Agenda

• Introductions

• Sub Surface Presentation:
  • Birch Channel and groundwater discussion

• Surface Presentation
Suncor MacKay River Project
2016 AER Performance Presentation: Subsurface Commercial Scheme Approval No. 8668

November 25, 2016
Reporting Period September 1, 2015 – August 31, 2016
To provide greater reliability and flexibility to our feedstock supplies, we produce bitumen through mining and in-situ recovery technologies and supplement that supply through third party agreements.

We currently produce a limited amount of natural gas but maintain a material land position in the high quality Montney resource play.

International and offshore assets are a source of steady cash flow to fund our oil sands growth.

Our investments in renewable wind energy and biofuels are a key part of Suncor’s climate change action plan.

A staged approach to increasing crude oil production capacity allows Suncor to better manage capital costs and incorporate new ideas and new technologies into our facilities.

Suncor takes an active role in connecting supply to consumer demand with a diverse portfolio of products, downstream assets and markets.
Suncor has high quality leases in close proximity
Section 3.1.1 – Subsurface Issues Related to Resource Evaluation and Recovery
Table of Contents

• Introduction
• Geoscience
• Well Operations
• Scheme Performance
• Caprock Integrity
• Future Plans
MacKay River Project Overview

- Company’s first operated SAGD facility - located 60 km NW of Ft. McMurray;
- Current Approved Bitumen Production Rate 11,600 m³/d (73 kbpd);
- Adjacent to Suncor Dover (UTF/AOSTRA) Project;
- Horizontal production wells are placed in the McMurray Formation at a depth of 98 – 145 m from surface;
- No extensive underlying water or gas over bitumen issues in current development areas;
- Initial development had 25 well pairs with first steam in September 2002 and first production in November 2002 (Phase 1);
- 112 well pairs have been subsequently added.

<p>| | |</p>
<table>
<thead>
<tr>
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<td>Producing</td>
<td>98</td>
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<tr>
<td>Non-Producing</td>
<td>37</td>
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<td>Abandoned/Planned for Abandonment</td>
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<td>Total</td>
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Project Area and Project Site

- Current Project Area (PA) approximately 24 ½ sections.
Wellpads and Subsurface Patterns

98 producing well pairs at MacKay River (up to 824).
MacKay River Well Spacing

- Optimal well spacing is evaluated for each new development.
Scheme Approval Amendments

- Amendment 8668A
  - Changed annual average volume to 33,000 bpd (5,250 m³/d)
- Amendment 8668B
  - Increase to project area
- Amendment 8668C
  - Additional project area
  - Approval to inject non-condensable gas
- Amendment 8668D
  - Additions to project area
  - Increase to annual average volume to 72,964 bpd (11,600 m³/d)
- Amendment 8668E
  - Approval to drill four well pairs
- Amendment 8668F
  - Approval to change approval holder from Petro-Canada to Suncor
- Amendment 8668G
  - Approval to undertake amendments & modifications to CPF systems
  - Approval to tie-in 6 well pairs to well testing facilities
- Amendment 8668H
  - Approval to conduct non-condensable gas injection test on Pad 21 wells
- Amendment 8668I
  - Approval to conduct non-condensable gas injection at the Section 16 Test Project
- Amendment 8668J
  - Approval to transfer portions of the Dover project area into the MacKay River project area
- Amendment 8668K
  - Approval to tie-in 16 well pairs to well testing facilities
- Amendment 8668L
  - Approval to remove the limiting factor of a mole percent restriction for the B Pattern non-condensable gas injection test on Pad 21
- Amendment 8668M
  - Approval to inject chemical into Pad 22 wells
- Amendment 8668N
  - Approval to abandon 3 wells and suspend 1 well on Pad 20
- Amendment 8668O
  - Approval to change Phase 5F well trajectories
- Amendment 8668P
  - Approval to develop Pads 750/751/28 and add 2 sections to project area
- Amendment 8668Q
  - Approval to conduct a pilot of water treatment technologies
- Amendment 8668R
  - Approval to abandon well G1I
- Amendment 8668S
  - Approval to conduct chemical injection test on Pad 21 (D-Pattern Injectors)
Scheme Approval Amendments

- **Amendment 8668T**
  - Pad 819 Approval

- **Amendment 8668U**
  - Maximum Operating Pressure Approval

- **Amendment 8668V**
  - NCG Expansion Project and Phase 5D/F Chemical Injection Approval

- **Amendment 8668W**
  - MR CPF Expansion Project and Directive 081 Waiver Approval

- **Amendment 8668X**
  - Administrative reissue approval

- **Amendment 8668Y**
  - WHIP for Phases 5B2, 5D and 5F Patterns approval

- **Amendment 8668Z:**
  - Pad 828 change from 3 well pairs to 2 wells pairs and correction of well UWIs on Pad 21 Chemical Injection Test (D-Pattern Injectors) approval issued December 10, 2014.

- **Amendment 8668AA:**
  - Phase 1 NCG design amendment approval issued December 19, 2014.

- **Amendment 8668BB:**
  - Phase 2 and Phase 3 Chemical Co-Injection (E, F and G Patterns) approval issued January 1, 2015.

- **Amendment 8668CC:**

- **Amendment 8668DD:**
  - Approval for NN6P Sidetrack well issued February 3, 2015.

- **Amendment 8668EE:**
  - Approval for VX™ multiphase meter on Pad 824 issued February 19, 2015.

- **Amendment 8668FF:**
  - Approval for NCG Test at OO5I well on pad 24 issued March 17, 2015.

- **Amendment 8668GG:**
  - Approval to conduct CO2 Co-Injection at the OO9 well pair on Pad 24 issued April 13, 2015.

- **Amendment 8668HH:**
  - CO2 Co-Injection amendment to change to OO8 well pair on Pad 24 issued.

- **Amendment 8668II:**
  - Pad 824 Thermal Compatibility Assessment approval issued July 14, 2015.

- **Amendment 8668JJ:**
  - Approval for NCG Test at OO7I issued July 29, 2015.

- **Amendment 8668KK:**
  - Approval for an alternate MOP Strategy Trial.

- **Amendment 8668LL:**
  - Approval for C2IPB Sidetrack Well.

- **Amendment 8668MM:**
  - Approval for Pad 750 Thermal Compatibility Assessment.
Scheme Approval Amendments

- **Amendment 8668NN:**
  - Approval to increase MWHIP for all operating wells.
- **Amendment 8668OO:**
  - Approval to alter DA, DB, DC and DF Pattern MWHIPS;
  - **Approval to adjust CO2 co-injection rate;**
    - Approval to extend chemical co-injection test at the D pattern wells on Pad 21.
- **Amendment 8668PP:**
  - Approval for abandonment of A3I.
- **Amendment 8668QQ:**
  - Approval to change Clause 32.
MacKay River Performance Presentation
Geoscience
MacKay River Stratigraphy

2015 MacKay Bitumen Pay
Contour Interval = 5m
2015-16 Activities – Vertical & SAGD Drilling

• 1 vertical wells:
  – Wabiskaw C monitoring well.

• Horizontal Wells:
  – 2 sidetracks.

• Special core analyses conducted in PA:
  – FMI.
Base of Pay Structure Map

Legend

- **Approved PA Boundary**
- Contour Interval = 5m

**2015 MacKay Base of Pay**
- Contour Interval = 5m
Top of Pay Structure Map

Legend

- Approved PA Boundary
  Contour Interval = 5m

Contour Interval = 5m
**Oil Sands Facies and Gross Bitumen Pay**

**Facies:**
Defined by visual mud index (VMI)

**Cutoffs:**
- F1 (Sandstone) = 0-5% VMI
- F2 (Sandy IHS*) = 5-15% VMI
- F3 (IHS*) = 15-30% VMI
- F4 (Muddy IHS*) = 30-70% VMI
- F5 (Mudstone) = 70-100% VMI
- F10 (Breccia) = variable

* IHS = inclined, interbedded, sand and shale

**Pay:**
Includes Facies F1, F2, and F10
Can include F3-F5, if < 2m thick

Weight percent bitumen > 10%

Generally > 30% Porosity
- PA averages 31.1% in clean sands

Permeability ~ 1 to 5 Darcy's

> 15m for OBIP volumetric
**Pattern OBIP Calculation**

**Gross Rock Volume (GRV)** = total rock volume derived from Continuous Pay map;

**Net Rock Volume (NRV)** = product of Continuous Pay gross rock volume multiplied by the average Net Sand Ratio for each area;

**Net Sand Ratio (NSR)** = a net-to-gross adjustment used to account for pay mapping being done on a continuous (gross) basis:

- 15% VMI (visual mud index) cutoff plus the sand component of breccia intervals.

