ConocoPhillips

Surmont In Situ Oil Sands Project

Directive 054 Submission & Annual OSCA Report

Commercial Scheme Approval No. 9426
EPEA Approval No. 48263-01-00, as amended
Class 1b Disposal Approval No. 10044M

Reporting Period: January 1, 2020 to December 31, 2020

Submission Date: June 30, 2021

Scope

This submission is intended to provide information in compliance with:

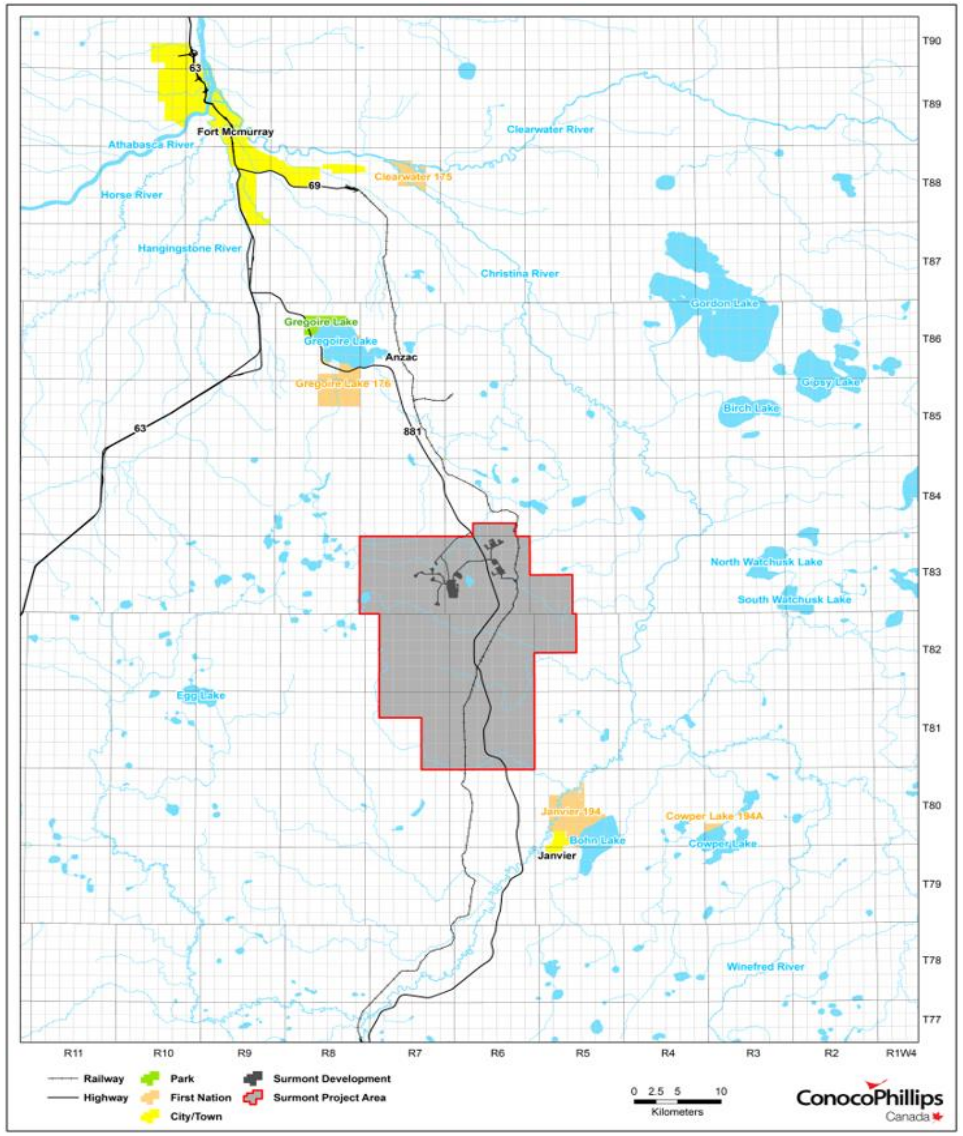
- *Directive 054: Performance Reporting and Surveillance of In Situ Oil Sands Schemes* (April 2020) for the operating period from January 1, 2020 to December 31, 2020
- Condition 22 of Commercial Scheme Approval No. 9426XX for the submission of an annual *Oil Sands Conservation Act* Report (*OSCA* Report)
- Condition 4 (d) of Class 1b Disposal Approval No. 10044M for the summary of the Basal McMurray disposal monitoring results

Introduction

Directive 054: Section 4.1

Surmont Overview

Area Map: Approved Surmont Project Area



OWNERSHIP

Surmont is a steam-assisted gravity drainage (SAGD) bitumen recovery facility in the Athabasca oil sands area that is operated by ConocoPhillips Canada under a 50/50 joint venture agreement with Total E&P Canada.

LOCATION

The project is approximately 63 km southeast of Fort McMurray, Alberta and covers 219 sections of land in Townships 80, 81, 82, 83, and 84, and Ranges 5, 6, and 7, west of the fourth meridian.

PROJECT HISTORY

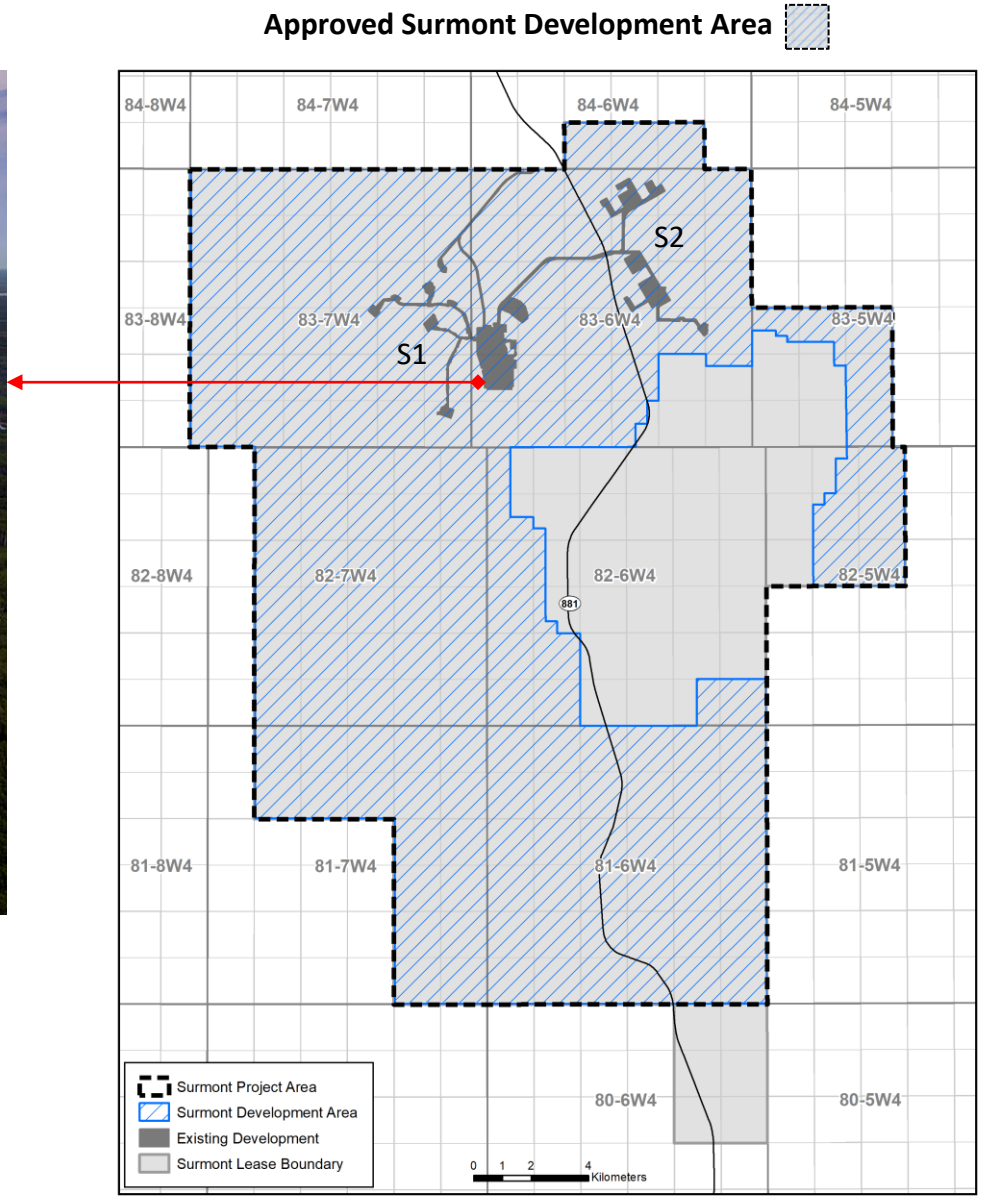
Surmont currently features two phases:

- 2004 - construction start at Surmont Phase 1 (“S1”)
- 2007 - commercial production at S1
- 2010 - construction start at Surmont Phase 2 (“S2”)
- 2015 - commercial production at S2

APPROVED BITUMEN PRODUCTION LIMIT

29,964 cubic metres per day (m^3/d) on an annual average basis or 188 thousand barrels of oil equivalent per day (MBOED)

Surmont Overview: Development Area



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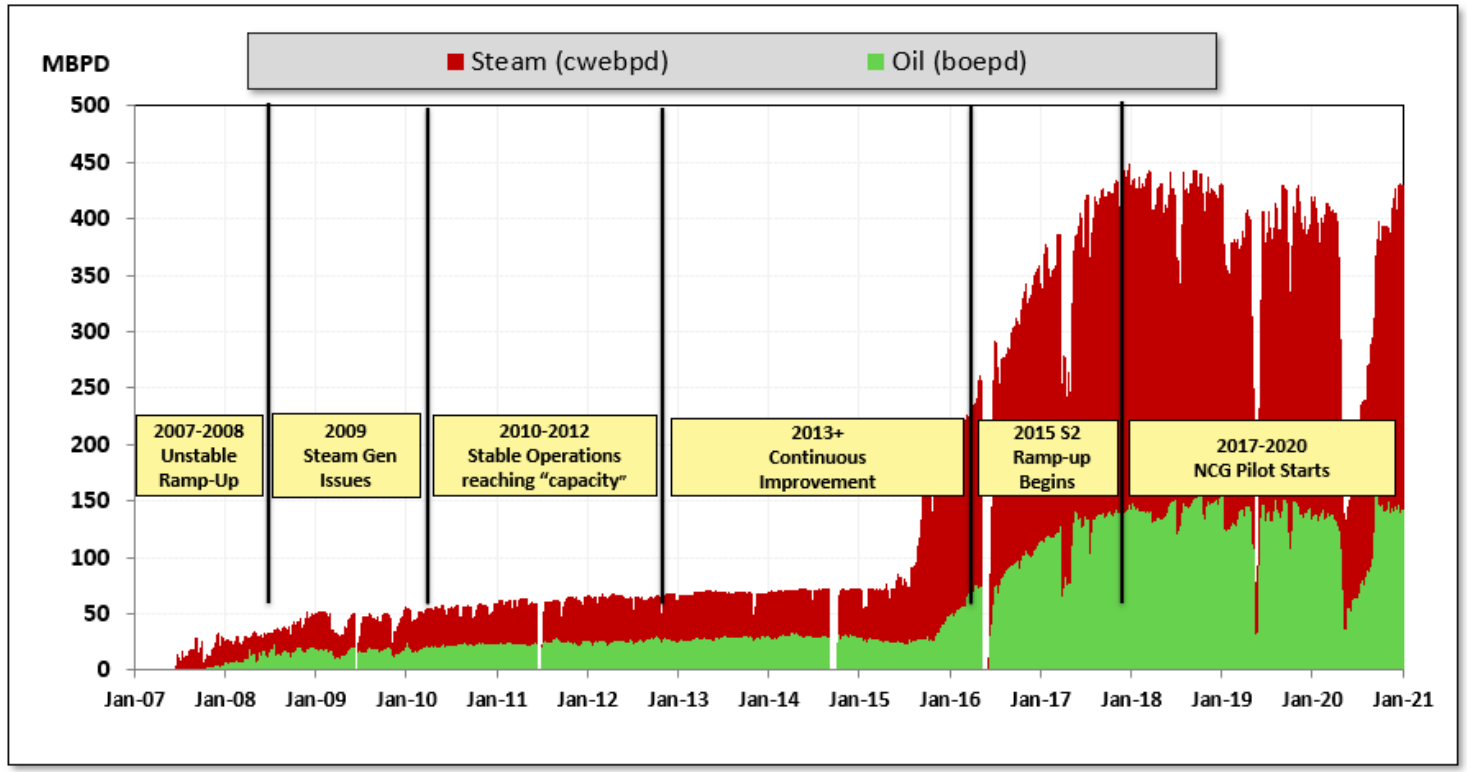
Subsurface

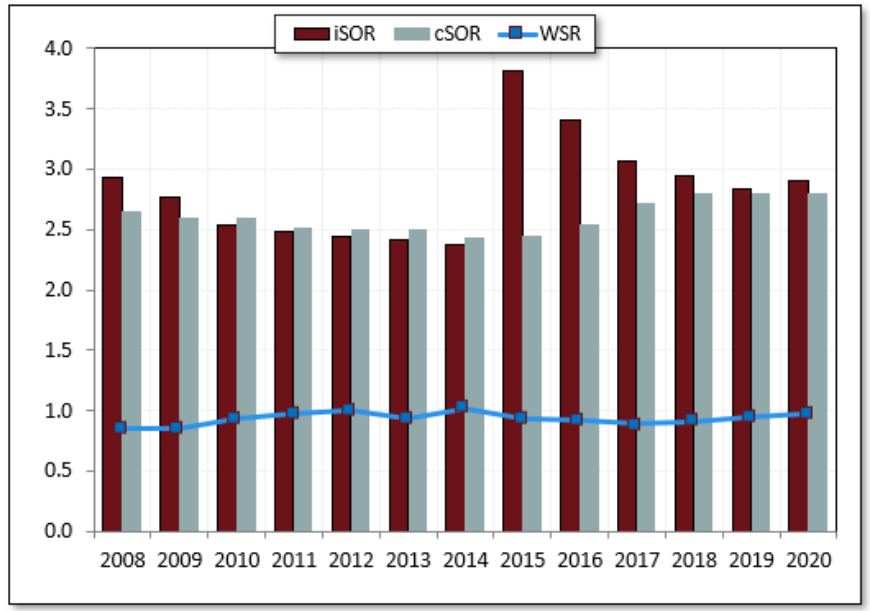
Directive 054: Section 4.2
OSCA Report: Table 1 (1)

OneSurmont Lifespan Production

Historical Steam Injection and Bitumen Production

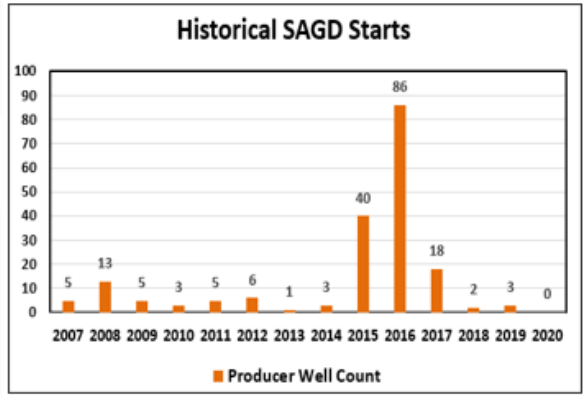


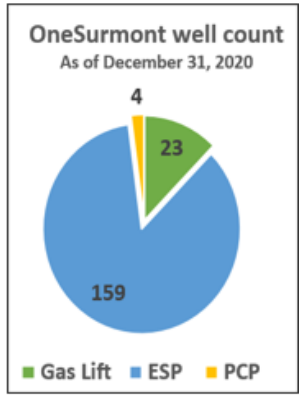
Historical iSOR, cSOR and WSR



2020 Highlights

- Expanded NCG injection capabilities across Surmont.
  - Utilized to limit thief zone invasion and minimize pressure loss during extended curtailments/shut-ins.
- Covid related response resulted in an approximate 4-month shut-in at Surmont 1.
- Surmont 2 production was curtailed in Q2 and then ramped back up to full production by Q4.
- Re-Drills pushed to 2021.





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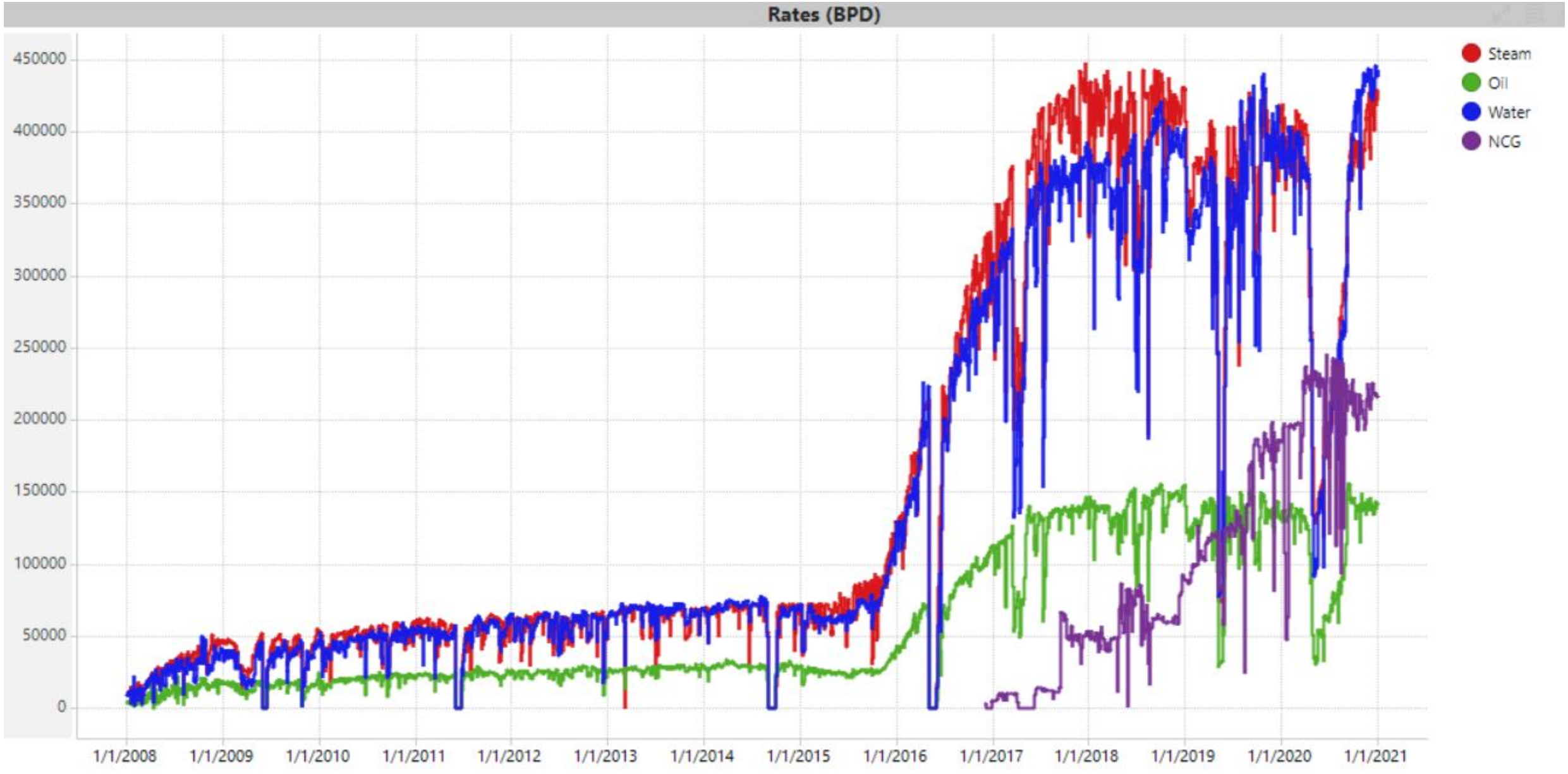
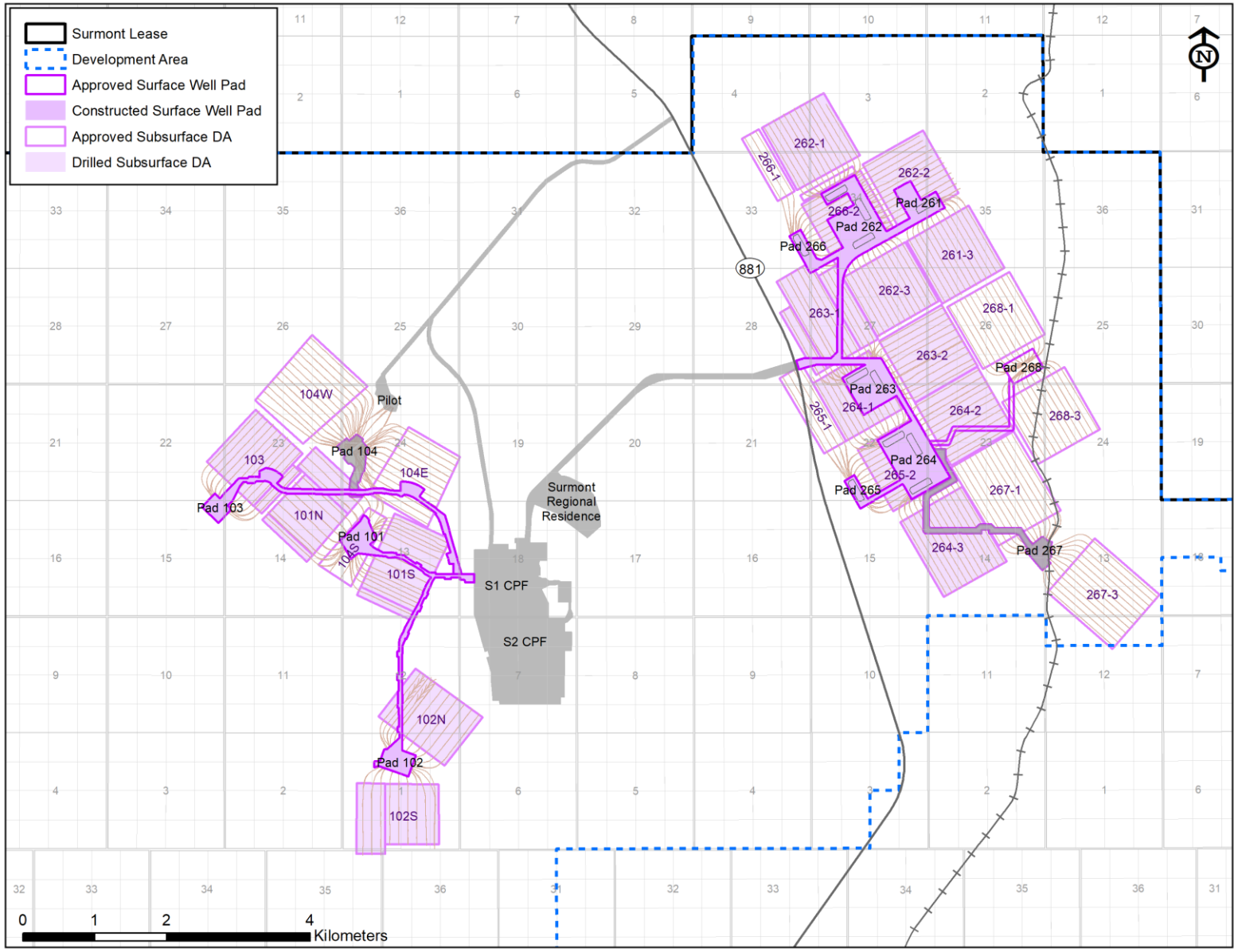
OneSurmont Lifespan Production



