2018 *Directive 054* Performance Presentation



Seal Scheme Approval No. 11320F September 2018



Agenda Subsurface

- 1. Overview
- 2. Geology / Geoscience
- 3. Drilling and Completions
- 4. Scheme Performance
- 5. Injection Pressures
- 6. Future Plans



Agenda Surface

- 1. Facilities
- 2. Measurement and Reporting
- 3. Water Usage
- 4. Gas / Sulphur Production
- 5. Regulatory



Subsurface





1. Overview Background



- Peace River Oil Sands Area 2
- Range 15 Townships 83 & 84
 - Seal Central
 - Enhanced Recovery Scheme Approval 11320F
- Polymer injection into horizontal wellbores to increase recovery of heavy oil from the Bluesky Formation
- Baytex acquired Seal Central assets including the polymer enhanced recovery scheme in January of 2017
 - Current presentation covers the time period of July 2017 to July 2018
- Polymer flooding is an established technology for EOR whereby fluid is injected into a formation to sweep oil to offset producing wells. Polymer flooding consists of dissolving polymer in the injected water to increase its viscosity and improve the sweep efficiency in the hydrocarbon reservoir



1. Overview History



- Seal Central development began ~2001 under primary production utilizing single-leg horizontal wellbores; primary production continues to account for the majority of the oil produced in the area
- Beginning late 2010, Murphy Oil Corp. (Murphy) initiated an experimental polymer injection pilot making use of existing and infill drilled wellbores
- Based on encouraging preliminary results from the pilot, the scheme was expanded to include Phases 1, 2, and 3 (approved, not implemented) in 2012
- An application to expand the scheme was approved in 2013; this expansion was not implemented by Murphy
- Baytex Energy Corp. (Baytex) acquired all heavy oil assets in the Peace River area from Murphy effective January 2017; included in the acquisition was the Enhanced Oil Recovery (EOR) polymer flood, Approval 11320
- Baytex applied to expand the scheme area and the amended scheme was approved in January 2018; Baytex has near-term plans to expand into areas adjacent to the Pilot



2. Geology / Geoscience

Type Log & Reservoir Parameters



- Bluesky sand deposition represents a prograding barrier bar complex within a greater estuarine-deltaic environment
 - Moderately sorted, Quartz rich litharenite of upper fine to lower medium grain size
 - Relatively low clay content <5%
 - Absence of fluid contacts (top/bottom gas or water) over project area
- Capped by Wilrich marine shales above and basal seal by fluvio-estuarine, heterolithic Gething deposits
- Total OOIP 32,712,000 m³
 - Includes 11320C expansion & Phase 3 (approved, not implemented)
- Operating OOIP 5,297,000 m³
 - Includes Pilot, Phase 1 and Phase 2 only
 - Volumetric methodology
 - Well Tops, 3D Seismic Data where available
 - Core Sampling Data (Dean Stark / Helium Porosity) / Petrophysical Analysis

Reservoir Parameters (Entire Scheme & Operating)

- Depth: 625m TVD
- Net Pay: 2 8m
 - Porosity: 22 30%
- Permeability_{Air}: 500 2,000mD
- Reservoir Temp: 19°C
- Water Saturation: 20%
- Oil Viscosity: 5,000 30,000cSt (Dead Oil)
- Initial Reservoir Pressure: 4,500 5,000kPa



2. Geology / Geoscience Structural Cross Section - South to North





2. Geology / Geoscience

Structure - Top Net Oil Pay (Bluesky Top)



- Top net oil is Bluesky top
 - No top gas or water over project area
- Higher regional structure to the northeast towards Red Earth Highlands (Bluesky onlap edge)
 - Average structural dip of 0.1°
- Locally structure is fault influenced with relative lows within Phase 3 and Phase 2N
 - Normal displacement, footwall to south
 - 5-9m TVD flexure across fault zone over 100-400m (~2.5-4.5°)
- 3D seismic produces erratic contours
 - High resolution data
 - Will be revisited once data is reprocessed, interpreted and integrated into Baytex dataset



