2017 Performance Presentation
Devon Canada Corporation
Jackfish SAGD Project

Commercial Scheme Approval No. 10097 (as amended)
October 2017
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Subsurface Operations
Project Background

Section 3.1.1-1
3.1.1-1

• Jackfish 1, 2, and 3 utilize steam-assisted gravity drainage (SAGD) to recover bitumen from the McMurray formation
• Located 150 km south of Fort McMurray
• Jackfish 1 scheme approval granted in August 2006; first steam was August 2007
• Jackfish 2 scheme approval granted in August 2008; first steam was May 2011
• Amalgamation of Jackfish approvals (including Jackfish 3) in November 2011; first steam was July 2014
Brief Background of Scheme

Overall Scheme Map

3.1.1-1
### Brief Background of Scheme

**Jackfish**

3.1.1-1

<table>
<thead>
<tr>
<th>Asset</th>
<th>Number of Operating Pads</th>
<th>Number of Operating Well Pairs</th>
<th>Upcoming Pads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jackfish 1</td>
<td>9</td>
<td>65</td>
<td>O, R</td>
</tr>
<tr>
<td>Jackfish 2</td>
<td>8</td>
<td>60</td>
<td>QQ</td>
</tr>
<tr>
<td>Jackfish 3</td>
<td>5</td>
<td>43</td>
<td>EEE</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>22</strong></td>
<td><strong>168</strong></td>
<td>-</td>
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### 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 Pay (m)*</th>
<th>Avg. Oil Saturation (So)*</th>
<th>Avg. Porosity (%)*</th>
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<tbody>
<tr>
<td>Project Area</td>
<td>7,668</td>
<td>228.6</td>
<td>21.4</td>
<td>78.0</td>
<td>33.0</td>
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<td>Development Area</td>
<td>5,445</td>
<td>221.8</td>
<td>23.0</td>
<td>79.0</td>
<td>34.0</td>
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</table>

*Average attributes derived from well control*
Geology
Jackfish Approved Area OBIP Methodology

3.1.1-2a

**Gross Rock Volume (GRV)**

**GRV Base (GRV1_B):** picked as the maximum lower limit of continuous exploitable bitumen >50% $S_o$ and <40% $V_{sh}$

**GRV Top (GRV1_T):** first barrier above GRV Base >3m true vertical thickness of $S_o$ < 50% and >40% $V_{sh}$ or base of gas cap

**Gross Rock Volume (GRV):** interval between GRV1_B and GRV1_T

**GRV Net Pay:** determined by removing estimated mud volumes from the GRV using a cutoff of 40% on the $V_{sh}$ curve

Average $S_o$ and porosity values are calculated from the GRV Net Pay interval for each well

$V_{sh}$ and $S_o$ are standard petrophysical curves calculated from gamma ray, resistivity, and porosity logs, and correlated to image logs and core data
Geology

Jackfish Approved Area OBIP Methodology

3.1.1-2a

Gross Rock Volume Height on Logs

Generate GRV P50

Calculate Ave Net/Gross (NTG)

Net GRV Pay Porosity ($\Phi$)

Net GRV Pay Oil Saturation ($S_o$)

OBIP = Gross Rock Volume * NTG * $\Phi$ * $S_o$

Original Bitumen in Place
## Geology

### Jackfish 1, 2, and 3 Average Reservoir Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Jackfish 1</th>
<th>Jackfish 2</th>
<th>Jackfish 3</th>
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</thead>
<tbody>
<tr>
<td>OBIP (10^6m^3)*</td>
<td>69.9</td>
<td>76.7</td>
<td>66.6</td>
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<tr>
<td>Avg. Reservoir Depth (mTVD)</td>
<td>400</td>
<td>459</td>
<td>428</td>
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<tr>
<td>Avg. Reservoir Depth (mASL)</td>
<td>202</td>
<td>202</td>
<td>202</td>
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<tr>
<td>Avg. Original Reservoir Pressure (kPa)</td>
<td>2,700 @ scheme startup</td>
<td>2,700 @ scheme startup</td>
<td>2,700 @ scheme startup</td>
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<tr>
<td>Avg. Reservoir Temp. (^\circ)C)</td>
<td>12</td>
<td>12</td>
<td>12</td>
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<tr>
<td>Avg. Kh (md)</td>
<td>5,000</td>
<td>3,000</td>
<td>4,000</td>
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<tr>
<td>Avg. Kv (md)</td>
<td>2,000</td>
<td>1,200</td>
<td>1,500</td>
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<tr>
<td>Avg. Phi (%)</td>
<td>33</td>
<td>33</td>
<td>33</td>
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<tr>
<td>Avg. Bitumen Viscosity (Cp)</td>
<td>1,000,000+</td>
<td>1,000,000+</td>
<td>1,000,000+</td>
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<tr>
<td>Original Bottom Water Pressure (kPa)</td>
<td>2,300</td>
<td>2,300</td>
<td>2,300</td>
</tr>
</tbody>
</table>

*Total for all producing, drilled, and planned pads utilizing GRV methodology (2015)*
Geology
Jackfish Total Net Bitumen Pay Isopach

3.1.1-2c
Geology
Jackfish McMurray Water Contact to Paleozoic Isopach
Geology

Jackfish Structure On Base Gross Rock Volume (GRV_B)

3.1.1-2d
Geology

Jackfish Structure On Top Gross Rock Volume (GRV_T)

3.1.1-2d
Geology

Jackfish 1 Representative Well Log

3.1.1-2e
Geology

Jackfish 2 Representative Well Log

3.1.1-2e
Geology

Jackfish 2017 Drilling Program and Cored Wells

3.1.1-2f

Special Core Analysis

No special core analysis conducted on core from the 2017 drilling program.