**Original Bitumen in Place** = product of the Net Pay volume multiplied by the average Porosity, and the average Oil Saturation.

\[ \text{OBIP} = \text{GRV} \times \text{NSR} \times \text{So} \times \text{Por} \]

New net-to-gross adjustment using Net Sand Ratio map allows for consistent application of a mudstone cutoff while:

a) avoiding adjustments based on pattern averages, and

b) allowing the differential treatment of sand- versus mud-rich breccia's.
### Reservoir Properties and Base Case OBIP

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<tr>
<th>Pattern</th>
<th>Net Sand Ratio</th>
<th>So</th>
<th>Phi</th>
<th>So-Phi</th>
<th>OBIP(e³m³)</th>
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<td>A</td>
<td>91%</td>
<td>82%</td>
<td>31%</td>
<td>26%</td>
<td>2,389</td>
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<td>C</td>
<td>95%</td>
<td>89%</td>
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<td>D</td>
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<td>G</td>
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<td>QQ (Phase 4/5)</td>
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<td>Pad 824</td>
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<td>86%</td>
<td>31%</td>
<td>27%</td>
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Average Reservoir Depth = 109 m TVD, Pi = 400 kPa, Ti = 6-7 °C, $K_{\text{max}} = 1.7-8.5$ D, $K_{\text{min}} = 1.1-6.5$ D
Phase 1

A Pattern

B Pattern

C Pattern

D Pattern

Clearwater

Wabiskaw C

Wabiskaw D

Top of Pay

Devonian

Beaverhill Lake

Pad 20

Pad 21

mSS, GR RES
Phases 2, 3 and 4

Clearwater
Wabiskaw C
Wabiskaw D
Top of Pay
Devonian
Beaverhill Lake
MacKay River – 3D / 4D Seismic Activity 2016

- 2016 3D Baseline acquired over North Arm to assess:
  - Caprock Integrity;
  - Reservoir Quality;
  - Base Reservoir structure.

- 2016 4D acquired over NN, OO and QQ Patterns to:
  - Aid in estimating steam chamber growth in these patterns since April 2013.
Special Core Analysis– Petrographic Analysis/Geochemistry

Geochemistry
• Suncor has collected geochemistry samples and is currently analyzing for vertical changes in bitumen degradation to tie to geologic information; and operational related data (production, Obs wells, 4D seismic).

Petrographic Analysis
• 750/751 developed in 2nd pay trend (West);
• Suncor completed additional routine petrographic work to better understand 2nd pay trend;
• As expected, sampling has confirmed a quartz dominated sand sized reservoir persists in the area with the same compositional characteristics (subarkose/sublitharenite) as current producing wells within Eastern pay trend.
Typical Well Completions – Phase 1 Type

**Injector**
- 339.7 mm conductor @ 80.0 mKB
- 114.3 mm x 73 mm crossover @ mKB
- 73 mm tbg @ mKB
- TD @ 1110.3 mKB
- 1.0% slotted area from 333.0 - 1101.3 mKB
- 177.8 mm Slotted Liner landed @ 1101.5 mKB
- HS-HT packer set at 365.5 mKB
- 244.5 mm ceg @ 384.5 mKB

**Producer**
- 339.7 mm conductor @ 77.5 mKB
- 19.1 mm ges lift @ mKB
- 68.9 mm tbg @ mKB
- 25.4 mm coil @ mKB
- 88.9 mm x 73 mm Crossover @ mKB
- TD @ 1172.0 mKB
- 1.5% slotted area from 416.9 - 1167.4 mKB
- 177.8 mm Slotted Liner landed @ 1167.8 mKB
- HS-HT packer set at 380.0 mKB
- 244.5 mm ceg @ 400.0 mKB
Typical Well Completions – Phase 5 Type

Injector

- 473 mm surface casing @ mKB
- SHORT STRING
  - 114 mm tubing @ mKB
- Instrument String
- Short string last joint perforated
- TD @ 1529 mKB (126.8 mTVD)
- 245 mm slotted liner landed @ mKB
- Liner hanger set at mKB
- 340 mm casing @ mKB

Producer

- 473.0 mm Surface Casing
- 44.5 mm gas lift
- HS-HT packer
- 339.7 mm csg
- Instrument String
- Instrumentation guide string
- Bubble Tube
- Short string last joint perforated
- TD @ mKB (133.1 mTVD)
- 114 mm Long Tubing String
- 114.3 mm Short String Last Joint Perforated
- 244.5 mm Slotted Liner
- 44.5 mm gas lift
Typical Well Completions – Pad 824 (DSAGD)
Typical Well Completions – Pad 824 (DSAGD)

- Direct to SAGD (DSAGD) – well design that avoids the need for conversion from circulation completion to a SAGD (ESP) completion
- DSAGD combines initial completion stage with Mechanical Lift (ML) conversion stage
- Allows flexibility to return to circulation if well is not quite ready, and no down time during conversion
- No additional completions are needed for ML conversion as pump is already down hole
- Steaming past the pump has not appeared to affect run life
Typical Well Completions – Flow Control Devices

Typical completion diagram for producer and injector in isolation
Well Downhole Instrumentation

- Phase 1 (25 well pairs):
  - Temperature optic fibre in 4 producers have been replaced and are functional today (A5, B2, C1, and C2).

- Phase 2 (14 well pairs):
  - Temperature fibre optic installed in G6P;
  - P/T gauge installed in G6I.

- Phase 3 (7 well pairs):
  - No instrumentation.

- Phase 4 (10 well pairs):
  - No instrumentation except temperature fibre optics in OO3 I & P;
  - Temperature fibre optic installed in NN1P.

- Phase 5A (6 well pairs):
  - Pressure - bubble tube to the toe in every producer;
  - Two producers equipped with 6 point thermocouple bundle to the toe (QQ5, NN5).

- Phase 5B-1 (6 well pairs):
  - Pressure - bubble tube to the toe in every producer except OO5;
  - All producers equipped with 6 point thermocouple bundle to the toe except OO5 and OO9 which have temperature fibre optic.
Well Downhole Instrumentation

• Phase 5B-2 (10 well pairs):
  — Pressure – bubble tube to the toe in every producer;
  — All producers equipped with 6 point thermocouple bundle to the toe.

• Phase 5D&F (18 well pairs):
  — Pressure – bubble tube to the toe in every producer except OO well pairs which have pressure gauges;
  — All producers equipped with fibre optic to the toe, except OO10.

• Pad 824 (2 well pairs):
  — All producers equipped with ERD (P/T) and 2 point thermocouple on pump.
Artificial Lift

• All existing SAGD production wells designed for gas lift:
  – Low cost completion;
  – Recover gas;
  – No downhole moving parts.

• Producing wells with downhole pumps:
  – 824P1/P2, DSAGD completion installed in May 2015. Production since Feb 2016 (current pumps).
New Re-Drill/Sidetrack

- **C2IPB Infill**
  - C2P was not producing since 2011.
  - Abandoned injector and drilled C2IPB off the C2I intermediate casing.
  - Infill drilled ~ 40-50 m away laterally between C2P and C3P
  - Drilled at the same depth as the original wellbore
- Gained ~ 3m of cellar oil over 300 m of the well
New Re-Drill/Sidetrack

- **D4PB Infill**
  - D4P was producing at very low oil rates.
  - Abandoned original wellbore and drilled infill off the original wellbore intermediate casing
  - Infill drilled ~ 50 m away laterally between D3P and D4P
  - Drilled at the same depth as the original wellbore
  - Gained ~ 2m of cellar oil over 300 m of the well
Key Learnings: Wellbore Integrity Management

• **Wellbore integrity management** is a high priority focused on wellbore containment over a well's full life cycle:
  
  • **Flow Control Devices** installation to control steam coning, avoid liner failures (NN12 and OO14);
  
  • **Subcool strategy**: operate wells above subcool limit to control steam coning;
  
  • **Monitoring and Surveillance**;
  
  • **Wellbore thermal shock mitigation** for start-up after wild fires (i.e. B5);
  
  • **Erosion monitoring program**;
  
  • **Monitoring and repair of SCVFs**:
    
    • Regular monitoring of pressure, rate and/or bubbles & H₂S concentration (annually for non-serious SCVFs, monthly – quarterly for serious SCVFs);
    
    • Gas migration rates continue to decline indicating remediation work may have been successful;
    
    • Innovative repair techniques (i.e. SMART tool).
Key Learnings: Well Enhancement Repairs

- **Flow Control Devices (FCDs):**
  - Used to repair steam break through condition, achieve higher and consistent flow rate, reduce risk of future new steam break through and potential liner failure;
  - FCD completions utilized in new, mature and sidetracked wells using various vendor devices:
    - Early results look promising:
      - Example of well limited due to hot spots Pre-FCD’s (blue) now capable of full drawdown for increased peak production (orange).
Flow Control Device Implementations

Wide use of flow control devices (FCDs)

- 15 producers, 2 injectors, and 1 sidetrack now have FCDs installed at MacKay River;
- 2 new producer wells recompleted with FCDs since Sept 2015 (NN12, OO14);
- Improving design and implementation through field experience;
- Suncor field experience enhanced through working with industry to develop FCDs learnings in the field and enhancing performance predictions evolving simulation efforts.
## Flow Control Device Implementations

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<th>Well</th>
<th>Status</th>
<th>Start of SAGD</th>
<th>Start of Production with Flow Control</th>
<th>FCD Well Type</th>
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<td>Inj OCDs + Prod ICDs</td>
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<td>SAGD</td>
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<td>Oct-2015</td>
<td>Producer ICDs</td>
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Flow Control Device Implementations

- Producer FCD Retrofit Unsuccessful
  - Well experienced steam coning which limited production shortly after conversion
  - Various alternative operating strategies were attempted unsuccessfully
  - Flow control installed after about 8 months
    - Included a long string to allow circulation inside of FCD string
  - Quick ramp-up after FCD workover
  - Subsequently, production rates dropped faster than anticipated as steam production remained problematic
    - May be due to limited reservoir deliverability
    - FCD with more effective steam-limiting characteristics may be required for such cases
Key Learnings: Infill and Sidetracked wells

- **Infill and Sidetracked Wells:**

  - Drilled 3 infill wells, sidetracking from original wellbore intermediate casing (C2IPB, C3PB, D4PB) and 4 sidetracks (G7PB, G6, E1 and NN6):
    - Drilling operation learnings;
    - Sand control installation (WWS, PPS, Meshflux screens);
    - Start-up procedures (steam flushes, steam circulation & bullheading);
    - Performance Evaluation (reservoir, wellbore hydraulics, operations).

