2013 Subsurface Performance Presentation

Devon Canada Corporation

Jackfish SAGD Project

Commercial Scheme Approval No. 10097
(as amended)
October 2013
<table>
<thead>
<tr>
<th>Section</th>
<th>Author</th>
</tr>
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<tr>
<td>Background</td>
<td>Bernard Leung</td>
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<td>Geology/Seismic</td>
<td>Dermot O’Shea</td>
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<td>Drilling &amp; Completions</td>
<td>Bernard Leung</td>
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<td>Bernard Leung</td>
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<td>Scheme Performance J2</td>
<td>Heather Krislock</td>
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<td>Future Plans</td>
<td>Mark Anderson</td>
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Project Background
Section 3.1.1-1
• Jackfish 1 and 2 utilize steam-assisted gravity drainage (SAGD) to recover bitumen from the McMurray formation
• Located 150 km south of Fort McMurray
• J1 Scheme approval granted in Aug 2006
• J2 Scheme approval granted in Aug 2008
• Amalgamation of Jackfish approvals (included J3) in Nov 2011
Brief Background of Scheme
Overall Scheme Map
Brief Background of Scheme
Jackfish 1

5,565 m³/day (35,000 bbl/d) bitumen production licensed capacity

- Currently, 42 well pairs on 6 pads (A-E,H) are operational
- Pad I scheduled to start up in Q4 2013
- Pad G is currently in the application process
5,565 m³/day (35,000 bbl/d) bitumen production licensed capacity

- 35 well pairs are operating on 5 pads (AA-DD, KK)
- 9 well pairs at Pad FF are scheduled for start up in Q4 2013
- Pad OO & PP are currently in the application process
Geology
Section 3.1.1-2
### Geology

**Jackfish Approved Area OBIP**

#### 3.1.1-2a

<table>
<thead>
<tr>
<th></th>
<th>Area (Ha)</th>
<th>OBIP ($10^6 m^3$)*</th>
<th>Avg. Net Steamable Pay (m)**</th>
<th>Avg. Oil Saturation (So)**</th>
<th>Avg. Porosity (%)**</th>
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</table>

*OBIP derived from Geomodel: Steamable interval >18m

**Average attributes derived from well control

Net Steamable Pay >18m

Phi>25%; So>50%; VSh<30%

---

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3.1.1-2a

1. Lithological facies are identified using core, logs and associated petrophysical attributes.

2. Steamable interval is deterministically defined by a “steamable” top and base using vertical well control.

3. Create steamable top and base structure surfaces.

4. 3D geomodel is statistically distributed with facies and their associated reservoir attributes (water saturation, porosity, permeability).
### Net Steamable Pay

- Cumulative pay that exists within the steamable interval and contributes to OBIP
- \( \Phi > 25\%; \ So > 50\%; \ Vsh < 30\% \)

<table>
<thead>
<tr>
<th>Pad</th>
<th>OBIP ((10^6 \text{m}^3))</th>
<th>Avg Steamable Interval (m)</th>
<th>Avg Net Steamable Pay (m)</th>
<th>Avg Oil Saturation Of Pay (%)</th>
<th>Avg Porosity of Pay (%)</th>
<th>Status</th>
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<tbody>
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<td>A</td>
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<td>C</td>
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<td>H</td>
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### Geology

**Jackfish 2 OBIP and Reservoir Properties**

### 3.1.1-2b

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<th>Pad</th>
<th>OBIP ((10^6 \text{m}^3))</th>
<th>Avg Steamable Interval (m)</th>
<th>Avg Net Steamable Pay (m)</th>
<th>Avg Oil Saturation Of Pay (%)</th>
<th>Avg Porosity of Pay (%)</th>
<th>Status</th>
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<tr>
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**Net Steamable Pay**
- Cumulative pay that exists within the steamable interval and contributes to OBIP
- Phi>25%; So>50%; Vsh <30%

[Net Steamable Pay >18m](#)
### 3.1.1-2b

<table>
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<tr>
<th>Property</th>
<th>Jackfish 1</th>
<th>Jackfish 2</th>
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<td>Avg Reservoir Depth mTVD</td>
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<tr>
<td>Avg Reservoir Depth mASL</td>
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<td>202</td>
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<td>Avg. Original Reservoir Pressure kPa</td>
<td>2700 @ scheme startup</td>
<td>2700 @ scheme startup</td>
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<tr>
<td>Avg. Reservoir Temp. ºC</td>
<td>12</td>
<td>12</td>
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<tr>
<td>Avg Kh md</td>
<td>5000</td>
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<tr>
<td>Avg Kv md</td>
<td>2000</td>
<td>1200</td>
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<tr>
<td>Avg Phi %</td>
<td>33</td>
<td>33</td>
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<tr>
<td>Avg Bitumen Visc. Cp</td>
<td>1,000,000+</td>
<td>1,000,000+</td>
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<tr>
<td>Original Bottom Water Pressure kPa</td>
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Geology
Jackfish Net Steamable Pay > 18 m
Geology
Jackfish Structure On Base Steamable Surface

3.1.1-2d

M ASL

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Geology
Jackfish Structure On Top Steamable Surface

3.1.1-2d
• Water Contact to Paleozoic = “bottomwater”
• No areas of water influx or “thieving”
Geology
Jackfish 1 Representative Well Log

3.1.1-2e

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Geology
Jackfish Cores and FMI Logs

3.1.1-2f

Project Area
- 2013 Wells: 25
- Total Well Count: 335
- 2013 Core: 9
- Total Core: 162
- 2013 FMI: 21
- Total FMI: 248

Special Core Analysis
- AA/05-30-075-06W4 - Grain size, water mobility
- 02/01-27-075-07W4 - Geomechanical
- 02/05-27-075-07W4 - Rel perm, water mobility, geomech
- all work still ongoing
Geology Jackfish 1
Representative Structural Cross-Section
Geology Jackfish 2
Representative Structural Cross-section

3.1.1-2i

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Geology
Jackfish Clearwater Regional Cap Rock Isopach

- Regionally extensive
- 15 to 25 m throughout project area
• 02/01-27-075-07W4 & 02/05-27-075-07W4 selected for caprock core and subsequent geomechanical testing
• Geomechanical testing still underway
J1 (2008-2013)
Max displacement rate: 52 mm/yr (Pad A)
Max cumulative displacement: 210 mm (Pad A)
No steam related subsidence observed
Accuracy of data point xy cords affected by error in manually overlaying InSAR with ground image (6m) and combining image pixels (5m)
Jackfish 2
Accumulated Displacement 2011-2013

3.1.1-2k

J2 (2011-13)
Max displacement rate: 47 mm/yr (Pad BB)
Max cumulative displacement: 95 mm (Pad BB)
No steam related subsidence observed
Accuracy of data point xy cords affected by error in manually overlaying InSAR with ground image (6m) and combining image pixels (5m)
Jackfish 1 & 2
Corner Reflectors March 2013

Installed 53 corner reflectors

Installed 37 corner reflectors
Seismic
Jackfish 3D & 4D Shoots

2003-2008: Jackfish 3-D
23 km²

Jackfish 2 4-D
2013: 9.1 km²

Jackfish 1 4-D
2010: 8.4 km²
2011: 8.4 km²
2012: 9.1 km²
2014: (prop’d)

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Jackfish 2 4D Seismic Survey
Preliminary Interpretation

- Colour gradient represents BHL reflector depth change from 2008 (March) to 2013 (March)

- Time delay is in direct relation to level of steam chamber development and cumulative production

- Pad BB & AA currently highest cumulative production

- Interpretation currently being refined and tied to Obs well data

Low steam chamber development correlates with mapped shale channel

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Drilling & Completions
Section 3.1.1-3
Operating SAGD Horizontal Wells

- **Jackfish 1** - 42 well pairs on six pads (Hz sections are 790 - 1200m)
- **Jackfish 2** - 35 well pairs on five pads (Hz sections are 790 - 900m)

Observation Wells

- 22 SAGD observation wells in operations (2 per operating pad)
- 5 additional wells to be online (2 at Pad I & 3 at Pad FF)
- 21 regional multi-zone monitoring wells equipped with piezometers

Service Wells

- 6 brackish source water wells (Grand Rapids)
- 9 water disposal wells (Class 1b)
Drilling & Completions
Jackfish 1 Overview - SAGD Wells

Existing Pads
• Pad A, B, C, D, E & H: 7 well pairs per pad
• Pad I: 7 well pairs (not producing)
• 2 observation wells per pad (heel and toe)

Future Pad Activity
• Pad G is currently in application process
Current Pads
- Pad AA, BB, CC, DD & KK: 7 well pairs per pad
- Pad FF (9 well pairs) scheduled to start up in early Q4
- 2 observation wells per pad (heel and toe), 3 wells at Pad FF

Future Pad Activity
- Pad OO & PP are currently in application process
Drilling & Completions
Jackfish 3 Overview - SAGD Wells

Existing Pads
- Pad J: 7 well pairs drilled & completed
- Pad VV: Currently being completed
- Pad EE: Currently being drilled

Future Pad Activity
- Pad K & RR to be drilled in 2014
Some injectors had been upsized the vertical section to 114.3 mm (4½")
Currently, two Jackfish 2 SAGD injector wells are equipped with steam distribution system

- AA4I - 109/03-28-075-07W4M
- DD3I - 102/11-28-075-07W4M

Steam distribution system will be selectively installed in Jackfish 3 injectors on a well by well basis

- 10 of the first 24 wells will be equipped with the steam distribution system
Jackfish 1 & 2 SAGD Production Well

406.4 mm (16") Conductor Pipe

298.5 mm (11¼") Production Casing
Kick-Off Point approximately 150 m

114.3 mm (4½") Tubing - "Long"

38.1 mm (1½") Coiled Tubing Instrumentation

114.3 mm (4½") Tubing - "Short"

1½" Coiled Tubing Lift Gas concentric in "Long" Tubing -
12000 scf/d

1½" Coiled Tubing Lift Gas concentric in "Short" Tubing -
6000 scf/d

219.1 mm (8 5/8") Slotted Liner
Thermal Shear Sub—used for pulling Instrumentation Coiled Tubing
to toe, separates at 110°C when steam injection is started

Liner Hanger at approx. 700 m MD (415 TVD)
Total Depth approximately 1500 m MD
Currently, two Jackfish 2 SAGD producer wells are equipped with ICD
- CC1P - 113/08-29-075-07W4M
- DD2P - 110/06-28-075-07W4M

ICD can create additional pressure drops to restrict flow in strategic locations
- Promote evenly distributed flow profile along the well lateral
- More uniform pressure drawdown along the lateral can potentially mitigate “hot spot” and steam breakthrough issues
Objectives of Test#1:

- Confirm fluid jet drilled holes can be drilled vertically from main bore.
- Slim holes will act as conduits through low permeable zones.
- Identify changes to production or steam chamber development due to the slim holes.

