



# 2015 Directive 54 Performance Presentation

**BAYTEX**  
ENERGY LTD.

Cliffdale Scheme Approval No. 11034L

September 23, 2015

# Agenda – Subsurface

1. Overview
2. Geology / Geoscience
3. Drilling and Completions
4. Artificial Lift
5. Instrumentation
6. Scheme Performance
7. Future Plans

# Agenda – Surface

1. Facilities
2. Measurement and Reporting
3. Water Source and Usage
4. Water and Waste Disposal and Landfill Waste
5. Sulphur Production
6. Environmental Issues
7. Compliance Statement
8. Future Plans

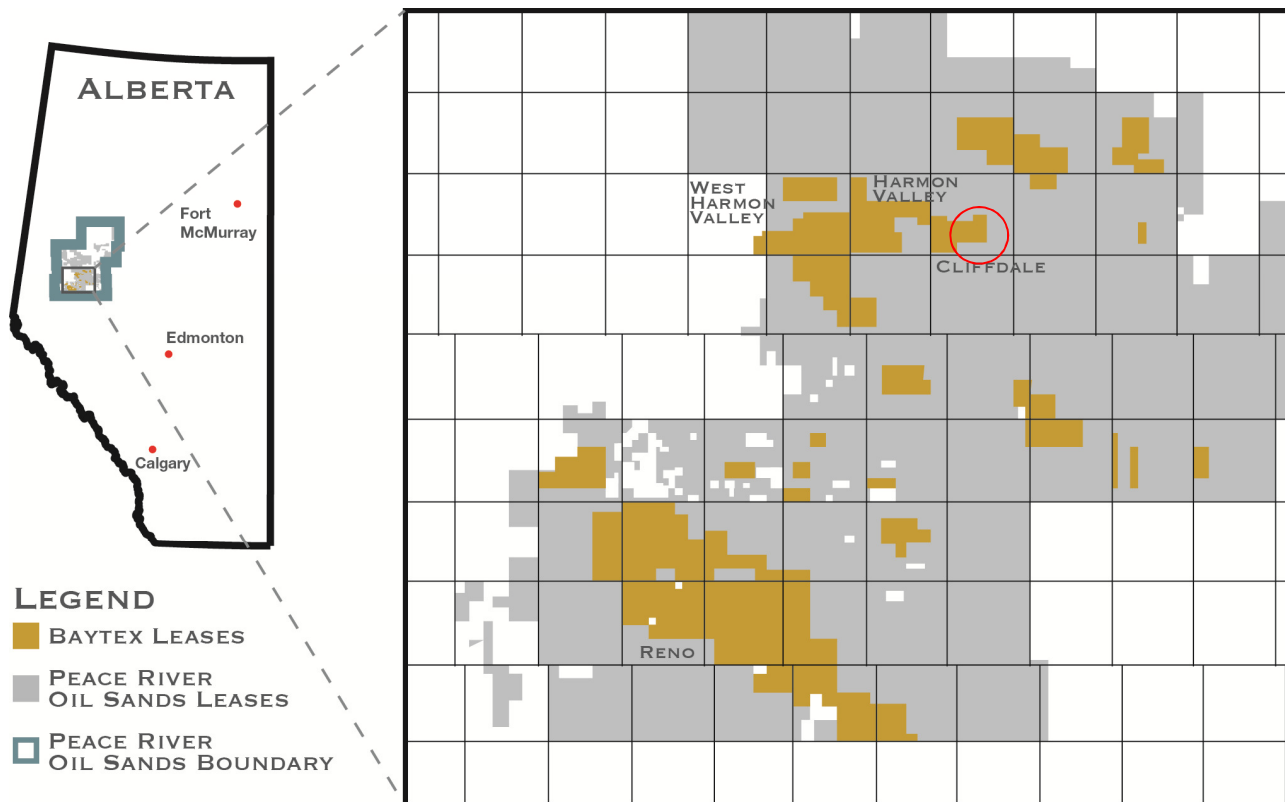


# Subsurface



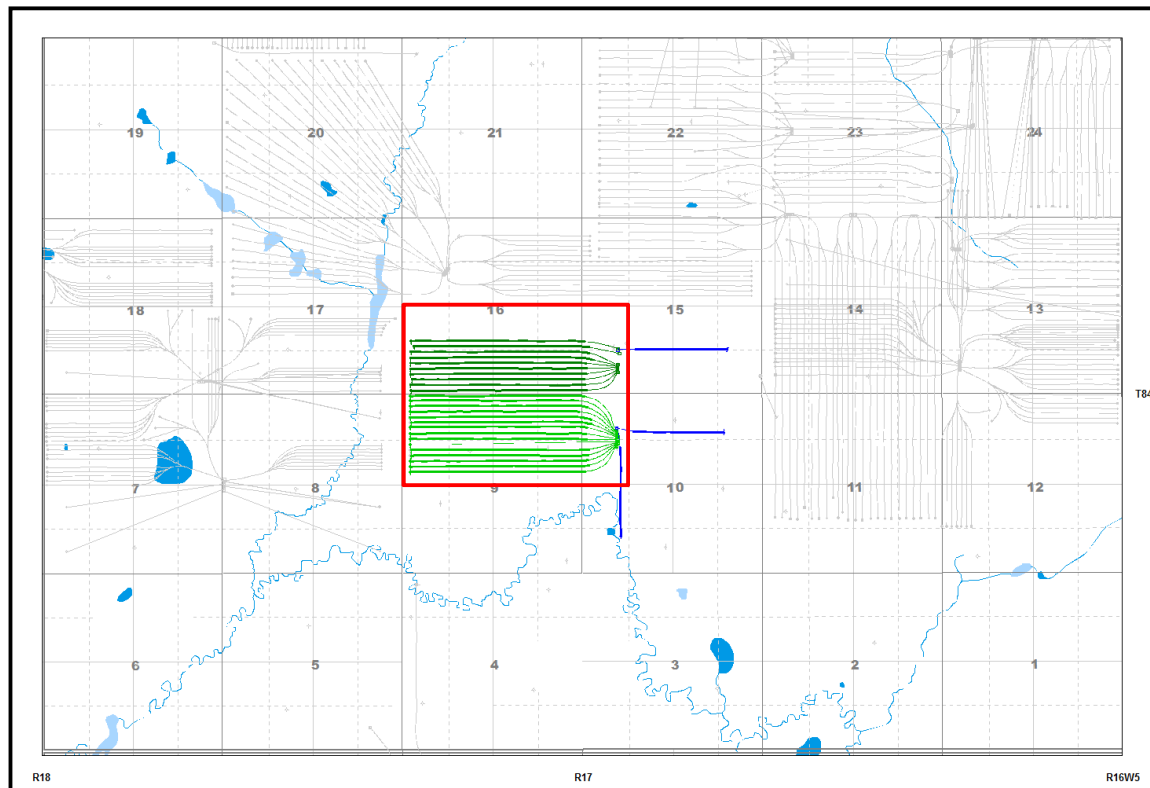
# Overview

- Northwest Alberta
  - Peace River Area
    - Cliffdale



# Overview

- Peace River Oil Sands
  - Township 84, Range 17W5
    - Bluesky Oilsands Formation



# Overview

- Horizontal well cyclic steam stimulation (CSS) is used to recover bitumen from the Bluesky formation in the Peace River oil sands
- In the CSS process, steam is injected into the oil sands formation to reduce bitumen viscosity
- Initially, each well is produced on primary (cold) production to create voidage for the first steam cycle
- Cliffdale CSS then starts with rapid, short-duration steam cycles to accelerate injectivity for subsequent cycles
- Maximum bottom-hole injection pressure is 10,800 kPag



## 2) Geology and Geoscience

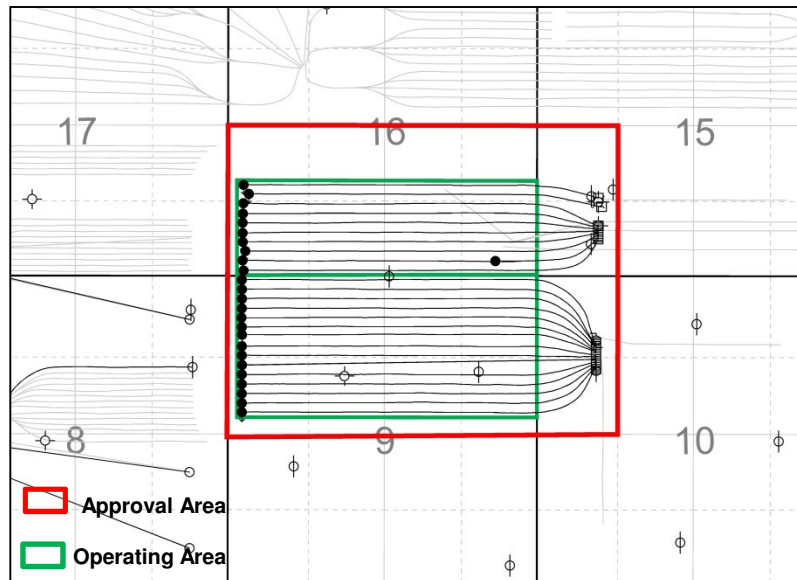
# Project Geology

ERA	PERIOD	EPOCH	STAGE	UNIT		
CENOZOIC	QUATERNARY	HOLOCENE		GLACIAL CHANNELS, GLACIAL DRIFT		
		PLEISTOCENE				
MESOZOIC	CRETACEOUS	LATE	CENOMANIAN	BASE FISH SCALES FM		
			EARLY	ALBIAN	FORT ST. JOHN GROUP	PEACE RIVER FORMATION
		CADOTTE MEMBER				
		HARMON MEMBER				
		NOTIKEWIN MEMBER				
		APTIAN		BULLHEAD GROUP	SPIRIT RIVER FORMATION	FALHER MEMBER
				WILRICH MEMBER		
				BLUESKY FORMATION		
				GETHING FORMATION		
		PALEOZOIC	MISSISSIPPIAN	EARLY CARBONIFEROUS	RUNDLE GROUP	DEBOLT FORMATION (Subcretaceous Unconformity)

- The principal zone of CSS production is the Lower Cretaceous Bluesky Formation
- Well logs in the project area and beyond were incorporated in the geological and reservoir analysis of the Bluesky Formation
- Well log signatures (typically gamma ray, resistivity, bulk density, compensated neutron, spontaneous potential, and photoelectric logs) were matched with cored wells and correlated with wells that lack core data
- The Bluesky ranges between 600 m and 642 m TVD and consists of up to 23 m of semi-consolidated sand in the project area

# Reservoir Properties / OBIP

	Area (ha)	Average Reservoir Depth (m)	Viscosity (cP)	Average Permeability - $k_H$ (mD)	Average Thickness (m)	Average Oil Saturation - $S_o$ (%)	Average Porosity - $\Phi$ (%)	OBIP (e <sup>3</sup> m <sup>3</sup> )
Approval Area	336	609.2 mTVD (+65.8 mSS)	4400 to 194,000	200 to 4600	21.7	72%	26%	13,649
Pad 1 (04-15)	76	607.7 mTVD (+65.8 mSS)	4400 to 194,000	200 to 4600	21.4	72%	26%	3,107
Pad 2 (13-10)	116	610.4 mTVD (+65.7 mSS)	4400 to 194,000	200 to 4600	22.1	72%	26%	4,815



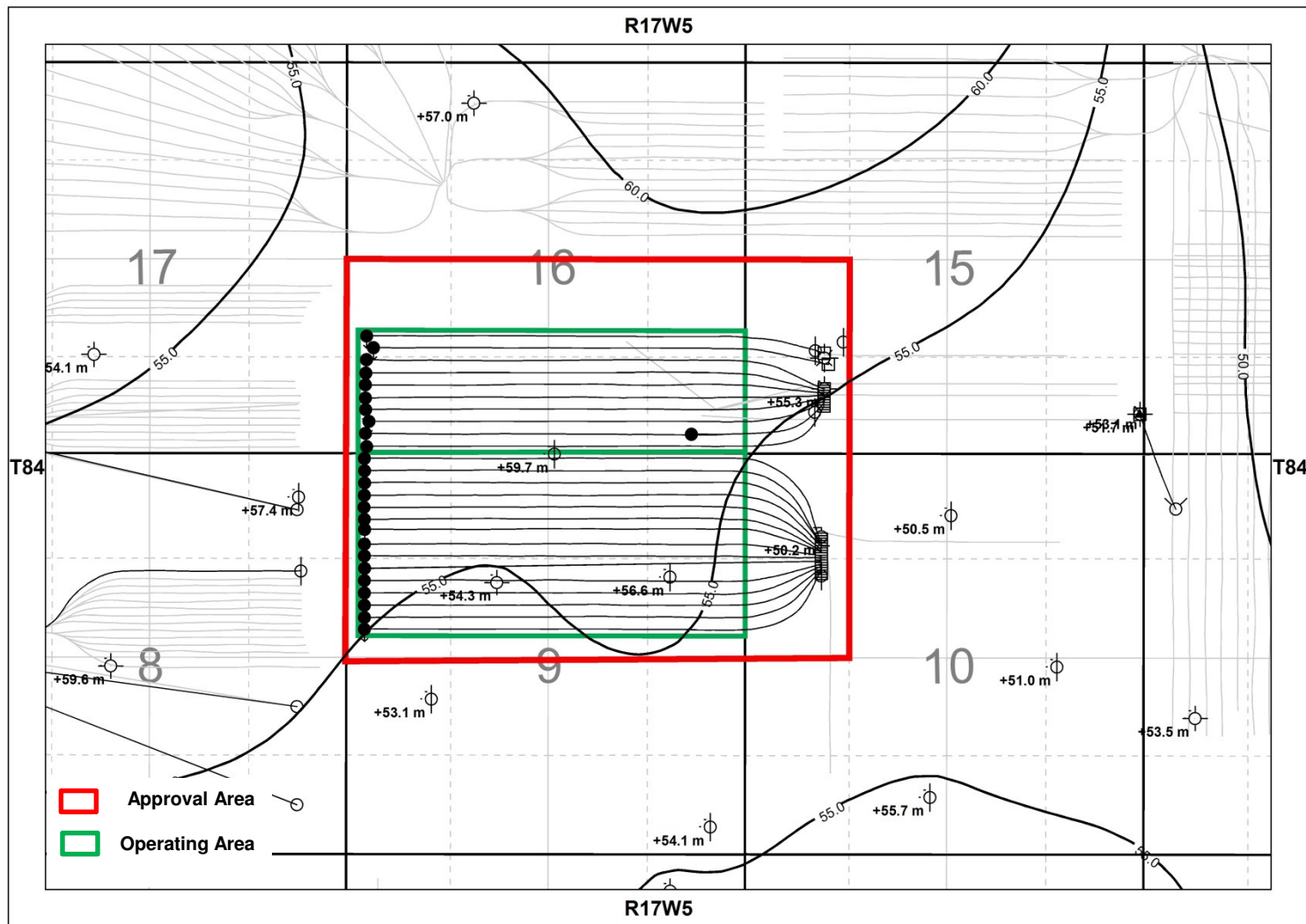
- $OBIP = Area \times Height \times S_o \times \Phi$
- Permeability increasing with depth of pay column
- $k_V / k_H \approx 0.6$
- Increasing oil viscosity with depth of pay column