2. Geology / Geoscience Structure - Base Net Oil Pay



- Base Bluesky bitumen pay is equivalent to top Gething
 - No bottom water over project area
- Gething comprises a mixture of non reservoir fluvio-deltaic and estuarine deposits
 - Shales, silts and generally areally discontinuous sands
 - Shale flooding surface at Bluesky base/Gething top provides basal seal over project area
- Average structural dip of 0.1°
- Consistent 5-9m flexure across fault zone with Bluesky top
 - Flexure due to faulting at lower stratigraphic levels
- 3D seismic produces erratic contours
 - High resolution data
 - Will be revisited once data is reprocessed, interpreted and integrated into Baytex dataset



2. Geology / Geoscience Net Oil Pay Isopach



- Net bitumen pay calculated from
 - VCL (~75-80 API Gamma Ray)
 - Phi_e >17%
 - Sw_e < 30%
- Net Pay ranges from ~2-10m thick in Polymer project area
 - Locally, generally thinning east to west
- Depth converted 3D seismic included in interpretation
- MWD Gamma Ray from horizontal drilling included in interpretation
- Operating OOIP 5,297,000 m³ (~33,300,000 bbl)



2. Geology / Geoscience Local Faulting



- Fault zones do not appear to cross the Bluesky level
 - Limited to deeper stratigraphic layers
 - Result is flexure at Bluesky level; 5-9m TVD flexure across fault zone over 100-400m (~2.5-4.5°)
- Fault is interpreted from structure mapping utilizing horizontal and vertical well control at this time with credence given to seismic interpretations from the previous operator
 - Reservoir continuity is demonstrated through horizontals across fault zone
 - Consistent Bluesky isopach across fault zone
 - Will be revisited once seismic data is reprocessed, interpreted and integrated into Baytex dataset
- Faulting does not affect operating strategy or well placement
 - Horizontal well paths follow reservoir through structural flexure
 - Where zone is 5m or less, no priority given to drilling target
 - >10m thickness, top 5m has been targeted 12



3. Drilling and Completions Typical Drilling Configuration



- Original primary inter-well spacing was 140 meters
- Open hole laterals re-entered to add slotted liners
- Infill wellbores drilled prior to injection
 - Resultant producer to injector spacing of 70m
 - Producer and injector planned to be drilled at the same elevation



3. Drilling and Completions Typical Completion Details





Operating History

- Historic primary wells were drilled on 140m spacing; these were converted to injectors under scheme approval
- Primary recovery levels prior to polymer injection range from 3 7%
- Infill wells at 70m spacing were drilled and brought online as production wells
- Polymer injection commenced October 2010 at Pilot, late 2012 for Phase 1 and Phase 2 expansions
- Operational phases have seen little in the way of downtime since inception; what downtime was experienced was mostly attributed to flowline issues at surface (Pilot, Phase 1, Phase 2 North)
- Only one of the Phase 1 injection wells is operating due to premature communication between 100/13-15 and offsetting producer 103/13-15
- Phase 2 South (04-10 Pad) has experienced premature communication between injectors and producers and is currently not operating
- Consistent with the previous operator, Baytex has continued to target an injection viscosity of 50cp, which is within the optimal range for the current producing phases
- Since assuming operations, Baytex has pursued an optimization strategy to ensure producers remain in a nearly pumped-off state while injection is targeted within 500 kPa of MAWHIP (4900 kPa-g); this has resulted in a significant increase in oil production, particularly at the Pilot
- Water production has increased due to both normal maturing operations, as well as efforts to pump off excess injected water that accumulated when production was not optimized



Resource Recovery

- Variability in recovery is driven by changes in oil viscosity and reservoir permeability across the schemes
- Well placement, i.e. minimum distances between injectors and producers, is critical to successful performance
- In Phase 1 and Phase 2, poor well placement has resulted in significantly lower recovery than what would otherwise be achievable



