Annual Performance Presentation

In Situ Oil Sands Schemes
9673 / 10147 / 10423 / 10787 / 9404

March 2020

Premium Value I Defined Growth I Independent

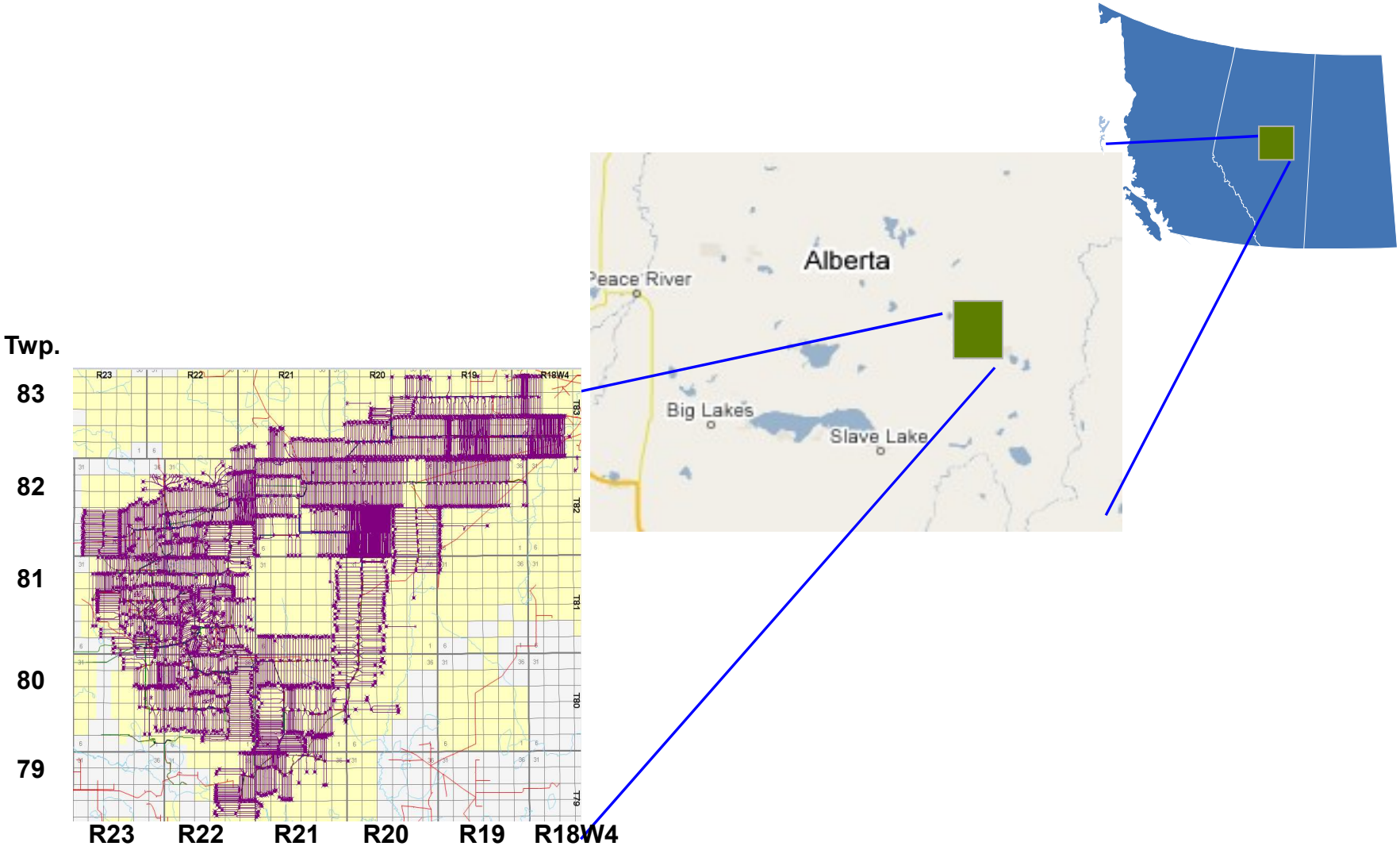
Canadian Natural

Agenda

Canadian Natural

- Current Approvals
- Geological Overview
- Drilling, Completions, and Artificial Lift
- Field Performance and Surveillance
- Cap Rock Integrity & Monitoring
- Future Development Plans
- Facilities
- Measuring & Reporting
- Water Use, Conservation & Disposal
- AER Compliance
- Conclusions

Brintnell Location



Oil Sands Royalties (OSRs 101/006/061)

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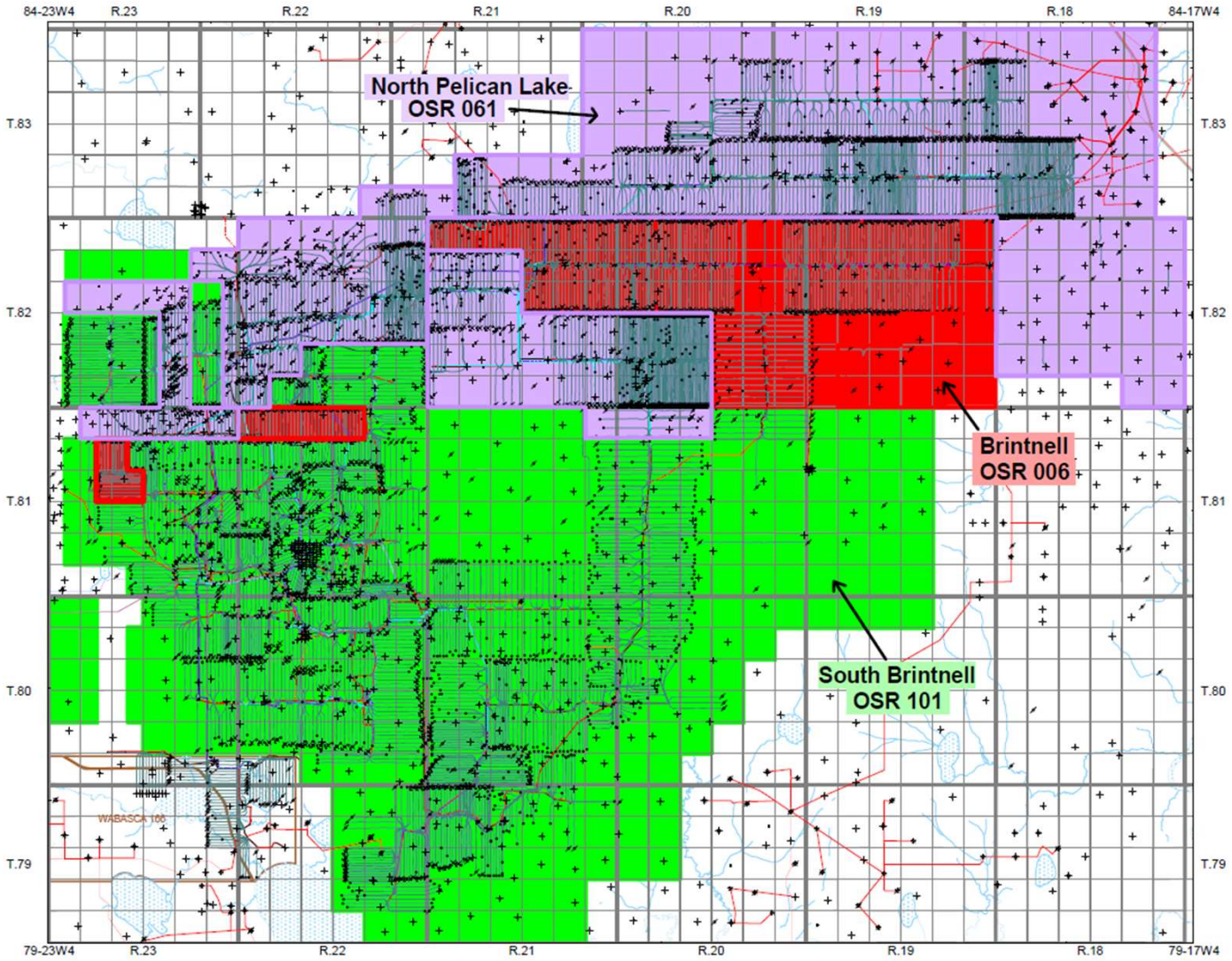
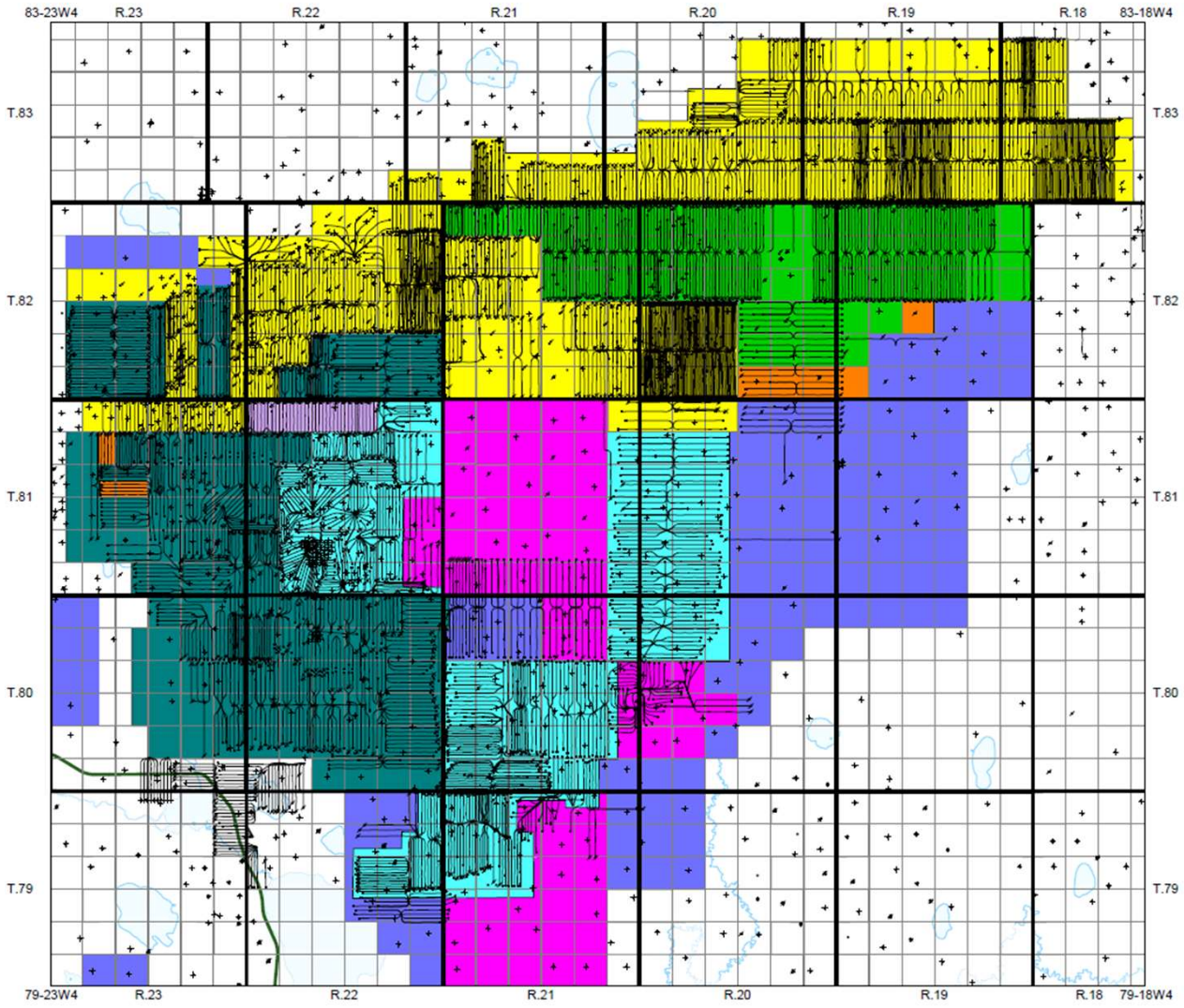


Primary and Enhanced Approval Regions



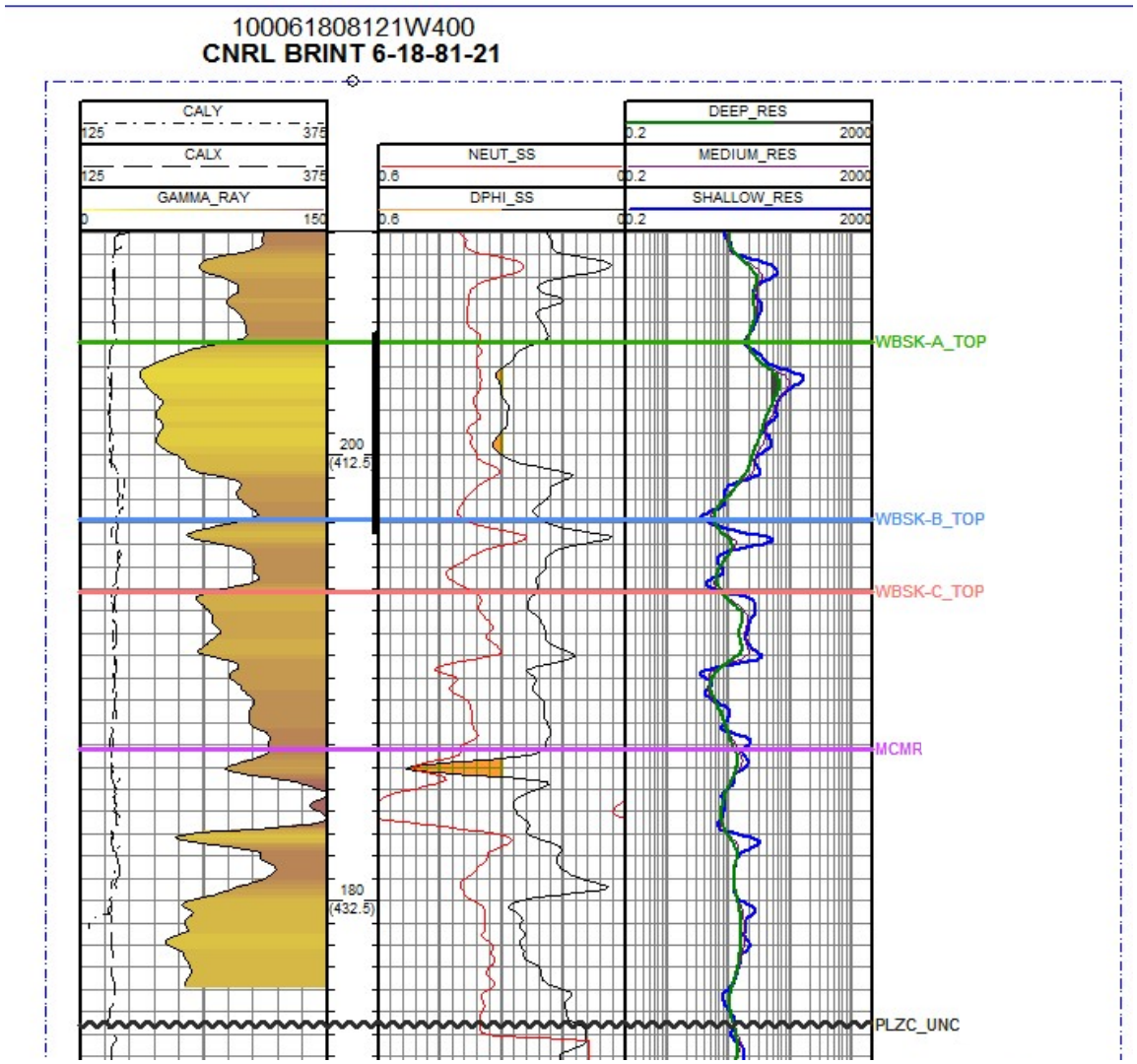
Enhanced Recovery Schemes

- 10147 (Central Brintnell)
- 9673 (North Brintnell)
- 10787 (Central Brintnell)
- 10423 (South and West Brintnell)
- 9404 (Pelican Lake)

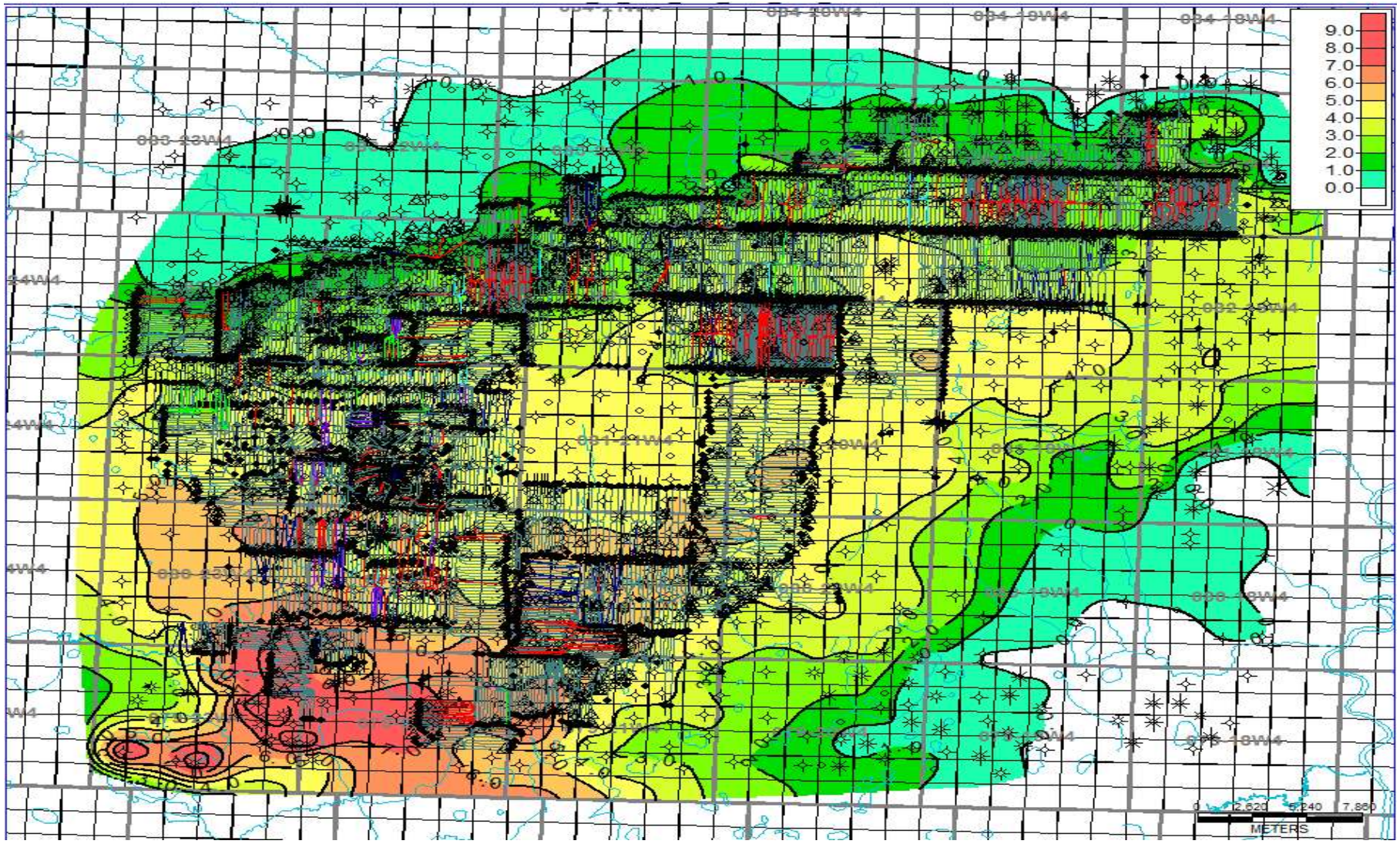
Primary Recovery Schemes

- 6619 (Central Brintnell)
- 9466 (Brintnell)
- 9884 (West and North Brintnell)

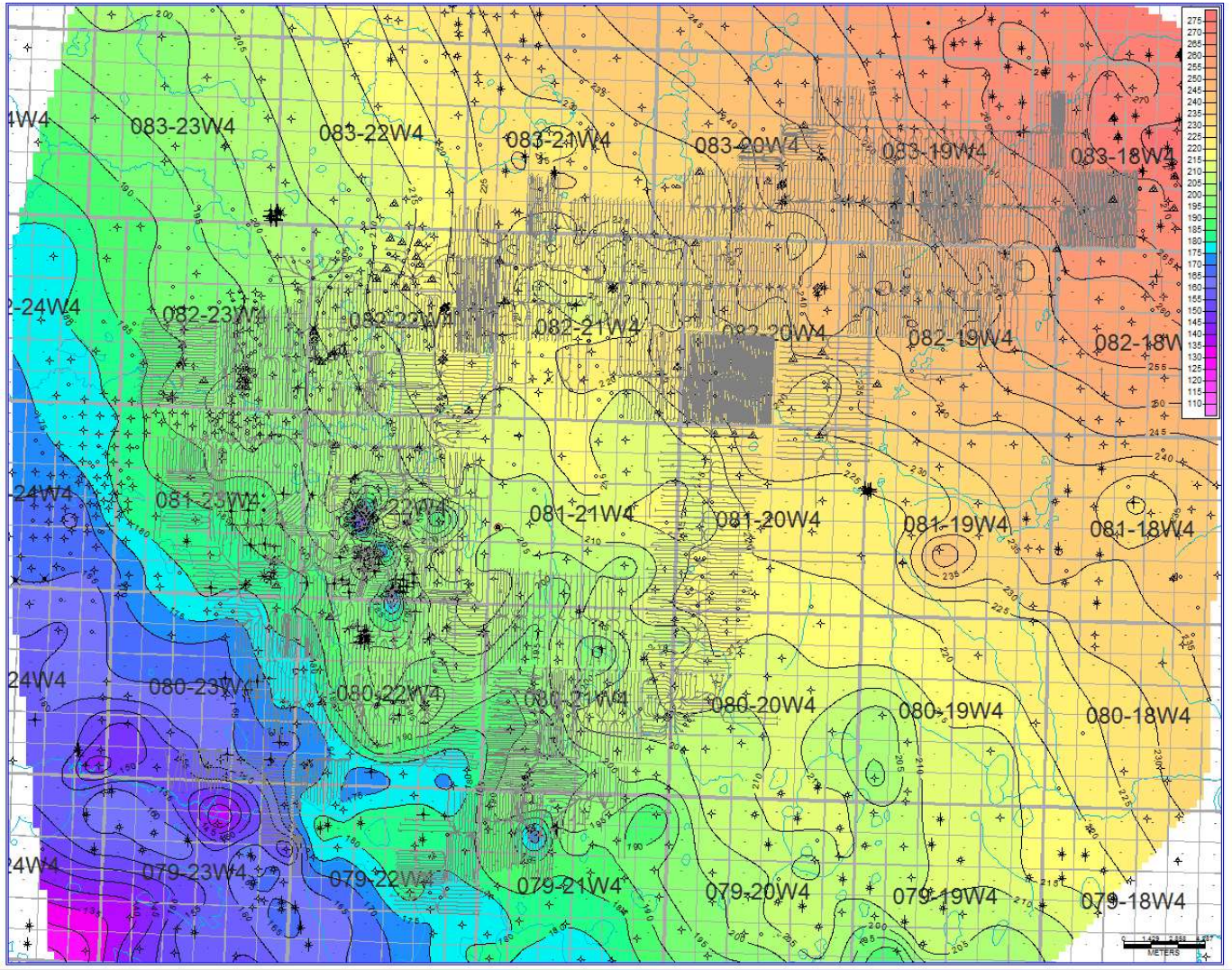
CNRL Brint 6-14-81-21 W4M Type Log



Wabiskaw ‘A’ Net Pay Map



Wabiskaw Structure Map



Produced Oil Viscosity Map

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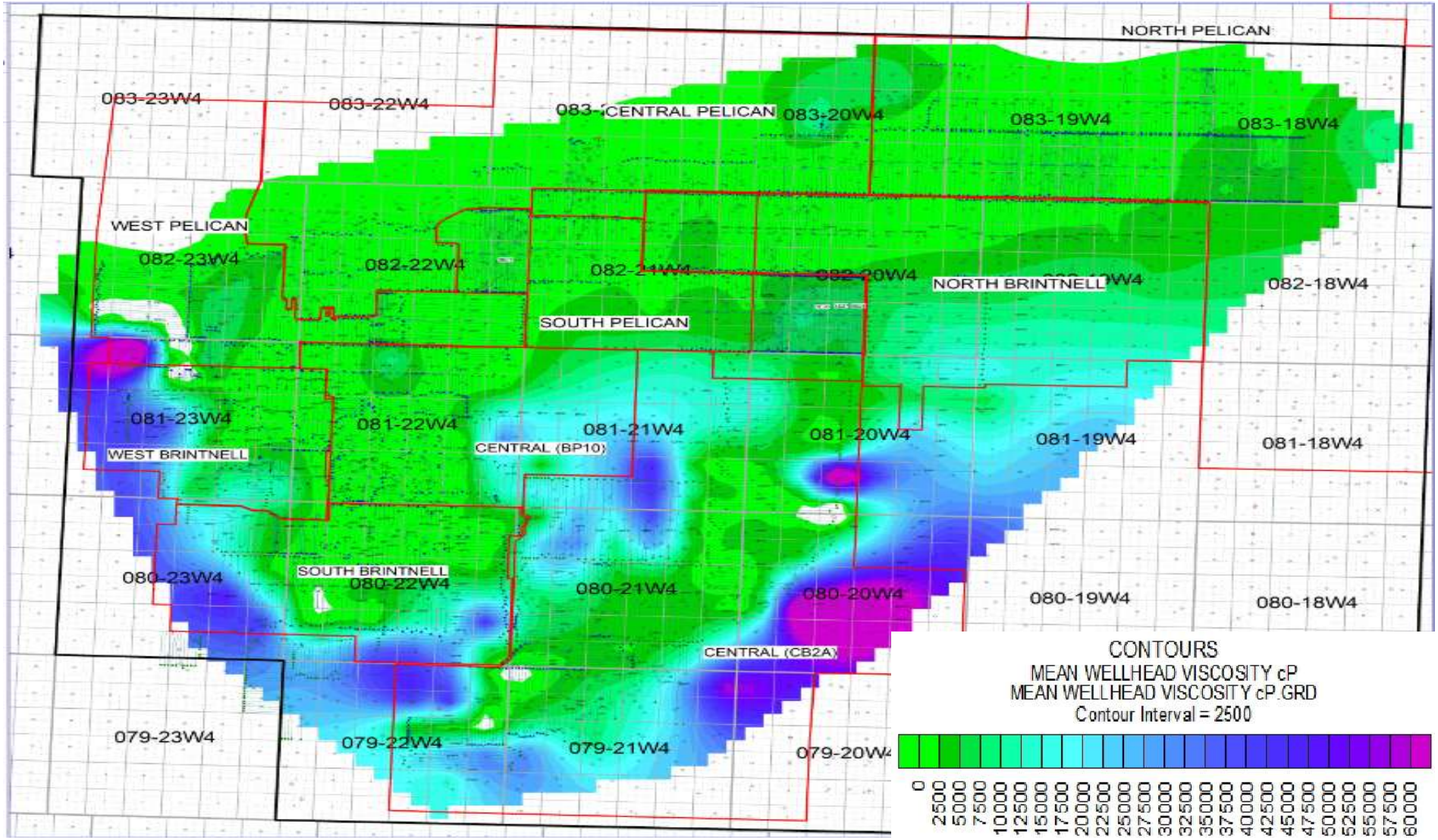
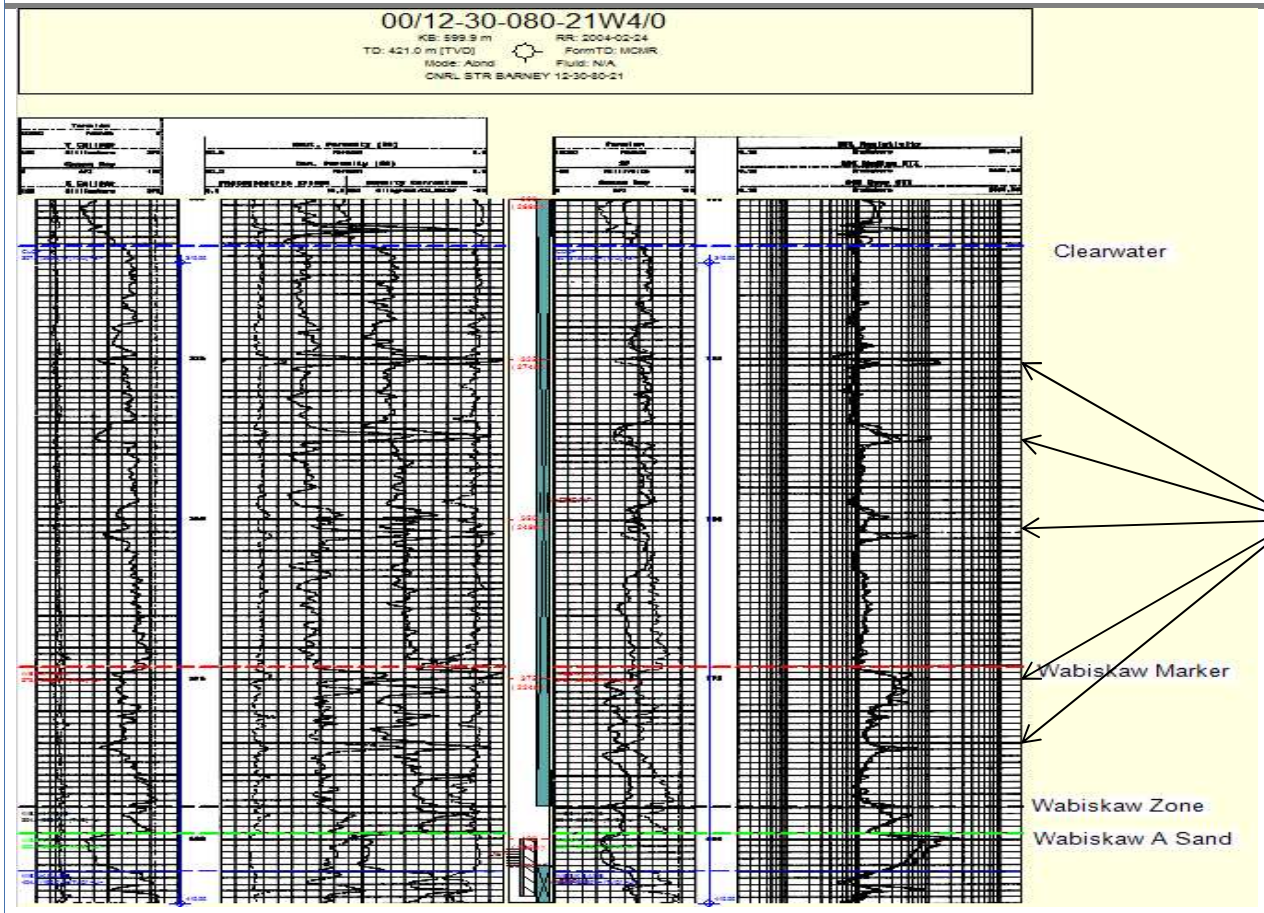


Type Log Clearwater Isopach/Tight Streaks



The cap rock comprises the Clearwater Shales, Wabiskaw Marker and the Wabiskaw zone (which ranges in thickness from 80 to 95 meters) and over lies the Wabiskaw A Sand.

Contained within this isopach are numerous tight streaks ranging from 1.5 - 4 meters in thickness throughout this interval; they are found in both the Clearwater shale interval the Wabiskaw marker interval, as illustrated in the accompanying log.

