



Algar Lake SAGD Project

2015 In Situ Performance Presentation

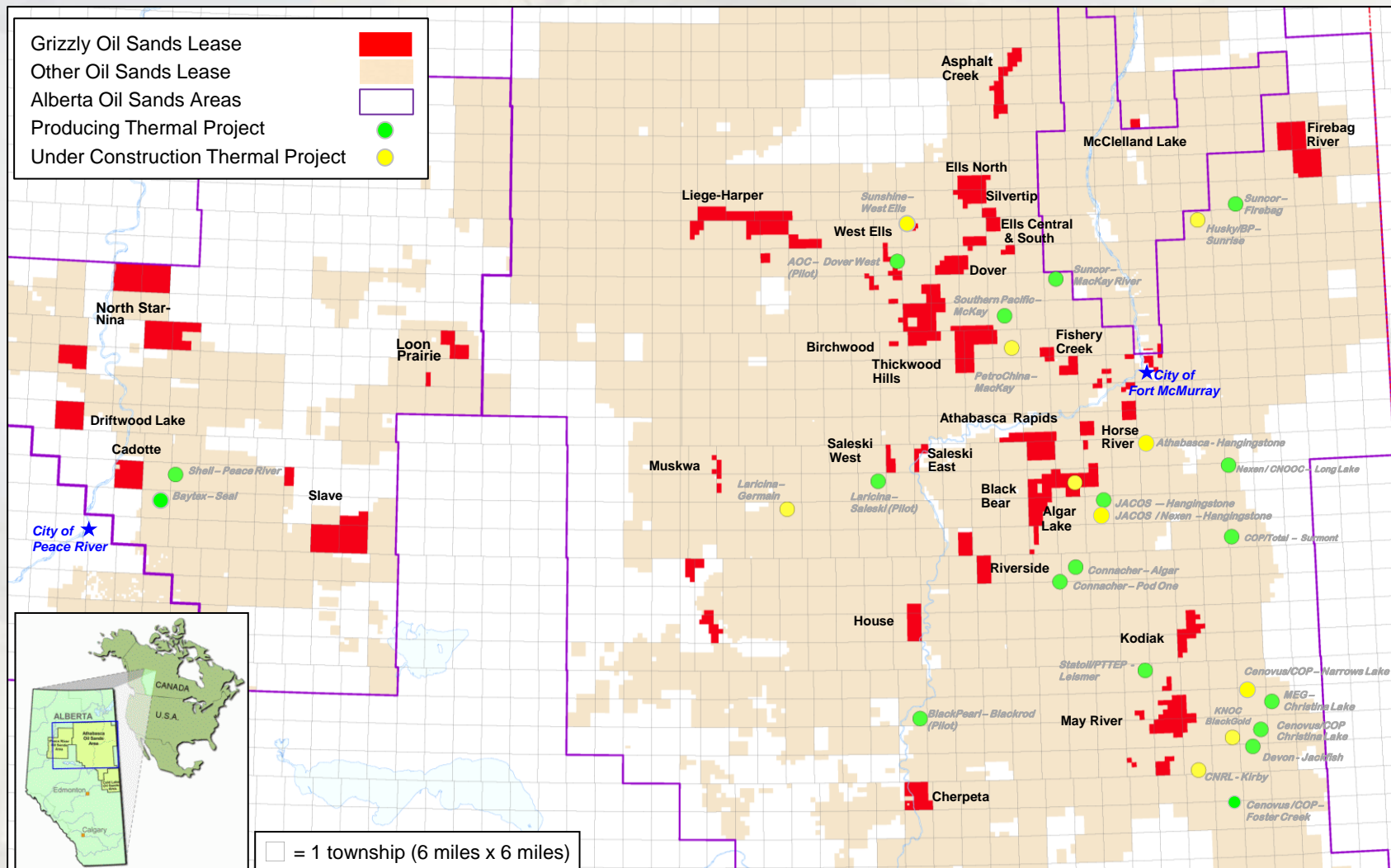
Scheme Approval No. 11688C

May 13, 2015

Outline and Presenters

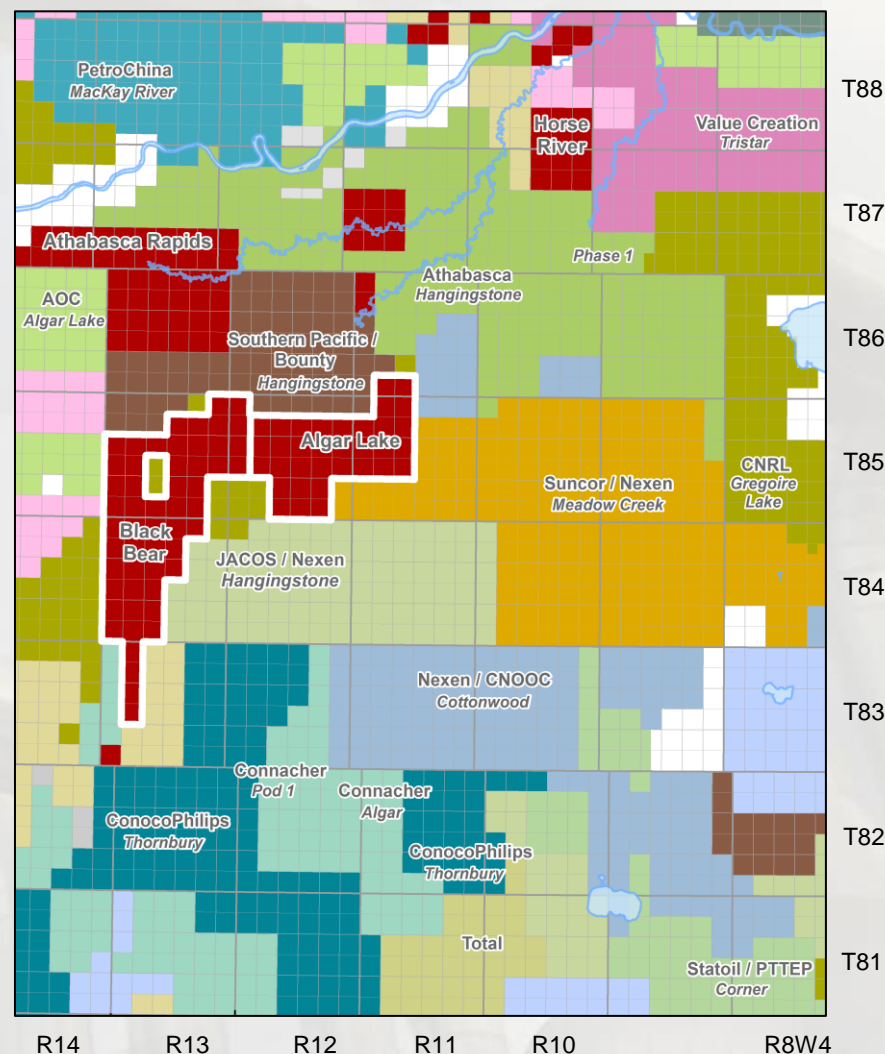
- Introduction and Project Background – Alan Stroich
- Geoscience – Jinxiu Qi
- Drilling and Completions – Alan Stroich
- Scheme Performance – Alan Stroich
- Surface Operations – Kristian Nespor
- Measurement and Reporting – Kristian Nespor
- Water – Kristian Nespor
- Environmental and Regulatory Compliance – Wayne Thompson

800,000+ Net Acres of Alberta Oil Sands Leases

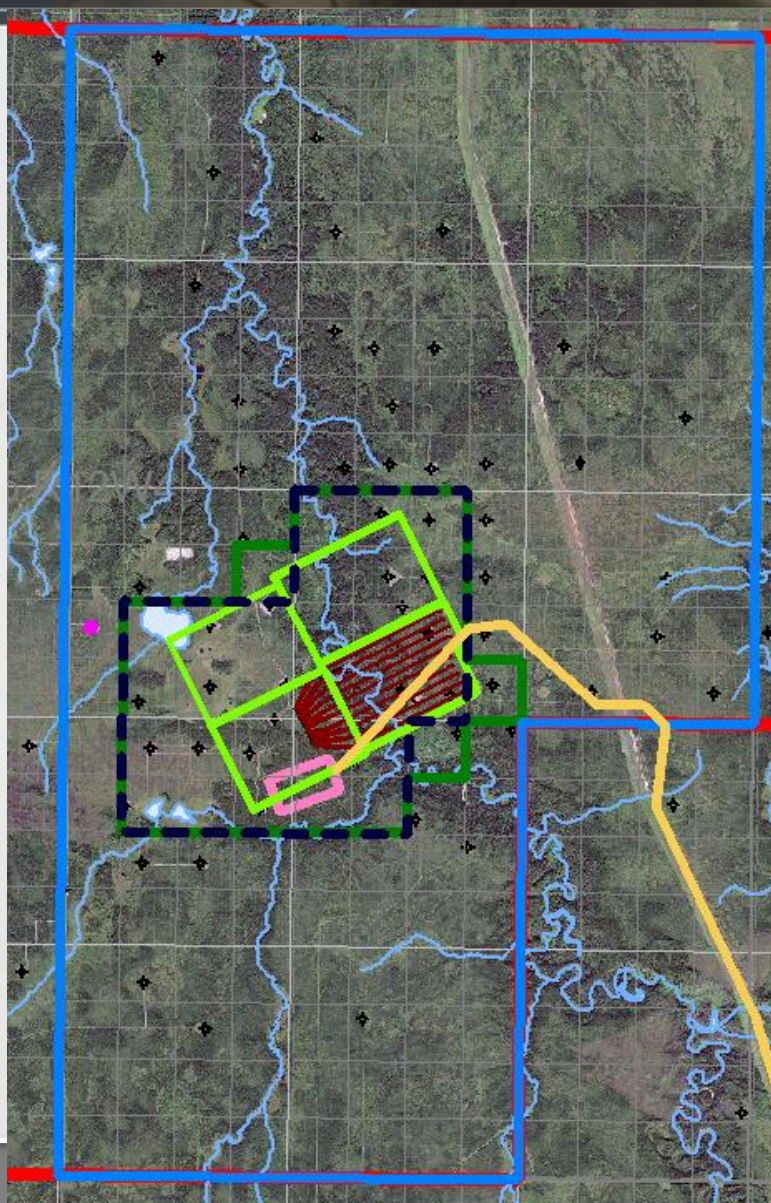


Algar Lake Property

- A 100% W.I. in 56,960 contiguous acres of oil sands leases in the southern Athabasca region
- GLJ has assigned 103 mmbbls of 2P Reserves and 46 mmbbls of Contingent Resources
- The Algar development area has been extensively explored
 - 65 cored delineation wells and an additional 16 appraisal exploration core holes outside of the initial development area.
- Reservoir characteristics
 - Up to 20 metre thick bitumen pay
 - No bottom water or top gas
 - Continuous caprock over 40 metres thick
 - Make-up water source in place for Stages 1 & 2
- Expansion potential
 - 18+ meter thick bitumen pay outside of the initial development area