Resource Summary											
	Original Oil In Place (e ³ m ³)	Primary Recovery (e ³ m ³)	Primary Recovery %	Secondary Recovery (e ³ m ³)	Secondary Recovery %	Current Recovery %	Ultimate Recovery %				
Pilot	1,093	44.8	4.1%	125.9	11.5%	15.6%	25.0%				
Phase 1	588	39.4	6.7%	19.9	3.4%	10.1%	12.7%				
Phase 2	3,616	127.8	3.5%	52.8	1.5%	5.0%	6.0%				



4. Scheme Performance Pilot



- Pilot consists of 3 injectors and 4 producers on 70m spacing
- Injection commenced Q4 2010, production response observed Q3 2011
- Oil production increased significantly with resumption of high rate injection
- Water production is trending up as expected with a maturing polymer flood

	Original Oil	Primary	Primary	Secondary	Secondary	Current	Ultimate
	In Place	Recovery	Recovery	Recovery	Recovery	Recovery	Recovery
	(e ³ m ³)	(e ³ m ³)	%	(e ³ m ³)	%	%	%
Pilot	1,093	44.8	4.1%	125.9	11.5%	15.6%	25.0%

Phase 1



- Phase 1 consists of 2 injectors and 2 producers
- Injection commenced Q3 2012, production response observed Q4 2014
- Oil production continues to be stable despite shut-in of 100/13-15-083-15W5 injector
- Only half of the pattern receives injector support, which results in an ultimate recovery factor that is half of the Pilot

	Original Oil	Primary	Primary	Secondary	Secondary	Current	Ultimate
	In Place	Recovery	Recovery	Recovery	Recovery	Recovery	Recovery
	(e ³ m ³)	(e ³ m ³)	%	(e ³ m ³)	%	%	%
Phase 1	588	39.4	6.7%	19.9	3.4%	10.1%	12.7%



Phase 2



- Phase 2 consists of 9 injectors and 11 producers
- Injection commenced Q4 2012 at the 13-03 pad & Q2 2013 on the 04-10 pad
- 13-03 pad is driving Phase 2 production, 04-10 pad performance has been poor due to unfavourable well placement

	Original Oil	Primary	Primary	Secondary	Secondary	Current	Ultimate
	In Place	Recovery	Recovery	Recovery	Recovery	Recovery	Recovery
	(e ³ m ³)	(e ³ m ³)	%	(e ³ m ³)	%	%	%
Phase 2	3,616	127.8	3.5%	52.8	1.5%	5.0%	6.0%

Phase 2 North (13-03 Pad)



- · Phase 2 (North) consists of 4 injectors and 5 producers
- Injection commenced Q4 2012 at the 13-03 pad
- Oil production has remained consistent since ramp up in late 2016
- Higher water production has primarily resulted from the pump off of excess inventory of injected water at the eastern edge of the pattern, which accumulated when the 104/16-10-083-15W5 producer was shut in while injection continued

Phase 2 South (04-10 Pad)



- Phase 2 (South) consists of 5 injectors and 6 producers
- Injection commenced Q2 2013 at the 04-10 pad
- Wells experienced early communication from Phase 2 North injectors, likely due to the "cross-drilled" nature of the pads with insufficient heel to heel offset
- Poor well placement cannot be rectified with out major workovers, no timeline is proposed to resume injection into Phase 2 South
- 105/01-04 producer operates with limited support from Phase 2 North injector 100/15-10



Lessons Learned

- High rate injection near MAWHIP combined with maintaining producer wells in a nearly pumped-off state has been an effective operating strategy to increase production and recovery
- Water cut is increasing across operational phases, which is expected as the flood continues to mature. Prior efforts at reducing production in attempt to alleviate increasing water cut have been counter-productive to optimizing scheme performance
- Positive results from operating strategy has increased confidence to expand the polymer flood into adjacent reservoir



Pilot Injection Pressures and Rates



4. Scheme Performance

Phase 1 Injection Pressures and Rates



4. Scheme Performance

Phase 2 North Injection Pressures and Rates



4. Scheme Performance

Phase 2 South Injection Pressures and Rates



4. Injector Pressure Exceedance

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Pilot Injection Pressure Above MAWHIP