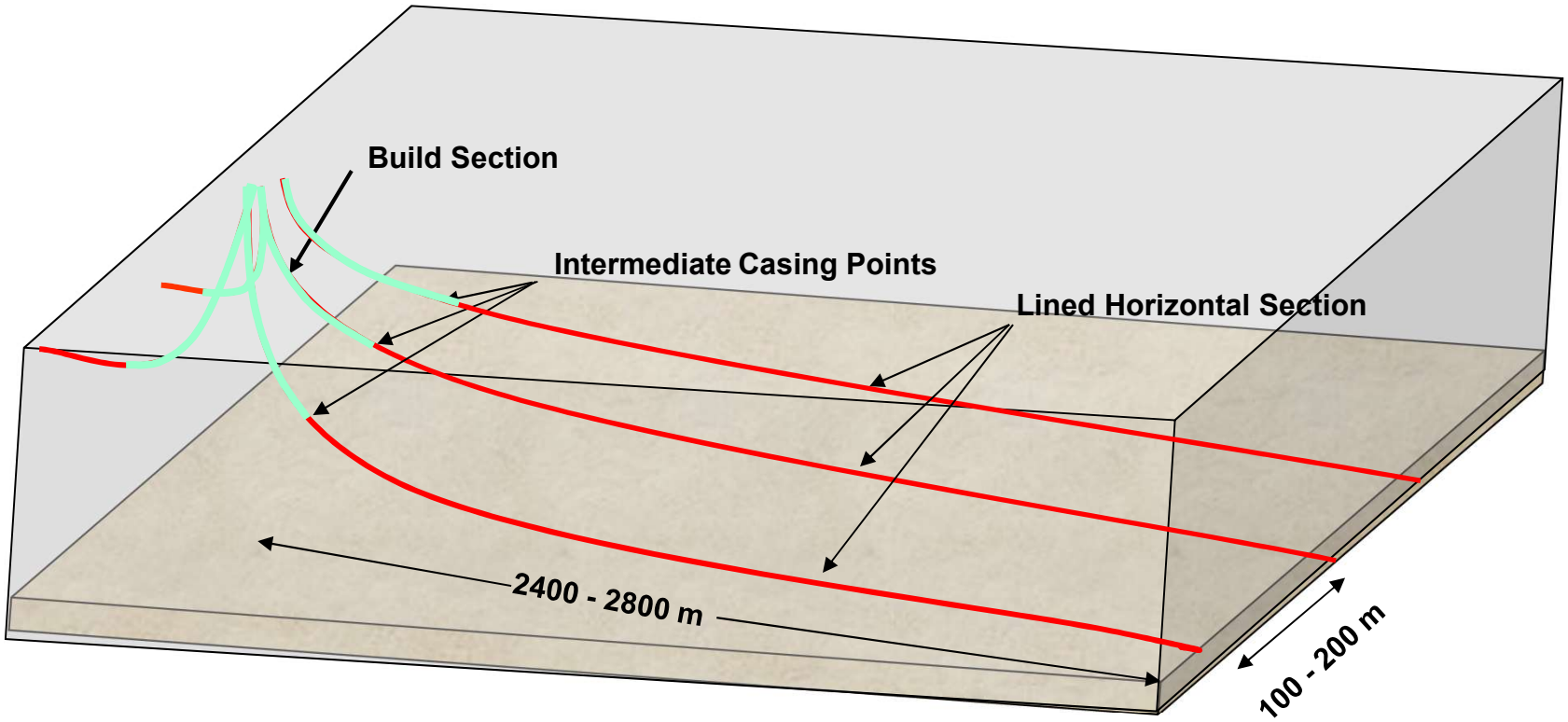
Brintnell Regional Reservoir Properties

Canadian Natural

- **Upper Wabiskaw Sand**
  - Depth of 300-425m TVD
  - Net Pay Range 1 – 9m
  - Porosity 28 – 32%
  - Permeability 300 – 3000md
  - Temperature 13-17 deg. C
  - Water Saturation 30 – 40%
  - Oil Viscosity (dead oil) 800 – 80,000cp @ 15 deg. C
  - Initial Reservoir Pressure 1900 – 2600kpa

Drilling, Completions, and Artificial Lift

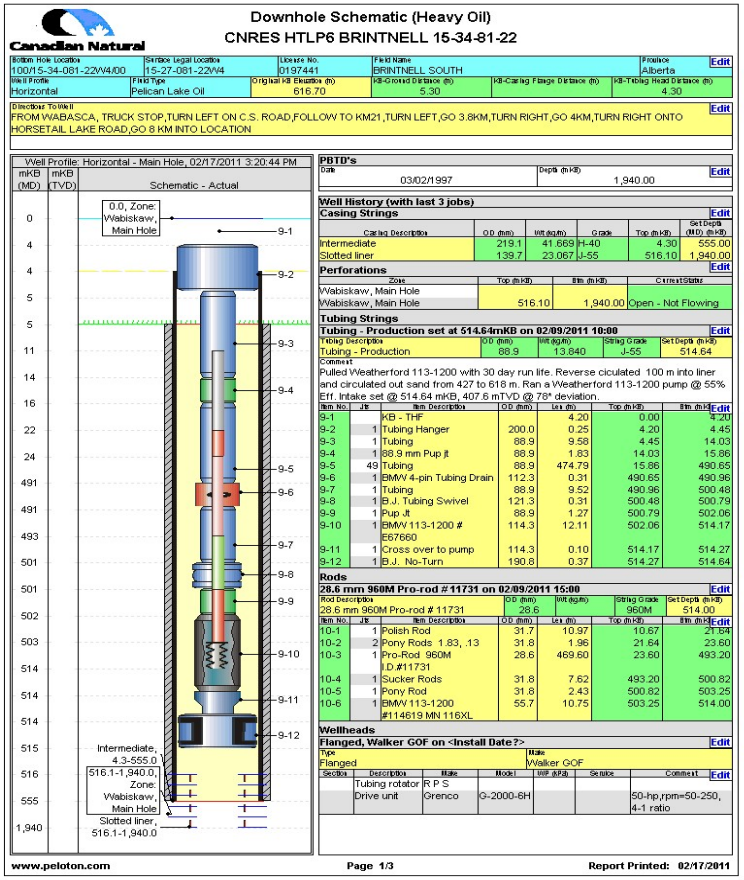
Typical Drilling Configuration



- **CNRL lands the intermediate casing within the Wabiskaw formation.**

Typical Well Configurations

- **Producer**



Downhole Schematic (Heavy Oil)
CNRES HTLP6 BRINTNELL 15-34-81-22

Bottom Hole Location	Surface Legal Location	License No.	Field Name	Province
100/15-34-081-22W4/00	15-27-081-22W4	0197441	BRINTNELL SOUTH	Alberta

Well Profile	Field Type	Original KB Elevation (m)	KB-Ground Distance (m)	KB-Casing Flange Distance (m)	KB-Tbg Head Distance (m)
Horizontal	Pelican Lake Oil	616.70	5.30		4.30

Directions To Well
FROM WABASCA, TRUCK STOP,TURN LEFT ON C.S. ROAD,FOLLOW TO KM21,TURN LEFT,GO 3.8KM,TURN RIGHT,GO 4KM,TURN RIGHT ONTO HORSETAIL LAKE ROAD,GO 8 KM INTO LOCATION

Well Profile: Horizontal - Main Hole, 02/17/2011 3:20:44 PM
Schematic - Actual

PBTD's

Date	Depth (mKB)
03/02/1997	1,940.00

Well History (with last 3 jobs)

Casing Strings

Casing Description	OD (mm)	Wt (kg/m)	Grade	Top (mKB)	Set Depth (MD) (mKB)
Intermediate	219.1	41.669	H-40	4.30	555.00
Slotted liner	139.7	23.067	J-55	516.10	1,940.00

Perforations

Zone	Top (mKB)	Btm (mKB)	Current Status
Wabiskaw, Main Hole			
Wabiskaw, Main Hole	516.10	1,940.00	Open - Not Flowing

Tubing Strings

Tubing - Production set at 514.64mKB on 02/09/2011 10:00

Tubing Description	OD (mm)	Wt (kg/m)	String Grade	Set Depth (mKB)
Tubing - Production	88.9	13.840	J-55	514.64

Comment
Pulled Weatherford 113-1200 with 30 day run life. Reverse ciculated 100 m into liner and circulated out sand from 427 to 618 m. Ran a Weatherford 113-1200 pump @ 55% Eff. Intake set @ 514.64 mKB, 407.6 mTVD @ 78° deviation.

Item No.	Jts	Item Description	OD (mm)	Len (m)	Top (mKB)	Btm (mKB)
9-1		KB - THF		4.20	0.00	4.20
9-2	1	Tubing Hanger	200.0	0.25	4.20	4.45
9-3	1	Tubing	88.9	9.58	4.45	14.03
9-4	1	88.9 mm Pup jt	88.9	1.83	14.03	15.86
9-5	49	Tubing	88.9	474.79	15.86	490.65
9-6	1	BMW 4-pin Tubing Drain	112.3	0.31	490.65	490.96
9-7	1	Tubing	88.9	9.52	490.96	500.48
9-8	1	B.J. Tubing Swivel	121.3	0.31	500.48	500.79
9-9	1	Pup Jt	88.9	1.27	500.79	502.06
9-10	1	BMW 113-1200 # E67660	114.3	12.11	502.06	514.17
9-11	1	Cross over to pump	114.3	0.10	514.17	514.27
9-12	1	B.J. No-Turn	190.8	0.37	514.27	514.64

Rods

28.6 mm 960M Pro-rod # 11731 on 02/09/2011 15:00

Rod Description	OD (mm)	Wt (kg/m)	String Grade	Set Depth (mKB)
28.6 mm 960M Pro-rod # 11731	28.6		960M	514.00

Item No.	Jts	Item Description	OD (mm)	Len (m)	Top (mKB)	Btm (mKB)
10-1	1	Polish Rod	31.7	10.97	10.67	21.64
10-2	2	Pony Rods 1.83, .13	31.8	1.96	21.64	23.60
10-3	1	Pro-Rod 960M I.D.#11731	28.6	469.60	23.60	493.20
10-4	1	Sucker Rods	31.8	7.62	493.20	500.82
10-5	1	Pony Rod	31.8	2.43	500.82	503.25
10-6	1	BMW 113-1200 #114619 MN 116XL	55.7	10.75	503.25	514.00

Wellheads

Flanged, Walker GOF on <Install Date?>

Type	Make
Flanged	Walker GOF

Section	Description	Make	Model	WP (kPa)	Service	Comment
	Tubing rotator	R P S				
	Drive unit	Grenco	G-2000-6H			50-hp,rpm=50-250, 4-1 ratio

0.0, Zone: Wabiskaw, Main Hole
Intermediate, 4.3-555.0
516.1-1,940.0, Zone: Wabiskaw, Main Hole
Slotted liner, 516.1-1,940.0

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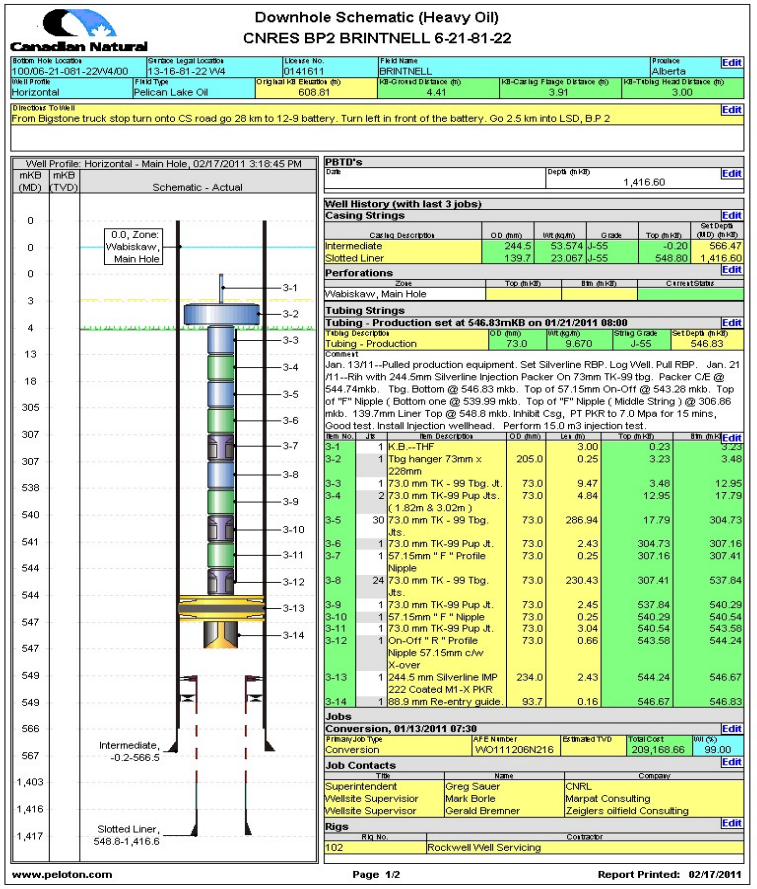
- **Injector**



Downhole Schematic (Heavy Oil)
CNRES BP2 BRINTNELL 6-21-81-22

Bottom Hole Location	Surface Legal Location	License No.	Field Name	Province
100/06-21-081-22W4/00	13-16-81-22 W4	0141611	BRINTNELL	Alberta

Well Profile	Field Type	Original KB Elevation (m)	KB-Ground Distance (m)	KB-Casing Flange Distance (m)	KB-Tbg Head Distance (m)
Horizontal	Pelican Lake Oil	608.81	4.41	3.91	3.00

Directions To Well
From Bigstone truck stop turn onto CS road go 28 km to 12-9 battery. Turn left in front of the battery. Go 2.5 km into LSD, B.P 2

Well Profile: Horizontal - Main Hole, 02/17/2011 3:18:45 PM
Schematic - Actual

PBTD's

Date	Depth (mKB)
	1,416.60

Well History (with last 3 jobs)

Casing Strings

Casing Description	OD (mm)	Wt (kg/m)	Grade	Top (mKB)	Set Depth (MD) (mKB)
Intermediate	244.5	53.574	J-55	0.20	566.47
Slotted Liner	139.7	23.067	J-55	548.80	1,416.60

Perforations

Zone	Top (mKB)	Btm (mKB)	Current Status
Wabiskaw, Main Hole			

Tubing Strings

Tubing - Production set at 546.83mKB on 01/21/2011 08:00

Tubing Description	OD (mm)	Wt (kg/m)	String Grade	Set Depth (mKB)
Tubing - Production	73.0	9.670	J-55	546.83

Comment
Jan. 13/11--Pulled production equipment. Set Silverline RBP. Log Well. Pull RBP. Jan. 21 /11--Rih with 244.5mm Silverline Injection Packer On 73mm TK-99 tbg. Packer C/E @ 544.74mkb. Tbg. Bottom @ 546.83 mkb. Top of 57.15mm On-Off @ 543.28 mkb. Top of "F" Nipple (Bottom one @ 539.99 mkb. Top of "F" Nipple (Middle String) @ 306.86 mkb. 139.7mm Liner Top @ 548.8 mkb. Inhibit Csg, PT PKR to 7.0 Mpa for 15 mins, Good test. Install Injection wellhead. Perform 15.0 m3 injection test.

Item No.	Jts	Item Description	OD (mm)	Len (m)	Top (mKB)	Btm (mKB)
3-1	1	K.B.--THF		3.00	0.23	3.23
3-2	1	Tbg hanger 73mm x 228mm	205.0	0.25	3.23	3.48
3-3	1	73.0 mm TK - 99 Tbg. Jt.	73.0	9.47	3.48	12.95
3-4	2	73.0 mm TK-99 Pup Jts. (1.82m & 3.02m)	73.0	4.84	12.95	17.79
3-5	30	73.0 mm TK - 99 Tbg. Jts.	73.0	286.94	17.79	304.73
3-6	1	73.0 mm TK-99 Pup Jt.	73.0	2.43	304.73	307.16
3-7	1	57.15mm " F " Profile Nipple	73.0	0.25	307.16	307.41
3-8	24	73.0 mm TK - 99 Tbg. Jts.	73.0	230.43	307.41	537.84
3-9	1	73.0 mm TK-99 Pup Jt.	73.0	2.45	537.84	540.29
3-10	1	57.15mm " F " Nipple	73.0	0.25	540.29	540.54
3-11	1	73.0 mm TK-99 Pup Jt.	73.0	3.04	540.54	543.58
3-12	1	On-Off " R " Profile Nipple 57.15mm c/w X-over	73.0	0.66	543.58	544.24
3-13	1	244.5 mm Silverline IMP 222 Coated M1-X PKR	234.0	2.43	544.24	546.67
3-14	1	88.9 mm Re-entry guide.	93.7	0.16	546.67	546.83

Jobs

Conversion, 01/13/2011 07:30

Primary Job Type	AFE Number	Estimated TVD	Total Cost	Wt (K)
Conversion	WO111206N216		209,168.66	99.00

Job Contacts

Title	Name	Company
Superintendent	Greg Sauer	CNRL
Wellsite Supervisor	Mark Borle	Marpat Consulting
Wellsite Supervisor	Gerald Bremner	Zeiglers oilfield Consulting

Rigs

Rig No.	Contractor
102	Rockwell Well Servicing

Intermediate, -0.2-566.5
Slotted Liner, 548.8-1,416.6

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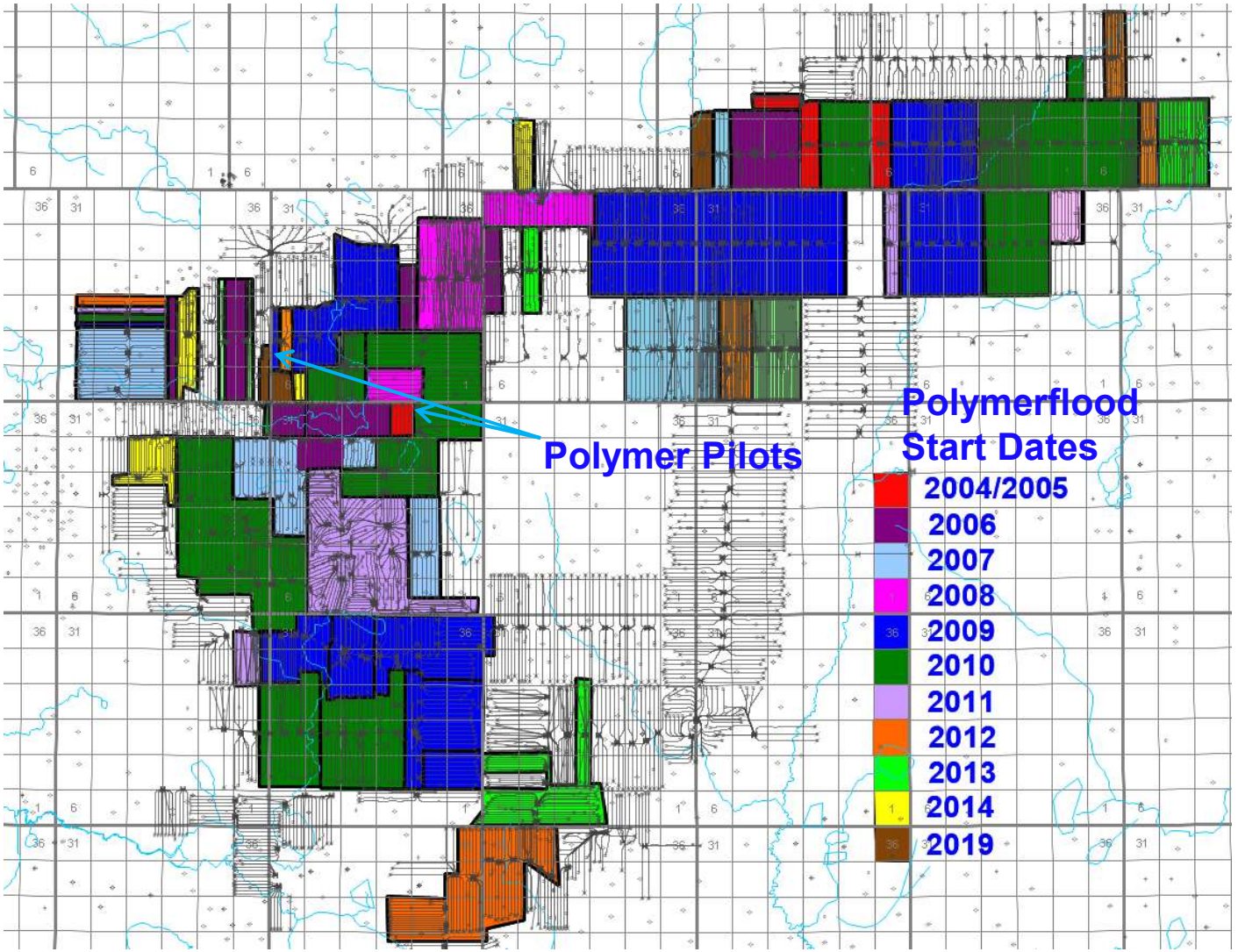
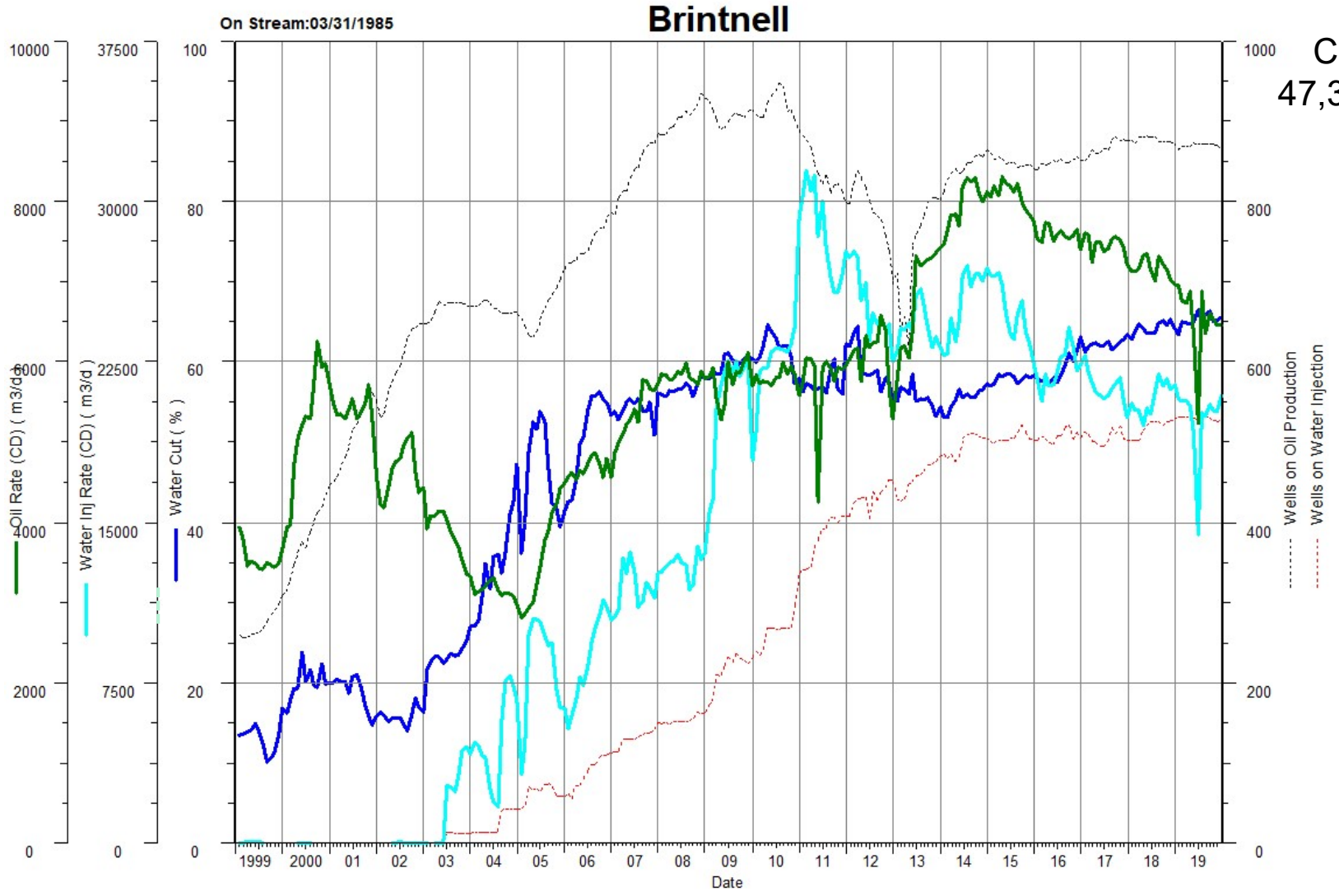
- **Intermediate Casing landed in Wabiskaw sand (producers and injectors).**

EOR History and Current Approvals

Polymerflood Development



Legacy Field Overview

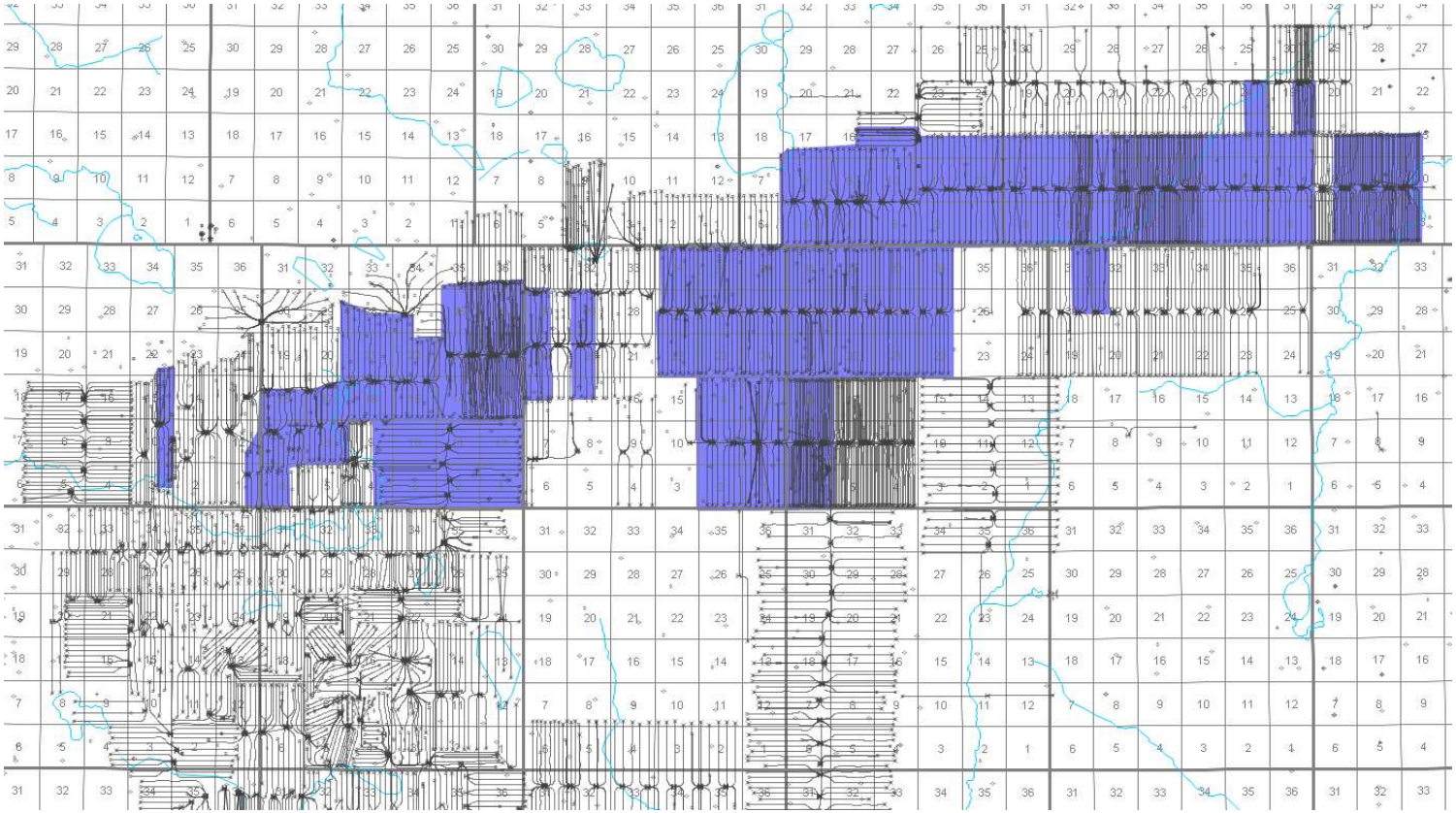


Cum. oil:
47,359 E3m3

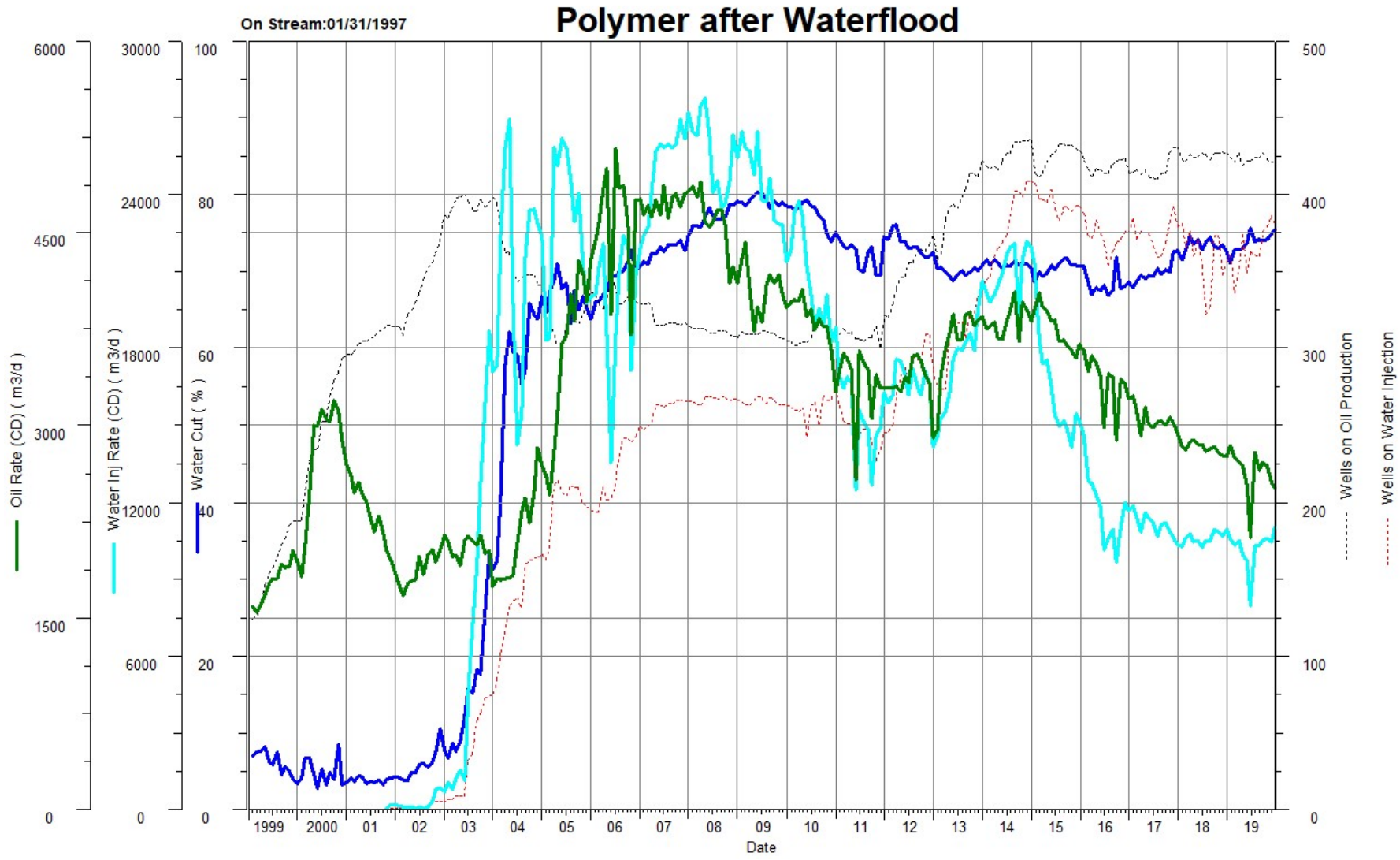
Approximately 63% of the legacy approved EOR scheme areas
are currently developed and under flood as of the end of 2019

Polymerflood after Waterflood

- **With the inclusion of Approval 9404 area, the polymer after waterflood area is significantly larger but still concentrated in the Northern half of the field, generally corresponding to lower in-situ oil viscosity.**

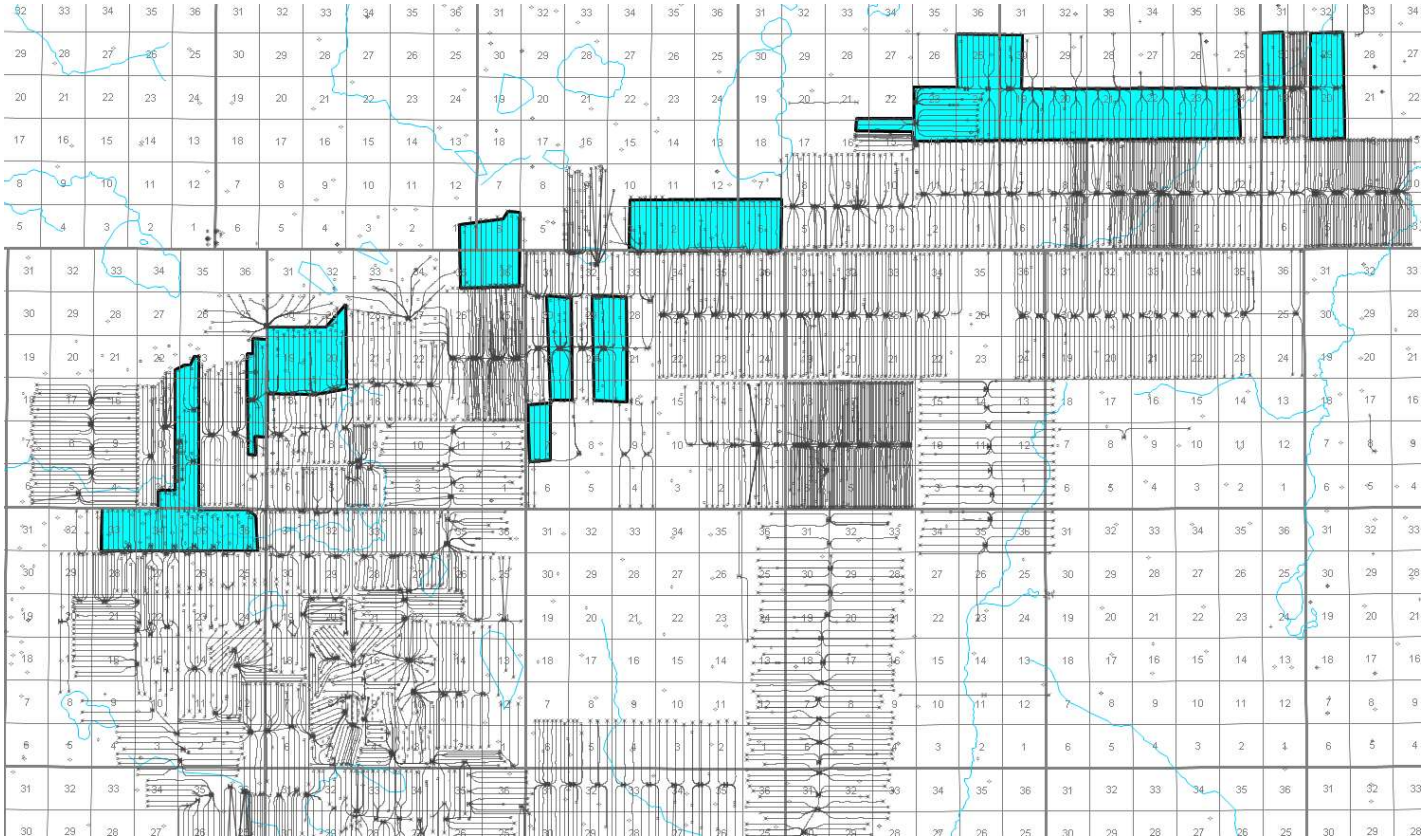


Polymerflood after Waterflood

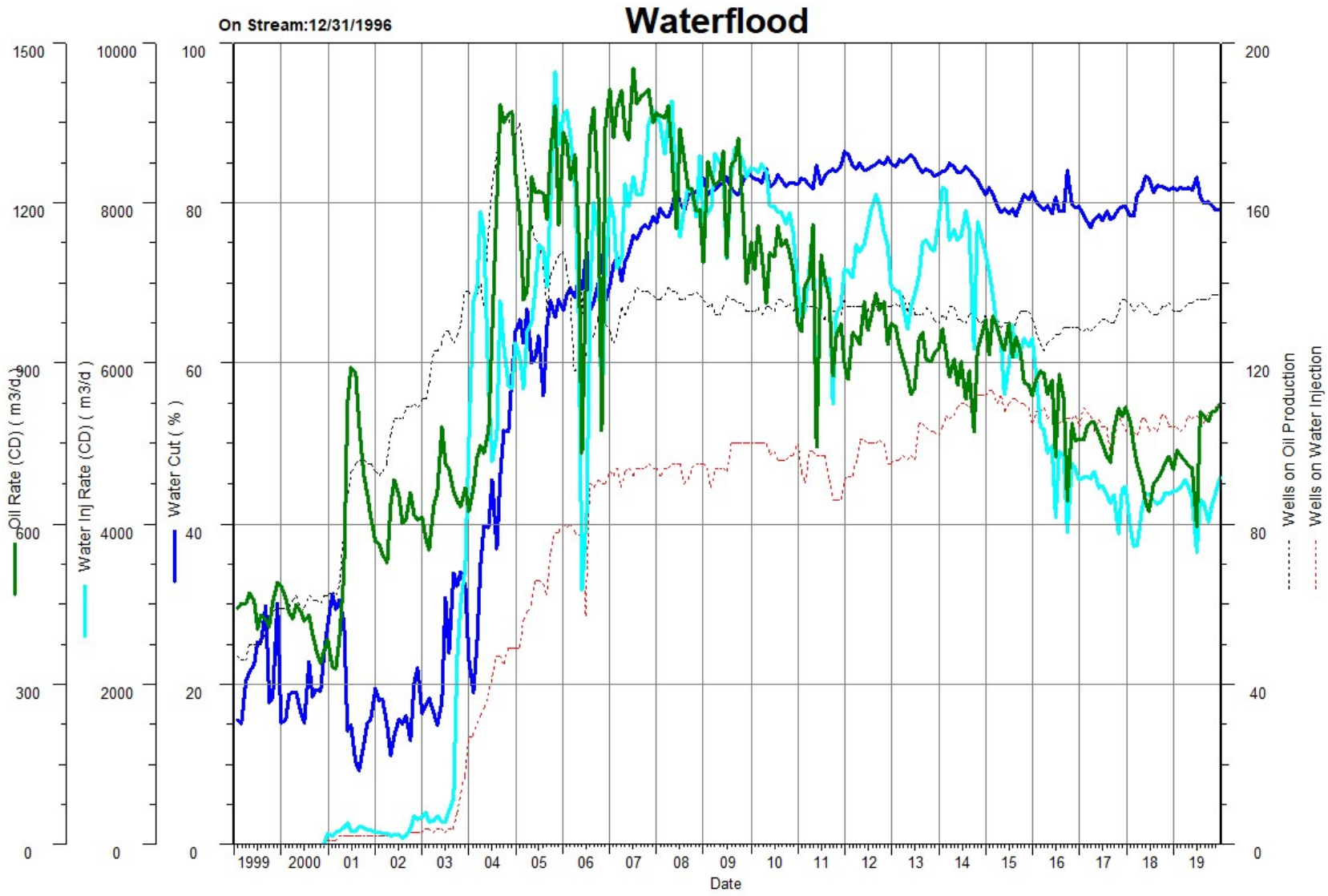


Waterflood

- **Current waterflood patterns are all contained in Approval 9404 area. The majority of these patterns have been under waterflood since the mid-2000s, conversion to polymerflood is under evaluation.**



