Performance Presentation
Poplar Creek ET-DSP™ Field Test
Location 09-13-090-10W4
Experimental Scheme Approval No. 10457H
03 June 2014
E-T Energy Management Team

- Bruce McGee
  - CEO

- Peter Johanson
  - CFO
Presentation Outline

1. Subsurface Operations (as per D054: 15 October 2007)
   1.1 Scheme Background & Bitumen Recovery Process
   1.2 Geology
   1.3 Drilling and Completions
   1.4 Artificial Lift
   1.5 Instrumentation in Wells
   1.6 4D Seismic – not applicable
   1.7 Scheme Performance
   1.8 Future Plans

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2. Surface Operations (as per draft directive provided by ERCB)
   2.1 Facilities
   2.2 Facility Performance
   2.3 Measurement and Reporting
   2.4 Water Production, Injection and Recycle
   2.5 Sulphur Production
   2.6 Environmental Issues
   2.7 Compliance with Regulatory Requirements
   2.8 Noncompliance Discussion
   2.9 Future Plans
Presentation Outline

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   3.2 Step 3 – Production Well Subsurface Drawings
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   3.4 Step 3 – Observation Well Subsurface Drawings
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   3.6 Step 3 – Production Accounting Formulas
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   3.14 Step 3 – Propane and Power Use
1.0 Subsurface Operations
1.1 Scheme Background

- Received initial EUB approval 30 January 2006, #10457A, as an experimental scheme
- Confidential status in effect from 30 January 2006 to 31 January 2011
- Most recent approval for experimental scheme amendment dated 19 March 2013, #10457H (expires 31 Jan 2017)
- Finished construction, started heating and production for Step 3 Poplar Creek Field Test during the 2012 calendar year
1.1 Scheme Background: Location

- Located 4km north of Fort McMurray on the west side of Highway 63
- 09-13-090-10-W4M
1.1 Scheme Background:
Existing Development: Jan 2013
1.1 Scheme Background:

Development: Dec 2013

Removed in Oct 2013:
- Well Field Tank Farm
- Battery
- Glycol Heater
- Site Office Trailer
- Storage Tents
1.1 Bitumen Recovery Process: ET-DSP™

[Diagram of the Bitumen Recovery Process]

- Power Delivery System (PDS)
- Dilbit Sales
- Recycled Water
- Extraction Well (X-Well)
- Bitumen Pay (30 metres)
- Water Injection Ports
- Current Flow
- Electrode Wells (E-Well)
- Electricity & Water
- Electrodes
- Downhole Pump

Depth To Top Of Pay (6-250 metres)

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1.1 Bitumen Recovery Process: ET-DSP™

Method of Heating the Formation

- Each equilateral triangle defines an element
- Two elements create a diamond shape
- Extraction well located at intersection of bisecting lines
## 1.2a Geology: Original Bitumen-in-Place

<table>
<thead>
<tr>
<th></th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 3 Revised</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electrode Wells</strong></td>
<td>3.5</td>
<td>3.5</td>
<td>23</td>
<td>23</td>
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<tr>
<td><strong>Well Spacing (m)</strong></td>
<td>12</td>
<td>16</td>
<td>16</td>
<td>16</td>
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<tr>
<td><strong>OBIP (rm³)</strong></td>
<td>1,048</td>
<td>1,862</td>
<td>24,360</td>
<td>18,422</td>
</tr>
<tr>
<td><strong>OBIP (rBbl)</strong></td>
<td>6,589</td>
<td>11,714</td>
<td>153,217</td>
<td>115,874</td>
</tr>
</tbody>
</table>

Step 3 OBIP estimation based off 36 m of heated pay. Step 3 Revised OBIP estimation based on 27 m of pay. The revision was to account for the stranded resource above the water sand.
1.2b Geology: Reservoir Properties

- Calculation Methodology: Volumetric based on core samples

- Revised Average Reservoir Properties:
  - Average Porosity: 34%
  - Average Bitumen Saturation: 62%
  - Pay Thickness: 27 m
  - Production Area: 3,215 m²

Original estimate for Step 3 OBIP based on 36 m of heated pay. Revised Step 3 OBIP based on 27 m of pay. The revision was to account for the stranded resource above the water sand.
1.2e Geology: Type Log
1.2f Geology: Core Analysis

