Imperial Cold Lake Operations

Directive 054 Annual Submission

June 2023

Outline

Imperial Cold Lake Operations annual Directive 054 submission provides a performance update for the operating period of January 1st 2022 to December 31st, 2022.

- Background of scheme
- Subsurface

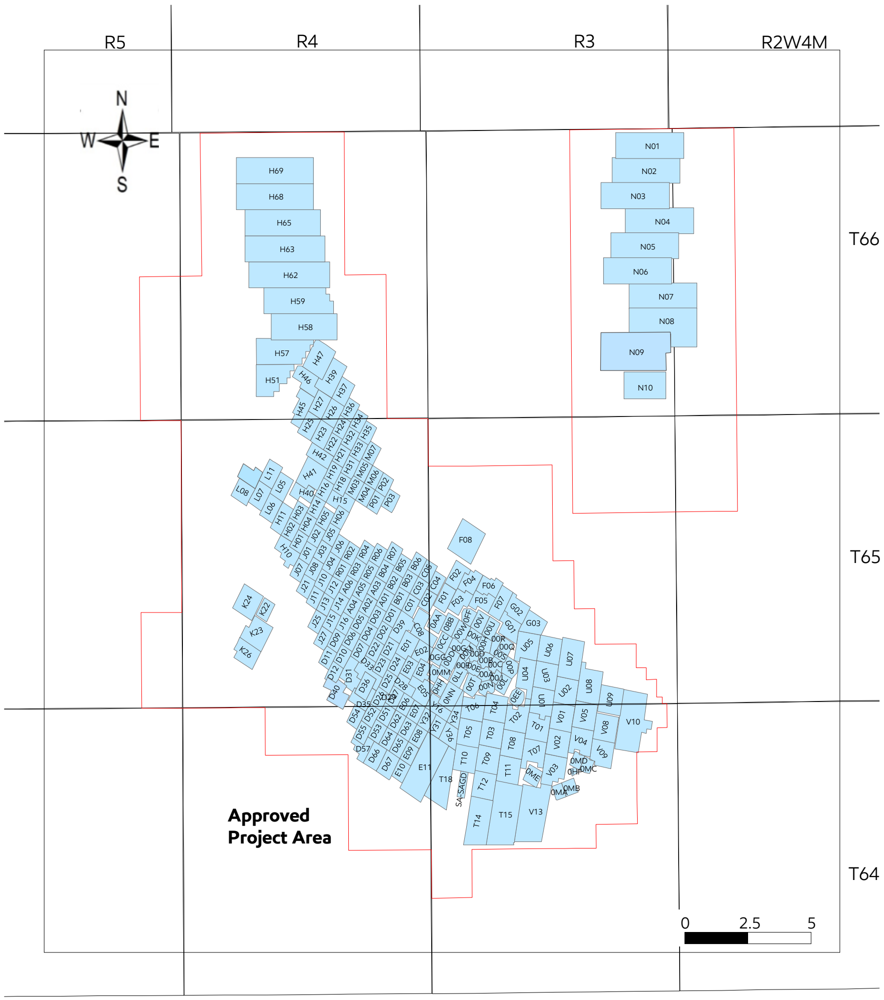
  Scheme Performance ○ Geoscience Overview ○ Pad Recovery ○ Co-injection
- Surface

  Built/Planned Surface Infrastructure Map ○ Facility Modifications ○ Facility Performance
- Historical and Upcoming Activity

  Suspension/Abandonment Activity ○ Regulatory and Operational Changes ○ Future Plans

Background of Scheme

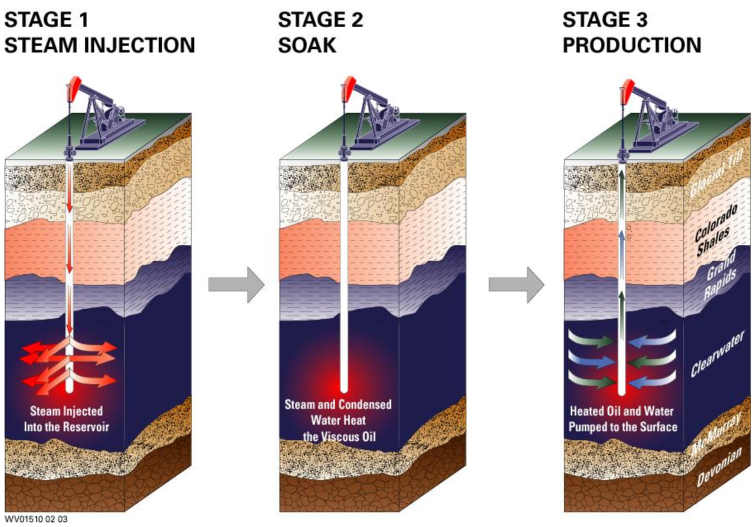
Background



Development History

60's-70's	Lease acquisition Small scale research pilots
1975	10 kbd commercial pilot
'85-'94	Phase 1-10 > Maskwa > Mahihkan
2002	Phase 11-13 Mahkeses > Cogeneration facility
2004	Approval area expanded > Nabiye, Mahihkan North
2015	Phases 14-16 Nabiye > Cogeneration facility

CSS Process Overview

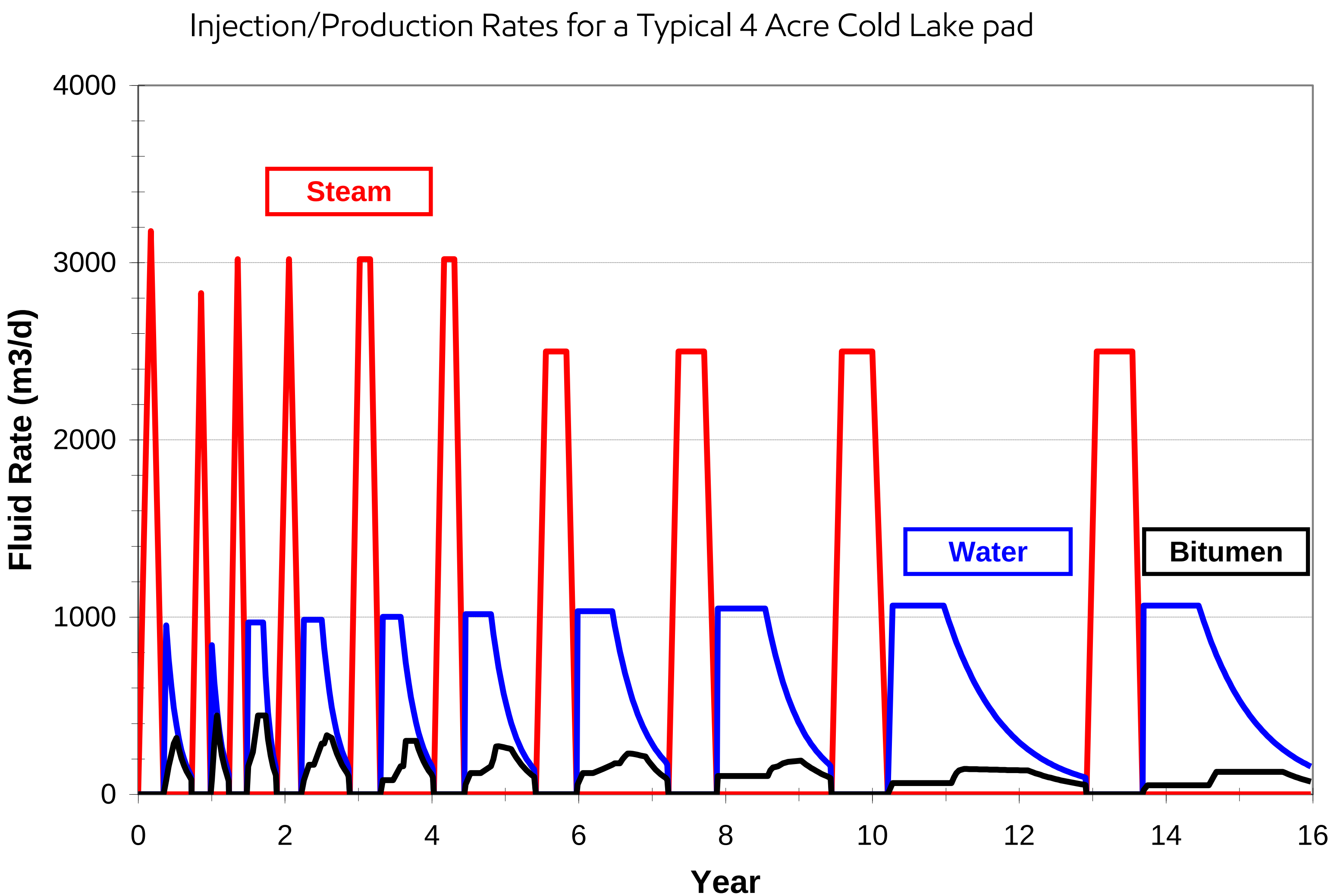


Mobilizing Agent:	Heat
Mobilizing Agent Delivery System:	Steam
Drive Mechanisms:	Compaction, solution gas drive, gravity drainage
Wells Required:	1
Well Type:	Deviated or horizontal
Operating Pressure:	Above fracture pressure

Cyclic Steam Stimulation (CSS)

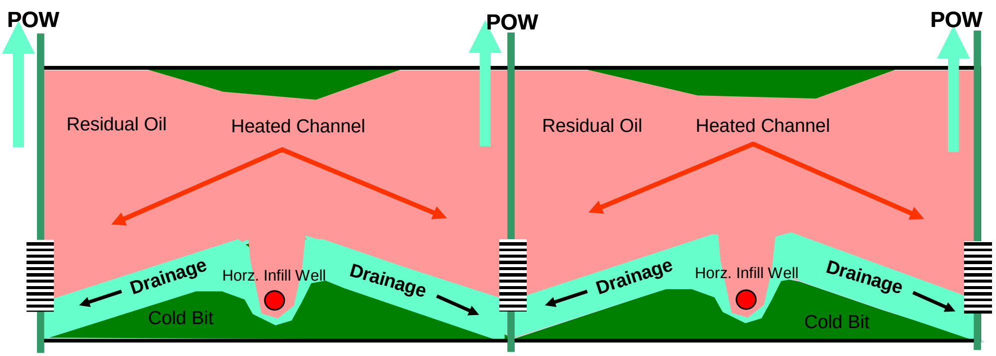
- High-pressure, high-rate, cyclic process with multiple drive mechanisms
  - compaction
  - solution gas drive
  - gravity drainage
- Steam injection heats bitumen to reduce its viscosity (4 - 6 weeks)
- Brief soak phase to confirm casing integrity and control inter-well communication (2 days – several weeks)
- Length of the production period increases from a few months in early cycles to multiple years in late cycles
- Full well life: 8 -17 cycles and up to 50 years including follow-up processes

CSS Process Overview



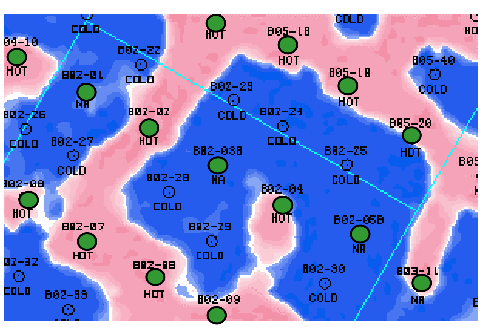
Injector Only Infills (IOI) Horizontal Injector Producer (HIP)

IOI / HIP Schematic

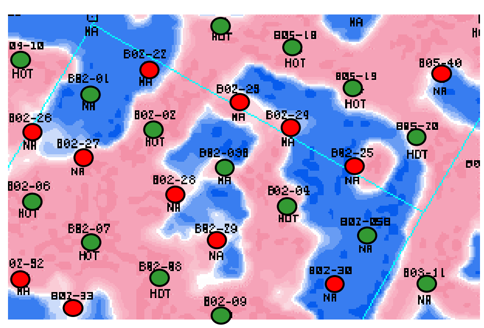


POW: Producer Only Well

Increase in steam conformance following infilling



Pre-Infill 3D Seismic

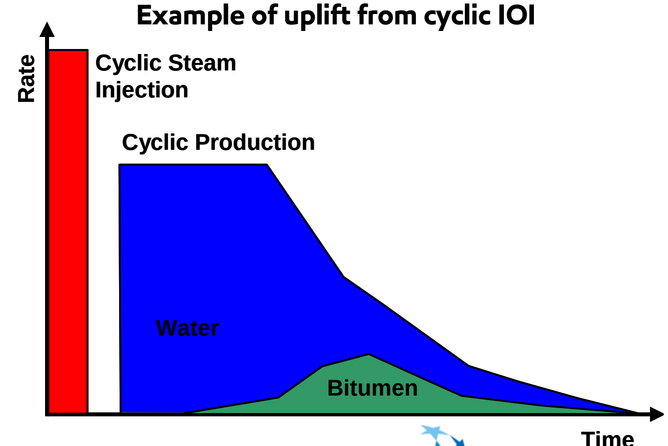


Post-Infill 3D Seismic

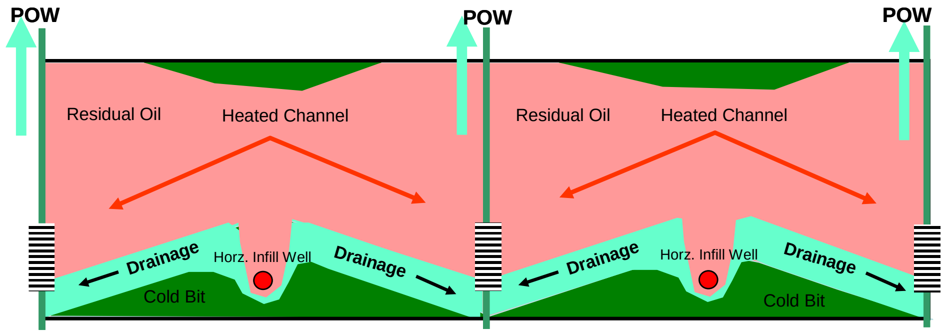
- Hot reservoir (partially depleted)
- Cold reservoir (undepleted)
- CSS wells
- Infill wells

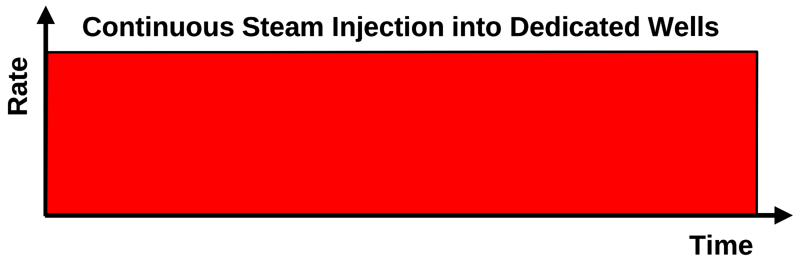
- Infill wells direct cyclic steam to cold bitumen
- Steam distribution in horizontal wells controlled by limited entry perforations (~20 holes/1000 m well)
- For IOIs, existing deviated wells operate as cyclic producers. HIPs offer the ability to both produce and inject.
- HIP well spacing
  - 1x has 1 horizontal well between adjacent CSS wells
  - 2x has 2 horizontal wells between adjacent CSS wells

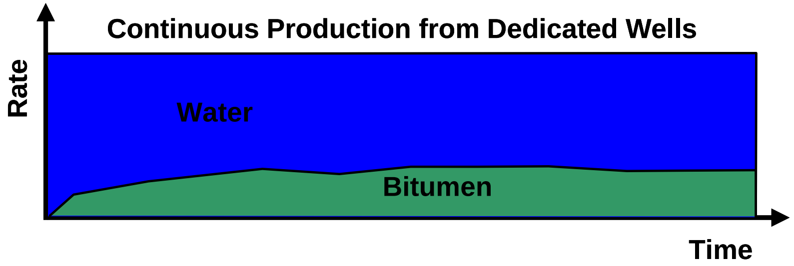
Example of uplift from cyclic IOI



Steamflood Process Overview





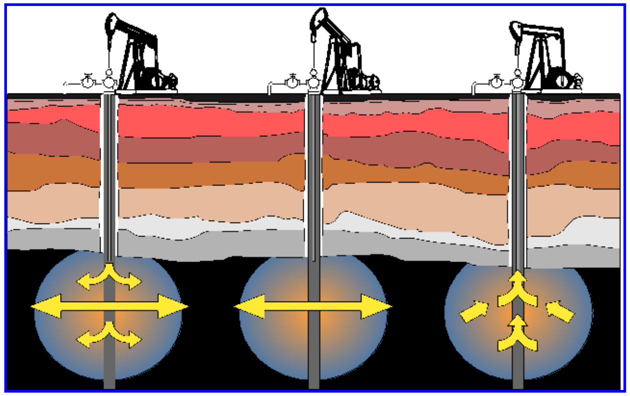


- Continuous steam injection, at low rates has the potential to:
  - Lower operating costs
  - Improve well operability
  - Reduced casing stress

