Annual performance review of in-situ oil sands scheme approval 9404W

Pelican Lake Asset Team
Conventional Oil & Gas
Cenovus Energy Inc.

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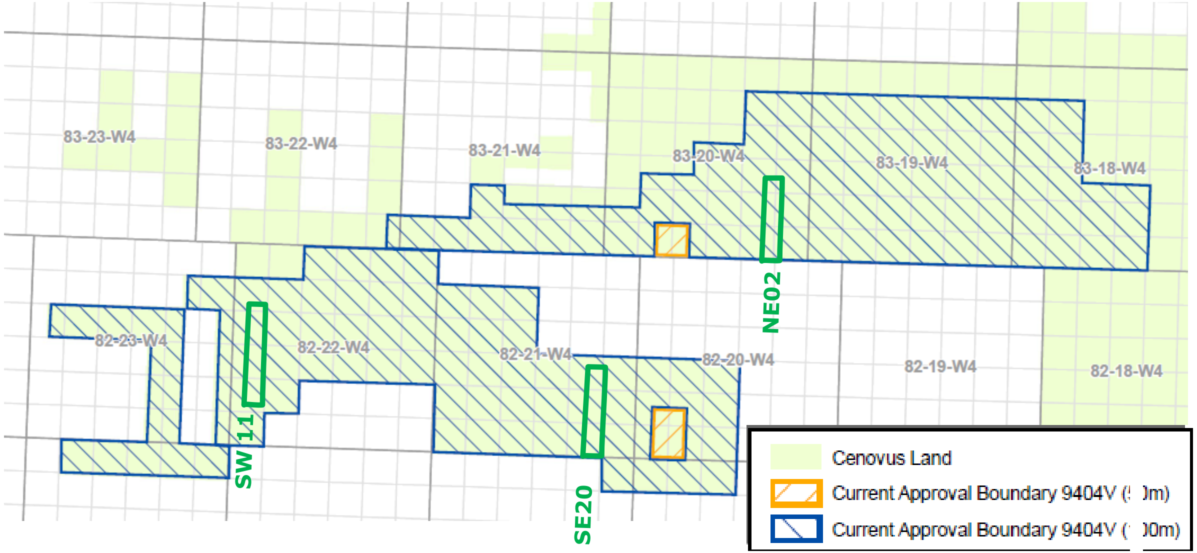
Agenda

- Introductions
- Current approval
- Geological overview
- Scheme performance update
- Water usage update
- Hot water injection update
- Cap rock integrity & monitoring program
- Facilities update
- 2016 development activities
- AER regulatory discussion & key learnings

Current approval and enhanced oil recovery (EOR) scheme area

Approval 9404W – Current EOR scheme area



Interwell spacing distance is from producer to producer

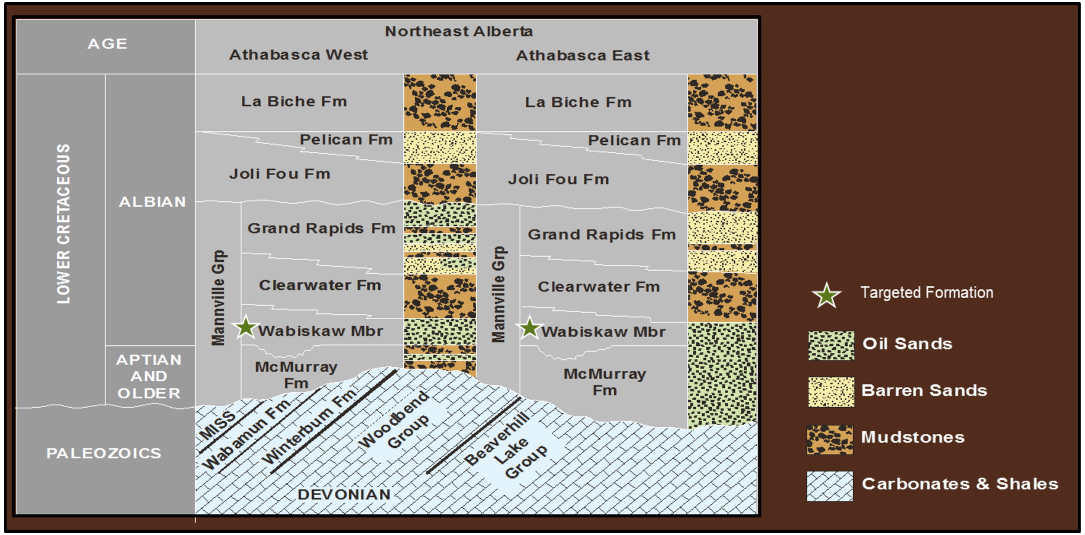
- 9404W was originally approved in April 2014
- No near term requirements to expand beyond existing boundaries and spacing
- Pads shown in green are performance examples shown later in presentation

Geological overview

Geologic review

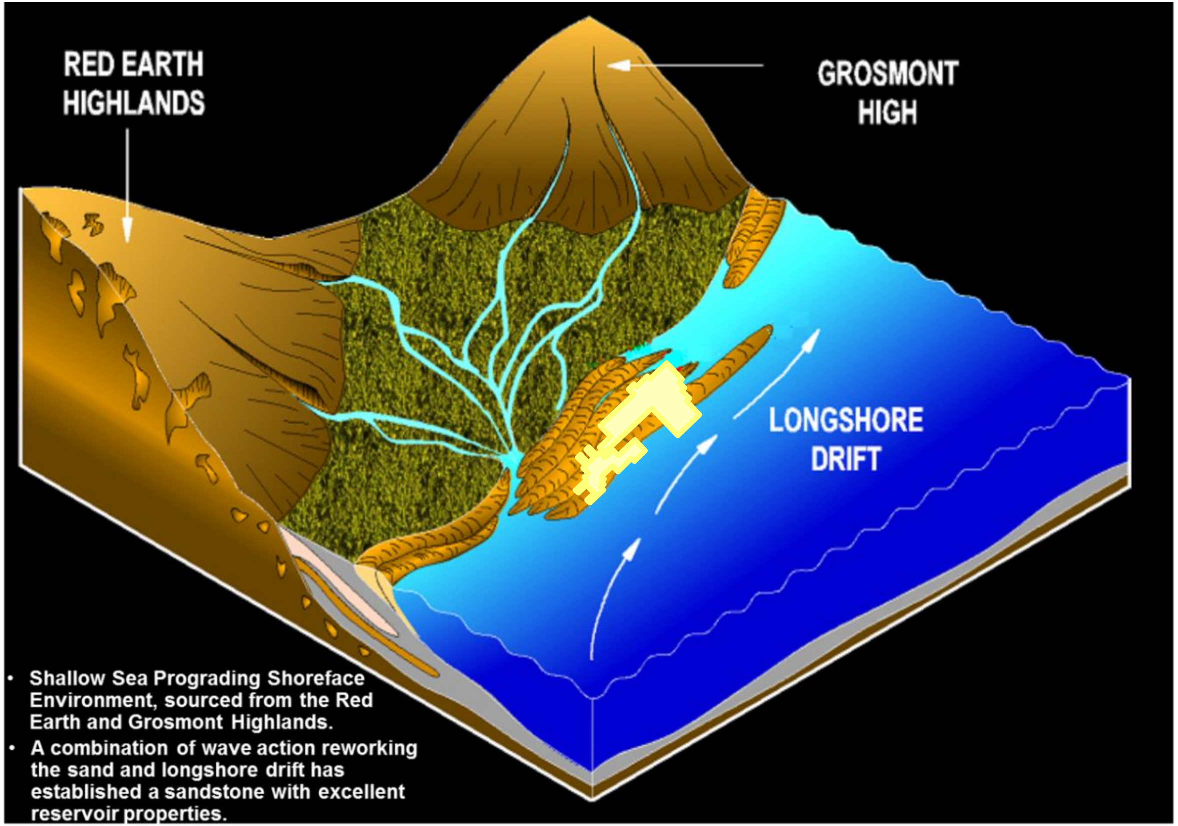
The development interval at Pelican Lake is the Wabiskaw formation

- Wabiskaw and Clearwater are part of the Mannville Group
- Wabiskaw composed of oil bearing shoreface sands
- Clearwater acts as cap rock and is composed of mudstones and very competent calcified siltstones
- Reservoir properties are very consistent and of a high quality across the field



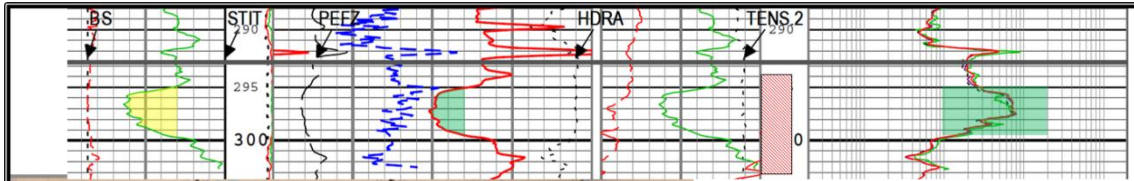
Parameter	Avg or Range	Comments
Depth	300 – 450m	Generally deeper in SW
Avg Thickness	3m	Thins towards North, ranges between 1 – 6m
Avg. Porosity	30%	
Avg. Oil Saturation	70%	
Avg. Permeability	300 – 3000mD	Generally better rock in Western portions of Pelican Lake
Reservoir Temp.	12 – 16 C	
Initial Reservoir Pressure	1800 – 2400kPa	
Oil Viscosity (dead)	1000 – 25000+ cP	Most of core land <= 2500 cP Polymer flood typically < 7000cP
Oil Gravity	11.5 – 16.5 API	

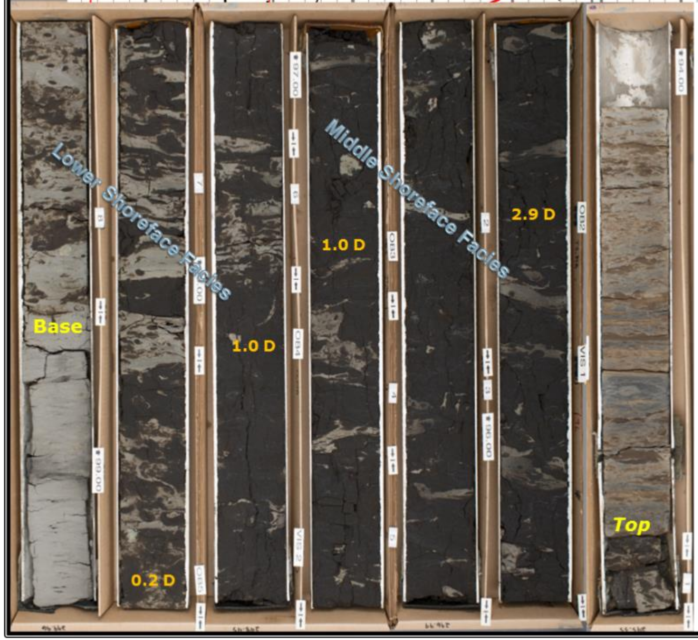
Wabiskaw depositional environment: Prograding shoreface into a shallow sea



- During the early Cretaceous, a relative rise in sea level caused a major southward transgression of the Boreal Sea, which in turn created a marine environment for the deposition of the Wabiskaw Member
  - approximately 133 million years ago a shallow sea filled the basin from the north, with the Red Earth & Granor Highlands protruding as barriers
    - large extent Tabular sands a result of Shallow sea environment
  - these barriers are the primary source of sediment supply for the formation of the Wabiskaw
- The Pelican Lake field is interpreted as a lower to middle shoreface sand which progrades towards the northwest into an offshore environment

Pelican Lake type log & example core: 10-03-83-18W4





Core supports the interpretation of the Prograding Shoreface environment.

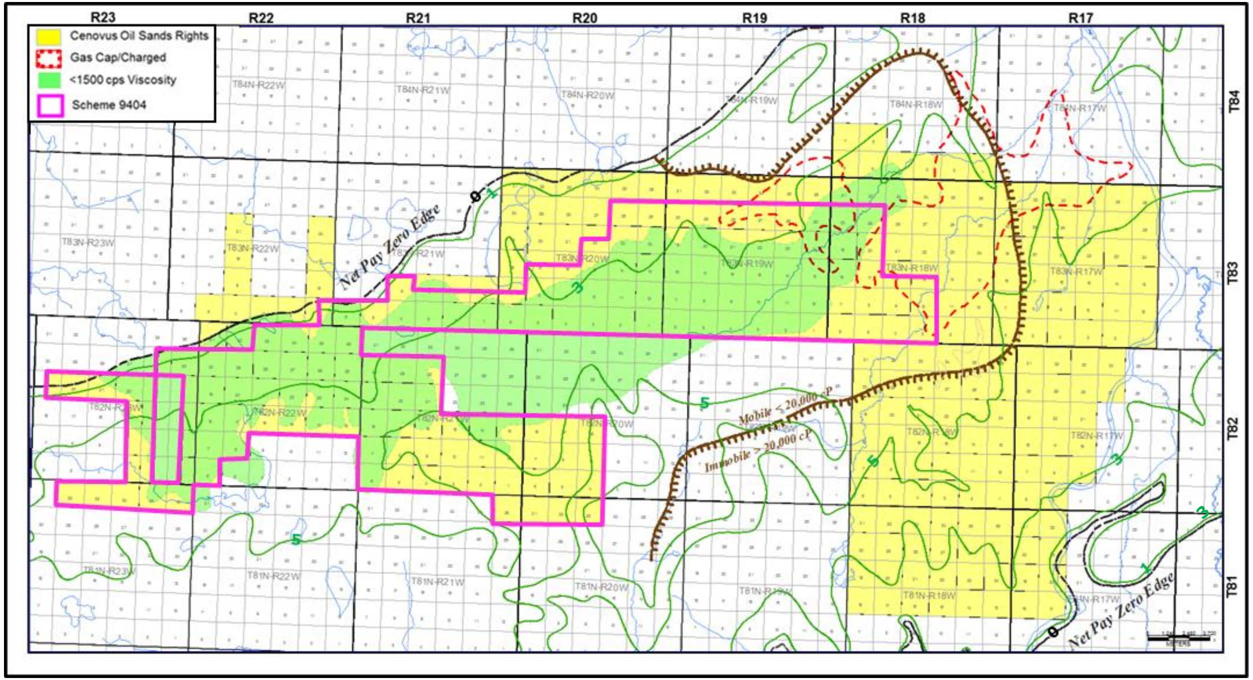
- Cleans up from approximately 25% mud near the base of the Wabiskaw (interpreted as Lower Shoreface), to under 10% mud at the top of the Wabiskaw (Interpreted as Middle Shoreface).
- Coarsens up from Very Fine Upper Sand in the Lower Shoreface to Fine Lower Sand in the Middle Shoreface.

Core Placement	micrometers
Low Core Average	120.33
Middle Core Average	134.87
High Core Average	153.14

- Trace Fossil Assemblages are less marine, and less diverse toward top of the Wabiskaw. This is a further indicator of a prograding shoreface environment.
- Permeability gets better towards top of core as sand coarsens up.

D = Darcy

Wabiskaw net pay & viscosity fairway



Prograding shoreface environment makes the reservoir very uniform, continuous and predictable.

- *Net pay bounded by onlap edge to the north and shoreface edge to the south, thinning uniformly from the center of the pool to the edges*

Viscosity is low enough for mobile oil over the majority of the pool. However as we approach the edges of the pool the viscosity gradient is very steep.

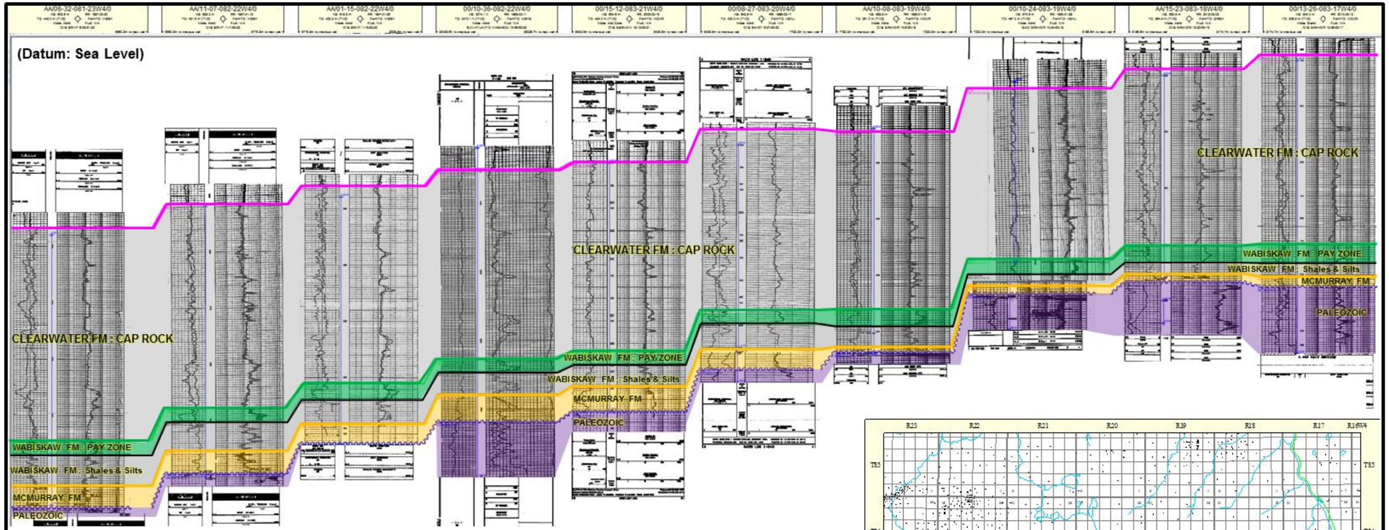
- *Full development inventory lies in the mobile oil area*

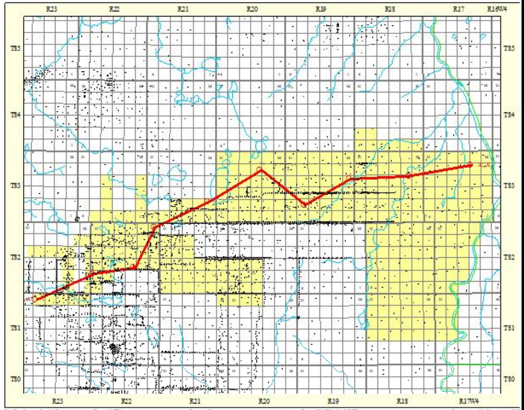
Structure is driven by Paleozoic unconformity and rises dramatically to the NE.

- *A number of gas caps exist on associated highs, mostly in the NE part of the reservoir and are avoided when planning our future development wells*

Reservoir properties of the step out areas in both the mobile and hot water development plans compare very favorably to the rest of the field.

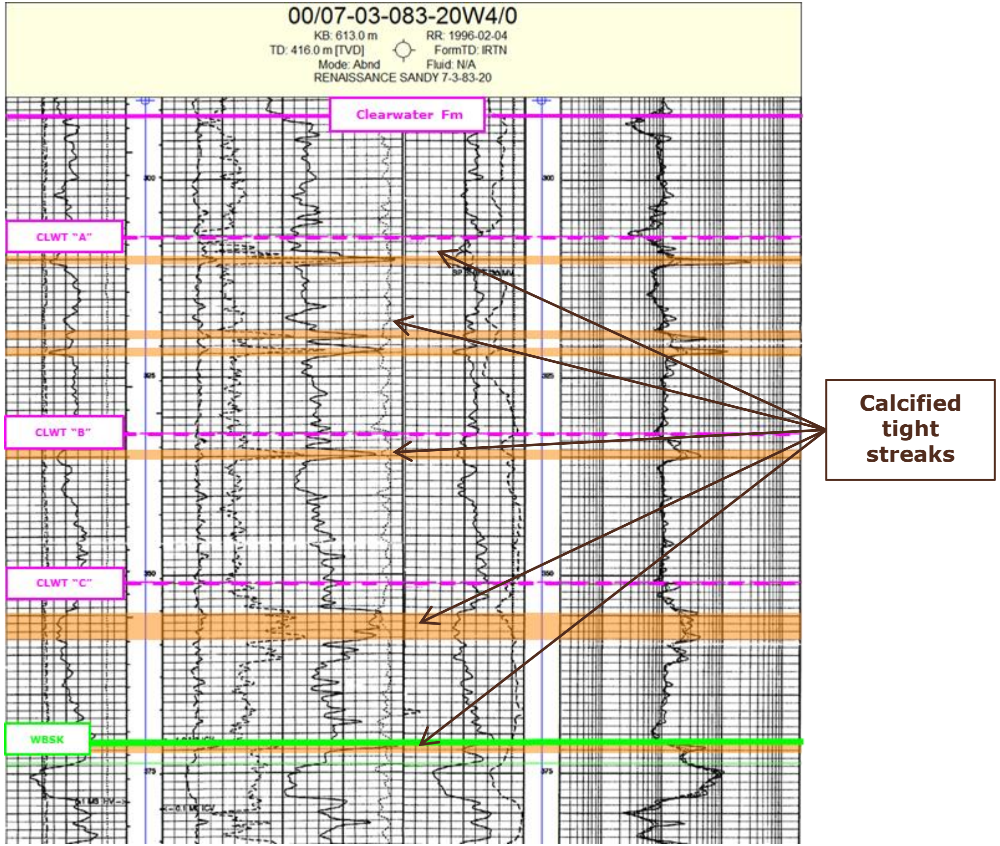
Geological cross section – Field wide strike section





- Wabiskaw Pay zone is uniform throughout the pool, along strike (SW to NE).
- Clearwater Cap rock is approximately 80 m thick across the whole pool. It is a very competent formation comprised of shale and calcified siltstone, which makes it a very robust cap rock.
- Structure rises as you move north due to the rising of the Paleozoic Unconformity.
- We start to lose accommodation space for the Wabiskaw toward the NE as we approach the Paleozoic high.