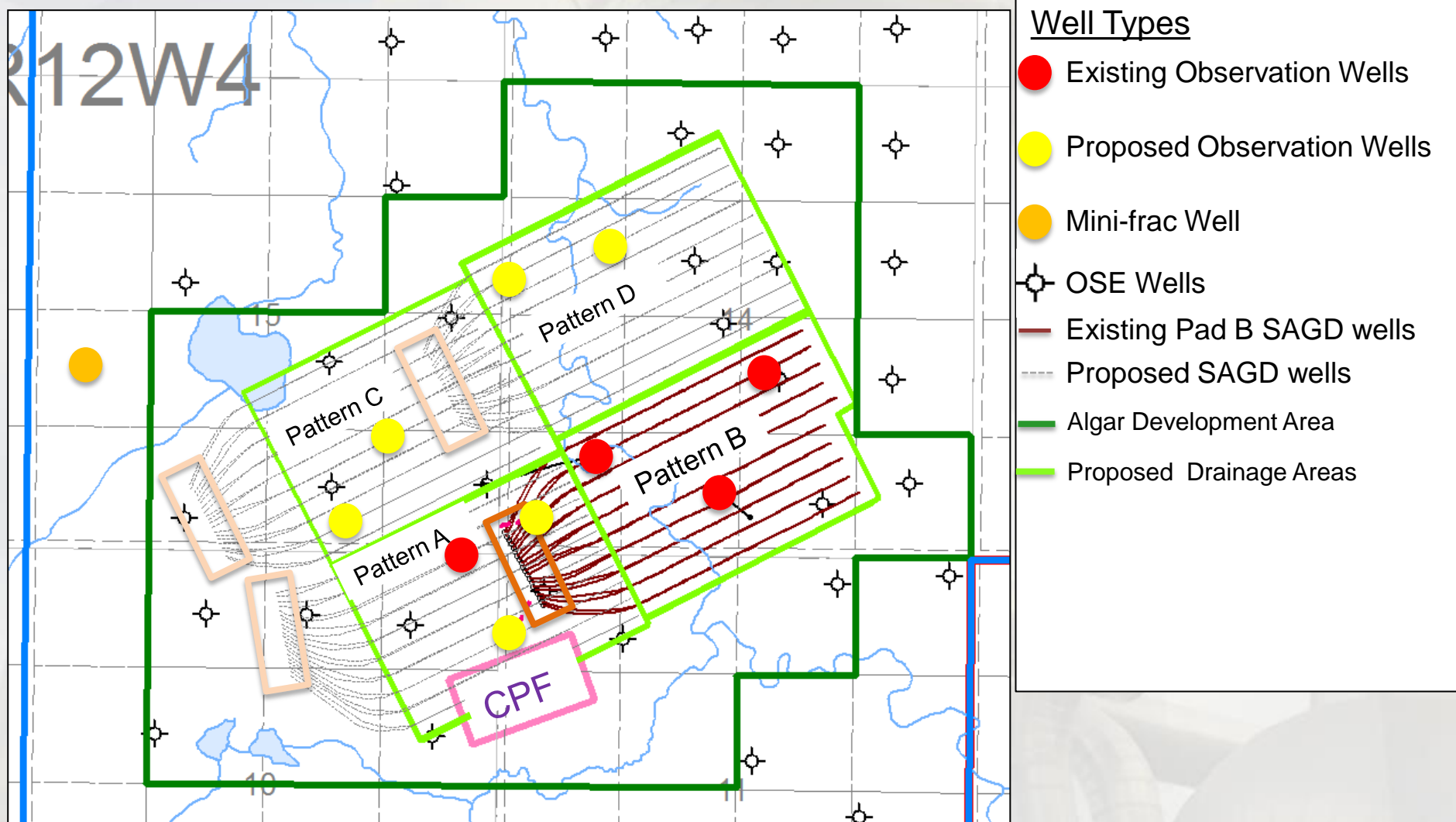
Project and Development Areas



Legend

- Algar Lease Boundary
- Algar Project Area Boundary
- - Algar Development Area (11688)
- - Algar Development Area (11688A)
- Proposed Drainage Areas
- Existing Pad B SAGD wells
- Road
- ✕ OSE Wells
- Mini-frac Well

Development Area Subsurface Drainage Patterns

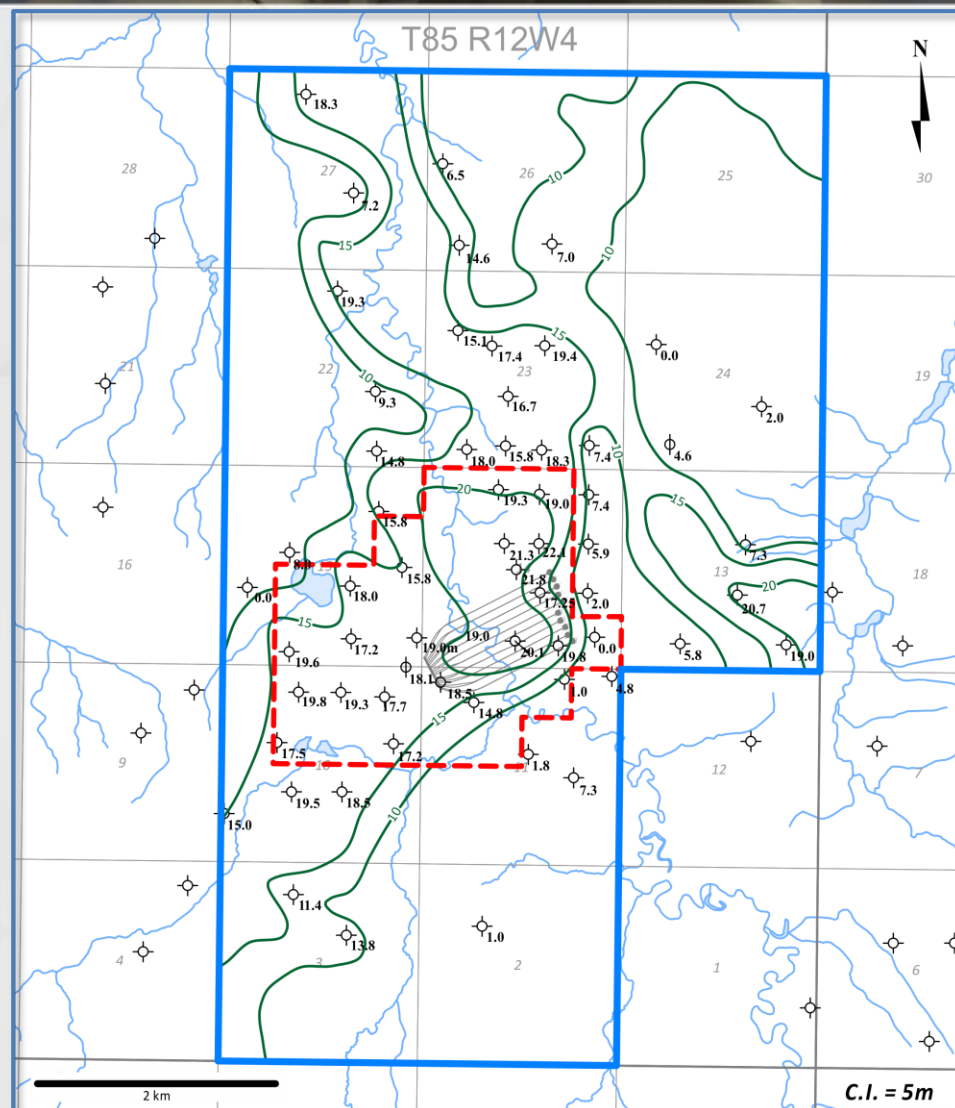


Initial Development

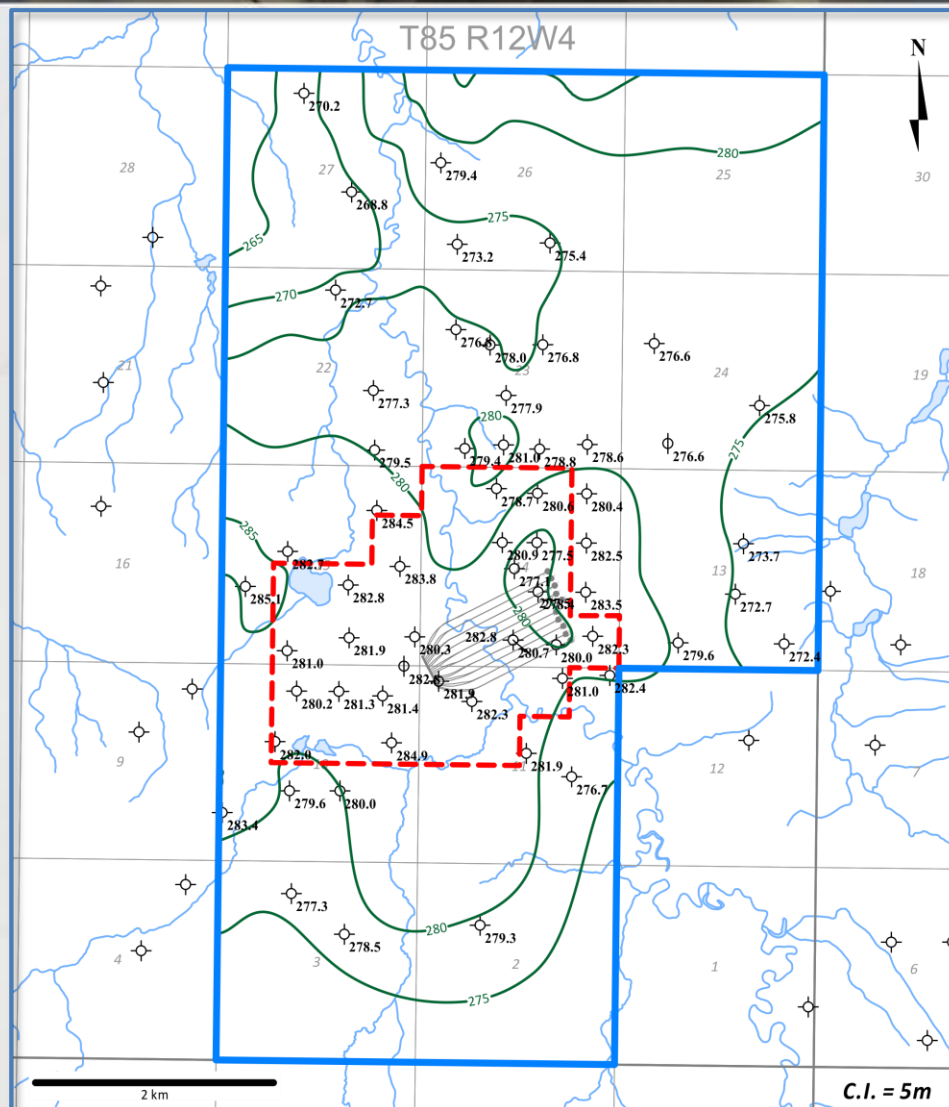
- Application for a 1,800 m³/d steam assisted gravity drainage (SAGD) commercial scheme submitted March 3, 2010
- Scheme Approval No. 11688 received on November 21, 2011
- Amendment No. 11688A received November 15, 2012 – slightly expanded Development Area
- Amendment No. 11688B received February 20, 2015 – increase bottom hole MOP to 3,275 kPag
- Amendment No. 11688C received April 6, 2015 to allow 3 wellpairs to operate up to 4,000 kPag downhole injection pressure for up to 3 months
- Project development planned for two 900 m³/d stages
 - Stage 1 consists of one process train and one well pad with 10 SAGD wellpairs
- Modular plant design “ARMS” – Advanced, Re-locatable, Modular, Standardized
- First steam to wells January 27, 2014, all wells on steam March 17, 2014
- Steam and production operations suspended April 23, 2015 due to low oil pricing

