



# Canadian Natural

## PRIMROSE AND WOLF LAKE IN SITU OIL SANDS PROJECT DIRECTIVE 054 ANNUAL PERFORMANCE PRESENTATION

Commercial Scheme Approval 9140 (as amended)  
June 30, 2023



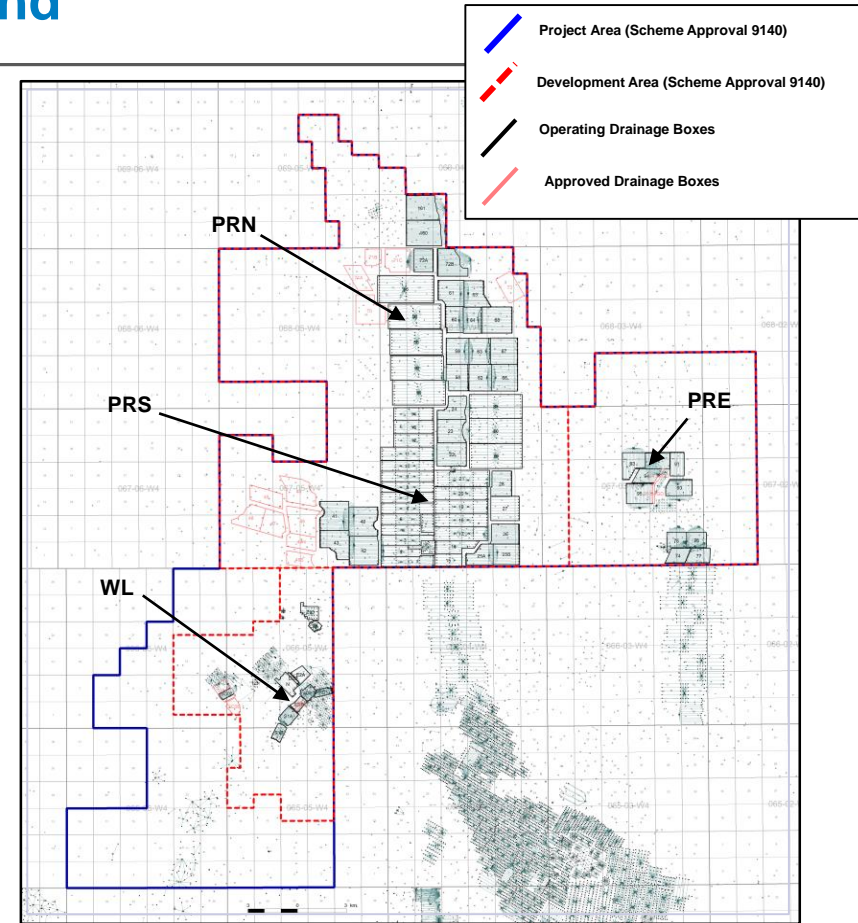


## 4.1 Introduction



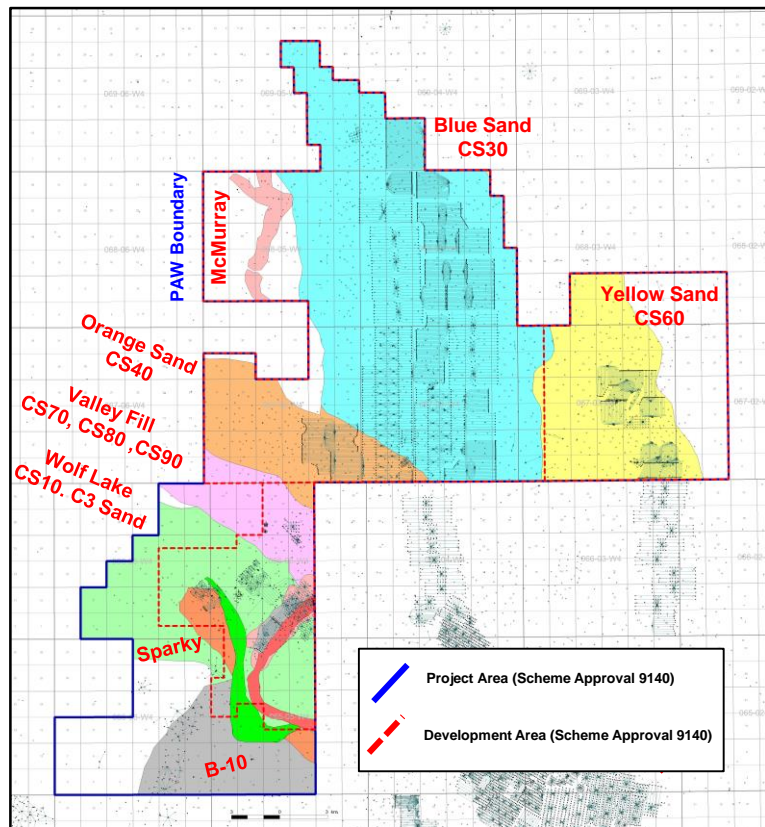
## 4.1, 1) Scheme Setting and Background

- The Primrose and Wolf Lake In Situ Oil Sands Project (PAW Project) is located in east central Alberta, in the northern portion of the Cold Lake Oil Sands Area.
- The Clearwater, Grand Rapids and McMurray formations are the bitumen-bearing sands and the target of steam injection in the Primrose and Wolf Lake operating areas. Recovery processes used include Cyclic Steam Stimulation (CSS), Steam Assisted Gravity Drainage (SAGD) and Steamflood (SF).
- The PAW Project is split into the following four operating areas:
  - Wolf Lake (WL)
  - Primrose South (PRS)
  - Primrose North (PRN)
  - Primrose East (PRE)





## 4.1, 1) Scheme Setting and Background (cont'd)



### Development History for PAW

#### **Orange/Blue Sand (Primrose South and North)**

1981-1983 (Dome): Moore Pilot Vertical Well CSS  
 1992 (Amoco): CDD Pilot Phase 5 Horizontal Well Steam Drive  
 1993-1999 (Amoco): Phase 1-20 Horizontal Well CSS  
 1996 (Amoco): Phase 2-3 MWSDD Steam Drive Drainage Pilot  
 1998 (Amoco): BD-18 SAGD Pilot  
 2000 (CNRL): Phase 21 Horizontal Well CSS  
 2003-2004: Phase 29-31 Horizontal Well CSS  
 2004-2006: Phase 51-55 Horizontal Well CSS  
 2003: Phase 14 Surfactant in Steam CSS  
 2003: Phase A1-A2 Cyclic Gas  
 2004: Phase A1 Cyclic Rich Gas  
 2005: Phase B2 Solvent in Steam CSS  
 2005-2007: Phase 27, 17 in-fill, 28 Horizontal CSS  
 2006: Phase BD-18 VAPEX  
 2008-2009: Phase 58, 59, 62, 63, 66, 67 Horizontal Well CSS  
 2010-2011: Phase 22-24 Horizontal Well CSS  
 2011-2012: Phase 25-26 Horizontal Well CSS  
 2011-2013: Phase 60,61,64,65,68 Horizontal Well CSS  
 2013: Phase 40-43 Horizontal Well CSS  
 2014: Phase 40-43 Horizontal Well CSS  
 2018-2019: Phase 72A-72B Horizontal Well CSS  
 2022: Phase 160-161 Horizontal Well CSS

#### **Yellow Sand (Primrose East)**

1986-1988 (Suncor): Phase 14A-14B Slant Pads  
 1996 (Suncor): Burnt Lake Pilot SAGD  
 2007-2008 (CNRL): Phase 74, 75, 77, 78 Horizontal Well CSS  
 2011-2012: Phase 90-95 Horizontal Well CSS  
 2021: PH 77-78 re-drill

#### **Valley Fill (Wolf Lake)**

1988 (BP): Z8 Vertical Well CSS  
 1989 (Amoco): HWP1 SAGD Pilot  
 2005 (CNRL): Z13 Vertical Well CSS

#### **C3 Sand (Wolf Lake)**

1966 (BP): Phase A Vertical Well Pilot  
 1978-1988 (BP): Marguerite Lake Pilot  
 1980-1985 (BP): Wolf Lake 1 West Vertical Well CSS  
 1980-1985 (BP): Wolf Lake 1 East Vertical Well CSS  
 1987-1988 (BP): Wolf Lake 2 Vertical Well CSS  
 1994 (Amoco): Wolf Lake 1 East Horizontal MWSDD  
 1996 (Amoco): Wolf Lake 1 West Horizontal MWSDD  
 1999-2000 (CNRL): Phase E2 and N Horizontal CSS

#### **B10 Sand (Wolf Lake)**

1989 (BP): E14 Vertical Well CSS Pilot  
 1997 (Amoco): D2 Pair 1 SAGD  
 2000 (CNRL): D2 Pair 2-6 SAGD  
 2000-2001: SD9 SAGD  
 2001: S1A SAGD  
 2004: S1A SAGD re-drill  
 2010: S1B SAGD  
 2017: S1A SAGD re-drill

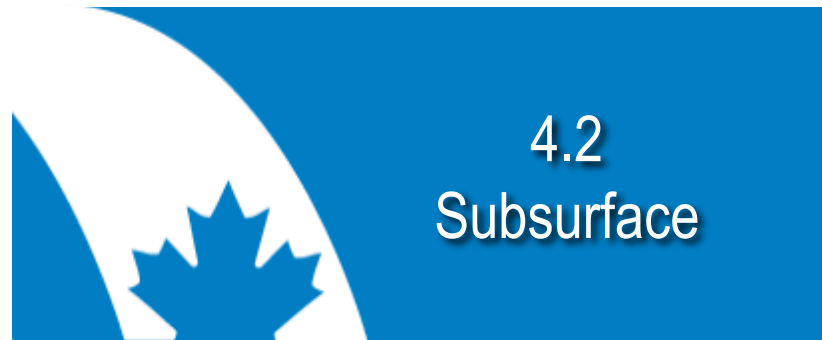
#### **SPARKY C Sand (Wolf Lake)**

2022: SC07 SAGD

#### **McMurray Sand (Wolf Lake)**

2010 (CNRL): MC1 SAGD



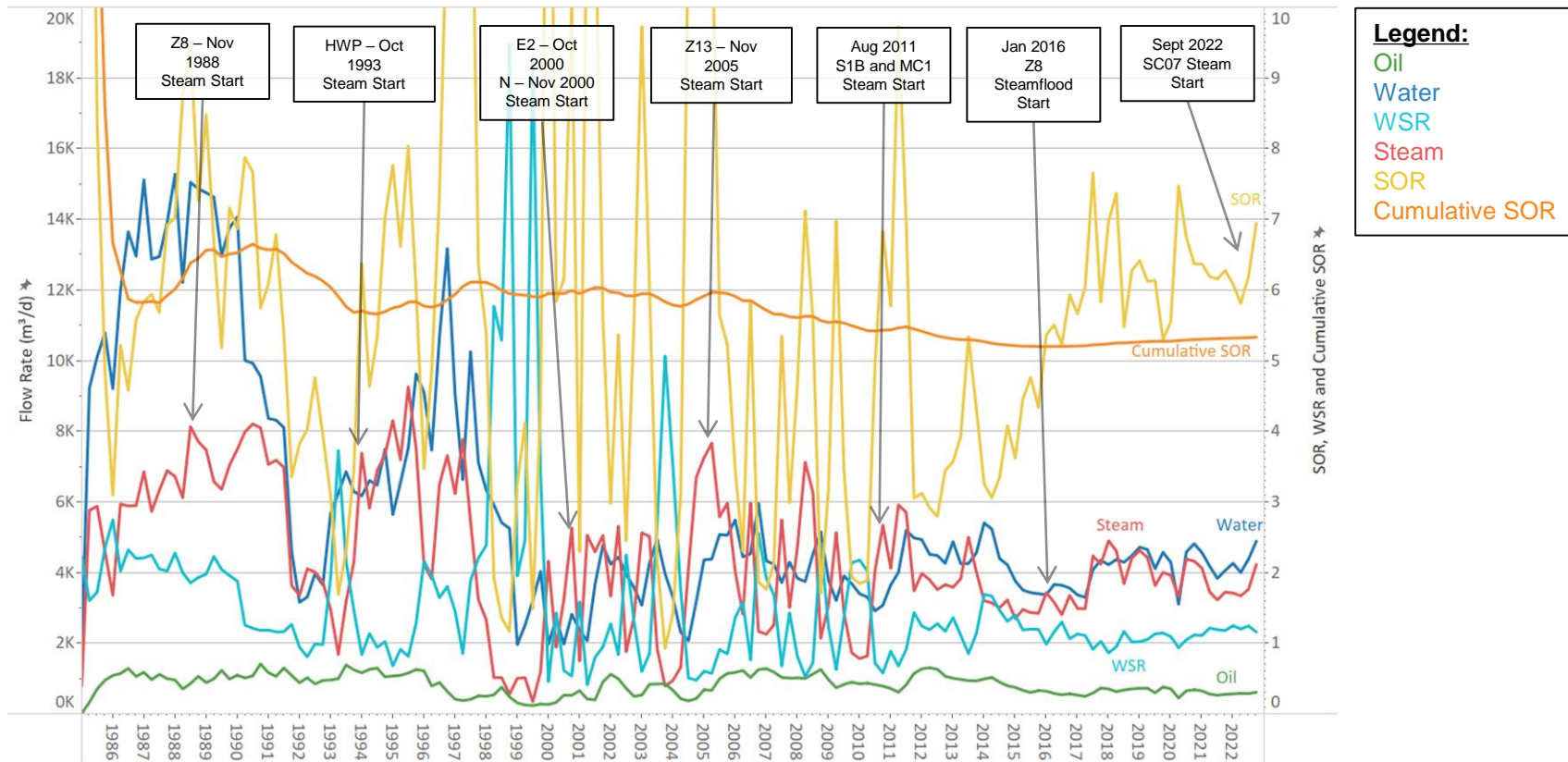


## 4.2 Subsurface



## 4.2, 2) Production Plot - Wolf Lake

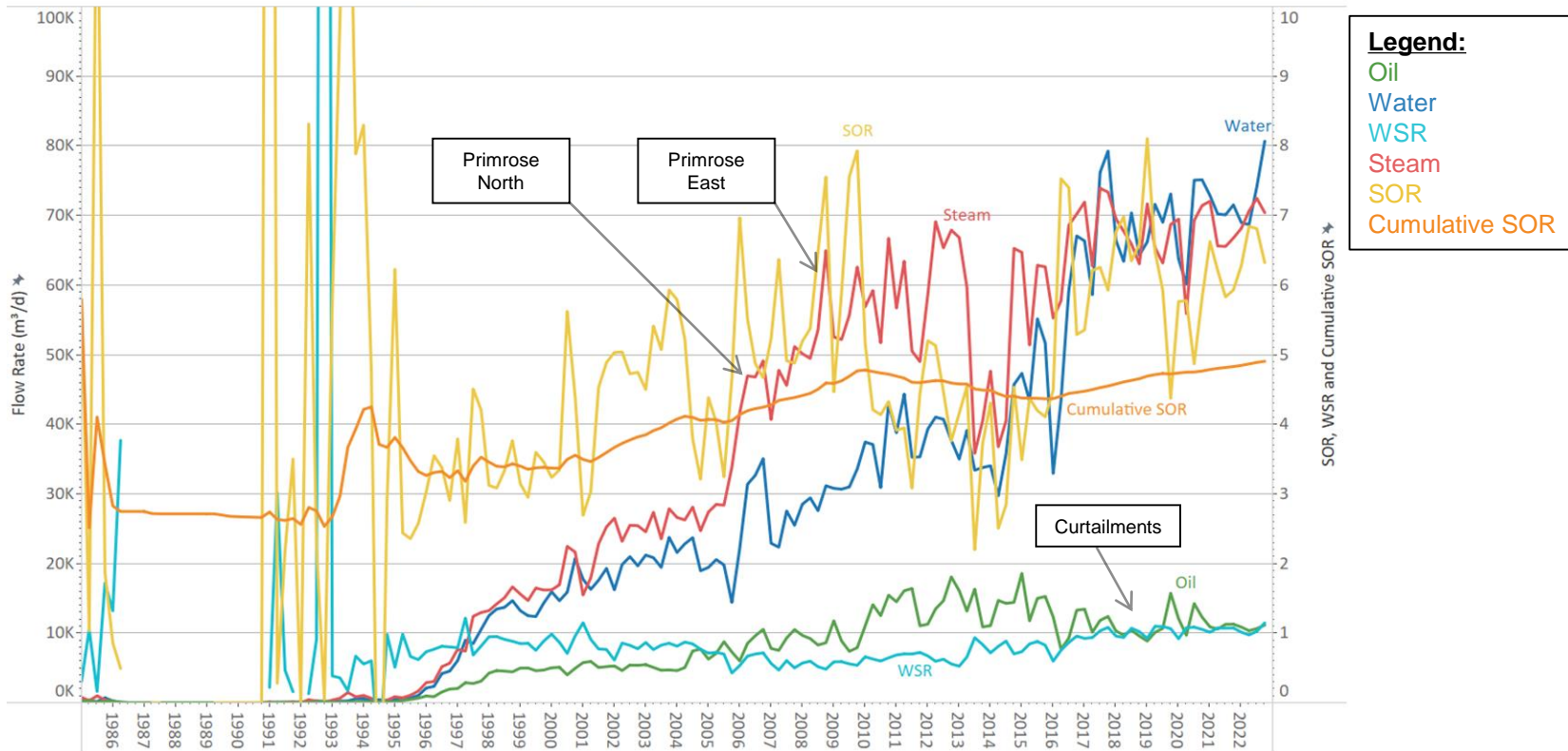
Wolf Lake CSS, SAGD and SF (Quarterly Data)





## 4.2, 2) Production Plot - Primrose

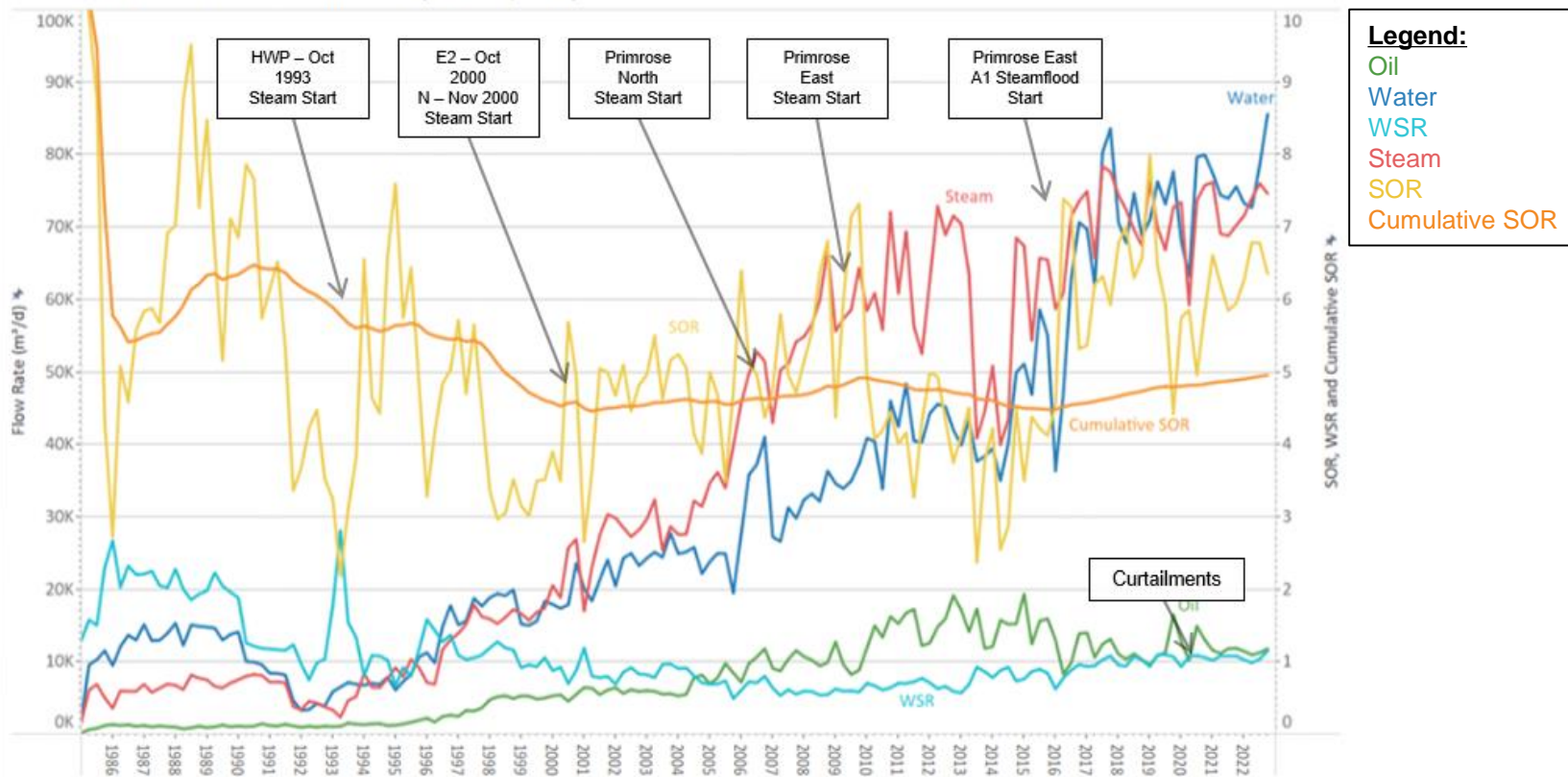
Primrose East, North and South (Quarterly Data)





