INTRODUCTION

PROJECT DESCRIPTION AND STATUS

SUBSURFACE
- Geoscience
- Well Design and Instrumentation
- 4-D Seismic and Monitoring
- Scheme Performance
- Future Plans

SURFACE
- Facilities
- Measurement and Reporting
- Facility Performance
- Water Production, Injection and Uses
- Sulphur Production
- Compliance
- Future Plans
DEVELOPMENT OVERVIEW

PROJECT DETAILS
- Located 20 km south of Fort McMurray, AB
- 5 production pads
- 25 horizontal well pairs (5 well pairs per pad)
- Central Processing Facility (CPF)
- Offsite services and utilities

INFRASTRUCTURE
- Fuel gas from TransCanada Pipeline (TCPL)
- Dilbit export to Enbridge Cheecham Terminal
- Diluent from Inter Pipeline (IPL)
HANGINGSTONE PROJECT

- First steam (downhole) achieved March 2015
  - *First oil produced July 2015*

- 24 well pairs in SAGD mode and 1 standing well pair
  - *Last well pair (AA03) to be brought on-stream when steam is available*

- Expansion application submitted in 2013
  - *Environmental Impact Assessment report deemed complete by the AER pursuant to Section 53 of EPEA*
  - *Expands Project Area and Development Area*
  - *Application includes 3 phases (+70,000 bbl/d)*
### Surface Data Overview

**Area**

<table>
<thead>
<tr>
<th>Area</th>
<th>Area (km²)</th>
<th>MCMR Cored Wells</th>
<th>Image Logs</th>
<th>Caprock Core</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development Area</td>
<td>5.1</td>
<td>26</td>
<td>31</td>
<td>1</td>
</tr>
<tr>
<td>Project Area</td>
<td>5.6</td>
<td>26</td>
<td>31</td>
<td>1</td>
</tr>
</tbody>
</table>

In the reporting period there were no new geoscience analyses obtained:
- i.e. cores, petrographic, geomechanical or fracture pressure or caprock integrity tests
STRATIGRAPHY AND REFERENCE WELL

MIDDLE MCMURRAY TARGET RESERVOIR

<table>
<thead>
<tr>
<th>FACIES</th>
<th>Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand</td>
<td>Yellow</td>
</tr>
<tr>
<td>Sandy IHS</td>
<td>Orange</td>
</tr>
<tr>
<td>Muddy IHS</td>
<td>Brown</td>
</tr>
<tr>
<td>Mudstone</td>
<td>Gray</td>
</tr>
<tr>
<td>Limestone</td>
<td>Blue</td>
</tr>
</tbody>
</table>

Undifferentiated Quaternary Glacial Drift & Till

Quaternary

- Grand Rapids FM
  - Lower Grand Rapids
  - Upper Grand Rapids

Cretaceous

- Clearwater FM
  - Wabiskaw

Middle Miocene

- McMurray FM
  - Upper
  - Middle

Paleozoic

Beaverhill Lake Group (Devonian)

Seismic

- Peak
- Trough

Resistivity

- High
- Low

Location of Vertical Wells

0 50 100 150 200 250m

1:5000

Grand Rapids
Clearwater
Clearwater Argillaceous
Clearwater Shale
Wabiskaw
McMurray
Top Reservoir
Base Reservoir
Paleozoic
Left - Gamma Ray
Right - Resistivity
GROSS AND NET PAY

MIDDLE MCMURRAY GROSS PAY DEFINITION

- Thickness >= 10 m
- GR < 70 API
- Density > 27%
- Resistivity > 18 ohm-m
- Water Saturation < 50%
- Includes < 1 m thick mud
- Net pay thickness uses gross pay criteria but excludes mud
STRUCTURAL CROSS SECTION NW-SE ACROSS HS1 AREA

- Gross 36m Net 26m
- Gross 36m Net 31m
- Gross 38m Net 22m
- Gross 43m Net 38m
- Gross 44m Net 39m
- Gross 36m Net 21m