  - Increased production and reserves by drilling into cellar oil accessing unswept reservoir.
Observation Wells

Observation wells

87 McM
52 Wab C
15 Wab C & McM
154 Total
Observation Well Overview

- Total of 154 licensed observation wells at MacKay River;
- Observation wells at MacKay River serve three main purposes:
  1. Reservoir optimization (steam chamber monitoring):
     - 40 wells with fibre optic cable from surface to TD:
       - 7 wells with fibre optic cable and pressure sensors.
     - 43 wells with thermocouple bundles and pressure sensors.
  2. Wabiskaw C pressure monitoring:
     - 65 wells with a single pressure / temperature sensor.
  3. Subsurface Monitoring (outside of producing area):
     - 5 wells with thermocouple bundles and pressure sensors;
     - 2 wells with a single pressure / temperature sensor;
     - 5 piezometer wells.
- Current observation well design incorporates thermocouple measurement as this provides sufficient resolution for steam chamber monitoring and is preferred for remote well locations.
Typical Observation Well Instrumentation – Question #6

**McMurray Observation Well (Type 1):**
- Capillary line loop cemented outside casing
- Fibre optic cable pumped into capillary line loop to provide temperature profile along entire vertical well depth
- Allows for close monitoring of steam chamber development
- There are no reliability concerns with the Type 1 observation well temperature data

**McMurray Observation Well (Type 2):**
- Coiled tubing instrument string containing 14 thermocouples and 1 P/T gauge run inside 114 mm intermediate casing
- Perforated near the top of the McMurray oil sands zone
- Pressure / temp gauge positioned at MPP
- 14 point thermocouple bundle collects temperature data across the McMurray
- 24 point thermocouple bundle go forward design

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**PC OB E6-1 DOVER 09-09-93-12W4**

- 177.8 mm csg @ 71.2 mKB
- Capillary line loop cemented to surface
- Fiber Optic Instrument Line
- Wabiskaw ‘C’ Sand @ 79.3 mKB
- Mudstone @ 83.3 mKB
- McMurray Oil Sand @ 85.4 mKB
- Plug Back Depth @ 129.9 mKB
- 114.3 mm csg @ 136.9 mKB

**OBSERVATION WELL N1-1**

- 177.8 mm Surface Casing @ 62.7 mKB
- 114.3 mm Prod Csg @ 157.2 mKB
- 45 mm CT-MORE Coiled Tubing
- PROMORE ERD @ 119.25 mKB
- Perforated 119.0 - 119.5 mKB
- 14 Point Thermocouple Bundle from 110.5 - 143.0 mKB
- 45 mm coil tubing @ 144.0 mKB
- PBD @ 148.7 mKB
- TD @ 157.2 mKB
Typical Observation Well Design

**Wabiskaw C Observation Well:**

- Open hole into Wabiskaw C sand;
- Wellbore does not penetrate Wabiskaw D mudstone or McMurray sand;
- Pressure / temp gauge landed inside tubing;
- WBC-56 drilled and tested;
- WBC-40 abandoned in Feb 2016;
- WBC-29 after the cleaning, instrumentation readings have been consistent with the expected Wab-C P & T;
- WBC-41 lost communication in 2016, vendor scheduled to inspect and remediate the well in September 2016;
  - WBC-41 had a downhole gauge replacement completed on September 22. Reliable WabC data has been observed since then.
- WBC-39 high-T well, down since March 2016, requiring downhole intervention based on July 2016 vendor inspection.
  - WBC-39 is in the planning stage for a downhole gauge replacement. The scope of work is similar to the workover done on WBC-41.
### Summary of Operating Wells

<table>
<thead>
<tr>
<th>Pad</th>
<th>Pattern</th>
<th>Phase</th>
<th># Well pairs</th>
<th>First steam to Pad</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>A</td>
<td>1</td>
<td>7</td>
<td>Sept 2002</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td></td>
<td>7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D</td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>E</td>
<td>2</td>
<td>7</td>
<td>Jan 2006</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td></td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>F</td>
<td>3</td>
<td>7</td>
<td>Sept 2007</td>
</tr>
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<td></td>
</tr>
<tr>
<td>23</td>
<td></td>
<td>4</td>
<td>3</td>
<td>Oct 2008 - Apr 2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5B-1</td>
<td>6</td>
<td>Feb 2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5DF</td>
<td>6</td>
<td>May 2014</td>
</tr>
<tr>
<td></td>
<td>H</td>
<td>4</td>
<td>4</td>
<td>Feb 2009 - Jun 2010</td>
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<tr>
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<td>QQ</td>
<td>4</td>
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<td>Nov 2008</td>
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<td></td>
<td>5A</td>
<td></td>
<td>2</td>
<td>Jul 2011</td>
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<td>5B-2</td>
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<td>5</td>
<td>Jan - May 2013</td>
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<td>5DF</td>
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<td>June 2014</td>
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<td>NN</td>
<td>4</td>
<td>1</td>
<td>Dec 2008</td>
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<td></td>
<td></td>
<td>5A</td>
<td>4</td>
<td>Jun - Jul 2011</td>
</tr>
<tr>
<td></td>
<td>5B-2</td>
<td></td>
<td>5</td>
<td>Jan - Feb 2013</td>
</tr>
<tr>
<td></td>
<td>5DF</td>
<td></td>
<td>6</td>
<td>June 2014</td>
</tr>
<tr>
<td>824</td>
<td></td>
<td></td>
<td>2</td>
<td>Oct 2015</td>
</tr>
</tbody>
</table>
Producing Well Count
Cumulative Fluid Volumes

As of August 2016
Cum Oil 19.5 million m³
Cum Steam 48.1 million m³
Cum Water 48.3 million m³
CSOR 2.5
Average Oil Rate per Pattern
CSOR by Pattern

- QQ wells have the lowest CSOR
- NN wells have a mid range CSOR
- A Pattern has the highest CSOR
## Performance Summary by Pattern

<table>
<thead>
<tr>
<th>Pattern</th>
<th>OBIP [e³ m³]</th>
<th>Cum. Oil [e³ m³]</th>
<th>Recovery up to August 2016 [%]</th>
<th>CSOR [m³/m³]</th>
<th>ISOR (Aug. 2016) [m³/m³]</th>
<th>Ultimate Recovery [%]</th>
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<tbody>
<tr>
<td>Pattern A</td>
<td>2,389</td>
<td>1031</td>
<td>43.2</td>
<td>4.4</td>
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<tr>
<td>Pattern B</td>
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<td>2664</td>
<td>80.3</td>
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<td>7.7</td>
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<td>Pattern C</td>
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<td>3471</td>
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<td>Pattern D</td>
<td>2,741</td>
<td>1923</td>
<td>70.2</td>
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<td>3,728</td>
<td>2282</td>
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<td>Pattern F</td>
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<td>2342</td>
<td>64.8</td>
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<td>Pattern G</td>
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<td>Pattern H</td>
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<tr>
<td>Pattern NN</td>
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<td>Pattern OO</td>
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<td>14.9</td>
<td>3.2</td>
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<tr>
<td>Pattern QQ</td>
<td>5,581</td>
<td>1184</td>
<td>21.2</td>
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<td>2.7</td>
<td>55</td>
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<tr>
<td>Pad 824</td>
<td>684</td>
<td>7</td>
<td>1</td>
<td>8.1</td>
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<tr>
<td>Total</td>
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<td>19,478</td>
<td>44</td>
<td>2.5</td>
<td>3.1</td>
<td>65</td>
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<tr>
<td>Pattern Examples Based on Recovery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>-----------------------------------</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pre-Fire ISOR [m³/m³]</td>
<td>CSOR [m³/m³]</td>
<td>Cum Oil [10³m³]</td>
<td>Peak Oil Rate [m³/d/well pair]</td>
<td>Pre-Fire Oil Rate [m³/d/well pair]</td>
<td>Comments</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>OO Pattern</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **Low Recovery** | 2.4 | 3.2 | 784 | 13-150 | 8 - 54 | • Very poor geology  
- 14.9 % recovery to date (ultimate RF: 52%)  
- Producing for 7 years |
| **NN Pattern** | | | | | | |
| **Medium Recovery** | 2.5 | 2.7 | 1,471 | 95-190 | 53 - 132 | • Medium quality geology  
- 21 % recovery to date (ultimate RF: 58%)  
- Producing for 7 years |
| **F Pattern** | | | | | | |
| **High Recovery** | 3.9 | 2.3 | 2,342 | 151-277 | 45 - 105 | • High quality geology  
- 64.8 % recovery to date (ultimate RF: 81%)  
- Producing for 8 years |
OO Pattern – Low Recovery
NN Pattern – Medium Recovery
F Pattern – High Recovery

![Graph showing rate and SOR over time for F Pattern - High Recovery]
Steam Chamber Growth: OB E6-1 Observation Well

- After 9 years of stunted steam chamber growth, steam has been able to surpass geological layers of resistance:
  - OB E6-1 observation well shows that chamber can grow through IHS in certain areas;
  - Impediment restricted ~12m of chamber growth.
Steam Chamber Development: Surface Heave Monitoring

- 445 monuments exist over MacKay River for heave measurement and monitoring;
- Installed 14 new monuments in 750/751 in 2016;
- Survey History:
  - 1st: Fall 2002;
  - 2nd: Dec 2006;
  - 3rd: Fall/Winter 2007/08;
  - 4th: Nov 2008;
  - 5th: Jan/Feb 2010;
  - 6th: Nov. 2010;
  - 7th: Dec. 2011;
  - 8th: Dec. 2012;
  - 9th: Oct 2013;
  - 10th: Oct 2014;
2D Surface Heave: Change from Baseline to October 2015

Survey strategy

- Heave surveys are performed at different frequencies depending on well vintage:
  - Oct 2015 heave survey for northern producing area (Ph 4 – Ph 5DF).