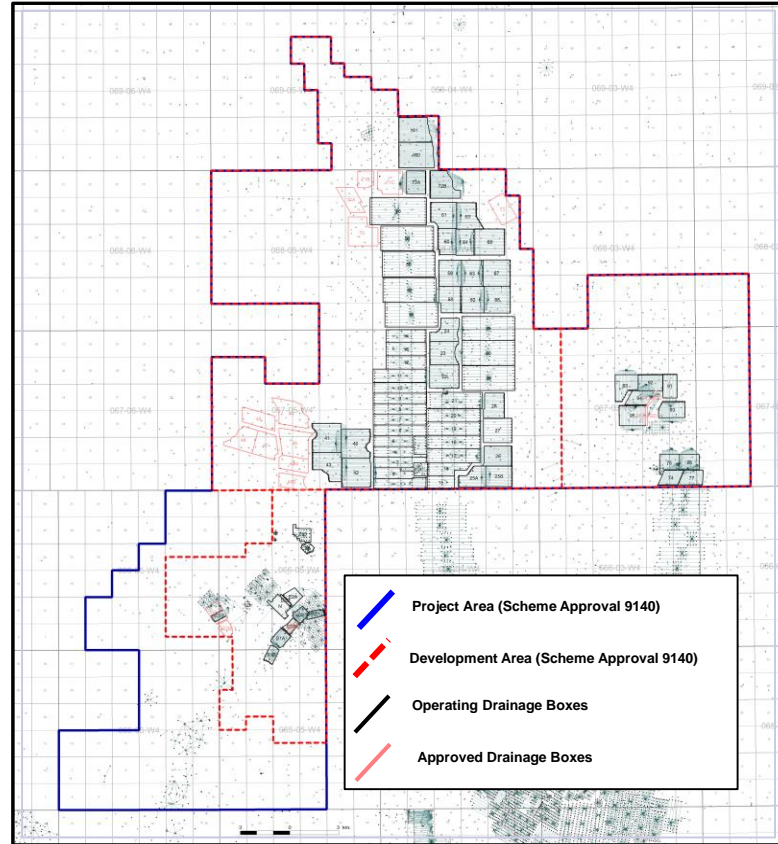
## 4.2, 2) Production Plot - Primrose and Wolf Lake

Primrose and Wolf Lake CSS, SF and SAGD (Quarterly Data)





## 4.2, 3 a) Drilled and Approved Drainage Boxes

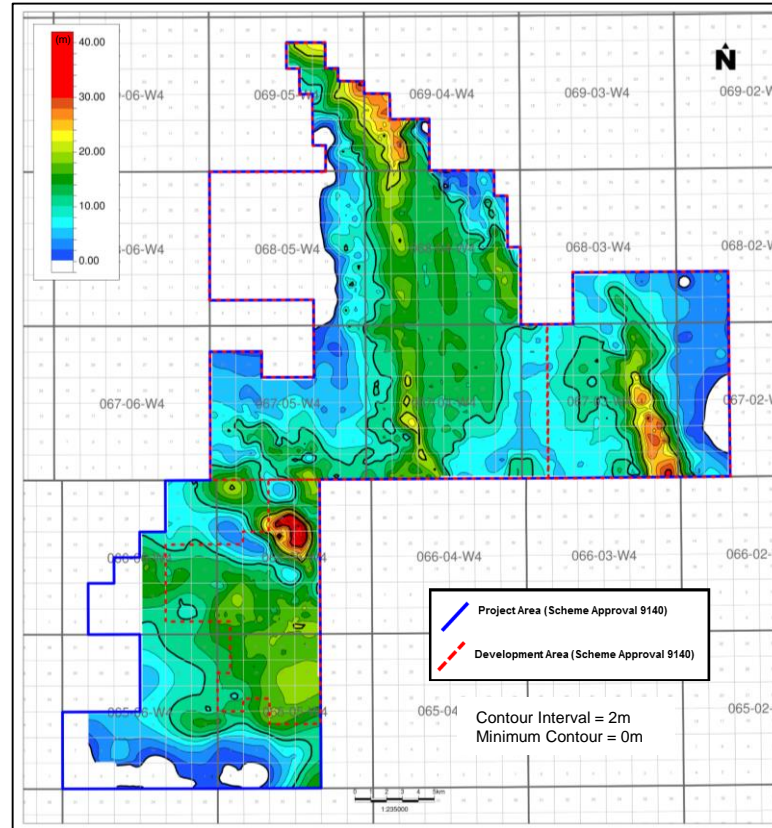




## 4.2, 3 b) Net Pay Isopach with Resource Cut-off

### Clearwater

Regional Clearwater Net Pay Isopach



Primrose and Wolf Lake Pay Cut-offs:

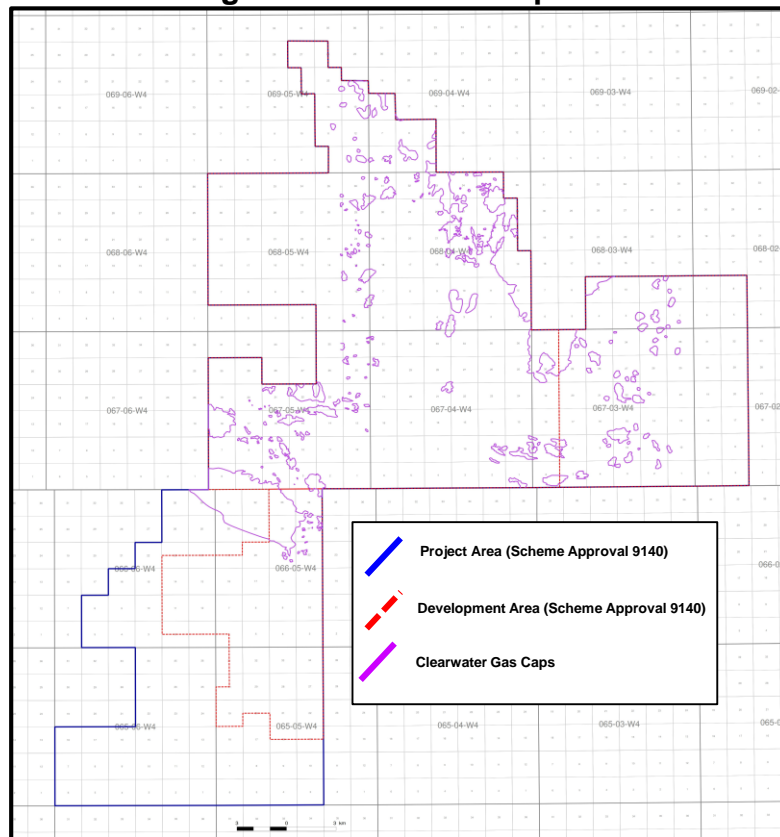
- Bitumen weight (bit wt%) greater than 6%
- Continuous pay with less than 1 m shale baffles



## 4.2, 3 c) Major Gas and Water Intervals

### Clearwater Top Gas

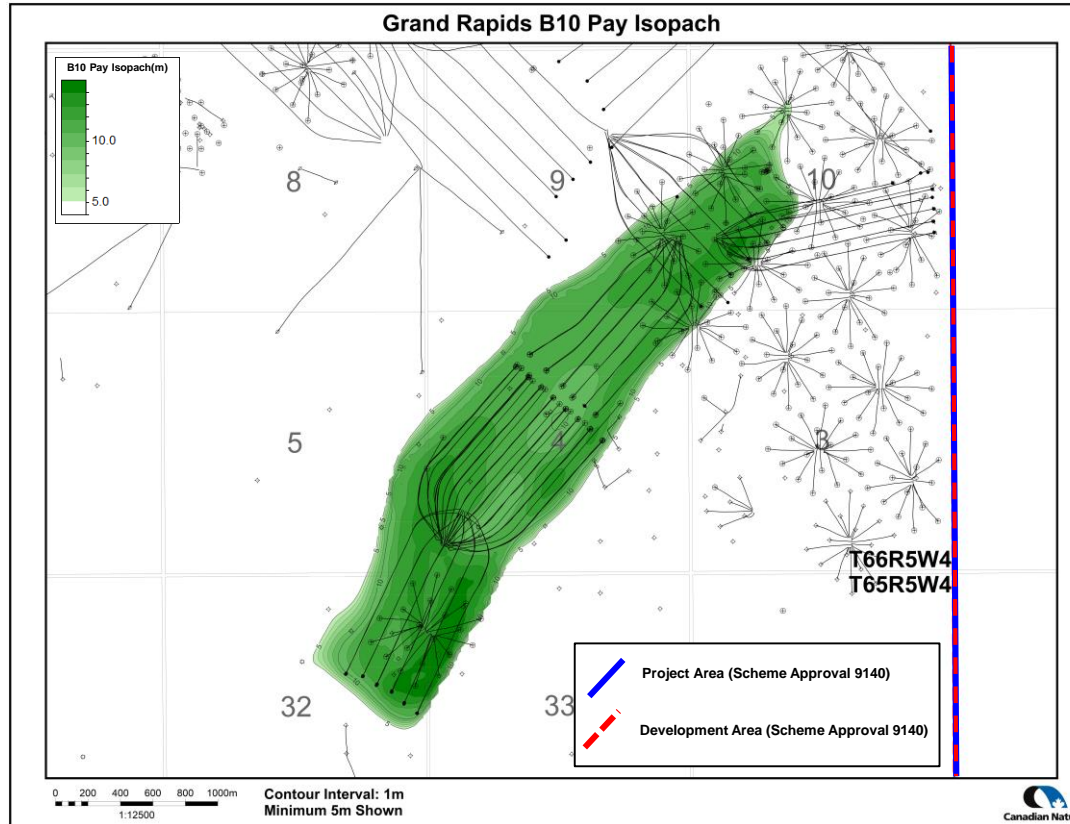
Regional Clearwater Top Gas





## 4.2, 3 b) Net Pay Isopach with Resource Cut-off

### Wolf Lake Grand Rapids B10



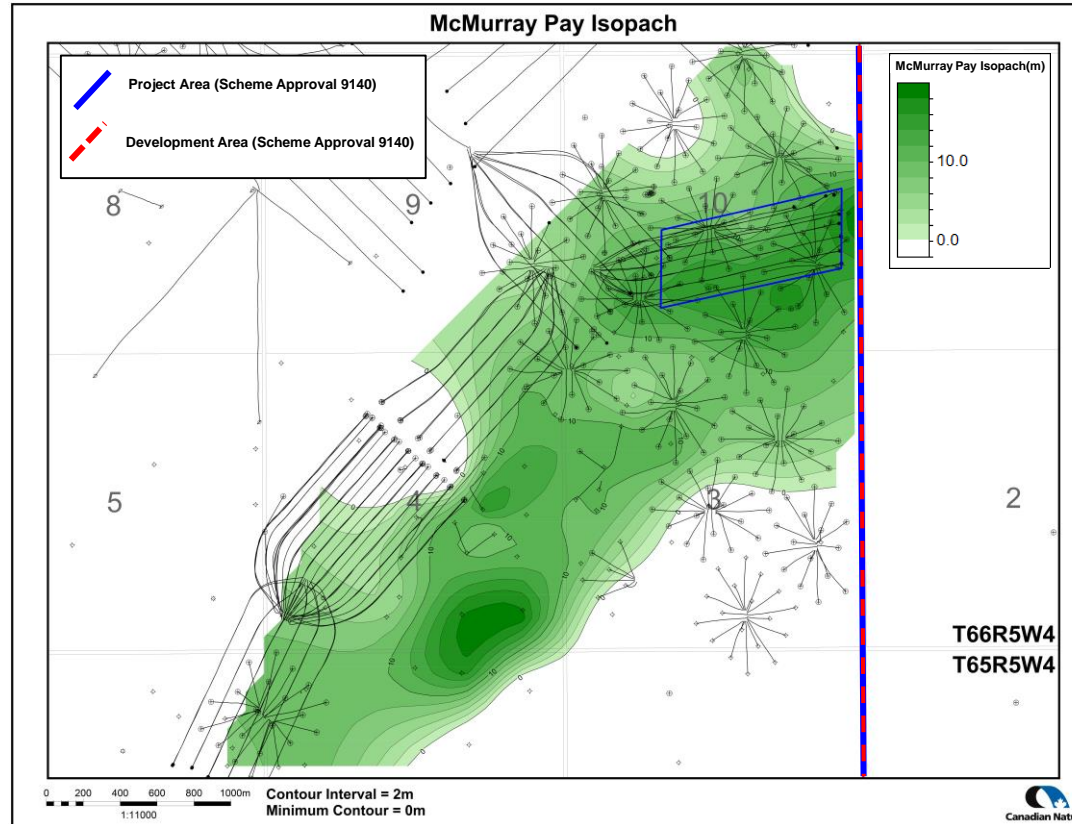
### Grand Rapids B10

- Shoreface deposits in FA4 & FA5, with Bit wt% >8%
- Net pay >10m for development



## 4.2, 3 b) Net Pay Isopach with Resource Cut-off

### Wolf Lake McMurray SAGD



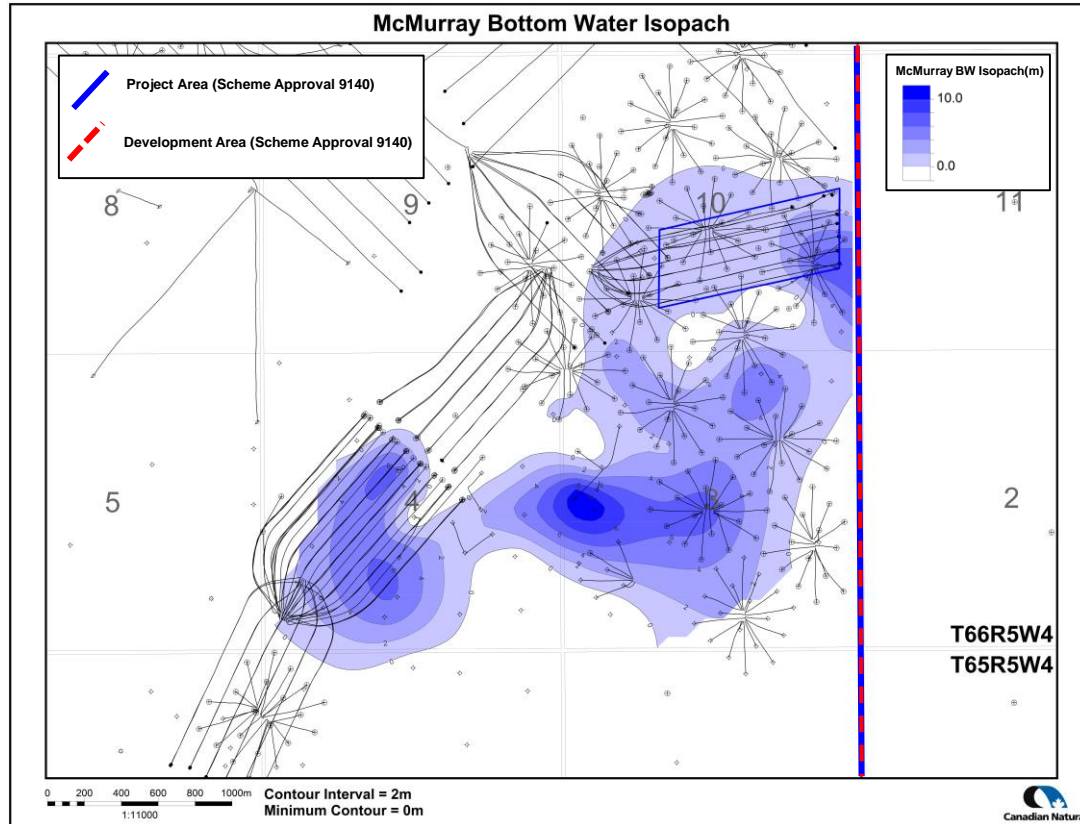
### McMurray Pay Isopach

- Pay defined as continuous clean sand and breccia. IHS not included
- Channel deposits with bit wt% >8%
- Net pay >10 m for development
- MC1 McMurray SAGD pad highlighted as blue polygon



## 4.2, 3 c) Major Gas and Water Intervals

### Wolf Lake McMurray Bottom Water Isopach



### McMurray Bottom Water Isopach

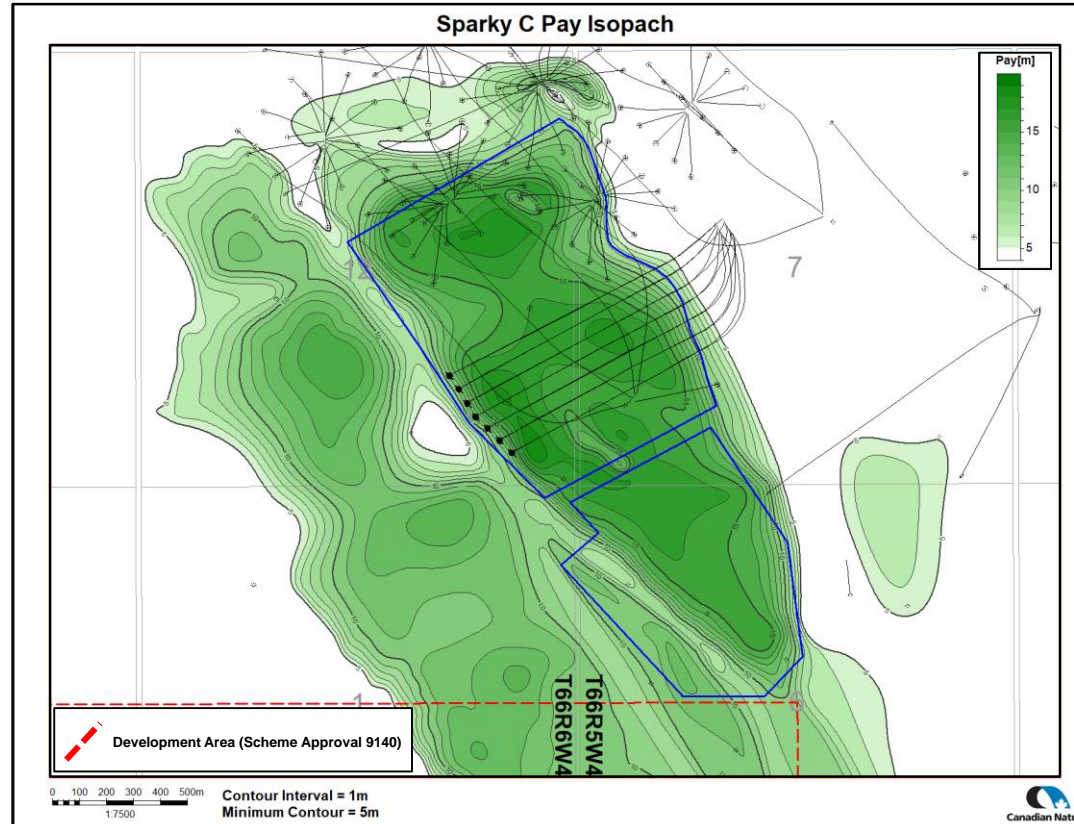
- Cut-off is <6 ohmm
- Isopach represents a gross water interval
- MC1 McMurray SAGD pad highlighted as blue polygon

No major gas intervals in communication with pay.