Project Area

- 2016-2017 Wells: 30
- Total Well Count: 433
- 2016-2017 Core: 5
- Total Core: 196
Geology

Jackfish 1 Pad G Steam Evaluation Core

No new implications on ultimate recovery at this point in time
Geology

Jackfish 1 Representative Structural Cross-section

3.1.1-2i

[Diagram showing geological cross-section with markers for Clearwater Cap Rock, Wabiskaw, McMurray Fm, GRV_T, GRV_B, and Paleozoic layers]
Geology
Jackfish 2 Representative Structural Cross-section

3.1.1-2i
Geology
Jackfish 3 Representative Structural Cross-section

3.1.1-2i

C

C'

Clearwater Cap Rock
Wabiskaw McMurray Fm
GRV_T
GRV_B
Paleozoic
Geology
Caprock Overburden Map and 2015 Mini Frac’s

3.1.1-2m

Interpretation complete on 2015 mini frac program:
- Lowest Wabiskaw shale fracture closure gradient of 14.1kPa/m at AA/10-31
- Fracture closure gradient of 18.6kPa/m from the 2011 mini frac program was utilized for the earlier MOP approval
- Category 2 Amendment to adjust the Jackfish MOP submitted in Q3 2016 and subsequently approved

\[
MOP = 0.80 \times \text{Caprock Fracture Closure Gradient} \times \text{Caprock Base Depth}
\]
Seismic

Historical Jackfish 3-D and 4-D to 2015

3.1.1-21

Jackfish 2 4-D
2013: 6.3 km²
2015: 9.4 km²

Jackfish 3-D
2003-2008: 23 km²

Jackfish 1 4-D
2010: 8.4 km²
2011: 8.4 km²
2012: 8.7 km²
2014: 11.6 km²

No seismic acquisition in 2016
Seismic
Jackfish 2017 4D Acquisition

3.1.1-6a

Jackfish 2 and 3 4-D 2017: 9.7 km²

Jackfish 3 4-D 2017: 2.1 km²

Jackfish 1 4-D 2017: 9.9 km²

Extensive seismic acquisition totaling 21.7 km²
Time delay is in direct relation to steam chamber development.

Colour gradient represents Paleozoic reflector time change from 2003 (baseline) to 2017.
Jackfish 2 and 3 4D Seismic Survey
2017 4D Interpretation

3.1.1-6b

Time Delay

High

Low

2017
Jackfish 3 4D Seismic Survey
2017 4D Interpretation

3.1.1-6b

Time Delay

High

Low

2017

VV
Jackfish 1
Accumulated Displacement 2008-2017

3.1.1-2k

Cumulative Ground Motion [mm]

- > 150
- 100 to 150
- 50 to 100
- 35 to 50
- 20 to 35
- 20 to -20
- -20 to -35
- -35 to -50
- -50 to -100
- -100 to -150
- < -150

TS-1 Max 192.6mm
TS-2 Max 148.5mm
TS-3 Max 94.5mm
Jackfish 1
Comparing Accumulated Displacement 2015 to 2017

3.1.1-2k

Cumulative
Ground Motion [mm]
- > 150
- 100 to 150
- 50 to 100
- 35 to 50
- 20 to 35
- 20 to -20
- 10 to -20
- 5 to -10
- 10 to -10
- 15 to -10
- < -150

2015

2017
Jackfish 2
Accumulated Displacement 2011-2017

3.1.1-2k

Cumulative Ground Motion [mm]

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<th>Range</th>
<th>Color</th>
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<td>&gt; 150</td>
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<td>100 to 150</td>
<td>Orange</td>
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<tr>
<td>50 to 100</td>
<td>Yellow</td>
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<tr>
<td>35 to 50</td>
<td>Light Blue</td>
</tr>
<tr>
<td>20 to 25</td>
<td>Blue</td>
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<tr>
<td>10 to 20</td>
<td>Light Blue</td>
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<tr>
<td>5 to 10</td>
<td>Light Blue</td>
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<tr>
<td>2 to 5</td>
<td>Yellow</td>
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<tr>
<td>1 to 2</td>
<td>Orange</td>
</tr>
<tr>
<td>&lt; 1</td>
<td>Red</td>
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</tbody>
</table>

TS-1 Max 127.2mm

TS-2 Max 79.8mm

TS-3 Max 37mm
Jackfish 2
Comparing Accumulated Displacement 2016 to 2017

3.1.1-2k
Jackfish 3
Accumulated Displacement 2014-2017

3.1.1-2k

Cumulative Ground Motion [mm]
- > 150
- 100 to 150
- 50 to 100
- 35 to 50
- 20 to 35
- 20 to -20
- -20 to -35
- -35 to -50
- -50 to -100
- -100 to -150
- < -150

TS - 1

TS - 2

TS-1 Max 52.2mm

AXCSY39 - deformation rate: 6.14 - deformation rate standard deviation: 0.60
Cumulative displacement: 62.20

AW80WK9 - deformation rate: 3.43 - deformation rate standard deviation: 0.80
Cumulative displacement: 35.00

TS-2 Max 35mm
Jackfish 3
Comparing Accumulated Displacement 2016 to 2017

3.1.1-2k
Drilling and Completions
Section 3.1.1-3
Operating SAGD Horizontal Wells

- **Jackfish 1**: 65 well pairs on nine pads (horizontal sections are 790 – 1,200m)
- **Jackfish 2**: 60 well pairs on eight pads (horizontal sections are 790 – 1,200m)
- **Jackfish 3**: 43 well pairs on five pads (horizontal sections are 720 – 1,200m)

Observation Wells

- 52 active SAGD observation wells (two to three wells per operating pad)
- 21 regional multi-zone monitoring wells equipped with piezometers

Service Wells

- Six Grand Rapids brackish source water wells
- Two McMurray brackish source water wells
- 14 water disposal wells (Class 1b)
  - 12 active wells
  - 1 inactive well (102/12-05-076-06W4)
  - 1 suspended well (102/03-22-075-06W4)
Drilling and Completions

Jackfish 1 Overview – SAGD Wells

3.1.1-3a

**Existing Pads**

- Pad A, B, C, D, E, G, H, and I: Seven well pairs per pad
- Pad F: Nine wells pairs
- Pad O: Seven well pairs
  - Planned for steam Q4 2017
- Pad R: Six well pairs
  - Planned for steam Q1 2018
- Two observation wells per pad (heel and toe)
Existing Pads

- Pad AA, BB, CC, DD, and KK: Seven well pairs per pad
- Pad OO and PP: Eight well pairs per pad
- Pad FF: Nine well pairs
- Two observation wells per pad (heel and toe), three wells at Pad FF
Drilling and Completions

Jackfish 3 Overview – SAGD Wells

Existing Pads

- Pad J and EE: Seven well pairs per pad
- Pad VV and K: Ten well pairs per pad
- Pad RR: Nine well pairs
- Pad EEE: Ten well pairs
  - Planned for steam Q4 2017
Drilling and Completions

*Inter-well Spacing*

- Standard lateral inter-well spacing at Jackfish is 80m
- Currently drilled pads that differ from the standard are:
  - Pad VV: Spacing of 60m
  - Pad F: Spacing of 60m at the heels fanning to 90m at the toes
  - Pad O: Spacing of 75m at the heels fanning to 90m at the toes
  - Pad R: Spacing varies from 71 to 90m due to boundary restrictions
Drilling and Completions

Typical Injection Well Schematic

3.1.1-3c

- Shiftable steam subs utilized on several injection wells
  - Majority of new wells have a steam sub installed on the long injection string to improve steam distribution