Geoscience

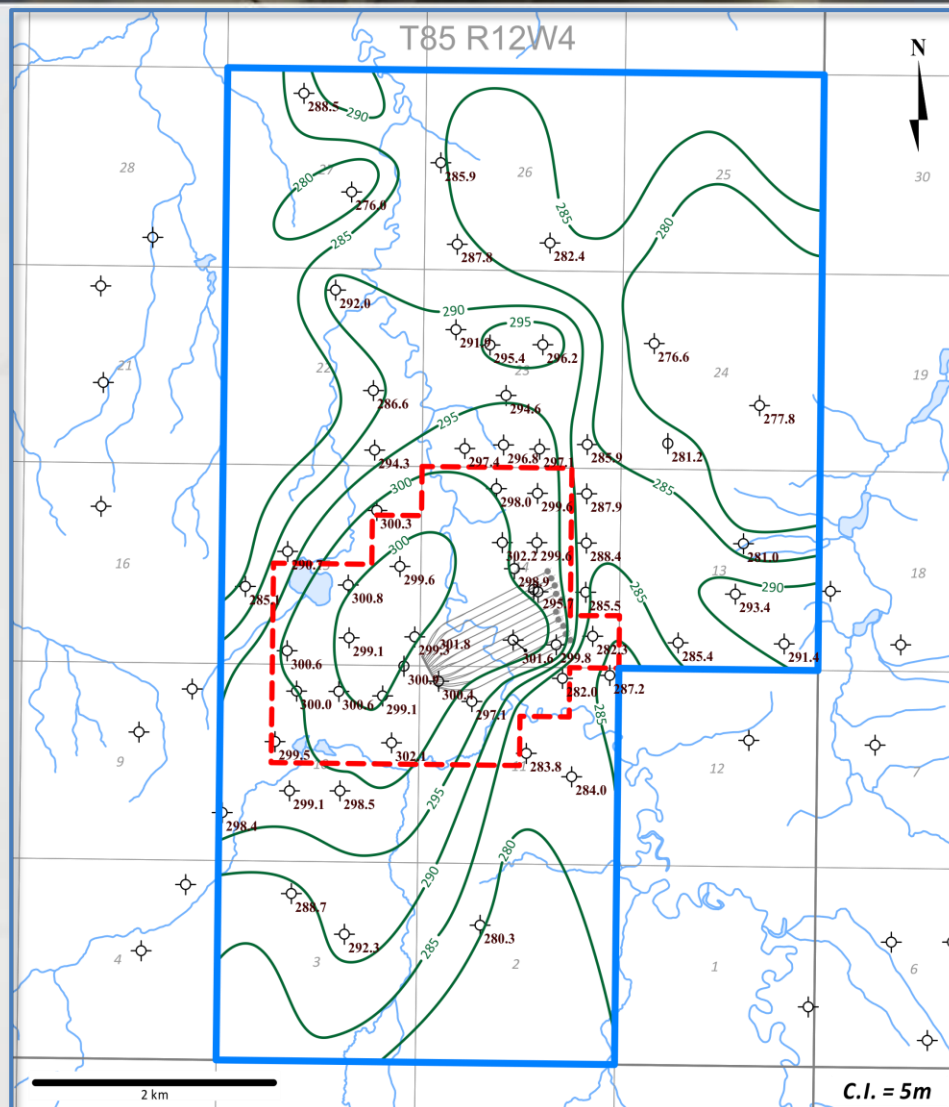
McMurray Net Pay



Base of Bitumen Pay Structure

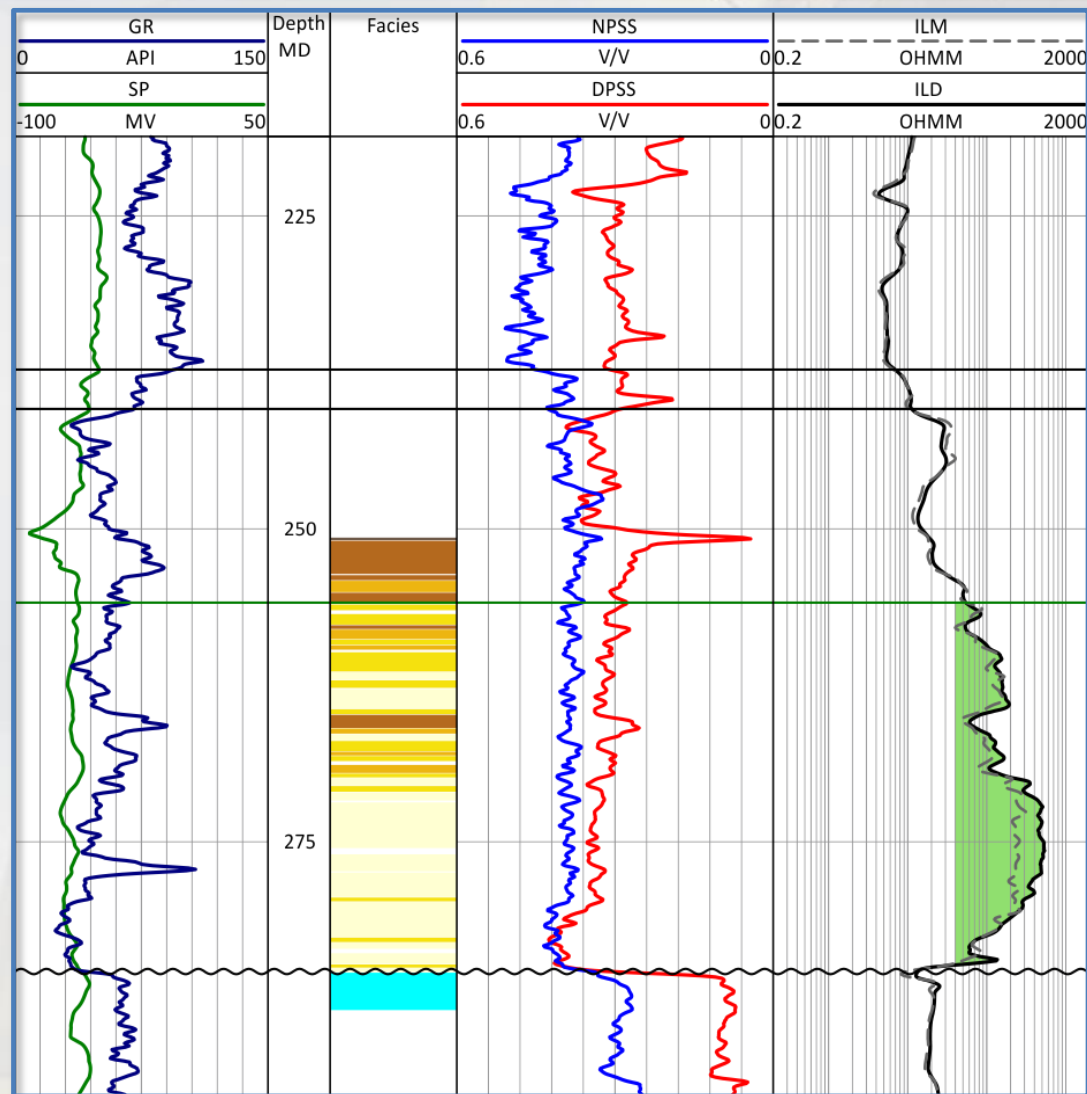


Top of Bitumen Pay Structure



Reference Well 00/03-14-085-12W4/0

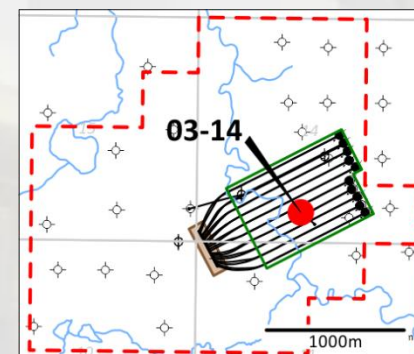
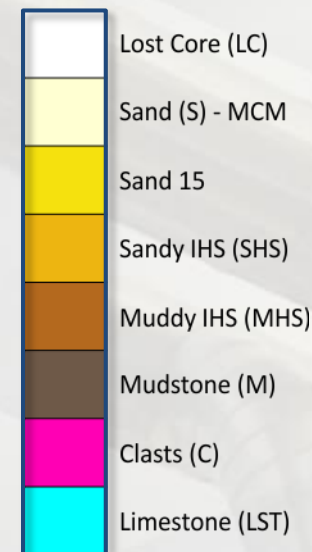
Zone of Exploitation



