Subsurface Agenda

1. Background
2. Geology / Geoscience
3. Drilling & Completions
4. Artificial Lift
5. Well Instrumentation
6. Scheme Performance
1. Background
Project Overview

Approved Development Area as per ERCB Scheme Approval No. 11522E

Well Pair 1
13-25-076-18W4

Well Pair 2
10-36-076-18W4

CORED WELLS
BLACKPEARL OIL SANDS
LEASE HOLDINGS
Project Summary

- AER Scheme Approval No. 11522E
- Two(2) SAGD Pilot Well Pairs
- Portage area on Oil Sands Lease 7407060158
- Pilot site located in 02-36-076-18W4
- Target formation is the Lower Grand Rapids Unit 1 (L.GR1)
- Traditional SAGD recovery process
- BlackPearl is the 100% W.I. Owner
Blackrod Pilot Site
Blackrod Pilot Site (cont.)
Traditional SAGD Process

![Diagram of Traditional SAGD Process](image)
Project Milestones – 13-25 WP1

- **Oct 2010**  AER Scheme Approval No. 11522
- **Dec 2010**  Drill 13-25 WP1
- **May 2011**  Commission Pilot Facility
- **Jun 2011**  Commence Circulation Phase
- **Sep 2011**  Convert to SAGD Production Phase
- **Apr 2012**  Achieve commercial production monthly rate of 400 bbl/d
- **Oct 2014**  Produce 260,000 cumulative barrels
- **Q1 2015**  “Ultra-Temp” ESP surpasses 500 days of continuous run-time
Project Milestones – 10-36 WP2

- **Feb 2012** AER Approval No. 11522C for 10-36 WP2 and facility expansion
- **Feb 2013** Drill 10-36 WP2
- **Oct 2013** Commission Phase 2 Pilot Facility Expansion
- **Nov 2013** Commence Circulation Phase
- **Mar 2014** Convert to SAGD Production Phase
- **Oct 2014** Production ramp-up approaching commercial rate of 400 bbl/d
- **Q1 2015** Produce 125,000 cumulative barrels
2. Geology / Geoscience
Original Bitumen in Place

- \( \text{OBIP}_{WP1} = A_1 \times h_1 \times S_{o1} \times \Phi_1 \times Bo \)
  \[ = (100 \text{ m} \times 800 \text{ m}) \times 22 \text{ m} \times 0.63 \times 0.35 \times 1.0 \]
  \[ = 388,080 \text{ m}^3 \]

- \( \text{OBIP}_{WP2} = A_2 \times h_2 \times S_{o2} \times \Phi_2 \times Bo \)
  \[ = (100 \text{ m} \times 1050 \text{ m}) \times 25 \text{ m} \times 0.63 \times 0.34 \times 1.0 \]
  \[ = 562,275 \text{ m}^3 \]

Where:

- \( \text{OBIP} = \) Original Bitumen In Place
- \( A = \) Drainage Area
- \( h = \) Thickness
- \( S_{o} = \) Oil Saturation
- \( \Phi = \) Average Porosity
- \( Bo = \) Expansion Factor
- \( WP1 = 1^{\text{st}} \text{ Pilot Well Pair drilled at 13-25-076-18W4} \)
- \( WP2 = 2^{\text{nd}} \text{ Pilot Well Pair drilled at 10-36-076-18W4} \)
Net Pay Map

LOG CUTOFFS
- Gamma Ray < 75 API
- Resistivity > 20 Ohm.m
- Porosity > 33%

Total L.GR1 SAGD Net Oil Pay

- Existing lease and access selected for Pilot surface location
- Bottom hole locations for both Pilot Well Pairs selected based on offsetting well control
Type Log

LOG CUTOFFS
- Gamma Ray < 75 API
- Resistivity > 20 Ohm.m
- Porosity > 33%
**L.GR1 Core Characteristics:**

- Oil saturation: 0.60
- Bitumen weight: 11%
- Net pay thickness: 26 m
- Porosity: 36%
- Vertical permeability: 3024 mD
- Horizontal permeability: 3450 mD
- Kv/Kh: 0.88
- API Gravity: 9.8 (at 15.6 °C)

*Based on 10 cores within Pilot Project Area*
Cross Section Through 13-25 WP1

- 13-25 WP1 experimental well pair placed to substantiate SAGD recovery in the L.GR
Cross Section Through 10-36 WP2