Based on Dean Stark tests from all 6 observation wells>>

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1.2f Geology: Core Analysis

Average Porosity vs. Depth

- Porosity vs. Depth chart with two lines:
  - Original $\theta$
  - Adjusted $\theta$

Average Permeability vs. Depth

- Permeability vs. Depth chart

Based on Dean Stark tests from all 6 observation wells

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1.2k Geology: Heave Monuments

- Heave monuments were installed to measure potential surface heave.
- 3 monuments located within the well field (designated as HM01, HM02, and HM03)
- 2 monuments located outside heated areas.
1.2k Geology: Heave Monuments

- Elevation differences of monuments **inside** heated area:
  - HM01: +1.47cm
  - HM02: +1.55cm
  - HM03: +1.55cm

- Elevation differences of monuments **outside** heated area:
  - HM04: +0.06cm
  - HM05: -0.20cm
1.2m Geology: Fracture Testing

- Diagnostic fracture injection tests completed on 3 production wells in March 2012.
- Tests conducted on production wells S3-X14, S3-X03, and S3-X02.
- Calculated fracture gradients ranged from 13.6 kPa/m to 17.2 kPa/m.
- Fracture gradients used to limit electrode-water injection pressures.
1.3 Drilling and Completions: Step 3

2013: No new wells

2011 Drilling:
- 23 Electrode Wells
- 14 Production Wells
- 6 Observation Wells

Notes:
1. Well schematics provided in Appendix
2. Cross-reference between well name, e.g., S3-E02, to well license number and UWI provided in Appendix.
1.4 Artificial Lift

Progressive cavity pumps used for artificial lift.

- KUDU 13K1300PCP.
- Pumps have operated continuously for Step 3 without any reliability issues
- Production Pump Capability
  - Up to 13 m³/day
  - 50°C to 120°C
  - Line pressure average = 300kPa, up to 1,000 kPa.
- Pumps remain downhole in wells
1.5 Instrumentation in Wells:

- **Electrode Wells**
  - All 23 Wells have temperature sensors, digiTCs™, from 45m to TD

- **Production Wells**
  - Temperature sensors, digiTCs™, from 45m to 87m bgs

- **Observation Wells**
  - Temperature sensors, digiTAMs™, from 45m to 87m bgs.
  - OB01 and OB05 have five piezometers
  - OB02, OB03, OB04, and OB06 have two piezometers
  - Instrumentation remains in wells
1.7a Scheme Performance: Design Basis

- **Electrode Wells**
  - Improved electrode lead connection
  - Incorporated improvements from Step 1&2
    - Key to electrode power is reliable water injection
    - Electrode lead connection design improvements
    - Observation well design and instrumentation

- **Production Wells**
  - Glycol tubing run along production tubing to keep bitumen mobile

- **Observation Wells**
  - Four wells with 2 piezometers
  - Two wells with 5 piezometers
  - All wells have a temperature sensor (digiTC or digiTAM) installed
1.7a Scheme Performance: Challenges

Several challenges were overcome during this Step:

• Addressed concerns regarding construction in proximity to live electrodes
• Successfully commissioned and operated production facilities
• Produced bitumen despite permeable water zone in target formation
• Managed to control heating lost to permeable water zone
• Advanced understanding of reservoir mechanisms
• Electrode reliability issues encountered, currently under investigation
1.7a Scheme Performance: Discussion

• Operational durations based on previous numerical simulation
• Predicted and actual operational phases and durations shown below.
  • Heat-up phase:
    • Predicted: 90 days
    • Actual: 115 days
  • Heat and production phase:
    • Predicted: 180 days
    • Actual: 311 days
  • Production only phase:
    • Predicted: 90 days
    • Actual: 41
      • Actual production stopped early due to funding limitations
1.7a Scheme Performance: Discussion

- Reasons for difference between predicted and actual schedule:
  - Heating was slower than predicted
    - Influence of water zone
    - Lower power per electrode than designed
  - Electrode reliability issues
    - Resulted in lower energy input rate
1.7a Scheme Performance: Discussion

• Production Summary:
  • Predicted field production:
    • 2.5 m$^3$/day/well (35 m$^3$/day/well field)
  • Actual field production:
    • 0.9 to 4.0 m$^3$/day/well field
  • Production occurred from June 2012 to May 2013

• Reason for deviation from target rates
  • Influence of water zone
  • Electrode reliability issues prevented reaching design temperatures
  • Started production before reaching design temperatures
1.7b Scheme Performance: Temperature at OB06, Jun 2013