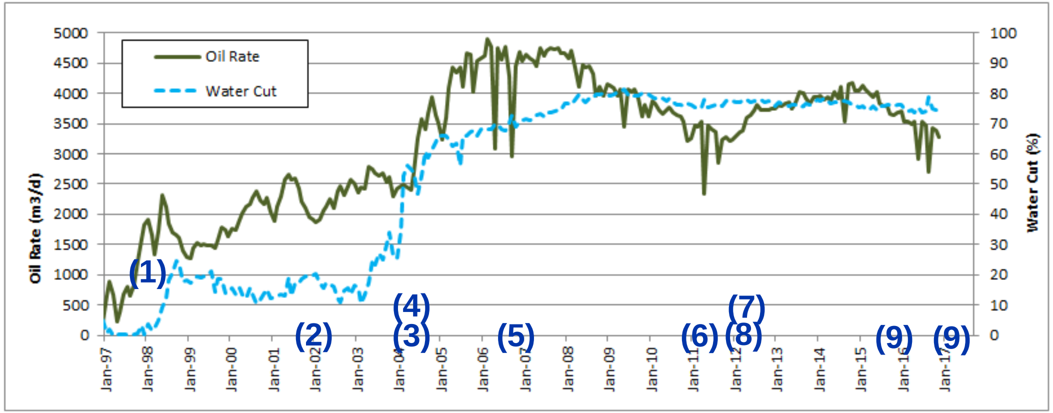
Regional caprock geology: Clearwater and Wabiskaw formation

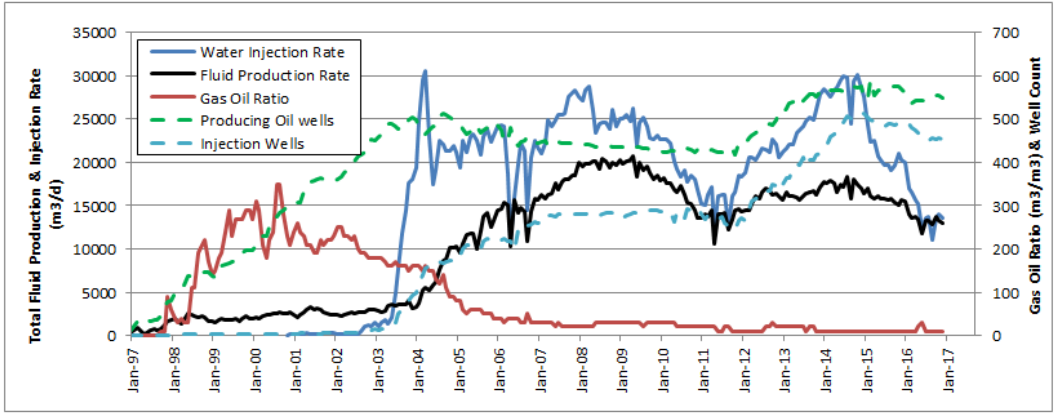


- Top Clearwater to top Wabiskaw porosity includes Clearwater formation, Wabiskaw tight streak and Wabiskaw shale
- 75 to 95 m thick over the oil development area, very gentle dip to the SW
- Clearwater formation can be correlated across entire region
- Clearwater subdivided into four units: three cycles (Clearwater C, B, and A) and a shale unit at the top. The siltstone at the top of the three packages has been cemented into a tight streak or a package of calcareous streaks.
- The Clearwater units and associated packages of tight streaks can be correlated regionally
- The Wabiskaw tight streak is present in every well across the area and can be correlated regionally Clearwater formation deposition is unaffected by karsting or carbonate dissolution. Therefore, Clearwater deposition occurs after these events.

Scheme performance update

Scheme 9404W - Production update (cumulative oil @ Dec. 2016 = 23,111 E^3m^3)

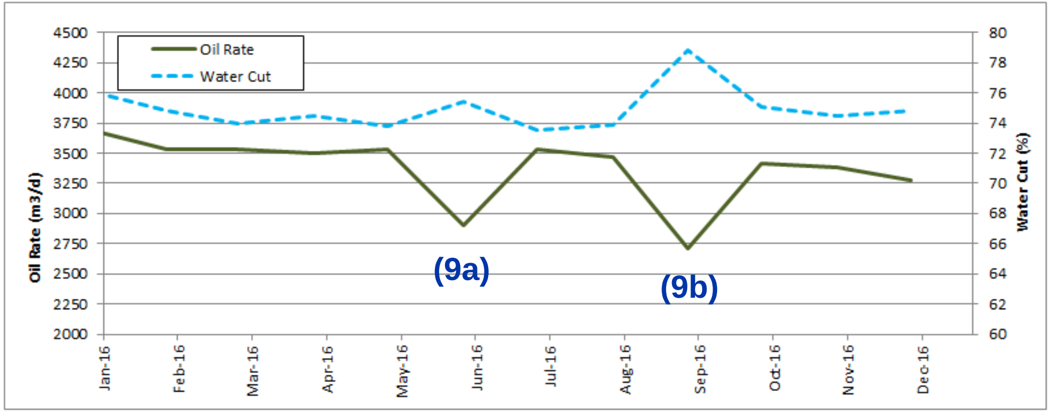


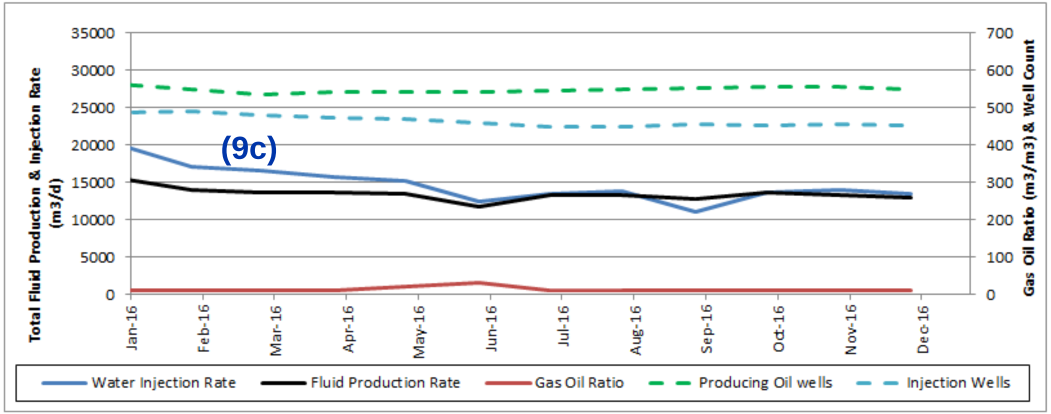


Milestones

1) Primary production (400m inter-well spacing)
2) Waterflood pilot (400m inter-well; injector infilled)
3) Commercial Waterflood
4) Polymer pilot
5) Commercial polymer
6) Injection rates lowered to arrest watercut increases. Injection shut-in on pads for infill drilling program
7) Infill drilling to 100m and 133m inter-well spacing (2011-2014)
8) Hot Water pilot (pad E29)
9) Field-wide optimization of injection rates and polymer consumption

Scheme 9404W – Production update (cumulative oil @ Dec. 2016 = 23,111 E^3m^3)





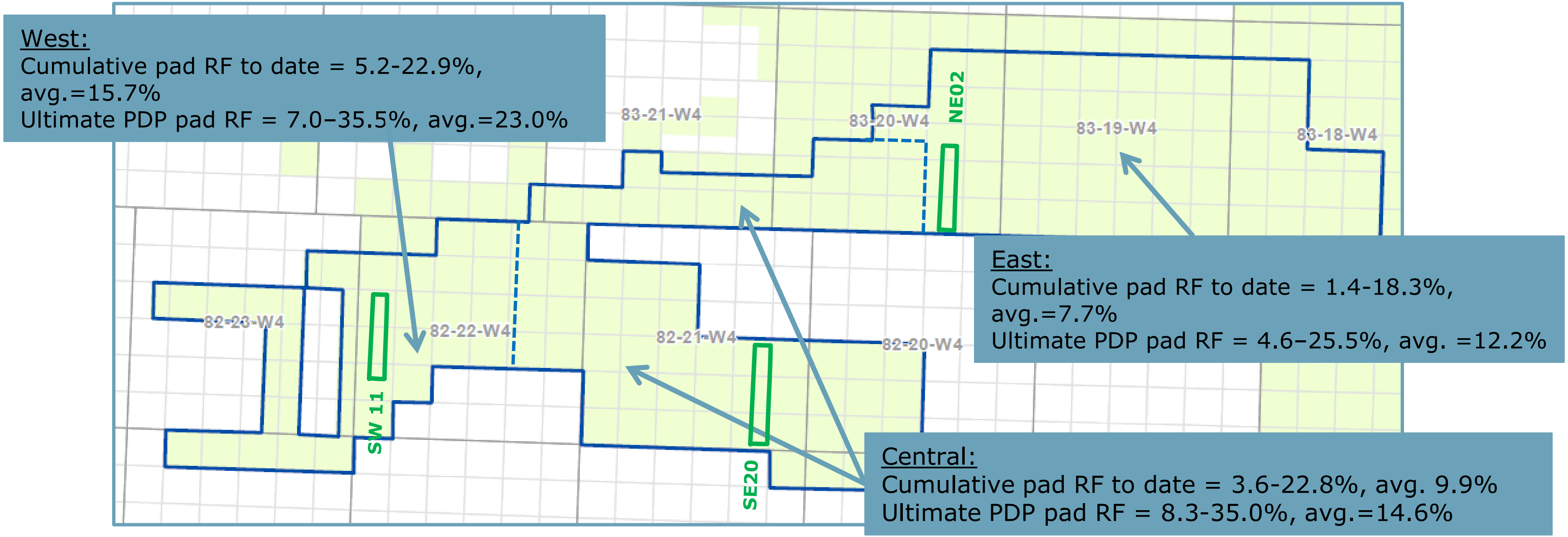
Milestones

9a) Forest fire near battery caused field to be shut in

9b) Seven day facility turn around

9c) Field wide optimization to bring injection rates in line

Current and expected ultimate recovery factors



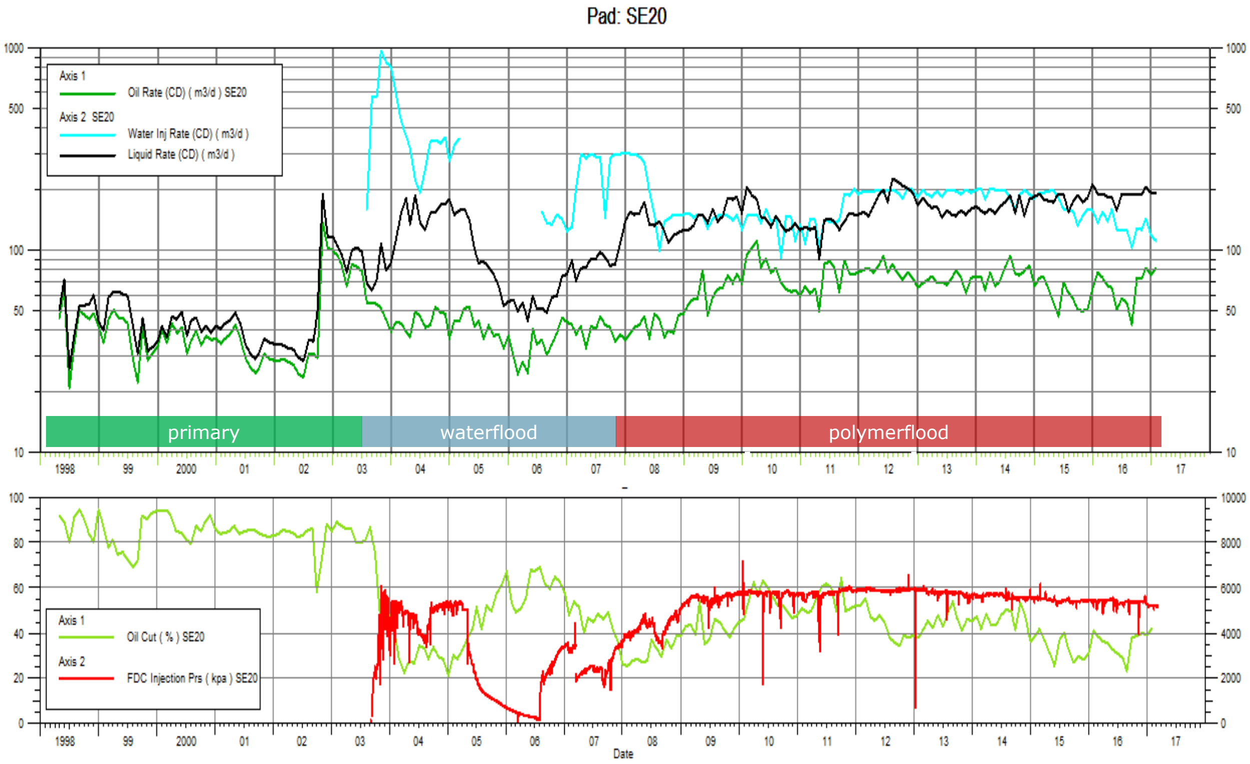
- Recovery factors (RF) are dependent on reservoir quality, heterogeneity, pad maturity, well density/spacing, and if gas caps are present
- Cumulative pad recovery factors include primary recovery

2016 highlights

Injection rate/polymer consumption optimization

- Continued flood management focus in 2016
  - injection rates were reduced to optimize flood performance
- Polymer consumption optimized as supported by technical work

SE20 – Good performance



- Dead Oil visc (N-S): 1488-3908 cp
- Waterflood started in 2003
- Polymer started in 2007
- Oil cut started to increase
- Oil rate increased as a result and remains at peak
- Remedial actions in 2015 & 2016 undertaken to heal breakthroughs were met with success

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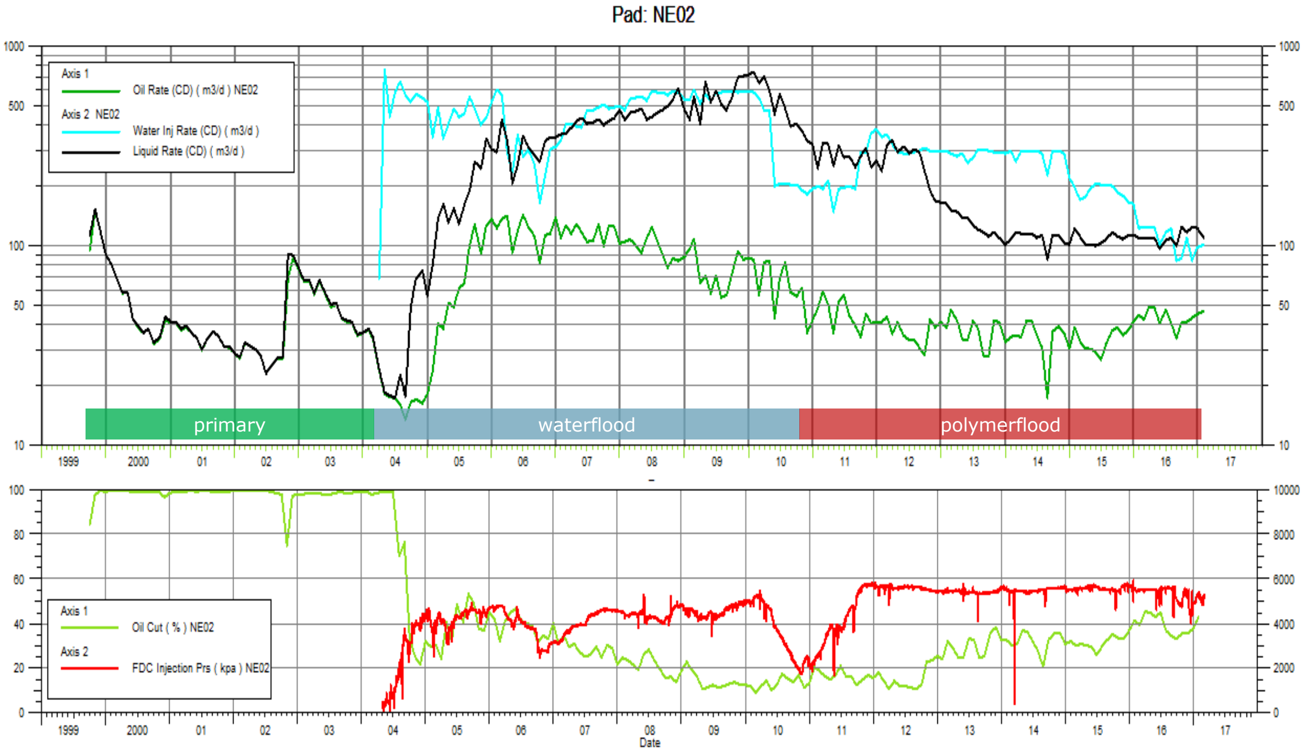
NE02 – Average performance



- Dead Oil visc (N-S): 841-636 cp
- Polymer started in late 2010
- Oil decline rate arrested due to improvement in oil cut
- Oil rate stable for the last five years

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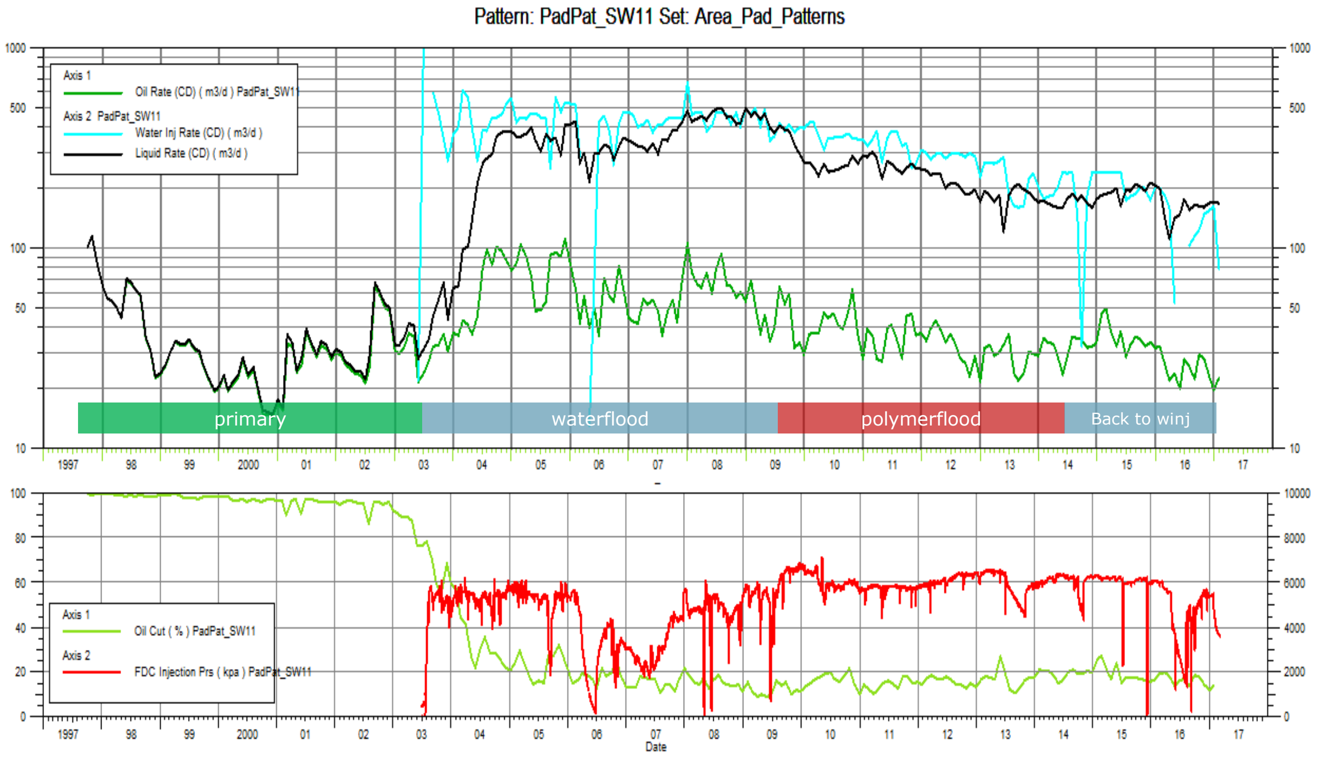
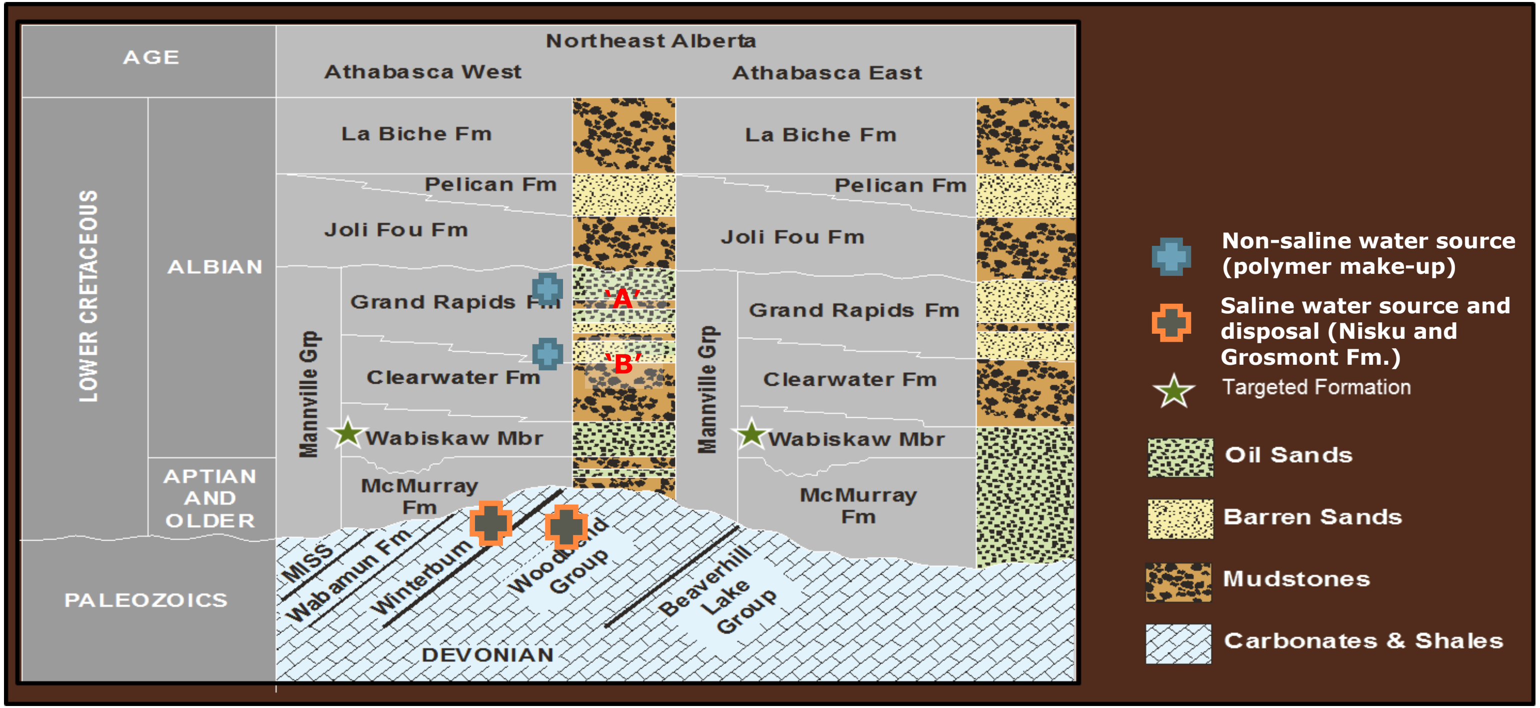
SW11 – Below average performance