406.4 mm (16”) surface casing

298.5 mm (11 ¾”) intermediate casing

Short and long tubing are from 88.9 to 114.3 mm (3 ½” to 4 ½”)

25.4 mm (1”) coil tubing instrument string with thermocouples and a conduit to pump down fiber optics

219.1 mm (8 5/8”) slotted liner
Drilling and Completions

**Typical Production Well Schematic**

- Inflow Control Devices (ICDs) are trialed on select wells
  - Goal is to gain better understanding of this technology in SAGD environment
  - Devices promote production through uniform inflow

- 406.4 mm (16”) surface casing
- 298.5 mm (11 ¾”) intermediate casing
- 31.8 mm (1 ¼”) lift gas coils
- Short and long tubing are from 88.9 to 114.3 mm (3 ½” to 4 ½”)
- 25.4 mm (1”) coil tubing instrument string with thermocouples and a conduit to pump down fiber optics
- 219.1 mm (8 5/8”) slotted liner or wire wrap screen
Drilling and Completions

Inflow Control Devices (ICDs)

3.1.1-3c

• Tubing-deployed systems on wells CC1P, DD2P, and DD7P
  – Installed successfully via service rig

• Liner-deployed systems on wells RR2P and RR6P
  – Installed successfully via drilling rig

• Performance measured through sustained production uplift
  – Sustained uplift yet to be observed on tubing deployed systems
  – Evaluation of liner deployed systems ongoing, learnings will be incorporated in future ICD design

• Key learnings were:
  – Actual pressure drops through ICDs different than designed
Drilling and Completions

Wire Wrapped Screens

3.1.1-3c

- Wire wrapped screens are the producer sand control standard for all future pads at Jackfish
- Expected benefits of wire wrapped screens:
  - Reduced liner pressure drop
  - Increased open flow area
  - Mechanical strength
  - Sand control
- First implementation at Jackfish 1 was at Pad F
  - Successful start up in 2016
Drilling and Completions

*Liner Failures*

3.1.1-3c

- **G5i**
  - Liner failure confirmed, re-entered well
  - Re-entry drilled and completed in Q1 2017
  - Conversion to full SAGD Q2 2017
  - Excellent performance to date

- **G6P**
  - Liner failure confirmed
  - Re-entry planned for Q4 2017
Artificial Lift

Section 3.1.1-4
Artificial Lift

3.1.1-4a, b

- Gas lift is currently used for artificial lift at Jackfish District
- Gas lift continues to be an effective lift strategy for Jackfish operating conditions
  - Typical producer operating pressure above 1,800 kPag
  - Ability to handle over 1,000 m³/day emulsion flow
  - No operating temperature limitation
- One ESP installed in March 2015 (B3P)
  - B3P was selected due to lift issues caused by high pressure drop when operating on gas lift
  - Plan to continue to evaluate feasibility and deploy ESPs as deemed necessary
Instrumentation

Section 3.1.1-5
Instrumentation in Wells
SAGD Injection and Producer Wells

3.1.1-5b

- 25.4 mm (1”) coil tubing instrument string with four to six evenly spaced thermocouples and a conduit to pump down fiber optics
- Fiber optics currently in 39 wells on Pads I, J, CC, DD, KK, FF, and RR
As of September 2017 all injector and gas lift producer wells use annulus gas pressure measurement. B3P (ESP) uses a downhole gauge. Prior to the implementation of AGPM, several methods of downhole pressure measurement were available, as discussed below:

**For Injector Wells:**

- Using thermocouples / fiber optics temperature data to convert downhole live steam temperature from $T_{sat}$ to $P_{sat}$
- Conducting annulus blanket gas pressure survey on periodic basis
- Calculate downhole pressure based on surface steam injection pressures on short and long tubing strings
  - $BHP = \text{steam injection surface pressure} - \text{frictional losses}$
- Conducting periodic near-zero steam injection rate test to estimate bottomhole pressure from surface injection pressure

**For Producer Wells:**

- Use concentric open-ended lift gas (LG) coiled tubing to calculate down hole pressure
  - $BHP = \text{LG surface pressure} - \text{frictional losses} + \text{static head}$
  - Frictional losses are correlated/calculated by performing numerous gas lift step rate tests
- Validation of the above correlation is performed by periodic annulus blanket gas pressure surveys

* 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.
Jackfish 1, 2, and 3 SAGD observation wells contain:

- 20 points thermocouples (25 points in more recently drilled wells), spaced above, below, and within pay interval
- Two to four pressure sensors spaced above, below, and within pay interval
Instrumentation
Regional Monitoring Well Locations

Well
- Jackfish Monitoring Wells
- McMurray Source Wells
- GRC Source Wells
- Jackfish Potable Wells
- Jackfish Disposal Wells

Land
- Jackfish
- Jackfish CPF

Date: Sept. 7, 2017

Not in use

00/16-25
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
### Instrumentation

**Regional Multi-Zone Monitoring Wells**

<table>
<thead>
<tr>
<th>UWI</th>
<th>Rig Release</th>
<th>Quaternary</th>
<th>Colorado Group</th>
<th>Grand Rapids</th>
<th>Clearwater</th>
<th>Wabiskaw</th>
<th>McMurray Bitumen</th>
<th>Basal McMurray Water</th>
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* F1/09-22 Quaternary piezometer is in the Empress Sand equivalent of the Sunday Creek Channel
Scheme Performance

Section 3.1.1-7
Scheme Performance Prediction

Jackfish

3.1.1-7a

• Well pad performance forecasts generated using Jackfish and industry analogues; validated with numerical simulation and analytical methods

• Facility service factors based on historical data, future plans, and quantified risks
Scheme Performance

Jackfish 1 Project Life Plot

3.1.1-7a
Scheme Performance
Jackfish 2 Project Life Plot

3.1.1-7a
Scheme Performance

Jackfish 3 Project Life Plot

3.1.1-7a

- Pad RR startup
- Pad K startup
- Turn around

Flow Rate (m$^3$/d)

SOR (m$^3$/m$^3$), Well Pairs

Daily Steam Injection
Daily Oil Production
Daily Water Production
ISOR
CSOR
Well Pairs
Devon manages injection pressures to maximize producing rates, manage leakoff and increase overall reservoir recovery. A reduction in operating pressure was implemented in 2013 and continued into 2017.
Scheme Performance

