SUNSHINE OILSANDS LTD.

WEST ELLS SAGD

Scheme No. 11764G
AER In Situ Performance Presentation 2018
Presenters

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- Sokwon (Brandon) Yoon, E.I.T. – Production/Completions Engineer

- Lisa Moore – Production Accountant

- Tye Bietz – Sr. Regulatory Analyst
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Overview

With almost 1,000,000 acres of oil sands and PNG leases, Sunshine holds current Scheme approvals for two 10,000bbl/d SAGD projects, and a third in the application process.
Sunshine’s main focus is currently West Ells, but Sunshine holds an approval for its Thickwood 10,000bbl/d SAGD project and is in the application stage for the Legend Lake 10,000bbl/d SAGD project.
- Covering 9,856 contiguous gross hectares in the Athabasca Oil Sands Region
- Two phases of 5,000 bbl/d
  - Phase 1 currently in Operation since September 2015 is supplied by Pad 2
  - Phase 2 will commence in the future and is supplied by Pad 3 which has already been drilled.
  - MSL 112941 and MSL 112933 were cleared of vegetation with no soil disturbance, anticipated to serve as make-up pads as the project advances
- First production December 2015
## Development and Project Area

<table>
<thead>
<tr>
<th>Area</th>
<th>Land Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development Area (4 sections)</td>
<td>T94 R17W4; Sec 30, 31; T94 R18W4; Sec 25, 36</td>
</tr>
<tr>
<td>Project Area (6 sections)</td>
<td>T94 R17W4; Sec 30, 31, 32, 33; T94 R18W4; Sec 25, 36</td>
</tr>
</tbody>
</table>
Development timeline – Scheme 11764

• Mar 31, 2010 - West Ells application submitted to the AER (formerly ERCB)

• January 26, 2012 – Commercial Scheme Approval 11764 received

• February to September 2012 – All season road access construction

• October 2, 2012 – Site construction commences at West Ells

• December 2012- March 2013 – Wells drilled for Pad 2 and Pad 3

• 2013 – Civil work completed, general CPF construction of tank farms, buildings, evaporator and, construction of Operations camp

• 2014 - mid-2015 – Work completed on steam and emulsion lines to pads, final construction and QA/QC

• September 22, 2015 – First Steam at West Ells

• December 7, 2015 – First production from West Ells
• Pad alignment – 11764A and 11764B
  - May 30, 2012 – Amendment 1 filed to change well bore trajectory and pad alignment, approval received February 8th, 2012
  - August 21, 2012 – Amendment 2 filed to change well bore trajectory and pad alignment, approval received October 2, 2012

• Infill wells – 11764C
  - April 8, 2013 – Application submitted for infill wells to improve resource recovery, approval received August 9, 2013

• CPF Changes – 11764D
  - May 28, 2013 – Application filed for minor changes to CPF design such as fuel gas consumption and cold water equivalent for steam, approval received August 30, 2013
Scheme Amendments

- NCG Co-injection – 11764E
  - October 24, 2013 – Application for NCG co-injection during Phase 1 filed, approval received June 19, 2014

- NCG Co-injection Full Field – 11764F
  - July 18, 2014 – Application for NCG Co-injection full field filed, approval received March 2, 2015

- Maximum Operating Pressure – 11764G
  - October 29, 2015 – Application filed to increase the MOP, this brought it in line both with Industry standard (80% cap rock fracture pressure), and with previously filed and approved amendments to the Directive 051 Injection approval for both Phase 1 and 2, approval received March 10, 2016
• CPF design changes
  • December 20, 2012 – Amendment application filed for minor design changes to the CPF that would have affected the modeling and emissions limits, approval received July 4, 2013

• Industrial Runoff Pond design correction
  • In response to a supplemental information request Sunshine had indicated that the designed runoff pond included a polyethylene liner. This was misstated as there was never a liner planned for, nor required. Sunshine confirmed that the pond had been built with a compacted clay liner with the appropriate Proctor compaction for a pond of this type
  • February 5, 2015 – Application filed to amend the approval to use the compacted clay liner as originally designed, approval received February 6, 2015
Geoscience
West Ells
Located in the NW part of the Athabasca Oilsands Deposit, Alberta, Canada

http://osip.alberta.ca/map/
The Wabiskaw sands are laterally extensive and were deposited along the emergent Devonian highs as the Boreal Sea transgressed over the Athabasca Basin.
West Ells SAGD Project is located in an embayment in T94 R17 W4M.