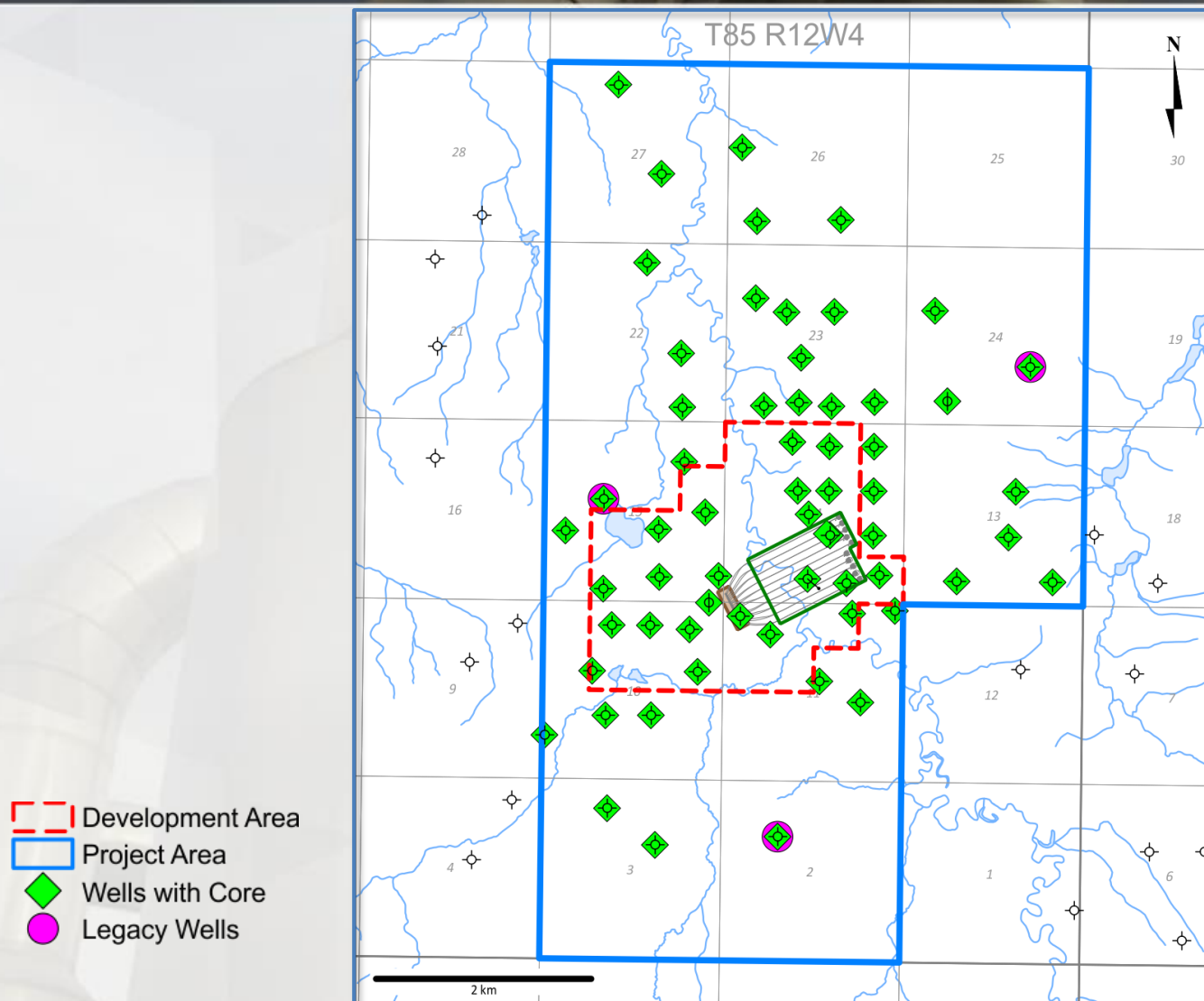
Wabiskaw C
McMurray

Top Exploitation Zone

Devonian

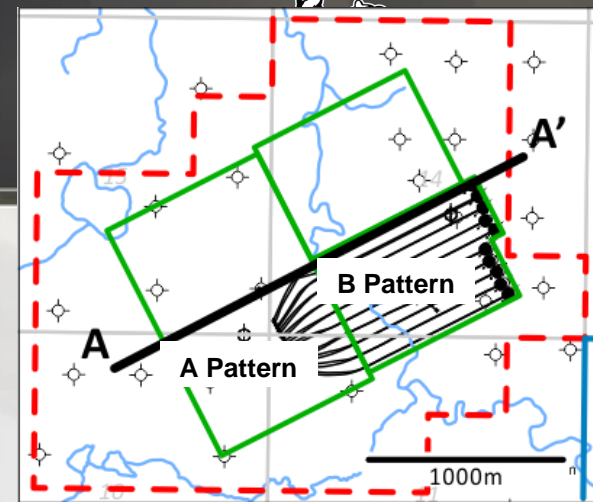


Wells with Core



Structural Cross-Section A- A'

With Horizontal Well Projections

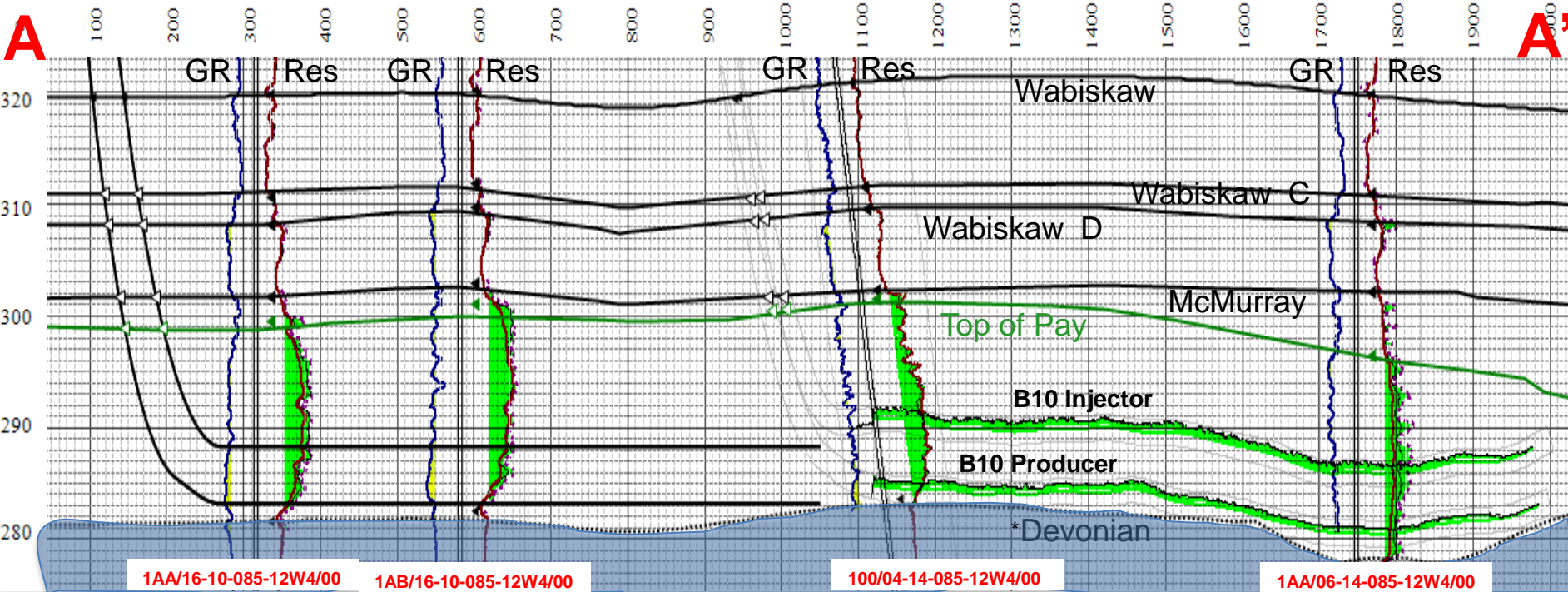


Future

Pad A Producer and Injector Well Profiles

Actual

Pad B Producer and Injector Well Profiles

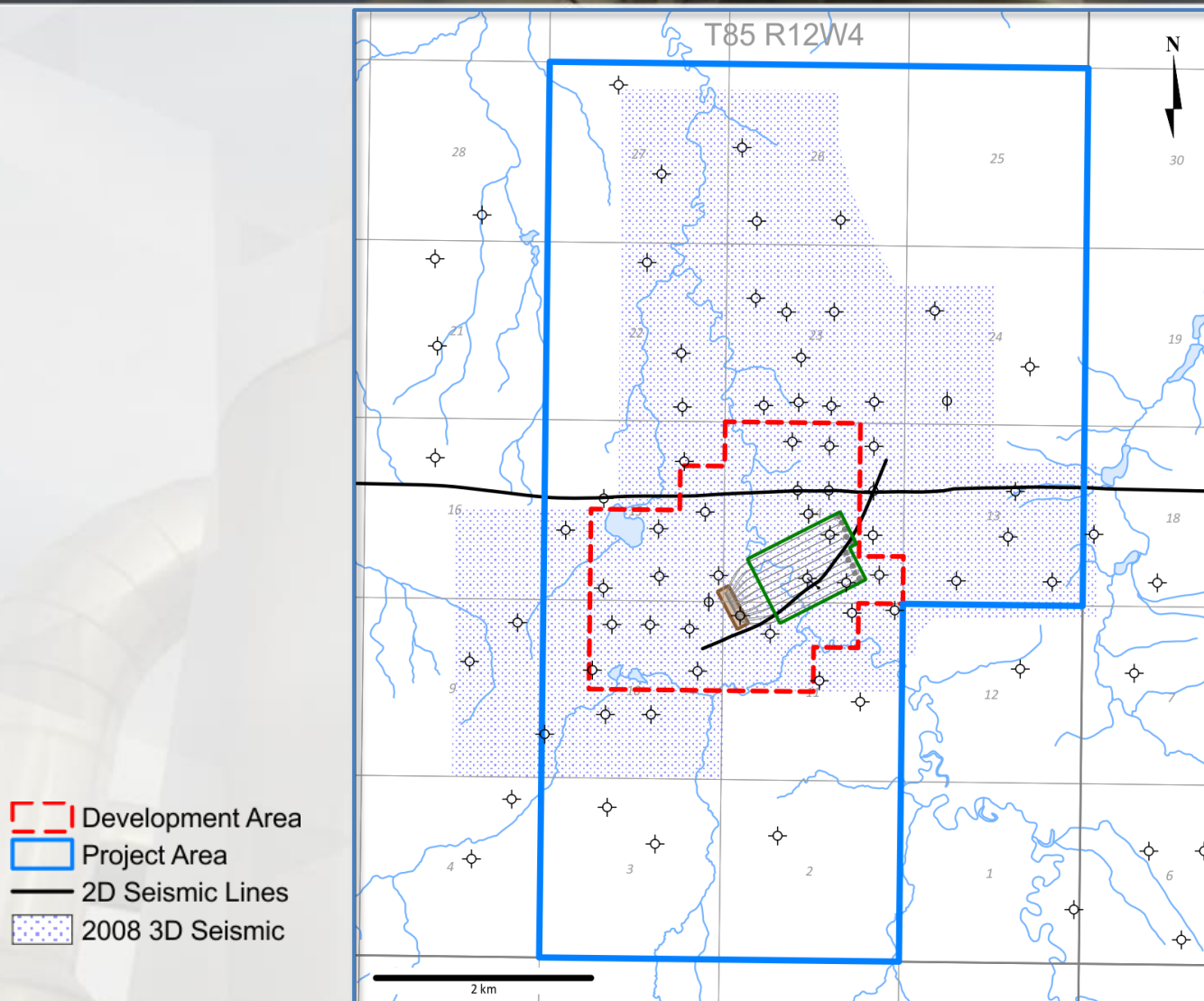


* Devonian Surface from well control and ADR trajectory data.