Development Area Maps: Drilled and Approved Drainage Areas



DRILLED DRAINAGE AREAS

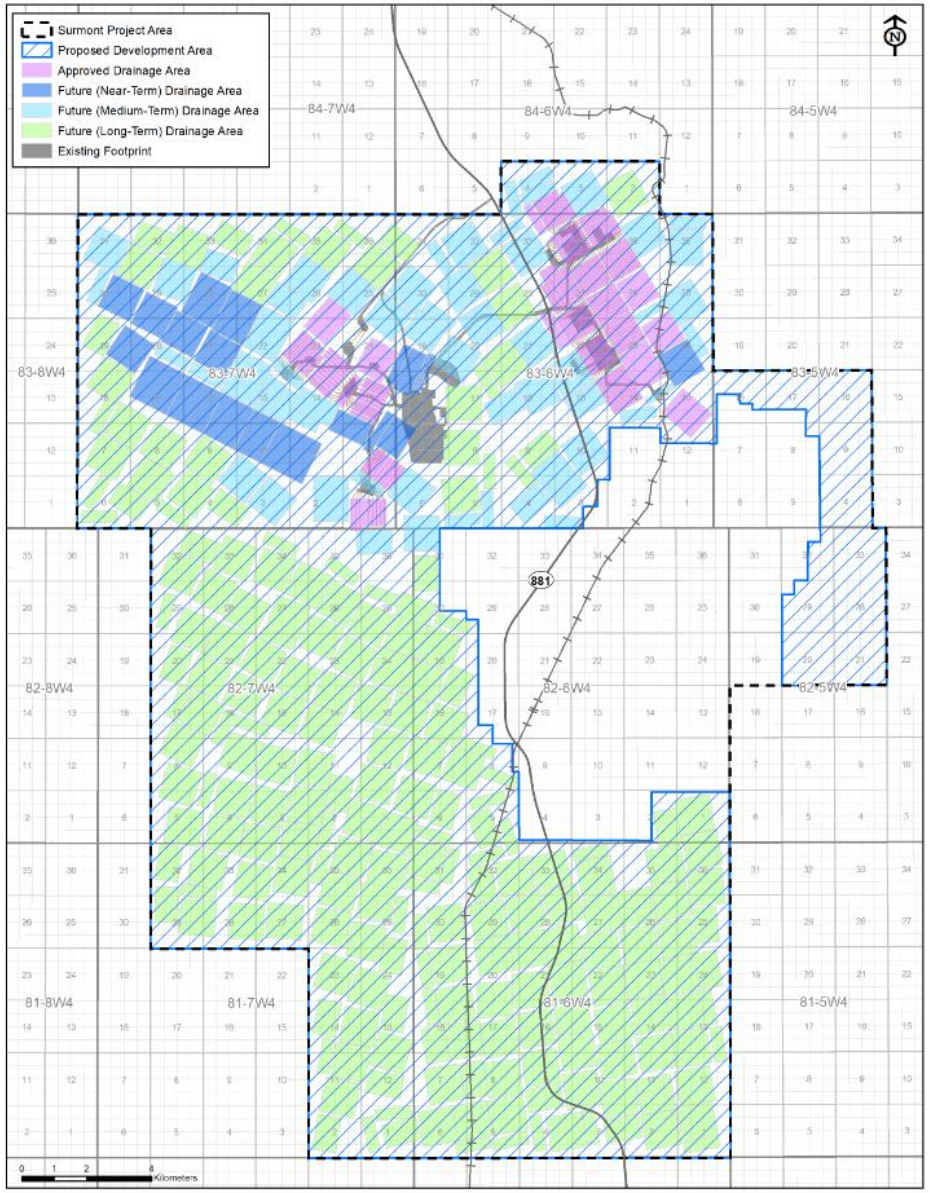
- 101N
- 101S
- 102N
- 102S
- 103
- 261-3
- 262-1
- 262-2
- 262-3
- 263-1
- 263-2
- 264-1
- 264-2
- 264-3
- 265-2
- 266-2

APPROVED DRAINAGE AREAS

- 104E
- 104W
- 104S
- 265-1
- 266-1
- 267-1
- 267-3
- 268-1
- 268-3

- Additional approved drainage areas described in Lifecycle Application No. 1922683 are illustrated on the next slide.

Development Area Maps: Drilled and Approved Drainage Areas



LIFECYCLE APPROACH (APPLICATION NO. 1922683)

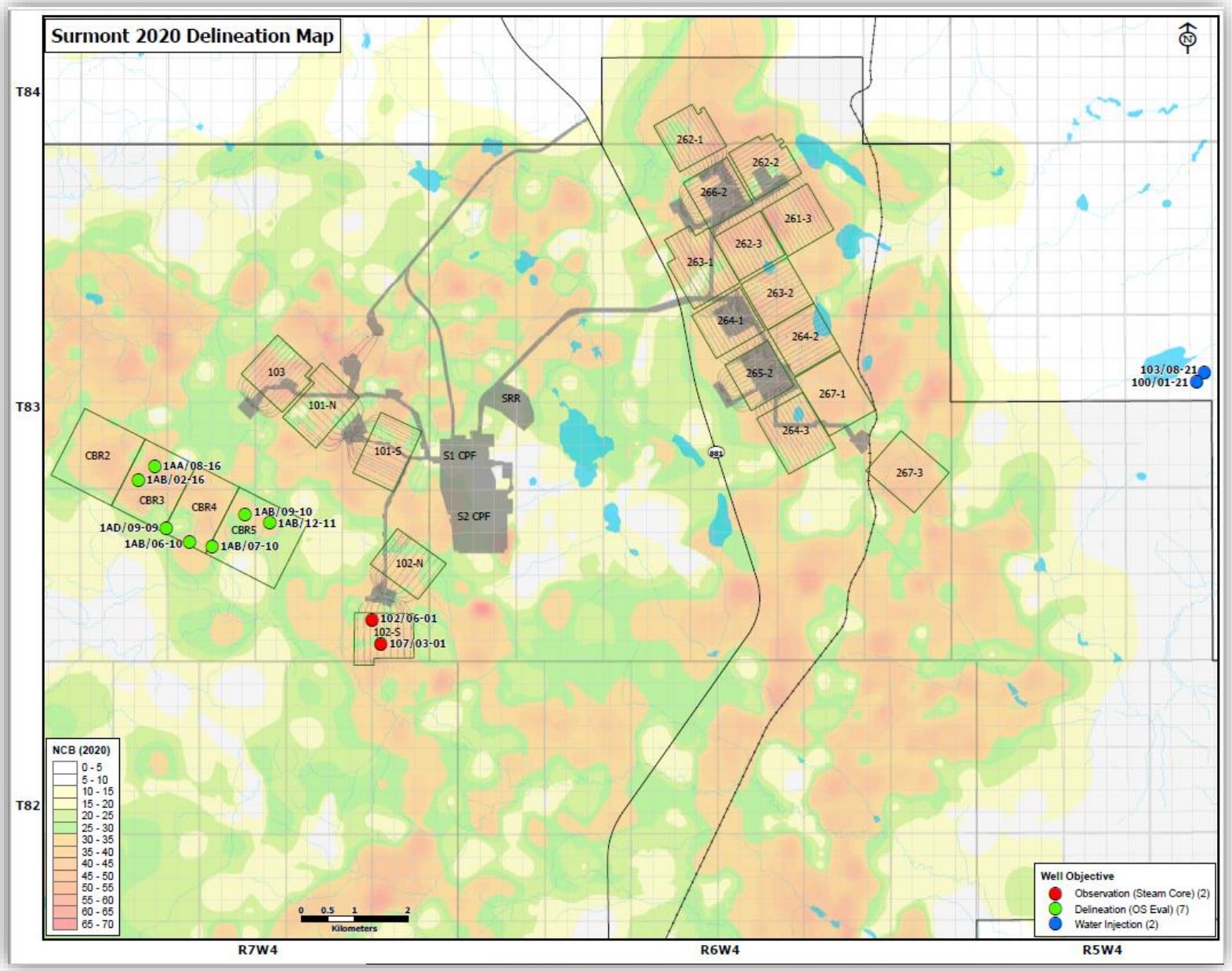
The conceptual locations of future subsurface drainage pattern areas are identified based on current sequencing scenarios as follows:

- future near-term drainage areas: next 10-15 years
- future medium-term drainage areas: development years 15-41
- future long-term drainage areas: beyond development year 41

SUBSURFACE INFORMATION

No new subsurface information is available related to approved lifecycle activities, i.e., drainage area evaluation, design, or development

New Geological, Geomechanical & Reservoir Data

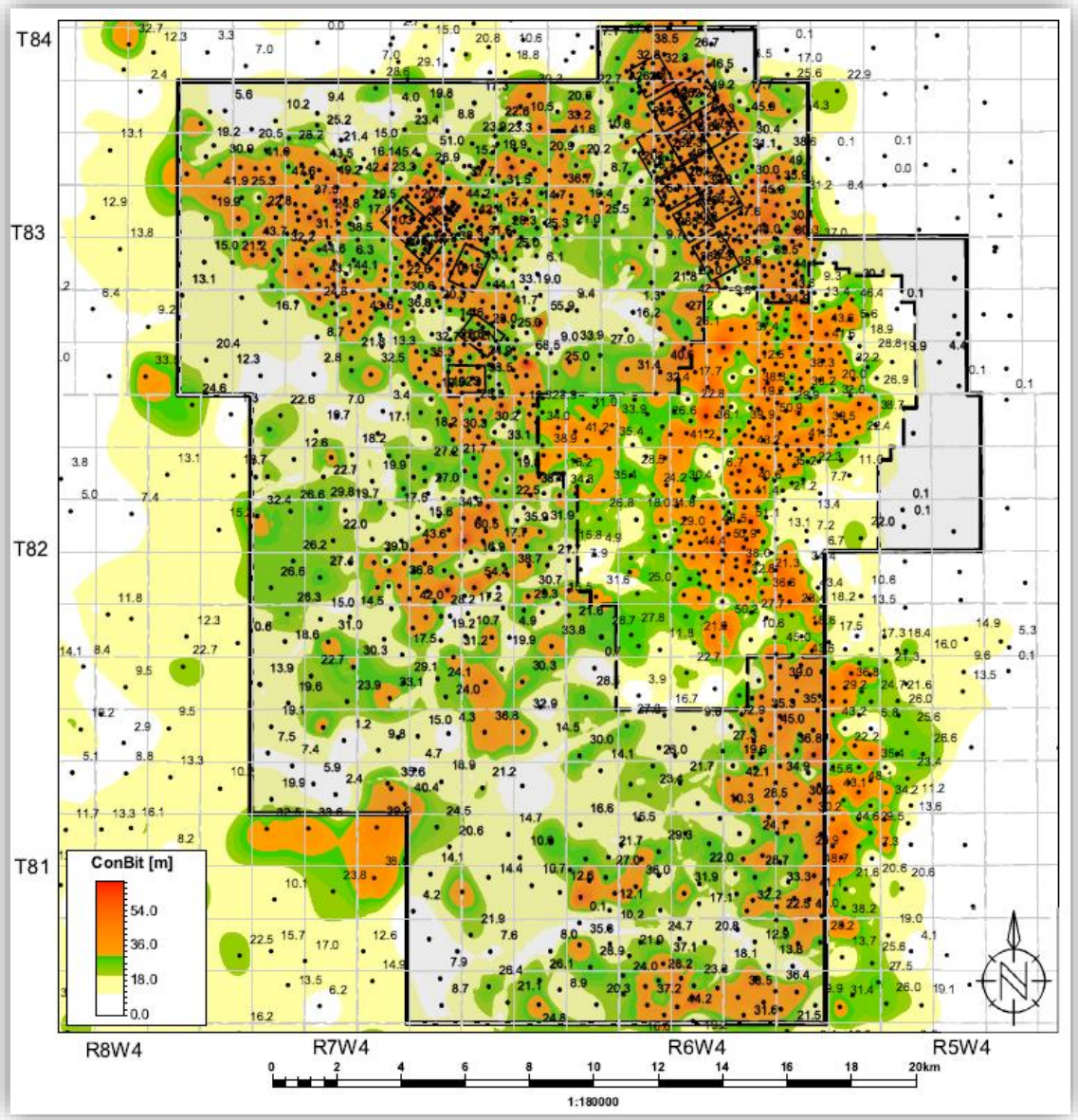


Wells Drilled in 2020	DA	Type
1AA081608307W402	CBR3	Delineation
1AB021608307W400	CBR3	Delineation
1AB061008307W402	CBR4	Delineation
1AD090908307W400	CBR4	Delineation (cored)
1AB071008307W400	CBR5	Delineation
1AB091008307W402	CBR5	Delineation
1AB121108307W400	CBR5	Delineation
102060108307W400	102S	Steam Core
107030108307W400	102S	Steam Core
100012108305W400	NA	Water Wells
103082108305W400	NA	Water Wells

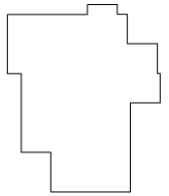
2020 Data Acquisition Table

Data Types Acquired	Quantity
Basic Logs	7
Shear Sonic	4
Micro Image Logs	7
Wireline Pressure	3
Core (McMurry Formation)	1
Steam Cores (McMurry Formation)	2
Dean Stark Analysis	98 Samples
Core Flood Tests	8 Samples

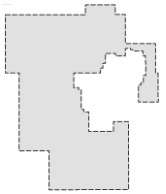
Development Area Maps: Net Pay Isopach



Net Pay Isopach



Surmont Project Area



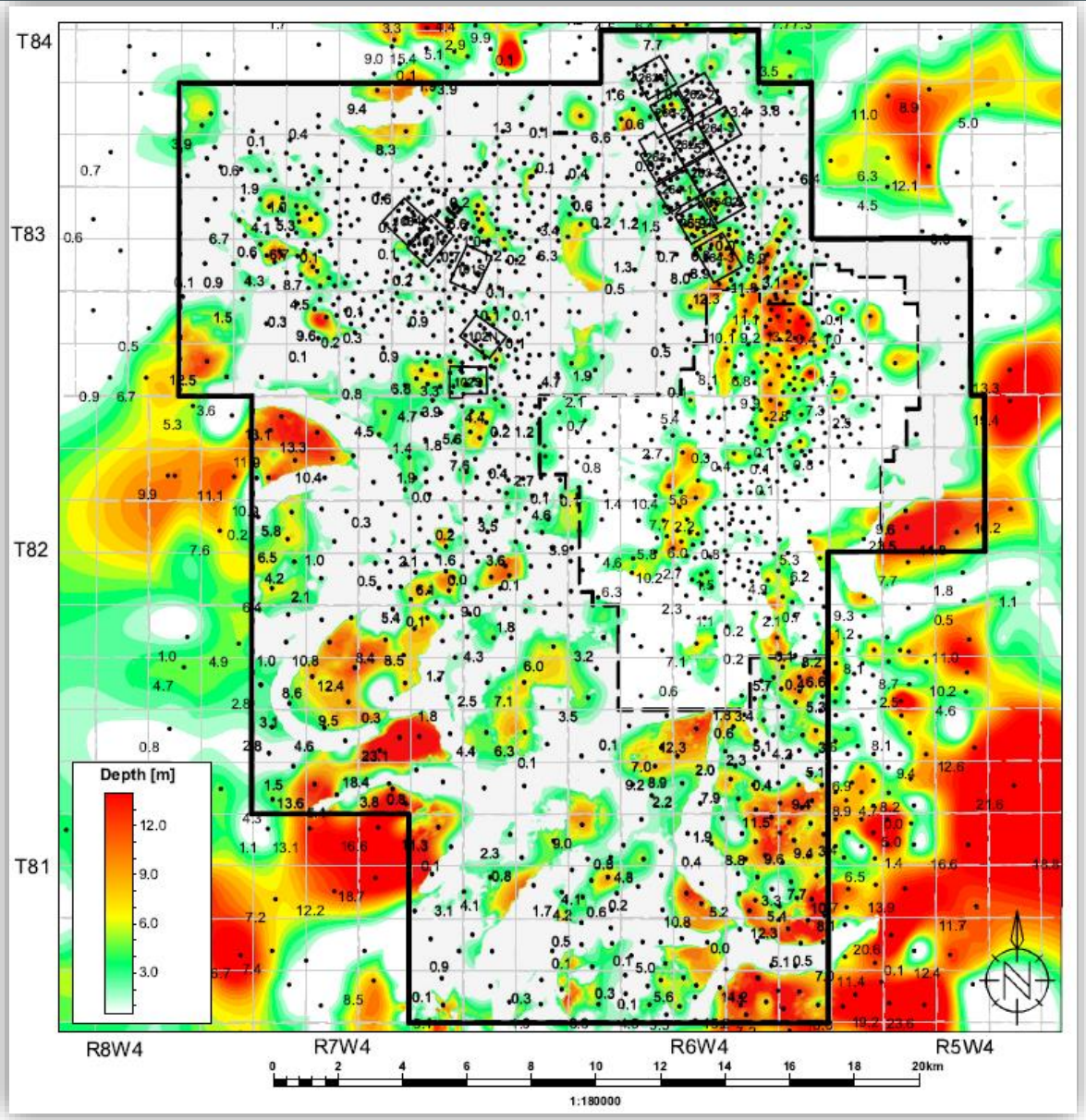
Development Area

Drainage Areas

OBIP = Thickness x Phie x So x Area

Properties	Development Area
NCB Thickness Range	0 to Greater than 30 m
Phie in NCB	31.73%
So in NCB	75.79%
OBIP in NCB > 18m	13916.67 MMbbls Deterministic