Isopach Map (Clearwater Marker to Devonian)

"Paleotopographic" map

- Reflects paleotopography during the Late Cretaceous.
- Warm colors represent valleys and cooler colors represent highs.
- Major McMurray drainage systems are marked with a dashed line.
- Extensive amalgamated shoreface sands (Wabiskaw A, C, & D) were deposited on the east side of the emergent Devonian strata.
The SAGD wells are located at the base of the Wabiskaw D sand unit.
<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bitumen saturation (%)</td>
<td>71</td>
</tr>
<tr>
<td>Porosity (%)</td>
<td>33</td>
</tr>
<tr>
<td>Grain size</td>
<td>Fine to medium</td>
</tr>
<tr>
<td>Net pay (m)</td>
<td>15.2</td>
</tr>
<tr>
<td>Horizontal perm. (D)</td>
<td>2.4</td>
</tr>
<tr>
<td>Vertical perm. (D)</td>
<td>1.7</td>
</tr>
<tr>
<td>Reservoir pressure (kpa)</td>
<td>600</td>
</tr>
<tr>
<td>Reservoir temperature (°C)</td>
<td>9</td>
</tr>
<tr>
<td>Reservoir depth (m TVD)</td>
<td>265</td>
</tr>
<tr>
<td>Bitumen viscosity (cp)</td>
<td>&gt; 1 million</td>
</tr>
<tr>
<td>Well length (m)</td>
<td>800</td>
</tr>
<tr>
<td>Well spacing (m)</td>
<td>70</td>
</tr>
</tbody>
</table>
Typical SAGD Well Placement (e.g. Pair 8)

Wells are placed at the base of the Wabiskaw D unit. The producer well was positioned above the underlying mud unit by using a deep resistivity geosteering tool that detected the proximity of the bed boundary while drilling.

Top 261.6 m

So = 78.6%
Porosity = 35.1%

Injector

kh = 3860 md
kv = 2960 md

So = 83.0%
Porosity = 34.9%

Producer

Bottom 268.75 m
Uniform gamma ray profile is indicative of a clean sandy shallow marine environment (e.g., shoreface) 
• 3D seismic data shows continuity of Wabiskaw reservoir units.

<table>
<thead>
<tr>
<th>Pad</th>
<th>Percent Effective Producer (GR &lt; 60) (%)</th>
<th>Percent Effective Injector (GR &lt; 60) (%)</th>
<th>Horizontal Well Length (m)</th>
<th>Interwell spacing (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pad 2</td>
<td>99</td>
<td>100</td>
<td>800</td>
<td>70</td>
</tr>
<tr>
<td>Pad 3</td>
<td>100</td>
<td>100</td>
<td>800</td>
<td>70</td>
</tr>
</tbody>
</table>
The elevation varies from 290 to 297 m asl.
The elevation varies from 270 to 280 m asl.
The top gas ranges in thickness from 1.0 to 6.4 m and the average is 3.1 m.
The lean zone varies in thickness from 0 to 3.6 m and the average is 1.3 m.
# OBIP for Pads 2 & 3 and Development Area

<table>
<thead>
<tr>
<th></th>
<th>Number of SAGD Well Pairs</th>
<th>Well Length (m)</th>
<th>Well Spacing (m)</th>
<th>Drainage Area 50m Boundary (10^3 m^3)</th>
<th>Average Net Pay above producer (m)</th>
<th>Total OBIP (10^6 m^3)</th>
<th>Cumulative Bitumen Produced* (m^3)</th>
<th>Current Recovery Factor (%)</th>
<th>Estimated Recovery Factor (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pad 2</td>
<td>8</td>
<td>800</td>
<td>70</td>
<td>504</td>
<td>16.2</td>
<td>1.87</td>
<td>108,165</td>
<td>5.78</td>
<td>50-60</td>
</tr>
<tr>
<td>Pad 3</td>
<td>8</td>
<td>800</td>
<td>70</td>
<td>504</td>
<td>15.4</td>
<td>1.86</td>
<td>0</td>
<td>0</td>
<td>50-60</td>
</tr>
</tbody>
</table>