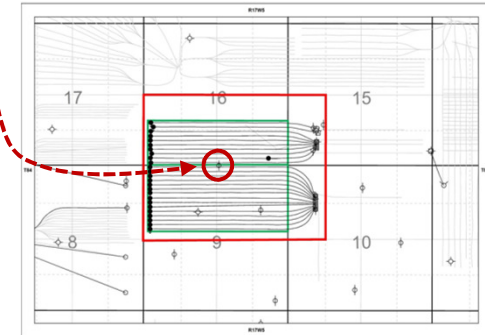
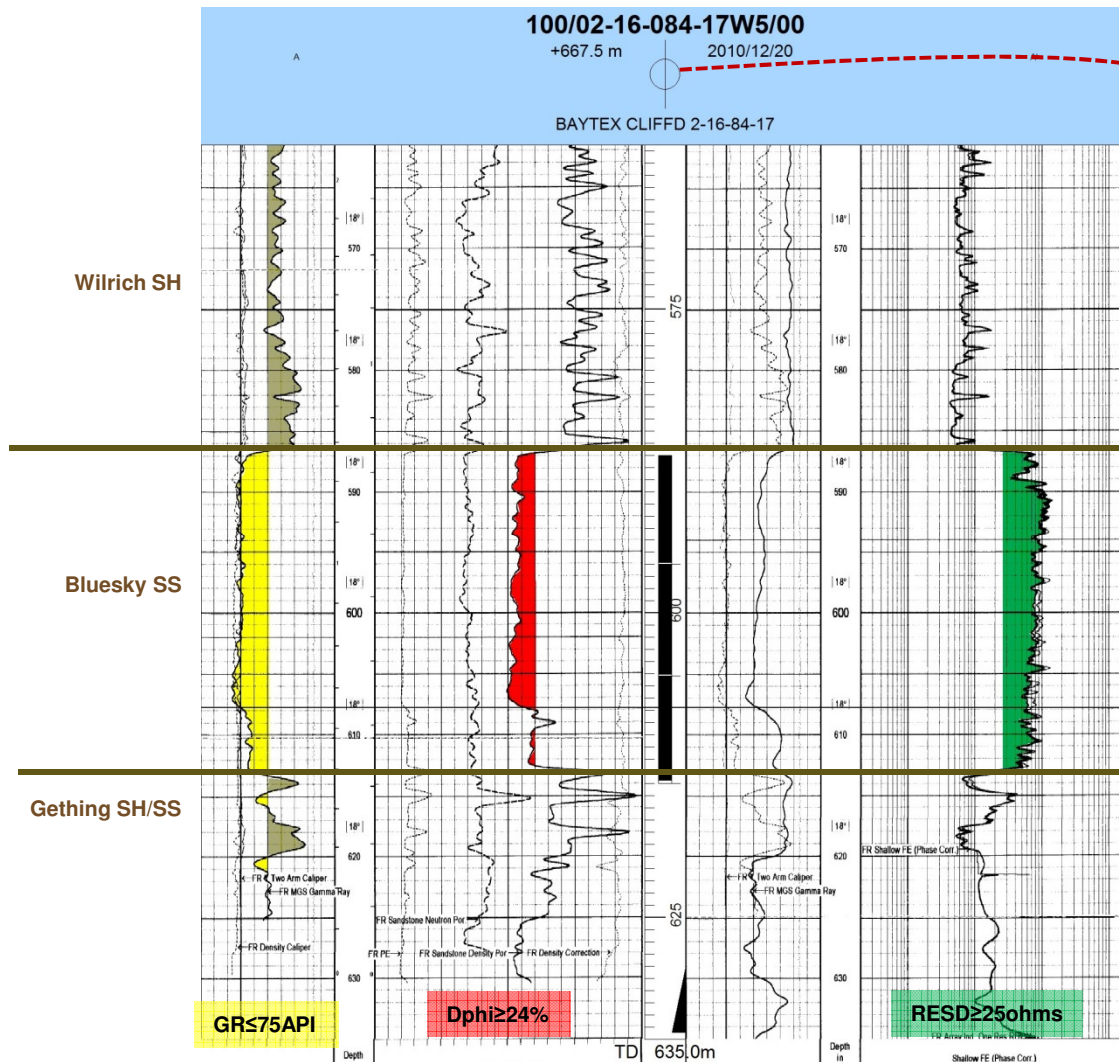
# Bluesky Base Bitumen Structure Map



Contour intervals = 5 m

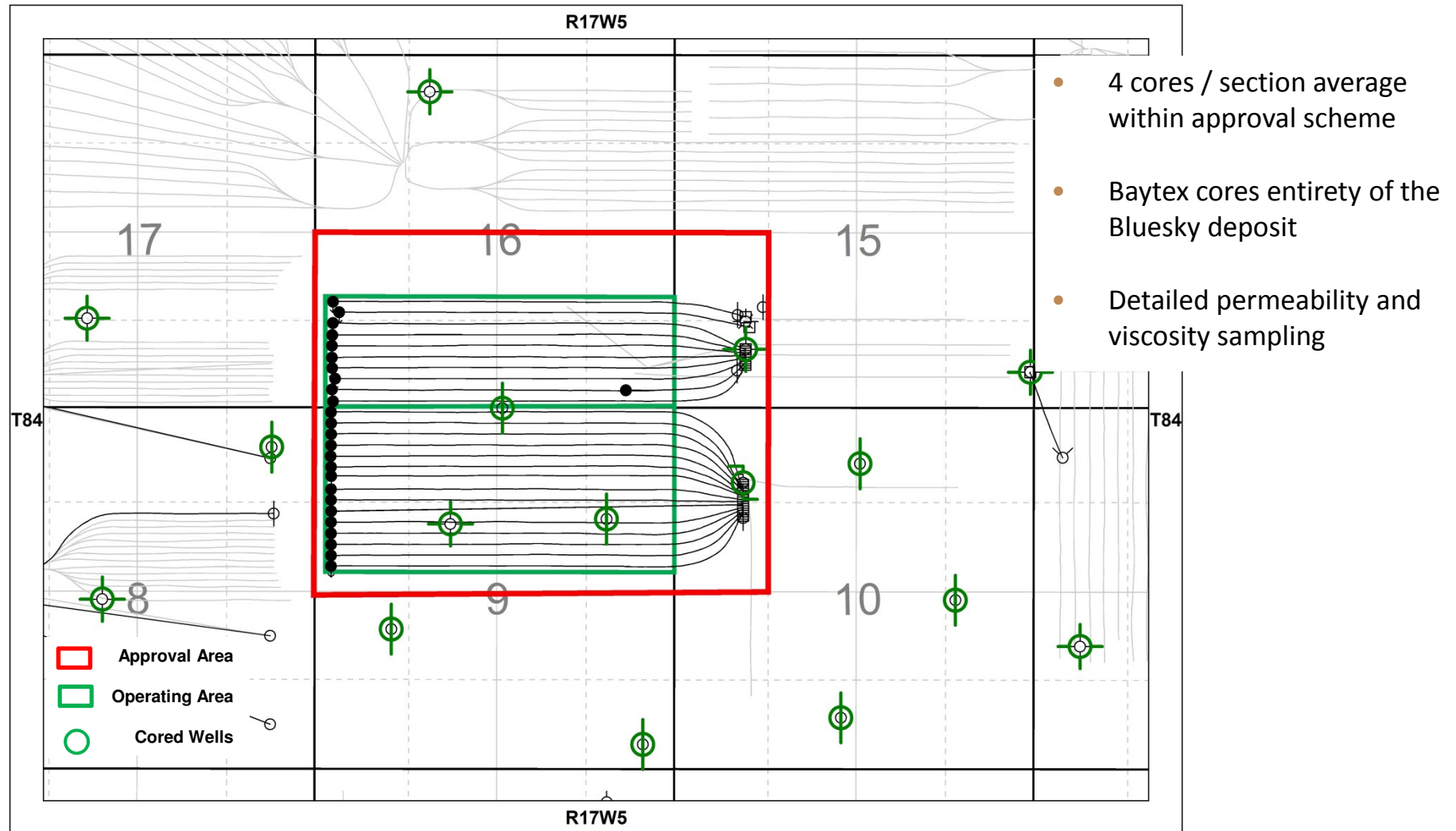


# Bluesky Type Log



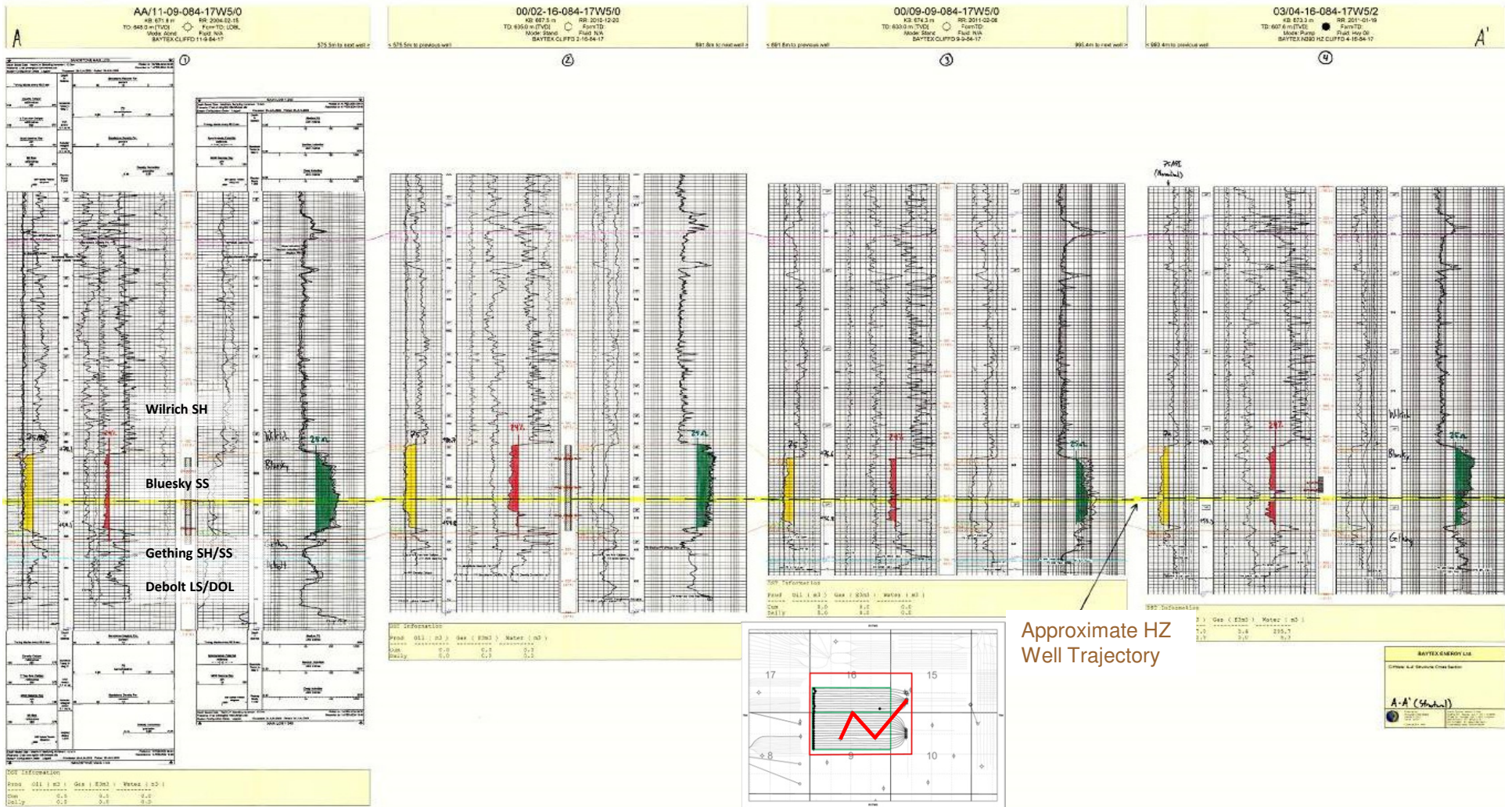
- Bluesky overview: fining upward sequence, fine to medium grained at base, very fine grained at top

