PENGROWTH

PENGROWTH ENERGY CORPORATION

LINDBERGH SAGD PROJECT

2018 ANNUAL PERFORMANCE PRESENTATION

SCHEME APPROVAL 6410P

2019 01 15

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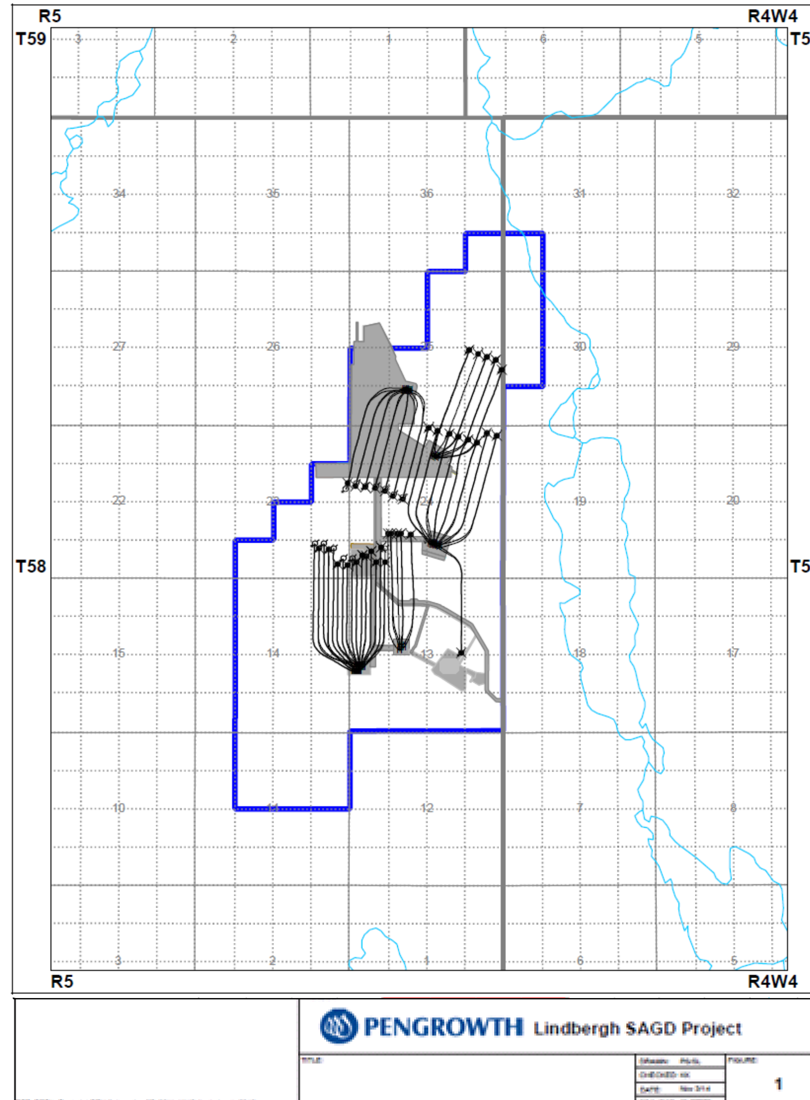
BACKGROUND AND OVERVIEW

PROJECT LOCATION



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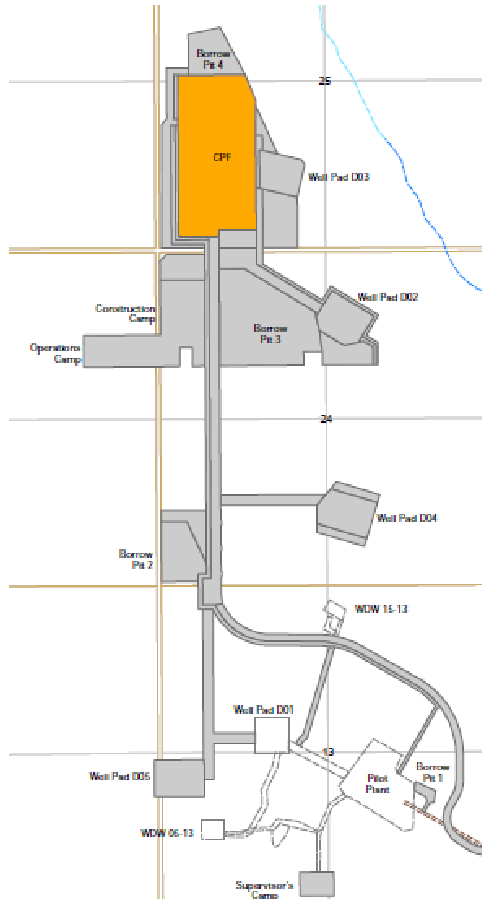
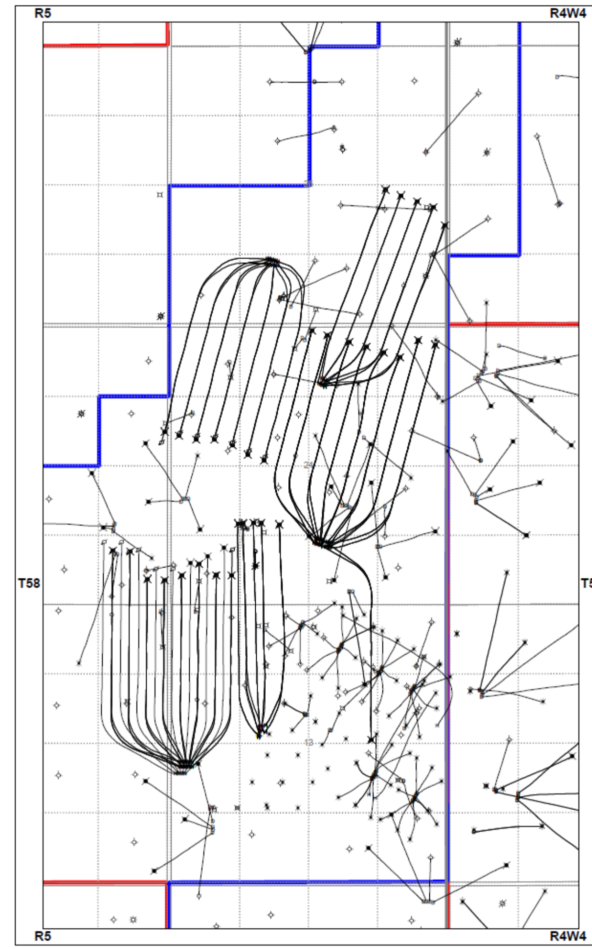
PROJECT OVERVIEW AND HISTORY

- Murphy piloted and then commercialized CSS production in the Lloydminster and Rex formations in Section 13 from 1972-1998
- Pengrowth acquired the Lindbergh lease from Murphy Canada in April, 2004
- All CSS wells have been abandoned
- Pilot project implemented to evaluate the SAGD recovery process in the Mannville Lloydminster Formation
  - 2 pilot SAGD wells – began steam circulation Feb 2012
- 12,500 bpd SAGD facility completed Q4, 2014
  - 20 new SAGD wells – began steam circulation Dec 2014
  - 1 new SAGD well/2 Infill wells – began steam circulation June 2017
  - 6 new SAGD wells – began steam circulation Sept 2017
  - 3 new SAGD wells – began steam circulation Feb 2018
  - 8 infill wells – began steam circulation July 2018
- Pilot SAGD CPF decommissioned upon start-up of the Phase 1 CPF and then recommissioned in April 2018 to handle increasing production from the field.
- Approved to increase production to 40,000 bpd





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CSS IMPACT ON FUTURE DEVELOPMENT IN SEC 13

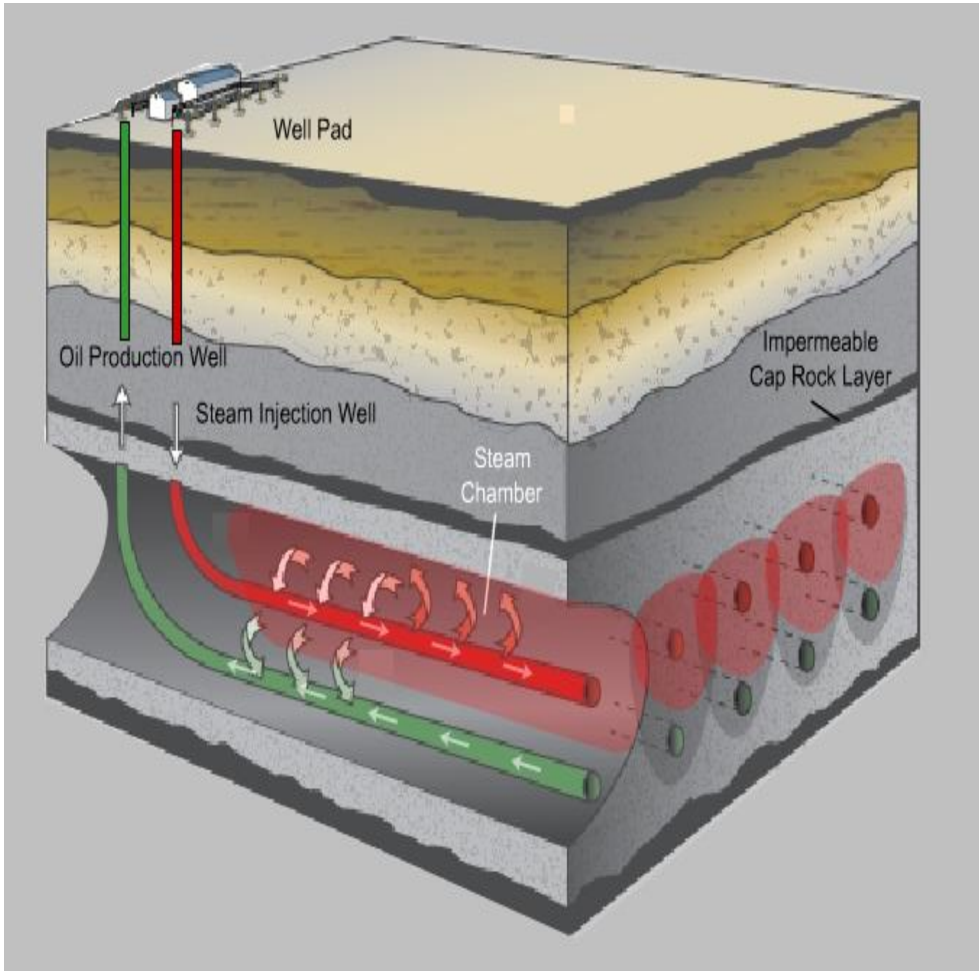
- Murphy produced a total of 2.3 MMbbls of oil and 7.6 MMbbls of water with 8.2 MMbbls (CWE) steam injection
- 71 vertical wells and 3 horizontal wells used in CSS operations
- The average recovery factor for the CSS area is 5-6% of the OOIP (up to 10% in various wells)
- CSS injection operations were at pressures over 10 MPa with injection at various depths within the target formation
- Pengrowth received D78 Category 2 Amendment Approval to install 2 additional horizontal well pairs on well pad 4 to test SAGD production performance in the CSS impacted area. 1 well pair was drilled in 2017 and placed on circulation in September.
- Potential impacts of the CSS operations are:
  - Channeling of steam, breakthrough to bottom water, increased SOR with decreased recovery, increased water production from residual CSS steam condensate
- Performance of D04-06 drilled in the CSS area in 2017 has been as expected
- The success of drilling and producing D04-06 has de-risked future production from this part of the reservoir

LINDBERGH APPLICATION HISTORY

OPERATOR	DATE	EVENT
Murphy	May 1991	ERCB Scheme Approval 6410 granted
	Aug 1993	ERCB Amended Scheme Approval 6410B granted
	Dec 1996	ERCB Amended Scheme Approval 6410C granted
	Aug 1997	ERCB Amended Scheme Approval 6410D granted
	Jun 1999	ERCB Amended Scheme Approval 6410E granted
Pengrowth	Apr 2004	ERCB Amended Scheme Approval 6410F granted
	July 2011	Scheme Amended - 6410H SAGD Pilot Project granted
	Aug 2012	Scheme Amended - 6410I Expansion to 12,500 bopd granted
	Apr 2014	Scheme Amended - 6410J Solvent Soak Trial granted
	Nov 2014	Scheme Amended – 6410K Facility De-bottlenecking
	Jun 2015	Scheme Amended – 6410L Section 13 addition
	May 2016	Scheme Amended – 6410M EIA Approval to 30kbbl/d
	Nov 2016	Scheme Amended – 6410N Infill Wells
	May 2017	Scheme Amended – 6410O Legacy Well Remediation Scheduling
	Jun 2017	Scheme Amended – 6410P Phase II Treater Addition to 40kbbl/d
	May 2018	Scheme Amended – 6410Q Gas co-injection
	Dec 2018	Scheme Amended – 6410R Expansion of Project Dev Area

SAGD RECOVERY PROCESS

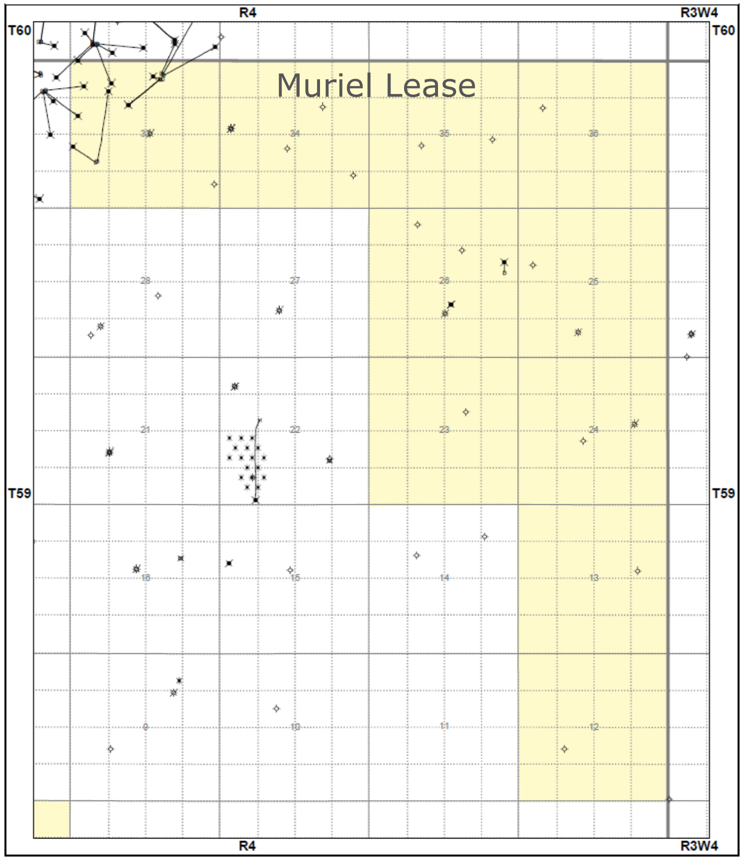
- Stacked horizontal wells
- Steam injected into top well and forms steam chamber
- Steam condenses on boundary of chamber and releases heat into the bitumen
- Bitumen and condensed water drain by gravity to the bottom well
- Bottom well produces liquid bitumen to surface

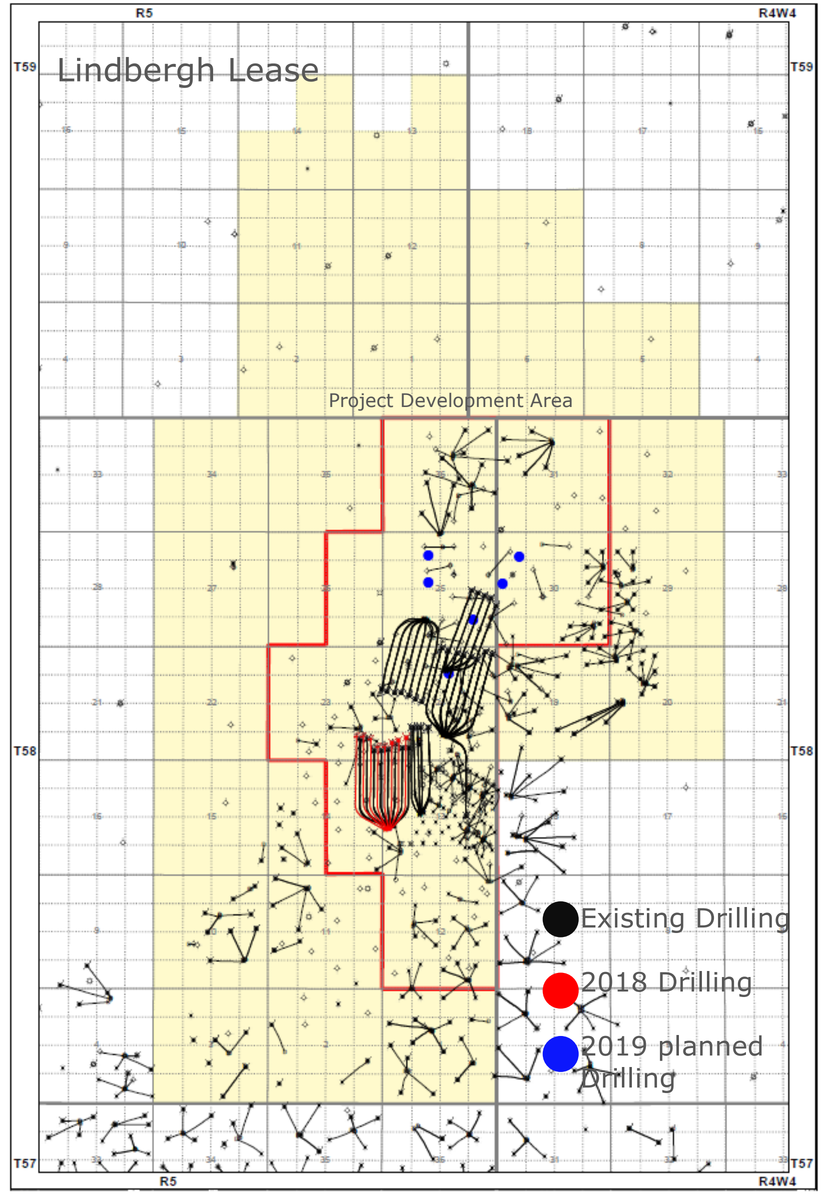


GEOLOGY AND GEOSCIENCE

2017 & 2018 DRILLING

- 8 Infill wells drilled in 2018 at Lindbergh
- No wells drilled at Muriel Lake
- 6 delineation wells planned for 2019





BITUMEN VOLUMES & RESERVOIR PROPERTIES

- All values shown for S_w, Φ and bitumen volume are measured from the Petrel geological model which was recently updated
- Boundaries defining the area and the top and bottom surfaces of the reservoir are used to confine the volume calculation
- Bitumen volume extends below well pairs to the 10 ohm.m resistivity level
- S_w, Φ are averages for the volume shown
- Average horizontal permeability = 3500 md: Kv / Kh = 0.86
- Viscosity of the bitumen decreases upwards through the reservoir from approximately 600,000 cP at the base to 50,000 cP near the top
- Mean reservoir thickness over entire lease is 16.7 m. This includes all areas having a minimum thickness of 10 meters
- Initial reservoir temperature = 20 Celsius, initial reservoir pressure 2800-3000 kPa
- Reservoir pressure in bottom water interval = 2850 kPa
- Reservoir depth ~ 500 mKB

Region	OBIP Volume (E3m³)	Porosity (%)	Sw (%)
Wellpad D01	1,407.5	36	19
Wellpad D02	2,160.1	35	21
Wellpad D03	2,886.5	35	17
Wellpad D04	4,295.3	36	22
Wellpad D05	3,493.0	37	20

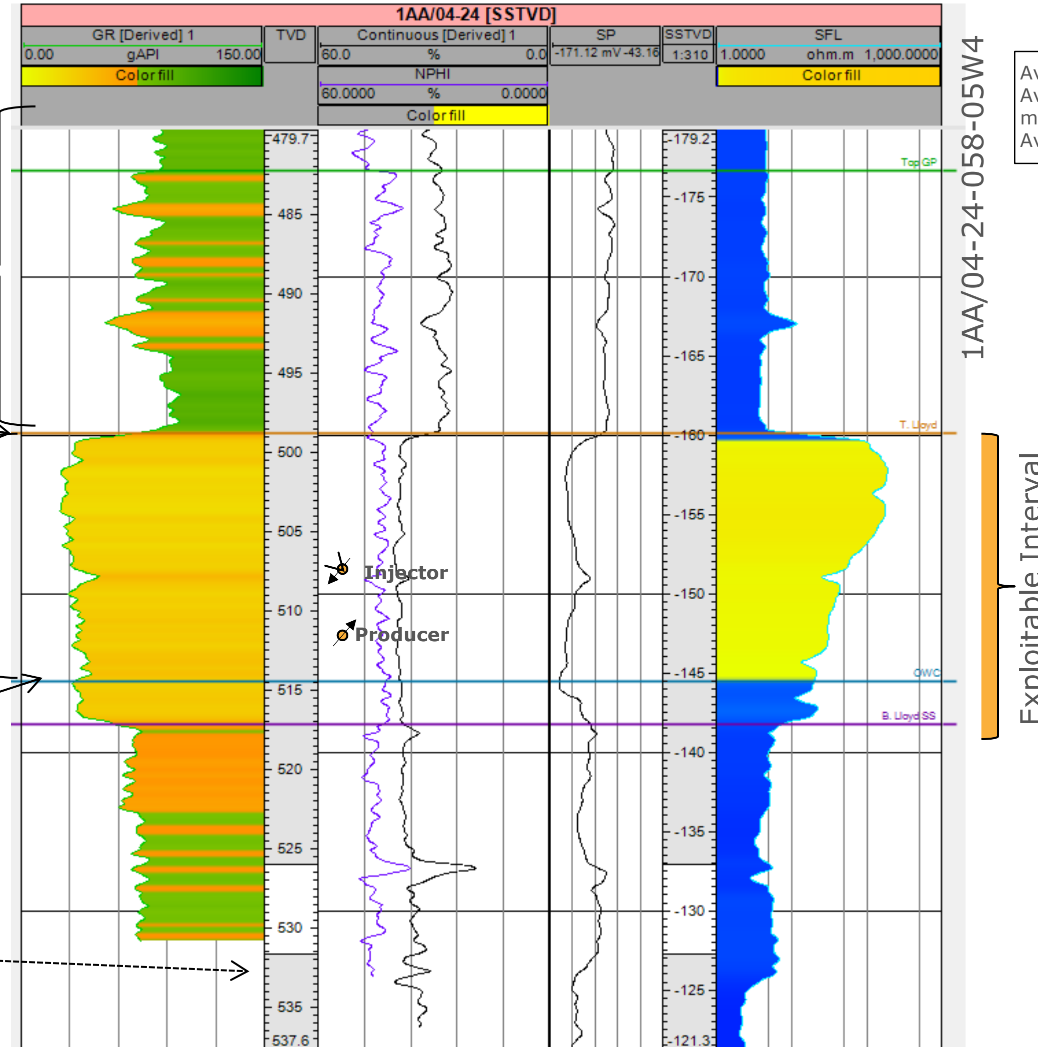
REPRESENTATIVE COMPOSITE WELL LOG

Cap Rock

Top Lloydminster Fm Reservoir

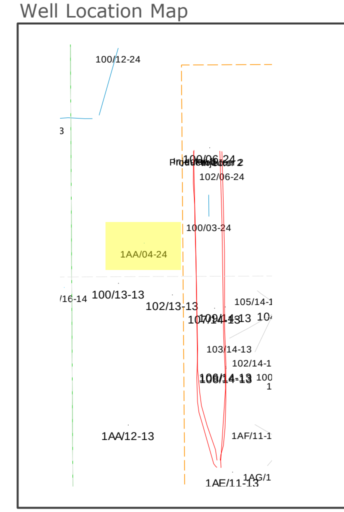
Oil/Water Contact Defined at 10 Ωm

Estimated Top Cummings Fm

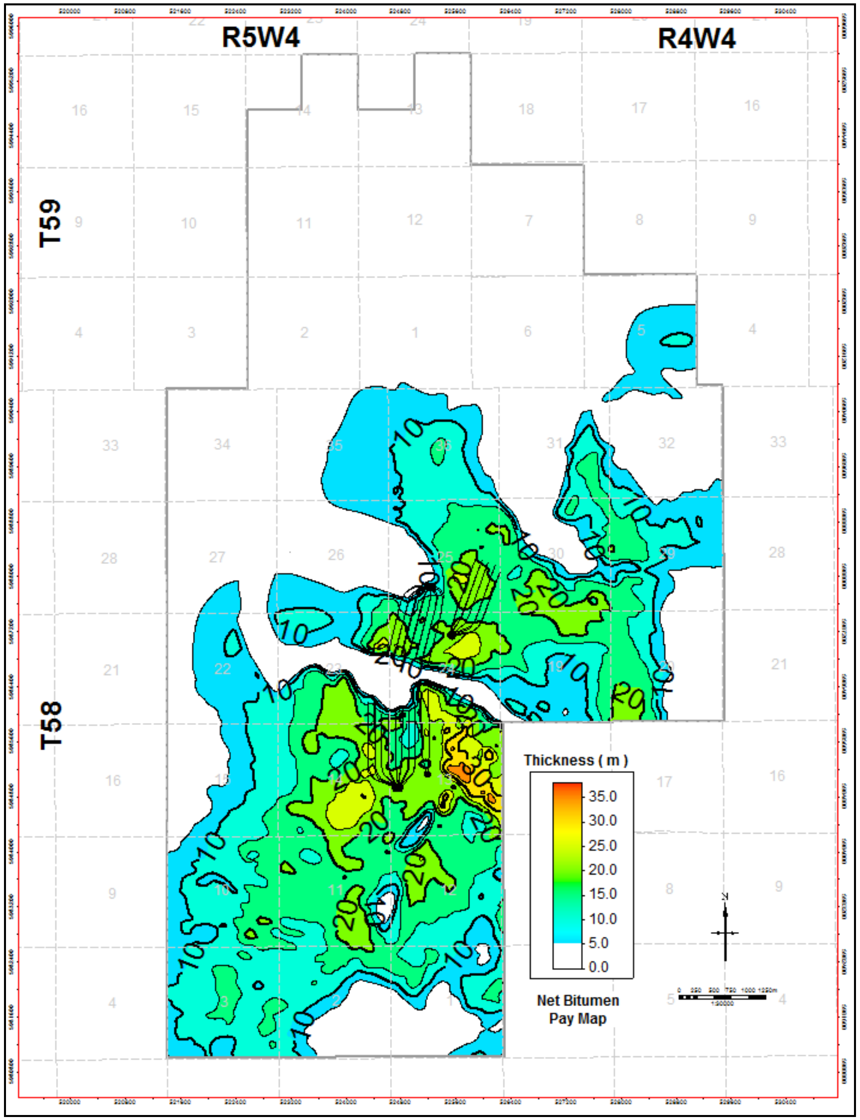


Average Pay Thickness = 20m
Average Producer to Injector Spacing = 5 m
Average O/W to Producer Distance = 3 m

