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# Heavy Oil

## Controlled Document

### Quest CCS Project

# Submission for Permits and Consents

<b>Project</b>	Quest CCS Project
<b>Document Title</b>	Submission for Permits and Consents
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<b>Disclosure</b>	

*Revision History shown on next page*

**Revision History**

REVISION STATUS			APPROVAL		
Rev.	Date	Description	Originator	Reviewer	Approver
00	2014/05/12	Issued for Review	Glenda Prudom, Joseph Campbell	Janis Gayle, Michael Scheck, Robert Simms, Leonid Dykhno, Irina Ward, Allen Miller, Chris Charbonneau, Brett Kirk, David Hope-Johnstone, Muzzamil Hashmi	Anita Spence
01	2014/07/08	Issued for Approval	Joseph Campbell		Anita Spence
02	2014/07/15	Approved	Joseph Campbell		Anita Spence
<ul style="list-style-type: none"> <li>All signed originals will be retained by the UA Document Control Center and an electronic copy will be stored in Livelink</li> </ul>					

**Signatures for this revision**

Date	Role	Name	Signature or electronic reference (email)
2014/07/15	Originator	Joseph Campbell	
	Approver	Anita Spence	<a href="https://knowledge.shell.ca/livelink/livelink.exe/open/95581542">https://knowledge.shell.ca/livelink/livelink.exe/open/95581542</a>

## Summary

## Keywords

## Summary

The purpose of the Project is to deploy technology to capture CO<sub>2</sub> produced at the Scotford Upgrader and to transport, compress and inject the CO<sub>2</sub> for permanent storage in a saline formation near Thorhild, Alberta. Up to 1.2 Mt/a of CO<sub>2</sub> will be captured, representing greater than 35% capture of the CO<sub>2</sub> produced from the Scotford Upgrader. The Project is a part of the Athabasca Oil Sands Project (AOSP), an oil sands joint venture operated by Shell and owned by Shell Canada, Chevron Canada and Marathon Oil.

According to Shell's Opportunity Realization Manual (ORM) process, the Project has completed the Define phase whereby the Project scope is finalized and the Front End Engineering and Design (FEED) is completed. The project is now in the Execute Phase and will be until early 2015.

The CO<sub>2</sub> will be captured from three existing steam methane reformers used to generate hydrogen at the Scotford Upgrader. The CO<sub>2</sub> will then be compressed by an electrical drive compressor to a maximum dense-phase pressure of approximately 14 MPa. At this pressure, the CO<sub>2</sub> will be transported through a 12-inch diameter pipeline to a location 64 kilometers north of the Scotford Upgrader. No further compression or pumping is required to transport the CO<sub>2</sub> into the storage area by means of three injection wells.

By means of three injection wells, CO<sub>2</sub> will be injected approximately 2 km underground into the Basal Cambrian Sands (BCS) geological formation. The BCS formation is situated below layers of impermeable, continuous, and thick cap rock, which will keep CO<sub>2</sub> isolated within the formation and will prevent any upward migration. The CO<sub>2</sub> will be trapped within the pore spaces of the rock formation in the same way that geological formations have naturally contained large reservoirs of oil and gas for millions of years.

Storage properties of the BCS complex have been validated through analysis of the data obtained from drilling a test well into the BCS formation. Risks of CO<sub>2</sub> containment loss are comprehensively detailed along with mitigation activities.

A detailed measurement, monitoring and verification (MMV) Plan has been developed and will be implemented by Shell to monitor the storage of CO<sub>2</sub> and to protect public health and safety. The MMV Plan will be integrated with the GHG reporting system in place at the Scotford Upgrader.

Final regulatory approvals for the Project were received by August 2012, following a public hearing held in March of that year. Subsequent to that, a public announcement was held on September 5, 2012, whereby the joint venture owners and representatives of the Governments of Canada and Alberta announced that Shell had been given final approval to proceed with the Project.

This document is intended to document the remaining regulatory and environmental permitting work required for the Execute phase of Quest. The work completed in the previous project phases are outlined in the Quest Project Regulatory Strategy and Environmental Plan.