# Cored Wells and Detailed Core Analysis Wells





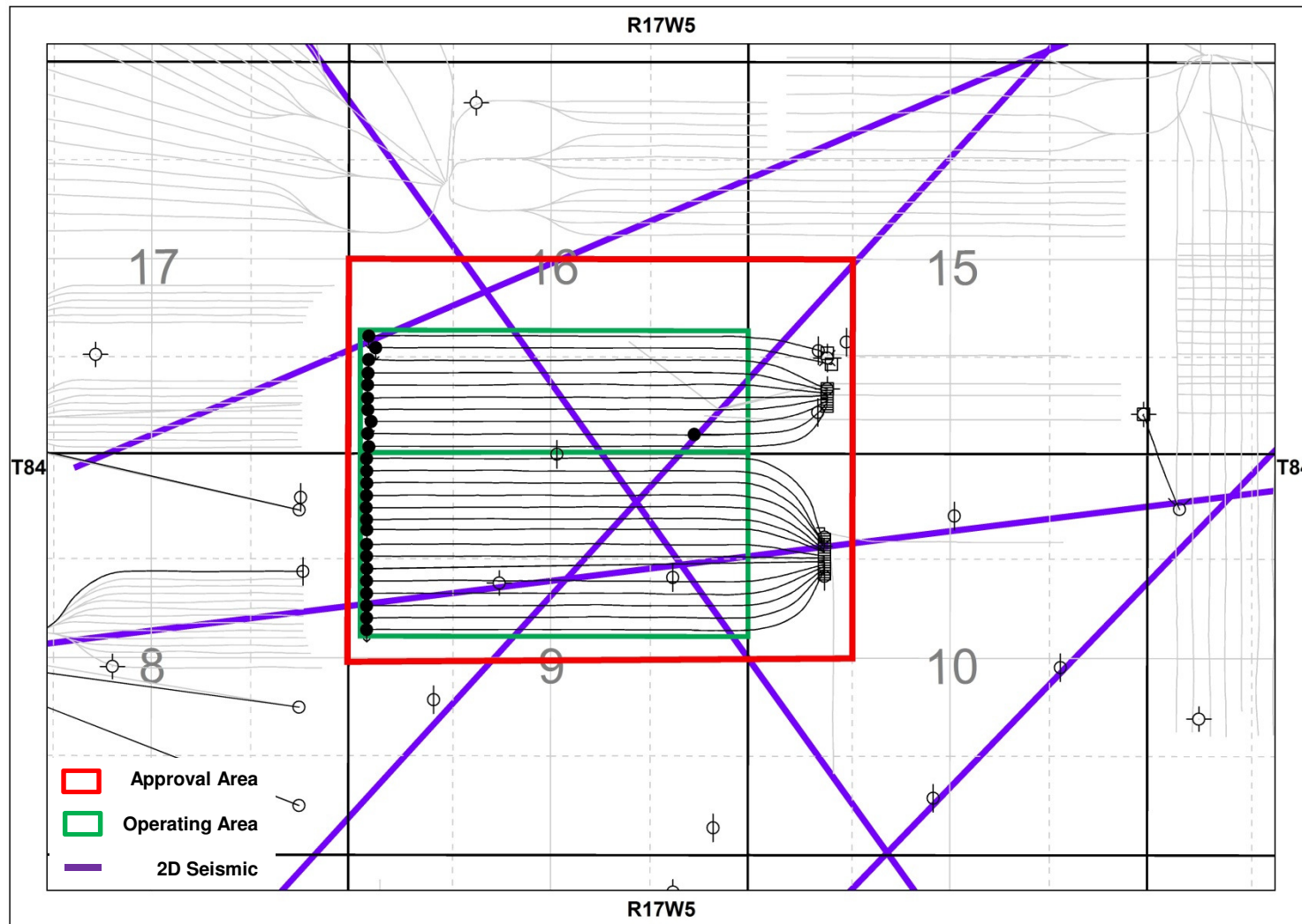
# Bluesky Cross Section



Approximate HZ Well Trajectory



# 2D Seismic Coverage



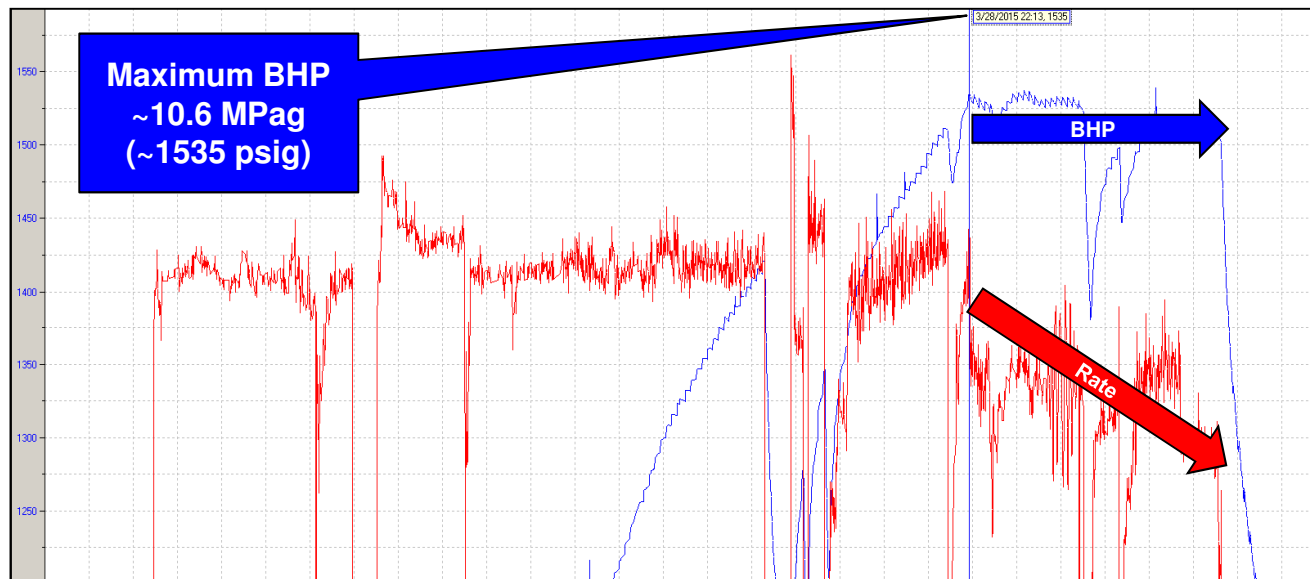
7.2 km 2-D coverage over Approval Area

# Geomechanics

- The Bluesky caprock is the Wilrich Shale, a regionally extensive marine shale with an average thickness of 70 m over the project area
- In March 2010, Baytex completed a series of mini-frac tests at 01-18-084-17W5 to determine Wilrich and Bluesky formation fracture pressures
  - Fracture pressures are defined as closure pressures of induced hydraulic fractures
    - Wilrich: 13,000 kPag (22.6 kPag/m @ 575.0 m to mid-point perforations)
    - Bluesky: 12,000 kPag (20.0 kPag/m @ 600.0 m to mid-point perforations)
- Maximum bottom-hole injection pressure has been limited to 90% of Bluesky reservoir fracture pressure based on 2010 test results, i.e. 10,800 kPag
- In January 2015, Baytex completed another, more rigorous, series of mini-frac tests at 15-10-084-17W5 to confirm Wilrich and Bluesky formation fracture pressures and to increase understanding of formation breakdown pressures
  - Fracture pressures are defined as closure pressures of induced hydraulic fractures
    - Wilrich: 12,773 kPag (21.4 kPag/m @ 597.5 m to mid-point perforations) – horizontal fracture
    - Bluesky: 10,582 kPag (17.4 kPag/m @ 607.0 m to mid-point perforations) – vertical fracture
- 2015 test results agree reasonably well with 2010 test results for Wilrich formation fracture pressure gradient (21.4 vs. 22.6 kPag/m)
- 2015 test results suggest that Bluesky formation fracture pressure gradient is lower than previously thought based on 2010 test results (17.4 vs. 20.0 kPag/m)

# Geomechanics

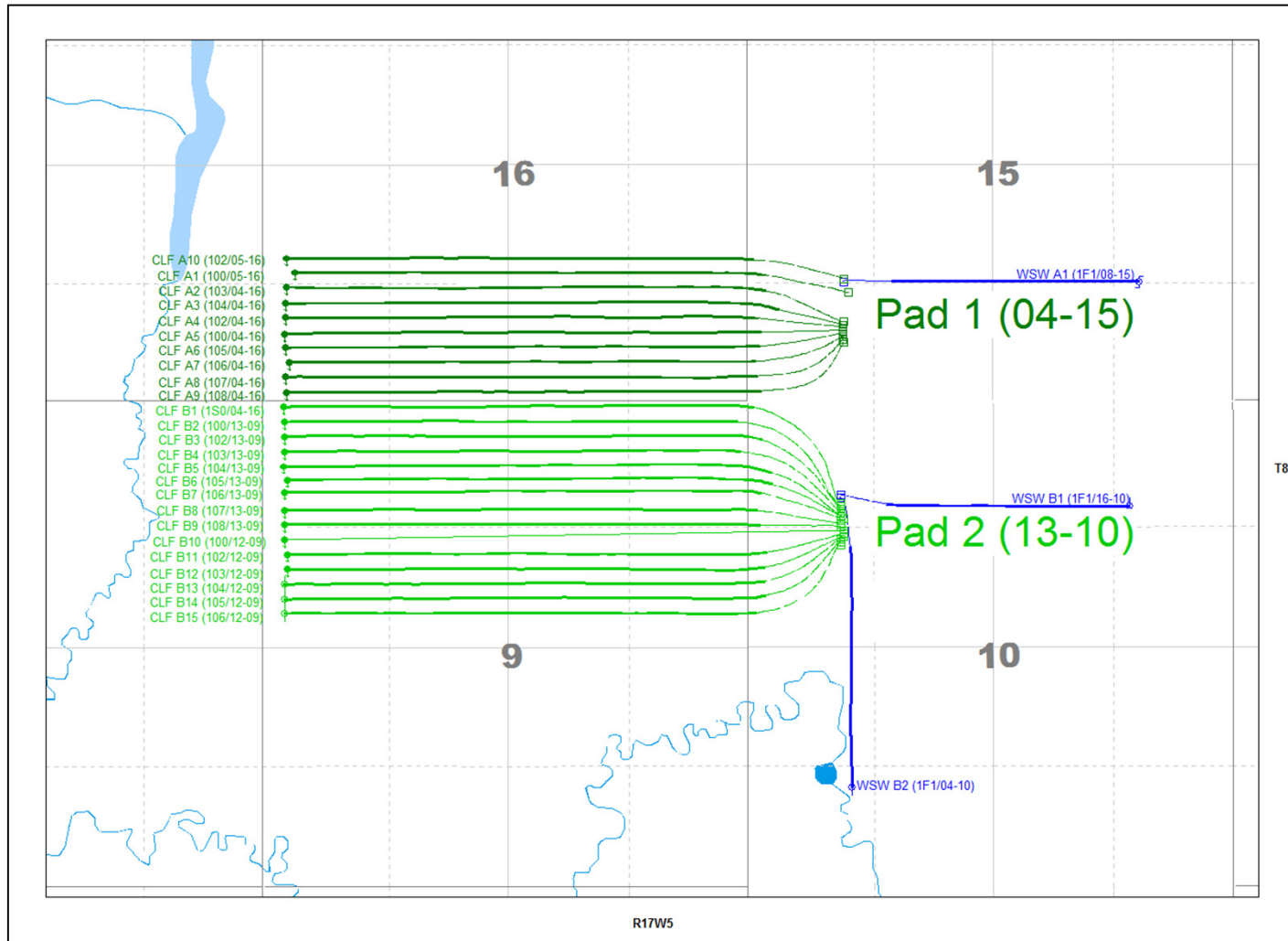
- While Baytex considers 2015 test results more credible than 2010 test results, a reduction of maximum bottom-hole injection pressure below 10,800 kPag is not warranted due to the large difference between Bluesky formation breakdown pressure and fracture closure pressure
  - Formation breakdown pressure: >15,000 kPag (24.7 kPag/m @ 607.0 m)
  - Fracture closure pressure: 10,582 kPag (17.4 kPag/m @ 607.0 m)
- Interpretation of 2015 test results is supported by the consistently observed need to decrease injection rates in an effort to maintain BHP below MOP, i.e. no increase in injectivity despite BHP approaching or slightly exceeding measured fracture closure pressure (example below)