Waterflood


Waterflood
On Stream:12/31/1996
Oil Rate (CD) (m3/d)
Water Inj Rate (CD) (m3/d)
Water Cut (%)
Wells on Oil Production
Wells on Water Injection
Date
1500
1200
900
600
300
0
10000
8000
6000
4000
2000
0
100
80
60
40
20
0
200
160
120
80
40
0
1999
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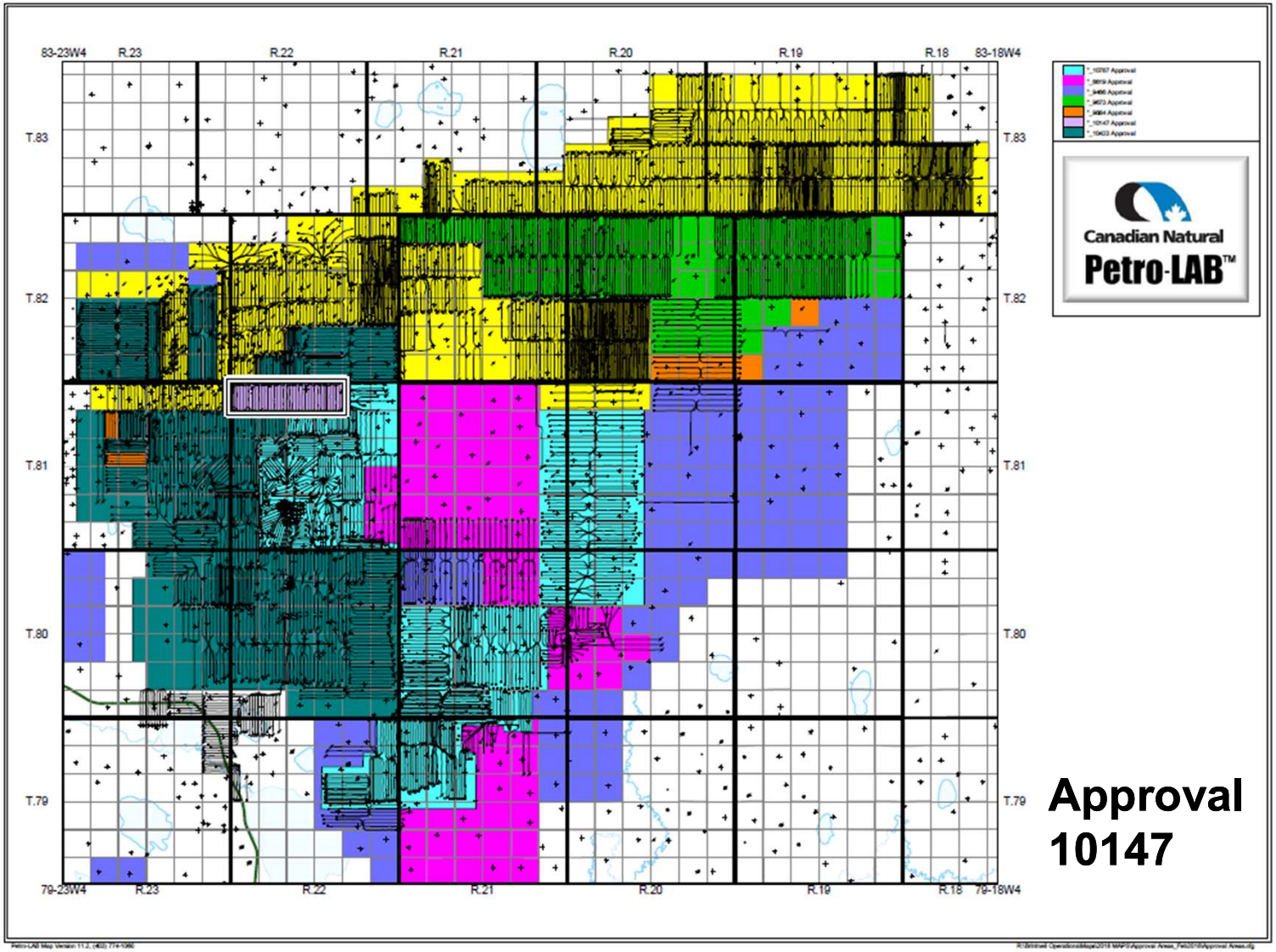
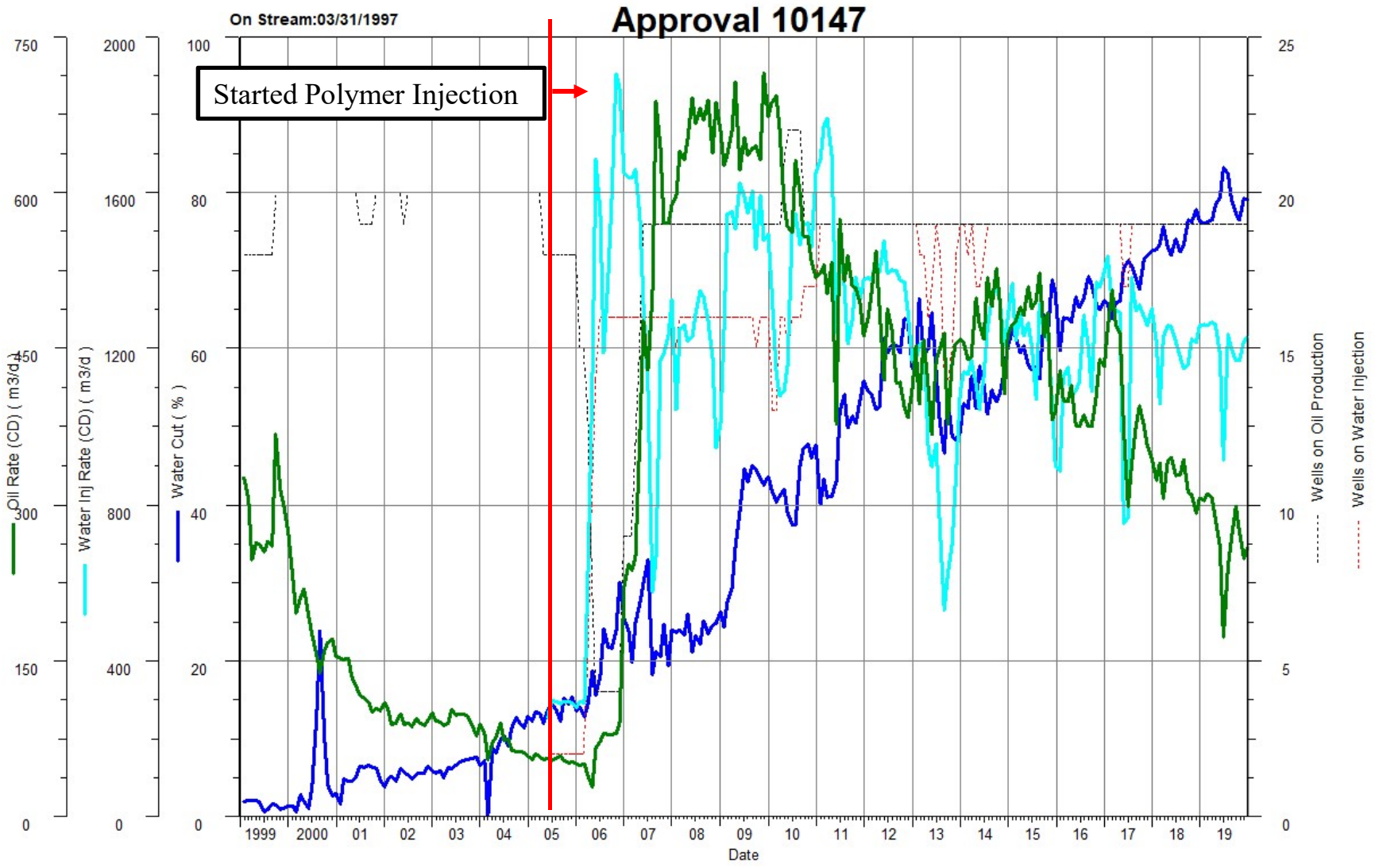
Field Performance and Surveillance

Approval 10147



Approval 10147 Production Update



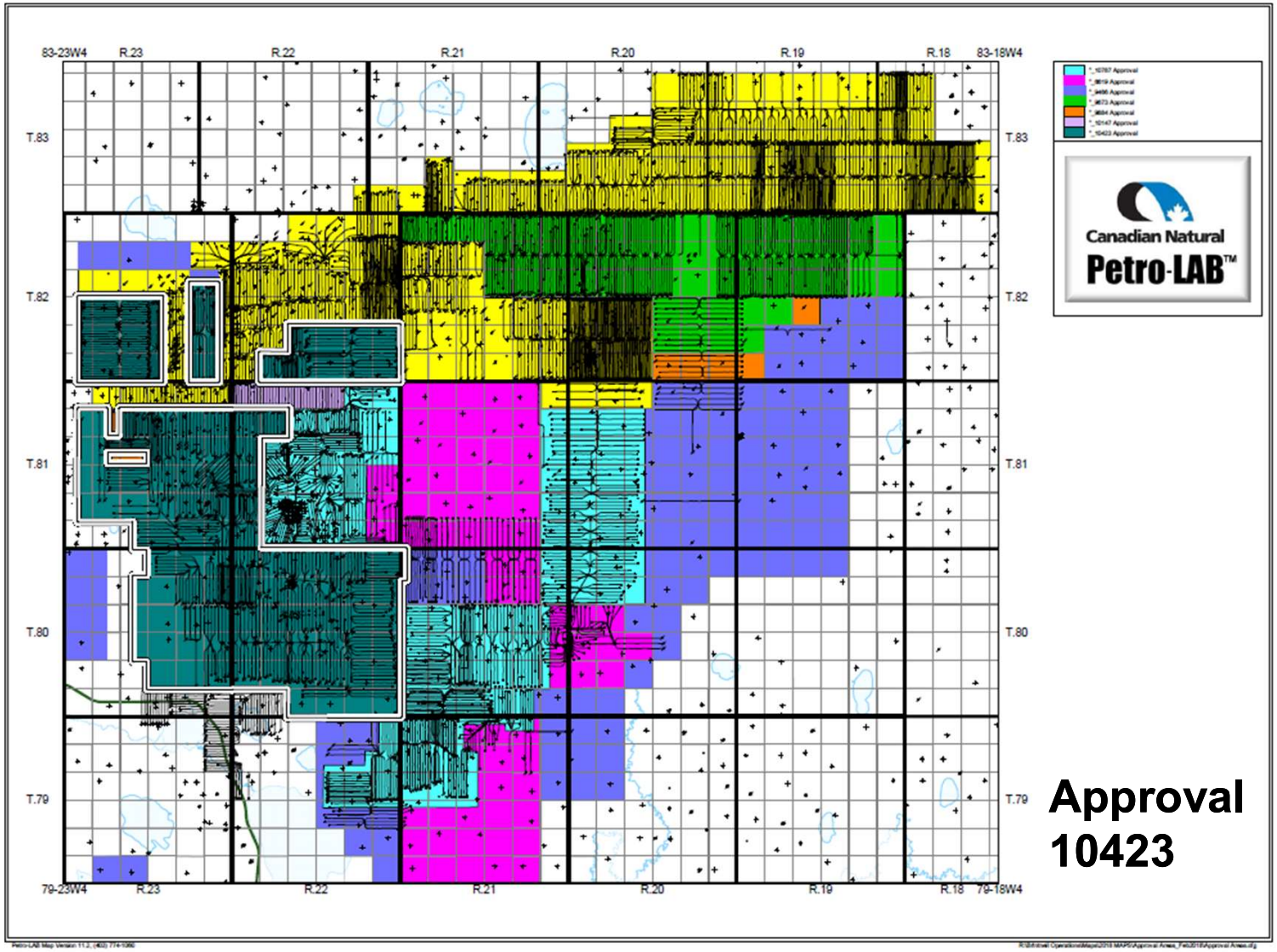
Cum oil: 2,844 E3m3 Cum water: 2,865 E3m3 Cum injection: 6,488 E3m3

Approval 10147 Discussion

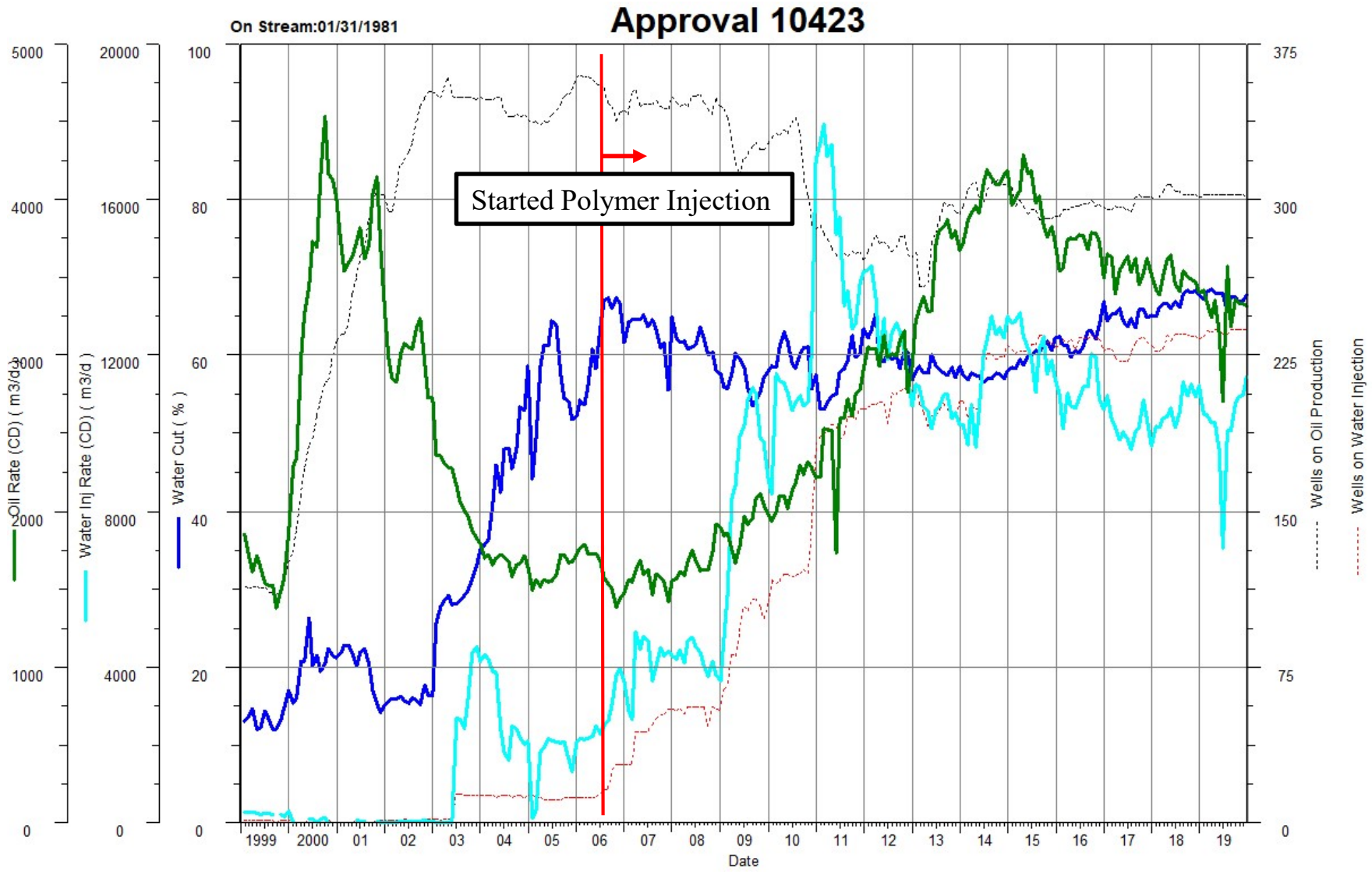
Canadian Natural

- Contains the most mature polymer flood patterns including the original CNRL pilot area which began flooding in 2005.
- First Polymer Response in April 2006 from the HTL6 Pilot area.
- Peak production occurred from mid 2007 to early 2010 at 650 m3/d oil.
- Injection returned to normal in 2014-2015 following a significant reduction in 2013 for offset drilling.
- Increased water cut was observed in 2018 and 2019 due to the maturity of the flood.
- Water cut averaged roughly 79% during 2019.
- Oil viscosity ranges from 1,300 cp to 2,800 cP.

Approval 10423



Approval 10423 Production Update



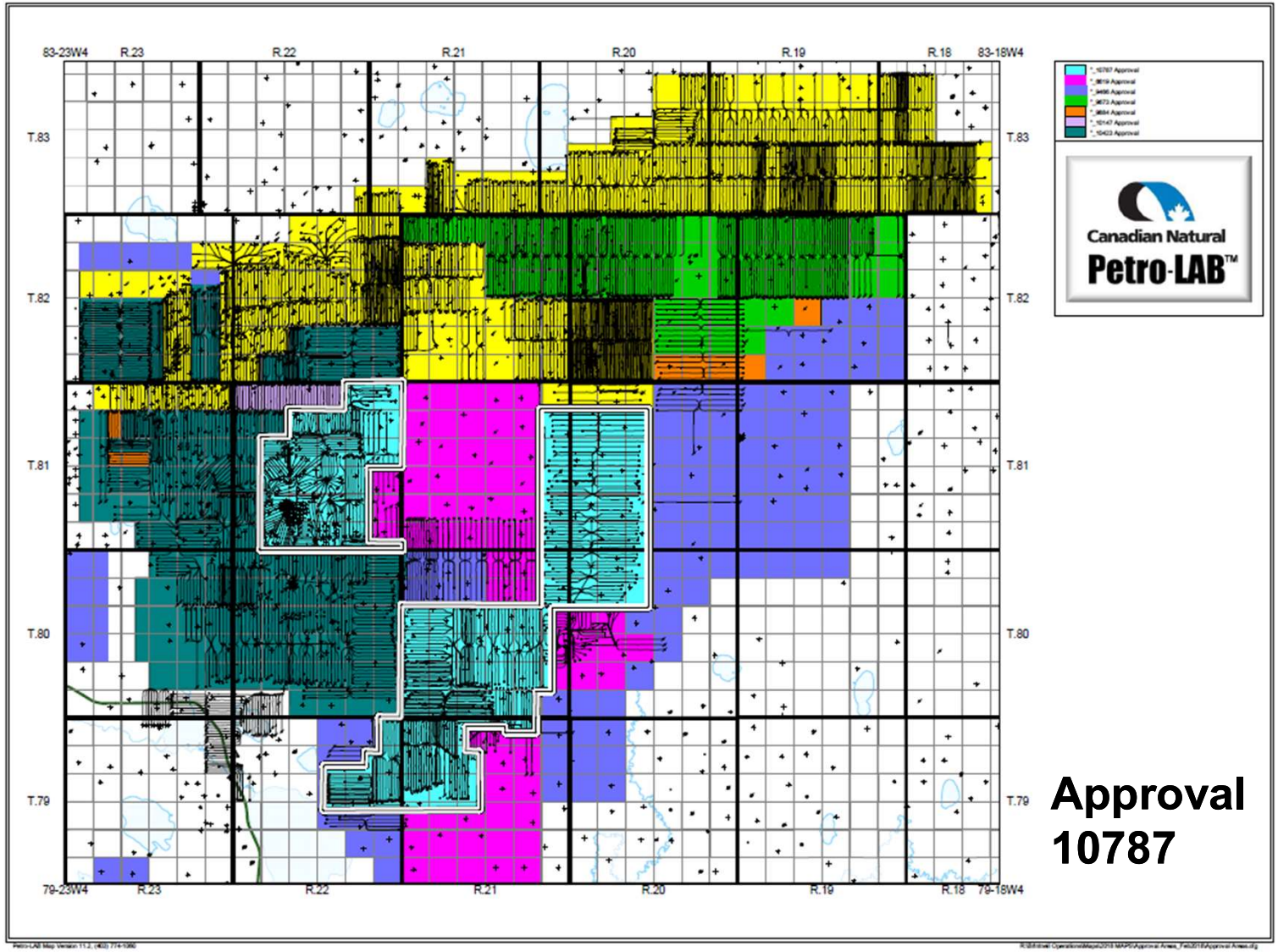
Cum oil: 22,965 E3m3 Cum water: 26,553 E3m3 Cum injection: 52,043 E3m3

Approval 10423 Discussion

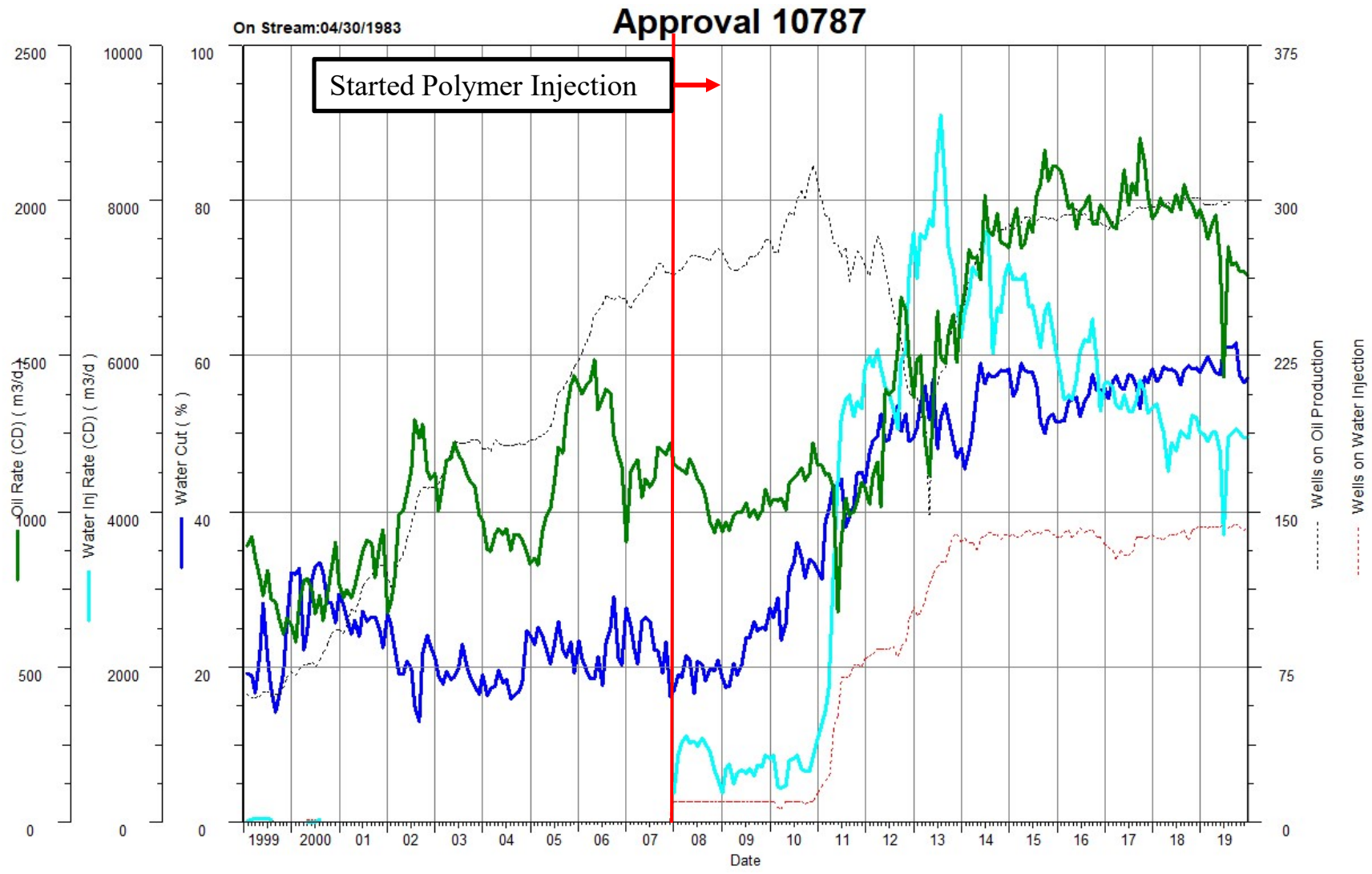
Canadian Natural

- Polymerflood started in 2006 covering roughly 5% of the approval area split between 3 small groups. The flood was expanded every year up to 2010. In 2012, small area from PRSA 9884 was added to the approval.
- Currently 73% of the approval area is under flood.
- Small portion of approval area under waterflood starting in 2003. This area was converted to polymer in 2008 and 2010.
- First polymer response in July 2007 but due to the size and staged flood expansion, did not see a ramp up in oil volumes until early 2009.
- Portions of the approval area are affected by higher in-situ water saturation and/or oil viscosity. Response in these regions has been more delayed and erratic when compared to other portions of the pool.
- Oil viscosity ranges from 1,100 cp to 50,000 cp.
- 14 producers in WB 14 converted to injection in 2014. 6 producers in WB32 area converted to injection in 2015.
- Average WCT in 2019 approximately 68%. 10 re-drills in late 2016 & 2017 and 10 re-drills in 2018.

Approval 10787



Approval 10787 Production Update



Cum oil: 11,156 E3m3 Cum water: 8,449 E3m3 Cum injection: 20,024 E3m3

Approval 10787 Discussion

Canadian Natural

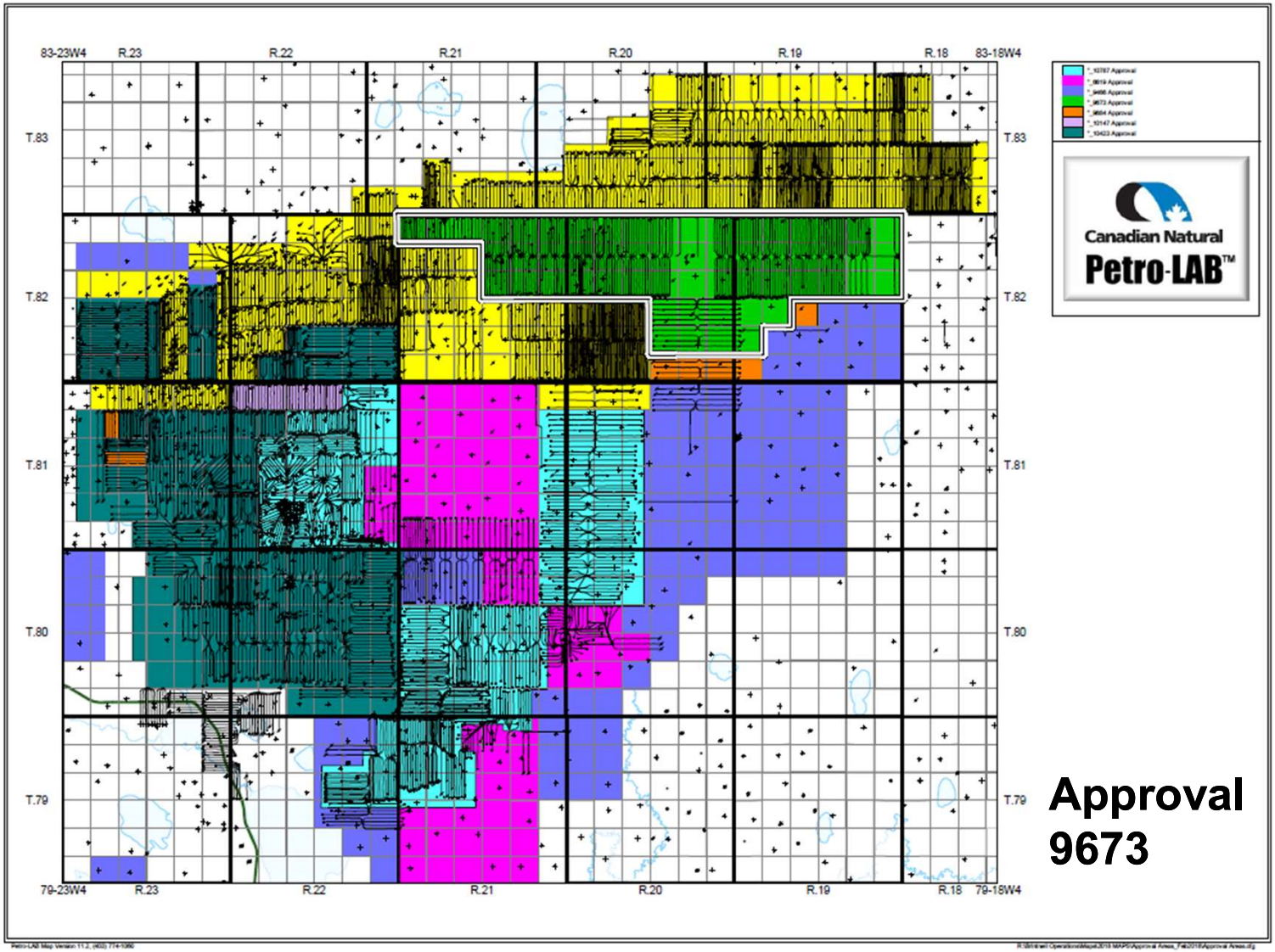
- Polymer flood started in Dec 2007 covering roughly 4% of the approval area split into 2 small groups. There were no expansions until 2010, since then there has been an expansion completed in every year including 2013. Currently 45% of the approval area is under flood.
- First polymer response in Nov 2008 but due to the size and staged flood expansion, did not see a ramp up in oil volumes until mid 2012.
- Oil production increased in the late part of 2013 and early 2014, mostly due to new well activations.
- Polymer injection was commenced in the Peerless and Sandy Lake portions of the area in 2013, with the majority of wells exhibiting some form of polymer flood response.
- Average WCT in 2019 was 59%. There were 6 infill drills in 2018.
- Oil viscosity ranges from 1,100 cp to 14,400 cp.