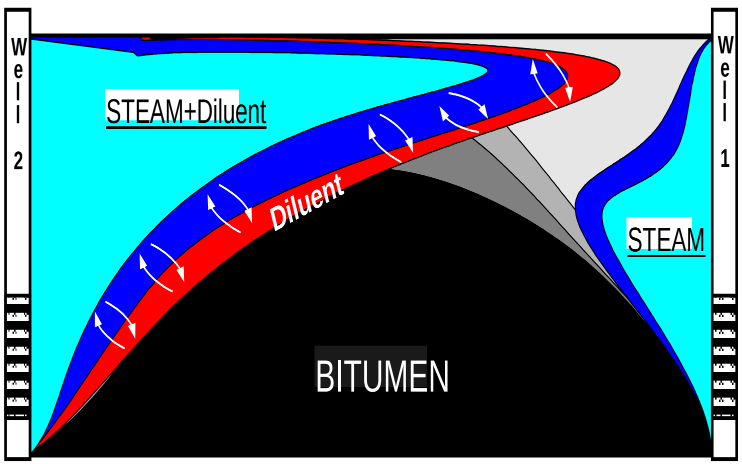
- Target reservoir pressure between 0.5 to 1.5 MPa

- Continuous rather than cyclical steam injection through dedicated injectors and production from dedicated producers

LASER Process Overview



CSS Thermal Process



Liquid Addition to Steam for Enhancing Recovery (LASER)

- LASER is a mid/late-life technology
  - Follow-up process for CSS
  - Implemented with >2-3 cyclic cycles remaining
  - Alternative to purely thermal processes
- LASER is a cyclic steam process with the addition of a C5+ condensate to the steam during injection
  - Enhances gravity drainage efficiency by reducing in-situ viscosity beyond thermal limit
  - Potentially increases the recovery by >5% of effective original bitumen in place (OBIP)
- Key process performance indicators
  - Incremental oil-steam ratio (OSR) over a purely thermal baseline
  - Fractional recovery of injected solvent

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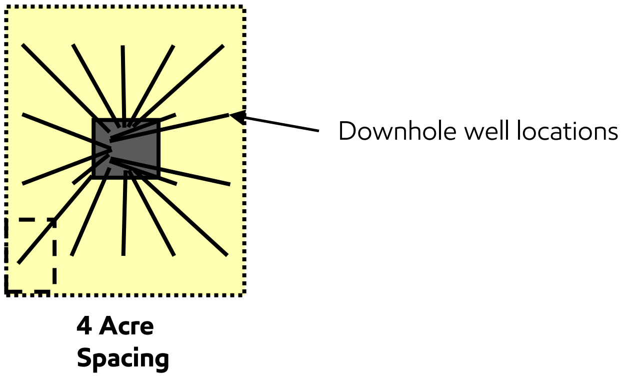
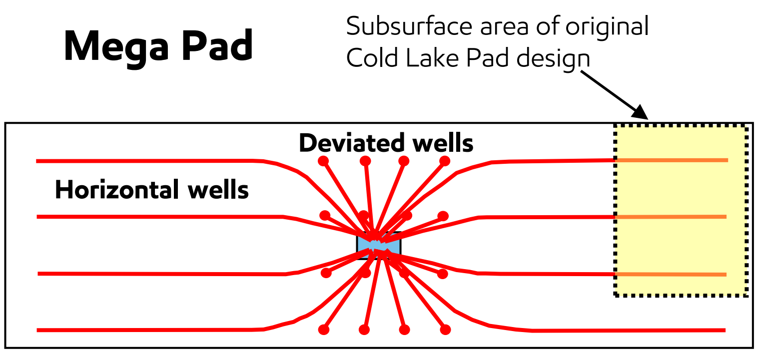
Pad Design

Original Pad Design



Mega Pad



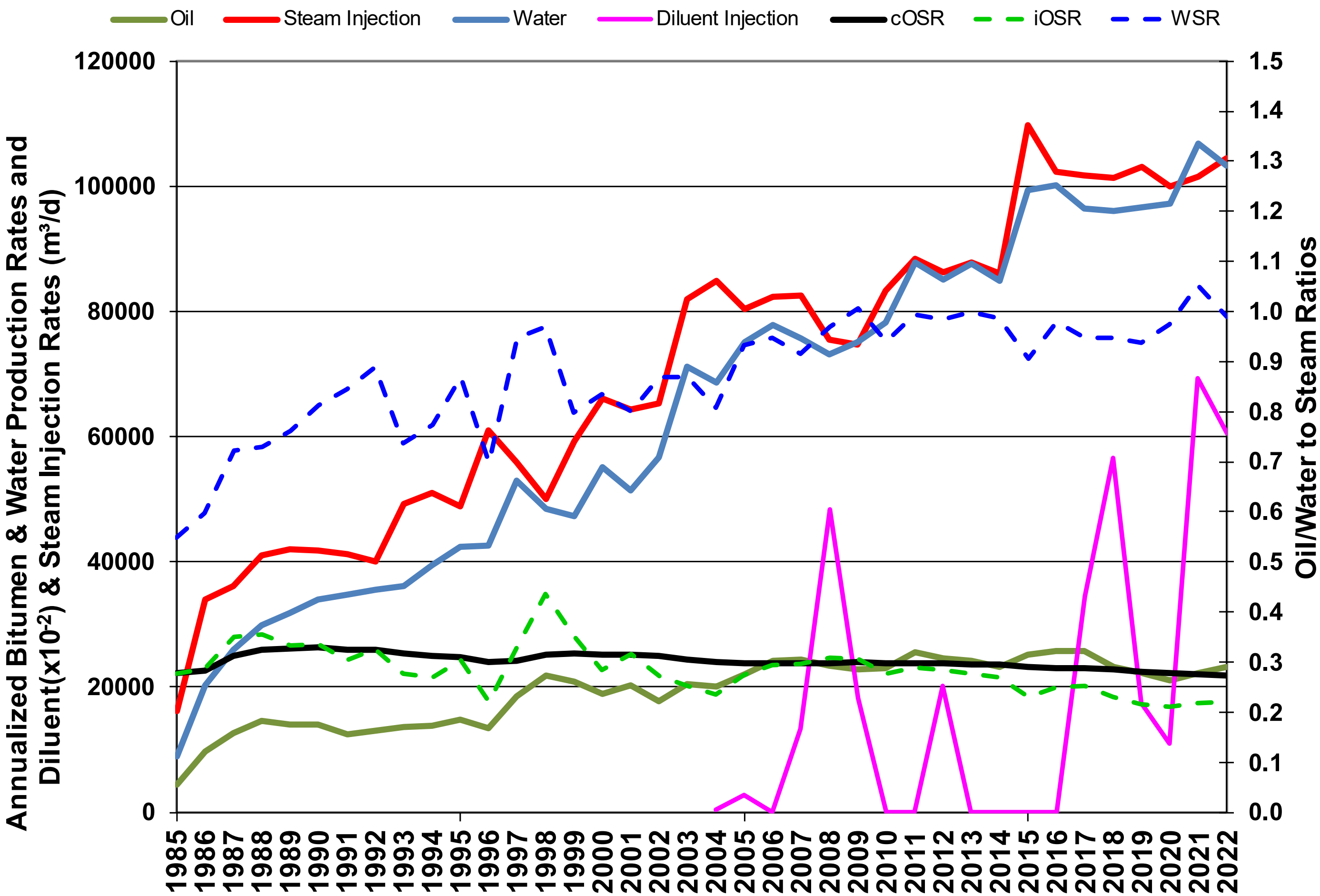
- Wells drilled directionally from central lease location
  - Reduced environmental disturbance
  - Improved development economics
  - Increased operational efficiencies
- Original pad design 20 wells on 4 acre spacing
- Current pad designs
  - Up to 35 wells on 4 or 8 acre spacing
  - Mix of deviated and horizontal wells

Subsurface

Scheme Lifespan Performance

Cold Lake Production Performance

Cold Lake Approval 8558 Area Production



	Bitumen Production	Steam Injection	Cumulative OSR
	10^3 m³/d	10^3 m³/d	
2021	22.3	101.5	0.28
2022	23.1	104.5	0.27

- Maximum daily bitumen production under approval 8558 of 40,000 m³/d
- Production data includes Cyclic Solvent Process (CSP) and Solvent Assisted-Steam Assisted Gravity Drainage (SA-SAGD) pilot projects
- Only commercial diluent injection included
- 2022 Producing Well Count: 4119

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Cold Lake Major Events

Site	Plant	Phase	Year of Regulatory Approval	First Production	Decommissioned
Ethel	-	Pilot	1964	1964	1998
May	-	Pilot	1972	1972	1999
Leming	-	1	1973	1975	-
Maskwa	1	1, 2	1983	1985	-
Mahihkan	2	3, 4	1984	1985	-
Maskwa	3	5, 6	1985	1986	-
Mahihkan	4	7, 8	1986	1992	-
		9, 10		1995	-
Mahkeses	5	11, 12, 13	1999	2002	-
Mahihkan North	-	Extension to 9 and 10	2004	2005	-
Nabiye	6	14, 15, 16	2004	2015	-
Cold Lake Expansion Project (CLEP)	-		2018	Not yet constructed	-
Grand Rapids	-	-	2018	Under Construction	

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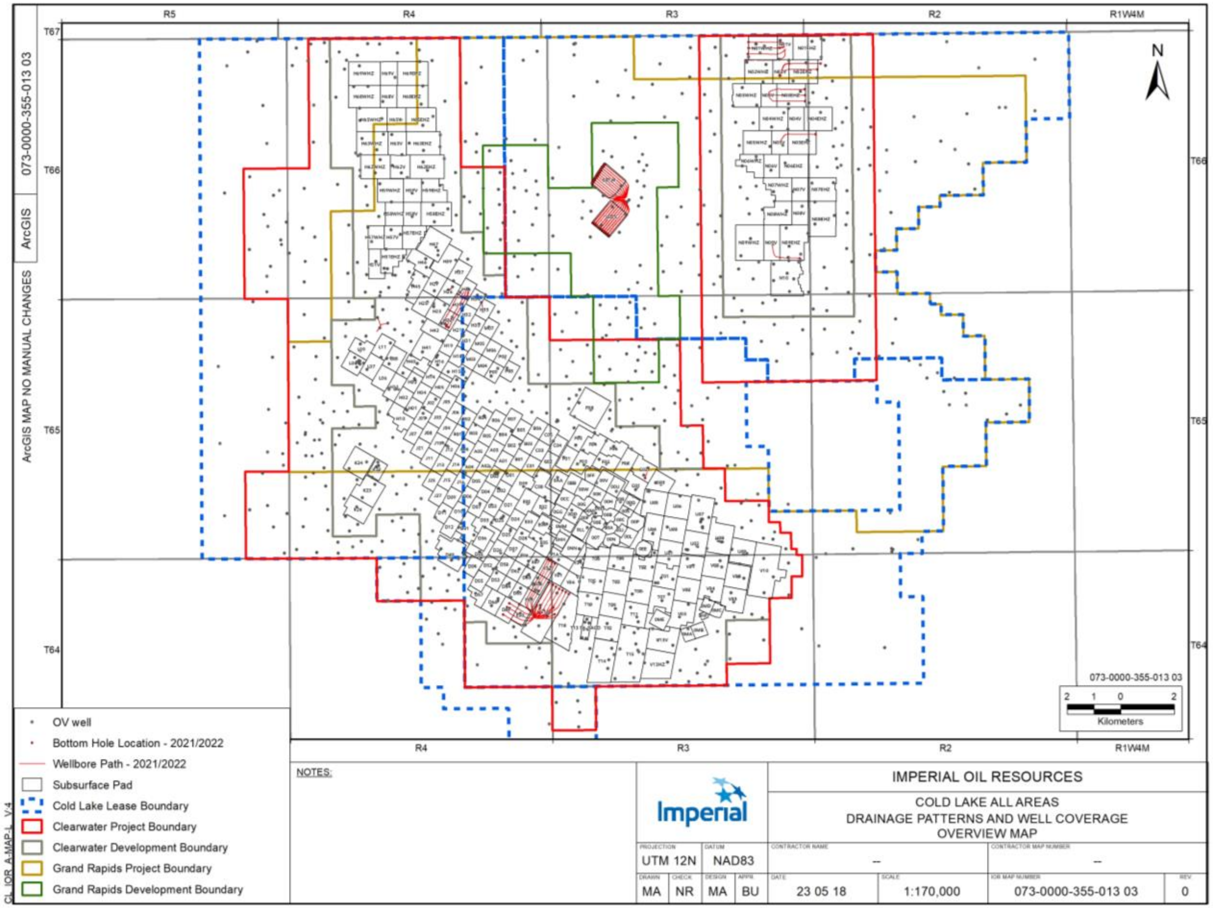
Geoscience Overview

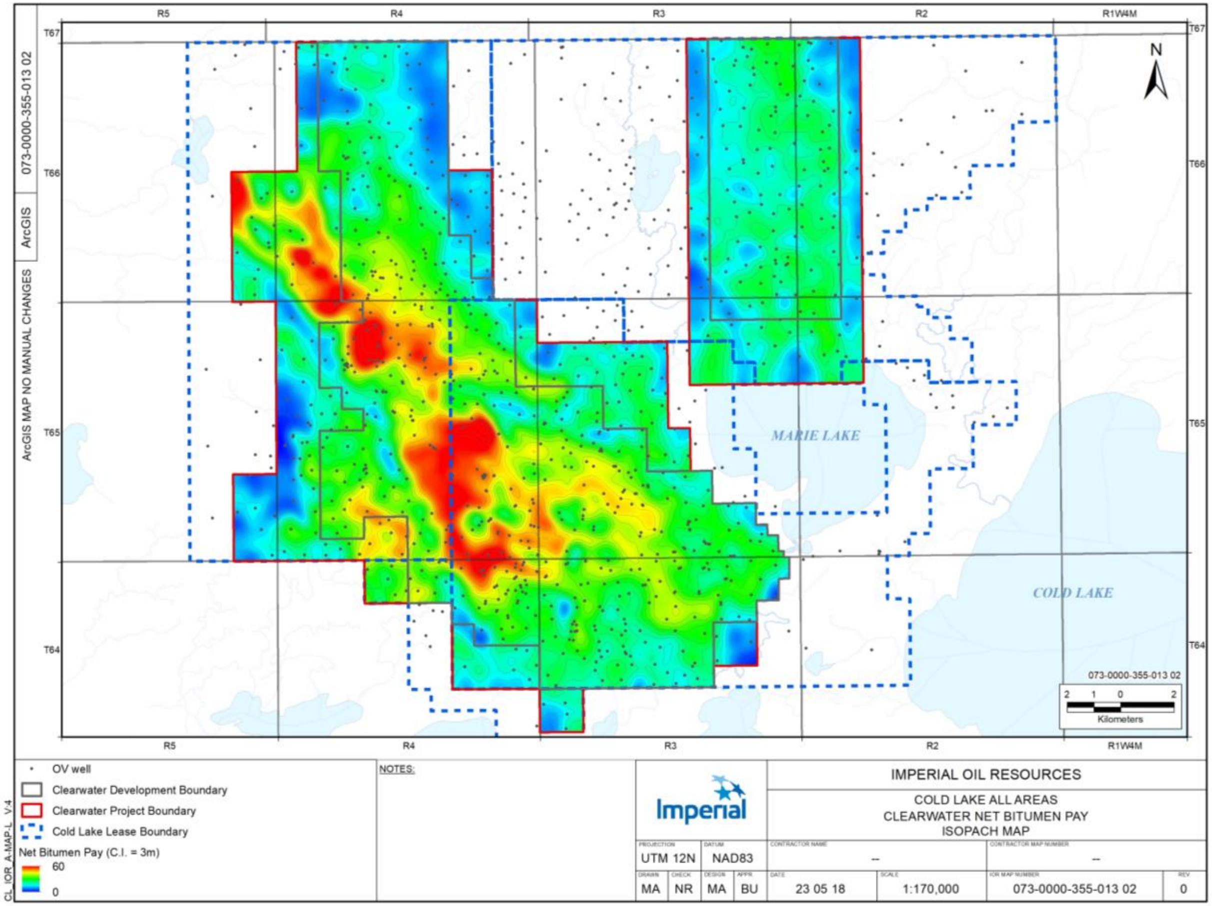
Drilled/Approved Map



Map Illustrates:

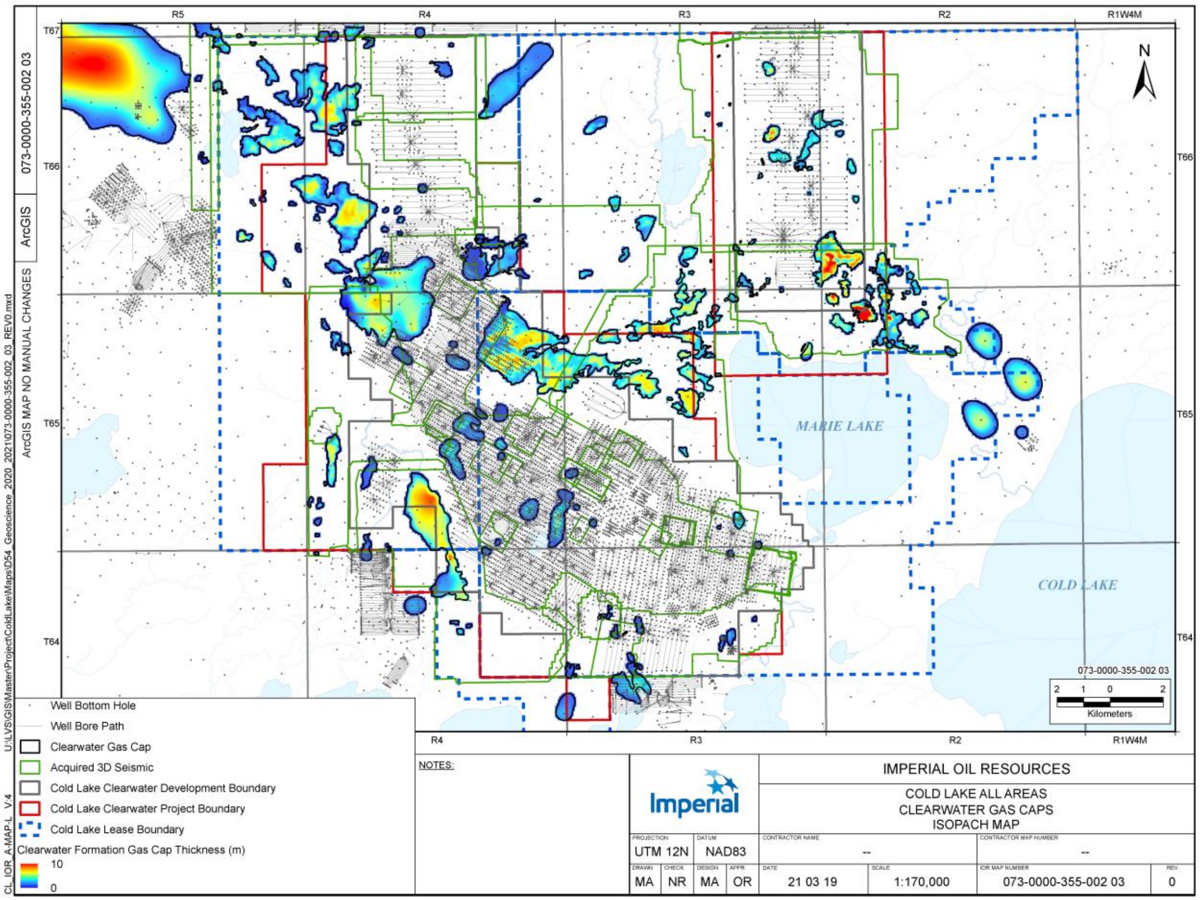
- Approved Project Areas
- Approved Development Areas
- Location and extent of existing development pads
- Annotated drainage pattern areas
- Distribution of oilsands evaluation (OV) core holes
- Wells drilled in 2022

Isopach of Clearwater Net Bitumen Pay



- Map illustrates distribution of pay above 8 wt% saturation cut-off
- Thin pay and pay immediately adjacent to water included in isopach calculation
- Thickness trend is consistent with orientation of main valley incision

Gas/Water Zones in Communication with Pay



- CSS is highly sensitive to contact with potential thief zones.
- Contact with the saline water below operational pads is avoided by imposing a significant stand-off whenever mud barriers are deemed inadequate.
- Large gas caps are avoided, but a few small gas zones are in contact with the Cold Lake CSS operation.