Net Pay Thickness, m

- GR
- RESISTIVITY
- HIGH
- LOW

- Wabiskaw
- McMurray
- Top Pay
- Base Pay
- Paleozoic
RESERVOIR STRUCTURE MAPS

Top Reservoir Structure, m asl

Base Reservoir Structure, m asl

ELEVATION RANGE
- 262 to 301 m asl

ELEVATION RANGE
- 241 to 262 m asl

Legend:
- Pad Drainage Area
- Project Area
- Development Area

Contour Interval: 5.0 m
BOTTOM WATER

- Localized and not in direct contact with bitumen; separated by MIHS or mud

- Bottom water interval consists of interbedded mud and sand (resistivity < 10 ohm-m)
MIDDLE McMURRAY GAS

- Minimal thickness and limited distribution within the development area
LOW BITUMEN SATURATION ZONE (LSZ)

- GR<60 API, density porosity >0.27 and resistivity 10-18 ohm-m and core water saturation >50%
- Core So= 0.36 and porosity = 0.37, thus the LSZ will still contribute to the overall bitumen production
2019

- No pressure or temperature change has been observed in the caprock during the reporting period
- No new caprock core, mini-frac or tri-axial testing completed during the reporting period

HISTORICAL

- Caprock is defined as the unit between the top of the Clearwater and Wabiskaw
- One observation well has one piezometer and two thermocouples in the caprock
RESERVOIR PROPERTIES AND OBIP

RESERVOIR PROPERTIES
- Typical Producer Depth: 191 TVD (258 masl)
- Initial Reservoir Pressure @ 190 m TVD: 600 kPa
- Initial Reservoir Temperature: 8°C
- Horizontal Permeability: 3,500-4,300 mD
- Vertical Permeability: 2,800-3,600 mD
- Bitumen Viscosity @ initial reservoir temperature: >1 mln cP

Gross OBIP = Thickness from Top to Base Pay x Area x Porosity x So

<table>
<thead>
<tr>
<th></th>
<th>Avg Por (frac)</th>
<th>Avg So (frac)</th>
<th>OBIP (mln m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drainage Areas</td>
<td>0.36</td>
<td>0.72</td>
<td>15.6</td>
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<tr>
<td>Development Area</td>
<td>0.36</td>
<td>0.72</td>
<td>18.6</td>
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<tr>
<td>Project Area</td>
<td>0.36</td>
<td>0.72</td>
<td>18.6</td>
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</tbody>
</table>
2019
- No new wells were drilled during this reporting period

HISTORICAL
- 5 well pads with 25 well pairs
All wells initially completed with all-metal PCP
- Converted from PCPs to ESPs as rates improved and the wells matured

Typical pump operating conditions:
- Average bottomhole pressure = 1,800 kPag
- Average bottomhole temperature = 180 °C

ESP run life greater than 2 years on 14 wells
- 7 ESPs with greater than 1,000 day run life

<table>
<thead>
<tr>
<th>Well</th>
<th>Type</th>
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<tbody>
<tr>
<td>AA1</td>
<td>ESP</td>
</tr>
<tr>
<td>AA2</td>
<td>ESP</td>
</tr>
<tr>
<td>AA3</td>
<td>PCP*</td>
</tr>
<tr>
<td>AA4</td>
<td>ESP</td>
</tr>
<tr>
<td>AA5</td>
<td>PCP</td>
</tr>
<tr>
<td>AB1</td>
<td>ESP</td>
</tr>
<tr>
<td>AB2</td>
<td>ESP</td>
</tr>
<tr>
<td>AB3</td>
<td>ESP</td>
</tr>
<tr>
<td>AB4</td>
<td>ESP</td>
</tr>
<tr>
<td>AB5</td>
<td>ESP</td>
</tr>
<tr>
<td>AC1</td>
<td>ESP</td>
</tr>
<tr>
<td>AC2</td>
<td>PCP</td>
</tr>
<tr>
<td>AC3</td>
<td>ESP</td>
</tr>
<tr>
<td>AC4</td>
<td>ESP</td>
</tr>
<tr>
<td>AC5</td>
<td>ESP</td>
</tr>
<tr>
<td>AD1</td>
<td>ESP</td>
</tr>
<tr>
<td>AD2</td>
<td>ESP</td>
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<td>AD3</td>
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<td>AD4</td>
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<tr>
<td>AD5</td>
<td>ESP</td>
</tr>
<tr>
<td>AE1</td>
<td>ESP</td>
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<td>AE2</td>
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</tr>
<tr>
<td>AE3</td>
<td>ESP</td>
</tr>
<tr>
<td>AE4</td>
<td>ESP</td>
</tr>
<tr>
<td>AE5</td>
<td>ESP</td>
</tr>
</tbody>
</table>