Development Area Maps: Net Top Gas Interval



Net Top Gas Isopach

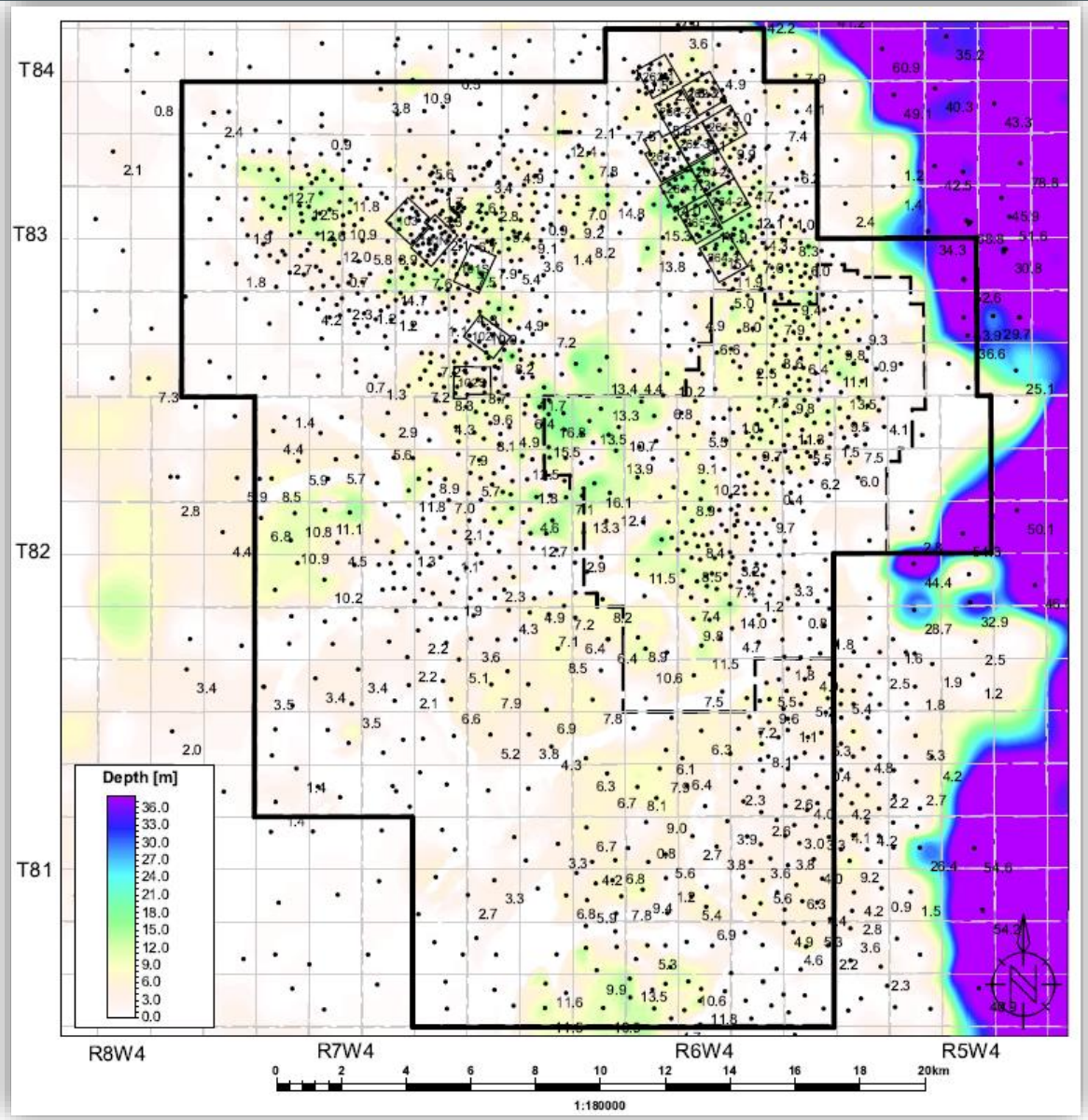
Surmont Project Area

Development Area

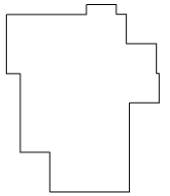
Drainage Areas

Net Top Gas Thickness =
Sands have Deep Reisitivity >= 10 Ohm-m and Vsh < 65%

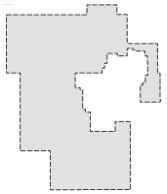
Development Area Maps: Major Water Intervals (Net Top Water)



Net Top Water Isopach



Surmont Project Area



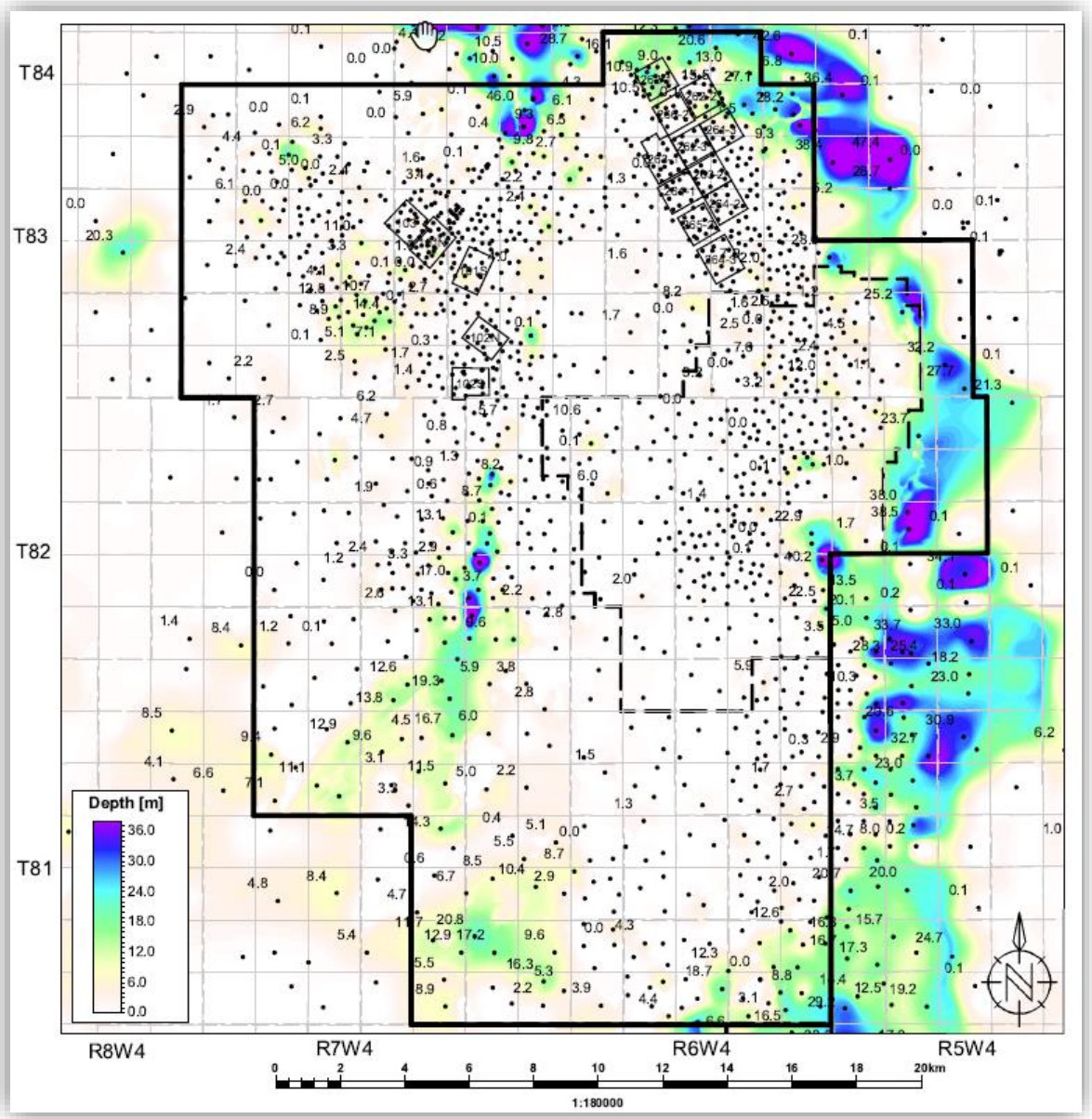
Development Area

Drainage Areas

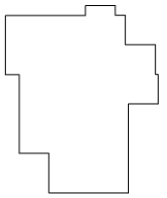
Net Top Water thickness = sands having

- **Deep Resistivity < 10 Ω-m, and**
- **Vsh < 45%**

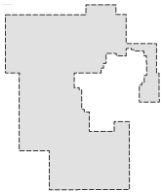
Development Area Maps: Major Water Intervals (Net Bottom Water)



Net Bottom Water Isopach



Surmont Project Area



Development Area

Drainage Areas

Net Bottom Water thickness = sands having

- **Deep Resistivity < 10 Ω-m, and**
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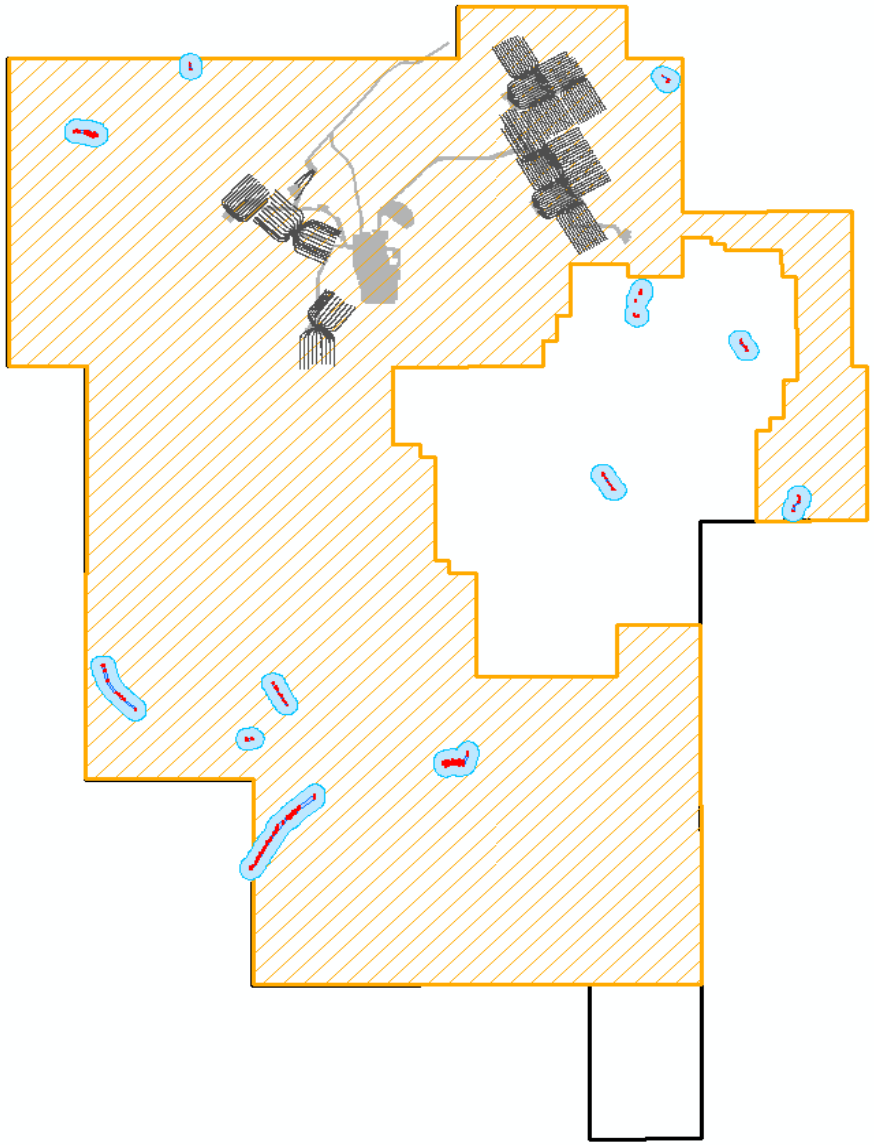
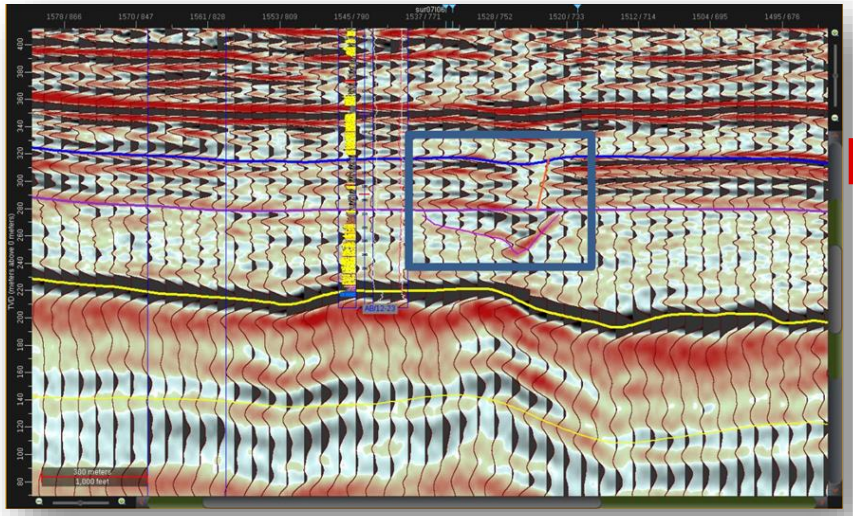
Development Area Maps: Seismic Discontinuities



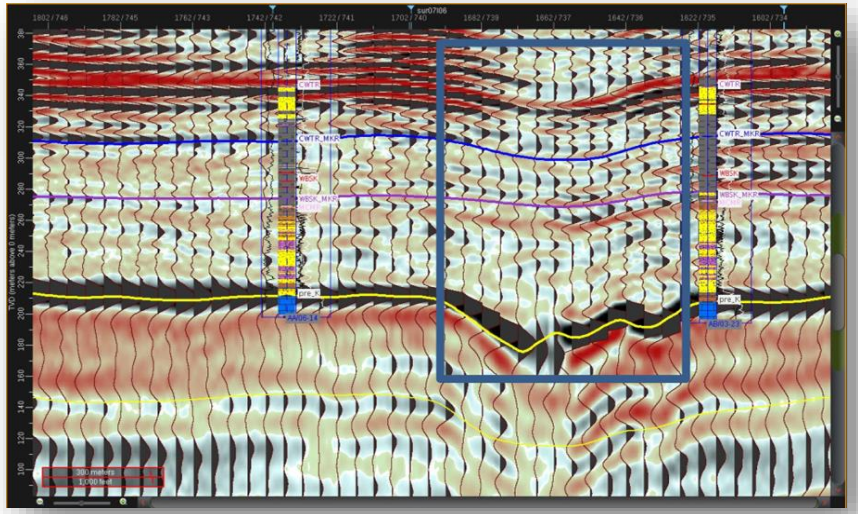
CAPROCK GEOTECHNICAL HAZARD ANALYSIS

- No new seismic discontinuities have been identified within the Surmont development area since the submission of Lifecycle Application No. 1922683.
- The three highest risk structural mechanisms for caprock integrity are:
  1) caprock faulting or fracturing,
  2) post-caprock dissolution of the Prairie Evaporite, and
  3) post-caprock karsting of underlaying Devonian carbonates.
- None of these features are present within the near-term development area. Discontinuities will be investigated prior to pad development activities in those areas.

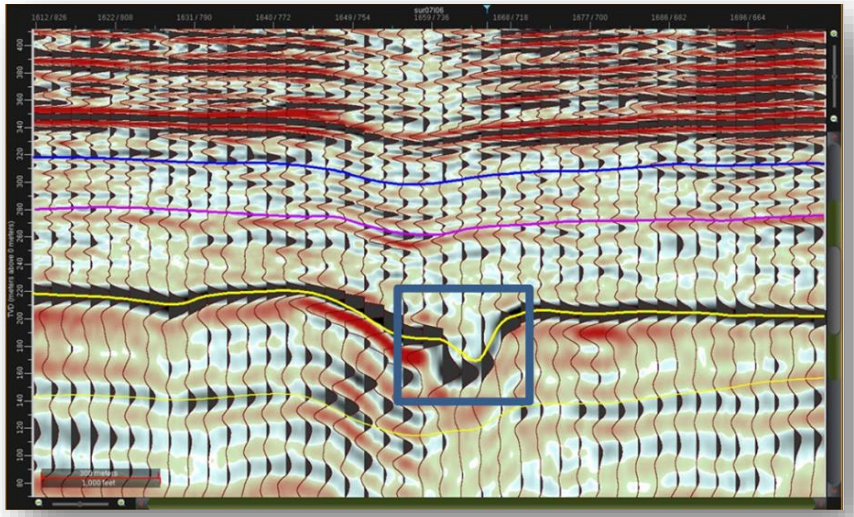
Development Area Maps: Potential Geomechanical Anomalies



1) Caprock seismic discontinuities due to *Differential Compaction* of McMurray mud abandoned channels

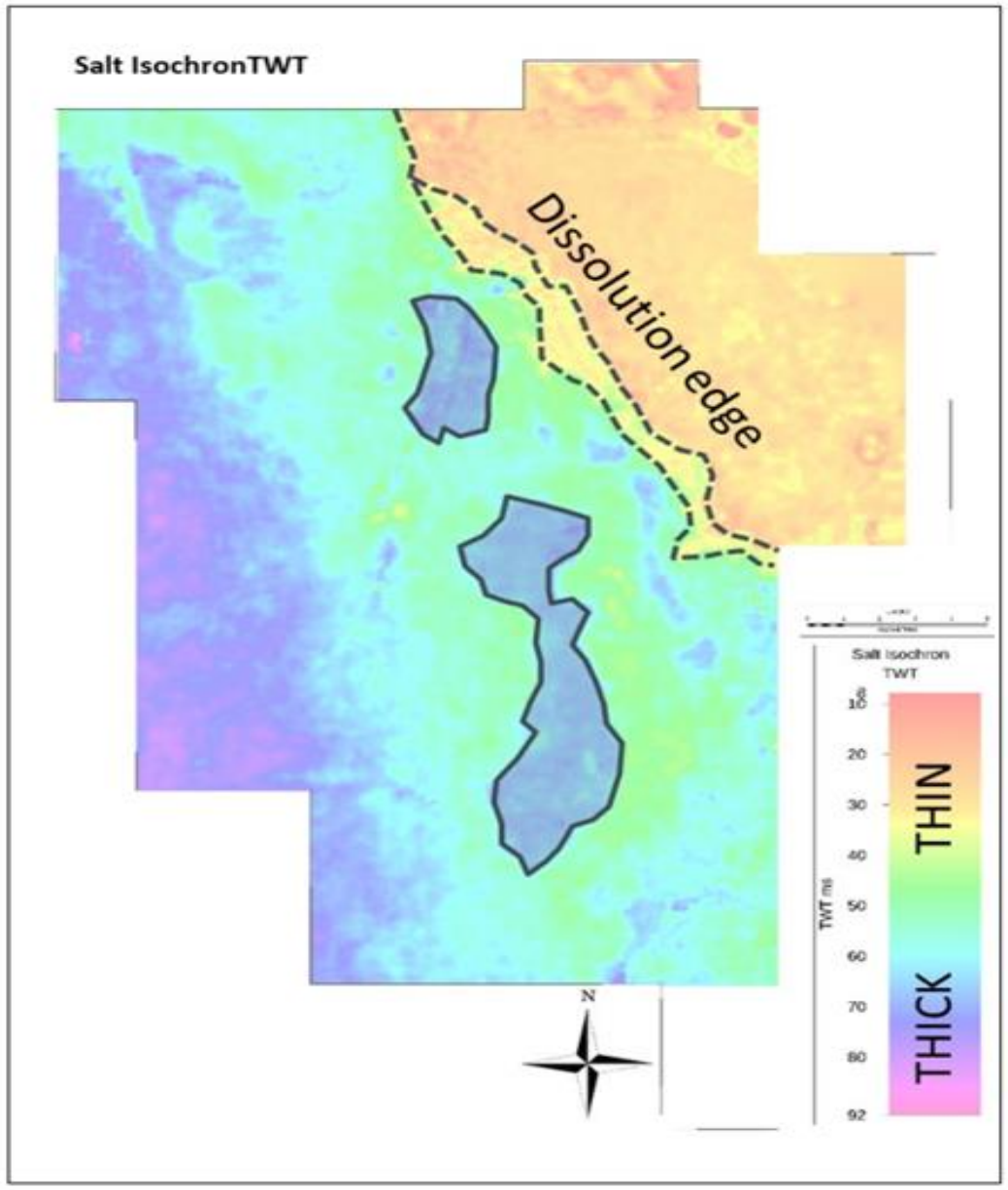


2) Post caprock *Dissolution* of the Prairie Evaporite, Cold Lake, or Lotsberg Salts



3) Post caprock *Karsting* of underlying Devonian carbonates

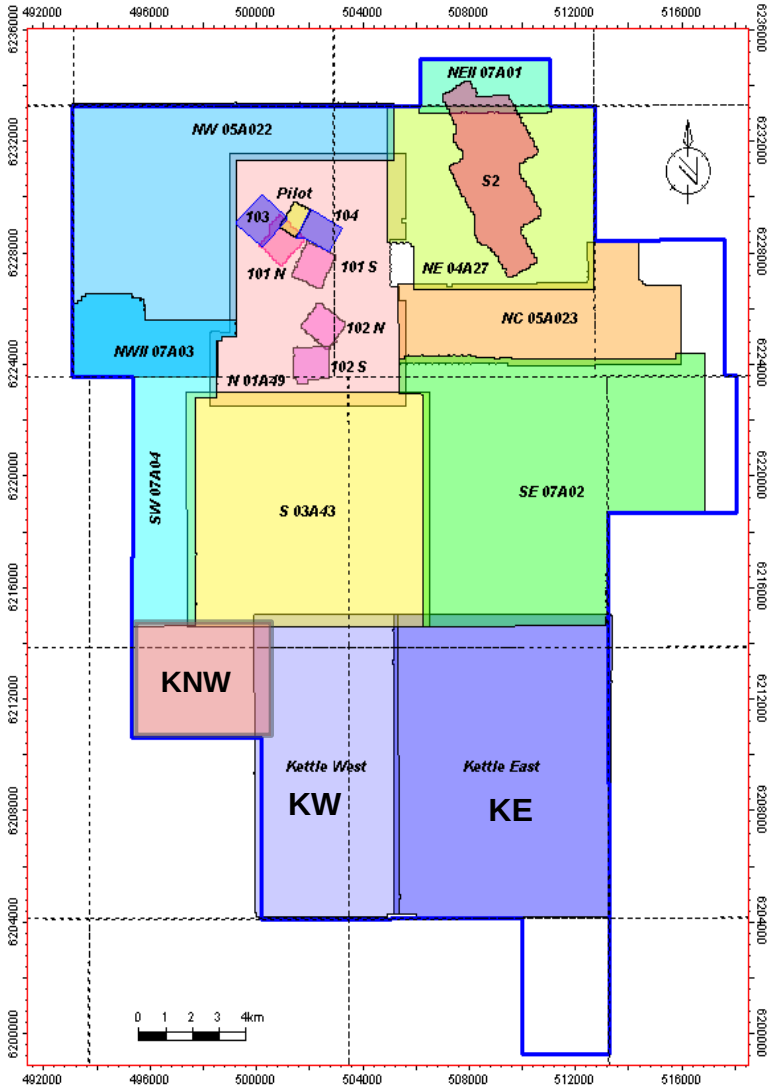
Development Area Maps: Geomechanical Anomalies