Jackfish 2 Bottom Hole Injector Pressures
Scheme Performance

Jackfish 3 Bottom Hole Injector Pressures

3.1.1-7b
2017 Scheme Performance
Jackfish 1 Pad Recoveries

<table>
<thead>
<tr>
<th>Pad</th>
<th>Area (m²)</th>
<th>Avg. GRV Pay (m)</th>
<th>Avg. Net to Gross (%)</th>
<th>Net GRV Pay S₀ (%)</th>
<th>Net GRV Pay Porosity (%)</th>
<th>OBIP (10⁶m³)</th>
<th>Ult Rec (10⁶m³)</th>
<th>Cum Prod ¹ (10⁶m³)</th>
<th>RF (%) to Date ¹</th>
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¹ Effective August 31/2017
## 2017 Scheme Performance

### Jackfish 2 Pad Recoveries

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<th>Area (m²)</th>
<th>Avg. GRV Pay (m)</th>
<th>Avg. Net to Gross (%)</th>
<th>Net GRV Pay S_o (%)</th>
<th>Net GRV Pay Porosity (%)</th>
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¹ Effective August 31/2017
## 2017 Scheme Performance

### Jackfish 3 Pad Recoveries

### 3.1.1-7c

<table>
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<tr>
<th>Pad</th>
<th>Area (m²)</th>
<th>Avg. GRV Pay (m)</th>
<th>Avg. Net to Gross (%)</th>
<th>Net GRV Pay $P_o$ (%)</th>
<th>Net GRV Pay Porosity (%)</th>
<th>OBIP ($10^6$m³)</th>
<th>Ult Rec ($10^6$m³)</th>
<th>Cum Prod ¹ ($10^6$m³)</th>
<th>RF (%) to Date ¹</th>
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<td>1.2</td>
<td>20</td>
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</tbody>
</table>

¹ Effective August 31/2017
First steam occurred in June 2011
Seven well pairs in operation
NCG injection commenced as of March 2016 on wells DD1, DD3, DD5, and DD6
  SOR improvement has been observed
Heterogeneous reservoir with low mid-heel ceiling of ~5m pay thickness
  Limited vertical steam chamber growth
  Regions of poor temperature conformance
Inflow Control Device installed in September 2013 (DD2); well achieved expected production with period of flush production
Inflow Control Device installed in November 2014 (DD7); under-performing pre-installation rates, likely due to $\Delta P$ higher than anticipated in design
Potential fluid interaction with Pad AA due to chamber growth on DD1-DD3 wells
Pad DD Performance

Jackfish 2 Pad DD Life Plot

3.1.1-7c
Pad DD Toe Observation Well Temp (10.5m from DD3 well pair)

3.1.1-5d
3.1.1-7c

- First steam occurred in July 2014
- Seven well pairs in operation
- Production currently in plateau phase
- Wells EE1 – EE5 have clean sand with uniform ceiling
- Wells EE6 – EE7 have low ceiling at toe of wells
- Steam subs opened on EE1 – EE5 in 2015 to increase steam injection rates
- Pad SOR historical average between 2.0 – 2.5
Pad EE Performance

Jackfish 3 Pad EE Life Plot

3.1.1-7c
Pad EE Heel Observation Well Temp
(4.8m from EE5 well pair)

3.1.1-5d
Jackfish 3 - Pad K Highlights

High Performer

3.1.1-7c

• First steam occurred in February 2015
• Ten well pairs are in operation
• Best performing pad at Jackfish 3
• Clean sand throughout all ten well pairs
• Historical SOR < 2
Pad K Performance

Jackfish 3 Pad K Life Plot

3.1.1-7c
Pad K Toe Observation Well Temp
(9.5m from K5 well pair)

3.1.1-5d
• No anticipated pad abandonments at Jackfish within the next five years
Wellhead Steam Quality

3.1.1-7d

<table>
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<tr>
<th></th>
<th>Pressure (kPag)</th>
<th>Temperature (°C)</th>
<th>Quality (%)</th>
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<tr>
<td>Wellhead</td>
<td>2,600-4,600</td>
<td>228-260</td>
<td>97%</td>
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</table>

- Losses in steam quality occur as steam is transported to the pads
- Utilize condensate traps at each pad to maximize wellhead steam quality
• NCG source is fuel gas, primarily composed of methane
• NCG co-injection pilot at Pad A was discontinued in late 2014
• NCG co-injection started on Pads DD, FF, and KK in March 2016
  – NCG co-injection was taken off of Pad FF in August 2017
• Learnings to date:
  – NCG injection rates within expected range (1 – 4 mole%, per pad)
  – NCG successful in maintaining chamber pressure with reduced steam injection
  – No negative impact to resource recovery observed in late life NCG co-injection
  – Improved SOR observed
• Continuing to monitor and evaluate NCG performance
NCG Co-Injection
Pad DD

3.1.1-7e, g

- NCG co-injection as of August 2017 on DD1, DD3, DD5, and DD6
NCG co-injection discontinued as of August 2017 on FF1, FF2, FF3, FF4, FF5, FF6, FF8, and FF9
NCG Co-Injection
Pad KK

3.1.1-7e, g

- NCG injection as of August 2017 on KK2, KK3, KK5, and KK6
Jackfish Performance

Key Learnings

3.1.1-7f

- District SOR improvements tied to pressure reduction and optimization
- Continued focus on pressure balance with aquifer
- Successful use of NCG enables steam transfer to higher quality pads
Future Plans
Section 3.1.1-8
Future Plans
Well Operations, Drilling, and Trials

3.1.1-8a, b

Jackfish 1
• Pad G – G2i and G6i/p planned re-entry drilling start Q4 2017
• Pad EX – SAGD drilling planned Q4 2017
• Pad O – Planned circulation start Q4 2017
• Pad R – Planned circulation start Q1 2018
• Planned implementation of NCG co-injection
• Pad F10P well drilling in Q3 2017

Jackfish 2
• Pad QQ – SAGD drilling planned Q3 2017
• Pad MM – SAGD drilling planned Q2 2018

Jackfish 3
• Pad EEE – Planned circulation start Q4 2017
• Pad III – SAGD drilling planned Q4 2017
Future Plans

Jackfish District Steam Strategy

3.1.1-8c

Jackfish 1
• Utilizing steam capacity while managing SOR through steam allocation, implementation of NCG co-injection, and continued balanced chamber pressures with aquifer

Jackfish 2
• Utilizing steam capacity while managing SOR through steam allocation, pressure management, and leveraging NCG co-injection on Pads DD and KK

Jackfish 3
• Utilizing steam capacity while managing SOR through steam allocation and pressure management
Surface Operations
Table of Contents