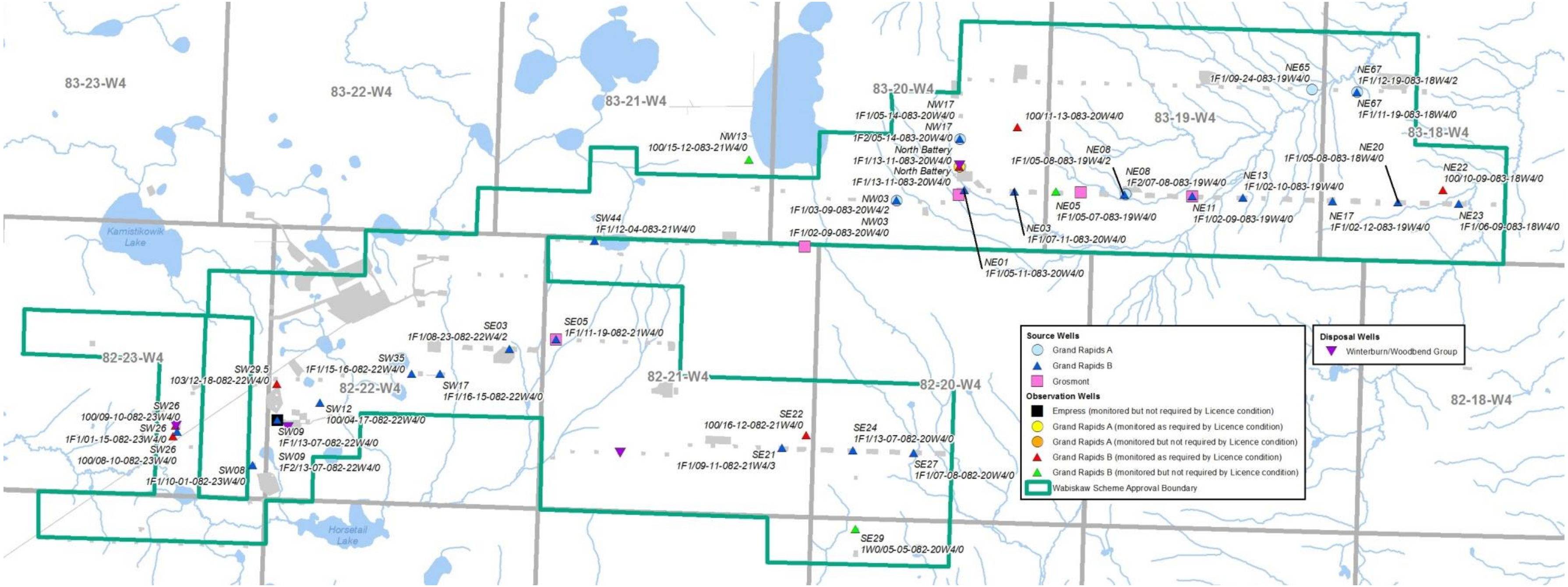
- Dead Oil visc (N-S): 1950-1478 cp
- Polymer started in 2009
- Insignificant increase in oil cut offset by declining liquid
- No observable upside to polymer

Water usage update

Regional hydrogeology



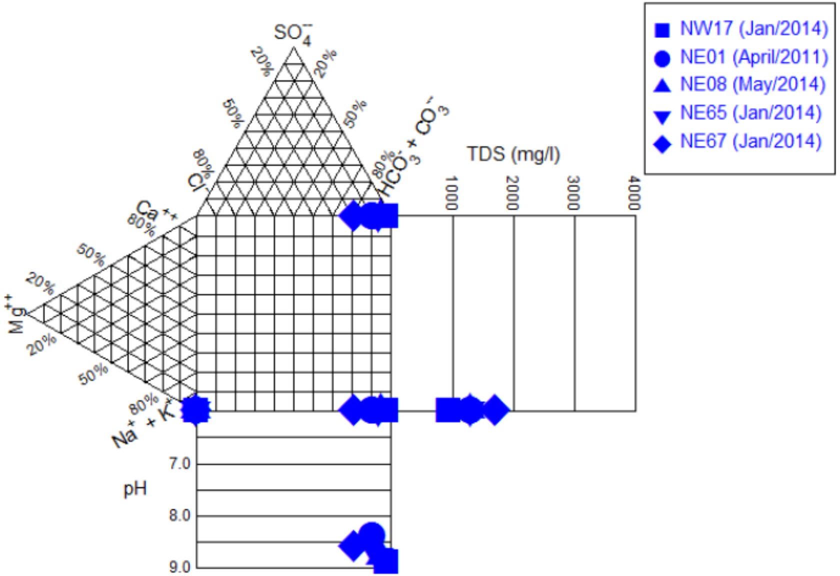
Water source, observation and disposal well locations



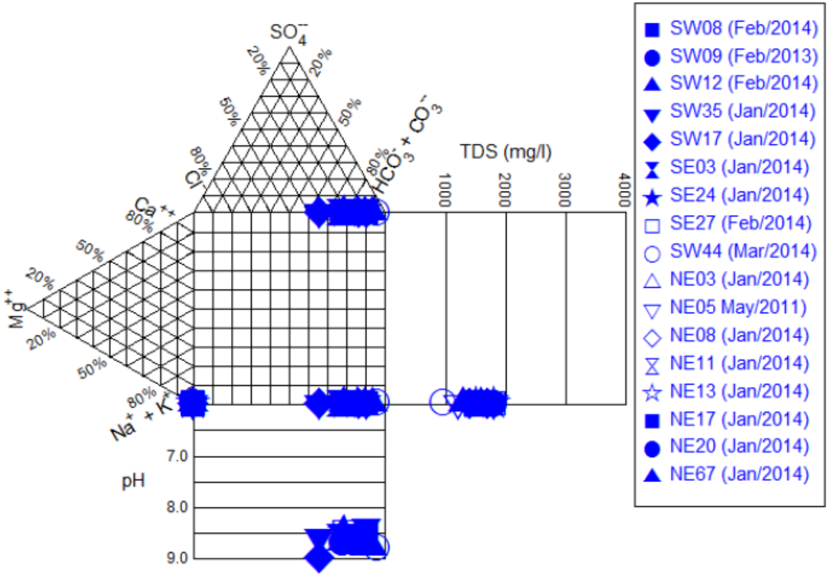
- Grand Rapids formation: hosts non-saline water; source wells usually located at polymer make-up sites
  - Grand Rapids ‘A’ aquifer: 5 source wells, Grand Rapids ‘B’ aquifer: 21 source wells
- Observations wells: Grand Rapids ‘A’ aquifer: 1, Grand Rapids ‘B’ aquifer: 10 (7 required by licence)
- Nisku & Grosmont formations: hosts saline water
  - 5 source wells supplement injection volumes to meet well target injection rates; 4 disposal wells

Water quality- Major ions and TDS

Durov Plot – Grand Rapids 'A' (from 2015 Water Use report)



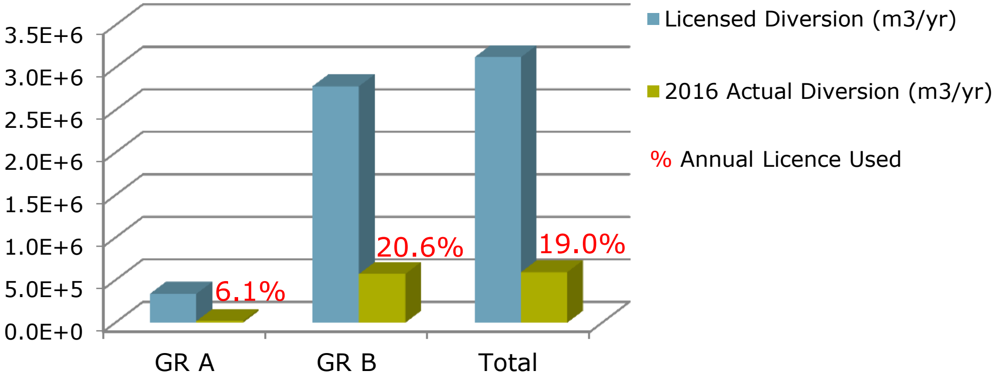
Durov Plot – Grand Rapids 'B' (from 2015 Water Use report)



- Grand Rapids 'A' and 'B' aquifers host Na-HCO_3 type water with TDS in the range of 900 to 2,000 mg/L (good for polymer make-up)

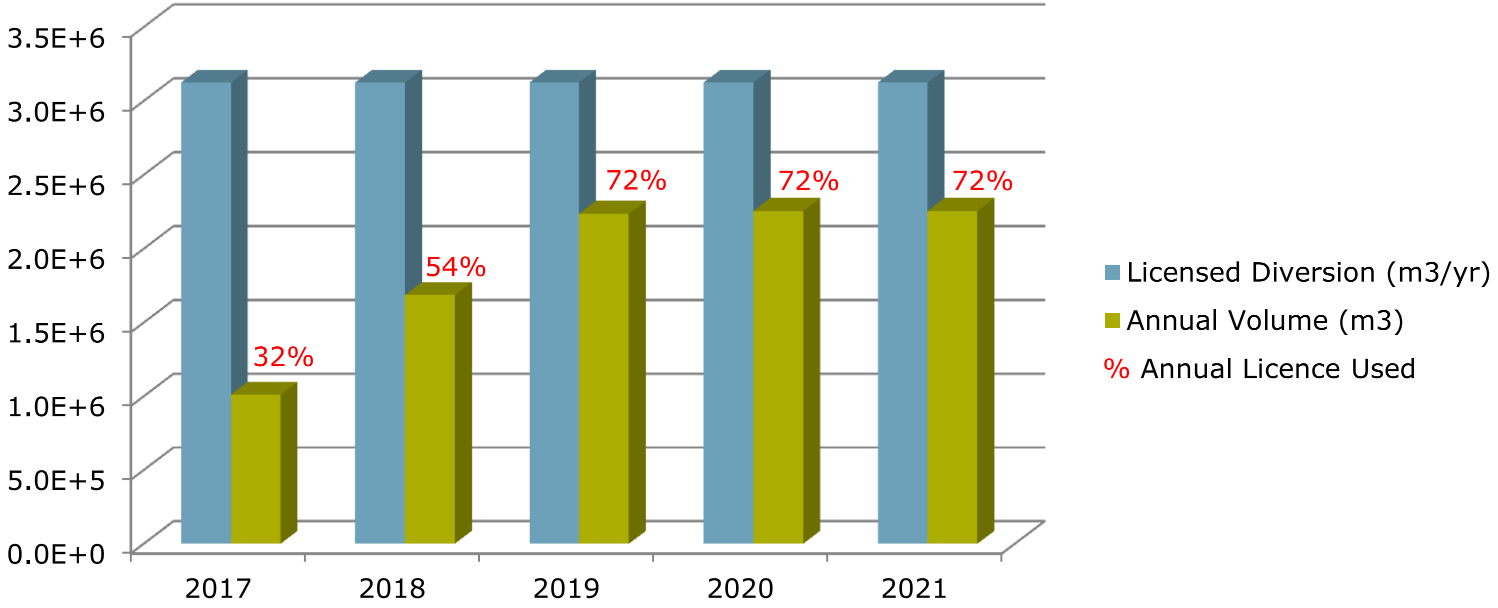
2016 non-saline water use summary

	Grand Rapids 'A'	Grand Rapids 'B'	Total
Annual Licenced Diversion (m^3)	341,458	2,783,067	3,124,525
Actual Diversion (m^3)	20,816	573,800	594,616
Actual % Licence Used	6.1	20.6	19.0



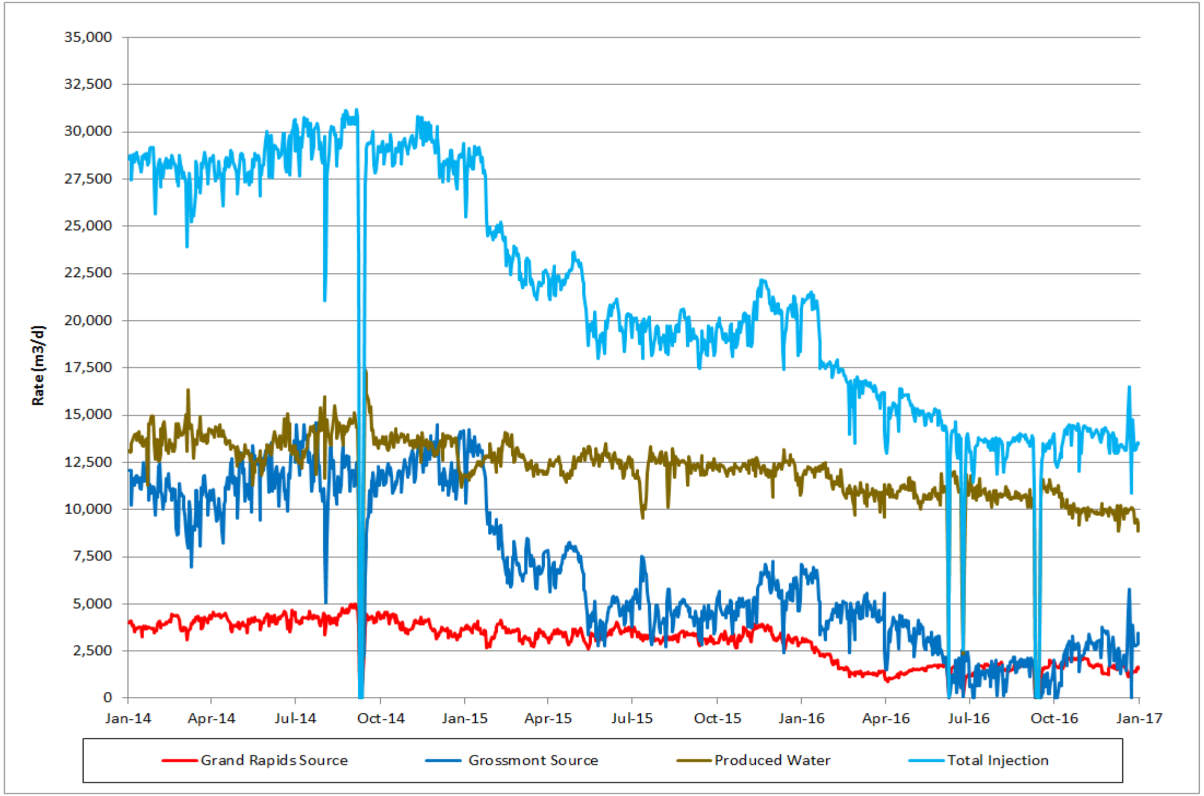
- Cenovus had 26 licenses that allowed for 3,124,525 m^3 of non-saline water usage for polymer injection; <u>two licenses were cancelled in February 2016</u>
- Cenovus used 19% of the total licensed volume; operations scaled back due to the lower price of oil
- Optimization projects are continually executed and evaluated to ensure non-saline water is used to its full benefit for polymer hydration

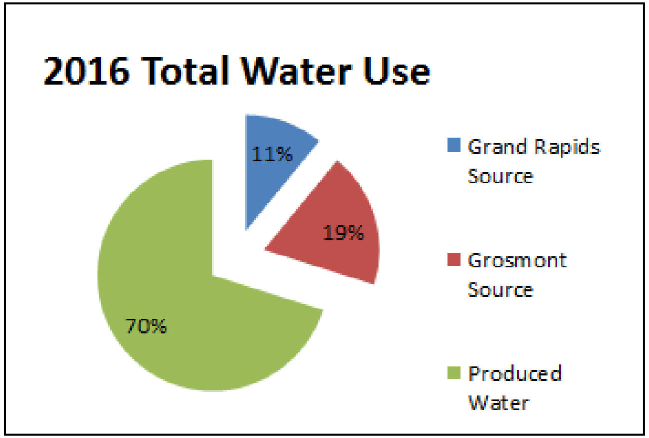
Grand Rapids five year water source forecast



- 2017 to 2018 - forecast a modest increase in annual diversion for polymer make-up
- 2019 to 2021 - forecast annual diversion for polymer make-up ~72% of Licensed Diversion
- Additional diversion license requirements dependent on future development

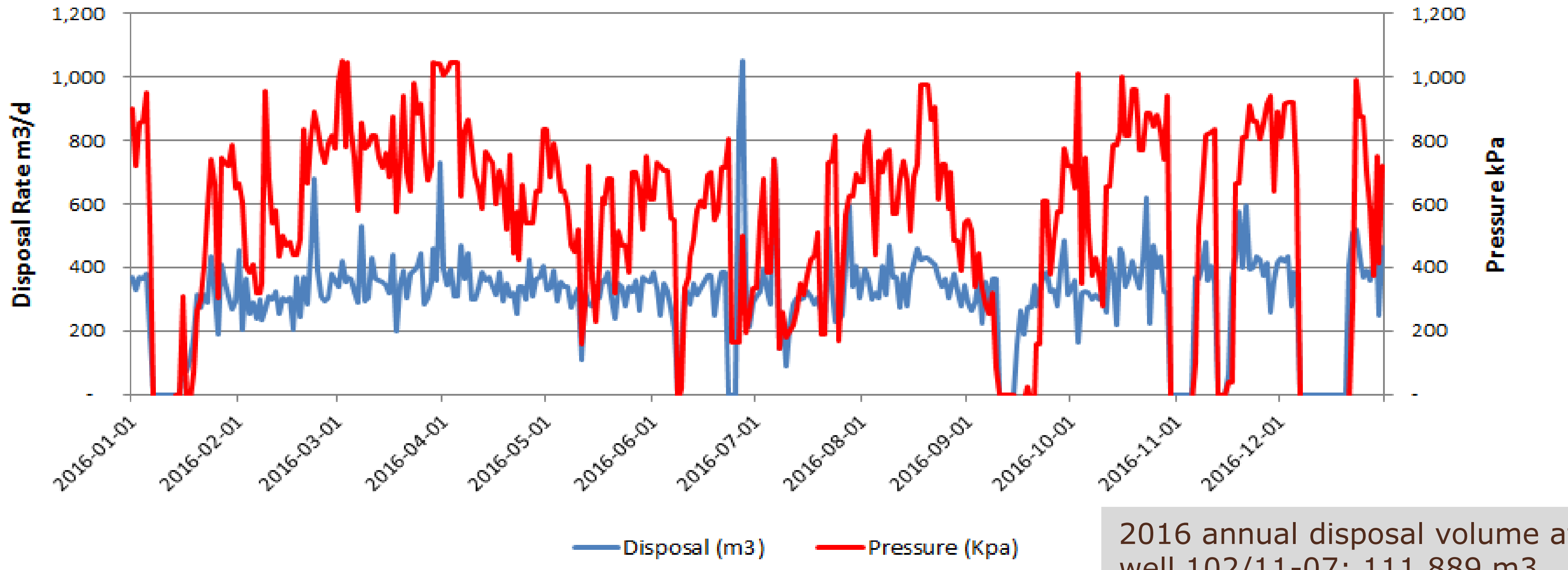
2014 - 2016 total water usage





- Produced water recycle over 98% in 2016
- Reduced Grosmont saline water use in 2015 & 2016 through optimized VRR and reservoir management
- Non-saline Grand Rapids use is effectively managed and mostly used for polymer makeup; non-saline water use was about 11% in 2016