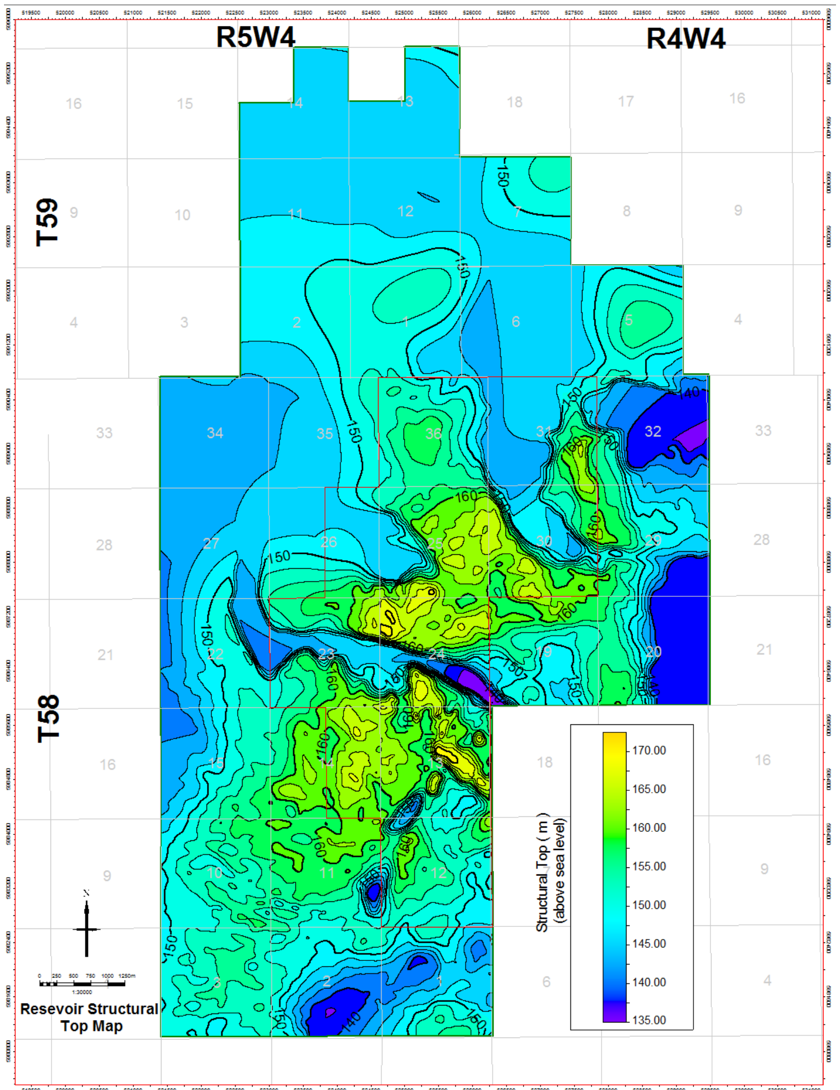
Well Location Map

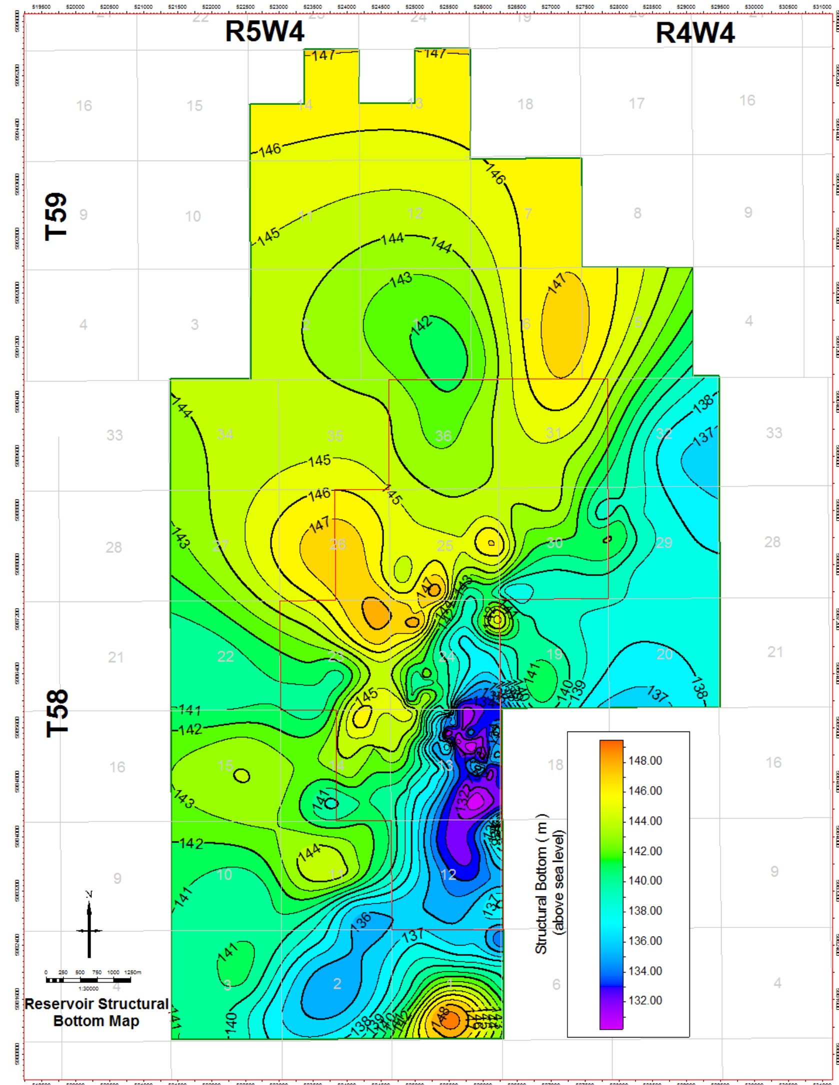


NET BITUMEN PAY



STRUCTURAL TOP AND BOTTOM OF BITUMEN RESERVOIR





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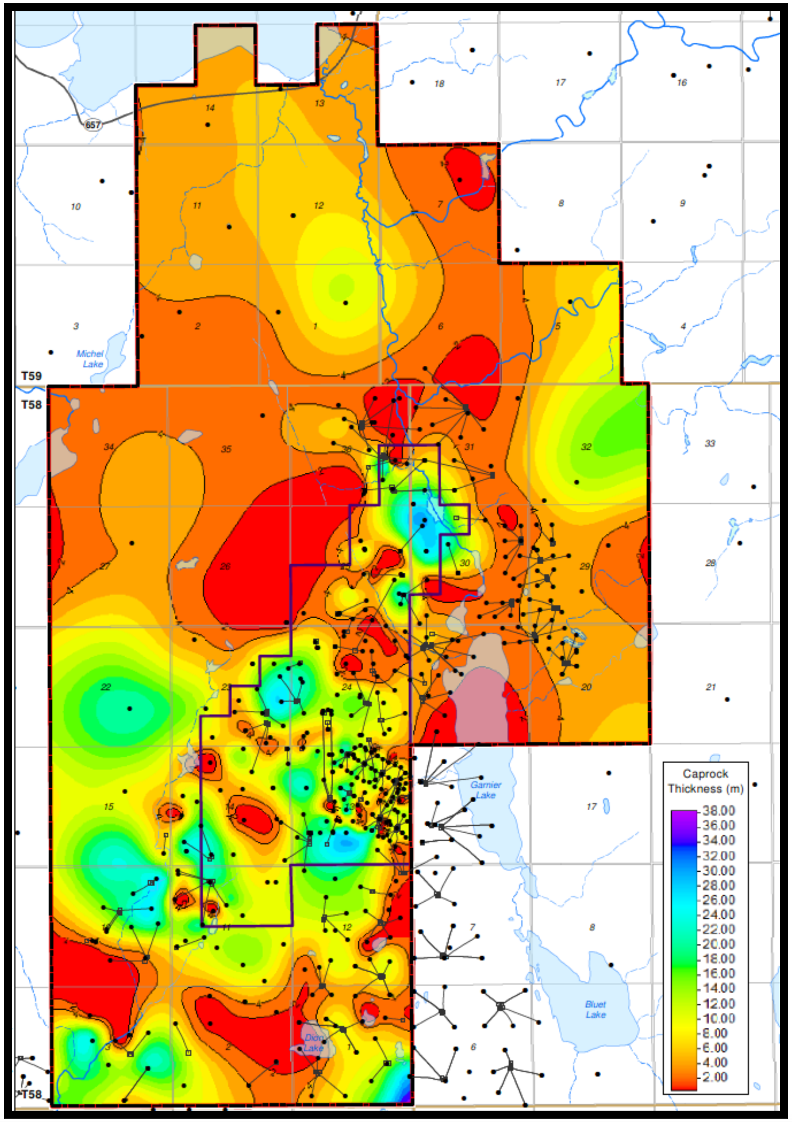
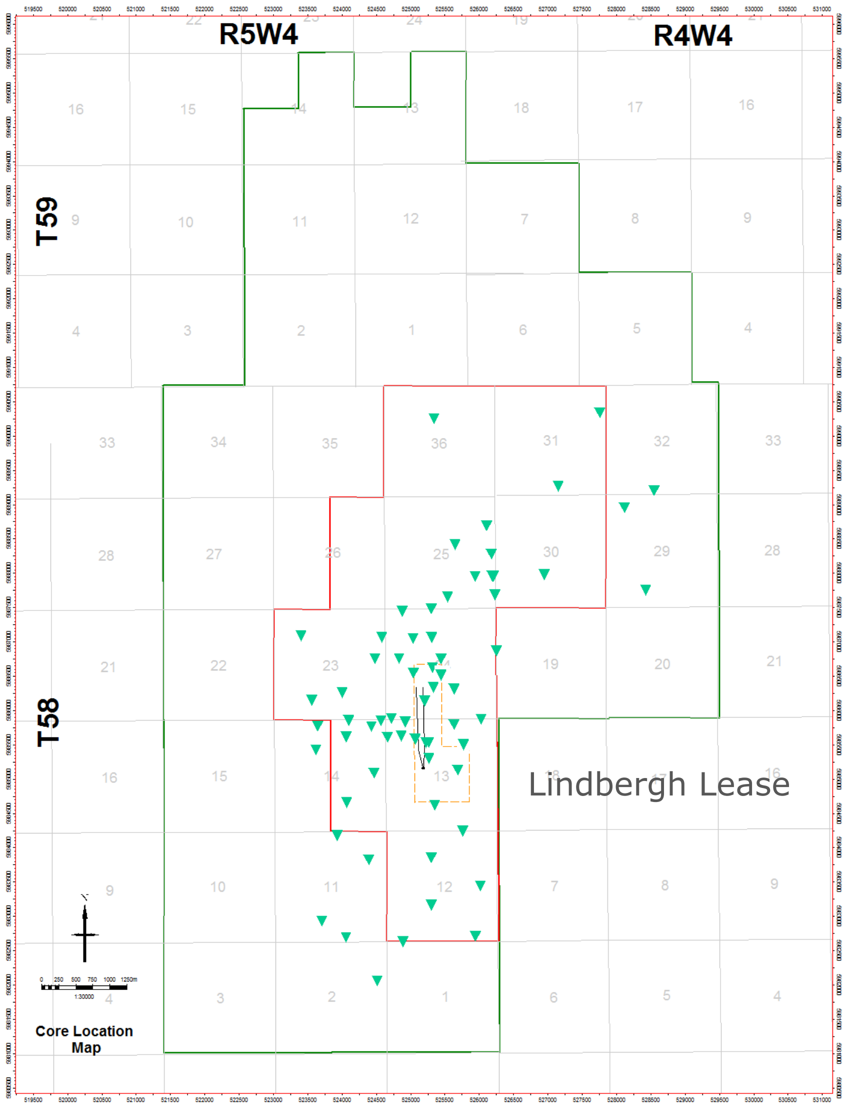
CAPROCK THICKNESS MAP

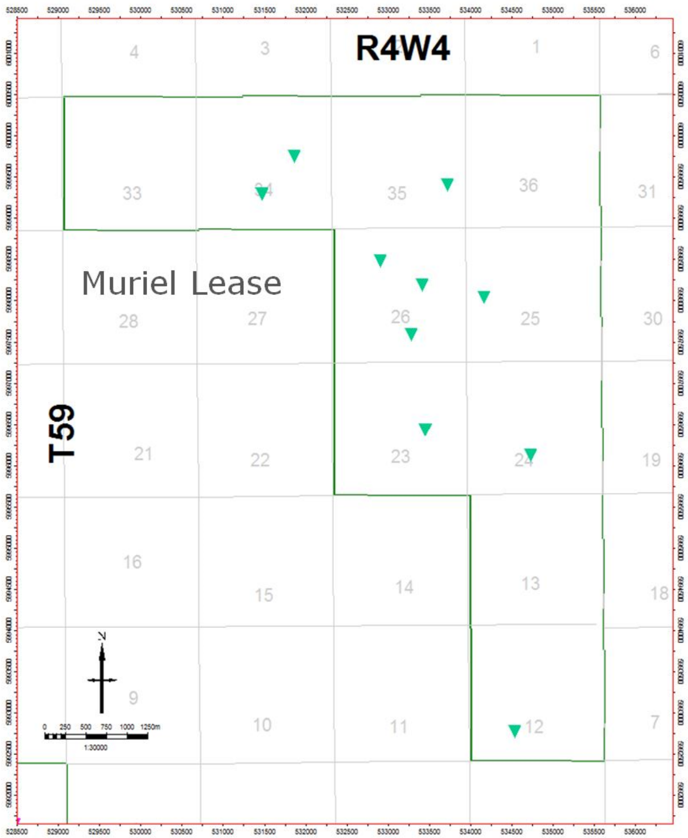


CORED WELLS AND SPECIAL CORE ANALYSIS



Core analysis typically consists of the following:

- Dean-Stark – 1762 samples
- Small plug Φ, K, Sw, - 2100 samples
- Grain size – 39 wells sampled
- Petrographic, XRD – 50 samples from 15 wells
- Special core analysis – 140 samples from 20 wells



TYPICAL LINDBERGH CORE SAMPLE

- Lloydminster sands are continuous and contain rare shale interbeds
- Typically the reservoir is composed of very fine grained sands throughout the interval

1AA/16-24-058-05W4

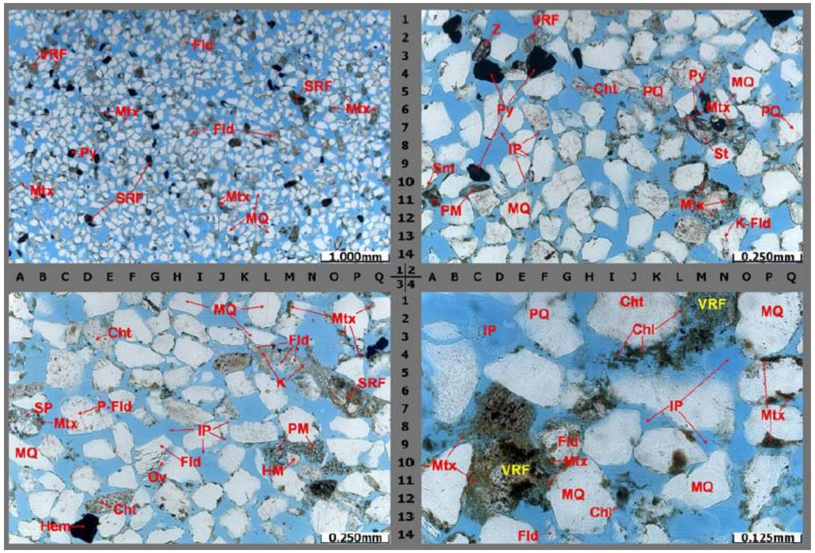
480.1 m

454.1 m

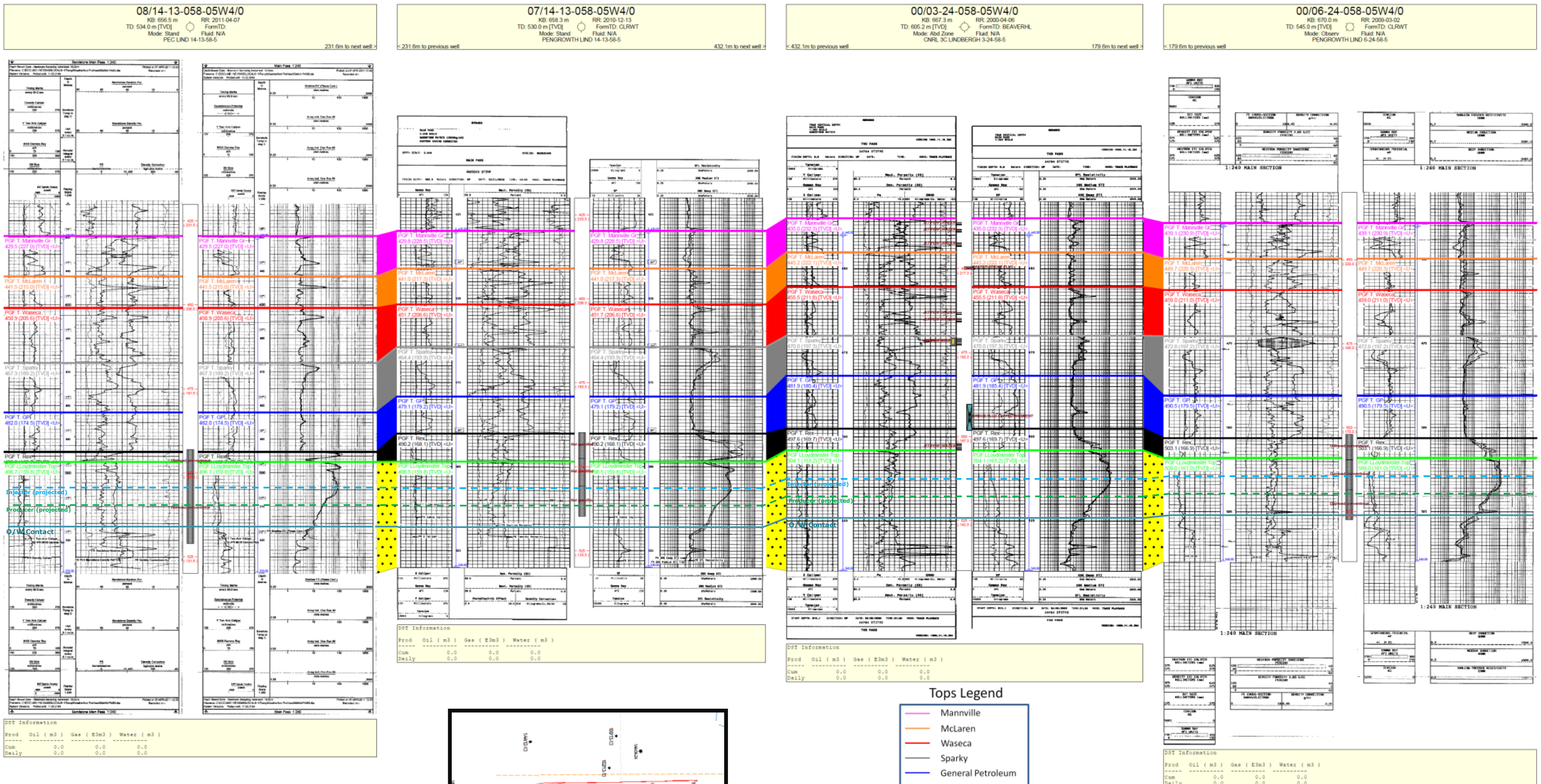
Top of Lloydminster

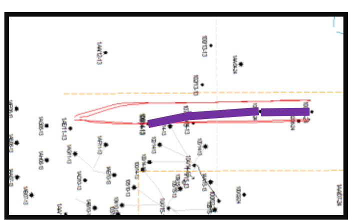
PETROGRAPHIC ANALYSIS

- Some Petrographic analysis has been done on core samples in the Lloydminster Reservoir
- Sands are typically classified as Feldspathic Litharenite to Sublitharenite on the Folk scale (Folk, 1974)
- The clay fraction is less than 10% of the bulk sample
- Grain sizes range from coarse silt to lower medium grained sand
- Critical velocity testing indicates that clays remain non-mobile during steam injection. The clays will not block pore throats



REPRESENTATIVE CROSS SECTION THROUGH PROJECT AREA

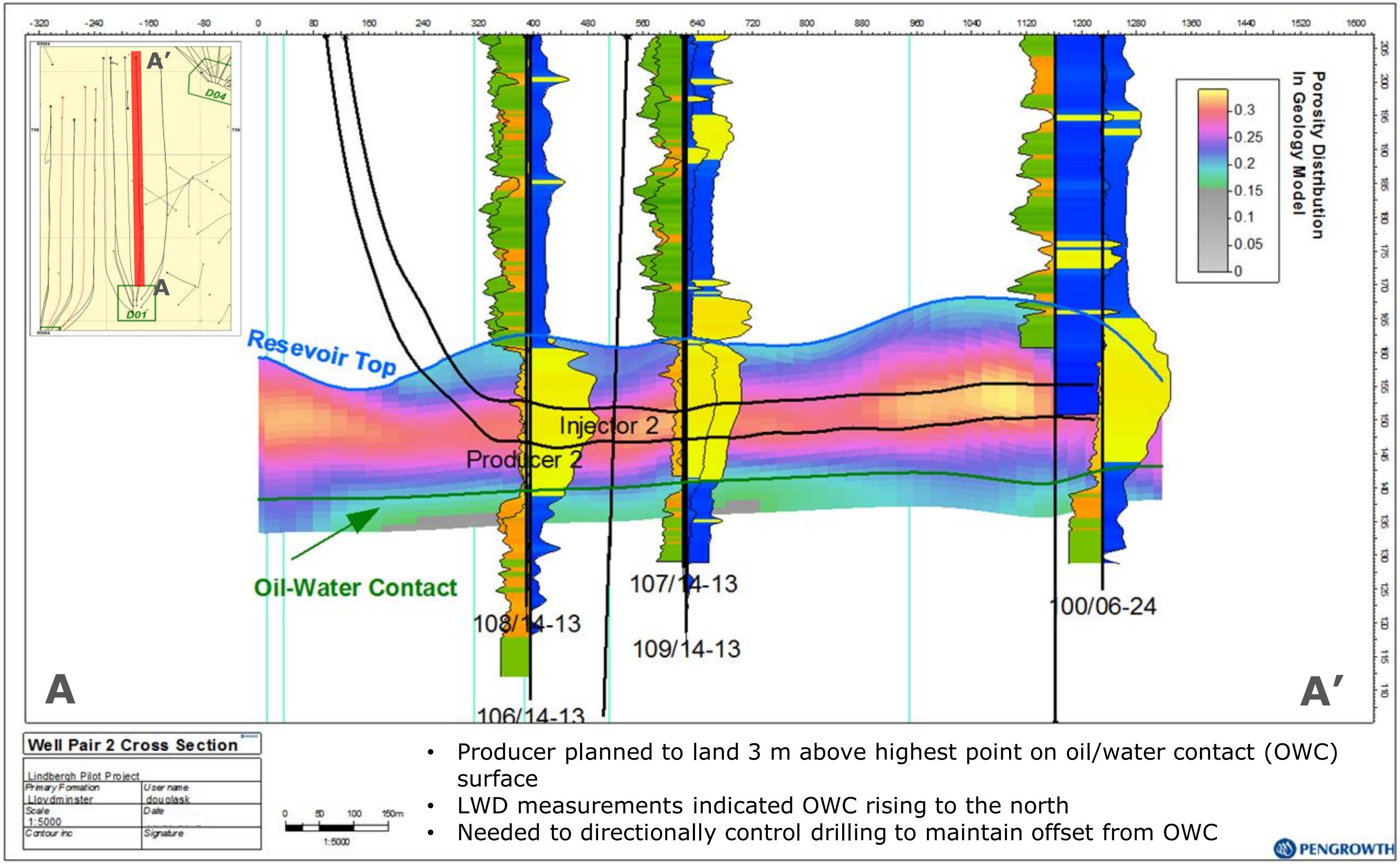




Tops Legend

- Mannville
- McLaren
- Waseca
- Sparky
- General Petroleum
- Rex
- Lloydminster
- Injector (Projected)
- Producer (Projected)
- O/W Contact