*Production to December 31, 2017

<table>
<thead>
<tr>
<th></th>
<th>Area (10^3 m^3)</th>
<th>Average Net Pay (m)</th>
<th>Total OBIP (10^6 m^3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development Area</td>
<td>10,511</td>
<td>15.2</td>
<td>37.2</td>
</tr>
</tbody>
</table>

**OBIP = Area x Net Pay x Porosity x Bitumen Saturation / FVF**

**FVF = Formation Volume Factor**

= 1.005
Wells with Core and Special Core Analysis

Development Area

LEGEND
- Core (43)
- PSD (14)
- Caprock Analysis (5)
- Bitumen Analysis (3)
- Geochemistry (1)
Structural Cross-Section A-A’

Development Area

Location of Section A-A’

T94

OB 23

OB 26

OB 42

00/04-31-094-17W4/0

100043109417W400

R18W4

R17W4

210 m

280 m

ELEV KB : 542

ELEV KB : 543

ELEV KB : 541

04/03-31-094-17W4/0

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Composition

- Small differences in clay content and quartz is seen between WBSK C and D
- WBSK C = 3% clay, WBSK D = 0.6%-1.3% clay
### Survey Layout

### Acquisition Parameters

<table>
<thead>
<tr>
<th>Area</th>
<th>10.7 (km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Source Information</strong></td>
<td><strong>Receiver Information</strong></td>
</tr>
<tr>
<td>Source interval (m)</td>
<td>20</td>
</tr>
<tr>
<td>Source line interval (m)</td>
<td>80</td>
</tr>
<tr>
<td>Line orientation</td>
<td>N-S</td>
</tr>
<tr>
<td>Total km of line</td>
<td>167.1</td>
</tr>
<tr>
<td>Number of source points</td>
<td>7078</td>
</tr>
<tr>
<td>Source depth (m)</td>
<td>6</td>
</tr>
<tr>
<td>Source type</td>
<td>Dynamite</td>
</tr>
</tbody>
</table>
• As measured on the observation wells, the width of the steam chamber is narrow and less than 10 m from the SAGD well pair. Therefore, Sunshine did not plan a 4D seismic acquisition survey in 2017 because it is difficult to image a small steam chamber in the seismic data.

• While there are no plans in 2018 to conduct a 4D seismic survey, Sunshine will consider a 4D seismic survey when it is appropriate and provides an advantage for resource recovery.
• Mini-frac tests were performed at:
  • 1AA/14-31-094-17W4/0
  • 1AA/07-36-094-18W4/0
• Caprock average minimum stress gradient = 22 kPa/m (Wabiskaw Shale Member).
• Oil sand average minimum stress gradient = 17 kPa/m (Wabiskaw Sand).
• Sunshine applied for a maximum operating pressure (MOP) of 4400 kPag in the Wabiskaw Shale Member based on a 80% safety factor.
• The maximum operating pressure (MOP) of 4400 kPag was granted on March 10, 2016.
Caprock - Wabiskaw Shale Member

Regional Marine Shale (~ 15 m thick)

Caprock mini-frac

Oil sand mini-frac

Oil sand - Wabiskaw Sand

1AA/14-31-094-17W4/0 Well Log
Surface Heave – Corner Reflector Locations
Surface Heave Monitoring

• 52 corner reflector locations

• Baseline information gathered prior to steaming operations

• Since the start up of the wells, 30-55mm of surface expression due to SAGD related activities has been observed at some corner reflector locations.
Surface Heave Monitoring – Corner Reflector Deformations

Corner Reflector Cumulative Vertical Deformation
April 12, 2013 to December 11, 2017

MDA

West Els SAGD 2018 In Situ Performance Presentation
Surface Heave Monitoring – CR Deformation With Time

Deformation Time Series for CR1

Deformation Time Series for CR33

Deformation Time Series for CR22

West Ells SAGD 2018 In Situ Performance Presentation
Drilling and Completions
West Ells Pad & Well Locations

CPF

Pad 2 (Phase 1)  Pad 3 (Phase 2)

SAGD Well Pair – Drilled & Completed

SAGD Well Pair – Drilled, liners installed, pump and instrumentation install not complete.