Approval 10787 – 04/01-24-079-22W4 Monitoring

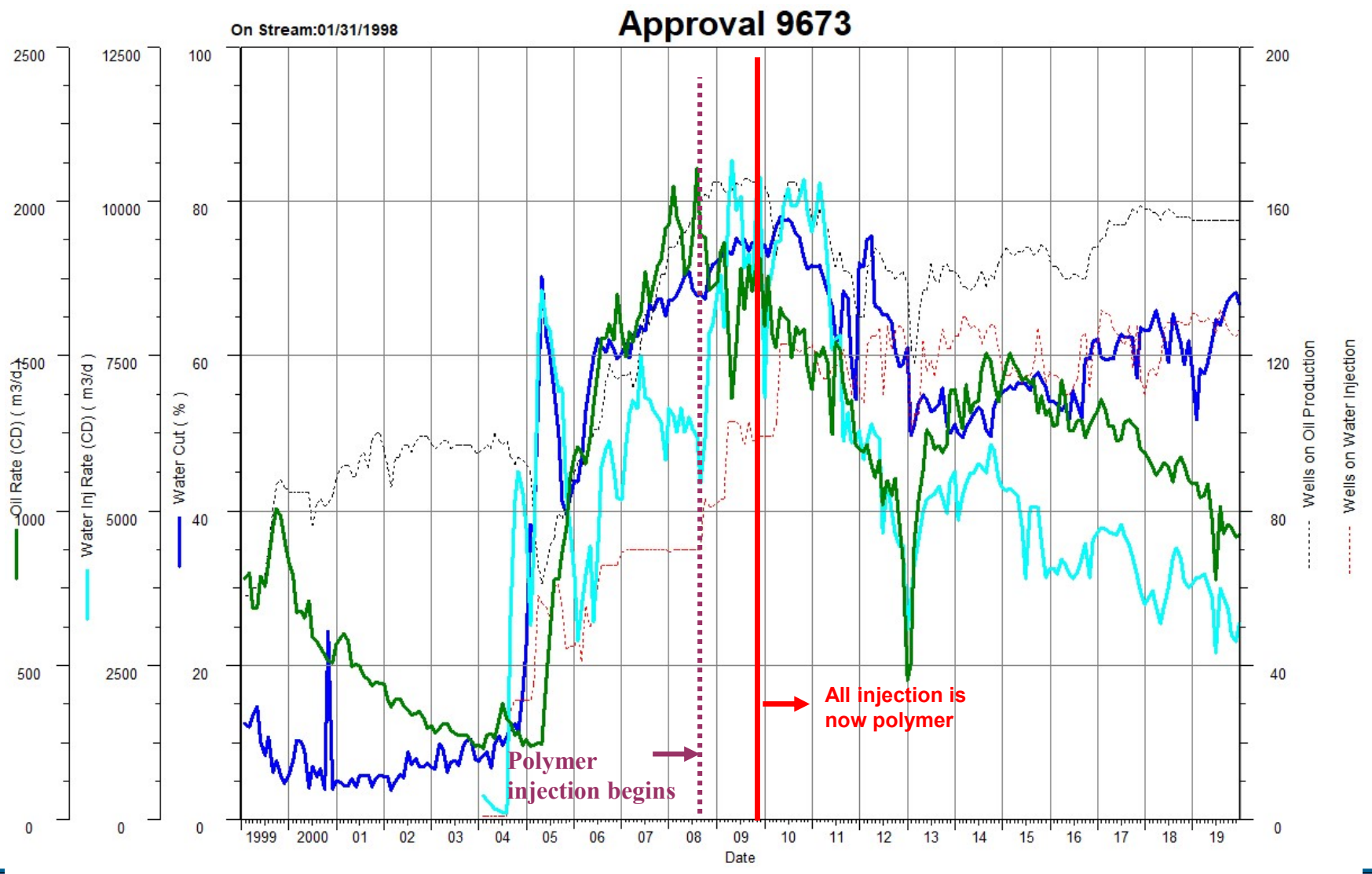
Canadian Natural

- In May 2012, the 03/16-36-079-22W4 well intersected the 00/01-24-079-22W4 wellbore while drilling
- Numerous attempts were made to repair the 00/01-24 well but ultimately the wellbore could not be returned to service. A non-routine abandonment was conducted on 00/01-24 in March 2013. The 04/01-24-079-22W4 observation well was drilled in September 2013 to monitor the polymer flood near the 00/01-24 offset following consultations with the AER (Approval 10787K).
- 04/01-24-079-22W4 Monitoring Program:
  - Produced water has been monitored continuously since Q4 2013. Through 2016, the well has not produced enough water to obtain a representative water analysis.
  - July 2019 TDS of 4970ppm is in line with expectations for Wabiskaw formation water.
  - The bottomhole reservoir pressure was measure quarterly in 2013/2014 and yearly from 2015-2018. Measurements were in line with expectations for the Wabiskaw reservoir under primary depletion.
  - CNRL will continue to monitor the produced watercut and emulsion samples.

Approval 9673



Approval 9673 Production Update



Cum oil: 8,540 E3m3 Cum water: 13,446 E3m3 Cum Injection: 32,684 E3m3

Approval 9673 Discussion

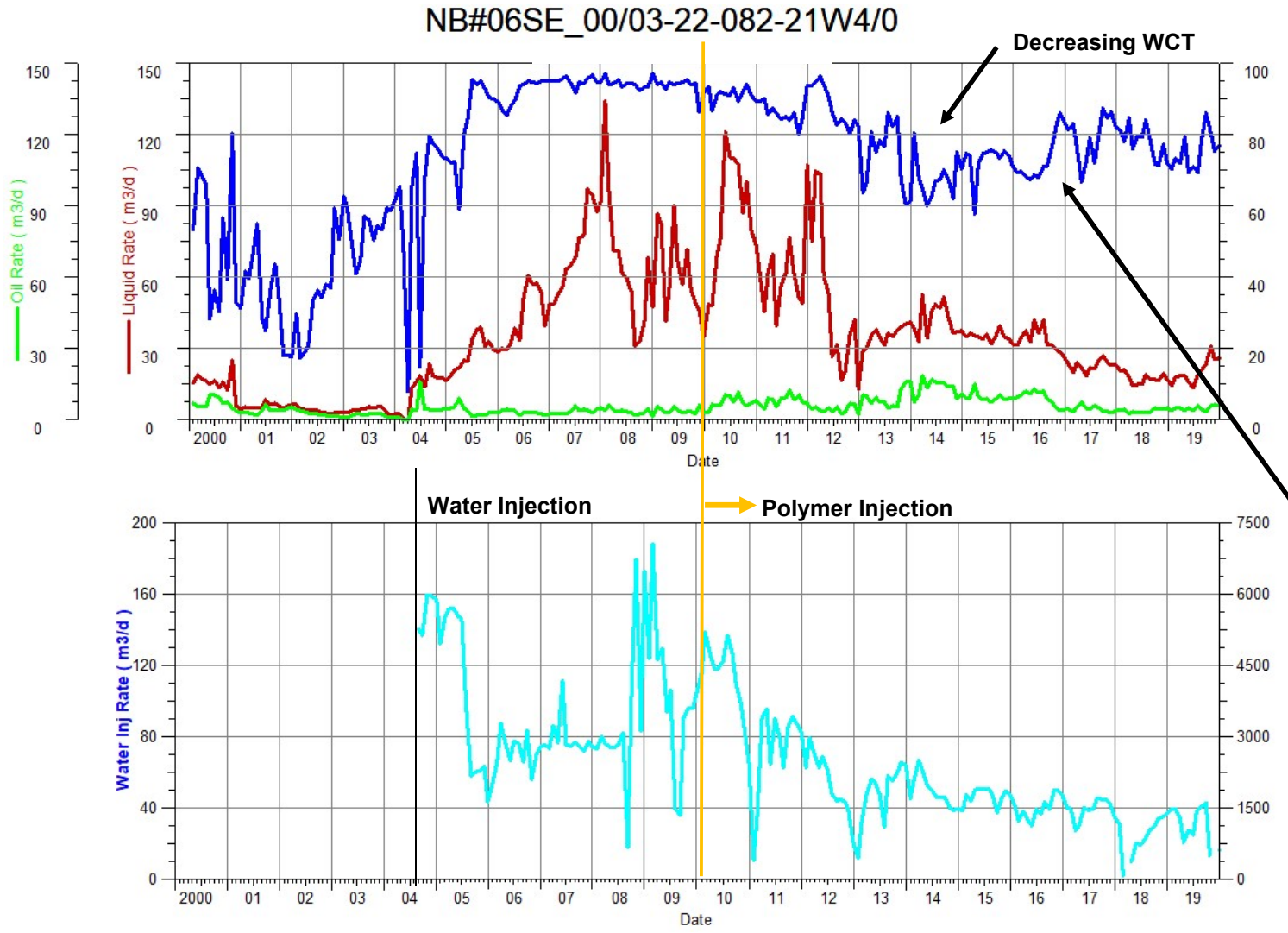
Canadian Natural

- Originally approved for waterflood in 2004; waterflood was expanded in 2005/2006 to cover roughly 40% of the current approval area.
- Waterflood peak production occurred from late 2007 to early 2009 at 1850 m3/d oil.
- Polymerflood began in Sept 2008 covering 6% of approval area. Existing waterflood patterns remained unchanged at this time.
- In 2009 all waterflood areas were converted to polymer and a small expansion area from primary was added; additional small expansions from primary were conducted in each year from 2010 to 2012. Currently 70% of the approval area is under flood.

Approval 9673 Discussion

- The conversion from water to polymer has had a dramatic effect on the conformance of the flood. Within two years of conversion for most areas, watercuts declined.
- In 2019 watercut averaged about 64%, this has been trending higher since being shut-in during the June 2019 wildfire.
- Oil viscosity ranges from 600 cp to 13,000 cp.

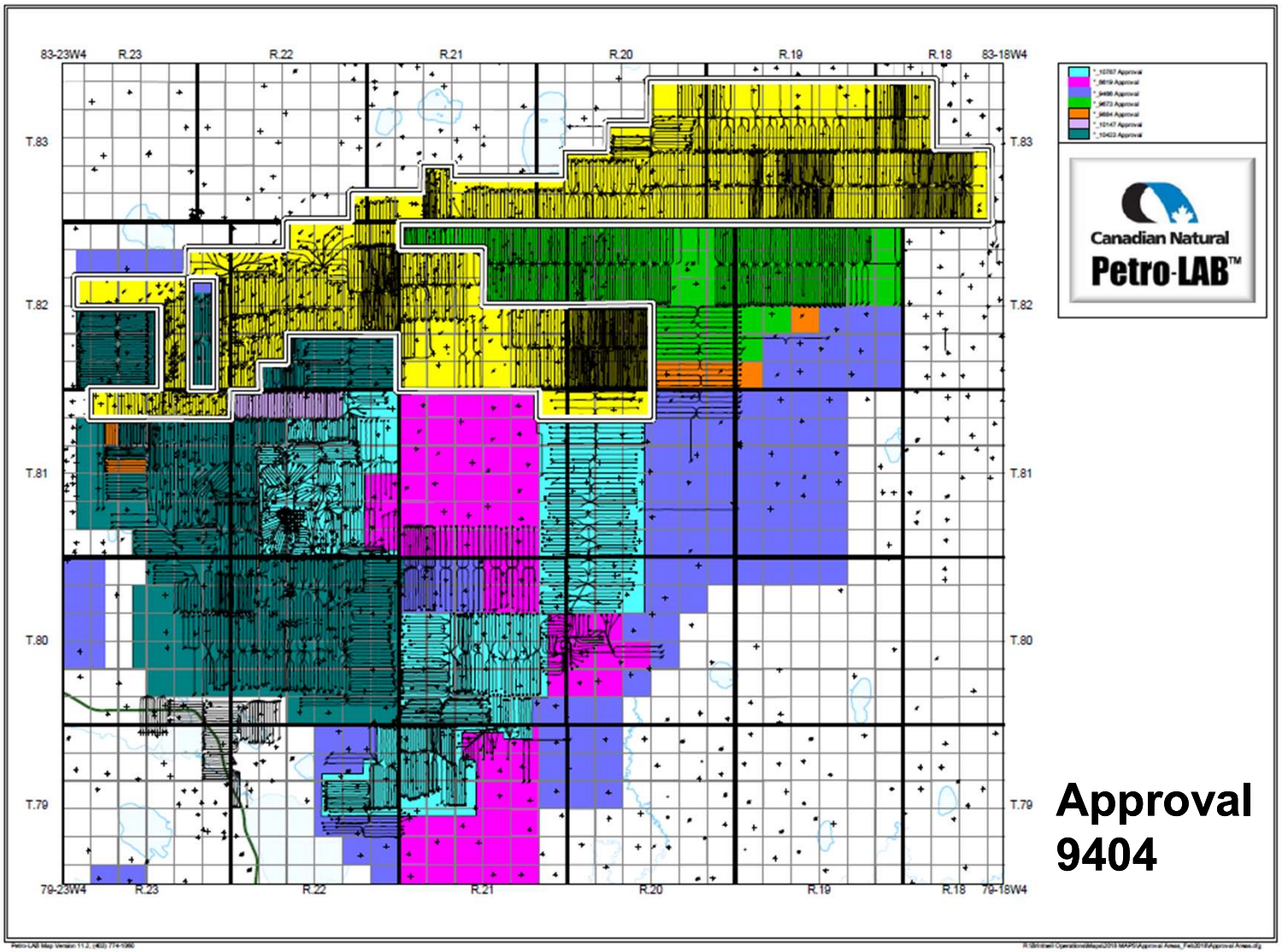
Approval 9673 Discussion: Polymer after Waterflood Example



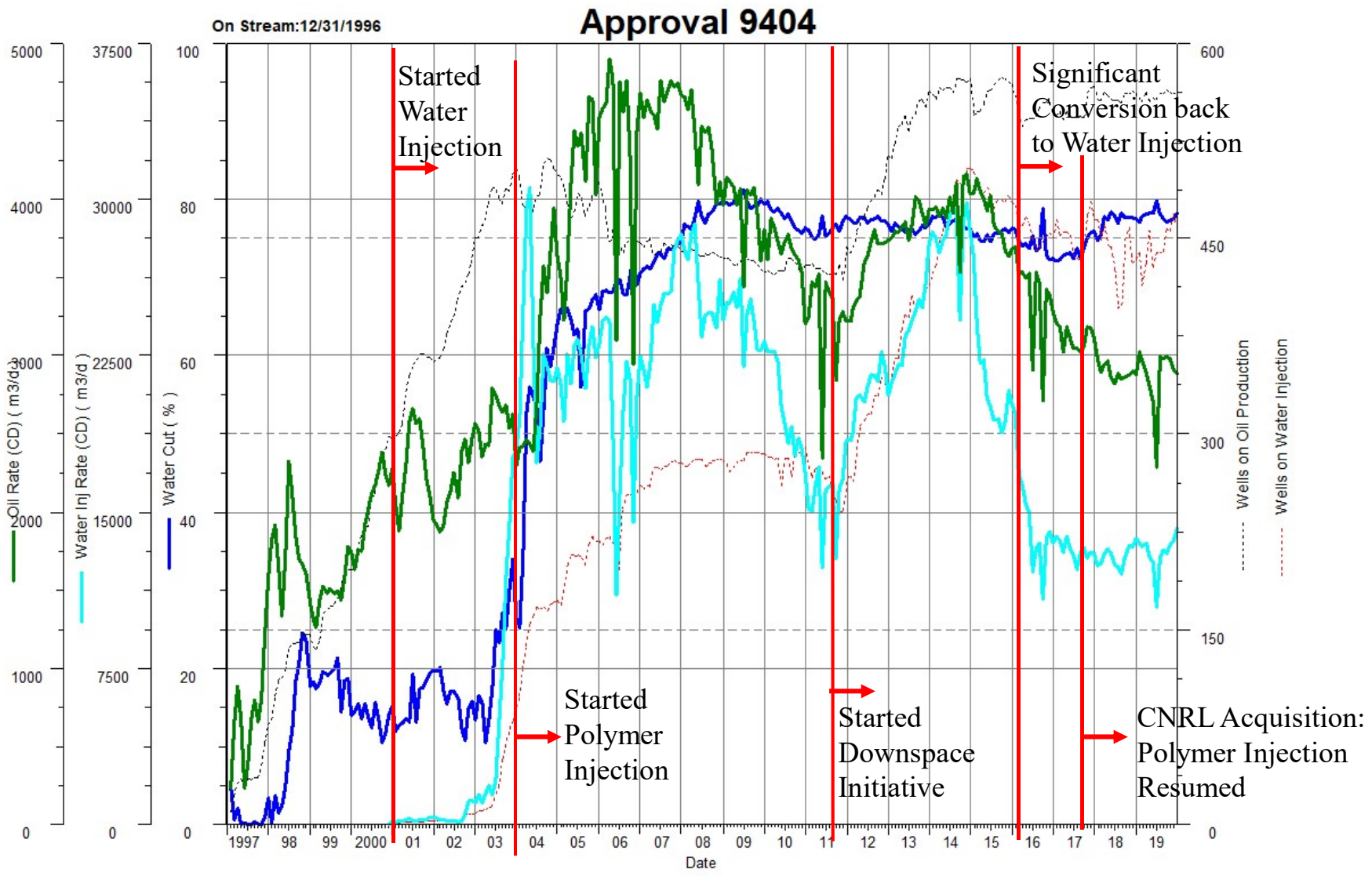
Results from polymer flood after waterflood areas vary by pattern but do show substantial polymer flood response on both oil and WCUT.

Starting at the end of 2016, WCTs have been rising, showing sensitivity of area.

Approval 9404

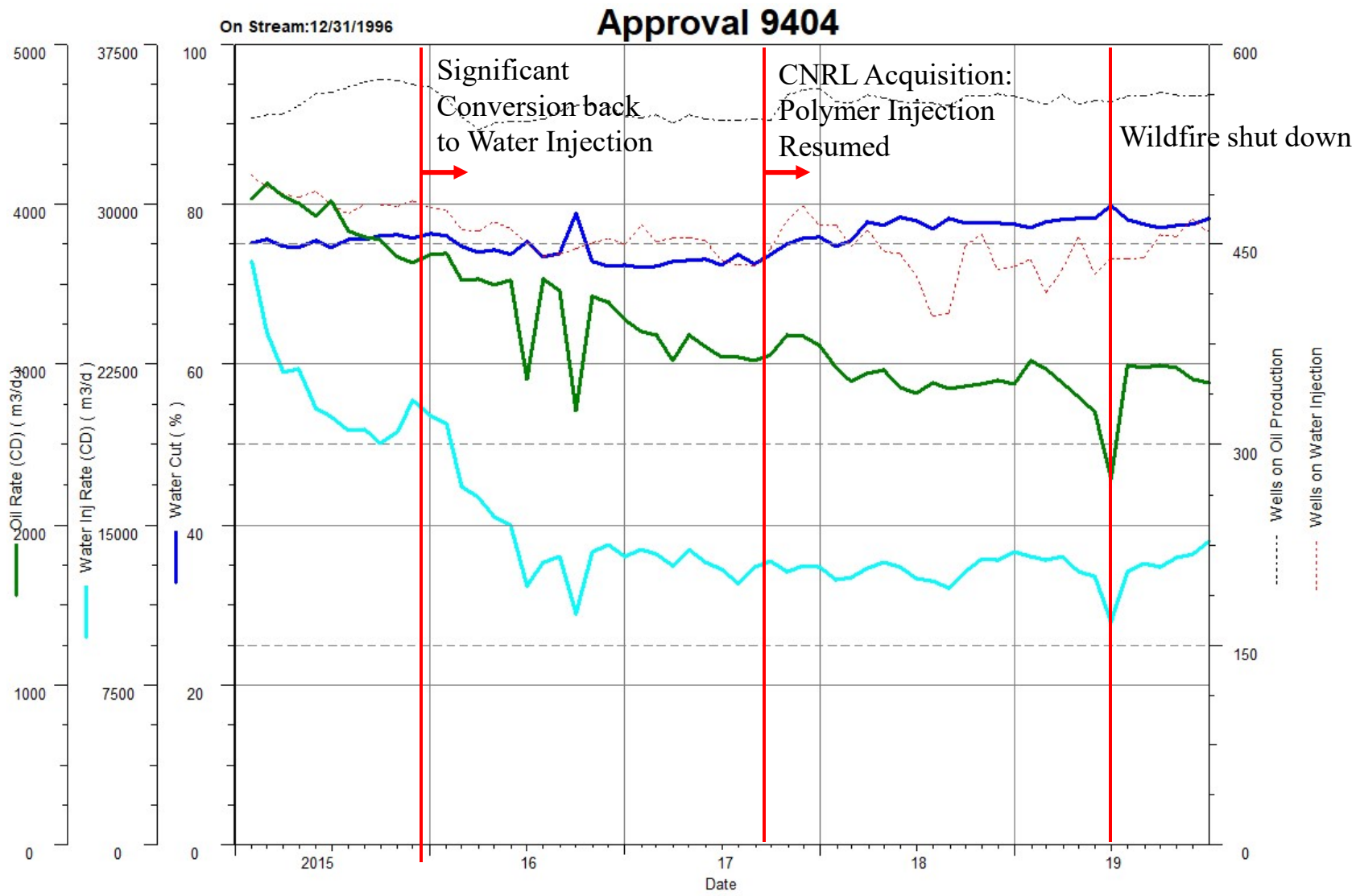


Approval 9404 Production Update



Cum oil: 26,293 E3m3 Cum water: 65,296 E3m3 Cum injection: 120,868 E3m3

Approval 9404 Production Update



Approval 9404 Discussion

Canadian Natural

- Waterflood initiated on SE09 in Nov 2000. Waterflood expansion began in 2002 in the SW region and spread throughout the field covering over 65% of the approval area. Majority of waterflood expansion occurred from 2002-2007.
- Oil response to waterflood was substantial, nearly doubling primary production rates, but water breakthrough progressed rapidly with watercuts as high as 90% within the first two years.
- To help address breakthrough, the first polymer conversion was initiated on SW08 in Dec 2003. Polymer expansion progressed steadily until 2014 covering over 45% of the approval area.
- The majority of injectors were converted from water to polymer, but a small percentage were completed directly to polymer from primary.

Approval 9404 Discussion

- Downspacing initiative was undertaken from 2011-2014. This increased the injector count by 50% and resulted in higher reservoir throughput.
- Through 2015 and 2016 injection rates were reduced significantly and about 75% of the polymerflood was converted back to water.
- CNRL acquired the approval area in September 2017 and has worked to resume polymer injection, by year end 2017 approximately 33% of the shut-in polymerflood area was reactivated.
- As of the end of 2019, 98% of previously polymer flooded area has been returned to polymer injection.
- Focus has been on re-establishing consistent polymerflood patterns.

Estimated Ultimate Recovery Factors (EURF) for Flooded Areas

Approval 9673
Total area OBIP 97.4 E^6m^3
OBIP under flood: 78.4 E^6m^3
Primary RF: 3%
RF to date: 10%
EURF: 15-19%

Approval 10787
Total area OBIP 205.2 E^6m^3
OBIP under flood: 81.4 E^6m^3
Primary RF: 5%
RF to date: 10%
EURF: 21-28%

Approval 10147
Total area OBIP 8.98 E^6m^3
OBIP under flood: 8.98 E^6m^3
Primary RF: 5%
RF to date: 31%
EURF: 35-38%

Approval 10423
Total area OBIP 229.0 E^6m^3
OBIP under flood: 163.8 E^6m^3
Primary RF: 6%
RF to date: 13%
EURF: 22-27%

Approval 9404
Total area OBIP 170.1 E^6m^3
OBIP under flood: 144.7 E^6m^3
Primary RF: 5%
RF to date: 18%
EURF: 27-30%

*RF to-date represents the RF from the active flood areas only. EURF range represents RF from areas recognized for EOR reserves by reserve auditor.

Good Performance – HTL1 (Approval 10147)

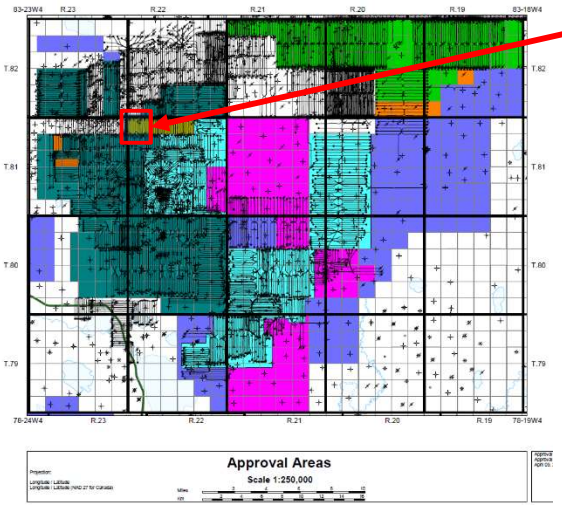
- **HTL1 100/15-31 Pattern**
  - **Well list and allocation factors:**

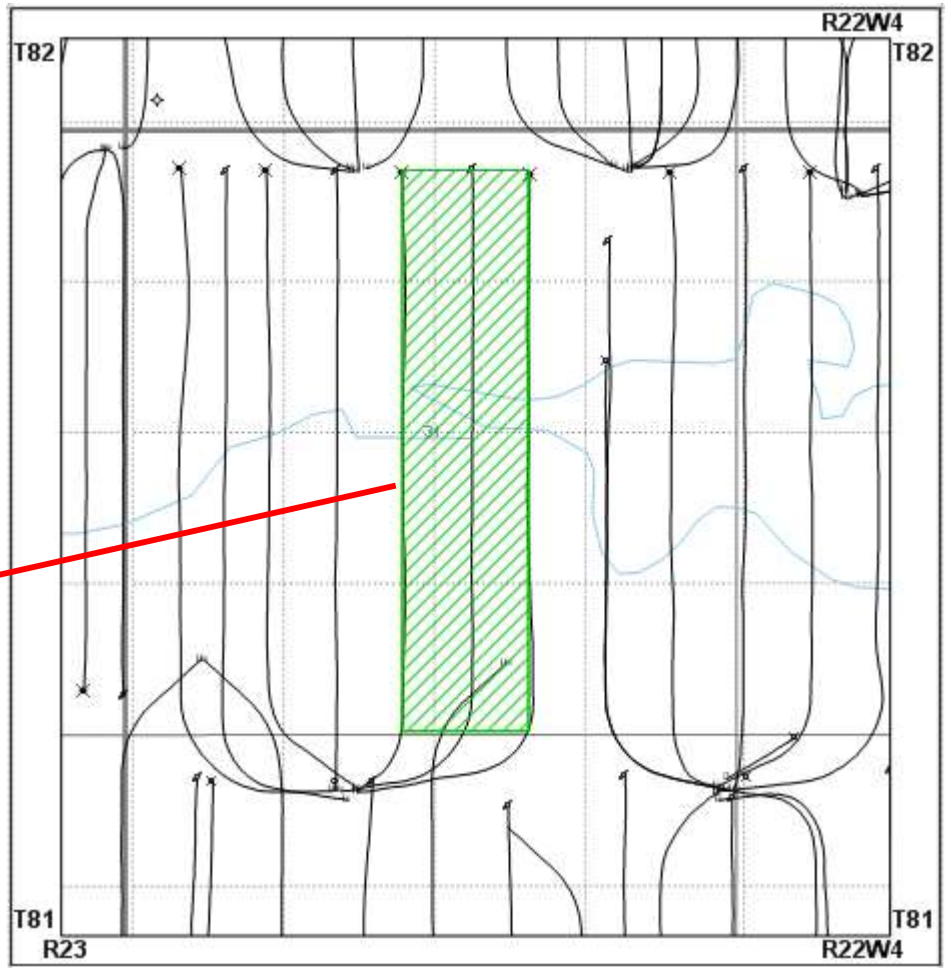
Injectors

- 100/15-31-081-22W4/0 (100%)

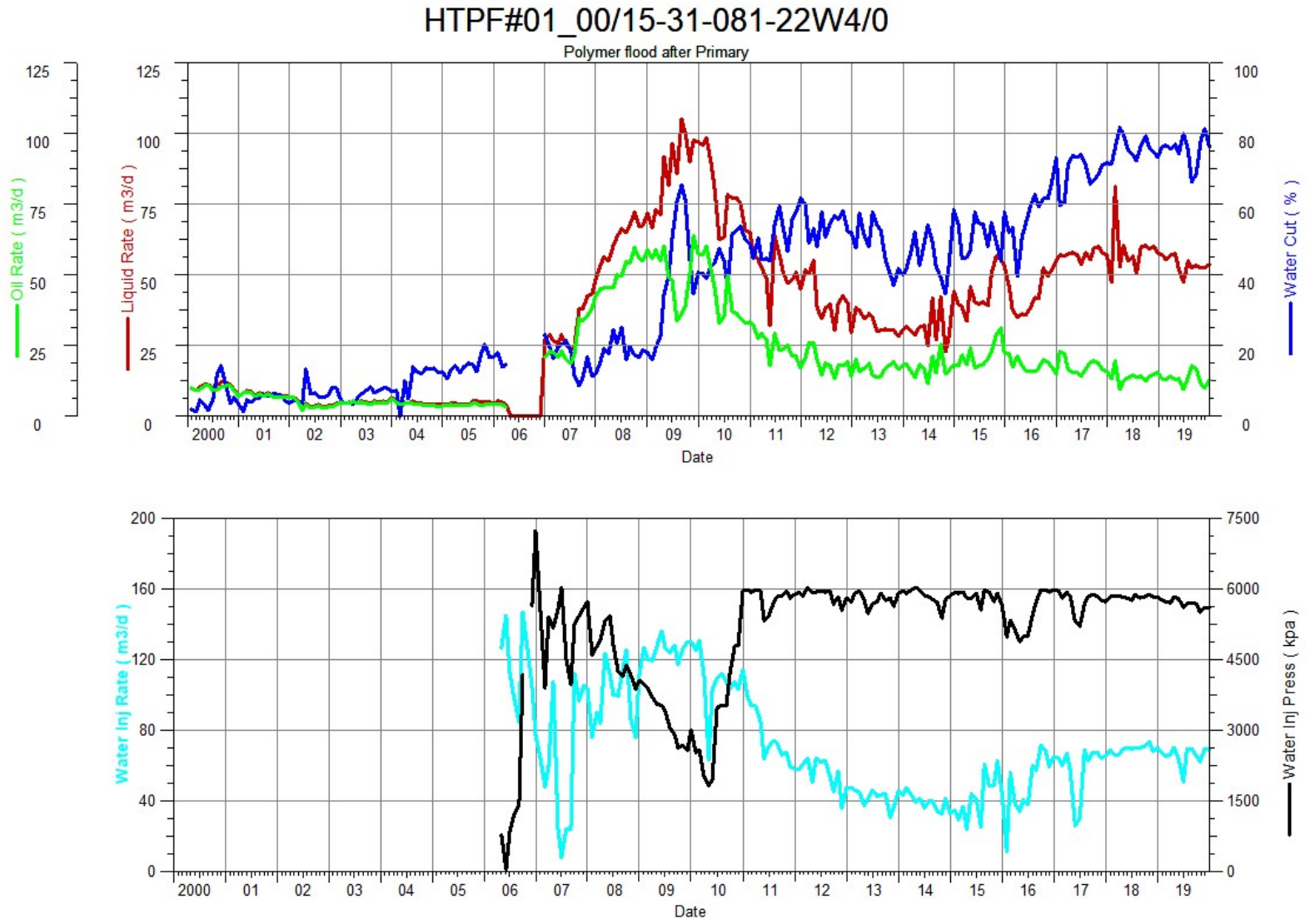
Producers

- 102/14-31-081-22W4/0 (50%)
- 102/15-31-081-22W4/0 (50%)





Good Performance – HTL1 (Approval 10147)



Average Performance – BP23 (Approval 10787)

- **BP23 100/05-23 Pattern**
  - **Well List and allocation factors:**

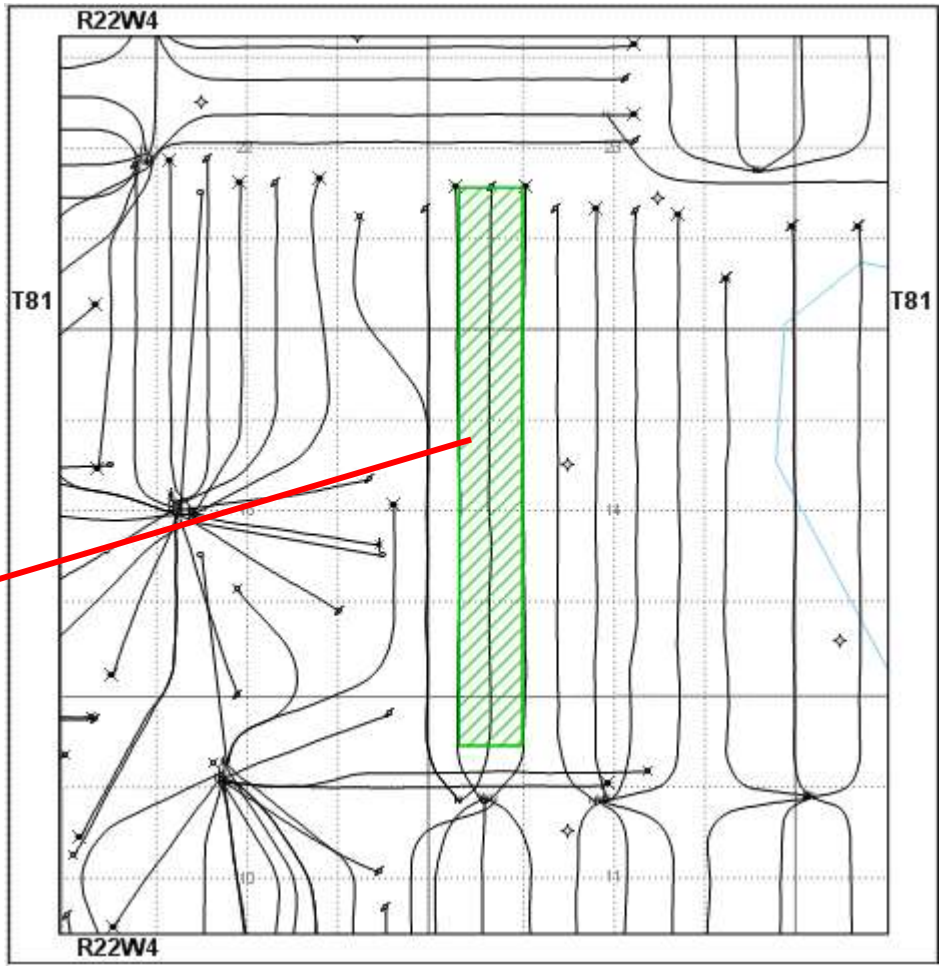
    Injectors

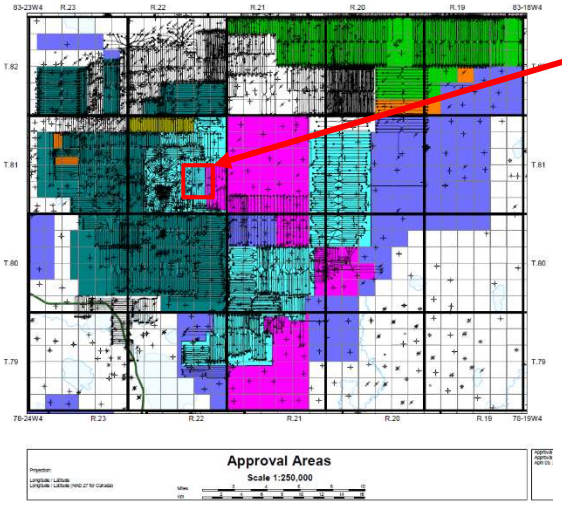
    ➢ **100/05-23-081-22W4/0 (100%)**

    Producers:

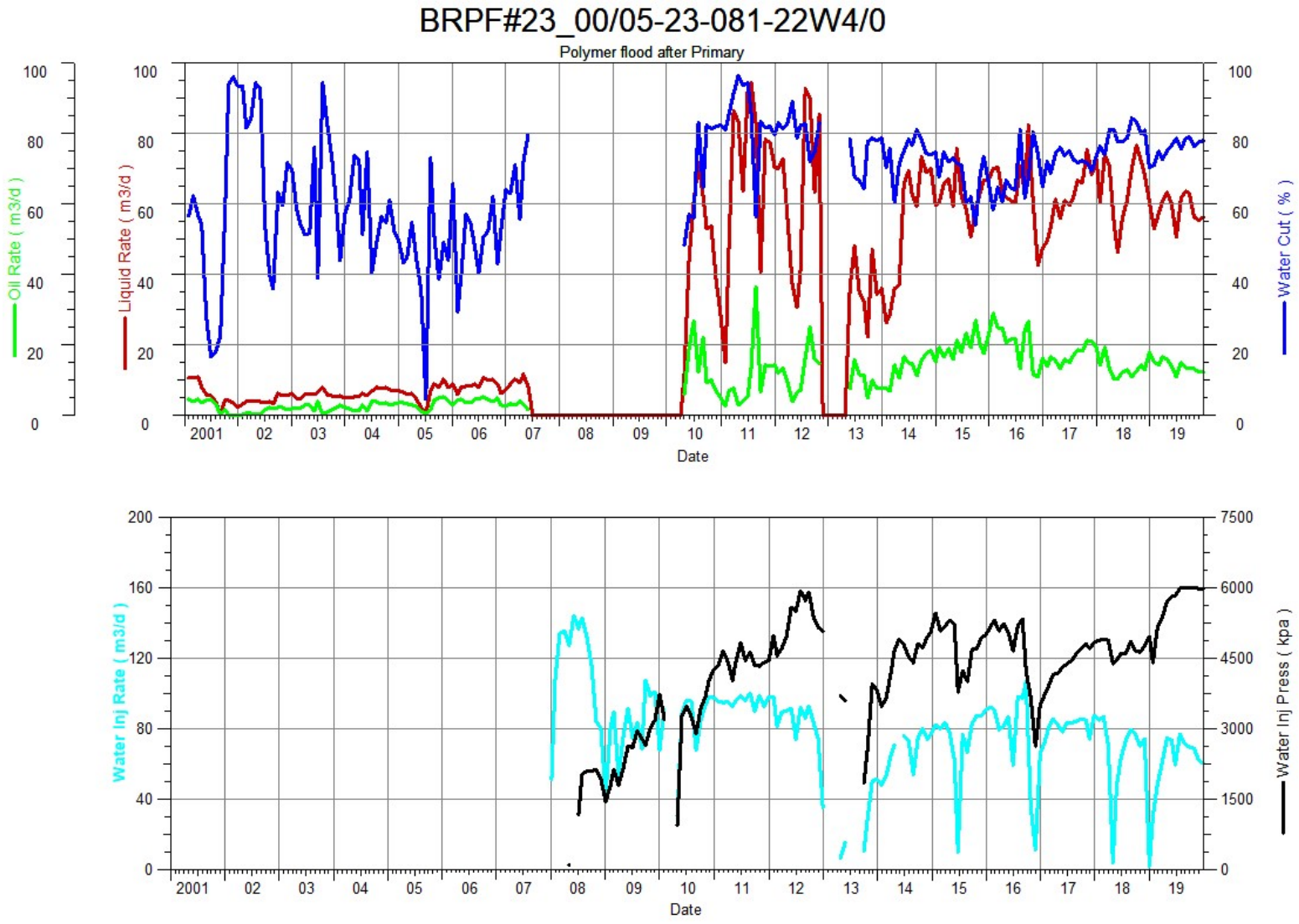
    ➢ **102/05-23-081-22W4/0 (50%)**

    ➢ **102/06-23-081-22W4/0 (50%)**





Average Performance – BP23 (Approval 10787)



Below Average Performance – SB 29 (Approval 10423)

Canadian Natural

- **SB 29 102/08-13 Pattern**
  - **Well List and allocation factors:**

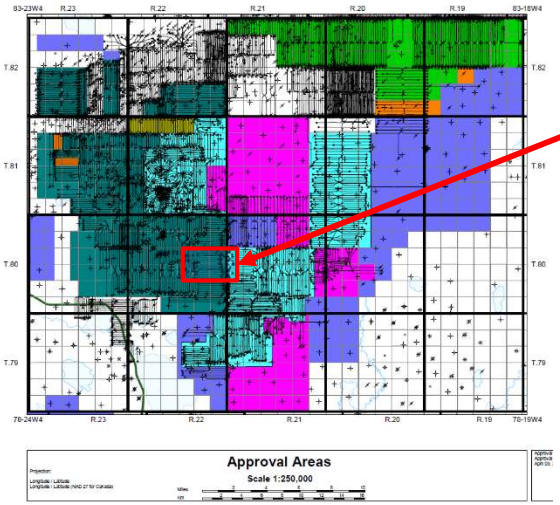
    Injector

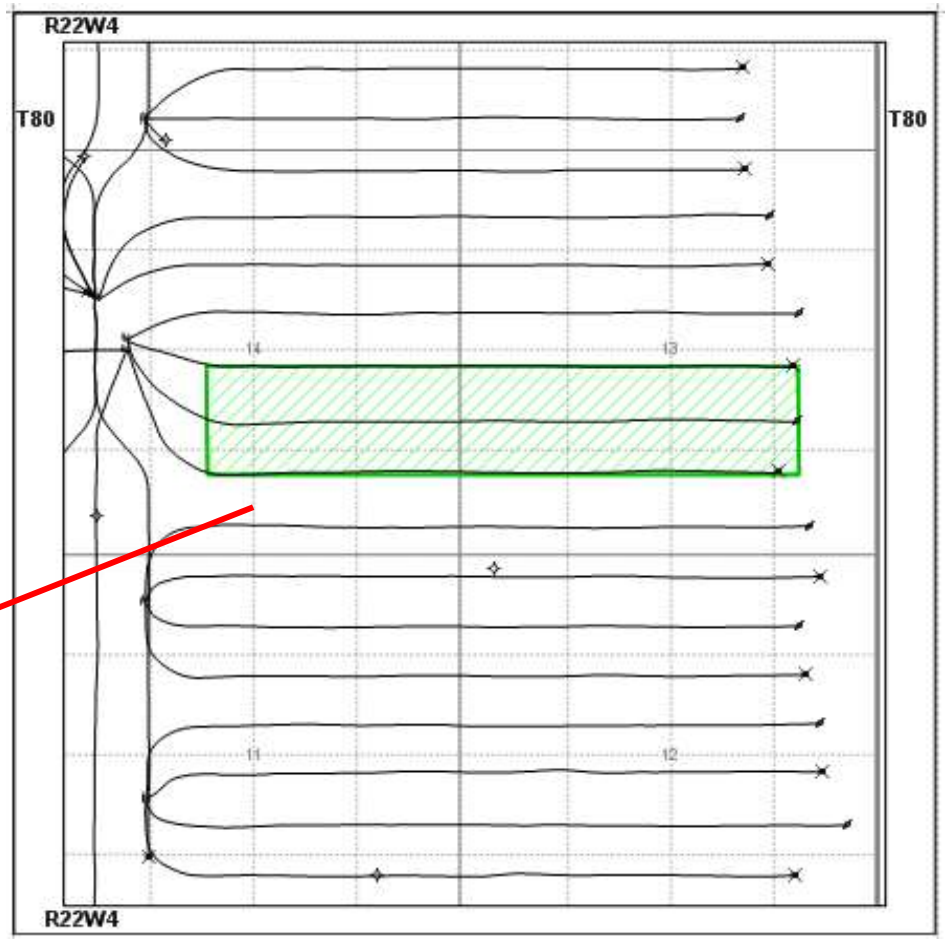
    ➢ **102/08-13-080-22W4/0 (100%)**

    Producers

    ➢ **100/01-13-080-22W4/0 (50%)**

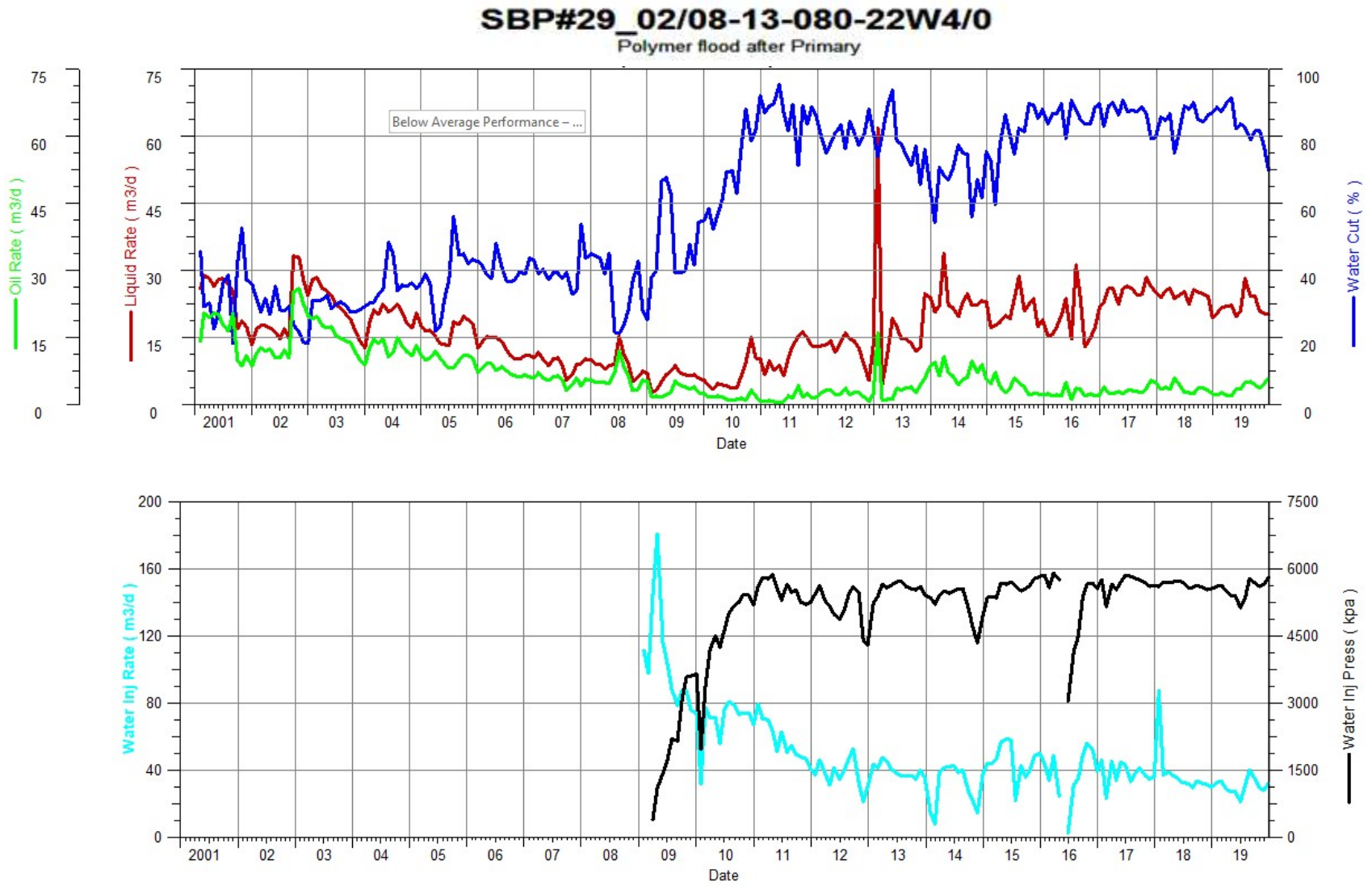
    ➢ **100/08-13-080-22W4/0 (50%)**



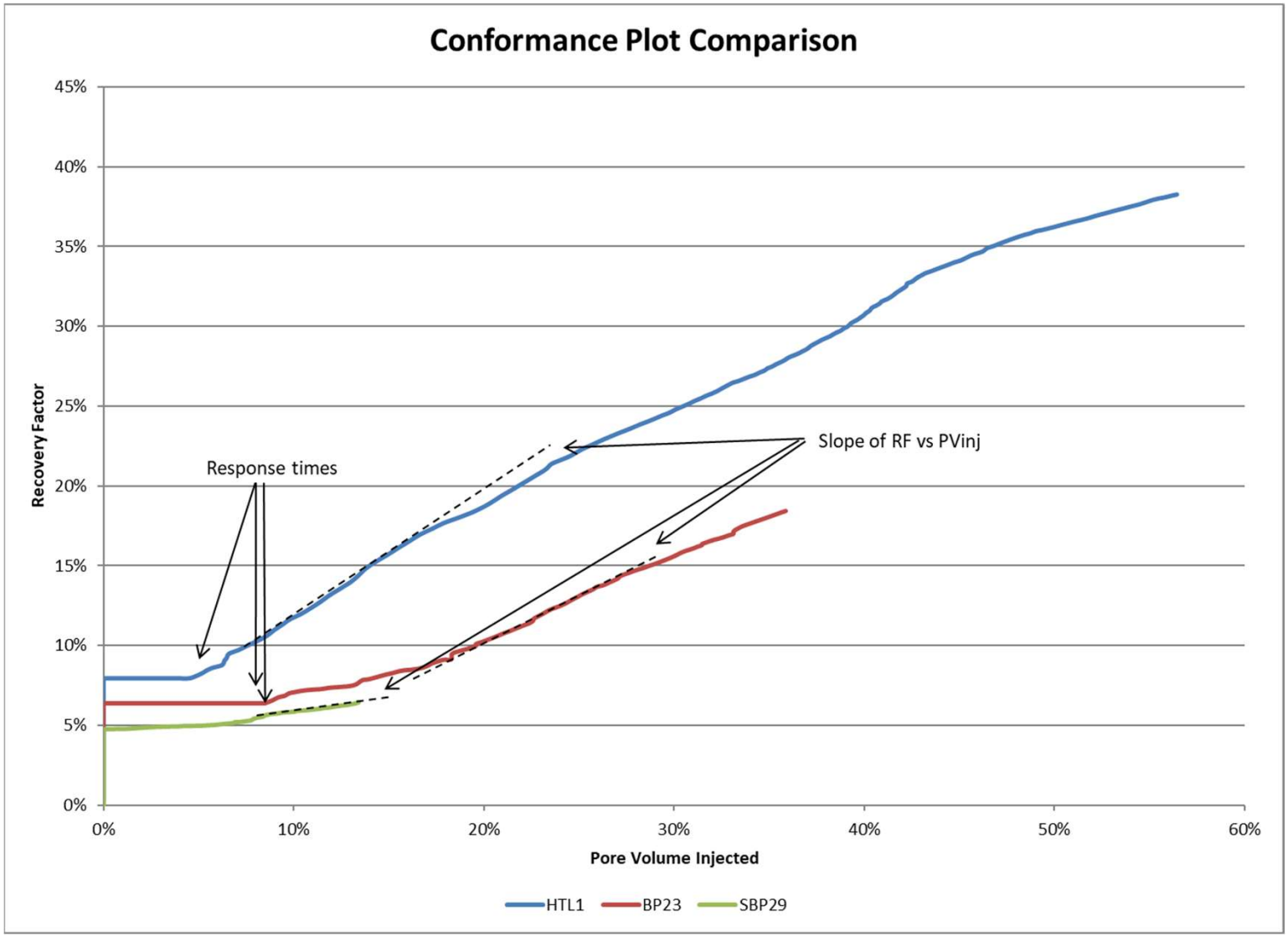


Below Average Performance – SB 29 (Approval 10423)

Canadian Natural



Summary of Good/Average/Poor Areas



Plot showing Recovery Factor (RF) versus Pore Volume (PF) Injected. Indicates effectiveness and performance of the flood.

High Viscosity Performance – SB 41 (Approval 10423)

- **SB 41 102/01-13 Pattern**
  - **Well list and allocation factors:**

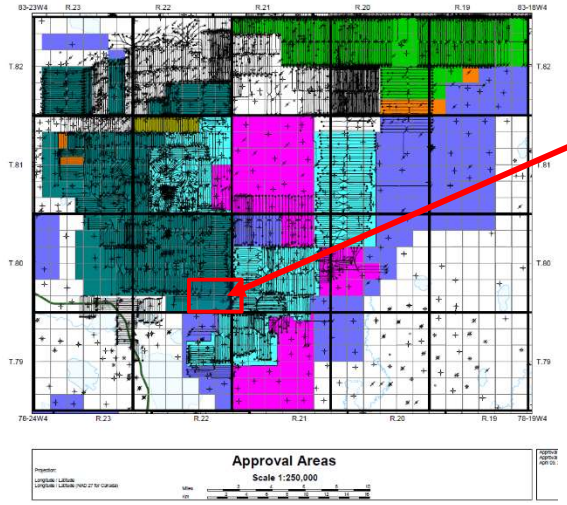
    Injectors

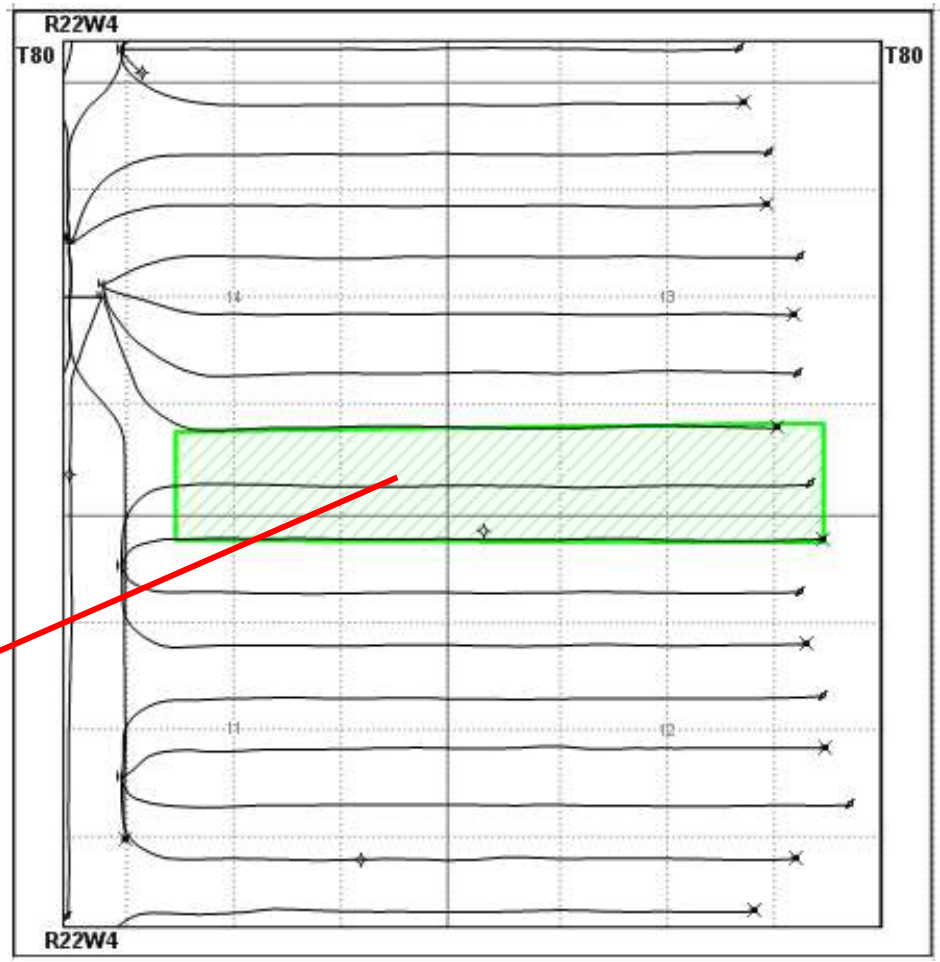
    ➢ **102/01-13-080-22W4/0 (100%)**

    Producers

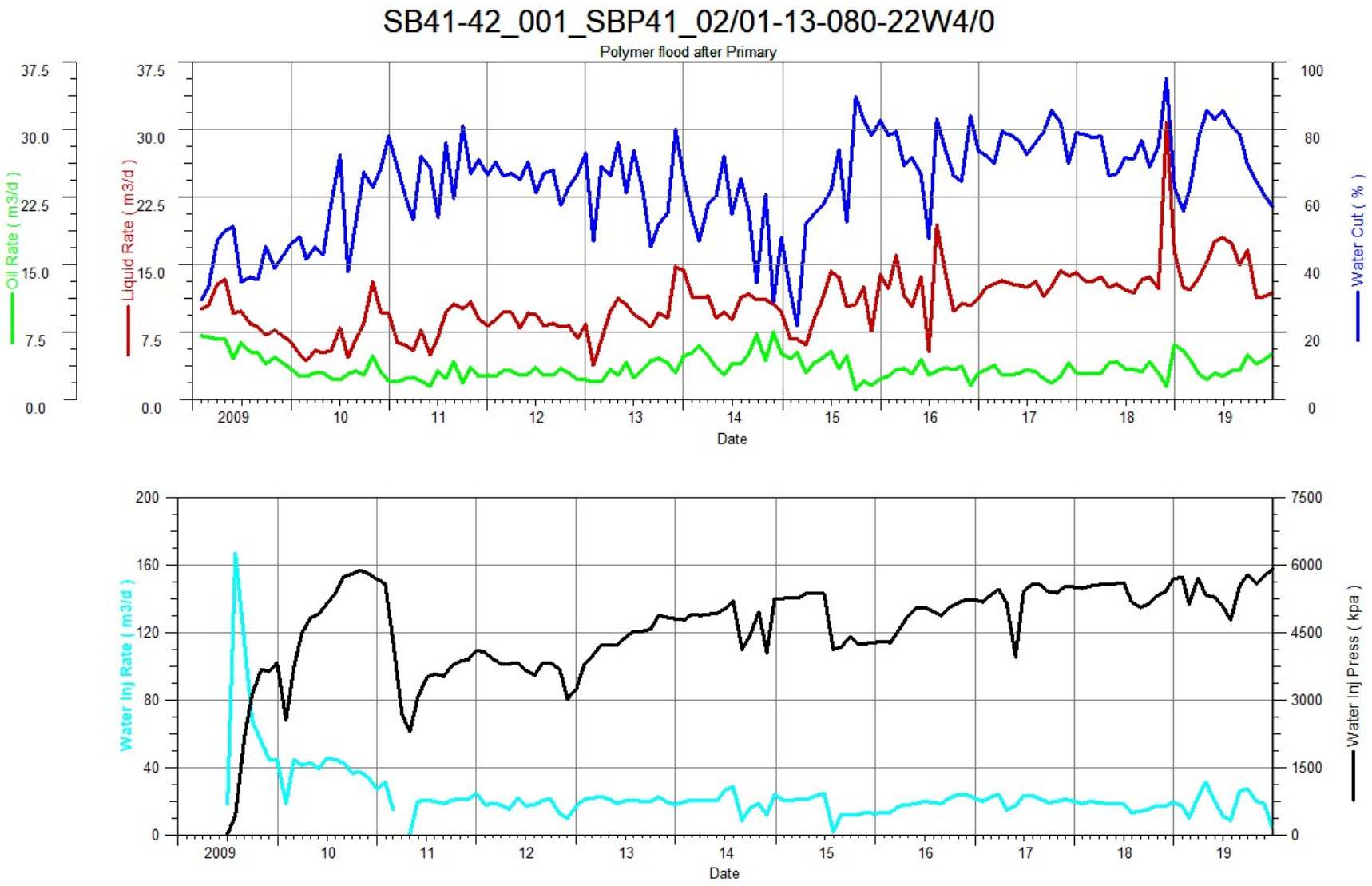
    ➢ **100/01-13-080-22W4/0 (50%)**

    ➢ **102/16-12-080-22W4/0 (50%)**





High Viscosity Performance – SB 41 (Approval 10423)



High Viscosity Performance – SB 41 (Approval 10423)

Canadian Natural

- **Experience with higher viscosity flooding has been varied but indications are that response is to be expected but is harder to predict**
  - **In the example total production from pattern has doubled in response to polymer flooding**
  - **Water cut response has been muted compared to lower viscosity examples**
- **Lower injection rates and slower response characteristic of polymer flooding higher viscosity oil.**

Cap Rock Integrity

Cap Rock Integrity

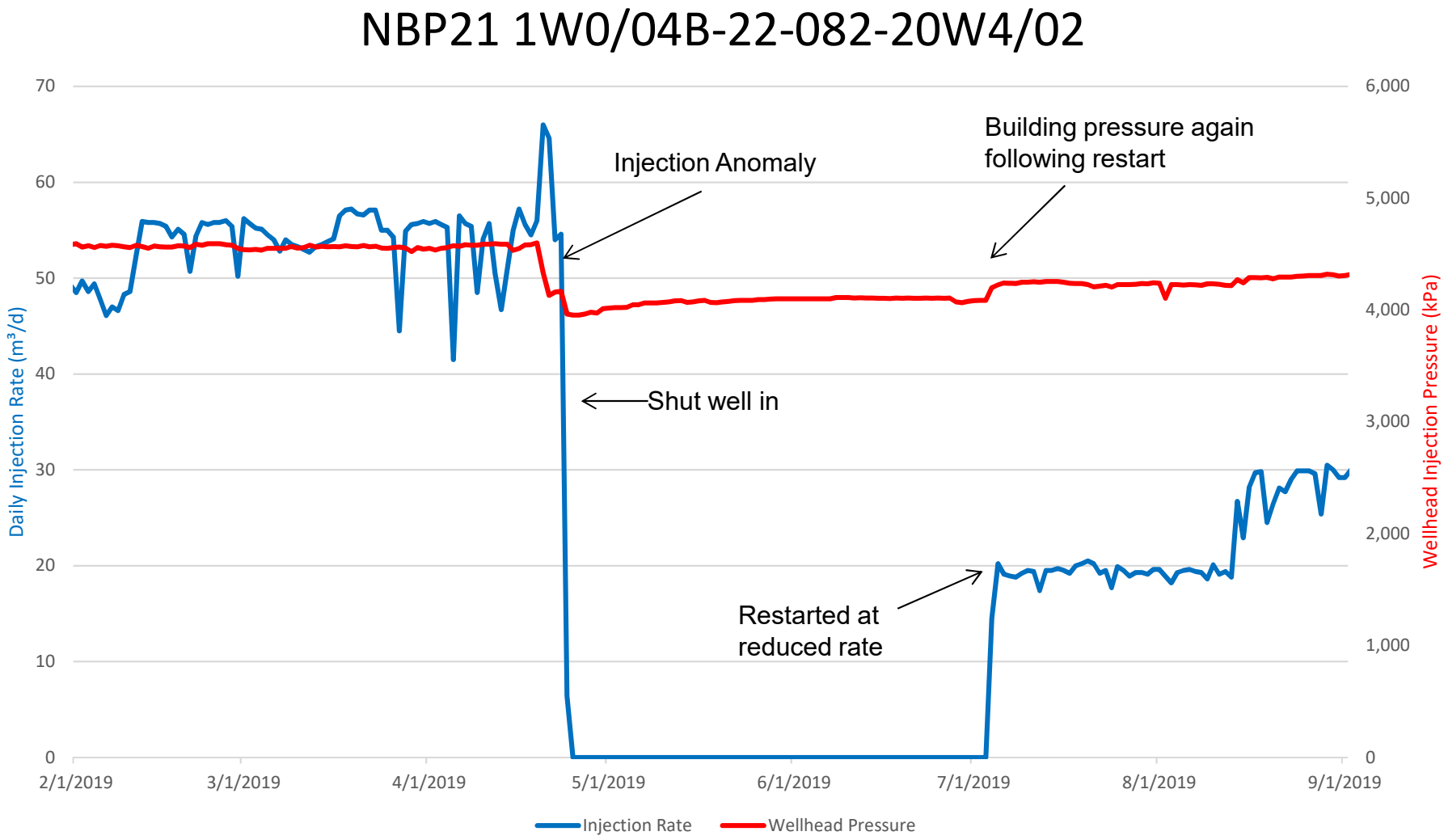
Canadian Natural

• 2019 Anomalies (7 in total)

Date of Event	Location	Cause of Alarm	Operations Review of Injection Well	Initial Injection Pressure	Anomalous Pressure	Initial Injection Rate	Anomalous Rate	Cause of Anomaly
(MM/DD/YYYY)	(Pad Name and UWI)			(kPag)	(kPag)	(m3/d)	(m3/d)	
2/1/2019	SW33 100/09-29-082-22W4/0	Drop in injection pressure	A secondary pressure transmitter located on the inside of the injection building did not confirm this pressure drop. Cause was determined to be extreme cold temperatures freezing the outside meter.	6,205	3,658	30	30	Meter error
2/20/2019	SE28 106/01-04-082-20W4/0	Drop in injection pressure	Both MS and makeup water pressure transmitters (redundant metering) indicate a substantial pressure drop. Pressure stabilized within 24 hours.	6,017	4,955	40	40	Dilation
4/23/2019	NBP21 1W0/04-22-082-20W4/2	Drop in injection pressure & rate spike	Combined pressure drop and rate increase appears to indicate anomaly is not a metering issue.	4,613	4,108	56	90	Dilation
10/31/2019	PRP 6 102/06-22-079-22W4/0	Drop in injection pressure	Pressure began to build shortly after the event and stabilized within 12hrs.	5,620	3,518	59	61	Dilation
11/6/2019	BP6 00/02-21-081-22W4/0	Drop in injection pressure & rate increase	Combined pressure drop and rate increase appears to indicate anomaly is not a metering issue.	5850	5000	39	47	Dilation
11/11/2019	BP26 02/03-01-081-22W4/0	Drop in injection pressure	CT tank fluid supply checked. Pressure started building within a day along with rate.	5030	4400	35	35	Dilation
12/11/2019	BP7 02/05-08-081-22W4/0	Drop in injection pressure	Pressure did not build immediately with rate, could be a transmitter issue.	5600	3500	19	19	Dilation or meter error

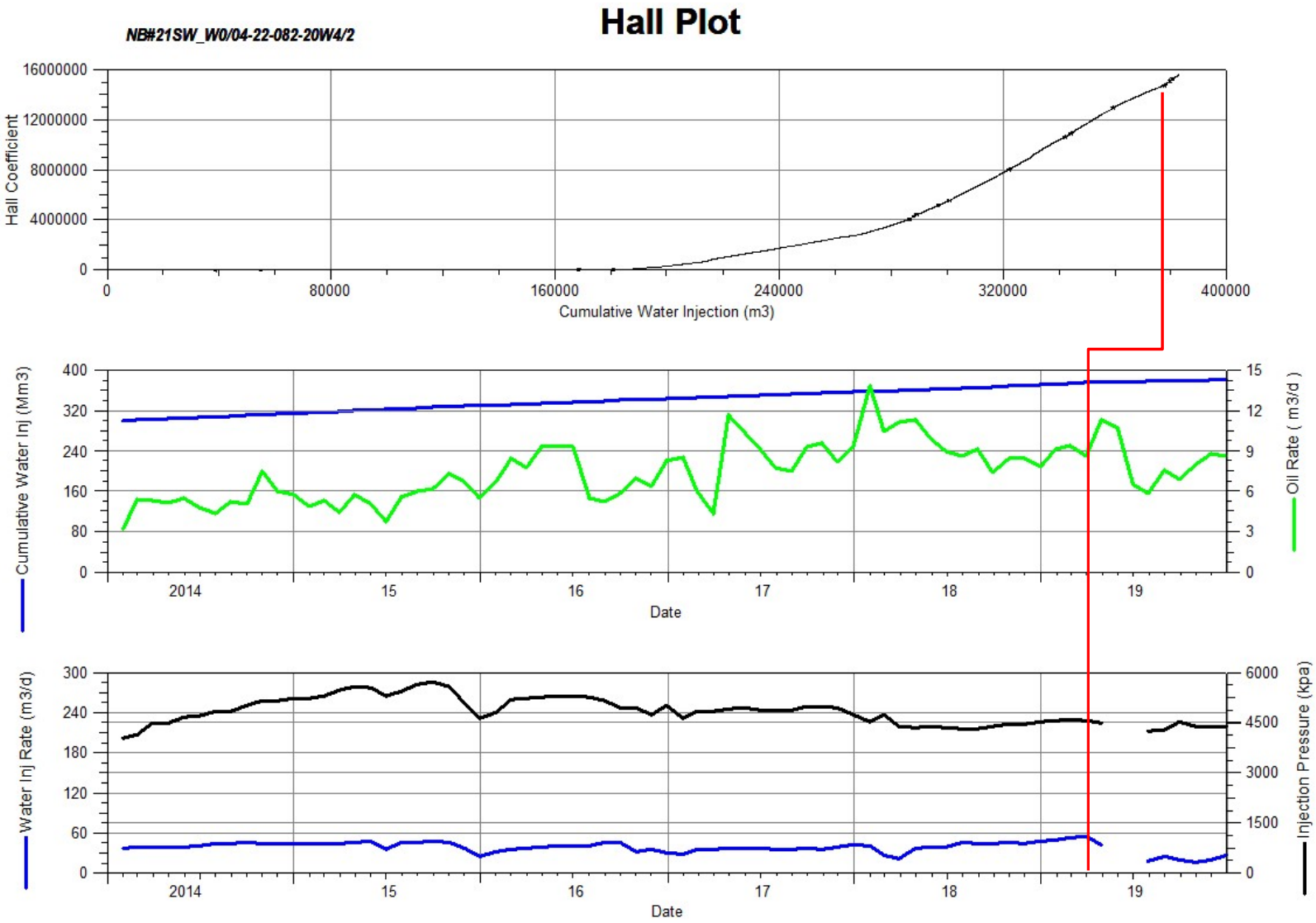
All seven 2019 anomalies were fully investigated. All injectors are back on-stream under normal operating conditions and have regained pressure following the event.

Cap Rock Integrity – NBP21: W0/04-22



W0/04-22-082-20W4: Injector was shut in shortly after anomaly to allow time for the dilation to "heal". Restarted at a reduced rate and pressure is building.

Cap Rock Integrity – NBP21: W0/04-22



Hall plots are reviewed regularly to investigate potential cap rock breaches. A sudden change in the Hall Plot slope may indicate a potential issue.