REPRESENTATIVE MODEL CROSS SECTION THROUGH PROJECT AREA



- Producer planned to land 3 m above highest point on oil/water contact (OWC) surface
- LWD measurements indicated OWC rising to the north
- Needed to directionally control drilling to maintain offset from OWC

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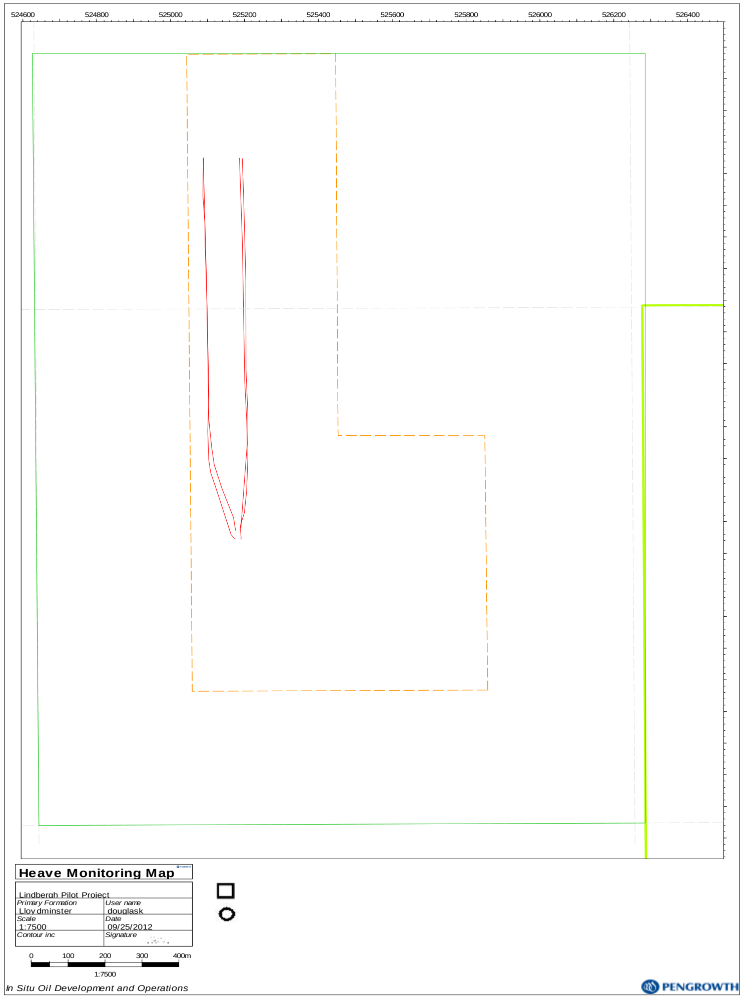
HEAVE MONUMENTS

- Baseline readings were taken in March 2012
- Most recent observations were taken in February and September of 2014
- Based on current analysis we do not anticipate additional monitoring within the next year

		Point Differences vs Observation 1		
		ΔN(m)	ΔE(m)	ΔElev(m)
Observation 6 (February 2014)	Control	0 0	0 0	0 0
	WP01	0.051 - 0.022	-0.05 - -0.003	0.019 0.002 0.003
	WP02	0.014 0.046 -	0.011 -0.107 -	0.019 0.003 0.0022
Observation 7 (September 2014)	Control	0 0	0 0	0 0
	WP01	- - 0.016	- - 0.008	0.0019 0.0029 0.004
	WP02	0.012 0.044 0	0.021 -0.09 0.001	0.011 0.005 0.003



CAPROCK INTEGRITY AND RESERVOIR OPERATING PRESSURE

- Mini-frac testing was done on the 1AB/13-13-58-5W4 (March 2011), 100/13-24-58-5W4 (December 2011), and 1AF/10-13-58-5W4 (March 2014)
  - All showed – comparable results
- Approved maximum ongoing operating pressure = 5500 kPa, less than 80% of minimum stress in caprock at reservoir depth

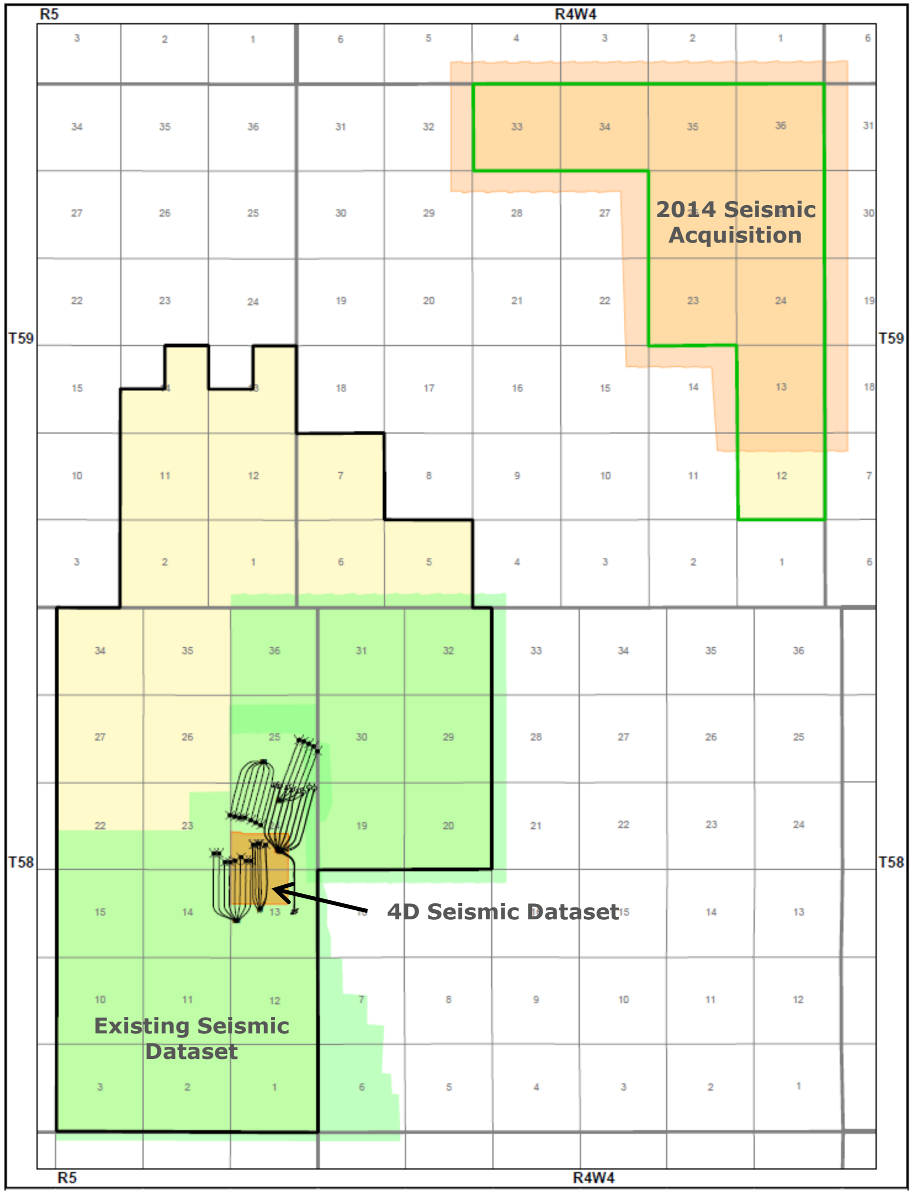
Pengrowth 1AB/13-13-58-05W4M						
Zone	TVD	Min Stress		Vert Stress		Stress Regime
	m	MPa	kPa/m	MPa	kPa/m	
Lloydminster	512.0	5.94	11.60	10.74	20.98	V. frac
GP Zone #1	493.0	7.48	15.17	10.34	20.97	V. frac
GP Zone #2	484.0	7.55	15.60	10.15	20.97	V. frac
GP Zone #3	476.0	6.80	14.29	9.97	20.95	V. Frac

- Caprock Shale Core Preservation on 1AF/10-13-58-5W4 in March 2014 shows several fractures

PENGROWTH 1AF/10-13-058-05W4				
Fracture No.	**Formation**	**Fracture Type**	**Depth (m)**	**Dip (Degrees)**
F1	GP	Small fracture	480.6	65
F2	GP	Small Fracture	480.9	70
F3	GP	Small Fracture	482.9	70
F4	GP	Hairline fracture	484.2	60

LINDBERGH SEISMIC

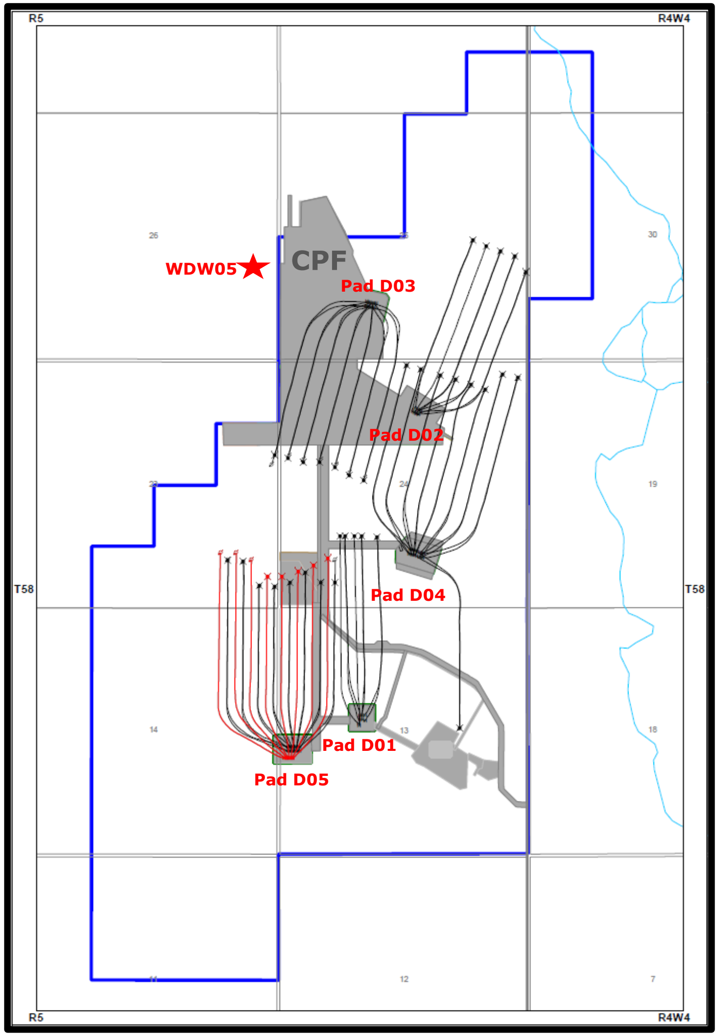
- 102 sq km of 3D data exist over most of the Lindbergh and Muriel Lake leases with exploitable resource
- 1.32 sq km 4D Seismic over D01 wellpad:
  - Baseline acquired Feb 2012
  - First monitor acquired Dec 2013
  - Second monitor acquired Dec 2016
- No new seismic acquired in 2018



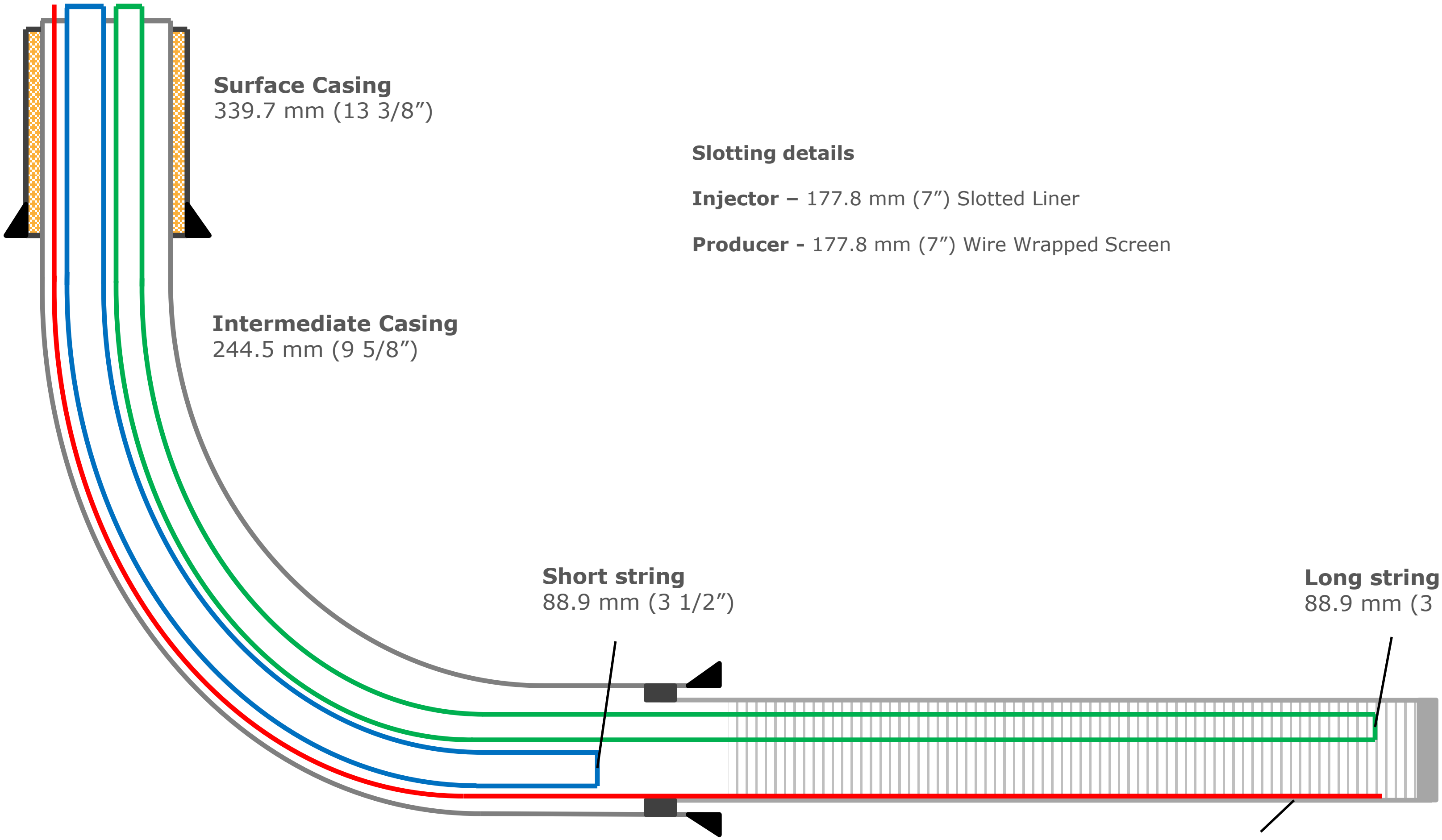
DRILLING AND COMPLETIONS

COMMERCIAL DRILLING & COMPLETIONS

- Eight new well infill wells drilled and completed in 2018 on the D05 Pad
- Artificial lift installed in the D05 infill wells in Q3/Q4 2018 following steam warm-up phase



TYPICAL SAGD PAIR CIRCULATION COMPLETION



Slotting details

Injector – 177.8 mm (7”) Slotted Liner

Producer - 177.8 mm (7”) Wire Wrapped Screen

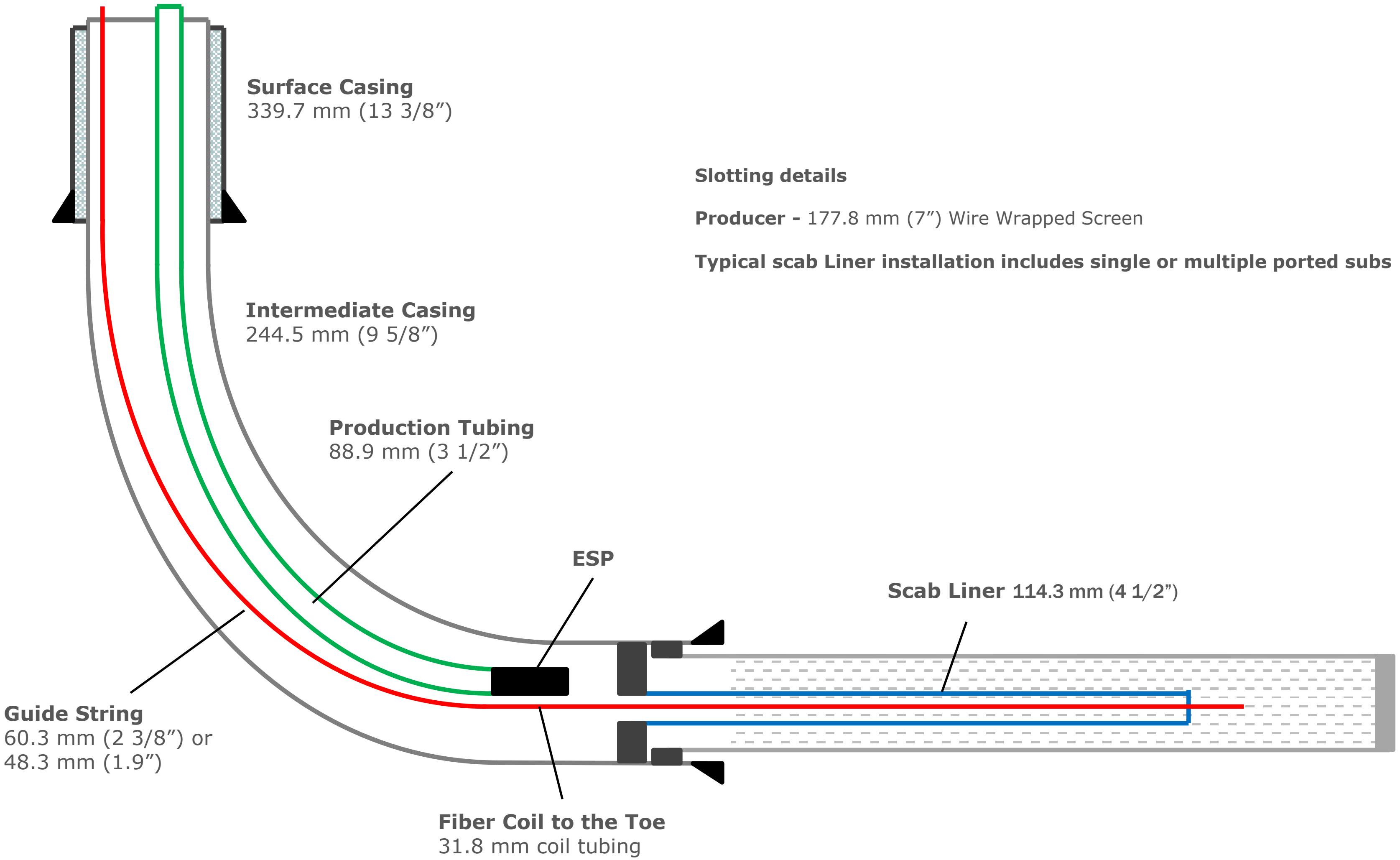
LINER DESIGN

- The relatively small grain size, the presence of fines in the reservoir and combined laboratory flow testing indicated a liner slot width of 0.009” would be required
- This small slot width can lead to quality control problems in the manufacturing process
- The presence of fines with the small slot widths increased the potential for slot plugging
- Therefore, Pengrowth chose to utilize wire wrap screens with a 0.009” wrap for the producer well liners
  - This increased the open flow area from about 2.5% to over 9%
- Straight cut slots were utilized in the injector wells

LINER DESIGN

- Pilot wells utilize 219.1 mm slotted liners in the injector wells and 219.1 mm wire wrap screens in the producer wells
- Phase 1 Commercial wells utilize 177.8 mm slotted liners in the injector wells and 177.8 mm wire wrap screens in the producer wells
- Both Pilot and Phase 1 Commercial well pairs are completed with the same slot and wire wrap screen design
- Wellbore was downsized from the Pilot to the Phase 1 Commercial wells to optimize drilling costs and complexity as the larger liners were not required for forecast flow rates
- Inflow control devices
  - Liner deployed systems have been installed in five producer wells (D05-P08, D03-P01, D04-P06, D04-P07, D04-P08) across the field to test the performance in variable pay thicknesses, with bottom water interaction and overall steam chamber conformance
  - Application of the first ICD system installed in well D05-P08 (started-up in 2015) has been deemed a success as this has been one of the highest performing well pairs across the field
  - Metrics that PGF is using to measure success is produced emulsion rates, overall well pair operation (steam injection rates and ESP stability), subcool control and inflow characteristics based on downhole temperature data

TYPICAL SAGD PAIR ARTIFICIAL LIFT COMPLETION

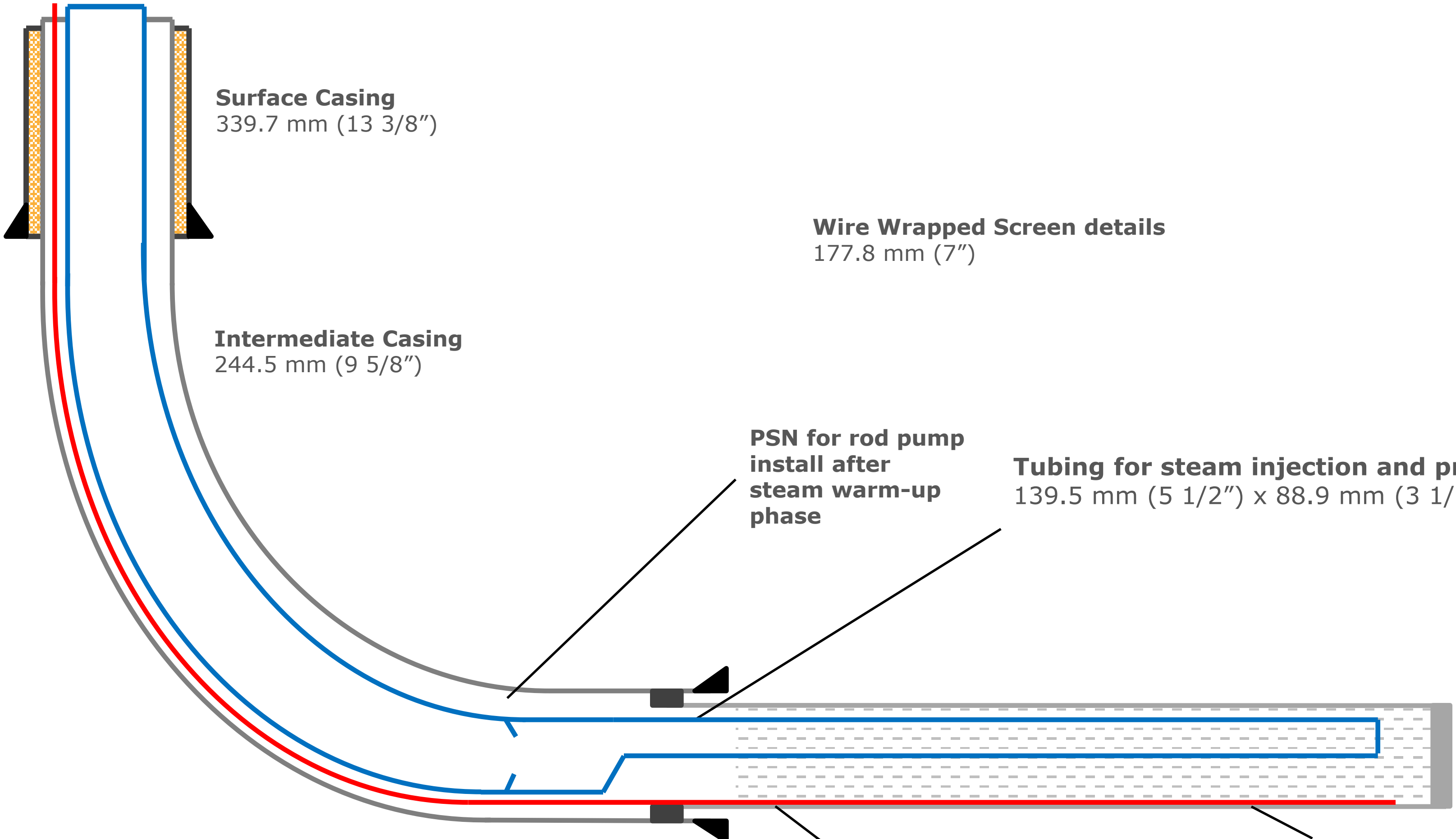


Slotting details

Producer - 177.8 mm (7") Wire Wrapped Screen

Typical scab Liner installation includes single or multiple ported subs

D05 INFILL WELL TYPICAL COMPLETION



COMPLETION CHANGES

- Scab liners
  - Initially installed in the producers based on shut-in temperature profiles across the lateral, drill profiles of the injector and producer and steam splitter locations in the injectors
  - Typical target landing depth is approximately 75-80% of the lateral length to aid in toe development early in SAGD production and mitigate flow breakthrough at the heel; learnings include two ported subs for optimal pressure drop and drawdown along the lateral
- Mechanical perforation of scab liner
  - Performed concurrently with pump changes where applicable
  - Opens flow to selected intervals along the scab liner
    - Wells and corresponding perforation intervals selected based on fall off temperature response; typically targeting areas of high subcool that would indicate cooler stranded emulsion
    - Producers that show signs of being very hot (near saturated temperature during fall off) are typically not candidates for scab liner modifications
    - All Lindbergh well pairs are continually being monitored and analyzed for possible scab liner modifications to optimize production and reservoir conformance
  - Reduces the risks and cost associated with pulling and/or modifying the scab liner