Water Zone

> 90 °C
1.7b Scheme Performance: Temperature at OB04

Temperature at OB04 > 50 °C

Water Zone
1.7b Scheme Performance: Energy Input

- Decision to not heat upper zone - Upper Electrodes shut off (July 4, 2012)
- Return to full time operation (June 22, 2012)
- Majority of Electrodes Turned Off (January 2, 2013)
- Majority of Electrodes Turned back on (February 12, 2013)
- Power to all Electrodes stopped (March 31, 2013)
1.7b Scheme Performance: Reservoir Balance

Monthly Reservoir Balance

- Fluid Production
- Water Injection
- Bitumen Production

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1.7c Scheme Performance:

Well Recoveries from June 2012 to May 2013

<table>
<thead>
<tr>
<th>Well Name</th>
<th>Total Water Production [m3]</th>
<th>Total Bitumen Production [m3]</th>
<th>OBIP Recovered [%]</th>
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</thead>
<tbody>
<tr>
<td>S3-X00</td>
<td>363</td>
<td>35.0</td>
<td>2.7</td>
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<td>S3-X01</td>
<td>938</td>
<td>52.4</td>
<td>4.0</td>
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<td>S3-X02</td>
<td>165</td>
<td>38.7</td>
<td>2.9</td>
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<td>S3-X03</td>
<td>1,230</td>
<td>118</td>
<td>9.0</td>
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<td>S3-X04</td>
<td>512</td>
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<td>1,138</td>
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<td>109</td>
<td>20.9</td>
<td>1.6</td>
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<td>S3-X14</td>
<td>152</td>
<td>81.1</td>
<td>6.2</td>
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<td>S3-X15</td>
<td>801</td>
<td>67.2</td>
<td>5.1</td>
</tr>
</tbody>
</table>

* Based on OBIP of 1,316m3 for each production-well
1.7d Scheme Performance: Reservoir Pressure

OB03 Pressure vs. Time

- Water injection with no production:
  Feb 2012 to Jul 2012
- Water injection with production:
  Jul 2012 to May 2013

Pressure, kPa

06-Feb-12 16-May-12 24-Aug-12 02-Dec-12 12-Mar-13 20-Jun-13 28-Sep-13

Water injection with no production:
Feb 2012 to Jul 2012

Water injection with production:
Jul 2012 to May 2013

82.24 m bgs 58.31 m bgs
1.7e Scheme Performance: Composition of Fluids

- **Make-up water:**
  - Trucked in municipal water
  - TDS of make up water approximate 500 mg/L
  - Injected during heat-up phase (Feb 2012 to Jul 2012)

- **Produced water:**
  - All produced water recycled through electrodes back to reservoir
  - TDS of produced water approximately 3,000 mg/L
  - Injected during all producing phases (Jul 2012 to May 2013)

- **Produced bitumen emulsion:**
  - Bitumen and entrained water
  - No sand
  - Entrained water separated from bitumen in CPF before sales
1.7e Scheme Performance: Chemical Injection Tests

Two chemicals were tested during Step 3:
- Terraflux™ from Oilflow Solutions
- SAW™ from Baker-Hughes

Oilflow Solutions – Terraflux™:
- Injected 4,600 litres into 2 electrodes from Nov 2012 – Feb 2013
- Behaviour of injected chemical: Surfactant
- Concentration of injected chemical: 10,000 ppm

Baker-Hughes – SAW™:
- Injected 1,446 litres into 4 electrodes from Dec 2012 – Mar 2013
- Behaviour of injected chemical: Reacted with acids in the formation to create surfactant
- Concentration of injected chemical: 2,000 ppm
**1.7f Key Learnings:**

- Electrode reliability key to effective reservoir heating
- Critical production aspects:
  - Significance of high water mobility ratio
  - Even vertical heat distribution within electrode well
- No significant sand production, even at high fluid production rates
- Able to effective control and minimize heat to water zone
- Chemical injection increased recovery but need to quantify how much
- Advanced understanding of reservoir drive mechanisms in a low-pressure environment
1.8 Future Subsurface Plans

• Seeking partner for continued experimental development in Northwest Well Field
• ERCB scheme approval, 10457H, received 19 Mar 2013
• Initial development planned for 250-500 bpd
• Development planned in 2014
2.0 Surface Operations
2.1a Facilities: Site Survey Plan, Jan 2013
2.1b Facilities: Plant Schematic