Surface Operations

- Facilities Overview
  - Travis Swallow
- Facilities Performance
  - Travis Swallow
- Measurement and Reporting
  - Mike Brewster and Jody Kutschera
- Water Production, Injection, and Uses
  - Travis Swallow
- Sulphur Production and Air Emissions
  - Katie Howes
- Environment
  - Katie Howes
- Regulatory Compliance
  - Katie Howes
- Future Plans
  - Travis Swallow
Facilities
Section 3.1.2-1
Facilities

Plot Plan – Jackfish 1

3.1.2-1a
Facilities
Plot Plan – Jackfish 2
Facilities
Plot Plan – Jackfish 3
Facilities
Plant Schematic

3.1.2-1b
Facilities Performance
Section 3.1.2-2
Facilities Performance

3.1.2-2a-c

**Turnarounds/Outages**
- Jackfish 3 maintenance turnaround completed June 2017
- Jackfish 2 maintenance outage completed July 2017

**Bitumen Treatment**
- Stable operation at elevated production rates at J2/J3 compared to historical

**Water Treatment**
- Utilized brackish water wells with TDS ranging from 5,000-13,000 ppm for all make up water requirements
- Jackfish 3 upgrades completed to Lime and MagOx systems and HLS to improve system reliability

**Steam Generation**
- 80% overall steam quality targeted to decrease blowdown disposal volumes and increase steam generation
Power consumption was low in May-July 2017 for maintenance turnaround

Power consumption was low in July 2017 for maintenance outage
• Flare volumes include produced gas only. Volumes are aligned with MARP reporting requirements for Jackfish.
• J1: Plant trip in May and August.
• J2: VRU and gas boot compressor maintenance in May. Production ramp-up following outage resulted increased flaring in July and August.
• J3: Increased flaring in May in preparation for turnaround. Production ramp-up following outage resulted increased flaring in July.
• Devon has notified the AER of all events as per Directive 60
• J3 gas boot compressors taken offline in March for repair following AER notification
• Devon has notified the AER of all events as per Directive 60
Facilities Performance

Solution Gas Recovery

3.1.2-2e

Solution Gas Recovery

Monthly Percentage

<table>
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<th></th>
<th>Sep-16</th>
<th>Oct-16</th>
<th>Nov-16</th>
<th>Dec-16</th>
<th>Jan-17</th>
<th>Feb-17</th>
<th>Mar-17</th>
<th>Apr-17</th>
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</table>
Methodology for calculating produced gas volumes changed January 1/2017 to improve accuracy.

The amount of fuel consumed remains constant.

Gas production calculation methodology was adjusted for 2017 production. This was done to incorporate a net monthly, facility level GOR (as per Devon’s MARP).
Methodology for calculating produced gas volumes changed January 1/2017 to improve accuracy.

The amount of fuel consumed remains constant.

Gas production calculation methodology was adjusted for 2017 production. This was done to incorporate a net monthly, facility level GOR (as per Devon’s MARP).
Methodology for calculating produced gas volumes changed January 1/2017 to improve accuracy.

The amount of fuel consumed remains constant.

Gas production calculation methodology was adjusted for 2017 production. This was done to incorporate a net monthly, facility level GOR (as per Devon’s MARP).
Measurement and Reporting
Section 3.1.2-3
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 + Blending Shrinkage

- Battery Water Production = Inlet Produced Water + ΔInventory + Truck Out – Truck in – Desand Water to Treater and FWKO

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

Production and Injection Volumes

3.1.2-3a, c

Well Gas Production

- Well estimated test gas production = GOR x test bitumen production
- Battery Gas Production = Fuel + Fuel to IF + Flare – TCPL Purchase – Receipt Gas – Diluent Flash
- Battery gas is allocated to each well based on well test

Steam Injection

- Total steam to field measured downstream of HP separators minus the steam condensate
  - Alternate steam determination in place at J2 and J3
- Vortex meters at each wellhead are used to allocate the total steam
Measurement and Reporting

Proration factors

3.1.2-3a, b

Bitumen / Water Proration Factor

- Within AER target tolerances on an ongoing basis
- Jackfish 3 extended facility outage June / July 2017
- Jackfish 1 bitumen proration being monitored by Devon

Steam Proration Factor

- 12 months average was 1.033 for Jackfish 1, 1.024 for Jackfish 2, and 0.990 for Jackfish 3
- Trends for all facilities highly stable

Note: Data for June 2017 for J3 was omitted from graphs as facility was down for maintenance for bulk of month
### Facility Reporting Codes

<table>
<thead>
<tr>
<th>Facility Code</th>
<th>Facility Sub-type</th>
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<td>621 Gas Gathering System</td>
<td>Purchase Fuel Distribution</td>
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Primary Steam Metering with Bypass

- Primary meters (vortex) currently isolated
- Alternate steam volume determination has been authorized by the AER
- Investigation into root cause of failure continues
- Engineering project to replace failed meters currently in final design
Water Production, Injection, and Uses
Section 3.1.2-4
Water Disposal and Source Water

Well Locations
Water Disposal Geology
Basal McMurray Aquifer
Water Disposal Operations

Basal McMurray Pressure in 75-6W4, 75-7W4
Water Usage - Brackish

3.1.2-4a

- Brackish source water produced from the Grand Rapids ‘C’ and McMurray zones

- Available for Jackfish 1, Jackfish 2, and Jackfish 3

- Two McMurray Wells:
  - F1/07-30-075-06W4
  - F1/03-15-075-06W4

- Six Grand Rapid 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
Source Water Geology

Grand Rapids C Aquifer

Jackfish Source Well
- Source from Grand Rapids C

Jackfish Monitoring Well
- Monitoring Grand Rapids C
- Monitoring other formations

Quaternary Channel Outlines

Grand Rapids C Isopach
- C.I. = 5m

- 75m
- 5m

Date: Sept. 7, 2017

Kilometers

0 0.5 1 2
3.1.2-4b

- Brackish water production from the Grand Rapids ‘C’ commenced on July 12/2007 and McMurray commenced on October 2/2014
- Brackish water quality analyzed 1-2 times per year
J3 produced water was low in June/July 2017 due to a planned maintenance turnaround

J2 produced water was low in July 2017 due to maintenance
J3 steam injection was low in June/July 2017 due to a planned maintenance turnaround.