Key water disposal well: 102/11-07-082-22W4



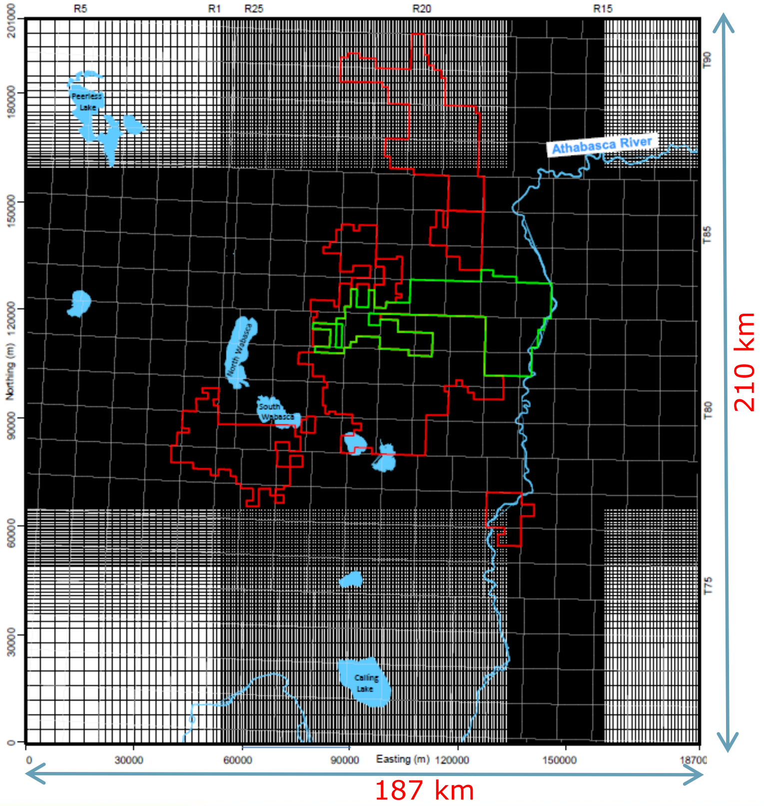
2016 annual disposal volume at well 102/11-07: 111,889 m3

- Required water disposal rates have remained steady
- 102/11-07 well at Main Battery handled approximately 86% of disposal needs in 2016

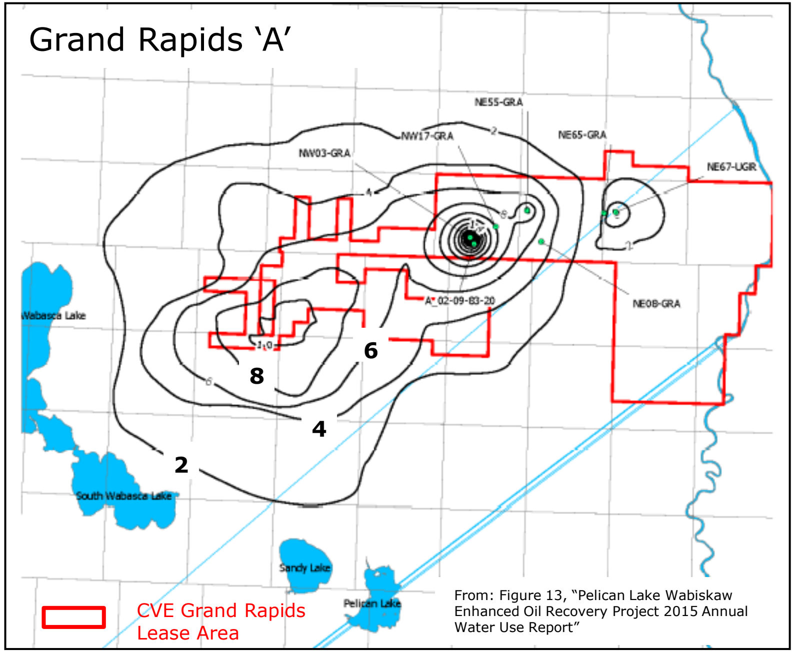
Regional groundwater flow model

Period	Group	Formation	Hydro-stratigraphic unit	Model layer
Quaternary/ Tertiary		Undifferentiated	Quaternary Till	1-3
		Empress (?)	Bedrock Valley Deposits	3
Upper Cretaceous	Colorado	La Biche	Aquitard	4
		Viking	Aquifer/Aquitard	4-6
		Joli Fou	Aquitard	6
Lower Cretaceous	Mannville	Upper (‘A’)	Aquifer/Aquitard	7-10
		Lower (‘B’ & “C”)	Aquifer/Aquitard	11-13
		Clearwater	Aquitard	N/A

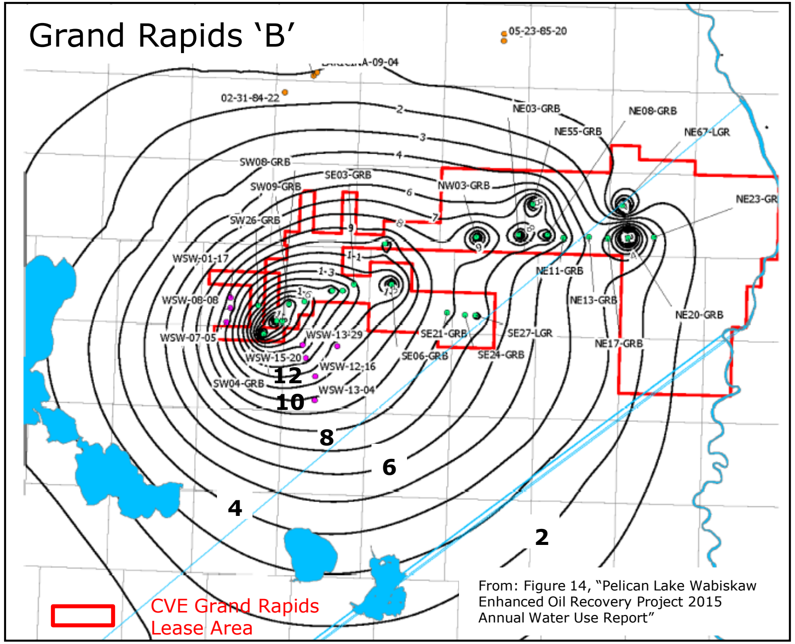
- Regional groundwater flow model (MODFLOW-2000) supports Wabiskaw EOR scheme 9404W (model developed in 2011)



Model simulations – Drawdown (m) in Grand Rapids ‘A’ and ‘B’



From: Figure 13, “Pelican Lake Wabiskaw Enhanced Oil Recovery Project 2015 Annual Water Use Report”



From: Figure 14, “Pelican Lake Wabiskaw Enhanced Oil Recovery Project 2015 Annual Water Use Report”

- Purpose: simulate source water production from the Grand Rapids ‘A’ and ‘B’ aquifers to estimate drawdown in both aquifers and to optimize present and future production rates

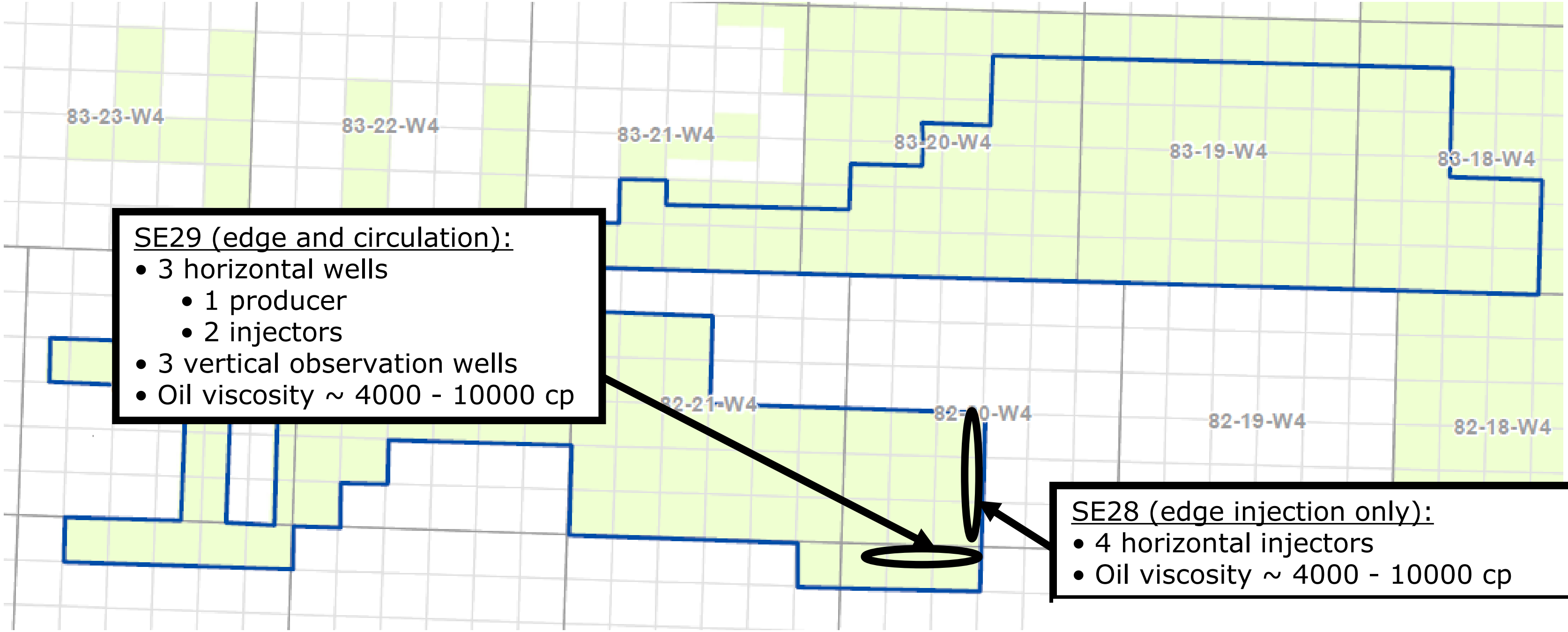
Annual water use reports

- **Previously (<2016) prepared by consultant**
- **Since 2016, prepared by Cenovus staff**
  - utilizes in-house expertise
  - incorporates internal knowledge, experience, and good working relationships with other operators and lease holders
  - integrates Pelican Lake, Wabiskaw and Grand Rapids Pilot learnings
  - reflects commitment to responsible water resource management

Hot water injection update

Pelican Lake hot water injection pilots

Pilot areas are only hot water (no polymer)



SE29 (edge and circulation):
- 3 horizontal wells
  - 1 producer
  - 2 injectors
- 3 vertical observation wells
- Oil viscosity ~ 4000 - 10000 cp

SE28 (edge injection only):
- 4 horizontal injectors
- Oil viscosity ~ 4000 - 10000 cp

- Both pilots target higher oil viscosity areas within Pelican Lake
- Expansion opportunities being evaluated offsetting current SE29 pilot

Pelican Lake hot water injection status

SE29 pilot status update (edge and circulation GR source)

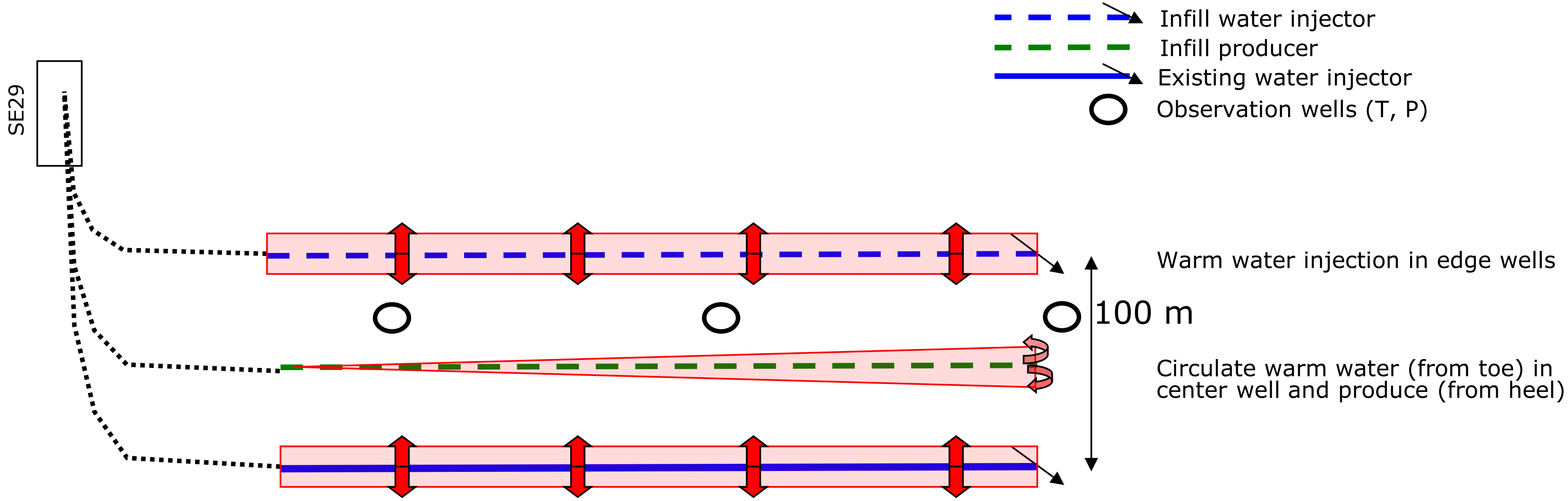
- Phase 1 complete
  - primary production: November 28, 2010 - May 31, 2011
- Phase 2 complete
  - warm waterflood: June 1, 2011 – March 13, 2012
- Phase 3 ongoing
  - hot water circulation (Patent Pending): March 14, 2012 – through January 2015
  - boiler facilities shut-in February 2015, pilot underwent cold waterflood and cold water circulation during remainder of 2015
  - warm water circulation recommenced in July 2016 (high efficiency line heater)

SE28 pilot status update (edge only produced water)

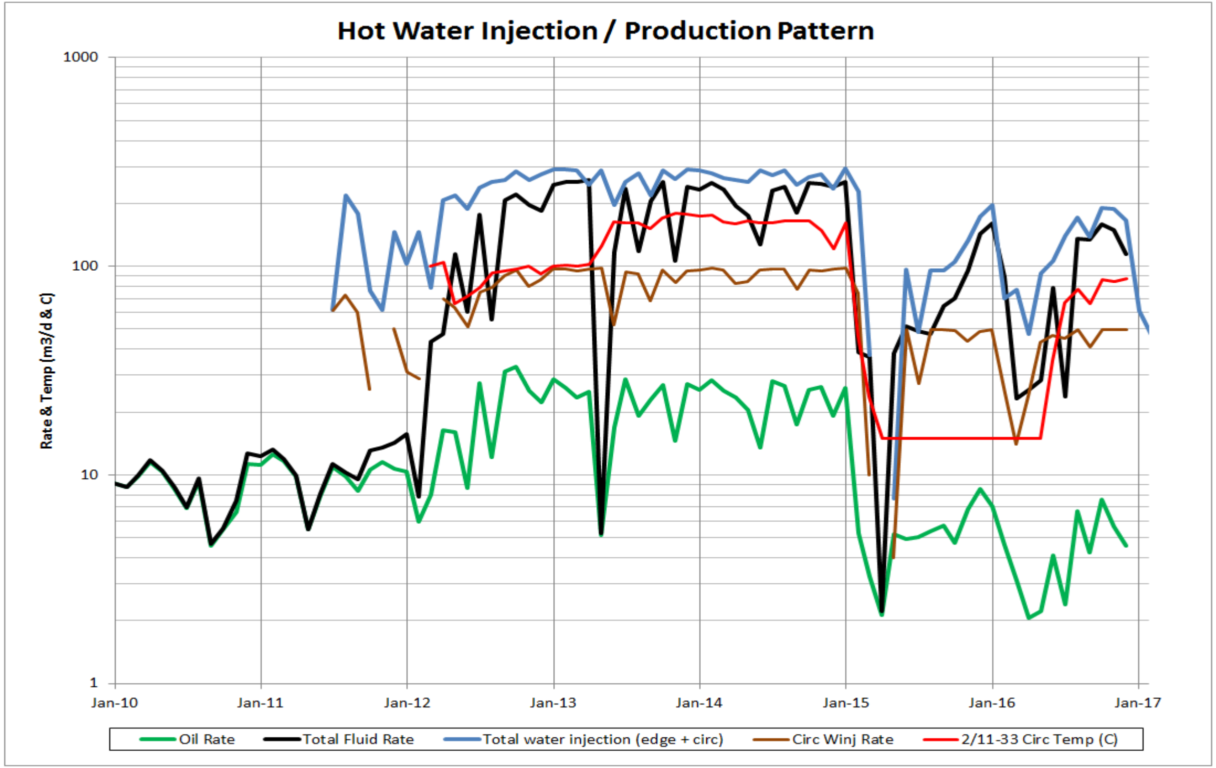
- Four injectors at SE28 initially targeted a surface injection temperature of 80°C using energy efficient line heaters (max temp 90°C)
  - actual injection temperatures remained much lower than target in 2014-2015 due to technical issues with line heaters and fouling, design optimization was completed on one heater with limited success
  - pilot was shut-in

SE29 hot water pilot well configuration

Phase 3: Warm water circulation



SE29 Hot Water pilot performance



Primary	Warm WF	Hot WF & Hot Circulation	Cold WF & Cold Circ.	Cold WF & Warm Circ.
Phase 1	Phase 2	Phase 3		

- Circulation temperature entered 2015 at ~160°C prior to being ramped down in February 2015
- Injection rate is representative of total injection from circulation & offsetting injectors
- Oil rates returned to approximately 5m^3/d in 2015 after resuming cold waterflood operation, limited impact from cold circulation in Q4-2015
- High efficiency lineheater installed and returned to warm circulation in July 2016

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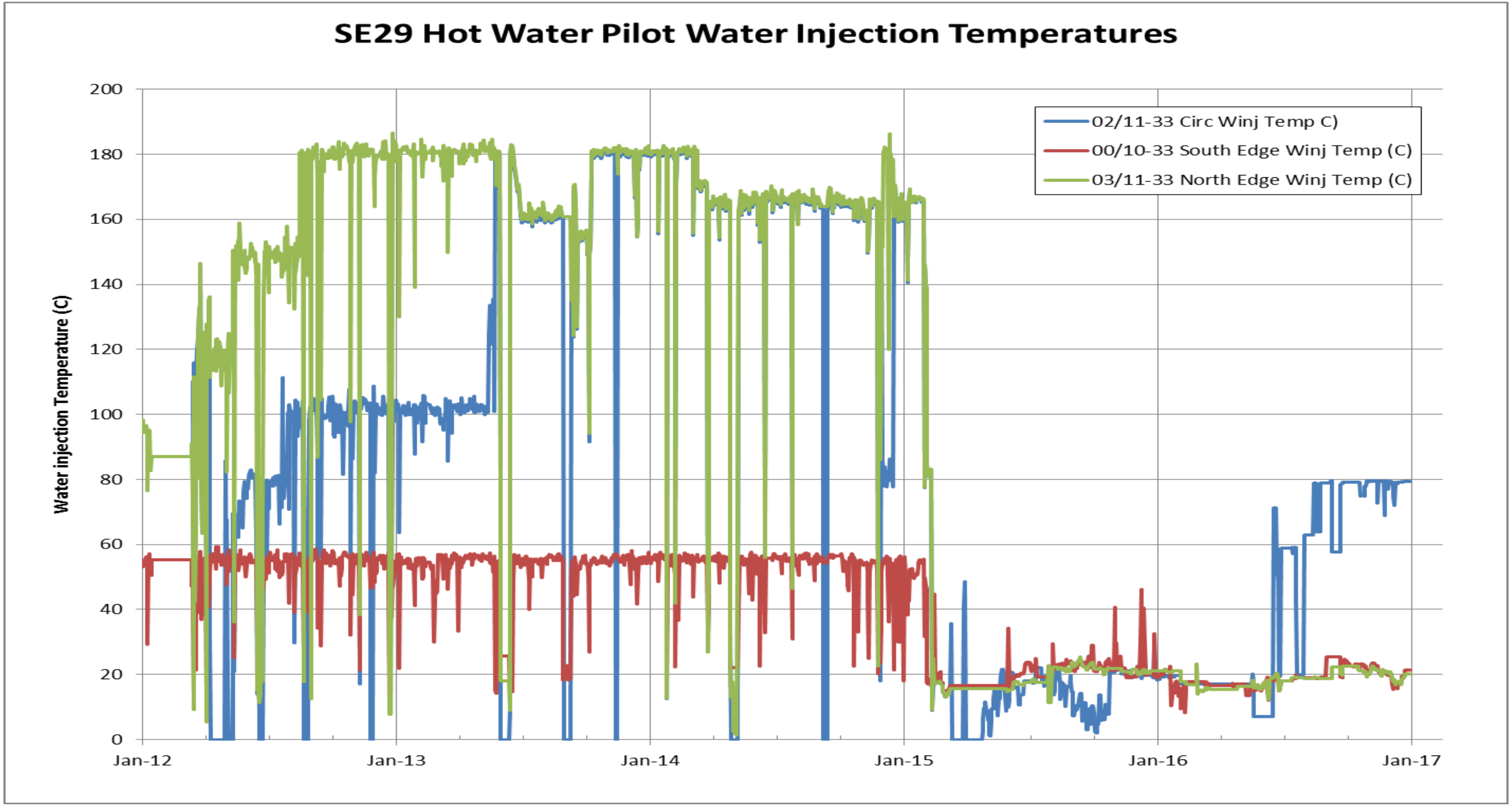
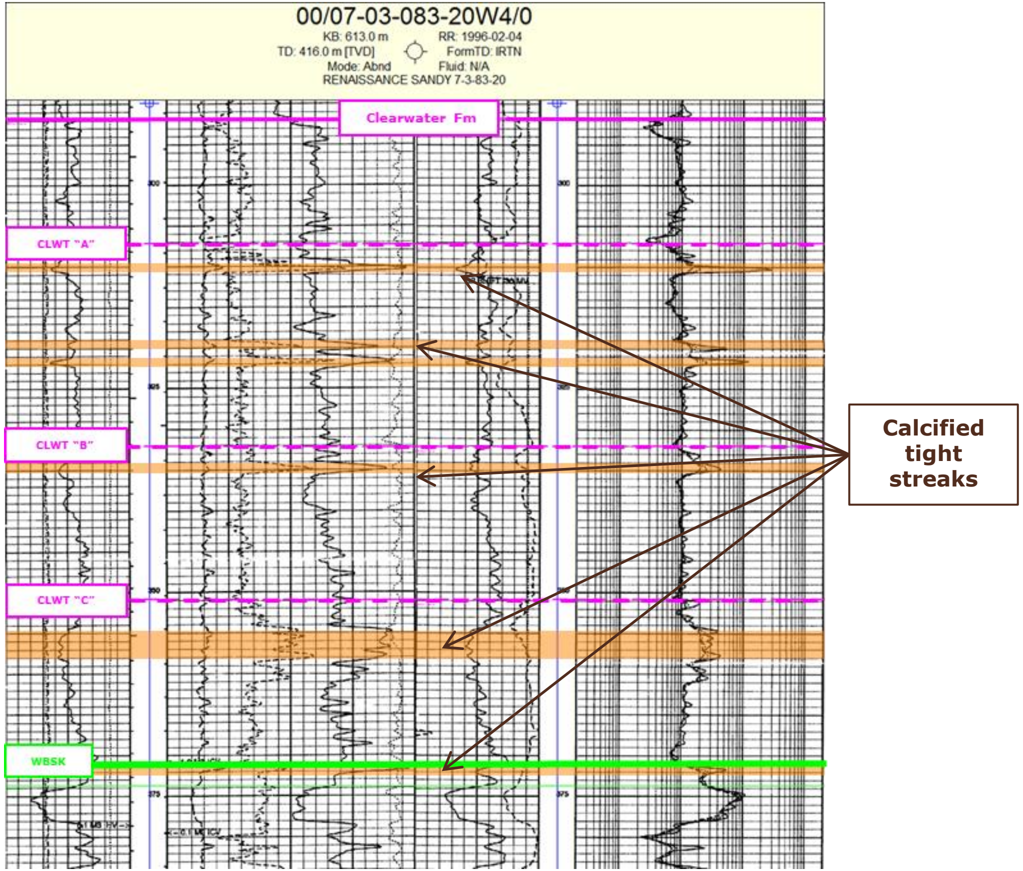

SE29 Hot Water Pilot Water Injection Temperatures
Water injection Temperature (C)
200
180
160
140
120
100
80
60
40
20
0
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
02/11-33 Circ Winj Temp C)
00/10-33 South Edge Winj Temp (C)
03/11-33 North Edge Winj Temp (C)

Cap rock monitoring program

Regional Caprock Geology: Clearwater and Wabiskaw Formation



- Top Clearwater to top Wabiskaw porosity includes Clearwater formation, Wabiskaw tight streak and Wabiskaw shale
- **75 to 95 m thick** over the oil development area, very gentle dip to the SW
- Clearwater formation can be correlated across entire region
- Clearwater subdivided into four units: three cycles (Clearwater C, B, and A) and a shale unit at the top. The siltstone at the top of the three packages has been cemented into a tight streak or a package of calcareous streaks.
- The Clearwater units and associated packages of tight streaks can be correlated regionally
- The Wabiskaw tight streak is present in every well across the area and can be correlated regionally
- Clearwater formation deposition is unaffected by karsting or carbonate dissolution. Therefore, Clearwater deposition occurs after these events.