- Schematic shows process when equipment was onsite
- All tanks and process equipment (except piping) removed from site in Nov 2013

All red arrows are a return to the FWKO
A detailed PFD is provided in the Appendix of this presentation

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2.1c Facilities: Modifications for Step 3

- Plot plan modified in Nov 2013 to remove Bitumen Battery and Injection Battery
- Containment berm still exits at site

Two facilities on site: (Jan 2013)
- Bitumen Battery (12 Tanks)
  - Well field Tank Farm
    - 4 x 400 bbl weigh tanks
    - 1 x 100 bbls weigh tank
  - CPF
    - 2 x 750 bbl sales tanks
    - 1 x 1000 bbl skim tank
    - 1 x 750 bbl free water knockout
    - 1 x 750 bbl produced water tank
    - 1 x 750 bbl diluent tank
    - 1 set of bag filters

- Injection Battery at CPF (2 Tanks)
  - 2 x 1000 bbl water tanks
  - 2 sets of bag filters

PFDs are provided in the Appendix of this presentation
2.2 Facility Performance

- Overall the facility performance as expected and designed
- Future process improvements will include:
  - Obtaining accurate water-cut measurements
  - Reconciling production between individual test tank and the group tanks
  - Allocating production to specific wells (as opposed to groups of wells)
  - Measurement certainty as it relates to wellfield pipe fill and test tank
- Facility did **not** include a treater vessel designed to produce oil at >0.5% BS&W
  - Treated to >1% BS&W for approximately half the bitumen produced and sold

PFDs are provided in the Appendix of this presentation
2.2a Facility Performance: Bitumen Treatment

Efficiency of bitumen water separation better than design
Minimum BS&W of sales bitumen less than 1%
Maximum BS&W of sales bitumen 5-6%

All red arrows are a return to the FWKO
A detailed PFD is provided in the Appendix of this presentation
2.2b Facility Performance: Water Treatment

All red arrows are a return to the FWKO. A detailed PFD is provided in the Appendix of this presentation.
2.2b Facility Performance: Water Treatment

- Produced water was filtered three times before being re-injected
  - 1 set of filters before being transferred from bitumen battery to injection battery
  - 2 sets of filters between injection battery and electrodes.
  - Failsafe not treatment
- The produced water passes through the free water knockout, skim tank, and produced water tank before recycle to reservoir:
  - Residence time
  - Heat
  - Skimming operations
2.2d Facility Performance: Power Consumption

- Power consumption was imported electrical energy
- No power generation on site
- Table of power usage for 2013 included in Appendix
2.2e Facility Performance: Gas Usage and Venting

- Fuel gas usage is presented in Appendix
- No flaring on site
- Tanks headspaces are vented to atmosphere
- Casing gas is collected and metered before being vented to atmosphere
- Casing gas volumes are below meter recording levels and below reportable levels

Note: equipment no longer at site
2.2f Facility Performance: Greenhouse Gas Emissions

- Estimated CO\textsubscript{2} emissions in 2013
  - CO\textsubscript{2}: 199 tonnes
  - Based on 146 m\textsuperscript{3} propane (liquid) usage from Jan 2013 to Dec 2013
2.3a Measurement and Reporting: Estimation Methods

- E-T Energy worked with Manford James Group to update our existing MARP
- All reporting meters were calibrated and/or proved before production started
- Production estimates are generated from instrumentation in the wellfield and then prorated using a facility balance
- Production accounting formulas provided in Appendix
- Meter calibration records also provided in Appendix
## 2.3b Measurement and Reporting: Proration Factors

<table>
<thead>
<tr>
<th>Month</th>
<th>Injection Proration Factor</th>
<th>Produced Water Proration Factor</th>
<th>Produced Bitumen Proration Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 2013</td>
<td>0.914</td>
<td>1.001</td>
<td>1.151</td>
</tr>
<tr>
<td>February 2013</td>
<td>0.987</td>
<td>1.066</td>
<td>1.567</td>
</tr>
<tr>
<td>March 2013</td>
<td>1.082</td>
<td>0.949</td>
<td>1.149</td>
</tr>
<tr>
<td>April 2013</td>
<td>1.318</td>
<td>1.152</td>
<td>0.760</td>
</tr>
<tr>
<td>May 2013</td>
<td>0.946</td>
<td>1.271</td>
<td>1.417</td>
</tr>
</tbody>
</table>