Quest Project Regulatory Strategy:

[https://knowledge.shell.ca/livelihood/livelihood.exe/fetch/2000/1601508/42015262/42022197/87486155/42270836/42526295/QST-0-AA-5980-0001\\_-\\_Quest\\_Project\\_Regulatory\\_Strategy\\_April\\_29\\_2010.pdf?nodeid=52527917&vernum=-2](https://knowledge.shell.ca/livelihood/livelihood.exe/fetch/2000/1601508/42015262/42022197/87486155/42270836/42526295/QST-0-AA-5980-0001_-_Quest_Project_Regulatory_Strategy_April_29_2010.pdf?nodeid=52527917&vernum=-2)

Quest Regulatory Strategy Supplement Pore Space:

[https://knowledge.shell.ca/livelihood/livelihood.exe/fetch/2000/1601508/42015262/42022197/87486155/42272921/46611540/07-0-HE-5880-0001\\_-\\_Quest\\_Environmental\\_Plan.pdf?nodeid=46616372&vernum=-2](https://knowledge.shell.ca/livelihood/livelihood.exe/fetch/2000/1601508/42015262/42022197/87486155/42272921/46611540/07-0-HE-5880-0001_-_Quest_Environmental_Plan.pdf?nodeid=46616372&vernum=-2)

Quest Environmental Plan:

<https://knowledge.shell.ca/livelihood/livelihood.exe?func=ll&objId=46611540&objAction=browse>

## Project Approvals

Quest has received partial funding for the Project from the Government of Canada Clean Energy Fund – a program created as part of the federal Economic Action Plan and administered by Natural Resources Canada (NRCan). As such, the Project was subject to a federal environment assessment under the Canadian Environmental Assessment Act (CEAA). NRCan is a Responsible Authority (RA) under CEAA (Section 5(1)(b) of CEAA), and as the Project is not listed under the Comprehensive Study List Regulations, nor is it in the Exclusion List Regulations under CEAA, the RA has determined that a screening-level environmental assessment is required under CEAA (Section 18(1) of CEAA).

While neither the Project nor any of its components are considered to be mandatory activities, as defined in the Provincial Environmental Assessment (Mandatory and Exempted Activities) Regulation, Shell prepared and submit an EIA report under EPEA, and associated regulations for the CO2 storage component of the Project.

A single environmental impact assessment report was prepared that meets Alberta Environment's Terms of Reference (TOR) for the Quest Carbon Capture and Storage Project, developed by provincial and federal regulators, and the environmental information requirements prescribed under the Alberta EPEA and associated regulations

The outcome of the combined EIA report was:

a letter of completeness from the AENV wrt to the EIA on the storage part of the project, which is stored in the Scotford Livelink folder

<https://knowledge.shell.ca/livelink/livelink.exe?func=ll&objId=61899176&objAction=browse&sort=name>

- a Screening Report and Decision Report from NRCAN & CTA, which is stored in the Scotford Livelink folder
- approved C&R plan for pipeline, which is stored in the Scotford Livelink folder
- approved amendment to Capture EPEA, which is stored in the Scotford Livelink folder

NRCAN and Canadian Transportation Agency (CTA) as responsible authorities of this project, issued a decision report in June 2012 (CEAR Reference No. 10-01-55916).

AER	<i>Oil and Gas Conservation Act</i>		AER Board's final approval		<a href="#">AER Decision Report 2012 ABERCB 008</a>	10-Jul-12
AESRD	<i>Oil and Gas Conservation Act</i>	Ministerial Order	Minister of AESRD approved an application to the AER for a carbon dioxide disposal scheme for up to eight injection wells for the disposal of Class III fluids identified in Directive 51.	<a href="#">Project Applications and EIA</a>	<a href="#">Ministerial Approval No. 12-11837 ERCB</a>	8-Aug-12

### **Capture Approvals**

The regulatory and environmental approvals for the capture portion of the project have been obtained in the previous phases of the project. At a high-level these include:

An amendment to the existing AER approval for Scotford (pursuant to advice from ERCB)

An amendment to the existing AENV approval for Scotford, which will not require an EIA, based on an internal environmental review provided by Shell--

### **AER Well, Storage and Pipeline Approvals**

The Project facilities comprise the main pipeline, three injection wells, and three lateral pipelines to connect the injection well to the main pipeline. D56 approvals for all pipelines and well have been received.

Injection Wells:



IW 8-19 injection well D56 approval was received in June 2010. This well was originally licensed as a test hole for exploration purposes. The well licence will be amended to change the well type to “injection”.

IW 5-35 injection well D56 approval was received in September 2012. No amendments are expected to be required to the licence.

IW 7-11 injection well D56 approval was received in September 2012. No amendments are expected to be required to the licence.

#### Pipelines:

D56 approval for the main pipeline was received in August 2012. Since that time, the pipeline length has been shortened and five minor reroutes have been identified to mitigate environmental and safety risks. An amendment to the pipeline licence is currently being prepared and will be submitted to AER in Q2, 2014.