MAP OF MAJOR DISSOLUTION

- Seismically interpreted isochron of Prairie Evaporite at Surmont illustrating areas of major dissolution

Development Area Maps: Existing Seismic Acquisition



3D SEISMIC AT SURMONT

Existing Seismic

3D	km²	Shots	S-R line	S-R
N	60	17 004	60	60x30
S	75	33 668	80x120	24x18
NE	50	24 512	120x80	24x18
NW	65	29 906	80(160)x120	20x20
NC	33	24 009	60(120)x80	20x20
NEII	9	3 598	120x80	24x18
NWII	14	4 394	160x120	20x20
SW	23	7 236	160x120	20x20
SE	86	54 801	80x100	20x20
KNW	22	9 543	120x80	20x20
KW	58	24 690	120x80	20x20
KE	85	55 808	80x80	20x20
	580	289 169		

4D SEISMIC AT SURMONT

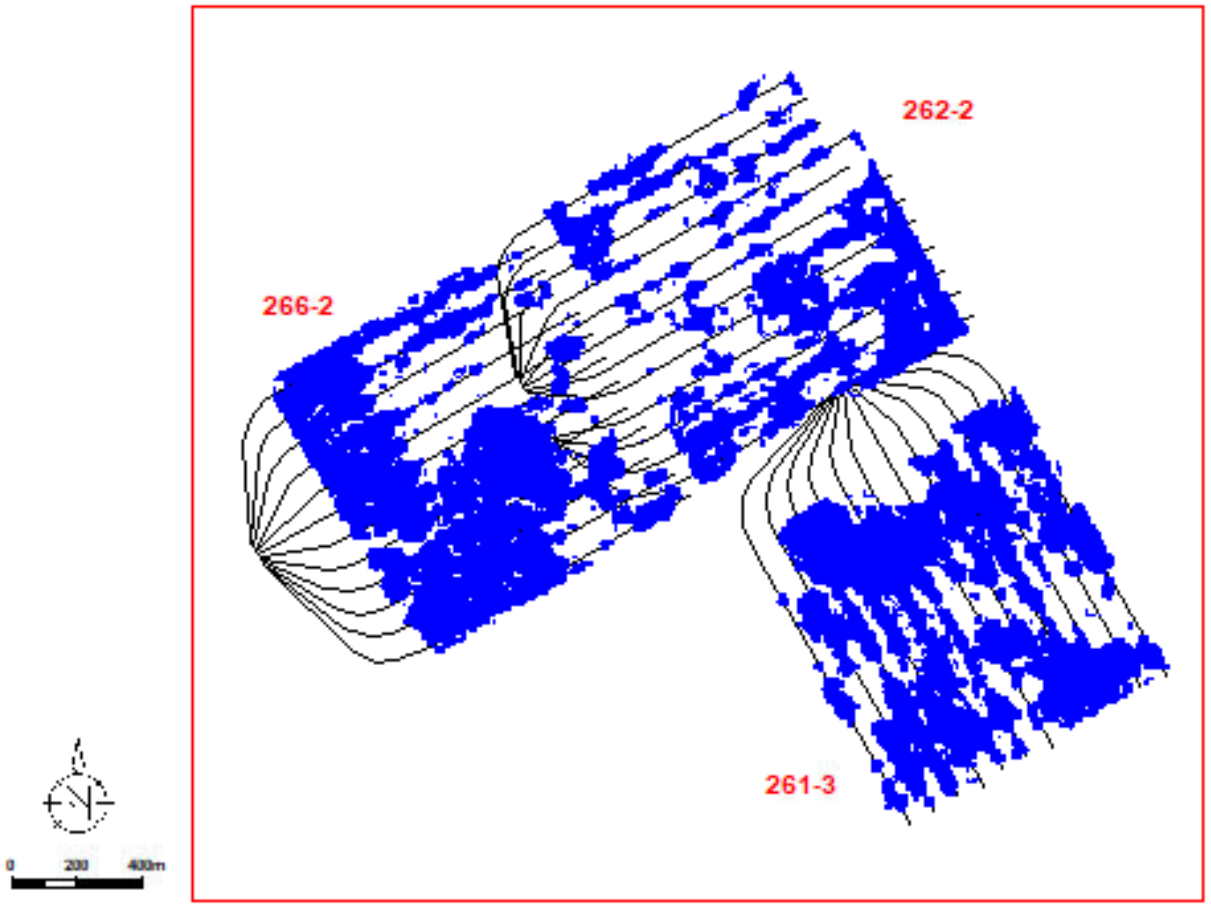
Existing Seismic

4D	km²	S-R	# Monitors
101N	1.8	10x10	9
101S	1.8	10x10	9
102N	1.6	20x20	10
102S	1.7	20x20	7
103	1.9	20x20	4
S2	15.0	20x20	3 (*)
	23.8		42

(*) Average # Monitor per DA in S2

Development Area Maps: Seismic Acquisition (4D) 2020

S2 4D Monitor – Spring 2020

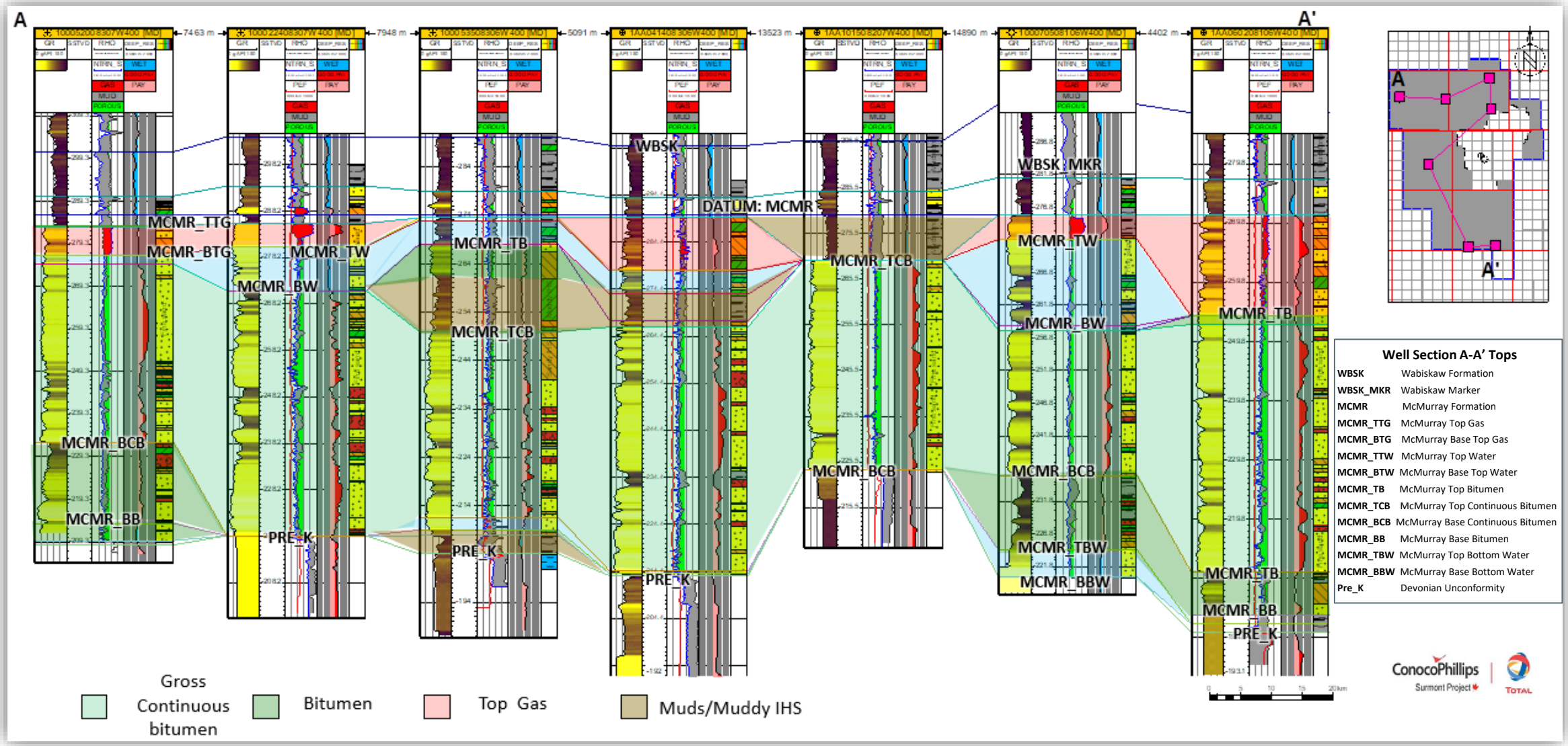


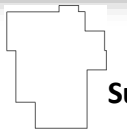
4D SEISMIC AT SURMONT

4D Monitors Spring 2020

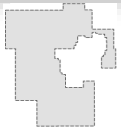
4D	S-R	# Monitors
S2 / 266-2	20x20	2nd
S2 / 262-2	20x20	3rd
S2 / 261-3	20x20	3rd

Representative Well Cross-Section A - A`



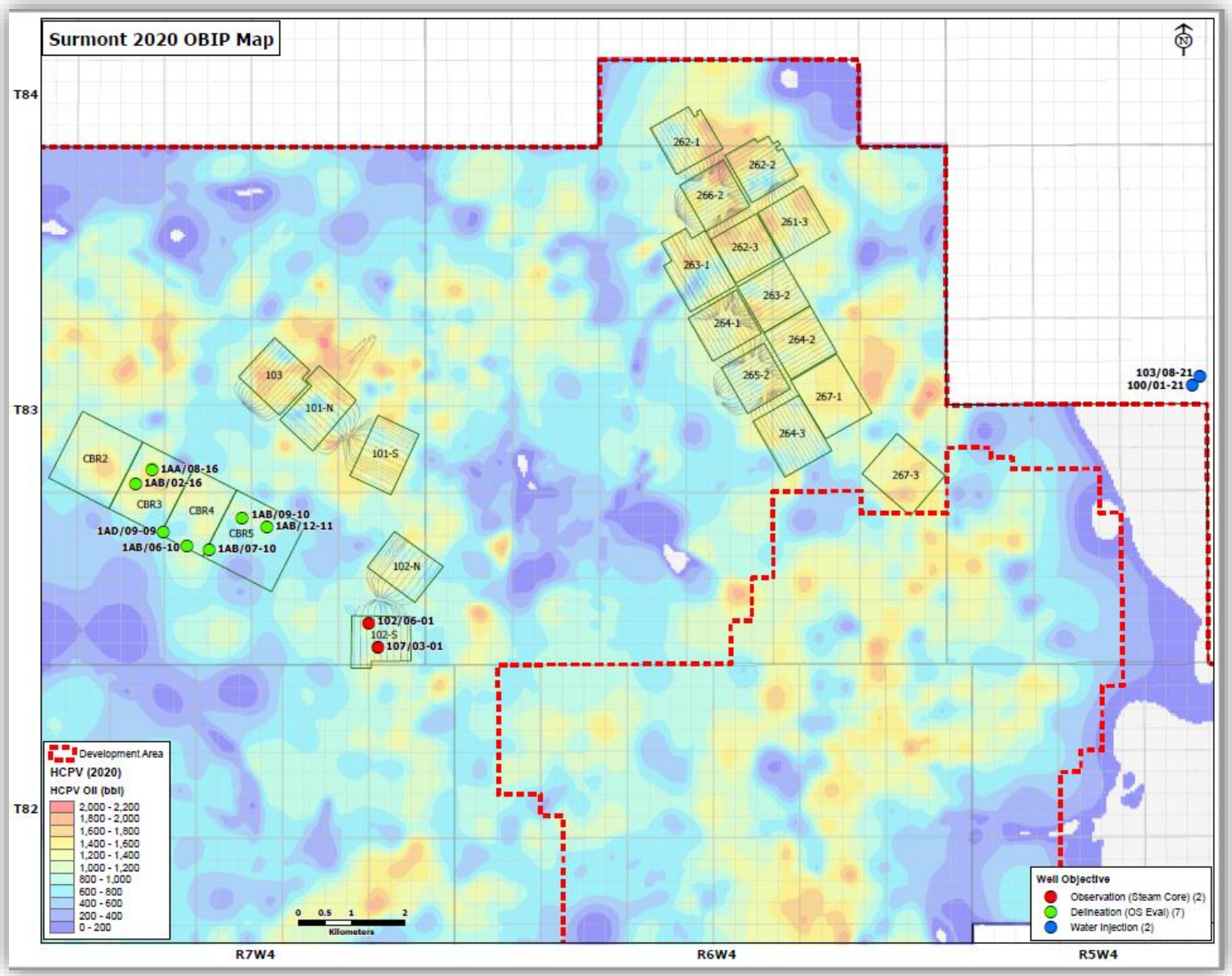


Surmont Project Area

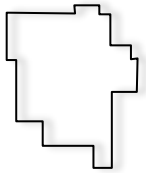


Development Area

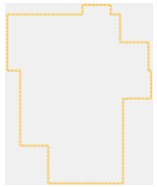
Original Bitumen in Place



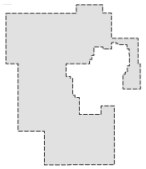
HCPV Map 2020



Surmont Lease



Project Area



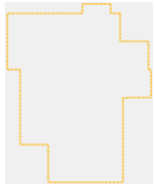
Development Area

Drainage Areas

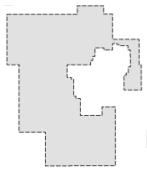
Region	MMBBLs
Surmont Lease	20822.54
Project Area	20606.04
Development Area	16262.24
101N	64.52
102N	50.56
103	71.36
101S	66.89
102S	51.04
261-3	69.67
262-1	63.42
262-2	61.82
262-3	67.49
263-1	75.18
263-2	65.00
264-1	67.21
264-2	68.03
264-3	69.09
265-2	55.97
266-2	67.83

Well Patterns, Bitumen Recovery & Reservoir Parameters

Properties	Depth (masl)	Area (m2)	Thickness NCB (m)	Phie in NCB %	So in NCB %	KH in NCB (mD)	KV in NCB (mD)	Initial Pressure (KPa)	Original Bitumen in Place (MMBBLS)	Producible Oil in Place (MMBBLS)	Expected RF	Current RF
Project Area	~256.1	561632100	23.5	31.9%	77.0%	4158	3459		20606.0	16897.6	50%	1.6%
Dev Area	~255.8	457757230	22.9	31.8%	76.6%	4107	3415		16262.2	13241.6	50%	2.0%
101N	277.5 - 212.1	1090775	35.5	32.6%	82.4%	4350	3614	1690	64.5	54.5	50%	39.2%
101S	272.9 - 218.4	1064692	37.4	33.2%	80.4%	5482	4604	1684	66.9	60.8	59%	53.6%
102N	276.3 - 223.9	975251	31.1	32.7%	80.3%	4636	3877	1735	50.6	45.5	50%	46.9%
102S	285.0 - 223.6	1019252	34.2	31.3%	74.3%	4001	3290	1800	51.0	46.3	74%	68.9%
103	272.8 - 211.4	1022239	42.8	32.2%	78.6%	4441	3691	1691	71.4	66.0	50%	37.8%
261-3	271.0 - 201.8	1000542	44.8	32.0%	78.1%	4342	3562	1328	69.7	50.8	50%	21.4%
262-1	273.6 - 206.1	996252	39.6	31.7%	80.1%	4195	3471	1307	63.4	51.3	50%	32.1%
262-2	271.8 - 212.6	974291	38.6	33.1%	78.6%	5239	4420	1296	61.8	53.6	50%	18.8%
262-3	271.5 - 208.6	943213	44.3	32.8%	78.2%	4968	4140	1368	67.5	60.3	50%	9.8%
263-1	272.1 - 211	1271315	36.1	33.0%	79.4%	4966	4170	1404	75.2	56.6	50%	34.2%
263-2	275.4 - 212.9	998219	40.9	32.4%	78.1%	4769	3979	1397	65.0	57.3	50%	21.8%
264-1	271.1 - 213.5	1033834	39.5	32.9%	79.7%	5148	4338	1444	67.2	59.4	50%	13.9%
264-2	269.2 - 213.7	1011337	42.1	32.7%	78.2%	4763	3965	1437	68.0	63.1	50%	14.1%
264-3	281.2 - 207.6	1209485	37.5	32.0%	75.6%	4446	3683	1564	69.1	62.9	50%	23.4%
265-2	271.5 - 215.5	917433	38.8	32.5%	76.8%	4917	4101	1496	56.0	43.9	50%	39.0%
266-2	276.2 - 210.2	949974	43.0	32.8%	80.1%	4925	4121	1337	67.8	57.9	50%	27.3%

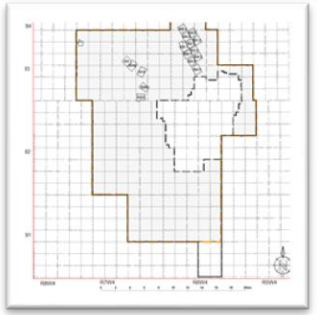


Project Area



Development Area

Drainage Areas



Wellbore Integrity

Casing Integrity

- Four casing failures detected during the reporting period
  - 3 SAGD injector wells during shut in period from May-August 2020
    - Identified through well performance and monitoring and verified with caliper logging and pressure testing
    - Failures were reported in DDS and the AER was engaged for appropriate repair plans
  - Observation well failure within the McMurray formation
    - Detected through observation of thermocouple string and verified through caliper logging and pressure testing
    - Failure was reported in DDS and the AER was engaged for appropriate repair plans

Surface Casing Vent Flow/Gas Migration

- 5 new SCVF/GM issues on SAGD wells during the reporting period
  - Gas samples collected for isotope analysis against database of known samples and diagnostics completed to verify source of all SCVF/GM issues
  - Failures reported in DDS
  - Total of 11 open SCVF/GM issues on all SAGD wells, all classified as non-serious

Wellhead Integrity

- Scheduled wellhead preventative maintenance program
- Active wellhead valve inspection program to identify compromised valves
  - Five wellhead valves were changed out due to freezing/thermal expansion, no release of well fluids
- Proceeding with wellhead valve upgrade to reduce freezing/thermal expansion events

Workovers & Recompletions

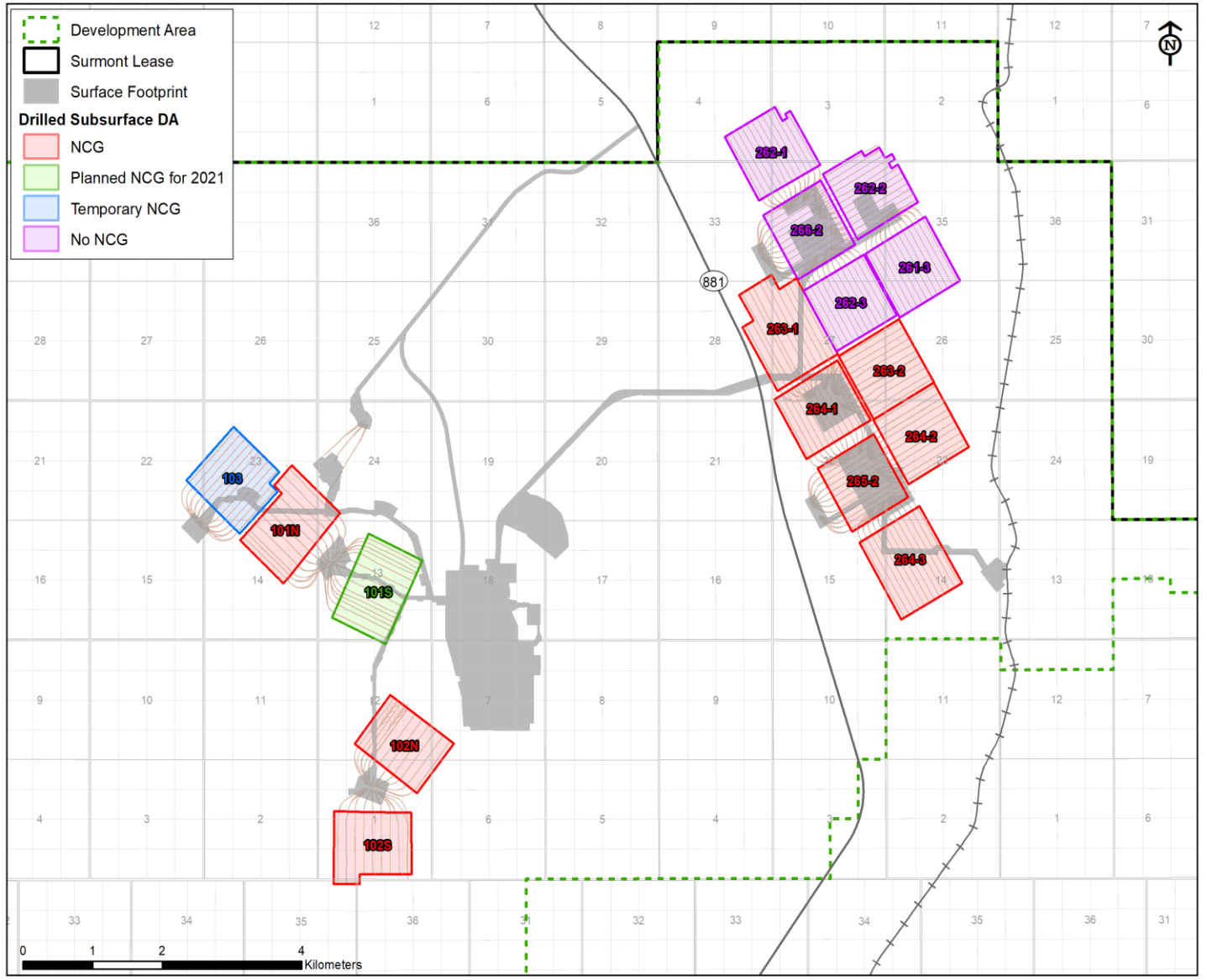
- All re-drills pushed to 2021

- Well Workovers:

Well	Date	Scope	Status
262-3 P12	Feb-20	Clean out sand/Caliper/Straddle packer FCD liner failure	Completed and back online in March 2020
266-2 P06	Nov-20	Clean out sand/Caliper/Patch FCD liner failure	Not finished by December 31. To be completed in 2021
266-2 P09	Nov-20	Clean out sand/Caliper/Straddle packer FCD liner failure	Completed and back online in December 2020
263-2 P08	Nov-20	Clean out sand/Straddle packer in-zone liner/casing issue	Completed and back online in December 2020
264-1 P12	Nov-20	Clean out sand/Caliper/install plug at toe of liner	Completed and back online in December 2020
101-P16	Dec-20	Clean out sand/Caliper/Straddle packer slotted liner failure	Unable to be cleaned out. Investigating options in 2021

Co-Injection

- Non-Condensable Gas (NCG) co-injection was deployed in the wells indicated on the next two slides for pressure support in the steam chambers and as mitigation for top water thief zones where pressure balance and steam loss can be a challenge. In both scenarios, NCG has proven to be a successful technology yielding optimization of SOR.
- NCG has reduced SOR on pads with top water and reduced the temporary SOR impact of re-pressurizing pads under a top water thief zone.
- NCG was injected at an average of 20,000-43,000 Sm^3/d on a per subsurface pad basis. NCG rates vary with recovery factor and injectivity; larger steam chambers have greater volumes of gas injected.
- NCG was also used to re-pressurize pads after shut-downs in 2020.
- NCG was online at Pad 103 for re-pressurization purposes in 2020 - no continuous injection.
- Pipeline specification natural gas from TCPL pipeline is used for NCG co-injection. Surface metering of produced gas is poor and there is no distinction between steam and hydrocarbon gas; therefore, a recovery percentage cannot be estimated.