Geomechanical anomalies

- No new open-hole diagnostic fracture injection test (DFIT) tests were performed on the Colorado Group caprock in 2022
- No anomalous fracture closure pressures observed

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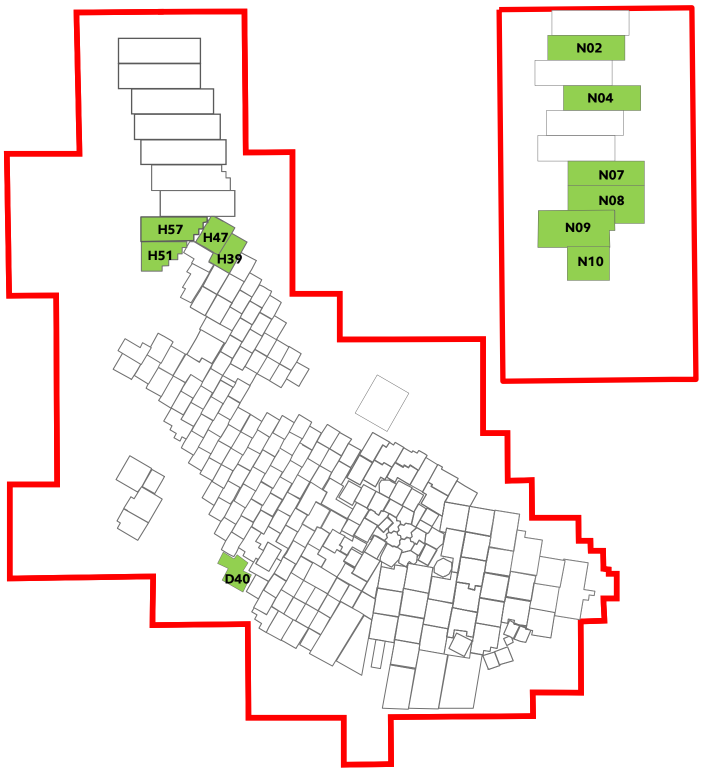
Map of Surface Heave

- The map shows pads that have Interferometric Synthetic Aperture Radar (InSAR) heave data covering CSS steam cycles in 2022
- Subsequent contour plots provided show incremental surface heave during steam windows, where satellite pass corresponds most closely to steam-start/end timing
- In general, surface heave recovers during the production phase as shown in example line plots of surface heave vs time for each pad, where InSAR data was available past the steaming period.



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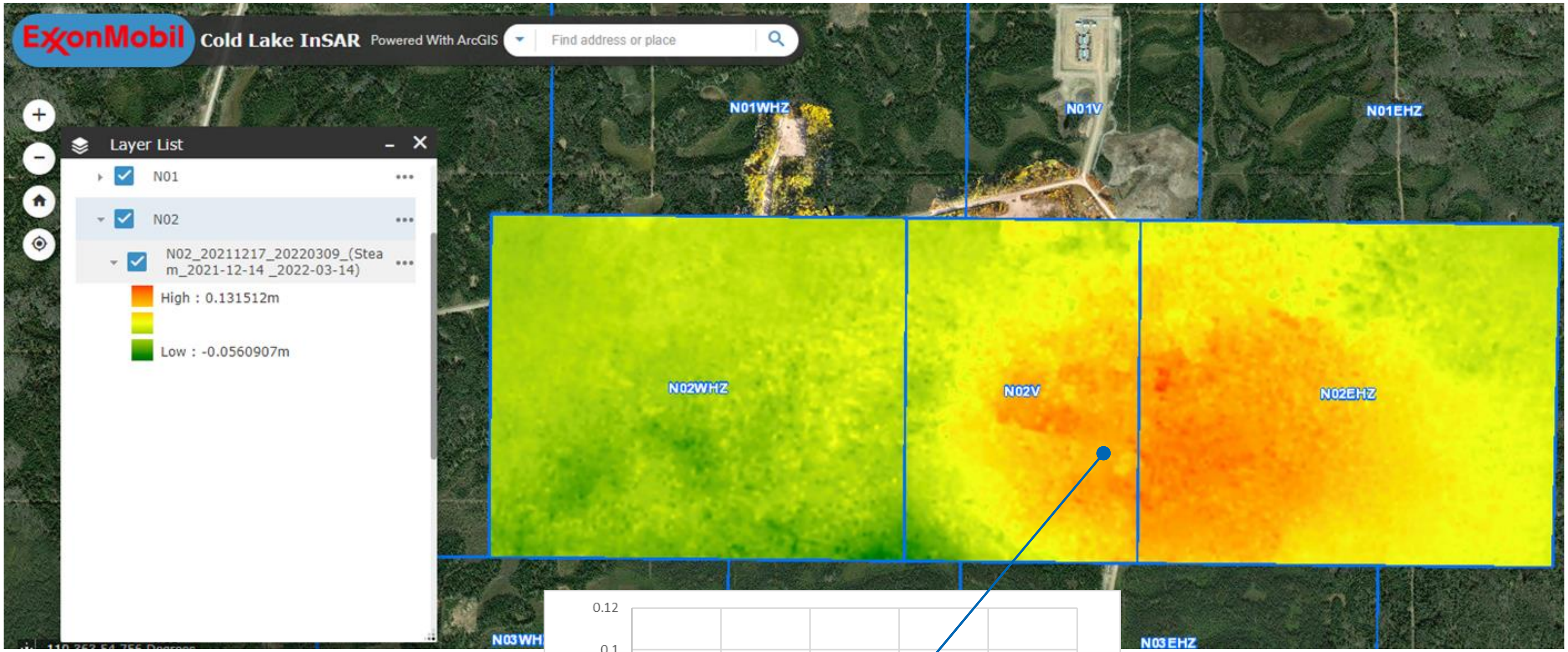
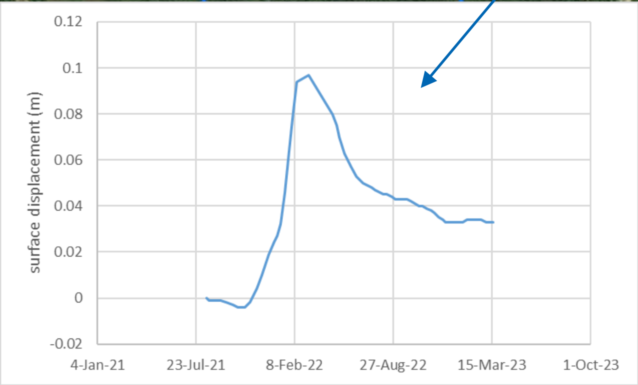
N02 Surface Heave

Steam Timing: Dec 14, 2021 – Mar 14, 2022
InSAR Window: Dec 17, 2021 – Mar 9, 2022





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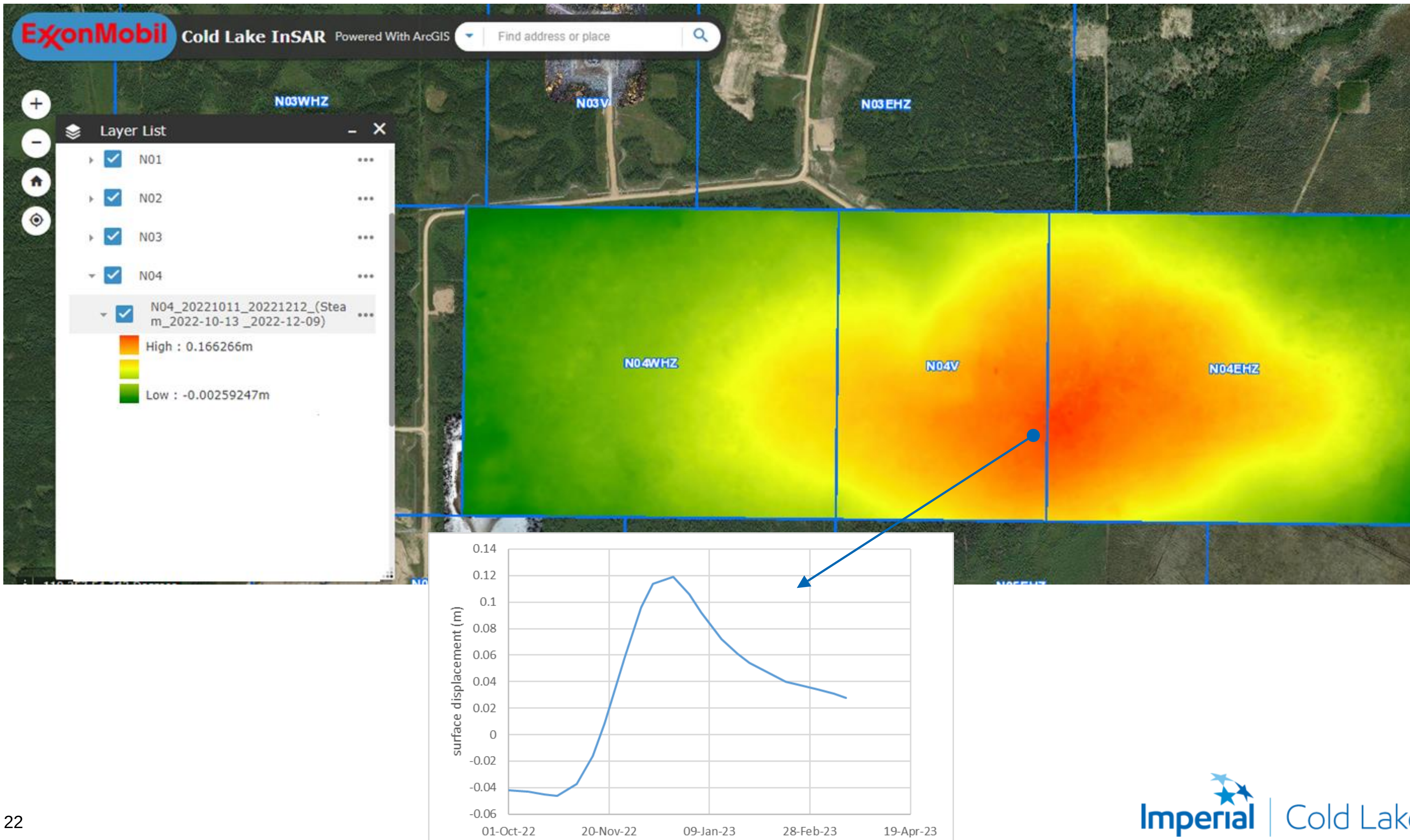
N04 Surface Heave

Steam Timing: Oct 13, 2022 – Dec 9, 2022
InSAR Window: Oct 11, 2022 – Dec 12, 2022



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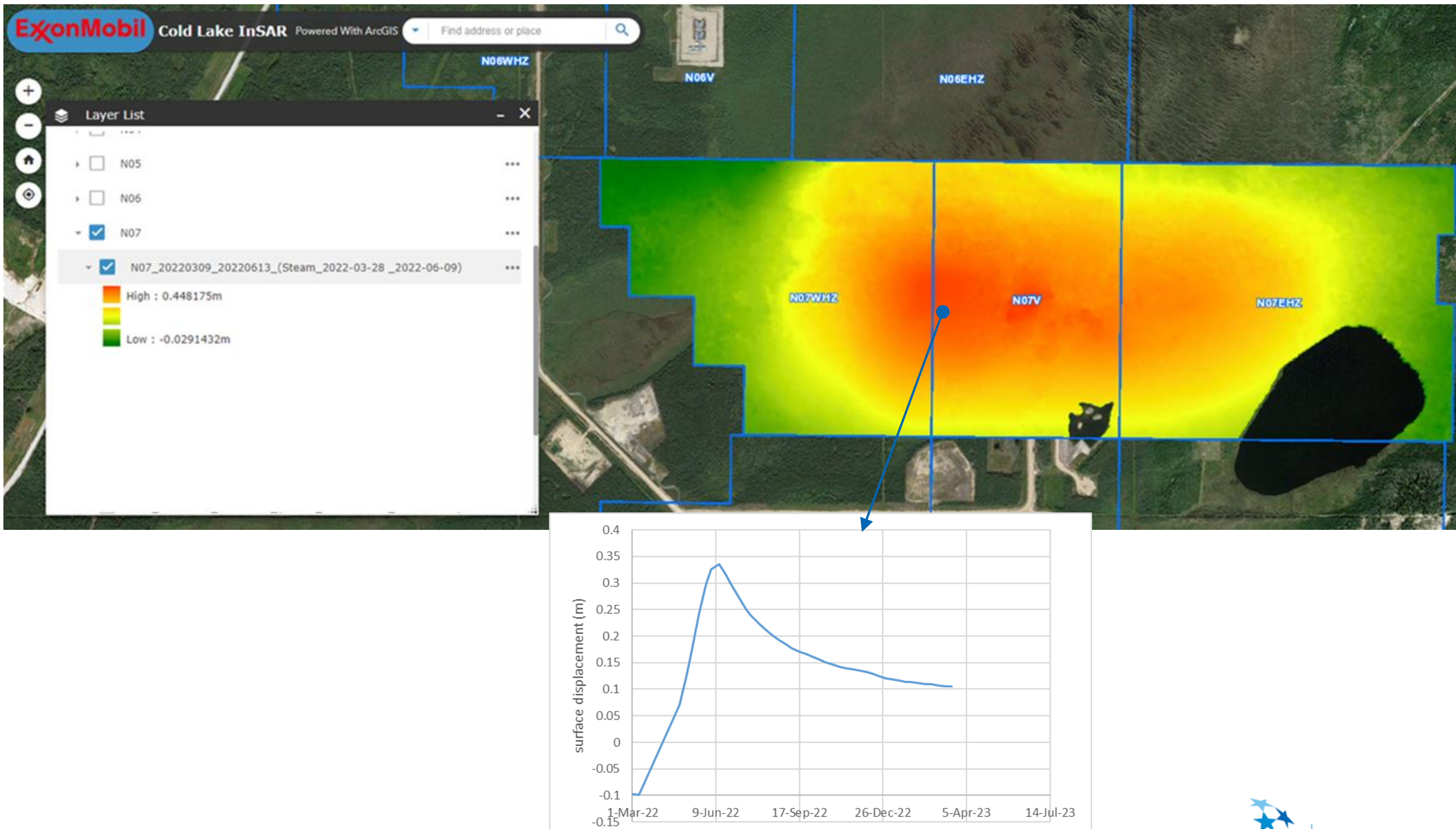
N07 Surface Heave

Steam Timing: Mar 9, 2022 – June 13, 2022
InSAR Window: Mar 28, 2022 –June 9, 2022