- To maximize oil recoveries, 10-36 WP2 placed deeper and drilled longer than 13-25 WP1
Seismic

3D X-Line along 13-25 WP1

3D Seismic Area Coverage
Primary Cap Rock

- MFS (Maximum Flooding Shale)
- Directly overlays Lower Grand Rapids formation
- Regionally extensive
- 3 m average thickness
- Mini Frac Analysis:
  - Performed on the 13-25-076-18W4 OSE Core Hole
  - Initial Breakdown Pressure = 8500 kPa
  - Closure Pressure Gradient = 13.7 kPa/m
MFS Cap Rock Isopash Map
MFS Cap Rock Structure Map
MFS Cap Rock Base Depth Map

Legend:
- Background SAGD Pilot Project
- PILOT PROJECT STUDY AREA
- ORIGINAL SAGD PILOT WELL PAIR
- SECOND BLACKROD SAGD WELL PAIR
- BLACKPEARL OIL SANDS HOLDINGS
- DA & 6m
Secondary Cap Rock

- Joli Fou formation
- 45 m above Lower Grand Rapids formation
- Regionally extensive
- 20 m average thickness

Mini Frac Analysis:
- Performed on the 01-36-076-18W4 OSE Core Hole
- Initial Breakdown Pressure = 12,750 kPa
- Closure Pressure Gradient Range = 19.4 kPa/m
Joli Fou Cap Rock Isopash Map
Joli Fou Cap Rock Structure Map
3. Drilling and Completions
Blackrod Pilot Well Network
13-25 WP1 - Injector

Well Name: SRC 132-2WP1 1HP PORTAGE 13-25-76 56
LRT: 1607-25-76-56RNP

Surface: 8.4 m East Sec. 25
Ground: 614.5 m West Sec. 25
KB: 465.60 m
GL: 515.60 m

Surface Hole:
- Surface Casing: 668.9 mm
- Liner: 118.0 mm
- Cemented to surface with Thermal cement

Intermediate Hole:
- Intermediate Casing: 211.0 mm
- Intermediate Liner: 244.5 mm
- Cemented to surface with Thermal cement

Long Hole:
- Size: 63.5 mm
- Landing @ 1571.1 m KGI

Short String:
- Size: 54.3 mm
- Landing @ 432.8 m KGI

Shoe String:
- Size: 121.2 mm
- Size 167.8 mm

Drill Stem:
- Size: 127 mm
- Bore Size: 103.9 mm
- Landing @ 1032 m KGI

Lateral Hole:
- Size: 222.3 mm
- Aligned Liner: 65.0 mm
- Landing @ 1136.0 m Aligned Liner @ 436.9 mm

TD: 2116.8 m KGI / 1150.6 m MD

BlackPearl Resources Inc.
13-25 WP1 – Producer (Prod. Phase)
13-25 WP1 – Downhole Modifications

• Injector Well:
  – No modifications

• Producer Well:
  – No modifications
10-36 WP2 – Producer (Prod. Phase)
10-36 WP2 – Downhole Modifications

• Injector Well:
  – Open Steam Splitters in Mar 2014 as part of SAGD Production Phase conversion
  – Close Steam Splitters in May 2014 to accelerate thermal development at the toe

• Producer Well:
  – Install “Ultra Temp” ESP and scab liner c/w production port in Mar 2014 as part of SAGD Production Phase conversion
Blackrod Subsurface

4. Artificial Lift
Electrical Submersible Pump

• Fluid production via “Ultra Temp” Electrical Submersible Pumps (ESP) on both 13-25 WP1 and 10-36 WP2

• ESP advantages:
  – Operate and lift fluids at controlled downhole pressures
  – Maintain continuous fluid production

• Variable Flow Drive (VFD) utilized to control pump speed and production rates

• Current ESPs meeting expectations
5. Well Instrumentation
13-25 WP1 – Instrumentation Overview

[Diagram showing various layers and wells with labels such as VIKING / JOLI FOU / UPPER GRAND RAPIDS, CAPPING SHALE, LOWER GRAND RAPIDS UNIT 1, LOWER GRAND RAPID UNITS 2, LOWER GRAND RAPID UNITS 3, CLEARWATER, and GROSMONT. The diagram includes symbols for RTDs, Thermo-couples, P/T Gauge, and bubble tubes, indicating the placement and connectivity of instruments.]
13-25 WP1 – Obs Wells