## 4.2, 3 b) Net Pay Isopach with Resource Cut-off

### Wolf Lake Sparky "C" SAGD



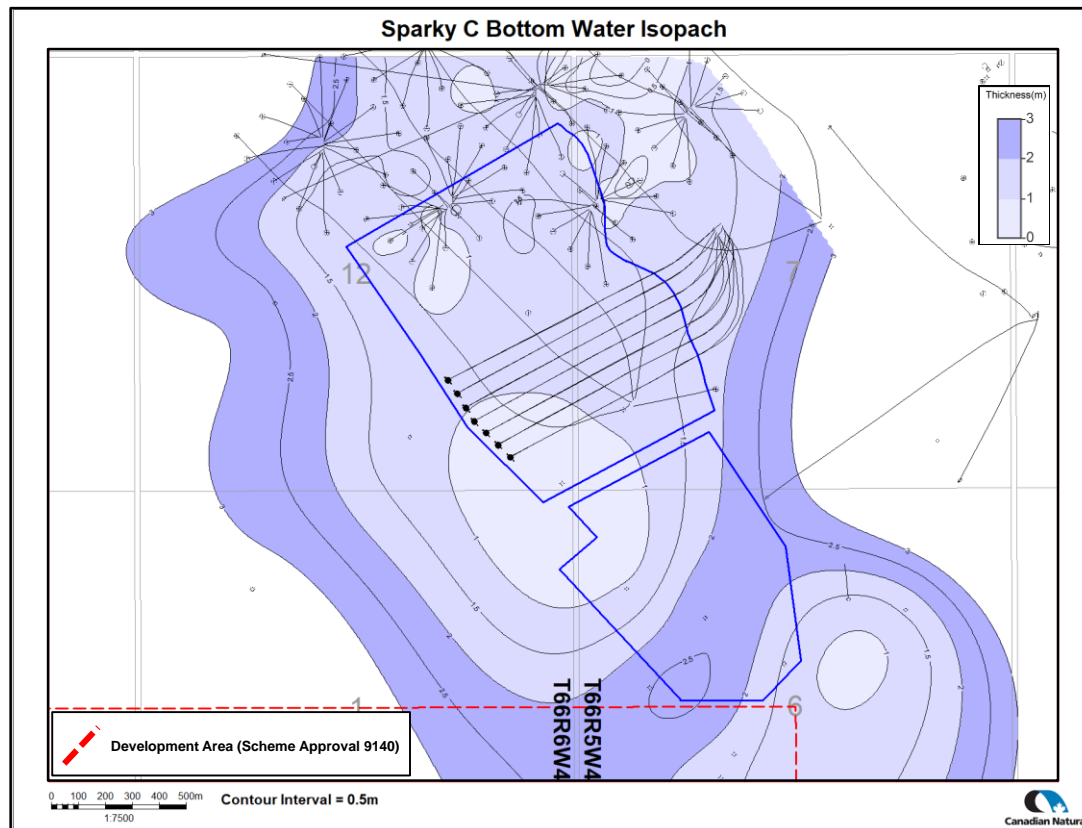
### Sparky C Pay Isopach

- Channel deposits with bit wt% >8%
- Isopach represents continuous clean sand
- Sparky C drainage boxes SC07 and SC06 represented as blue polygons



## 4.2, 3 b) Net Pay Isopach with Resource Cut-off

### Wolf Lake Sparky "C" SAGD



#### Sparky C Bottom Water and Transition Thickness

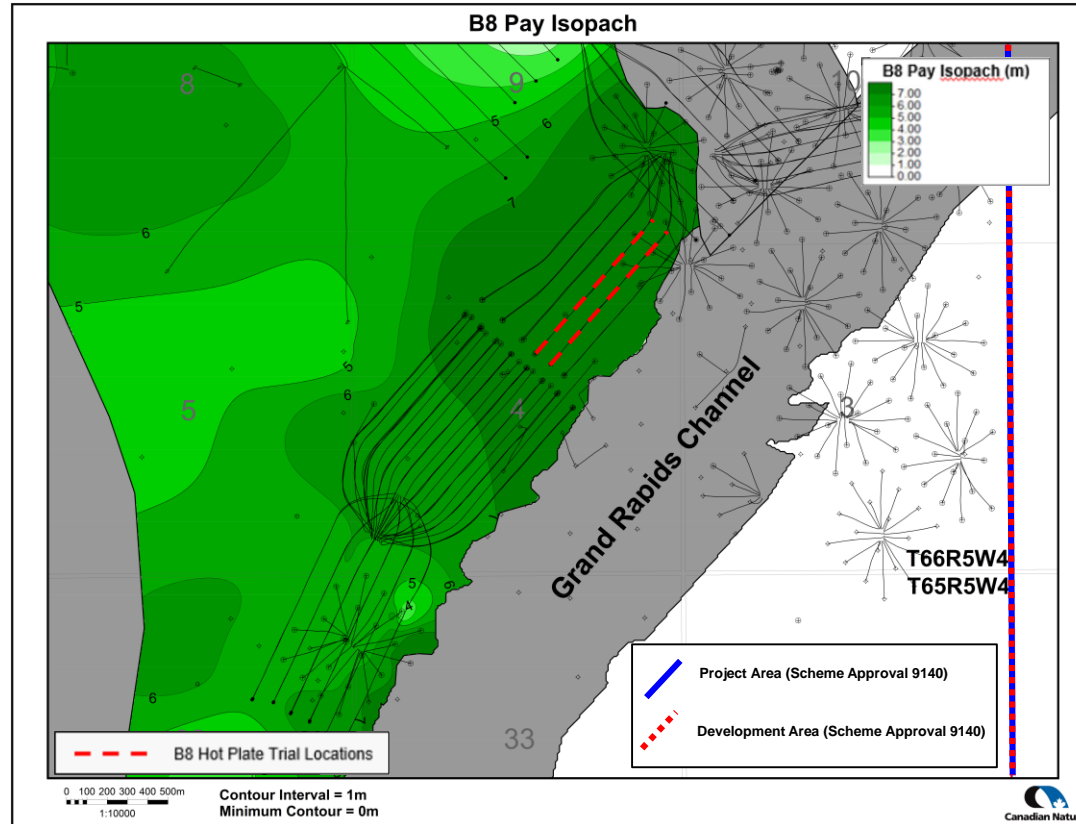
- Map represents combined thickness of bottom water and transition zone below Sparky C pay
- Bottom water defined as <2.5 bit wt % (4 ohmm)
- Transition defined as 2.5-8% bit wt % (6 ohmm)
- Sparky C drainage boxes SC07 and SC06 represented as blue polygons

No major gas intervals in communication with pay.



## 4.2, 3 b) Net Pay Isopach with Resource Cut-off

### Wolf Lake B8



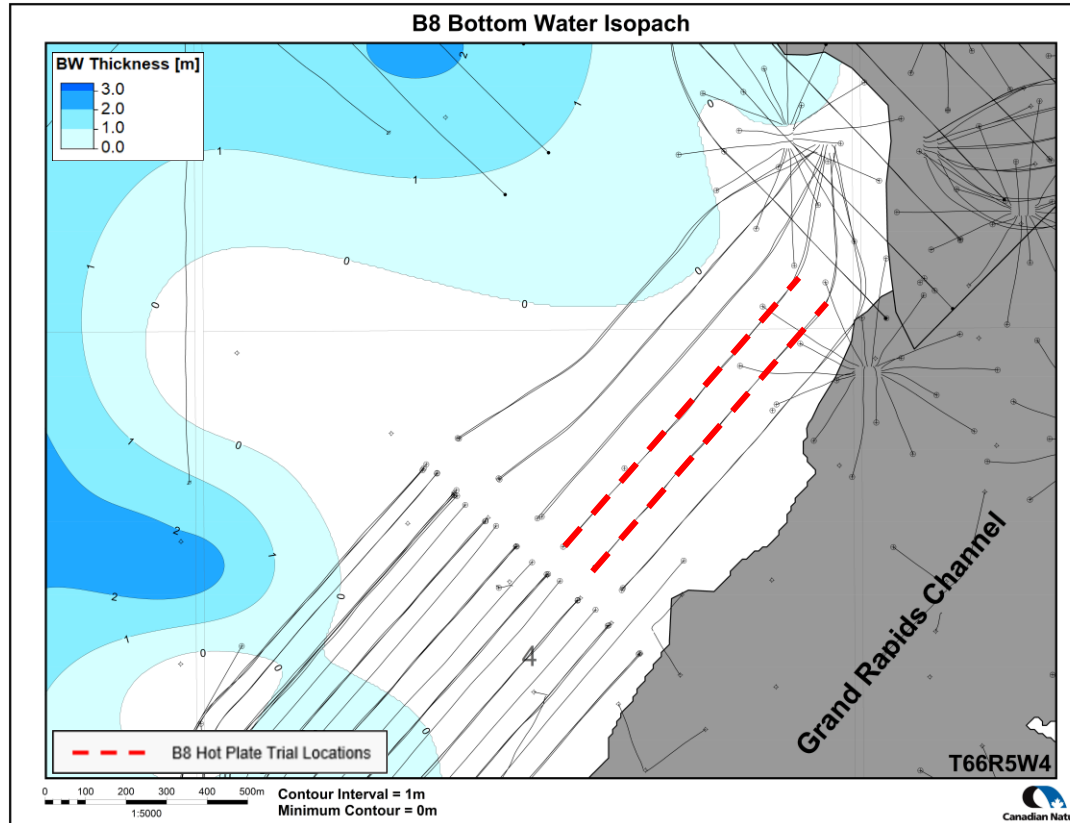
### B8 Reservoir

- Pay represents sand deposits with bit wt % >8%



## 4.2, 3 c) Major Gas and Water Intervals

### Wolf Lake B8 Bottom Water Isopach



#### B8 Bottom Water

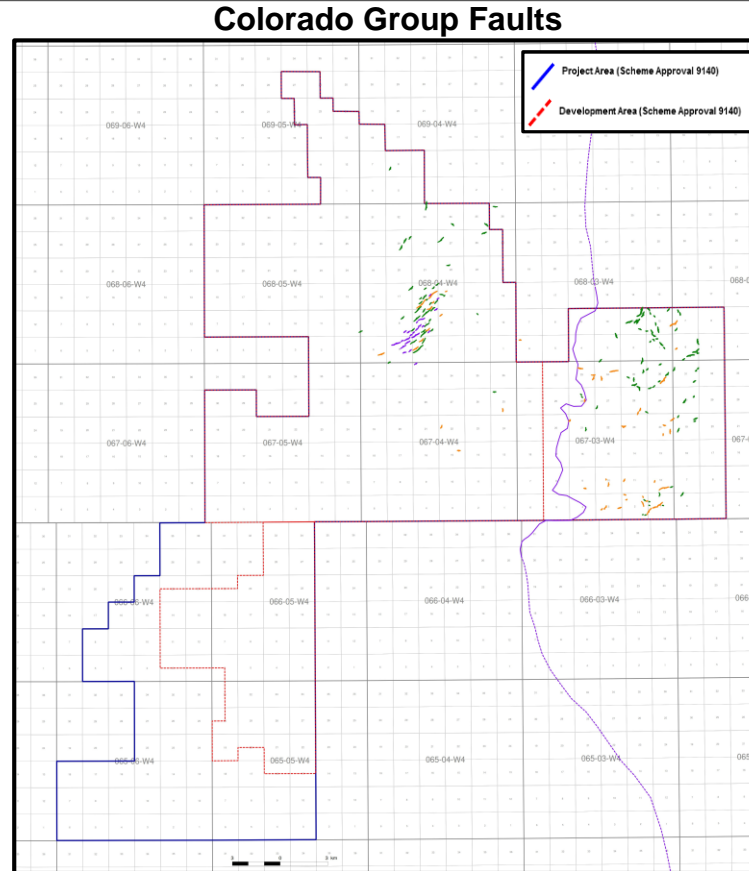
- Water-saturated sand defined as  $S_w > 70\%$
- 1-3 m of bottom water occurs within the B8, but is not expected to be encountered in immediate development area

No major gas intervals in communication with pay.



## 4.2, 3 d) Geomechanical Anomalies





### Colorado Group Faults



#### Lifecycle Update:

- No new geomechanical anomalies have been identified.

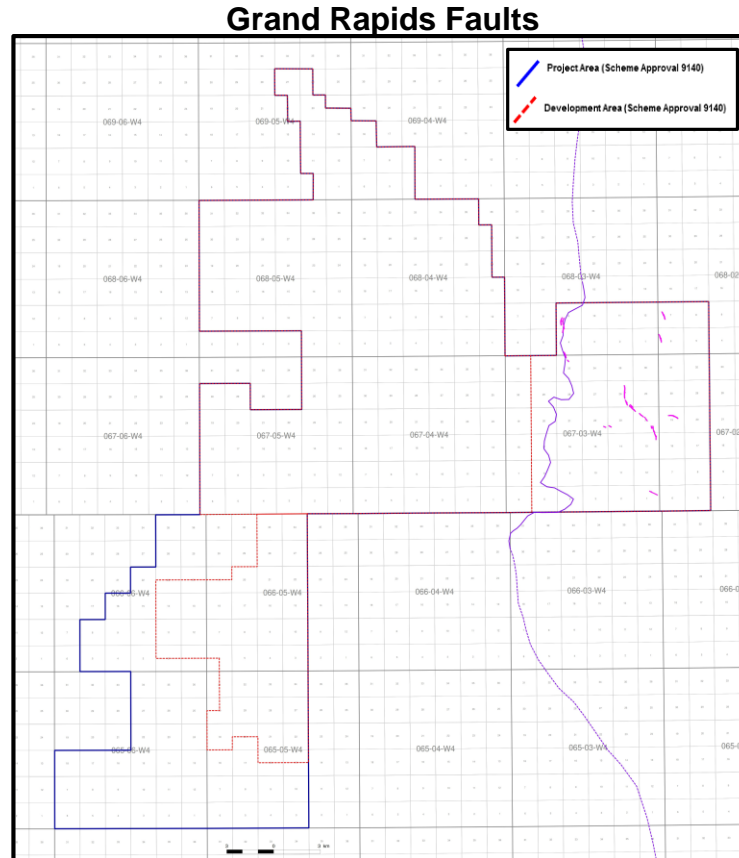
#### LEGEND

-  Faults terminating in Viking
-  Faults terminating in Westgate
-  Faults terminating in Second White Specks
-  Salt Dissolution Front



## 4.2, 3 d) Geomechanical Anomalies

### Grand Rapids Faults



#### Lifecycle Update:

- No new geomechanical anomalies have been identified.

#### LEGEND

- Salt Dissolution Front
- Grand Rapids Faults



# Confined Differential Compaction Feature Localized within a pre-Clearwater Intrastratal Devonian Karst

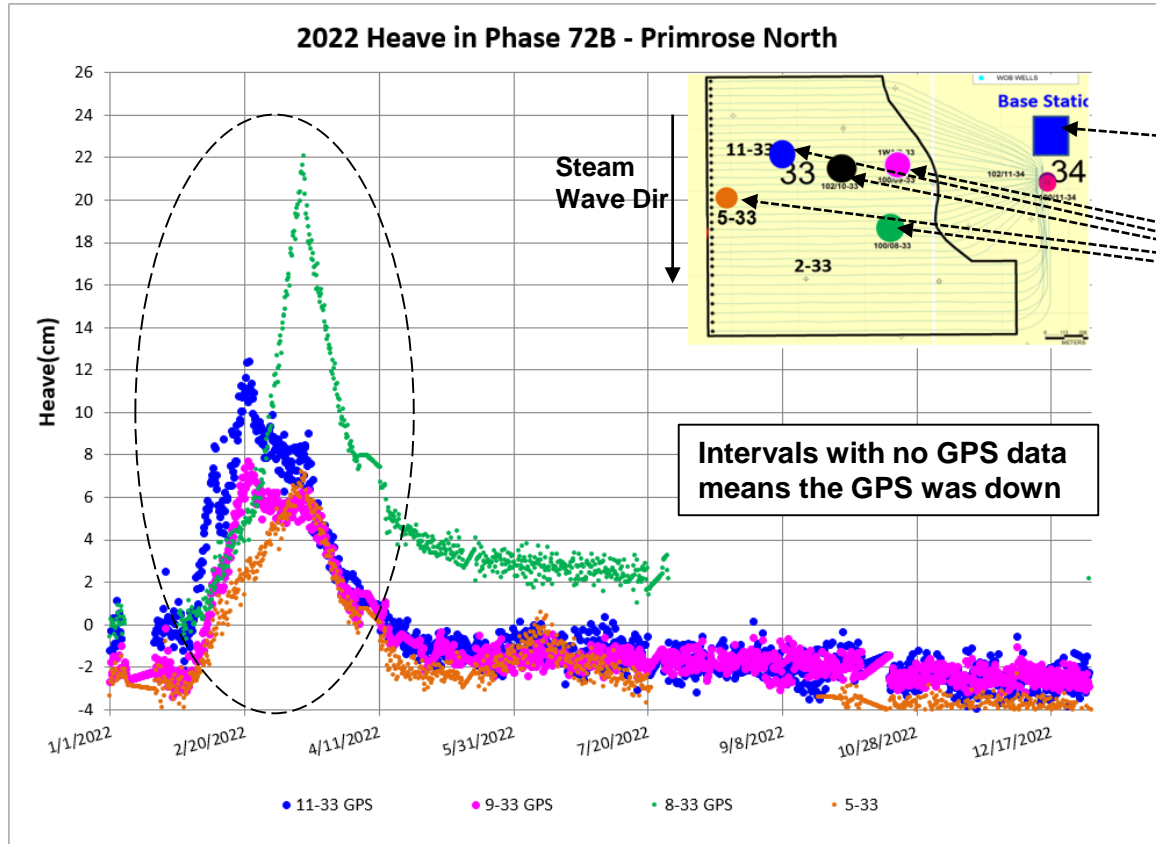


- Canadian Natural has identified a differential compaction feature located in 06-069-04W4.
- Caprock assessment and monitoring plan application submitted December 2022.





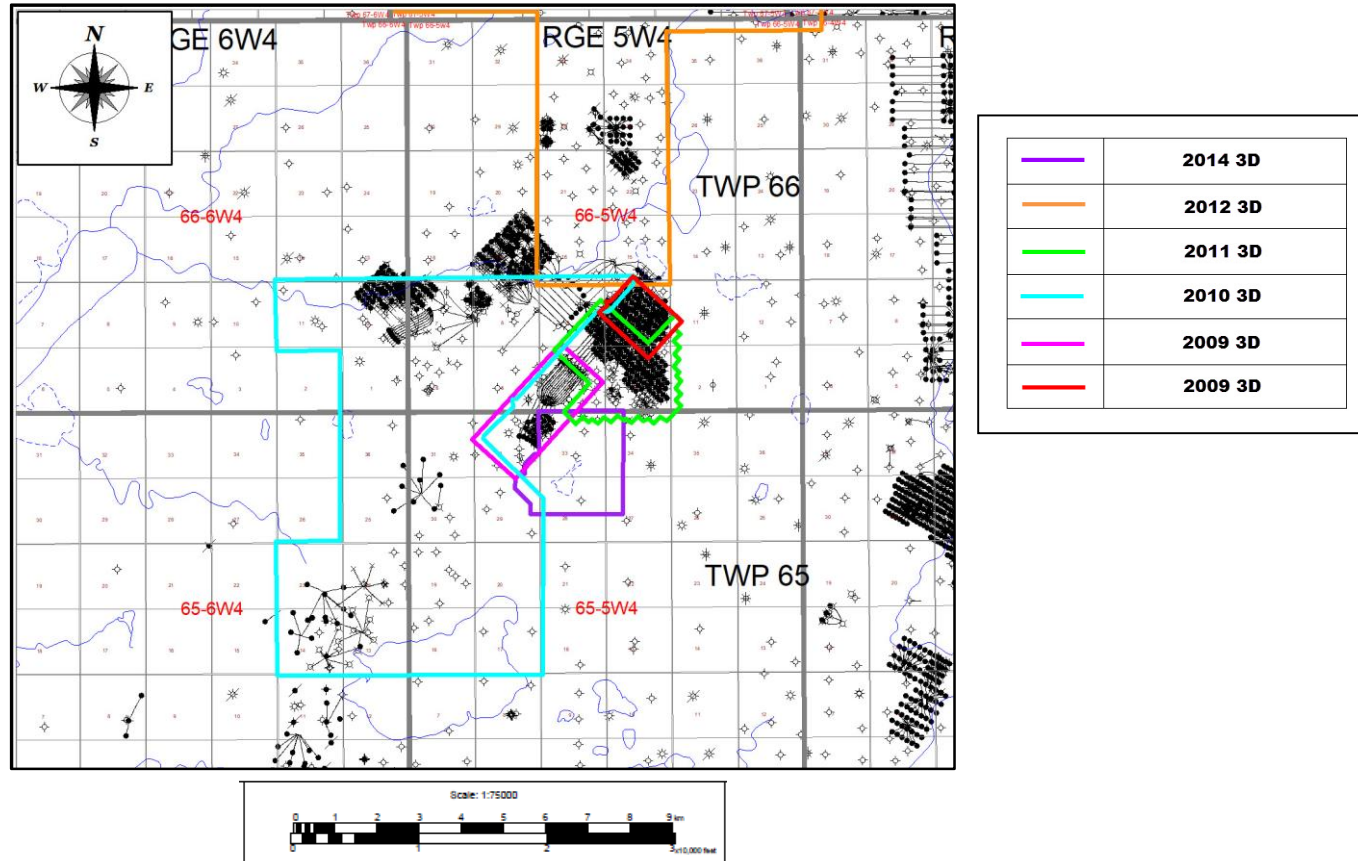
## 4.2, 3 d) Heave Monitoring



- 8-33 with highest surface heave of ~ 22 cm
- Limiting steam injection into the liners under 9-33 & 11-33 GPSs due to their partial re-completions was the reason for their reduced surface heaves compared with 8-33
- 10-33 GPS, the black circle, was decommissioned due to GPS issue