- From March to May 2018 there were repeated incidents where injection pressures exceeded MAWHIP
- High pressure limit controls had been set to shut down injection at 4900 kPa. As 4900 kPa was the approved MAWHIP this was not an appropriate strategy; on a number of occasions, immediately following the shut down period, wellhead pressures could exceed MAWHIP by approximately 50 60 kPa
- In order to mitigate this situation pressure control set points were lowered to 4700 kPa, Since mid-May
 injection pressures have not exceeded 4400 kPa at any of the injectors



5. Future Plans

- In 2017 Baytex applied for a scheme amendment to expand the scheme into the area adjacent to the Pilot and Phase 2 North patterns. Approval 11320F was received in January 2018
- Construction to expand the project into Section 15 East is expected to begin in Q1 2019
- Planning is currently underway for further expansion into Sections 22 and 27
- The Water Act License for the 1F1/14-10-083-15W5/0 source well expires in March 2019; a saline source water well will be drilled in Q1 2019 to replace required water volumes and supply expansion into Section 15 East. Fresh water usage will be discontinued at that time.





Surface





1. Facilities Facility Locations



- The polymer flood surface locations are located at:
 - Pilot: 14-10-083-15W5
 - Phase 1: 13-10-083-15W5
 - Phase 2 N: 13-03-083-15W5
 - Phase 2 S: 04-10-083-15W5
- Polymer Injection facilities are located at:
 - 14-10-083-15W5 (Pilot & Phase 1)
 - 13-03-083-15W5 (Phase 2)

ABIF	ABBT	ABCT	Description
0111879	0121572	N/A	14-10 Polymer Injection Facility
0129026	0129029	N/A	12 02 Polymor Injection Eacility
N/A	0129032	N/A	13-03 Folymer injection Facility
N/A	0094150	N/A	Flow line of 04-33 CPF
N/A	N/A	0133398	04-33 CPF
0080049	N/A	N/A	10-04 SWD
0088019	N/A	N/A	11-28 SWD
0107239	N/A	0133398	06-33 SWD

Central Processing Facility - 04-33-083-15W5 Plot Plan



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1. Facilities Pilot – 14-10-083-15W5 Plot Plan





Pilot – 14-10-083-15W5 Process Flow Diagram



1. Facilities Phase 1 – 14-10-083-15W5 Plot Plan



Phase 1 – 14-10-083-15W5 Process Flow Diagram



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1. Facilities Phase 1 – 13-10-083-15W5 Plot Plan





1. Facilities Phase 2 – 13-03-083-15W5 Plot Plan





1. Facilities Phase 2 – 04-10-083-15W5 Plot Plan





Phase 2 – Process Flow Diagram



Phase 2 – Process Flow Diagram (cont.)





Phase 2 – Process Flow Diagram (cont.)





2. Measurement and Reporting

Well Testing and Injection Rates

Well Tests

- Test tanks located at 14-10 (which also serves 13-10 pad), and 13-03 pads to determine production rates
- Composite fluid samples are collected via top cut samplers for manual BS&W measurement
- Production from the polymer flood is prorated against the inlet meter at the 04-33 Battery inlet
- There is a wide range of variability with respect to well productivity in the project, as such Baytex schedules its testing frequency and durations based on the requirements prescribed in Directive 17, Section 6.4.4, Table 6.1. There is no single testing frequency that is appropriate for all wells in the project.

Polymer Injection

- Polymer injection rates are measured via individual wellhead meters
- Produced polymer is contained in the aqueous phase and is not miscible with the oil phase



2. Measurement and Reporting

Production Accounting Proration

Production Date	Oil Proration Factor	Gas Proration Factor	Water Proration Factor
2017-08	0.53	1.42	1.40
2017-09	0.50	1.35	1.41
2017-10	0.62	1.41	1.62
2017-11	0.65	1.16	1.58
2017-12	0.56	1.10	1.54
2018-01	0.58	0.75	1.32
2018-02	0.53	0.68	1.28
2018-03	0.67	1.07	1.52
2018-04	0.57	0.98	1.45
2018-05	0.61	0.71	1.37
2018-06	0.60	0.83	1.52
2018-07	0.52	0.91	1.80