Average Reservoir Properties for Development Area

Parameter	Value
Pay zone thickness (m)	18
Lateral well spacing (m)	65
Horizontal well length (m)	820
Reservoir depth (TVDSS)	280
Initial reservoir pressure (kPag)	1,300
Initial reservoir temperature (°C)	12
Permeability horizontal (Darcy)	1-5
Permeability vertical (Darcy)	0.5-4
Initial oil saturation (%)	80
Porosity (%)	33
Bitumen viscosity at initial reservoir temperature condition (cp)	> 1,000,000

3D Seismic Location Map



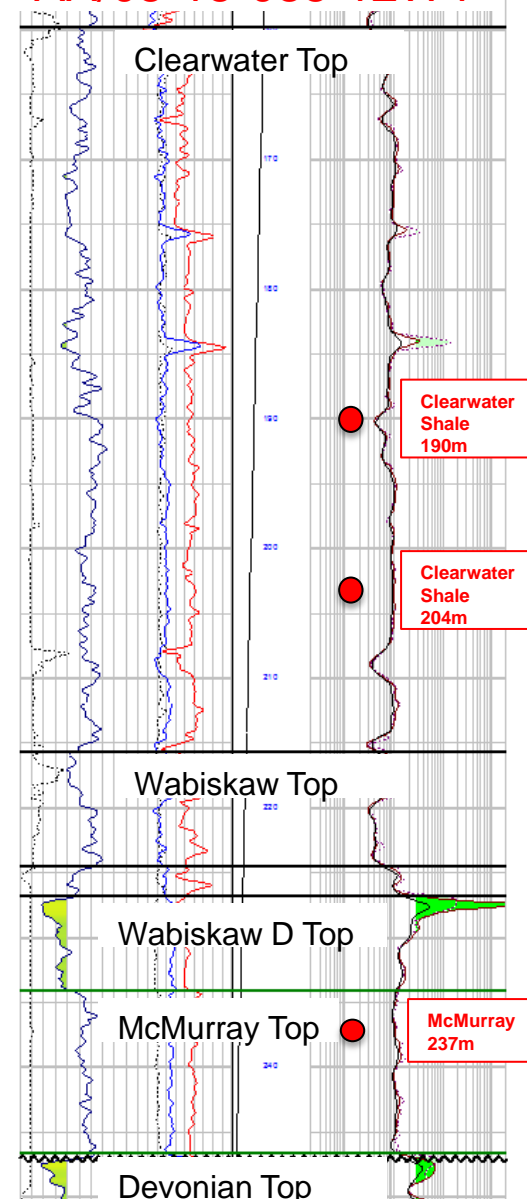
Cap Rock Integrity

- Mini-frac tests were performed on 5-15-85-12W4 in 2011

Formation	TVD (m)	Min. Stress MPa	Min. Stress kPag/m
Clearwater Shale	190.0	3.86	20.32
Clearwater Shale	204.0	4.42	21.67
McMurray C	237.0	4.77	20.13

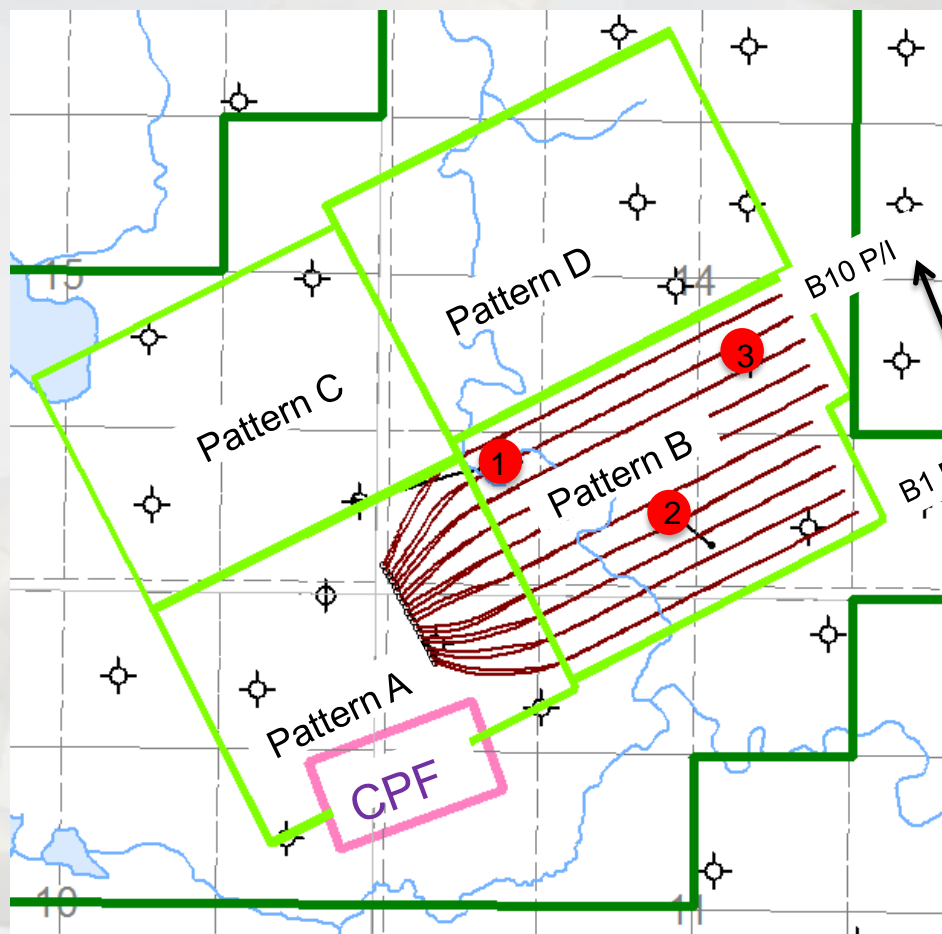
- Minimum overburden coverage is 195m, average minimum stress gradient in Clearwater shale caprock is 21.0 kPa/m
- Fracture pressure at base of caprock is 4,095 kPag
- Initial maximum approved steam chamber operating pressure was 3,100 kPag, increased to 3,275 kPag in Feb/15 (Approval Amendment 11688B) equal to 80% of caprock fracture pressure

AA/05-15-085-12W4



Drilling and Completions

Pad B and Associated Wells



Pattern B Observation Wells

- ① 100/04-14-085-12W4
- ② 100/03-14-085-12W4
- ③ 111/07-14-085-12W4

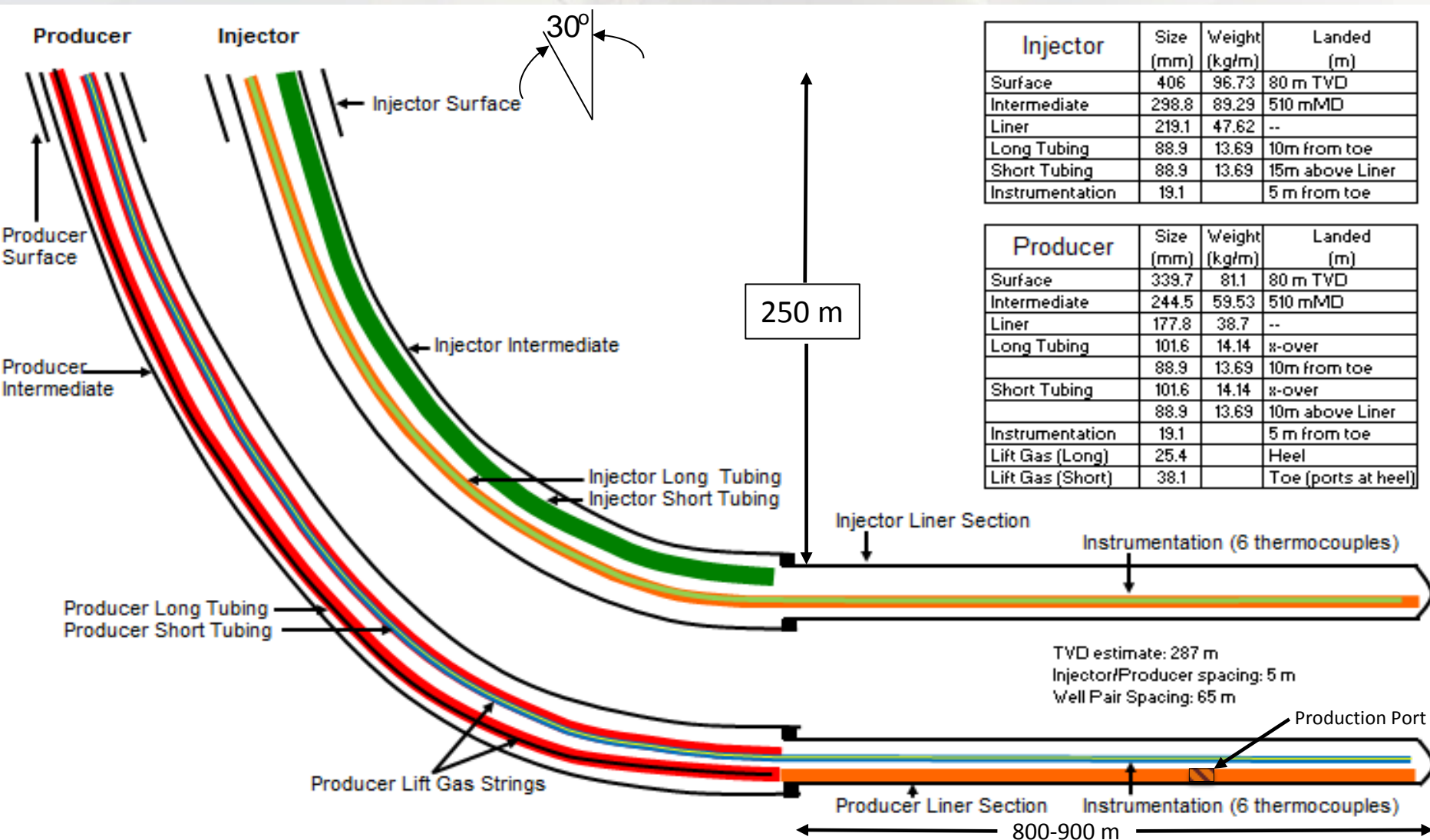
Wells Numbered South to North.
B1 P/I through B10 P/I