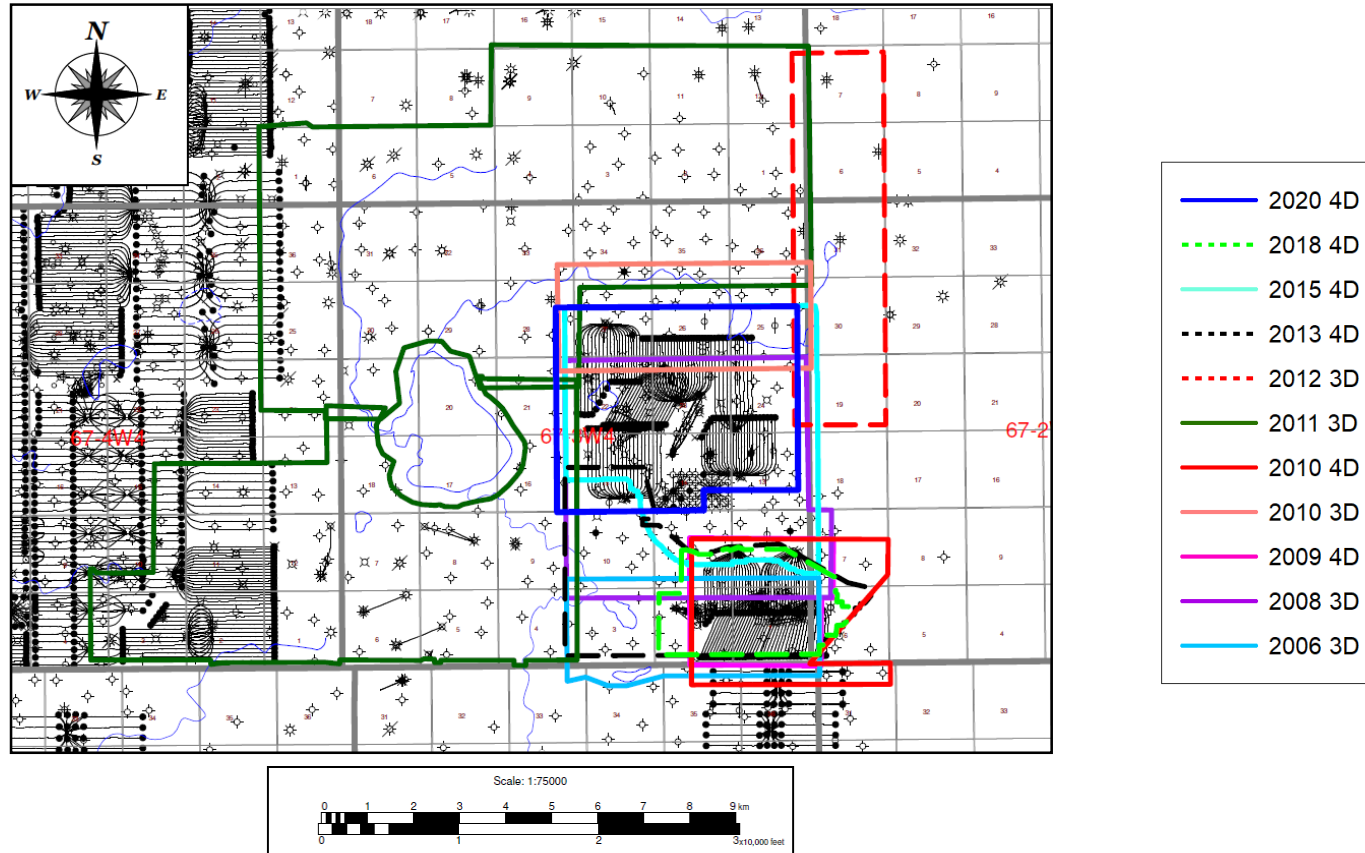


## 4.2, 3 e) Seismic - Wolf Lake (3D)



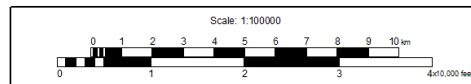
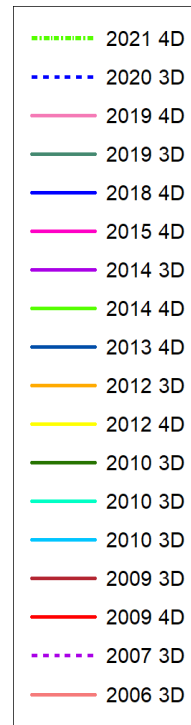
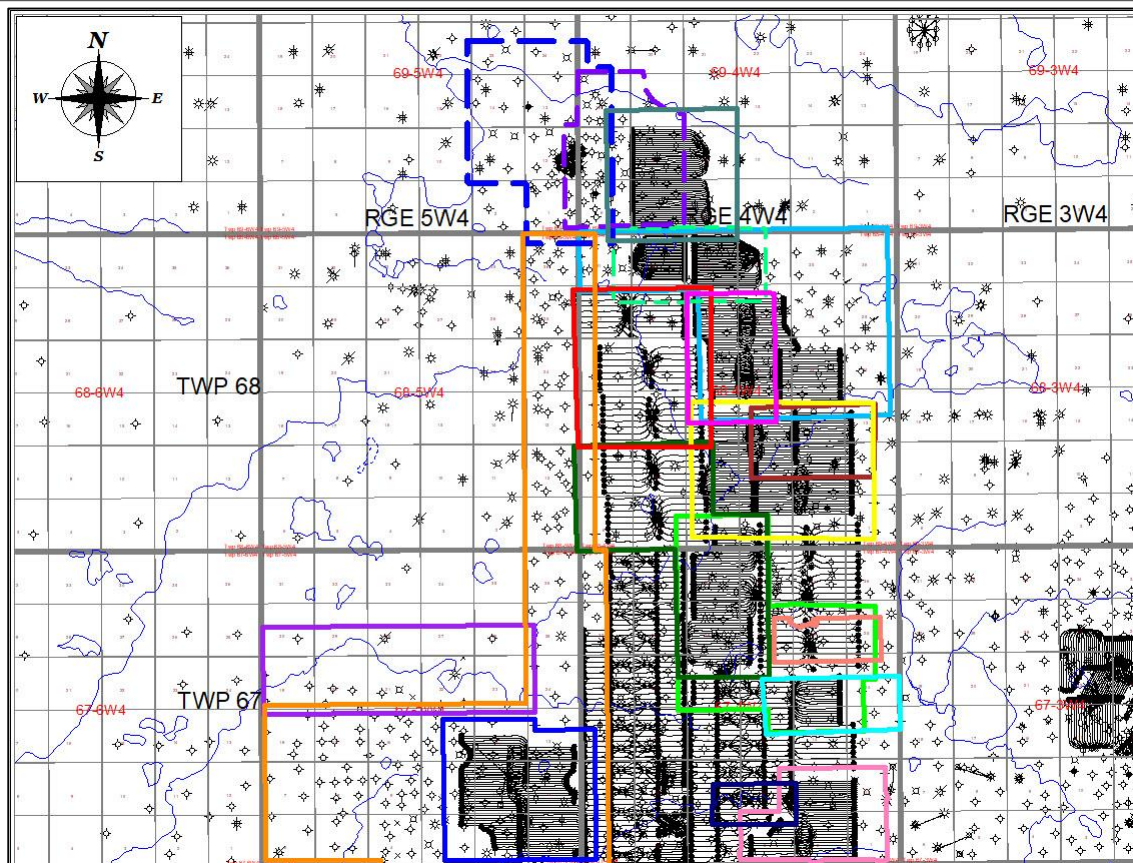


## 4.2, 3 e) Seismic - Primrose East (3D/4D)



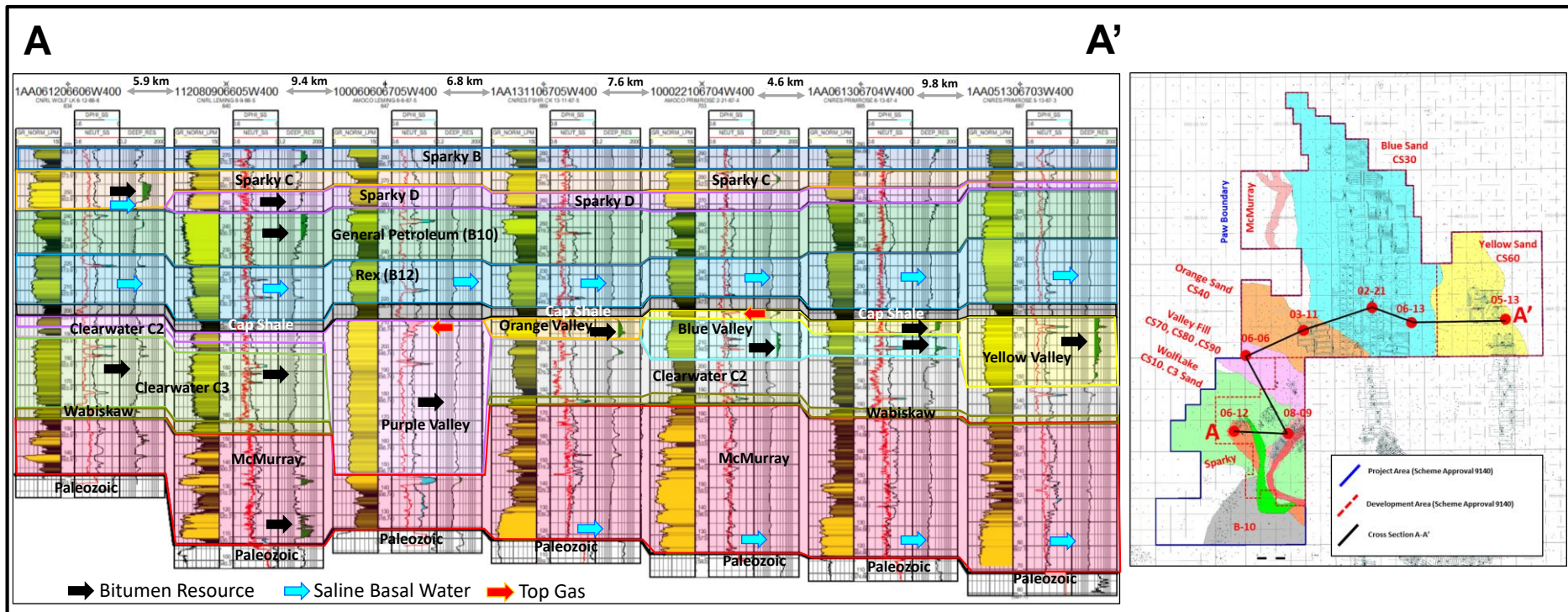


## 4.2, 3 e) Seismic - Primrose North and South (3D/4D)





## 4.2, 4) Representative Stratigraphic Cross-Section





## 4.2, 5) Project, Development and Combined Active Well Pattern Volumetrics

Primrose & Wolf Lake	PBIP/OBIP (e <sup>6</sup> m <sup>3</sup> )	Development Area	PBIP/OBIP (e <sup>6</sup> m <sup>3</sup> )	Pay Thickness (m)	Porosity (dec)	Avg. So	Cum % Recovery
Project Area	1,519	Primrose	965	12	0.32	0.61	9%
Development Area	1,310	Wolf Lake	345	19	0.34	0.55	2%
Combined Active Well Pattern Area	434						

Reservoir Sand	Development Area	Avg. So	Max Net Pay Thickness (m)	Avg. Porosity	Avg. Horizontal Permeability (mD)	Avg. Vertical Permeability (mD)	Avg. Viscosity (cP @ 15°C)
CLGP Orange	Primrose South	0.65	20	0.32	3,000	900	100,000
CLGP Yellow	Primrose East	0.63	29	0.32	3,000	900	70,000
CLGP Blue	Primrose South/North	0.62	23	0.32	3,000	900	100,000
CLGP Valley Fill	Wolf Lake	0.57	42	0.32	3,000	2,000	100,000
CLGP C3	Wolf Lake	0.50	17	0.33	2,000	200	100,000
GDPD B8	Wolf Lake	0.64	8	0.33	1,400	1,100	150,000 (@ 20°C)
GDPD B10	Wolf Lake	0.75	16	0.33	3,200	2,500	450,000 (@ 20°C)
GDPD Sparky C	Wolf Lake	0.84	16	0.33	5,300	4,200	180,000 (@ 20°C)
MCMR	Wolf Lake	0.73	19	0.34	6,000	5,000	600,000 (@ 20°C)

GDPD = Grand Rapids

CLGP = Clearwater Group

MCMR = McMurray

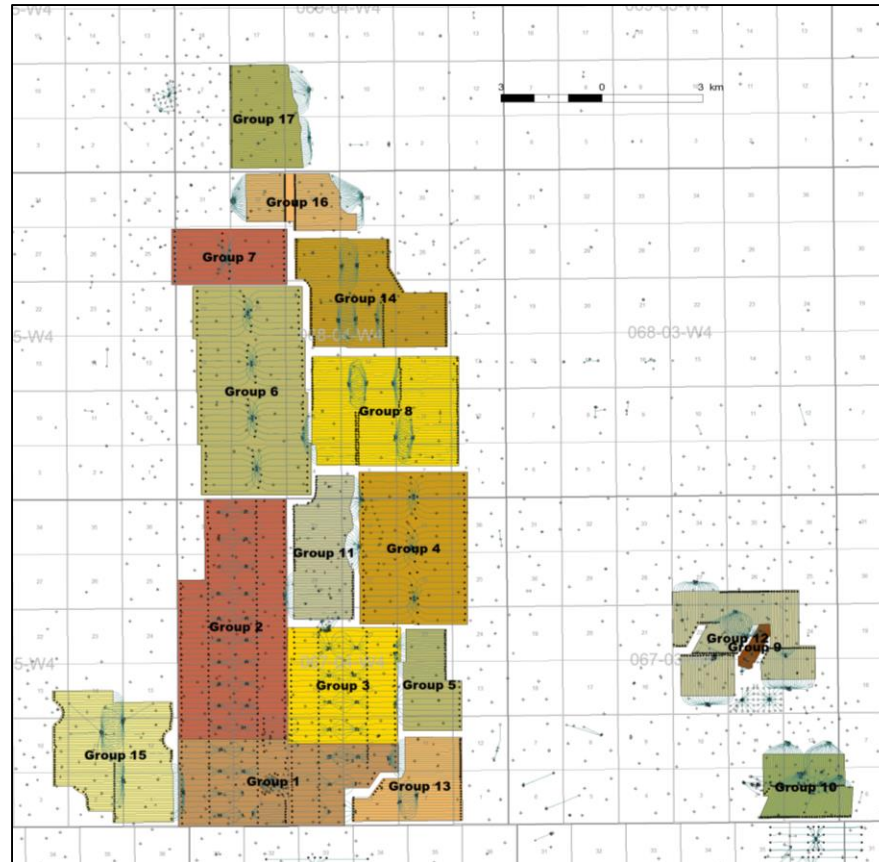
OBIP = Original Bitumen in Place

PBIP = Producing Bitumen In Place

Note at PAW: PBIP=OBIP



## 4.2, 6) Well Patterns Volumetrics – Primrose





## 4.2, 6) Well Patterns Volumetrics – Primrose (cont'd)

	PBIP/OBIP (e³m³)	Area (m²)	Pay Thickness (m)	Porosity (dec)	Avg. So	Cum Oil (e3m3)	Current Recovery	Potential Recovery Range
<b>Group 1:</b>								
1	5,780	2,048,000	14.1	0.32	0.62	1,443	25%	35-40%
2	3,934	1,536,000	12.6	0.32	0.64	659	17%	24-30%
3	3,901	1,792,000	10.5	0.32	0.65	763	20%	26-32%
P-MWSDD	2,495	768,000	17.5	0.32	0.58	574	23%	26-32%
4	3,533	1,664,000	10.1	0.32	0.66	572	16%	20-26%
15	4,139	1,280,000	15.4	0.32	0.66	521	13%	26-32%
16	3,377	1,280,000	13.1	0.32	0.63	427	13%	22-28%
16C	766	444,347	8.7	0.32	0.62	68	9%	15-21%
17	5,259	2,560,000	10.3	0.32	0.63	1,032	20%	30-35%
<b>Subtotal</b>	<b>33,185</b>					<b>6,059</b>	<b>18%</b>	
<b>Group 2:</b>								
5	3,221	1,536,000	9.9	0.32	0.66	600	19%	21-27%
CDD	998	896,000	6.0	0.32	0.58	185	19%	20-22%
D5	1,231	668,077	9.5	0.32	0.61	70	6%	16-22%
6	5,625	2,048,000	13.6	0.32	0.63	772	14%	20-26%
7	5,679	2,048,000	13.9	0.32	0.62	951	17%	23-29%
8	5,691	2,048,000	14.0	0.32	0.62	897	16%	21-27%
9	5,229	2,048,000	12.9	0.32	0.62	896	17%	23-29%
10	5,616	2,048,000	13.9	0.32	0.62	956	17%	28-34%
11	6,735	2,560,000	13.5	0.32	0.61	1,018	15%	26-32%
12	5,058	1,920,000	13.5	0.32	0.61	729	14%	22-28%
13	5,270	1,920,000	14.0	0.32	0.61	752	14%	20-26%
14	5,112	1,920,000	13.6	0.32	0.61	755	15%	21-27%
<b>Subtotal</b>	<b>55,465</b>					<b>8,579</b>	<b>15%</b>	
<b>Group 3:</b>								
18	5,772	2,560,000	11.2	0.32	0.63	1,127	20%	24-30%
19	5,592	2,560,000	10.9	0.32	0.62	1,236	22%	29-35%
20	5,723	2,560,000	11.1	0.32	0.63	1,137	20%	23-29%
21	7,055	3,072,000	11.2	0.32	0.64	1,145	16%	21-27%
<b>Subtotal</b>	<b>24,142</b>					<b>4,645</b>	<b>19%</b>	
<b>Group 4:</b>								
29	10,394	4,175,104	10.4	0.32	0.65	1,893	18%	20-26%
30	10,380	4,175,104	10.4	0.32	0.65	2,104	20%	21-27%
31	11,334	4,175,104	11.3	0.32	0.66	2,274	20%	21-27%
<b>Subtotal</b>	<b>32,108</b>					<b>6,270</b>	<b>20%</b>	

	PBIP/OBIP (e³m³)	Area (m²)	Pay Thickness (m)	Porosity (dec)	Avg. So	Cum Oil (e³m³)	Current Recovery	Potential Recovery Range
<b>Group 5:</b>								
27	4,628	2,726,635	8.3	0.32	0.64	993	21%	20-26%
28	2,028	900,000	11.0	0.32	0.64	989	49%	60%+
28B	2,083	900,000	11.3	0.32	0.64	770	37%	60%+
<b>Subtotal</b>	<b>8,738</b>					<b>2,752</b>	<b>31%</b>	
<b>Group 6:</b>								
51	14,533	4,817,343	15.1	0.32	0.63	1,663	11%	13-19%
52	14,247	4,817,343	14.6	0.32	0.63	1,469	10%	13-19%
53	14,800	4,817,343	15.8	0.32	0.61	1,392	9%	13-19%
54	15,585	4,817,343	15.7	0.32	0.64	1,931	12%	13-19%
<b>Subtotal</b>	<b>59,165</b>					<b>6,455</b>	<b>11%</b>	
<b>Group 7:</b>								
55	16,927	5,537,442	15.9	0.32	0.60	2,004	12%	13-19%
<b>Subtotal</b>	<b>16,927</b>					<b>2,004</b>	<b>12%</b>	
<b>Group 8:</b>								
58	5,441	2,064,800	14.0	0.32	0.59	1,919	35%	60%+
59	6,959	2,208,000	14.2	0.32	0.69	2,220	32%	60%+
62	6,343	2,230,006	13.2	0.32	0.68	1,858	29%	60%+
63	5,555	2,114,640	12.5	0.32	0.66	1,875	34%	60%+
66	6,708	2,582,960	12.0	0.32	0.67	1,937	29%	60%+
67	7,180	2,643,200	13.3	0.32	0.64	1,919	27%	60%+
<b>Subtotal</b>	<b>38,186</b>					<b>11,728</b>	<b>31%</b>	
<b>Group 9:</b>								
Burnt Lake	1,516	279,234	24.3	0.32	0.70	1,066	70%	60%+
<b>Subtotal</b>	<b>1,516</b>					<b>1,066</b>	<b>70%</b>	
<b>Group 10:</b>								
74	5,969	1,077,633	24.1	0.32	0.72	1,965	33%	60%+
75	7,138	1,234,303	25.1	0.32	0.72	3,348	47%	60%+
77	6,308	1,195,133	24.2	0.32	0.68	2,941	47%	60%+
78	6,584	1,200,000	25.3	0.32	0.68	2,409	37%	60%+
<b>Subtotal</b>	<b>25,999</b>					<b>10,664</b>	<b>41%</b>	
<b>Group 11:</b>								
22	6,736	2,531,371	13.2	0.32	0.63	1,450	22%	60%+
23	6,009	2,288,372	13.3	0.32	0.62	2,058	34%	60%+
24	5,204	1,926,224	13.4	0.32	0.63	1,610	31%	60%+
<b>Subtotal</b>	<b>17,949</b>					<b>5,118</b>	<b>29%</b>	