Source Water Well – Drilled & Completed
**Injector Well Completions**

- Steam injection down long and short tubing
- Blanket gas held on intermediate casing annulus

**Diagram Details:**
- 16” surface casing
- 11 3/4” intermediate casing
- 4.5” short tubing
- 1.5” Instrumentation Coil
- 8 5/8” slotted liner
- 3.5” long tubing
Producer Well Completions – Circulation Phase

- Steam injection through long tubing
- Circulation returns via intermediate casing
- Blanket gas contained in short tubing
- Slotted liner in three wells
- Facsrite screen in five wells

16” surface casing
11 3/4” intermediate casing
7” short tubing
8 5/8” liner
3.5” long tubing
1.5” Instrumentation Coil

Steam injection through long tubing
Circulation returns via intermediate casing
Blanket gas contained in short tubing
• Electric Submersible Pumps (ESPs) installed in all SAGD producers
• Blanket gas held on short tubing and intermediate casing

16” surface casing
11 3/4” intermediate casing
7” short tubing
3.5” production tubing
ESP
8 5/8” liner
1.5” Instrumentation Coil
Producer Well Completions – Liner Type

- Slotted Liner – 0.012” x 0.020” RT
- Facsrite – 250 Micron
• All SAGD production wells were designed to use Electric Submersible Pumping (ESP) systems

• Designed production capacity of the ESPs is 50-720m$^3$/d for initial stage of operation

• Current emulsion rate varies between 80-550m$^3$/d

• Designed operational temperature of ESP is at 230 degrees C

• Current operational temperature between 150-200 degrees C
Well Instrumentation

1.5” instrumentation coils include (all wells):
- Heel and toe bubble tube – pressure
- 8 thermocouples, evenly spaced
- Fiber optic temperature (DTS or 40-point FBG)

Injector

Producer

- Bubble Tubes (Pressure)
- Blanket Gas (Pressure)
- Thermocouples (x8)
Observation Wells

- 7 vertical OB wells drilled on Pad 2 (Phase 1) across zone
- Each well equipped with instrument bundle cemented outside 4 ½” casing, equipped with:
  - 20 thermocouples spaced from above the cap rock to below base of pay
  - 3 piezometers in zones of interest: gas cap, mid-pay, and lower pay
Subsurface and Scheme Performance
• All 8 well pairs are now in production mode
• SAGD steam chamber still developing
• The injection pressure varied from 2000 kPa to 2300 kPa
• Producer pressure registered between 1000 kPa and 2000 kPa
• Sunshine’s near term operating strategy is to maximize steam rates to achieve and sustain a bottom hole injection pressure of around 2300 kPa
• Sunshine’s injection pressure is within approved limit of 4400 kPa
OB41 Temperature Log

- OB41 is 4.2 m east of Pair 12.
- Oil sand with mm to cm silt/shale laminate (act as a baffle and not a barrier).
- Original reservoir temperature was 9 °C
- Temperature near the injector level is about 210 °C.

Core

Temperature Response on Type Well (102/06-31-094-17W4)

- OB41 is 4.2 m east of Pair 12.
- Oil sand with mm to cm silt/shale laminate (act as a baffle and not a barrier).
- Original reservoir temperature was 9 °C
- Temperature near the injector level is about 210 °C.
West Ells Fluid Rates

- Steam, m³/d
- Bitumen, m³/d
- Water, m³/d
- ISOR

Date

2017-01 2017-02 2017-03 2017-04 2017-05 2017-06 2017-07 2017-08 2017-09 2017-10 2017-11 2017-12

Rate, m³/d

- ESP failure
- Reaction tank cleaning
- ESP issues
- EVAP outage
- Reaction tank outage
- Boiler repair
- EVAP Reaction tank cleaning
West Ells Cumulative Fluids

Cumulative Fluid Rate

West Ells SAGD 2018 In Situ Performance Presentation
Recovery Patterns Pair 7

P7 Production

- Average Oil Production
- Average Water
- Average Steam
- CSOR x 10
- ISOR x 10
- Cumulative Oil
- Cumulative Water
- Cumulative Steam

Date
Cumulative Volume (m³)