Heave monitoring application:

- Field performance monitoring coupled with seismic.

New heave monuments installed:

- Over 750/751;
- Next survey is planned for Q4 2016.

A121:

- Revisited A121 in Aug 2016 to validate elevation and monument integrity:
  - Readings are accurate:
    - Anomaly due to frost heave
    - Additional monuments installed for monitoring.
Key Learnings - Suncor Leases & Fire Extent

- Suncor safely evacuated over 10,000 people over 3 days:
  - Lodges and camps at all sites were used to house displaced individuals and families (~14,000 people);
  - Over 500 Suncor employees were directly involved in supporting the evacuation efforts;
  - Zero safety incidents and was zero asset damage related to the fire.

- MacKay River was shut down on May 3rd restarted on June 25th;

- There has been a focused effort since the restart, to understand the impact of an outage of this nature on our operations.
Key Learnings - Subsurface Learnings Following the 2016 Fort McMurray Fires

• MacKay River was returned to operation and ramped-up in a safe and efficient manner;

• Water cuts were significantly higher post-outage:
  – This behavior was expected based on past planned outages;
  – Past performance indicates that the duration of an outage is roughly equal to the recovery
duration for bitumen production.

• Significant chamber pressure losses were seen during the outage, as a result of heat losses:
  – Temperature losses as a result of this contribute to the increased water cut seen at MacKay
River:
    • Condensate from the collapsing steam chamber;
    • Density of fluids.
Key Learnings - MacKay River Production Recovery

- Pre-outage average production ranged from 35-37 kbpd;
- Since resuming normal operations, production has ramped up to between 33-35 kbpd;
  - Currently a couple percent below where production was prior to the fire;
  - Volumes are continuing to ramp up as wells return to pre-outage conditions.
Key Learnings - MacKay River Current & Historical Recovery

- Compared with past outages and upsets, and normalized for peak production expectations:
  - Recovery has been marginally slower than past ones to recover to full volumes;
  - The recovery, is related to high water cuts occurring following outages at MacKay River:
    - Due to condensate from the collapsing steam chamber & density of fluids.
Key Learnings - Time to Recovery

- Gray boxes roughly outline the durations of each of the past outages and upsets. Yellow boxes show period in which water cut recovers to pre-outage;
- Duration of the outage is equivalent to the duration of the recovery period following it:
  - Expect the current recovery to continue until about the middle of September.
Key Learnings - Chamber Pressure

- Chamber pressure losses were seen across MacKay River, ranging from 50 to 250 kPa;
- Larger pressure losses were seen:
  - Wells operated at higher chamber pressures;
  - In less mature, non-coalesced, steam chambers;
- This is in agreement with data collected during previous outages;

- Work is ongoing to rebuild chamber pressures where feasible and economic to do so.
Key Learnings - MOP Trial Overview

- AER approval received October 9, 2015:
  - QQ5: MWHIP increased from 1370 to 1525 kPag, bottomhole MOP increased from 1210 to 1370 kPag;
  - QQ6-QQ16: MWHIP increased from 1350 to 1500 kPag, bottomhole MOP increased from 1200 to 1350 kPag;
  - Trial was conducted to QQ6-QQ16 as the wells have the lowest MOP in the field resulting in production lift constraints.
- Most success has been seen on well pairs 6-10:
  - Limited geological challenges.
- Well pairs 11-16 have developed hotspots when steam injection pressures are increased.
Key Learnings - QQ7 MOP Trial Results

- The increase in MOP has had a significant impact on production;
- Average oil production has increased 120%
- Production impacted by fires;
- Well is slowly ramping up to pre-fire rates;
  - Rates similar to 2 months into the trial.
Key Learnings Pad 824 Update and Learnings

Pad 824 successfully converted to SAGD after circulation with a DSAGD completion

Ramp up has been impacted by the wildfires but rates are increasing as expected

- Wells were shut in for 80 – 90 days (including re-circulation time).

Key Learnings

- The successful conversion of Pad 824 shows that it is possible to circulate a well with a DSAGD completion at MacKay River
  - The previous DSAGD completions in Firebag were bullheaded.
  - The ESPs started up successfully after steaming past them
- The VX meter has been valuable in understanding the real time impact of operating parameters (injection pressures and rates) on well performance.
Steam Injection Conditions

- Approved MOPs based on the methodology detailed in Application 1724610;
- Approved Bottomhole MOP at 80% of the fracture closure pressure;
- MOPs are set by shallowest point in each pattern to allow for intra-pattern; communication;
- Steam injection pressure limits are enforced at wellhead on tubing and annulus via pressure transmitters. Phase 1 wells are monitored via manual pressure measurement at the wellhead every second day;
- Steam injection pressure is reduced as required to maintain estimated bottomhole pressure below MOP for neighboring patterns in communication.

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Wells</th>
<th>Maximum Operating Pressure*</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Surface</td>
</tr>
<tr>
<td></td>
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<td>(kPag)</td>
</tr>
<tr>
<td>A</td>
<td>A1-7</td>
<td>2120</td>
</tr>
<tr>
<td>B</td>
<td>B1-7</td>
<td>2020</td>
</tr>
<tr>
<td>C</td>
<td>C1-6</td>
<td>1745</td>
</tr>
<tr>
<td>D</td>
<td>D1-5</td>
<td>1555</td>
</tr>
<tr>
<td>E (S)</td>
<td>E1-4</td>
<td>1640</td>
</tr>
<tr>
<td>E (N)</td>
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<td>1600</td>
</tr>
<tr>
<td>F</td>
<td>F1-7</td>
<td>1680</td>
</tr>
<tr>
<td>G</td>
<td>G1-7</td>
<td>1935</td>
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<td>H</td>
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<td>2225</td>
</tr>
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<td>NN</td>
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<td>1500</td>
</tr>
<tr>
<td>QQ</td>
<td>QQ11-16</td>
<td>1500</td>
</tr>
</tbody>
</table>
| 824     | 824WP1-2 | 2320 | 2060  

*Commercial Scheme Approval No. 866800
All of the Mackay wells in SAGD are currently operating at pressures below the new approved 80% maximum bottomhole operating pressure;

Alarm systems are in place to ensure the approved maximum bottomhole operating pressures are not exceeded;

Steam injection pressure is reduced as required to maintain estimated bottomhole pressure below maximum bottomhole operating pressure;

824 - Inadequate chamber development to obtain a valid bottomhole pressure.

Impact

Lower production rates in low MOP areas;

Slower ramp-up post planned outage’s;

Impacts new well conversions in low MOP areas;

Small impact to mature wells performance.

* Suncor has temporary approval to be above the 80% limit for QQ6-16
Stewardship to maximum bottomhole operating pressure

- For SAGD wells with no downhole instrumentation, **Step-down Tests (SDT)** and **Low Rate Tests (LRT)** are performed and used to calculate estimated chamber pressure to ensure that the Maximum Bottomhole Injection Pressure (MBHIP) is not exceeded;

- **SDTs** are conducted by lowering the steam injection rate in steps and allowing pressures to stabilize between steps;

- **LRTs** are conducted on wells that do not have reliable SDT correlations by reducing the steam injection rates low enough to estimate the chamber pressure;

- **SDT** is the preferred method for chamber pressure estimation as it allows for real-time chamber pressure monitoring based on changing injection rates;
Pad Abandonment Outlook

• The strategy for future well and pad (including surface equipment) abandonments is under development;

• Do not anticipate abandonment of operating Pads during the next 5 years:
  • Pads 20 and 21 (A/C and B/D patterns) are the most mature and are expected to be under pressure maintenance within 5 years;
  • Individual wells may be suspended or abandoned as required.

• Pad 40 expected to be abandoned within the next 5 years:
  • Three of four wells on pad abandoned (NP, NI and SP);
  • Considerations for surface equipment are under review.
Pilot

- NCG co-injection into B pattern commenced October 2011;
- Pilot infrastructure left in place until Stage 1 is operational;
- Injection currently based on steam availability.

Stage 1

- NCG co-injection to A, B, C, D patterns currently approved;
- Expect First NCG Co-Injection Q4 2016;
- Plan to reduce and reallocate steam to other pads to optimize field.

Stage 2

- NCG co-injection into E, F, G, patterns work in progress;
- Planning First NCG Co-Injection Q3 2017.
NEW TECHNOLOGY PROJECTS – NEAR TERM

NCG Co-Injection Expansion (A/B/C/D)
- First injection planned for Q4 2016.

Surfactant Chemical Pilot (D2/D4/D5)
- Injection Feb 2015 to April 2016;
- Post-pilot monitoring in progress.

Surfactant Co-Injection Pilot Expansion (F)
- First Injection planned for Q4 2016.

CO2 Co-Injection Pilot Well (OO8)
- First injection started for April 2016 but has since been suspended due to the Fort McMurray Fire:
  • Expected to restart October 2016.