Cap rock monitoring summary

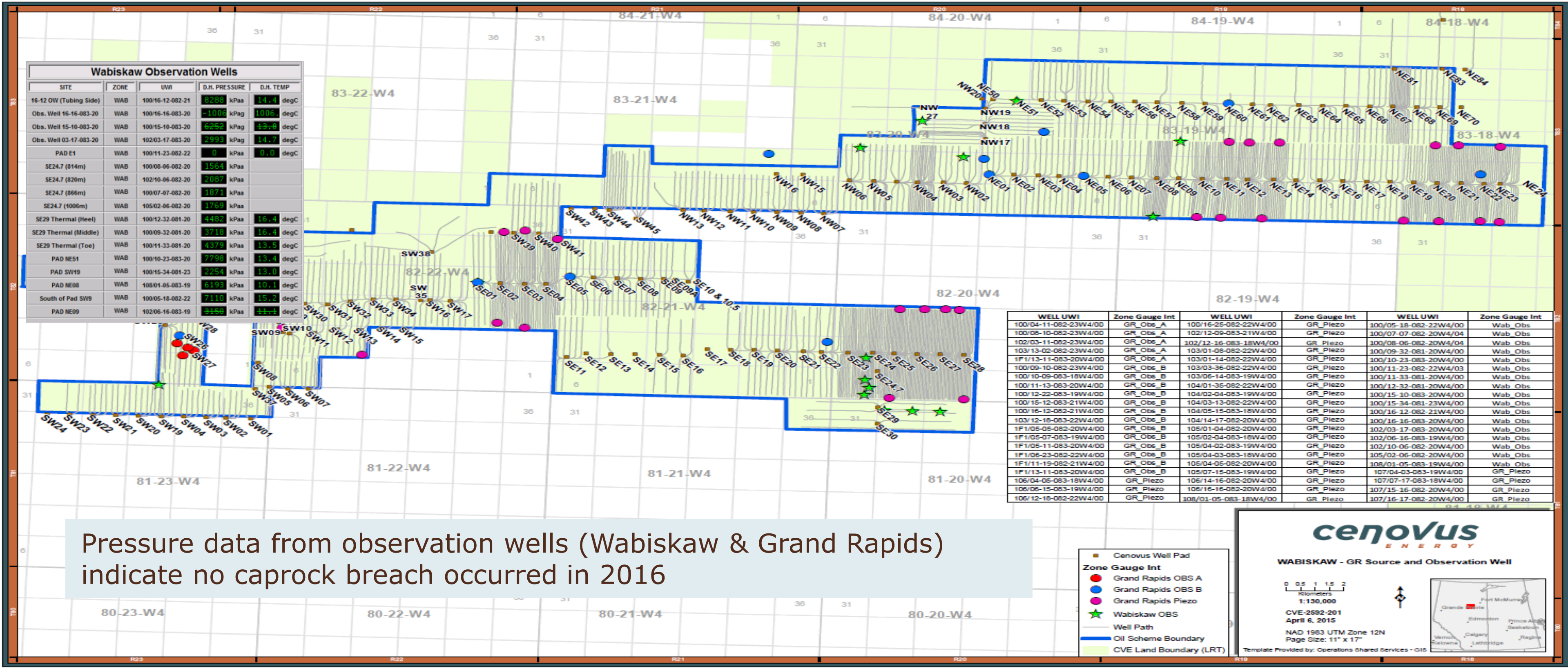
No indication of caprock breach based on ongoing flood surveillance

- Previous third-party studies indicate the Clearwater shale caprock is safe against the failure mechanisms studied at injection pressures up to 14 Mpa (bottomhole)
  - allowable maximum wellhead injection pressure 7MPa
- Real-time monitoring of Wabiskaw injection pressures and regular review of pattern voidage replacement ratio (VRR)
  - injection pressures and VRR's support containment within the Wabiskaw. Currently, overall VRR=1.1 (instantaneous) with average wellhead injection pressure 4.7 MPa
  - using an automated field-wide alarm system in SCADA-ProcessNet to monitor and notify engineers of any changes in injectivity
  - long-term monitoring: hall plots
- Real-time monitoring of the bottom hole pressures and rates in Grand Rapids water source wells and bottom hole pressures in Grand Rapids observation wells. No increase in pressures in the Grand Rapids observation wells to suggest any communication with Wabiskaw formation.

Annual water analysis on all Grand Rapids water source wells

- No increases in total dissolved solids (TDS) observed that can be attributed to a loss of caprock integrity

Observation well summary



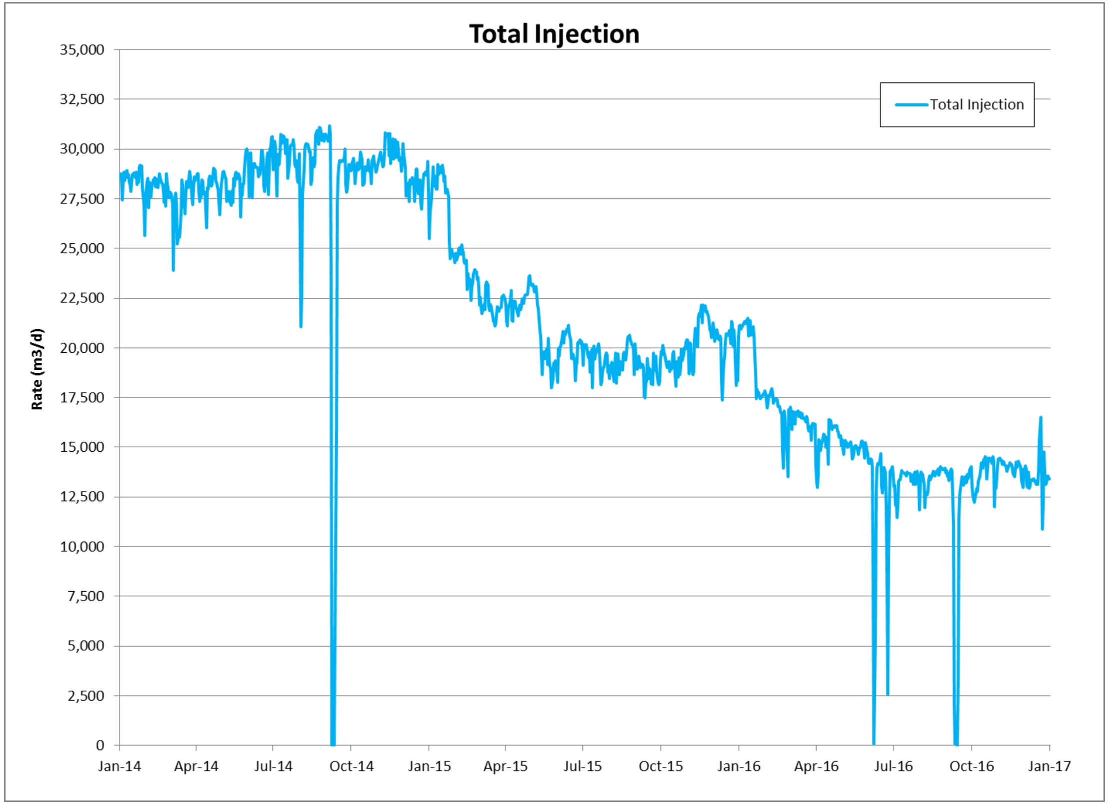
Wabiskaw Observation Wells

SITE	ZONE	UWI	D.H. PRESSURE	D.H. TEMP
16-12 OW (Tubing Side)	WAB	100/16-12-082-21	8288 kPaa	14.4 degC
Obs. Well 16-16-083-20	WAB	100/16-16-083-20	-1006 kPag	1006. degC
Obs. Well 15-10-083-20	WAB	100/15-10-083-20	~~6252~~ kPag	~~13.8~~ degC
Obs. Well 03-17-083-20	WAB	102/03-17-083-20	2993 kPag	14.7 degC
PAD E1	WAB	100/11-23-082-22	0 kPaa	0.0 degC
SE24.7 (814m)	WAB	100/08-06-082-20	1564 kPaa	
SE24.7 (820m)	WAB	102/10-06-082-20	2087 kPaa	
SE24.7 (866m)	WAB	100/07-07-082-20	1871 kPaa	
SE24.7 (1006m)	WAB	105/02-06-082-20	1769 kPaa	
SE29 Thermal (Heel)	WAB	100/12-32-081-20	4482 kPaa	16.4 degC
SE29 Thermal (Middle)	WAB	100/09-32-081-20	3718 kPaa	16.4 degC
SE29 Thermal (Toe)	WAB	100/11-33-081-20	4379 kPaa	13.5 degC
PAD NE51	WAB	100/10-23-083-20	7798 kPaa	13.4 degC
PAD SW19	WAB	100/15-34-081-23	2254 kPaa	13.0 degC
PAD NE08	WAB	108/01-05-083-19	6193 kPaa	10.1 degC
South of Pad SW9	WAB	100/05-18-082-22	7110 kPaa	15.2 degC
PAD NE09	WAB	102/06-16-083-19	~~3150~~ kPaa	~~11.1~~ degC

WELL UWI	Zone Gauge Int	WELL UWI	Zone Gauge Int	WELL UWI	Zone Gauge Int
100/04-11-082-23W4/00	GR_Obs_A	100/16-25-082-22W4/00	GR_Piezo	100/05-18-082-22W4/00	Wab_Obs
100/08-10-082-23W4/00	GR_Obs_A	102/12-09-083-21W4/00	GR_Piezo	100/07-07-082-20W4/04	Wab_Obs
102/03-11-082-23W4/00	GR_Obs_A	102/12-16-083-18W4/00	GR_Piezo	100/08-06-082-20W4/04	Wab_Obs
103/13-02-082-23W4/00	GR_Obs_A	103/01-08-082-22W4/00	GR_Piezo	100/09-32-081-20W4/00	Wab_Obs
1F1/13-11-083-20W4/00	GR_Obs_A	103/01-14-082-22W4/00	GR_Piezo	100/10-23-083-20W4/00	Wab_Obs
100/09-10-082-23W4/00	GR_Obs_B	103/03-36-082-22W4/00	GR_Piezo	100/11-23-082-22W4/03	Wab_Obs
100/10-09-083-18W4/00	GR_Obs_B	103/06-14-083-19W4/00	GR_Piezo	100/11-33-081-20W4/00	Wab_Obs
100/11-13-083-20W4/00	GR_Obs_B	104/01-35-082-22W4/00	GR_Piezo	100/12-32-081-20W4/00	Wab_Obs
100/12-22-083-19W4/00	GR_Obs_B	104/02-04-083-19W4/00	GR_Piezo	100/15-10-083-20W4/00	Wab_Obs
100/15-12-083-21W4/00	GR_Obs_B	104/03-13-082-22W4/00	GR_Piezo	100/15-34-081-23W4/00	Wab_Obs
100/16-12-082-21W4/00	GR_Obs_B	104/05-15-083-18W4/00	GR_Piezo	100/16-12-082-21W4/00	Wab_Obs
103/12-18-083-22W4/00	GR_Obs_B	104/14-17-082-20W4/00	GR_Piezo	100/16-16-083-20W4/00	Wab_Obs
1F1/05-05-082-20W4/00	GR_Obs_B	105/01-04-082-20W4/00	GR_Piezo	102/03-17-083-20W4/00	Wab_Obs
1F1/05-07-083-19W4/00	GR_Obs_B	105/02-04-083-18W4/00	GR_Piezo	102/06-16-083-19W4/00	Wab_Obs
1F1/05-11-083-20W4/00	GR_Obs_B	105/04-02-083-19W4/00	GR_Piezo	102/10-06-082-20W4/00	Wab_Obs
1F1/06-23-082-22W4/00	GR_Obs_B	105/04-03-083-18W4/00	GR_Piezo	105/02-06-082-20W4/00	Wab_Obs
1F1/11-19-082-21W4/00	GR_Obs_B	105/04-05-082-20W4/00	GR_Piezo	108/01-05-083-19W4/00	Wab_Obs
1F1/13-11-083-20W4/00	GR_Obs_B	105/07-15-083-19W4/00	GR_Piezo	107/04-03-083-19W4/00	GR_Piezo
106/04-05-083-18W4/00	GR_Piezo	106/14-16-082-20W4/00	GR_Piezo	107/07-17-083-18W4/00	GR_Piezo
106/06-15-083-19W4/00	GR_Piezo	106/16-16-082-20W4/00	GR_Piezo	107/15-16-082-20W4/00	GR_Piezo
106/12-18-082-22W4/00	GR_Piezo	108/01-05-083-18W4/00	GR_Piezo	107/16-17-082-20W4/00	GR_Piezo

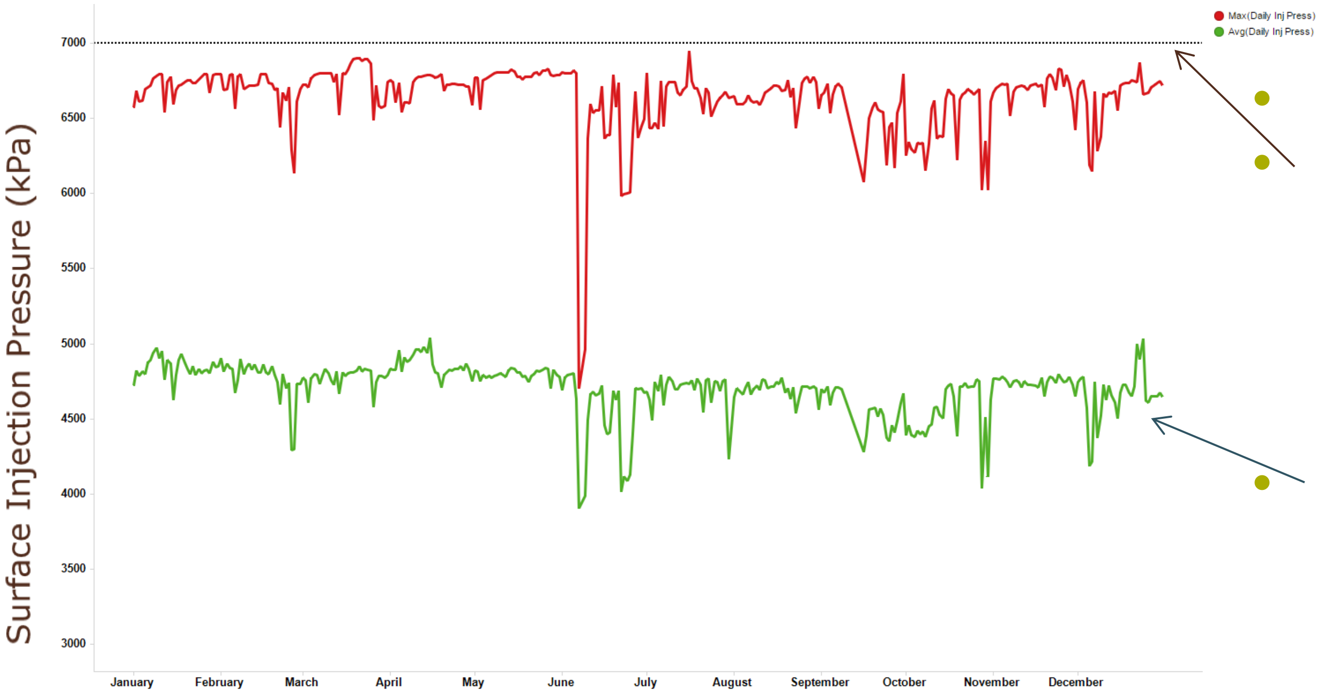
Pressure data from observation wells (Wabiskaw & Grand Rapids) indicate no caprock breach occurred in 2016

2014 - 2016 Pelican daily injection volumes



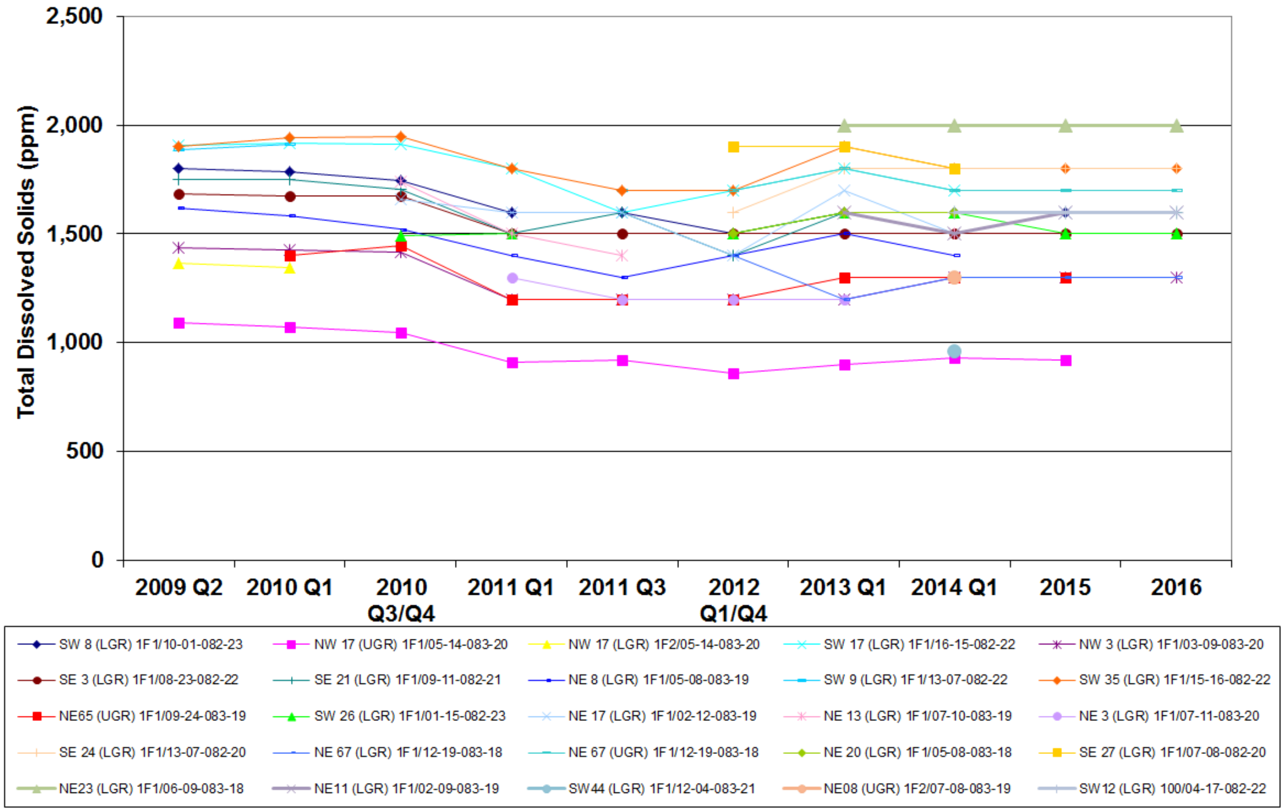
- Injection pressures reduced due to lower water injection volumes