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Wells with NCG Co-Injection

WELL	ALIAS	LICENSE_ID	WELL	ALIAS	LICENSE_ID
103141408307W400	101-08(02)	AB0399948	102020108307W400	102-13	AB0314293
100141408307W400	101-09(01)	AB0399895	102030108307W400	102-14	AB0314284
100022308307W400	101-10(03)	AB0399898	104030108307W400	102-15	AB0328617
103022308307W400	101-11(04)	AB0399984	100163508207W400	102-16	AB0389690
105022308307W400	101-12(05)	AB0400047	103163508207W400	102-17	AB0390761
107022308307W400	101-13(06)	AB0400089	105163508207W400	102-18	AB0390814
103072308307W400	101-16(07)	AB0328304	100142308307W400	103-01	AB0458456
102072308307W400	101-17(08)	AB0328303	102112308307W400	103-02	AB0458503
100072308307W400	101-18(09)	AB0328302	103112308307W400	103-03	AB0458606
100101208307W400	102-01	AB0314285	104112308307W400	103-04	AB0458626
100071208307W400	102-02	AB0314286	105112308307W400	103-05	AB0458669
100081208307W400	102-03	AB0314287	106112308307W400	103-06	AB0458728
102081208307W400	102-04	AB0314288	106112308307W402	103-06	AB0458728
103081208307W400	102-05	AB0314289	103102308307W400	103-08	AB0458583
109081208307W400	102-06	AB0389669	107072308307W400	103-09	AB0458455
100050708306W400	102-07	AB0390440	108072308307W400	103-10	AB0458516
103040708306W400	102-08	AB0390802	109072308307W400	103-11	AB0458607
105040708306W400	102-09	AB0390956	110072308307W400	103-12	AB0458635
103010108307W400	102-10	AB0314292	103092808306W400	263-1-01	AB0449420
108020108307W400	102-11	AB0409009	105092808306W400	263-1-02	AB0449467
100020108307W400	102-12	AB0314290	103162808306W400	263-1-04	AB0449725

Wells with NCG Co-Injection

WELL	ALIAS	LICENSE_ID	WELL	ALIAS	LICENSE_ID
102162808306W400	263-1-06	AB0449414	112061408306W402	264-3-04	AB0456313
100013308306W400	263-1-07	AB0449508	113061408306W402	264-3-05	AB0456444
102013308306W400	263-1-08	AB0449701	114061408306W400	264-3-06	AB0456497
108132708306W400	263-1-09	AB0449777	115061408306W400	264-3-07	AB0456635
112132708306W400	263-1-11	AB0450154	116061408306W400	264-3-08	AB0456049
105122608306W400	263-2-02	AB0443148	103041408306W400	264-3-09	AB0456069
107122608306W400	263-2-03	AB0443478	104041408306W400	264-3-10	AB0456087
109062608306W400	263-2-09	AB0443726	102041408306W400	264-3-11	AB0456110
104032608306W400	263-2-10	AB0442968	100071408306W400	264-3-12	AB0456146
107042708306W400	264-1-04	AB0456777	102092208306W400	265-2-01	AB0462071
107032708306W400	264-1-05	AB0456897	103092208306W400	265-2-02	AB0462123
104032708306W400	264-1-07	AB0456625	104092208306W400	265-2-03	AB0463692
109032708306W400	264-1-08	AB0456418	1W0122308306W400	265-2-04	AB0462073
110032708306W400	264-1-09	AB0456522	113052308306W400	265-2-05	AB0465240
113032608306W400	264-2-01	AB0447863	103052308306W400	265-2-06	AB0462072
109032608306W402	264-2-02	AB0447676	104052308306W400	265-2-07	AB0462124
102022608306W402	264-2-03	AB0447788	105052308306W400	265-2-08	AB0463693
100142308306W402	264-2-04	AB0447650	106052308306W400	265-2-09	AB0464044
103071408306W400	264-3-01	AB0456161	107052308306W400	265-2-10	AB0464222
104071408306W400	264-3-02	AB0456206	102042308306W400	265-2-11	AB0464417
107071408306W400	264-3-03	AB0456160			

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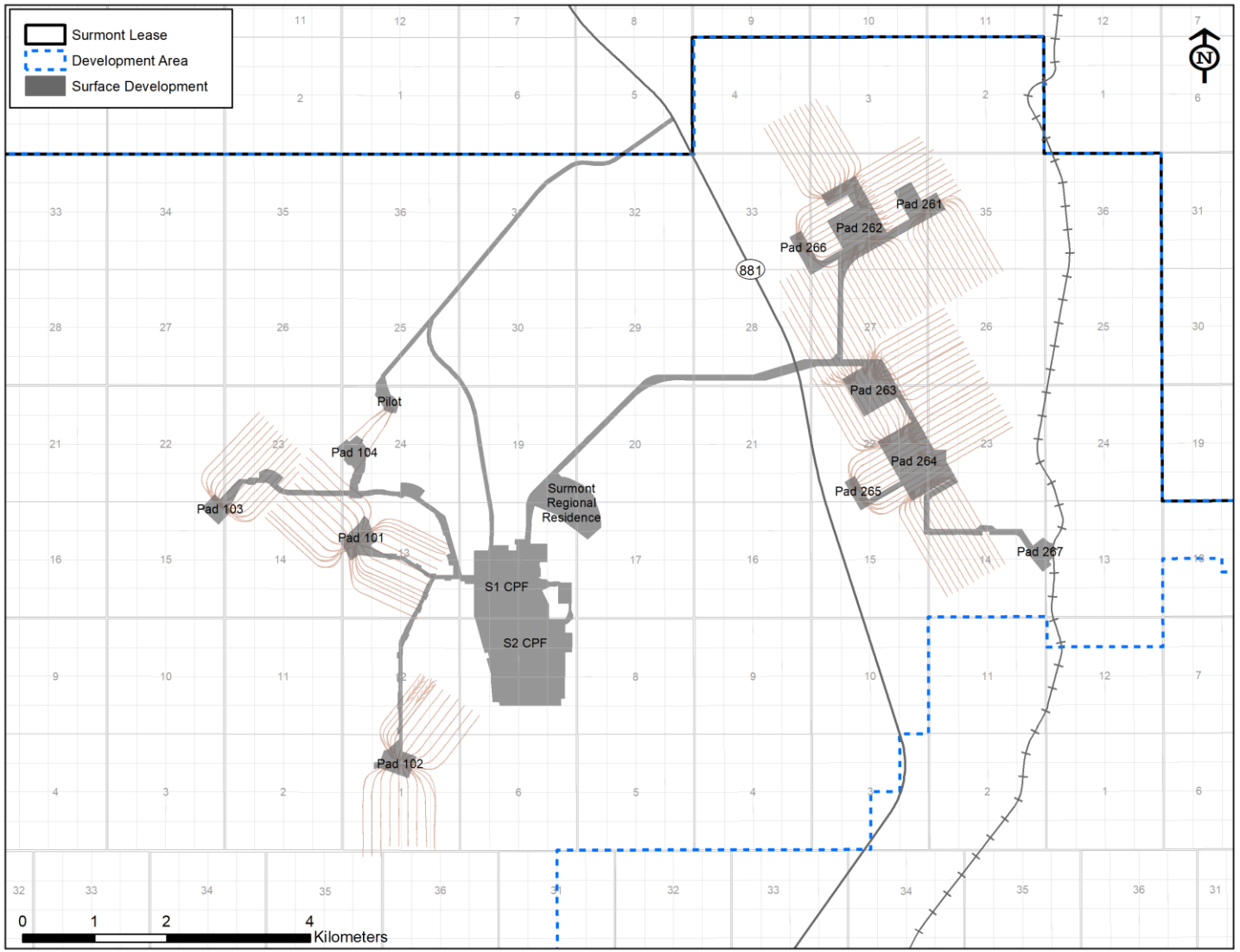
Surface

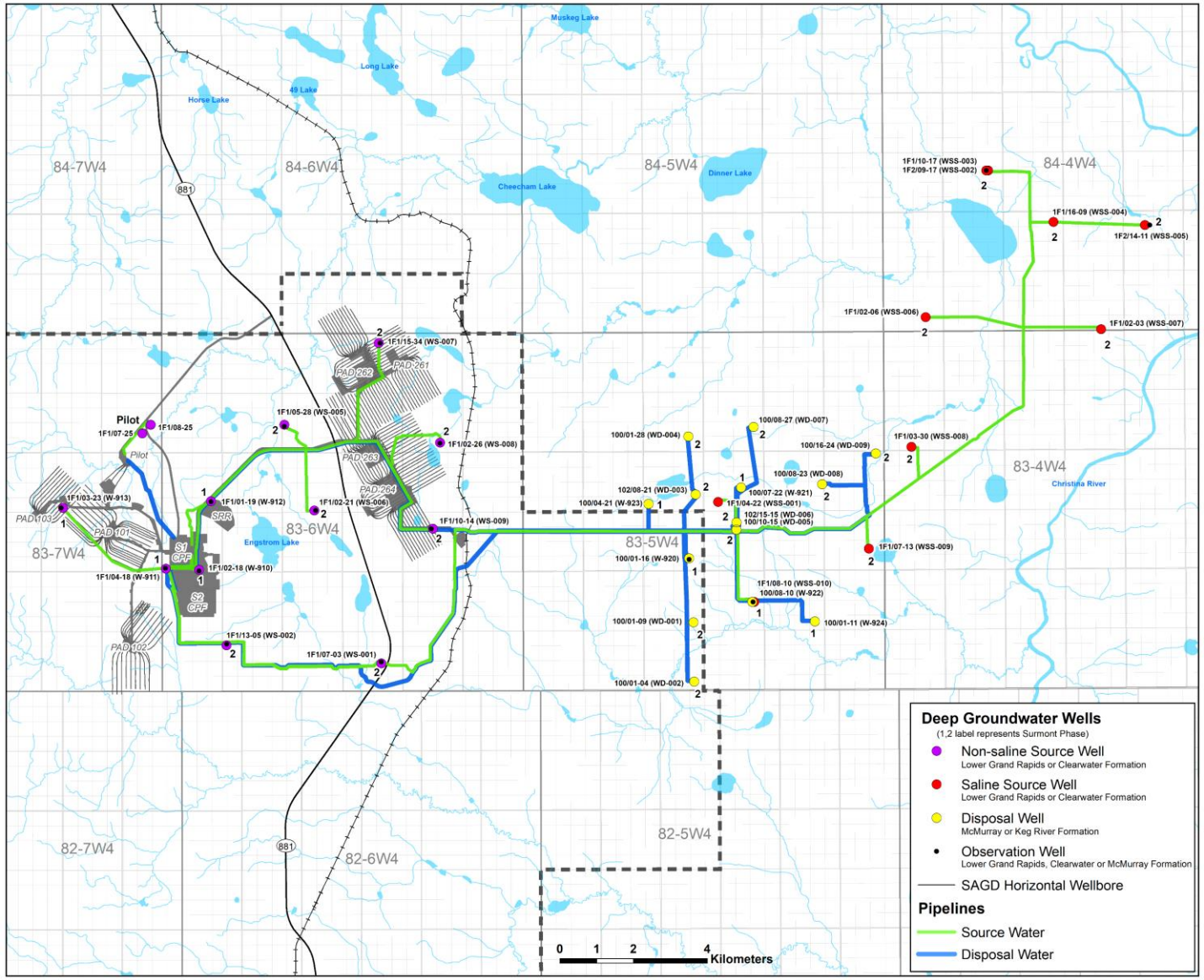
Directive 054: Section 4.3
OSCA Report: Table 1 (2)

Surface Infrastructure: Built & In Progress



- **S1/S2 CENTRAL PROCESSING FACILITIES**
- **WELL PADS - BUILT**
  - 101
  - 102
  - 103
  - 261
  - 262
  - 263
  - 264
  - 265
  - 266
- **WELL PADS – IN PROGRESS**
  - 104
  - 267
- **SURMONT REGIONAL RESIDENCE**

Surface Infrastructure: Water Source & Disposal Wells



2020 Surmont Operations

GENERAL

- Facility throughput guided by AER curtailment for Q1
- Market conditions in May led to a curtailment in rates – production increased back to normal levels in September
- No new surface technologies were trialed during the reporting period

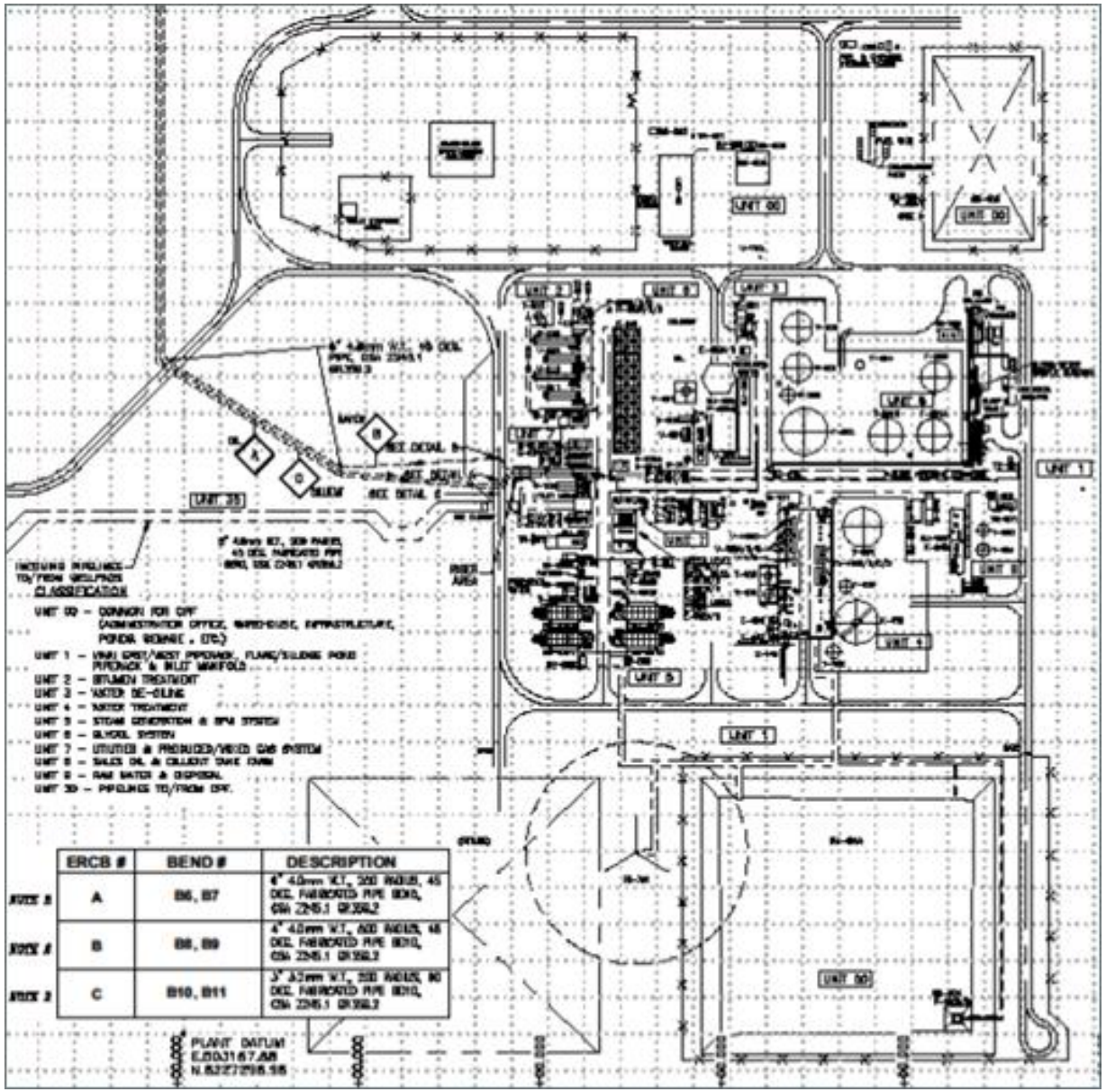
SURMONT PHASE 1

- Full plant outage May 1 – September 7
- Planned maintenance executed in August

SURMONT PHASE 2

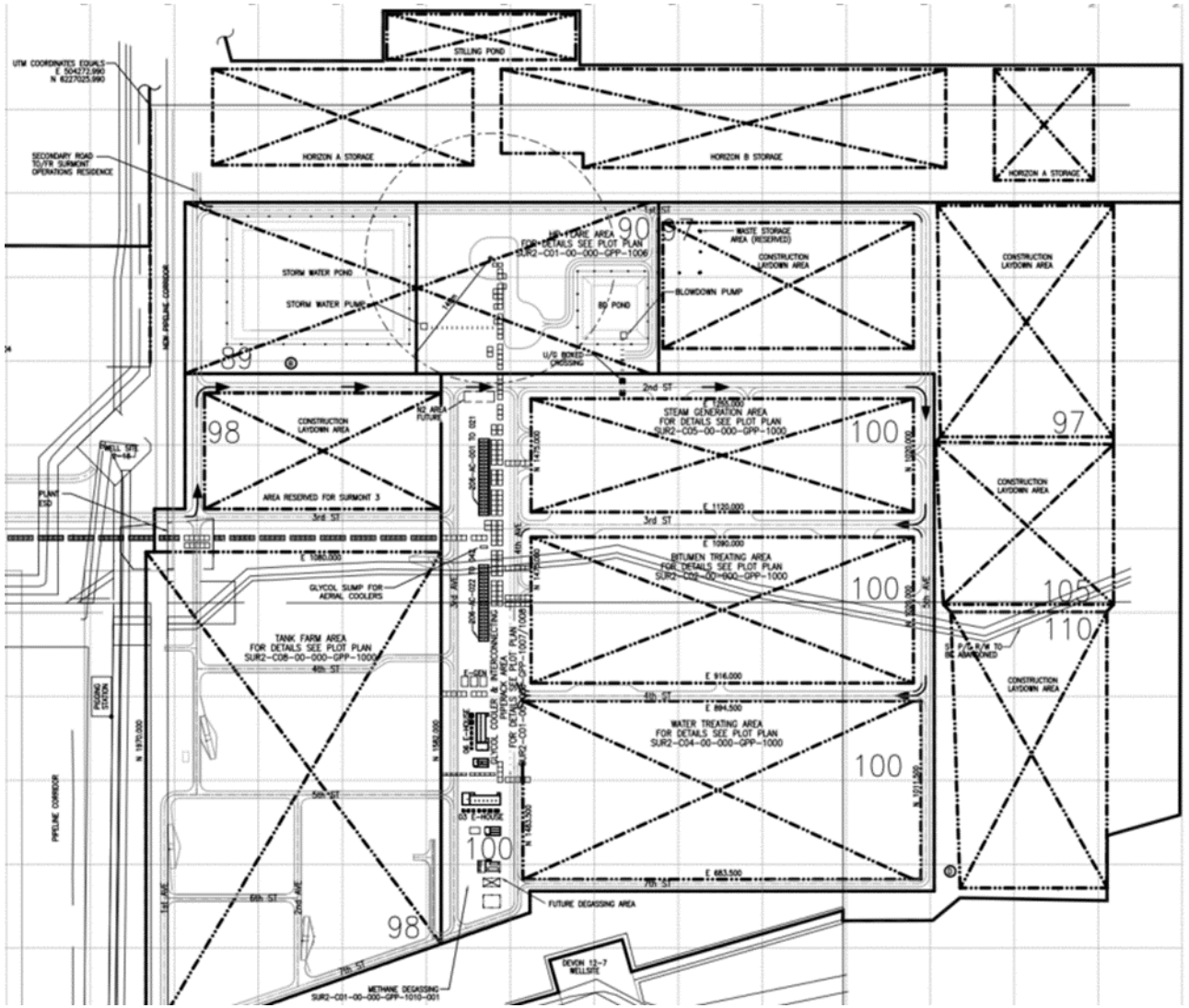
- Operational challenges due to high variability in production rates