Average Oil, Water, and Steam Injection Rate (m³/d)

- Jan-2017
- Feb-2017
- Mar-2017
- Apr-2017
- May-2017
- Jun-2017
- Jul-2017
- Aug-2017
- Sep-2017
- Oct-2017
- Nov-2017
- Dec-2017
Recovery Patterns Pair 10

P10 Production

- Average Oil Production
- Average Water
- Average Steam
- CSOR x 10
- ISOR x 10
- Cumulative Oil
- Cumulative Water
- Cumulative Steam

Date:
- Jan-2017
- Feb-2017
- Mar-2017
- Apr-2017
- May-2017
- Jun-2017
- Jul-2017
- Aug-2017
- Sep-2017
- Oct-2017
- Nov-2017
- Dec-2017
Recovery Patterns Pair 5

P5 Production

- Average Oil Production
- Average Water
- Average Steam
- CSOR x 10
- ISOR x 10
- Cumulative Oil
- Cumulative Water
- Cumulative Steam

Date
Cumulative Volume (m³)

Average Oil, Water, and Steam Injection Rate (m³/d) * 10

Jan-2017 - Dec-2017
Steam Strategy

- West Ells is in the early stage of the SAGD process

- Steam will be continually optimized in individual wells based on the steam chamber growth rate, with a target pressure of around 2300 kPa

- Once the steam chamber has reached the top of the reservoir/peak rates, the target pressure will be reviewed again

- Currently, West Ells is planning to use the full steam generation capacity of the CPF
Key Learnings

- Continuous steam supply is key to steady growth of the steam chamber

- Down hole instrumentation is very important for optimizing well performance

- Better than predicted performance validates proper wellbore placement and good reservoir pressure containment

- Current ESP design needs to be upgraded to meet anticipated higher flow rates
Facilities
Three Viking formation non-saline water source wells are located at:

1. 14-32-94-17W4
2. 16-32-94-17W4
3. 10-33-94-17W4
# Water Source Summary Table

<table>
<thead>
<tr>
<th>Licence No.</th>
<th>Well Name</th>
<th>Location</th>
<th>Measurement Start Date</th>
<th>Measurement Stop Date</th>
<th>Maximum Approved Rate of Diversion</th>
<th>Maximum Approved Diversion Volume</th>
<th>Cum Volume produced</th>
<th>Percent of Max Diversion Volume Produced</th>
</tr>
</thead>
<tbody>
<tr>
<td>00316770 (Licence)</td>
<td>WSW 16-32c</td>
<td>16-32-94-17W4</td>
<td>Jan. 1, 2017</td>
<td>Dec. 31, 2017</td>
<td>1400</td>
<td>365,000</td>
<td>120,007.0</td>
<td>32.9%</td>
</tr>
<tr>
<td>00316770 (Licence)</td>
<td>WSW 14-32</td>
<td>14-32-94-17W4</td>
<td>November, 2017</td>
<td>December 31, 2017</td>
<td>1500</td>
<td>365,000</td>
<td>37,344.4</td>
<td>10.2%</td>
</tr>
<tr>
<td>00385204 (TDL)*</td>
<td>WSW 14-32</td>
<td>14-32-94-17W4</td>
<td>Jan 1, 2017</td>
<td>October 6, 2017</td>
<td>1500</td>
<td>182,500</td>
<td>130,014.1</td>
<td>71.2%</td>
</tr>
</tbody>
</table>

*TDL for this location granted from October 7, 2016 through October 6, 2017

- Did not exceed the maximum daily or maximum approved diversion volume.
- Did not impact the groundwater levels in the overlying Quaternary sediment.
- Both withdrawal locations included under initial Water Act Term Licence after expiry of TDL 00385204
## Monthly Water Source Production