Cap Rock Monitoring

Canadian Natural

- **No cap rock anomalies were recorded in the Approval 9404 area by Cenovus or CNRL in 2017. Cenovus' 2017 data was reviewed and there were no anomalies identified. This is in line with the monitoring results since injection rates and pressures were reduced in 2015.**
- **In early 2018, CNRL implemented a monitoring system in 9404 that has the same parameters and setpoints as the legacy injection system.**

Future Development Plans

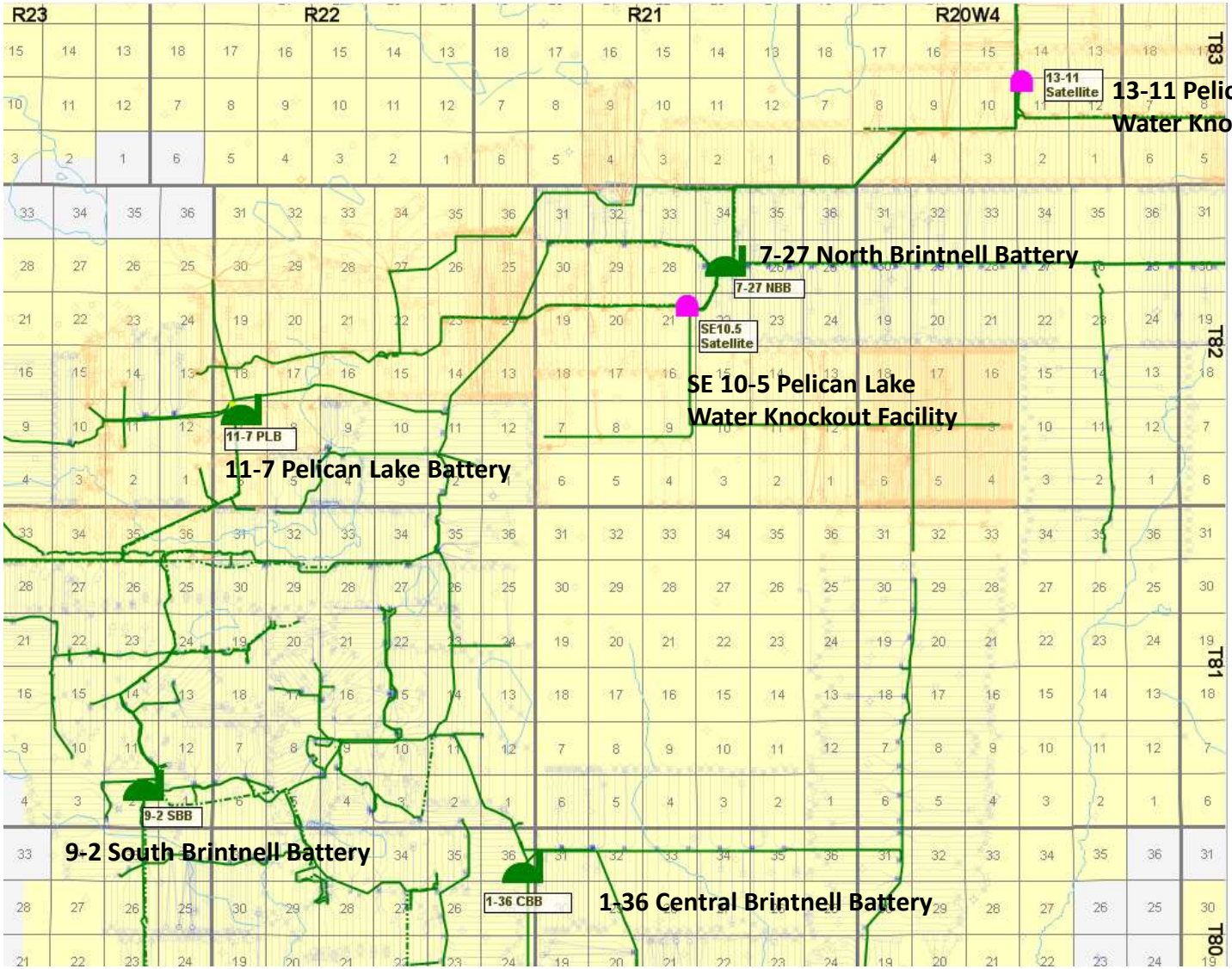
Future Development Plans

Canadian Natural

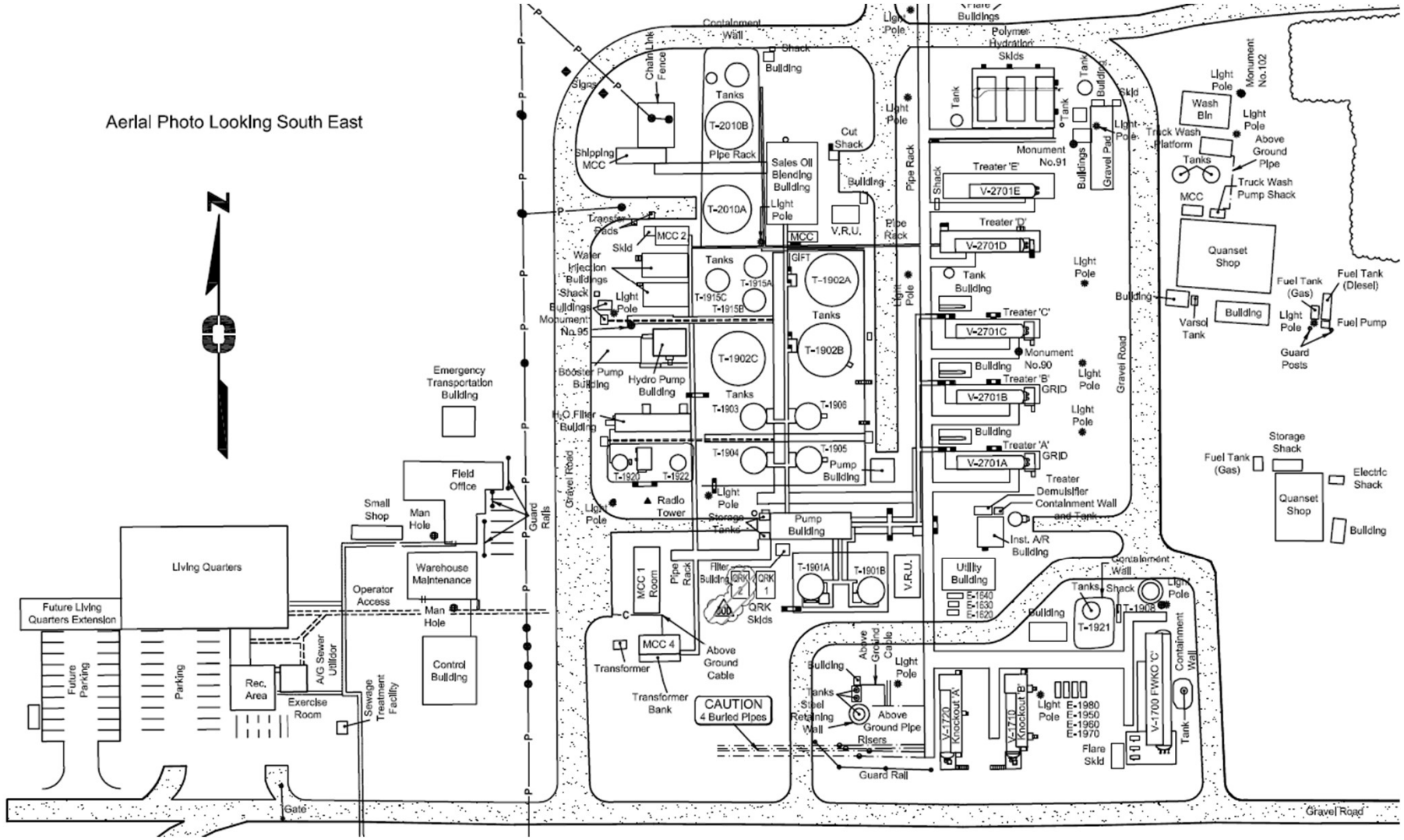
- Canadian Natural plans to continue with the expansion of the polymer flood at Brintnell over the next several years. Expansion will push the flood to the southeastern and western edges of the pool.
- The focus of this year's capital program will be infill drilling and polymer flood optimization of existing well patterns. Optimization will be achieved through continuous flood management to ensure balance and optimal recovery factor.
- CNRL received approval in 2012 to implement a surfactant pilot in the field. CNRL is not pursuing surfactant flooding at the present time.

Facilities

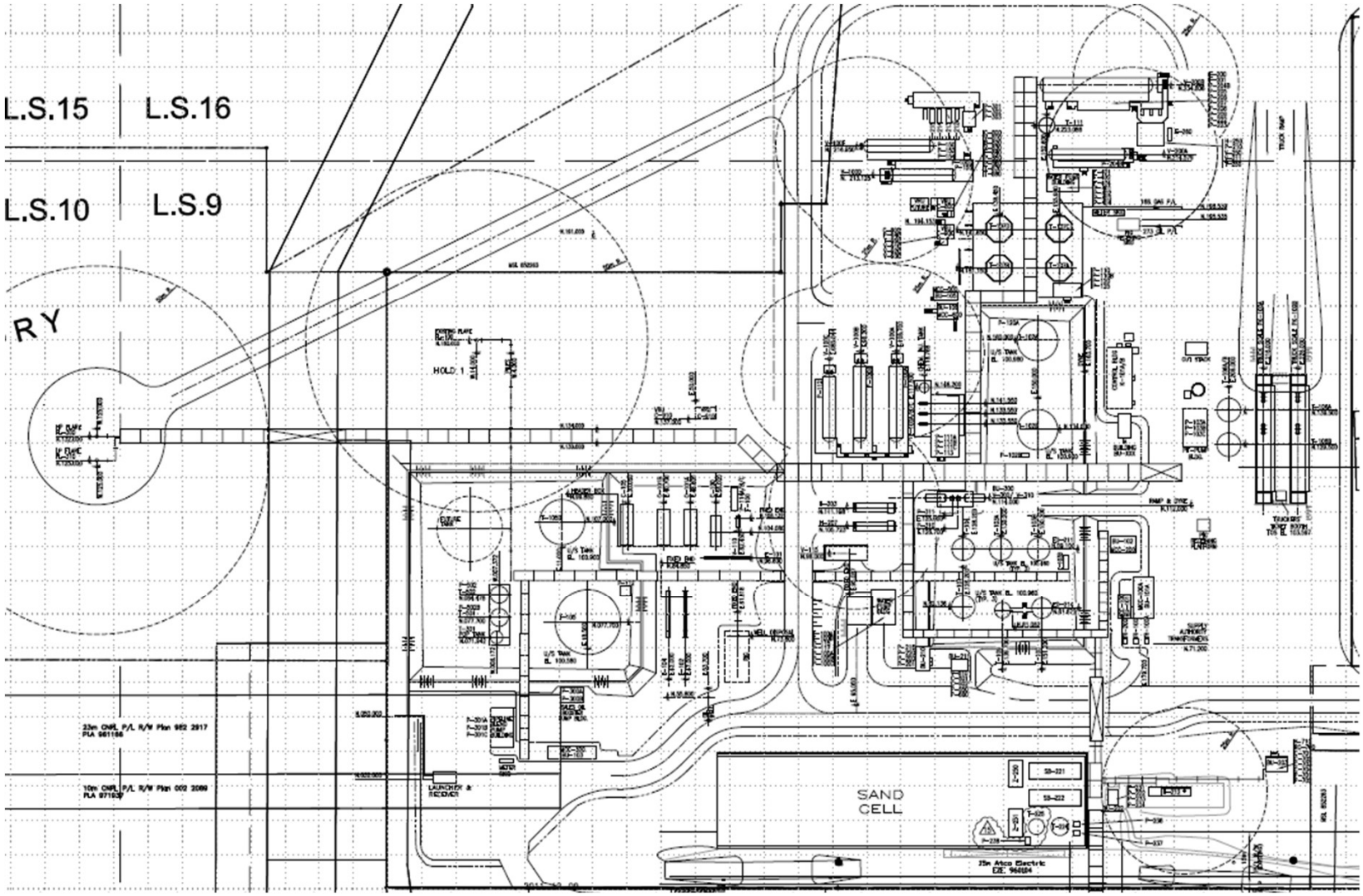
Brintnell / Pelican Lake Batteries



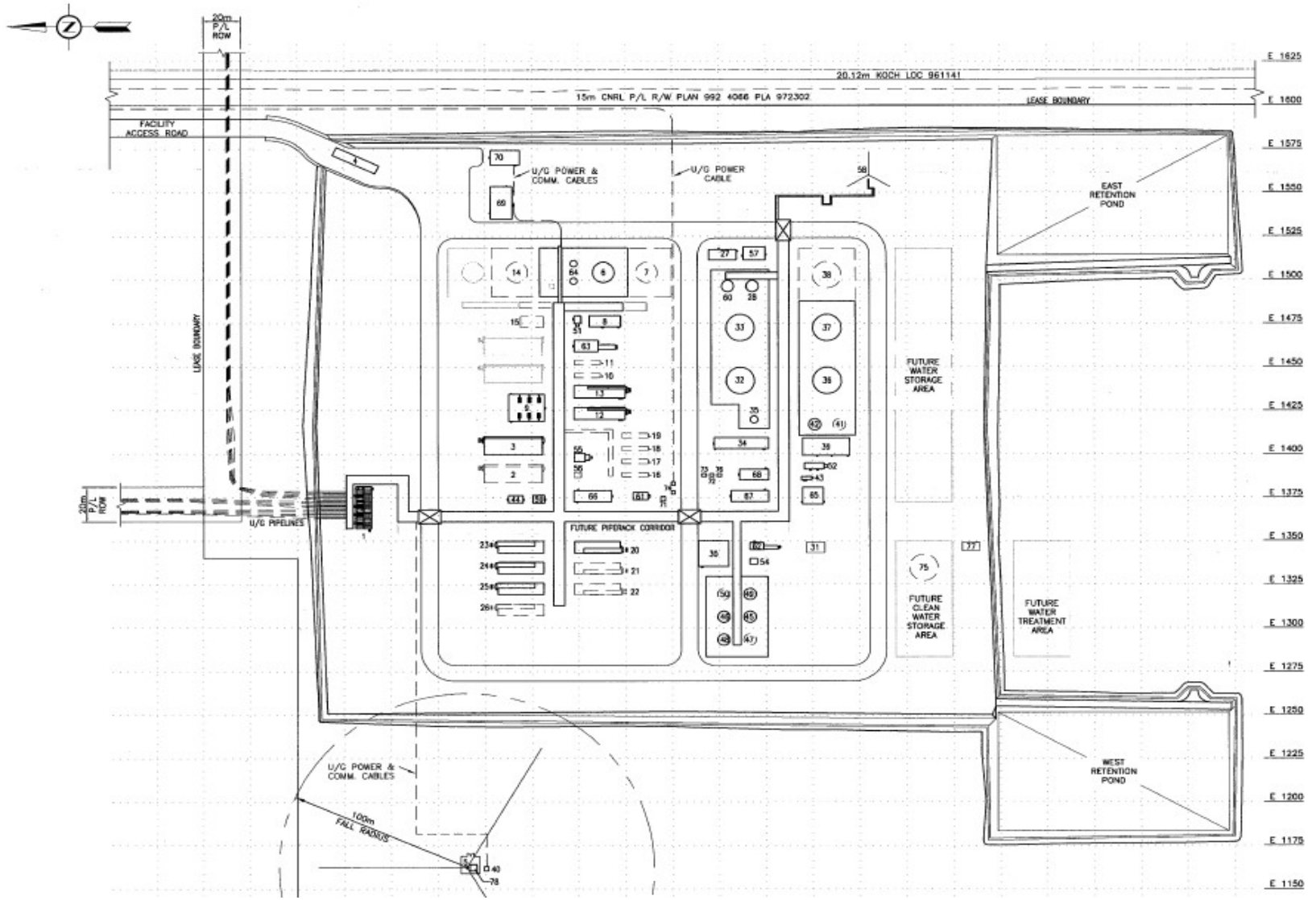
Facility: NBB 07-27-82-21W4 Battery Plot Plan



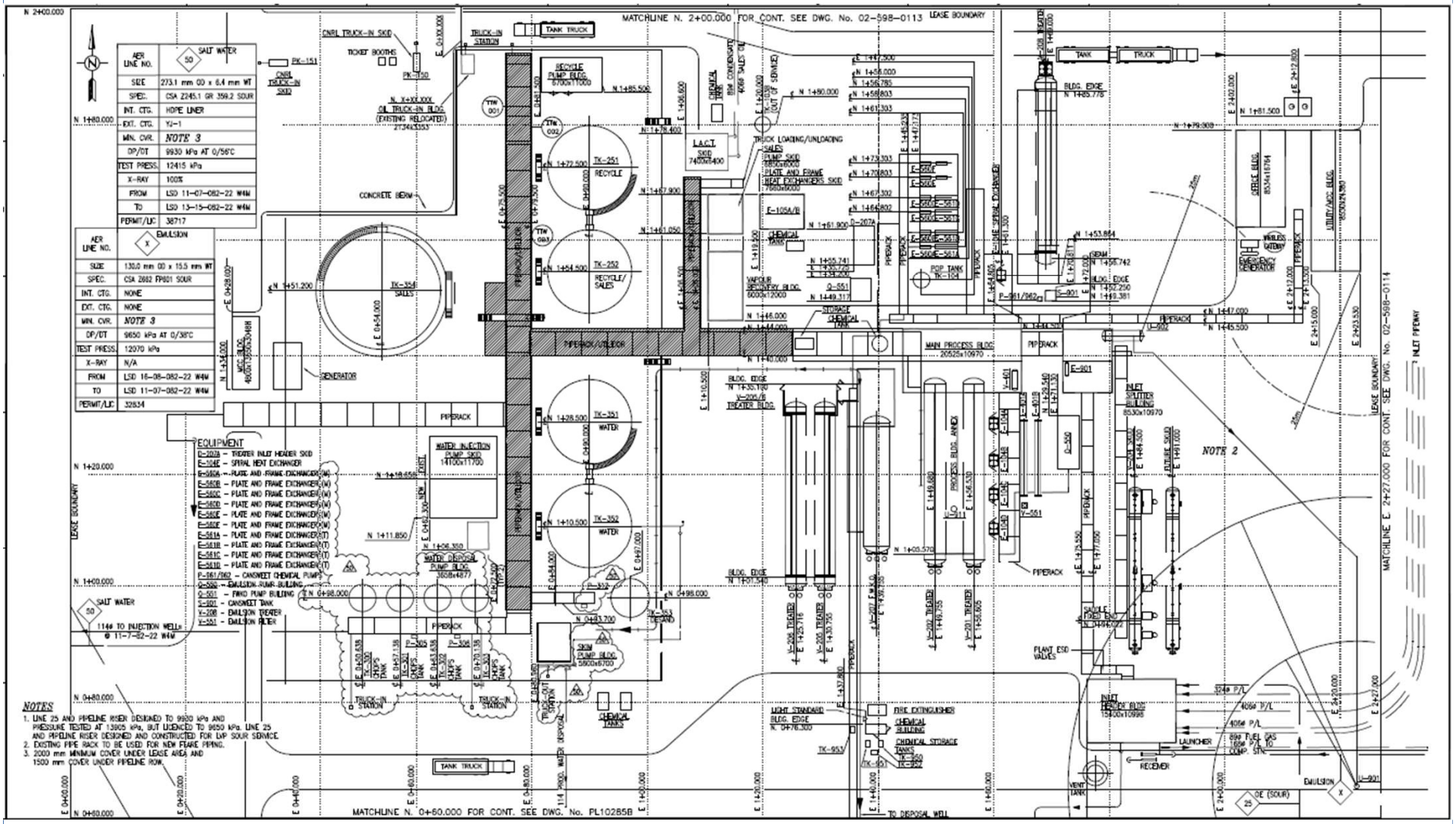
Facility: SBB 09-02-81-23W4 Battery Plot Plan



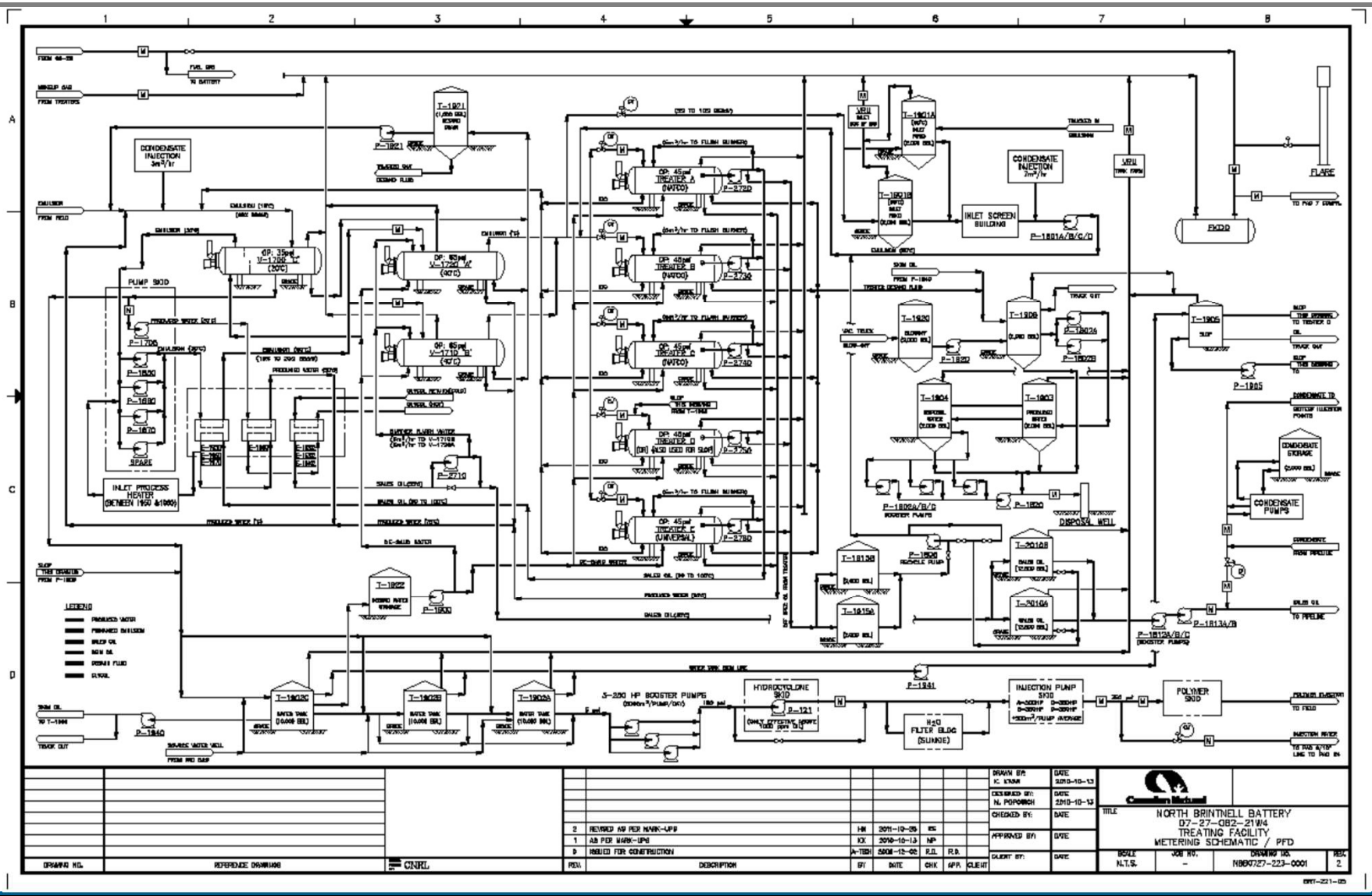
Facility: CBB 01-36-80-22W4 Battery Plot Plan



Facility: PLB 11-07-082-22W4 Battery Plot Plan



Facility: Typical Brintnell Battery PFD



Facility Modifications

- **Oil Treating:**
  - Heat integration: Install indirect heating projects to reduce OPEX.
- **Improve Water Quality:**
  - Looking at De-oiling and Filtration opportunities
- **Integrity:**
  - Continued implementing plan to rebuild existing flood areas; future flood areas to be rebuilt as the flood is expanded. Monitoring ongoing in order to prioritize.
  - Construction and routine monitoring ongoing. Working towards 2020 compliance.
  - All high risk sour pipelines have been lined as of Feb, 2014. Remaining unlined pipelines being routinely inspected.
- **Facility Interconnects:**
  - Pipeline construction completed connecting Pelican and Brintnell fields. Interconnects allowed us to offload and shut in NBB 07-27 on May 1, 2019 to further reduce OPEX across the Pelican and Brintnell fields.

Facility Future Plans

- **Major Activities:**
  - Shut down North Brintnell battery 07-27 and consolidated with Pelican Lake 11-07 in 2019
  - Pad Rebuilds Continued
  - NW06, SW06 and SW08 polymer expansion
  - Future Polymer Expansions
  - Water Management Plan

Battery Performance - Brintnell

Canadian Natural

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
North Brintnell 7-27													
Oil Produced (m3)	809,627	959,335	988,448	957,855	835,263	1,075,836	1,027,258	937,154	900,340	644,767	670,070	599,394	135,588
Produced Water (m3)	1,775,300	2,096,258	2,292,879	2,386,085	1,484,277	1,795,440	1,567,398	1,772,860	1,618,804	1,325,432	1,669,135	1,411,728	281,568
Recycle Rates (m3)	1,779,160	2,057,161	2,238,740	2,330,418	1,453,371	1,786,316	1,559,325	1,772,860	1,618,804	1,325,432	1,606,228	1,383,084	276,718
Produce Recycle	100.2%	98.1%	97.6%	97.7%	97.9%	99.5%	99.5%	100.0%	100.0%	100.0%	96.2%	**98.0%**	**98.3%**
Average Daily Recycle (m3/d)	4,874	5,621	6,134	6,385	3,982	4,881	4,272	4,857	4,435	3,621	4,401	3,789	758
Average Disposal Rates (m3/d)	-11	107	148	153	85	25	22	0	0	0	172	78	13
Central Brintnell 12-09													
Oil Produced (m3)	603,657	569,149	533,178	528,267	492,495	546,580	237,914						
Produced Water (m3)	193,349	267,607	378,988	323,086	402,772	402,822	143,284						
Recycle Rates (m3)	26,826	159,288	346,418	301,720	357,025	329,781	104,583						
Produce Recycle	13.9%	59.5%	91.4%	93.4%	88.6%	81.9%	**73.0%**						
Average Daily Recycle (m3/d)	73	435	949	827	978	901	775						
Average Disposal Rates (m3/d)	456	296	89	59	125	200	106						
Central Brintnell 01-36													
Oil Produced (m3)							584,297	780,513	951,411	1,298,572	1,161,176	1,115,119	1,206,940
Produced Water (m3)							638,159	1,946,244	2,347,871	2,570,249	2,475,657	2,471,567	2,730,123
Recycle Rates (m3)							565,099	1,615,263	1,908,506	2,150,738	2,028,121	2,061,624	2,410,538
Produce Recycle							88.6%	83.0%	81.3%	83.7%	81.9%	**83.4%**	**88.3%**
Average Daily Recycle (m3/d)							2,457	4,425	5,229	5,876	5,556	5,648	6,604
Average Disposal Rates (m3/d)							318	907	1,204	1,149	1,340	1,123	876
South Brintnell 9-02													
Oil Produced (m3)	575,306	620,631	602,897	645,053	782,847	1,080,977	1,055,952	1,220,367	1,100,589	840,998	887,192	801,084	740,382
Produced Water (m3)	413,480	501,318	544,390	776,095	1,014,789	1,505,539	1,494,985	1,205,459	1,278,060	1,438,774	1,566,380	1,773,319	1,828,591
Recycle Rates (m3)	22,465	173,011	204,727	173,120	823,109	1,412,965	1,384,546	1,091,455	1,172,557	1,173,748	1,375,245	1,411,632	1,346,774
Produce Recycle	5.4%	34.5%	37.6%	22.3%	81.1%	93.9%	92.6%	90.5%	91.7%	81.6%	87.8%	**79.6%**	**73.7%**
Average Daily Recycle (m3/d)	62	473	561	474	2,255	3,861	3,793	2,990	3,212	3,207	3,768	3,867	3,690
Average Disposal Rates (m3/d)	1,071	897	931	1,652	525	253	303	312	289	726	524	991	1,320
Total Volumes													
Oil Produced (m3)	1,988,589	2,149,115	2,124,523	2,131,175	2,110,605	2,703,393	2,905,421	2,938,034	2,952,339	2,784,337	2,718,438	2,515,597	2,082,911
Produced Water (m3)	2,382,129	2,865,183	3,216,258	3,485,267	2,901,838	3,703,800	3,843,826	4,924,563	5,244,736	5,334,455	5,711,173	5,656,613	4,840,282
Recycle Rates (m3)	1,828,451	2,389,460	2,789,885	2,805,257	2,633,505	3,529,061	3,613,553	4,479,577	4,699,867	4,649,918	5,009,594	4,856,340	4,034,029
Fresh Water (m3)	1,026,684	1,493,264	1,433,242	1,553,045	1,479,780	1,876,840	2,041,938	2,028,731	1,937,567	1,916,943	2,162,684	3,093,614	2,841,011
Brackish Water (m3) - Grosmont	1,661,989	764,664	2,963,684	3,999,848	6,274,361	4,780,011	3,800,437	3,666,120	3,133,047	2,276,529	1,959,507	1,280,884	799,429
Disposal Volume (m3)	553,678	475,723	426,373	680,010	268,333	174,739	222,200	464,554	544,868	684,537	743,035	743,035	806,252
Total Produce Recycle (%)	76.8%	83.4%	86.7%	80.5%	90.8%	95.3%	94.0%	91.0%	89.6%	87.2%	87.7%	**85.9%**	**83.3%**
Average Daily Recycle (m3/d)	5,009	6,529	7,644	7,686	7,215	9,642	9,900	12,273	12,876	12,705	13,725	13,305	11,052
Average Daily Disposal (m3/d)	1,517	1,300	1,168	1,863	735	477	748	1,219	1,493	1,875	2,036	2,193	2,209

Battery converted to trucked in facility May 15, 2013

Battery Performance – Pelican Lake

Canadian Natural

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Pelican Lake 11-07													
Oil Produced (m3)	1,701,363	1,598,118	1,443,895	1,340,247	1,185,437	1,311,462	1,407,459	1,446,857	1,416,547	1,228,548	1,158,641	1,152,186	1,343,240
Produced Water (m3)	4,558,956	5,654,792	5,653,441	4,645,123	3,816,945	4,435,326	4,497,339	4,920,892	4,511,525	3,841,121	3,553,250	4,060,672	4,346,245
Recycle Rates (m3)	3,234,277	4,811,599	4,810,249	4,256,039	3,684,090	4,188,103	4,256,695	4,753,603	4,381,028	3,711,085	3,428,883	3,953,812	4,255,807
Produce Recycle	70.9%	85.1%	85.1%	91.6%	96.5%	94.4%	94.6%	96.6%	97.1%	96.6%	96.5%	97.4%	97.9%
Average Daily Recycle (m3/d)	8,861	13,146	13,179	11,660	10,093	11,443	11,662	13,024	12,003	10,167	9,394	10,832	11,660
Average Disposal Rates (m3/d)	3629	2304	2310	1066	364	675	659	458	358	356	341	293	248

- **Battery Performance**
  - **Overall battery performance has been strong and met expectations since the NBB 07-27 shut-down on May 1, 2019**

Measuring and Reporting

Measurement and Reporting

Canadian Natural

- **Methods of Measurement:**
  - Oil and Water: flow meters and test tanks (Primary only)
  - Solution Gas: orifice meters/GOR Testing
- **Typical Well Testing:**
  - Frequency and duration: well testing as per Directive 17.
  - Meter installations have replaced test tanks (high volume and flood producers).
    - Part of all new pad expansions and rebuilds.
- **2019 Field Proration Factors:**
  - Meets directive 17 requirements
    - Brintnell:
      - Oil – 0.91, Water – 1.12
    - Pelican Lake:
      - Oil – 0.90, Water – 1.07

Measurement and Reporting – Continued

Canadian Natural

- **Optimization:**
  - Remove test tanks and install flow meters on pads/wells
    - Increase testing frequency and duration
    - Perform testing inline
    - Eliminates gas venting from tanks
    - Reduces fuel gas consumption
    - Reduces potential for spill
  - Standardize testing equipment across field
    - Reduce downtime and maintenance
    - Increase reliability in calibration
    - Improve & revise BS&W testing procedures for better accuracy

Gas Volumes - Update

Canadian Natural

Brintnell

Gas VolumeS (e3m3)	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Total
Disp	2913.3	2634.4	2953.3	2903.4	2411.5	1836.9	2542.0	2509.8	2266.9	2092.1	1965.7	2189.5	29218.8
Flare	108.2	101.4	119.3	75.7	55.3	78.7	66.6	90.6	45.8	206.4	138.5	61.2	1147.7
Fuel	2922.8	2741.3	2917.5	2445.3	1966.2	1414.1	1919.4	2108.6	2315.9	2626.1	2466.3	2633.5	28477.0
Prod	3424.2	3009.8	3377.4	3272.2	2678.3	2087.5	2842.3	2816.1	2530.9	2529.1	2343.6	2495.7	33407.1
Rec	2848.7	2696.4	2872.7	2419.6	1945.6	1398.2	1900.1	2090.4	2293.3	2599.6	2439.7	2605.9	28110.2
Vent	328.6	229.1	260.0	267.4	190.9	156.0	214.4	197.5	195.6	204.1	212.8	217.4	2673.8