Description of Test#1:

- Single well test on FF2I, where 15.2 cm slim holes are drilled from the main injector bore through a low permeable zone.
- Used high pressure fluid and self-propelled section of coil tubing to advance.
- Slim holes target length 5 meters in the vertical direction. Locations along horizontal selected on geology.
- Drilling executed Q4 2012. 12 out of 14 holes successfully placed in injector well.
- First steam expected Q4 2013. Initial results expected Q1 2014.
- Production and temperature will be used to measure any enhancements from slim holes.
Artificial Lift
Section 3.1.1-4
Artificial Lift

• Gas lift is currently used exclusively for artificial lift at both Jackfish 1 and Jackfish 2

• Gas lift continues to be an effective lift strategy for Jackfish operating conditions
  - Typical operating pressure 2600 to 3500 kPag
  - Ability to handle over 1000 m3/day emulsion flow
  - No operating temperature limitation
Instrumentation in Wells
SAGD Injection & Producer Wells

Variation #1
6 Thermocouples
19mm (3/4 in.) instrumentation coiled tubing

Variation #2
8 Thermocouples
25.4mm (1 in.) instrumentation coiled tubing

Variation #3
6 Thermocouples + Fiber Optics control line
25.4mm (1 in.) instrumentation coiled tubing

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Various methods are used simultaneously to monitor down hole pressure

**For Injector Wells:**

- Using thermocouples / fiber optics temperature data to convert downhole live steam temperature from $T_{\text{sat}}$ to $P_{\text{sat}}$*
- Conducting annulus blanket gas pressure survey on weekly basis
- Conducting periodic near-zero steam injection rate test to estimate bottomhole pressure from surface injection pressure

* Prior initial start up of circulation, well pairs would be purged to eliminate dead fluid column inside the wellbore. Historical data also showed such procedures improve warm up time in the horizontal wellbore section.

**For Producer Wells:**

- Use concentric open-ended lift gas (LG) coiled tubing to calculate down hole pressure
  - BHP = LG surface pressure - frictional losses + static head
  - Frictional losses are correlated/calculated by performing numerous gas lift step rate tests
  - Typical uncertainty to be < 1%
- Validation of the above correlation is re-assured by periodic annulus blanket gas pressure surveys

**Other Measurement Initiative - Bubble tube:**

- currently there are limited applications (3 wells) to existing wells due to current surface unit control design
- A new surface unit control design to be trialed in early 2014 on 5 existing wells and all Jackfish 3 producer wells

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Jackfish 1 and 2 SAGD observation wells contain:

- 20 points thermocouples (25 points in more recently drilled wells), spaced above, below & within pay interval
- 2 pressure sensors, one in the bitumen and the other in the basal water
Instrumentation in Wells
Regional Multi-zone Monitoring Wells

Monitoring wells cover areas of Jackfish 1, 2, and 3

Twenty-one wells

- 00/07-32-75-6W4 (5 piezometers)
- F1/08-28-75-6W4 (4 piezometers)
- F1/09-14-75-6W4 (4 piezometers)
- F1/12-31-75-6W4 (4 piezometers)
- F1/10-22-75-6W4 (5 piezometers)
- F1/04-26-75-7W4 (5 piezometers)
- F1/06-28-75-7W4 (5 piezometers)
- F1/15-19-75-6W4 (5 piezometers)
- F1/09-24-75-7W4 (5 piezometers)
- F1/14-25-75-6W4 (5 piezometers)
- F1/05-12-75-6W4 (5 piezometers)
- F1/09-22-75-7W4 (4 piezometers)
- 02/12-23-75-7W4 (4 piezometers) *
- 02/01-35-75-7W4 (3 piezometers)
- 00/15-07-75-5W4 (4 piezometers)
- 00/07-22-75-7W4 (2 piezometers)
- 00/03-15-75-6W4 (3 piezometers) **
- 02/09-33-75-6W4 (4 piezometers)
- 00/04-30-75-7W4 (3 piezometers)
- 00/01-19-75-6W4 (3 piezometers) **
- AA/11-30-75-6W4 (5 piezometers)

* Perf with a Level Logger
** Perf for water sampling

Surface Data Logger

114.3 mm- 4 ½” Casing

Quaternary
Colorado Group
Mid McMurray Bitumen
Lower McMurray Bitumen
Basal McMurray
Grand Rapids C
Clearwater
Wabiskaw

Pressure Sensors

~440 mKB --

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3.1.1-5c,d

- Required information for Section 3.1.1-5c - d are located in the appendix
Scheme Performance
Section 3.1.1-7
### Circulation (~3 months)

- Circulate steam into injectors and producers to heat the inter-well region
- Inject steam down long tubing; returns up short tubing
- Bottom hole pressures are controlled at or slightly above reservoir pressure to minimize interference from the aquifer
- Once sufficient heat has been transferred to the formation, wells are transitioned to full SAGD operating mode
  - use temperature falloff and bump tests to confirm heat transfer
Partial SAGD (~4-5 days)

- Returns from injector are closed (direct injection)
- Continue to circulate steam in producer

Full SAGD

- Inject steam down both long and short tubing of injector
- Produce up both long and short tubing of producer
- Adjust steam and choke to achieve injector bottom hole temperature target
- Startup plan has been successful; continue to follow the plan
- If a well pair is not performing as expected, well pair would be converted to partial or full circulation mode for short duration:
  - Attempt to warm up the inter-well fluids and optimize drainage
  - Hence, producer will have small volume of steam injection reported in Petroleum Registry
Scheme Performance Prediction
Jackfish 1 and 2

- Well pair performance predictions based on Butler’s equation, historical data and input from geology and reservoir
- Well capability forecasted and subsequent well and plant service factors applied
- Service factors based on historical data, future plans and quantified risks
Scheme Performance
Jackfish 1 Overview

• Production is currently at designed plant capacity of bitumen (35,000 bbl/d)
• Current CSOR is approximately 2.5 which is below initial plant design
• 42 wells currently on production from 6 pads
Devon manages injection pressures to maximize producing rates, manage leakoff and increase overall reservoir recovery. Small reductions in pressure have been implemented in 2013 and will be studied to determine long term pressure plan.
• Calculation of injection pressure can be measured several ways and different methods are used at a well level to represent the most accurate data. Studies are ongoing as to the best single method to determine pressure for Devon wells.

• In 2012 the pressure data was calculated by taking the thermocouple readings in the injectors and converting them to a saturated pressure. In 2013 the pressure data was calculated by using long string steam injection pressure correlations. The switch was made for the following reasons:
  - Failed injector ICT points were getting difficult to manage over time
  - Devon suspected data reliability issues on some of the original ICT strings in the district when compared to blanket gas readings to determine accuracy
  - The long string steam injection pressure correlation method provided a single common method across J1
## Scheme Performance

### Jackfish 1 Pad Recoveries

<table>
<thead>
<tr>
<th>Pad</th>
<th>OBIP ($10^6$ m$^3$)</th>
<th>Ult Rec $^1$ ($10^6$ m$^3$)</th>
<th>Cum Prod $^2$ ($10^6$ m$^3$)</th>
<th>R.F. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4.75</td>
<td>3.08</td>
<td>3.15</td>
<td>66.3%</td>
</tr>
<tr>
<td>B</td>
<td>4.04</td>
<td>2.62</td>
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<tr>
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<td>46.8%</td>
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<tr>
<td>E</td>
<td>3.94</td>
<td>2.79</td>
<td>0.62</td>
<td>15.7%</td>
</tr>
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<td>H</td>
<td>3.37</td>
<td>2.19</td>
<td>0.09</td>
<td>2.7%</td>
</tr>
</tbody>
</table>

$^1$ 65% recovery factor (predicted)

$^2$ Effective August 31, 2013
Pad A Highlights

- First steam on August 2007
- Pad A has the longest production history
- 7 well pairs in operation
- Production is currently in the decline phase
- Overall performance fully meets expectations
- High recovery pad example
Pad A Heel Observation Well Temp
(7.1m from A5 well pair)

3.1.1-5d

Conductive heating
Pad B Highlights

- First steam on August 2007
- 7 well pairs in operation
- Lower recovery pad example, production currently in the plateau phase
- Since early 2011, consistent steam to Pad B wells has improved oil production

* Based on operational history, Pad B is still immature. Prior early 2011, Pad B (due to its poor performance) was usually the first pad received steam curtailment during plant upset.
Pad B Performance
Jackfish 1 Pad B Life Plot

