Statoil Canada Ltd.
Solvent Co-Injection Pilot (SCIP) Project
Approval No. 11834A

SCIP 2014 (January 1 – December 31, 2013)
Annual D054 Performance Presentation
Alberta Energy Regulator
March 5, 2014
SCIP PROJECT

Introduction and Overview

- Introduction
Subsurface Issues Related to Resource Evaluation and Recovery
## BACKGROUND

### SCIP Application History

<table>
<thead>
<tr>
<th>Project</th>
<th>Application Number</th>
<th>Date Submitted</th>
<th>Approval Date</th>
<th>New Approval No.</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>Solvent Co-Injection Pilot at wells on Pad L3</td>
<td>1709858</td>
<td>2-Dec-11</td>
<td>11-Jun-12</td>
<td>11834</td>
<td>Initial application for the experimental scheme approval to co-inject solvent on 3 well pairs on Pad L3</td>
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<tr>
<td>Confidentiality request</td>
<td>1753179</td>
<td>13-Jan-13</td>
<td>6-Jun-13</td>
<td>11834A</td>
<td>Request for confidentiality for the project as well as a revised solvent start date</td>
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<tr>
<td>Steaming start date notification</td>
<td>n/a</td>
<td>18-Mar-13</td>
<td>n/a</td>
<td>n/a</td>
<td>Notification of new solvent co-injection start date of September 2013.</td>
</tr>
</tbody>
</table>
GEOSCIENCE OVERVIEW

Pad L3 - Petrophysical Log Cross-Section along L3P3

Wabiskaw Member Top
McMurray Formation Top
McMurray A2 Mudstone Base
McMurray B1 Base
Bitumen Top
Bitumen Base
Devonian Top

S
119/12-27-078-10W4/0
MD_RKB
1/250

102/12-27-078-10W4/0
MD_RKB
1/250

1AF/04-34-078-10W4/0
MD_RKB
1/250

N
GEOSCIENCE OVERVIEW

Pad L3 - Petrophysical Log Cross-Section along L3P3
GEOSCIENCE OVERVIEW

Pad L3 - Petrophysical Log Cross-Section along L3P4

S

117/12-27-078-10W4/0

CA_117122707810W400
MD_RKB 1/250

103/13-27-078-10W4/0

CA_103132707810W400
MD_RKB 1/250

104/13-27-078-10W4/0

CA_104132707810W400
MD_RKB 1/250

N

Wabiskaw Member Top
McMurray Formation Top
McMurray A2 Mudstone Base
McMurray B1 Base
Bitumen Top
Bitumen Base
Devonian Top
GEOSCIENCE OVERVIEW

Pad L3 - Petrophysical Log Cross-Section along L3P4
GEOSCIENCE OVERVIEW

Pad L3 - Petrophysical Log Cross-Section along L3P5

120/12-27-078-10W4/0
102/13-27-078-10W4/0
111/04-34-078-10W4/0

- Wabiskaw Member Top
- McMurray Formation Top
- McMurray A2 Mudstone Base
- McMurray B1 Base
- Bitumen Top
- Bitumen Base
- Devonian Top

1/250
1/250
1/250
GEOSCIENCE OVERVIEW

Pad L3 - Petrophysical Log Cross-Section along L3P5
DRILLING AND COMPLETIONS

Well Location Map – Wellbore Design for Pad L3

INJECTORS
8-5/8” slotted liners

PRODUCERS
7” slotted liners
INSTRUMENTATION

Leismer Downhole Producer Instrumentation for Pad L3

- Fiber Bragg Grating (FBG), Distributed Temperature Sensing (DTS) - 40 discrete temperature points
- Bubble Tube and Thermocouple
- Thermocouple
- Fiber Optic (FO) Gauge, single temperature/pressure
INSTRUMENTATION

Leismer Downhole Injector Instrumentation for Pad L3

- Bubble Tube and Thermocouple
- Thermocouple

Subsurface Section  5

Classification: Internal  2014-03-05
SAGD PERFORMANCE
Subsurface Section 7
SCIP 2014 Annual Performance Presentation
SCHEME PERFORMANCE

L3P5 Performance

LEISMER - L3P5 Totals

- Oil Rate (CD) m3/d
- Water Rate (CD) m3/d
- cSOR m3/m3
- iSOR m3/m3
- Steam Inj Rate m3/d
- Solvent Start-Date

Rate (m3/d)

Steam Oil Ratio (SOR)