<table>
<thead>
<tr>
<th>Month</th>
<th>WSW-16-32</th>
<th>WSW 14-32</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 2017</td>
<td>231.10</td>
<td>20,404.00</td>
<td>20,635.10</td>
</tr>
<tr>
<td>February 2017</td>
<td>1,369.00</td>
<td>25,255.20</td>
<td>26,624.20</td>
</tr>
<tr>
<td>March 2017</td>
<td>3,078.90</td>
<td>16,761.60</td>
<td>19,840.50</td>
</tr>
<tr>
<td>April 2017</td>
<td>19,071.00</td>
<td>1,270.10</td>
<td>20,341.10</td>
</tr>
<tr>
<td>May 2017</td>
<td>17,882.10</td>
<td>2,068.60</td>
<td>19,950.70</td>
</tr>
<tr>
<td>June 2017</td>
<td>13,800.80</td>
<td>13,902.20</td>
<td>27,703.00</td>
</tr>
<tr>
<td>July 2017</td>
<td>10,609.30</td>
<td>14,755.50</td>
<td>25,364.80</td>
</tr>
<tr>
<td>August 2017</td>
<td>6,065.10</td>
<td>16,948.30</td>
<td>23,013.40</td>
</tr>
<tr>
<td>September 2017</td>
<td>11,077.40</td>
<td>13,230.10</td>
<td>24,307.50</td>
</tr>
<tr>
<td>October 2017</td>
<td>23,088.40</td>
<td>5,418.50</td>
<td>28,506.90</td>
</tr>
<tr>
<td>November 2017</td>
<td>6,452.20</td>
<td>17,909.30</td>
<td>24,361.50</td>
</tr>
<tr>
<td>December 2017</td>
<td>7,281.70</td>
<td>19,435.10</td>
<td>26,716.80</td>
</tr>
<tr>
<td><strong>2017 Total</strong></td>
<td><strong>120,007.00</strong></td>
<td><strong>167,358.50</strong></td>
<td><strong>287,365.50</strong></td>
</tr>
</tbody>
</table>

### Monthly Water Source Production (m³/month)

- **WSW 16-32**
- **WSW 14-32**

![Monthly Water Source Production Chart](chart.png)

*West Eills SAGD 2018 In Situ Performance Presentation*
Water Source Well Typical Completion

Production Casing
219.1 mm OD (8 5/8”) Steel Casing

K-Packer

Tubing String
86 mm (3 3/8” OD) Galvanized Pipe, 76 mm (3”) ID

Polytube with Pressure Transducer
34.9 mm (1 3/8” OD), 25.4 mm (1” ID)

Submersible Turbine Pump
Franklin 350STS8 40HP

Wire-wrapped Telescopic Screen
190.5 mm (7 ½”) OD, 0.012” Screen

VIKING Formation
## Source Water Composition

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>WSW 14-32</th>
<th>WSW 16-32c</th>
<th>WSW 10-33b</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab pH</td>
<td>pH</td>
<td>7.78</td>
<td>7.85</td>
<td>7.73</td>
<td>7.79</td>
</tr>
<tr>
<td>Lab Ec</td>
<td>μS/cm</td>
<td>1230</td>
<td>892</td>
<td>944</td>
<td>1022</td>
</tr>
<tr>
<td>Ca</td>
<td>mg/L</td>
<td>46.5</td>
<td>74.3</td>
<td>89.7</td>
<td>70.2</td>
</tr>
<tr>
<td>Mg</td>
<td>mg/L</td>
<td>20.1</td>
<td>20.5</td>
<td>25.5</td>
<td>22.0</td>
</tr>
<tr>
<td>Na</td>
<td>mg/L</td>
<td>217</td>
<td>85.8</td>
<td>74.3</td>
<td>125.7</td>
</tr>
<tr>
<td>K</td>
<td>mg/L</td>
<td>5.98</td>
<td>4.75</td>
<td>5.24</td>
<td>5.32</td>
</tr>
<tr>
<td>Cl</td>
<td>mg/L</td>
<td>4.4</td>
<td>0.96</td>
<td>1.00</td>
<td>2.12</td>
</tr>
<tr>
<td>Total Alkalinity</td>
<td>mg/L</td>
<td>527</td>
<td>376</td>
<td>430</td>
<td>444</td>
</tr>
<tr>
<td>HCO3</td>
<td>mg/L</td>
<td>643</td>
<td>458</td>
<td>525</td>
<td>542</td>
</tr>
<tr>
<td>SO4</td>
<td>mg/L</td>
<td>148</td>
<td>116</td>
<td>86</td>
<td>116.6</td>
</tr>
<tr>
<td>Hardness</td>
<td>mg/L</td>
<td>199</td>
<td>270</td>
<td>329</td>
<td>266</td>
</tr>
<tr>
<td>TDS</td>
<td>mg/L</td>
<td>759</td>
<td>528</td>
<td>540</td>
<td>609</td>
</tr>
</tbody>
</table>
Methods for Calculation