Pelican Lake

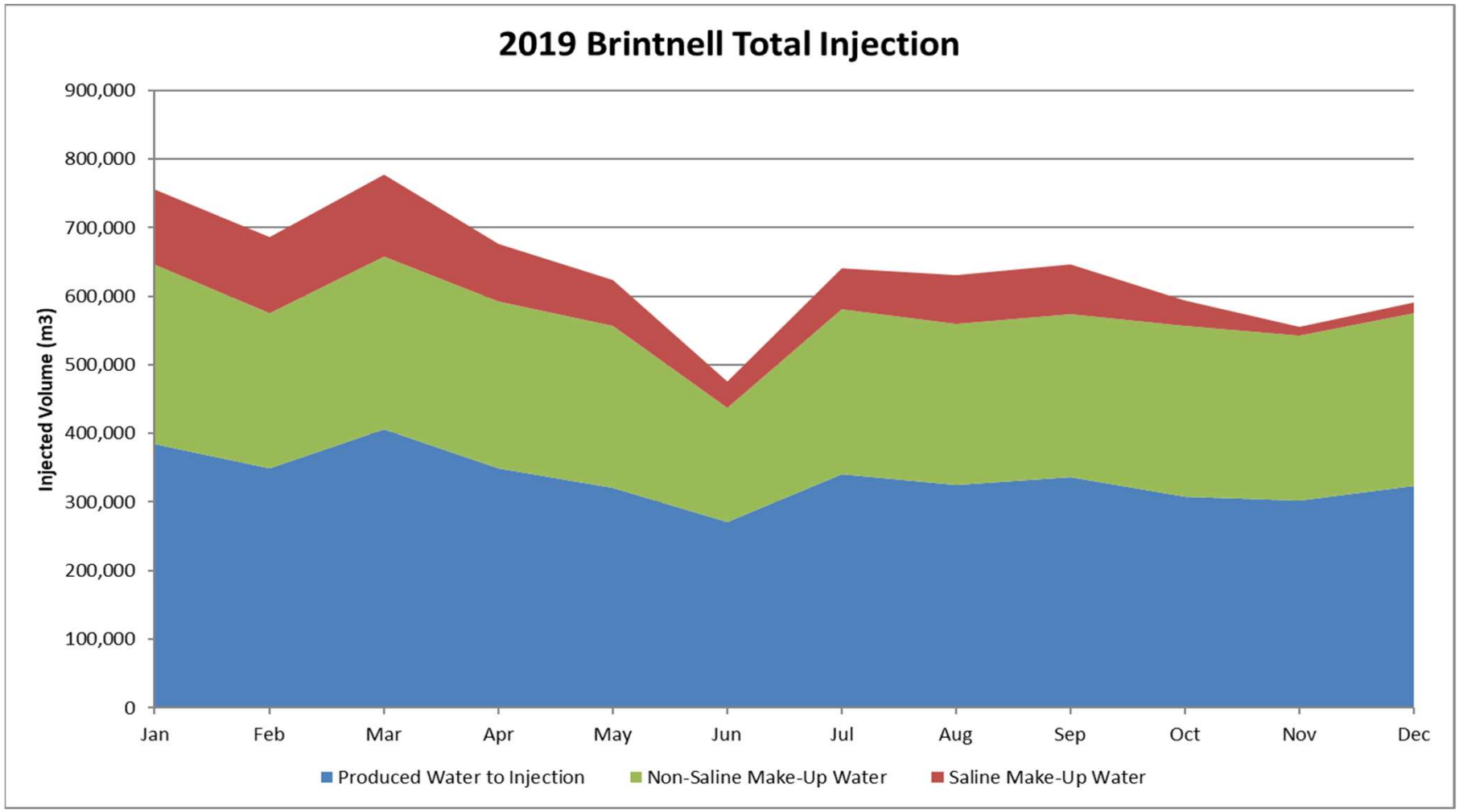
Includes North Brintnell due to consolidation May 1, 2019

Gas VolumeS (e3m3)	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Total
Disp	0.0	0.0	0.0	0.0	217.8	252.4	217.8	207.5	203.2	207.5	207.6	214.1	1727.9
Flare	21.1	27.3	20.5	18.8	42.7	29.1	31.4	34.7	40.8	81.3	73.5	78.2	499.4
Fuel	1664.3	1551.2	1468.8	1817.0	1763.4	1536.9	1938.5	1878.9	2088.3	2113.4	2082.3	2517.8	22420.8
Prod	1066.4	918.0	986.7	1053.3	1308.5	1164.1	1485.6	1360.7	1370.7	1831.1	1699.4	1924.8	16169.3
Purrec	47.1	53.5	52.7	37.5	37.2	50.6	54.7	49.6	55.2	48.7	42.2	49.8	578.8
Rec	826.2	834.1	693.3	977.3	985.4	859.2	992.4	947.6	1134.4	760.8	849.4	1074.6	10934.7
Vent	254.3	227.1	243.4	232.3	307.2	255.5	345.0	236.8	228.0	238.4	227.6	239.1	3034.7

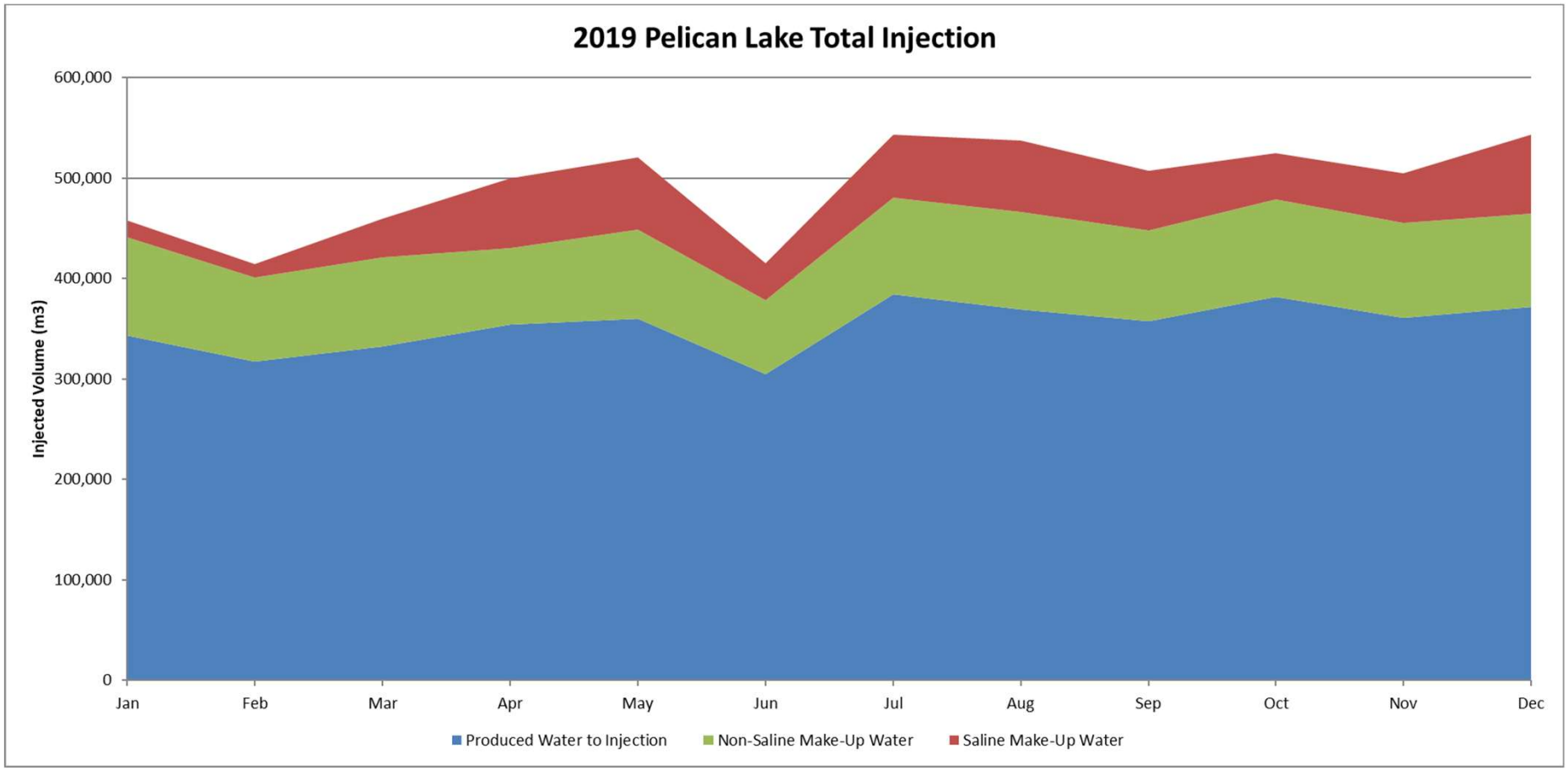
- Produced gas is captured, processed and used throughout the field as consumable fuel gas.
- Venting only occurs at the well leases when D-60 requirements have been approved by the AER. No sour gas vented.

Water Use

Brintnell Total Injection



Pelican Lake Total Injection



2019 Injection Water Summary

Brintnell

2019 Injection Volumes (m³)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Produced Water to Injection	384,417	348,835	405,524	348,553	320,011	271,006	340,230	325,543	335,635	307,533	301,836	323,691
Non-Saline Make-Up Water	262,117	225,857	252,799	243,603	236,187	166,481	240,098	233,704	238,457	248,846	240,805	252,059
Saline Make-Up Water	109,415	111,610	119,408	84,111	67,881	37,615	60,812	71,257	72,009	37,441	12,143	15,728
Total	755,950	686,301	777,731	676,267	624,078	475,101	641,140	630,504	646,101	593,819	554,783	591,478

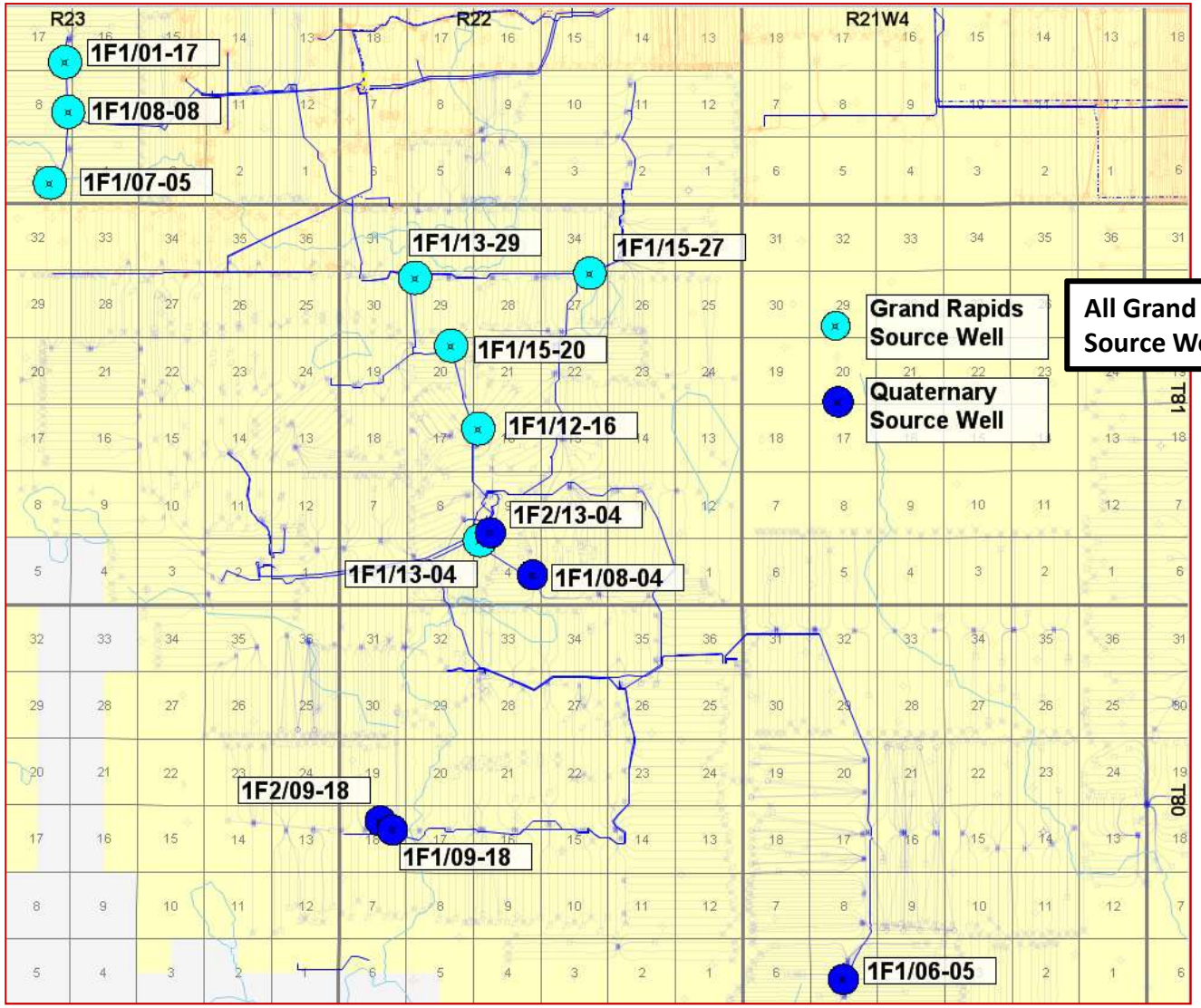
Total Injection Volumes (m³)	2011		2012		2013		2014		2015		2016		2017		2018		2019	
Produced Water to Injection	2,901,838	27%	3,388,006	34%	3,522,671	38%	4,390,618	44%	4,617,604	48%	4,507,036	52%	4,946,868	55%	4,819,935	52%	4,012,815	52%
Non-Saline Make-Up Water	1,479,780	14%	1,876,840	19%	2,041,938	22%	2,028,731	20%	1,937,567	20%	1,916,943	22%	2,162,684	24%	3,093,614	34%	2,841,011	37%
Saline Make-Up Water	6,274,361	59%	4,780,011	48%	3,800,437	41%	3,666,120	36%	3,133,047	32%	2,276,529	26%	1,959,507	22%	1,280,884	14%	799,429	10%
Total	10,655,979		10,044,856		9,365,047		10,085,470		9,688,218		8,700,507		9,069,059		9,194,433		7,653,255	

Pelican Lake

2019 Injection Volumes (m³)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Produced Water to Injection	343,612	317,517	332,379	354,426	360,126	304,615	384,557	368,982	357,324	381,875	360,894	372,132
Non-Saline Make-Up Water	97,745	83,920	89,188	75,910	88,480	74,205	95,650	97,787	90,236	97,054	94,533	92,354
Saline Make-Up Water	16,273	13,039	38,020	69,288	72,519	36,374	62,950	70,868	59,551	46,392	49,638	78,504
Total	457,629	414,475	459,587	499,624	521,126	415,194	543,157	537,636	507,110	525,321	505,065	542,990

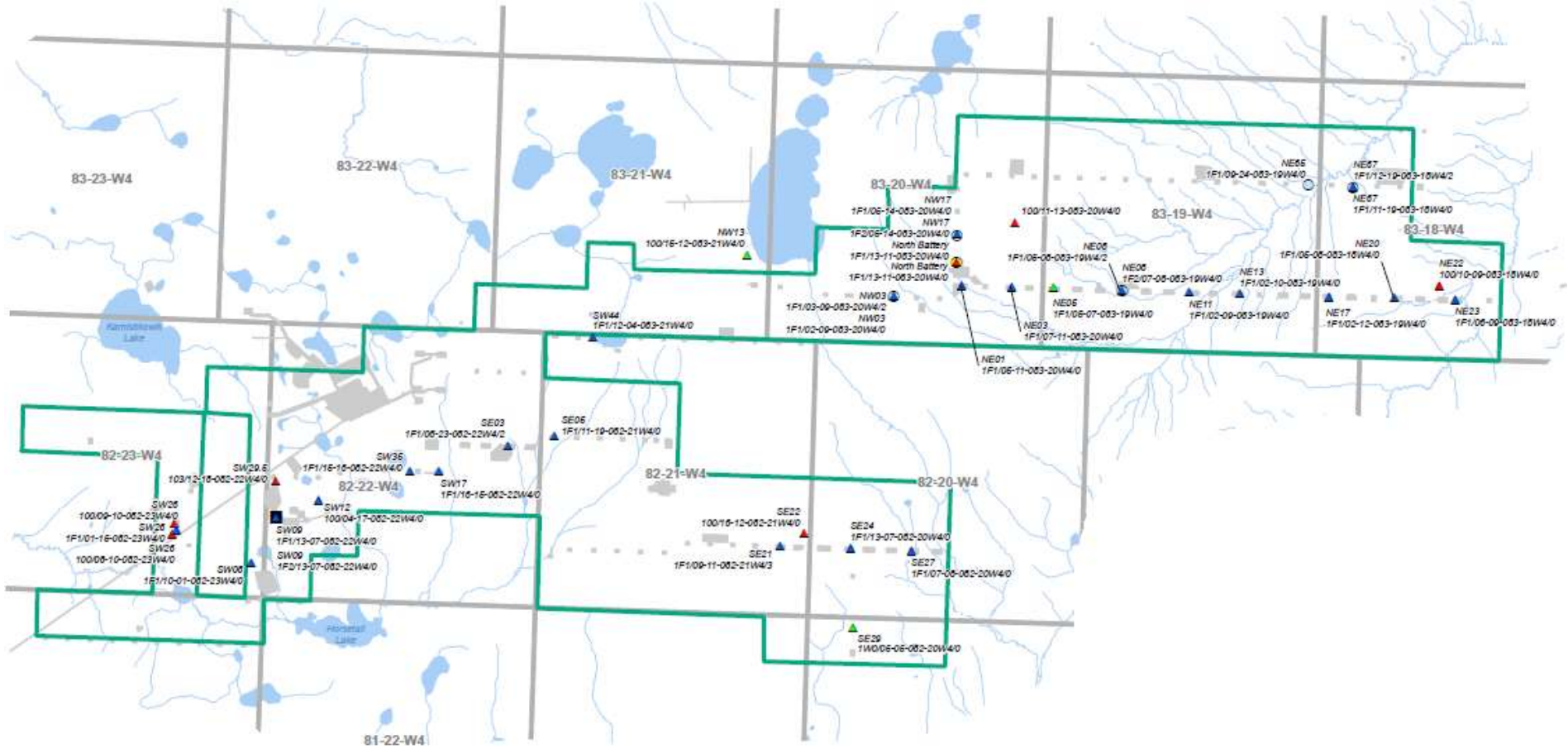
Total Injection Volumes (m³)	2011		2012		2013		2014		2015		2016		2017		2018		2019	
Produced Water to Injection	3,684,090	64%	4,188,103	56%	4,256,695	49%	4,753,603	44%	4,381,028	57%	3,711,085	70%	3,428,883	73%	3,953,812	78%	4,255,807	72%
Non-Saline Make-Up Water	803,000	14%	953,380	13%	1,132,595	13%	1,369,845	20%	1,078,575	14%	571,955	11%	570,130	12%	1,001,925	20%	1,077,062	18%
Saline Make-Up Water	1,270,930	22%	2,403,890	32%	3,220,395	37%	4,163,555	36%	2,224,675	29%	1,027,475	19%	713,210	15%	111,325	2%	613,415	10%
Total	5,758,020		7,545,373		8,609,685		10,085,470		7,684,278		5,310,515		4,712,223		5,067,062		5,946,284	

Non-Saline Well Locations - Brintnell



Non-Saline Well Locations – Pelican Lake

Canadian Natural



Non-Saline Water Use - Brintnell

Canadian Natural

- Canadian Natural currently has two licenses with Alberta Energy Regulator for the diversion of non-saline water for injection
  - 00249595-02-00. 2,151,310 m3/yr with expiry date of 2024-01-25
  - 00329572-01-00. 1,460,000 m3/yr with expiry date of 2024-05-25
- Working to optimize the use of non-saline water for polymer hydration to maximize its benefit
- In Compliance with Alberta Environment and Water regarding monthly reporting, observation well monitoring, and all other terms of the License.

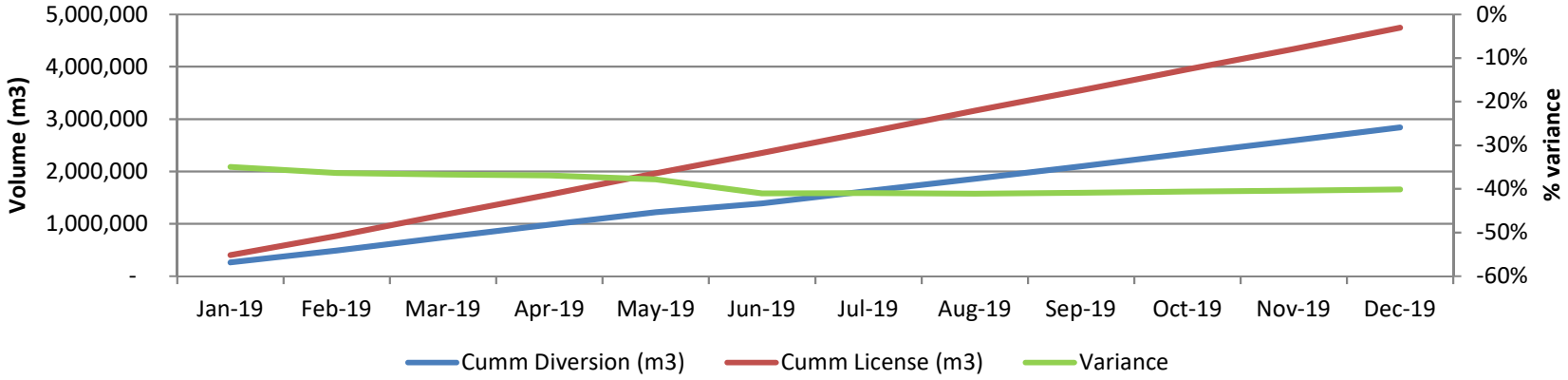
Brintnell Non-Saline Water Make up Wells

Well Name	UWI	Production Interval	Maximum Rate of Diversion (m3/d)	Maximum Annual Diversion Volume (m3/yr)	2019 Average Diversion Volumes (m3/d)
WSW BP25 - QUAT	100/08-04-081-22W4	53.3-65.2	818	247,470	513
WSW BP11 - QUAT	1F2/13-04-081-22W4	34.3-38.8	1200	153,300	390
WSW BP2 - GR	1AA/12-16-081-22W4	270.6-317.6	1200	1,750,540	649
WSW BP11 - GR	1F1/13-04-081-22W4	258.5-315.9	812		667
WSW HTP2 - GR	1F1/13-29-081-22W4	265.8-326.8	2250		1254
WSW HTP6 - GR	1F1/15-27-081-22W4	264.8-317.8	468		343
WSW NHTP16 - GR	1F1/01-17-082-23W4	253.0-310.0	933		350
WSW WBP30 - GR	1F1/15-20-081-22W4	260-315	750		233
WSW NHP13 - GR	1F1/07-05-082-23W4	232-302	325		258
WSW NHP15 - GR	1F1/08-08-082-23W4	243-305	225		119
WSW CB2A - QUAT	1F1/06-05-080-21 W4	159 – 167	1190	1,460,000	831
WSW SBP36 - QUAT	1F2/09-18-080-22 W4	205.7 – 215.7	1500		1053
WSW SBP36 – QUAT	1F3/09-18-080-22 W4	152-169	1500		1123

1,413,971

1,097,474

2019 Brintnell Non-Saline Water



Pelican Lake Non-Saline Water

At this time CNRL is evaluating the future potential to expand polymer to additional areas of the field. This would expand the water sourcing demands and use a higher portion of the available license. As more certainty is developed we would be in a better position to make long term adjustments to our licensed diversions.

- **In 2019, CNRL used 35.8% of the total licensed volume. This is up from 2018 rate of 31.7%.**
- **2019 had an increase in utilization from 2018 due to optimization of injection throughput resulting in higher cumulative production**

	Grand Rapids 'A'	Grand Rapids 'B'	Total
Annual Licensed Diversion (m3)	290,723	2,647,022	2,937,745
Annual Diversion (m3)	65,017	986,914	1,051,931
Actual % License Used	22%	37.3%	35.8%

- **Grand Rapids 'A'**
  - **2019, water diverted from 1 of 4 source wells**
- **Grand Rapids 'B'**
  - **2019, water diverted from 16 of 20 source wells**

Water Chemistry - Brintnell

Canadian Natural

- **Non-Saline Water Source Wells**

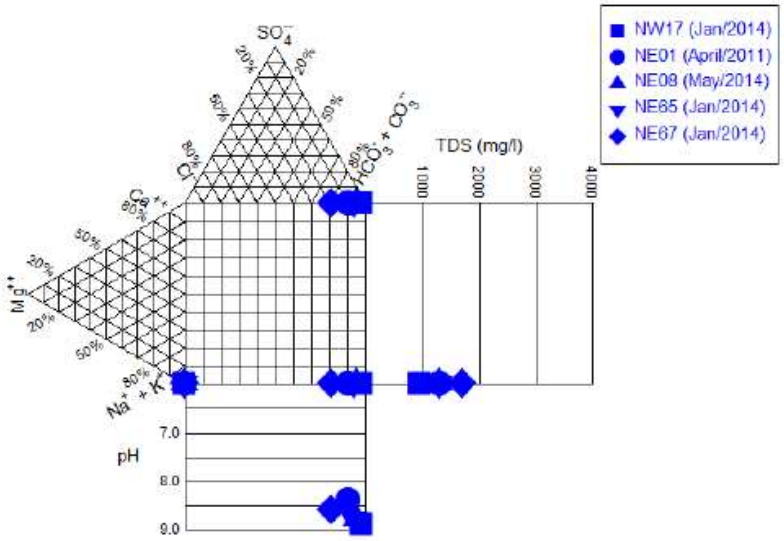
Monitoring Well	Sample Date	Lab pH	Lab EC µS/cm	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	Cl mg/L	T-Alkalinity mg/L	HCO_3 mg/L	CO_3 mg/L	SO_4 mg/L	NO_2-N mg/L	NO_3-N mg/L	NO_2-N+NO_3-N mg/L	Hardness mg/L	TDS mg/L
WSW HTP 2 - GR	25-Jul-15	*8.95*	2600	2.05	1.41	*608*	3.64	82.6	1270	1340	104	<0.60	<0.020	<0.040	<0.045	10.9	*1460*
WSW HTP 6 - GR	25-Jul-15	*8.95*	2580	1.95	1.34	*602*	3.58	91.3	1250	1320	98.7	<0.60	<0.020	<0.040	<0.045	10.4	*1450*
WSW NHTP 13 - GR	26-Jul-15	*8.65*	2570	2.35	1.56	*603*	4.17	94.8	1260	1400	66.6	<0.60	<0.020	<0.040	<0.045	12.3	*1470*
WSW NHTP 15 - GR	26-Jul-15	*8.96*	2560	1.88	1.52	*610*	3.71	99.8	1230	1300	102	<0.60	<0.020	<0.040	<0.045	11	*1460*
WSW NHTP 16 - GR	26-Jul-15	*8.93*	2670	1.99	1.71	*637*	3.99	93.2	1350	1430	108	<1.5	<0.050	<0.10	<0.11	12	*1550*
WSW BP 2 - GR	25-Jul-15	*8.94*	2470	1.84	1.23	*609*	3.57	89	1210	1270	96.2	<0.60	<0.020	<0.040	<0.045	9.7	*1430*
WSW BP 11 - GR	25-Jul-15	*8.95*	2390	1.74	1.17	*595*	3.53	76	1210	1280	101	<0.60	<0.020	<0.040	<0.045	9.2	*1410*
WSW BP 11 - Quat	25-Jul-15	*8.54*	740	88	24.1	*53.8*	4.9	0.73	329	369	16.2	73.8	<0.010	0.062	0.062	319	*443*
WSW BP 25 - Quat	19-Jan-16	*7.59*	1600	129	39.4	*207*	6.32	1.52	487	594	<5.0	462	<0.010	<0.020	<0.050	484	*1140*
WB30 - GR	25-Jul-15	*9.01*	2610	2.22	1.37	*631*	3.74	98.3	1330	1380	116	<0.60	<0.020	<0.040	<0.045	11.2	*1540*

Monitoring Well	Sample Date	MSI Sample Number	Lab pH	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	Cl mg/L	SO_4 mg/L	Fe mg/L	NO_3-N mg/L	T-Alkalinity mg/L	HCO_3 mg/L	CO_3 mg/L	Hardness mg/L	TDS mg/L
1F1/06-05	16-Aug-17	0387417081 6X01	7.59	103	33	trace	266	20.6	339	*3*	0.4068	560.67	684	0	339.09	*1098*
1F2/09-18	16-Aug-17	0387417081 6X02	8.17	23	9	trace	470	82.3	6.9	trace	0.5198	916.33	1117.9	0	94.49	*1140*
1F3/09-18	16-Aug-17	0387417081 6X03	8.05	121	49	8	233	30.1	480	trace	0.452	507.5	619.2	0	503.92	*1225*

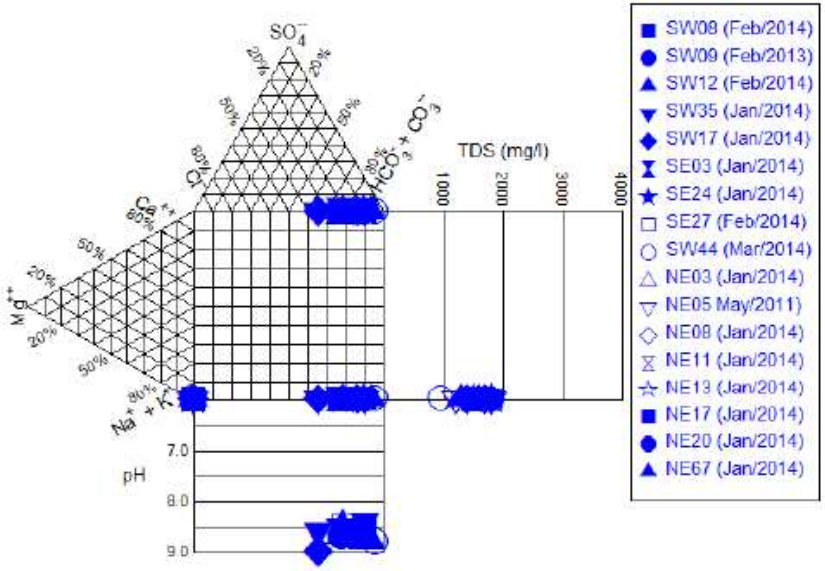
- **Saline Water Source Wells – Grosmont**
  - **Typical TDS range – 22,000-35,000 mg/L**

Water Chemistry – Pelican Lake

Durov Plot Grand Rapids ‘A’

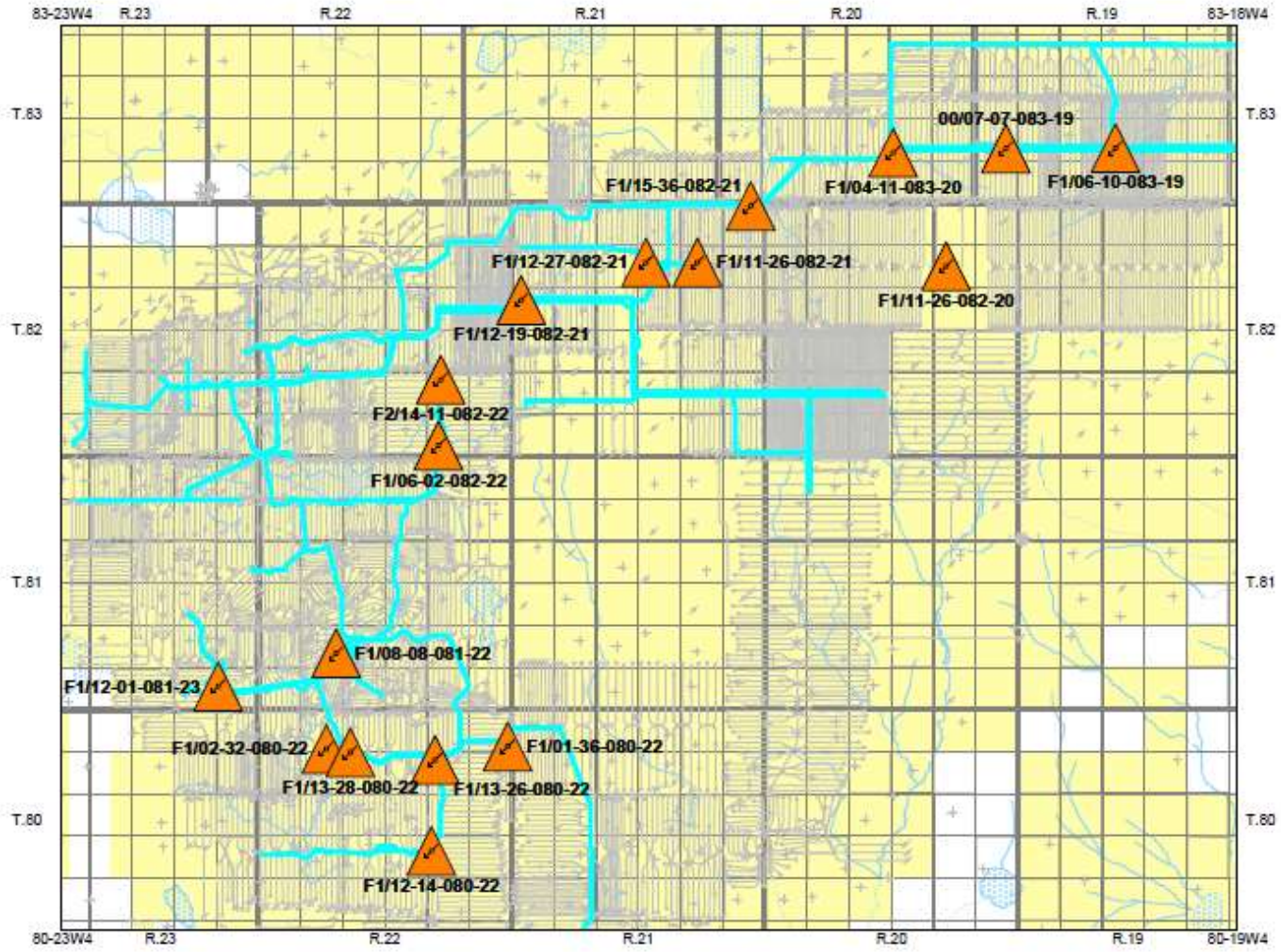


Durov Plot Grand Rapids ‘B’



TDS 900-2000 mg/L from Grand Rapids ‘A’ and ‘B’ aquifers.

Saline Water Source Map



2019 Saline Water Source Well Diversion Volumes (m^3)

Canadian Natural

Brintnell

Saline Wells	19-Jan	19-Feb	19-Mar	19-Apr	19-May	19-Jun	19-Jul	19-Aug	19-Sep	19-Oct	19-Nov	19-Dec	Totals
1F1/01-36-080-22W4/00	15,060	13,308	17,431	2,590	-	-	-	-	-	-	10,206	13,131	71,726
1F1/02-32-080-22W4/00	73,398	76,401	69,235	77,381	67,507	14,062	31,815	70,360	70,114	35,970	-	-	586,243
1F1/08-08-081-22W4/00	1,301	1,805	997	25	-	16	113	897	1,895	1,472	1,936	2,549	13,004
1F1/11-26-082-21W4/00	19,656	19,361	21,800	3,830	-	-	-	-	-	-	-	48	64,695
1F1/13-26-080-22W4/00	-	734	9,945	286	373	23,537	28,884	-	-	-	1	-	63,761
1F1/12-01-081-23W400	-	-	-	-	-	-	-	-	-	-	-	-	-
1F1/13-28-080-22W4/00	-	-	-	-	-	-	-	-	-	-	-	-	-
1F1/12-14-080-22W4/00	-	-	-	-	-	-	-	-	-	-	-	-	-
1F1/11-26-082-20W4/00	-	-	-	-	-	-	-	-	-	-	-	-	-
1F1/12-27-082-21W4/00	-	-	-	-	-	-	-	-	-	-	-	-	-
1F1/06-02-082-22W4/00	-	-	-	-	-	-	-	-	-	-	-	-	-
1F2/14-11-082-22W4/00	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL SALINE	109,415	111,610	119,408	84,111	67,881	37,615	60,812	71,257	72,009	37,441	12,143	15,728	799,429

Pelican Lake

Saline Wells	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Totals
BR CAMP 27 1F1/04-11-083-20W4/00 SRC	16,273	13038.7	38,020	67,797	1	0	0	0	0	46,392	49,638	78,504	309,664
BR PEL NE06 100/07-07-083-19W4/00 SRC	0	0	0	0	0	0	0	0	0	0	0	0	0
BR PEL NE11 1F1/06-10-083-19W4/00 SRC	0	0	0	1,491	72,518	36,374	62,950	70,868	59,551	0	0	0	303,751
BR PEL NW07 1F1/15-36-082-21W4/00 SRC	0	0	0	0	0	0	0	0	0	0	0	0	0
BR PEL SE05 1F1/12-19-082-21W4/00 SRC	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL SALINE	16,273	13,039	38,020	69,288	72,519	36,374	62,950	70,868	59,551	46,392	49,638	78,504	613,415

- Inactive wells above have been suspended and could be reactivated for future use.