	PBIP/OBIP (e³m³)	Area (m²)	Pay Thickness (m)	Porosity (dec)	Avg. So	Cum Oil (e³m³)	Current Recovery	Potential Recovery Range
<b>Group 12:</b>								
90	5,235	1,542,997	17.0	0.32	0.63	1,899	36%	60%+
91	2,992	1,234,816	11.5	0.32	0.66	646	22%	60%+
92	6,185	1,485,956	19.0	0.32	0.69	1,409	23%	60%+
93	4,558	1,770,368	12.7	0.32	0.63	1,088	24%	60%+
94	4,355	1,200,403	16.7	0.32	0.68	478	11%	15-20%
95	4,752	1,969,724	11.9	0.32	0.64	1,336	28%	60%+
<b>Subtotal</b>	<b>28,077</b>					<b>6,855</b>	<b>24%</b>	
<b>Group 13:</b>								
25A	2,718	1,727,106	7.0	0.32	0.71	540	20%	60%+
25B	2,565	2,034,990	5.5	0.32	0.72	631	25%	60%+
26	3,077	2,083,550	7.0	0.32	0.66	859	28%	60%+
<b>Subtotal</b>	<b>8,360</b>					<b>2,031</b>	<b>24%</b>	
<b>Group 14:</b>								
60	5,052	1,720,000	14.2	0.32	0.65	1,320	26%	60%+
61	6,923	2,362,000	13.7	0.32	0.67	1,624	23%	60%+
64	5,262	1,856,000	12.9	0.32	0.69	1,466	28%	60%+
65	5,055	2,107,081	11.3	0.32	0.67	1,362	27%	60%+
68	7,220	2,894,006	10.5	0.32	0.74	1,927	27%	60%+
<b>Subtotal</b>	<b>29,512</b>					<b>7,699</b>	<b>26%</b>	
<b>Group 15:</b>								
40	4,106	3,008,352	6.8	0.32	0.63	1,056	26%	60%+
41	5,272	3,014,070	8.1	0.32	0.68	1,440	27%	60%+
42	6,761	3,130,144	10.2	0.32	0.66	1,335	20%	60%+
43	5,423	2,492,978	11.0	0.32	0.62	1,344	25%	60%+
<b>Subtotal</b>	<b>21,561</b>					<b>5,175</b>	<b>24%</b>	
<b>Group 16:</b>								
72A	5,329	1,649,715	17.4	0.32	0.58	1,248	23%	60%+
72B	6,595	2,456,054	12.2	0.32	0.69	1,602	24%	60%+
<b>Subtotal</b>	<b>11,924</b>					<b>2,850</b>	<b>24%</b>	
<b>Group 17:</b>								
160	11,705	3,277,839	18.0	0.32	0.62	0	0%	60%+
161	10,649	2,745,376	20.0	0.32	0.61	0	0%	60%+
<b>Subtotal</b>	<b>22,354</b>					<b>0</b>	<b>0%</b>	
<b>PR Total</b>								
<b>PR Total</b>	<b>435,169</b>					<b>89,949</b>	<b>21%</b>	

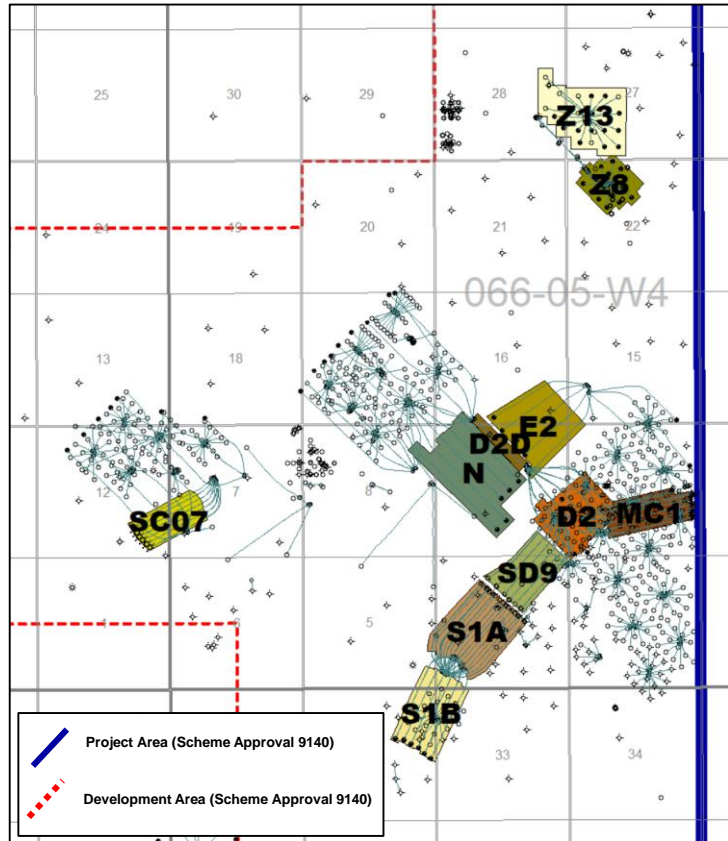
OBIP = Original Bitumen in Place

PBIP = Producibile Bitumen In Place

Note at PAW: PBIP=OBIP



## 4.2, 6) Well Patterns Volumetrics – Wolf Lake



	PBIP/OBIP (e <sup>3</sup> m <sup>3</sup> )	Area (m <sup>2</sup> )	Reservoir	Pay Thickness (m)	Porosity (dec)	Avg. So	Cum Oil (e <sup>3</sup> m <sup>3</sup> )	Current Recovery	Potential Recovery Range
<b>WL:</b>									
D2	1,358	352,881	GDPD	14.3	0.34	0.79	313	23%	25-75%
SD9	1,819	505,041	GDPD	13.4	0.34	0.79	1,148	63%	62-68%
S1A	2,327	647,488	GDPD	13.4	0.34	0.79	1,372	59%	57-62%
S1B	1,972	586,786	GDPD	12.5	0.34	0.79	658	33%	33-39%
MC1	1,929	589,214	MCMR	11.9	0.34	0.81	820	43%	42-58%
SC07	1,346	361,145	GDPD	14.6	0.35	0.73	4	0%	60%+
Z8	2,995	485,616	CLGP	38.4	0.32	0.50	835	28%	29-34%
Z13	3,947	639,394	CLGP	38.8	0.32	0.50	450	11%	12-37%
E2/N/D2D	4,890	1,918,183	CLGP	14.3	0.33	0.54	1,124	23%	23-26%
<b>WL Total</b>	<b>22,583</b>						<b>6,724</b>	<b>30%</b>	

OBIP = Original Bitumen in Place  
 PBIP = Producing Bitumen In Place  
 Note at PAW: PBIP=OBIP

GDPD = Grand Rapids  
 CLGP = Clearwater Group  
 MCMR = McMurray



## 4.2, 7) Co-Injection

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- There were no co-injection activities that took place associated with the Primrose and Wolf Lake Project in 2022.

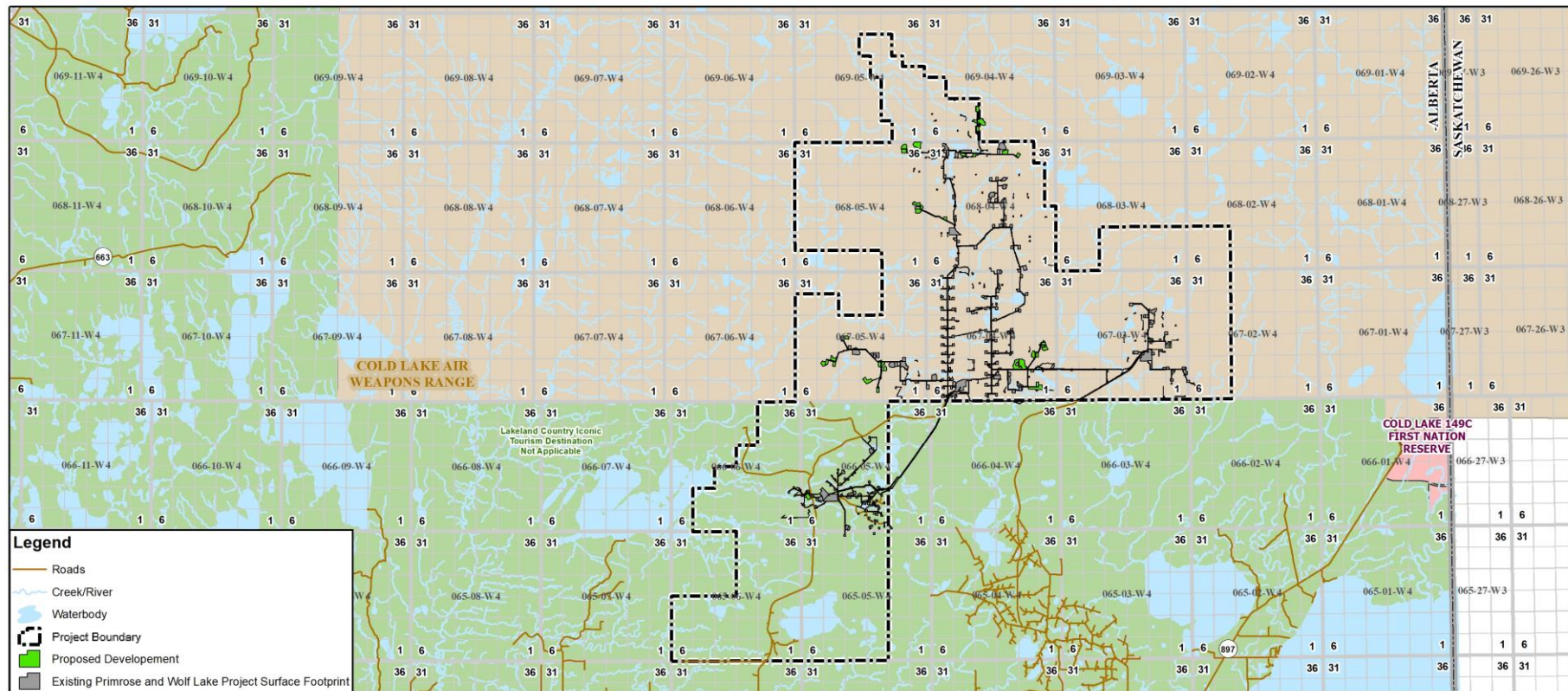




## 4.3 Surface



## 4.3, 8 a) Built and Planned Surface Infrastructure Map





## 4.3, 8 b) Modifications to the Central Processing Facility

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- Summary of modifications:
  - Reverse osmosis unit (RO) was added to Wolf Lake Plant
    - Commissioning of RO unit was conducted in Q4 2022 for the commencement of operations in November 2022.



## 4.3, 8 c) Annual Operational Bitumen and Steam Rates

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	Design (m <sup>3</sup> /d)	Actual (m <sup>3</sup> /d)
PAW Bitumen	23,000	11,317
PAW Steam Total	90,800	81,129
Primrose South	32,500	29,515
Primrose North	22,400	21,773
Primrose East	26,400	23,952
Wolf Lake	9,000	5,889
Burnt Lake	500	0





4.4

Historical &  
Upcoming Activity



## 4.4, 9) Suspension and Abandonment Activity

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- No well patterns suspended or abandoned during the reporting period.
- No well patterns in active blow-down or ramp down during the reporting period.



## 4.4, 10 a) Regulatory Approvals

Application Description	Application Number	Submission Date	Approval Date
Wolf Lake Sparky C Warm Hydrocarbon Agent Start up Assist	1935579	01/24/2022	05/19/2022
Wolf Lake Pads MC1, SD9, S1A & S1B NCG Co-Injection Measurement	1937682	05/10/2022	06/01/2022
Primrose and Wolf Lake 72A FEI	1938237	06/06/2022	06/06/2022
Primrose North Phase 71C, 162, 163, and 164 Thermal Wellbore Compatibility Assessment	1941275	12/02/2022	01/25/2023
Wolf Lake Sulphur Removal Unit Extension (EPEA Approval 11115-04-09)	1941564	12/20/2022	02/16/2023
Primrose 06-069-04W4 Confined Differential Compaction Feature Localized within a pre-Clearwater Intrastratal Devonian Karst - Caprock Assessment and Monitoring Plan	1941572	12/22/2022	05/31/2023



## 4.4, 10 b) Events with Potential to Impact to Scheme Performance

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- Summary of 2022 events that may affect Scheme Performance:
  - Primrose North 160-161
    - 51 CSS wells drilled in 2022
  - Wolf Lake SC07
    - 7 SAGD well pairs drilled in 2022



## 4.4, 10 c) Primrose CSS & SF Learnings

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- Cyclic Steam Stimulation
  - CSS continues to be a highly effective initial recovery method in the Clearwater reservoir (enhances vertical permeability).
  - Conditions reservoir for follow-up recovery processes like steamflood.
  - Skin damage mitigated through repeated acid stimulations to maximize recovery:
    - Recent developments completed with WWS or PPS to reduce scale build-up in liner of wells
    - Optimizing boiler feed water chemistry during CSS cycles to reduce skin damage
- Steamflood
  - Steamflood performance primarily driven by conformance, net pay, well placement, skin damage and artificial lift capacity:
    - Skin effects mitigated with acid stimulations and/or perforations
  - Continuing to understand and improve longitudinal inter-well conformance remains a primary objective for 2023:
    - Continued DTS implementation leads to enhanced understanding of conformance, further guiding well servicing interventions
    - ICD's, scab liners and injection string placement are well servicing interventions that have demonstrated improvement in conformance
    - Re-drills effective mitigation to broken liners and accessing full drainage area
  - Steam-oil-ratio optimization continuing:
    - Mitigation of adverse conformance impacts through steam management
    - Minimization of pressure differentials within well patterns where appropriate
    - Balanced steam injection with water production has been key to optimizing oil cuts and SOR
  - Sulphur recovery installed at Primrose South Plant to address increase in Sulphur rates from maturing steamfloods:
    - Sulphur recovery at Wolf Lake Plant being installed with target in service date Q3 2023



## 4.4, 10 d) Regulatory and Operational Changes

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- There are no reportable updates on pilots or major technical innovations during 2022.
- Canadian Natural continues to evaluate emerging technologies.



## 4.4, 11) Compliance History

- Reportable Incidents - Releases:
  - 15 total release incidents with a volume of 668 m<sup>3</sup>
    - \* note: the June 9 event involved a 646m<sup>3</sup> release due to the failure of the tank floor from 4T-101*
- The majority of volumes were released into secondary containment and all remained on lease. Additionally, all releases were recovered and associated remediation action taken, if required.

**Reportable Incidents – Releases**

Reference Number	Incident Date	Estimated Volume (m <sup>3</sup> )
20220215	01/17/2022	<0.1
20220376	01/27/2022	<0.1
20220364	02/06/2022	<0.1
20220787	04/05/2022	5.0
20220866	04/14/2022	5.0
20220875	04/16/2022	<0.1
*20221337	06/09/2022	646.0
20221404	06/16/2022	0.8
20221522	07/02/2022	4.0
20221670	07/22/2022	<0.1
20222173	09/20/2022	<0.1
20222293	10/08/2022	4.0
20222324	10/13/2022	0.5
20222661	11/25/2022	3.0
20222809	12/12/2022	0.1



## 4.4, 11) Compliance History (cont'd)

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- Voluntary Self Disclosure

- There were seven pressure recordings, which briefly exceeded the maximum bottomhole injection pressures (BHIP) as shown in Scheme Approval No. 9140, Clause 34.
- Due to frictional pressure drops from surface and/or through the liner, it is highly unlikely that the recorded injection pressure was representative of the reservoir pressure during these events. Rather, the inferred reservoir pressure was likely below the maximum BHIP.
  - The pressure exceedances were short in duration, with the longest exceedance lasting 80 minutes and the majority being under 5 minutes due to immediate corrective response.
  - The corresponding voluntary self disclosures were submitted on the following dates:
    - April 14, 2022
    - June 21, 2022
    - July 4, 2022
    - July 20, 2022
    - July 25, 2022
    - November 7, 2022
    - November 16, 2022



## 4.4, 11) Compliance History (cont'd)

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- Contraventions: Environmental Protection and Enhancement Act & Water Acts
  - March 15, 2022: Primrose South Plant Heat Recovery Steam Generators Contravention occurred for CEMS unit failing to meet 90% uptime requirement (Ref. # 20230615).
  - April 6, 2022: Surface water (snow melt) breached berm resulting in fluid off lease (Ref. #20220803).
  - November 18, 2022: A water table monitoring well was abandoned prior to AER approval. A suitable substitute from the existing project EPEA monitoring well network was proposed by Canadian Natural and accepted by the AER (Ref. #20230266).
  - March 3, 2022: The pressure transducer at an industrial water source well malfunctioned during the March 2022 monthly pressure data download. The faulty transducer was replaced with a new transducer on May 2, 2022 (Ref. # 20230292).



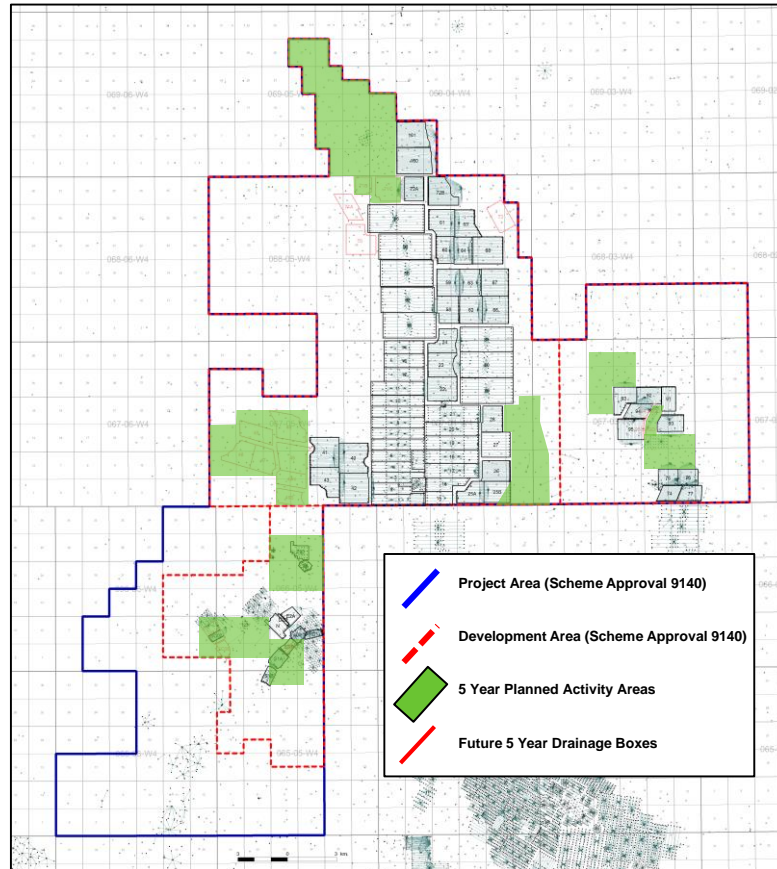
## 4.4, 12 a) Future Plans: Upcoming 12 Month Activity

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- Overview of activities conducted or under evaluation for 2023:
  - Primrose North 160-161 drills
    - Steam-in Q2 2023
  - Wolf Lake Delineation
    - 4 strat wells Q1 2023
  - Primrose Delineation
    - 6 strat wells Q1 2023
    - 6 observation wells Q1 2023
  - Wolf Lake SRU commissioning Q2 2023 and commencing operations in Q3 2023



## 4.4, 12 b) 5-Year Potential Development Plan





## 4.4, 12 c) Future Plans: Upcoming 12 Month Applications

Application Description	Application Number	Submission Date	Approval Date
Wolf Lake Former Well Pad Runoff Authorization (EPEA)	Letter	02/28/2023	Under Review
Wolf Lake Aerial Cooling	1942880	05/1/2023	Under Review
PRE Phase 93N		Q3 2023	

- Note that the Primrose portion of the PAW Project received Lifecycle Approval on May 28, 2021 and will follow the Lifecycle process for Applications and Reporting from Q3 2021.