Production stopped on 11 May 2013
2.3c Measurement and Reporting: Test Durations

Summary of well testing:
• Well operational period:
  • Start: 20 Jun 2012
  • Stop: 11 May 2013
• Conducted over 80 tests on 14 wells
• Average test duration 53 hours
2.3d Measurement and Reporting: Measurement Technology Tested

Three water-cut meters were compared:

- Sentech
- Phase Dynamics
- Red Eye (Weatherford)

- All meters were difficult to calibrate for bitumen
- All meters, especially the Red Eye meter, were inaccurate with low bitumen cuts
- Meter accuracy improved with higher bitumen cuts
- Accuracy achieved with taking sampling during tank emptying events was higher than accuracy from meters.
2.4 Fresh and Produced Water Use

- No make-up water was used in 2013.
- Make-up water used in 2012 was municipal water delivered to the site via water trucks.
- Source of the make-up water was the Municipality of Wood Buffalo.
- Make-up water and produced water (after treatment) were injected into the electrodes.
- Purpose of water injection was to cool the electrodes and to provide convective heat transfer.
### 2.4b-c-e Fresh and Produced Water Use

<table>
<thead>
<tr>
<th>Month</th>
<th>Fresh Water Use [m³]</th>
<th>Produced Water Use [m³]</th>
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<tbody>
<tr>
<td>January 2013</td>
<td>0</td>
<td>570</td>
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<tr>
<td>February 2013</td>
<td>0</td>
<td>515</td>
</tr>
<tr>
<td>March 2013</td>
<td>0</td>
<td>497</td>
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<tr>
<td>April 2013</td>
<td>0</td>
<td>487</td>
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<tr>
<td>May 2013</td>
<td>0</td>
<td>437</td>
</tr>
<tr>
<td>June 2013</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>July 2013</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>August 2013</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>September 2013</td>
<td>0</td>
<td>0</td>
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<tr>
<td>October 2013</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>November 2013</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>December 2013</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

- Produced water was 43 % of the total volume of water injected to electrodes (Jan 2012 to May 2013)
- All produced water was re-injected to electrode wells
2.5 Sulphur Production

- There is no sulphur recovery requirement as part of Alberta Environment (AER) approval
- No H$_2$S measured
- Any H$_2$S produced was below measureable levels
2.6 Environmental Issues

a) No compliance issues
b) No amendments to approvals
c) Ground Water monitoring did not detect any hydrocarbons in shallow monitoring wells
e) No reclamation activities during this reporting period
2.7 & 2.8 Noncompliance Discussion

- All operations and activities associated with Step 3 were in compliance with conditions of the approval and regulatory requirements.
- Past operations were found to be noncompliant with requirements:
  - 2 High-Risk Enforcement Actions, both dated 20 Feb 2013, for (1) improper well abandonment and (2) improper well heads and well completions.
  - Action plan agreed to by AER.
    - Corrective action for well heads completed Nov 2013
    - Corrective action for improperly abandoned wells and improperly completed wells (subsurface) to be accomplished by 30 Jun 2014.
2.10 Future Surface Plans

• Continue experimental development in nearby Northwest Well Field
• AER scheme approval, 10457H, for Northwest Well Field received 19 Mar 2013
• Initial development planned for 250-500 bpd
• Development planned in 2014
3.0 Appendix
### 3.1 Step 3 – Well Listing – Production and Observation Wells

<table>
<thead>
<tr>
<th>ERCB License</th>
<th>Project Well Name</th>
<th>UWI</th>
<th>Well Type</th>
<th>Total Depth, m</th>
</tr>
</thead>
<tbody>
<tr>
<td>0434224</td>
<td>S3-X00</td>
<td>148/09-13-090-10W4/0</td>
<td>Production</td>
<td>87.5</td>
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<tr>
<td>0431964</td>
<td>S3-X01</td>
<td>143/09-13-090-10W4/0</td>
<td>Production</td>
<td>87.5</td>
</tr>
<tr>
<td>0434225</td>
<td>S3-X02</td>
<td>149/09-13-090-10W4/0</td>
<td>Production</td>
<td>87.5</td>
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<td>S3-X03</td>
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<td>Production</td>
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<td>S3-X07</td>
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3.1 Step 3 – Well Listing – Electrode Wells