*Production assurance well

Artificial Lift Performance

<table>
<thead>
<tr>
<th></th>
<th>PCP</th>
<th>ESP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical Minimum Rate (m³/d)</td>
<td>100</td>
<td>125</td>
</tr>
<tr>
<td>Typical Maximum Rate (m³/d)</td>
<td>600</td>
<td>825</td>
</tr>
</tbody>
</table>
INSTRUMENTATION & FLOW CONTROL

TEMPERATURE
- Two types of fiber for temperature measurements
  - Fiber Bragg Grating (FBG) and Distributed Temperature Sensing (DTS)

BOTTOMHOLE PRESSURE (BHP)
- Injector BHP is measured with blanket gas
- Producer BHP is measured using optical gauges and/or bubble tubes

FLOW CONTROL DEVICES (FCDs)
- FCD installed in well AB04, March 2018
- Evaluation of performance is inconclusive due to impact of voluntary curtailment after install
INSTRUMENTATION – OBSERVATION WELLS

OBSERVATION WELLS
- Instrumentation used to monitor reservoir pressure and temperature
  - Some pressure sensors have failed (typically after steam conditions observed)

LEGEND
- 10 Vertical delineation wells
- 5 Obs wells with 10 to 20 thermocouples (TCs)
- 10 Obs wells with 10 to 20 TCs and 3-6 piezometers
- Obs well also monitoring above pay (U. McM, Wab and CLW caprock)
SUBSURFACE
4D SEISMIC AND MONITORING
SEISMIC DATA OVERVIEW

2019
- No new data acquired in reporting period

HISTORICAL
- 3D acquired in 2011 and 2012, merged in 2012
- Total proprietary 2D ~450 km
- Total 3D area ~98 km² (merged), covers development area
- Total 4D area ~3.72 km²
  - Baseline acquired Q1 2014
  - First Monitor acquired Q1 2016 / Second Monitor acquired Q1 2017

3D/4D PARAMETERS
- Source line/source spacing: 60m/20m
- Receiver line/receiver spacing: 40-60m/20m
2019
- No new data acquired in reporting period

HISTORICAL
- Baseline acquired in 2012
- 2016 acquired 7 saturation logs; 2017 acquired 8 saturation logs
- Results show steam chamber thickness correlates with observation well temperature profiles
SURFACE HEAVE MONITORING

PROGRAM DESIGN
- 31 permanent surface heave monuments (0.30 x 0.30 m plate)
- Survey tolerance range is +/- 3 cm

SURVEY/RESULTS
- During 2019 the maximum change observed was within the +/- 3 cm survey tolerance
- The maximum change observed between 2015 and 2019 is 11 cm
SUBSURFACE
SCHEME PERFORMANCE
24 of the 25 SAGD well pairs on production
Injectors at target operating pressure
SOR declining as upper portions of the reservoir drain
Maximum monthly bitumen rate 1,466 m³/d (9,223 bbl/d) with SOR of 4.5 (Feb 2019)
Curtailed production in Q4 2018 in response to extreme pricing differentials
# PAD RECOVERY