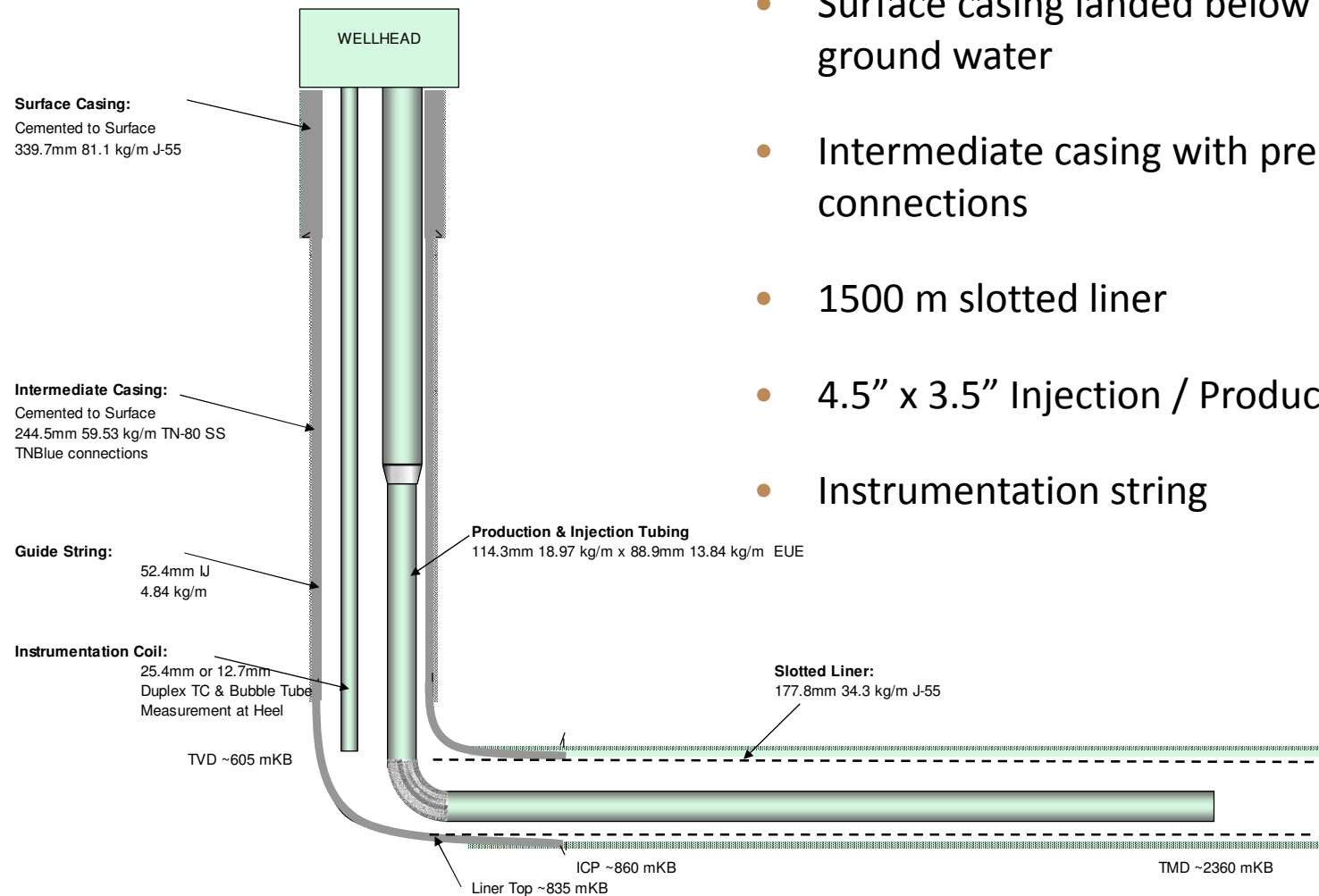
## 3) Drilling and Completions

# Well Layout and Location Map



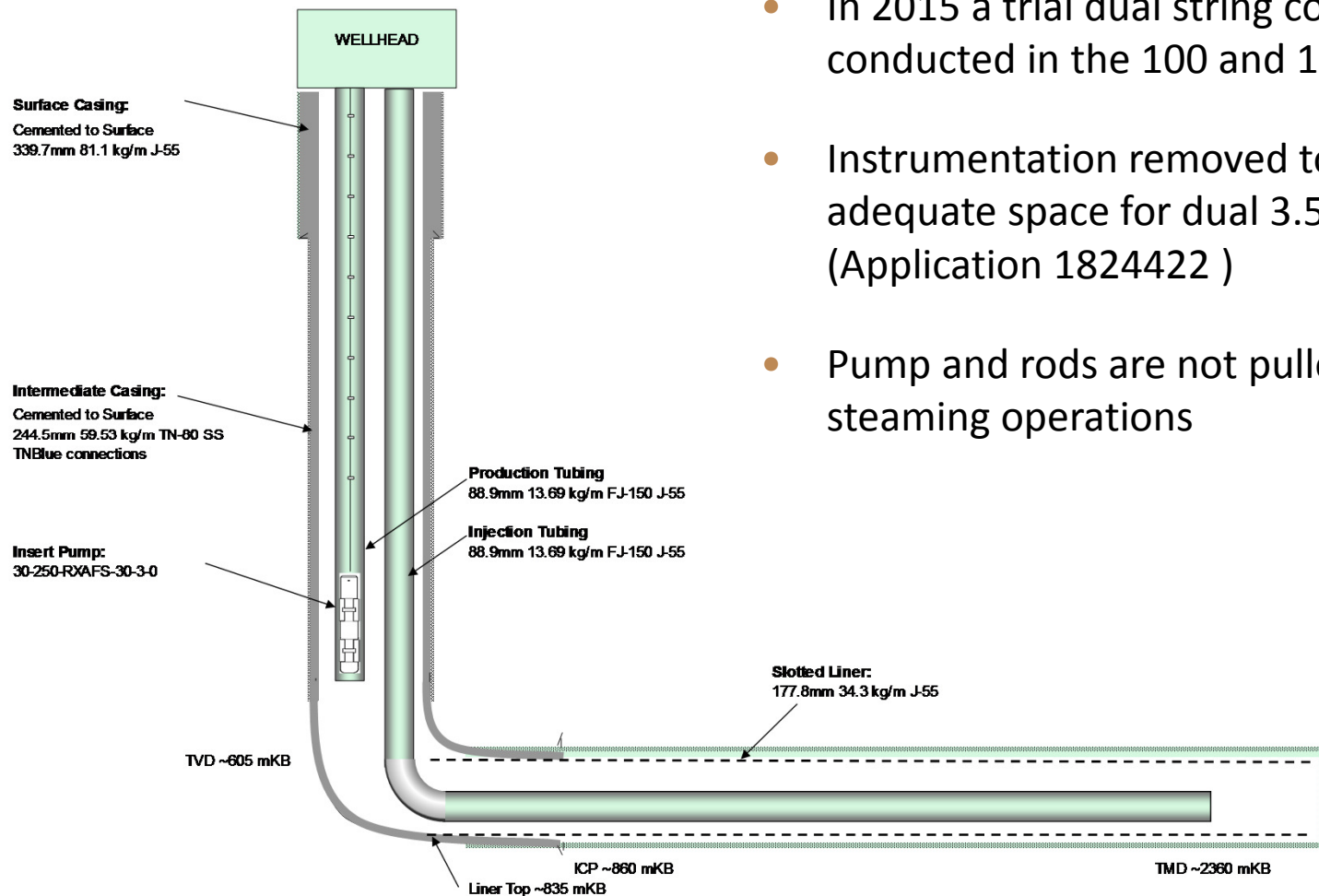


# Typical CSS Completion



- Surface casing landed below base of ground water
- Intermediate casing with premium connections
- 1500 m slotted liner
- 4.5" x 3.5" Injection / Production tubing
- Instrumentation string

# Dual String CSS Completion



- In 2015 a trial dual string completion was conducted in the 100 and 102/13-09 wells
- Instrumentation removed to provide adequate space for dual 3.5" strings (Application 1824422 )
- Pump and rods are not pulled during steaming operations



## 4) Artificial Lift

# Artificial Lift

- Progressive cavity pumps for primary production
- Rod insert pumps for thermal operations
  - Conventional and hydraulic pump jacks
    - Ampscot 1280-305-240
    - Weatherford VSH2
  - 2.5" and 3.25" rod insert pumps
  - Max lift capacity 120 - 280 m<sup>3</sup>/d
  - No temperature limitations
- No issues with artificial lift system



## 5) Instrumentation



# Instrumentation In Wells

- Typical installation (single 4.5" x 3.5" injection/production string)
  - Bubble tube for injection/production bottom hole pressure monitoring
  - Duplex thermocouples at heel
  - Contained in 52.4 mm IJ guide string
- Trial installation (dedicated 3.5" injection and production strings)
  - No bubble tube or thermocouples as insufficient room for guide string
  - Bottom-hole pressure inferred from tubing-head pressure per Application 1824422
  - 100/13-09 (B2) and 102/13-09 (B3)



## 6) Scheme Performance

# Background

- **Pad 1 (04-15):**
  - Operating 9 CSS wells and 1 primary well
  - 108/04-16 (A9) reconfigured with PCP pump June 2014
    - Objective is to establish thermal conformance along 150/04-16 (B1)
    - Inter-well communication has been observed between A9 and B1
- **Pad 2 (13-10):**
  - Operating 3 CSS wells and 12 primary wells that will be converted to CSS

## Pad 1 Original Bitumen in Place

UWI	Length (m)	W (m)	H (m)	Porosity (%)	Oil Sat (%)	OBIP (e <sup>3</sup> m <sup>3</sup> )
102/05-16	1,559	50	21.3	26	72	311
100/05-16	1,541	50	21.3	26	72	307
103/04-16	1,503	50	21.2	26	72	299
104/04-16	1,561	50	21.3	26	72	312
102/04-16	1,572	50	21.4	26	72	314
100/04-16	1,573	50	21.4	26	72	315
105/04-16	1,553	50	21.5	26	72	313
106/04-16	1,530	50	21.5	26	72	308
107/04-16	1,553	50	21.5	26	72	313
108/04-16	1,566	50	21.6	26	72	316



## Pad 2 Original Bitumen in Place

UWI	Length (m)	W (m)	H (m)	Porosity (%)	Oil Sat (%)	OBIP (e <sup>3</sup> m <sup>3</sup> )
150/04-16	1,544	50	22.3	26	72	322
100/13-09	1,519	50	22.3	26	72	317
102/13-09	1,556	50	22.3	26	72	325
103/13-09	1,520	50	22.3	26	72	318
104/13-09	1,556	50	22.2	26	72	324
105/13-09	1,570	50	22.2	26	72	327
106/13-09	1,573	50	22.2	26	72	327
107/13-09	1,544	50	22.1	26	72	320
108/13-09	1,561	50	22.0	26	72	322
100/12-09	1,566	50	21.8	26	72	320
102/12-09	1,539	50	21.9	26	72	316
103/12-09	1,563	50	22.0	26	72	322
104/12-09	1,565	50	21.9	26	72	321
105/12-09	1,553	50	21.9	26	72	319
106/12-09	1,560	50	21.9	26	72	319

# Strategy and Forecasting

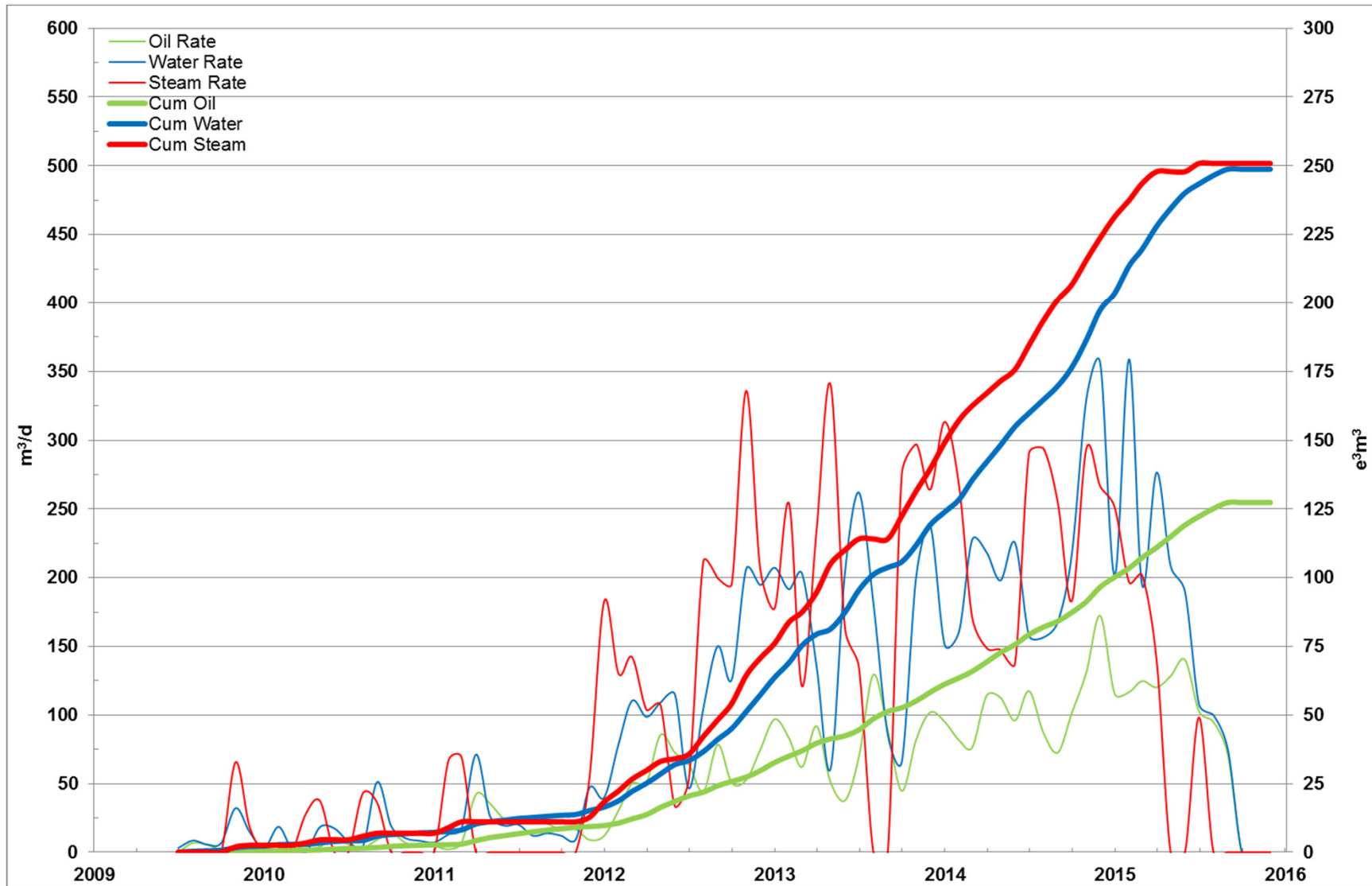
## CSS Strategy:

- Start with a period of primary production to create voidage
- Perform multiple, short steam cycles to increase injectivity for subsequent cycles and maximize conformance
- Most recent steam cycles at steady state target of ~250 - 300 m<sup>3</sup>/d for ~1 month (~8,000 m<sup>3</sup>)

## CSS Forecasting:

- Extrapolate historic Pad 1 cycles for early Pad 2 performance
- Long-term expectations based on history-matched reservoir simulation

# Project Production



# Well Activity

UWI	Pad	On Primary	First Steam	Steam Cycles
102/05-16	04-15	Jan 2012	Jun2012	4
100/05-16	04-15	Jul 2009	Nov 2009	8*
103/04-16	04-15	Feb 2011	Jan 2012	5
104/04-16	04-15	Feb 2011	Dec 2011	6
102/04-16	04-15	Apr 2011	Mar 2012	6
100/04-16	04-15	Apr 2011	Apr 2012	7
105/04-16	04-15	Feb 2012	Aug 2012	6
106/04-16	04-15	Feb 2012	Oct 2012	6
107/04-16	04-15	Mar 2012	Oct 2012	6
108/04-16	04-15	Mar 2012	Aug 2012	4
100/13-09	13-10	Oct 2013	July 2014	4
102/13-09	13-10	Oct 2013	Jun 2014	3
103/13-09	13-10	Nov 2013	Sep 2014	2

\* First steam cycle (Nov – Dec 2009) was negated due to lengthy post-steam shut in related to a mechanical downhole failure of the original dual tubing completion.



# Steam Properties

- Injecting wet steam
- Approximately 80% quality at the wellhead
- Hydraulic modelling indicates ~65% downhole quality
- Maximum 10,800 kPag bottom hole pressure (Approval 11034B)
- At MOP, steam saturation temperature ~316 °C

# Bottomhole Injection Pressures

## Maximum Bottomhole Injection Pressure of Each Cycle (kPa)

UWI	Pad	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 6	Cycle 7
102/05-16	04-15	10,300	9,900	8,600	3,800**			
100/05-16*	04-15	7,900	10,100	10,400	10,700	10,500	8,500**	4,200**
103/04-16	04-15	10,600	10,500	9,700	9,800	6,000**		
104/04-16	04-15	10,500	10,400	9,800	10,000	9,400	9,800	
102/04-16	04-15	10,500	10,400	10,400	10,100	10,200	10,400	
100/04-16	04-15	10,700	10,500	10,100	10,100	10,200	10,300	10,100
105/04-16	04-15	10,600	9,900	10,100	10,200	10,400	10,500	
106/04-16	04-15	10,500	10,500	10,200	9,600	10,300	9,300	
107/04-16	04-15	10,500	10,400	9,300	10,300	10,400	10,600	
108/04-16	04-15	10,500	10,000	9,900	10,200			
100/13-09	13-10	10,400	10,500	10,500	10,500			
102/13-09	13-10	10,400	10,500	10,500				
103/13-09	13-10	10,400	10,500					

\* Not including first 2 cycles

\*\* Total injected volume intentionally limited (i.e. steam cycle stopped before MOP reached) to mitigate inter-well communication

# Resource Recovery

## Pad 1 Volumes\*:

UWI	OBIP (e <sup>3</sup> m <sup>3</sup> )	Cum Oil ** (e <sup>3</sup> m <sup>3</sup> )	CSOR (v/v)	RF (%)	Expected RF*** (%)
102/05-16	311	9.6	2.5	3.1	17
100/05-16	307	16.7	4.3	5.4	17
103/04-16	299	14.2	3.3	4.7	17
104/04-16	312	13.7	1.7	4.4	17
102/04-16	314	11.6	2.5	3.7	17
100/04-16	315	6.1	1.9	1.9	17
105/04-16	313	9.7	2.6	3.1	17
106/04-16	308	8.4	2.4	2.7	17
107/04-16	313	4.6	1.8	1.5	17
108/04-16	316	3.6	2.8	1.1	17

\* Production data to July 31, 2015

\*\* Data includes initial primary volumes

\*\*\* Based on ten years of operations

# Resource Recovery

## Pad 2 Volumes\*:

UWI	OBIP (e <sup>3</sup> m <sup>3</sup> )	Cum Oil ** (e <sup>3</sup> m <sup>3</sup> )	CSOR (v/v)	RF (%)	Expected RF*** (%)
1S0/04-16	322	1.6	N/A	0.5	17
100/13-09	317	1.4	1.4	0.4	17
102/13-09	325	1.5	0.3	0.5	17
103/13-09	318	2.1	0.8	0.7	17
104/13-09	324	1.4	N/A	0.4	17
105/13-09	327	0.9	N/A	0.3	17
106/13-09	327	1.4	N/A	0.4	17
107/13-09	320	1.6	N/A	0.5	17
108/13-09	322	1.8	N/A	0.6	17
100/12-09	320	1.8	N/A	0.6	17
102/12-09	316	1.8	N/A	0.6	17
103/12-09	322	1.7	N/A	0.5	17
104/12-09	321	1.6	N/A	0.5	17
105/12-09	319	1.6	N/A	0.5	17
106/12-09	319	1.8	N/A	0.6	17