D56 approvals for the three lateral pipelines were received in April, August and September of 2012. No amendments are expected to be required to these licences.

#### D51 and D65 Injection Approvals:

Injection of CO<sub>2</sub> into the three injection wells also requires approval under AER D51. The 8-19 injection well served as the anchor well for the D65 scheme approval that was issued in August 2012, and is currently licenced for injection under that scheme. At the time of the D65 scheme approval application, the ERCB required that there be at least one exploration well to delineate the scheme area and support application under D65. The 8-19 injection well functioned as the exploration well.

D51 approvals for the 5-35 and 7-11 injection wells will be completed in 2014, as well as the associated amendment to the D65 scheme approval to incorporate these two wells into the scheme.

Timing of approvals for these wells will be aligned with plans to inject the first CO<sub>2</sub> in IW 8-19 well in mid April 2015 (earliest) and then in the other two wells (IW 7-11 and IW 5-35) in end of May 2015.

#### Monitoring Wells:

Several groundwater and deep monitoring wells have been licenced under D56 for the project. The purpose of these wells is to provide the ability under the MMV Plan to monitor whether CO<sub>2</sub> migrates from the storage area. If additional monitoring wells are deemed to be required, approvals under D56 will be sought at that time.

## **Role and responsibilities**

Regulatory: Coordination and delivery of AER approvals and interface with AER for required regulatory reporting

Environmental focal: Coordinate permits, maintain approvals and permits, manage project commitments as made during the regulatory and stakeholder engagement process.

Government agencies: Provide guidance on the regulatory process

## **Regulatory Requirements for Quest**

Various government and non-government bodies have a stake in the Quest project. Approvals and/or permits were required from Federal, Provincial, and several Municipal governments. In addition, historical, paleontological and First Nations consultations and clearances were sought.

Approvals from the AER are required for the injection scheme under D65, and for the construction and operation of wells, pipelines and facilities under D56. To date, all AER approvals required to achieve project milestones have been achieved. Outstanding approvals required for future project milestones are currently planned or in progress to meet required filing dates with the AER.

Approval is also required from Industry Canada for the radio and telecommunication signals required to support Supervisory Control and data Acquisition (SCADA) for the project. Consultation with landowners and the municipal authority to achieve approval is underway to support licensing required for construction of this project component.

Regulatory applications to AER will be submitted for other issues as required to support compliance.

**Quest 2014 Regulatory Plan:**

Table 1.0 provides an overview of the application currently being applied for to the end of 2013 and through 2014 and the individuals who have been assigned to and their expected responsibility.

Table 2.0 provides the timeline for the upcoming applications which will take us into the 4<sup>th</sup> quarter of 2014.

The Project plans to inject the first CO2 in IW 8-19 well in mid April 2015 (earliest) and then in the other 2 wells (IW 7-11 and IW 5-35) in end of May 2015.

**Table 1.0**

ERCB APPLICATION	Project Responsibility	Timeline
<b>2013</b>		
<b>Injection Well Perforation Self-Disclosure</b> Self disclosure submitted to AER on November 25, 2013.	Subsurface Manager – Sean McFadden Technical – Luc Rock Regulatory – Glenda Prudom Legal – Lindsay Grice	November 28, 2013, possible follow-up into 2014
<b>2014</b>		
Document control for <b>GOA Closure Plan</b> (have all our approvals, applications and IR in controlled collections)	VSI - Leah Kirkpatrick Tanu Dixit – Geological Tech Katerina Berkovich	Complete
Response to SIRs on Special Report #1 & Pre-Baseline MMV Plan October 15, 2012 Submission Re: SCVF and GM issues on injection and groundwater monitoring wells	Subsurface Manager – Sean McFadden Technical – Luc Rock Regulatory – Glenda Prudom Legal – Lindsay Grice	February 14, 2014 (extended from January 31, 2014) Complete
<b>Telecom</b> consultation for Industry Canada SCADA licence and tower at 8-19 wellsite	Technical – Carlos Perez Consultation – Jessica Blackmore Regulatory – Glenda Prudom	Complete
<b>Amendment – Main Pipeline Licence #54407 (Line 1)</b> <ol style="list-style-type: none"> <li>1. Line length reduction</li> <li>2. Reroutes of ROW</li> </ol>	Technical – Carlos Perez Consultation – Jessica Blackmore PLA – Amanda Allen IOPS – Carlos Perez Regulatory – Glenda Prudom	Mid May 2014 expected for first amendment, with further amendments ongoing if other reroutes are identified. Delayed due to delay in receipt of required PLA for Namepi Creek crossing reroute. Complete