<table>
<thead>
<tr>
<th>Pad</th>
<th>Well Pairs</th>
<th>Average Lateral Length (m)</th>
<th>Average Net Pay (m)</th>
<th>Oil Saturation (frac)</th>
<th>Total Net Pay Porosity (frac)</th>
<th>OBIP (10^6 m³)</th>
<th>Current Recovered¹ (10^6 m³)</th>
<th>Current Recovery Factor (%)</th>
<th>Predicted Recovery Factor (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA</td>
<td>4/5</td>
<td>850</td>
<td>28.0</td>
<td>0.71</td>
<td>0.35</td>
<td>3.3</td>
<td>0.31</td>
<td>9.4</td>
<td>50-70</td>
</tr>
<tr>
<td>AB</td>
<td>5/5</td>
<td>640</td>
<td>29.3</td>
<td>0.73</td>
<td>0.37</td>
<td>2.9</td>
<td>0.68</td>
<td>23.5</td>
<td>50-70</td>
</tr>
<tr>
<td>AC</td>
<td>5/5</td>
<td>750</td>
<td>28.7</td>
<td>0.70</td>
<td>0.36</td>
<td>3.0</td>
<td>0.25</td>
<td>8.5</td>
<td>50-70</td>
</tr>
<tr>
<td>AD</td>
<td>5/5</td>
<td>670</td>
<td>32.1</td>
<td>0.71</td>
<td>0.35</td>
<td>3.2</td>
<td>0.35</td>
<td>11.0</td>
<td>50-70</td>
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<tr>
<td>AE</td>
<td>5/5</td>
<td>830</td>
<td>28.2</td>
<td>0.70</td>
<td>0.35</td>
<td>3.2</td>
<td>0.39</td>
<td>12.3</td>
<td>50-70</td>
</tr>
<tr>
<td>TOTAL</td>
<td>24/25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15.6</td>
<td>1.99</td>
<td>12.8</td>
<td>50-70</td>
</tr>
</tbody>
</table>

¹ Recovery Factor based on cumulative oil production in Oct 2019

Notes:
- Well Spacing: 100 m, Spacing between pads: 130 m
- Volumetrics include 25 m at heel and toe of the well pair
- OBIP is gross oil volume between base and top of pay
Approved Maximum Operating Pressure is 2,100 kPag

Throughout the reporting period, the reservoir continues pressuring up
  - Pressure drops due voluntary curtailment in Nov/Dec 2018 and facility maintenance

No pressure change in caprock

**Average monthly field pressure at base, middle and top of reservoir**

**Average monthly injection pressure in each Pad**
STEAM CHAMBER PROGRESSION IN OBSERVATION WELLS

PROGRESSING THROUGH IHS

- Height of steam chamber top was maintained during voluntary curtailment; some pads showed increased steam chamber development over the year
- Conductive heating into IHS observed in all OBS wells

Temperature Plots

- Oct 31, 2018
- Oct 31, 2019
- Jan 14, 2020

>80°C Temp log cutoff for mobile oil (shaded)

m Growth of Top of Steam Chamber from Oct 31, 2018 to Oct 31, 2019

AC05OB: 1 to 2 m mudstone acted as a baffle, not a barrier, to flow
Variation of pad performance depends on geology, pad boundary, well pair trajectories, pump performance and subcool conformance:

- Pads AB, AD and AC selected as examples of high/medium/low performing pads
  - Selection based on cumulative oil recovery and cSOR
  - Differences in the productivity of the wells primarily due to geological variability
PAD PERFORMANCE – HIGH PAD AB

PAD AB

- Highest reservoir quality
  - Mostly sandy reservoir
  - High oil saturation around well pairs
  - Thin low bitumen saturation zone
- Highest average effective wellbore (97%)
- Peak well pair monthly rates >1,000 bbl/d

STEAM CHAMBER DEVELOPMENT

- Well AB03OE shows 2.5 m steam chamber rise near toe
- Pressure continues to increase at top of reservoir (through IHS)
PAD PERFORMANCE – MID PAD AD

PAD AD

- Average reservoir quality
  - Thickest net pay above producer (26.2 m)
  - IHS with high oil saturation in upper reservoir
  - Thick low bitumen saturation zone above injection well
- Shortest wells
- High average effective wellbore (96%)

STEAM CHAMBER DEVELOPMENT

- Well AD04OA shows 2.5 m steam chamber rise near heel of AD04 in 12 months, 9 m in 14 months
- Steam chamber advanced through LSZ