Injection pressure: Maximum & average



- Total 525 injection wells
- Allowable maximum wellhead injection pressure = 7,000kPa
  - SCADA system logic has alarm and shut-downs set below 7,000KPa
- Average injection pressure fairly constant ~4700 kPa

Grand Rapids water source well TDS tracking



- Continued annual surveillance of Grand Rapids TDS at the source wells
- No deviation from TDS baseline through time (calculated TDS)
- Exceeding annual monitoring requirements

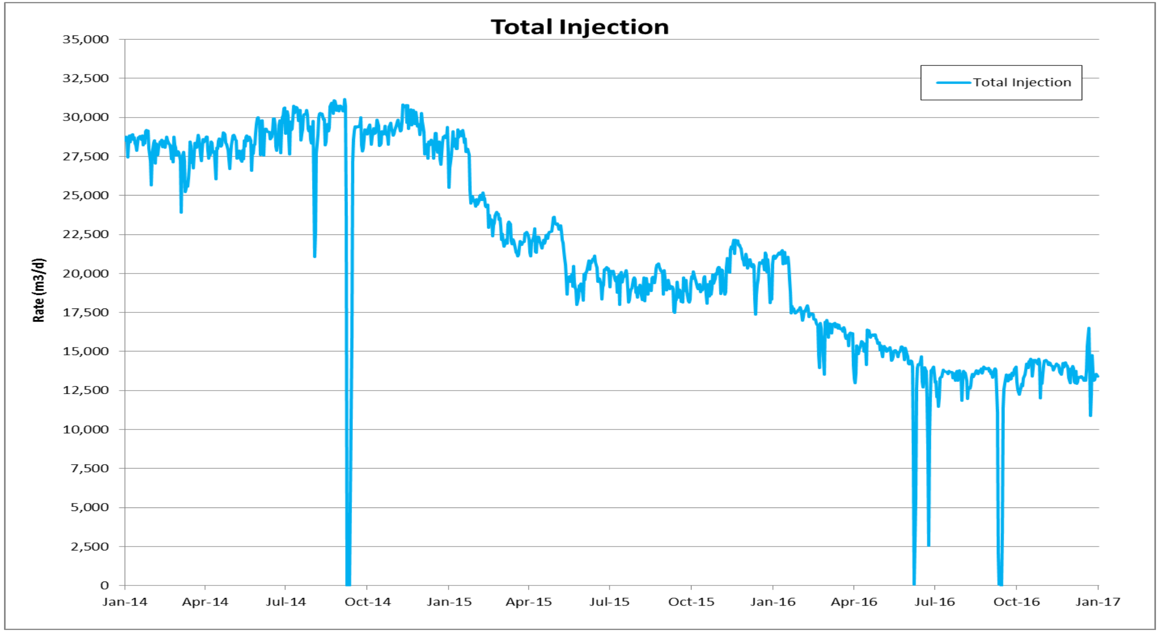
Casing Integrity

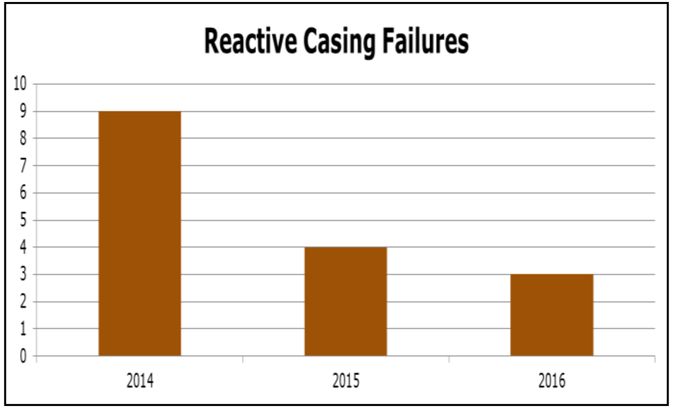
Casing Failure Prevention Program Update

- **Initial program identified 55 High Risk wells identified based on casing rated collapse pressure, offsetting downhole injection pressure, dogleg severity, offsetting PV polymer injected and proximity to breakthrough**
- **Program consisted of installation of a liner extension or "stacked liner" to cover area of expected failure within zone**
- **Only 10 wells remaining from initial program**
- **Injection pressures have been trending down as injected volumes have been reduced. This has lowered the risk rating on the remaining wells in the original program to a level where we do not plan on proactively installing stacked liners**
- **Casing failures on wells outside of program have also been trending down with injection rate and pressure**
- **Sufficient capital in place to react and repair casing failures as they are identified**

Casing Failure Prevention Program Update

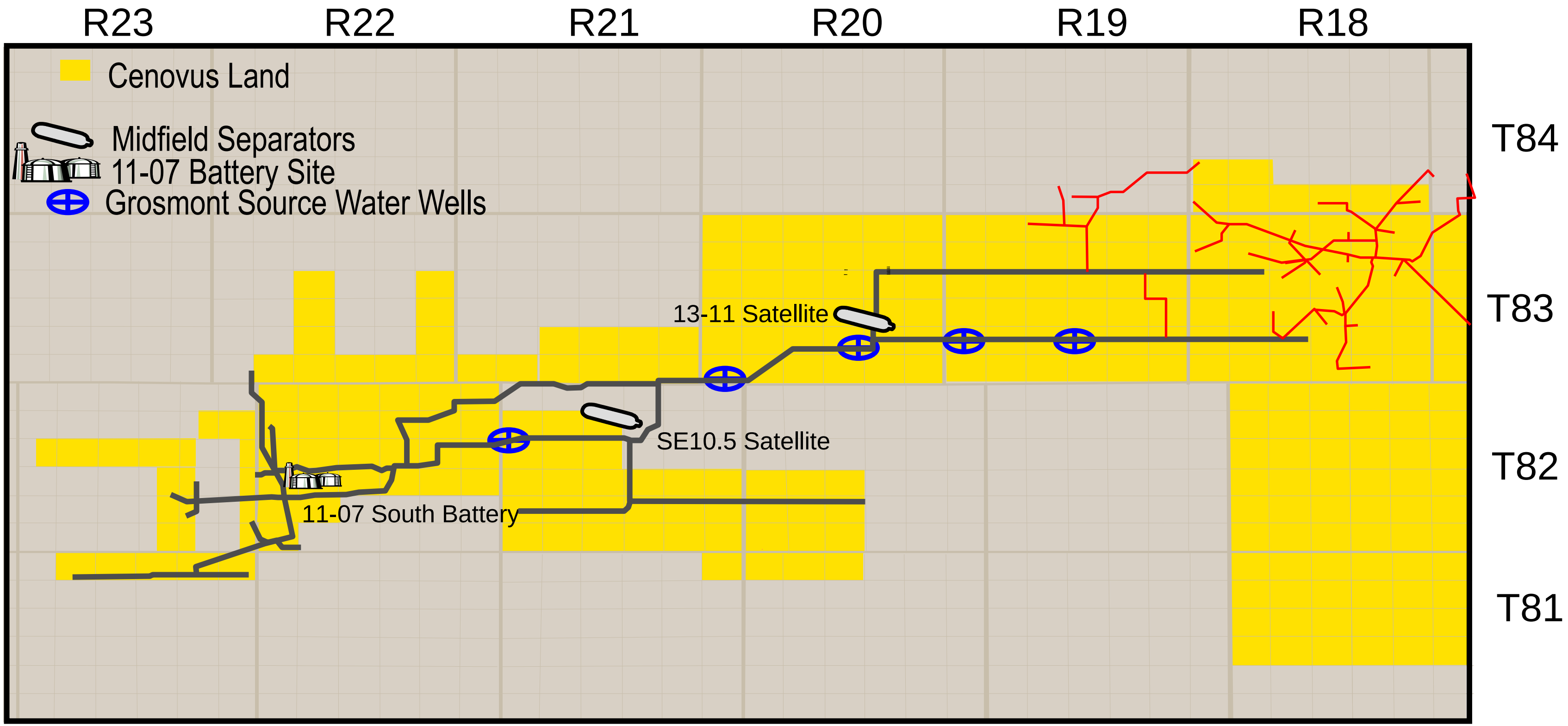
- **Casing failures on wells outside of program have also been trending down with lowering injection rates and pressures**





Facilities update

Pelican Lake facilities map



Pelican Lake major facilities description

13-11 Satellite

- Utilizes two inclined free water knock out vessels (cold) to remove as much free water as possible from emulsion before sending to South Battery for processing
- Free water is pumped into high pressure injection line

SE10.5 Satellite

- Utilizes one inclined free water knock out vessel (cold) to remove as much free water as possible from emulsion before sending to South Battery for processing (suspended in 2016)
- Free water is pumped into high pressure injection line (suspended in 2016)

11-07 South Battery

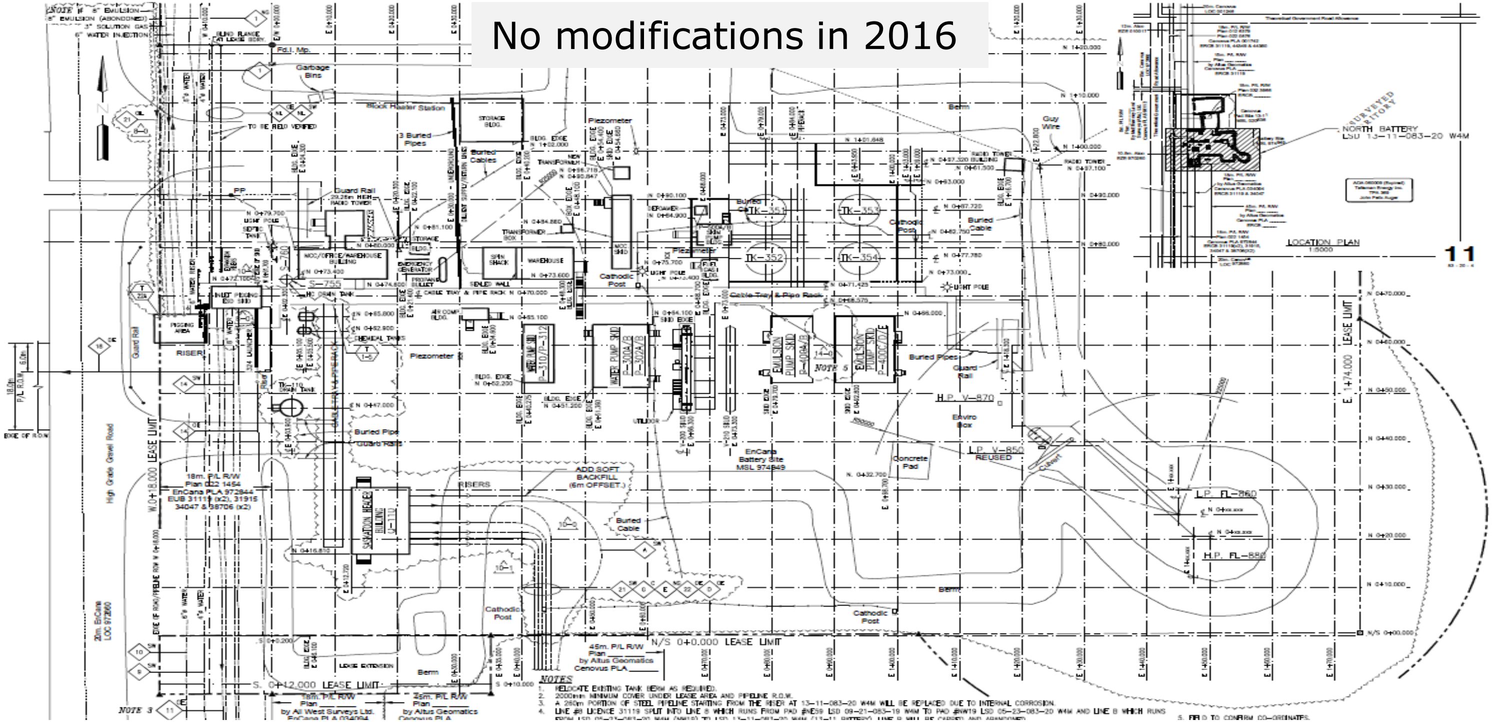
- Utilizes inclined free water knock out (cold), heated knock out vessels, plate and frame heat exchangers, and five treaters to dewater emulsion to sales oil spec.
- De-oiled water is pumped into high pressure injection line

2016 Facility modifications

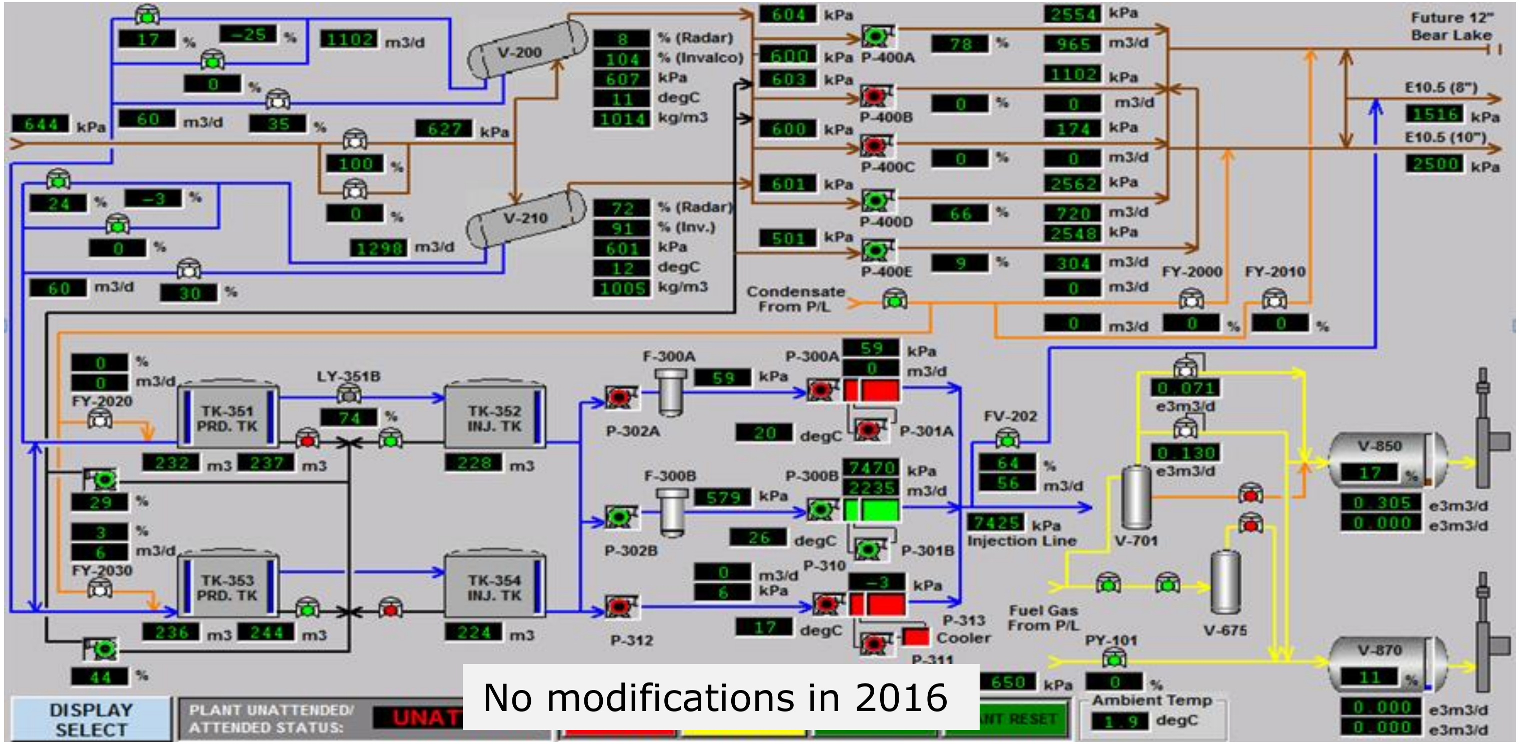
- South Battery plate and frame heat exchangers were upgraded (material upgrade from titanium to SMO254 super austenitic stainless steel) to improve reliability
- SE10.5 satellite was suspended as a result of the lower total fluid rates. Equipment suspended includes: inclined free water knockout, water tanks, skim pumps, and water injection pumps. The emulsion transfer pumps remain active. All suspended equipment and associated piping were preserved for future reactivation.
- No major facility modifications are planned for 2017

13-11 satellite plot plan

No modifications in 2016



13-11 satellite process flow



No modifications in 2016

2016 facility performance

With our optimization of water injection and polymer consumption from 2015 to 2016, all three major facilities had experienced better emulsion separation and water treatment performance:

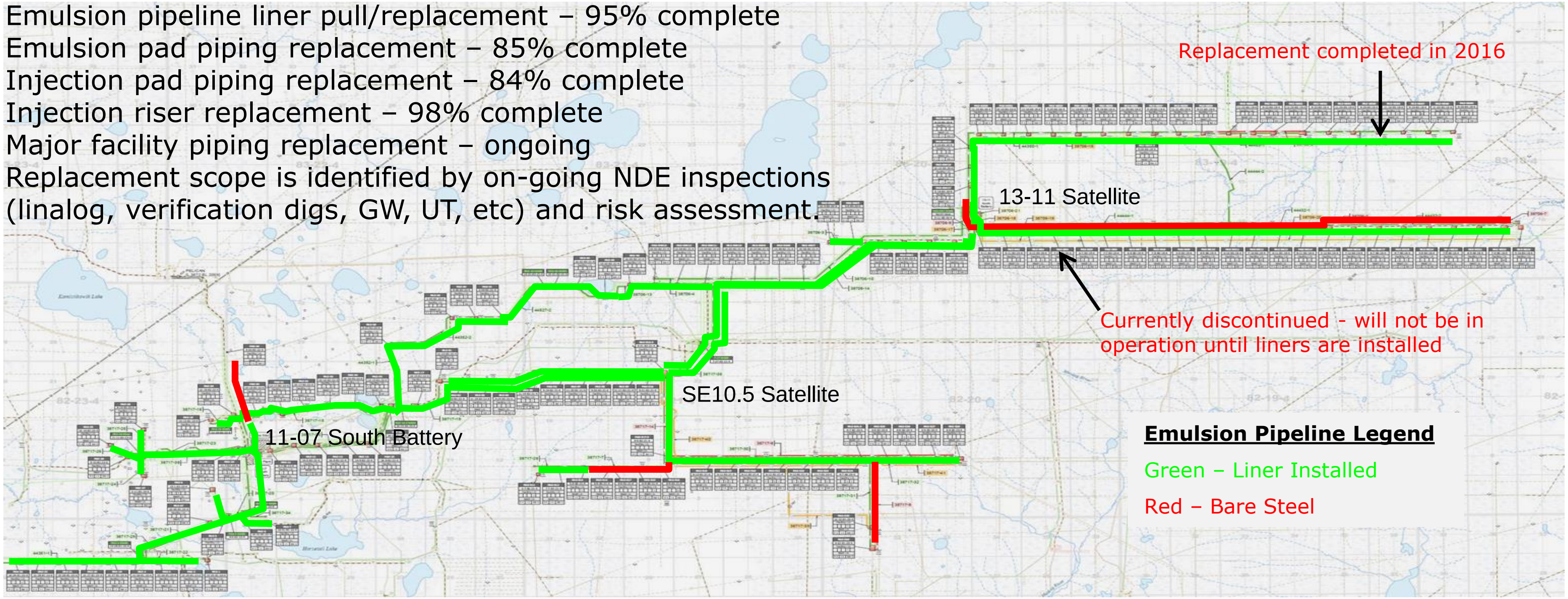
- Achieved better emulsion separation efficiency at the vessels and also increased the run time of the plate & frame heat exchangers
- Achieved better water treatment performance at the cascading water tanks (through gravity separation and skim system). The oil & grease content in our produced water has dropped from 2015 to 2016.

2016 pipeline upgrades

- NE69 to NE63 bare steel emulsion pipeline replacement
- Pipeline cathodic protection upgrade (new anode beds) for the SE28, NE23 and NE69 legs
- Water injection riser replacement
  - NE63 to NE69 & South Battery to SW35.5
- Emulsion riser replacement
  - SW45 to SW16.5 & South Battery to SW35.5
- Miscellaneous emulsion pig barrel replacement
- Continued with proactive emulsion pipeline improvement program (e.g. conduct linalog inspections and verification digs)

Pelican Lake corrosion mitigation summary

Emulsion pipeline liner pull/replacement – 95% complete
Emulsion pad piping replacement – 85% complete
Injection pad piping replacement – 84% complete
Injection riser replacement – 98% complete
Major facility piping replacement – ongoing
Replacement scope is identified by on-going NDE inspections (linalog, verification digs, GW, UT, etc) and risk assessment.