# Scheme Approval 9140, Clause 8, Paragraph 3

- Non-saline, saline, produced and steam injection volumes

Month	Surface Water	Non-Saline Groundwater <sup>1</sup>	Saline Groundwater <sup>2</sup>	Produced Water	Steam Injection	Actual Water Disposal	Water Disposal Limit <sup>3</sup>
	m <sup>3</sup> /day	m <sup>3</sup> /day	m <sup>3</sup> /day	m <sup>3</sup> /day	m <sup>3</sup> /day	%	%
January	189	2,375	9,460	73,237	69,106	15.9	19.7
February	6	2,356	10,972	73,027	72,041	13.3	16.7
March	13	2,340	8,706	73,232	73,493	9.9	14.5
April	1,000	2,324	10,802	76,126	74,203	15.1	17.4
May	521	2,702	9,750	74,099	76,688	7.8	14.9
June	215	2,405	14,091	67,767	70,899	13.8	17.4
July	126	2,676	13,220	77,655	75,692	17.4	18.3
August	14	2,509	13,074	75,632	74,585	15.4	17.5
September	20	2,355	11,793	82,382	77,656	16.1	20.3
October	3	2,326	6,666	87,643	76,815	15.6	24.2
November	19	2,559	6,363	85,064	73,198	16.9	25.5
December	21	2,792	5,708	83,864	73,731	15.4	23.6
<b>Average</b>	<b>179</b>	<b>2,477</b>	<b>10,050</b>	<b>77,477</b>	<b>74,009</b>	<b>14.4</b>	<b>19.1</b>

Notes: 1 - Non-Saline groundwater from Wolf Lake water source wells.

2 - Saline groundwater from the McMurray Formation aquifer

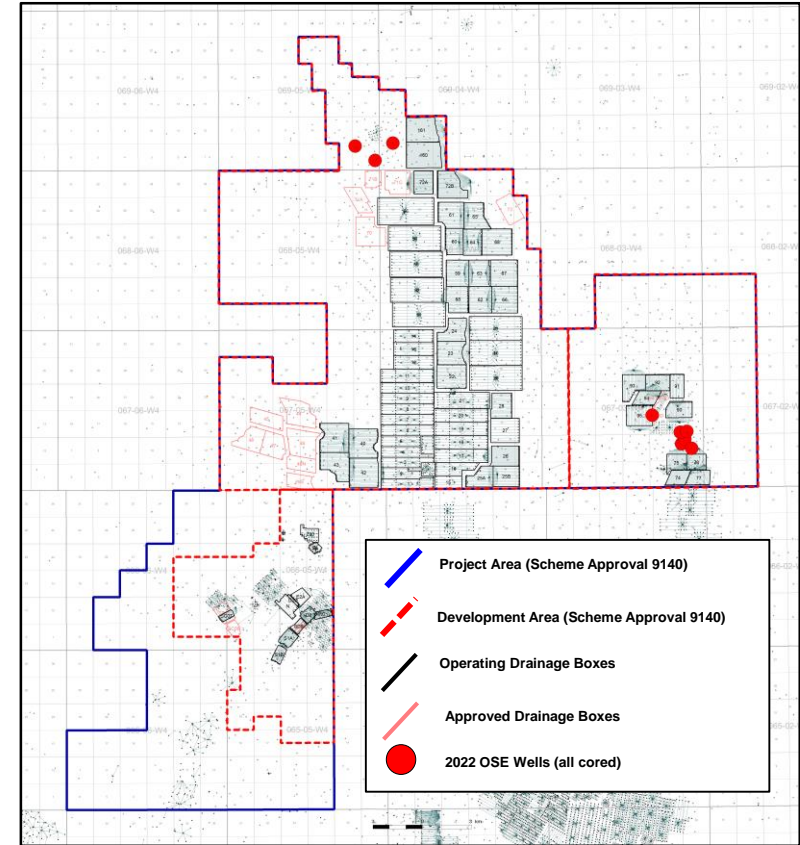
3 - Directive 81 Water Disposal Limit as per Approval No. 9140KKK



# Scheme Approval 9140 OSCA Annual Report: Lifecycle Update

- Delineation Activity:

	OSE Well	Cored
2022	9	9



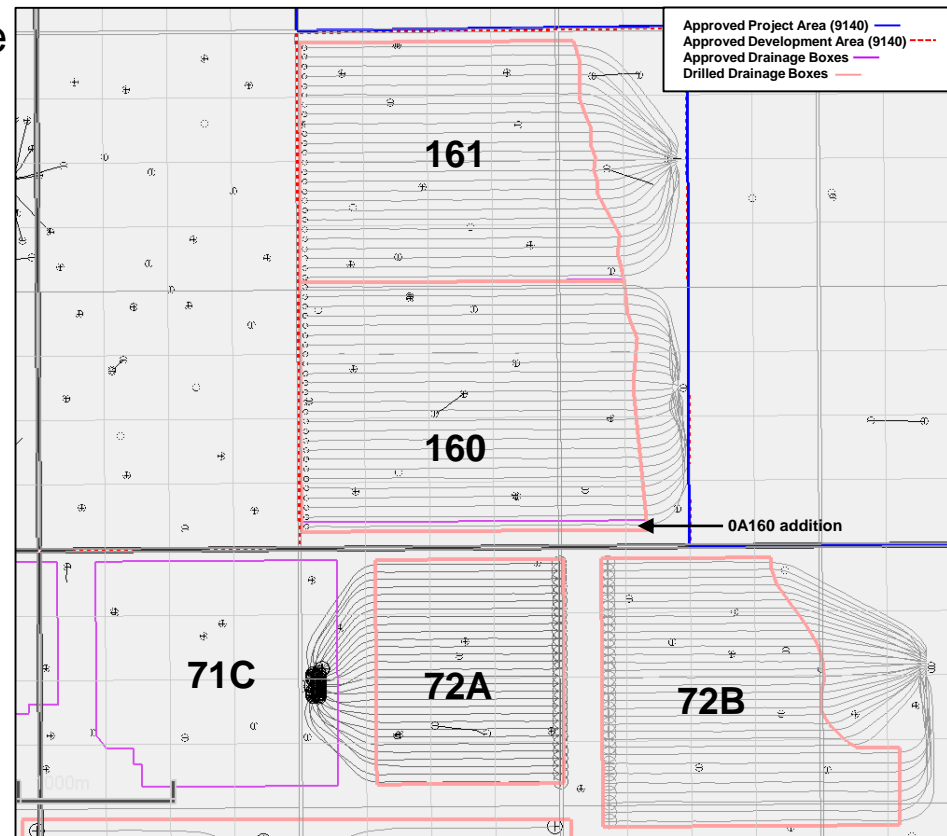


# Scheme Approval 9140 OSCA Annual Report: Lifecycle Update

- Additional well added to the southern edge of drainage pattern 160
  - Phase 160 and 161 developments were applied for prior to lifecycle approval (Application No. 1927742)
  - Drilled Q3 2022

Name	Lateral Length	Spacing
OA160	2,095m	60m

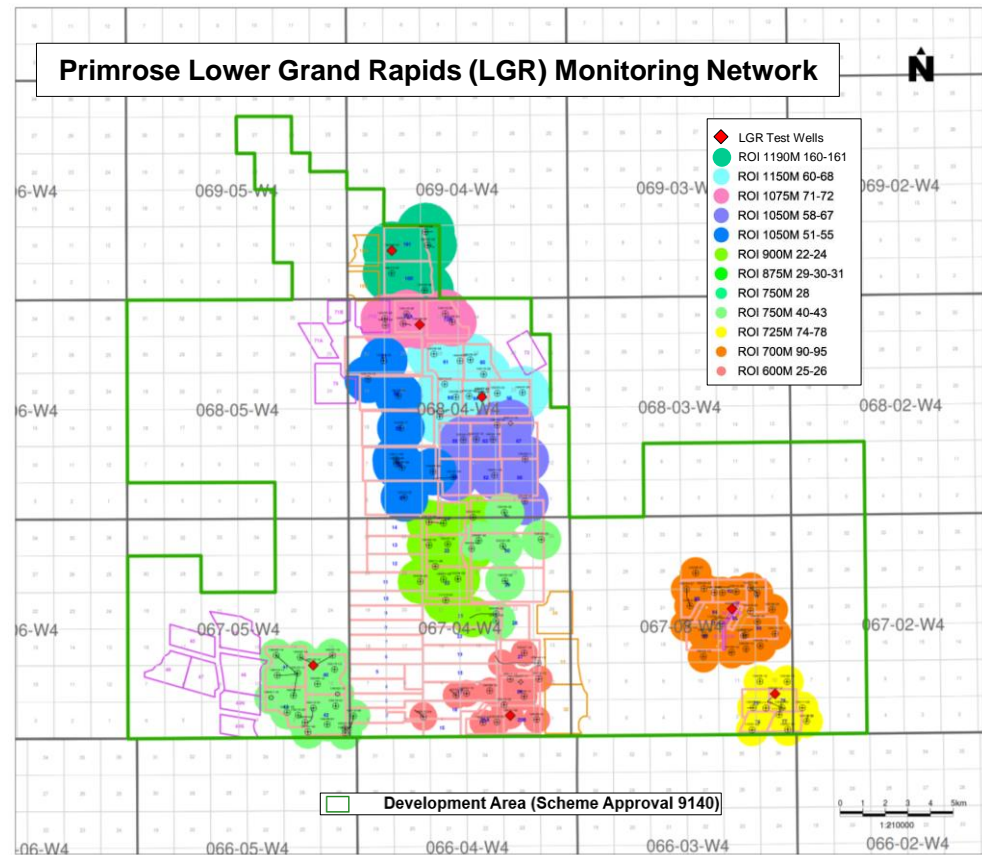
- Updated drainage pattern volumetrics are provided on Slide 29





# Scheme Approval 9140 OSCA Annual Report: Lifecycle Update

- As outlined in Scheme Approval 9140III Clause 38(7) all CSS and steaming operations within 1,000 m of an FTS location must have complete Lower Grand Rapids (LGR) basal water sands pressure monitoring coverage
  - Five completed LGR observation wells in 2022 over Primrose North 160 and 161
  - One LGR pumping test in Primrose North in 2022





# Approval 9140 OSCA Annual Report: Lifecycle Update

- Summary of LGR monitoring wells that had maintenance repair work completed within 2022:

Well	Activity
100/01-10-067-05W4	-Packer repair
100/04-04-069-04W4	-Additional LGR monitoring zone added
100/05-08-069-04W4	-Converted stand and cased well to LGR monitoring -Additional pump test completed to review regional reservoir parameters for observation monitoring
100/05-09-069-04W4	-Converted stand and cased well to LGR monitoring
100/13-09-069-04W4	-Converted stand and cased well to LGR monitoring
100/12-05-069-04W4	-Converted stand and cased well to LGR monitoring



## Additional Directive 054 Reporting: Primrose MWI & LGR Events

- During CSS injection, multi-well injectivity (MWI) and Lower Grand Rapids (LGR) events reported as outlined in 9140 approval:

Date	Type	Well(s)
02/08/2022	MWI	26-31B72
02/21/2022	LGR	102/10-33-068-04W4
02/22/2022	LGR	102/10-33-068-04W4
03/13/2022	MWI	1-8B72
03/14/2022	LGR	100/08-33-068-04W4
06/12/2022	MWI	12-27A72
06/12/2022	LGR	100/08-32-068-04W4
06/12/2022	LGR	102/10-32-068-04W4
06/13/2022	LGR	100/08-32-068-04W4
06/13/2022	LGR	102/10-32-068-04W4



## Special Note Regarding Forward-Looking Statements

Certain statements relating to Canadian Natural Resources Limited (the "Company") in this document or documents incorporated herein by reference constitute forward-looking statements or information (collectively referred to herein as "forward-looking statements") within the meaning of applicable securities legislation. Forward-looking statements can be identified by the words "believe", "anticipate", "expect", "plan", "estimate", "target", "continue", "could", "intend", "may", "potential", "predict", "should", "will", "objective", "project", "forecast", "goal", "guidance", "outlook", "effort", "seeks", "schedule", "proposed", "aspiration" or expressions of a similar nature suggesting future outcome or statements regarding an outlook. Disclosure related to expected future commodity pricing, forecast or anticipated production volumes, royalties, production expenses, capital expenditures, income tax expenses and other targets provided throughout this presentation and the Company's Management's Discussion and Analysis ("MD&A") of the financial condition and results of operations of the Company, constitute forward-looking statements. Disclosure of plans relating to and expected results of existing and future developments, including, without limitation, those in relation to the Company's assets at Horizon Oil Sands ("Horizon"), the Athabasca Oil Sands Project ("AOSP"), Primrose thermal oil projects, the Pelican Lake water and polymer flood projects, the Kirby Thermal Oil Sands Project, the Jackfish Thermal Oil Sands Project, the North West Redwater bitumen upgrader and refinery, construction by third parties of new, or expansion of existing, pipeline capacity or other means of transportation of bitumen, crude oil, natural gas, natural gas liquids ("NGLs") or synthetic crude oil ("SCO") that the Company may be reliant upon to transport its products to market, the development and deployment of technology and technological innovations, and the financial capacity of the Company to complete its growth projects and responsibly and sustainably grow in the long term also constitute forward-looking statements. These forward-looking statements are based on annual budgets and multi-year forecasts, and are reviewed and revised throughout the year as necessary in the context of targeted financial ratios, project returns, product pricing expectations and balance in project risk and time horizons. These statements are not guarantees of future performance and are subject to certain risks. The reader should not place undue reliance on these forward-looking statements as there can be no assurances that the plans, initiatives or expectations upon which they are based will occur.

In addition, statements relating to "reserves" are deemed to be forward-looking statements as they involve the implied assessment based on certain estimates and assumptions that the reserves described can be profitably produced in the future. There are numerous uncertainties inherent in estimating quantities of proved and proved plus probable crude oil, natural gas and NGLs reserves and in projecting future rates of production and the timing of development expenditures. The total amount or timing of actual future production may vary significantly from reserves and production estimates.

The forward-looking statements are based on current expectations, estimates and projections about the Company and the industry in which the Company operates, which speak only as of the earlier of the date such statements were made or as of the date of the report or document in which they are contained, and are subject to known and unknown risks and uncertainties that could cause the actual results, performance or achievements of the Company to be materially different from any future results, performance or achievements expressed or implied by such forward-looking statements. Such risks and uncertainties include, among others: general economic and business conditions (including as a result of effects of the novel coronavirus ("COVID-19") pandemic and the actions of the Organization of the Petroleum Exporting Countries Plus ("OPEC+") which may impact, among other things, demand and supply for and market prices of the Company's products, and the availability and cost of resources required by the Company's operations; volatility of and assumptions regarding crude oil and natural gas and NGLs prices including due to actions of OPEC+ taken in response to COVID-19 or otherwise; fluctuations in currency and interest rates; assumptions on which the Company's current targets are based; economic conditions in the countries and regions in which the Company conducts business; political uncertainty, including actions of or against terrorists, insurgent groups or other conflict including conflict between states; industry capacity; ability of the Company to implement its business strategy, including exploration and development activities; impact of competition; the Company's defense of lawsuits; availability and cost of seismic, drilling and other equipment; ability of the Company and its subsidiaries to complete capital programs; the Company's and its subsidiaries' ability to secure adequate transportation for its products; unexpected disruptions or delays in the mining, extracting or upgrading of the Company's bitumen products; potential delays or changes in plans with respect to exploration or development projects or capital expenditures; ability of the Company to attract the necessary labour required to build, maintain, and operate its thermal and oil sands mining projects; operating hazards and other difficulties inherent in the exploration for and production and sale of crude oil and natural gas and in mining, extracting or upgrading the Company's bitumen products; availability and cost of financing; the Company's and its subsidiaries' success of exploration and development activities and its ability to replace and expand crude oil and natural gas reserves; the Company's ability to meet its targeted production levels; timing and success of integrating the business and operations of acquired companies and assets; production levels; imprecision of reserves estimates and estimates of recoverable quantities of crude oil, natural gas and NGLs not currently classified as proved; actions by governmental authorities (including production curtailments mandated by the Government of Alberta); government regulations and the expenditures required to comply with them (especially safety and environmental laws and regulations and the impact of climate change initiatives on capital expenditures and production expenses); asset retirement obligations; the sufficiency of the Company's liquidity to support its growth strategy and to sustain its operations in the short, medium, and long term; the strength of the Company's balance sheet; the flexibility of the Company's capital structure; the adequacy of the Company's provision for taxes; the continued availability of the Canada Emergency Wage Subsidy ("CEWS") or other subsidies; and other circumstances affecting revenues and expenses.

The Company's operations have been, and in the future may be, affected by political developments and by national, federal, provincial, state and local laws and regulations such as restrictions on production, changes in taxes, royalties and other amounts payable to governments or governmental agencies, price or gathering rate controls and environmental protection regulations. Should one or more of these risks or uncertainties materialize, or should any of the Company's assumptions prove incorrect, actual results may vary in material respects from those projected in the forward-looking statements. The impact of any one factor on a particular forward-looking statement is not determinable with certainty as such factors are dependent upon other factors, and the Company's course of action would depend upon its assessment of the future considering all information then available.

Readers are cautioned that the foregoing list of factors is not exhaustive. Unpredictable or unknown factors not discussed in this presentation or the Company's MD&A could also have adverse effects on forward-looking statements. Although the Company believes that the expectations conveyed by the forward-looking statements are reasonable based on information available to it on the date such forward-looking statements are made, no assurances can be given as to future results, levels of activity and achievements. All subsequent forward-looking statements, whether written or oral, attributable to the Company or persons acting on its behalf are expressly qualified in their entirety by these cautionary statements. Except as required by applicable law, the Company assumes no obligation to update forward-looking statements in this presentation or the Company's MD&A, whether as a result of new information, future events or other factors, or the foregoing factors affecting this information, should circumstances or the Company's estimates or opinions change.



A large graphic on the right side of the slide, consisting of a large white circle and a smaller blue circle, both partially cut off by the right edge of the frame. The background is a solid blue color.

# Canadian Natural

PROVEN • EFFECTIVE • STRATEGY



Premium Value.  
Defined Growth.  
Independent.  
**Canadian Natural**

**PRIMROSE and WOLF LAKE  
2022 WELL INTEGRITY PERFORMANCE  
Scheme Approval No. 9140**

June 30, 2023





# Agenda

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- Well Integrity Philosophy
- 2022 Casing Failure Statistics
- 2022 Well Integrity Initiatives



# Canadian Natural's Well Integrity Philosophy

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- Reduce casing failures through proper well design, construction and operational practices.
- Understanding of well failure mechanisms to reduce failure frequency.
- Monitoring programs to minimize risks to HSE, assets, and reputation.