2. Measurement and Reporting

Actions to Improve Proration Factors

- On August 9, 2018 Baytex submitted a voluntary self disclosure (VSD) to the AER describing an ongoing non-compliance related to proration factors at the projects 04-33-082-15W5 battery (facility license F34313; AB BT 0094150).
- The VSD disclosed how proration factors at the facility have consistently exceeded the prescribed limits as defined in AER *Directive 017*, Section 3.14.
- The VSD proposed a plan to bring the proration factors back into compliance. The plan included the following actions:
 - Baytex recently modified well testing procedures to provide test tanks with several hours of "rest-time" after a test is complete in order to obtain more accurate tank level readings. The rest-time is intended to allow entrained gas to be liberated through the VRU system.
 - Baytex is proceeding with a trial whereby additional sample taps are being installed in a single test tank so that an oil/water interface can be estimated with improved accuracy. If the additional test taps are found to help, a plan will be implemented to install test taps on all proration pads that are flow lined into the 04-33 facility.
 - Baytex is proposing to extend the duration of well test events to improve the accuracy of test volumes and emulsion composition.
 - A modified test schedule is also being proposed for all proration pads which would be implemented, and evaluated for a period of 12 months to establish if the current facility design of one test tank can meet the standards of accuracy as defined by *Directive 017*.
 - Finally if the above actions do not bring the facility into compliance with *Directive 017*, within 12 months, additional equipment (tanks and/or meters) will be installed at each proration battery as required to restore compliance.



3. Water Usage

Paddy Cadotte Formation Source Water

- UWI: 1F1/14-10-083-15W5/0
 - Alberta Environment & Parks (AEP) Water Act approval 00289082-00-00 for the diversion of up to 164,250 m3 of water for injection
 - Expires 2019-03-05; source water volumes will be replaced with a saline source well to be drilled in Q4 2018
 - 3,750 ppm TDS
 - High iron concentrations were not detected
 - Volume of water diverted August 2017 July 2018 was 61,157 m³
- UWI: 1F1/15-03-083-15W5/0
 - No Water Act approval necessary with TDS testing >4,000 ppm
 - 5,383 ppm TDS
 - High iron concentrations were not detected
 - Not in use since 2013



3. Water Usage Notikewan Formation Source Water

- UWI: 1F1/4-10-083-15W5
 - Water Act approvals are not needed for Notikewan wells with TDS >4,000 ppm
 - 10,592 ppm TDS
 - High iron concentrations were not detected
 - Current supply for the Polymer facility at the 13-03 Pad
 - Volume of water diverted August 2017 July 2018 was 45,069 m³



3. Water Usage Source Water Well Locations





3. Water Usage 04-33 Water Volumes

04-33 Water Volumes, m ³	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18
Produced Water, Polymer Flood	2470.7	2511.0	1773.2	2139.0	3075.2	2396.3	2987.6	3986.6	4386.0	4051.7	3423.0	3859.5
Produced Water, Primary	4121.9	4772.2	5056.4	6527.2	4759.4	4820.3	4373.3	2975.2	1797.1	4042.0	4216.8	4854.9
Received Water	1201.5	1000.8	945.6	990.7	782.6	8272.1	8741.8	8241.0	1210.1	637.3	909.4	761.8
Fresh Water Injected	4567.0	3615.8	3374.9	4360.9	3438.8	3475.0	5244.0	5927.0	5526.0	4473.0	4408.0	5213.0
Saline Water Injected	3681.5	3414.9	2974.8	3748.1	3739.4	3183.7	2933.6	3624.7	3598.8	3724.2	3653.9	3456.3
Disposal Volumes, Battery	7794.3	8294.1	7740.4	9562.3	8642.8	1075.2	1045.1	1544.0	7502.2	8548.3	8571.2	9556.2