- The 2016 Corrosion Mitigation budget was never cut nor trimmed even during the economic downturn

Power consumption

		2016												
		Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**2016 Total**
13-11 Satellite	Power Import (kWh)	676,657	614,091	605,294	521,875	388,690	355,904	392,507	407,981	255,843	472,968	494,411	609,949	5,796,170
	Power Export (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Power Consumption (kWh)	**676,657**	**614,091**	**605,294**	**521,875**	**388,690**	**355,904**	**392,507**	**407,981**	**255,843**	**472,968**	**494,411**	**609,949**	**5,796,170**
SE10.5 Satellite	Power Import (kWh)	388,646	363,929	328,711	321,754	71,516	16,887	19,024	18,418	29,283	88,648	94,243	147,100	1,888,159
	Power Export (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Power Consumption (kWh)	**388,646**	**363,929**	**328,711**	**321,754**	**71,516**	**16,887**	**19,024**	**18,418**	**29,283**	**88,648**	**94,243**	**147,100**	**1,888,159**
11-07 South Battery	Power Import (kWh)	2,109,141	1,783,728	1,806,993	1,814,357	1,736,986	1,494,599	1,727,728	1,672,857	1,473,755	1,905,766	1,928,217	2,155,632	21,609,758
	Power Export (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Power Consumption (kWh)	**2,109,141**	**1,783,728**	**1,806,993**	**1,814,357**	**1,736,986**	**1,494,599**	**1,727,728**	**1,672,857**	**1,473,755**	**1,905,766**	**1,928,217**	**2,155,632**	**21,609,758**
Pelican Lake Total	Power Import (kWh)	12,102,516	10,477,747	10,442,002	8,981,418	6,373,561	4,831,727	5,207,998	5,597,036	5,917,194	8,678,415	9,426,250	10,538,333	98,574,197
	Power Export (kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Power Consumption (kWh)	**12,102,516**	**10,477,747**	**10,442,002**	**8,981,418**	**6,373,561**	**4,831,727**	**5,207,998**	**5,597,036**	**5,917,194**	**8,678,415**	**9,426,250**	**10,538,333**	**98,574,197**

Gas volumes summary

	2016													2017
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2016 Total	Jan
Fuel Consumed(e3m3)	1,681	1,422	1,568	1,541	2,122	2,814	1,777	1,637	1,502	1,737	1,657	1,653	**21,109**	1,663
Produced Gas (e3m3)	1,098	942	1,064	1,090	1,643	2,353	1,289	1,206	1,081	1,224	1,129	1,070	**15,189**	1,024
Buyback Gas (e3m3)	876	765	832	751	749	673	753	700	682	793	789	861	**9,226**	771
Vented Gas (e3m3)	227	226	263	243	259	207	261	261	195	252	218	216	**2,828**	200
Flare (e3m3)	31	30	41	43	4	1	0	0	13	16	28	34	**242**	26
Solution Gas Recovery Percentage	77%	73%	71%	74%	84%	91%	80%	78%	81%	78%	78%	77%	**N/A**	78%

Green house gas emissions summary

	2016													2017
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2016 Total	Jan
Green House Gas Emissions (Tonnes CO2 Equivalent)	7,190.93	6,590.06	7,515.99	7,100.84	8,489.32	9,014.00	7,900.73	7,682.35	6,206.24	7,626.97	6,940.72	6,736.80	**88,995**	6,643

- Vapor recovery units (VRUs) installed on production tanks (no routine gas venting off tanks)
- Air compressors ('instrument air') installed for operating pneumatic equipment (no gas venting)
- The still column vent of the 11-07 South Battery Glycol dehydrator was tied in to low pressure flare (vent gas is combusted, not vented to atmosphere)
- Gas conserved on pads where economically feasible
- 2016 total greenhouse gas emissions: 88,995 tonnes CO_2 equivalent (**20% decrease compared to 2015**)

Measuring & reporting protocol

Methods of measurement

- Oil and water: inline meters installed on every producer and injector
- Solution gas:
  - conserved wells use a facility level gas oil ratio (GOR)
  - non-conserved wells use individual GOR as per Dir. 017 requirements

Proration factors

- Within acceptable range (Oil: 0.91, Water: 0.91)

Typical well testing:

- Frequency and duration; all producers have inline metering and are considered on “Test” for full monthly hours
- No test tanks on any wells

Measurement technology:

- Producer: mixture of coriolis and positive displacement meters
- Injector: coriolis meters

Environmental compliance issues summary

- Late submission of Water Use Report under Temporary Diversion License (TDL) 00366686. This was self-disclosed in February 2016 and corrective actions have since been implemented.
- Groundwater was diverted from a well between the expiry of TDL No. 00340416 on November 14, 2014 and the effective date of TDL No. 00360875 on December 3, 2014. This was self-disclosed in February 2016 and corrective actions have since been implemented.
- Exceeded permitted diversion volume for Water Act license 00385580. This was self-disclosed in November 2016 and corrective actions have since been implemented.

Regional environmental initiatives

Member - Regional Industry Caribou Collaboration (RICC)

- Coordination of caribou research and mitigation at the landscape (caribou range) scale
- Coordination of habitat restoration and population research
- Covers the East Side Athabasca and Cold Lake ranges

Cenovus Caribou Habitat Restoration Project

- Habitat restoration within the Cold Lake range
- Covers approximately 3900 km^2 of area during 2016-2026
- See http://www.cenovus.com/news/docs/Cenovus-caribou-project-factsheet.pdf for more details

Reclamation program update

- Reclamation is currently under way on approximately 70 locations
- Activities include the following stages: Phase I & II environmental site assessment (ESA), minor soils work or re-contouring, vegetation monitoring and weed control and detail site assessment (DSA)
- Remediation & risk assessment on two sites
- Submitted four reclamation certificate applications in 2016 and received 38 approvals (which were submitted in 2015)
- Target to apply for 20 reclamation certificates in 2017
- Four new abandonments took place in January 2017

Compliance confirmation

- Pelican Lake is currently compliant with all conditions of the approval and regulatory requirements
- Besides the self-disclosures as mentioned under the environmental section, an AER pipeline permit amendment self-disclosure was submitted and approved in March 2016 to update the status of the water injection pipeline Lic#38717 Line#15 from "operating" to "discontinued". This license discrepancy was identified in our internal annual pipeline risk assessment.
- The Pelican Lake measurement & volumetric reporting was audited in 2016 as part of Cenovus's Enhanced Production Audit Program (EPAP) as mandated under AER directive 076

Future facilities plan

- Continue conducting NDE inspections and risk assessment, and upgrade bare steel piping as part of the corrosion mitigation program. AER pipeline permit will be required in the event of a liner pull and/or pipeline replacement.

2016 development activities

2016 development initiatives

- No drilling in 2016
- 2016 priorities:
  - operating cost reductions
  - optimizing injection rates, non-saline water usage and polymer consumption
  - reservoir flood management
  - optimize polymer effectiveness
  - workover frequency reductions
- Continued reservoir characterization to enhance long term field development strategy

AER regulatory discussion & key learnings

AER regulatory discussion & compliance

- Current approval and downspacing is flexible for Cenovus to continue its infill program
- Cenovus is in compliance with all conditions of the approval and regulatory requirements

Key learnings

- **Reservoir flood optimization is key to maximizing oil recovery**
    - optimal VRR assists in maximizing recovery by reducing premature breakthroughs
    - maximizing polymer efficiency assists in providing optimal oil recovery

End

Supplemental slides

Typical well schematic: example

Downhole Well Profile

cenovus ENERGY

Well Name: CVE 8C-23 2B4 BRINT 4-13-82-22

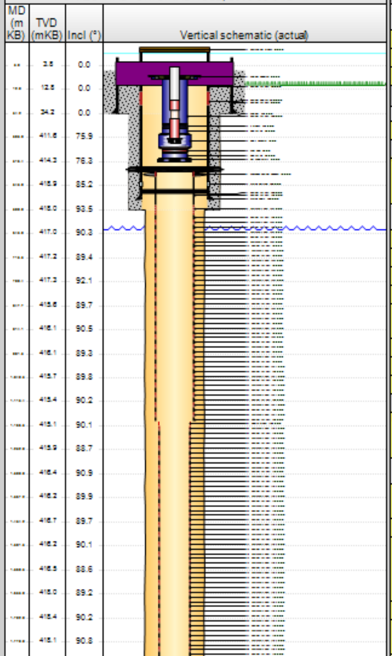
Bottom Hole UWI	Surface Legal Location	Pad	Field Name	License #	State/Province
103/04-13-082-22W4/00	LSD 08-23-082-22W4	SE002	BRINTNELL	0437500	AB

Profile Type	Orig KB Elev (m)	KB-Grd (m)	KB-CF (m)	KB-TH (m)	Total Depth (mKB)	Sour Class (Licensed)	Sour Status Date
HORIZONTAL	634.00	5.10	5.10		2,667.00	SWEET	2011-10-06 00:00

Type
CASING BOWL

Des	Make	Model	WP (kPa)	Service	Top WP (kPa)	Top Ring Gasket	Bore Min (mm)
CASING BOWL	ABB VETCO GRAY	C-22L	14,000	GENERAL	14,000	R-53	

HORIZONTAL - ORIGINAL HOLE, 2016-03-01 2:44:11 PM



Casing Strings

Csg Des	OD (mm)	Wt/Len (kg/m)	Grade	Top Thread	Set Depth (mKB)
CONDUCTOR	406.4	96.731	H-40		34.20
INTERMEDIATE	244.5	59.527	L-80		556.55
LINER	139.7	23.067	J-55	Buttress	2,665.00

Perforations

Date	Top (mKB)	Btm (mKB)	Zone

TUBING - PRODUCTION set at 516.42mKB on 2012-04-23 11:00

Tubing Description	Run Date	String Length (m)	Bottom or Set Depth (mKB)
TUBING - PRODUCTION	2012-04-23	511.72	516.42

Item Des	Jts	Make	Model	OD (mm)	Wt (kg/m)	Grade	Len (m)
TUBING HANGER	1	N/A		179.0			0.15
TUBING	51			88.9	13.840	J-55	498.11
F NIPPLE	1	BAKER		88.9			0.33
PUP JOINT	1	N/A		88.9			1.28
PCP - STATOR	1	WEATHERFORD	95-1000	114.0			10.25
TAG BAR	1	N/A		88.9			0.55
PUP JOINT	1	N/A		88.9			0.53
NO TURN TOOL	1	N/A	TX5	114.0			0.52

NEW COATED MOORE ROD on 2015-01-14 12:00

Rod Description	Run Date	String Length (m)	Set Depth (mKB)
NEW COATED MOORE ROD	2015-01-14	510.92	514.70

Item Des	Jts	Make	Model	OD (mm)	Wt (kg/m)	Grade	Len (m)
POLISHED ROD	1	NORRIS	STAINLESS STEEL	31.7		N/A	10.97
SUCKER ROD	1	NORRIS	GRADE 78	31.8	6.206	D	7.62
CONTINUOUS SUCKER ROD	1	MOORE ROD RUN NEW JAN 14 2015	28.6MM CTD	28.6	5.030	D	475.00
SUCKER ROD	1	NORRIS	GRADE 78	31.8	6.206	D	7.62
PCP - ROTOR	1	WEATHERFORD	95-1000 XL	55.0		N/A	9.71

Directional Schematic and Survey Plot

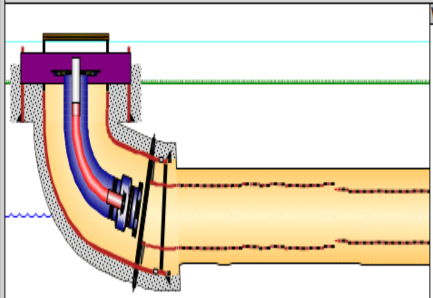
Well Name: CVE 8C-23 2B4 BRINT 4-13-82-22

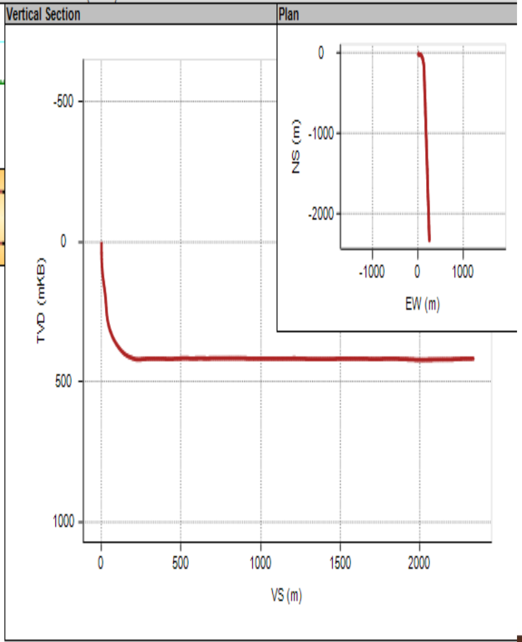
cenovus ENERGY

Bottom Hole UWI	Surface Legal Location	Pad	License #	State/Prov	Profile Type	Ground Broke Spud...	Rig Release Date	Orig KB Elev (m)	Working GLE (...	CF Elev (m)	KB-Grd (m)	KB-CF (m)	TD (mKB)
103/04-13-082-22W4/00		SE002	0437500	AB	HORIZONTAL	2011-11-24	2012-03-26	634.00	628.90	628.90	5.10	5.10	2,667.0

HORIZONTAL - ORIGINAL HOLE, 2016-03-01 2:41:53 PM

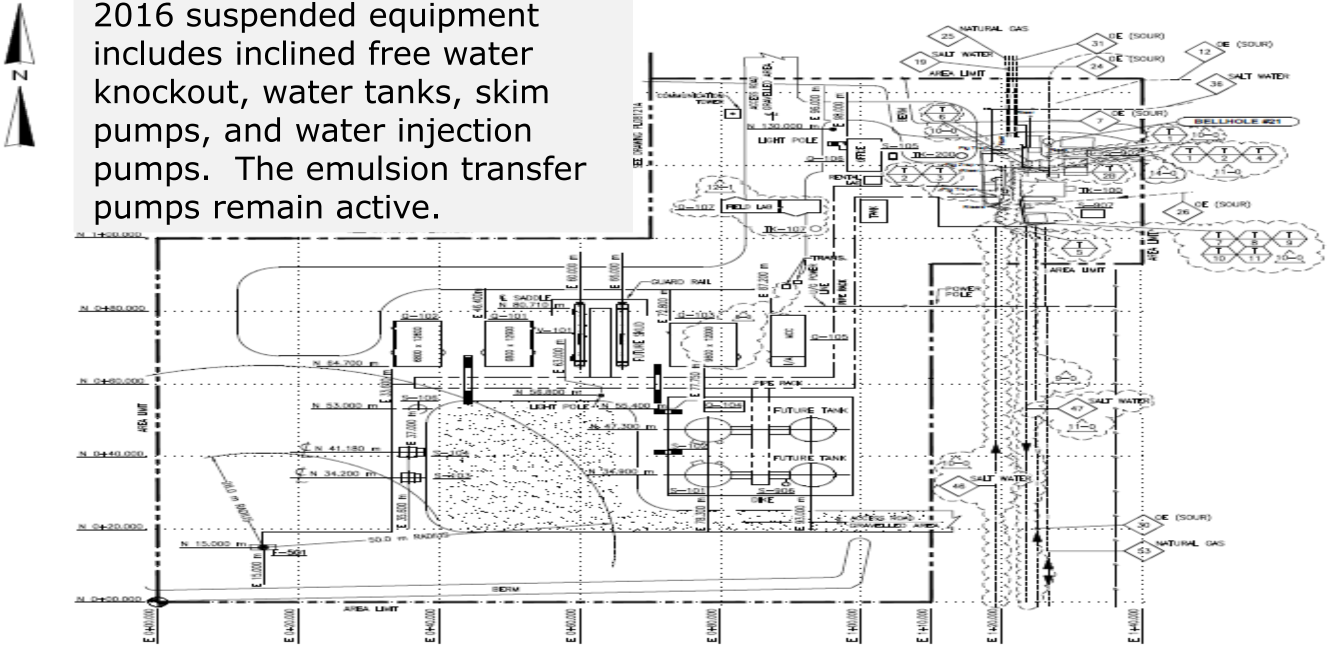
Directional schematic (actual)





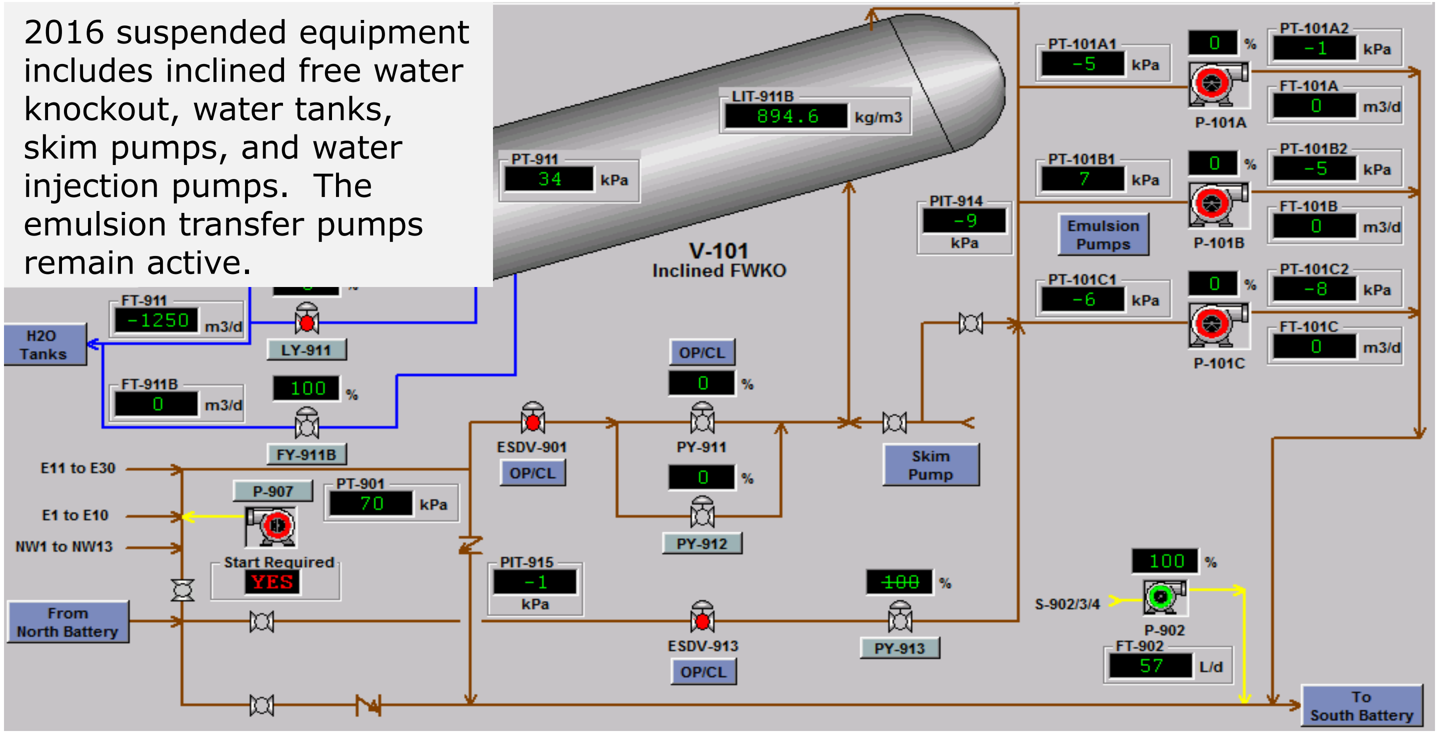
Se10.5 satellite plot plan

2016 suspended equipment includes inclined free water knockout, water tanks, skim pumps, and water injection pumps. The emulsion transfer pumps remain active.

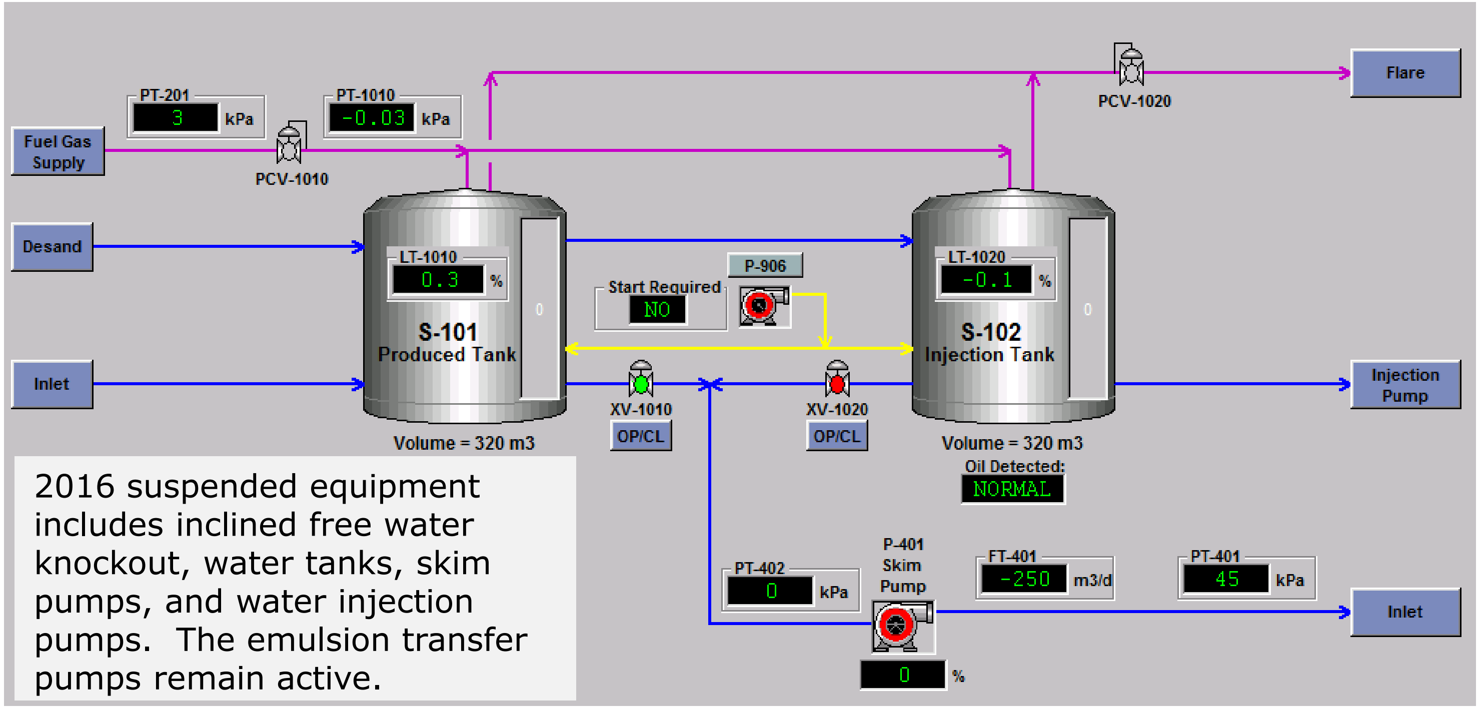


Facility: SE10.5 satellite process flow

2016 suspended equipment includes inclined free water knockout, water tanks, skim pumps, and water injection pumps. The emulsion transfer pumps remain active.