- Daily oil rate of each well is calculated by multiplying the most current well emulsion rate with the manual oil cut
  - Emulsion rate is the test flow rate from the test separator and oil cut is measured manually by taking a sample of the flow.
  - Due to the slugging nature of the wells and high water flow during initial production, the test separator is not fully commissioned
  - There is only one separator on the well pad and well tests generally last for 8 to 15 hours depending on the fluid rate from the well (includes time to purge the test pipeline and test vessel)
  - To properly conduct a well test, with 8 wells on a pad, only one well can be tested every 4 - 5 days
- With the total production from the pad, individual well volumes are prorated against the overall production volume
- The same philosophy and process is applied to produced water and gas
- Currently, the meters on the test separator are being verified every time by comparing the results with the manual oil cut and water
Water Balance and Meter Calibration

- Water balance at the project has been maintained within +/- 5% and well within reporting and Petrinex limits

- Meter Calibration is now underway for 2018
  - Sunshine is now in the process of ensuring that the annual meter calibrations are completed.
  - Sunshine calibrates on a rolling schedule ensuring all meters are calibrated at least once annually or as required by appropriate Regulations
• Currently there are no approved disposal facilities or wells associated with the West Ells Project

• Development of a disposal well would be beneficial to the project, unfortunately all receptive formations in the region are hydrocarbon bearing zones and as such inappropriate for disposal

• All waste streams are currently collected on site and trucked off to 3rd party approved oilfield waste facilities
• Due to there being no disposal wells associated with the West Ells Project, all water is trucked off site to approved waste management facilities in the form of Evaporator Blowdown water.

• Directive 81 currently requires a disposal limit of 7.35%
  • \[
  \frac{(\text{Fresh In} \times D_f + \text{Produced In} \times D_p)}{(\text{Fresh In} + \text{Produced In})} \times 100
  \]

• West Ells has had an average disposal rate of 2.43% for 2017
  • \[
  \frac{\text{(Total Disposal)}}{(\text{Fresh In} + \text{Produced In})} \times 100
  \]

• West Ells was compliant with disposal limits for the entirety of 2017.
# Water Disposal And Recycle Rates

## Directive 081 Monthly balances

<table>
<thead>
<tr>
<th></th>
<th>January 2017</th>
<th>February 2017</th>
<th>March 2017</th>
<th>April 2017</th>
<th>May 2017</th>
<th>June 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Water In (m3)</td>
<td>20,635.10</td>
<td>26,624.20</td>
<td>19,840.50</td>
<td>20,341.10</td>
<td>19,950.70</td>
<td>27,703.00</td>
</tr>
<tr>
<td>Produced Water In (m3)</td>
<td>20,250.40</td>
<td>22,325.00</td>
<td>24,742.00</td>
<td>20,661.50</td>
<td>35,963.60</td>
<td>32,645.30</td>
</tr>
<tr>
<td>Disposal Total (m3)</td>
<td>1,520.80</td>
<td>1,455.40</td>
<td>1,256.00</td>
<td>1,075.10</td>
<td>1,198.70</td>
<td>1,380.00</td>
</tr>
<tr>
<td>Disposal Factor, Fresh Water</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>Disposal Factor, Produced Water</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td>Disposal Limit %</td>
<td>6.47</td>
<td>6.19</td>
<td>6.88</td>
<td>6.53</td>
<td>7.50</td>
<td>6.79</td>
</tr>
<tr>
<td>Disposal Rate %</td>
<td>3.72</td>
<td>2.97</td>
<td>2.82</td>
<td>2.62</td>
<td>2.14</td>
<td>2.29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>July 2017</th>
<th>August 2017</th>
<th>September 2017</th>
<th>October 2017</th>
<th>November 2017</th>
<th>December 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Water In (m3)</td>
<td>25,364.80</td>
<td>23,013.40</td>
<td>24,307.50</td>
<td>28,506.90</td>
<td>24,361.50</td>
<td>26,716.80</td>
</tr>
<tr>
<td>Produced Water In (m3)</td>
<td>27,222.60</td>
<td>34,552.80</td>
<td>41,031.70</td>
<td>40,466.10</td>
<td>49,435.20</td>
<td>43,837.00</td>
</tr>
<tr>
<td>Disposal Total (m3)</td>
<td>1,254.00</td>
<td>1,379.00</td>
<td>1,469.10</td>
<td>1,322.20</td>
<td>1,301.10</td>
<td>1,300.90</td>
</tr>
<tr>
<td>Disposal Factor, Fresh Water</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>Disposal Factor, Produced Water</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td>Disposal Limit %</td>
<td>6.62</td>
<td>7.20</td>
<td>7.40</td>
<td>7.11</td>
<td>7.69</td>
<td>7.35</td>
</tr>
<tr>
<td>Disposal Rate %</td>
<td>2.38</td>
<td>2.40</td>
<td>2.25</td>
<td>1.92</td>
<td>1.76</td>
<td>1.84</td>
</tr>
</tbody>
</table>
Water Disposal Rate