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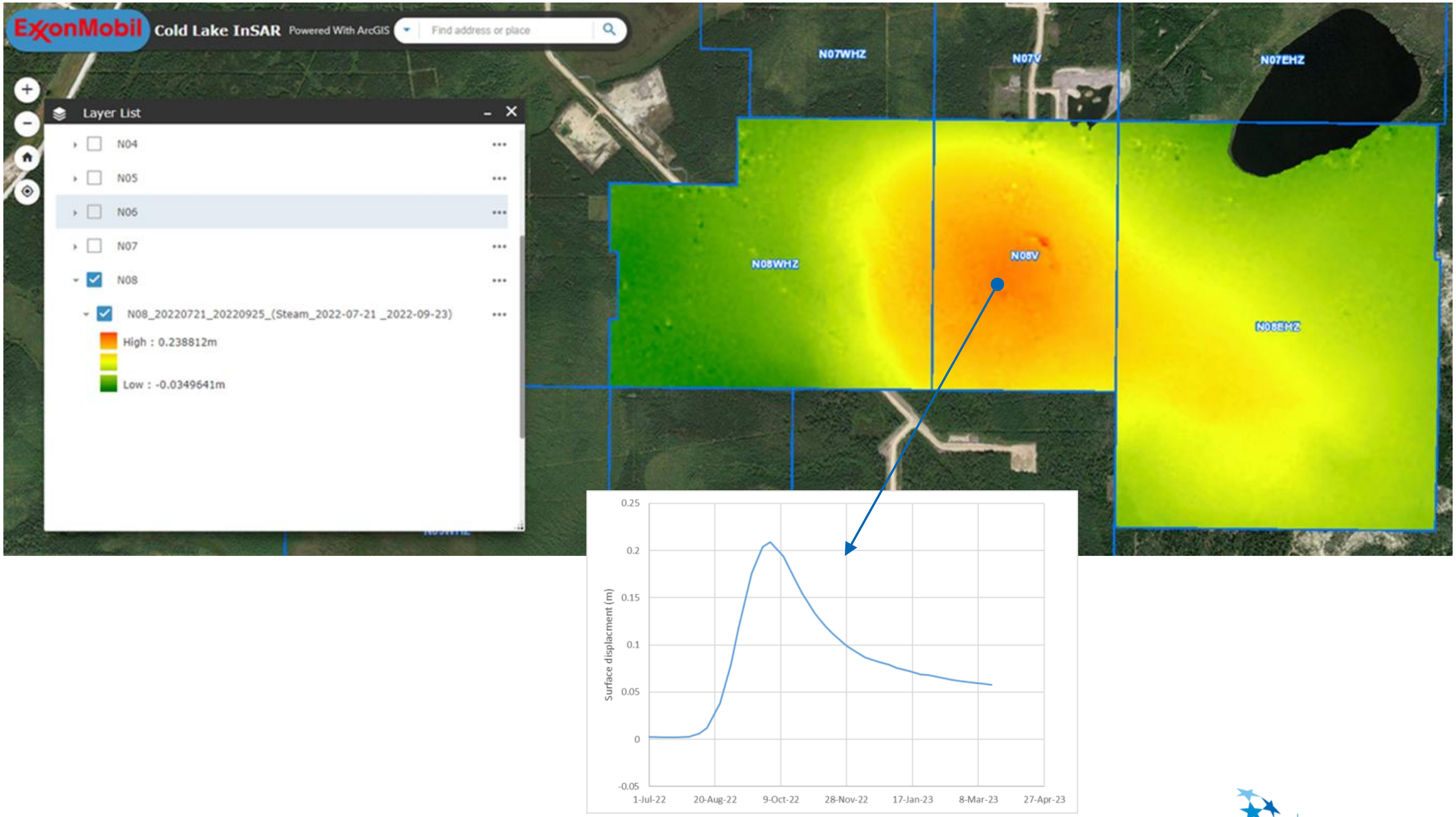
N08 Surface Heave

Steam Timing: July 21, 2022 – Sept 23, 2022
InSAR Window: July 21, 2022 –Sept 25, 2022



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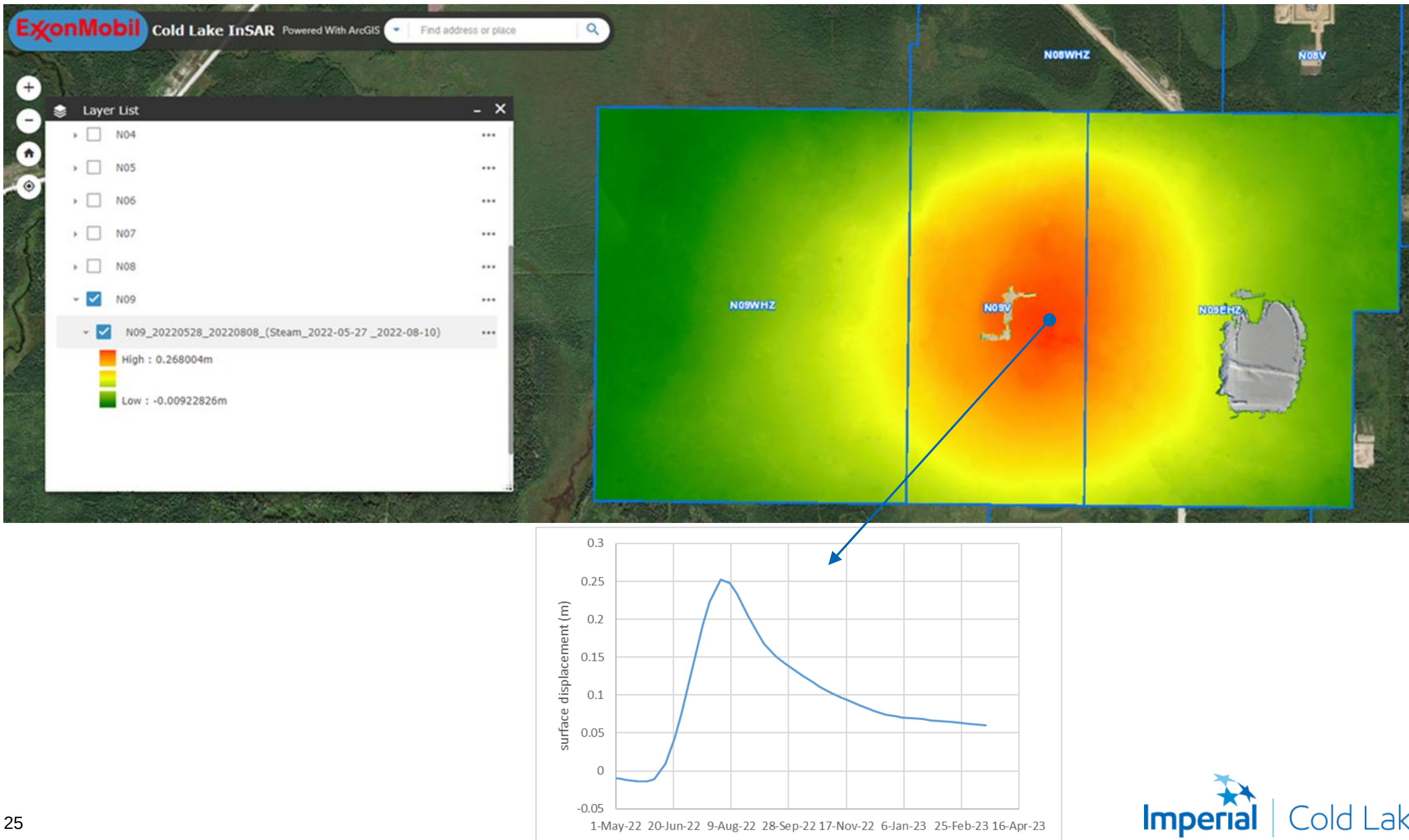
N09 Surface Heave

Steam Timing: May 27, 2022 – Aug 10, 2022
InSAR Window: May 28, 2022 –Aug 8, 2022



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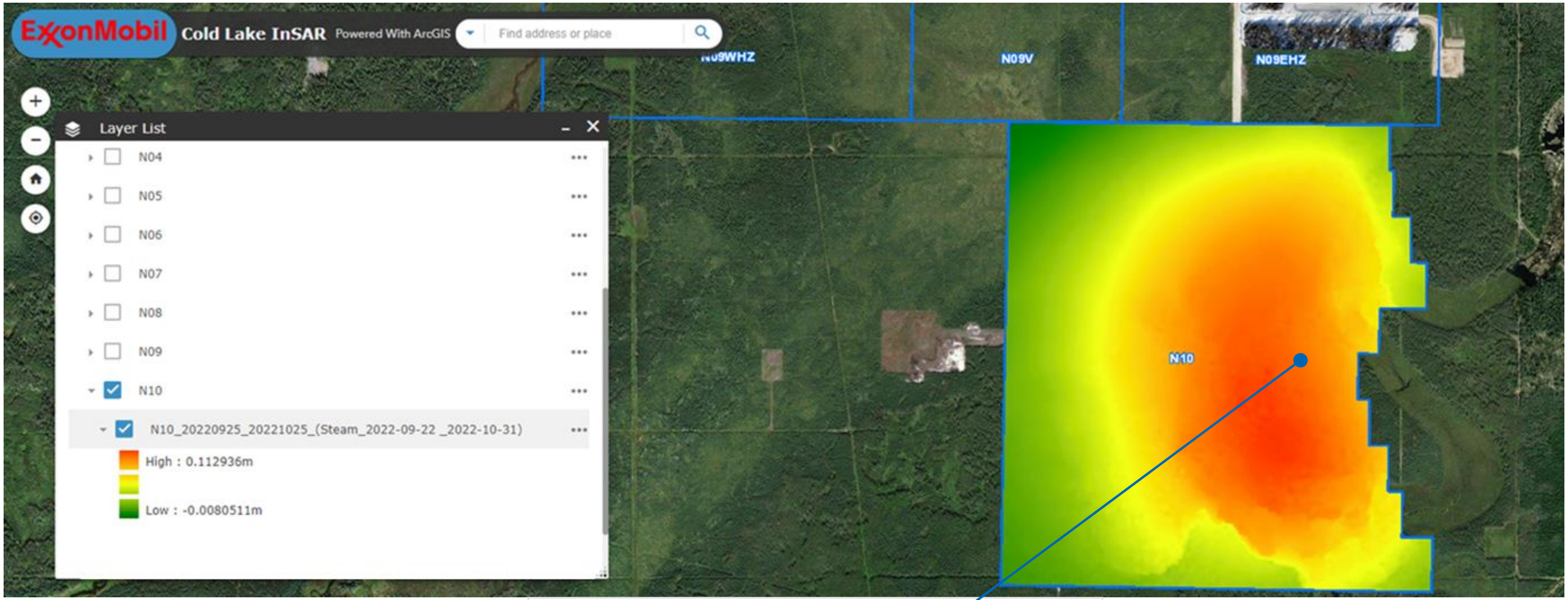
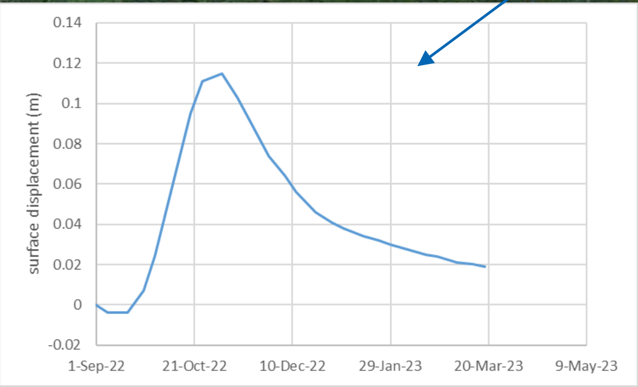
N10 Surface Heave

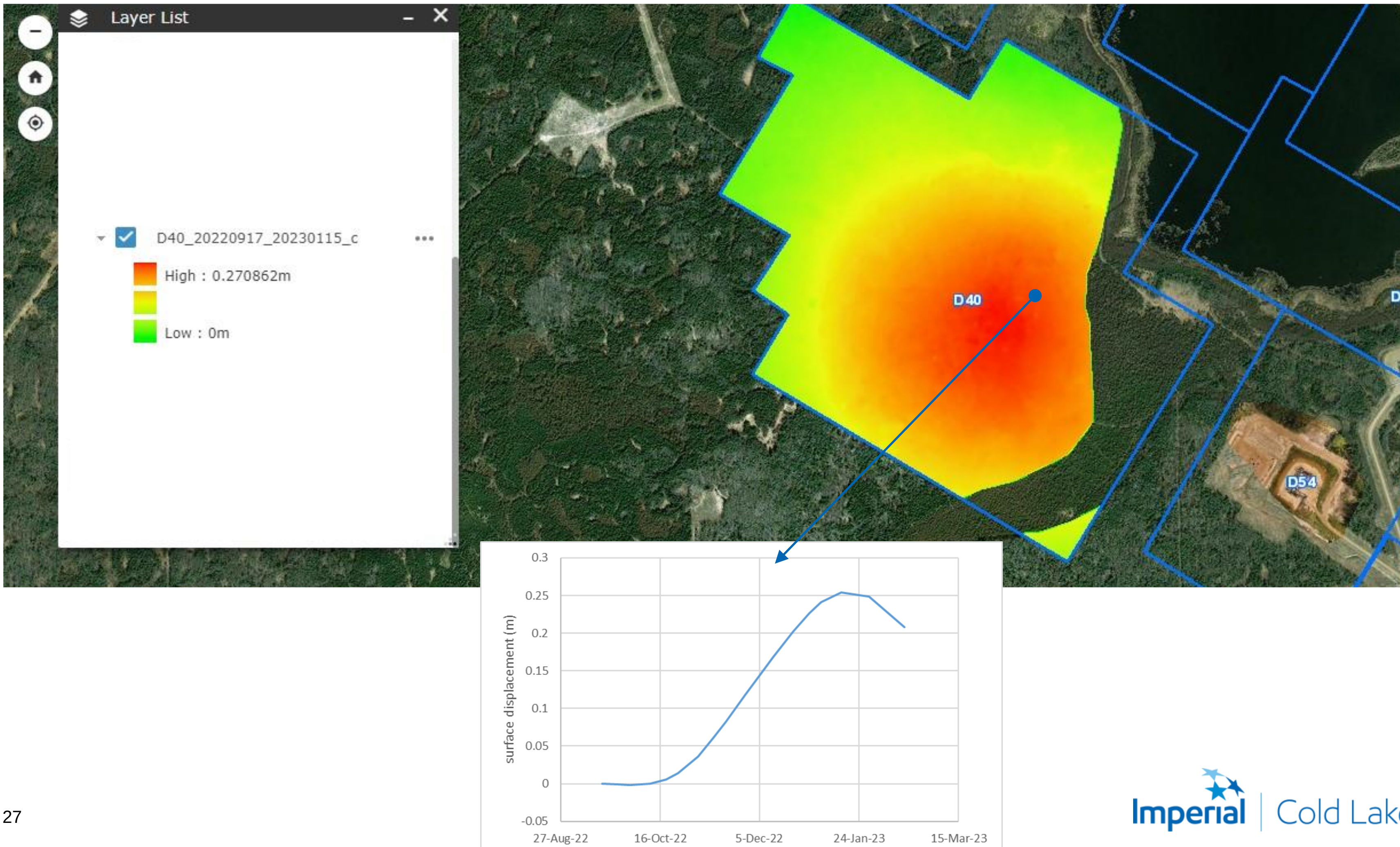
Steam Timing: Sept 22, 2022 – Oct 31, 2022
InSAR Window: Sept 25, 2022 –Oct 25, 2022





D40 Surface Heave

Steam: Oct 8, 2022 – Jan 19, 2023
InSAR: Sep 17, 2022 – Dec 12, 2022



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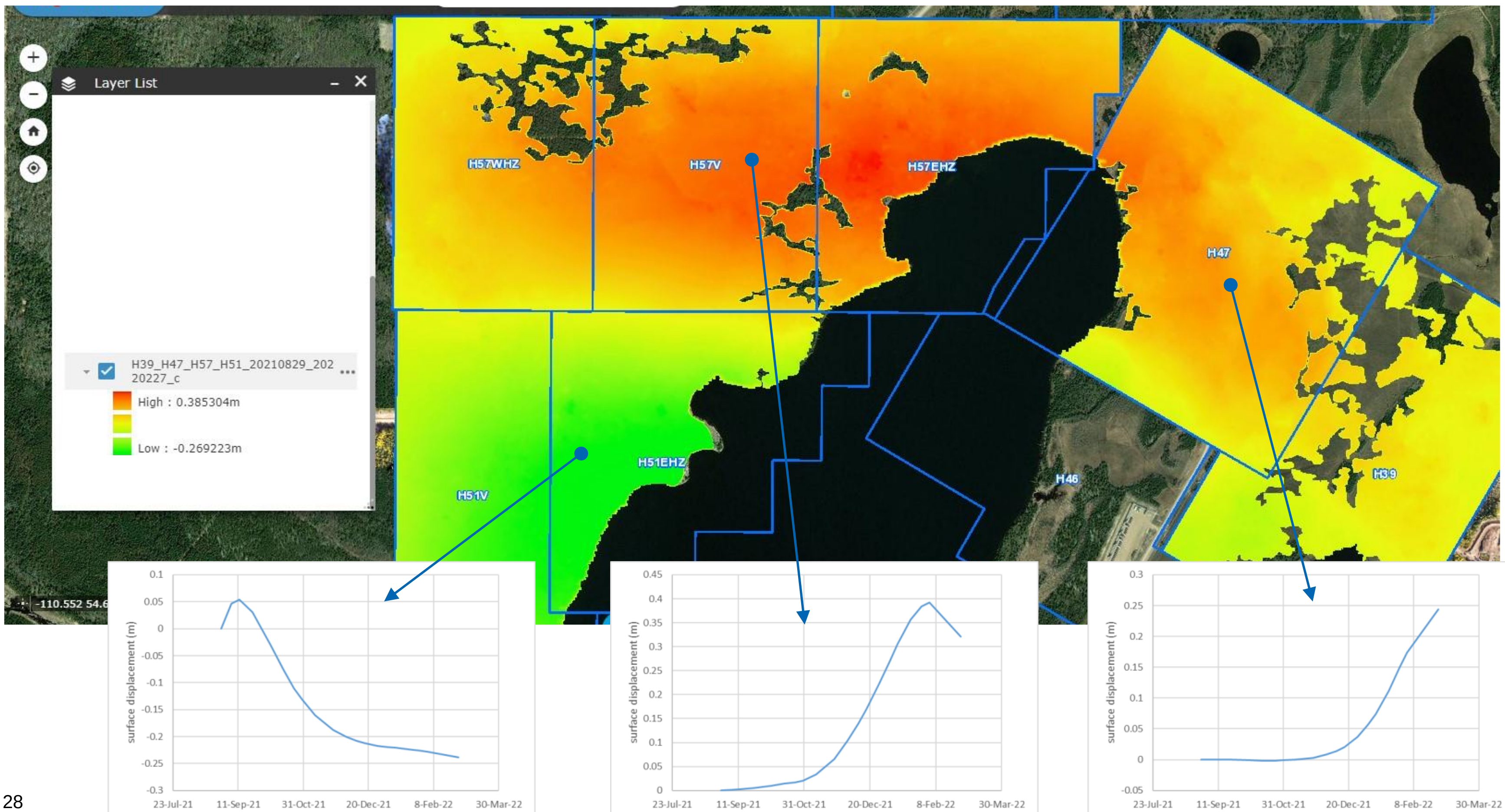
H57, H39, H47, H51 Surface Heave