0 5 10 15 20 25 30

SCHEME PERFORMANCE

L3P5 Performance

LEISMER - L3P5 Totals

- Total Steam (bbls/d)
- Produced Water (bbls/d)
- Gas Rate (e3m3/d)

Diagram showing the performance of L3P5 with data from 01-Jan-13 to 27-Dec-13.
Solvent Performance 2013

• 2013 Solvent Injection Period: November 15 to December 31, 2013

• At this moment it is not confidently known how much solvent has been recovered, however, compositional analysis is ongoing to tune the instantaneous and cumulative amounts

• Recovery performance results will be shown in the 2015 presentation

<table>
<thead>
<tr>
<th>Well Pair</th>
<th>Short Tubing Cumulative Injection (m³)</th>
<th>Long Tubing Cumulative Injection (m³)</th>
<th>Well Pair Cumulative Injection (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L3I5</td>
<td>1,379</td>
<td>449</td>
<td>1,828</td>
</tr>
</tbody>
</table>
SCHEME PERFORMANCE

Pad L3 SCIP Highlights

• First solvent November 15, 2013, in L3I5
  • 12 hour ramp-up to targeted solvent concentration
• 10% by volume on top of stabilized steam rates
• Pembina Redwater Condensate (rich in pentane and hexane)
• Remaining pairs phased in after surface reliability and subsurface stability proven (~1.5 months with L3I4)
• Co-injection will conclude on all three well pairs (I5, I4 and I3) by Q4 2014
• During co-injection and for a year following, compositional sampling will be ongoing to track solvent recovery
SCHEME PERFORMANCE

SCIP Key Learnings

• Optimal start-up time should occur within the ideal pressure-temperature envelope for the solvent system
• Understanding thief zone interactions helps mitigates risk
• High plant and field reliability has benefited pilot performance
• Integrated reservoir surveillance is a key factor in pilot monitoring
  − Compositional data
  − Observation well data
  − 3D and 4D seismic
  − Production data
  − History matched models
FUTURE PLANS

Subsurface Section 8

SCIP 2014 Annual Performance Presentation
No plans in 2014 for substantive changes to co-injection strategy (operating pressure, fluid composition) for Leismer Project

Solvent co-injection pilot-related activities

- Baseline (including compositional sampling): August 1 – November 15, 2013
- Solvent co-injection initiated: November 15, 2013 (L3I5)
- Well priority: January 2014 (L3I4) and targeting March 2014 (L3I3)
- Injection end date to be determined, current target Q4 2014
1. Facilities
2. Facility Performance *(n/a)*
3. Measurement and Reporting
4. Water Production, Injection and Uses *(n/a)*
5. Sulphur Production *(n/a)*
6. **Summary of Environmental Issues** *(will NOT be presented today as per AER request)* - *(n/a)*
7. Compliance Statement
8. Non-compliance Events
9. Future Plans
FACILITIES
Surface Section 1
SCIP 2014 Annual Performance Presentation
FACILITIES

Pad L3 Plot Plan

1 - Heat Medium
Skid relocated

2 – Installed new
test separator

3 – Installed solvent
injection infrastructure
(pumps, piping, etc)
FACILITIES

Simplified SCIP Schematic

Notes:
1. Auto Sampler abbreviated “AS”

Solvent Co-injection Process Sketch
MEASUREMENT AND REPORTING

SCIP Well Testing

• Test separator used to calculate daily bitumen and water production (since February 2014)

• Well test duration: 11 hours well tests with 1 hour purge

• Typical frequency is 6 – 7 per month per well

• Auto-samplers used to measure and monitor solvent recovery
  - Flexibility in sampling from gas line, casing header, overheads, and bottoms
COMPLIANCE STATEMENT
Surface Section 7
SCIP 2014 Annual Performance Presentation
• Statoil believes that it is in compliance with all conditions of the AER scheme approval and regulatory requirements
NON-COMPLIANCE EVENTS
Surface Section 8
SCIP 2014 Annual Performance Presentation
NON-COMPLIANCE EVENTS

AER Non-Compliance Events

1. December 2013

   − Voluntary self disclosure 12/24/2013: Co-injection of solvent commenced prior to receiving a Directive 051 Class III approval. Directive 051 Class III application was submitted and approval was received in January 2014.
Future SCIP Plans

- Future plans for existing infrastructure to be determined
There’s never been a better time for good ideas.

Presentation: SCIP 2014 Annual Performance Presentation (D054) to Alberta Energy Regulator

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