Water disposal rate versus limit

Percentage

Disposal rate
Limit

January 2017
February 2017
March 2017
April 2017
May 2017
June 2017
July 2017
August 2017
September 2017
October 2017
November 2017
December 2017
West Ells SAGD 2018 In Situ Performance Presentation

Sulphur Emissions Intensity

West Ells has a sulphur inlet rate of 0.34 t/d
• Emissions intensity average was 0.935 tonnes/m³ 2017
Proration factors

Proration Factors

- Oil
- Water

West Els SAGD 2018 In Situ Performance Presentation
Produced Gas Monthly Average

Produced Gas Volume

[Graph showing the produced gas volume from January 2017 to December 2017, with peaks and troughs indicating fluctuations in gas production.]
### Monthly Flaring Volume Totals

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Flaring Volume e³m³</td>
<td>5.74</td>
<td>0.68</td>
<td>1.7</td>
<td>4.85</td>
<td>0.5</td>
<td>0</td>
<td>0</td>
<td>0.9</td>
<td>2.2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
• There have been no changes to the MARP since the 2015 update
  • Reporting codes associated with West Ells
    • ABBT0123666
    • ABIF0123667
    • ABWS0139258, ABWS0139259, ABWS0139260
Regulatory and Compliance
Compliance

• **Issues**
  • Air monitoring
    • Minor issues with uptime percentage on CEMS unit, all non-compliances reported and any backfilling of data was completed with the approval of the CEMS Coordinator
      • Issues were traced back to a minor maintenance problem and have since been resolved
    • Signage details was indicated to be insufficient in some areas
      • Entire site was reviewed and retrofitted with appropriate signage, no compliance issue remains

• **Ongoing Compliance Management**
  • Issues were discovered with MARP Calibration schedule in 2016, full calibration compliance was achieved in 2017, and will continue forward
  • Faulty equipment discovered in the PRV thief hatch
    • Issue was self-disclosed to the AER, and repairs continue under a remedial plan and direction of Bonnyville Field Center
  • No major spills or releases (>2m³)
Future Plans

- **Regulatory**
  - Solvent Surfactant Application
    - Sunshine expects to apply for solvent surfactant approval to improve resource recovery
  - Renewal of Water Act Term Licence for 5 year term.
- **Phase 1 (5,000bbl/d)**
  - Sunshine plans to continue to fully demonstrate the reservoir productivity before advancing to Phase 2
- **Phase 2 (5,000bbl/d)**
  - Sunshine continues to plan the development of Phase 2 and will incorporate any and all key learnings from Phase 1 to improve design and efficiency
  - Phase 2 development will begin as funding is secured
- **Steam Strategy**
  - Continue to maximize steam efficiency
  - Sunshine will continue building the steam chamber and ramping up production towards nameplate capacity
  - Even steam chamber development will be a strong focus in 2018
Compliance Declaration

Sunshine is compliant with all AER Rules and Regulations and meets all approval requirements under the Environmental Protection and Enhancement Act.
Thank you for your time!

Sunshine Oilsands Ltd.
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Calgary, AB T2P 0P7
(403) 984-1450
info@sunshineoilsands.com