3.1.1-7c

SO (m^3/m^3), Well Pairs

Daily Steam Injection
Daily Oil Production
Daily Water Production
ISOR
CSOR
Well Pairs

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Pad D Highlights

- First steam on July 2008
- 7 well pairs are operational
- Steam injection started at D6 and D7 in December 2009
- Pad production is in the decline phase
- Recent focus on dropping operating pressure to balance WSR showing predicted results
Scheme Performance

Jackfish 2 Overview

- Production is currently 3,580 m³/d (22,500 bbl/d) bitumen and continuing to ramp up
- Licensed capacity of 5,565 m³/d (35,000 bbl/d)
- Currently 35 well pairs on production
- Recent cumulative SOR is approaching 3.0
- Have been decreasing operating pressure since December 2012
- First turnaround completed August 2013
# Scheme Performance
## Jackfish 2 Pad Recoveries

<table>
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<tr>
<th>Pad</th>
<th>OBIP ($10^6$m$^3$)</th>
<th>Ult Rec $^1$ ($10^6$m$^3$)</th>
<th>Cum Prod $^2$ ($10^6$m$^3$)</th>
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<td>20.92</td>
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<tr>
<td>BB</td>
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<td>2.92</td>
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<td>10.14</td>
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<tr>
<td>KK</td>
<td>2.89</td>
<td>1.88</td>
<td>0.25</td>
<td>8.65</td>
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</tbody>
</table>

$^1$ 65% recovery factor (predicted)

$^2$ Effective August 31, 2013
Pad BB Highlights

- First steam occurred in May 2011
- Pad BB was the first Pad to startup and has the longest production history
- 7 well pairs are operational
- Best performing pad at Jackfish 2 and is meeting expectations
- 1 partial scab liner installed in August 2012 for hot spot mitigation
- Upsized vertical tubing in 2 injectors during August 2013 turnaround
Pad CC Highlights

- First steam occurred during June 2011
- 7 well pairs are operational
- Difficulties converting CC5 and CC6 to full SAGD due to poor interwell reservoir quality
- Heterogeneous reservoir is impacting steam chamber development
- Stable producer
- 1 Inflow Control Device installed during August turnaround
Pad CC Heel Observation Well Pressure (8m from CC4 well pair)
Pad DD Highlights

- First steam occurred during May 2011
- 7 well pairs are operational
- Heterogeneous reservoir is impacting steam chamber development
- Oscillating production profile due to uneven pay thickness
- 1 Selective Steam Device installed in November 2012
Pad DD Performance
Jackfish 2 Pad DD Life Plot

3.1.1-7c

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Pad DD Toe Observation Well Temp (10.5m from DD3 well pair)
Pad DD Toe Observation Well Pressure
(10.5m from DD3 well pair)

Fluid level shot June 2012 to dispute pressure reading
## Pad DD Toe Observation Well Pressure

(10.5m from DD3 well pair)

![Graph showing varying pressure and temperature over time]

<table>
<thead>
<tr>
<th>Shot #</th>
<th>Acoustic Travel Distance (m)</th>
<th>Pressure (kPag)</th>
<th>Temperature (ºC)</th>
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<tr>
<td>1</td>
<td>497</td>
<td>3950</td>
<td>36</td>
</tr>
<tr>
<td>2</td>
<td>568</td>
<td>3950</td>
<td>36</td>
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<tr>
<td>3</td>
<td>570</td>
<td>3950</td>
<td>36</td>
</tr>
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</table>

*Fluid shot conducted on DD2P*
Five Year Outlook
Jackfish 1 and 2 Pad Abandonments

- No anticipated pad abandonments at Jackfish 1 & 2 within the next five years
Reservoir Saturation Tool (RST)  
2013 RST Logging Program- Jackfish

17 RST logs ran in J1 & J2 District in 2013:

<table>
<thead>
<tr>
<th>Jackfish</th>
<th>Pad</th>
<th>Relative Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>Heel near A5, 00/08-32</td>
</tr>
<tr>
<td>1</td>
<td>B</td>
<td>Heel &amp; Toe near B2</td>
</tr>
<tr>
<td>1</td>
<td>C</td>
<td>Heel &amp; Toe near C5</td>
</tr>
<tr>
<td>1</td>
<td>D</td>
<td>Heel &amp; Toe near D4, 00/08-05</td>
</tr>
<tr>
<td>1</td>
<td>E</td>
<td>Heel &amp; Toe near E5</td>
</tr>
<tr>
<td>2</td>
<td>BB</td>
<td>Toe near BB4</td>
</tr>
<tr>
<td>2</td>
<td>CC</td>
<td>Near Heel of CC6</td>
</tr>
<tr>
<td>2</td>
<td>DD</td>
<td>Heel &amp; Toe near DD3</td>
</tr>
<tr>
<td>2</td>
<td>KK</td>
<td>Heel &amp; Toe near KK5</td>
</tr>
</tbody>
</table>

- Used to validate thermocouple instrument readings
- Used to validate vertical chamber growth
- Additional RST’s planned for J1, J2 & J3 in 2014
Wellhead Steam Quality

Jackfish 1 and 2

- 5.5 Mpa wellhead injection limit
- Losses occur as steam is transported to the pads
- Utilize condensate traps at each pad to maximize wellhead steam quality

<table>
<thead>
<tr>
<th></th>
<th>Pressure (kPag)</th>
<th>Temperature (°C)</th>
<th>Quality (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant Gate</td>
<td>9,500</td>
<td>308</td>
<td>100%</td>
</tr>
<tr>
<td>J1 Wellhead</td>
<td>3,100-4,300</td>
<td>233-243</td>
<td>97%</td>
</tr>
<tr>
<td>J2 Wellhead</td>
<td>3,600-4,600</td>
<td>247-260</td>
<td>97%</td>
</tr>
</tbody>
</table>
Jackfish Performance
Key Learnings

• Understanding benefits of reduced operating pressure:
  - SOR optimization
  - Reduced leak off
  - Increased ability to inject steam to toe
  - Hot spot reduction

• Application of new technologies to improve recovery and SOR

• Improving SAGD well placement with advanced logging tools
Jackfish Performance
Injection Well with Steam Splitter Update

- Successfully installed Selective Steam completion in two injectors
- Improved producer conformance
- Increased ability to inject steam to toe (area with higher net pay)
Future Plans
Section 3.1.1-8
Future Plans
Jackfish 1 Well Operations & Drilling

• Continued production at design capacity.
• Steam limited operations.
• Pad I to start up in Q4 2013 through 2014, as steam is available.
• SAGD drilling on Pad G in 2014.
• 2 observation wells to be drilled on Pad G.
• 4D seismic shoot proposed for 2014.
• Plant maintenance turnaround tentatively planned for 2014.
Future Plans
Jackfish 2 Well Operations & Drilling

• Jackfish 2 at well capacity.
• Pad FF first steam planned for Q4 2013.
• Trialing tubing deployed inflow control on 2 producing wells.
• SAGD Drilling on Pad OO and PP in 2014.
• 2 observation wells to be drilled on each Pad OO and PP.
Future Plans
Jackfish 3 Drilling & Trials

- First Steam planned for late 2014.
- SAGD drilling on Pad EE, K, and RR in 2014.
- 2 observation wells to be drilled on each Pad J, VV, and RR.
- Steam distribution to be installed on some Pad VV wells.
Future Plans (2013-2014)
Jackfish 1 Steam Strategy

- J1 first five pads on production with anticipated decline in 2014.
- Pad H onstream and ramping up.
- Additional Pad I first steam in Q4 2013 as steam is available.
- Jackfish 1 expected to be steam limited through 2014.
- *Plant maintenance turnaround planned for 2014.*

<table>
<thead>
<tr>
<th>Steam Forecast by Well w/ DT (MBbl/d)</th>
<th>Pad A</th>
<th>Pad B</th>
<th>Pad C</th>
<th>Pad D</th>
<th>Pad E</th>
<th>Pad H</th>
<th>Pad I</th>
<th>Total (T/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ave Balance of 2013</td>
<td>20.0</td>
<td>13.5</td>
<td>14.5</td>
<td>13.0</td>
<td>16.2</td>
<td>14.7</td>
<td>2.5</td>
<td>94.4</td>
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<tr>
<td>Ave 2014</td>
<td>16.8</td>
<td>12.4</td>
<td>13.2</td>
<td>11.2</td>
<td>15.0</td>
<td>14.2</td>
<td>6.3</td>
<td>89.1</td>
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<tr>
<td>Exit Rates 2014</td>
<td>17.0</td>
<td>13.4</td>
<td>13.8</td>
<td>11.1</td>
<td>16.3</td>
<td>15.4</td>
<td>9.7</td>
<td>96.6</td>
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<tr>
<td>Total 2014</td>
<td>6,100</td>
<td>4,500</td>
<td>4,800</td>
<td>4,100</td>
<td>5,500</td>
<td>5,200</td>
<td>2,300</td>
<td>32,500</td>
</tr>
</tbody>
</table>
Future Plans (2013-2014)
Jackfish 2 Steam Strategy

• Production expected to remain steady through 2013.
• Pad FF first steam anticipated in late 2013 and rampup in 2014.
• Jackfish 2 not expected to be steam limited in 2014.

<table>
<thead>
<tr>
<th>Steam Forecast by Well w/ DT (MBbl/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pad AA</td>
</tr>
<tr>
<td>Ave Balance of 2013</td>
</tr>
<tr>
<td>Ave 2014</td>
</tr>
<tr>
<td>Exit Rates 2014</td>
</tr>
<tr>
<td>Total 2014</td>
</tr>
</tbody>
</table>
Future Plans (2013-2014)
Jackfish 3 Steam Strategy

- Jackfish 3 Plant startup expected in late 2014.
- First steam anticipated in 2014 on Pad J, VV, and EE.