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3.2 Step 3 – Production Well Subsurface Drawings
3.2 Step 3 – Production Well Subsurface Drawings
3.3 Step 3 – Electrode Well Subsurface Drawings
3.4 Step 3 – Observation Well Subsurface Drawings

![Observation Well Subsurface Drawings]

**Material List**
- 381 mm Upper Hole Section
- 1,076 kg/m³ thermal-40 Cement to Surface
- 216.0 mm Circle to Surface
- 216.0 mm 35.1 kg/m³ H-40 Material
- CTAG and X Pin Connections 203.7 mm ID
- Lined Al-16 mHDPE

**Fiberglass Plugs**
- 58.9 mm Fiberglass Star Splies 2500 and 3000 Casing to Surface 88.9 mm OD x 74.6 mm ID
- EUE (cemented) with 60 mm OD X Pin Connections
- Lower Hole Section
- 156.75 mm Lower Hole Section
- Surface to 890.0 m RDB

**Wiper Plug**
- 89.9 mm Wiper Plug

**Gusher Tube**
- 8.35 mm X 333 mm Wall Welded Duplex 2205 line. Used To Apply Pressure To Expand Grease Plug & Serve As A Backup Bubble Tube

**NOTE:** There are 10 cables coming out of this hole, each piezometer has an instrumentation line and a capillary line.
3.4 Step 3 – Observation Well Subsurface Drawings

03 Jun 2014
3.5 Step 3 – Production Records
June 2012 to May 2013

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3.6 Production Accounting Formulas

• Produced Bitumen Formula:

\[
\text{Produced Bitumen} = \left(\frac{(O_s + DBI_c - DBI_o)}{SF}\right) - (D_i + D_{oi} - D_{ci})
\]

- **Produced Bitumen Formula**: 
  
  \[
  \frac{(O_s + DBI_c - DBI_o)}{SF} - (D_i + D_{oi} - D_{ci})
  \]

  - **Trucked out Oil Inventory**
  - **Closing Oil Inventory**
  - **Opening Oil Inventory**
  - **Blending Shrinkage Factor**
  - **FE9100 Diluent Receipts**
  - **Opening Inventory**
  - **Closing Inventory**

• Bitumen Proration Formula:

\[
PF = \frac{\text{Produced Bitumen}}{\text{Estimated Bitumen}}
\]

- **Where Estimated Bitumen is based on testing results**
3.6 Production Accounting Formulas

- **Produced Water Formula:**
  
  \[
  \text{Water to Injection} + \text{(Closing Water Inventory in tanks)} - \text{Opening water inventory in tanks)} - \text{FE9130} - \text{Water received with Diluent Receipts}
  \]

- **Water Proration Formula:**
  
  - FE-8900 indicates transfer between facilities and is used to ensure balance
  
  - Estimate Injection: \( \sum \text{Water injection meters FT-8000 : FT8025} \)
  
  - Total Injection: \( \text{Total water injected} = \text{FE-8100} \)
  
  - Proration Factor: \( \text{Total water injected/estimated wellhead injection} = \text{Water injection proration factor} \)
    
    \( \text{Actual water injected} = \text{injection water meter} \times \text{Water injection proration factor} \)
## 3.11 Step 3 – Electrode Injection Volume (m3)

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Jan 2012 to May 2013

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3.9 Step 3 – Observation Well Temperature Profiles

Temperature [°C]

S3-OB1

03 Jun 2014
3.9 Step 3 – Observation Well Temperature Profiles

Temperature [°C]

OB02

03 Jun 2014
3.9 Step 3 – Observation Well Temperature Profiles

![Graph showing temperature profiles for OB03 over the period from 3-Dec-11 to 25-Jul-13.](image)

- **Step**: Observation
- **Well**: OB03
- **Temperature**
- **ProQiles**

03 Jun 2014
3.9 Step 3 – Observation Well Temperature Profiles

![Graph showing temperature profiles over time for OB04 well.](image-url)
3.9 Step 3 – Observation Well Temperature Profiles

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<td>62.9</td>
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<td>4 Sep 13</td>
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<td>7 Sep 13</td>
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<td>10 Sep 13</td>
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<td>13 Sep 13</td>
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</table>

30 Jun 2014
3.9 Step 3 – Observation Well Temperature Profiles
3.9 Step 3 – Observation Wells Ave. Temperature

Observation DigiTAM Average Temperature (without OB-05)
3.11 Step 3 – Pressure Profiles