• Toe Obs Well:
  – 103/13-25-076-18W4
  – 8.5 m North of WP1
  – RTD gauges to monitor temperature above, below, and within L.GR1
  – RTD temperature profile indicating maturing steam chamber

• Heel Obs Well:
  – 102/14-25-076-18W4
  – 17.7 m South WP1
  – RTD gauges to monitor temperature above, below, and within L.GR1
  – RTD temperature profile indicating maturing steam chamber
  – P/T gauge to monitor pressure & temperature within L.GR3 aquifer
10-36 WP2 – Instrumentation Overview
10-36 WP2 – Obs Wells

• Toe Obs Well:
  – 100/07-36-076-18W4
  – 17.5 m West of WP2
  – Thermocouples to monitor temperature above, below, and within L.GR1
  – Thermocouple profile indicating early stages of steam chamber development
  – P/T gauge to monitor pressure & temperature within L.GR3 aquifer

• Heel Obs Well:
  – 100/02-36-076-18W4
  – 16.1 m East of WP2
  – Thermocouples to monitor temperature above, below, and within L.GR1
  – Thermocouple profile indicating early stages of steam chamber development
  – P/T gauge to monitor pressure & temperature within L.GR3 aquifer
Groundwater Monitoring Wells

- **100/03-36-076-18W4 GWM:**
  - Directionally drilled from 14-25 lease
  - PCP to sample/analyze non-saline L.GR3 H₂O
  - P/T gauge to monitor pressure & temperature within L.GR3 aquifer

- **100/14-25-076-18W4 GWM:**
  - Directionally drilled from 14-25 lease
  - PCP to sample/analyze non-saline L.GR3 H₂O
  - P/T gauge to monitor pressure & temperature within L.GR3 aquifer

- **100/15-25-076-18W4 GWM:**
  - PCP to sample/analyze non-saline Viking H₂O
  - P/T gauge to monitor pressure & temperature within Viking aquifer

*Annual Groundwater Monitoring Summary Report Submitted to the AER on Mar 31, 2014*
6. Scheme Performance
13-25 WP1 Performance as of Oct 31, 2014

- Three (3) years of SAGD Production Phase
- Maturing steam chamber / flat-lined oil production
- Current performance in line with internal simulated SAGD models
- Oil production currently averaging 26 m³/d
13-25 WP1 Oil Production as of Oct 31, 2014

- Cumulative Production = 41,500 m³
- Recovery to Date = 10.7%
- Ultimate Recovery = 20 - 25% (lower due to 13-25 WP1 well placement)
- CSOR including Circ. Phase = 5.0
- CSOR during Prod. Phase only = 4.7
- Average Rate during Prod. Phase = 36 m³/day
- Max Rate during Prod. Phase = 96 m³/day
13-25 WP1 Steam Injection as of Oct 31, 2014

• Average Steam Chamber Pressure = 2505 kPa

• Average Surface Steam Temperature = 240 °C

• Wellhead Steam Quality = 95 – 100%
13-25 WP1 Performance Plot
10-36 WP2 Performance as of Oct 31, 2014

- 8 months of SAGD Production Phase
- Early stages of steam chamber development
- Preliminary results are favourable and in line with internal simulated SAGD models
- Oil production currently averaging 60 m³/d and continuing to ramp-up
10-36 WP2 Oil Production as of Oct 31, 2014

- Cumulative Production = 9700 m³
- Recovery = 1.7%
- Ultimate Recovery = 55 - 60%
- CSOR including Circ. Phase = 5.6
- CSOR during Prod. Phase only = 3.4
- Average Rate during Prod. Phase = 40 m³/day
- Current Ramp-up Rate = 60 m³/day (and climbing)
13-25 WP1 Steam Injection as of Oct 31, 2014

- Average Steam Chamber Pressure = 2355 kPa
- Average Surface Steam Temperature = 240 °C
- Wellhead Steam Quality = 95 – 100%
10-36 WP2 Performance Plot

![Graph Showing Performance Plot for Blackrod 10-36 WP2](image)
Blackrod Surface Operations
Surface Operations Agenda

1. Facilities
2. Measurement & Reporting
3. Water Source
4. Disposal
5. Environmental
6. Compliance Statement
1. Facilities
Pilot Facility Overview
Pilot Facility Performance