<table>
<thead>
<tr>
<th>Steam Forecast by Well w/ DT (MBbl/d)</th>
<th>Pad J</th>
<th>Pad VV</th>
<th>Pad EE</th>
<th>Total</th>
<th>Total (T/hr)</th>
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</thead>
<tbody>
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<td>Ave Balance of 2013</td>
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<td>Ave 2014</td>
<td>3.2</td>
<td>5.0</td>
<td>3.8</td>
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<tr>
<td>Total 2014</td>
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<td>1,800</td>
<td>1,400</td>
<td>4,400</td>
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</table>
2013 Performance Presentation
Supplemental Data
Devon Canada Corporation

Jackfish SAGD Project

Commercial Scheme Approval No. 10097
(as amended)
October 2013
Devon Pad C Solvent Pilot

Objectives of Test#1:
- Confirm increasing production rates / SOR Reduction.
- Validate testing and sampling procedures.
- Review changes in Gas analysis and Bitumen composition.

Description of Test#1:
- Single well test co-injecting Hexane with Steam. Injection rate coupled to steam rate.
- Solvent recovery being tracked in both gas and liquid phases using Devon operated lab on site.
- Injection started Q1 2013 and stopping Q3 2013. Solvent in produced fluids appeared within 1 month of starting injection. Continuing to monitor solvent after injection stops until solvent ultimate recovery achieved.
- Solvent migration mitigated using pressure differential between neighboring steam chambers along with regular sampling of adjacent wells.
- Effect on production rates and SOR currently under review.
Co-injection Pilot

- Co-injection of methane with steam in the field to improve SOR
- 3% to 10% mole fraction of gas to steam
- Methane is currently co-injected with steam into Pad A pairs:
  - A3 (April - Present)
  - A4 (July - Present)
  - A5 (June - Present)
- Rates vary between 5-10 e3m3/d
- Co-injection has not demonstrated a negative impact on production since April 2013
- Still at the first phase of co-injection and it is too early to evaluate impact on CSOR and rate of recovery
Potential Projects
Status Update

• Infill wells at Jackfish have been postponed.
• Pad J pre-startup solvent soak trial was cancelled.
At 5:40am on 11 July 2013 surface piping adjacent to well C6P at JF1 Well Pad C was identified to be releasing production fluids. The emergency response plan was activated.

The release was stopped at 2:05pm that afternoon; total release time of ~8.5 hours. Bitumen, produced water and steam were released, the majority of which was collected on, and removed from the well pad.

Mobile ambient air monitoring station was deployed, all samples showed non-detects or low background H$_2$S levels. Spill containment booms were mobilized to the nearest surface water body. Produced liquids on Well Pad C were contained. Surface water bodies were sampled and all results were within previous testing ranges. Surface contaminants were not observed on any water body surface.

Failure points were confirmed in the surface piping of the long production string at the first, second and sixth elbows and wing valve.

Bitumen release volume was estimated to be 7.5 m$^3$ on-site and 3.6 m$^3$ off-site, produced water (liquid/steam) was estimated to be 14 m$^3$ on-site and 5.5 m$^3$ off-site. Estimated bitumen volumes were based on observed area and estimated thickness. Off-site volumes were quantified through mass measurement of bitumen loading on a coated PVC pipe and extrapolating the results to the impacted area.
Well Pad C base material and berms that came into contact with bitumen were removed for disposal. Testing was completed to confirm that on-site impacted material was removed and that bitumen impacts were contained on-site.

An environmental assessment concluded that off-lease misting was scarce, and that there was negligible environmental impacts. Wildlife was not in the vicinity of the C6P release. There is no evidence of stressed wildlife or mortality.

Ongoing environmental monitoring efforts related to the B3P release have been expanded to include areas of deposition related to the C6P release. Monitoring includes vegetation, wildlife, soil, ground and surface water assessments. All monitoring conducted to date indicate negligible impacts. Winter wildlife tracking program will be conducted in 2013 and 2014 to assess wildlife use of the habitat within the vicinity of Well Pad C.
Further information on the C6P Release is available in the “Incident Investigation Response Report” provided to AER on Sept 16th, 2013 (Reference FIS Incident No: #20131348)
Appendix A
Instrumentation 3.1.1-5c,d
**Instrumentation**

**Regional Multi-zone Monitoring Wells**

F1/09-22 Quaternary piezometer is in the Empress Sand equivalent of the Sunday Creek Channel

<table>
<thead>
<tr>
<th>UWI</th>
<th>R/R</th>
<th>Quaternary</th>
<th>Colorado Group</th>
<th>Grand Rapids</th>
<th>Clearwater</th>
<th>Wabiskaw</th>
<th>McMurray Bitumen</th>
<th>Bsl McMurray water</th>
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</tbody>
</table>
Pad A Heel Observation Well Temp
(7.1m from A5 well pair)

3.1.1-5d
Pressure plots submitted in 2012 presentation had both heel and toe locations plotted on the same figure, as well as daily averaged pressure values. 2013 pressure plots use monthly averaged pressure values on separate heel and toe plots.
Pad A Toe Observation Well Temp
(5.3m from A5 well pair)

Equipment requires vendor repair to correct fluctuating data. Thermocouple depths corrected from 2012 presentation.
Pressure plots submitted in 2012 presentation had both heel and toe locations plotted on the same figure, as well as daily averaged pressure values. 2013 pressure plots use monthly averaged pressure values on separate heel and toe plots.
Pad B Heel Observation Well Temp
(6.5m from B2 well pair)
Pad B Heel Observation Well Pressure
(6.5m from B2 well pair)

Pressure plots submitted in 2012 presentation had both heel and toe locations plotted on the same figure, as well as daily averaged pressure values. 2013 pressure plots use monthly averaged pressure values on separate heel and toe plots.

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Pad B Toe Observation Well Temp
(4.1m from B2 well pair)
Top piezometer displayed significant offset. Resolution for suspect reading being investigated.

Pressure plots submitted in 2012 presentation had both heel and toe locations plotted on the same figure, as well as daily averaged pressure values. 2013 pressure plots use monthly averaged pressure values on separate heel and toe plots.

Elevated pressure does not appear to be related to any operational changes at adjacent well pair B2I or B2P. Temporary increase in observed pressure may be partially linked to cleanout of a neighboring lateral.
Equipment requires vendor repair to improve confidence in recent thermocouple readings.
Pressure plots submitted in 2012 presentation had both heel and toe locations plotted on the same figure, as well as daily averaged pressure values. 2013 pressure plots use monthly averaged pressure values on separate heel and toe plots.
Pad C Toe Observation Well Temp
(5.0m from C5 well pair)

Vendor troubleshooting and subsequent surface equipment repair September 2013
Pressure plots submitted in 2012 presentation had both heel and toe locations plotted on the same figure, as well as daily averaged pressure values. 2013 pressure plots use monthly averaged pressure values on separate heel and toe plots.
Pad D Heel Observation Well Temp
(10.9m from D4 well pair)

Equipment requires vendor repair to improve confidence in recent thermocouple readings

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Pressure plots submitted in 2012 presentation had both heel and toe locations plotted on the same figure, as well as daily averaged pressure values. 2013 pressure plots use monthly averaged pressure values on separate heel and toe plots.
Pad D Toe – Observation Well Temp
(19.8m from D4 well pair)
Pressure plots submitted in 2012 presentation had both heel and toe locations plotted on the same figure, as well as daily averaged pressure values. 2013 pressure plots use monthly averaged pressure values on separate heel and toe plots.
Pad E Heel Observation Well Temp
(35m from E5 well pair)
Pressure plots submitted in 2012 presentation had both heel and toe locations plotted on the same figure, as well as daily averaged pressure values. 2013 pressure plots use monthly averaged pressure values on separate heel and toe plots.
Pad E Toe Observation Well Temp
(32m from E6 well pair)

Equipment requires vendor repair to improve confidence in recent thermocouple readings.
Pressure plots submitted in 2012 presentation had both heel and toe locations plotted on the same figure, as well as daily averaged pressure values. 2013 pressure plots use monthly averaged pressure values on separate heel and toe plots.

Data gap due to SCADA equipment interference. Issue corrected and communication re-established.
Pad H Heel Observation Well Temp
(11.4m from H7 well pair)
Pad H Heel Observation Well Pressure (11.4m from H7 well pair)
Pad H Toe Observation Well Temp
(7.4m from H4 well pair)

3.1.1-5d
Pad H Toe Observation Well Pressure
(7.4m from H4 well pair)
Pad AA Heel Observation Well Temp (36.5m from AA4 well pair)

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3.1.1-5d
Pad AA Heel Observation Well Pressure (36.5m from AA4 well pair)

3.1.1-5d

Pressure plots submitted in 2012 presentation had both heel and toe locations plotted on the same figure, as well as daily averaged pressure values. 2013 pressure plots use monthly averaged pressure values on separate heel and toe plots.

Top and bottom sensors inverted in 2012 presentation.

Prior to 03/2013 data gap due to conversion of temporary to permanent SCADA tower equipment. Post 03/2013 data gap due to post installation troubleshooting.
Pad AA Toe Observation Well Temp
(42.8m from AA4 well pair)
Pressure plots submitted in 2012 presentation had both heel and toe locations plotted on the same figure, as well as daily averaged pressure values. 2013 pressure plots use monthly averaged pressure values on separate heel and toe plots.