\* Production data to July 31, 2015

\*\* Data includes initial primary volumes

\*\*\* Based on ten years of operations

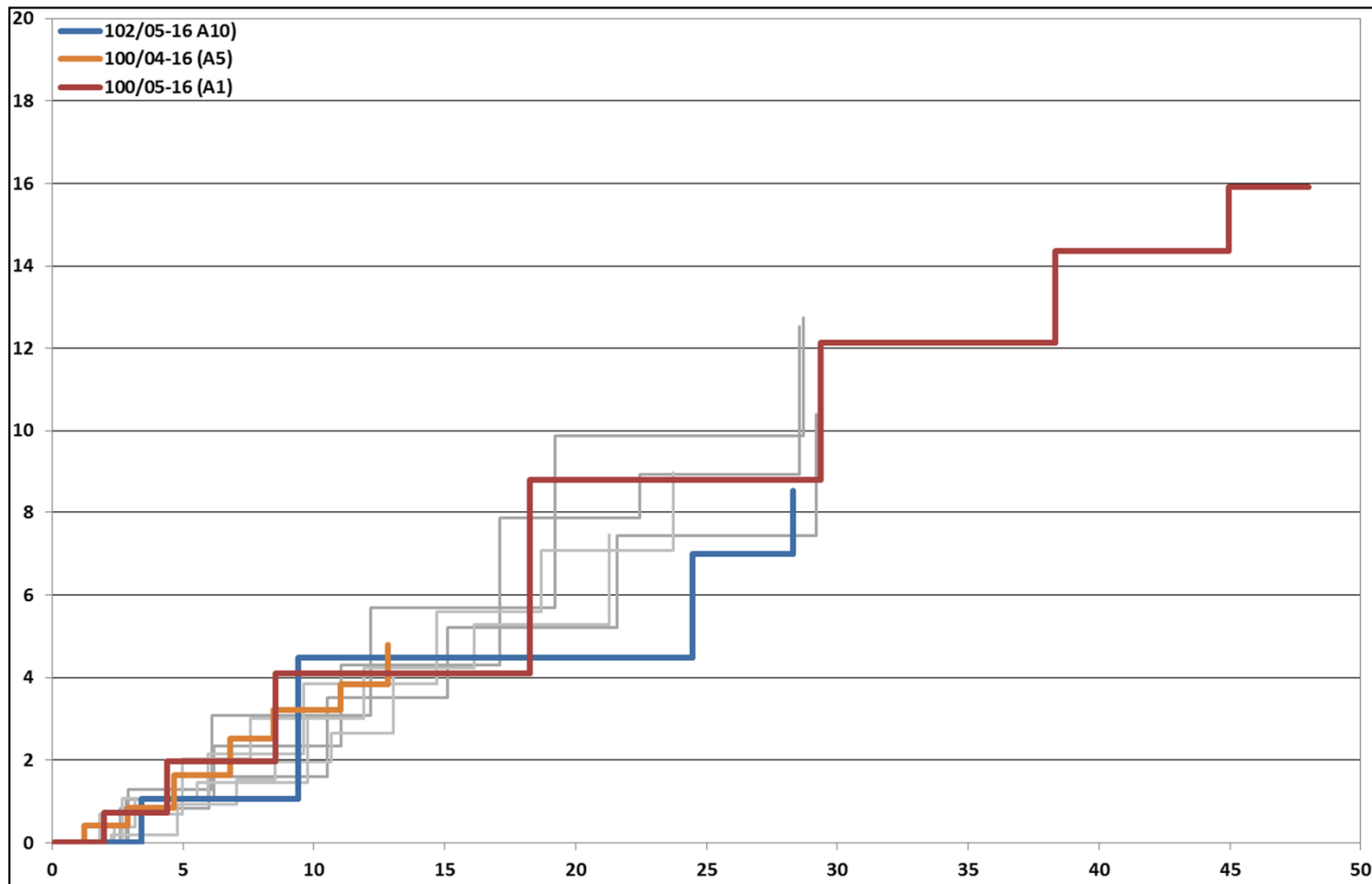


# Well Performance

- **100/05-16 (A1):**
  - Original pilot well; highest cumulative recovery and performance analogue
- **100/04-16 (A5):**
  - Lowest cycle-over-cycle injectivity growth; possibly related to completion strategy in context to localized geological variability
- **102/05-16 (A10):**
  - Lowest thermal efficiency due to pronounced inter-well communication

# Well Performance (Continued)

Cumulative Oil vs. Cumulative Steam (e<sup>3</sup>m<sup>3</sup>):



# Well Performance (Continued)

## Initiative to improve longitudinal conformance:

- Multi-Port Injection String
  - In an effort to improve longitudinal steam conformance and mitigate inter-well communication between horizontal CSS wells, a completion technique based on closed-end tubing with a linear distribution of ~30 variably sized limited-entry perforations has been implemented in the following wells:
    - 102/04-16 (A4)
    - 103/04-16 (A2)
    - 104/04-16 (A3)
    - 105/04-16 (A6)
    - 106/04-16 (A7)
    - 107/04-16 (A8)
    - 100/13-09 (B2)
    - 102/13-09 (B3)
    - 103/13-09 (B4)
  - Temperature logs planned for select wells in future cycles

# Well Performance (Continued)

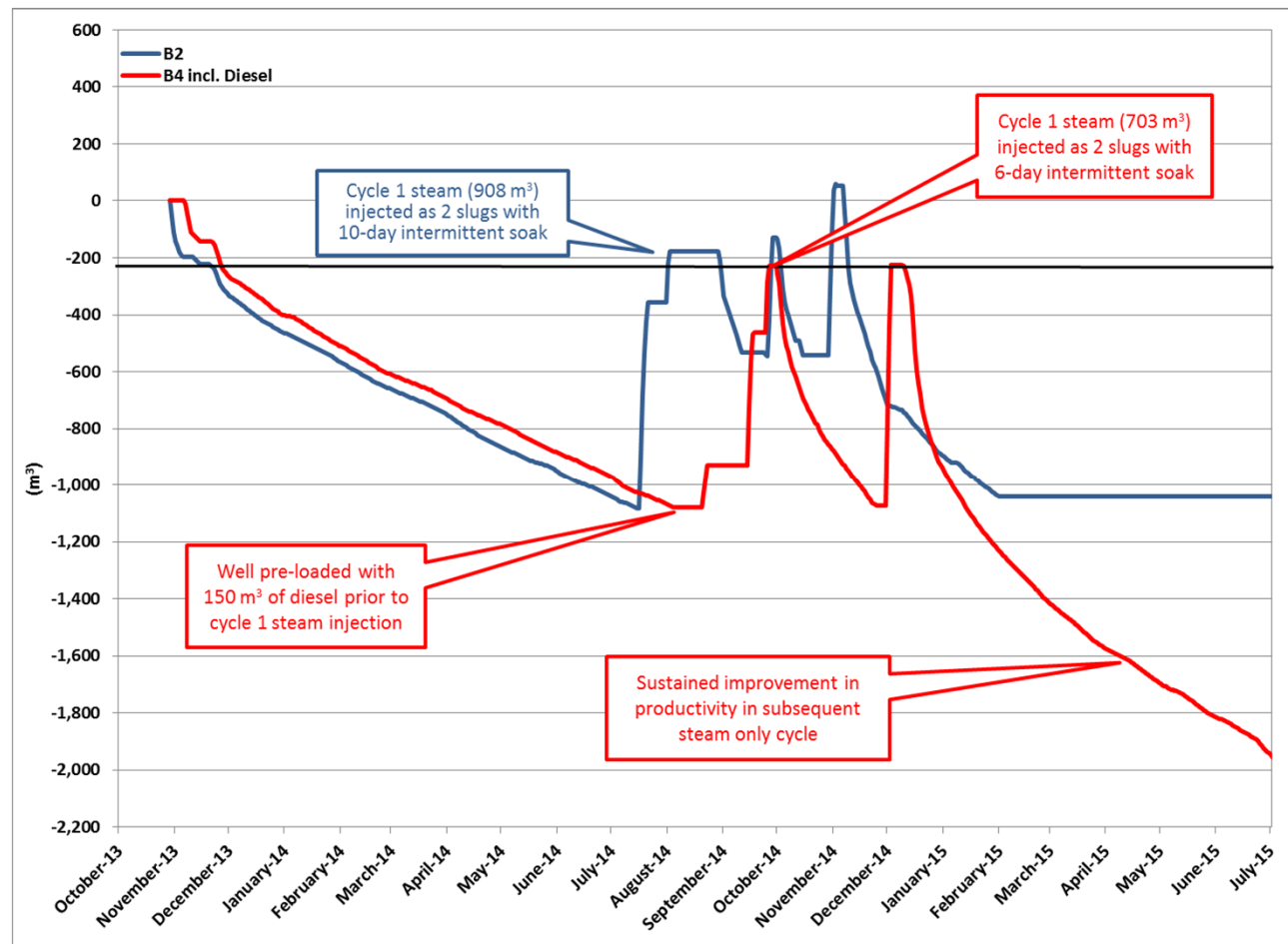
## Initiatives to improve initial injectivity:

- Solvent soak
  - Scheme Approval 11034K
  - 150 m<sup>3</sup> of diesel was injected into 103/13-09 (B4) August 2014
  - Injected volumes reported in PETRINEX as load fluid
  - 100/13-09 (B4) had comparable depletion levels prior to first steam injection
  - No improvement in total (diesel + steam / water) first cycle injectivity in response to 103/13-09 (B4) diesel soak
  - Significant improvement in 103/13-09 (B4) productivity compared to 100/13-09 (B2), likely in response to diesel soak
  - At this time, no further injections trials are planned



# Well Performance (Continued)

## Solvent Soak – Net injection (m<sup>3</sup>):



# Future Plans

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- **Temporary Suspension of Operations:**
  - Due to low commodity prices, Baytex has temporarily suspended operations at the Cliffdale Thermal Project. The generation of steam was halted on August 25<sup>th</sup> 2015 and suspension operations will be completed in October 2015.
  - The project will be suspended in a manner that ensures all regulatory and environmental obligations are satisfied while maintaining the ability to return to normal operations efficiently upon return of a sustainable price environment
  
- **Multi-Port Injection Strings:**
  - Remaining wells to be (re)completed with the multi-port injection string
  
- **Dual-String Completions:**
  - Balance of the Pad 2 wells will be equipped with the dual-string wellheads and associated production / injection strings
  