No new wells drilled in
the project since 2013
report

SAGD Well Drilling and Completions

- Initial development consists of 10 SAGD wellpairs in the B pattern
- Wellhead spacing of 15m, spud angles average 30 degrees
- Horizontal well lengths range from 800 to 900m, total drilled lengths of 1,240m to 1,380m, 65m interwell spacing
- All injectors completed with slotted liners, 9 producers completed with slotted liners, 1 with a FacsRite wire mesh completion (B7P)
- No new wells since initial 10 well drilling program
- SAGD well workovers:
 - Production well long tubing production ports opened on 7 of 10 wells
 - Downhole thermocouple string replaced on producer B10

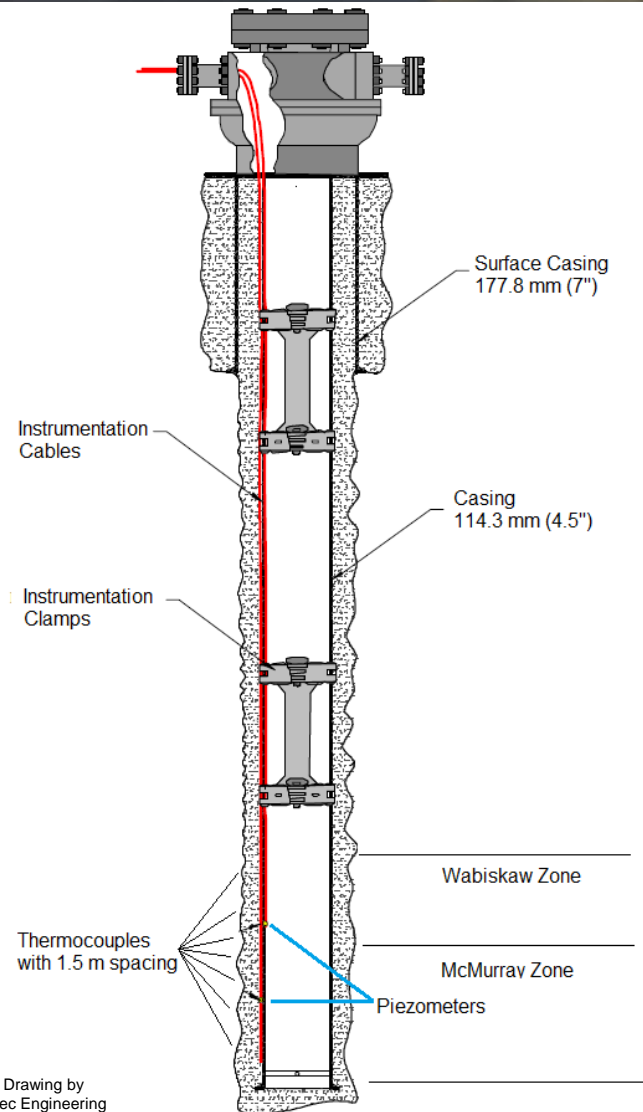
Typical SAGD Wellpair Completion



Artificial Lift and Well Instrumentation

- Artificial Lift
 - All production wells use natural steam lift supplemented with gas lift
 - No difficulty lifting production to surface
 - Pump tangents incorporated into producer trajectories
- Well Instrumentation
 - Each injector and producer are equipped with 6 thermocouples spaced along the horizontal section
 - Multiple thermocouple failures on producers due to fluid ingress during initial completion and apparent corrosion cracking . Injector thermocouples functioning properly
 - Injector bottom hole pressures calculated from thermocouple readings, or measured on surface when steam is injected down the annulus. Friction losses roughly equal to hydrostatic head
 - Lift gas strings used as pressure bubble tubes on production wells with compensation for flowing pressure losses
 - Three observation wells in Pad B, each with thermocouples spanning the pay interval, and 2 piezometers, one around mid-pay and one below base of caprock

Observation Well Completions



- Three instrumented observation wells drilled into the B pattern

Instrumentation

- 04-14 and 07-14
 - 21 Thermocouples and 2 piezometers per well
 - Available for future cased hole logging
- 03-14
 - 18 Thermocouples and 2 piezometers
 - Casing internally cemented to surface and cut and capped. Instrumentation still active.

4-D Seismic

- No 4-D seismic surveys have been conducted on the Project
- No immediate plans to conduct a 4-D survey

Scheme Performance

Scheme Performance

- First steam to wells on January 27, 2014
- All wells on steam March 17, 2014
- Steam circulation start-up on all injectors and producers
- Circulation established with little leak-off to the reservoir, lower steam rates than expected (3.5 t/h vs 5.0 t/h)
- Gradual increase of pressure differential between injector and producer prior to SAGD conversion
- Conversion to partial or full SAGD after 3 to 4 months of circulation

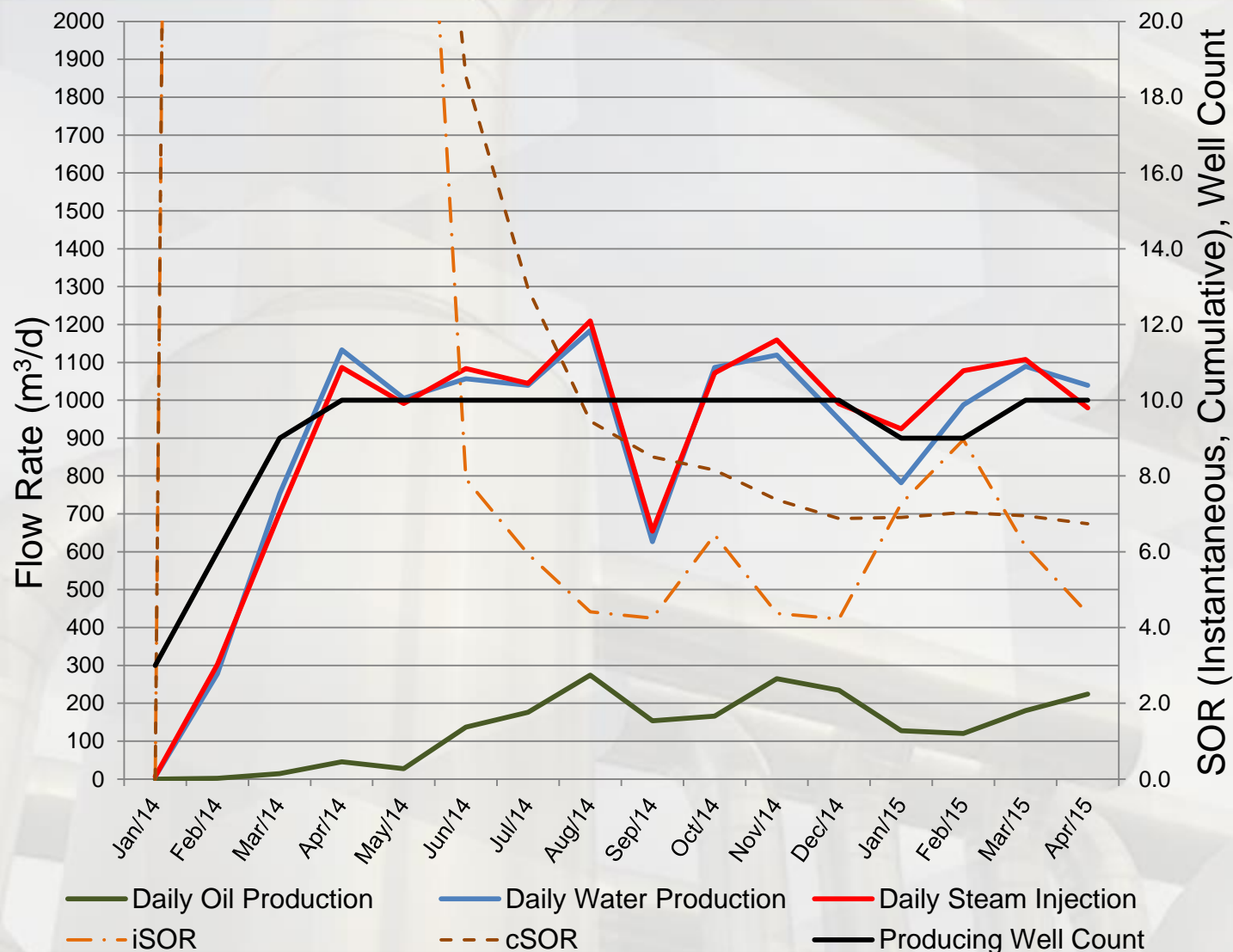
Scheme Performance

- Some wells began to experience elevated vapour and sand production in August 2014 after placed on SAGD, difficult to build and maintain steam chamber pressure target of approximately 2,500 kPag on some wells
- Plant turnaround in September and wells re-started fine
- A series of steam outages in December and early January negatively affected production and steam chamber pressures. Production ramp-up was compromised
- Most well pairs re-pressured in January and February
- Production began ramping up in March
- The 4,000 kPag injection test was not performed
- Final well production and injection on April 23, 2015. Project suspended due to low oil pricing