Data gap due to conversion of temporary to permanent SCADA tower equipment.
Pad BB Heel Observation Well Temp
(13.5m from BB4 well pair)
Pressure plots submitted in 2012 presentation had both heel and toe locations plotted on the same figure, as well as daily averaged pressure values. 2013 pressure plots use monthly averaged pressure values on separate heel and toe plots.

Top and bottom sensors inverted in 2012 presentation.

Bottom piezometer believed to be in poor communication with formation.
Pad BB Toe Observation Well Temp
(11.5m from BB4 well pair)
Pad BB Toe Observation Well Pressure
(11.5m from BB4 well pair)

Pressure plots submitted in 2012 presentation had both heel and toe locations plotted on the same figure, as well as daily averaged pressure values. 2013 pressure plots use monthly averaged pressure values on separate heel and toe plots.
Pad CC Heel Observation Well Temp (8m from CC4 well pair)
Pressure plots submitted in 2012 presentation had both heel and toe locations plotted on the same figure, as well as daily averaged pressure values. 2013 pressure plots use monthly averaged pressure values on separate heel and toe plots.

Top and bottom sensors inverted in 2012 presentation.
Pad CC Toe Observation Well Temp
(11.7m from CC4 well pair)
Pressure plots submitted in 2012 presentation had both heel and toe locations plotted on the same figure, as well as daily averaged pressure values. 2013 pressure plots use monthly averaged pressure values on separate heel and toe plots.

Top and bottom sensors inverted in 2012 presentation.

Data gap due to conversion of temporary to permanent SCADA tower equipment.

Top piezometer believed to be in poor communication with formation.
Pad DD Heel Observation Well Temp (10.4m from DD3 well pair)
Pressure plots submitted in 2012 presentation had both heel and toe locations plotted on the same figure, as well as daily averaged pressure values. 2013 pressure plots use monthly averaged pressure values on separate heel and toe plots.

Top and bottom sensors inverted in 2012 presentation.

Data gap due to conversion of temporary to permanent SCADA tower equipment.
Pad DD Toe Observation Well Temp
(10.5m from DD3 well pair)
Pad DD Toe Observation Well Pressure
(10.5m from DD3 well pair)

Fluid level shot June 2012 to dispute pressure reading. Top and bottom sensors inverted in 2012 presentation.

Pressure plots submitted in 2012 presentation had both heel and toe locations plotted on the same figure, as well as daily averaged pressure values. 2013 pressure plots use monthly averaged pressure values on separate heel and toe plots.
Pad KK Heel Observation Well Temp
(8.5m from KK5 well pair)
Pad KK Heel Observation Well Pressure (8.5m from KK5 well pair)

Pressure plots submitted in 2012 presentation had both heel and toe locations plotted on the same figure, as well as daily averaged pressure values. 2013 pressure plots use monthly averaged pressure values on separate heel and toe plots.

Top and bottom sensors inverted in 2012 presentation.
Pad KK Toe Observation Well Temp
(9m from KK5 well pair)
Pad KK Toe Observation Well Pressure (9m from KK5 well pair)

Pressure plots submitted in 2012 presentation had both heel and toe locations plotted on the same figure, as well as daily averaged pressure values. 2013 pressure plots use monthly averaged pressure values on separate heel and toe plots.

Data gap due to SCADA equipment interference. Issue corrected and communication re-established.

Top and bottom sensors inverted in 2012 presentation.
Observation Well Pressure Measurement Challenges

In cases where downhole pressure sensor readings are considered suspect it is primarily believed poor communication between the sensor and reservoir to be the cause. Investigative work being done to date on pressure instrumentation readings is as follows:

- Exploring other vendor options and moving instrumentation internal to the casing with monitoring equipment
- Conducting fluid shots on adjacent producing wellbores to confirm suspect pressure readings are not reflective of reservoir pressures
- Have instrumentation vendor conduct analysis on drift mechanisms in temperature sensor component of ERD
- Work with instrumentation vendor to develop corrective actions to improve reading reliability

In the event of a failed pressure sensor, Devon will continue to use other installed observation well sensors at a particular pad to monitor subsurface pressures. A damaged or failed sensor is not possible to be repaired, if the subsurface equipment is compromised, due to the sensor being cemented in place. To improve the likelihood of the sensor having proper communication with the formation Devon has or is exploring the idea of:

- Reducing drill hole diameters for observation wells (200mm as opposed to 222mm)
- Detonating small charges near installed pressure sensors to remove possible blockages
Thank You.
Overview
Surface Operations - Day 2

- Facilities Overview
  Jim Anderson
- Facilities Performance
  Jim Anderson
- Measurement & Reporting
  Jim Anderson
- Water Production, Injection & Uses
  Justin Goble
- Sulphur Production & Air Emissions
  Maude Ramsay
- Environment
  Maude Ramsay
- Regulatory Compliance
  Maude Ramsay
- Future Plans
  Justin Goble
Facilities
Section 3.1.2-1
Facilities
Plot Plan - Jackfish 1

SRU Addition
Facilities
Plot Plan - Jackfish 2

Temporary SRU Addition
Facilities Performance
Section 3.1.2-2
Facilities Performance
2013 Overall Highlights

Jackfish 1

- Successful turnaround executed in September 2012
- Sustainable nameplate production of 35,000 bopd since November 2012, after full ramp-up from the turnaround
- Peak daily production rate of 42,260 bopd reached (facility license amendment in progress)
- Ramped up all 7 well pairs on new Pad H

Jackfish 2

- Average monthly production to date within facility nameplate capacity
- No facility bottlenecks
- Operated for 2 years without turnaround
- First turnaround commenced in August 2013
Facilities Performance
2013 Highlights - Jackfish 1

Bitumen Processing

- Increased bitumen processing efficiency and reliability achieved through chemical and process optimization
- Stable operation maintained at higher blend densities and tighter blend density ranges
- Production choke actuator/positioner upgrades to improve process control and reduce lost production
- Improved production flowback method for well optimization activities to control CPF process stability and minimize production disruption
- Sulphur production
  - Sulphur Removal Unit to be commissioned in late September 2013
Facilities Performance
2013 Highlights - Jackfish 1

3.1.2-2b

Water Treatment

- Upset management
  - Water plant uptime has exceeded 97%
  - Major water plant upsets due to lime & magox excursions
  - Upgrades ongoing to lime & magox systems to improve system reliability

- Water recycle
  - Utilized brackish water wells with TDS ranging from 5000-13000 ppm for all make up water requirements
  - Water recycle and disposal volumes within allowable limits in Directive 81
Facilities Performance
2013 Highlights - Jackfish 1

Water Treatment

- Chemical Treatment
  - Continuous anionic polymer injection upstream of HLS for bed stability enhancement

- Water Chemistry Testing
  - 24 hour lab trial ongoing to increase sampling and earlier detection of upsets
  - Implementation of improved hardness testing

- Blowdown Disposal Pipeline Liner Failures
  - Replaced additional failed liner sections in Q2 2013 with further repairs expected to be completed in early 2014
  - Long term mitigation strategy underway
Steam Generation

• Upset management
  - Steam plant uptime has exceeded 98%
  - Annual regulatory inspections and pigging completed in August 2013

• OTSG tubesheets
  - Replaced in September 2012 - issue mitigated
  - Inspected one unit in September 2013 - no damage discovered
  - Remaining units to be inspected during next available outage

• HP BFW Seal Optimization
  - Previous trial on coated seals proved to be unsuccessful
  - Trialing new seal system, similar to J2 design, with improved run times
  - Based on new findings 2012 root cause analysis (RCA) has been re-visited on HP BFW pump system
Bitumen Processing

- Increased bitumen processing efficiency and reliability achieved through chemical and process optimization
- Stable production output and operation maintained at higher blend densities and tighter blend density ranges
- Production choke actuator/positioner upgrades to improve process control and reduce lost production
- Sulphur production
  - Sulphur Removal Unit to be commissioned in October 2013
Facilities Performance
2013 Highlights - Jackfish 2

Water treatment

• Upset management
  – Water plant uptime has exceeded 99%
  – Minor water plant upsets (power outages)
  – Upgrades ongoing to lime & magox systems to improve system reliability

• Water Management
  – Utilized brackish water wells with TDS ranging from 5000-13000 ppm for all make up water requirements
  – Water recycle and disposal volumes within allowable limits in Directive 81
  – WAC resin technology test completed. No change to facility
  – ORF media trial and subsequent conversion from Eastern Black to English Walnut shells

• Regen Disposal Pipeline Liner Failures
  – Liner replacement in Q2 2013
Steam Generation

- **Upset management**
  - Steam plant uptime has exceeded 99%
  - Optimization of chemical injection during upset conditions to mitigate OTSG fouling

- **OTSG tubesheets**
  - Replaced convective sections on all 6 units (May - August 2013)
  - OTSG regulatory inspections and pigging completed on all six units during 2013 turnaround

- **Process Stabilization**
  - 80% steam quality trial successfully completed
Facilities Performance
Flared Gas Volume

- Peak volume in August 2012 at J2 due to 2 unplanned power outages
- Peak volume in October 2012 at J1 due to plant trip/upset during turnaround ramp-up
- Flaring volumes March-August 2013 due to plant upsets (OTSG trips, power outages)
- J1 recovery dropped in September 2012 due to turnaround
Facilities Performance
Fuel Gas Consumption

Fuel Gas Consumption J1

- Produced Gas
- Purchased Gas

Monthly Volume (MMscf)

- Aug-12
- Sep-12
- Oct-12
- Nov-12
- Dec-12
- Jan-13
- Feb-13
- Mar-13
- Apr-13
- May-13
- Jun-13
- Jul-13
- Aug-13
Facilities Performance