J2 steam injection was low in July 2017 due to maintenance.
Produced Water Recycle

3.1.2-4e

- Only brackish water is used for required makeup volumes
- Jackfish disposal limit = 12 - 15%
  - Jackfish 1 2016/17 disposal rate = 7.7%
  - Jackfish 2 2016/17 disposal rate = 7.6%
  - Jackfish 3 2016/17 disposal rate = 6.6%

\[
\text{Disposal Limit} = \left( \frac{\text{Brackish Water} \times D_f}{\text{Brackish Water} + \text{Produced Water}} \right) \times \left( \frac{\text{Produced Water} \times D_p}{\text{Brackish Water} + \text{Produced Water}} \right) \times 100\%
\]
Disposal System is shared between Jackfish 1, 2, and 3

Two disposal streams:
- Blowdown and regen waste

Fourteen Class 1b disposal wells in total:
- Twelve active (see list below)
- One inactive (102/12-05-076-06W4)
- One suspended (102/03-22-075-06W4)

Approved MWIP of 6,000 kPa (July 2009)

Jackfish 1 disposal wells:
- 00, 02, and 03/09-14-075-06W4 (blowdown)
- 00 and 02/12-14-075-06W4 (regen)

Jackfish 2 disposal wells:
- 02 and 03/07-13-075-06W4 (blowdown)
- 02 and 04/12-15-075-06W4 (regen)

Jackfish 3 disposal wells:
- 00 and 02/05-12-075-06W4 (blowdown)
- 00/03-22-075-06W4 (regen)
Water Disposal – Approval No. 10790
Volume Summary

3.1.2-4h

Blowdown Water Volumes

Regen Water Volumes
Water Disposal – Approval No. 10790
00/09-14-075-06W4

3.1.2-4h

00/09-14-075-06W4 BD Disposal Well
MWIP 6,000 kPag

Monthly Volumes [m³]
Average Injection Pressure [kPa]
Water Disposal – Approval No. 10790
02/09-14-075-06W4

3.1.2-4h

02/09-14-075-06W4 BD Disposal Well
MWIP 6,000 kPag

[Graph showing monthly volumes (m^3) and average injection pressure (kPa) from Sep-16 to Aug-17]
Water Disposal – Approval No. 10790
03/09-14-075-06W4

3.1.2-4h

03/09-14-075-06W4 BD Disposal Well
MWIP 6,000 kPag

Average Wellhead Pressure (kPag)

Monthly Volume (m³)

Average Injection Pressure [kPa]

Monthly Volumes [m³]
Water Disposal – Approval No. 10790
02/07-13-075-06W4

3.1.2-4h

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

Average Wellhead Pressure (kPag)

Monthly Volume (m³)

MWIP 6,000 kPag

Monthly Volumes [m³]
Average Injection Pressure [kPa]
Water Disposal – Approval No. 10790
03/07-13-075-06W4

3.1.2-4h

03/07-13-075-06W4 BD Disposal Well
MWIP 6,000 kPag

- Monthly Volumes [m3]
- Average Injection Pressure [kPa]
Water Disposal – Approval No. 10790
00/12-14-075-06W4

3.1.2-4h

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

Monthly Volumes [m³]  Average Injection Pressure [kPa]
Water Disposal – Approval No. 10790
02/12-14-075-06W4

3.1.2-4h

02/12-14-075-06W4 Regen Disposal Well
MWIP 6,000 kPag

Average Wellhead Pressure (kPag)

Monthly Volume (m³)

- 02/12-14-075-06W4 Regen Disposal Well
- MWIP 6,000 kPag

Average Injection Pressure [kPa]

Monthly Volumes [m³]

- Sep-16
- Oct-16
- Nov-16
- Dec-16
- Jan-17
- Feb-17
- Mar-17
- Apr-17
- May-17
- Jun-17
- Jul-17
- Aug-17
3.1.2-4h

02/12-15-075-06W4 Regen Disposal Well
MWIP 6,000 kPag

Average Wellhead Pressure (kPag)

Monthly Volume (m3)

- Monthly Volumes [m3]
- Average Injection Pressure [kPa]
Water Disposal – Approval No. 10790
04/12-15-075-06W4

3.1.2-4h

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

Monthly Volumes [m3]
Average Injection Pressure [kPa]
Water Disposal – Approval No. 10790
00/05-12-075-06W4

3.1.2-4h

00/05-12-075-06W4 BD Disposal Well
MWIP 6,000 kPag

Average Wellhead Pressure (kPag)
Monthly Volumes [m3]
Average Injection Pressure [kPa]

Monthly Volumes [m3]
- Sep-16: 25,000
- Oct-16: 20,000
- Nov-16: 22,000
- Dec-16: 21,000
- Jan-17: 20,000
- Feb-17: 19,000
- Mar-17: 18,000
- Apr-17: 17,000
- May-17: 16,000
- Jun-17: 15,000
- Jul-17: 23,000
- Aug-17: 14,000

Average Injection Pressure [kPa]
- Sep-16: 3000
- Oct-16: 2800
- Nov-16: 2600
- Dec-16: 2400
- Jan-17: 2200
- Feb-17: 2000
- Mar-17: 1800
- Apr-17: 1600
- May-17: 1400
- Jun-17: 1200
- Jul-17: 1000
- Aug-17: 800
Water Disposal – Approval No. 10790

02/05-12-075-06W4

3.1.2-4h

02/05-12-075-06W4 BD Disposal Well
MWIP 6,000 kPag

Average Wellhead Pressure (kPag)

Monthly Volumes [m³]

Average Injection Pressure [kPa]

Monthly Volume (m³)

02/05-12-075-06W4 BD Disposal Well

MWIP 6,000 kPag
Water Disposal – Approval No. 10790
00/03-22-075-06W4

3.1.2-4h

00/03-22-075-06W4 Regen Disposal Well
MWIP 6,000 kPag

- Monthly Volumes [m³]
- Average Injection Pressure [kPa]

Average Wellhead Pressure (kPag)

Monthly Volumes [m³]

Average Injection Pressure [kPa]
Water Disposal – Approval No. 10790
02/03-22-075-06W4

3.1.2-4h

02/03-22-075-06W4 Regen Disposal Well
MWIP 6,000 kPag

Average Wellhead Pressure (kPag)
Monthly Volume (m3)

Monthly Volumes [m3]
Average Injection Pressure [kPa]
### Off-site Water Disposal Volumes

#### 3.1.2-4i

<table>
<thead>
<tr>
<th>Facility</th>
<th>Volume (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Swan Atmore Disposal Well</td>
<td>345</td>
</tr>
<tr>
<td>Tervita Lindberg</td>
<td>8,853</td>
</tr>
<tr>
<td>Newalta Kitscoty</td>
<td>125</td>
</tr>
<tr>
<td>Newalta Hughenden</td>
<td>284</td>
</tr>
<tr>
<td>Newalta Elkpoint</td>
<td>1,819</td>
</tr>
<tr>
<td>Cancen New Serepta Disposal</td>
<td>3,793</td>
</tr>
<tr>
<td>Newalta Fort McMurray</td>
<td>12,404</td>
</tr>
<tr>
<td>Ceiba Athabasca</td>
<td>2,693</td>
</tr>
<tr>
<td>White Swan Atmore Waste Management Facility</td>
<td>2,610</td>
</tr>
<tr>
<td>Secure Tulliby Lake Full Service Terminal</td>
<td>25</td>
</tr>
<tr>
<td>White Swan Conklin Waste Management Facility</td>
<td>8,474</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>41,424</strong></td>
</tr>
</tbody>
</table>
Sulphur Production and Air Emissions