![Graph showing fluid flow rates and SOR over years (2015-2019)]

![Diagram of AD04OA – HEEL (6.5 m OFFSET) with 2.5 m steam growth and temperature plots]
PAD PERFORMANCE – LOW PAD AC

PAD AC
- Heterogeneous reservoir
  - IHS dominated
  - Thin low bitumen saturation zone above injection well
- Bounded at east of pad
- Sharing west boundary with pads AB and AD

STEAM CHAMBER DEVELOPMENT
- AC03OD steam chamber developed beyond the LSZ and is now advancing through SIHS and Breccia

![Graph showing fluid flow rates](image)
STEAM QUALITY

- Steam quality leaving the plant is approximately 98% (includes Continuous Blow Down at typically 6,000 kPag)
- Steam quality decreases to wellheads and is not measured but is modeled to be ~95%
- These conditions align with the original design
**WELL INTEGRITY**

- Well integrity is addressed by using thermally engineered casing, thermal cement and completing cement bond logs in accordance with Directive 051
  - No wellbore integrity failures during the reporting period
  - No non-compliances of reporting and repairing wellbore integrity issues during the reporting period

- AOC has a wellhead valve maintenance program in place to prevent wellhead valve failures
  - No wellhead failures during the reporting period

**ABANDONMENTS**

- No wells have been abandoned or suspended within the project area to date
FUTURE PLANS

- No plans for the drilling of any new SAGD well pairs for next reporting period

- No abandonments planned in the next 5 years

- Well AA03 to be brought online pending steam availability (Q3 2020)

- Expect to convert remaining active PCP wells to ESPs as required

- Evaluating opportunities for Flow Control Devices (FCDs) into producer wells
Diluent Optimization and Inlet Emulsion Cooler projects completed during reporting period
Updated facility schematic showing inlet emulsion cooler
SURFACE MEASUREMENT, ACCOUNTING AND REPORTING PLAN (MARP)
MEASUREMENT AND REPORTING

MEASUREMENT, ACCOUNTING AND REPORTING PLAN (MARP)

- MARP approved 2012
- 2019 - Voluntary disclosure of failed MARP meter (June 4) meter replacement (June 9)

MEASUREMENT METHODOLOGY

- No changes or alterations made to measurement methodology in reporting period

- WELL PRODUCTION AND INJECTION VOLUMES
  - Each well pad has a dedicated test separator with liquid flow meter and water cut analyzer to determine well bitumen and water production
  - Wells are individually put on test for one valid testing hour for every 20 hours of operation
    - Valid well test criteria per approved MARP
  - Well gas production prorated from Battery Level GOR using a proration factor of 1
    - Battery Level GOR is updated monthly
  - Steam injection is metered at each individual wellhead. Primary and secondary steam production metering available at the central steam plant

- BATTERY SALES OIL
  - Sales oil is shipped via pipeline from the Hangingstone Battery. Custody transfer metering is done at receiving facility

- MEASUREMENT TECHNOLOGY
  - Well testing uses standard method of test separators with microwave water cut analyzers

- STEAM VOLUMES
  - Steam quality leaving the plant is approximately 98%
  - A continuous blowdown (CBD) of approximately 2% is added to the steam of each boiler and is injected into the wells
  - Intermittent blow down (IBD) flow is estimated at 0.02% of total water out of the facility using sound engineering practices

- PRODUCED WATER VOLUMES
  - Calculated using the measured Water Disposition to the Injection Facility plus the Water Dispositions from the Plant plus changes in Water Inventory less any Water Receipts
MEASUREMENT AND REPORTING

PRORATION OF BITUMEN AND WATER

Proration Factor for Bitumen & Water

- Bitumen Proration
- Water Proration
- Lower Limit (-15%)
- Upper Limit (+15%)
SITE RELIABILITY > 95%

- Based on steam performance
- Integrity management program and predictive maintenance programs have been implemented to maintain higher site reliability