North Arm 3
Solvent Technology:
- Demonstration facility currently at scoping stage;
- Integrated Application expected for Q4 2016.
MacKay River Coupled Geo-Mechanics/Reservoir Workflow

1 - Data Gathering
- SAGD well operations (Rate/Pressure)
- Ob well pressure (Piezometer)
- Ob well temperature (Thermocouple/Fiber)
- Surface heave (Monuments)
- Cores and borehole image log analysis
- Rock geo-mechanical properties (Lab tests)
- In situ stress (mini-frac tests)

2 – Data Interpretation
Reservoir Physics
- Well performance
- Pressure Leak-off
- Heat transfer
Geo-Mechanics
- Stress state
- Rock behavior
  - Shear failure conditions
  - Tensile failure conditions
  - Permeability change
- Thermal expansion
- Reservoir level deformations

3 - Coupled Reservoir Geo-Mechanics
- Update pressures and temperature
- Update stress state
- Recalibrate models using history match to field data
- Forecast/Design for safe development

4 - Learnings
- Sensitize key variables within uncertainty range
- Quantify geo-mechanical risks
- Verify and update MOP
- Recommend/Design further measurements / lab tests

Geo-Mechanical analysis for safe optimal MacKay River operations
Dataset for Characterization of Natural Fractures

2005/06:
• Image logs for 15 wells,

2007/09:
• Cores and/or image logs for 17 wells,

2010/11:
• 17 wells with cores and image logs;
• 10 wells with only image logs.

2011/12:
• Cored 6 wells;
• FMI logs for 27 wells.

2012/13:
• No wells were drilled.

2013/14:
• Cored 3 wells;
• FMI logs for 3 wells.

2014/15:
• Cored 2 wells;
• FMI Logs for 11 wells.

2015/16:
• FMI Log for 1 well.
Average pressure decrease of 15 kPa from August 2015 to August 2016:

- Pressures are below hydrostatic and well below fracture pressures.

12 Wabiskaw C wells with elevated temperatures (>30°C) directly above mature SAGD operations:

- 4 wells between 90°C and 141°C - 8 wells between 30°C and 90°C.
- Elevated temperatures are within the expected range as depicted by heat conduction calculations;
- Ongoing analysis and simulation efforts are continuing to further understand underlying mechanisms.
Monitoring: Wab C Alarms

- Observation well data is reviewed bi-weekly and automated alarms initiate proactive, more detailed daily review of data. The following alarm settings are used for the automated alarms:
  - High pressure – set to alarm at 60% of fracture pressure at gauge depth in the OB wells (12.6 kPag/m);
  - Rising pressure – set to alarm if the pressure increase is >25 kPa/day;
  - High temperature – set to alarm at 20 C subcool of steam temperature calculated using the OB well pressure as assumed steam saturation pressure;
  - Rising temperature – set to alarm if temperature increase is > 5 ºC/day;
  - The set point for the proactive alarms result in daily alarms if set conditions are exceeded; review of current alarms has resulted in no safety concerns.
Monitoring: Wab C Response

- In the event that pressure or temperatures are nearing levels of concern Suncor will:
  - Confirm the alarm pressure or temperature, and if accurate;
  - Decrease injection pressure in the offsetting injection wells as appropriate;
  - Monitor the response and adjust operations as required.

- No alarms have resulted in the above actions to be performed.
Geo-Mechanics: Mini-frac Test

- No mini-frac tests conducted since last reporting period;
- Fracture gradient within operating area still holds at or above 21 kPag/m:
  - Fracture gradient measured (kPag/m) from mini-frac test.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>McM</td>
<td></td>
<td>19.9</td>
<td>21.1</td>
</tr>
<tr>
<td>WabD</td>
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</tr>
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<td>WabA</td>
<td>21.1</td>
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<td>21.2</td>
</tr>
<tr>
<td>CW</td>
<td>22.3</td>
<td>24.1</td>
<td>21.3</td>
</tr>
</tbody>
</table>
Geo-Mechanics: Geo-mechanical Simulation Studies

Continuous Improvement to Geomechanical Models:

- Continued calibration of the model with an integrated dataset (SAGD performance data, pressure and temperature data acquired from the WabC and McMurray, surface heave);
- Verified sufficient factor of safety to tensile and shear failure in the caprock.

Review of Geomechanical Model Prior to 750 Start-up:

- Results indicate that the current MOP design for the 750/751 development continues to provide sufficient factor of safety to tensile and shear failure in the caprock.
MacKay River Performance Presentation

Future Plans
Future Development: Pads 750/751

- Pad 750/751 is a future area of development within the MacKay River PA:
  - To provide sustaining production for the existing MR1 central processing facility (CPF).
- Approval received August 7, 2012:
  - 35 well pairs and 2 single producers.
- Drilling completed June 2014;
- First Steam for Pad 750 in September 2016;
- To maintain maximum MR1 CPF capacity:
  - Pad 751 and remaining Pad 750 completions will occur in 2018/2019.
  - First Steam for Pad 751 expected in 2020.
Future Development: Pad 819

• Pad 819 is a future area of development within the MacKay River PA:
  – To provide sustaining production for the existing MR1 central processing facility (CPF).

• Directive 078 amendment approval received in January 2014:
  – 9 well pairs located south of existing infrastructure.

• Drilling planned to be completed in 2020;

• First steam expected in 2022.
MacKay River Performance Presentation

Responses to Additional Questions
• Birch Channel interpreted throughout MacKay River producing area
• West of producing area, channel thickens as reservoir deepens
Groundwater Monitoring at Mackay River: Monitoring Network and Chemistry
Outline

- Monitoring Network in the Birch Channel
  - Water Well Licensing
  - Drawdown at Observation Wells
- Thermal Mobilization Effects
  - Temperature
  - Chemistry
## Water Well Licensing

<table>
<thead>
<tr>
<th>Facility</th>
<th>Water Well Licence</th>
<th>Well ID</th>
<th>Volume diverted in 2015 /m³</th>
<th>Maximum Annual Volume / m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>MacKay River</td>
<td>00338812-00-00</td>
<td>BC-MW-270-44</td>
<td>2,091</td>
<td>7,154</td>
</tr>
<tr>
<td></td>
<td>00188229-02-00</td>
<td>GD-SW-212-53, GD-SW-213-86, and GD-SW-215-91</td>
<td>507,308</td>
<td>511,000</td>
</tr>
<tr>
<td></td>
<td>00289164-00-00</td>
<td>WSW 5, 6, and 7</td>
<td>0</td>
<td>876,000</td>
</tr>
<tr>
<td></td>
<td>00249470-01-00</td>
<td>CWSW-SW-218-55</td>
<td>0</td>
<td>25,550</td>
</tr>
</tbody>
</table>
Drawdown in the production aquifer, as measured at an observation well at a distance of 150 metres from the production well, to 35% of available head during the first year of operation and no more than 50% of available head over the life of the project.

<table>
<thead>
<tr>
<th>Observation Well</th>
<th>Pumping Well</th>
<th>Approximate Distance Between Observation and Pumping Well (m)</th>
<th>Saturated Thickness* (m)</th>
<th>Available Head** (m)</th>
<th>50% of Available Head (m)</th>
<th>Maximum Measured Drawdown at Observation Well (m)***</th>
</tr>
</thead>
<tbody>
<tr>
<td>GD-MW-211-55</td>
<td>GD-SW-212-53</td>
<td>20</td>
<td>26</td>
<td>17</td>
<td>8.67</td>
<td>1.72</td>
</tr>
<tr>
<td>GD-MW-214-86</td>
<td>GD-SW-213-86</td>
<td>20</td>
<td>56</td>
<td>37</td>
<td>18.67</td>
<td>2.44</td>
</tr>
<tr>
<td>GD-MW-216-93</td>
<td>GD-SW-215-91</td>
<td>20</td>
<td>57</td>
<td>38</td>
<td>19.00</td>
<td>0.18</td>
</tr>
<tr>
<td>BC-MW-270-44</td>
<td>BC-SW-271-43</td>
<td>20</td>
<td>27</td>
<td>18</td>
<td>8.96</td>
<td>0.85</td>
</tr>
</tbody>
</table>

* Based on Worley Parson’s Report "Additional Water Withdrawal Application (WP, 2011)
** Calculated as 2/3 of saturated thickness
***Maximum Drawdown Measured in 2015
Well Pads & Groundwater Monitoring Network

LEGEND
- MONITORING WELL
- GROUNDWATER DIVERSION WELL
- MONITORING WELL
(NOT MONITORED IN 2014)

Maximum temperature is ~ 26°C (WP24-MW231-27)

2016 monitoring ongoing. Update to be provided in the 2016 compliance groundwater monitoring report
Sporadic exceedances for phenols, cadmium and selenium and increasing trend for aluminum (2009-2013) not due to temperature.

Occurrences of trace metals (Al, Fe, Mn) mediated by natural processes (microbial reductive dissolution) under anaerobic conditions.

Exceedances for sodium (WP40-MW-228-08 & WP25-MW-235-43) and sulphate (WP40-MW-228-08) are within historical ranges for these wells.
References

- Tetra Tech EBA Inc. February 2016. 2015 Baseline Camp Water Source Well Annual Water Use Report. Licence No. 00338812-00-00 (File No. 00338812) Suncor MacKay River Lease, NE 31-092-12 W4M Alberta
AER Directive 054
2016 Performance Presentation

Section 3.1.2 – Surface Operations, Compliance, and Issues not related to Resource Evaluation and Recovery
Table of Contents

- Introduction
- Facilities
- Central Processing Facilities (CPF) Performance
  - Measurement and Reporting
  - Water Production, Injection and Use
    - Sulphur Production
  - Environmental Performance
    - Future Plans
MacKay River Project Site
CPF Plot Plan

- Unit 800 ZLD
- Unit 600 Fuel Gas Instrument Air
- Unit 500 Glycol
- Unit 400 Steam Generation
- Unit 100 Bitumen Separation
- Unit 700 Bitumen Shipping
- Unit 200 DeOiling
- Unit 300 Water Treatment
MacKay River Performance Presentation
Central Processing Facility Performance
CPF Performance (September 2015 to 2016 YTD)

The reliability of the facility has been steady:

- Very stable CPF availability realized during the past year;
- Entering sustainment of OEMS, introduced years prior.