- **Abandonments:**
  - No abandonments are planned for the next five years

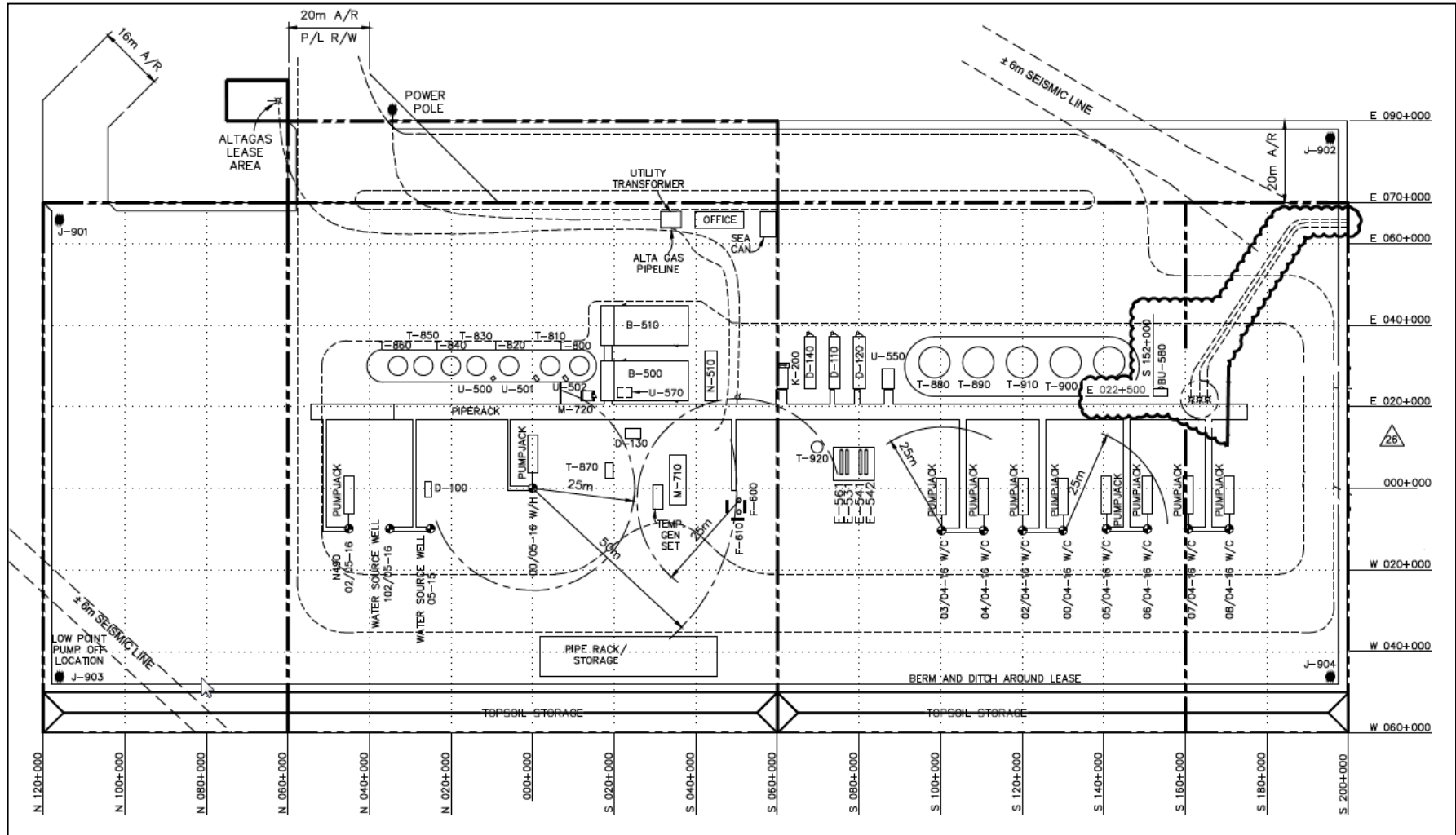
# Surface



# 1) Facilities

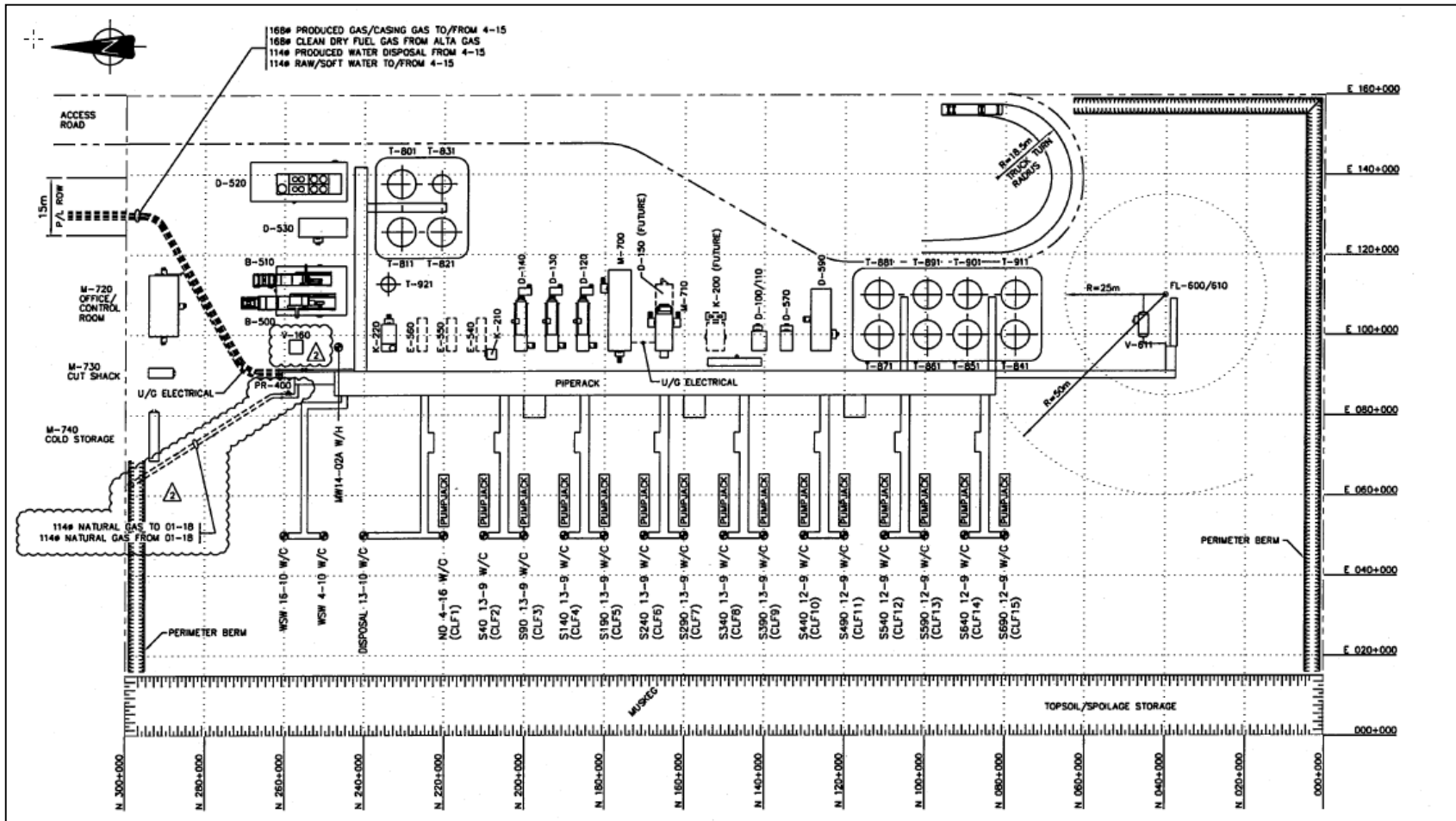


# Pad 1 (04-15) Plot Plan

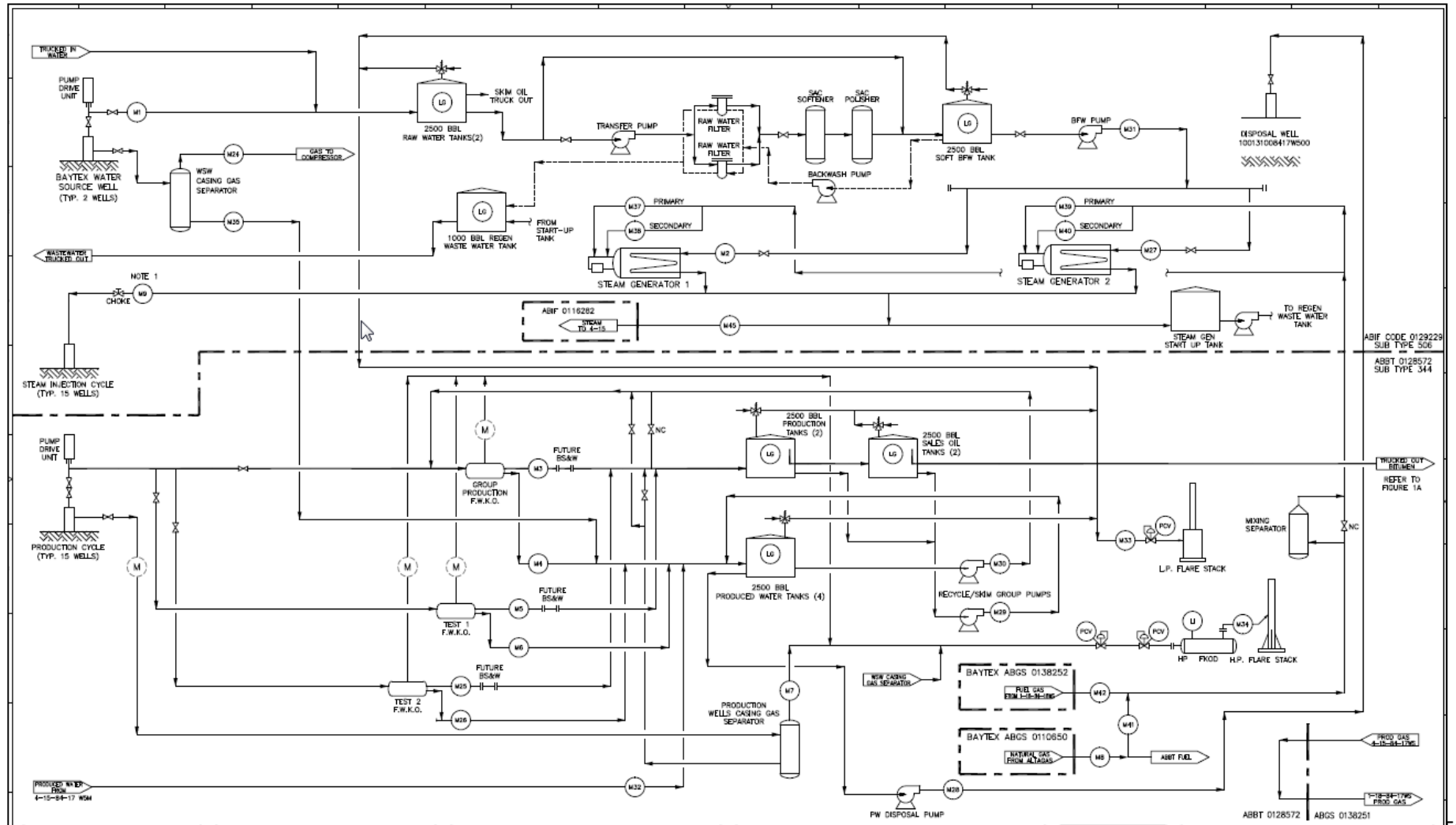




# Pad 2 (13-10) Plot Plan



# Pad 2 (13-10) Process Flow Diagram

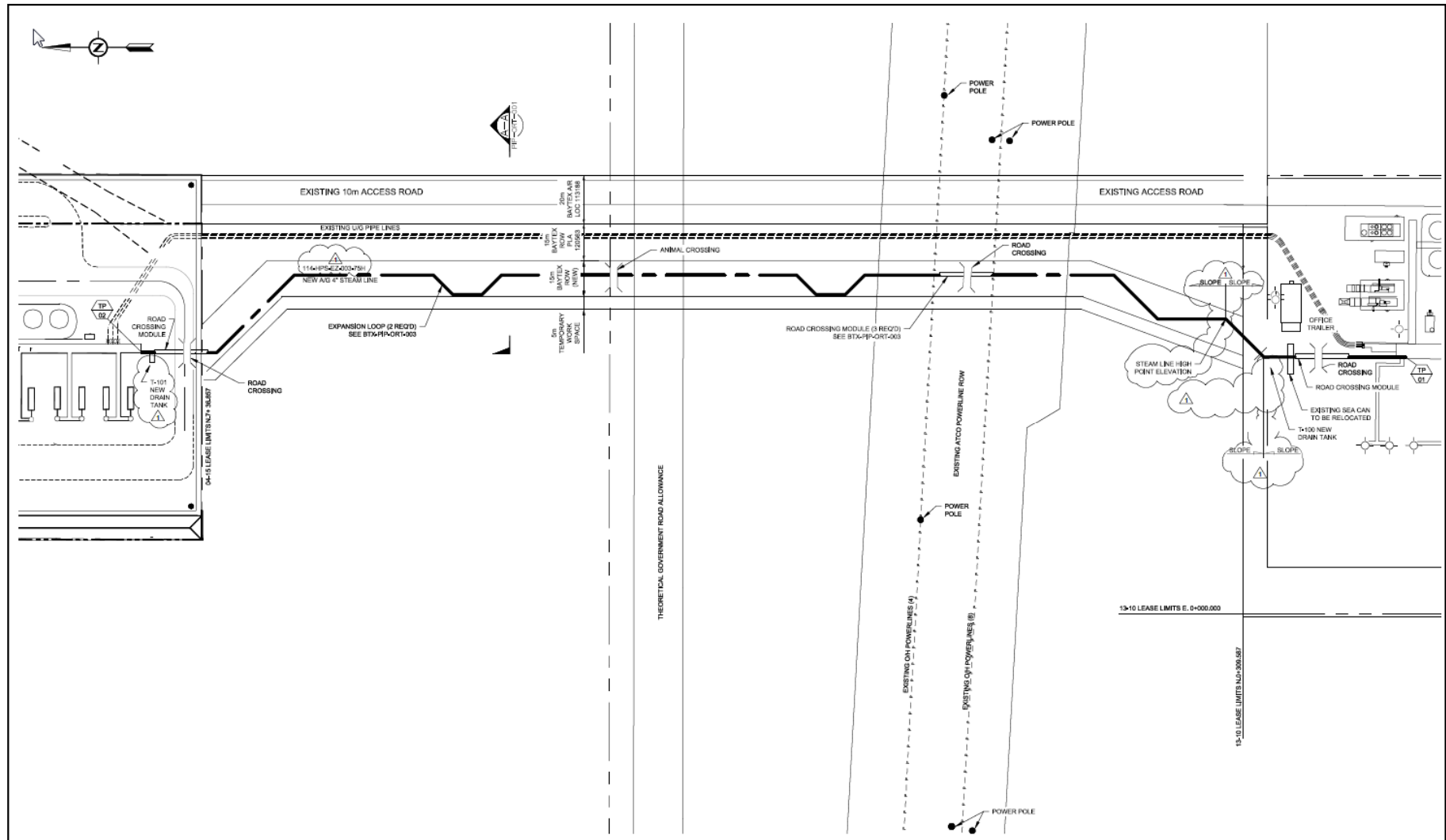




# Surface Modifications

- In 2015 two notable surface modifications were made to the Cliffdale Project:
  - Conversion of inter-pad water line to a fuel gas line to allow produced gas from surrounding Baytex facilities to be burned as fuel in Pad 1 OSTSGs
  - Construction of an inter-pad steam pipeline to transport steam from Pad 2 to Pad 1. Pad 1 boilers had numerous tube failures and addition of pipeline improves reliability of steam delivery and improves over all project performance

# Pad 2 to Pad 1 Surface Steam Pipeline



## 2) Facility Performance

# Facility Performance

## Bitumen Treatment

- Successfully producing sales spec oil with existing facility process

## Water Treatment

- No performance issues

## Steam Generation

- Pad 1 OTSG's shut-in April 2015
  - High alkalinity source water causing accelerated tube material loss due to corrosion / erosion
- Pad 2 OTSG's have limited operation and are considered to be in good condition. Before long term operation, the boiler feed water treating equipment needs to be upgraded to decrease the level of bicarbonate alkalinity in the Paddy Cadotte source water

## Gas Conservation

- As part of a larger gas conservation project, produced solution gas from Pad 1 has been shipped via pipeline to the Baytex Harmon Valley (HV) gas plant at 01-18-084-17W5 for processing; after sweetening and dehydration, the blended gas stream has been utilized in the Cliffdale steam and power generation facilities



## Facility Performance – Power

- Import power consumed (kWh)

Month	4-15 Pad	13-10 Pad	Total
Jan-14	395,056	394,159	789,215
Feb-14	343,693	429,436	773,130
Mar-14	319,018	473,816	792,834
Apr-14	292,533	376,193	668,726
May-14	222,645	280,491	503,136
Jun-14	202,397	183,348	385,745
Jul-14	234,715	187,904	422,619
Aug-14	243,017	220,101	463,118
Sep-14	278,712	317,580	596,292
Oct-14	281,741	392,840	674,581
Nov-14	353,671	492,336	846,007
Dec-14	357,784	534,144	891,929
Jan-15	383,971	482,947	866,918
Feb-15	317,492	461,685	779,177
Mar-15	303,017	403,356	706,373
Apr-15	280,367	312,199	592,565
May-15	191,685	196,128	387,813
Jun-15	217,146	2,977	220,123
Jul-15	184,943	1,251	186,194

- Back-up power generation on both sites; ran Pad 2 generator full time in June / July 2015; when available, the Pad 2 power generator is run on HV gas

# Facility Performance – Gas

## Gas Volumes (e<sup>3</sup>m<sup>3</sup>):

Month	Produced CSS	Produced WSW	Purchased AltaGas Fuel	Purchased Harmon Fuel	Raw Gas to Harmon 1-18	Vent	Flare	Solution Gas
Jan 2014	56.8		997.3			0	56.8	0%
Feb 2014	52		827.0			0	52.0	0%
Mar 2014	45.2		594.6			0	45.2	0%
Apr 2014	52.2		535.0			0	52.2	0%
May 2014	47.0		553.9			0	47.0	0%
Jun 2014	25.4		487.6			0	25.4	0%
Jul 2014	63.4	0	861.6			0	63.4	0%
Aug 2014	40.3	0	921.1			0	40.3	0%
Sep 2014	33.1	0	778.6			0	33.1	0%
Oct 2014	67.3	0	652.2			0	67.3	0%
Nov 2014	84.1	0	867.5			0	84.1	0%
Dec 2014	112.5	0	796.9			0	112.5	0%
Jan 2015	98.5	0	850.1			0	98.4	0%
Feb 2015	114.5	0	644.6	43.8		0	114.5	0%
Mar 2015	190.2	0	608.4	48.5		0	190.3	0%
Apr 2015	167.4	0	197.7	349.9		0	167.4	0%
May 2015	141	0	99.7	46.7	30	0	111	21%
Jun 2015	220.4	0	104.9	248.5	173.4	0	47	79%

- February 2015 started receiving Harmon Valley 01-18-084-17W5 fuel gas
- May 2015 commissioned Pad 1 solution gas recovery equipment and started shipping to HV 01-18-084-17W5 for processing