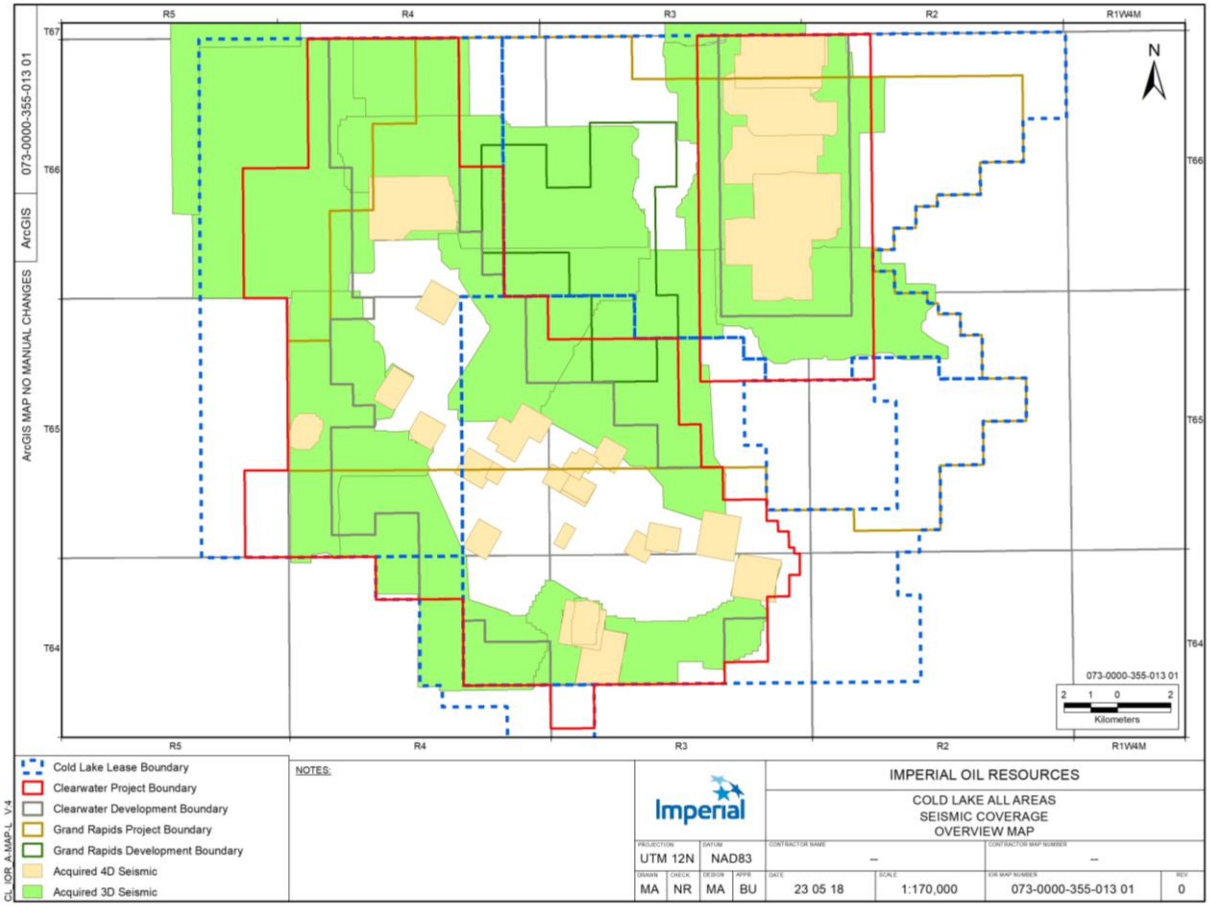
H57 Steam
Steam: Sept 15, 2021 – Feb 11, 2022
InSAR: Aug 29, 2021 – Feb 27, 2022

H39/47 Steam
Steam: Dec 20, 2021 – Mar 2, 2022
InSAR: Aug 29 2021 – Feb 27, 2022

H51 Steam
Steam: June 2 - Sept 10, 2021
InSAR: Aug 29 2021 – Feb 27, 2022
demonstrates heave rebound during production phase



Seismic Acquisition



- No new seismic acquired in 2022

Map Illustrates:

- Approved Project Area
- Approved Development Area
- Current 3D and 4D seismic coverage

Representative Structural Well Log Cross Section

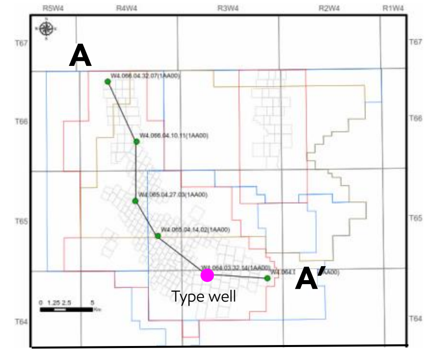
Cross section represents stratigraphic and structural variability within the Clearwater Formation from northwest to southeast.

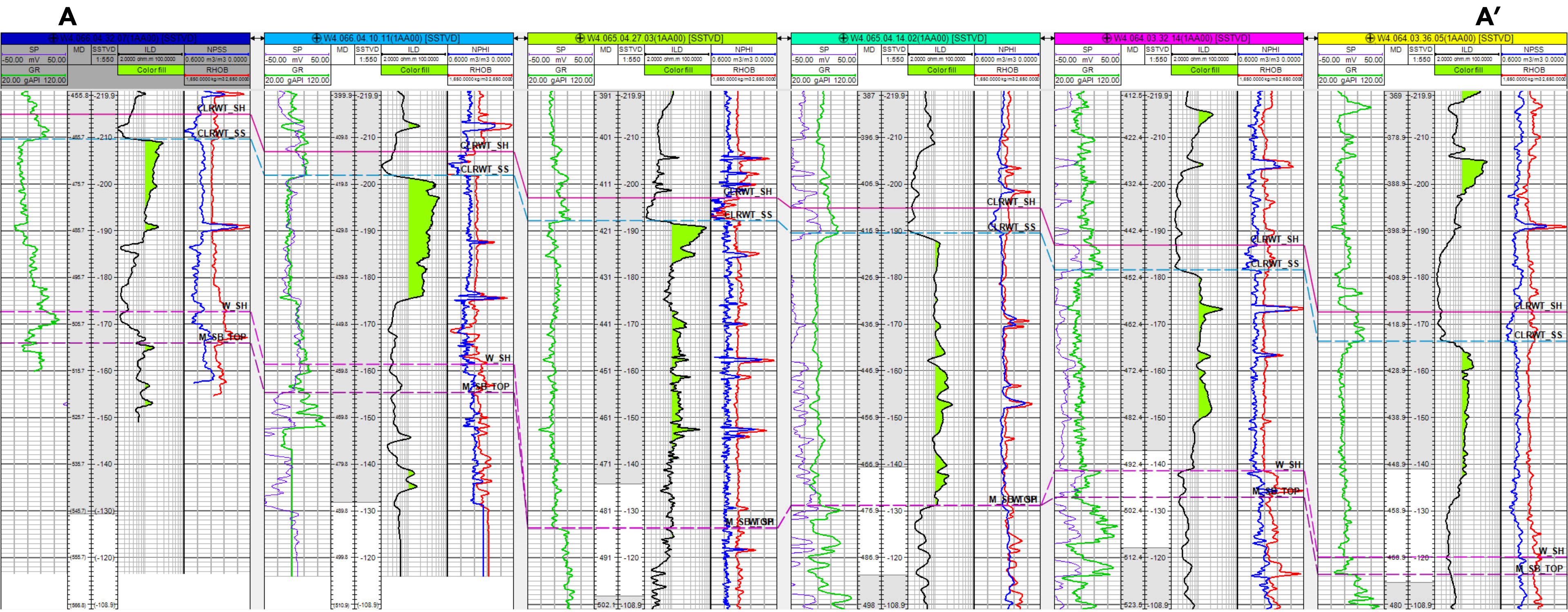
Cold Lake Leases

Clearwater project boundary

Developed pads

Grand Rapids project boundary





CLRWT_SH = Clearwater Shale

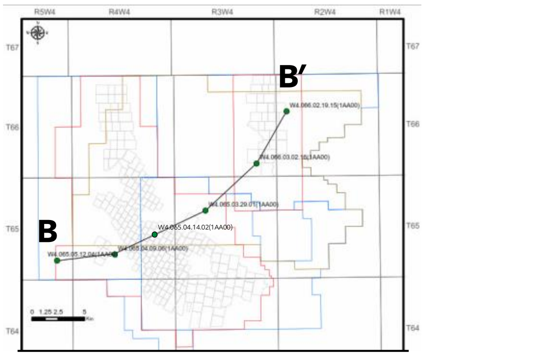
CLRWT_SS = Top of Clearwater Sandstone

W_SH = Wabiskaw Shale

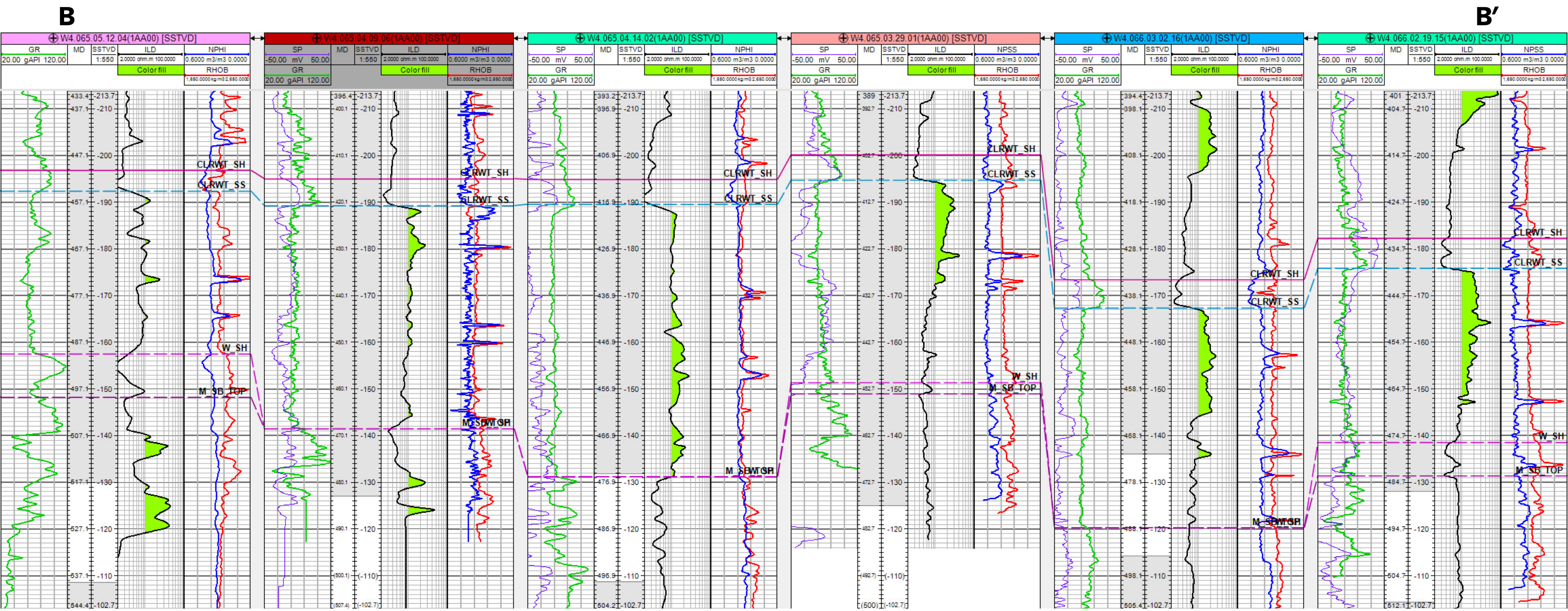
M_SB_TOP = McMurray Sequence Boundary Top

Representative Structural Well Log Cross Section

Cross section represents stratigraphic and structural variability within the Clearwater Formation from southwest to northeast.



- Cold Lake Leases
- Clearwater project boundary
- Developed pads
- Grand Rapids project boundary



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Average Reservoir Properties and OBIP

Reservoir and Fluid Properties

Depth	Clearwater @ 400M
Depositional Facies	Continental scale fluvial-deltaic system
Sands	Unconsolidated, reactive, clay clasts
Diagenetic Cements	Mixed-layer clays
Bitumen API Gravity	10.2
Bitumen Viscosity	100,000 cp @ 13 C 8 cp @ 200C
Bitumen Saturation	Average 70%

Reservoir Property	Range	Average
Porosity	27-35%	33%
Permeability	1-4 Darcies	1.5 Darcies
Bitumen wt%	6-14%	10.5%
Total Net Pay	0-60m	30m

Original-Bitumen-in-Place (OBIP)

Clearwater Fm	*8 Wt %* (E6m3)	*8 Wt %* (MBO)	*% Recovery*
Project Area	2,125	13,366	12.6
Development Area	1,547	9,730	17.3
Combined Active Well Pattern Area	1,029	6,472	26.1

CALCULATION METHOD

OBIP = A * H * So * P

A = Area (m^2)
H = Net pay (m)
So = Oil Saturation (%)
P = avg Porosity

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Pad Reservoir Properties and Recovery Information

Pad Recovery

Pad	Net Pay (m)	Porosity	Permeability (D)	Average Effective So	Effective OBIP (e3m3)	Drainage Area (m2)	Recovery to YE 2022		Ultimate Recovery (% EBIP)
							e3m3	% EBIP	
00A	30	0.33	1.3	0.67	1184	193591	152	13%	EUR = Recovery to Date
00B	27	0.33	1.4	0.68	1772	231800	126	7%	EUR = Recovery to Date
00C	25	0.33	1.2	0.68	1559	211035	216	14%	EUR = Recovery to Date
00D	29	0.33	1.5	0.67	1236	169839	212	17%	EUR = Recovery to Date
00E	28	0.33	1.3	0.69	1257	207993	150	12%	EUR = Recovery to Date
00F	22	0.33	1.4	0.68	1079	151975	233	22%	EUR = Recovery to Date
00G	29	0.34	1.6	0.67	2097	271522	358	17%	EUR = Recovery to Date
00H	28	0.33	1.4	0.69	2010	257344	291	14%	EUR = Recovery to Date
00J	36	0.33	1.3	0.68	850	134339	249	29%	EUR = Recovery to Date
00K	31	0.33	1.7	0.70	1905	233962	489	26%	EUR = Recovery to Date
00L	35	0.34	1.8	0.72	2019	280504	450	22%	EUR = Recovery to Date
00M	26	0.34	1.5	0.66	982	129945	68	7%	EUR = Recovery to Date
00N	28	0.33	1.7	0.67	1648	245719	490	30%	EUR = Recovery to Date
00P	32	0.33	1.7	0.69	2341	331516	714	30%	EUR = Recovery to Date
00Q	35	0.35	2.0	0.73	1988	220552	342	17%	EUR = Recovery to Date
00R	33	0.34	1.6	0.71	1764	210698	116	7%	EUR = Recovery to Date
00S	26	0.34	1.4	0.68	1174	135701	136	12%	EUR = Recovery to Date
00T	35	0.32	1.7	0.70	2644	381551	846	32%	EUR = Recovery to Date
00U	30	0.34	2.0	0.65	2093	311961	1090	52%	52% - 55%
00V	27	0.34	1.8	0.62	1938	339636	767	40%	40% - 45%
00W	26	0.33	1.8	0.65	1895	337998	1392	73%	75% - 80%
0AA	30	0.34	1.8	0.69	2533	322867	1115	44%	EUR = Recovery to Date
0BB	29	0.35	2.0	0.64	2107	324551	1649	78%	80% - 82%
0EE	36	0.33	1.7	0.72	1854	273856	575	31%	EUR = Recovery to Date
0FF	33	0.33	1.8	0.66	1825	248143	1264	69%	69% - 70%
0HF	20	0.33	1.9	0.72	297	60352	102	34%	EUR = Recovery to Date
0HH	19	0.32	1.6	0.66	1032	218243	637	62%	63% - 65%
0LL	22	0.32	1.6	0.67	1587	327247	735	46%	EUR = Recovery to Date
0MA	27	0.33	2.1	0.73	1454	202005	126	9%	EUR = Recovery to Date
0MB	29	0.33	1.7	0.70	1942	251246	452	23%	EUR = Recovery to Date
0MC	26	0.34	2.0	0.78	1087	206478	496	46%	EUR = Recovery to Date
0MD	30	0.33	1.9	0.73	816	209255	496	61%	EUR = Recovery to Date
0ME	31	0.32	1.6	0.71	2276	352968	533	23%	EUR = Recovery to Date

