist		X	
Project Engineer	X		

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3.0 Scope

The intent of this document is to provide guidance on how Shell manages the Quest CO2 pipeline integrity, through the use of risk-based methodology, in accordance with IA 26. At Scotford we are governed by AER pipeline act to ensure integrity of our pipelines which are designed in accordance with CSA Z662, and Shell Standards and site specifications.

4.0 References

- CSA Z662
- IA 26 Integrity of Products Pipelines
- RMP 31.40.00.51-Gen. Pipeline Integrity
- AER Alberta Energy Regulator
- PC-006 Performance Standard

5.0 Responsibilities

5.1 Chief Inspector


- (a) Upgrader Liaison to Alberta Energy Regulator.

5.2 Sr. Area Inspector/ Designated Responsible Person

- (a) Leads and coordinates the implementation of this procedure start to finish
- (b) Shall maintain all records associated with this document.
- (c) Generates a work order for the required inspections.
- (d) Upon completion of an inspection, performs the required documentation / updates.
- (e) Informs Corrosion Engineer and Static Equipment Engineer of all inspection results / findings.
- (f) Develops inspection plan and Inspection Tasks
- (g) Receive pipeline right of way (ROW) Aerial Flight Survey inspection reports from Integrated Sensing & Surveillance
- (h) Populate w-PIMS with smart pigging results and Annual CP survey results
- (i) Create annual report as per IA-26

5.3 Corrosion and Materials Engineer

- (a) Support area inspector with Inline inspection (ILI) data review.

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5.4 Maintenance

(a) Schedules the inspection and arranges for any sub-contractors required, as stated on Inspection Task.

5.5 Process Engineer

(a) Provides specific process information.

5.6 Operations Engineer

(a) Notifies the Lead Inspector / Inspector / Corrosion Engineer if the pipeline is experiencing abnormal operating conditions.

5.7 Field Operations

- (a) Responsible for validating start up procedures, shut down procedures, and actual operating conditions for the pipeline.
- (b) Line block valve testing as per SD005 performance standard.
- (c) Inform area inspector and AER representative of any third party damage to the pipeline

5.8 Inspection / Static Equipment Engineer

(a) Support area inspector with Inline inspection (ILI) data review.

6.0 Procedure Details


6.1 Design

Injection Wells

Completions Wells & Interventions is responsible for the injection wells.

Pipeline

Toyo Engineering designed the pipeline. Shell's design as it pertains to CO2 transportation meets or exceeds CSA requirements. While CO2 is not an HVP gas as defined in ERCB's directives, some design requirements are similar to HVP requirements. The burial depth exceeds the CSA requirement. Dehydrating the CO2 before entering the pipeline would limit internal corrosion. Three layers of fusion-bonded epoxy coating and cathodic protection to protect the pipeline from external corrosion. The compressor would have a rated discharge pressure matching the maximum operating pressure of the pipeline and below the fracture pressure of the formation. The

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wellhead emergency shutdown (ESD) valves would shut the pipeline system down if the wellhead pressure limit is exceeded.

6.2 Leak Detection

Six ESD line block valves (referred to in this decision as ESD valves) are installed on the pipeline at a maximum spacing of 15 km and at all major water crossings. The ESD valves are hydraulic, self-activated, and constructed of materials that are resistant to the low temperatures and high velocities associated with the decompression of dense phase CO2.

In the event of a line break, the ESD valves would be closed automatically by the supervisory control and data acquisition (SCADA) system at the Scotford Upgrader.


Operators will check the [REDACTED] well sites daily to ensure that there are no leaks from the piping or the flanges. The location of a leak would be pinpointed by sight and sound, and operators could confirm a release with their CO2 detectors. Bi-weekly aerial surveys along the pipeline ROW to help identify small leaks and ground disturbance will also be performed.

6.3 Construction

All construction turn over documentation is filed in Scotford data management system. RT film is stored in Calgary. Refer to Visions (Inspection Database) under corrosion circuit CC-24901 for the storage numbers of all film boxes.