# Greenhouse Gas – Pad 1

GHG Emissions from Cliffdale Pad 1 (04-15) (Jan. 1, 2014 to July 31, 2015)				
Month	CO <sub>2</sub> (tonnes)	CH <sub>4</sub> (tonnes)	N <sub>2</sub> O (tonnes)	CO <sub>2</sub> e (tonnes)
January 2014	1793	0.035	0.033	1803
February 2014	1494	0.029	0.027	1502
March 2014	1052	0.020	0.019	1058
April 2014	951	0.018	0.017	956
May 2014	952	0.018	0.017	958
June 2014	708	0.014	0.013	712
July 2014	1635	0.032	0.030	1645
August 2014	1808	0.035	0.033	1819
September 2014	1332	0.026	0.024	1340
October 2014	1108	0.021	0.020	1115
November 2014	1738	0.033	0.032	1748
December 2014	1523	0.029	0.027	1532
January 2015	1679	0.032	0.031	1689
February 2015	1391	0.027	0.025	1400
March 2015	1406	0.027	0.026	1414
April 2015	1238	0.023	0.022	1245
May 2015	320	0.006	0.006	322
June 2015	155	0.003	0.003	155
July 2015	152	0.003	0.003	153
<b>Total for Pad 1 (04-15)</b>	<b>22,435</b>	<b>0.43</b>	<b>0.41</b>	<b>22567</b>

# Greenhouse Gas – Pad 2

GHG Emissions from Cliffdale Pad 2 (13-10) (Jan. 1, 2014 to July 31, 2015)				
Month	CO <sub>2</sub> (tonnes)	CH <sub>4</sub> (tonnes)	N <sub>2</sub> O (tonnes)	CO <sub>2</sub> e (tonnes)
January 2014	229	0.004	0.004	230
February 2014	198	0.004	0.004	199
March 2014	174	0.003	0.003	175
April 2014	178	0.003	0.003	179
May 2014	200	0.004	0.004	201
June 2014	275	0.005	0.005	277
July 2014	193	0.004	0.004	194
August 2014	143	0.003	0.003	144
September 2014	329	0.006	0.006	331
October 2014	303	0.006	0.006	305
November 2014	178	0.003	0.003	179
December 2014	323	0.006	0.006	325
January 2015	152	0.003	0.003	153
February 2015	175	0.003	0.003	176
March 2015	178	0.003	0.003	179
April 2015	153	0.003	0.003	154
May 2015	212	0.004	0.004	213
June 2015	628	0.012	0.011	631
July 2015	1018	0.020	0.018	1024
<b>Total for Pad 2 (13-10)</b>	<b>5,238</b>	<b>0.10</b>	<b>0.10</b>	<b>5,269</b>

# Greenhouse Gas – Total

GHG Emissions from Cliffdale In-Situ Oil Sands Project (Jan. 1, 2014 to July 31, 2015)				
	CO <sub>2</sub> (tonnes)	CH <sub>4</sub> (tonnes)	N <sub>2</sub> O (tonnes)	CO <sub>2</sub> e (tonnes)
Project Total	27,672	0.53	0.50	27,836



## 3) Measurement and Reporting

# Measurement and Reporting

## Updated MARP submitted August 14, 2015:

- Major changes include
  - Shut-in Pad 1 water treatment equipment and OTSG's
  - New steam pipeline from Pad 2 to Pad 1
  - New fuel gas pipeline from Harmon Valley 01-18 to Pad 2
  - New raw gas pipeline from Pad 2 to Harmon Valley 01-18

## Production Volumes:

- Wells tested at three-phase separators and prorated on facility actuals
- Individual casing gas meters prorated on total facility gas
- Testing duration and frequency

## Injection Volumes:

- Individual injection meters prorated on measured boiler feed water volumes

# Measurement and Reporting – Proration Factors

Month	OIL		WATER	
	4-15 Pad PF	13-10 Pad PF	4-15 Pad PF	13-10 Pad PF
Jan-14	0.89	1.21	1.33	0.75
Feb-14	0.82	0.85	1.71	0.72
Mar-14	1.02	0.94	0.87	0.80
Apr-14	0.99	0.98	0.91	0.64
May-14	0.85	1.13	1.00	0.38
Jun-14	0.98	0.99	0.97	1.13
Jul-14	0.92	1.01	0.96	1.03
Aug-14	0.93	1.02	1.00	1.18
Sep-14	0.97	1.02	0.94	0.85
Oct-14	1.01	1.03	0.97	0.98
Nov-14	0.83	1.04	1.02	0.94
Dec-14	0.86	1.12	1.01	0.96
Jan-15	0.90	1.04	0.99	0.67
Feb-15	1.08	1.08	0.98	0.73
Mar-15	0.90	0.96	0.91	0.80
Apr-15	0.92	1.03	0.93	0.58
May-15	0.86	1.02	0.86	0.97
Jun-15	0.81	1.11	0.89	0.99

## Measurement and Reporting – Water Balance %

Month	04-15 Pad	13-10 Pad
	ABIF 0116282	ABIF 0129229
Jan 2014	4.3	0.0
Feb 2014	2.3	0.0
Mar 2014	8.1	1.2
Apr 2014	3.7	1.4
May 2014	0.9	0.3
Jun 2014	6.4	0.2
Jul 2014	4.8	2.9
Aug 2014	7.3	0.2
Sep 2014	0.1	0.7
Oct 2014	3.9	1.7
Nov 2014	5.4	1.1
Dec 2014	4.8	0.5
Jan 2015	2.8	0.3
Feb 2015	6.6	0.1
Mar 2015	3.9	1.1
Apr 2015	3.5	0.7
May 2015	2.8	0.0
Jun 2015	3.0	0.4

- Annual MARP meter inspections and calibration as per MARP and Directive 17



## 4) Water Production and Usage

# Source Water

## Source Water:

- Brackish water source wells:
  - Clifdale 1F1/08-15-084-17W5
  - Clifdale 1F1/04-15-084-17W5 - inactive
  - Clifdale 1F1/04-10-084-17W5
  - Clifdale 1F1/16-10-084-17W5
- All source water is produced from the Paddy/Cadotte aquifer
- Produced water is not recycled

# Source Water Quality

- **Cliffdale 1F1/04-15-084-17W5 vertical - inactive**
  - 4800 ppm TDS 2011-03-15
  - 4920 ppm TDS 2011-03-18
  - 4940 ppm TDS 2011-03-18
- **Cliffdale 1F1/08-15-084-17W5 horizontal**
  - 4640 ppm TDS 2011-11-13
  - 4440 ppm TDS 2012-02-14
  - 4574 ppm TDS 2013-02-19
  - 5878 ppm TDS 2013-05-13
  - 5900 ppm TDS 2014-01-20
  - 4510 ppm TDS 2014-09-14
- **Cliffdale 1F1/04-10-084-17W5 horizontal**
  - 4665 ppm TDS 2014-05-12
  - 4810 ppm TDS 2014-09-14
- **Cliffdale 1F1/16-10-084-17W5 horizontal**
  - 4434 ppm TDS 2014-05-12
  - 4460 ppm TDS 2014-09-14
- TDS calculations in accordance with *APHA Standard Methods for the Examination of Water and Wastewater*, as specified by Groundwater Information Letter 1/2010

# Source Water

- Source Water Volumes (m<sup>3</sup>):

Month	1F1/08-15-084-17W5	1F1/04-10-084-17W5	1F1/16-10-084-17W5
Jan 2014	11,217		
Feb 2014	9,492		
Mar 2014	8,040		
Apr 2014	6,223		
May 2014	5,217	138	143
Jun 2014	4,177	1,237	174
Jul 2014	9,420	0	716
Aug 2014	10,465	0	391
Sep 2014	7,511	1,631	399
Oct 2014	5,372	0	744
Nov 2014	9,461	158	147
Dec 2014	7,844	599	801
Jan 2015	9,424	0	0
Feb 2015	7,535	0	0
Mar 2015	7,199	0	0
Apr 2015	4,958	0	0
May 2015	0	0	0
Jun 2015	0	0	0



# Water and Steam Volumes

- Produced Water and Steam Injection volumes (m<sup>3</sup>):

Month	4-15 Pad		13-10 Pad	
	Produced Water	Injected Steam	Produced Water	Injected Steam
Jan 2014	4,274	9,538	412	
Feb 2014	3,718	8,122	789	
Mar 2014	6,532	5,216	524	
Apr 2014	6,129	4,532	428	
May 2014	6,003	4,493	138	
Jun 2014	6,386	3,089	380	1,096
Jul 2014	4,579	7,957	318	886
Aug 2014	4,391	8,734	465	218
Sep 2014	4,425	6,622	614	1,124
Oct 2014	5,724	4,890	1,011	686
Nov 2014	8,836	8,763	1,045	172
Dec 2014	10,062	7,264	973	846
Jan 2015	5,893	7,648	354	0
Feb 2015	9,827	5,988	223	0
Mar 2015	5,801	6,142	228	0
Apr 2015	8,150	4,263	144	0
May 2015	6,218	0	252	0
Jun 2015	5,517	0	176	0

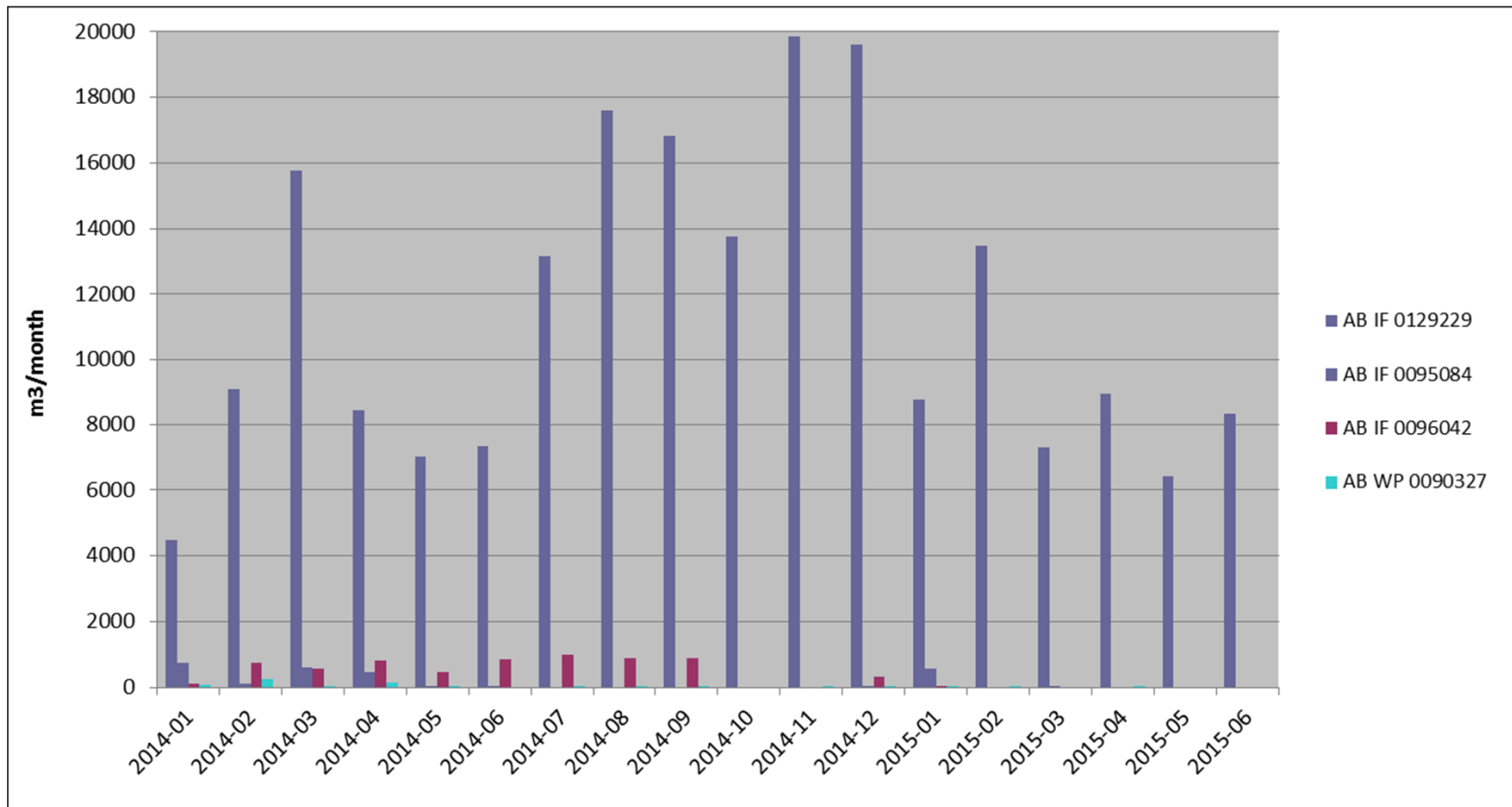
# Produced & Waste Water Disposal

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- **Baytex Cliffdale 100/13-10-084-17W5:**
  - Leduc formation
  - ABIF 0129229
  - Approval 12154
  - Injection Pressure ~6,500 kPa, Injection Temperature 55 – 65 °C
- **Baytex Harmon Valley 04-29 (100/06-29-084-18W5/02):**
  - Leduc formation
  - ABIF 0095084
  - Approval 11254
  - Injection Pressure 9,500 kPag, Injection Temperature 50 – 55 °C
- **Tervita Peace River (12-24-085-19W5):**
  - ABIF 0096042
- **Tervita Peace River WP (12-24-085-19W5):**
  - ABWP 0090327

# Disposal Volumes

- Produced & Waste Water Disposal Monthly Volumes (m<sup>3</sup>):



## 5) Sulphur Production

# Sulphur Balance

## Pad 1

Date	All Oil Sands Wells on Pad (kg S)	TANK VRU (kg S)	Flared Gas (kg S)
Aug 2014	0.567	0.135	0.701
Sep 2014	1.908	0.492	2.4
Oct 2014	7.504	1.096	8.6
Nov 2014	37.727	6.033	43.761
Dec 2014	148.265	21.058	169.323
Jan 2015	8.276	0.772	9.048
Feb 2015	7.082	0.807	7.888
Mar 2015	105.417	5.099	110.516
Apr 2015	89.082	5.384	94.459
May 2015	10.306	0.990	11.296
Jun 2015	1.986	0	1.986
Jul 2015	0.217	0.032	0.249

## Pad 2

Date	All Oil Sands Wells on Pad (kg S)	TANK VRU (kg S)	Flared Gas (kg S)
Aug 2014	0	0	0
Sep 2014	0.045	0.009	0.054
Oct 2014	0.073	0.014	0.087
Nov 2014	0.167	0.05	0.217
Dec 2014	0.066	0.012	0.078
Jan 2015	0.292	0.044	0.336
Feb 2015	0.307	0.044	0.351
Mar 2015	0.159	0.020	0.178
Apr 2015	0.357	0.040	0.396
May 2015	0.121	0.013	0.134
Jun 2015	0.12	0.011	0.094
Jul 2015	5.229	0.470	5.698