Section 3.1.2-5
Sulphur Production

Operations with Sulphur Recovery

3.1.2-5a (i) and (ii)

Inlet sulphur content <1t/d.
No sulphur recovery required.
Sulphur Production
Operations with Sulphur Recovery

3.1.2-5a (i) and (ii)

Jackfish 2 Sulphur Recovery

Sulphur Recovery (%)

Plant Outage

Daily Recovery
Quarterly Average Recovery
Required Recovery
Sulphur Production

Operations with Sulphur Recovery

3.1.2-5a (i) and (ii)

Jackfish 3 Sulphur Recovery

Sulphur Production Operations with Sulphur Recovery

3.1.2-5a (i) and (ii)

Turnaround
Sulphur Production

Peak Daily and Rolling Averages – $\text{SO}_2$ Emissions

3.1.2-5c

(30 day rolling average of the J1, J2, and J3 daily $\text{SO}_2$ emissions)

Notes:
- The ID 2001-03 waiver was not used during the Sept. 2016 – Aug. 2017 period.
- Emissions above EPEA limit were the result of process upsets.
- All reporting required under the EPEA approval has been completed.
- Approval No. 224816-00-05 has since been granted to address sulphur emissions (received on October 11/2017).
Ambient Air Quality Monitoring

3.1.2-5d

Passive air monitoring

• At minimum there are four passive stations located at each Jackfish site to monitor sulphur dioxide and hydrogen sulphide

• In September 2016, Devon was approved by the AER to relocate some of the passive monitoring stations to improve year-round accessibility

• Monitored parameters: sulphur dioxide and hydrogen sulphide

Continuous ambient monitoring

• Monitored parameters: sulphur dioxide, hydrogen sulphide, nitrogen dioxide, total hydrocarbons, wind speed, and direction

2016-2017 monitoring and reporting requirements were satisfactorily met
Ambient Air Quality Monitoring

Jackfish 1 Results

3.1.2-5d

Jackfish 1 Ambient Monitoring - NO2, SO2, THC Hourly Maximum

- NO2 (ppb)
- SO2 (ppb)
- THC (ppm)
- NO2 AAAQO (ppb)
- SO2 AAAQO (ppb)

Jackfish 1 Ambient Monitoring - H2S Hourly Maximum

- H2S (ppb)
- H2S AAAQO (ppb)
Ambient Air Quality Monitoring

Jackfish 2/3 Results

3.1.2-5d

Jackfish 2/3 Ambient Monitoring - NO2, SO2, THC Hourly Maximum

- NO2 (ppb)
- SO2 (ppb)
- THC (ppm)
- NO2 AAAQO (ppb)
- SO2 AAAQO (ppb)

Jackfish 2/3 Ambient Monitoring - H2S Hourly Maximum

- H2S (ppb)
- H2S AAAQO (ppb)
Environmental Issues
Section 3.1.2-6
3.1.2-6a

• District SO$_2$ Emission Limit Variances due to Operational Upsets
  – Devon currently has an application processing with the AER requesting temporary exceedances due to equipment failures or process upset conditions

• Jackfish 1 CEMS Downtime
  – Downtime caused by failure of the temperature probe ($\text{NO}_x$ measurements were still recorded during this period)
  – AER approved Devon’s proposal to use an alternate temperature probe located near the CEMS unit within the exhaust stack to allow for temperature measurement mitigation planning
  – Accuracy of the measurements taken with the alternate probe will be ensured by comparing them to reference method measurements taken during previously completed relative accuracy testing of the CEMS unit
AER Regulatory Approval Summary

D78 Amendments – September 2016 to August 2017
* Indicates current approval as of August 31, 2017

<table>
<thead>
<tr>
<th>Amendment</th>
<th>Category</th>
<th>Date</th>
<th>Reference</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revised Annual Average Production</td>
<td>2</td>
<td>November 4/2016</td>
<td>10097HH</td>
<td>2</td>
</tr>
<tr>
<td>Jackfish Maximum Operating Pressure</td>
<td>2</td>
<td>November 21/2016</td>
<td>10097II</td>
<td>2</td>
</tr>
<tr>
<td>Temporary Waiver ID 2001-03</td>
<td>2</td>
<td>November 21/2016</td>
<td>10097JJ</td>
<td>2</td>
</tr>
<tr>
<td>Pad R Revised Well Trajectories</td>
<td>2</td>
<td>April 20/2017</td>
<td>10097KK</td>
<td>2</td>
</tr>
<tr>
<td>Pad D Sub-Producer Horizontal Well</td>
<td>2</td>
<td>May 26/2017</td>
<td>10097LL</td>
<td>2</td>
</tr>
<tr>
<td>Pad E Expansion (Pad EX)</td>
<td>3</td>
<td>July 11/2017</td>
<td>10097MM</td>
<td>3</td>
</tr>
<tr>
<td>Pad TT Proposal</td>
<td>2</td>
<td>Under Review</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Pad MM Proposal</td>
<td>2</td>
<td>Under Review</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>
D56 Facilities Licences

- Changes to licence inlet and emission rates at the following facilities:
  - Jackfish 1 CPF (F33125)
  - Jackfish 2 CPF (F39950)
  - Jackfish 3 CPF (F44113)

D65 Disposal Approval No. 10790

- Amended to include 102/12-05-076-06W4 disposal well (Application No. 1870924)
# AER Regulatory Approval Summary

**Jackfish Class II Landfill**

3.1.2-6b

## D58 Approval WM 105 E

<table>
<thead>
<tr>
<th>Date Issued</th>
<th>Approval To:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov 16, 2016</td>
<td>• One time approval to accept contaminated soil from Devon Leismer 15-33-077-06W4 lease</td>
</tr>
<tr>
<td></td>
<td>• One time approval to accept OSE waste from the Devon Pike and Jackfish West Project Areas</td>
</tr>
<tr>
<td>Dec 16, 2016</td>
<td>• One time approval to accept contaminated soil from the Devon NE Gas Project Area</td>
</tr>
<tr>
<td>Jan 4, 2017</td>
<td>• One time approval to accept contaminated soil from Devon Leismer B Facility at 15-23-077-09W4</td>
</tr>
<tr>
<td>May 17, 2017</td>
<td>• One time approval to accept contaminated soil from Devon Kirby North Facility at 12-08-074-05W4</td>
</tr>
<tr>
<td>May 24, 2017</td>
<td>• One time approval to accept contaminated soil from Devon Leismer B Facility at 15-23-077-09W4</td>
</tr>
</tbody>
</table>
AER Regulatory Approval Summary