COMPLETION CHANGES

- One commercial producer scab liner pulled to-date
  - Well D05-P07 had a tubing-conveyed ICD (first in the field) installed in June 2018
  - Pulled original scab liner (installed in 2015), cleaned out lateral and installed tubing-conveyed ICD string to mitigate high vapour production and improve overall reservoir conformance
  - Early production results following the workover have been favorable
  - Metrics that PGF is using to measure success is very similar to liner-conveyed ICD systems; produced emulsion rates, overall well pair operation (steam injection rates and ESP stability), subcool control and inflow characteristics based on downhole temperature data

INJECTOR COMPLETION CHANGES

Well Name	Well Type	UWI	Steam Splitter(s) Installed	Shifted Open	Shifted Closed
D02-J04	Injector	106082505805W40	1		
D02-J06	Injector	108082505805W40	1		
D02-J07	Injector	109082505805W42	1		
D03-J03	Injector	103122405805W40	1		
D03-J04	Injector	104122405805W40	1	Nov-15	Nov-17
D03-J05	Injector	105122405805W40	2		
D03-J06	Injector	106122405805W40	1	Nov-15	Sep-16
D03-J07	Injector	102092305805W40	1		
D04-J01	Injector	105152405805W40	1		
D04-J02	Injector	106152405805W40	1		
D04-J03	Injector	107152405805W40	1	Jan-18	
D04-J04	Injector	109152405805W40	1	Jan-18	
D04-J05	Injector	104162405805W40	1	Dec-17	
D04-J06	Injector	109101305805W40	1		
D04-J07	Injector	108162405805W42	1		
D04-J08	Injector	109162405805W40	1	May-18	
D04-J09	Injector	110162405805W40	1	May-18	
D05-J03	Injector	109012305805W40	1	Nov-15	
D05-J04	Injector	110012305805W40	1		
D05-J06	Injector	107042405805W40	1	Nov-15	

PRODUCER COMPLETIONS CHANGES

Well Name	Well Type	UWI	Scab Liner Installed	Production Ports Installed	Scab Liner Perforated
D01-P01	Producer	106062405805W42	Y	0	
D01-P02	Producer	108062405805W40	Y	1	
D01-P03	Producer	114062405805W40	N	Liner-conveyed ICD	
D01-INF01	Infill	102052405805W40	N	0	
D01-INF02	Infill	113062405805W42	Y	0	
D02-P04	Producer	102082505805W40	Y	1	
D02-P05	Producer	100082505805W40	Y	1	Jul-17
D02-P06	Producer	103082505805W40	Y	1	Oct-16
D02-P07	Producer	104082505805W40	Y	1	
D02-P08	Producer	105082505805W42	Y	1	Jun-16
D03-P01	Producer	103112405805W40	Y	1	Sep-17
D03-P02	Producer	102112405805W40	Y	1	
D03-P03	Producer	107122405805W40	Y	1	
D03-P04	Producer	102122405805W40	Y	1	
D03-P05	Producer	108122405805W40	Y	1	Jan-17
D03-P06	Producer	109122405805W40	Y	1	
D03-P07	Producer	103092305805W40	Y	1	Jul-16

Well Name	Well Type	UWI	Scab Liner Installed	Production Ports Installed	Scab Liner Perforated
D04-P01	Producer	102152405805W40	Y	2	Aug-18
D04-P02	Producer	103152405805W40	Y	2	
D04-P03	Producer	104152405805W40	Y	2	
D04-P04	Producer	108152405805W40	Y	2	
D04-P05	Producer	103162405805W42	Y	2	
D04-P06	Producer	108101305805W40	N	Liner-conveyed ICD	
D04-P07	Producer	105162405805W40	N	Liner – conveyed ICD	
D04-P08	Producer	106162405805W40	N	Liner-conveyed ICD	
D04-P09	Producer	107162405805W43	Y	2	
D05-P01	Producer	104012305805W42	Y	1	Jul-17
D05-P02	Producer	105012305805W40	Y	1	Jan-17
D05-P03	Producer	106012305805W40	Y	2	
D05-P04	Producer	103012305805W40	Y	1	
D05-P05	Producer	102042405805W40	Y	1	Sep-17
D05-P06	Producer	103042405805W40	Y	1	Dec-16
*D05-P07	Producer	104042405805W40	N	Tubing-conveyed ICD	Jun-18
D05-P08	Producer	105042405805W40	N	Liner-conveyed ICD	

*Original scab liner pulled and tubing-conveyed ICD system installed

COMMERCIAL ARTIFICIAL LIFT

- Required to convert from circulation to typical SAGD operations
- All SAGD producers and Pilot infill wells utilize high temperature ESP's
  - Vendor and pump type selected based on expected well performance, target landing locations and historical run life
  - Pumps rated to 260°C
- New D05 infill wells utilize hydraulic lift rod pump systems
  - Lower capital cost when compared to ESP, better for higher viscosity emulsion, more variability in re-steaming operations if required
- Pumps designed to handle full flow rate range from initial install through ramp up to peak emulsion rates
- Vapour interference in the pump has been higher than anticipated in certain cases
  - Mitigating operational problems due to higher vapour loading through the use of AGH stages in ESP's and completion modifications
- Continuing to work closely with ESP vendors to improve performance and run time
- Run time improvement due to decreased start/stops as a result of improved plant reliability
- Technological improvements and advancements
    - Higher temperature motors
    - Improved seal systems
    - Improved bearing design
    - Shorter design resulting in less stress running in severe doglegs

DRILLING SCHEDULE

New drilling subject to market conditions, internal approval and regulatory approval where applicable.

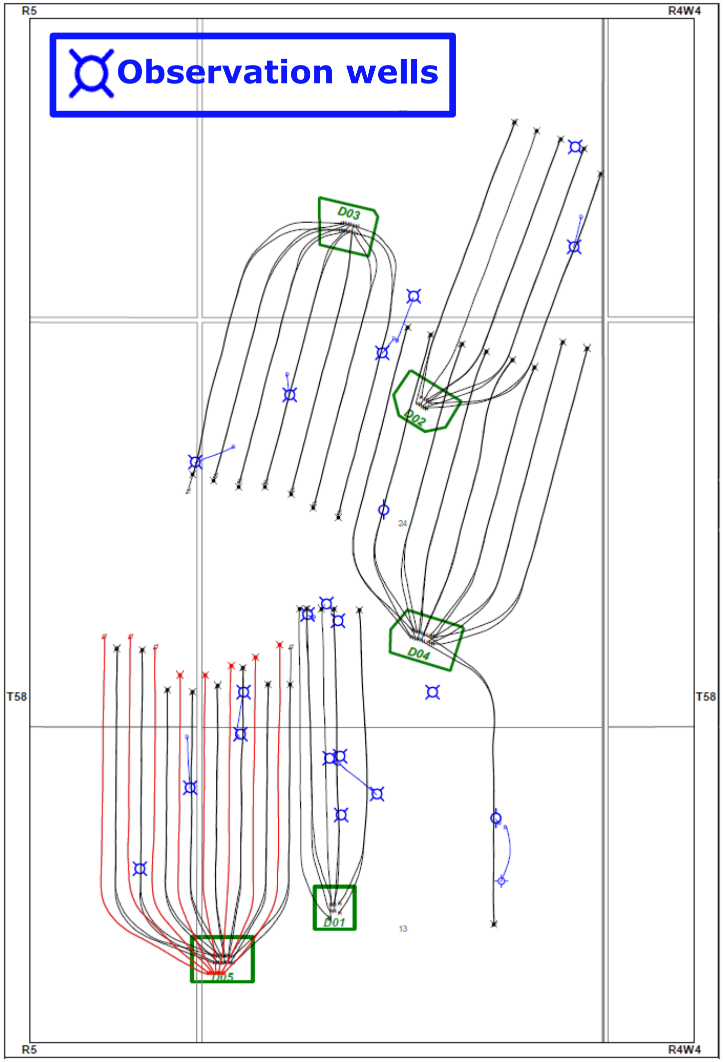
- Future considerations pending internal approval
  - Drilling of 3 SAGD well pairs on Pad D02 in 2019

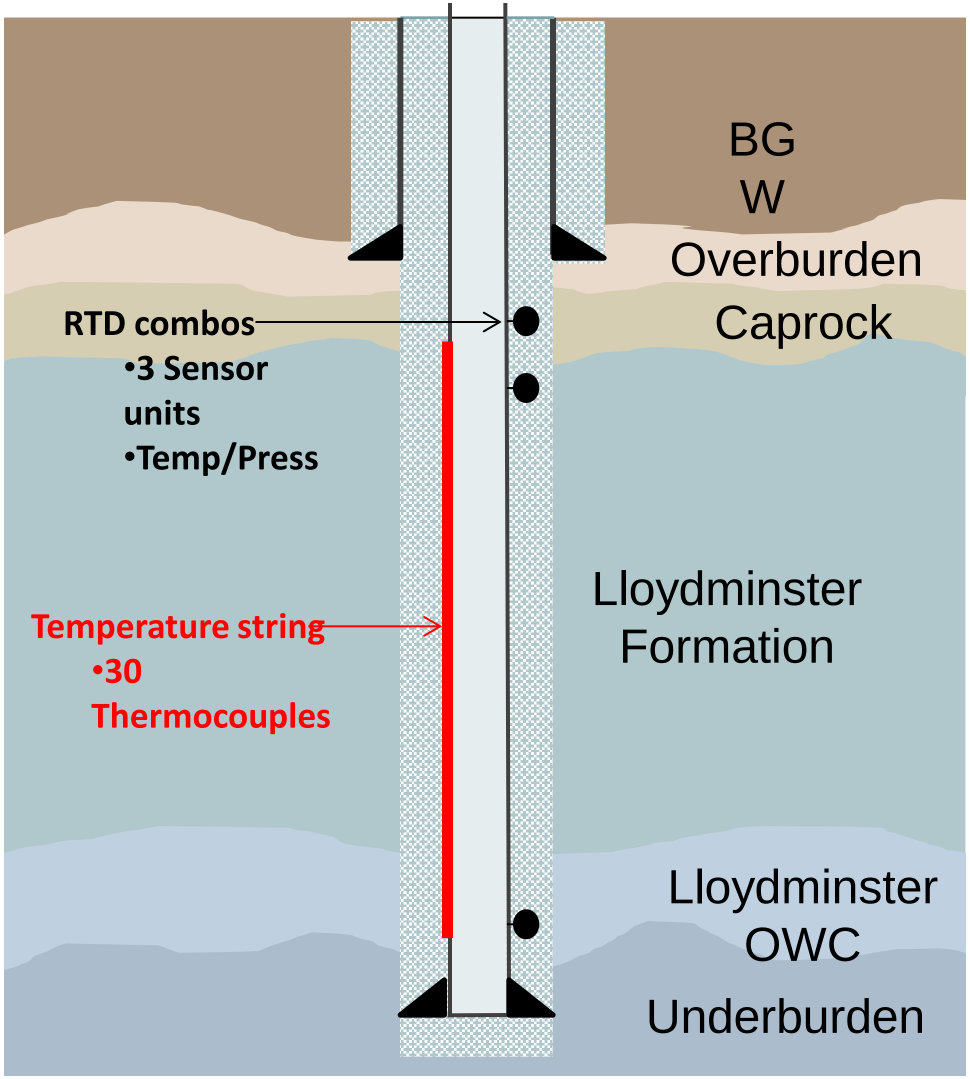
INSTRUMENTATION

SAGD WELL PAIR INSTRUMENTATION

- Single point pressure measurement is taken at the heel of both the injector and producer via bubble tube
  - Methane is injected in the casing of the injector and in the guide string annulus of the producer to provide a reading at surface via a pressure transmitter
  - Gas gradient calculations are accounted for in the pressure reading
  - Purging of the bubble tubes is completed on an as needed basis to limit the overall volume of gas being injected
  - Differential pressure is monitored between the injector and producer to provide insight into the accuracy of the pressure reading and subsequent purge timing
  - Producer bubble tubes are purged more frequently than injector bubble tubes due to the guide string annular volume and potential for plugging
- Fiber optic DTS (distributed temperature sensors) are run in all of the producer wells to provide real-time temperature data along the entire wellbore

OBSERVATION LOCATIONS/ TYPICAL COMPLETION





OBSERVATION LOCATIONS/ TYPICAL COMPLETION

- Downhole pressure/temperature gauge reliability has been good overall
  - As the thermocouple and pressure monitoring equipment is cemented on the backside of the casing, remediation of any failed downhole equipment is challenging
  - Pengrowth therefore runs multiple temperature and pressure points if this is encountered
- Surface equipment reliability has been an issue at times as all observation well locations rely on solar panels/battery combos for power
- Line of sight is also required for the Commercial observation wells to transmit data
- Pengrowth is continuing to work with the vendors on increasing the number of solar panels and battery capacity on location; especially important in winter months
- Data transmission accuracy is also being rectified between Pengrowth and the instrumentation vendors on an as needed basis
- Operations team checks locations monthly

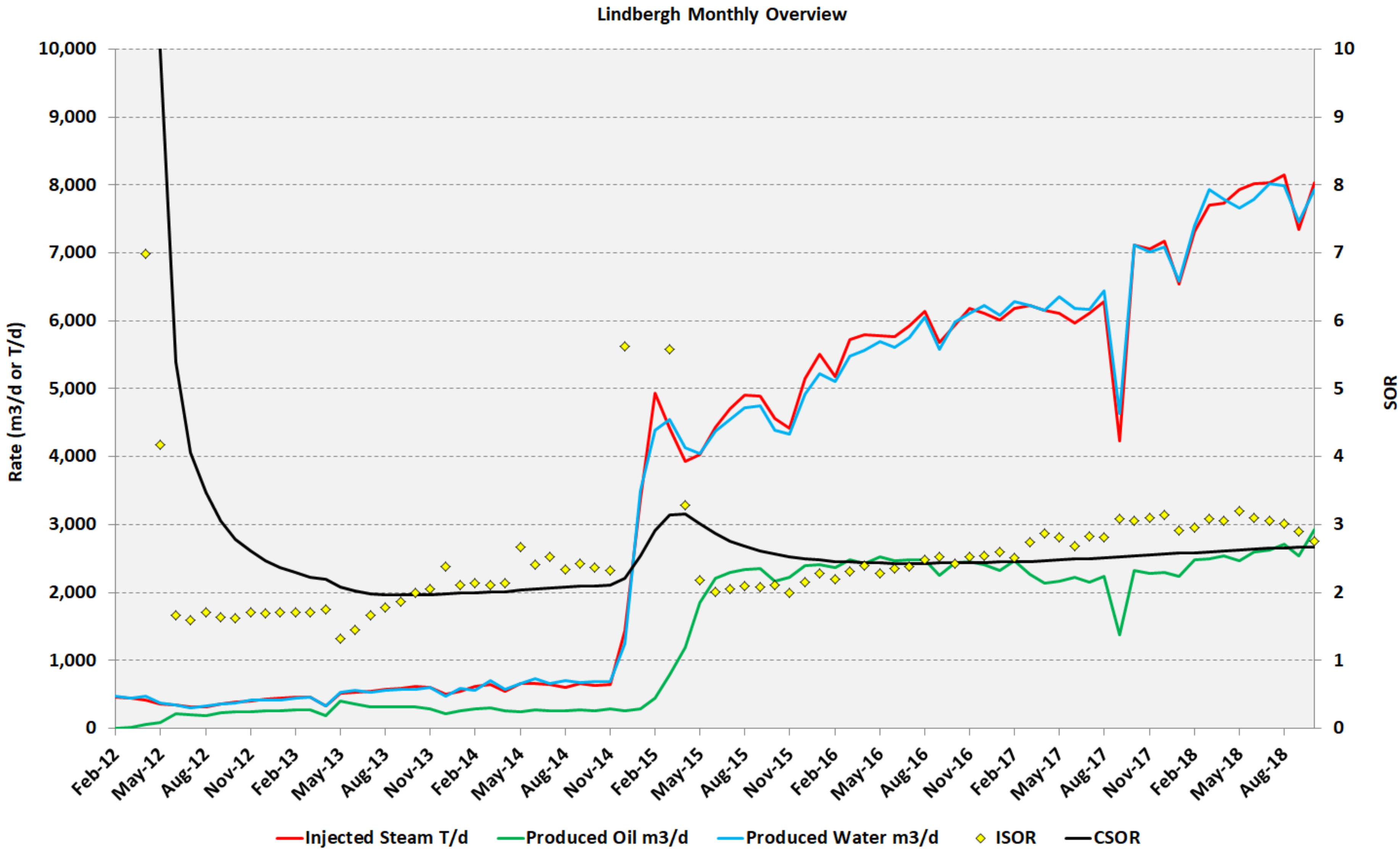
SCHEME PERFORMANCE

PENGROWTH

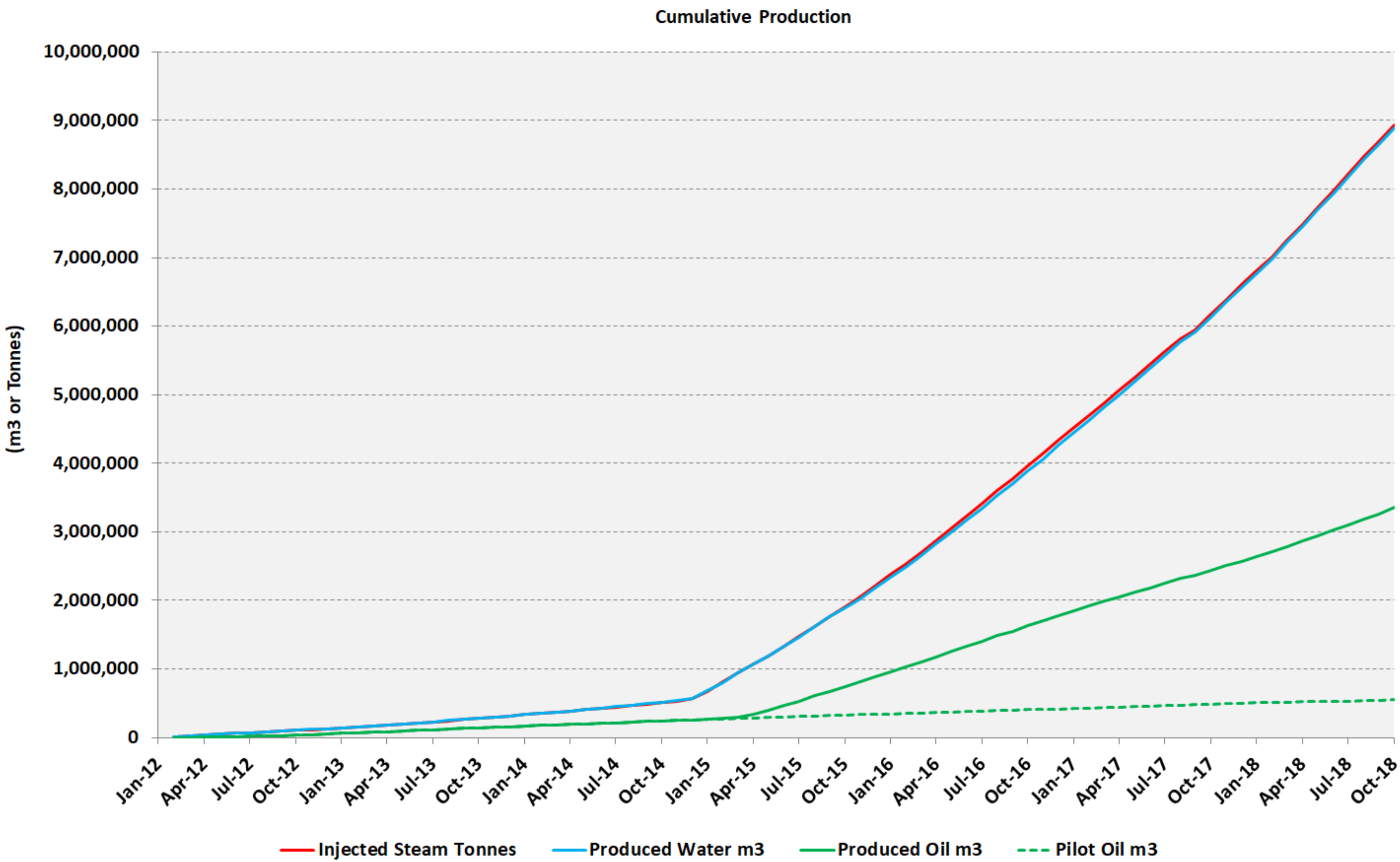
PREDICTING SAGD PERFORMANCE

- SAGD well production type curves are created using historical production data on the pilot and phase 1 wells.
- Butler's equation is used to modify each type curve based on the geological data available.
- Infill wells are forecasted based on the production forecast of the parent well

LINDBERGH PERFORMANCE



CUMULATIVE VOLUMES



PAD RECOVERIES

OBIP - Recovery and % recovery by pad

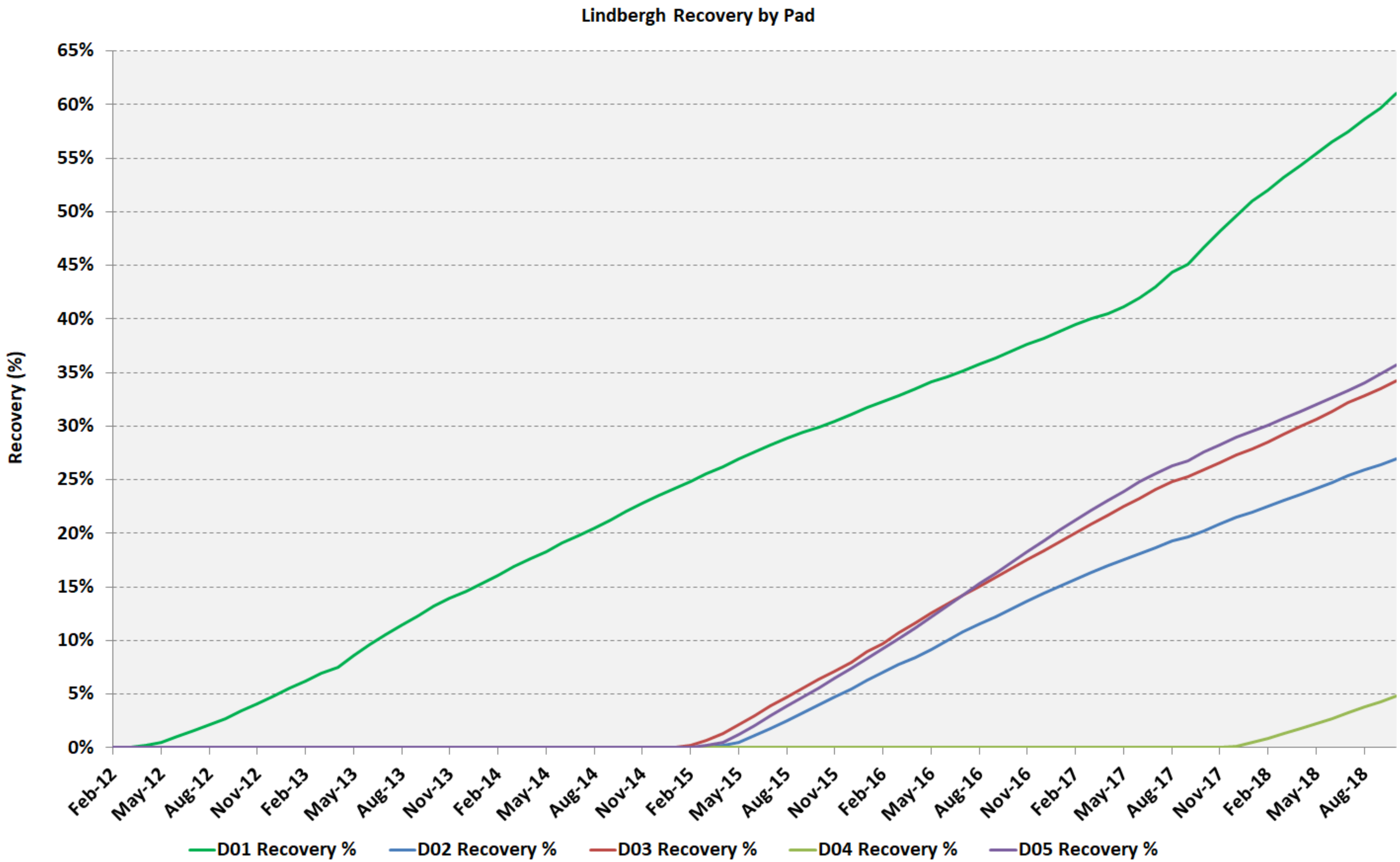
	Thickness	Length†	Spacing	Ave ϕ	Area	Ave So	OBIP	Recovery††	Recovery
Pad	(m)	(m)	(m)	(%)	(Ha)	(%)	(e3m3)	(e3m3)	**(%)**
D01†††	19.5	828	100	36	24.8	81	1407.5	668.1	**47.5**
D02	19.0	817	100	35	40.9	79	2160.1	542.6	**25.1**
D03	18.1	787	100	35	55.1	83	2886.5	864.3	**29.9**
D04	20.6	833	100	36	75.0	78	4295.3	163.3	**3.8**
D05	18.3	801	100	37	64.1	80	3493.0	1113.6	**31.9**