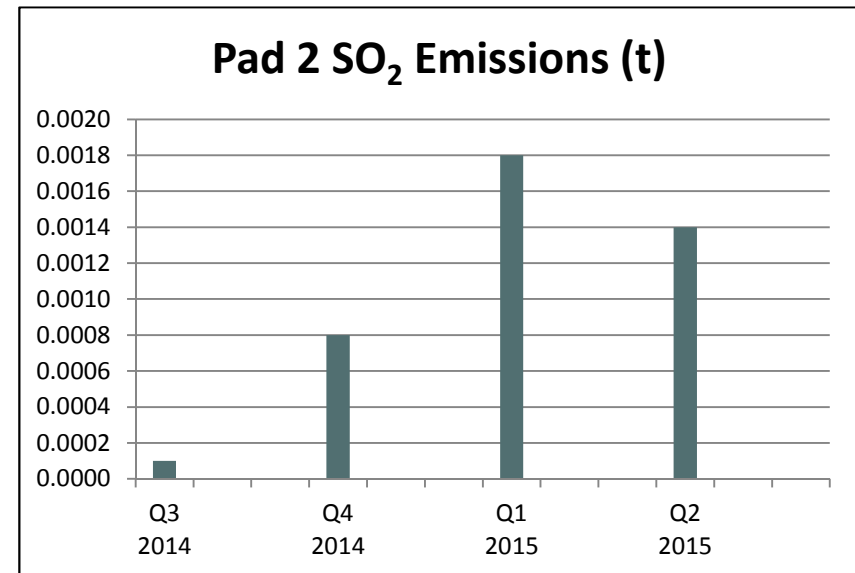
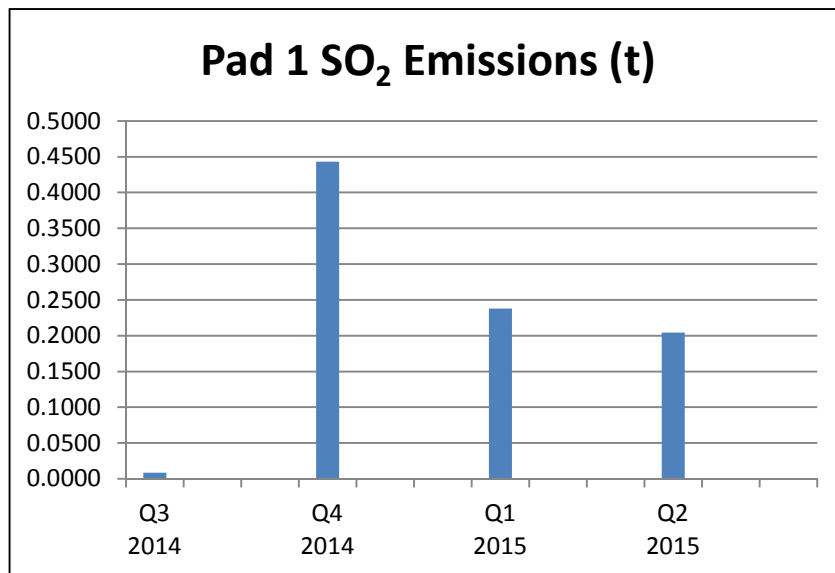


# SO<sub>2</sub> Max Daily Emissions (t)

- **SO<sub>2</sub> Emissions:**
  - No exceedances of EPEA Approval limits

	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	EPEA
Pad 1	0.0000	0.0003	0.0013	0.0052	0.0174	0.0012	0.0015	0.0101	0.0071	0.0011	0.0007	0.0005	0.04
Pad 2	0.000	0.000	0.00001	0.00002	0.00001	0.00003	0.00003	0.00002	0.00003	0.00003	0.00001	0.0114	0.05

# SO<sub>2</sub> Quarterly Emissions (t)



# Passive Monitoring

- **SO<sub>2</sub> Concentrations (ppbv):**
  - No exceedances

Maximum H <sub>2</sub> S Monthly Concentrations													
	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	AAAQO
<b>Pad 1</b>	0.16	0.06	0.10	0.11	0.11	0.09	0.17	0.04	0.04	0.05	0.07	0.13	none
<b>Pad 2</b>	0.05	0.03	0.06	0.08	0.1	0.14	0.12	0.03	0.02	0.04	0.04	0.05	none
Maximum SO <sub>2</sub> Monthly Concentrations													
	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	AAAQO
<b>Pad 1</b>	0.2	<0.2	1.4	0.3	0.3	0.3	3.9	0.2	0.3	0.2	7.1	0.2	11
<b>Pad 2</b>	0.3	<0.2	<0.2	0.3	<0.2	0.2	0.2	<0.2	0.2	<0.2	3.1	0.2	11
Maximum NO <sub>2</sub> Monthly Concentrations													
	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	AAAQO
<b>Pad 1</b>	5.1	6.30	7.0	2.2	4.7	5.1	3.9	2.8	2.8	4.8	7.1	5.2	none
<b>Pad 2</b>	1.6	2.8	2.2	1.1	2	2.5	1.8	0.6	0.5	1	3.1	3	none

AAAQO is an ESRD 30-day objective

Concentrations are in ppbv

- The values collected for H<sub>2</sub>S and NO<sub>2</sub> represent a time-weighted average based on the exposure time (1 month)
- Currently only 1 hr and 24 hr limits are available for H<sub>2</sub>S and 1 hr and annual limits for NO<sub>2</sub> under the AAAQO guidelines. Data is presented for trend analysis only

## 6) Environmental

# Spills and Clean-Up

- **October 20, 2014 – Boiler blowdown water spill at Pad 1 (3 m<sup>3</sup>):**
  - Reported to AER (Incident # 20142729)
  - Baytex completed an EM survey and conducted soil sampling and laboratory analyses
  - Some elevated EC, SAR and pH were identified
  - Baytex submitted soil management plan to the AER on January 14, 2015
  - AER accepted soil management plan on February 3, 2015 (two locations are to be added to the soil monitoring program in 2018)
- **Sept 4, 2015 – Oil spill at Pad 1 (~10 m<sup>3</sup>):**
  - Reported to AER (# 30394)
  - Preliminary investigations point to human error resulting in the valve not properly closed
  - Spill contained within secondary tank containment and being cleaned up using vacuum trucks and steamer units
  - Further investigations under way



# Groundwater Monitoring Program

- Operational groundwater monitoring completed in April and October 2014
- Groundwater temperatures monitored within the inter-till and basal unit varied by  $\pm 0.2^{\circ}\text{C}$ . No discernible trend
- Elevated concentrations of TDS, sulphate, sodium, iron and manganese were characterized within the surficial, inter-till and basal units but are interpreted to reflect background/baseline conditions
- Consistently elevated concentrations of aluminum, arsenic, and zinc relative to Tier 1 criteria were characterized within the surficial, inter-till and basal units. However, these conditions are expected to reflect background / baseline conditions
- Occasionally elevated concentrations relative to Tier 1 criteria were identified for cadmium, chromium, copper, mercury, nickel, selenium and silver. Interpreted to be related to natural occurrence
- Concentrations of PAHs and dissolved phase concentrations of BTEX and PHC fractions F1 and F2 were below the generic Tier 1 criteria at all locations

# NO<sub>x</sub>

## NO<sub>x</sub> EPEA Limit:

- All NO<sub>x</sub> emission rates are below the EPEA compliance limit of 0.68 kg/hr for stack A500 and 1.38 kg/hr for stack B500
- Manual stack surveys were conducted in October 2014 on the Pad 1, 25 MM BTU/hr steam generator stack (A500) and the Pad 2, 50 MM BTU/hr steam generator stack (B500). The survey results are shown in the table below:

Parameter	Pad 1 - 25 MM BTU/hr Steam Generator (A500)	Pad 2 - 50 MM BTU/hr Steam Generator (B500)
NO <sub>x</sub> Emission Rate (kg/hr)	0.46	0.78
Compliance Limit (kg/hr)	0.68	1.38

- At the time of survey, the second 25 MM BTU/hr steam generator at Pad 1 (A510) was not operating and the Pad 2, 25 MM BTU/hr steam generator (B510) had not been fully commissioned

## 7) Compliance

# Compliance

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- To the best of our knowledge, the Baytex Cliffdale CSS Thermal Project is currently in compliance with all conditions of its approvals and associated regulatory requirements

# Regulatory Summary

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## **Amendments:**

- October 2014: Amendment for minor piping changes at Pad 1 to receive fuel gas from Pad 2 and the 01-18 Baytex facility; approved October 24, 2014
- November 2014: Amendment to construct an above-ground steam pipeline between Pads 1 and 2; approved February 3, 2015 (11034L)
- February 2015: Amendment to change bottom-hole injection pressure surveillance method; approved March 6, 2015
- March 2015: Amendment for minor piping changes at Pad 1 to send produced gas to 01-18 Baytex facility for processing; approved April 8, 2015
- April 2015: D56 license application submitted for above-ground steam pipeline; license received May 4, 2015

## **Voluntary Self Disclosure:**

- March 2015: VSD submitted for not notifying the AER of a pipeline (Pad 1 to Pad 2) discontinuation within 90 days of completion by submitting a license amendment application; Resolved



# Future Plans

# Future Plans

- **Temporary Suspension of Operations:**
  - Due to low commodity prices, Baytex has temporarily suspended operations effective October 2015
  - The project will be suspended in a manner that ensures all regulatory and environmental obligations are satisfied while maintaining the ability to return to normal operations efficiently upon return of a sustainable price environment
  - 14 Days prior to reactivation Baytex will notify the AER of its intentions
- **13-10 Pad Installation of a Reverse Osmosis Unit:**
  - This equipment is required to treat the sites high bicarbonate alkalinity source water which was causing accelerated boiler tube material loss.
- **Commercial Expansion Application:**
  - In September of 2013 Baytex submitted an application (#1772858) to expand the current project with the addition a third CPF and 15 CSS wells on two well pads. Approval for this commercial expansion is expected imminently. Baytex plans to pursue the expanded project when economic conditions have improved and corporate sanction has been received.

# Advisory

## Forward-Looking Statements

In the interest of providing interested parties with information regarding Baytex, including management's assessment of Baytex's future plans and operations, certain statements made by the presenter and contained in these presentation materials (collectively, this "presentation") are "forward-looking statements" within the meaning of the United States Private Securities Litigation Reform Act of 1995 and "forward-looking information" within the meaning of applicable Canadian securities legislation (collectively, "forward-looking statements"). The forward-looking statements contained in this presentation speak only as of the date of this presentation and are expressly qualified by this cautionary statement. The information contained in this presentation does not purport to be all-inclusive or to contain all information that potential investors may require.

Specifically, this presentation contains forward-looking statements relating to, but not limited to: our business strategies, plans and objectives; and our Cliffdale CSS Project, including development and operational plans, completion strategies, our assessment of the performance of the project, our interpretation of geology, project life, original bitumen in place volumes, expected recovery factors and steam-oil ratios, the annual volume of make up water used by the project, our expectation that the application to amend the currently approved project will be approved; and our plan to resume operations and pursue the expanded project when economic conditions improve. In addition, information and statements relating to reserves are deemed to be forward-looking statements, as they involve implied assessment, based on certain estimates and assumptions, that the reserves described exist in quantities predicted or estimated, and that the reserves can be profitably produced in the future.

Although Baytex believes that the expectations and assumptions upon which the forward-looking statements are based are reasonable, undue reliance should not be placed on the forward-looking statements because Baytex can give no assurance that they will prove to be correct.

These forward-looking statements are based on certain key assumptions regarding, among other things: petroleum and natural gas prices and pricing differentials between light, medium and heavy gravity crude oils; well production rates and reserve volumes; capital expenditure levels; the receipt, in a timely manner, of regulatory and other required approvals for our operating activities; the availability and cost of labour and other industry services; interest and foreign exchange rates; the continuance of existing and, in certain circumstances, proposed tax and royalty regimes; our ability to develop our crude oil and natural gas properties in the manner currently contemplated; and current or, where applicable, proposed assumed industry conditions, laws and regulations will continue in effect or as anticipated. Readers are cautioned that such assumptions, although considered reasonable by us at the time of preparation, may prove to be incorrect.

Actual results achieved will vary from the information provided herein as a result of numerous known and unknown risks and uncertainties and other factors. Such factors include, but are not limited to: declines in oil and natural gas prices; risks related to the accessibility, availability, proximity and capacity of gathering, processing and pipeline systems; uncertainties in the credit markets may restrict the availability of credit or increase the cost of borrowing; refinancing risk for existing debt and debt service costs; a downgrade of our credit ratings; risks associated with properties operated by third parties; changes in government regulations that affect the oil and gas industry; changes in environmental, health and safety regulations; variations in interest rates and foreign exchange rates; risks associated with our hedging activities; the cost of developing and operating our assets; risks associated with the exploitation of our properties and our ability to acquire reserves; changes in income tax or other laws or government incentive programs; uncertainties associated with estimating petroleum and natural gas reserves; risks associated with acquiring, developing and exploring for oil and natural gas and other aspects of our operations; risks associated with large projects or expansion of our activities; risks related to heavy oil projects; the implementation of strategies for reducing greenhouse gases; depletion of our reserves; risks associated with the ownership of our securities, including the discretionary nature of dividend payments and changes in market-based factors; risks for United States and other non-resident shareholders, including the ability to enforce civil remedies, differing practices for reporting reserves and production, additional taxation applicable to non-residents and foreign exchange risk; and other factors, many of which are beyond our control. These and additional risk factors are discussed in our Annual Information Form, Annual Report on Form 40-F and Management's Discussion and Analysis for the year ended December 31, 2014, as filed with Canadian securities regulatory authorities and the U.S. Securities and Exchange Commission.

# Advisory (Continued)

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Readers are cautioned that the foregoing list of risk factors is not exhaustive. New risk factors emerge from time to time, and it is not possible for management to predict all of such factors and to assess in advance the impact of each such factor on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements.

The above summary of assumptions and risks related to forward-looking statements in this presentation has been provided in order to provide potential investors with a more complete perspective of our current and future operations and such information may be not appropriate for other purposes. There is no representation by Baytex that actual results achieved will be the same in whole or in part as those referenced in the forward-looking statements and Baytex does not undertake any obligation to update publicly or to revise any of the included forward-looking statements, whether as a result of new information, future events or otherwise, except as may be required by applicable securities law.

## **Oil and Gas Information**

The determination of oil and gas reserves involves the preparation of estimates that have an inherent degree of associated uncertainty. Categories of proved and probable reserves have been established to reflect the level of these uncertainties and to provide an indication of the probability of recovery. The estimation and classification of reserves requires the application of professional judgment combined with geological and engineering knowledge to assess whether or not specific reserves classification criteria have been satisfied. Knowledge of concepts, including uncertainty and risk, probability and statistics, and deterministic and probabilistic estimation methods, is required to properly use and apply reserves definitions.

The recovery and reserves estimates described herein are estimates only and there is no guarantee that the estimated reserves will be recovered. Actual reserves and future production from such reserves may be greater or less than the estimates provided herein. The estimates of reserves for individual properties may not reflect the same confidence level as estimates of reserves for all properties, due to the effects of aggregation. For complete NI 51-101 reserves disclosure, please see our Annual Information Form for the year end December 31, 2014 dated March 9, 2015.

When converting volumes of natural gas to oil equivalent amounts, Baytex has adopted a conversion factor of six million cubic feet of natural gas being equivalent to one barrel of oil, which is based on an energy equivalency conversion method primarily applicable at the burner tip and does not represent a value equivalency at the wellhead. Oil equivalent amounts may be misleading, particularly if used in isolation.



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