- No issues with bitumen treatment, water treatment, or steam generation
- Pilot Facility downtime associated with scheduled shut-downs as well as the odd critical valve failure
- Generated steam, produced bitumen, produced water, and produced gas volumes reported to Petrinex
- Purchased gas volumes reported to Petrinex
- Flared gas volumes reported to AER and Petrinex
- $\text{SO}_2$ & $\text{No}_x$ emissions and ambient air quality data submitted to AER both monthly and annually as per terms of EPEA Approval 00264736-00-00
- GHG emissions reporting not required for Blackrod Pilot Facility as per terms of EPEA Approval 00264736-00-00
Pilot Facility Modifications

• No facility modifications in 2014
2. Measurement & Reporting
Blackrod MARP

• BlackPearl remains compliant with AER Directive 017 as well as Directive 042 as per the terms of our approved MARP (Measurement, Accounting, and Reporting Plan)

• To validate compliance with Directive 017 and Directive 042, BlackPearl performs a detailed EPAP (Enhanced Production Audit Program) review annually as per Directive 076 with an independent consulting group

• Annual MARP update to be submitted on Feb 28, 2015
Process Flow Diagram
Process Flow Diagram (cont.)
Individual Well Testing

• The Blackrod Pilot Facility became a Crude Bitumen Multiwell Proration Battery in Nov-2013 when 10-36 WP2 was brought on-line

• Production volumes from both pilot well pairs are determined using the test-to-test method as per the terms of our approved MARP:
  
  – Both the 13-25 and 10-36 Producer wells are tested individually through the flash separator for 36 hours cumulative every month

  – Bitumen and water production rates are measured through a mass flow (coriolis) meter downstream the flash separator with BS&W cuts determined through a proportional fluid sampler

  – Total battery gas production is measured through the flare gas meter and is prorated to the 13-25 and 10-36 Producer wells based on the production volumes determined using the test-to-test method
Proration Factors

Blackrod Prorations

- Bitumen
- Water
- Gas
Blackrod Surface Operations

3. Water Source
Blackrod Water Source(s)

• 1F1/14-24-076-18W4 L.GR3 WSW:
  – Non-saline (~3700 TDS)
  – AER Water Act Licence No. 00308617-01-00 valid until Jun 2019
  – Approved for 109,500 m³ annually
  – Production volumes reported to AER and Petrinex
  – 100/14-24-076-18W4 monitoring well 20 m North of 1F1/14-24 WSW
  – No issues with water treatment process

• 1F1/15-25-076-18W4 Grosmont Member D WSW
  – Saline (~12,800 TDS)
  – No issues with saline water softening process
4. Disposal
Blackrod Disposal

• Produced Water:
  – 100/02-25-076-18W4 Class 1b Disposal Well
  – AER Scheme Approval No. 11703A
  – Disposal into Grosmont Members B, A
  – Maximum wellhead injection pressure of 6300 kPa
  – This well continues to operate on vacuum with no pressure at the wellhead
  – Disposal volumes reported to Petrinex

• Waste:
  – Waste fluids (i.e. sewage, sludge, etc.) trucked out to third party disposal facilities
Blackrod Disposal

100/02-25-076-18W4 Disposal Well

- 1836 WP2 brought on line

* 02-25 Disposal Well continues to operate on vacuum

02-25 Monthly Disposal Rate
5. Environmental Issues
Blackrod Environmental

• No environmental issues to date

• BlackPearl remains compliant with the terms of AER Approval No. 264736-00-00:
  – CPP (Caribou Protection Plan)
  – Air Monitoring
  – Groundwater Monitoring
  – Soil Monitoring
  – Etc.
6. Compliance
• To the best of BlackPearl’s knowledge, the Blackrod SAGD Pilot Project is currently in full compliance with all conditions and regulatory requirements related to AER Scheme Approval No. 11522E
Blackrod Future Plans
1. Ongoing Pilot Objectives
Ongoing Pilot Objectives

• Continue to ramp-up and optimize 10-36 WP2

• Plan and apply for a 3rd Pilot Well Pair incorporating flow control devices and a longer horizontal profile

• Plan and apply for NCG co-injection
2. SAGD Commercial Development
SAGD Commercial Development

- 80,000 bbl/d (12,720 m³/d) to be developed in phases, with the first phase planned for 20,000 bbl/d; two additional phases of 30,000 bbl/d each to follow
- Commercial SAGD Application No. 1728831 submitted in Q2 2012 currently under AER review
- BlackPearl is awaiting AER approval
Appendices
Appendices

1. Pressure & Temperature Data
   - 13-25 WP1
   - 10-36 WP2
   - Heel & Toe Observation Wells