Fuel Gas Consumption

![Bar chart showing monthly fuel gas consumption from August 2012 to August 2013 for both produced and purchased gas.](chart.png)
- Year to date Jackfish 1 total: 977,938 Tonnes CO$_2$E
- Year to date Jackfish 2 total: 735,978 Tonnes CO$_2$E
Measurement & Reporting
Section 3.1.2-3
Measurement & Reporting
Production and Injection Volumes

Well Bitumen / Water Production

- The total battery production is allocated to each SAGD producing well based on individual well tests

- Battery Bitumen Production = Dispositions - Receipts + Δinventory + Shrinkage

- Battery Water Production = Inlet Produced Water + Δinventory + Truck out - Truck in - Desand Water to Treater & FWKO

- Individual well test:
  - Each pad equipped with test separator along with coriolis meter and watercut analyzer
  - Vortex meter for water vapor and gas measurement and calculation
  - Tested water volume includes the calculated water vapor (from $P_{\text{sat}}/P_{\text{measured}}$)
  - Typical well test duration is 9 hours

J1 - J3 MARP has been amalgamated in 2013 to Jackfish District MARP
Well Gas Production

Currently
- Battery gas production = GOR x Oil Produced
- Battery gas is allocated to each well based on well test

Proposing To-Be
- Total battery produced gas is determined and converted to a gas oil ratio based on total bitumen production
- Total produced gas volume to be prorated to the production wells based on each well’s prorated bitumen production volume and the facility gas oil ratio
- Resulting in a gas proration factor of 1.000

Steam Injection
- Total steam to field measured off HP separators minus the steam condensate
- Vortex meters at wellhead are used to allocate the total steam
Measurement & Reporting

Proration factors

3.1.2-3b

Bitumen / Water Proration Factor*

• Typically less than 10%

• Jackfish 1 slightly lower bitumen proration factor in Oct 2012 due to post turnaround plant issue

Steam Proration Factor*

• 12 months avg to be 1.06 for J1 & 1.08 for J2

• Continually monitoring proration factor trends to ensure proper meter operations

* Proration data during turnaround was excluded

www.devonenergy.com
Future Opportunity

- Currently investigating different type of water cut analyzer for well testing purposes
Water Production, Injection, & Uses
Section 3.1.2-4
### Non-Process Water Usage - Fresh Water Used for Domestic Purposes

<table>
<thead>
<tr>
<th>Approval No.</th>
<th>Well UWI</th>
<th>Max Rate (m³/day)</th>
<th>Max Annual Allocation (m³)</th>
<th>Total Diversion Sept 12-Aug 13 (m³)</th>
<th>Daily Average (m³/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1</td>
<td>00251108-00-00 1AA/12-28-075-06W4</td>
<td>250</td>
<td>91,250</td>
<td>64,061</td>
<td>176</td>
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<tr>
<td>J2</td>
<td>00252624-00-00 1F1/11-27-075-07W4</td>
<td>150</td>
<td>54,750</td>
<td>21,982</td>
<td>60</td>
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</table>

<table>
<thead>
<tr>
<th>Temporary Diversion License No.</th>
<th>Well UWI</th>
<th>Max Rate (m³/day)</th>
<th>Max Diversion Volume (m³)</th>
<th>Total Diversion Dec 12-Aug 13 (m³)</th>
<th>Daily Average (m³/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>District Camp</td>
<td>00320429 03-33-075-07W4</td>
<td>282</td>
<td>91,250</td>
<td>25,370</td>
<td>89</td>
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<tr>
<td>District Camp</td>
<td>00333006 10-33-075-07W4</td>
<td>80</td>
<td>14,600</td>
<td>1,047</td>
<td>4</td>
</tr>
</tbody>
</table>
Non-Process Water Usage - Fresh Water Used for Domestic Purposes

Fresh Water Diversion

- **J1**
- **J2**
- **District Camp 3-33**
- **District Camp 10-33**

Monthly Volume (m³)

Date:
- Aug-12
- Sep-12
- Oct-12
- Nov-12
- Dec-12
- Jan-13
- Feb-13
- Mar-13
- Apr-13
- May-13
- Jun-13
- Jul-13
- Aug-13

www.devonenergy.com
Water Usage - Brackish

- Brackish source water produced from the Grand Rapids ‘C’
- Available for Jackfish 1 and Jackfish 2
- Six existing wells
  - F1/12-15-075-06W4
  - F1/15-15-075-06W4
  - F1/03-10-075-06W4
  - F1/03-11-075-06W4
  - F1/04-16-075-06W4
  - F1/05-17-075-06W4

www.devonenergy.com
Water Usage - Brackish

- Brackish water production from the Grand Rapids C commenced on July 12, 2007
- Brackish water analyzed 1-2 times per year

Brackish water use lower from May - Jul at J1 due to WSR increase due to well optimization. Lower at J2 due to WSR increase due to reservoir pressure management.
J1 Produced water peaked in May 2013 due to increased WSR from well optimization.
J2 Produced water volume was low in August 2013 due to planned turnaround.
Steam Injection Volume

Steam Injection

Monthly Volume (m³)

J1
J2

Aug-12, Sep-12, Oct-12, Nov-12, Dec-12, Jan-13, Feb-13, Mar-13, Apr-13, May-13, Jun-13, Jul-13, Aug-13

www.devonenergy.com
Produced Water Recycle

- No fresh ground water is employed in the Jackfish SAGD process; only brackish water is used for required makeup volumes.
- Recycle Rate: \[
\frac{(\text{Steam Injected} - \text{Fresh Water})}{\text{Water Produced}} \times 100\%
\]
  - Jackfish 1 2012 Recycle Rate Average: 108.6%
  - Jackfish 2 2012 Recycle Rate Average: 107.1%
  - Jackfish Scheme approval minimum Recycle Rate: 95%
- Devon is in full compliance with produced water recycle.

![Water Recycle Graph](www.devonenergy.com)
February: High blowdown disposal volumes due to Lime and MagOx excursion (low steam qualities)
June: Low disposal volumes due to BD pipeline outage
July/August: De-inventorying blowdown pond from pipeline outage
- Disposal System is shared between Jackfish 1 and Jackfish 2

- Two disposal streams:
  - blowdown & regen waste

- Nine Class 1b disposal wells in total

- Approved MWIP of 6,000 kPa (July 2009)

- J1 disposal wells:
  - 00, 02 & 03/09-14-075-06W4 (blowdown)
  - 00 & 02/12-14-075-06W4 (regen)

- J2 disposal wells:
  - 02 & 03/07-13-075-06W4 (blowdown)
  - 02 & 04/12-15-075-06W4 (regen)
Water Disposal - Approval No. 10790E
Class 1b

3.1.2-4g

- Disposal System is shared between Jackfish 1 and Jackfish 2
- Two disposal streams:
  - blowdown & regen waste
- Nine Class 1b disposal wells in total
- Approved MWIP of 6,000 kPa (July 2009)
- J1 disposal wells:
  - 00, 02 & 03/09-14-075-06W4 (blowdown)
  - 00 & 02/12-14-075-06W4 (regen)
- J2 disposal wells:
  - 02 & 03/07-13-075-06W4 (blowdown)
  - 02 & 04/12-15-075-06W4 (regen)
<table>
<thead>
<tr>
<th>Well Name</th>
<th>Rig Release</th>
<th>Quaternary</th>
<th>Colorado Group</th>
<th>Grand Rapids C</th>
<th>Clearwater A</th>
<th>Clearwater B</th>
<th>Clearwater C</th>
<th>Wabiskaw</th>
<th>McMurray</th>
<th>Basal McMurray</th>
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<td>F1/05-12-075-06W4</td>
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<td>Mar-06</td>
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<tr>
<td>00/03-15-075-06W4</td>
<td>Jan-13</td>
<td>x</td>
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<tr>
<td>00/01-19-075-06W4</td>
<td>Feb-13</td>
<td>x</td>
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<td>F1/15-19-075-06W4</td>
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<td>Mar-08</td>
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<td>F1/04-26-075-07W4</td>
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</tbody>
</table>
Devon believes that the sensor at F1/06-28 has failed.
McMurray pressure of 2,931 kPag is closer to real SAGD operating pressure on Pad AA
Water Disposal - Approval No. 10790E
Volume Summary

Blowdown Water Volumes

- Monthly Volume (m3)
- J1, J2

Regen Water Volumes

- Monthly Volume (m3)
- J1, J2

www.devonenergy.com
Water Disposal - Approval No. 10790E
02/07-13-075-06W4

02/07-13-075-06W4 Disposal Well
MWIP 6,000 kPag

- Volume
- Pressure

Month: Aug-12, Sep-12, Oct-12, Nov-12, Dec-12, Jan-13, Feb-13, Mar-13, Apr-13, May-13, Jun-13, Jul-13, Aug-13

Average Wellhead Pressure (kPag)
Monthly Volume (m³)

www.devonenergy.com
03/07-13-075-06W4 Disposal Well
MWIP 6,000 kPag

Monthly Volume (m³)

Average Wellhead Pressure (kPag)

0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000 4,500 5,000 5,500 6,000

Aug'12 Sep'12 Oct'12 Nov'12 Dec'12 Jan'13 Feb'13 Mar'13 Apr'13 May'13 Jun'13 Jul'13 Aug'13

www.devonenergy.com
Water Disposal - Approval No. 10790E
00/12-14-075-06W4

00/12-14-075-06W4 Disposal Well
MWIP 6,000 kPag

Monthly Volume (m³)