OB01 Pressure vs. Time

06-Feb-12 16-May-12 24-Aug-12 02-Dec-12 12-Mar-13 20-Jun-13 28-Sep-13

Pressure, KPaA

77.82 m bgs
72.47 m bgs
67.12 m bgs
57.89 m bgs

03 Jun 2014
3.11 Step 3 – Pressure Profiles

OB02 Pressure vs. Time

Pressure, KPAA

06-Feb-12 16-May-12 24-Aug-12 02-Dec-12 12-Mar-13 20-Jun-13 28-Sep-13

Pressure, kPa

0 100 200 300 400 500 600 700 800 900 1,000

77.33 m bgs

67.15 m bgs
3.11 Step 3 – Pressure Profiles

OB03 Pressure vs. Time

- Pressure, kPa
- Time:
  - 06-Feb-12
  - 16-May-12
  - 24-Aug-12
  - 02-Dec-12
  - 12-Mar-13
  - 20-Jun-13
  - 28-Sep-13

Pressure Levels:
- 82.24 m bgs
- 58.31 m bgs
3.11 Step 3 – Pressure Profiles

OB04 Pressure vs. Time

- Pressure, kPAA
- Time (08-Oct-12 to 23-Sep-13)

- Black line: 77.32 m bgs
- Red line: 67.16 m bgs

03 Jun 2014
3.11 Step 3 – Pressure Profiles

OB05 Pressure vs. Time

Pressure, KPA

83.2 m bgs
77.86 m bgs
72.51 m bgs
67.17 m bgs
57.97 m bgs

Date
11-Feb-12
21-May-12
29-Aug-12
07-Dec-12
17-Mar-13
25-Jun-13
03-Oct-13

03 Jun 2014
3.11 Step 3 – Pressure Profiles

OB06 Pressure vs. Time

Pressure, KPA

0 100 200 300 400 500 600 700 800 900 1,000

Time:

Legend:
- 77.72 m bgs
- 67.06 m bgs
3.12 Step 3 – PFD

Note: Battery removed from site Oct 2013
3.12 Step 3 – PFD

Note: Battery removed from site Oct 2013
3.12 Step 3 – PFD

Note: Battery removed from site Oct 2013
3.12 Step 3 – PFD

Note: Battery removed from site Oct 2013
3.12 Step 3 – PFD

Note: Battery removed from site Oct 2013
3.13 Step 3 – Meter Calibration Records

<table>
<thead>
<tr>
<th>Instrument Tag</th>
<th>Instrument Serial</th>
<th>MARP Req. Accuracy</th>
<th>Tested Meter Factor</th>
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</thead>
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<tr>
<td>FT-8000 (E-00)</td>
<td>FT-801030</td>
<td>+/- 2 %</td>
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<tr>
<td>FT-8001 (E-01)</td>
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<td>FT-8002 (E-02)</td>
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<td>FT-8003 (E-03)</td>
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<td>FT-8004 (E-04)</td>
<td>FT-801035</td>
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<td>FT-8005 (E-05)</td>
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<td>FT-8006 (E-06)</td>
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<td>FT-8017 (E-17)</td>
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<td>FT-8025 (E-25)</td>
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<td>FT-8029 (SPARE)</td>
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<td>FE-0130 (Casing Gas)</td>
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<td>FE-8900 (Produced Water)</td>
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<td>+/- 0.5 %</td>
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<td>FE-9130 (Storm Water)</td>
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<td>FE-9140 (Water Truck In)</td>
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<td>FE-8100 (Water Injection)</td>
<td>115925</td>
<td>+/- 0.65 %</td>
<td>20699</td>
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<tr>
<td>FE-8352 (Test Tank Flow)</td>
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<td>FE-9100 (Diluent Truck In)</td>
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<td>+/- 0.5 %</td>
<td>94463</td>
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## 3.14 Step 3 – Gas and Electricity Use

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<thead>
<tr>
<th>Month</th>
<th>Propane Used (L)</th>
<th>Electricity Used [MWhr]</th>
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<tr>
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<tr>
<td>March-2013</td>
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<td>382</td>
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<tr>
<td>April 2013</td>
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<tr>
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<td>74</td>
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<tr>
<td>December 2013</td>
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</tr>
</tbody>
</table>

**Notes:**
1. Jan and Feb usage averaged
2. August, Sep, Oct, Nov, and Dec propane usage averaged