Developed BIP - Recovery and % recovery by pad

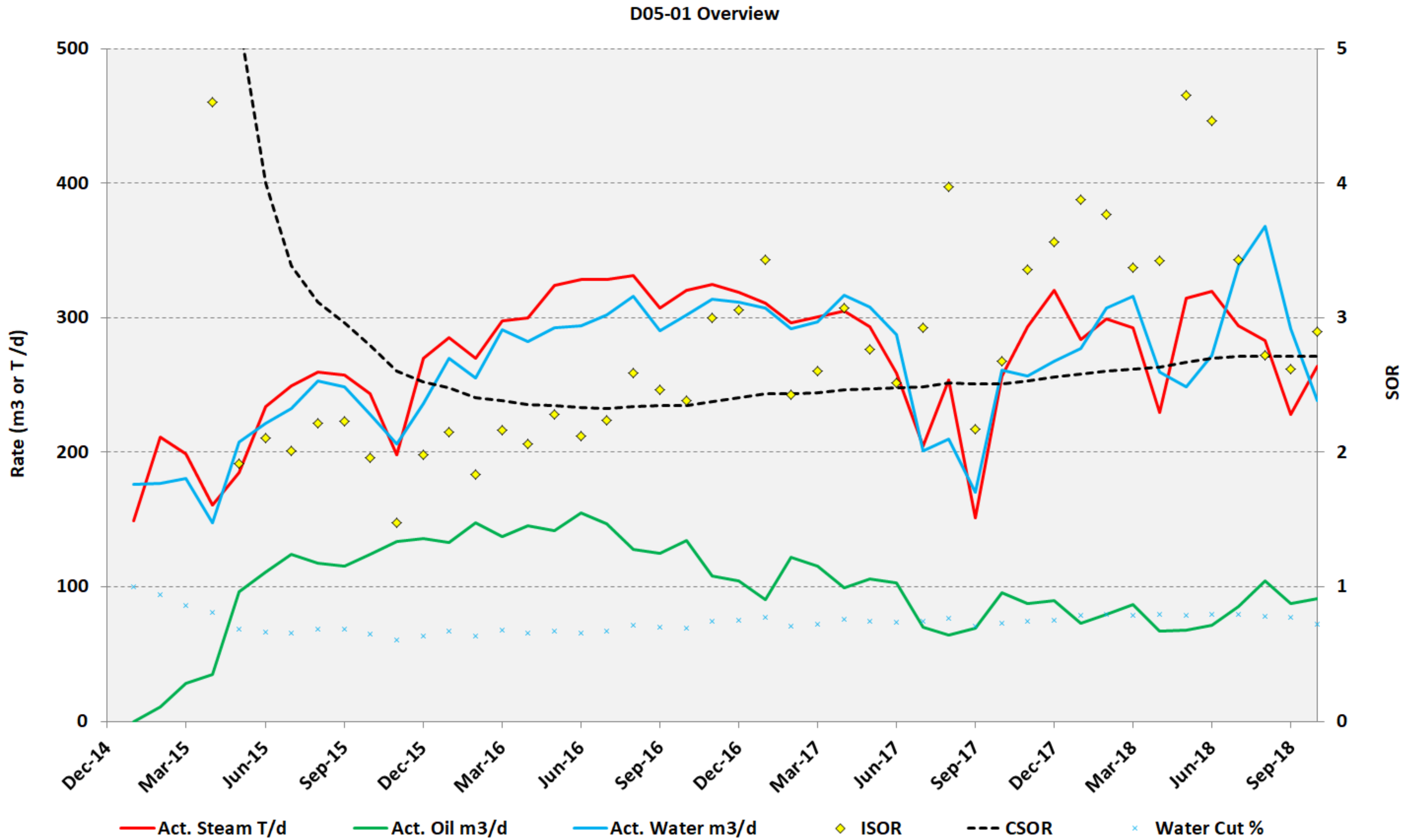
	Thickness	Length†	Spacing	Ave ϕ	Ave So	DBIP	Recovery††	Recovery	EUR
Pad	(m)	(m)	(m)	(%)	(%)	(e3m3)	(e3m3)	**(%)**	(%)
D01†††	15.2	828	100	36	81	1093.6	668.1	**61.1**	80
D02	17.7	817	100	35	79	2012.8	542.6	**27.0**	70
D03	15.9	787	100	35	83	2526.2	864.3	**34.2**	70
D04	16.3	833	100	36	78	3385.7	163.3	**4.8**	70
D05	16.3	801	100	37	80	3122.9	1113.6	**35.7**	70

† Length is average slotted length plus 25 meters per end (50 m total)
†† Cumulative production to Oct 31 2018
††† D01 numbers include a new well pair and two new infill wells, D05 number include 8 new infill wells

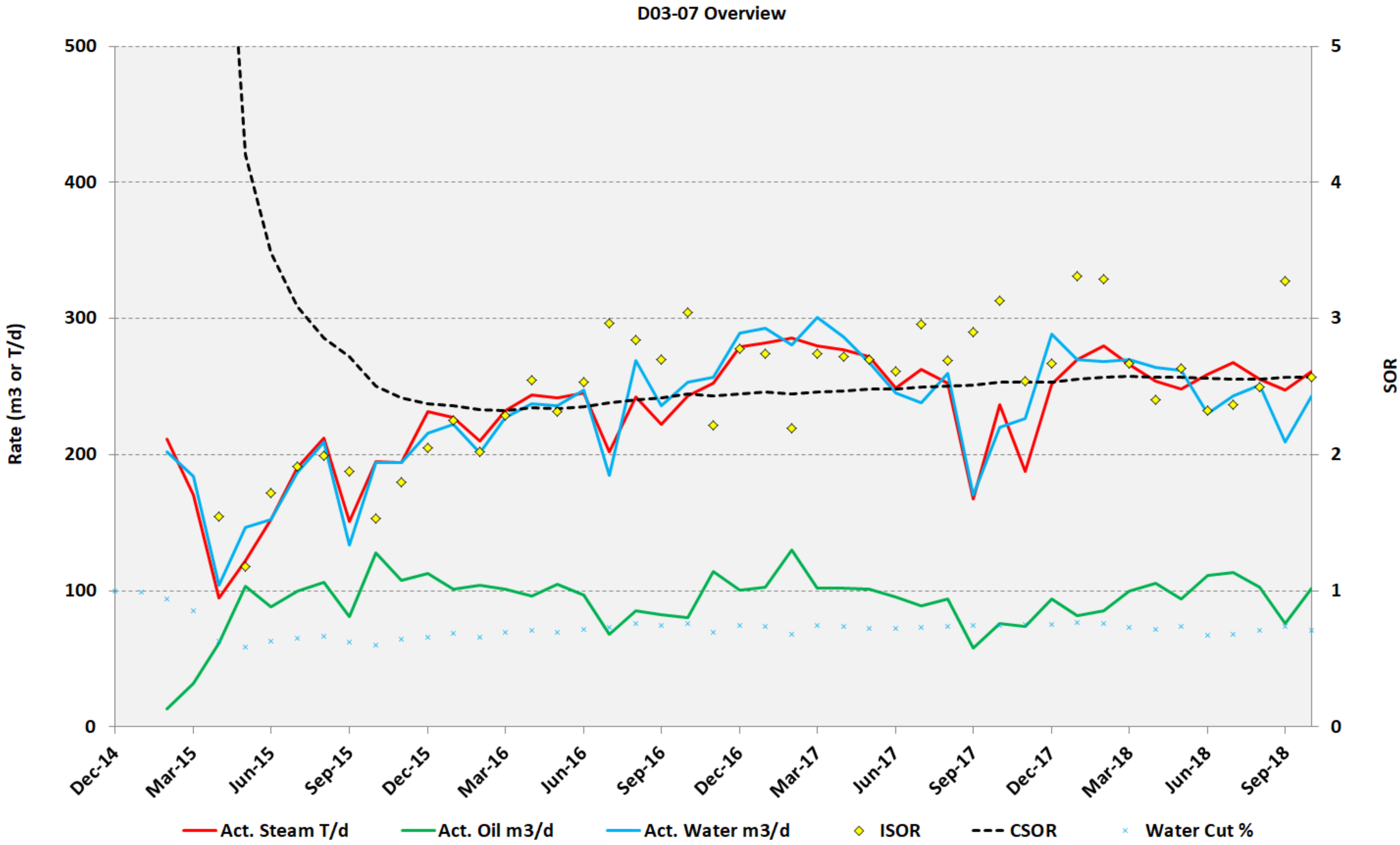
LINDBERGH DEVELOPED RECOVERY



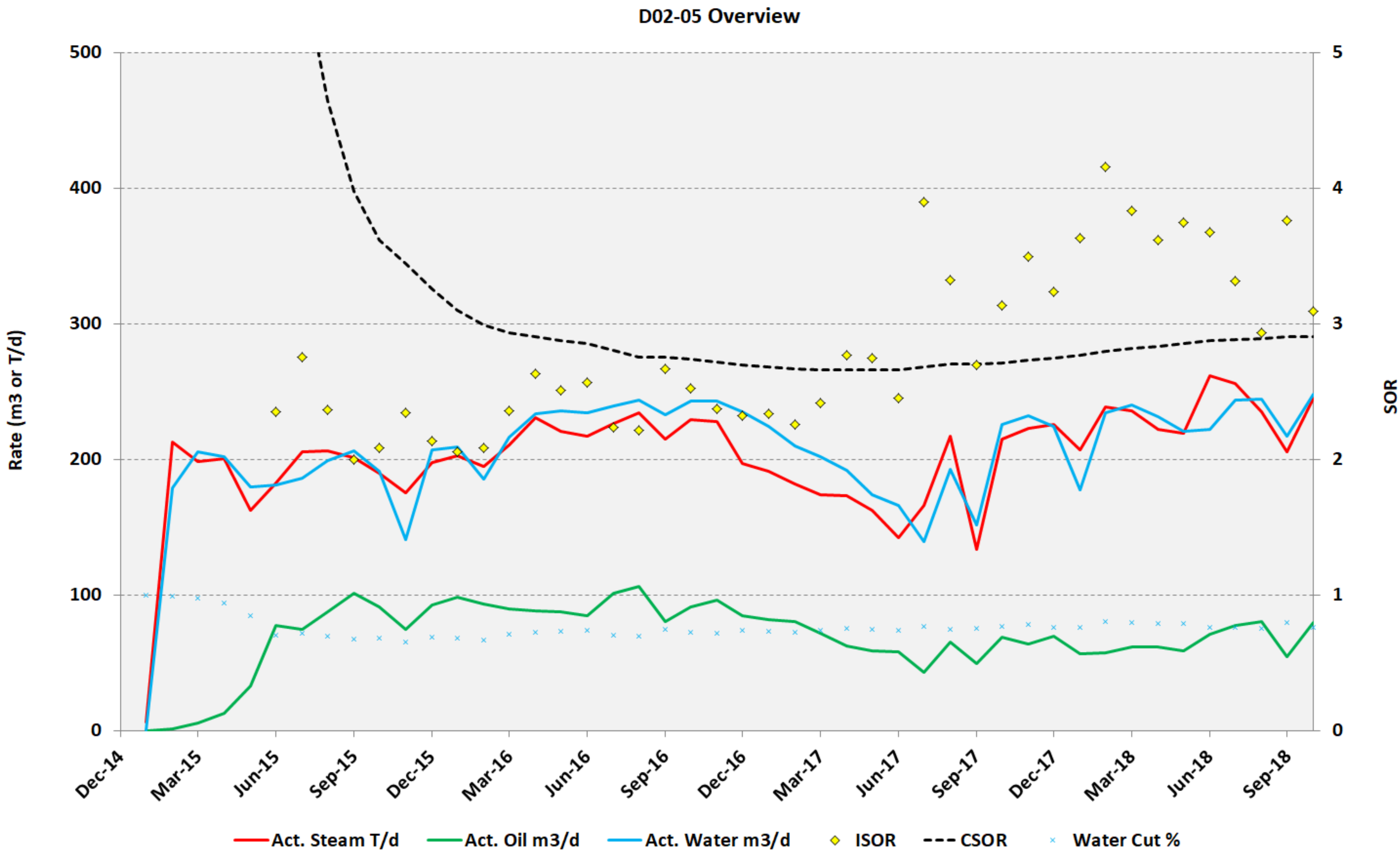
PHASE 1 HIGH PERFORMER



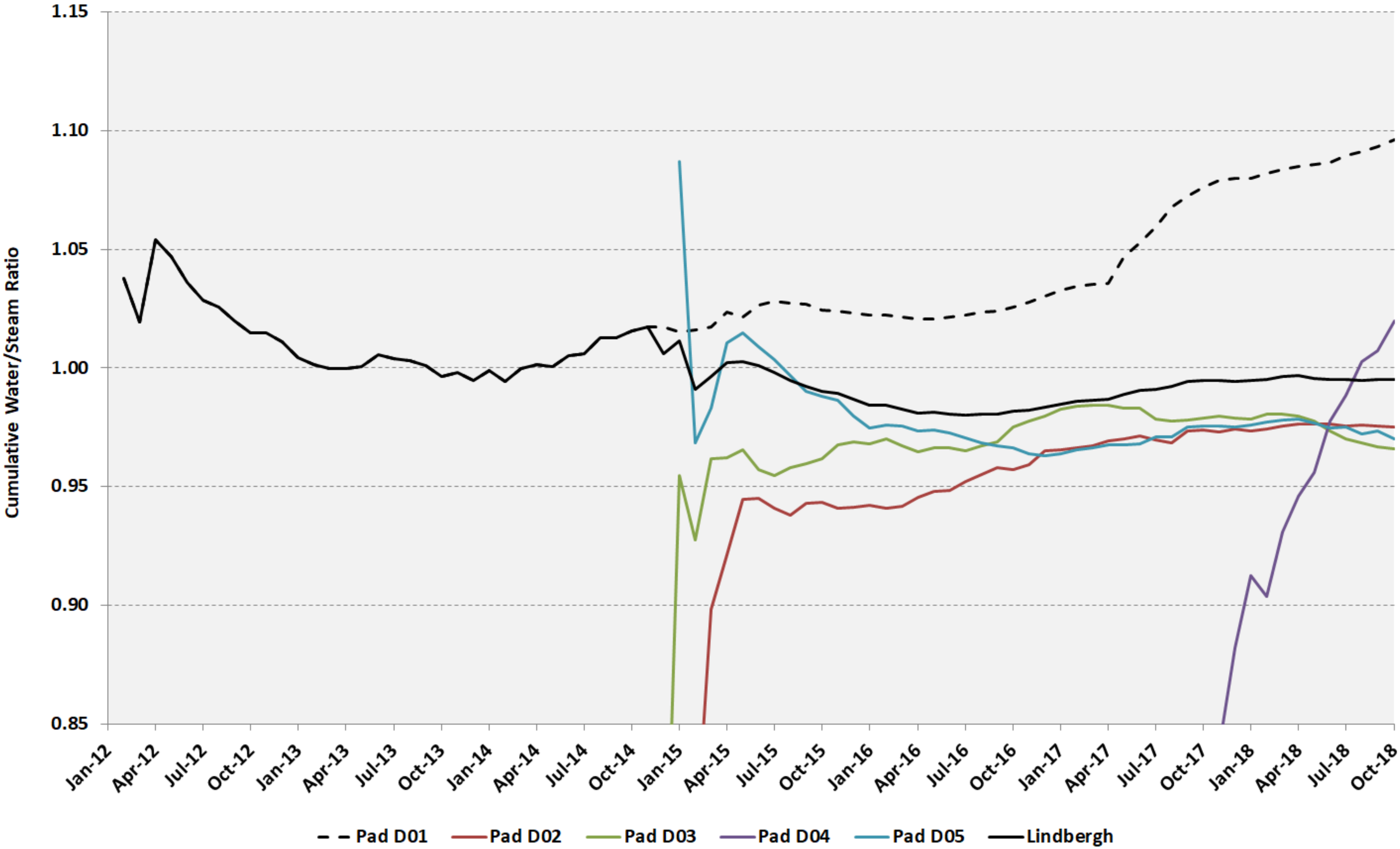
PHASE 1 MEDIUM PERFORMER



PHASE 1 POOR PERFORMER



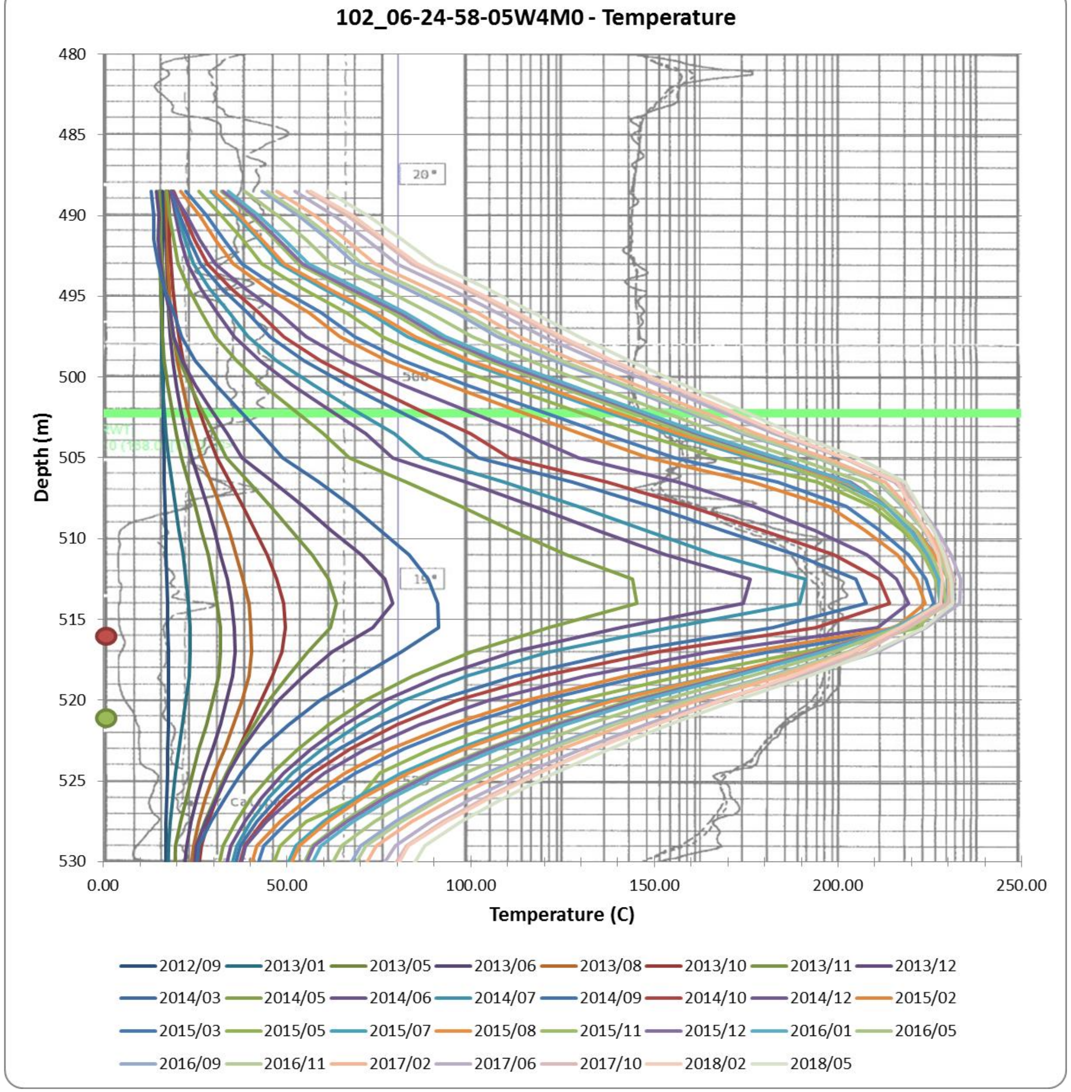
CUMULATIVE WATER/STEAM RATIO



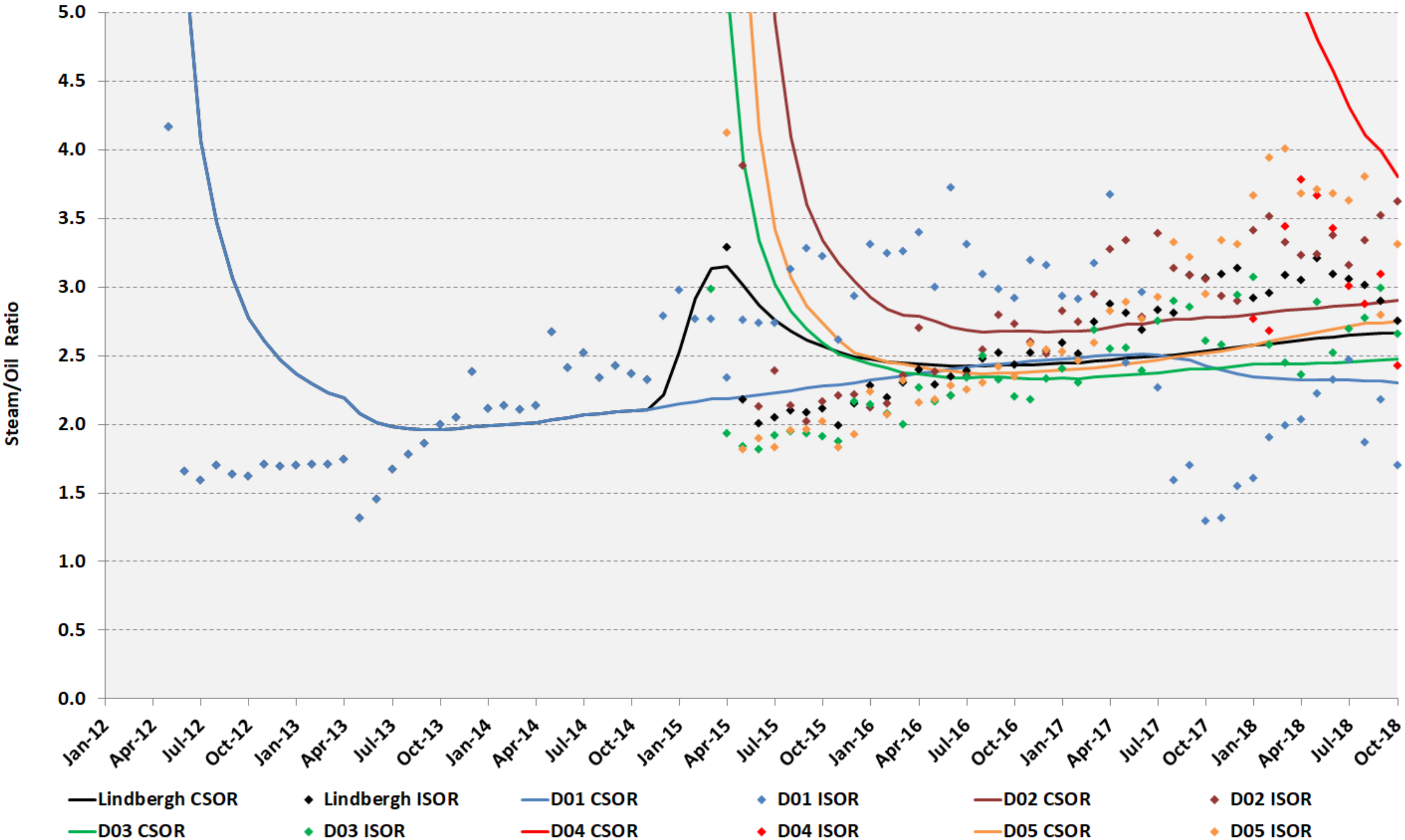
PENGROWTH

D01-02 OBSERVATION WELL EXAMPLE

~11 m offsetting WP2



LINDBERGH CSOR AND ISOR



WELLHEAD STEAM QUALITY

- Current steam quality injected at the well pad is ~98%
  - Close proximity to CPF