Steam Injection

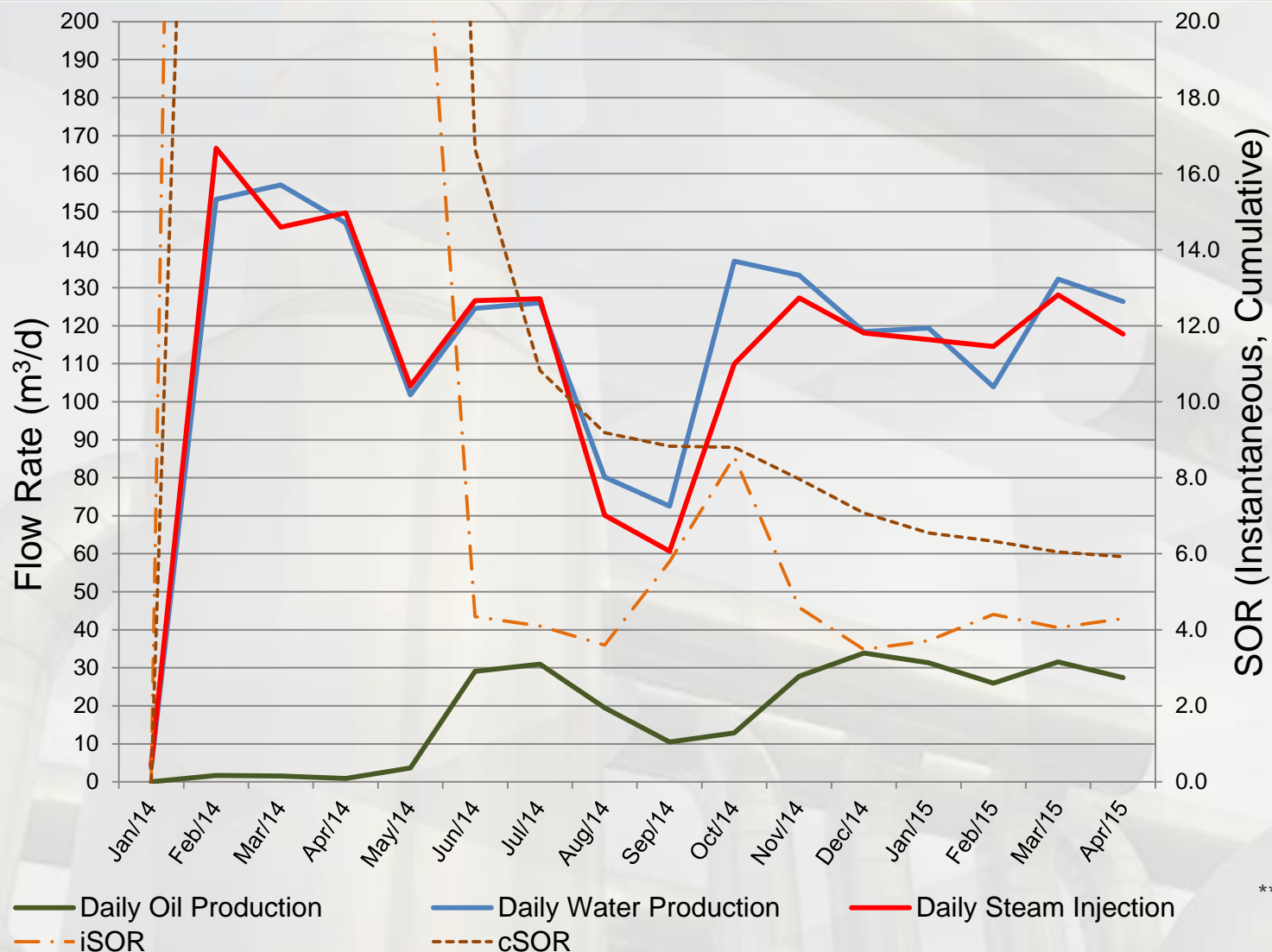
- Steam injection surface specifications:
 - Pressure 2,200 – 3,200 kPag
 - Temperature 220 – 240 °C
 - Pad Steam Quality Target 100%
- Pad B is next to the CPF, there have been no steam transport issues
- No exceedances of maximum injection pressure limits
- Injection pressures controlled by wellhead tubing and annulus pressure transmitters with downhole thermocouples for back-up
- No other fluids are injected with the steam