Water Usage and Disposal

Canadian Natural

Brintnell

Total Water Volumes	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Produced Water for Injection (m3)	2,865,183	3,216,258	3,485,267	2,901,838	3,703,800	3,522,671	4,390,618	4,617,604	4,507,036	4,946,868	4,819,935	4,012,815
Non-Saline Water (m3)	1,493,264	1,433,242	1,553,045	1,479,780	1,876,840	2,041,938	2,028,731	1,937,567	1,916,943	2,162,684	3,093,614	2,841,011
Brackish Water (m3) - Grosmont	764,664	2,963,684	3,999,848	6,274,361	4,780,011	3,800,437	3,666,120	3,133,047	2,276,529	1,959,507	1,280,884	799,429
Disposal Volume (m3)	475,723	426,373	680,010	268,333	174,739	222,200	464,554	544,868	684,537	743,035	800,273	806,252
Total Produce Recycle (%)	83.40%	86.70%	80.50%	90.80%	95.30%	94.00%	91.0%	89.6%	87.2%	87.7%	85.9%	83.3%
Average Daily Recycle (m3/d)	6,529	7,644	7,686	7,215	9,642	9,900	12,273	12,876	12,740	13,725	13,305	11,052

Pelican Lake

Total Water Volumes	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Produced Water for Injection (m3)	4,256,039	3,684,090	4,188,103	4,256,695	4,753,603	4,381,028	3,711,085	3,428,883	3,953,812	4,255,807
Non-Saline Water (m3)	684,010	803,000	953,380	1,132,595	1,369,845	1,078,575	571,955	570,130	1,001,925	1,077,062
Brackish Water (m3) - Grosmont	2,207,885	1,270,930	2,403,890	3,220,395	4,163,555	2,224,675	1,027,475	713,210	111,325	613,415
Disposal Volume (m3)	389,083	132,855	246,548	240,644	167,289	130,497	130,035	124,367	106,859	90,438
Total Produce Recycle (%)	91.62%	96.52%	94.44%	94.65%	96.60%	97.11%	96.61%	96.50%	97.37%	97.92%
Average Daily Recycle (m3/d)	11,660	10,093	11,443	11,662	13,024	12,003	10,167	9,394	10,832	11,660

- **Continued to focus on maintaining high water recycling ratios.**
  - **2019 recycle at 83.3% for legacy Brintnell and 97.9% for Pelican Lake.**
- **CNRL continues to be in compliance with AENV water diversion license.**
- **CNRL Disposal injection in compliance with Directive 51 Guidelines and Approvals.**

Brintnell Legacy Water Information

Canadian Natural

Brintnell - Water Information

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Non-Saline Water (m3/day) - Quaternary and Grand Rapids	4,091	3,927	4,255	4,054	5,142	5,594	5,558	5,308	5,252	5,925	8,476	7,784
Brackish Water (m3/day) - Grosmont	2,095	8,120	10,958	17,190	13,096	10,412	10,044	8,584	6,237	5,369	3,509	2,190
Total Source Water (m3/day)	6,186	12,046	15,213	21,244	18,238	16,007	15,602	13,892	11,489	11,294	11,985	9,974
Total Source Water per barrel of oil	1.1	2.1	2.6	3.7	3.0	2.3	2.0	1.7	1.5	1.5	1.7	1.7
Brackish Water per barrel of oil	0.4	1.4	1.9	3.0	2.1	1.5	1.3	1.1	0.8	0.7	0.5	0.4
Non-Saline Water per barrel of oil	0.7	0.7	0.7	0.7	0.8	0.8	0.7	0.7	0.7	0.8	1.2	1.4
Produced Water Recycle (m3/day)	6,546	7,644	7,686	7,215	9,669	9,900	12,273	12,876	12,740	13,725	13,305	11,052
Recycle Rates	83.4%	86.7%	80.5%	90.8%	95.3%	94.0%	91.0%	89.6%	87.2%	87.7%	85.9%	83.3%
Oil Produced (bbl/day)	37,035	36,612	36,726	36,372	38,656	42,934	50,194	50,877	47,982	46,847	43,351	35,895

Brintnell - Water Information 2019 Monthly

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Non-Saline Water (m3/day) - Quaternary and Grand Rapids	8,455	8,066	8,155	8,120	7,619	5,549	7,745	7,539	7,949	8,027	8,027	8,131
Brackish Water (m3/day) - Grosmont	3,530	3,986	3,852	2,804	2,190	1,254	1,962	2,299	2,400	1,208	405	507
Total Makeup Water (m3/day)	11,985	12,052	12,007	10,924	9,809	6,803	9,707	9,837	10,349	9,235	8,432	8,638
Total Makeup Water per barrel of oil	1.8	1.9	1.8	1.8	1.8	1.5	1.7	1.8	1.8	1.7	1.5	1.6
Brackish Water per barrel of oil	0.5	0.6	0.6	0.5	0.4	0.3	0.3	0.4	0.4	0.2	0.1	0.1
Non-Saline Water per barrel of oil	1.3	1.3	1.2	1.4	1.4	1.2	1.3	1.4	1.4	1.5	1.5	1.5
Produced Water Recylce (m3/day)	12677	11707	13400	11502	10553	8947	11232	10755	11130	10145	9978	10673
Recycle Rates	84.9%	85.4%	84.0%	81.5%	81.9%	80.9%	81.4%	82.7%	82.1%	80.7%	87.8%	86.9%
Oil Produced (bbl/day)	41,169	40,087	41,870	37,262	33,824	27,992	36,373	33,987	35,494	34,010	34,338	34,446

Pelican Lake Water Information

Canadian Natural

Pelican Lake Water Information

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Fresh Water (m3/day) - Grand Rapids	813	1,417	1,874	2,200	2,612	3,103	3,753	2,955	1,567	1,562	2,745	2,951
Brackish Water (m3/day) - Grossmont	10,324	7,835	6,049	3,482	6,586	8,823	11,407	6,095	2,815	1,954	305	1,681
Total Source Water (m3/day)	11,137	9,252	7,923	5,682	9,198	11,926	15,160	9,050	4,382	3,516	3,050	4,631
Total Source Water per barrel of oil	2.5	2.3	2.2	1.7	2.6	3.1	3.8	2.3	1.3	1.1	1.0	1.3
Brackish Water per barrel of oil	2.4	2.0	1.6	1.1	1.8	2.3	2.9	1.6	0.8	0.6	0.1	0.5
Fresh Water per barrel of oil	0.2	0.4	0.5	0.7	0.7	0.8	0.9	0.8	0.5	0.5	0.9	0.8
Produced Water Recycle (m3/day)	13,146	13,179	11,660	10,093	11,443	11,662	13,024	12,003	10,167	9,394	10,832	11,660
Recycle Rates	85.1%	85.1%	91.6%	96.5%	94.4%	94.6%	96.6%	97.1%	96.6%	96.5%	97.4%	97.9%
Oil Produced (bbl/day)	27,540	24,882	23,096	20,428	22,600	24,255	24,934	24,411	21,171	19,967	19,855	23,148

Pelican Lake Water Information 2019 Monthly

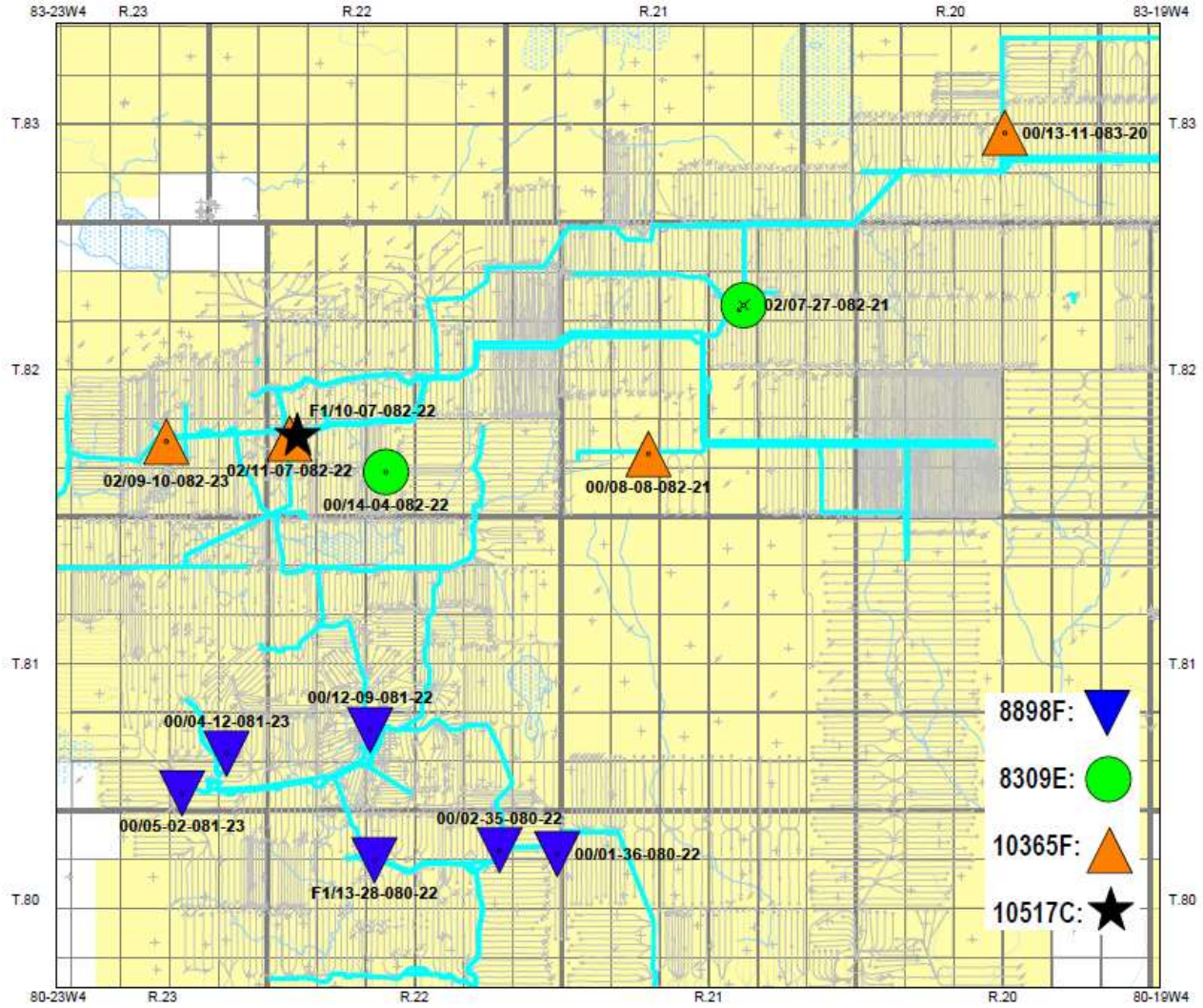
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fresh Water (m3/day) - Grand Rapids	3,153	2,997	2,877	2,530	2,854	2,473	3,085	3,154	3,008	3,131	3,151	2,979
Brackish Water (m3/day) - Grossmont	525	466	1,226	2,310	2,339	1,212	2,031	2,286	1,985	1,497	1,655	2,532
Total Makeup Water (m3/day)	3,678	3,463	4,103	4,840	5,194	3,686	5,116	5,440	4,993	4,627	4,806	5,512
Total Makeup Water per barrel of oil	1.1	1.0	1.4	1.3	1.4	1.2	1.3	1.4	1.3	1.1	1.2	1.4
Brackish Water per barrel of oil	0.2	0.1	0.4	0.6	0.6	0.4	0.5	0.6	0.5	0.4	0.4	0.7
Fresh Water per barrel of oil	0.9	0.9	1.0	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Produced Water Recylce (m3/day)	9033	11375	10738	11875	11675	10196	12455	11936	11986	12367	12102	12074
Recycle Rates	98.6%	98.7%	98.6%	98.1%	98.5%	95.2%	98.0%	97.9%	98.0%	97.4%	98.7%	97.2%
Oil Produced (bbl/day)	21,505	21,250	18,648	23,631	23,128	19,375	25,708	24,787	24,914	25,781	24,562	24,268

Brintnell/Pelican Lake Water Management Plan

Canadian Natural

- Striving to improve field performance by increasing throughput through injectivity improvements
- Optimize polymer loading with the use of existing non-saline water volumes
- Additional water treatment processes previously piloted but not implemented – economics and operating limitations posed challenges
  - Disc Stack Centrifuge Pilot Nov 2016 – April 2017
- Additional Grosmont Source/Disposal options are being investigated as we plan the long-term water sourcing options.
  - Brintnell water project was completed in 2019 to reduce produced water disposal and increase recycle rates in Brintnell Legacy field- higher recycle rates in November-December 2019 post completion

Water and Oilfield Disposal Map



CNRL Brintnell Disposal Wells

Canadian Natural

TABLE 1
APPROVAL NO. 8898F

1	2	3	4	5
Unique Well Identifiers	Disposal Zone	Top of Injection Interval (Measured depth - metres KB)	Depth of Production Packer (Measured depth - metres KB)	Maximum Wellhead Injection Pressure (kilopascals gauge)
F1/13-28-080-22W4/2[1]	Nisku/Grosmont	467.0	462.0	3200
† 00/02-35-080-22W4/0	Nisku	475.0	473.0	3200
00/01-36-080-22W4/0	Nisku	458.1	454.0	3200
00/12-09-081-22W4/0	Nisku	487.5	478.9	6000
02/12-09-081-22W4/0	Grosmont	536.0	526.7	4325
† 00/05-02-081-23W4/3	Nisku	513.0	508.2	3300
00/04-12-081-23W4/3	Nisku	508.0	506.0	3450

CNRL Brintnell Disposal Wells

Canadian Natural

TABLE 1
APPROVAL NO. 8309E

1	2	3	4	5
Unique Well Identifiers	Disposal Zone	Top of Injection Interval (Measured depth - metres KB)	Depth of Production Packer (Measured depth - metres KB)	Maximum Wellhead Injection Pressure (kilopascals gauge)
02/07-27-082-21W4/2[1]	Grosmont	555.0	545.1	3450
00/14-04-082-22W4/0	Nisku/Graminia/ Blue Ridge/ Calmar	453.0	438.0	3500

CNRL Pelican Lake Disposal Wells

Canadian Natural

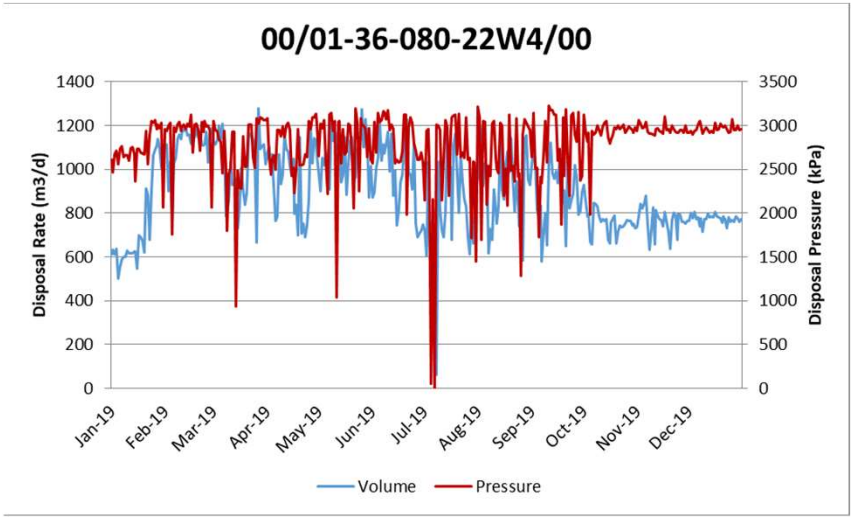
TABLE 1
APPROVAL NO. 10365F

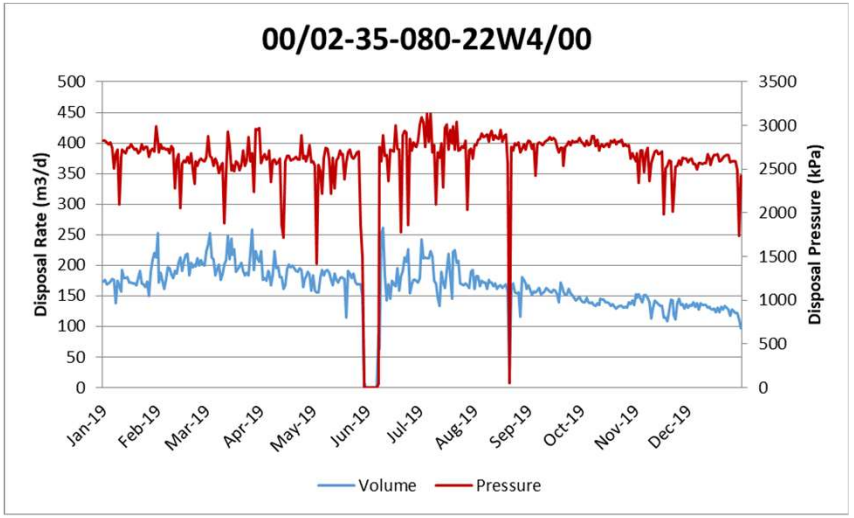
1	2	3	4	5
Unique Well Identifiers	Disposal Zone	Top of Injection Interval (Measured depth - metres KB)	Depth of Production Packer (Measured depth - metres KB)	Maximum Wellhead Injection Pressure (kilopascals gauge)
00/08-08-082-21W4/0	Grosmont	543.3	524.6	3300
02/11-07-082-22W4/0	Wabamum/Gramina/ Calmar/Nisku	450.7	431.0	3000
02/09-10-082-23W4/0 <rescinded[1]>	Nisku	511.0	503.37	3300
00/13-11-083-20W4/0	Nisku	390.7	374.5	2880

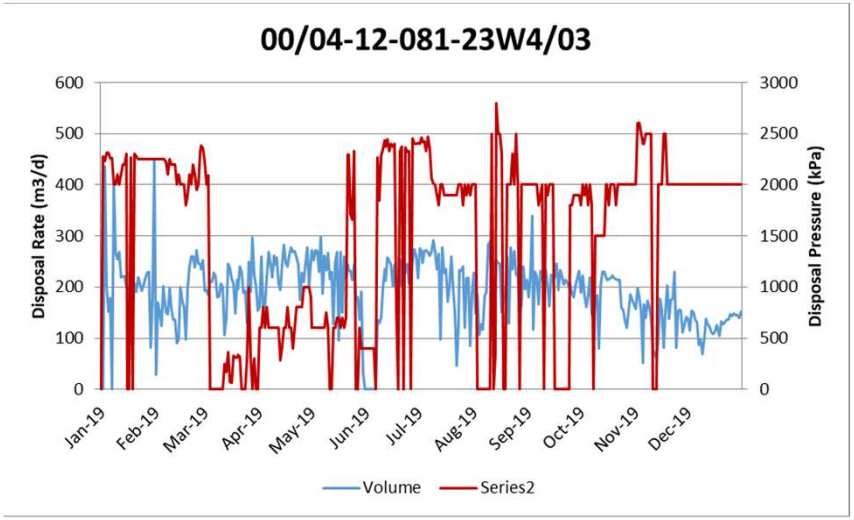
TABLE 1
APPROVAL NO. 10517C

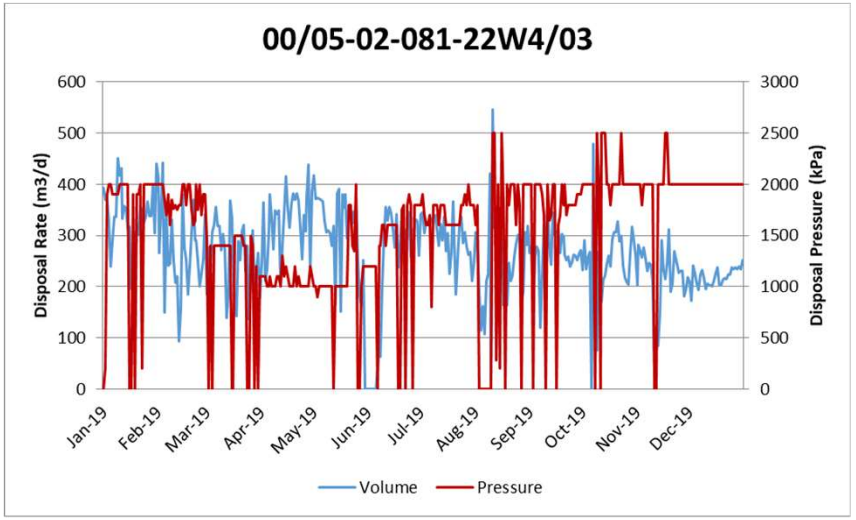
1	2	3	4	5
Unique Well Identifiers	Disposal Zone	Top of Injection Interval (Measured depth - metres KB)	Depth of Production Packer (Measured depth - metres KB)	Maximum Wellhead Injection Pressure (kilopascals gauge)
F1/10-07-082-22W4/0	Grosmont	596.1	584.9	3450

Brintnell Disposal Well Data

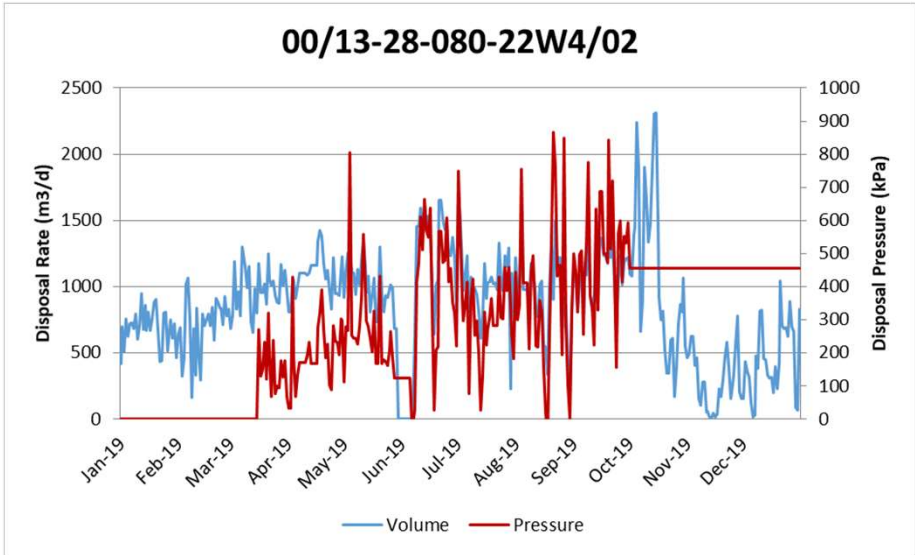


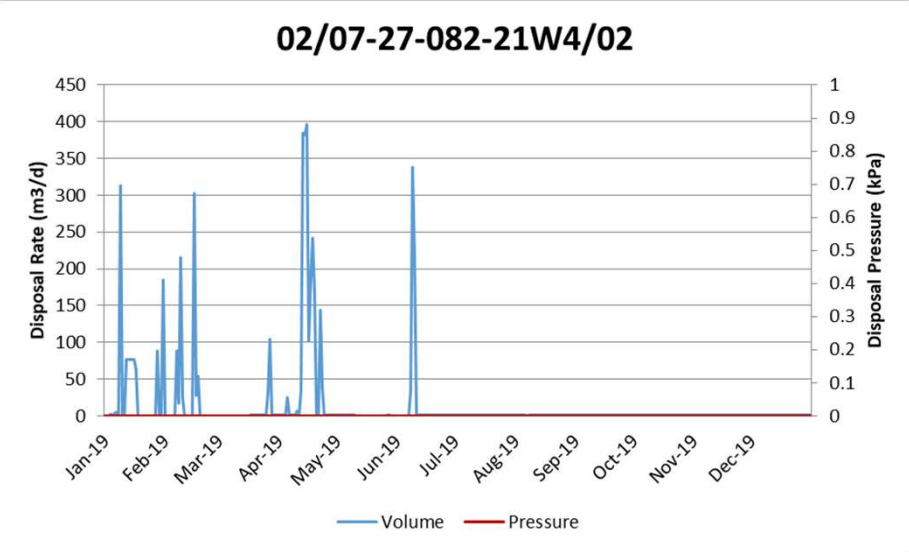




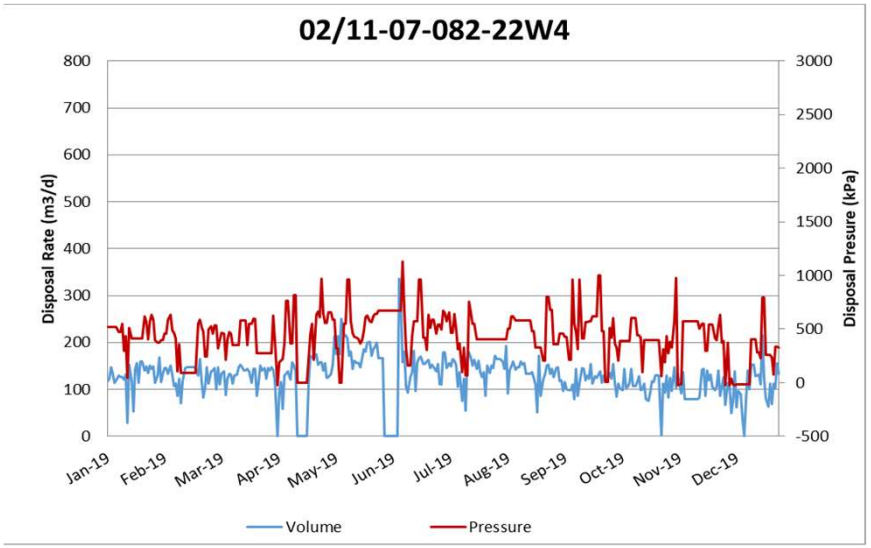


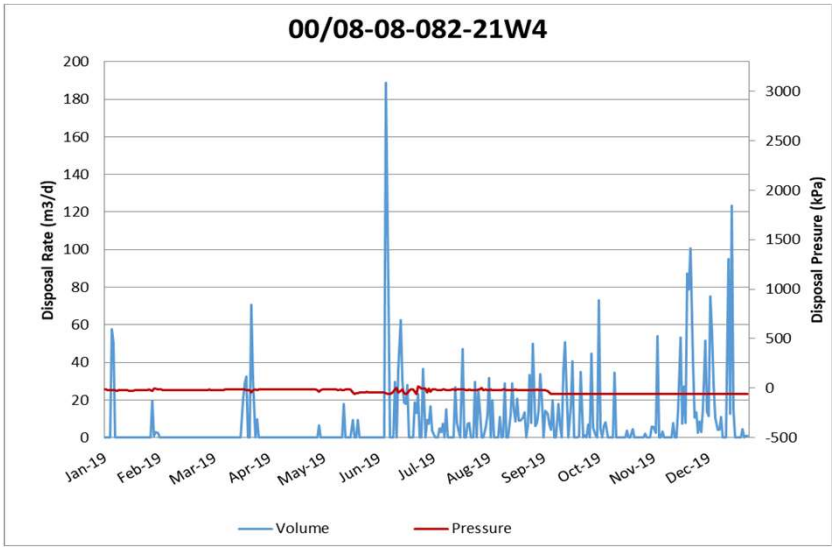
Brintnell Disposal Well Data

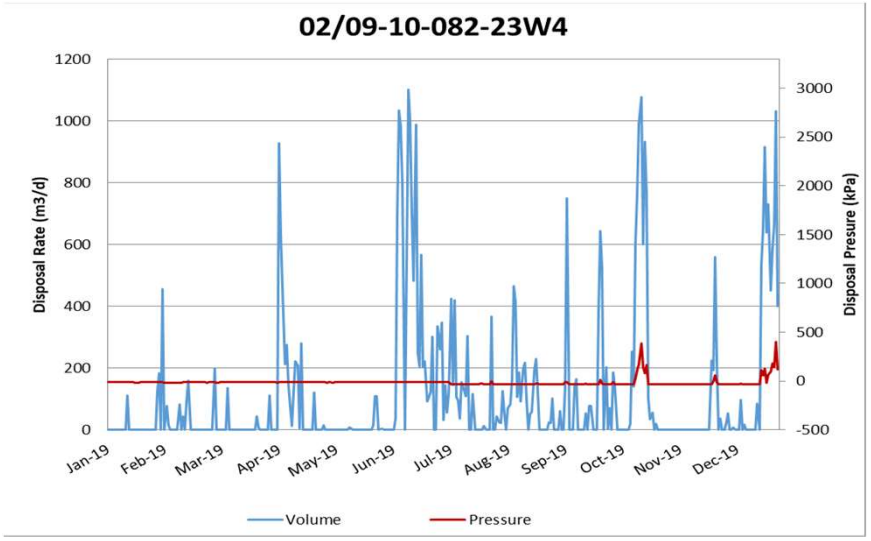




Pelican Lake Disposal Well Data







AER Compliance

Hydrogen Sulphide

Canadian Natural

- Souring of production to occur over time, Engineering and Construction, has and will continue to ensure compliance across the entire Field to handle sour production (<1% H2S).
- H2S produced at padsites and batteries is expected to be in low concentration and volume.
- CNRL collects solution gas at batteries and wellsites in a common solution gas gathering system.
- Gas to be sweetened in field and at major facility sites (emulsion batteries, compressor station).

AER Compliance

- **CNRL continues to work with AER regarding injection well integrity:**
  - **Formation/hydraulic isolation**
  - **Cement bond**
  - **Casing corrosion**

Identified Casing Failures with Enacted Repairs

- 00/06-05-081-22W4/4 – June 2019. Cemented in stacked liner
  - No fluid lost
- 00/07-19-079-21W4/3 – July 2019. Cemented in stacked liner
  - No fluid lost
- 00/13-31-082-20W4/2 – Sept 2019. Failure in zone, stacked liner
  - No fluid lost
- 02/01-04-083-20W4 – Jan 2019. Bridge Plug
  - No Fluid Lost
- 02/01-14-082-22W4 – May 2019. Casing patch
  - YES, 1m3 producer water (during pressure testing casing)
- 05/01-10-083-21W4 – Mar 2019. Bridge Plug
  - No Fluid Lost

Casing Failure Compliance

- **In cases of identified casing failure remediation is generally a cemented in stacked liner to protect the casing or if uneconomic a bridge plug is set, well operations are suspended and well is evaluated for redrill**
  - **Current mitigation plans include: production philosophy that minimizes casing exposure to produced fluids**
- **Regarding all non-compliant wellbores, upon identification of integrity issues CNRL proposes a solution to the AER and ensures mitigation is mutually agreed upon**
- **CNRL evaluates all failed wells for either repair or redrill with the focus on re-establishing consistent flood patterns**

Wellhead/SCVF/GM Repairs and Compliance

Canadian Natural

- **Currently there are no serious SCVF/GM issues.**
  - **There were no identified well integrity failures with risk to environment or ground water**
- **There were no wellhead failures in 2019**
  - **In cases of identified wellhead failures, remediation is generally isolation of wellhead from wellbore and surface facilities until a repair can be completed**
    - **Current mitigation plans include: Perform integrity inspections and replace as required**

EPEA Approval 1706-03-00 was granted effective October 1, 2019 and expires on Sept 30, 2029.

Observation Wells

Canadian Natural

Wabiskaw

- Primary source of reservoir pressure data is from injector fall-off analysis collected using SCADA
- 17 observation wells in Approval 9404 connected to Scada
- 2 wells in legacy area: AA/14-10-081-22W4, 00/15-04-082-23W4

Grand Rapids/Quaternary

Legacy area non-saline water monitoring:

Source Well Name	Associated Obs Well
WSW BP25 - QUAT	OBS BP25 - QUAT (08-04-081-22W4)
WSW BP11 - QUAT	OBS BP11 - QUAT (13-04-081-22W4)
WSW BP2 - GR	OBS BP02 - GR (13-16-081-22W4)
WSW BP11 - GR	OBS BP11 - GR (13-04-081-22W4)
WSW HTP2 - GR	OBS HTP02 - GR (13-29-081-22W4)
WSW HTP6 - GR	OBS HTP06 - GR (15-27-081-22W4)
WSW NHTP16 - GR	OBS NHT16 - GR (01-17-082-23W4)
WSW WBP30 - GR	OBS WB30 - GR (15-20-081-22W4)
WSW NHP 13 - GR	OBS NHTP13 - GR (07-05-082-23W4)
WSW NHP 15 - GR	OBS NHTP15 - GR (08-08-082-23W4)
OBS 06-05	WSW 1F1/06-05 (06-05-080-21 W4M)
OBS 09-18 Q1	WSW 1F2/09-18 (09-18-080-22 W4M)
OBS 09-18 Q2	WSW 1F3/09-18 (09-18-080-22 W4M)

Approval 9404 area has 46 observation wells in the Grand Rapids

Outstanding Applications

Conclusion

Canadian Natural

- **Canadian Natural continues to be committed to maximizing the value of the resource for the both the Province of Alberta through it's Royalty Interest and itself.**
  - **2019 – Stable production in low commodity price environment**
- **Results from the polymer flood continue to be encouraging**
  - **Continuing to evaluate the impacts of oil viscosity and water production on the ultimate performance and recovery under polymer flooding**
- **CNRL continues to optimize the operation of the flood and expand to new, more challenging areas**
  - **Injection management is a balance of OPEX, power consumption and flood management**
- **CNRL is working on an injection plan to maximize field throughput and thus ultimate recovery of the field. Several options are being investigated over the next several years.**
- **Compliance with all AER regulations, including cap rock integrity monitoring, and communication with the AER remains a top priority for CNRL.**

THE FUTURE CLEARLY DEFINED

Premium Value I Defined Growth I Independent

Canadian Natural