PAD ABANDONMENTS – 5 YEAR OUTLOOK

- No abandonments of SAGD wells or well pads are expected in the next 5 years

KEY LEARNINGS

- D05 infill wells meeting expectations
  - Learnings on circulation strategy will be incorporated into future infill well plans
- Successful drilling and circulation of 2 SAGD well pairs in previously depleted cyclic steam stimulation area.
  - Significant de-risking of reserves
- Reduced steam chamber operating pressure
  - Managing steam chamber pressure slightly above bottom water pressure to optimize SOR
- Well bore hydraulics optimization
  - Production ports in the scab liner and shift-able ports in the steam injection string improve well conformance
  - Scab liner perforating (select cases) has proven beneficial during pump changes to improve wellbore conformance, pump operation and well KPI's
  - Liner and tubing deployed flow control devices showing encouraging results
- Continuous improvement in ESP run life
  - Advanced gas handling stages improving performance in wells with high vapour production

FUTURE PLANS - SUBSURFACE

PENGROWTH

FUTURE PLANS - SUBSURFACE

- Future considerations pending internal approval
  - Drilling of 3-4 SAGD well pairs in Pad D02
  - Drilling 13 new infill wells in Pads D02 and D03
  - Commence non-condensable gas co-injection with steam in Pads D05 and D01

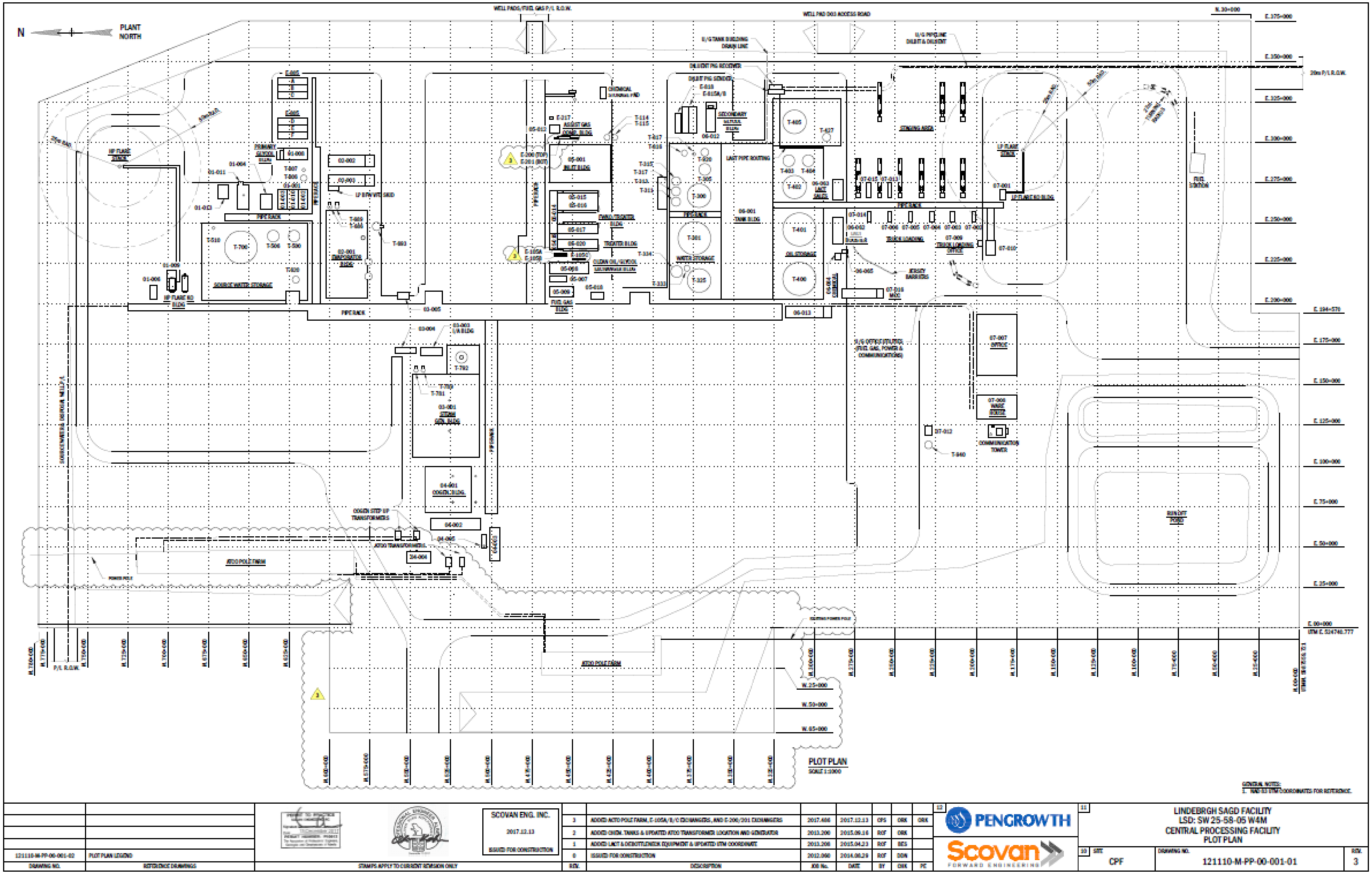
FACILITIES

PENGROWTH

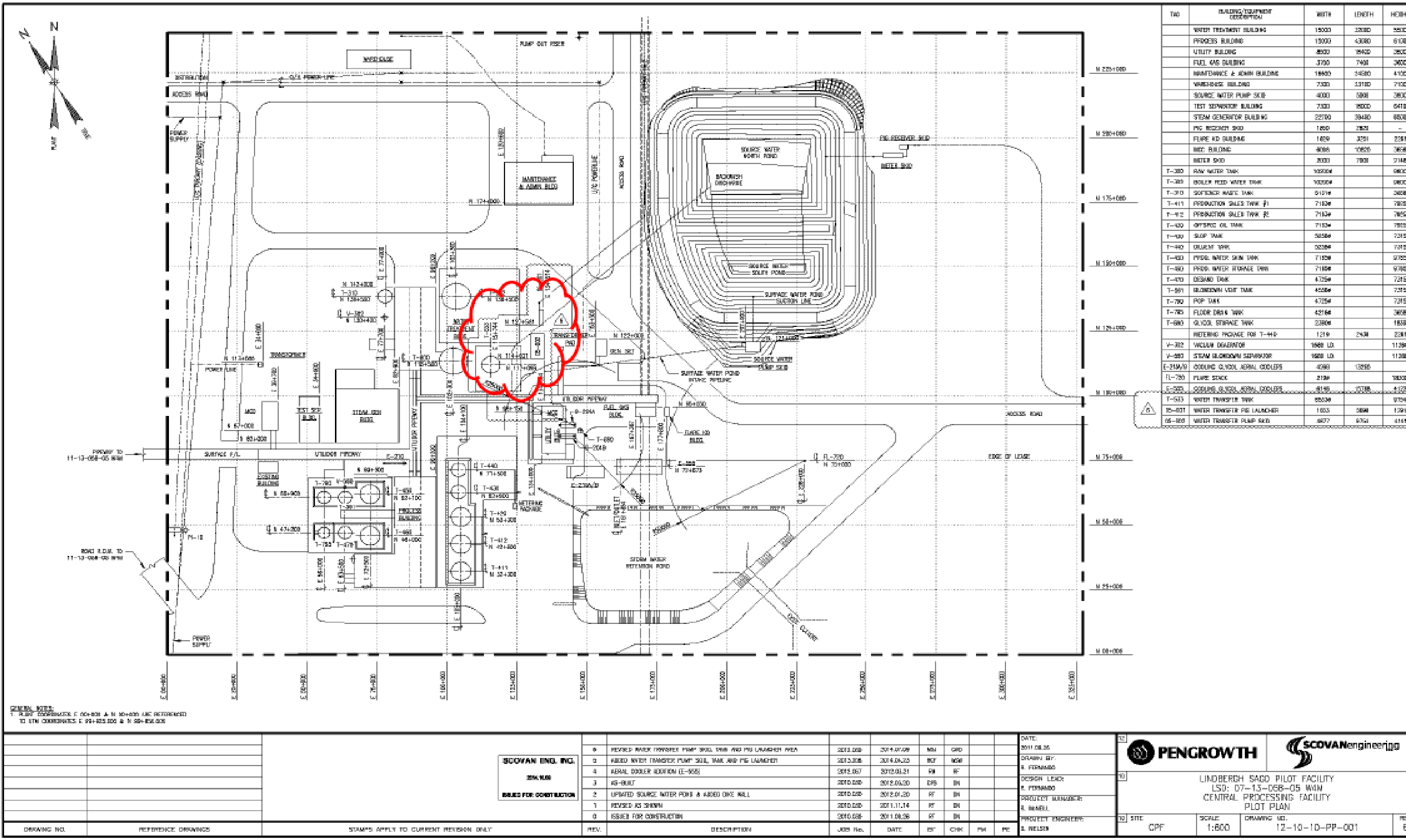
LINDBERGH SAGD COMMERCIAL FACILITY

- SW-25-058-05 W4M CPF site
- Original daily design capacity
  - 8000 m3/d (50,000 bwpd) CWE for steam generation
  - 2208 m3/d (13,888 bopd) bitumen production
  - SOR 3.61
- Debottlenecked daily design capacity
  - 8000 m3/d (50,000 bwpd) CWE for steam generation
  - 3180 m3/d (20,000 bopd) bitumen production
  - SOR 2.5
- Commercial facility equipped with water recycle
  - Falling film mechanical Vapour compression
  - >90% water recycle rate
- Qualified and experienced SAGD operations team
- Commercial facility first steam December 2014

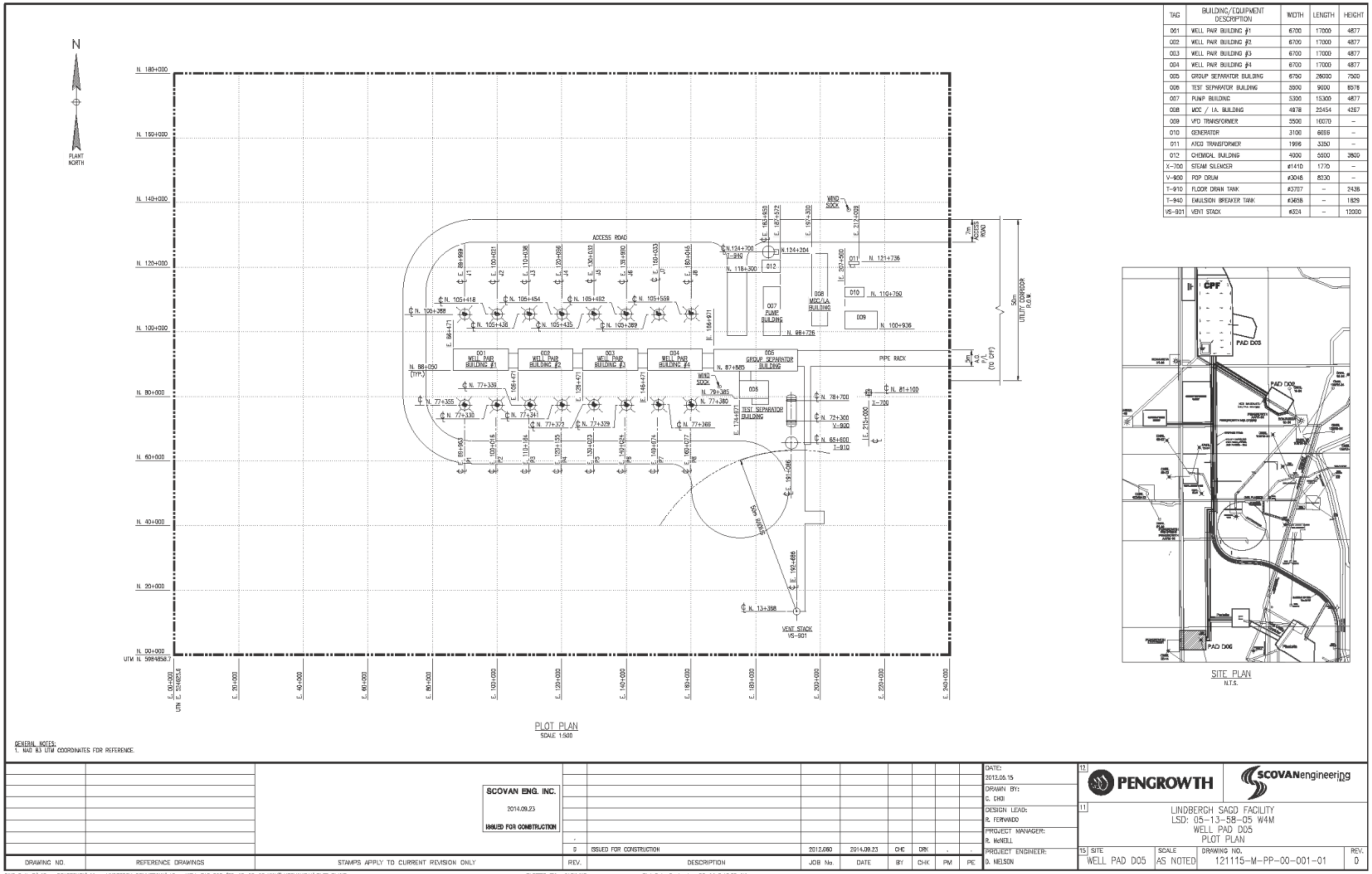
LINDBERGH COMMERCIAL CPF PLOT PLAN



LINDBERGH PILOT PLOT PLAN



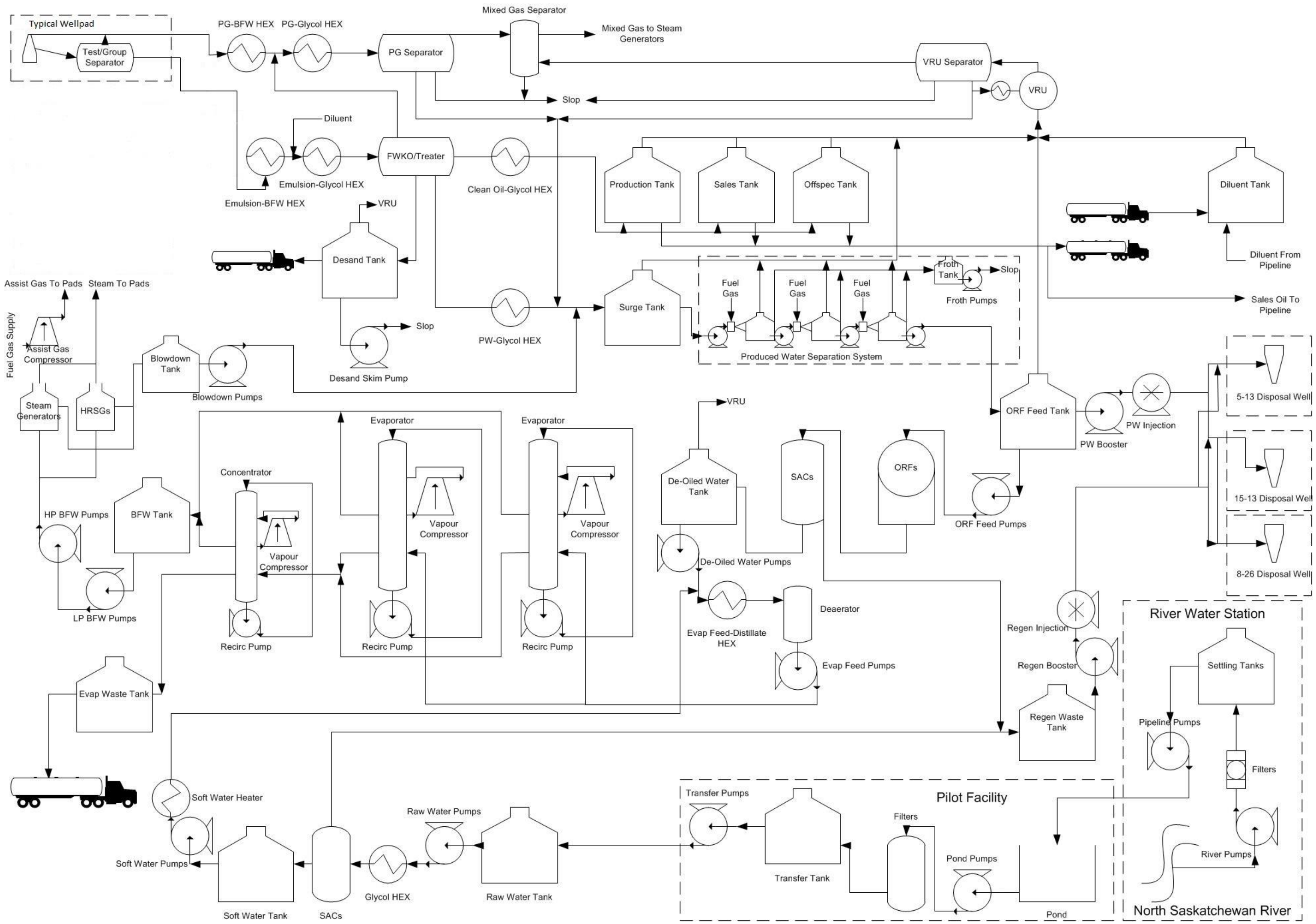
LINDBERGH COMMERCIAL TYPICAL WELLPAD PLOT PLAN



TAG	BUILDING/EQUIPMENT DESCRIPTION	WIDTH	LENGTH	HEIGHT
001	WELL PAIR BUILDING #1	6700	17000	4877
002	WELL PAIR BUILDING #2	6700	17000	4877
003	WELL PAIR BUILDING #3	6700	17000	4877
004	WELL PAIR BUILDING #4	6700	17000	4877
005	GROUP SEPARATOR BUILDING	6750	26000	7500
006	TEST SEPARATOR BUILDING	3500	9000	8578
007	PUMP BUILDING	5300	15300	4877
008	MCC / I.A. BUILDING	4978	22454	4267
009	VFD TRANSFORMER	5500	10070	–
010	GENERATOR	3100	6096	–
011	ATCO TRANSFORMER	1996	3350	–
012	CHEMICAL BUILDING	4000	5600	3800
X-700	STEAM SILENCER	ø1410	1770	–
V-900	POP DRUM	ø3048	8230	–
T-910	FLOOR DRAIN TANK	ø3707	–	2438
T-940	EMULSION BREAKER TANK	ø3658	–	1829
VS-901	VENT STACK	ø324	–	12000

D02 – 5 pairs D03 – 7 pairs D05 – 8 pairs D04 – 6 pairs

LINDBERGH SCHEMATIC



LINDBERGH SAGD COMMERCIAL FACILITY MODIFICATIONS

- Added future tie in locations for debottlenecking.
  - E-100 Emulsion/BFW HEX
  - E-101 Emulsion/Glycol HEX
  - E-106 Produced Water/Glycol HEX

- Recommissioned and started up Pilot Operating Facility in April 2018.

- WELL PAD EXPANSIONS
  - 3 new SAGD wells – began steam circulation Feb 2018
  - 8 new infill wells at D05 – began steam circulation in July 2018.

PILOT OPERATION

- Pilot Plant Restart in April 2018
- Equipment and instrumentation was inspected and verified prior to start up
- PVRVs on all tanks at the pilot were inspected and passed
- Both Pilot Boilers B-510 and B-520 were pigged and inspected
- Control system for pilot was tied into the Delta V, so control room operator can make changes at the main CPF control panel.
- Added piping spools on PW line to be able to divert PW to CPF, so we do not have to dispose of all the water down 5-13 disposal well.
- Added steam tie in lines to allow for main CPF header to tie in and send steam to D01 pilot.

LINDBERGH SAGD COMMERCIAL FACILITY PERFORMANCE

- September 2018 outage to complete the required regulatory inspections on boilers, vessels & PSVs.
- Bitumen treatment
  - Producing on spec oil with use of lighter density diluent from pipeline
- Water treatment
  - Increased hardness in the produced water causing more frequent regenerations of the softeners
  - Continual chemical treatment balancing in the evaporators to chelate any excess hardness and chemically cleaning the concentrator every 6 to 8 weeks
  - Oxygen content in softened make-up water causing internal corrosion in utility system piping; UT testing and chemical treatment continues

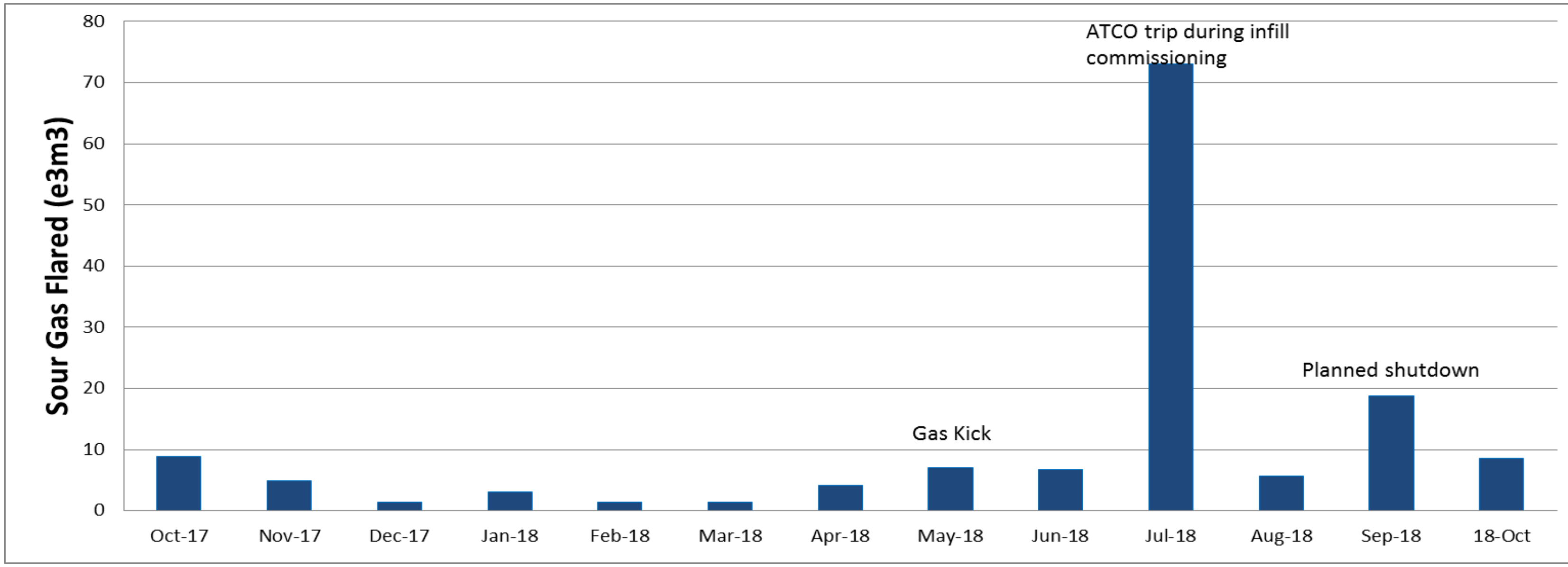
LINDBERGH SAGD COMMERCIAL FACILITY PERFORMANCE

- Steam generation
  - Operating at full capacity
- Power
  - Generation steady outside of regular maintenance
  - Import/Export vary due to weather
    - –Plant is islanded during thunderstorms
    - –High line power is affected by thunderstorms, ice, human factors
  - Consumption increasing as loading on facility ramps up

LINDBERGH – POWER CONSUMPTION

	Generation	Consumption	Import	Export
	MWh	MWh	MWh	MWh
Oct-16	10102	9065	617	1654
Nov-16	10790	9597	53	1247
Dec-16	11626	10381	41	1286
Jan-17	11441	9789	30	1682
Feb-17	10407	9140	0	1267
Mar-17	11457	10153	0	1304
Apr-17	10639	9431	0	1209
May-17	9991	8665	446	1773
Jun-17	9604	7740	0	1864
Jul-17	9352	7904	447	1894
Aug-17	10177	8453	0	1725
Sep-17	7226	6041	215	1400
Oct-17	10874	9841	308	1033
Nov-17	11111	9829	517	1282
Dec-17	11483	10523	268	960
Jan-18	11285	10501	233	784
Feb-18	10625	10433	270	192
Mar-18	11676	11608	385	68
Apr-18	10667	10176	505	491
May-18	10005	8720	666	1285
Jun-18	9899	8821	37	1078
Jul-18	10120	9078	35	1042
Aug-18	10204	9760	145	444
Sept-18	10454	9242	2	1212
Oct-18	11012	10411	739	604