MAJOR ACTIVITIES

- Boiler Mechanical Cleaning
- Evaporator Chemical Cleaning

MAJOR CHALLENGES

- De-oiling optimization
FACILITY PERFORMANCE

BITUMEN PRODUCTION

Bitumen Production

Bitumen Production (bpd)

Bitumen Production (m3/d)

Plant Design (bpd)

Plant Design (m3/d)

Bitumen Production

Bitumen Production (m3/d)

Plant Design (bpd)

Plant Design (m3/d)
STEAM GENERATION

Steam Generation

- **Actual (m³/month)**
- **Plant Design (m³/month)**

Chart showing steam generation from November 2018 to October 2019 with actual production and plant design for each month.
FACILITY PERFORMANCE

POWER USAGE YTD 92,096 MWH

POWER USAGE (MWh per month)
DIRECT GHG EMISSIONS FROM NOVEMBER 2018 – OCTOBER 2019: 312 KT CO$_2$e

- Sources: stationary combustion, flaring, venting and fugitives
- Calculated using 2019 CCIR
FACILITY PERFORMANCE

TOTAL GAS USAGE YTD 144,421 e$^3$m$^3$

SOLUTION GAS RECOVERY 100%
MONTHLY FLARING AND VENTING

Monthly Flaring and Venting

- Monthly Flaring volume
- Monthly Venting Volume

Note: STEAM GENERATION UNIT PROCESS UPSET FOR SHORT DURATION
- Calculations completed in accordance Directive 081 (2012)
- Revised Directive 081 released November 5, 2019, and is not applicable to the current reporting period (Nov. 1, 2018 – Oct. 31, 2019)
- AOC will incorporate new disposal factors in the 2020 Performance Report
WATER USAGE

Water Usage m³ per month

- Total Source Water Receipts m³
- Produced Water m³
- Steam Injected in wells m³
PRODUCED WATER RECYCLE (AVG. 97%)
WASTE DISPOSAL

- Waste streams are slop oil and evaporator blowdown
- Evaporator waste disposal volume reduced by 13,364 m$^3$
- No excess produced water trucked out in reporting period

Volumes reported via Petrinex
Currently there is no sulphur recovery

SO\textsubscript{2} emissions are calculated based on analytical results of produced gas samples
SURFACE
SOURCE WATER AND WATER CHEMISTRY
NON-SALINE WATER WELLS

- Hangingstone Water Act License 00316166-01-00 annual allocation is 479,975 m³
- During Nov. 1, 2018 to Oct. 31, 2019 AOC diverted 159,286 m³
- Aquifer drawdown is stable and within the allowable as specified in the Water Conservation and Allocation Guideline for Oilfield Injection (AENV 2006)

<table>
<thead>
<tr>
<th>Well ID</th>
<th>Location</th>
<th>Formation</th>
<th>TDS (mg/L)</th>
<th>Maximum Rate of Diversion (m³/d)</th>
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<tbody>
<tr>
<td>WSW153308508W400</td>
<td>15-33-085-08-W4</td>
<td>Quaternary</td>
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<td>WSW061208609W400</td>
<td>06-12-086-09-W4</td>
<td>Quaternary</td>
<td>310*</td>
<td>3,000</td>
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<tr>
<td>WSW040808608W400</td>
<td>04-08-086-08-W4</td>
<td>Quaternary</td>
<td>310*</td>
<td>3,000</td>
</tr>
</tbody>
</table>

Wells are less than 150 m in depth and not licenced with the AER
Well IDs are AOC internal identifiers, not UWIs
* 2019 Analysis
## TYPICAL WATER ANALYSIS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Non-Saline Make-up Water (mg/L)</th>
<th>Produced Water (mg/L)</th>
<th>Disposal Water (Evap blow-down) (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7.97</td>
<td>7.36</td>
<td>11.8</td>
</tr>
<tr>
<td>Total Dissolved Solids (TDS)</td>
<td>310</td>
<td>2,300</td>
<td>130,000</td>
</tr>
<tr>
<td>Chlorides</td>
<td>7.4</td>
<td>1,200</td>
<td>49,000</td>
</tr>
<tr>
<td>Hardness as CaCO₃</td>
<td>220</td>
<td>14.5</td>
<td>550</td>
</tr>
<tr>
<td>Alkalinity as CaCO₃</td>
<td>270</td>
<td>320</td>
<td>25,000</td>
</tr>
<tr>
<td>Silica</td>
<td>5</td>
<td>150</td>
<td>7,000</td>
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<tr>
<td>Total Organic Carbon</td>
<td>&lt;1</td>
<td>180</td>
<td>6,000</td>
</tr>
<tr>
<td>Oil Content</td>
<td>&lt;1</td>
<td>20</td>
<td>500</td>
</tr>
</tbody>
</table>
APPROVALS AND AMENDMENTS
- No applications were made or approvals received during the reporting period