**Major challenges:**

- Fort McMurray wild fire evacuations caused disruption in production;
- Impact on reliability limited as CPF was “available” to operate. CPF reliability is driven by internal events that impact production.

Average 99.5%
(September 2015 to August 2016)
Historical Production (January 2003 – 2016 YTD)

MacKay River Historical Production (January 2003 - August 2016)

- Production (m3/day)
- Months: Jan-03 to Sep-16
- Production levels from January 2003 to August 2016

Key points:
- January 2003
- August 2016
Production (2015)

Period Average: 4875.9 m³/d

- Planned Cogen Outage
- Turnaround

Production (m³/day)

- 1/1/2015 to 3/1/2015
- 5/1/2015 to 7/1/2015
- 9/1/2015 to 11/1/2015
Production (January 2016 to August 2016)

Period Average: 4093.4 m3/d

Power Outage

Wildfires + Line 32 Blockage

Cogen Outage

Shutdown due to Wildfires
Water Treatment Technology

Warm Lime Softening (WLS) and Weak Acid Cation (WAC) softening for produced water;

Zero Liquid Discharge (ZLD) System on blowdown slip stream:
- Evaporators: one steam and one mechanical driven;
- Crystallizer: Steam driven;
- Dryer: gas fired;
- Filter press (2): back up for dryer.
## Boiler Feed Water Quality

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature, ºC</td>
<td>153.4</td>
<td>160.0</td>
<td>140 – 170</td>
</tr>
<tr>
<td>Hardness (Dissolved), mg/L</td>
<td>0.24</td>
<td>1.54</td>
<td>&lt; 1.0</td>
</tr>
<tr>
<td>Total Dissolved Solids, mg/L</td>
<td>6544.4</td>
<td>10413.4</td>
<td>&lt; 8000</td>
</tr>
<tr>
<td>Silica, as SiO2, mg/L</td>
<td>21.8</td>
<td>98.5</td>
<td>&lt; 50.0</td>
</tr>
</tbody>
</table>
Water Treatment Successes and Challenges

The WLS performance has been steady since:

• Reliability is 98%:
  – Consecutive days within spec: 215 days Parameters: temperature, hardness, total dissolved solids, pH, silica, oil, free oxygen, total dissolved iron;
  – Impact of Wildfires included in value: off-spec BFW conditions are very rare;
  – Reliability of the slurry system has improved significantly with new chemical treatment program.

Challenges:

• Fort McMurray Wild fires caused 2 cold stand-by situations with little to no time to prepare for CPF shut down;
• Multiple CPF start-up situations and irregular operating modes impacted WLS outlet water quality.
Steam Generation (2015)

Steam Quality from Co-gen is maintained approximately 77% and OTSG is approximately 80%
Steam Generation (2016 YTD)

Steam Quality from Co-gen is maintained approximately 77% and OTSG is approximately 80%
Power Imported (2015)

*Note: All power imported into Mackay River is consumed*
Power Imported (2016 YTD)

*Note: All power imported into Mackay River is consumed
Gas Consumption (2015)
Gas Consumption (2016 YTD)
Energy Intensity

Energy Intensity Formula

- Energy Intensity (GJ/m³) = Total energy consumed by site / Sales bitumen volume;

- Total energy consumed by site (GJ) = Energy used to make steam in Cogen + Natural Gas imported to site + Solution gas to Cogen + Electricity consumed by site – Mixed gas to Cogen duct firing:
  - Note that the term “site” does not include Cogeneration.

- Energy used to make steam in Cogen (GJ) = BFW Mass Flow Rate to Cogen x Hourly average difference in enthalpy between steam and BFW.
Cogeneration with TransCanada Energy

- Energy exchange: TransCanada Energy (TCE) provides steam and electricity to Suncor in exchange for BFW and a “fee”;

- A large portion of the steam used in the injection wells is recovered by Suncor as produced water. This produced water supplies most of the feedwater required for the HRSG.;

- A portion of the electrical power generated by the cogeneration plant is sold to Suncor for use onsite as well as at other offsite locations. In addition to the power contracted to Suncor, up to 150 MW of power is made available to Alberta consumers

Mackay River Energy Intensity for 2015

Energy Intensity (GJ/M3 of Bitumen)
Energy Intensity (2016 YTD)

Mackay River Energy Intensity for 2016 (YTD)
MacKay River Performance Presentation
Measurement and Reporting
Measurement Accounting & Reporting Plan (MARP)

- MARP provided to AER in April 2016 as part of the AER audit;

- AER performed MARP site audit in April 2016;

- Resubmitted MARP in August 2016 with amendments:
  - Updates from AER audit;
  - Removal of lift gas meters from produced water calculation;
  - Update of water balance.

- MacKay River Report Codes:
  - Battery – AB BT 0067097;
  - Injection Facility – AB IF 0009498;
  - Meter Station – AB MS 0084090.
**Well Testing Strategy**

Test Separators are used to test all wells for production allocation:
- Fully compliant with Directive 017.

**Pad 20 Well Testing Strategy:**
- 13 active SAGD producers, 4-6 hour tests (+ purge time).

**Pad 21 Well Testing Strategy:**
- 12 active SAGD producers, 4.5 hour tests (+ purge time).

**Pads 22 Well Testing Strategy:**
- 23 active SAGD producers, 5.5 hour tests (+ purge time);
- No long grandfathered as a result of the Directive 017 update;
- Phase 4 (NN1 and QQ2-3) are tested via Pad 22 Test Separator;
- Phase 5A (NN2-5, QQ4-5) are tested via Pad 22 Test Separator.

**Pads 23/24 Well Testing Strategy:**
- 14 active SAGD producers, 7-7.5 hour tests (+ purge time);
- Pad 24 Phase 4 (OO1-3) are tested via Pad 23 Test Separator;
- Pad 24 (H1-4) are tested via Pad 23 Test Separator.

**Pad 25 Well Testing Strategy:**
- V-100 Test Separator:
  - 10 active SAGD producers, 5 hour tests (+ purge time).
- V-1100 Test Separator:
  - 12 active SAGD producers, 5 hour tests (+ purge time).
- V-1150 Test Separator:
  - 12 active SAGD producers, 6 hours test (+ purge time):
    - Pad 24 Phase 5B1 (OO4-9) are tested via V-1150;
    - Pad 24 Phase 5DF (OO10-15) are tested via V-1150.

**Pads 824 Well Testing Strategy:**
- 2 active SAGD producers, 7 hour tests (+ purge time);
- Wells are tested via Vx Meter.
Proration of Oil and Water

- Average for 2015:
  - Oil Factor = 0.97
  - Water Factor = 1.04

- Average for 2016 YTD:
  - Oil Factor = 0.93
  - Water Factor = 1.01
Fresh Water

Source Water Wells

- *Water Act* Licence No. 00188229-02-00 (511,000 m³/year) Birch Channel Aquifer (Renewal issued September 2012):
  
  1. 13-05-093-12W4 (GD-SW-212-53; formerly WSW-1), max. rate 450 m³/day;
  
  2. 04-08-093-12W4 (GD-SW-213-86; formerly WSW-2), max. rate 1368 m³/day;
  
  3. 04-08-093-12W4 (GD-SW-215-91; formerly WSW-3), max. rate 1411 m³/day.

Domestic Water Well:

- *Water Act* Licence No. 00249470-01-00 (25,550 m³/y) Birch Channel Aquifer (Currently not in use):
  
  4. 12-05-093-12W4 (CWSW-SW-218-55), max. rate 123 m³/day.

Monthly reporting for Source Water Wells and Domestic Water Well is done through Water Use Reporting System (WURS).
### Raw Water Source Wells

**Typical water quality assessment parameters:**

Monitoring station GD-SW-212-53 (formerly WSW-1);

Results shown are from October 5, 2015 sampling program.