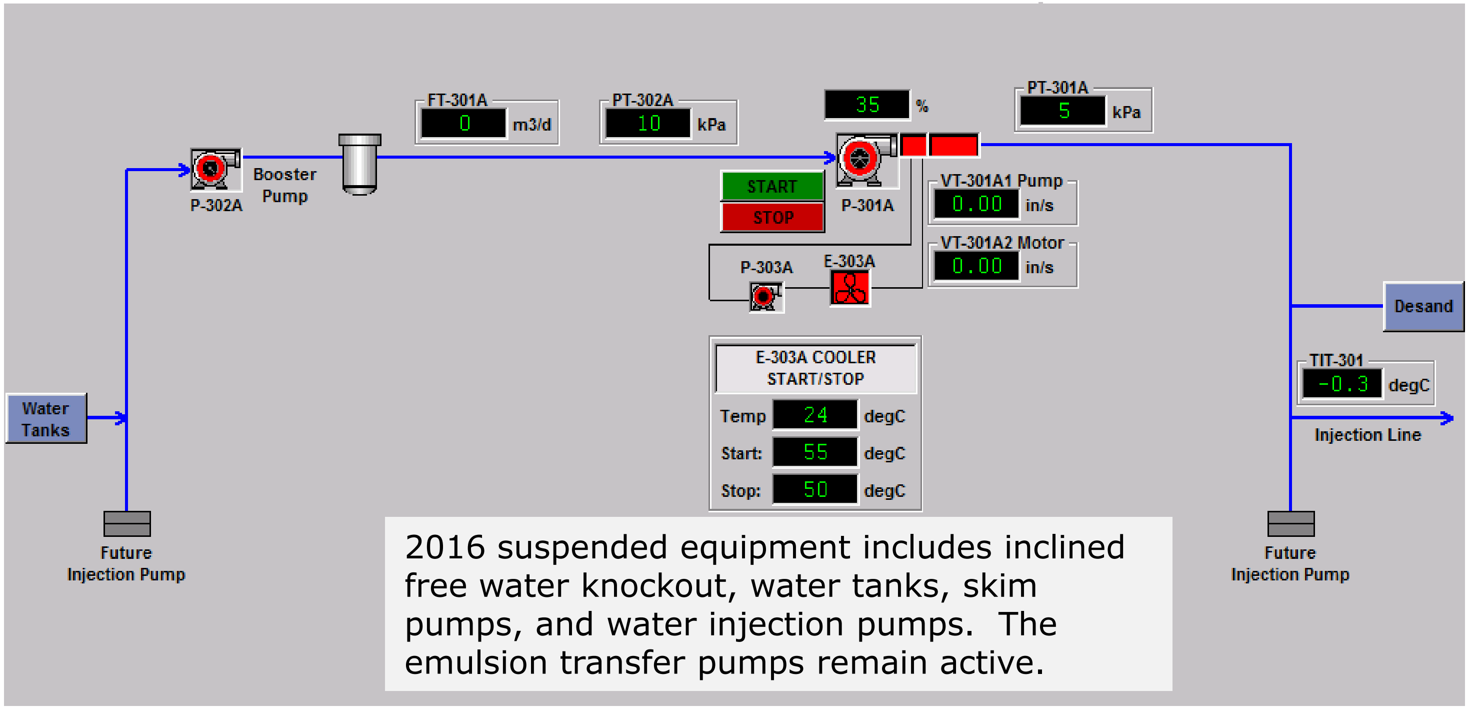


Facility: SE10.5 satellite process flow



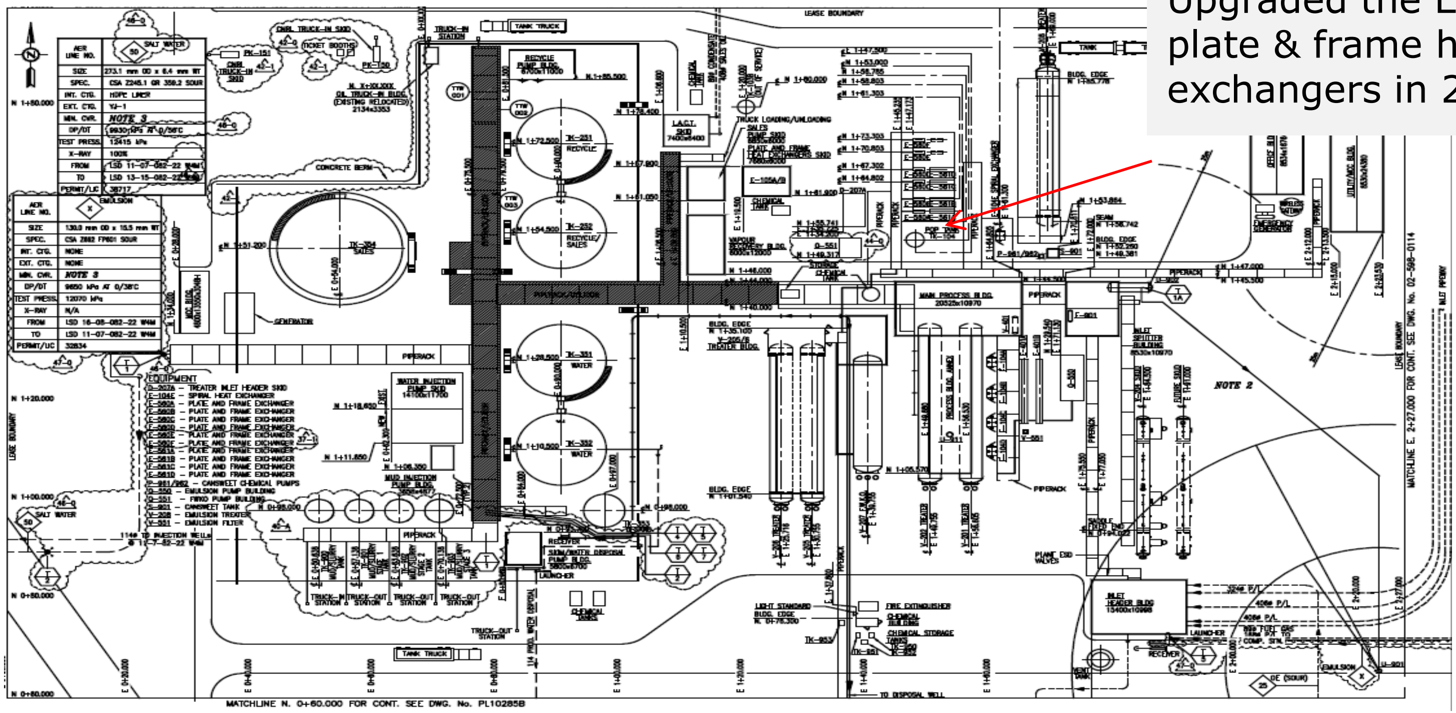
2016 suspended equipment includes inclined free water knockout, water tanks, skim pumps, and water injection pumps. The emulsion transfer pumps remain active.

Facility: SE10.5 Satellite Process Flow



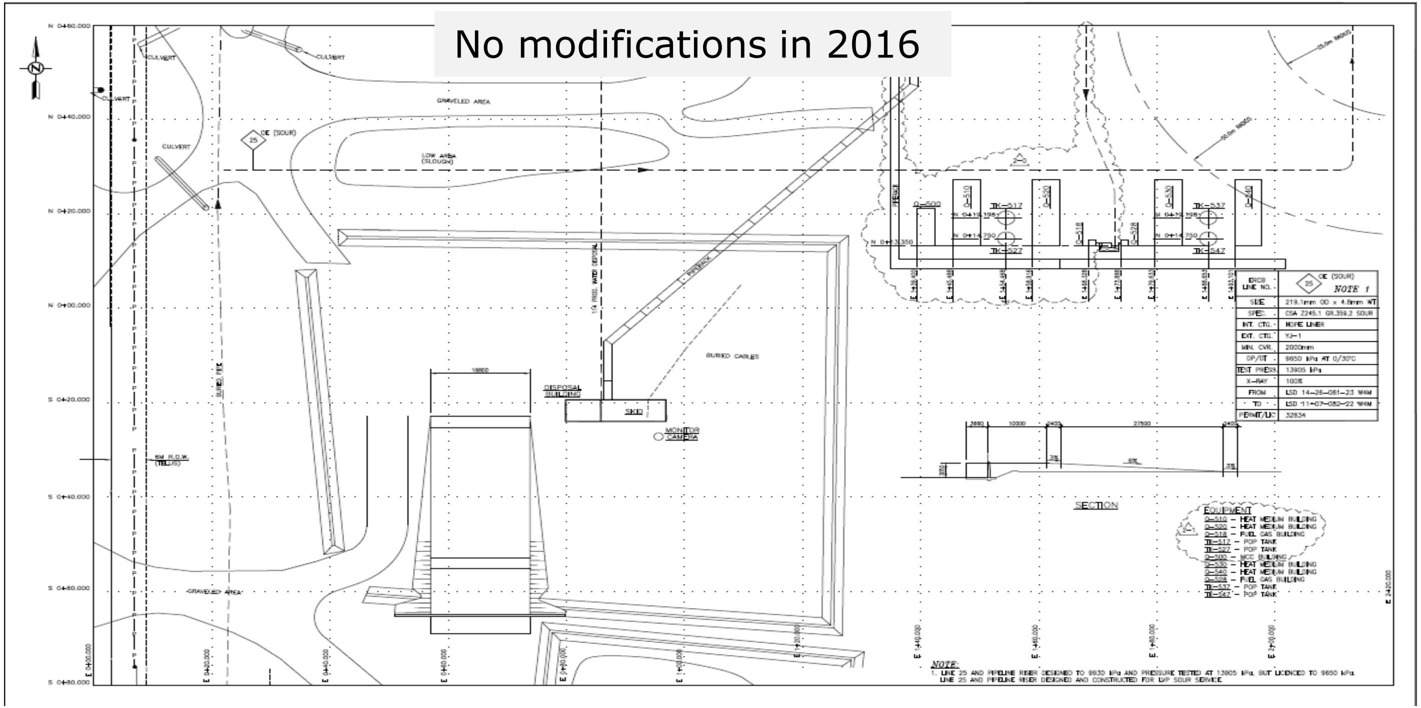
2016 suspended equipment includes inclined free water knockout, water tanks, skim pumps, and water injection pumps. The emulsion transfer pumps remain active.

11-07 South Battery plot plan

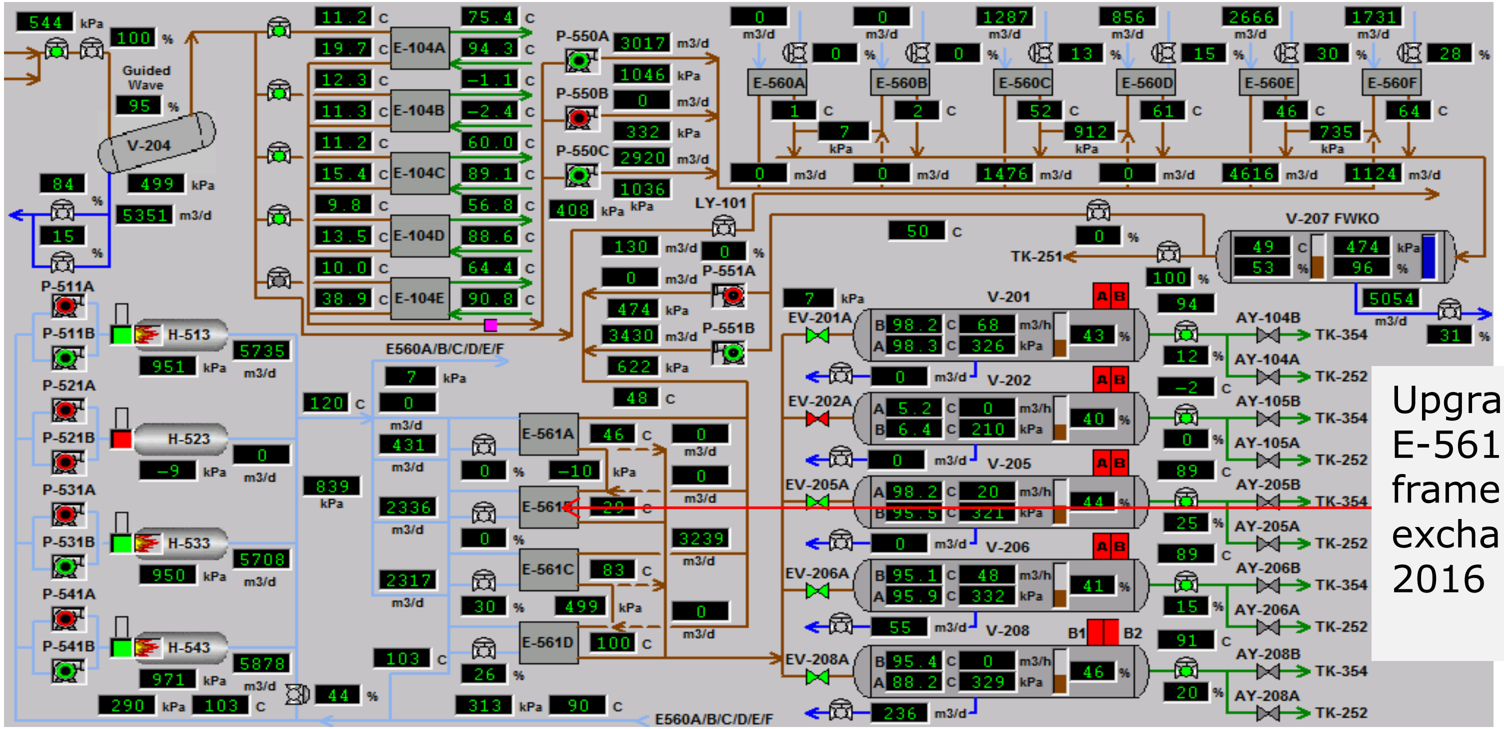


Upgraded the E-561 plate & frame heat exchangers in 2016

11-07 South Battery plot plan

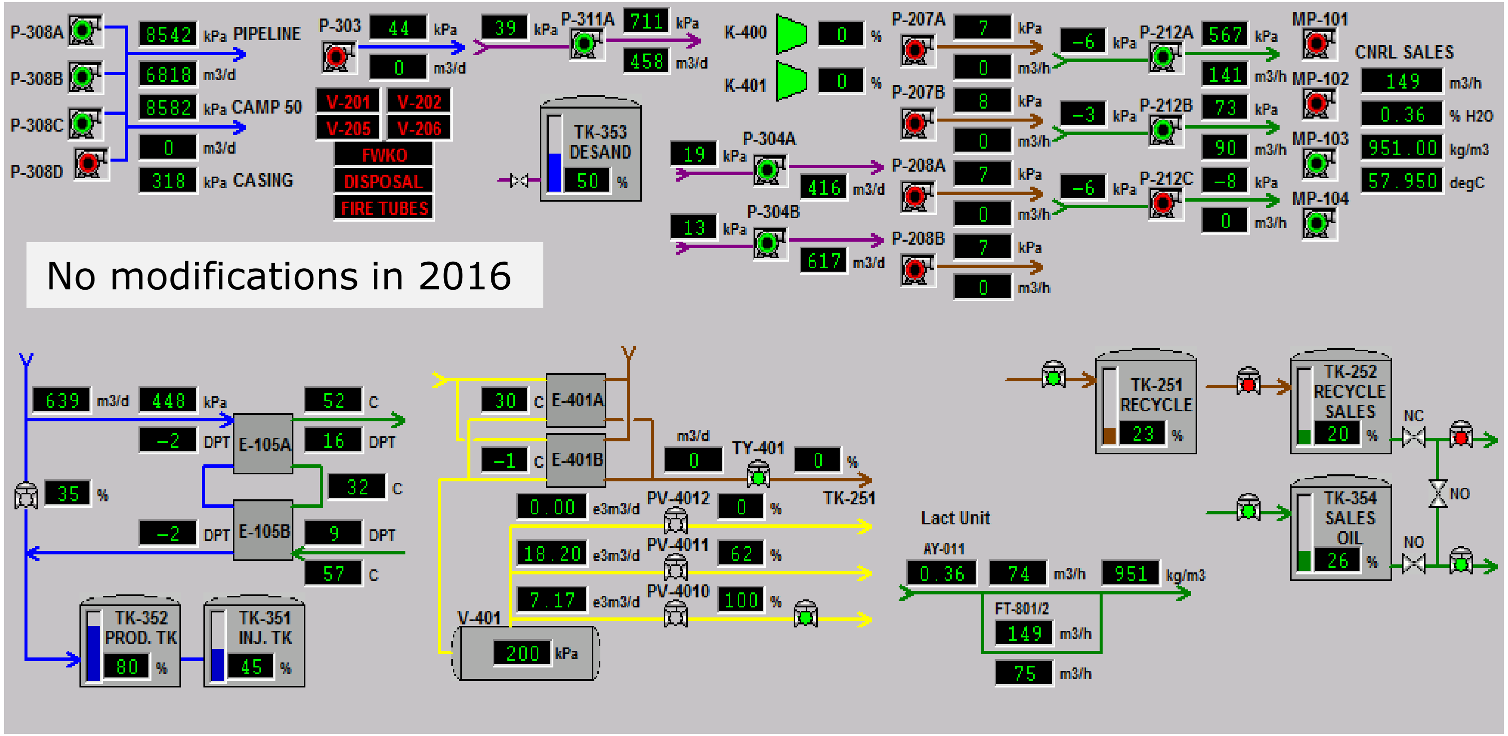


11-07 South Battery process flow



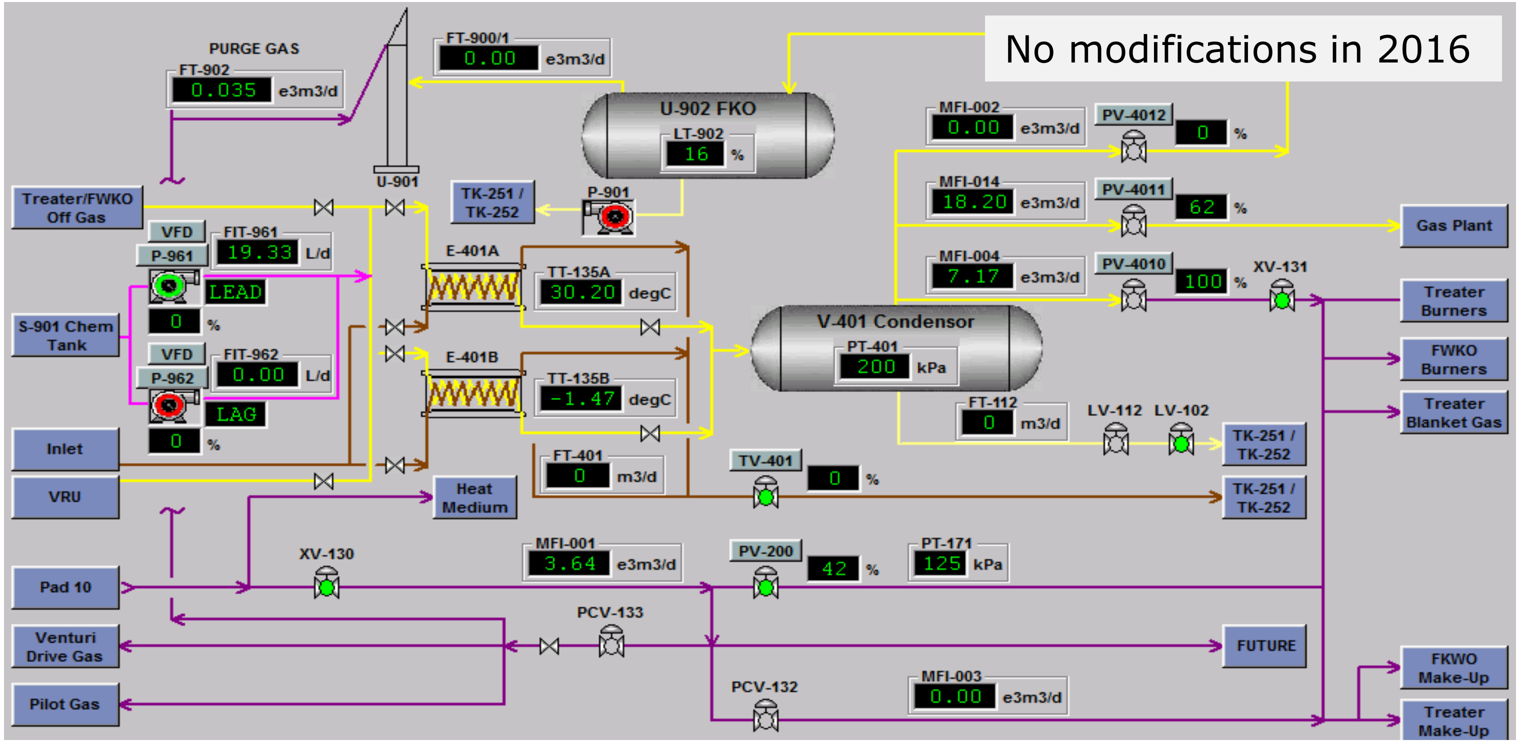
Upgraded the E-561 plate & frame heat exchangers in 2016

11-07 South Battery process flow



No modifications in 2016

11-07 South Battery process flow



Off-site disposal

	2016												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2016 Total
Off-site Waste Disposal Volumes (m3)	50.0	49.3	32.8	40.0	62.5	121.6	63.4	25.8	91.1	123.5	88.0	43.5	**791.5**

Off-site disposal locations:

- Tervita Mitsue
- Tervita Wabasca Landfill
- R.B.W. Edmonton