CPF Modifications: Surmont Phase 1 Plot Plan



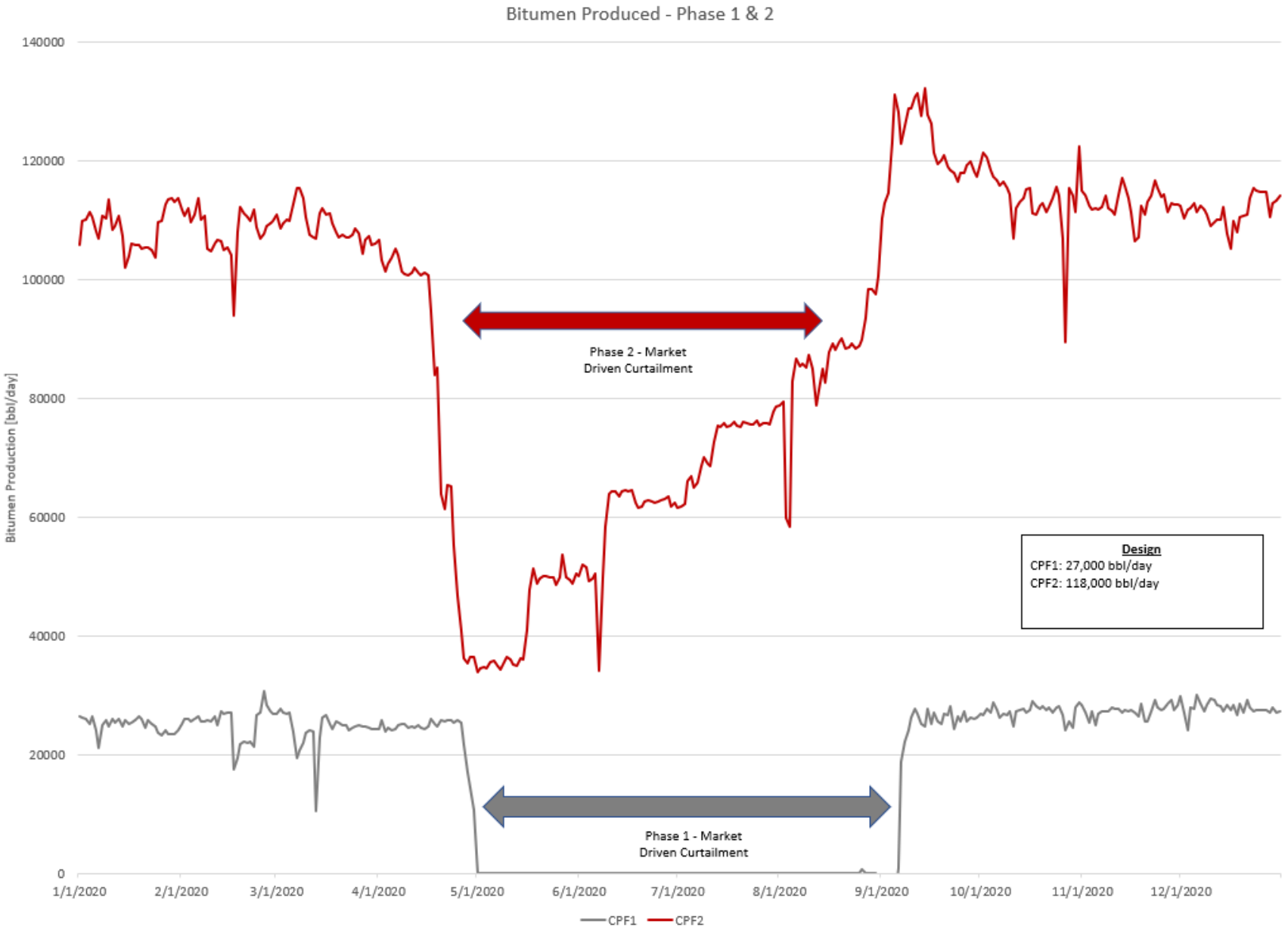
No modifications to the S1 CPF during the 2020 reporting period required an AER application approval.

CPF Modifications: Surmont Phase 2 Plot Plan



No modifications to the S2 CPF during the 2020 reporting period required an AER application approval.

Facility Performance: Bitumen Production by CPF



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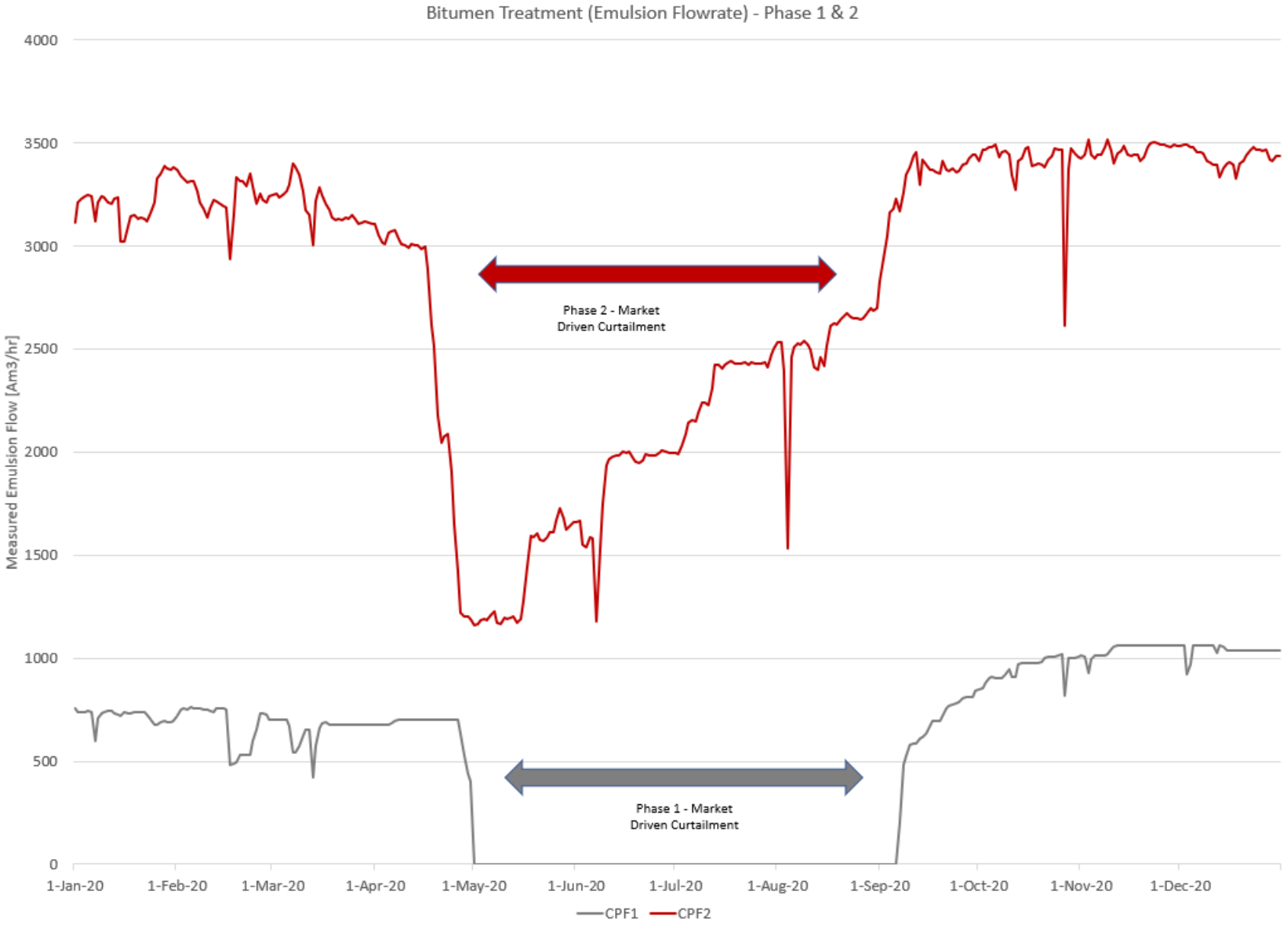
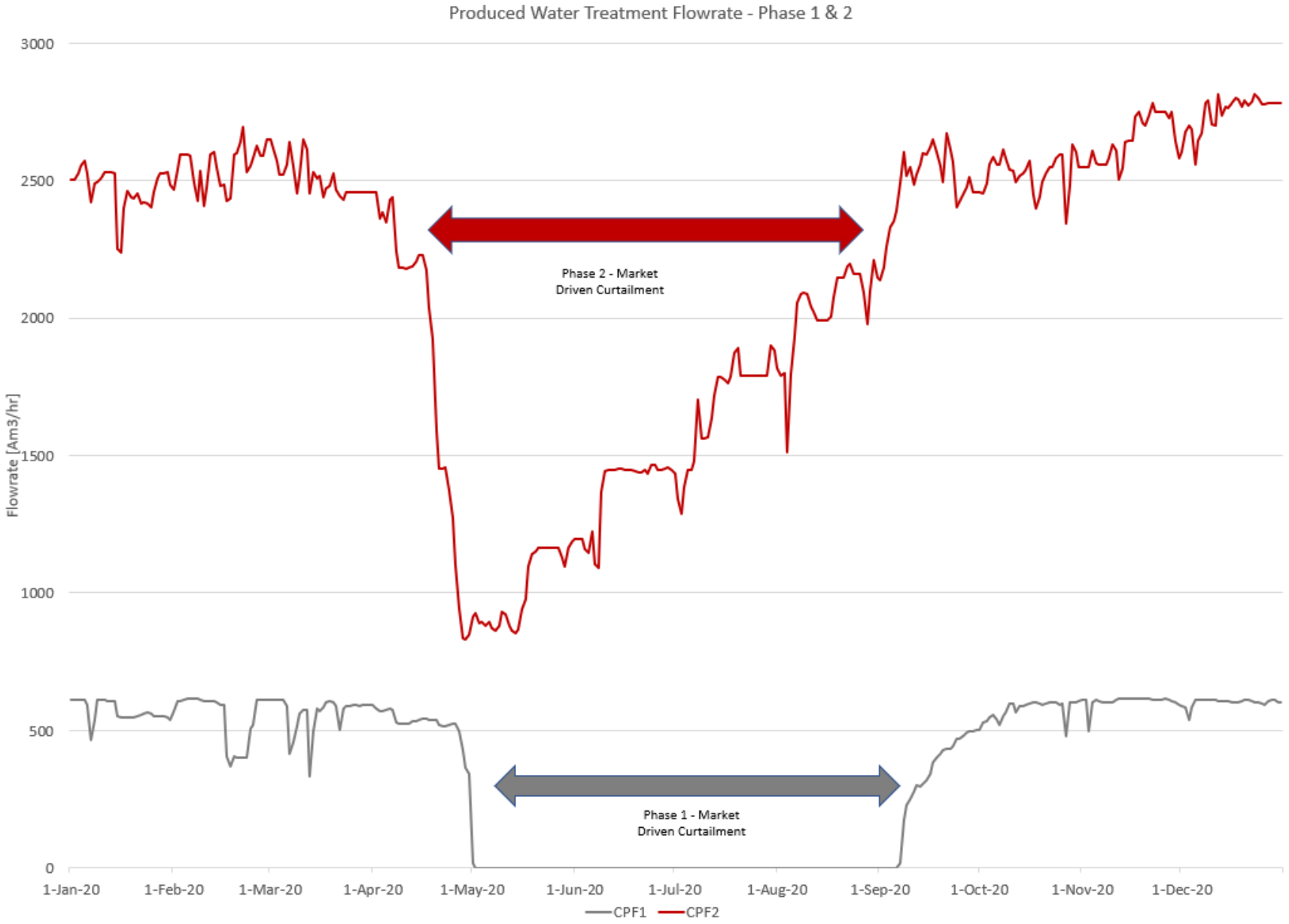
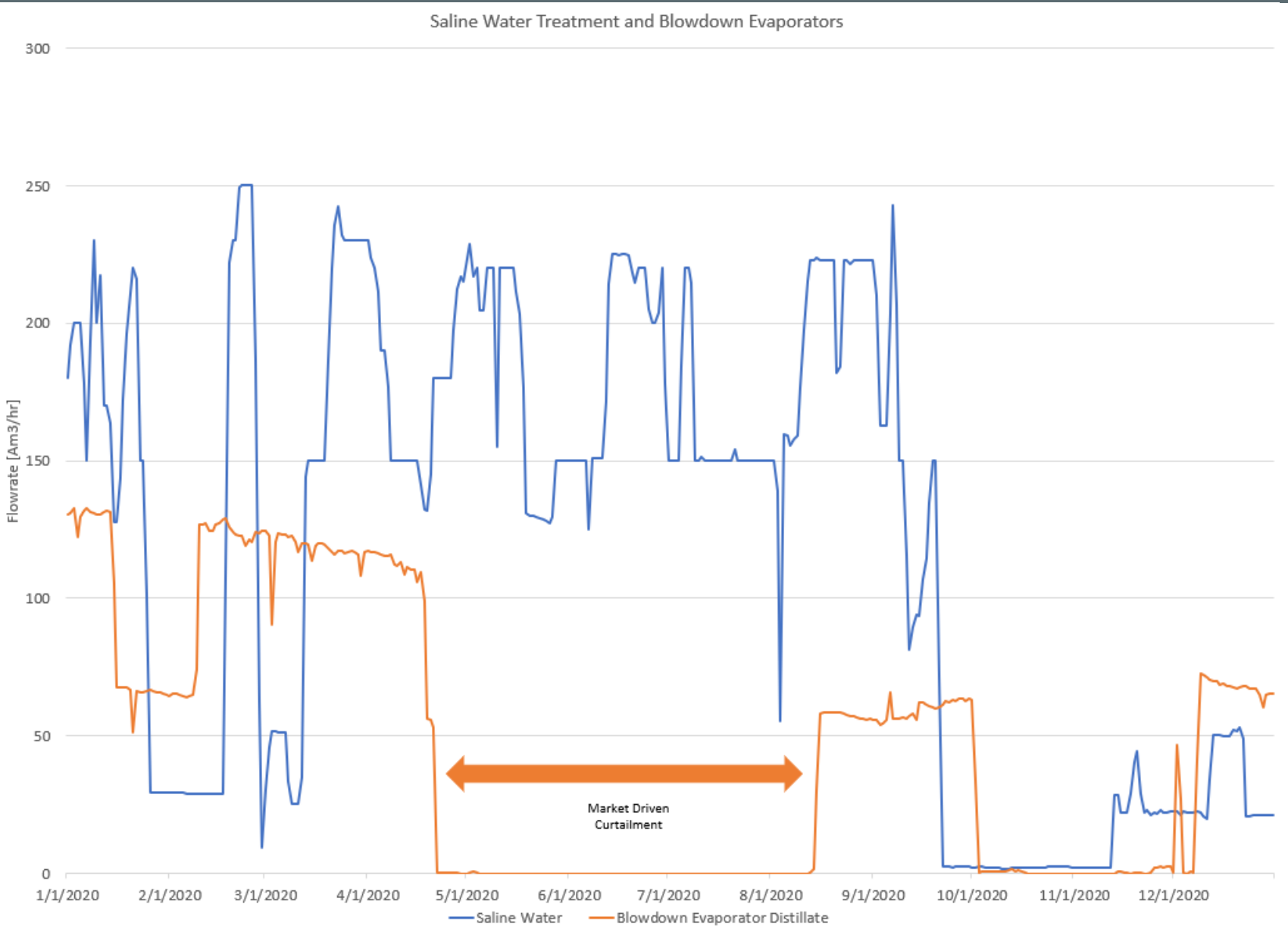
Facility Performance: Bitumen Treatment by CPF



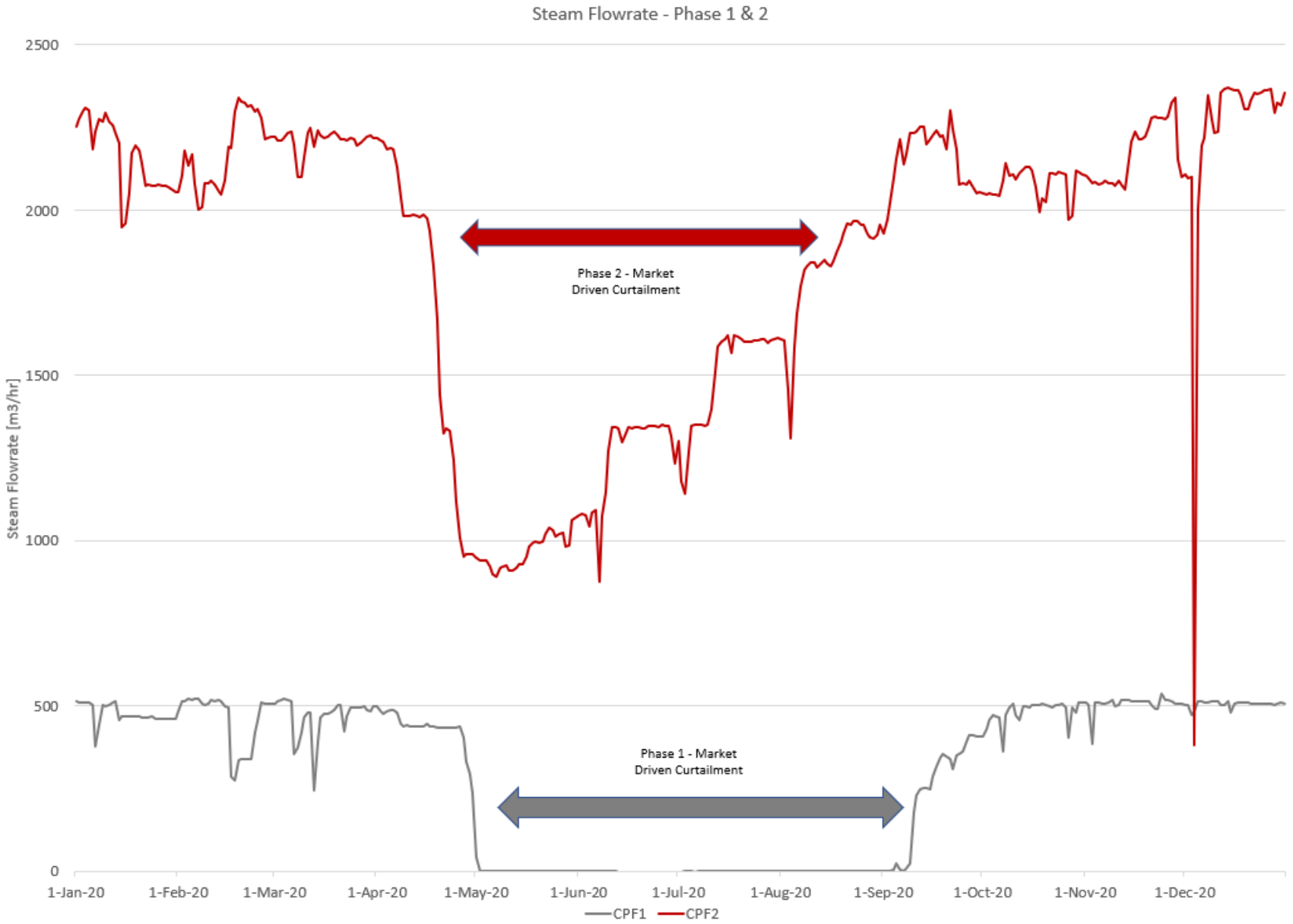
Facility Performance: Water Treatment by CPF



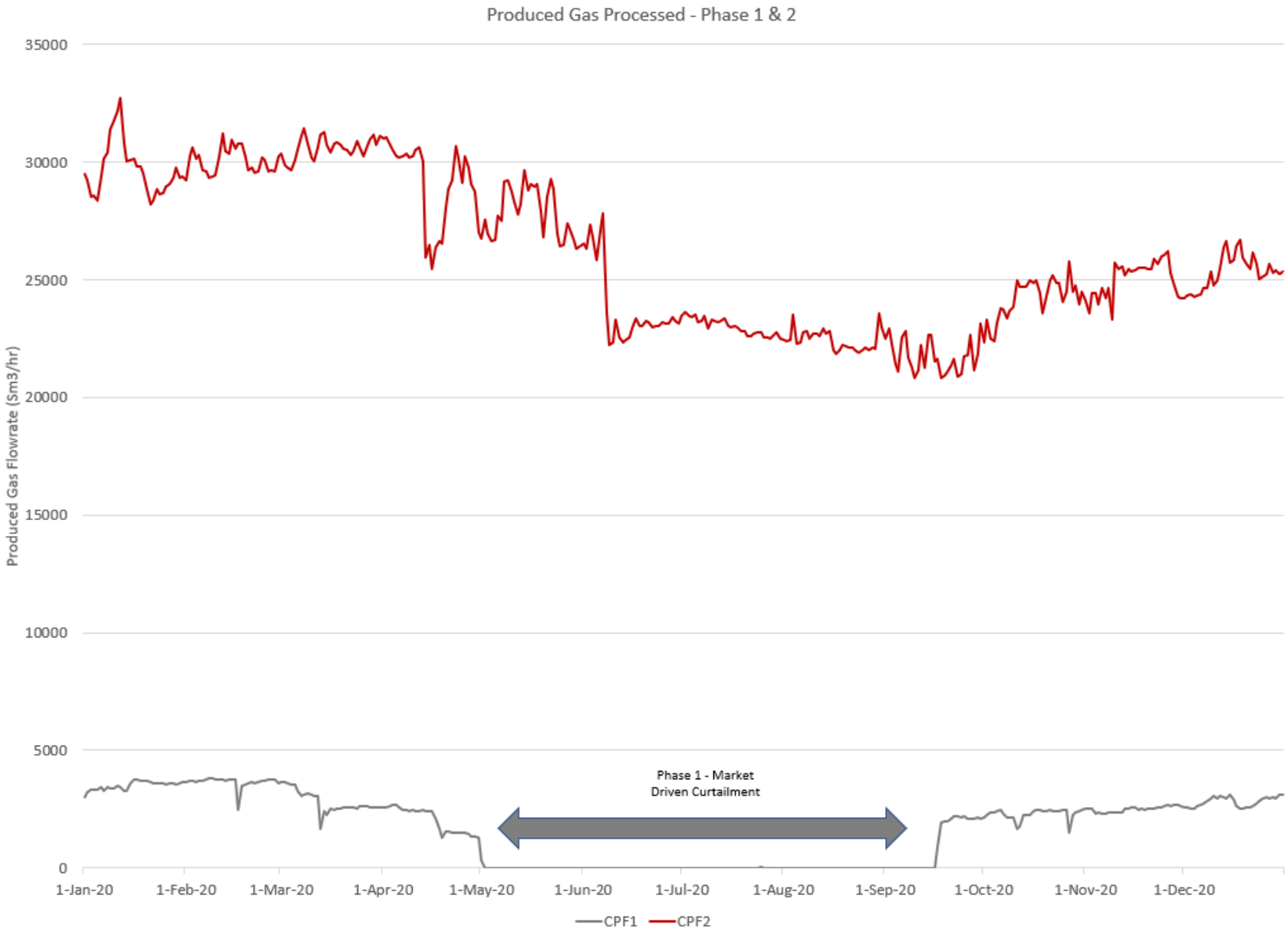
Facility Performance: Saline Water Treatment and Blowdown Evaporators