LINDBERGH – FLARED & VENTED GAS



- There was no sour gas venting during this period

LINDBERGH – SO_2 EMISSIONS

	Monthly SO2 Emissions (tonnes)				
	Total	Flare Stack	Steam Gens	Peak Day	EPEA Lic Limit
	t/month	t/month	t/month	t/d	t/d
Jan-17	21.30	0.030	21.27	0.74	3.0
Feb-17	18.52	0.001	18.52	0.67	3.0
Mar-17	24.02	0.004	24.02	0.81	3.0
Apr-17	19.36	0	19.36	0.67	3.0
May-17	16.94	0	16.94	0.59	3.0
Jun-17	25.13	0.009	25.12	0.89	3.0
Jul-17	24.94	0.095	24.85	0.93	3.0
Aug-17	23.48	0.003	23.48	0.78	3.0
Sep-17	6.29	0.310	5.98	0.32	3.0
Oct-17	16.41	0.064	16.34	0.54	3.0
Nov-17	23.77	0.048	23.72	0.83	3.0
Dec-17	24.03	0.140	24.02	0.81	3.0
Jan-18	33.28	0.049	33.23	1.22	3.0
Feb-18	31.62	0.024	31.59	1.20	3.0
Mar-18	22.49	0.017	22.48	0.76	3.0
Apr-18	34.67	0.012	34.59	1.19	3.0
May-18	39.23	0.099	39.12	1.35	3.0
Jun-18	37.78	0.127	37.65	1.34	3.0
Jul-18	31.50	1.266	30.24	1.05	3.0
Aug-18	33.53	0.107	33.43	1.14	3.0
Sep-18	29.52	0.348	29.17	1.15	3.0
Oct-18	39.18	0.173	39.006	1.33	3.0

- Simulations based on historical data do not indicate we will exceed our currently approved limit with the current production forecast of Phase 1
- Considerations will be given to the incorporation of sulphur recovery for future Phase 2 expansion

LINDBERGH – NO_X EMISSIONS

CEMS Data - Monthly Average - H-720	
	NOx (kg/h)
Jan-17	10.34
Feb-17	10.71
Mar-17	9.09
Apr-17	12.19
May-17	11.56
Jun-17	11.09
Jul-17	11.36
Aug-17	11.85
Sep-17	11.94
Oct-17	15.41
Nov-17	14.27
Dec-17	15.38
Jan-18	13.19
Feb-18	15.27
Mar-18	14.92
Apr-18	14.69
May-18	14.31
Jun-18	13.99
Jul-18	13.40
Aug-18	14.23
Sep-18	14.22
Oct-18	14.18

	2017 Manual Stack Surveys		2018 Manual Stack Surveys		
Emission Source	Date	NOx Emission Rate (kg/hr)	Date	NOx Emission Rate (kg/hr)	NOx Approval Limit (kg/hr)
H-710 (Steam Gen 1)	26-Apr-17	13.1	---	---	16.6
H-720 (Steam Gen 2)	25-Apr-17	12.2	27-Mar-18	15.1	16.6
H-730 (Cogen 1)	---	---	1-Aug-2018	1.34	5.0
H-740 (Cogen 2)	16-Aug-17	1.25	---	---	5.0

EPEA Approval 1581-02-03 Table 3.2 requires manual stack survey test frequency as:

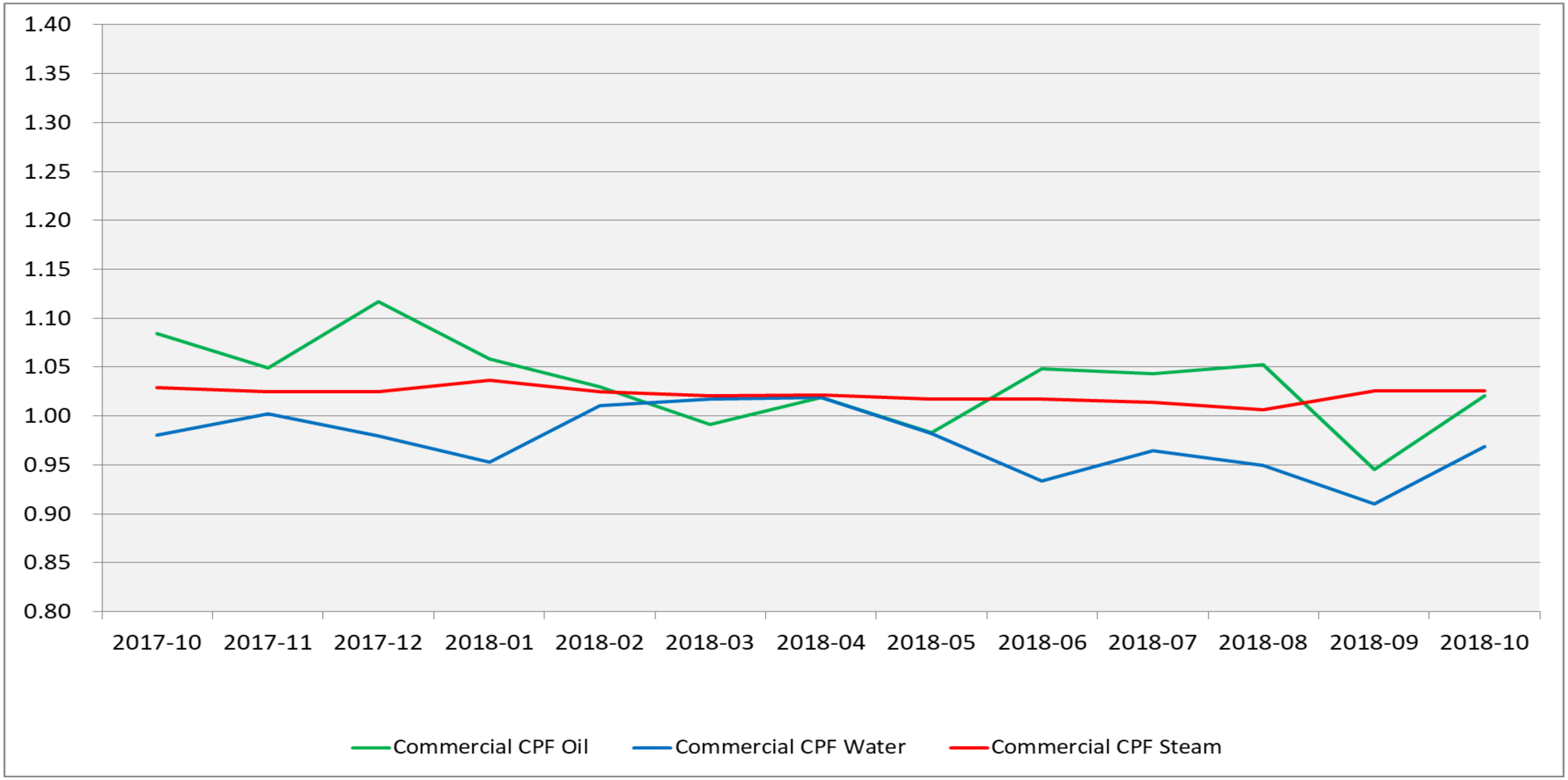
- H-710 & H-720 once per year on a rotating basis
- H-730 & H-740 once per year on a rotating basis
- H-710 & H-720 one with CEMS (Continuous Emission Monitoring System)

MEASUREMENT AND REPORTING

MARP SUMMARY

- Testing
  - Test separator located at D01, D02, D03, D04, and D05
  - 12-24 hour tests
    - Within +/- 10% of previous results to be accepted
  - Individual well gas allocated as a function of facility GOR and monthly allocated production
  - Pad D03 utilizing AGAR meter
  - Pad D01, D02, D04, and D05 utilizing manual testing
    - 2 samples captured per test to improve accuracy
  - Pad D01, D02, D04 and D05 to be converted to AGAR meter in 2019
    - Calibration of the test separator AGAR meters on-going; numerous calibration points throughout 2018 but with the addition of new wells in 2018 manual samples were deemed more accurate until steady state

PRORATION FACTOR



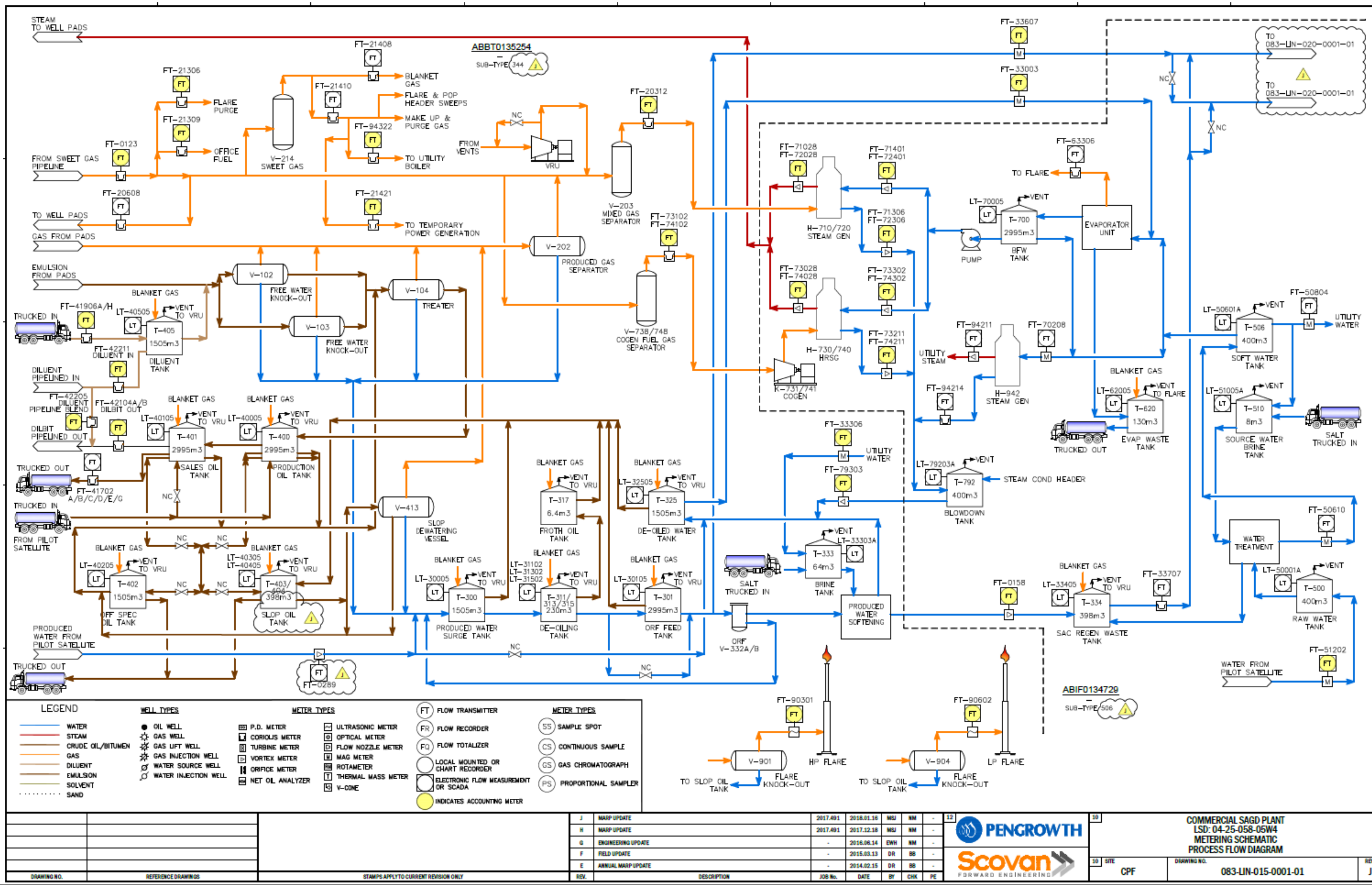
	2017-10	2017-11	2017-12	2018-01	2018-02	2018-03	2018-04	2018-05	2018-06	2018-07	2018-08	2018-09	2018-10
Oil	1.08	1.05	1.12	1.06	1.03	0.99	1.02	0.98	1.05	1.04	1.05	0.95	1.02
Water	0.98	1.00	0.98	0.95	1.01	1.02	1.02	0.98	0.93	0.96	0.95	0.91	0.97
Steam	1.03	1.02	1.03	1.04	1.02	1.02	1.02	1.02	1.02	1.01	1.01	1.03	1.03

PRORATION IMPROVEMENT INITIATIVES

- Main issues associated with BS&W consistency
- Completed
  - Testing procedure (Sept 2015)
  - Chemical adjustments (Sept 2015)
  - Various piping changes for more accurate testing (2015-2016)
  - Pad D02, D03, D05 AGAR Calibrations (2016-2018)
- Ongoing (Q1-Q2 2019)
  - Pad D01 AGAR (new) calibration
  - Pad D04 AGAR (new) calibration
  - Pad D05 AGAR re-calibration testing
  - Pad D03 AGAR re-calibration testing
  - Pad D02 AGAR re-calibration testing

COMMERCIAL MARP SCHEMATIC

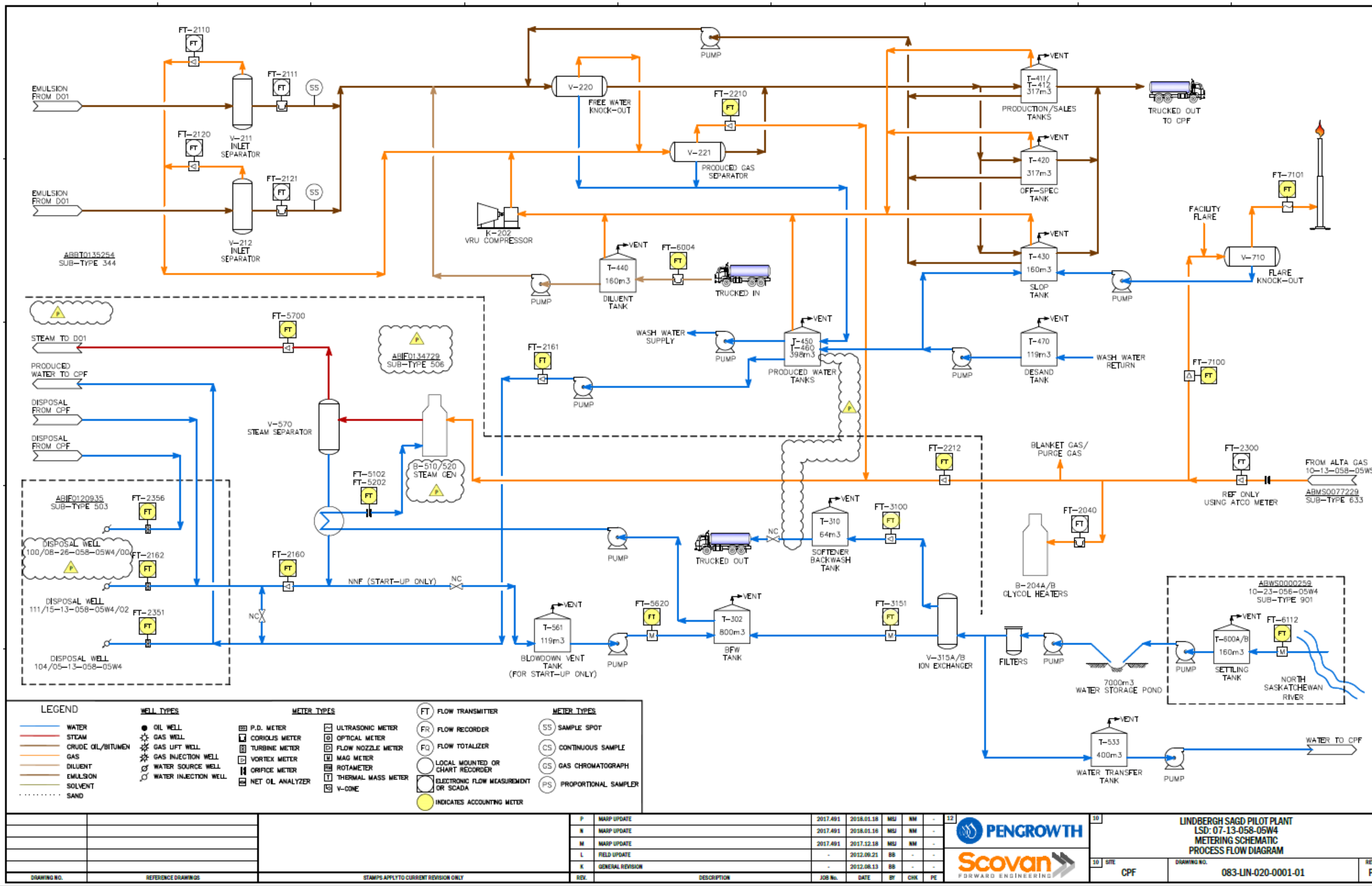
SAGD Production - BT0135254
SAGD Injection - IF0134729
Disposal -IF0120935



TSX:PGF

PENGROWTH

PILOT MARP SCHEMATIC



MARP CALCULATION SUMMARY

7.1.2. Total Battery Bitumen Production

Produced Bitumen = $((O_S + DBI_c - DBI_o)/SF) - (D_i + D_{Oi} - D_{Ci})$

$((O_s$	+	DBI_c	-	$DBI_o)$	/	SF)	-	$(D_i$	+	D_{Oi}	-	$D_{Ci})$
Sales Oil		Closing Inventory T-400, T-401, T402, T403, T-404, T-411, T-412, T-420 and T430		Opening Inventory T-400, T-401, T402, T403, T-404, T-411, T-412, T-420 and T-430		Blending Shrinkage Factor		Diluent Receipts		Opening Inventory T-405 and T-440		Closing Inventory T-405 and T-440

7.1.7. Battery Water Production

Dispositions	+	∆ Water Tanks	+	∆ De-oiling Tanks	+	∆ Slop Tank Water	+	∆ Off Spec Tank Water	-
Formula 7.1.8		Change in water tank inventory for T-300, T-301, T-325, T-450, T460, T400, T401		Change in water inventory in T-311, T-313 & T-315		Change in water inventory in T-403, T-404 and T-430		Change in water inventory in T-402 and T-420	
Water received with diluent	-	**FT-79303**	-	**Trucked in Water**	-	**FT-33306**			
		Blowdown water from IF T-792		Water trucked in to T-333 from outside sources		Utility water from IF to T-333			

7.1.8. Battery Water Dispositions

FT-33607	+	FT-2351	+	FT-2162	+	FT-33003	+	Sales Water	+	Other water out	+
Water Delivery to Injection Facility for Disposal		Produced Water Delivery to Injection for Disposal from Satellite		Blowdown Water Delivery to Injection for Disposal from Satellite		Water Delivery to IF for treatment		S&W content of sales dilbit blend		Water Content of other fluid trucked out	
FT-0158											
Waste Water to IF T-334											

7.3.1. Primary Steam Calculation

FT-71028	+	FT-72028	+	FT-73028	+	FT-74028	+	FT-5700
Steam to Pads from Steam Generator		Steam to Pads from Steam Generator		Steam to Pads from HRSG		Steam to Pads From HRSG		Steam to Pads from Satellite V-570

7.3.2. Secondary Steam Injection Calculation

FT-71401	+	FT-72401	+	FT-73302	+	FT-74302	+	FT-5102	+
BFW to Steam Gen H710 from T-700 BFW tank		BFW to Steam Gen H720 from T-700 BFW tank		BFW To Cogen H730 from T-700		BFW to Cogen H740 from T700		BFW to B-510	
FT5202	-	**(FT-71306**	+	**FT-72306**	+	**FT-73211**	+	**FT-74211**	+
BFW to B-520		Steam Condensate from Steam Gens		Steam Condensate from Steam Gens		Steam Condensate from HRSG		Steam Condensate from HRSG	
FT-2160)									
Pilot Steam Blowdown									

WATER

LINDBERGH WATER SOURCES

- 10-23-056-05 W4M river water station
  - Fresh water source from the North Saskatchewan River
  - AENV License No.13844
    - » Gross diversion, consumptive use: 2,272 acre-feet (2,802,467m3) annually
    - » Rate of diversion: 1.8 cubic feet per second (4403m3/d or 1,607,400m3 annually)

- Commercial
  - ~789 m3/d make-up water usage at commercial and pilot facility (2018 to date average)
  - 2018 make up water usage increased because of the restarting of the pilot facility in April 2018.
  - A higher water steam ratio in 2017 lowered the source water makeup to the evaporators as the evaporator feed stream is produced water supplemented with source water to meet total boiler feed water requirements

LINDBERGH SOURCE WATER MAKE UP VOLUMES

- Commercial volumes used primarily for soft de-oiled water make-up and miscellaneous utility services

	Source Water (m3 per month)
Oct-16	14,022
Nov-16	16,612
Dec-16	10,996
Jan-17	9,105
Feb-17	11,157
Mar-17	15,486
Apr-17	14,992
May-17	6,762
Jun-17	8,042
Jul-17	12,733
Aug-17	17,342
Sep-17	8,583
Oct-17	12,464
Nov-17	20,365
Dec-17	20,944
Jan-18	8,711
Feb-18	16,562
Mar-18	14,625
Apr-18	18,869
May-18	34,881
Jun-18	33,189
Jul-18	29,434
Aug-18	30,588
Sept-18	28,683
Oct-18	26,442

2017 Total: 157,975m3

- 5.6% of gross diversion license

2018 YTD: 241,984m3

Source water requirements increased in 2018 due to re-starting the pilot for additional steam generation in April 2018.

LINDBERGH COMMERCIAL DISPOSAL LIMITS

- The Lindbergh CPF is equipped with evaporator towers for PW recycle

	Produced Water (m3/month)	Disposal Water (m3/month)	Source Water Makeup (m3/month)	Disposal Limit (%)	Actual Disposal (%)
Oct-17	216,070	9,482	12,464	9.6%	4.6%
Nov-17	205,060	8,328	20,365	9.6%	4.5%
Dec-17	215,370	9,391	20,944	9.6%	4.4%
Jan-18	201,106	11,171	8,711	9.5%	4.7%
Feb-18	202,283	9,214	16,562	9.6%	5.1%
Mar-18	238,785	10,409	14,625	9.5%	4.6%
Apr-18	234,933	12,702	18,869	9.6%	4.5%
May-18	243,843	19,053	34,881	9.6%	4.9%
Jun-18	240,210	19,019	33,189	9.5%	5.3%
Jul-18	253,540	22,329	29,434	9.4%	5.7%
Aug-18	253,070	21,032	30,588	9.3%	5.9%
Sep-18	228,730	25,990	28,683	9.3%	6.3%
Oct-18	250,060	17,104	26,442	9.3%	6.4%

- Actual disposal increased since April 2018 with the restarting of the pilot facility.
- After the pilot operation stabilized we were able to increase the amount of produced water sent from the pilot to the CPF and the actual on site disposal balanced out. October 2018 Actual Disposal = 6.4%, November 2018 =6.3% and December 2018 = 6.3%

LINDBERGH WATER QUALITY

Raw Water Properties

Turbidity	5 – 1000 NTU
Suspended Solids	5 – 600 mg/l
Total Dissolved Solids	250mg/l
Total Hardness	170 ppm (as $CaCO_3$)
Na	10.7
K	1.2
Mg	13.1
Ca	46.7
Chlorides	10.8 mg/l
Bicarbonate	180 mg/l
CO_3	<0.50 mg/l
Sulphate	44.2
Total Alkalinity	150

Produced Water Properties

Component	mg/l as Ion	mg/l as CaCO3
Calcium (Ca^{++})	34.6	86.5
Magnesium (Mg^{++})	2	8.2
Sodium (Na^{+})	1920.0	4166.4
Potassium (K^{+})	78.2	100.1
Iron (Fe^{++})	0.0	0.0
Manganese (Mn^{++})	2.0	3.6
Hydrogen (H^{+})	0.0	0.0
Barium (Ba^{++})	0.7	0.5
Strontium (Sr^{++})	2.2	2.5
Sum Cations		4367.9
Bicarbonate (HCO_3^-)	100.0	82.0
Carbonate ($CO_3^=$)	0.0	0.0
Hydroxide (OH^-)	0.0	0.0
Sulphate ($SO_4^=$)	100.0	104.0

Chloride (Cl^-)	3010	4244.1
Sum Anions		4430.1
Total Dissolved Solids (Measured)	5400	
pH (Units)	6.11	
Total Hardness		101.4
Silica (SiO_2)	163.0	
Insoluble Oil (oil & grease)	9	
Total Organic Carbon:		
Normal (non-volatile)	123	
Maximum	300	
Turbidity (NTU) (Max)		
Temperature (°C)	23.0	
Conductivity (µS/cm)	9600	

SAC Waste Properties

CATIONS			ANIONS		
Ion	*mg/L*	*meq/L*	*Ion*	*mg/L*	*meq/L*
Na	17300	752	Cl	32340	911
K	230	5.88	HCO3	130	2.12
Ca	2340	117	SO4	81.0	1.69
Mg	195	16.0	CO3	<0.50	<0.02
Ba	27.5	0.401	OH	<0.50	<0.03
Sr	101	2.30			
Fe	0.46	0.0164			
H+					

Total Dissolved Solids (mg/L)

Measured	Calculated
	53000

Relative Density: 1.039	Refractive Index: 1.339
Conductivity (uS/cm): 80200	Resistivity (ohm-m) @25°: 0.12
Total Hardness as CaCO3 (mg/L): 6600	Total Alkalinity as CaCO3 (mg/L): 110
Total Fe (mg/L): 13.9	Total Mn (mg/L): 5.65
Observed pH: 6.62	H2S Spot Test: FALSE

LINDBERGH INDUSTRIAL RUNOFF MONITORING

Location	LSD	Number of Releases	Total Volume (m3)	pH	Oil and Grease	Chloride (mg/L)
CPF	04-25-058-05W4	4	41000	7.46 - 8.25	No sheen	5.2 - 13.8
Pilot	07-13-058-05W4	4	1000	7.66 - 7.93	No sheen	6.3 - 39.9
Well	14-24-058-05W4	8	3398	7.30 - 8.41	No sheen	<31
Well	05-13-058-05W4	12	3588	7.20 - 8.08	No sheen	<31
Well	11-13-058-05W4	6	457	6.80 - 8.19	No sheen	<31
Well	02-24-058-05W4	6	2032	6.57 - 8.60	No sheen	<31

- There were 40 surface water releases from Oct 2017 to Oct 2018
- Total volume discharged was 51,475 m3
- All laboratory analytical and field screening results were within license requirements for pH, oil and grease, and chloride.