- Pad production updated to Year End 2022
- Effective OBIP (original bitumen in place) is volume of bitumen >8 wt% between top of Effective Pay and base of Effective Pay

Pad Recovery

Pad	Net Pay (m)	Porosity	Permeability (D)	Average Effective So	Effective OBIP (e3m3)	Drainage Area (m2)	Recovery to YE 2022		Ultimate Recovery (% EBIP)
							e3m3	% EBIP	
0MM	23	0.33	1.7	0.63	1607	329151	770	48%	50% - 55%
0NN	21	0.33	1.5	0.66	2252	490646	1058	47%	50% - 55%
A01	28	0.32	1.8	0.65	2010	328813	956	48%	48% - 50%
A02	32	0.32	1.9	0.67	2298	333501	1195	52%	52% - 55%
A03	35	0.32	1.7	0.66	2418	325264	974	40%	40% - 45%
A04	32	0.32	2.0	0.68	2378	330758	1569	66%	66% - 70%
A05	26	0.32	1.7	0.65	1766	326066	841	48%	48% - 50%
A06	35	0.32	1.7	0.65	2475	335476	1228	50%	50% - 70%
B01	28	0.33	1.6	0.64	1994	327465	941	47%	47% - 50%
B02	27	0.34	1.8	0.65	2066	336542	1037	50%	50% - 55%
B03	28	0.33	1.7	0.66	2034	324926	1199	59%	59% - 60%
B04	35	0.33	1.6	0.63	2463	329819	1004	41%	45% - 50%
B05	18	0.33	1.7	0.63	2143	335722	1460	68%	68% - 70%
B06	27	0.33	1.7	0.67	2000	329908	1089	54%	54% - 55%
C01	32	0.32	1.4	0.64	2204	330162	954	43%	43% - 45%
C02	25	0.32	1.5	0.65	1762	328513	1154	65%	65% - 67%
C03	35	0.33	1.7	0.67	2532	324721	1715	68%	68% - 70%
C04	29	0.33	1.7	0.64	2044	330793	942	46%	46% - 50%
C05	29	0.33	1.7	0.65	2105	326483	792	38%	40% - 45%
C08	29	0.34	1.6	0.63	4091	654794	1362	33%	60% - 70%
D01	35	0.32	1.7	0.64	2405	329559	1039	43%	43% - 45%
D02	38	0.32	1.7	0.66	2673	326299	905	34%	55% - 65%
D03	36	0.32	1.9	0.67	2494	318726	1392	56%	60% - 65%
D04	42	0.32	2.0	0.68	3065	331559	1813	59%	75% - 85%
D05	41	0.32	1.9	0.67	2863	325578	1766	62%	65% - 70%
D06	47	0.32	2.3	0.70	3463	322502	3016	87%	90% - 95%
D07	41	0.32	2.1	0.69	3052	330962	2305	76%	80% - 95%
D09	40	0.33	2.2	0.68	3075	330529	2606	85%	85% - 95%
D10	39	0.33	2.2	0.68	2961	325822	2291	77%	80% - 95%
D11	24	0.33	1.3	0.71	2431	319000	80	3%	EUR = Recovery to Date
D12	25	0.33	1.5	0.64	1856	337253	574	31%	31% - 35%
D21	32	0.32	1.5	0.64	2516	329138	885	35%	55% - 65%
D22	38	0.32	1.8	0.67	3027	331542	1545	51%	55% - 60%
D23	34	0.33	1.7	0.64	2847	321196	1563	55%	70% - 80%
D24	32	0.33	1.4	0.63	2232	325490	986	44%	50% - 55%

Pad Recovery

Pad	Net Pay (m)	Porosity	Permeability (D)	Average Effective So	Effective OBIP (e3m3)	Drainage Area (m2)	Recovery to YE 2022		Ultimate Recovery (% EBIP)
							e3m3	% EBIP	
D25	41	0.32	1.7	0.67	2914	326409	1329	46%	55% - 60%
D26	47	0.32	2.1	0.69	3378	325318	1588	47%	47% - 50%
D27	41	0.32	1.8	0.67	2885	322159	1121	39%	40% - 45%
D28	29	0.33	1.4	0.62	2256	373383	981	43%	70% - 75%
D31	42	0.32	2.0	0.69	5438	562341	2935	54%	75% - 90%
D33	31	0.32	1.9	0.67	3453	504798	2306	67%	65% - 70%
D35	36	0.32	1.8	0.66	2966	384577	1202	41%	50% - 60%
D36	32	0.32	1.9	0.69	2902	409002	1257	43%	50% - 60%
D39	30	0.33	1.7	0.63	3541	556388	1325	37%	60% - 70%
D40	21	0.33	1.5	0.65	4390	977926	244	6%	25% - 40%
D51	32	0.33	2.2	0.70	2450	326718	1287	53%	60% - 75%
D52	35	0.33	2.0	0.67	2667	337762	791	30%	30% - 33%
D53	35	0.33	1.9	0.66	2554	331550	1769	69%	70% - 75%
D54	27	0.33	1.5	0.63	1941	334858	652	34%	35% - 40%
D55	28	0.32	1.4	0.61	1878	331475	652	35%	40% - 43%
D57	9	0.32	1.5	0.68	769	380291	97	13%	EUR = Recovery to Date
D62	31	0.34	2.0	0.67	2250	320178	1572	70%	70% - 75%
D63	30	0.34	1.7	0.62	2121	334418	1295	61%	65% - 70%
D64	32	0.32	2.0	0.69	2345	321448	1866	80%	80% - 85%
D65	29	0.32	2.0	0.70	2177	331446	1490	68%	70% - 75%
D66	13	0.33	1.7	0.73	1498	495376	187	12%	EUR = Recovery to Date
D67	27	0.32	1.7	0.67	3031	496595	696	23%	25% - 35%
E01	25	0.33	1.4	0.60	2560	498220	1322	52%	70% - 80%
E02	24	0.33	1.4	0.61	1968	388866	1054	54%	60% - 70%
E03	21	0.33	1.5	0.59	2005	320130	1099	55%	60% - 70%
E04	30	0.33	1.6	0.61	2153	343432	1023	48%	55% - 70%
E05	30	0.33	1.5	0.62	3513	567540	1294	37%	50% - 60%
E07	34	0.34	1.4	0.59	2280	325221	263	12%	EUR = Recovery to Date
E08	24	0.33	1.5	0.62	1664	328747	639	38%	40% - 50%
E09	22	0.32	1.6	0.65	1622	330440	777	48%	50% - 60%
E10	25	0.32	1.7	0.67	1820	330934	631	35%	40% - 50%
E11	20	0.33	1.5	0.64	8334	1908027	1399	17%	35% - 50%
F01	29	0.34	1.7	0.61	2780	454370	1300	47%	50% - 55%
F02	24	0.32	1.5	0.66	2551	482594	820	32%	40% - 50%
F03	28	0.33	1.6	0.63	2958	490118	1666	56%	60% - 70%
F04	23	0.32	1.4	0.64	2446	494641	1176	48%	50% - 60%

Pad Recovery

Pad	Net Pay (m)	Porosity	Permeability (D)	Average Effective So	Effective OBIP (e3m3)	Drainage Area (m2)	Recovery to YE 2022		Ultimate Recovery (% EBIP)
							e3m3	% EBIP	
F05	33	0.34	1.8	0.64	3356	468232	1984	59%	60% - 70%
F06	21	0.33	1.6	0.64	2223	482036	1225	55%	55% - 65%
F07	26	0.33	1.4	0.61	2976	541922	1798	60%	60% - 65%
F08	9	0.33	1.3	0.63	2510	1287327	542	22%	22% - 25%
G01	32	0.33	1.6	0.65	3936	559883	2060	52%	52% - 60%
G02	23	0.33	1.4	0.62	2769	573215	1378	50%	50% - 60%
G03	19	0.33	1.3	0.62	2165	543772	1337	62%	62% - 70%
H01	40	0.32	1.9	0.68	2493	329061	1955	78%	80% - 85%
H02	32	0.32	1.7	0.68	2343	328573	1218	52%	55% - 60%
H03	41	0.33	1.4	0.61	2636	328976	450	17%	25% - 35%
H04	38	0.32	1.2	0.65	2372	326043	515	22%	25% - 30%
H05	40	0.32	1.3	0.64	2565	330248	354	14%	35% - 40%
H10	15	0.32	1.2	0.64	1813	562300	703	39%	40% - 45%
H11	28	0.32	1.5	0.65	2880	488848	1447	50%	60% - 70%
H14	36	0.33	1.4	0.62	2483	330604	422	17%	20% - 25%
H15	29	0.33	1.7	0.65	3069	483319	1349	44%	50% - 60%
H16	24	0.33	1.8	0.66	1734	331365	1038	60%	60% - 65%
H18	29	0.33	2.2	0.69	2171	329107	1003	46%	50% - 55%
H19	27	0.33	1.9	0.67	2027	331169	1364	67%	70% - 75%
H21	28	0.32	1.8	0.68	2074	329180	1525	74%	75% - 80%
H22	30	0.33	2.0	0.68	2227	327559	1448	65%	70% - 75%
H23	28	0.32	1.9	0.68	3325	491421	2418	73%	75% - 80%
H24	24	0.32	1.7	0.69	1790	327075	766	43%	55% - 65%
H25	29	0.33	1.7	0.65	3091	487810	2256	73%	75% - 85%
H26	22	0.33	1.8	0.68	2517	494164	1257	50%	50% - 55%
H27	26	0.33	1.9	0.69	2923	488491	1603	55%	55% - 65%
H31	24	0.33	1.8	0.66	1745	327260	1126	65%	65% - 70%
H32	24	0.32	1.8	0.69	1755	326110	864	49%	50% - 55%
H33	23	0.32	1.7	0.67	1661	329580	666	40%	40% - 50%
H34	19	0.31	1.4	0.68	1386	322027	323	23%	23% - 25%
H35	18	0.32	1.4	0.68	1350	329729	388	29%	30% - 40%
H36	19	0.32	1.4	0.67	1385	330145	354	26%	26% - 30%
H37	13	0.32	1.5	0.68	1452	491579	525	36%	40% - 45%
H39	19	0.32	1.6	0.67	3088	731066	774	25%	35% - 45%
H40	26	0.32	1.4	0.64	2244	402849	1248	56%	60% - 65%

Pad Recovery

Pad	Net Pay (m)	Porosity	Permeability (D)	Average Effective So	Effective OBIP (e3m3)	Drainage Area (m2)	Recovery to YE 2022		Ultimate Recovery (% EBIP)
							e3m3	% EBIP	
H41	37	0.33	1.6	0.64	6349	787380	2252	35%	40% - 50%
H42	27	0.34	1.7	0.63	2852	481573	1888	66%	70% - 75%
H45	28	0.33	1.9	0.67	3632	573025	1426	39%	45% - 55%
H46	26	0.33	1.8	0.67	3415	595398	1870	55%	55% - 65%
H47	21	0.32	1.5	0.67	4326	952906	1503	35%	40% - 60%
H51	25	0.33	1.5	0.63	6307	1178021	1280	20%	40% - 50%
H57	21	0.33	1.4	0.66	8408	1768000	1828	22%	40% - 50%
H58	18	0.33	1.6	0.68	8726	2163529	2630	30%	40% - 50%
H59	18	0.33	1.7	0.70	9191	2186138	2758	30%	40% - 50%
H62	13	0.33	1.6	0.65	7338	2734667	1861	25%	30% - 40%
H63	12	0.33	1.6	0.63	6580	2742767	1675	25%	25% - 35%
H65	12	0.33	1.6	0.64	7021	2641134	1716	24%	25% - 35%
H68	10	0.33	1.5	0.63	5060	2490035	1560	31%	31% - 35%
H69	13	0.33	1.5	0.67	7615	2630744	1178	15%	20% - 30%
J01	37	0.32	2.0	0.70	2748	322674	2262	82%	85% - 95%
J02	33	0.32	1.7	0.67	2022	319882	1431	71%	70% - 75%
J03	39	0.32	2.1	0.69	2648	334676	1906	72%	75% - 90%
J04	44	0.32	1.8	0.66	2512	323742	2011	80%	80% - 85%
J05	35	0.32	1.6	0.65	2188	326851	954	44%	50% - 60%
J06	44	0.33	1.6	0.64	2640	338008	1216	46%	60% - 85%
J07	35	0.32	1.8	0.66	2516	325143	1957	78%	80% - 85%
J08	36	0.33	2.2	0.69	3126	331895	2891	92%	92% - 95%
J10	37	0.32	2.1	0.70	2691	318885	2235	83%	85% - 95%
J11	37	0.33	2.2	0.69	2793	326172	1313	47%	60% - 70%
J12	34	0.32	2.1	0.69	2407	316498	2057	85%	85% - 90%
J13	38	0.32	2.4	0.70	2923	316967	2715	93%	93% - 95%
J14	33	0.32	2.4	0.70	2467	323087	1836	74%	75% - 80%
J15	36	0.33	2.4	0.69	2686	321799	2558	95%	95% - 100%
J16	40	0.32	2.3	0.69	2881	315616	2190	76%	85% - 95%
J21	40	0.33	2.0	0.66	2807	324665	1496	53%	55% - 65%
J25	33	0.33	1.9	0.66	2350	324313	996	42%	50% - 55%
J27	30	0.32	1.7	0.65	2113	328353	461	22%	22% - 25%
K23	17	0.34	1.4	0.59	2876	848469	686	24%	25% - 30%
K24	9	0.34	1.2	0.59	1414	809673	512	36%	36% - 40%
K26	30	0.33	1.3	0.59	3939	651536	309	8%	10% - 15%

Pad Recovery

Pad	Net Pay (m)	Porosity	Permeability (D)	Average Effective So	Effective OBIP (e3m3)	Drainage Area (m2)	Recovery to YE 2022		Ultimate Recovery (% EBIP)
							e3m3	% EBIP	
L05	32	0.32	1.5	0.64	3273	495108	1524	47%	55% - 60%
L06	25	0.32	1.5	0.64	2682	490761	1821	68%	70% - 75%
L07	30	0.33	1.6	0.64	3213	501860	1776	55%	55% - 65%
L08	17	0.32	1.3	0.63	1657	473030	491	30%	40% - 45%
L09	29	0.33	1.3	0.63	2770	453662	657	24%	25% - 30%
L11	35	0.33	1.7	0.65	3627	489812	1688	47%	55% - 65%
M03	31	0.33	2.0	0.67	2313	327035	910	39%	40% - 45%
M04	31	0.33	2.0	0.67	2273	330753	897	39%	40% - 45%
M05	23	0.33	1.7	0.65	1681	327665	670	40%	40% - 45%
M06	26	0.33	1.8	0.66	1891	333545	462	24%	25% - 30%
M07	17	0.32	1.5	0.67	1264	328371	401	32%	32% - 35%
N01	47	0.33	1.5	1.96	8330	2407368	1708	21%	30% - 45%
N02	15	0.33	1.6	0.65	8175	2409732	1158	14%	25% - 35%
N03	42	0.33	1.5	1.97	7598	2401244	984	13%	15% - 25%
N04	15	0.33	1.5	0.66	8042	2399090	1043	13%	15% - 25%
N05	12	0.33	1.5	0.66	6140	2396682	855	14%	15% - 20%
N06	11	0.32	1.5	0.66	5171	2119119	677	13%	15% - 20%
N07	13	0.33	1.6	0.64	6284	2200195	713	11%	15% - 20%
N08	15	0.33	1.5	0.63	8486	2736576	828	10%	15% - 20%
N09	15	0.32	1.6	0.62	10603	3464504	798	8%	15% - 20%
N10	16	0.33	1.4	0.63	5028	1461900	262	5%	10% - 20%
P01	24	0.33	1.9	0.66	1728	317709	800	46%	46% - 50%
P02	22	0.33	1.6	0.65	1497	317130	347	23%	23% - 25%
P03	20	0.33	1.7	0.67	1461	329951	498	34%	34% - 36%
R01	31	0.32	1.8	0.68	2135	313829	1317	62%	62% - 70%
R02	32	0.33	1.5	0.62	2144	317549	1048	49%	60% - 70%
R03	32	0.32	1.5	0.63	2247	336378	923	41%	45% - 55%
R04	28	0.33	1.4	0.63	2015	332424	519	26%	30% - 40%
R05	23	0.32	1.3	0.62	1569	325946	806	51%	55% - 60%
R06	22	0.33	1.5	0.65	1526	324747	480	31%	31% - 33%
R07	18	0.33	1.6	0.64	1301	333947	670	51%	51% - 53%
T01	31	0.33	1.8	0.65	5119	743062	1305	25%	40% - 50%
T02	27	0.34	1.7	0.64	4758	806525	961	20%	40% - 50%
T03	23	0.34	1.6	0.62	3836	775850	904	24%	25% - 40%
T04	23	0.33	1.6	0.64	3867	775056	811	21%	40% - 50%