<p><b>Special Report #3 – Tracer Analysis (Condition of Approval No. 11837A)</b></p> <p>Request for final report extension submitted to AER on November 18, 2013.</p>	<p>Subsurface Manager – Sean McFadden  Technical – Luc Rock  Regulatory – Joseph Campbell</p>	<p>Interim report to be provided by January 31, 2014 (Complete), final report by June 30, 2014  Tracer Analysis Report completed and forwarded to AER June 25, 2014.</p>
<p><b>Annual Report - 2nd Annual</b></p> <p>Condition of Approval No. 11837A</p>	<p>Subsurface Manager – Sean McFadden  Technical – Mauri Smith  Regulatory – Glenda Prudom</p>	<p>January 31, 2014  Complete</p>
<p><b>MMV Plan Update Submission</b></p>	<p>Subsurface Manager – Sean McFadden  Technical - Mauri Smith  Regulatory – Glenda Prudom</p>	<p>February 27, 2014  Complete</p>
<p><b>Surface Casing Vent Flow and Gas Migration Issue Monitoring</b></p> <p>AER approval of SCVF repair deferral to end of well life via email (September 4, 2013)</p>	<p>Subsurface Manager – Sean McFadden  Technical – Luc Rock  Regulatory – Joseph Campbell</p>	<p>Annual reporting by March 31. Complete with request for annual deferral to June to meet requirements for testing in frost free conditions per AER Dir 20. Gas Migration Report completed and forwarded to AER June 30, 2014.</p>
<p><b>D51 Injection Approvals for 5-35 and 7-11</b></p>	<p>Subsurface Manager – Sean McFadden  Technical – Anna Atencio  Regulatory – Joseph Campbell</p>	<p>Q4, 2014</p>
<p><b>D65 Approval Update</b></p> <p>Condition 4 of Approval 11837A</p>	<p>Subsurface Manager – Sean McFadden  Technical – Luc Rock  Regulatory – Joseph Campbell</p>	<p>Q4, 2014</p>
<p><b>Well Licence Amendment for 8-19</b></p> <p>Type from Test Hole to Injection  Licence No. 0421182</p>	<p>Regulatory – Joseph Campbell</p>	<p>Q4, 2014</p>
<p><b>D56 for Potential EOR Pipeline Lateral</b></p>	<p>Technical – Carlos Perez  Consultation – Jessica Blackmore  Environment – Amanda Allen  Regulatory – Joseph Campbell</p>	<p>TBD</p>
<p><b>Update of Closure Plan Report</b></p> <p>Submission to AE</p>	<p>Surface Manager – Sean McFadden  Technical – Mauri Smith  Regulatory – Glenda Prudom</p>	<p>February 27, 2014  Complete</p>

<b>Scotford Well Licence Amendments</b> <b>Redwater 3-4-57-20</b> <b>Redwater 11-32-55-21</b>	Environment – Amanda Allen Regulatory – Joseph Campbell	TBD
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**Quest 2014 AER Applications Timelines \***

Table 2.0

	2013	2014			
	Q4	Q1	Q2	Q3	Q4
<b>Injection Well Perforation Self-Disclosure</b>	█				
<b>Amendment – Main Pipeline Licence #54407 (Line 1)</b>					
Line length reduction			█		
Reroutes of ROW			█		
<b>Special Report #3 – Tracer Analysis</b>		█			
Interim and final		█	█		
<b>Annual Report - 2nd Annual</b>		█			
<b>MMV Plan Update Submission</b>		█			
<b>Surface Casing Vent Flow and Gas Migration Issue Monitoring</b>		█			
<b>D51 Injection Approvals (5-35 &amp; 7-11)</b>					
Preparation of application			█	█	
Submission of application				█	
AER review				█	█
AER decision					█
8-19 D56 Well Type Amendment					█
<b>D65 Storage Scheme Approval-Amendment</b>					
Preparation of application			█	█	
Submission of application				█	
AER review				█	█
AER decision					█
<b>D56 for Potential EOR Pipeline Lateral (TBD)</b>					
<b>Update of Closure Plan Report</b>		█			

❖ Timeline above may be subject to change when under AER Review (Contingency of 30%)

### Outline of Post 2014 regulatory Work

The approval and permit requirements for Quest were determined through scope of work and consultation with Subject Matter Experts, SME. Once the approvals are obtained, they are assigned an owner and captured in the document management system.