DISPOSAL WELLS

DISPOSAL WELLS

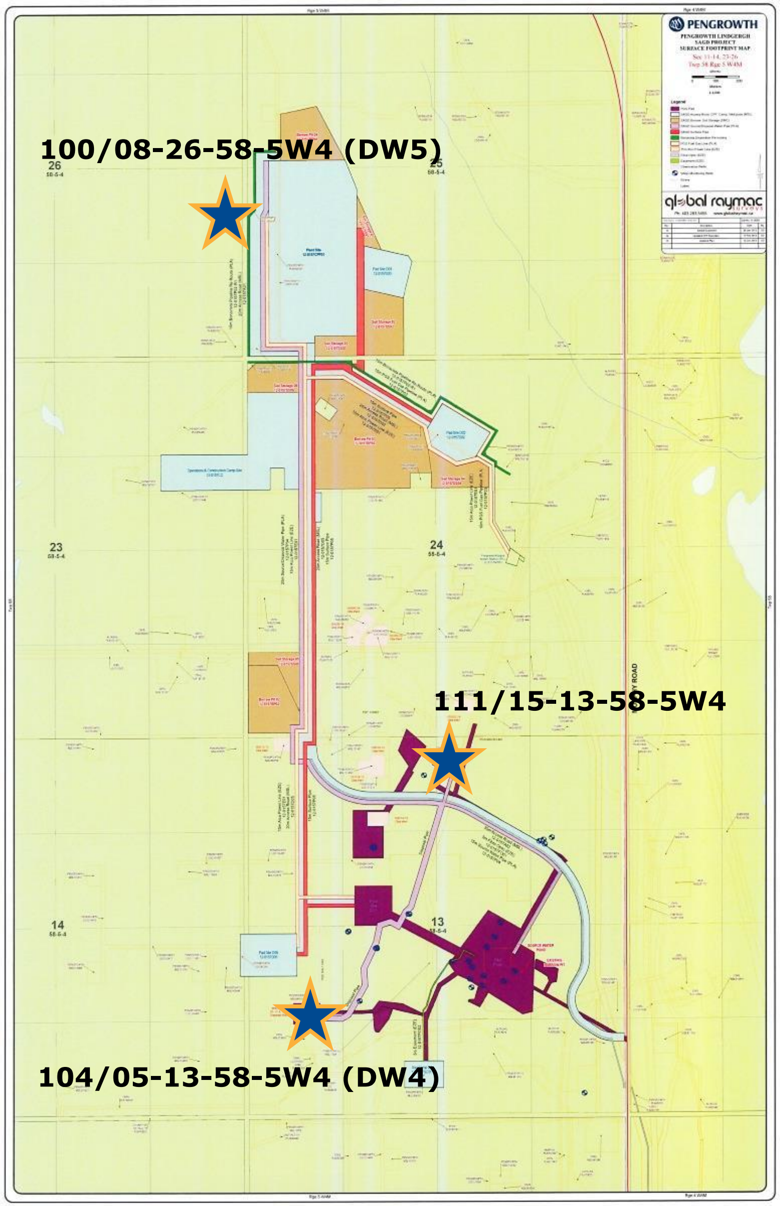
- 111/15-13-58-5W4
  - Well license number – 0126796
  - Disposal approval number – 5565
    - Completed in Basal Cambrian Sands
    - No rate limit
    - Max WHP – 10.9 MPa
  - Blowdown disposal for Pilot

- 104/05-13-58-5W4 (DW4)
  - Well license number – 0454598
  - Disposal approval number – 12088
    - Completed in Basal Cambrian Sands
    - No rate limit
    - Max WHP – 13 MPa
  - Produced water disposal (if required)

- 100/08-26-58-5W4 (DW5)
  - Well license number – 0469115
  - Disposal approval number – 12088B
    - Completed in Basal Cambrian Sands
    - Screened completion
    - No rate limit
    - Max WHP – 12.6 MPa
  - Softener backwash and/or produced water disposal (if required)

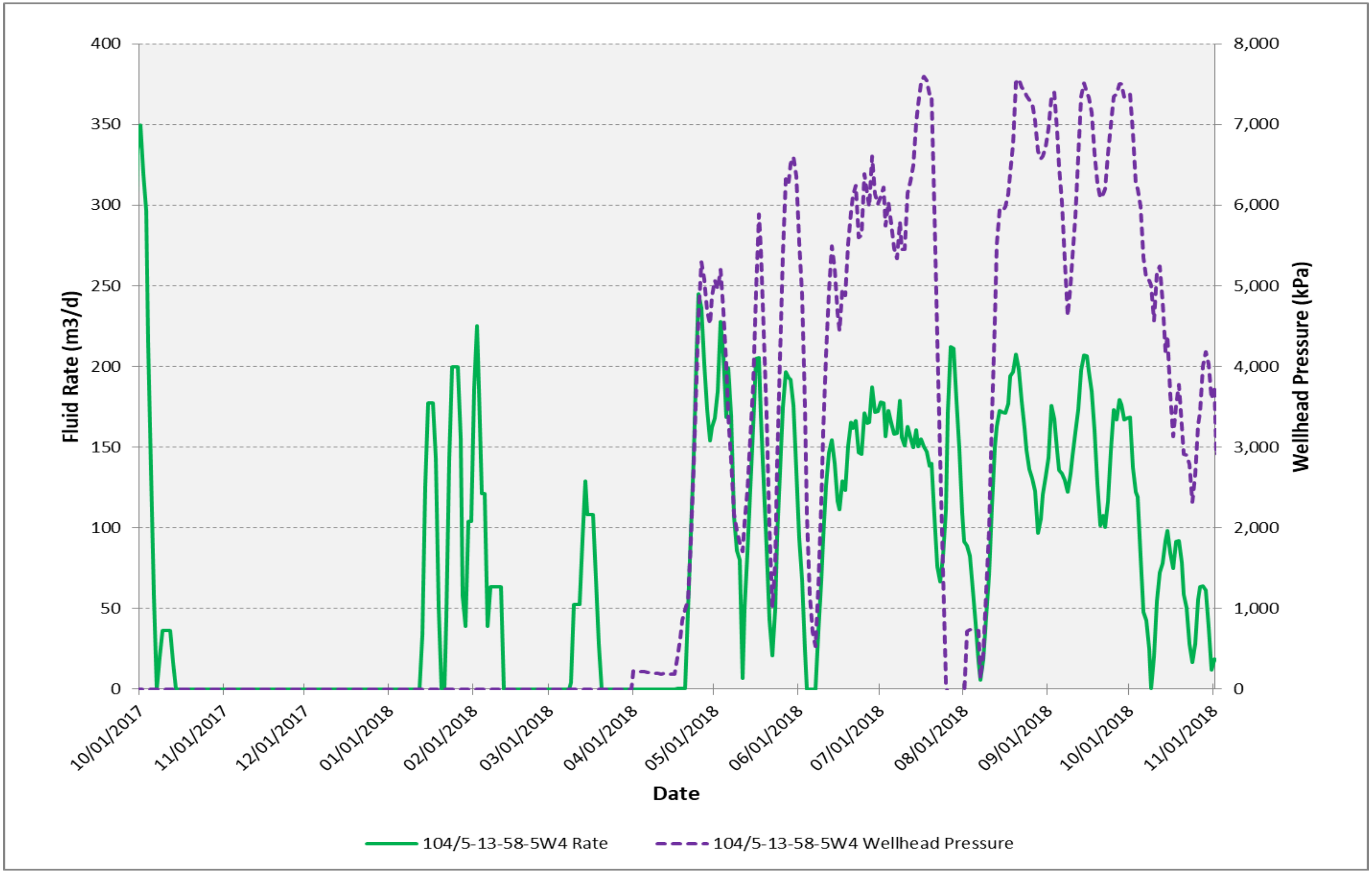
DISPOSAL WELLS

- Three water disposal wells (Basal Cambrian Sand) at ~ 1600 meters depth
- 11/15-13 disposes of Pilot blowdown
- 04/05-13 disposes of excess of produced water
  - Pilot was recommissioned in April 2018
- 00/08-26 is new well that was completed in November 2014
- All 3 wells are tied into the commercial CPF
  - 2 disposal streams into these wells are softener regeneration backwash and excess produced water

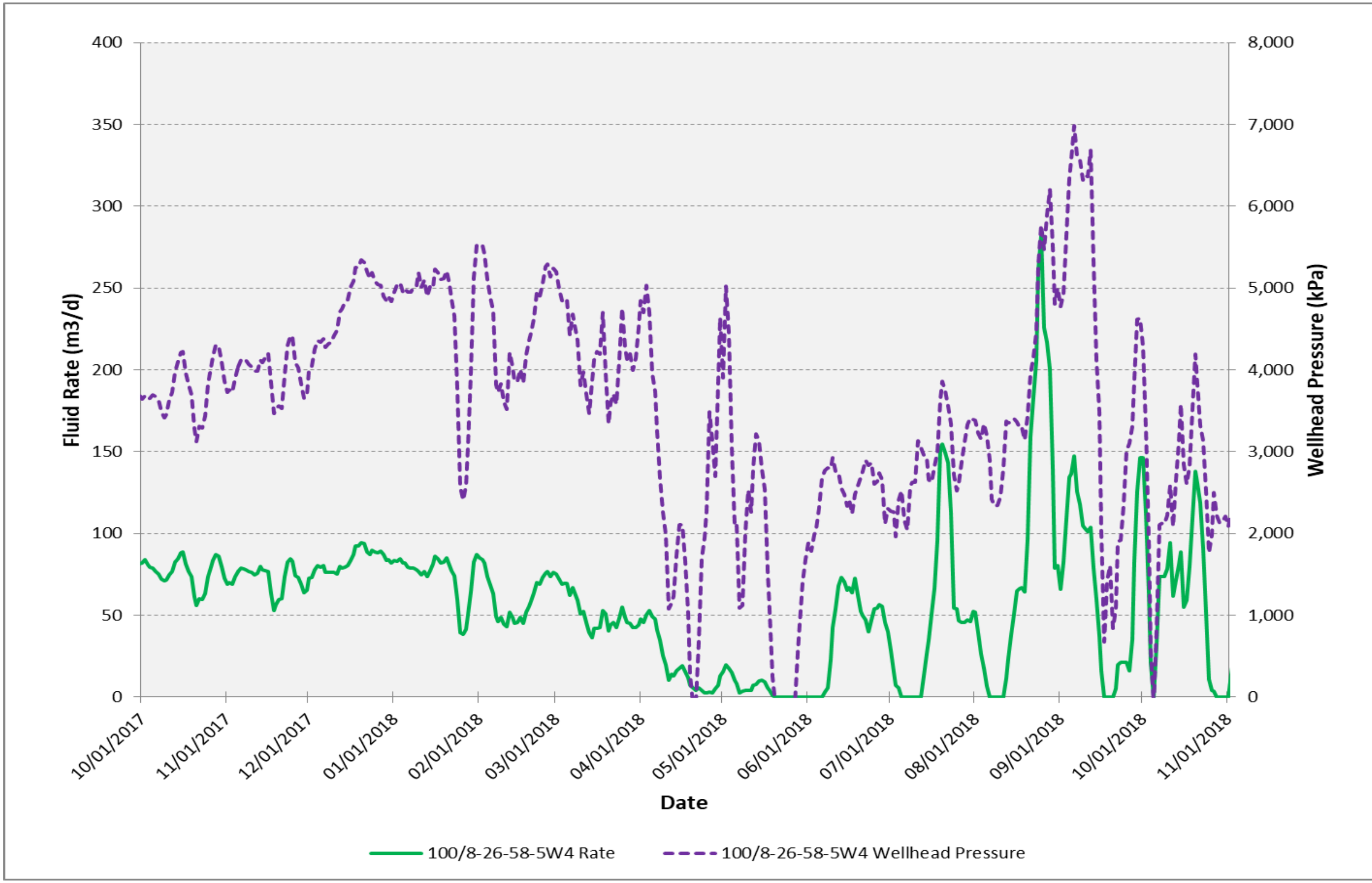


TSX:PGF PENGROWTH

DISPOSAL HISTORY – 104/5-13 PRODUCED WATER



DISPOSAL HISTORY – 100/8-26 SOFTENER BACKWASH



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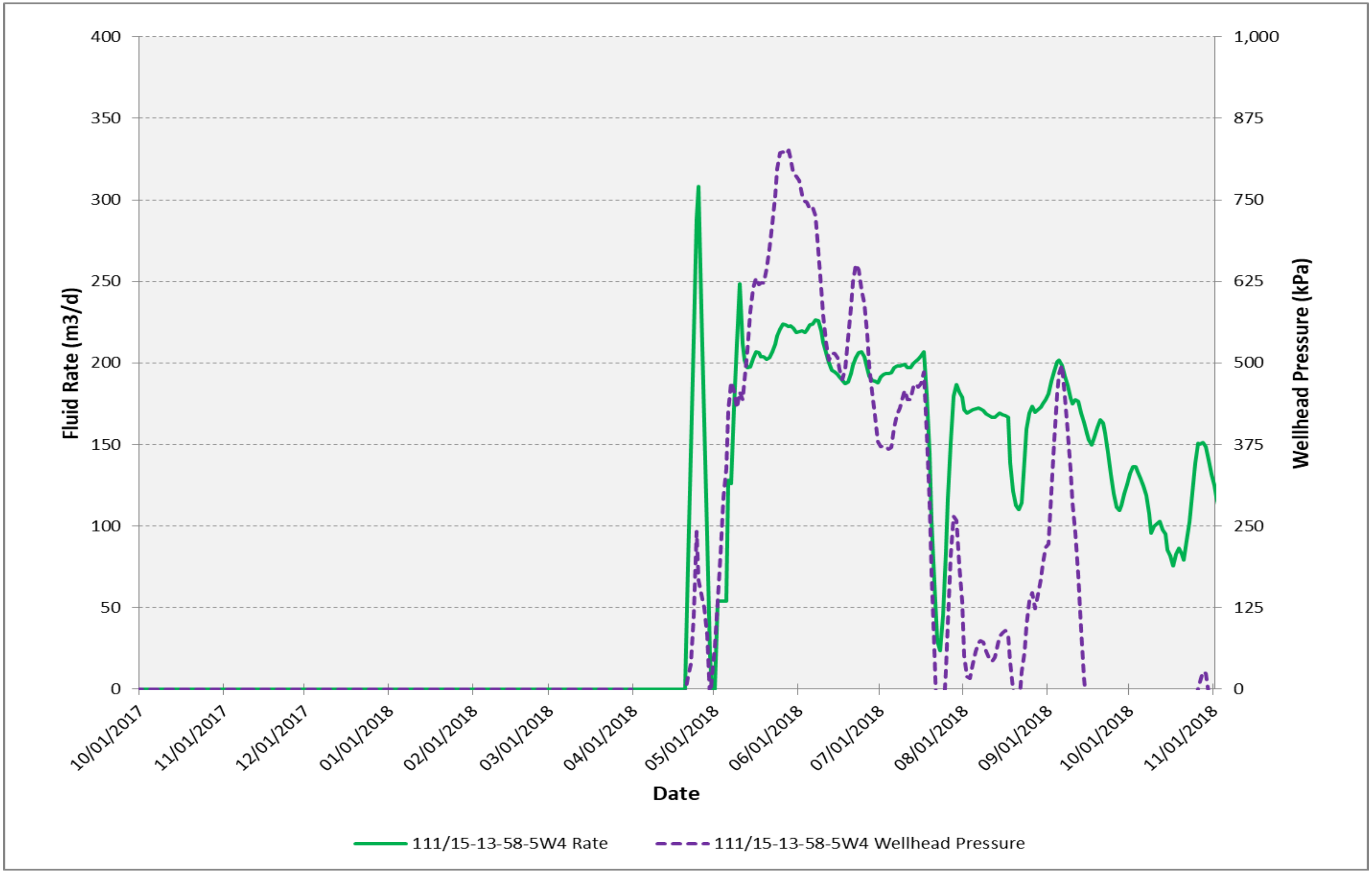
PENGROWTH

DISPOSAL HISTORY – 111/15-13 PILOT BLOWDOWN



OFFSITE DISPOSAL VOLUMES AND LOCATIONS – YTD 2018

	NewAlta Elk Point (m3)	Tervita Lindbergh (m3)	Secure Edmonton (m3)	**Total Offsite (m3)**	05-13 Prod Water (m3)	15-13 Boiler Blowdown (m3)	08-26 Softener Backwash (m3)
Oct-17	720	4577	424.8	**5,721**	475	0	2242
Nov-17	1338	4179	174.5	**5,691**	0	0	2115
Dec-17	1771	3722	942.3	**6,435**	0	0	2515
Jan-18	823	4849	301.4	**5,974**	2405	0	2227
Feb-18	796	5182	125.8	**6,103**	512	0	1614
Mar-18	2309	5210	100.5	**7,619**	804	0	1469
Apr-18	2769	5566	0.0	**8,335**	2038	1542	484
May-18	3081	5260	26.0	**8,366**	3823	5965	108
Jun-18	1726	6028	155.0	**7,909**	3592	5852	1268
Jul-18	6074	5121	410.0	**11,606**	4320	4797	1498
Aug-18	3827	4969	606.0	**9,401**	3808	4843	2651
Sep-18	5223	8619	229.0	**14,071**	4488	4541	2155
Oct-18	470	9027	374.0	**9,871**	1563	3350	1581

AMBIENT AIR QUALITY

AMBIENT AIR QUALITY

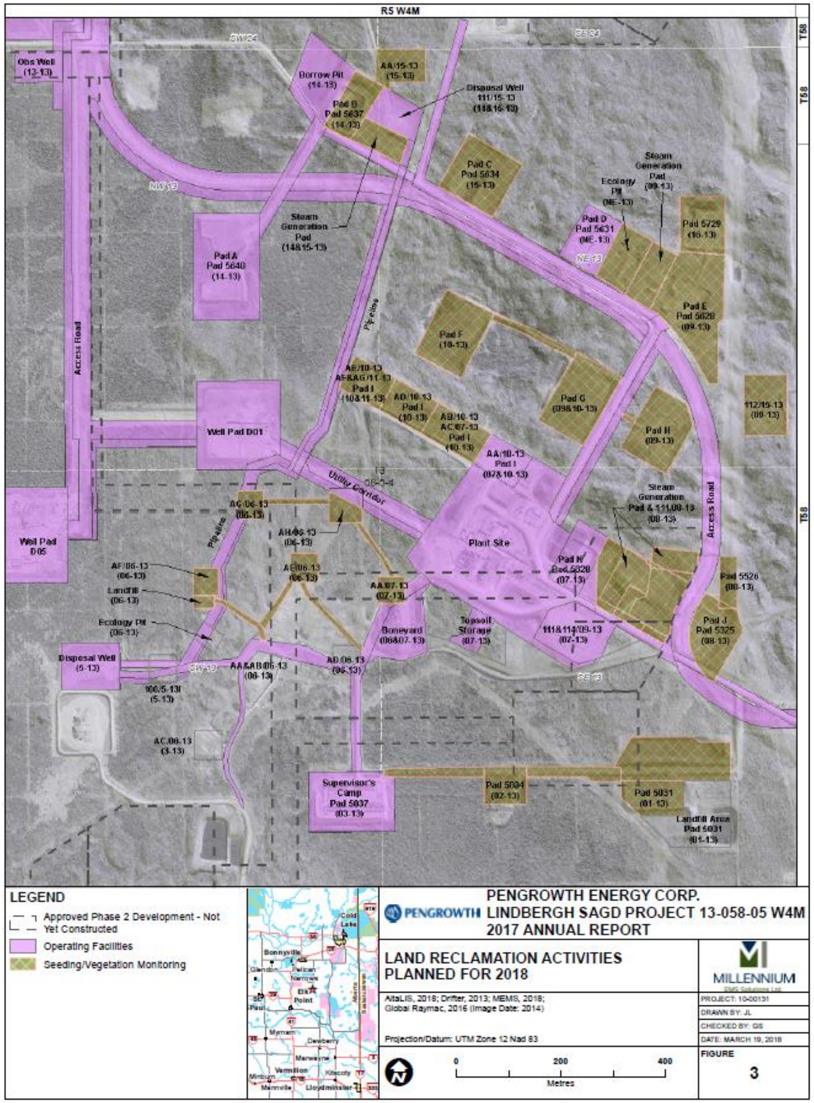
- Continue to actively participate in LICA and the Air Quality Monitoring Program Network as per the Lindbergh SAGD EPEA Approval 1581-02-03
- We are compliant with the Joint Oilsands Monitoring (JOSM) requirements

ENVIRONMENTAL ISSUES

PENGROWTH

DECOMMISSIONING AND RECLAMATION

- The 5 year reclamation of legacy CSS facilities was completed in 2017.
- Reclamation monitoring was completed in 2018 and will continue in 2019.
- The project is in the early stages of development. No current facilities are scheduled for decommissioning at this time.



ENVIRONMENT (EPEA 1581-02-03)

New EPEA Approval Requirements for 2018/2019:

- Wetland and Waterbody Monitoring Program Proposal was submitted and approved by the AER in July 2018. Field program to commence Spring 2019.
- Wetland Reclamation Trial Program Proposal submitted to the AER June 2018. AER approval yet to be received.
- Amended Wildlife Mitigation & Monitoring Program Proposal submitted July 2018. AER approval of wildlife camera installation received. Cameras were installed November 2018. Yet to receive approval of the full proposal.
- Project Level Conservation and Reclamation Closure Plan to be submitted October 2019.

COMPLIANCE

PENGROWTH

COMPLIANCE

AER INSPECTIONS

- February 2018, a facility CEMS and emissions inspection (Cylinder Gas Audit) was conducted by the AER. Satisfactory result.
- June 2018, a facility operational and EPEA inspection including production facility and well pads was conducted in June 2018. Satisfactory result.
- September 2018 Pengrowth VSD of bottom hole pressure of infill wells exceeding approved limit for more than two week interval.
- October 2018, Pengrowth responded to an AER follow up information request regarding former CEMS deficiencies (during initial facility commissioning in 2016). Satisfactory result as the CEMS is deemed in full compliance with applicable regulations.

Pengrowth believes that the Lindbergh project is in full compliance with AER/AEP regulatory approvals and requirements

COMPLIANCE

Voluntary Self Disclosures

Date	Description	Corrective Actions / Preventative Measures
September 2018	VSD of bottom hole pressure of infill wells exceeding approved limit for more than two week interval.	Pengrowth had misinterpreted the conditions of their approval. This was discussed in a meeting with key Pengrowth stakeholders at AER's office on September 17, 2018.

FUTURE PLANS

FUTURE PLANS

- Continuous incremental expansion of the CPF to 35,000 bbl/d
- Implementation of solvent assisted SAGD to improve efficiency and recovery
- Implementation of NCG injection with steam to improve efficiency and recovery
- Increased Cogeneration of steam and electricity

Pengrowth Energy Corporation

1600, 222 – 3rd Avenue SW
Calgary, Alberta, Canada T2P 0B4

Telephone: 403.233.0224
Toll Free: 1.800.223.4122
Facsimile: 403.265.6251

Investor Relations

Toll-free: 1.855.336.8814
Email: investorrelations@pengrowth.com
Website: www.pengrowth.com

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