<table>
<thead>
<tr>
<th>Test</th>
<th>Parameter</th>
<th>Water Analysis Result (5-Oct-15)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical</strong></td>
<td>EC (µS/cm)</td>
<td>855</td>
</tr>
<tr>
<td></td>
<td>pH (units)</td>
<td>8.32</td>
</tr>
<tr>
<td></td>
<td>Tot Hard as CaCO2 (mg/L)</td>
<td>398</td>
</tr>
<tr>
<td></td>
<td>Tot Alk as CaCO3 (mg/L)</td>
<td>363</td>
</tr>
<tr>
<td><strong>Indicators</strong></td>
<td>Chloride:D (mg/L)</td>
<td>&lt;0.5</td>
</tr>
<tr>
<td></td>
<td>Sulphate:D (mg/L)</td>
<td>111</td>
</tr>
<tr>
<td></td>
<td>Iron:D (mg/L)</td>
<td>3.75</td>
</tr>
<tr>
<td></td>
<td>Manganese:D (mg/L)</td>
<td>0.265</td>
</tr>
<tr>
<td></td>
<td>TDS-calculated (mg/L)</td>
<td>504</td>
</tr>
<tr>
<td><strong>Cations, Anions, and Ion Balance</strong></td>
<td>Calcium:D (mg/L)</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td>Magnesium:D (mg/L)</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Potassium:D (mg/L)</td>
<td>5.36</td>
</tr>
<tr>
<td></td>
<td>Sodium:D (mg/L)</td>
<td>31.8</td>
</tr>
<tr>
<td></td>
<td>Bicarbonate:D (mg/L)</td>
<td>363</td>
</tr>
<tr>
<td></td>
<td>Carbonate:D (mg/L)</td>
<td>&lt;5</td>
</tr>
<tr>
<td></td>
<td>Hydroxide:D (mg/L)</td>
<td>&lt;5</td>
</tr>
<tr>
<td></td>
<td>Fluoride:D (mg/L)</td>
<td>0.205</td>
</tr>
<tr>
<td></td>
<td>Ion balance % (%)</td>
<td>99.7</td>
</tr>
<tr>
<td><strong>Nitrogen Parameters</strong></td>
<td>NO2 as N (mg/L)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td></td>
<td>NO3 and N (mg/L)</td>
<td>&lt;0.02</td>
</tr>
<tr>
<td></td>
<td>NO2 + NO3 as N (mg/L)</td>
<td>&lt;0.022</td>
</tr>
<tr>
<td></td>
<td>DKN (mg/L)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>TKN (mg/L)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Tot Amm N (mg/L)</td>
<td>-</td>
</tr>
<tr>
<td><strong>Phenols</strong></td>
<td>phenols (mg/L)</td>
<td>-</td>
</tr>
<tr>
<td><strong>PAH</strong></td>
<td>Naphthenic Acids (mg/L)</td>
<td>-</td>
</tr>
</tbody>
</table>

- Regulatory allowable limit from Water Act Licence No. 188229 is 511e3 m³ per year;
- A temporary diversion license (TDL No. 375567) allowed Suncor to divert an additional 32.29e3 m³ between Dec 1-31, 2015;
- The total diversion limit of 543.29e3 m³ per year is shown (black line).
Raw Water Withdrawal – Source Wells (2016 YTD)

- Regulatory allowable limit from Water Act Licence No. 188229 is 511e3 m³ per year
Raw Water Withdrawal – Domestic Well (2016)

- Water well casing failure on September 9, 2011; well was abandoned and a replacement well drilled July 2013;
- No water has been withdrawn from this well (2016 YTD).
**Water Balance**

- **Steam:**
  - **Primary produced steam:**
    - New annubar steam meter (04-FI-1002) plus liquid carryover:
      - Installed during the September 2015 turnaround on the common steam header to the pads;
      - Carryover volume quantified through TDS analysis.
  - **Secondary produced steam:**
    - Sum of steam meters from steam separators (04-FI-600, 04-FI-1001) minus steam sent to production heaters (01-FI-162) and any steam vented (04-FI-283).
Water Balance Continued

[Diagram showing flow of water balance with labels such as HP Steam Separators, OTSGs, Cogeneration, HP BFW Pumps, Injection Wells, HP Steam to 01-E-100A~D, and LP Steam Separator.]
Water Balance Continued

- **Raw Water** = \( \Sigma \) Water Source wells (3 water source wells);

- **Accumulation** = Closing Inventory – Opening Inventory;

- **Produced Water** = Produced water to WLS + Accumulation – Others:
  - Produced Water to WLS = 02-FI-500 + 02-FI-306;
  - Others include: Raw water, BLD Recycle, BFW to VRU.

- Details of measurement and reporting procedures may be found in the MARP;

- Water from the crystallizer is metered at the crystallizer outlet before it goes to the dryer:
  - Truck tickets capture the volume of water trucked off-site;
  - Volumes reported in Petrinex.
Water Balance (2016 YTD)
Water Disposal % (2015)
Water Disposal % (2016 YTD)

- Jan-16: 9.7%
- Feb-16: 9.7%
- Mar-16: 9.7%
- Apr-16: 9.7%
- May-16: 9.7%
- Jun-16: 8.8%
- Jul-16: 8.8%
- Aug-16: 9.7%

Disposal limit (%): Light blue柱形图
Actual disposal (%): Deep red柱形图
Low Pressure Blowdown Recycle (2015 & 2016 YTD)

Blowdown Recycle = 100%:

- Blowdown treated in the Water Plant:
  - YTD: 43,670 m³/month (Lower as a result of plant shutdowns due to wildfires)
    2015: 54,741 m³/month.
- Blowdown treated in the Zero Liquid Discharge (ZLD) Plant:
  - YTD: 31,220 m³/month (Lower as a result of plant shutdowns due to wildfires)
    2015: 39,459 m³/month.

Trucked volumes from Diversion Lagoon:

- 55,816 m³ (January 1, 2014 – December 31, 2014);
- 23,979 m³ (January 1, 2015 – December 31, 2015);
- 16,199 m³ (January 1, 2016 – August 31, 2016).

Note: The diversion lagoon is filled by crystallizer concentrate during purges and by landfill leachate after periods of rain.
MacKay River Landfill / Waste Management

AER Approval WM-072 Class II Oilfield Landfill:
• Volumes of solids (salt/lime) to landfill:
  – 2015: 28,019 m³
  – 2016 YTD: 11,366* m³.
• Total volume of landfill fluids to facility:
  – 2015: 14,465 m³
  – 2016 YTD: 17,362* m³.
• Waste Surveys Total Volumes:
  – Phase III West: 46,139 m³
    • (Survey completed on July 7, 2016).
  – Phase III East: no material placed to date:
  – Phase II Cell (A&B): 74,270 m³
    • (Survey completed February 6/8, 2015).
  – Phase I of the MacKay River Landfill is closed and is in post-closure monitoring period.
• Waste services contract in place:
  – Addresses hazardous, scrap metal, domestic waste.
• Waste Tracker software used to track and submit manifests to AER.

*Volumes estimated in August 2016
Off-Site Brine Water Disposal

Location of disposal site:
- Absolute Environmental Waste;
- 11-17-53-23-W4M.

- Brine water is disposed of off-site when the diversion tank and diversion lagoon reach capacity and the ZLD system cannot process the boiler blowdown from Unit 400.

- Water sources in the diversion lagoon include: precipitation, leachate from the MacKay River Landfill and excess boiler blowdown water during upset conditions.
Off-Site Brine Water Disposal (2015)

- Volumes reported via Petrinex
Off-Site Brine Water Disposal (2016 YTD)

- Volumes reported via Petrinex
Sulphur Production

- Currently there are no sulphur recovery facilities at the MacKay River Project;
- All produced sulphur is burnt in the overall process;
- Present trends indicate an SRU will not be required for the Project;
- Suncor will continue to monitor the sulphur trends.
Sulphur Dioxide Emissions (2015)

- SO$_2$ emissions are calculated from monthly produced gas samples
Sulphur Dioxide Emissions (2016 YTD)

- $S_2O_3$ emissions are calculated from monthly produced gas samples.
H₂S Concentration (2015)

- H₂S concentrations are measured in monthly produced gas samples.
H₂S Concentration (2016 YTD)

- H₂S concentrations are measured in semi-monthly produced gas samples.
Solution Gas Flared (2015)
Solution Gas Flared (2016 YTD)

Solution Gas Flared for 2016 (YTD)

- January: Approximately 260 m³
- February: Less than 10 m³
- March: Less than 10 m³
- April: Less than 10 m³
- May: Less than 10 m³
- June: Less than 10 m³
- July: Approximately 23 m³
- August: Approximately 460 m³
- September: Less than 10 m³
- October: Less than 10 m³
- November: Less than 10 m³
- December: Less than 10 m³
Solution Gas Recovery (2015)

Solution Gas Recovery % for 2015
Solution Gas Recovery (2016 YTD)
Greenhouse Gas Emissions (GHG)

Submitted the annual SGER report to Alberta Environment and Parks and NPRI GHG report to Environment Canada:
  • GHG calculation methodology developed to improve transparency.

**Total direct emissions for 2015:**
  • 283,516 tonnes of CO₂equiv;
  • Total emissions have been reported to ACCO.

**Total direct emissions for 2016 (Budget):**
  • 302,547 tonnes of CO₂equiv*;
  • Total emissions will be reported to ACCO.

**Approved baseline emissions intensity:**
  • 0.1174 tCO₂e/m³ (Global Warming Potential Updated).

* 2016 actual data to be verified in 2017
Ambient Air Monitoring

- **WBEA Air Monitoring Stations:**
  - Ambient air quality data available for viewing on WBEA website.

- **Passive Air Monitoring:**
  - Four passive air monitoring stations at MacKay River;
  - Monthly passive air monitoring performed by a site representative and sample analysis reports submitted to AER by Suncor for H$_2$S and SO$_2$
  - In 2015 passive sampling results showed: average H$_2$S concentration was 0.09 ppb and average SO$_2$ was 0.47 ppb;
  - In 2016 (YTD) passive sampling results showed: average H$_2$S concentration was 0.11 and average SO$_2$ was 0.56 ppb.
Total Flared Gas (2015)
Total Flared Gas (2016 YTD)
Regulatory Compliance (2015 and 2016 YTD)

AER Site Visits

• **2015:**
  - May 13, 2015: Introduction of new inspector and discussion on transition of reporting from Bonnyville to the Fort McMurray Office.