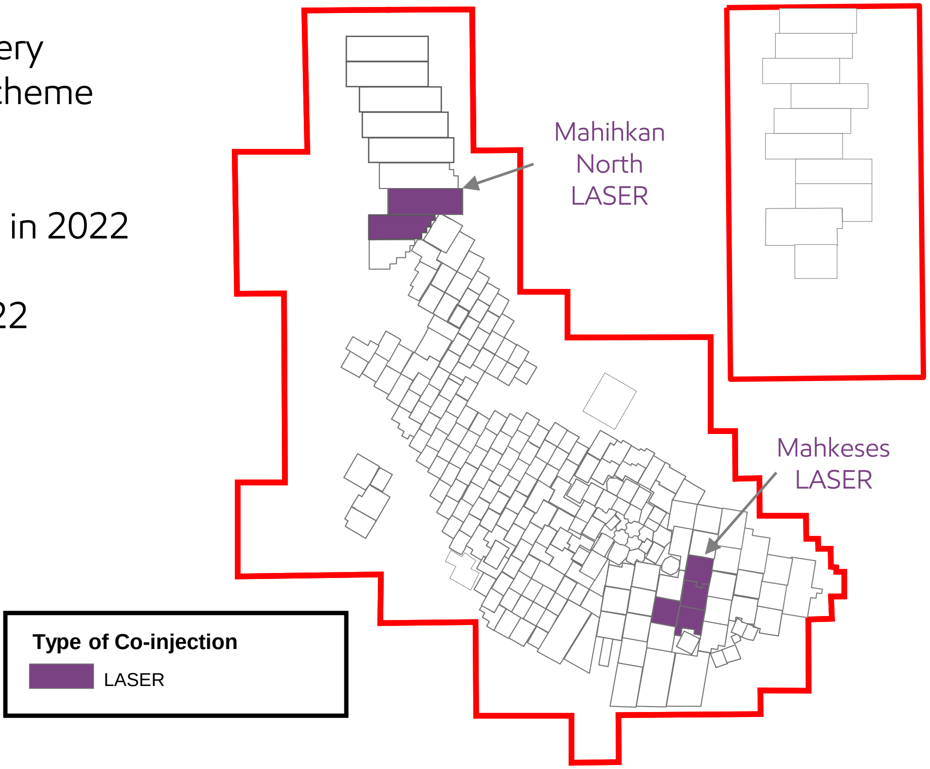
Pad Recovery

Pad	Net Pay (m)	Porosity	Permeability (D)	Average Effective So	Effective OBIP (e3m3)	Drainage Area (m2)	Recovery to YE 2022		Ultimate Recovery (% EBIP)
							e3m3	% EBIP	
T05	30	0.33	1.6	0.63	5087	806129	933	18%	40% - 50%
T06	23	0.34	2.1	0.63	3527	725691	936	27%	45% - 60%
T07	27	0.33	1.8	0.66	4596	745035	1095	24%	40% - 50%
T08	28	0.33	1.6	0.66	4832	774990	901	19%	35% - 50%
T09	24	0.33	1.4	0.62	3998	775378	598	15%	35% - 50%
T10	27	0.32	1.4	0.61	4207	764798	649	15%	20% - 25%
T11	22	0.32	1.5	0.65	3634	774660	728	20%	20% - 25%
T12	22	0.33	1.5	0.63	3663	774955	839	23%	25% - 35%
T14	19	0.33	1.9	0.68	6183	1414932	1223	20%	25% - 35%
T15	19	0.33	1.6	0.64	9513	2263668	1459	15%	20% - 30%
T18	18	0.32	1.4	0.64	5371	1384662	970	18%	20% - 30%
U01	27	0.33	1.7	0.65	4753	809886	1439	30%	40% - 50%
U02	22	0.32	1.2	0.64	3589	778146	1221	34%	45% - 60%
U03	27	0.33	1.5	0.65	4568	775924	1254	27%	50% - 65%
U04	28	0.34	1.6	0.63	4606	742187	1453	32%	40% - 50%
U05	31	0.33	1.7	0.64	5484	805485	1229	22%	35% - 50%
U06	25	0.33	1.5	0.63	4038	776166	780	19%	25% - 30%
U07	20	0.32	1.3	0.62	4843	1177341	1130	23%	30% - 45%
U08	19	0.33	1.2	0.63	4124	1050172	1244	30%	30% - 40%
U09	19	0.32	1.2	0.64	3316	814398	1320	40%	40% - 50%
V01	26	0.33	1.6	0.63	4293	775459	1271	30%	45% - 60%
V02	27	0.34	1.8	0.64	4579	775578	1156	25%	30% - 40%
V03	27	0.33	1.8	0.66	5060	828179	930	18%	30% - 40%
V04	21	0.32	1.3	0.65	3491	740131	1488	43%	45% - 60%
V05	23	0.32	1.2	0.64	3988	790349	1464	37%	40% - 50%
V08	22	0.33	1.4	0.63	3710	775455	1529	41%	45% - 60%
V09	20	0.33	1.5	0.65	3384	740326	1574	47%	50% - 60%
V10	20	0.33	1.4	0.63	8672	2017560	1883	22%	25% - 35%
V13	18	0.33	1.5	0.63	7774	2068506	1350	17%	20% - 30%
Y16	31	0.32	1.5	0.65	2612	393434	1082	41%	50% - 60%
Y31	35	0.32	1.4	0.62	2399	329976	831	35%	50% - 60%
Y32	32	0.33	1.4	0.60	2262	338472	484	21%	45% - 50%
Y34	26	0.34	1.7	0.61	1769	333186	783	44%	50% - 60%
Y36	28	0.32	1.2	0.63	2446	406801	1105	45%	50% - 60%

Co-injection

Map of Co-injection

- Liquid Addition to Steam for Enhanced Recovery (LASER) is the only commercial co-injection scheme implemented at Cold Lake.
- Mahihkan North LASER was applied to 2 pads in 2022
- Mahkeses LASER was applied to 4 pads in 2022



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LASER Co-injection Strategy

Injection

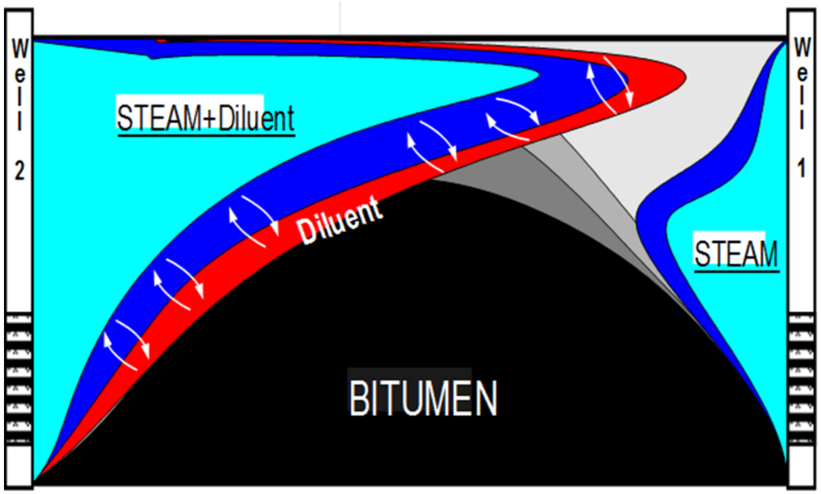
- At the original pilot, diluent was injected at a ratio of 6% diluent volume to cold-water-equivalent steam volume into 8 wells (equivalent to a ratio of 2.4% for the 20 well pad).
- The cycle diluent ratio for the commercial LASER projects at Upper H, Mahihkan North and Mahkeses ranged from 3 – 6% with an average of approximately 5%. H23 pad at Upper H was tested with a diluent ratio as high as 8.6%.
- At Upper H the diluent injection system was located at the individual pads, while at Mahihkan North and Mahkeses the diluent was injected into the steam line that supports the specific pads.
- With the exception of H23 pad, cycle diluent ratio for a pad does not exceed 8%, but the instantaneous diluent ratio can be up to 20% depending on pipeline limits.

Production

- Re-produced diluent is measured at each pad by taking production samples and analyzing the hydrocarbon composition.
- A diluent recovery of approximately 80% has been demonstrated at the Upper H LASER project.
- Produced diluent reduces the amount of diluent that needs to be added at the plant to meet the blend requirement.
- A diluent recovery unit (DRU) that was installed in 2008 (Mahihkan) and 2021 (Mahkeses) which minimizes the volume of diluent that is burned along with the produced gas in the steam generators.

Impact LASER of Co-injection

- The efficiency of the CSS process decreases with time due to the following factors:
  - More steam is required each cycle to pressurize the steam chamber as the depletion level increases
  - Inter-well communication makes it more difficult to confine steam and build pressure
  - Heat loss to the overburden increases as the steam chamber grows
- Co-injection of diluent provides another mobilization mechanism that increases the efficiency of mid-to late-cycle CSS. Injected diluent condenses and mixes with unswept bitumen, lowering its viscosity.
- Higher bitumen mobility increases the OSR and reduces the greenhouse gas intensity of the process.
- LASER operations were not predicted to have an impact on wellbore integrity based on earlier trial phases. Operating results over the past year in Mahihkan North and Mahkeses have further affirmed those prior experiences.



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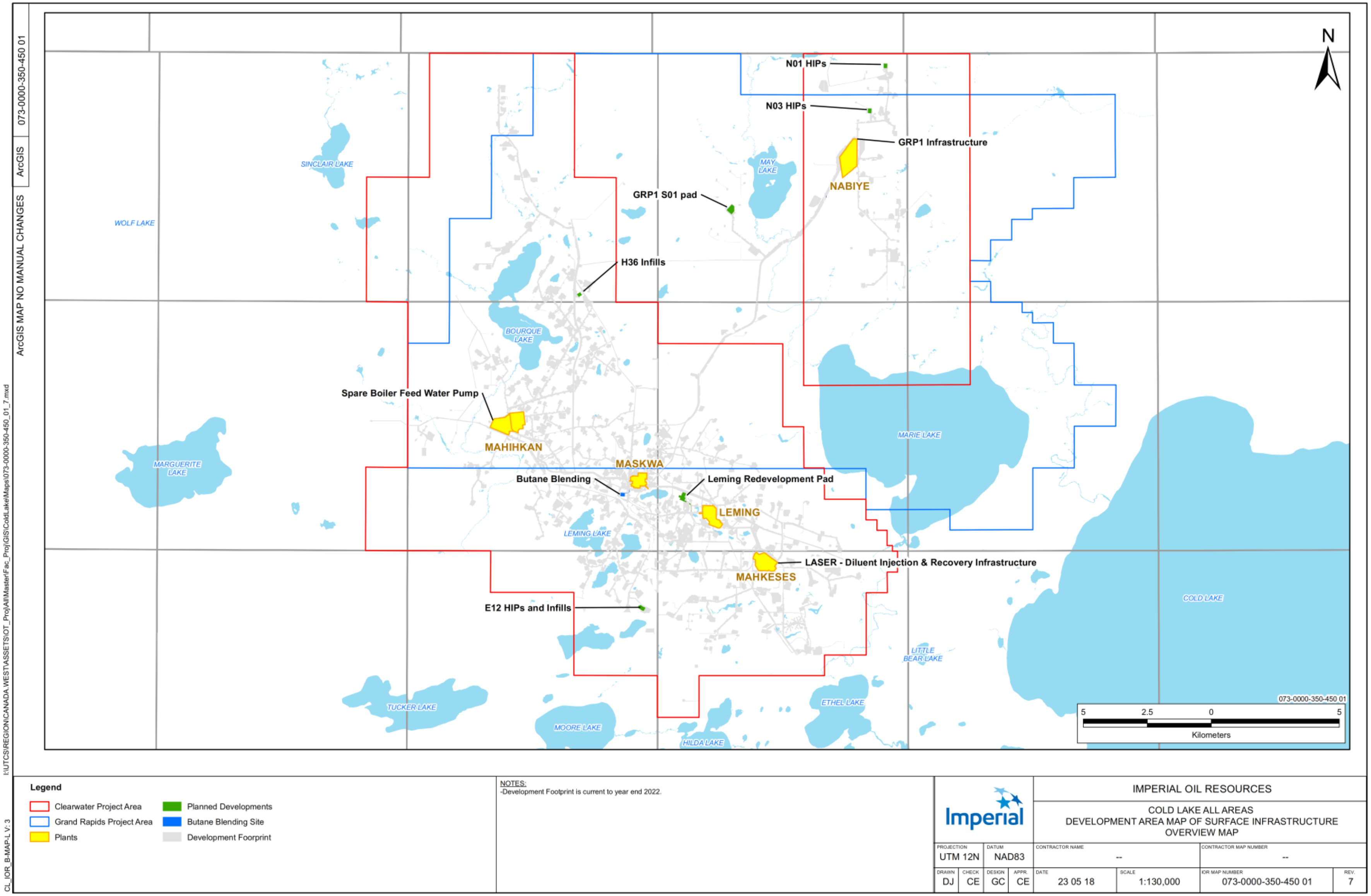
Surface

Built and Planned Surface Infrastructure



Map illustrates newly built/planned surface infrastructure from January 2022 – December 2022.

Facility Modifications

- Grand Rapids Phase 1 (Nabiye Central Processing Facility (CPF))
  - Construction progressed to add infrastructure.
- Butane blending
  - Construction was completed to add a butane blending facility at the Maskwa CPF. Started up in Q2 2022.
- Maskwa non-condensable gas steamflood (NCG-SF)
  - Construction progressed to add a compressor at the Maskwa CPF.

Comparison of Annual Operational Bitumen/Steam Rates to Design

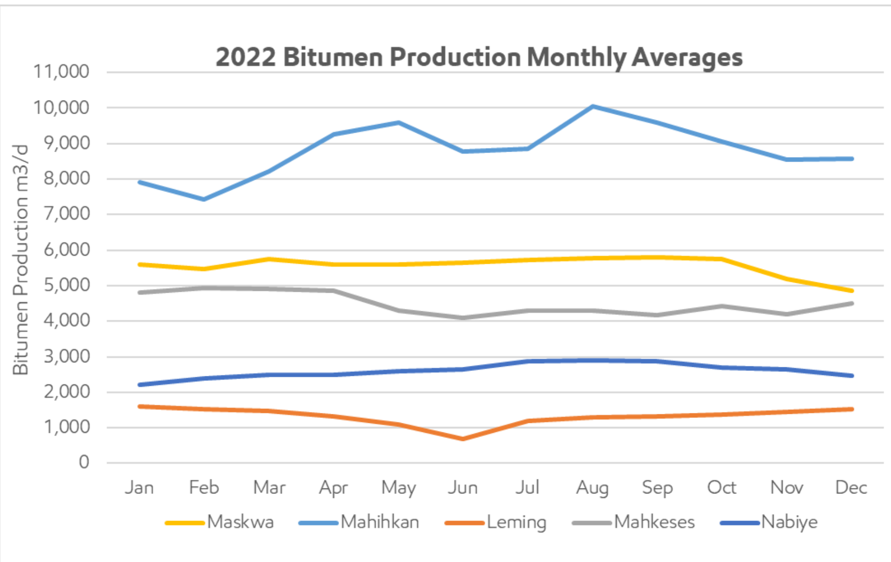
Approval 8558 Plant Limits

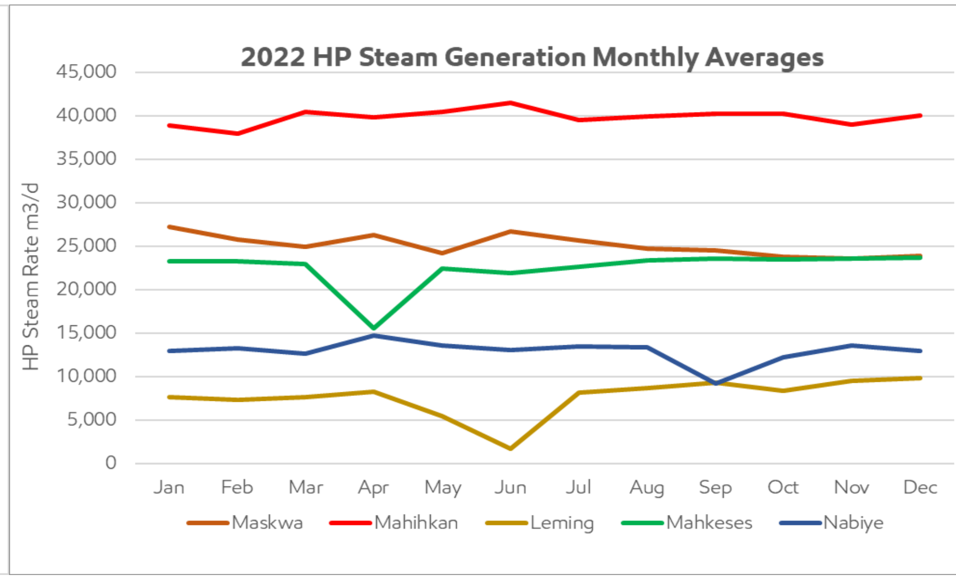
Agency	Maximum Daily Inlet Limits	Units	Maskwa	Mahihkan	Mahkeses	Leming	Nabiye	District
AER	Bitumen Inlet	m^3/d	11,000	15,000	8,000	5,000	8,000	40,000
AER	Gas Inlet	km^3/d	600	600	500	250	280	--
AER	Water Inlet	m^3/d	38,000	50,000	28,000	13,500	22,665	--
AER	H_2S Inlet Composition	mol/kmol	9.99	10.00	9.99	9.99	20.00	--
AER	Sulphur Inlet	t/d	8.13	3.00	4.43	3.39	3.76	--
Agency	**Maximum Daily Emission Limits**	**Units**	**Maskwa**	**Mahihkan**	**Mahkeses**	**Leming**	**Nabiye**	**District**
AER	Sulphur	t/d	2.00	3.00	2.00	1.05	1.11	--
AER	NOx	kg/hr	196.66	167.3	135.00	80.24	135.75	--
AER	CO_2	t/d	4,532.00	4,500.00	4,917.00	1,596.40	4323.00	--
AER	Continuous Flaring	km^3/d	0	0	0	0	0	--
AER	Continuous Venting	km^3/d	0	0	0.02	0	0.16	--
AENV	Sulphur Dioxide (SO_2)	t/d	4.00	--	--	2.10	--	13.15
AENV	NOx	kg/hr	--	--	126.00	--	135.75	--
Agency	**Calendar Quarter-Year Daily AVERAGE Emission Limits**	**Units**	**Maskwa**	**Mahihkan**	**Mahkeses**	**Leming**	**Nabiye**	**District**
AER	Sulphur	t/d	1.00	--	--	1.00	--	--
AER	Inlet Produced Gas Sulphur Recovery	%	70.0%	69.7%	69.7%	--	70.0%	--
AENV	Sulphur Dioxide (SO_2)	t/d	--	1.80	1.08	--	1.08	--