Facility Performance: Steam Production by CPF



Facility Performance: Produced Gas Production by CPF



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Surmont Water Source & Disposal Wells

Directive 054: Section 4.3 (8)(a)
Class 1b Disposal Approval No. 10044M

Surmont Phase 1 and Phase 2 Water Source Wells

Surmont Phase 1 Non-Saline Water Source Wells

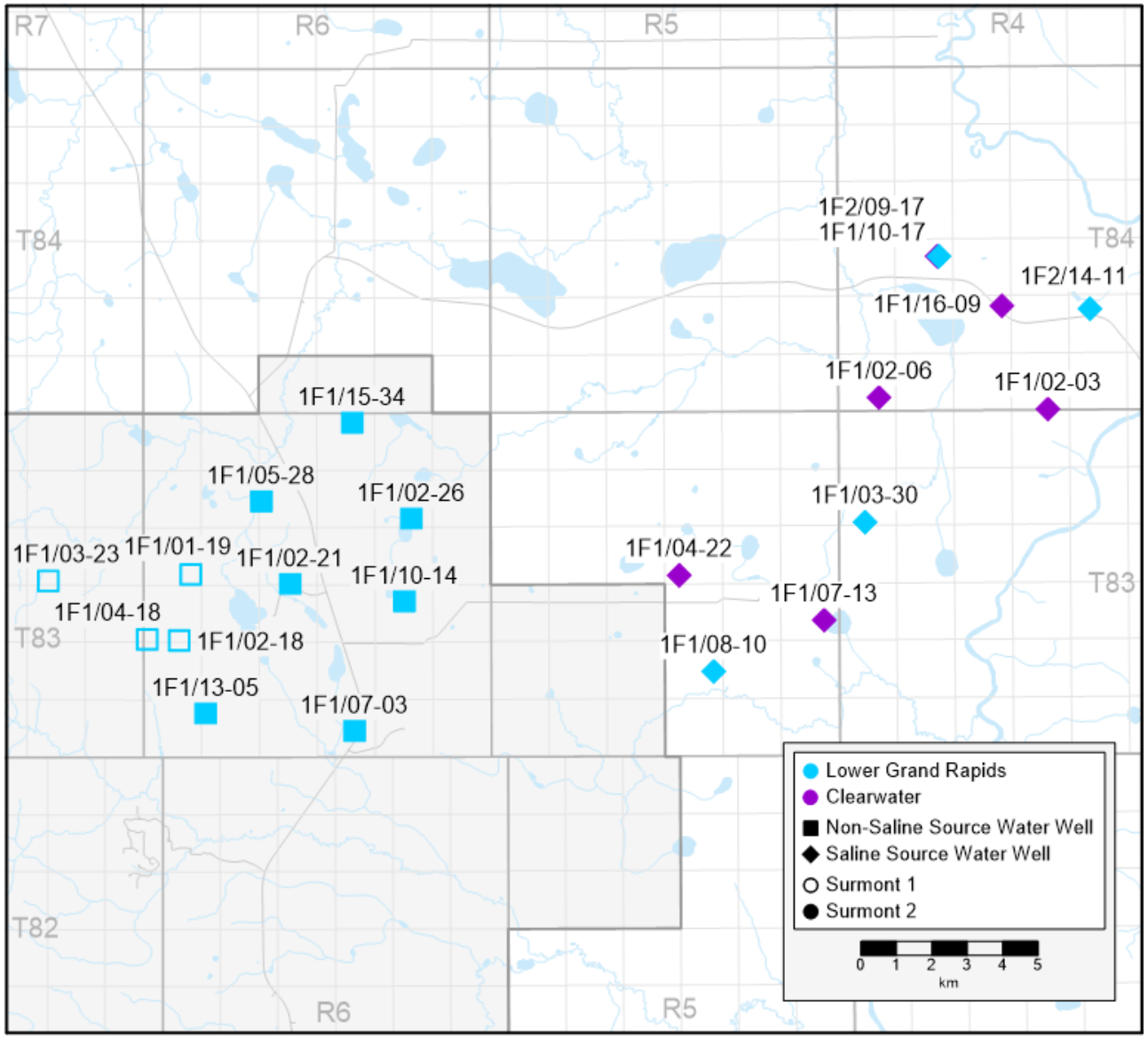
Source Well	Observation Well	Formation	Water Act Licence No.
1F1021808306W400	1F2021808306W400	Lower Grand Rapids	00253532-02-00
1F1041808306W400	102041808306W400	Lower Grand Rapids	00253532-02-00
1F1011908306W400	100011908306W400	Lower Grand Rapids	00253532-02-00
1F1032308307W400	100032308307W400	Lower Grand Rapids	00253532-02-00

Surmont Phase 2 Non-Saline Water Source Wells

Source Well	Observation Well	Formation	Water Act Licence No.
1F1022108306W400	100022108306W400	Lower Grand Rapids	00312463-02-00
1F1022608306W400	100022608306W400	Lower Grand Rapids	00312463-02-00
1F1052808306W400	100052808306W400	Lower Grand Rapids	00312463-02-00
1F1070308306W400	1F2070308306W400	Lower Grand Rapids	00312463-02-00
1F1101408306W400	1F1111408306W400	Lower Grand Rapids	00312463-02-00
1F1130508306W400	100130508306W400	Lower Grand Rapids	00312463-02-00
1F1153408307W400	1F2153408307W400	Lower Grand Rapids	00312463-02-00

Surmont Phase 2 Saline Water Source Wells

Source Well	Formation
1F1020308404W400	Clearwater
1F1020608404W400	Clearwater
1F1033008304W400	Lower Grand Rapids
1F1042208305W400	Clearwater
1F1071308305W400	Clearwater
1F1081008305W400	Lower Grand Rapids
1F1101708404W400	Clearwater
1F1160908404W400	Clearwater
1F2091708404W400	Lower Grand Rapids
1F2141108404W400	Lower Grand Rapids



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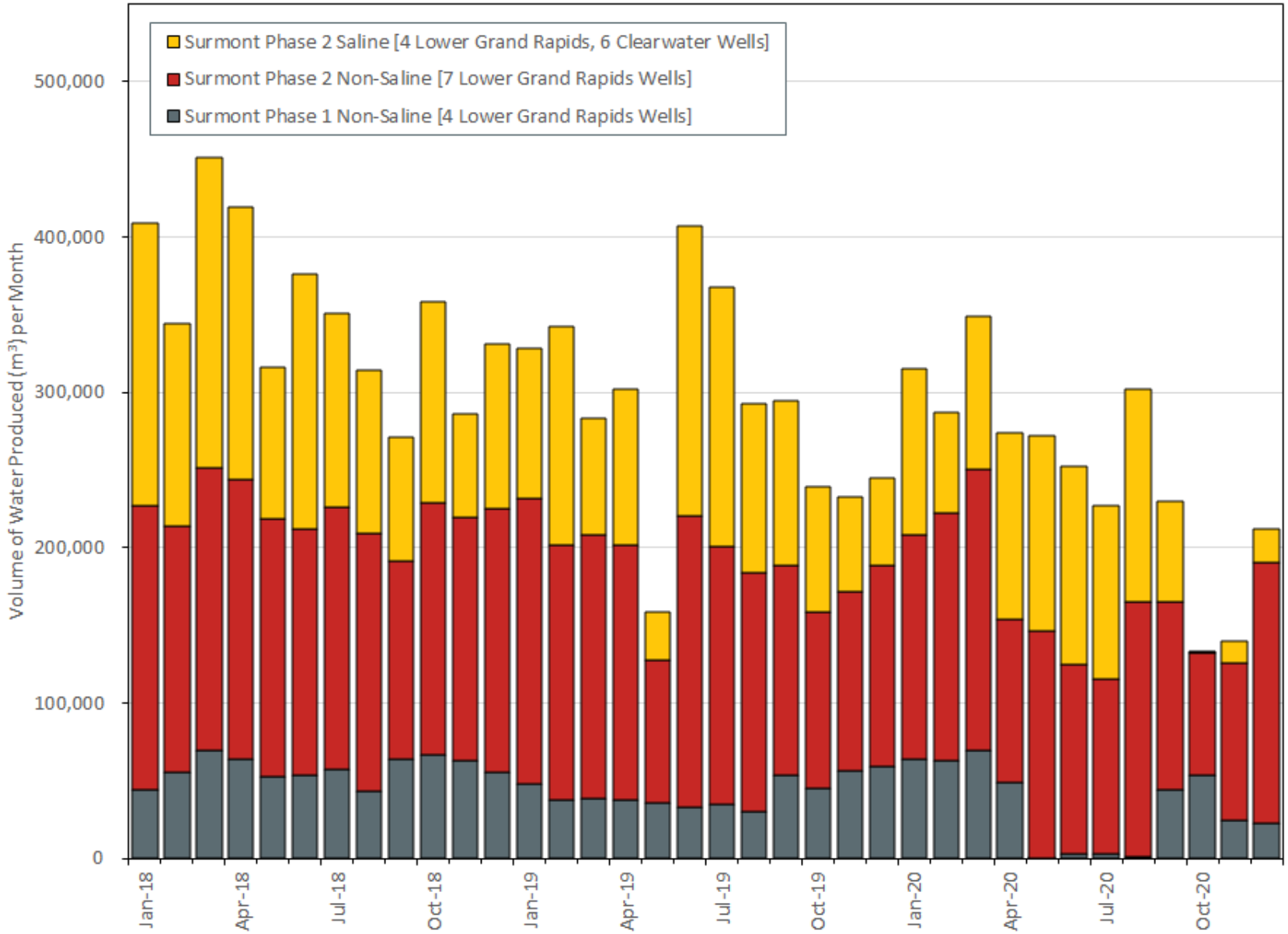
Surmont Non-Saline and Saline Water Source Wells: Production Volumes

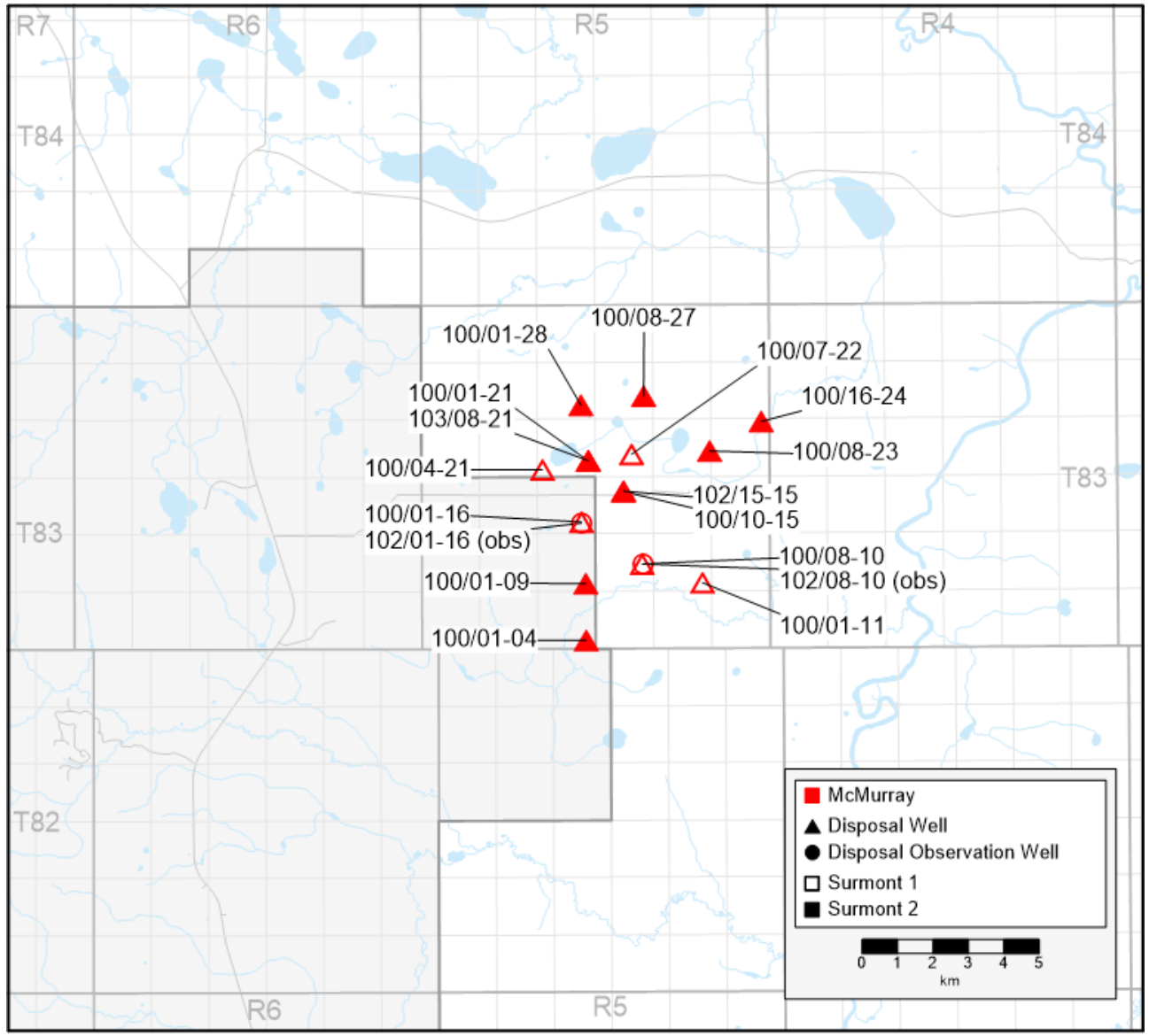


Surmont Phase 1 and Phase 2 Water Disposal Wells

Surmont Phase 1 Water Disposal Wells		
UWI	**Formation**	**Approval No.**
100011608305W400	McMurray	10044M
100072208305W400	McMurray	10044M
100081008305W400	McMurray	10044M
100042108305W400	McMurray	10044M
100011108305W400	McMurray	10044M

Surmont Phase 2 Water Disposal Wells		
UWI	**Formation**	**Approval No.**
100010908305W400	McMurray	10044M
100010408305W400	McMurray	10044M
100012808305W400	McMurray	10044M
100101508305W400	McMurray	10044M
102151508305W400	McMurray	10044M
100082708305W400	McMurray	10044M
100082308305W400	McMurray	10044M
100162408305W400	McMurray	10044M
100012108305W400	McMurray	10044M
103082108305W400	McMurray	10044M

Surmont Water Disposal Observation Wells	
UWI	**Formation**
102011608305W400	McMurray
102081008305W400	McMurray