6.4 Monitoring

There is continuous monitoring of dew point, product stream quality, and operating temperature and pressure. Bi-weekly aerial surveys along the pipeline ROW to help identify small leaks and ground disturbance will also be performed during the first year of operation and re-assessed after the first internal pipeline inspection. Aries Aviation is contracted to perform the flight surveillance at a cost of approx. \$8k/month. [REDACTED]

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[REDACTED] Reports are emailed out biweekly to the pipeline TA3 and field operators [REDACTED]

6.5 Cathodic Protection

The pipeline is protected by an impressed current system that consists of two rectifiers, one on base plant site and the other at well site #1. They are both set up for remote monitoring of the current output by Mobiltex Data Ltd. And they store the data for up to three years. However the data shall be downloaded on an annual basis for rectifier and CP test post surveys and uploaded into the w-PIMS data base. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]


[REDACTED]

[REDACTED]

[REDACTED]

7.0 Welding

The pipe body material as well as the fusion area of electric welded pipe or weld and heat affected zone of submerged arc welded pipe, must meet the requirements of CSA Z245.1 Category II with the specified toughness requirements listed below:

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- 60 joules absorbed energy
- 45 C test temperature
- Full scale Charpy V-notch test specimens
- ≥85% shear area ratio

[Redacted text block]

8.0 Alberta Energy Regulators (AER)

Contact info:

[Redacted contact information]


www.aer.ca

9.0 Risk Assessment & Inspection Strategy

As per IA26

9.1 Inspection Task

An Inspection Task is to be created for all required inspection activities. The Inspection Task is to outline the scope, details, and maintenance requirements to complete the inspection. See [Appendix B](#) for Inspection Task content requirements.

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9.2 External Inspections

Equipment associated to the well site skids will have external inspections scheduled as per Visions and all reports will be filed in Visions under the equipment number.

Pigging data will be managed by Shell web based pipeline integrity management system (w-PIMS).



10.0 Documentation

10.1 General

Visions database shall be used for the filing and storage of all inspection data and associated information. The annual report as required by IA-26 will be filed under CC-24901.

10.2 Scheduling

Pipeline inspection due dates are to be scheduled from the "Scheduling" tab in Visions. The inspection due dates are determined from the risk assessment in IA-26.

10.3 Work Request

Work requests (inspection work requests –IWR) are to be used if there is a repair or alteration required to the pipeline.

10.4 Inspection Task


An Inspection Task from Visions is to be generated for every inspection. As a minimum, the Inspection Task should outline the following:

The extent of the inspection. Include a drawing with all NDE and TML locations.
 Inspection methods.

Scaffolding, insulation, buffing, cleanliness requirements.

Operational constraints, seasonal requirements, logistics, etc.

Post inspection checklist

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If Inspection Task is performed external (on), external (off), or internal.

10.5 Integrity Report

An Integrity Report in Visions is to be completed following the completion of every inspection task. The Integrity Report shall summarize the inspection findings. This report is also to include all inspection results, third party inspection results, and summarize any required repair work per the work requests. Integrity Reports are to be coded as "Extent: FULL". Completing a "FULL" Integrity Report schedules the next inspection due date. Integrity Reports are not to be completed until the RBI assessment has been completed.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Appendix B: Inspection Task Template

GENERAL REQUIRMENTS:

- Include a copy of drawings with NDE locations.
- List the potential corrosion mechanisms.
- Do we need an as found inspection of any components?

CLEANING REQUIRMENTS:


- What is the general cleanliness required for required NDE? Does pipe need to be buffed? (Reference cleaning best practice)

SCAFFOLDING / INSULATION REQUIREMENTS:

- Where do we need scaffolding?
- What areas do we require insulation removal or inspection ports?

NDE SCOPE AND REQUIRMENTS:

- List full NDE scope. Include drawings.
- Visual external inspection requirements (by Shell Inspector)

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- Are power and lighting required?
- Are there any special requirements for NDE? I.e., a heads up if an area will need to be flagged off for X-rays, etc.

ADDITIONAL REQUIRMENTS:

- Comments about known repairs or IWRs in the scope.
- Any known safety concerns?
- Any seasonal or process limitations?