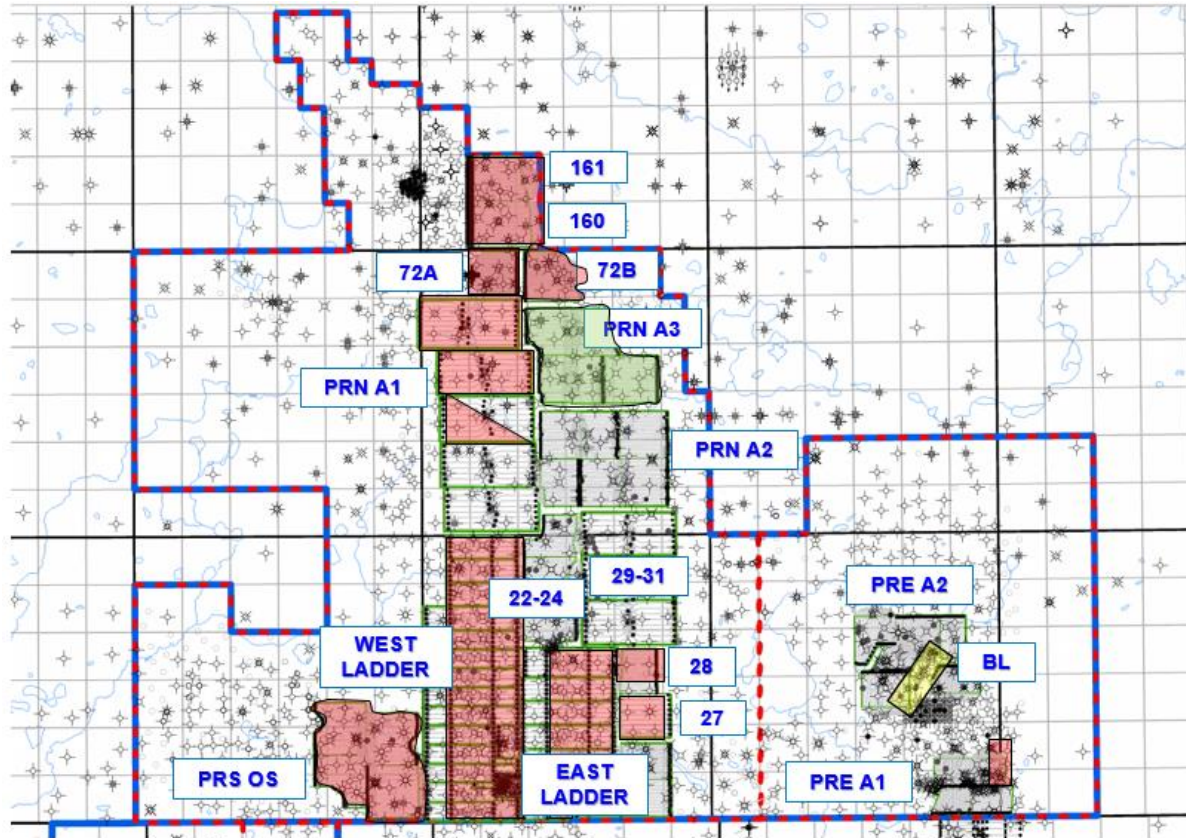




## 2022 CASING FAILURE STATISTICS



# Primrose Original Casing Connections



Hydril 563 = 574 wells

Hunting Boss = 319 wells

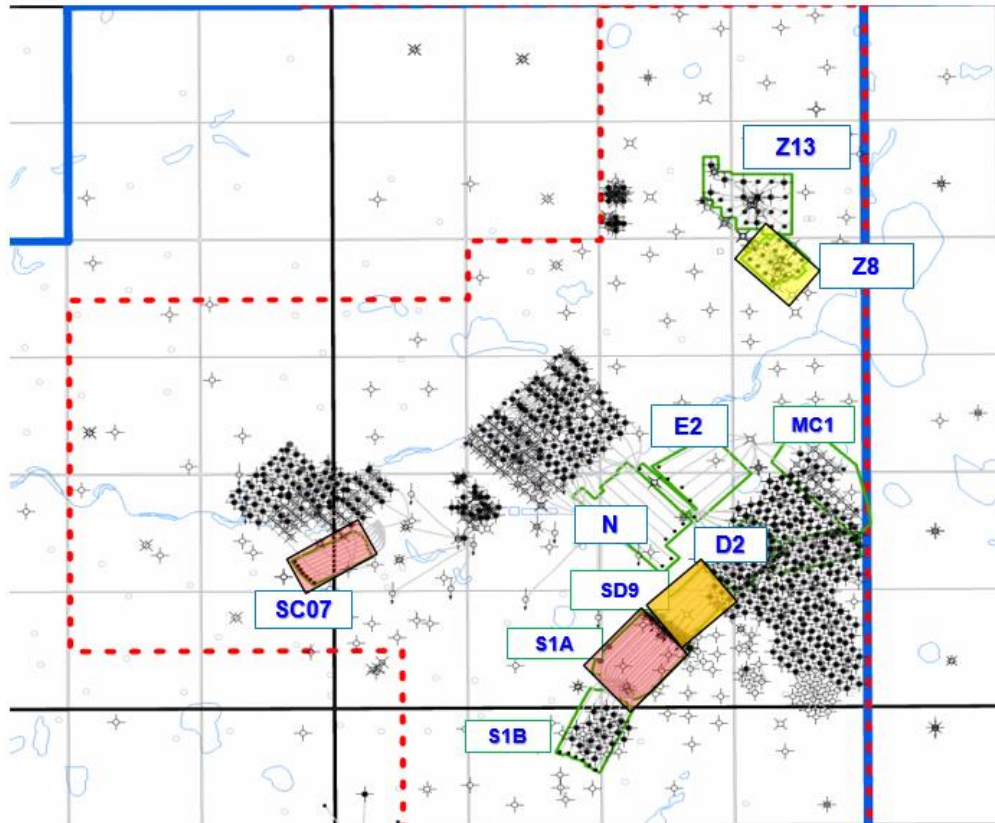
Tenaris Blue = 309 wells

Tenaris/Hydril = 101 wells

Buttress = 13 wells



# Wolf Lake Original Casing Connection Grouping



Hydril 563 = 62 wells

Buttress = 15 wells

Hunting Boss = 12 wells

Tenaris Blue = 24 wells



# Casing Failure Definitions

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- Near-surface failure:
  - Depth between 0 m – 25 m TVD
- Out of zone failure:
  - Depth between 25 m TVD to the interface of Grand Rapid/Clearwater formation
- In zone failure:
  - Occurs within the Clearwater formation (includes failures within the capping shale)
- Primary failure:
  - References pressure-containing string in the wellbore (typically 9-5/8" intermediate casing)

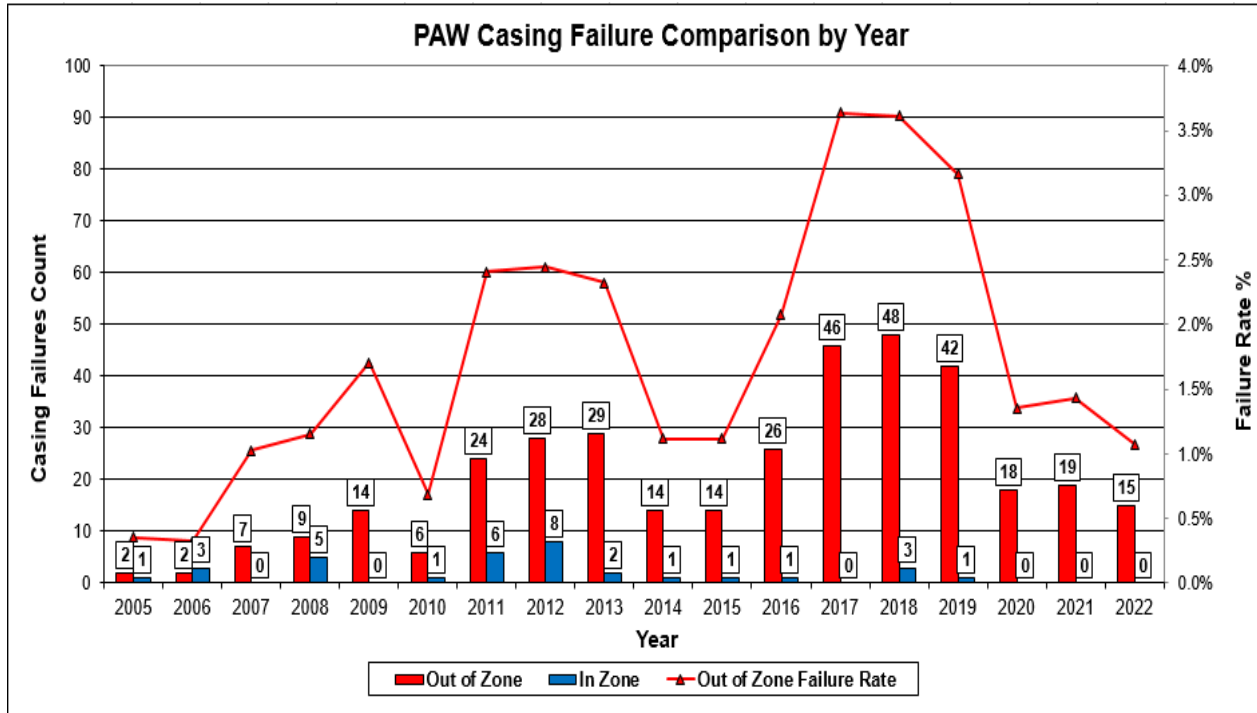


# 2022 Casing Failure Summary

Out of Zone	
Primary Casing Failures	15
Area	Concentrated in PRE A1/A2, PRS
Connection/Pipe Body	All failures at casing connection
Cycle	All wells on steamflood
Formation	No near-surface failures (0-25m) All wells in Colorado Shale Group
Pressure During Failure	All failures at BHP < 5.0MPa (sub hydrostatic) Therefore no high pressure notification is required
Status at time of Failure	9 wells associated with well shut-in (tensile loading) 3 wells on production 3 wells on injection



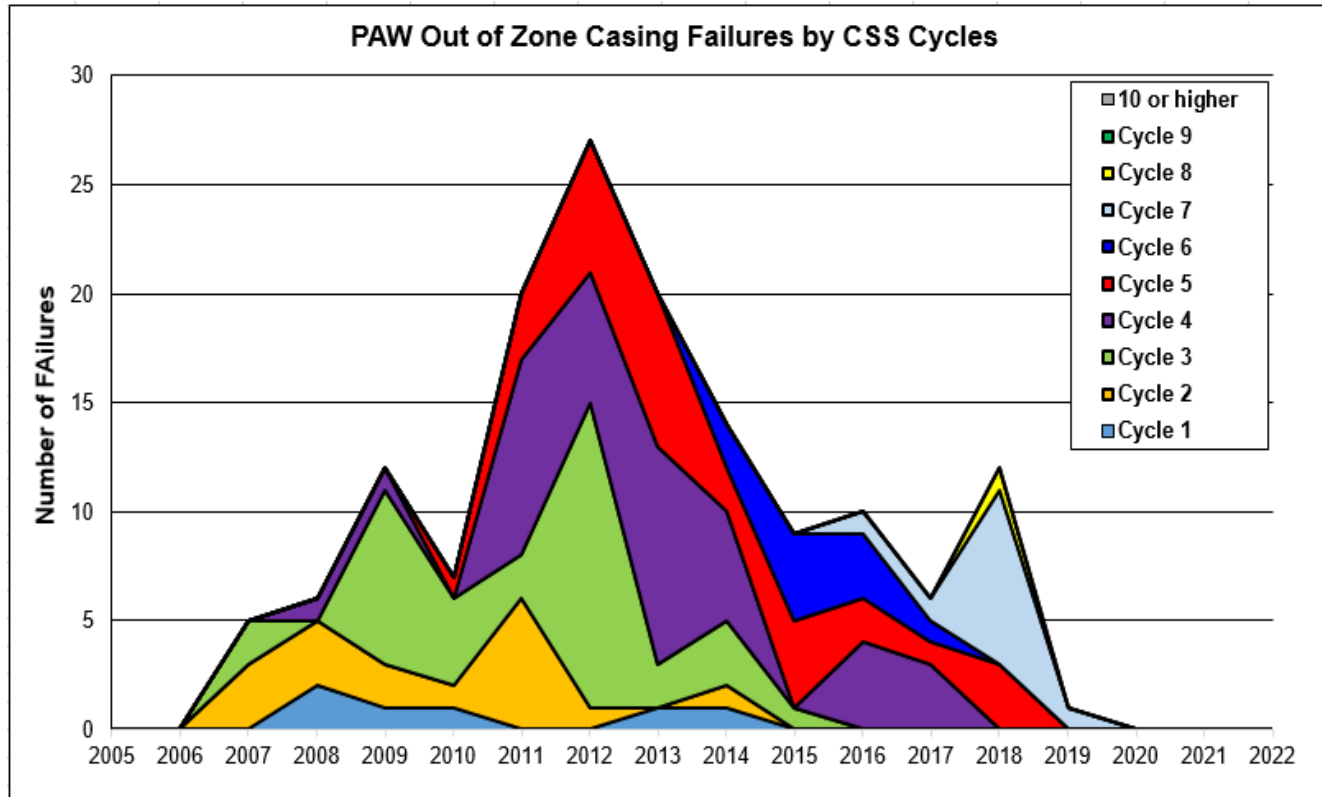
# PAW Casing Failure Count



- Confirmed out of zone failures increased post 2015 due to active well inspections and repairs on HPCSS wells.
- Fewer failures detected in 2022 due to progression with risk based investigation, new wells drilled since 2018 are equipped with premium connection with no known failures.



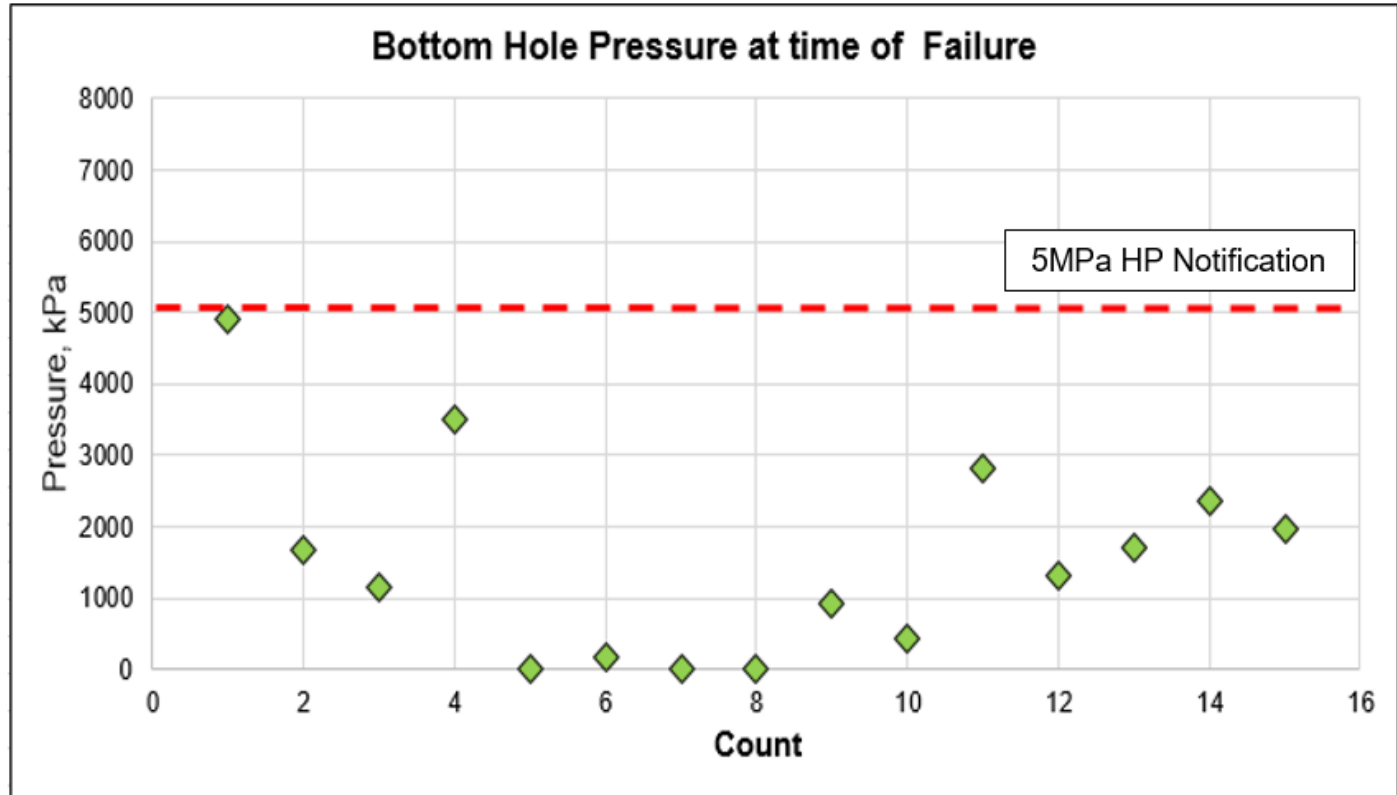
# Casing Failures by Cycle



Since 2012, majority of failures occurred in cycles 4-6 during CSS operations



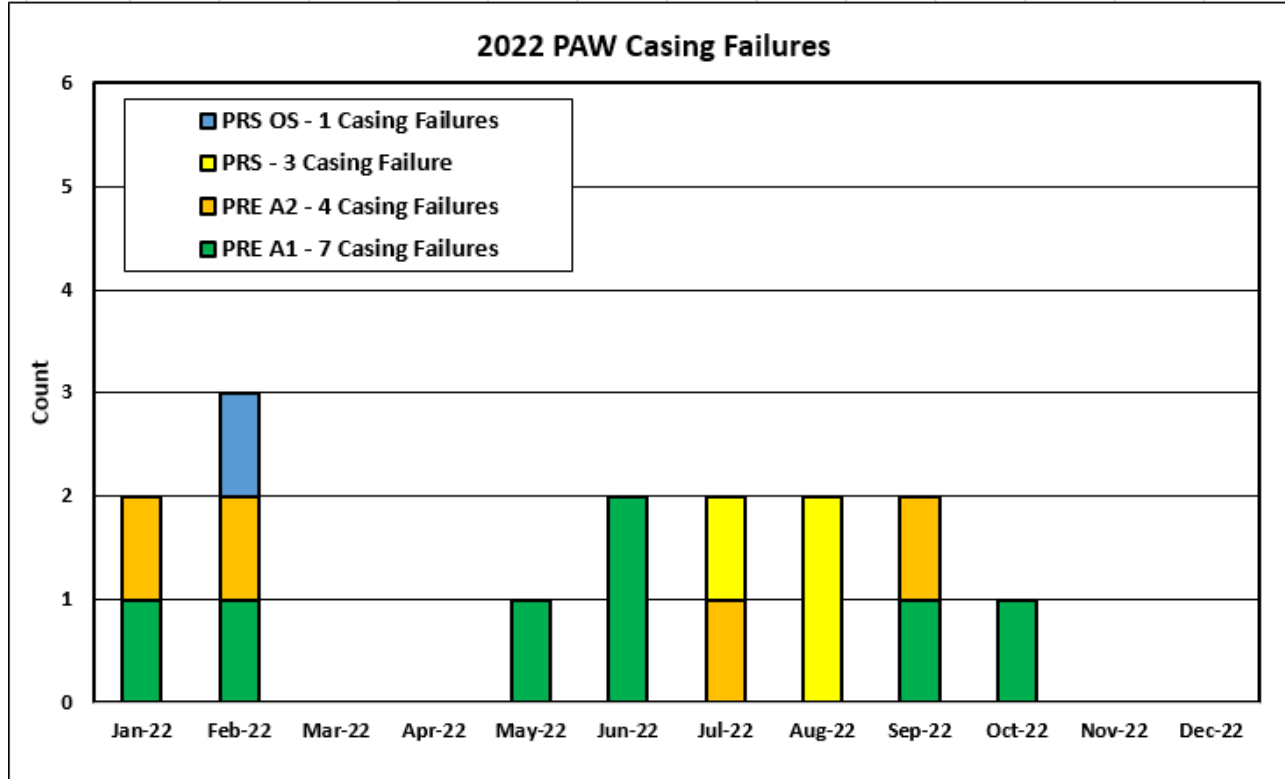
# 2022 PAW Casing Failure Notification



In 2022, there were no reported out of zone high pressure failures



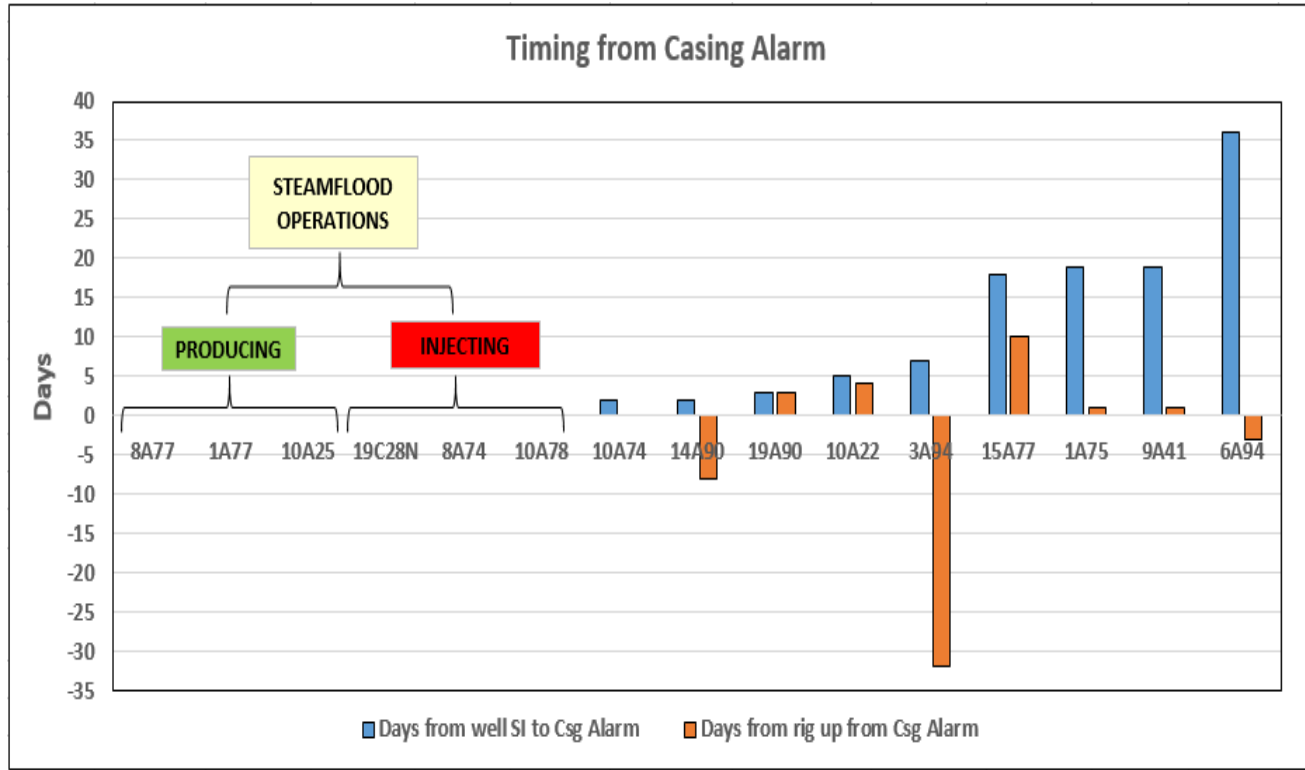
# 2022 PAW Casing Failure by Area



- Majority of the casing failures are concentrated in PRE A1/A2 and PRS.
- The majority of the 2022 casing failures occurred in Q3 as wellbores are exposed to excessive cooling under tensile loading during workover shut-ins.