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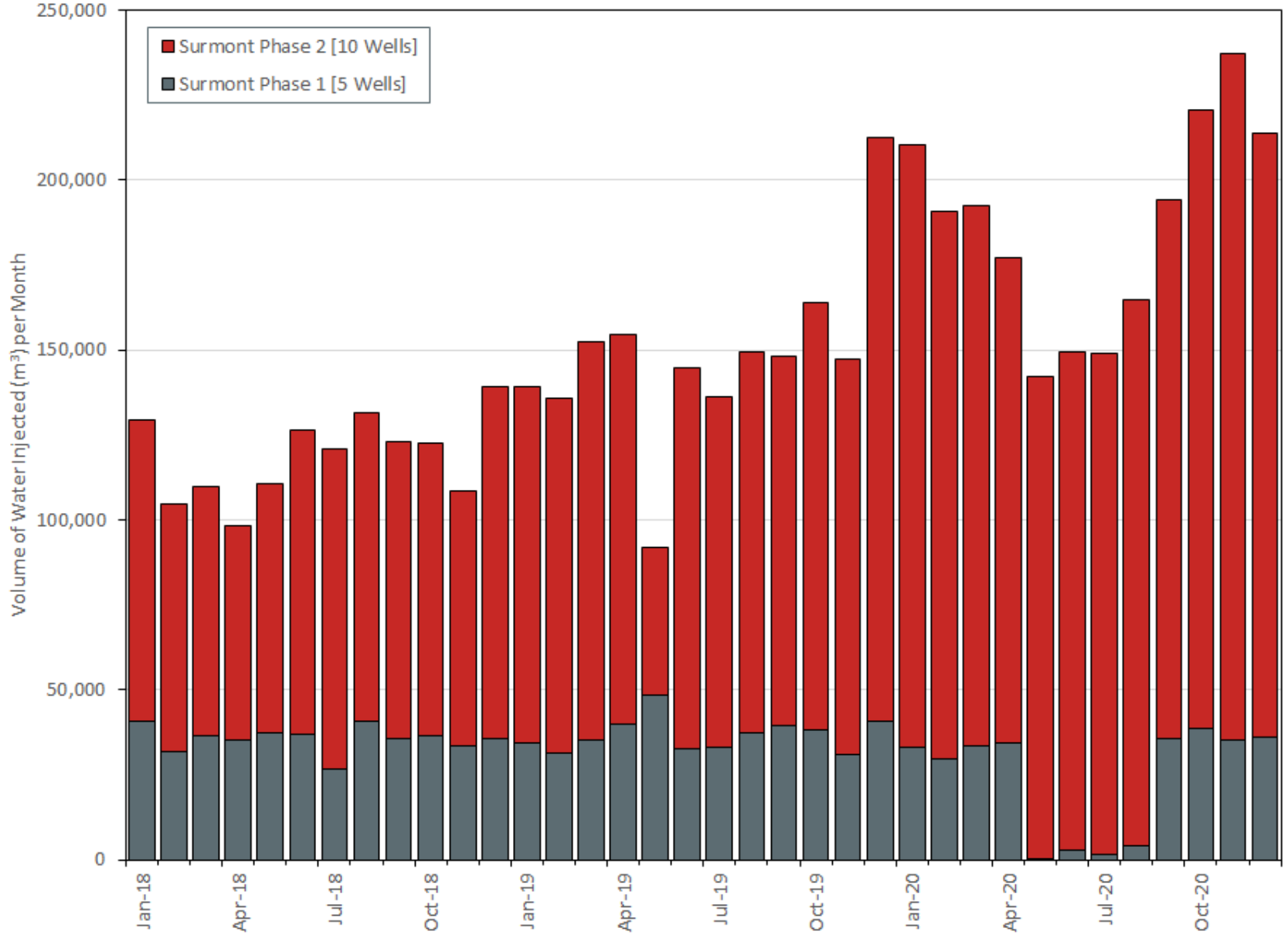
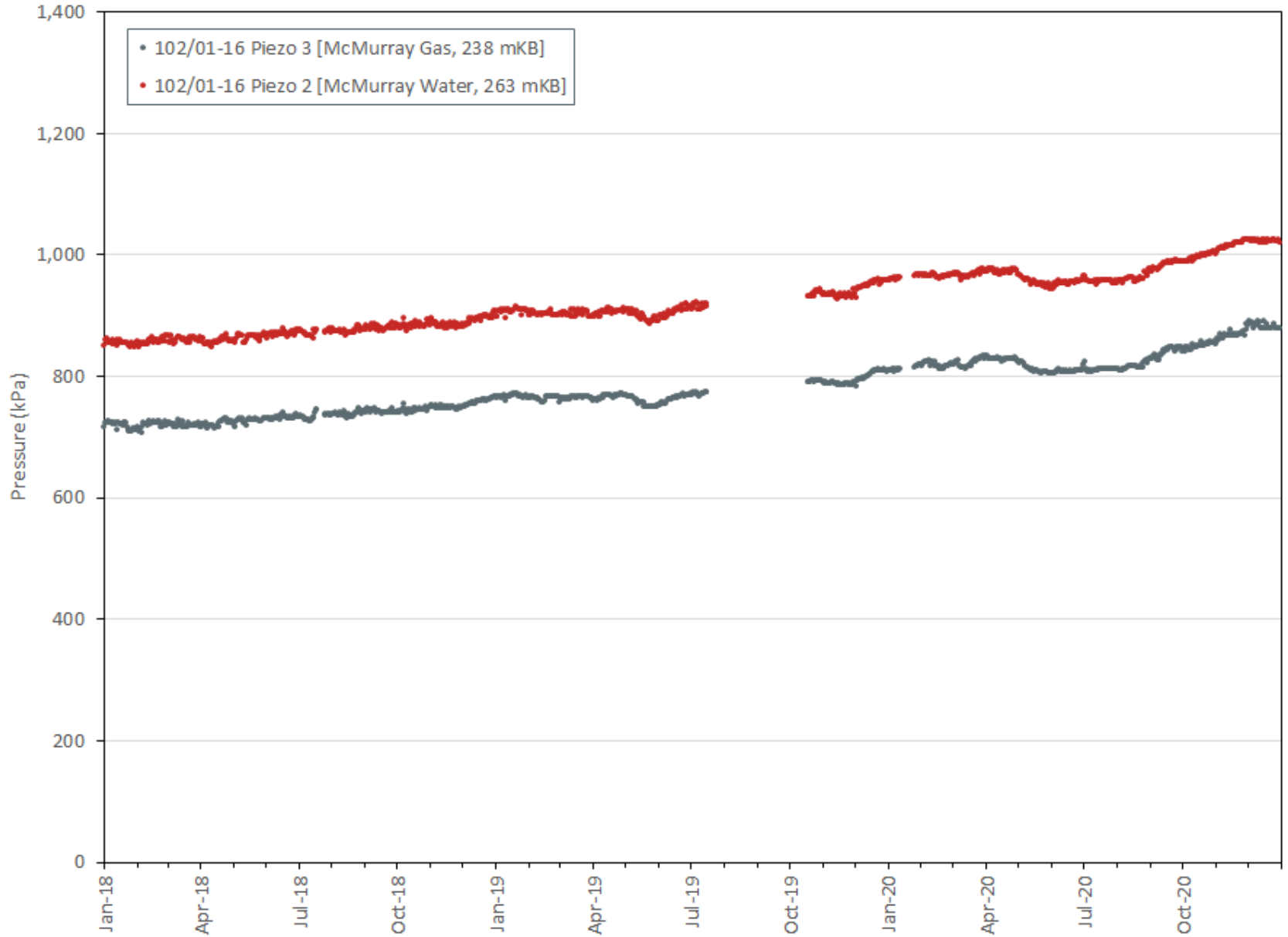
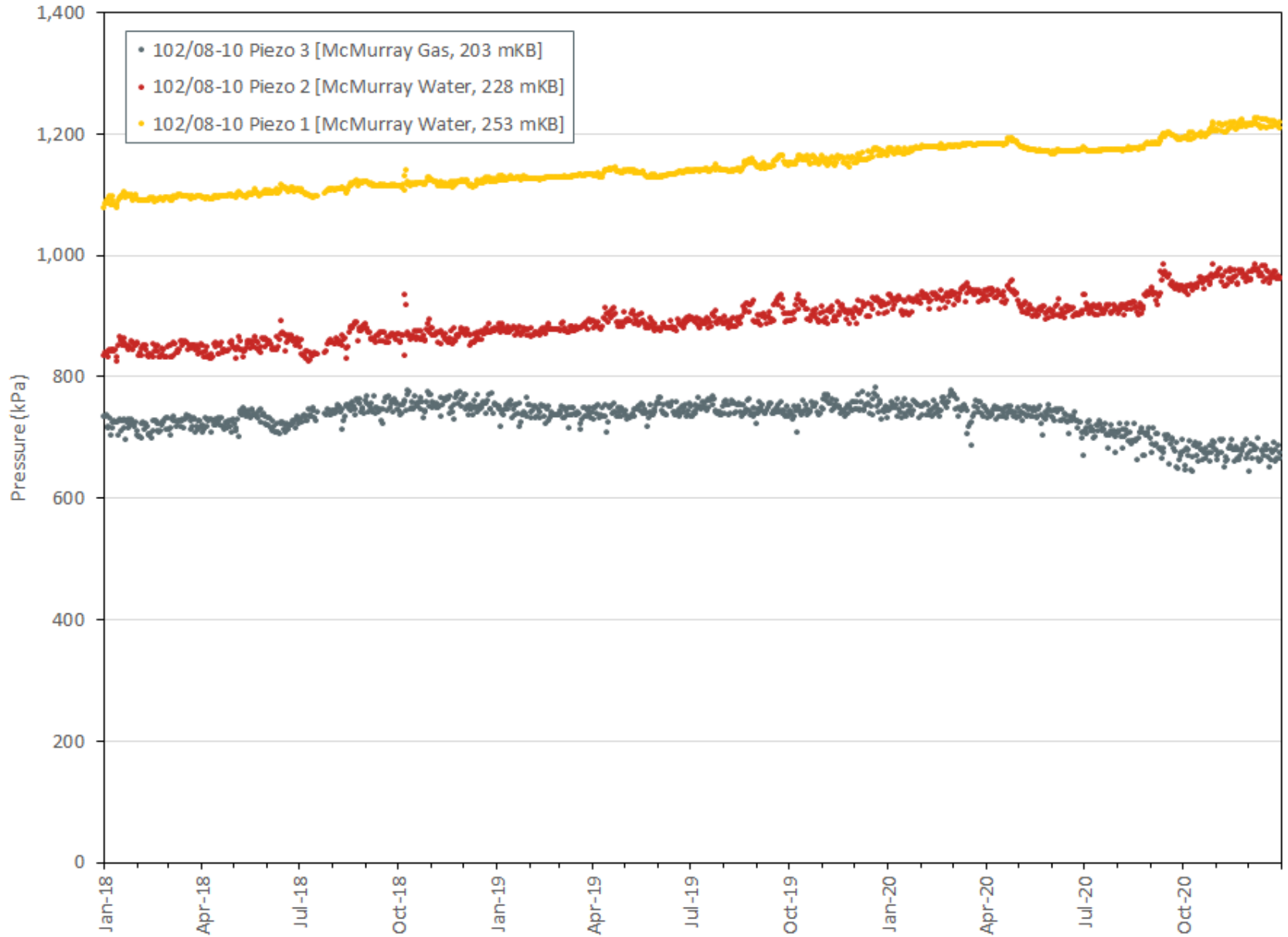
Surmont Water Disposal Wells: Injection Rates (McMurray)



Water Disposal Well: 102/01-16-083-05 W4M Observation Well Pressure (McMurray)



Water Disposal Well: 102/08-10-083-05 W4M Observation Well Pressure (McMurray)



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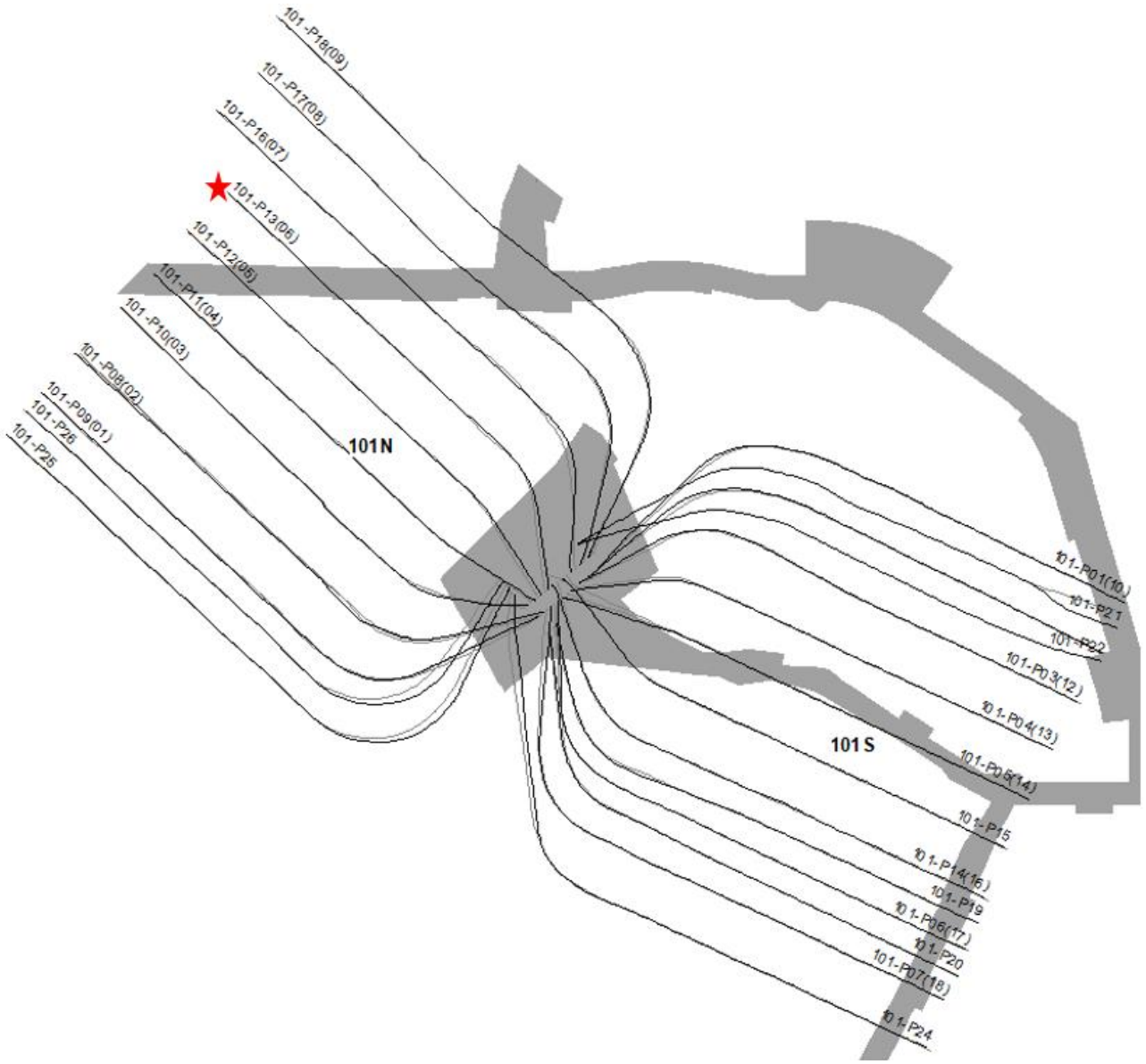
Historical & Upcoming Activity

Directive 054: Subsection 4.4

Suspension & Abandonment Activity



- 101-P13 (DH06) was suspended in July 2020 due to liner failure and is being reviewed for re-drill or future workover
- No pads currently in place for full scale suspension/abandonment
- No pads currently in blowdown/ramp down

Regulatory Approvals & Lifecycle Activities: 2020 Reporting Period

Application No./Date	Description	Approval Date/No.
1926474 **January 6, 2020**	**Temporary MOP increase at Pad 263-2** - Category 2 amendment to temporarily increase the maximum operating pressure (MOP) for the cold start-up of multilateral producer 263-2-P02. Requested approval to increase MOP from 4100 kPa to 4747 kPa for 90 days.	9426TT February 21, 2020
1926672 **January 15, 2020**	**ID 2001-03 Exemption Request** - Category 2 amendment requesting an exemption from ID 2001-03 sulphur recovery requirements for 2020.	9426UU March 20, 2020
Lifecycle Activity **February 18, 2020**	**Alternate Diluent Project – Facility Modification** - Notification for modifications at the Sumont Phase 1 CPF to enable the use of condensate as an alternate diluent at Surmont. Minor work commenced in 2020 with the majority rescheduled for 2021.	N/A
Lifecycle Activity **March 2020**	**Coriolis Water Cut Calculation** - Changed the process for collecting water cut readings on the test separator to an automated calculated value based off the Coriolis meter.	N/A
1928359 **April 27, 2020**	**Temporary MOP Increase at Pad 263-2** - Category 2 amendment to temporarily increase the maximum operating pressure (MOP) for the cold start-up of multilateral producer 263-2-P02. Requested approval to increase MOP from 4100 kPa to 5700 kPa for 150 days. Second application due to unsuccessful attempt at lower pressure.	9426VV August 11, 2020
Lifecycle Activity **April 27, 2020**	**NCG Injection Limit** - Temporary removal of the 60-day limit to inject 100 mol percent fuel gas without steam to enable flexibility during progressive and temporary production curtailment. NCG injection was used to help sustain or limit the decline in pressure in the reservoir and preserve our ability to return to normal production levels in the future.	N/A

No activities took place that could materially affect scheme performance or energy or material balances.

Lessons Learned, Successes & Failures

LESSONS LEARNED

- NCG may cause some production loss due to gas interference at the ESP.
  - On some wells, there is a loss of efficiency and an increased variation in ESP amperage draw that corresponds to NCG injection timing. Oil production will drop as the ESP can no longer lift effectively. Halting NCG injection on the well pair will cause this behavior to stop and the well to return to pre-NCG injection performance. If the gas volume is large enough, the ESP may temporarily stop lifting to surface due to gas locking. This only occurs on a portion of wells with NCG injection.

SUCCESSES

- Achieved SOR reduction on all pads where NCG was implemented on most wells.
- Through the protocols put in place and the diligence of the on-site workers, Surmont maintained continuous operation throughout 2020 without any COVID outbreaks at the facility.
- Successfully managed the challenges of multiple production rate changes throughout the year that resulted from the significant market variability.
- The largest ESP ever installed at Surmont was successfully started on November 21, 2020, at Pad 103, Producer 07. This ESP and well can deliver over 9000 bbl/d of emulsion, close to 2200 bbl/d of oil, compared to the average well production of ~800 bbl/d of oil.

Compliance History

Incident	Reference Number	Date of Occurrence	Detail/Action
X-Change (Caustic) Release	EDGE 0364039	February 25, 2020	Release of 0.65 m^3 from a chemical tote – the release was caused by operator error while unloading the totes and was cleaned up via vacuum truck. AER satisfied on February 29, 2020.
Saline Water Release	EDGE 0364052	February 26, 2020	Release of 0.1 m^3 from a leaking bonnet valve at a pipeline riser – once identified, the line was immediately shut in and the effected area was cleaned up via vacuum truck. AER satisfied on April 6, 2020.
Process Water Release	EDGE 0367319	June 6, 2020	Release of 1.5 m^3 from the S2 blowdown pond – the incident is believed to be due to heavy precipitation and wind, which redirected the flow pipe fluid outside of the pond. The effected area was cleaned up via vacuum truck. AER satisfied on June 15, 2020.
Steam Release	EDGE 0372962	October 20, 2020	Release of .00003 m^3 from an injector well bonnet on a master valve – a wellhead valve shroud was temporarily placed over the master valve to contain the release. When it was safe to do so, the well was killed, and the valve was changed. Not closed by AER at the time of this report.
Lime Slurry Release	EDGE 0373269	October 31, 2020	Release of 19.4 m^3 from the warm lime softener – the release was contained in the building sump and was cleaned up via vacuum truck. AER satisfied on November 10, 2020.
Boiler Feed Water Release	EDGE 0373501	November 6, 2020	Release of 5.5 m^3 from a pipe rack – the release was contained and cleaned up via vacuum truck. AER satisfied on December 16, 2020.
Compromised Interstitial Space in Building Sumps	VSD 10764	September 24, 2018	Seventeen building sumps were identified as having compromised interstitial space. The primary layer failed in these sumps, but the secondary liner barrier was functioning, and the environment is not being impacted. A voluntary self-disclosure (VSD) was submitted to the AER on September 24, 2018. ▪ 10 sumps have been repaired to date ▪ An extension has been granted by the AER until December 2021 to complete repairs on the remaining 7

Technical Innovations

STEAM ADDITIVES PILOT *- Lifecycle Activity*

- Continue development of a pilot project for the injection of steam additives into the reservoir, with the objective to reduce the viscosity of emulsion at downhole SAGD conditions and accelerate the flow of emulsion drainage in the reservoir. This pilot is expected to start in Q1/Q2 2021.

MULTILATERAL WELLS PROGRAM *- Lifecycle Activity*

- Continue to pursue the trial of the Multilateral (MLT) Wellbores Technology. The first MLT in Surmont is operational, and the plan to drill and complete two more MLT's will be carried out in 2021.

WARM APPLIED SOLVENT PROCESS (WASP) PILOT *- Lifecycle Activity*

- Working on plan development for solvent co-injection technology in Surmont 1. Plan for WASP execution in Q1 2022.

Future Plans: Next 12 Months

SURMONT PHASE 1

- Completion of alternate blend project planned for 2021 (construction/commissioning) – *Lifecycle Activity*
- 2021 multilateral well program – *Lifecycle Activity*
- 101-S NCG Injection

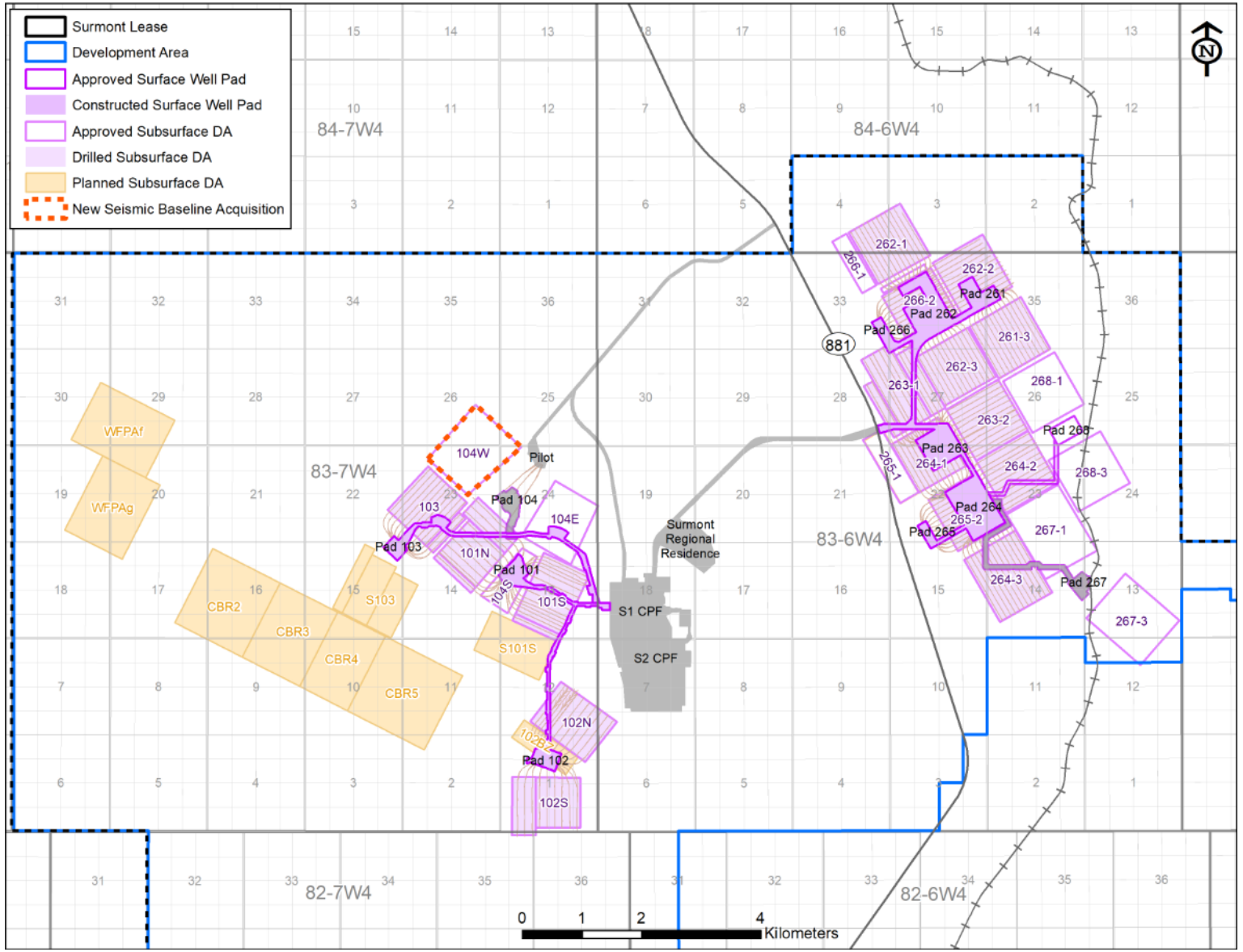
SURMONT PHASE 2

- Disposal water debottlenecking project planned for 2021 resulting in increased disposal capacity
- 2021 multilateral well program – *Lifecycle Activity*
- Steam additives trial to start in 2021 – *Lifecycle Activity*
- Single outboard fishbone producer well in drainage area 265-2 in 2021 – *Lifecycle Activity*
- Four outboard well pairs in drainage area 265-1 in 2021

EXPECTED APPLICATIONS

- Lifecycle approval changes - OSCA Annual Reporting requirements and conditional actions
- Temporary MOP increase for startup – drainage areas 103-P01, 261-3-P10, 265-1 & 265-2P13
- Pad 267 permanent MOP increase

Future Plans: Five Year Development & Delineation Outlook



FUTURE PAD DEVELOPMENT OPTIONS

- Approved Drainage Areas (pre-Lifecycle)
  - 104S
  - 267-1
  - 268-1
  - 265-1
  - 267-3
  - 268-3
- Lifecycle Approved Drainage Areas
  - CBR3
  - S101S
  - 102BZ
  - CBR4
  - 266-1
- Drainage Areas for Delineation
  - 266-1
  - 104W
  - 104E
  - CBR5
  - CBR2
  - S103
  - WFPAf
  - WFPAg

DELINEATION & OBSERVATION WELLS

- Proposed baseline seismic at 104W: 2022/23

Year	Observation Wells	Delineation Wells	Target Drainage Areas for Delineation
2021	4	3	267-3, 104S, CBR 2/3/4
2022	10	4	103, 265-2, 267-1/3, 104, S101S, 266-1, 104E, WFPAf/g, S103
2023	0	0	TBD
2024	9	5	TBD
2025	6	4	TBD
2026	7	3	TBD