Average Wellhead Pressure (kPag)
0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000 4,500 5,000 5,500 6,000

www.devonenergy.com
Water Disposal - Approval No. 10790E
04/12-15-075-06W4

04/12-15-075-06W4 Disposal Well
MWIP 6,000 kPag

Monthly Volume (m³)


Average Wellhead Pressure (kPag)

0  500  1,000  1,500  2,000  2,500  3,000  3,500  4,000  4,500  5,000  5,500  6,000

www.devonenergy.com
Waste Disposal
Section 3.1.2-4
Waste Disposal – Approval No. WM 105

- Devon Jackfish Class II landfill for disposal of up to 440,000 m$^3$ of lime sludge, drill cuttings and contaminated soil
- Located in SE$\frac{1}{4}$ -28-75-6W4, south of the J1 CPF
- Landfill placed into operation in October 2008
- 145.5 m$^3$ of drill cuttings, 3,084 m$^3$ of lime sludge and 17.2 tonnes of contaminated debris & soil trucked out from Sept 2012 to August 2013
- A total of 24,405 m$^3$ of material was placed into the landfill during this year’s reporting period

<table>
<thead>
<tr>
<th></th>
<th>Sep. 1, 2012 - Aug. 31 2013</th>
<th>Jackfish 1</th>
<th>Jackfish 2</th>
<th>Jackfish 3</th>
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<tr>
<td>Drill Cuttings</td>
<td>0</td>
<td>5,040</td>
<td>8,261</td>
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<td>Lime Sludge Solids</td>
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<td>Contaminated Debris &amp; Soil</td>
<td>33</td>
<td>40</td>
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### Actual Calendar Quarter-Year Sulphur Emissions - Jackfish 1 and 2

<table>
<thead>
<tr>
<th>Quarter</th>
<th>J1 Sulphur Emissions Total Tonnes</th>
<th>J2 Sulphur Emissions Total Tonnes</th>
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<tbody>
<tr>
<td>Q3 2012</td>
<td>50</td>
<td>53</td>
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<tr>
<td>Q4 2012</td>
<td>46</td>
<td>73</td>
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<tr>
<td>Q1 2013</td>
<td>71</td>
<td>113</td>
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<tr>
<td>Q2 2013</td>
<td>96</td>
<td>115</td>
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<td>Q3 2013*</td>
<td>63</td>
<td>50</td>
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</tbody>
</table>

* July and August only
Sulphur Emissions and Trends
Jackfish 1

3.1.2-5b(ii) & (iii)

Graph represents total monthly sulphur emissions from J1, and average inlet H2S concentration.

- Sulphur Removal Unit (SRU) - Liquid Chemical Scavenger
- Jackfish 1 SRU start-up in Q4 2013
Sulphur Emissions and Trends
Jackfish 2

3.1.2-5b(ii) and (iii)

- Graph represents total monthly sulphur emissions from J2, and average inlet H2S concentration
- Reservoir pressure reduction since Dec 2012
- Sulphur Removal Unit (SRU) - Liquid Chemical Scavenger
- Jackfish 2 SRU start-up in Q4 2013
3.1.2-5c

Faulty sampling apparatus discovered in Jan 2013 at J2 which resulted in air ingress in samples.
Minimal increase in NOx during winter months likely due to increase in trucking activities during winter months.
Environmental Issues
Section 3.1.2-6
## AER Regulatory Approval Summary

### D78 Amendments - August 2012 to August 2013

* Indicates current approval

### Category 1 Amendments

<table>
<thead>
<tr>
<th>Description</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selective Steam Distribution</td>
<td>Letter</td>
</tr>
<tr>
<td>Pad FF Selective Steam Distribution</td>
<td>Letter</td>
</tr>
<tr>
<td>Inflow Control Device Technology</td>
<td>Letter</td>
</tr>
<tr>
<td>Rifled Tubes J2 OTSG</td>
<td>Letter</td>
</tr>
</tbody>
</table>

### Category 2 Amendments

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pad VV New Trajectories</td>
<td>10097K</td>
</tr>
<tr>
<td>Pad J Solvent Soak</td>
<td>10097K</td>
</tr>
<tr>
<td>Relocate J3 SRU to J1</td>
<td>10097L</td>
</tr>
<tr>
<td>Temporary SRU J2</td>
<td>100970 *</td>
</tr>
</tbody>
</table>

### Category 3 Amendments

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jackfish Pad K Proposal</td>
<td>10097M</td>
</tr>
<tr>
<td>Pad RR Proposal</td>
<td>10097N</td>
</tr>
</tbody>
</table>
D56 Facilities Licenses

- J1 F33125 and J2 F39950 - Administrative amendment
- Changed facility category from C331 to D431 (Multiwell bitumen battery > 1 t/d sulphur)

D65 Disposal Approval No. 10790F

- Amendment application submitted for additional disposal wells for regen. and blowdown disposal for Jackfish 3

D58 Jackfish Class II Landfill - Approval No. WM 105
Approval No. WM 105C

- No Change
Water Diversion Licenses No. 252624-00-01
  • No amendments

Water Diversion Licenses No. 251108-00-01
  • No amendments

Water Diversion License application submitted for J3 potable water

Temporary Diversion License No. 320429 and 333006
  • Provides potable water for the district camp. Submitted water license application in Aug 2013 to replace the TDLs.

EPEA Operating Approval No. 224816-00-04
  • An administrative amendment to Jackfish EPEA approval to include Sulphur Removal Units at all 3 CPFs
AESRD Regulatory Reporting Requirements

- Industrial Wastewater and Industrial Runoff Report
- Groundwater Monitoring Report
- Wetland Monitoring Report
- Potable Water Monitoring Report
- Air Monitoring Report
- Soil Management Report
- Soil Monitoring Report
- Conservation and Reclamation Annual Report
- Wildlife Mitigation and Monitoring Program
- Caribou Mitigation and Monitoring Program
Water Management
Jackfish 1 and 2

Groundwater
- J1 & J2 Groundwater monitoring twice yearly as per AESRD approval
  - no concerns
- Facility GW monitoring at J1 & J2. Installing wells at J3 in Q4 2013.

Wetland (surface water)
- Conducting wetland/surface water monitoring, as per Approval
- 10 Surface Water Monitoring Stations at Jackfish 1 & 2
- Ongoing Wetland Monitoring at Jackfish 1&2, Jackfish 3 to commence in 2014
Regional Water Studies Jackfish

- Participating in AESRD regional groundwater model for the South Athabasca Oil Sands region (*no change since 2010*)
- Participating in development of the Groundwater Management Framework, through the Lower Athabasca Regional Plan
- CLRWMA participation along with Cenovus and MEG to model groundwater interactions in the region
Jackfish 2 - Soil Monitoring and Soil Management

- The Soil Monitoring Program consisted of 20 areas around the CPF and wells pads at J2 that were investigated to assess surficial soil quality.
- The Soil Management Program was authorized by the ESRD and is ongoing in 2013.
Environmental Monitoring & Progress
Wildlife Monitoring

3.1.2-6c

• As per AEPEA Approval Condition, Devon’s Jackfish Wildlife Monitoring Program was authorized in July 2012,

• Some monitoring programs have been going on since 2002, while others began with authorization of the Wildlife Monitoring Program

• Overall stable wildlife abundances for most species over the past 10+ years
• Monitor the effectiveness of mitigations
  - Initiated winter 2012, no results to report yet

• Monitor wildlife habitat use and responses to incremental in situ development
  - Winter tracking program ongoing since 2002 (2012-13 represented 7th year of monitoring specific to the EPEA approval)
  - Overall stable wildlife trail densities for most species over the study period (2002-13) despite cumulatively increasing industrial footprint and activity over the survey period

• Monitor wildlife responses to aboveground pipelines
  - Very high rate of crossing success for all species, no caribou interactions detected yet (6 yrs of data)

• Monitor amphibian mortality on project roads
  - Spring and fall migration period road surveys initiated in spring 2013

• Monitor relative abundance of breeding songbirds
  - Spring 2013 was 9th consecutive year of songbird surveys (some 4th replicates), little change in species abundance or diversity indices since initiation

• Monitor relative abundance of species at risk

• Validate impact predictions from the EIA

Covered off by above monitoring programs
Environmental Monitoring & Progress
Wildlife Monitoring

- As per AEPEA Approval Condition, results of monitoring program to be reported in a Comprehensive Wildlife Report to be submitted every 3 years (1st report due 2015)

- Jackfish Wildlife Mitigation and Monitoring Program acknowledged by GoA and 3rd party consultants as being the most intensive and extensive wildlife monitoring data set for the in situ area of NE AB

- Well beyond regulatory compliance (temporally and spatially)
Environmental Monitoring & Progress

3.1.2-6c

ABMI (Alberta Biodiversity Monitoring Institute)

- Continued annual support (technical, financial) of Alberta Biodiversity Monitoring Institute (ABMI) at provincial and regional level, as well as implementing project-specific (Jackfish) biodiversity assessments using ABMI data and protocols

Wood Buffalo Environmental Association (WBEA)

- As the implementation of the Joint Provincial-Federal monitoring plan moves forward, Devon is actively engaged in expanding the WBEA’s air and terrestrial monitoring network to the southern part of the airshed

- The expanded network will address recommendations proposed through internal WBEA review, the plans found in the Joint Report
Regional Aquatics Monitoring Program (RAMP)

- Devon maintains its membership with RAMP

Cumulative Effects Management Association (CEMA)

- Devon is active on the Air Working Group, Land Working Group and Ground Water Working Group
- Devon will continue to evaluate participation on additional CEMA working groups as their mandates expand to address in-situ concerns
EMCLA (Ecological Monitoring Committee for the Lower Athabasca)

- Devon is a major participant and leader on the EMCLA which consists of industry, government and academics designing monitoring program to address biodiversity and associated components at a regional scale rather than project-specific where it makes sense to do so.
- ABMI coordinating this monitoring process, and developed monitoring plans for rare animals, rare plants, and caribou habitat fragmentation and movement.