Facility Performance

Bitumen Production	Maskwa	Mahihkan	Leming	Mahkeses	Nabiye	District
Daily Inlet Bitumen Limit (m^3/d)	11,000	15,000	8,000	5,000	8,000	40,000
Actual Jan/22 – Dec/22 (m^3/d)	5,565	8,830	1,322	4,479	2,606	22,802

High Pressure (HP) Steam Generation	Maskwa	Mahihkan	Leming	Mahkeses	Nabiye	District
Design Steam Generation Capacity (m^3/d)	27,816	41,724	10,958	23,200	23,200	126,898
Actual Jan/22 – Dec/22 (m^3/d)	25,105	39,835	7,690	22,499	12,931	108,060





Major Scheduled Downtime in 2022

- Mahkeses Slowdown – 22 days in April
- Nabiye Slowdown – 22 days in September/October
- Leming Shutdown – 28 days in June

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Calendar quarter-year average sulphur emissions and recovery

As per approval 8558 Clause 10, all Maskwa, Mahkeses and Nabiye sulphur requirements were met

Q1 2022	Sulphur Inlet rate Tonnes / day	Sulphur Inlet Total Tonnes	Sulphur Recovered Tonnes (%)	Sulphur Recovery Required (69.7%) Tonnes	Surplus / Deficit Tonnes
Maskwa	1.15	103.28	0	71.99	-72.0
Mahkeses	1.86	167.75	124.46 (74.2%)	116.92	7.54
Nabiye	1.26	113.67	95.70 (84.2%)	79.23	16.47

Mahkeses and Nabiye Q1 sulphur recovery requirements met.
47.99 additional tonnes of recovery required in Q2 and Q3 to meet Maskwa Q1 sulphur recovery requirement as per approval 8558.

Q2 2022	Sulphur Inlet rate Tonnes / day	Sulphur Inlet Total Tonnes	Sulphur Recovered Tonnes (%)	Sulphur Recovery Required (69.7%) Tonnes	Surplus / Deficit Tonnes
Maskwa	0.90	81.72	0	0	0
Mahkeses	1.67	151.89	121.50 (80%)	105.87	15.63
Nabiye	1.69	154.21	130.00 (84.3%)	107.48	22.52

Mahkeses, Nabiye and Maskwa Q2 sulphur recovery requirements met.
9.84 additional tonnes of recovery required in Q3 to meet Maskwa Q1 sulphur recovery requirement.

Q3 2022	Sulphur Inlet rate Tonnes / day	Sulphur Inlet Total Tonnes	Sulphur Recovered Tonnes	Sulphur Recovery Required (69.7%) Tonnes	Surplus / Deficit Tonnes
Maskwa	0.93	85.88	0	0	0
Mahkeses	1.60	146.82	103.99 (70.8%)	102.33	1.66
Nabiye*	1.56	115.37	89.13 (77.3%)	80.41	8.72

*18 maintenance days at Nabiye from July 19 – August 5 for planned outage activities and improvements on the tower internals to enhance future recovery performance and reliability.

Mahkeses, Nabiye and Maskwa Q3 sulphur recovery requirements met.
Maskwa Q1 sulphur recovery requirement met in Q3.

Calendar quarter-year average sulphur emissions and recovery

Q4 2022	Sulphur Inlet rate Tonnes / day	Sulphur Inlet Total Tonnes	Sulphur Recovered Tonnes	Sulphur Recovery Required (69.7%) Tonnes	Surplus / Deficit Tonnes
Maskwa	0.99	91.36	0	0	0
Mahkeses	1.77	162.83	119.16 (73.2%)	113.49	5.67
Nabiye	1.51	139.3	97.93 (70.3%)	97.1	0.83

Mahkeses, Nabiye and Maskwa Q4 sulphur recovery requirements met.

Historical and Upcoming Activity

Summary of Suspension/ Abandonment Activity

Abandonment Outlook

Historic Assessments Supporting Abandonment Scope

- 'Flow Behind Pipe' assessment in 2011-2012 (E07 pad testing) confirmed:
  - Hydraulic isolation exists behind casing at key formation tops on Cold Lake wellbores.
  - Post-steam cement bond logs are not required as they do not reflect the high degree of hydraulic isolation behind casing.
- Aquifer isolation study completed in 2016 confirmed that isolation of aquifers at the time of full subsurface abandonment is not necessary

Pad Level Well Abandonment

- 0CC and 0DD Pads subsurface abandonments complete 4Q2022; surface abandonments cut & cap completed on final 7 wells 1Q2023
- D57 Pad subsurface abandonment complete 1Q2022, surface abandonment cut & cap completed 1Q 2023
- 0LL Pad all wells subsurface abandoned, all cut & capped 1Q2023 except 1 well being monitored
- 00N Pad all wells subsurface abandoned, all cut & capped 1Q2023 except 1 well being monitored
- D55 Pad subsurface abandonment initiated 4Q2022; cut & cap planned 2023+
- 00Q Pad all wells subsurface abandonment complete 2Q2022, cut & cap initiated 1Q2023+; 00S pad abandonment planned 2023+
- E07 pad subsurface abandonment planned 2023+

Individual Well Abandonment

- 20 shale monitoring well abandonments: 14 fully subsurface abandoned in prior years. Of the remaining 6, 5 surface abandonment cut & caps completed 1Q2022; 1 surface abandonment planned by 3Q2023
- 15 other individual well (11 on pad, 4 single well) subsurface abandonments completed in 2022

Suspension/Abandonment Justification

Pad	Recovery Factor (% EBIP)	Justification for Abandonment
00N	30%	Pad had reached end of economic viability. The CSS wells were approved to be converted to water disposal wells in 2001, but have since discontinued injection in favor of injecting into disposal wells in the Cambrian reservoir.
00Q	17%	Pilot pad drilled to study the impact of spacing on CSS recovery, wells are at higher risk of near surface or intermediate casing failures due to the casing material, connection type and risk of external corrosion.
00S	12%	Pilot pad drilled to study the impact of spacing on CSS recovery, wells are at higher risk of near surface or intermediate casing failures due to the casing material, connection type and risk of external corrosion. Select wells may be retained for future development monitoring.
0LL	46%	Pad has reached end of economic viability and will not receive future steam.
B03	59%	Awaiting results of field trial before abandoning.
D55	35%	Pad has reached end of economic viability and will not receive future steam.
E07	12%	Resource redeveloped with horizontal wells from D29 pad as E07 pad restricted to lower steam volumes following an oil-in-shale anomaly encountered while drilling leading to suboptimal CSS performance.

Summary of Recent Regulatory and Operational Changes

Regulatory Approvals in 2022

Application Title	Brief Summary	Application Number	Application Category	Approval Number	Approval Date
Mahkeses Pumps replacement	Replace three positive displacement diluent injection pumps with two 800hp motor driven multi-stage centrifugal pumps	1937691	Category 1 Scheme Amendment	Letter	2022-05-30
SO1 MOP and Trajectory scheme	-Extension of the SO1W Northern well pair trajectories by 0-70m -Additional use of short term temporary MOP increases for injectors	1938146	Category 2 Scheme Amendment	8558AAA	2022-07-05
Nabiye 2nd Lagoon	Construct and operate a second hot lime softener sludge lagoon at Nabiye CPF	1936535	Category 2 Scheme Amendment	8558BBB	2022-08-08
Mahihkan Pumps install	Install a 75 horse-power high-flow HLE pump between the Hot Lime Softener outlet and the After-Filter inlet header at Mahihkan CPF	1941217	Category 1 Scheme Amendment	Letter	2022-12-08

Summary of Scheme Performance

District

- 6 wells were re-drilled or sidetracked in CSS and steamflood areas across district to improve overall recovery efficiency.
- Salt Water Disposal capacity was restored on wells 02-03 and 01-32 after pipeline release in Nov 2021

Maskwa

- Over recovery of sulphur at Mahkeses and Nabiye continues to offset sulphur production at Maskwa allowing additional bitumen production from Maskwa.
- Drilled HIP and IOI wells at E12 pad to infill multiple pads from a common surface location. First injection is planned for 2023.

Mahihkan

- H87(CSS), H91(LASER), and H92(LASER) HIPs started production for the first time. This is the first application of a "2x infill" strategy in Cold Lake. Studies showed that 2x infilling demonstrates higher recovery levels in HIPs (compared to 1x) and enables steamflood at 8-acre pads in late life.
- H36 Infill wells were drilled. First injection is planned for 2023.

Mahkeses

- Select pads at Mahkeses transitioned from CSS to LASER recovery method receiving diluent injection for the first time in 2022.

Nabiye

- N01 HIP and N03 HIP wells were drilled. First injection is planned for 2023.
- Grand Rapids Phase 1 S01 Pad wells started drilling in 2022. First injection is planned for 2023.

Lessons and Successes

Regulatory

- Improved pipeline right of way maintenance and surveillance
- Stack tested a number for boilers across the district to understand NOx emissions in compliance with the Multi-Sector Air Pollutants Regulation (MSAPR)
- Successfully tested alternative liquid sulphur scavenger at Nabiye
- Completed hot lime softener (HLS) emissions testing at Mahihkan, confirming HLS emissions are negligible relative to other emissions sources at Cold Lake. Received confirmation from the AER that HLS does not need to be added to Environmental Protection and Enhancement Act (EPEA) approval as an approved emissions source.
- Successful full scale deployment emergency response exercise combining a well scenario event with a cyber security event occurring simultaneously
- Received waiver from the AER for Nabiye sulphur recovery unit (SRU) maintenance outage

Lessons and Successes

Operational

- Performed first bi-directional inline inspection (ILI) in upstream history on Mahihkan ground water (GW) pipeline to gain line of sight to integrity and end of life
- Replaced the Mahkeses diluent injection system (DIS) positive displacement (PD) pumps with centrifugal pumps to improve reliability

Pilot Updates

T13 SA-SAGD Pilot

- Research surveillance was completed in 2021. Wells were produced until September 2021. No current plans to resume steam injection.

Account of Compliance History

- 38 AER reportable releases
  - 8% reduction in government reportable spills compared to previous year and approximately a 17% reduction relative to 2020
- 84 AER Inspections (including post incident inspections)
  - (75) inspections satisfactory, (9) inspections resulted in non-compliances, (6) inspection resulted in information requests
- 3 voluntary self-disclosures (operational compliance in nature)
  - (1) Pipeline abandonment notification exceeded 90 days
  - (1) Damage to secondary containment Mahihkan calcium tank
  - (1) Maskwa to dilbit shipping pipeline overpressure
- 4 contraventions
  - (2) EPEA 1-hr NOx limit exceedances at Mahkeses
  - (1) Low gas heat value at Maskwa
  - (1) Wildlife mortality
- 6 Grand Rapids monitoring notifications
  - (2) pressure increases exceeding 80% of the fracture closure pressure calculated at the base of the Joli Fou Formation
  - (4) pressure increases exceeded 200 kPa over a 24 hour period
  - (0) injectivity events with pressure increases
- No bitumen in shale anomalies detected in the Colorado Shale Group

Future Plans

Scheme Performance Outlook

District
- Niche rig drilling program planned to redrill multiple wells in high and low pressure areas across district to increase volumes
- Planned to drill approved produced water disposal well in Cambrian formation to enable continued oil production with increasing water production

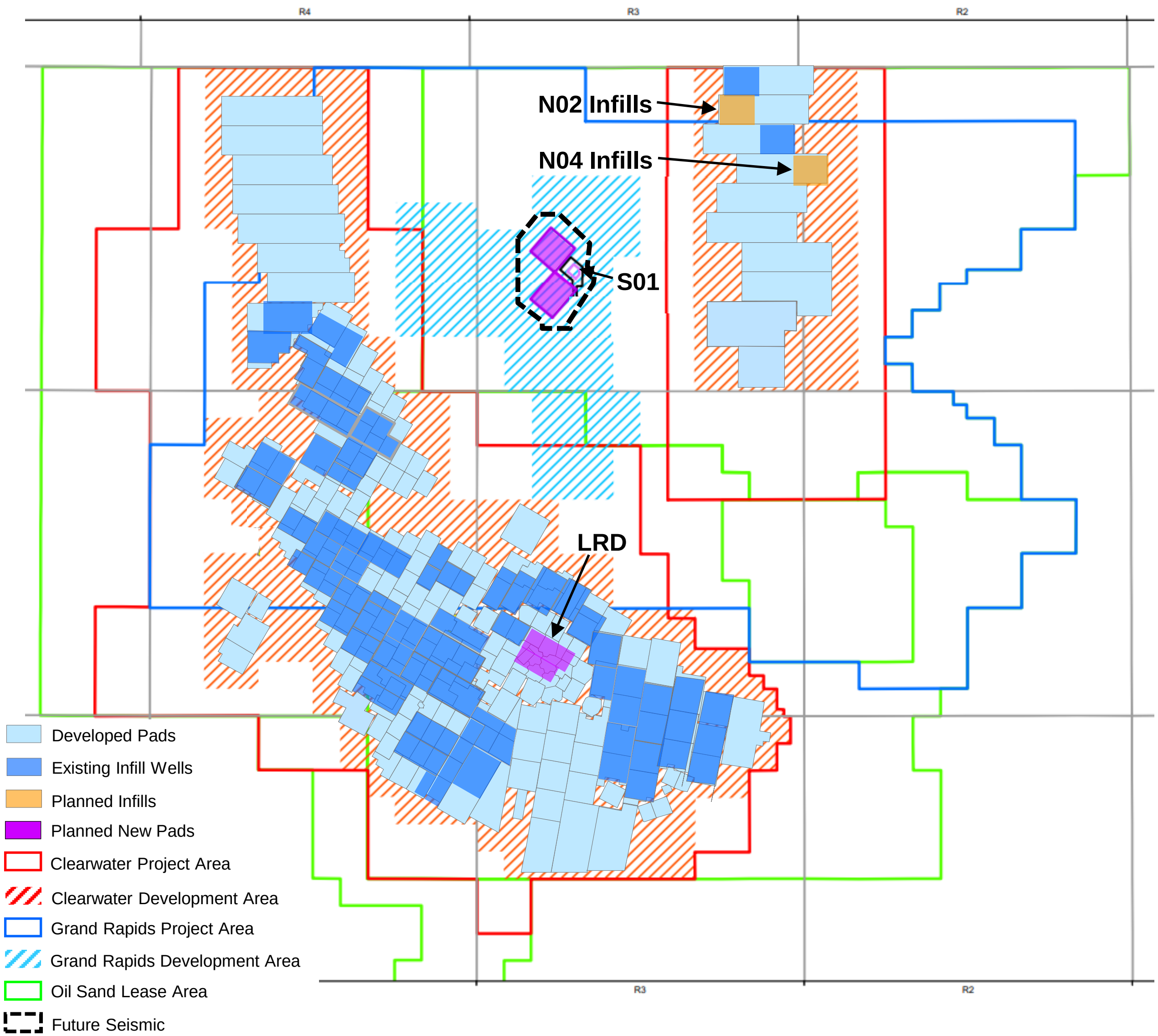
Leming
- Planned to drill Leming Redevelopment (LRD) SAGD wells to redevelop low-recovery CSS pilot area

Mahkeses
- Cycle 1 of LASER diluent injection planned at select pads to increase oil recovery and decrease emissions intensity

Maskwa
- Planned to start-up both HIP and IOI wells at E12 pad infilling multiple pads from a common surface location

Nabiye
- Planned to start-up first commercial SA-SAGD wells into Grand Rapids reservoir at GRP1 S01 pads
- Niche rig planned to redrill horizontal wells with liner integrity issues to improve steam distribution and productivity
- Niche rig planned to drill HIP wells on portions of N02 and N04 pads to increase interwell communication and transition to low pressure recovery processes; similar HIP wells on portions of N01 and N03 pads planned to start-up

Map of 5 Year Planned Development



- Planned developments represent only commercial technologies (i.e., CSS, SAGD, SA-SAGD)

AER Applications Outlook

The following is a list of scheme and EPEA regulatory applications expected to be submitted to AER in 2023 and early 2024.

- Air monitoring proposal EPEA Amendment application
- Carbon Capture and Storage(CCS) EPEA and Scheme amendment application