• **2016:**
  - March 1, 2016: AER site visit to discuss stack testing (Warren Grimes);
    - March 7, 2016: MARP Inspection (Paulette Bugajski);
  - March 16, 2016: Inspection of flow meters on Pads (Tim Chrest);
    - April 12, 2016: Landfill Inspection (Phoebe Thompson);
  - June 14, 2016: Post-Wildfire Inspection (Phoebe Thompson / Kelsey Martin);
Incident Summary (2015 – 2016 YTD)

AER Reportable Releases for 2015:
• 6 reportable spills;
• 8 reportable flaring events.

AER Reportable Releases for 2016 (YTD – Sept 30):
• 6 reportable spills;
• 8 reportable flaring events.

Voluntary Self Disclosures 2016 (YTD – Sept 30):
• WSW’s missing Dataloggers – remediation/installation complete Sept 2016;
• Landfill – tear in liner of Phase II cell – repair complete June 2016.

Environmental Awareness Training:
• Core training requirement;
• Highlights Spill Awareness, Waste Management, Flaring reporting, etc.
Scheme Approval Amendments

- Amendment 8668A
  - Changed annual average volume to 33,000 bpd (5,250 m³/d)
- Amendment 8668B
  - Increase to project area
- Amendment 8668C
  - Additional project area
  - Approval to inject non-condensable gas
- Amendment 8668D
  - Additions to project area
  - Increase to annual average volume to 72,964 bpd (11,600 m³/d)
- Amendment 8668E
  - Approval to drill four well pairs
- Amendment 8668F
  - Approval to change approval holder from Petro-Canada to Suncor
- Amendment 8668G
  - Approval to undertake amendments & modifications to CPF systems
  - Approval tie-in 6 well pairs to well testing facilities
- Amendment 8668H
  - Approval to conduct non-condensable gas injection test on Pad 21 wells
- Amendment 8668I
  - Approval to conduct non-condensable gas injection at the Section 16 Test Project

- Amendment 8668J
  - Approval to transfer portions of the Dover project area into the MacKay River project area
- Amendment 8668K
  - Approval to tie-in 16 well pairs to well testing facilities
- Amendment 8668L
  - Approval to change approval holder from Petro-Canada to Suncor
- Amendment 8668M
  - Approval to inject chemical into Pad 22 wells
- Amendment 8668N
  - Approval to abandon 3 wells and suspend 1 well on Pad 20
- Amendment 8668O
  - Approval to change Phase 5F well trajectories
- Amendment 8668P
  - Approval to develop Pads 750/751/28 and add 2 sections to project area
- Amendment 8668Q
  - Approval to conduct a pilot of water treatment technologies
- Amendment 8668R
  - Approval to abandon well G1I
- Amendment 8668S
  - Approval to conduct chemical injection test on Pad 21 (D-Pattern Injectors)
Scheme Approval Amendments

- **Amendment 8668T**: Pad 819 Approval
- **Amendment 8668U**: Maximum Operating Pressure Approval
- **Amendment 8668V**: NCG Expansion Project and Phase 5D/F Chemical Injection Approval
- **Amendment 8668W**: MR CPF Expansion Project and Directive 081 Waiver Approval
- **Amendment 8668X**: Administrative reissue approval
- **Amendment 8668Y**: WHIP for Phases 5B2, 5D and 5F Patterns approval
- **Amendment 8668Z**: Pad 828 change from 3 well pairs to 2 wells pairs and correction of well UWIs on Pad 21 Chemical Injection Test (D-Pattern Injectors) approval issued December 10, 2014.
- **Amendment 8668AA**: Phase 1 NCG design amendment approval issued December 19, 2014.
- **Amendment 8668BB**: Phase 2 and Phase 3 Chemical Co-Injection (E, F and G Patterns) approval issued January 1, 2015.
- **Amendment 8668CC**: Approval for E1P Sidetrack well issued January 27, 2015.
- **Amendment 8668DD**: Approval for NN6P Sidetrack well issued February 3, 2015.
- **Amendment 8668EE**: Approval for VX™ multiphase meter on Pad 824 issued February 19, 2015.
- **Amendment 8668FF**: Approval for NCG Test at OO5I well on pad 24 issued March 17, 2015.
- **Amendment 8668GG**: Approval to conduct CO2 Co-Injection at the OO9 well pair on Pad 24 issued April 13, 2015.
- **Amendment 8668HH**: CO2 Co-Injection amendment to change to OO8 well pair on Pad 24 issued.
- **Amendment 8668II**: Pad 824 Thermal Compatibility Assessment approval issued July 14, 2015.
- **Amendment 8668JJ**: Approval for NCG Test at OO7I issued July 29, 2015.
- **Amendment 8668KK**: Approval for an alternate MOP Strategy Trial.
- **Amendment 8668LL**: Approval for C2IPB Sidetrack Well.
- **Amendment 8668MM**: Approval for Pad 750 Thermal Compatibility Assessment.
Scheme Approval Amendments

- **Amendment 8668NN:**
  - Approval to increase MWHIP for all operating wells.

- **Amendment 8668OO:**
  - Approval to alter DA, DB, DC and DF Pattern MWHIPS;
  - Approval to adjust CO2 co-injection rate;
    - Approval to extend chemical co-injection test at the D pattern wells on Pad 21.

- **Amendment 8668PP:**
  - Approval for abandonment of A3I.

- **Amendment 8668QQ:**
  - Approval to change Clause 32.
Current Amendments Continued

- **Amendment 8668GG:**
  - Approval to conduct CO₂ Co-Injection at the OO9 well pair on Pad 24 issued April 13, 2015.

- **Amendment 8668HH:**
  - CO₂ Co-Injection amendment to change to OO8 well pair on Pad 24 issued.

- **Amendment 8668II:**
  - Pad 824 Thermal Compatibility Assessment approval issued July 14, 2015.

- **Amendment 8668JJ:**
  - Approval for NCG Test at OO7I issued July 29, 2015.

- **Amendment 8668KK:**
  - Approval for an alternate MOP Strategy Trial.

- **Amendment 8668LL:**
  - Approval for C2IPB Sidetrack Well.

- **Amendment 8668MM:**
  - Approval for Pad 750 Thermal Compatibility Assessment.
Current Amendments Continued

- **Amendment 8668NN:**
  - Approval to increase MWHIP for all operating wells.
- **Amendment 8668OO:**
  - Approval to alter DA, DB, DC and DF Pattern MWHIPS;
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- **Amendment 8668PP:**
  - Approval for abandonment of A3I.
- **Amendment 8668QQ:**
  - Approval to change Clause 32.
Current Amendments / Applications

• Currently there are no applications under review that are related to MacKay River;

• Suncor will be submitting a separate scheme approval in Q4 2016 for the In Situ Solvent Demonstration Facility that will be located within the MacKay River project area.
Environmental Initiatives

Suncor supports the Joint Oil Sands Monitoring Program and is also an active member of:

- The Wood Buffalo Environmental Association (WBEA) and its continued work through JOSM;
- The Alberta Biodiversity Monitoring Institute (ABMI);
- The Athabasca Watershed Planning and Advisory Council (AWC-WPAC);
- The Canadian Oil Sands Innovation Alliance (COSIA);
- Mining Association of Canada Toward Sustainable Mining initiative;
  - Oil Sands Spill Coop Area Y;
  - Alberta Association of Conservation Offsets (AACO).

Suncor is in ongoing consultation with:

- Regional stakeholders;
- Aboriginal Communities and the local Municipality.
Land Disturbance and Reclamation

- A Project-Level Conservation, Reclamation & Closure Plan is due to AER October 31, 2018. The Plan will follow the new SED-001;
- No reclamation activities are took place in 2015 or are presently underway at MacKay River;

- Total area of land cleared in 2015 was 12.05 ha:
  - Pad 8.24– 4.35 ha;
  - SML 140005 – 7.0 ha;
  - Gathering Line – 0.7 ha.

- Estimated total area of land to be cleared in 2016 is minimal:
  - Minor clearing due to bear safety issues and access that will be included in 2016 Conservation and Reclamation Report;
  - No clearing related to operations;
  - No projected land to be disturbed

Note: Estimated numbers do not include exploration programs and fire related clearing.
Regulatory Compliance

• As noted earlier Suncor has communicated with the AER regarding:
  • Landfill findings (AER Ref#: 312291); and
  • Source groundwater level monitoring (AER Ref #: 308679).

• Suncor Energy Inc. is in compliance with all regulatory approvals, decisions, regulations and conditions as described in Decision Report 2000-50; specifically pertaining to:
  • Plant and waste management facility location,
  • Ground level ozone and VOC monitoring,
  • Groundwater monitoring wells,
  • Surface water quality monitoring, and
  • Participation in Regional Initiatives.
Summary of Key Learnings (Operations)

• Continued focus on Suncor’s Safety Task force initiatives driving and reinforcing correct behaviours:
  • Primary focus on operational discipline and leadership;
  • Dedication to improving onsite process and personal safety.

• Continual focus on process indicators continues high performance of reliability:
  • Record consecutive days without unplanned steam outages;
  • Record consecutive days of on-spec boiler feed water.

• Many learnings from a safety and onsite performance perspective post fire at Mackay River- well performance, pipeline availability, etc.;

• Focus on brine dryer operation has significantly reduced offsite disposal. Further improvements and efficiencies to be realized.
MacKay River Performance Presentation

Future Plans
## Future Plans

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Comments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mackay River optimization</td>
<td>Unlocking throughput availability with improvements and testing to design</td>
<td>Currently being evaluated.</td>
</tr>
<tr>
<td>Pad 750/751 steaming and start-up</td>
<td>Continue with startup of 750 and transition to SAGD.</td>
<td>750 wells currently steaming.</td>
</tr>
</tbody>
</table>