MAPS Program (Monitoring Avian Productivity and Survivorship)

- Continued annual support (technical, financial) of the MAPS Program which analyzes influence of industry development on avian populations’ productivity and survivorship throughout northeast Alberta.
CBCC Program (Collaborative Boreal Caribou Conservation Program)

- Devon is leading a consortium of organizations (local energy sector and forestry sector, non-government organizations, the Government of Alberta and the University of Alberta) in implementing a collaborative caribou conservation program for the Cold Lake Range, which comprises the JF and Pike district.

- This program focuses on managing and reducing industry’s current and future footprint throughout the Cold Lake range and on identifying effective techniques to reduce wolf and bear movements on linear features throughout caribou habitat.
Regulatory Compliance
Section 3.1.2-7,8
<table>
<thead>
<tr>
<th>Date</th>
<th>Incident</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sept-12</td>
<td>Surface casing vent flow at C7P (J1)</td>
<td>Casing integrity was validated and was not compromised. A pilot surface casing vent flow assembly was installed to allow continuous monitoring. The SCVF was ceased when the subject well was put back in operations.</td>
</tr>
<tr>
<td>Oct-12</td>
<td>Lime sludge waste deposited in the Jackfish Landfill for a period of one week, potentially failed to meet the required Alberta Class II Landfill Guidelines for paint filter. There is a potential for contravention since there was a discrepancy between onsite paint filter test which passed and third party lab conducted paint filter test which failed.</td>
<td>Updated SOP for the Lime Sludge Waste Solids Disposal Protocol to include both onsite and 3rd party lab paint filter test of the same lime sludge sample.</td>
</tr>
<tr>
<td>Oct-12</td>
<td>Post J1 T/A, the pH of the regen stream was temporarily lowered beyond the lower limit of 6 (D51 limit). The lower pH was required to keep solids in solution and avoid plugging of filters and equipment.</td>
<td>Approval granted.</td>
</tr>
</tbody>
</table>
## AER & AESRD Non-Compliance Issues

<table>
<thead>
<tr>
<th>Date</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Oct-12</td>
<td>Source water entering the J1 CPF bypassed the main inlet meter post start-up. This was required since the source water was bypassed around the Hot Lime Softener until satisfactory temperature were achieved.</td>
<td>Source water volume was measured using the individual meters located at the source water wells.</td>
</tr>
<tr>
<td>Oct-12</td>
<td>J1 CEMS system availability fell below minimum requirement of 90% for the month of Oct 2012, due to self-calibration issues.</td>
<td>CEMS was recalibrating every hour due misconfiguration of the data acquisition system. This CEMS service provider was contacted to rectify this issue.</td>
</tr>
<tr>
<td>Nov-12</td>
<td>The effluent from the domestic waste water treatment plant at J1 exceeded approval limit for total suspended solids due to failed blower.</td>
<td>Effluent was redirected back into the sewage lagoon and blower was replaced. Subcontractor operation sampling procedures were updated.</td>
</tr>
<tr>
<td>Nov-12</td>
<td>A malfunctioning J1 CEMS Flowsic instrument resulted in the CEMS outputting invalid NO\textsubscript{x} and flow readings.</td>
<td>CEMS service provider was contacted to perform maintenance on the Flowsic which temporarily rectified the invalid readings. The Flowsic control board was eventually replaced.</td>
</tr>
</tbody>
</table>
## AER & AESRD Non-Compliance Issues

<table>
<thead>
<tr>
<th>Date</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Dec-12</td>
<td>Failed the NO$_x$ parameter during a routine Relative Accuracy Test Audit on the J2 CEMS.</td>
<td>CEMS was send to vendor for re-calibration.</td>
</tr>
<tr>
<td>Jan-13</td>
<td>Sulphur emission exceedance.</td>
<td>Accelerated SRU Installation plans. J2 reservoir pressure reduction. Ambient monitoring trailer and mobile monitoring trailers measured air quality to be well below the AAAQOs.</td>
</tr>
<tr>
<td>Mar-13</td>
<td>Breach in floor trenches in three building at J2 resulted in process fluid passing into secondary containment space.</td>
<td>Building 3020 breach repairs underway, and building 1000 and 3000 to be developed based on success of building 3020.</td>
</tr>
<tr>
<td>Jun-13</td>
<td>Waste material was placed on the ground at the edge of the landfill cell and then mobilized into the cell.</td>
<td>Reviewed operating and management protocols with new landfill contractors. Ramp upgrades ongoing.</td>
</tr>
<tr>
<td>Date</td>
<td>Incident</td>
<td>Corrective Action</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Jun-13</td>
<td>A perforation was found in the HDPE primary liner, at the top of the landfill berm above the waste footprint. The perforation was caused by a bulldozer used to spread the landfill waste.</td>
<td>Breach was repaired. Landfill liner protection protocol was reinforced with landfill contractor.</td>
</tr>
<tr>
<td>Jul-13</td>
<td>The primary steam meter for OTSG-E and OTSG-F failed for J2, calculated steam rates were reported to Petrinex.</td>
<td>The steam meter was repaired during turnaround. Tie-ins added onto the common steam flow line to the well pads for a secondary measuring device.</td>
</tr>
<tr>
<td>Jul-13</td>
<td>The J1 CEMS processor board overheated due to improper installation of a building fan, resulting in the CEMS monthly system availability to fall below the minimum requirement of 90%.</td>
<td>The J1 CEMS processor board was repaired. The heat regulation issues was resolved.</td>
</tr>
<tr>
<td>Aug-13</td>
<td>Casing patch failure in the intermediate casing. Well diagnostics indicated that the casing patch was unable to hold pressure.</td>
<td>Existing patch to be milled out and a new thermally rated patch will be installed and pressure tested.</td>
</tr>
</tbody>
</table>
## AER & AESRD Non-Compliance Issues

### 3.1.2-7,8

<table>
<thead>
<tr>
<th>Date</th>
<th>Incident</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug-13</td>
<td>Failure to complete leachate pond interstitial space monitoring due to failed pump.</td>
<td>Interstitial space monitoring to be initiated with the implementation of a new pump.</td>
</tr>
<tr>
<td>Aug-13</td>
<td>Deterioration to the surface water run-off pond berm is a result of significant weather within the regional area.</td>
<td>Repairs of the berm completed.</td>
</tr>
<tr>
<td>Aug-13</td>
<td>Non-impacted hydrovac muds deposited within the landfill boundary.</td>
<td>Ceased hydrovac mud deposition, hydrovac mud to be removed from landfill boundary and will perform re-contouring of the area.</td>
</tr>
<tr>
<td>Sep 12 - Aug 13</td>
<td>26 flaring incidents reported for J1  8 flaring incidents reported for J2  5 venting incidents reported for J1  11 venting incidents reported for J2</td>
<td>Initiated tank vent study to look at operational health and study to evaluate VRU optimization.</td>
</tr>
</tbody>
</table>
ERCB & AESRD Spill Reporting
Jackfish 1 & 2 Facilities

All spills were cleaned up and remediated promptly to eliminate any adverse effect.

Devon tracks all non-reportable spill incidents within the Devon Corporate Incident Management System (DCIMS).

All Devon spill incidents are reviewed weekly to ensure corrective actions are included and preventative measures are taken.

<table>
<thead>
<tr>
<th>Site</th>
<th>Reported to</th>
<th>No. of Reportable Spills</th>
<th>Volume Released (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jackfish 1</td>
<td>Total</td>
<td>4</td>
<td>32.6</td>
</tr>
<tr>
<td></td>
<td>AER</td>
<td>1</td>
<td>30.1</td>
</tr>
<tr>
<td></td>
<td>AESRD</td>
<td>4</td>
<td>32.6</td>
</tr>
<tr>
<td>Jackfish 2</td>
<td>Total</td>
<td>6</td>
<td>159.0</td>
</tr>
<tr>
<td></td>
<td>AER</td>
<td>2</td>
<td>14.0</td>
</tr>
<tr>
<td></td>
<td>AESRD</td>
<td>4</td>
<td>145.0</td>
</tr>
</tbody>
</table>

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In 2013, Devon implemented the following spill response/prevention initiatives:

- All spills caused by human error are reviewed and discussed with the workers involved with the intent of preventing future releases.
- Spill response training exercise was held in June using WCSS instructors and equipment.
- Spill prevention was reinforced for Jackfish 2 turnaround using spill prevention checklists and discussions with employees and contractors.
Future Plans
Section 3.1.2-9
Future Plans

Major Activities

- Pad I and Pad FF ramp up in 2014
- J3 commissioning and start-up in late 2014
- J1 maintenance turnaround tentatively planned for 2014
- Implementing new steam generation technology at J2 (rifle tubing) (Q4 2013)
- Pilot regen disposal water recycling to HLS (Q2 2014)
Future Plans
New Initiatives of Interest

- Bench testing electric coagulation application for blowdown water treatment
- Investigate the feasibility to further increase steam qualities (80% at J1 and 82% at J2)
- Evaluate the use of McMurray source water as an alternative to Grand Rapids C
- J1 LSF debottlenecking study
- District lime/magox optimization study
- Investigating power generation initiatives to reduce greenhouse gas emissions
  - Waste heat power generation via Organic Rankine Cycle
  - Fuel gas pressure letdown power utilization
Thank You.