# Days to Failure After Shut-in

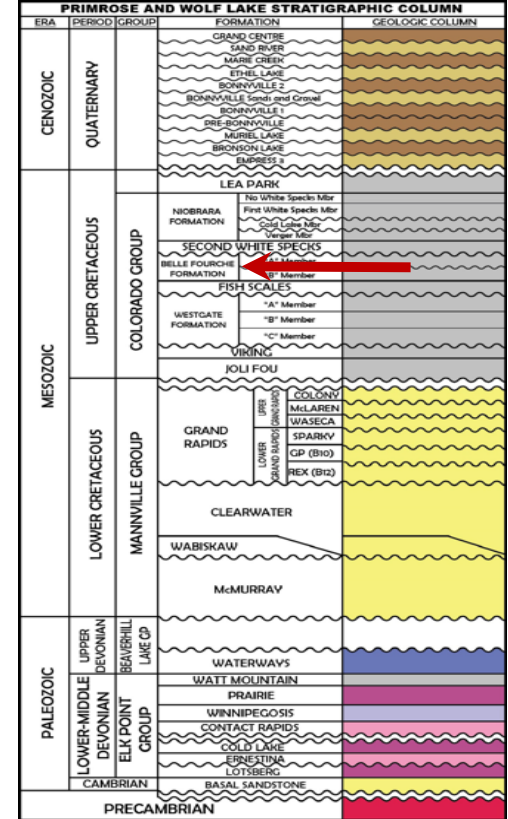
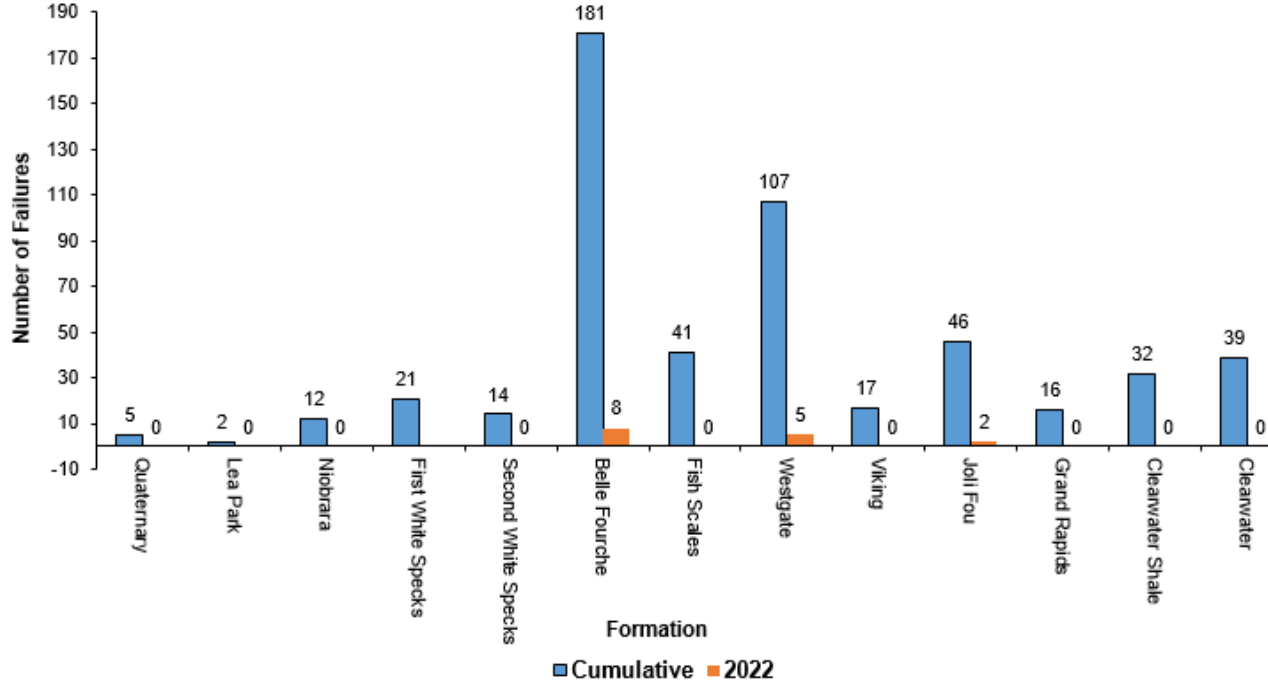


- Well Integrity protocol recommends purging wells with Fuel Gas or N<sup>2</sup> if shut-in > 7 days.
- Failures > 7 days likely driven by wells being shut-in for extended periods of time, while in queue for workovers:
  - 3 wells had alarm ring in while producing
  - 3 wells had alarm ring in while injecting
  - 6 wells can be correlated to a service rig well kill
  - 3 wells can be correlated to excessive cooling under tensile loading waiting for workovers



# Out of Zone Confirmed Casing Failures by Formation

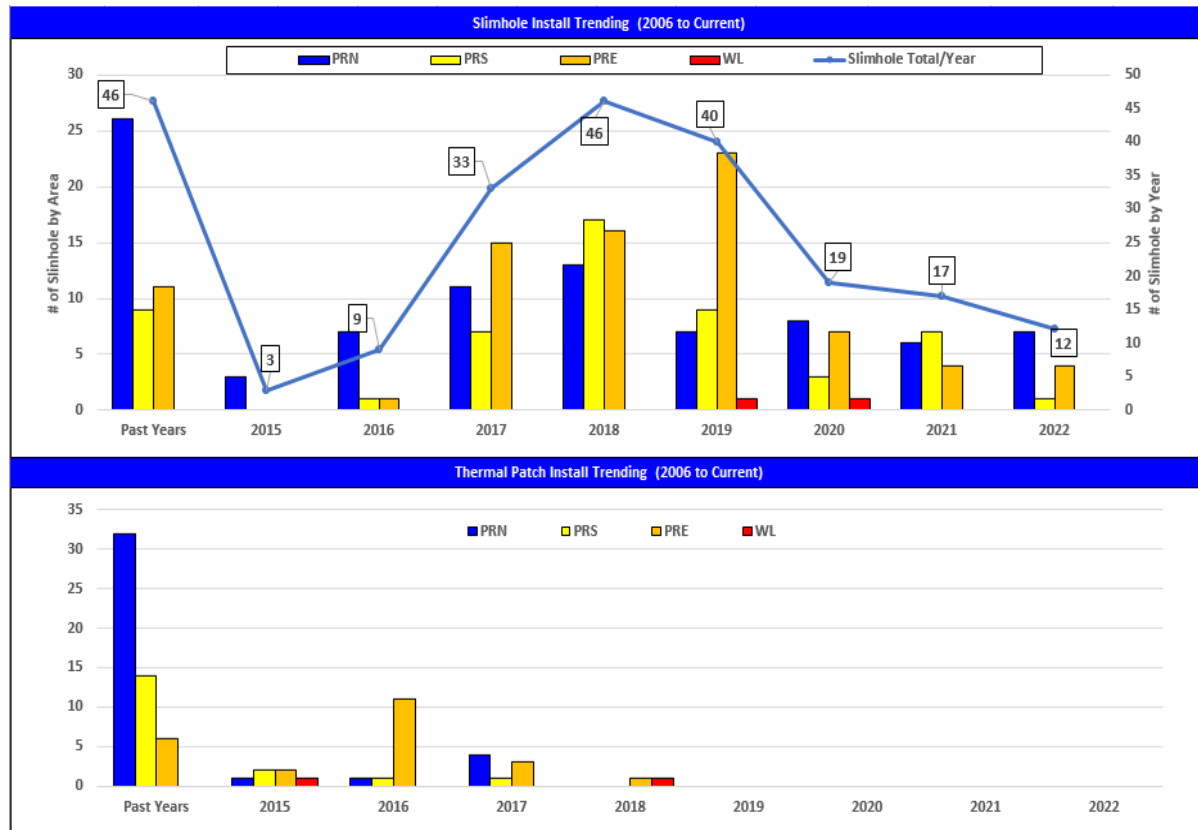
Failure by Formations - Cumulative Number of Failure since 2004, and 2022 Data



34% of casing failures were in the Belle Fourche formation



# 2022 Casing Failure Repairs



- Since 2019, all casing failure remediation programs have progressed with slimhole repair:
  - “one-time” wellbore fix by not having to deal with multiple breaks in same casing string.
  - Two layers of cement allowed for the usage of non-premium connections on the slim-hole.
- 12 slimholes were completed in 2022:
  - Reduction in slimhole installation count due to more wells getting remediated in prior years.



# 2022 PAW Casing Failures Table

Well Name	Area	Sub-Area	Licence#	Failure Of	Detection Method	Detection Date	Confirmation Date	Depth (mKB)	Depth (mTVD)	Formation
19C28N	PRS	PRS	368317	Connection	Passive Seismic	30-Jan-18	7-Jul-22	275	273	Belle Fourche
1A77	PRE	PRE A1	378144	Connection	Passive Seismic	19-Jun-19	16-Jun-22	317	312	Belle Fourche
10A25	PRS	PRS	442916	Connection	Passive Seismic	26-Mar-20	4-Aug-22	270	268	Belle Fourche
8A74	PRE	PRE A1	380836	Connection	Passive Seismic	7-Jun-20	22-Oct-22	258	257	Belle Fourche
1A75	PRE	PRE A1	381905	Connection	Passive Seismic	20-Jan-21	14-May-22	307	302	Westgate
10A74	PRE	PRE A1	380838	Connection	Passive Seismic	2-Mar-21	9-Jun-22	319	315	Westgate
10A22	PRS	PRS	424752	Connection	Passive Seismic	6-May-21	5-Aug-22	346	342	Joli Fou
15A77	PRE	PRE A1	378165	Connection	Passive Seismic	10-Dec-21	3-Feb-22	264	263	Belle Fourche
10A78	PRE	PRE A1	375389	Connection	Passive Seismic	17-Dec-21	28-Jan-22	291	290	Westgate
6A94	PRE	PRE A2	433085	Connection	Passive Seismic	1-Jan-22	10-Jan-22	321	313	Westgate
9A41	PRS	PRS OS	455612	Connection	Passive Seismic	15-Feb-22	18-Feb-22	252 266	252 265	Westgate
19A90	PRE	PRE A2	430522	Connection	Passive Seismic	15-Feb-22	17-Feb-22	284	282	Belle Fourche
14A90	PRE	PRE A2	430486	Connection	Passive Seismic	14-Jul-22	22-Jul-22	284	284	Belle Fourche
3A94	PRE	PRE A2	433082	Connection	Passive Seismic	17-Jul-22	15-Sep-22	267	264	Belle Fourche
8A77	PRE	PRE A1	378152	Connection	Passive Seismic	5-Sep-22	10-Sep-22	404	390	Joli Fou





**2022**  
**WELL INTEGRITY INITIATIVES**  
**NEAR SURFACE EXTERNAL CORROSION**  
**MONITORING**



# PAW External Casing Corrosion Program

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- 2022 program targets inspections as a function of well age and prior inspection results:
  - Prior inspection programs based on well age only
  - Program commitment to inspect a sampling of wells each year with increasing inspection counts if results deem warranted
- Execution of the inspection varies depending on the design of the well.

Open Access to Casing



Inspection of Intermediate Casing  
(CSS/SF)

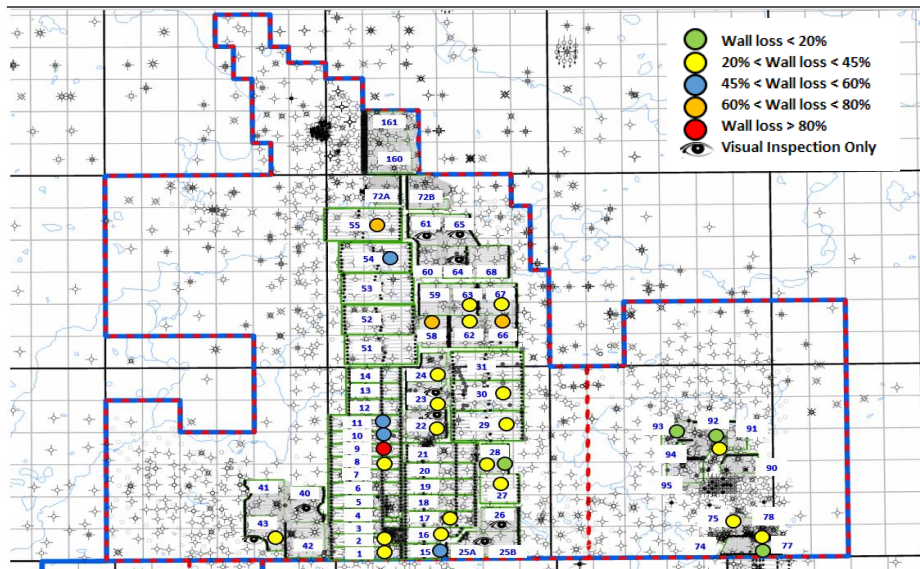
Restricted Access to Casing



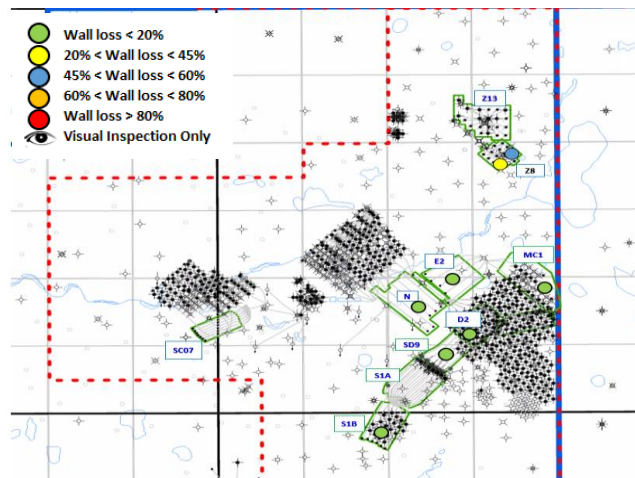
Inspection of Surface  
Casing (SAGD)



# PAW External Casing Corrosion Results



- In 2022, only 5 wells inspected
  - Targeted areas in PRS pad 22, 23, 27 and 28. Prior inspection on other pads continues to show declining wall loss in low pressure steamflood areas
  - All wells coated with high temp metallic coatings
  - All wells have bentonite top ups with biannual inspection program in place



Data supports reduction in required inspections using risk based approach



# PAW External Casing Corrosion Integrity Assessment

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- New methodology for casing integrity assessment and repair decision making using ASME Modified B31.G vs Barlow's approach:
  - Previous approach was overly conservative
  - Level 1 analysis conducted; most common failures a function of temperature and wall loss
  - Developed a decision tree for repair/remediation options based on rupture vs leak failure
  - 13 wells will not require any casing stub cut-out and replacement
- Progress risk based approach of the re-inspection interval:
  - Additional sampling to acquire baseline data to allow for further progression of risk based approach
  - Revise maintenance and inspection schedule based on results / data as warranted





## BENTONITE TOP UP PROGRAM



# Bentonite Top Up Check System

**PRIM - North**

Search

STATUS TYPE

**Bentonite Check**  
Start: Jul 11, 2020 Due: Jan 7, 2021

SURFACE LOCATION  
1-15-068-04W4  
WELL  
2A67 (100/12-12-068-04W4/00)

**Bentonite Check**  
Start: Jul 11, 2020 Due: Jan 7, 2021

SURFACE LOCATION  
1-15-068-04W4  
WELL  
4A67 (103/12-12-068-04W4/00)

**Bentonite Check**  
Start: Jul 11, 2020 Due: Jan 7, 2021

SURFACE LOCATION  
1-15-068-04W4  
WELL  
6A67 (104/12-12-068-04W4/00)

**Bentonite Check**  
Start: Jul 11, 2020 Due: Jan 7, 2021

SURFACE LOCATION  
1-15-068-04W4

7:37

Surface Location GPS Location  
1-15-068-04W4 54.879726; 110.515542

Well  
2A67 (104/12-12-068-04W4/00)

Frequency Date Checked  
180 days 2/4/2022

Bentonite top up reqd >1in gap

Bentonite Status  
In Good Condition

Top up date

Well Slim holed?  
No

Slim hole check

Bentonite Status Slim Hole Top up date Slim Hole  
2/4/2022

Comments  
code 998 suspended



## Incomplete Bentonite Inspections

Overdue and >160 Days from Start As of: 5/4/2022

1A63 (100/12-11-068-04W4/00)	Overdue		01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAACJ</a> <a href="#">lu7500109.ct.sendgrid.net</a>
1A64 (100/16-15-068-04W4/00)	Overdue		01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAAE1</a> <a href="#">lu7500109.ct.sendgrid.net</a>
1A65 (100/13-23-068-04W4/00)	Overdue		01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAAF2</a> <a href="#">lu7500109.ct.sendgrid.net</a>
1A67 (103/12-12-068-04W4/00)	Overdue	In Good Condition	01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAAGC</a> <a href="#">lu7500109.ct.sendgrid.net</a>
1C55 (100/01-29-068-04W4/00)	Overdue	In Good Condition	01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAAJN</a> <a href="#">lu7500109.ct.sendgrid.net</a>
20A60 (100/14-21-068-04W4/02)	Overdue		01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAAMZ</a> <a href="#">lu7500109.ct.sendgrid.net</a>
20A64 (105/09-22-068-04W4/00)	Overdue		01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAAFB</a> <a href="#">lu7500109.ct.sendgrid.net</a>
20A66 (102/12-12-068-04W4/00)	Overdue	In Good Condition	01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAAGB</a> <a href="#">lu7500109.ct.sendgrid.net</a>
20A67 (102/12-13-068-04W4/00)	Overdue	Top Up Required	01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAAGZ</a> <a href="#">lu7500109.ct.sendgrid.net</a>
2A53 (100/03-18-068-04W4/00)	Overdue	In Good Condition	01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAAEF</a> <a href="#">lu7500109.ct.sendgrid.net</a>
2A60 (103/15-16-068-04W4/00)	Overdue		01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAAMD</a> <a href="#">lu7500109.ct.sendgrid.net</a>
2A64 (102/16-15-068-04W4/00)	Overdue		01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAAE2</a> <a href="#">lu7500109.ct.sendgrid.net</a>
2A66 (102/12-01-068-04W4/00)	Overdue	In Good Condition	01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAAF1</a> <a href="#">lu7500109.ct.sendgrid.net</a>
3A64 (103/16-15-068-04W4/00)	Overdue		01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAAE3</a> <a href="#">lu7500109.ct.sendgrid.net</a>
3A65 (103/13-23-068-04W4/00)	Overdue		01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAAF2</a> <a href="#">lu7500109.ct.sendgrid.net</a>
3A66 (103/12-01-068-04W4/00)	Overdue	In Good Condition	01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAAF2</a> <a href="#">lu7500109.ct.sendgrid.net</a>
3A67 (105/12-12-068-04W4/00)	Overdue	In Good Condition	01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAAGE</a> <a href="#">lu7500109.ct.sendgrid.net</a>
4A52 (102/06-07-068-04W4/00)	Overdue	In Good Condition	01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAABX</a> <a href="#">lu7500109.ct.sendgrid.net</a>
4A60 (104/06-21-068-04W4/00)	Overdue		01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAAMF</a> <a href="#">lu7500109.ct.sendgrid.net</a>
4A62 (106/14-03-068-04W4/00)	Overdue	Top Up Required	01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAAC0</a> <a href="#">lu7500109.ct.sendgrid.net</a>
4A64 (104/16-15-068-04W4/02)	Overdue		01-Mar-2022	30-Apr-2022	-4	<a href="#">AJRAAAAE4</a> <a href="#">lu7500109.ct.sendgrid.net</a>



## Changes:

- Migrate data from Excel to in-house database similar to Directive 013 inactive well inspections
- Add bentonite check for slimholed wells

## Advantages:

- Dashboard allows for high level review of any outstanding inspections
  - Drill down from district to run, pad, well etc.
  - Map with locations
- Ability to retrieve historical data of when the last check was done
- Fill form using mobile platform that works offline
- Tool capable of sending weekly notification to Operations via email on overdue inspections





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