Jackfish District

3.1.2-6b

EPEA Operating Approval No. 00224816-00 (as amended)

• Application submitted for SO$_2$ limit amendment (July 2017)
• EPEA renewal application submitted (August 2017)

Water Diversion Licences

• No amendments
AER Regulatory Reporting Requirements

3.1.2-6c

- 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, 2, and 3

Groundwater

- Jackfish 1, 2, and 3 groundwater monitoring twice yearly at CPF, well pads, and tank farm as per EPEA approval

- Minor issues to date include:
  - Slightly elevated chlorides due to de-icing agents and dust suppressants
  - Trace hydrocarbons identified at a single well downgradient of Jackfish 2, as result of an isolated spill in 2015
  - Rebalancing of water table below Jackfish 1 CPF

Wetlands

- Wetland monitoring program amendment approved by AER (September 2016)
- Wetland monitoring sites were surveyed in Q2 and Q3 2017
- No significant impacts observed to date
Soil Monitoring and Soil Management

**Jackfish 1, 2 and 3**

3.1.2-6c

- Jackfish 1 soil monitoring report submitted in 2011
  - Soil management report was not required

- Jackfish 2 soil monitoring report submitted 2012

- District soil monitoring proposal for Jackfish 1, 2, and 3 was submitted November 2016
  - District soil monitoring report will be submitted November 2017
Environmental Monitoring and Progress

Wildlife Monitoring

3.1.2-7c

• As per EPEA approval condition, Devon’s Jackfish Wildlife Monitoring Program was authorized in July 2012

• First comprehensive wildlife report was submitted July 2015

• Long term monitoring ongoing

• No significant project related impacts observed to date
Regional and Other Initiatives

3.1.2-6d

- Christina Lake Regional Water Management Agreement (CLRWMA)
- Canada’s Oil Sands Innovation Alliance (COSIA)
- Alberta Biodiversity Monitoring Institute (ABMI)
- Regional Aquatics Monitoring Program (RAMP)
- Monitoring Avian Productivity and Survivorship (MAPS Program)
- Regional Industry Caribou Collaboration (RICC)
- Clean Air Strategic Alliance (CASA)
- Wood Buffalo Environmental Association (WBEA)
- Oil Sands Environmental Monitoring Program, within the Environmental Monitoring and Science Division (EMSD)
Canada’s Oil Sands Innovation Alliance (COSIA)

- Devon is an active participant of the Water, Land, and greenhouse gas (GHG) Environmental Priority Areas (EPAs) and the COSIA Monitoring Working Group
- Aspirations for each EPA have been developed and Devon is striving to:
  - GHG: Produce oil with lower GHG emissions than other sources of oil
  - Land: Be world leaders in land management, restoring the land and preserving biodiversity of plants and animals
  - Water: Be world leaders in water management, producing Canadian energy with no adverse impact on water
- Devon is either leading or participating in Joint Industry Projects in each of the EPAs
Other Environmental Initiatives

3.1.2-7d

Monitoring Avian Productivity and Survivorship (MAPS Program)
• Continued annual support (technical and financial) of the MAPS Program
• This program analyzes the influence of industry throughout NE Alberta on productivity and survivorship of migratory birds

Regional Industry Caribou Collaboration (RICC)
• Devon is leading a consortium of organizations in implementing a collaborative caribou conservation program for the Cold Lake Range, which includes the Jackfish and Pike areas
• This program focuses on:
  – Managing and reducing industry’s current and future footprint
  – Monitoring wildlife use of linear features
  – Identifying effective techniques to reduce wolf and bear movements throughout the caribou habitat
Regulatory Compliance
Section 3.1.2-7, -8
Devon Canada Corporation believes the Jackfish Project is in compliance with AER approvals and regulatory requirements. As of August 31/2017, Devon has no unaddressed non-compliant events.
The following list summarizes spills reported to the AER within the reporting period.

<table>
<thead>
<tr>
<th>Site</th>
<th>No. of Reportable Spills</th>
<th>Volume Released (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jackfish 1</td>
<td>4</td>
<td>40.5</td>
</tr>
<tr>
<td>Jackfish 2</td>
<td>5</td>
<td>68.4</td>
</tr>
<tr>
<td>Jackfish 3</td>
<td>3</td>
<td>55.5</td>
</tr>
</tbody>
</table>
The following list summarizes non-compliant events within the reporting period. For all events corrective actions were identified and tracked to completion.

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Corrective Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 2016</td>
<td>Notice of Noncompliance re: missed deadline to update SCVF/GM in DDS</td>
<td>Clerical issue for not reporting on time was resolved.</td>
</tr>
<tr>
<td>September 2016</td>
<td>Notice of Noncompliance re: J1 injection facility water imbalance 2015-2016</td>
<td>Update: Source water meter relocation completed in September 2017 has significantly improved the water balance.</td>
</tr>
<tr>
<td>October 2016</td>
<td>Notice of Noncompliance re: unauthorized activity related to Surface Material Licences (SMC's)</td>
<td>Devon obtained TFAs and conducted necessary remedial work at three locations.</td>
</tr>
<tr>
<td>March 2017</td>
<td>Notice of Noncompliance re: well data deficiencies</td>
<td>Devon submitted required information and is working with vendors to ensure more timely data submission.</td>
</tr>
<tr>
<td>August 2017</td>
<td>Notice of P&amp;NG Rights expiry for one well</td>
<td>DOE linked wellbore to an active mineral agreement.</td>
</tr>
</tbody>
</table>
The following waiver or variance requests were approved by the AER within the reporting period.

<table>
<thead>
<tr>
<th>Date</th>
<th>Waiver/Variance Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 2016</td>
<td>Authorization for alternative steam measurement at Jackfish 1, 2, and 3 due to failure of primary steam meters. Approval extended to December 31/2017.</td>
</tr>
<tr>
<td>August 2017</td>
<td>Authorization to defer until pad abandonment repair of failed intermediate casing at B3i</td>
</tr>
</tbody>
</table>
Future Plans (2017 – 2018)

Surface Operations

3.1.2-9a, b, c, d

Jackfish 1

• Plant maintenance turnaround planned for 2018

Jackfish 2 and 3

• Fourth LSF installation to improve water treatment reliability
Thank you.