AUDITS
- The AER completed an audit of the Emergency Response Plan and found it satisfactory

INSPECTIONS
- The AER completed 6 facility inspections, all results satisfactory
### Notices of Non-Compliance and Voluntary Self Disclosures

<table>
<thead>
<tr>
<th>Event</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 24, 2019 – CEMS code violation 90% uptime</td>
<td>Investigation identified a defective communication card. Method 4 calculation approved for missing data and the defective card was replaced.</td>
</tr>
<tr>
<td>June 4, 2019 - Voluntary Self-Disclosure for failed MARP meter</td>
<td>Meter was repaired and put back into service June 9, 2019</td>
</tr>
</tbody>
</table>

From November 1, 2018 to October 31, 2019 there were

- 2 reportable releases
MONTHLY AND ANNUAL MONITORING PROGRAMS

- Passive air monitoring stations— no exceedances ($SO_2$, $NO_2$, $H_2S$) of the Alberta Ambient Air Quality Objectives
- A continuous air monitoring station is **not** an EPEA approval requirement
- Continuous $NO_2$ emissions monitored using a Continuous Emissions Monitoring System (CEMS) as required under the EPEA approval (Boiler A)
- $SO_2$ and $NO_2$ emissions were summarized in monthly and annual EPEA Air Emissions Reports
- Air Emissions Inventory Report submitted in September 2019
- Industrial wastewater and runoff – all releases monitored with no exceedances
- Groundwater water monitoring completed (2 events)
- A soil monitoring program proposal was approved by the AER and the monitoring program completed
- A Woodland Caribou Report (2015 – 2018) was submitted and approved by the AER
- Water Act Licenses (term & surface) all conditions met and reporting completed
COMPLIANCE - MONITORING PROGRAMS

Boiler "A" NOx Monthly Average

- Boiler A Monthly Avg. NOx
- Nox limit per Boiler

Boiler "B" NOx Monthly Average

- Boiler B Monthly Avg. NOx
- Nox limit per Boiler

Glycol Heater NOx Monthly Average

- Glycol Heater Monthly Avg. NOx
- Nox limit

- Boiler “A” NOx based on online CEMS unit
- Boiler “B” NOx based on manual calculation
- Glycol Heater NOx based on manual calculation and is operated only in winter months
Reclamation certificates have been obtained for all Hangingstone OSE programs with the exception of 3 programs that were applied for in Q4 2019.
AOC IS A FUNDING MEMBER OF:

- Oil Sands Environmental Monitoring Program
- Wood Buffalo Environmental Association (WBEA) – air shed monitoring
- Regional Industry Caribou Collaboration (RICC)
- Industrial Footprint Reduction Options Group (iFROG) – wetland reclamation research industry collaboration

AOC PARTICIPATES IN:

- Various regional CAPP Committees
  - *Oil Sands Environmental Policy and Regulatory Committee*
  - *NE Alberta Caribou Working Group*
  - *Indigenous Affairs Committee*
  - *Air Issues Committee*
- Oil Sands Community Alliance
ATHABASCA OIL CORPORATION HANGINGSTONE PROJECT IS IN COMPLIANCE WITH AER APPROVALS AND REGULATORY REQUIREMENTS

- For the period of November 1, 2018 to October 31, 2019, AOC has no unaddressed non-compliant events
FUTURE PLANS

- No new initiatives planned