Source Water, m ³	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18
1F1/04-10-083-15W5	5162.0	4184.8	3813.9	4871.9	3909.8	4023.0	5881.0	7015.0	6511.0	4959.0	4951.0	5875.0
1F1/14-10-083-15W5	3864.0	3864.0	3142.0	4033.0	3923.0	3294.0	2883.0	4359.0	4079.0	3908.0	3950.0	3770.0



3. Water Usage Produced Water Volumes

- Produced volumes are prorated back to the producing wells by periodic well tests performed at each pad and the proration meter at the 04-33 battery
- As of July 2018, there has been a recorded 93,258 m³ of water produced during polymer flood operation at the respective phases. Volumes are considered from the beginning of polymer injection at each individual pattern
- Water volumes are calculated through sampling the BS&W during the well test
- Produced water is currently being injected into the disposal well at 102/06-33-082-15W5/0 that is connected to the 04-33 battery by a pipeline



3. Water Usage Disposal Wells





*MWHIP of 12,000 kPa not shown on plot

UWI	Approval Number	MWHIP kPa	Formation	Disposal Volume m³ (Aug 2017-Jul 2018)
102/06-33-082-15W5/0	11949	3,600	Debolt	158,936
100/10-04-083-14W5/3	11353C	12,300	Nisku	5,262
100/11-28-082-15W5/2, not active	11949	3,600	Debolt	



3. Water Usage

Injected Volumes

- Pilot 291,474 m³ injected
- Phase 1 80,033 m³ injected
- Phase 2 234,278 m³ injected
- Total 605,785 m³ injected
- Baytex measures bacteria levels as part of the field monitoring program for corrosion and fouling
- Currently employing a biocide batch treatment program to reduce levels of sulphur-reducing bacteria and acid producing bacteria

4. Gas / Sulphur Production

(e³m³)	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18
Produced Gas, Polymer Flood	108.5	171.0	108.5	135.0	127.1	96.1	89.6	130.2	144.0	127.1	114.0	133.3
Produced Gas, Primary	1261.5	1239.4	1077.8	1152.1	1427.4	1094.5	963.1	1215.6	958.8	986.5	1025.5	1226.1
Total Inlets	1370.0	1410.4	1186.3	1287.1	1554.5	1190.6	1052.7	1345.8	1102.8	1113.6	1139.5	1359.4
Total Inlets	1370.0	1410.4	1186.3	1287.1	1554.5	1190.6	1052.7	1345.8	1102.8	1113.6	1139.5	1359.4
Consumed (4-33 Fuel)	366.0	366.0	366.0	366.0	366.0	366.0	357.3	357.3	357.3	357.3	357.3	357.3
Consumed (4-33 Fuel in Primary + Polymer)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Consumed (Disp, AB CT 0133398)	294.5	330.8	266.1	361.8	361.7	386.7	264.0	247.2	364.3	244.5	259.2	357.6
Flared	113.6	24.7	30.2	18.1	43.8	33.2	17.2	82.5	11.3	25.6	39.8	4.1
Vent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delivered (Disp, AB GS 0095626)	595.9	688.9	524.0	541.2	783.0	404.7	414.2	658.8	369.9	486.2	483.2	640.4
Total Outlets	1370.0	1410.4	1186.3	1287.1	1554.5	1190.6	1052.7	1345.8	1102.8	1113.6	1139.5	1359.4

- Gas usage shown reflects values reported into Petrinex at the 04-33 Battery
- There are no flares on the polymer flood specific sites. Since the polymer flood operates above the bubble point, unlike the primary production that accounts for the majority of gas production volumes at 04-33 Battery, the contribution of polymer flood to total flare volumes ranges from 7-13% with an average of 10% over the reporting period
- There is no sulphur production at the polymer facilities
- All gas is sent to third party gas plant (Tidewater) via 04-33 for sales and processing

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5. Regulatory Compliance Statement

- Baytex inherited a long-standing measurement problem at the projects 04-33-082-15W5 battery which results in proration factors being out of compliance with respect to *Directive 017*.
- As described in the Measurement and Reporting Section a voluntary self disclosure describing the non-compliance and proposing a plan to resolve it was submitted on August 9th, 2018.
- There are no known environmental issues