Pad B - Overall Performance



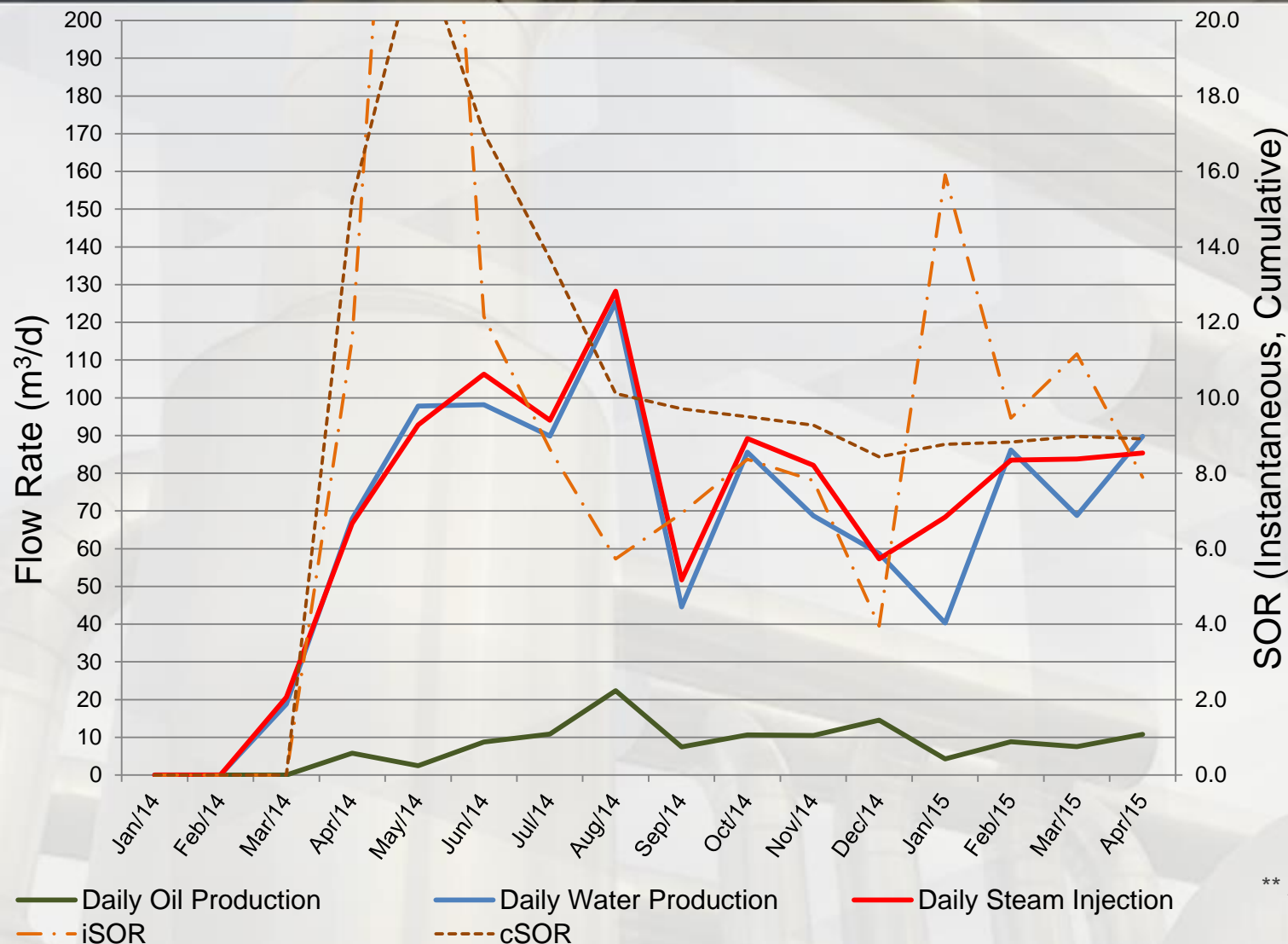
** April 2015 Volumes estimated

Wellpair B5 - Good Performance



** April 2015 Volumes estimated

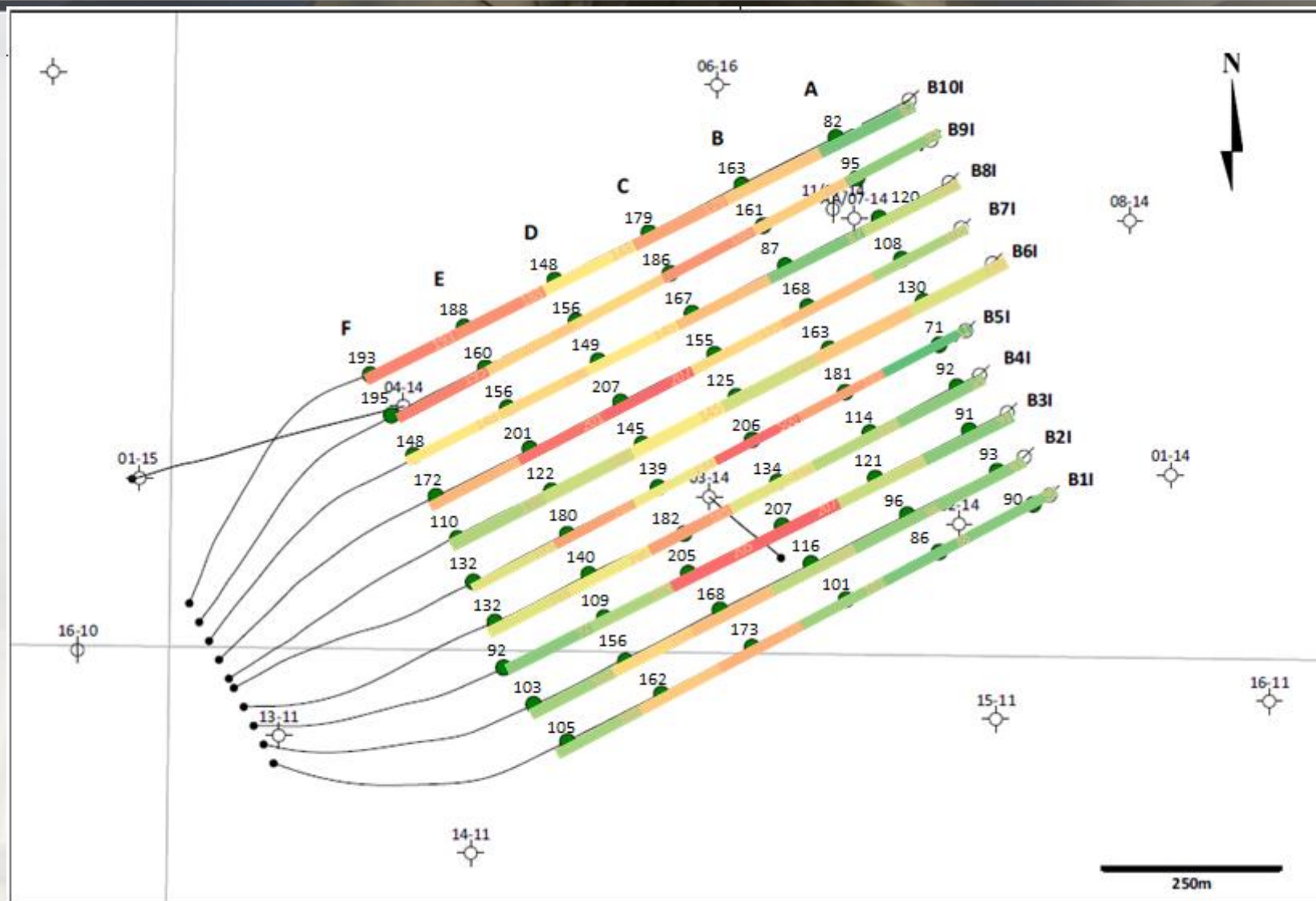
Wellpair B2 - Poor Performance



** April 2015 Volumes estimated



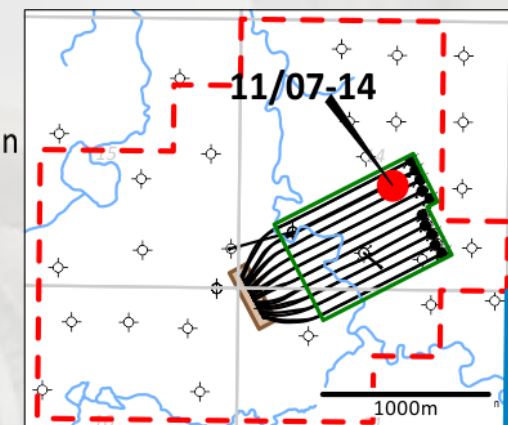
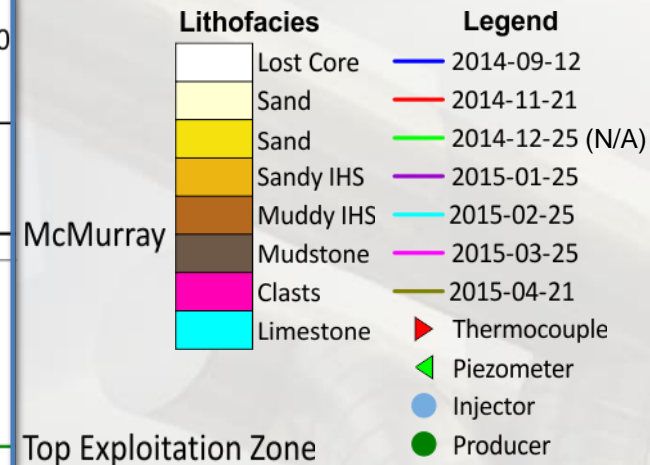
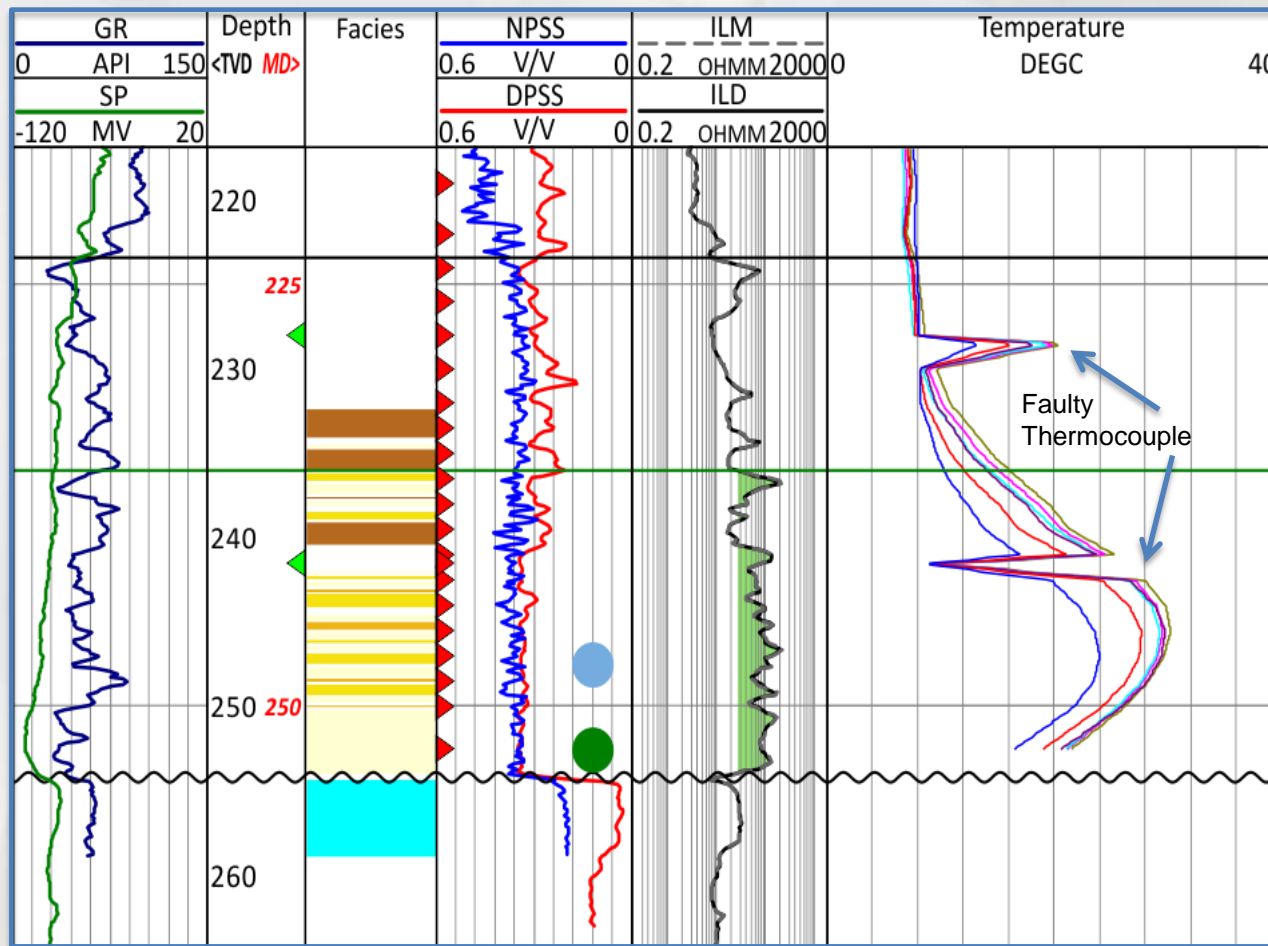
May 3, 2015 10 Day Injector Temperature Falloff



Pad B OBS Well Thermocouple Data

11/07-14-085-12W4/0

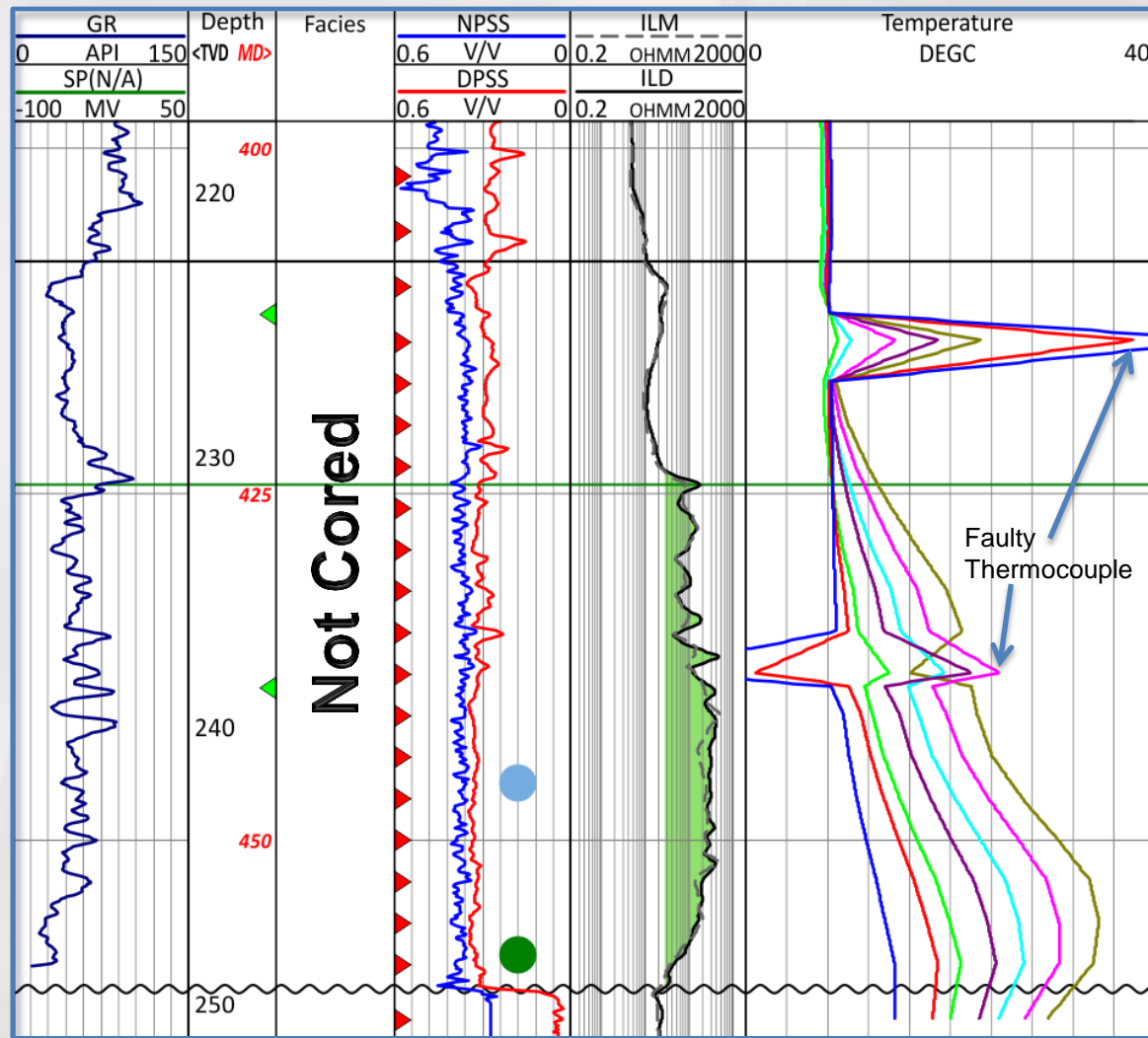
(30m North of B8 Toe)



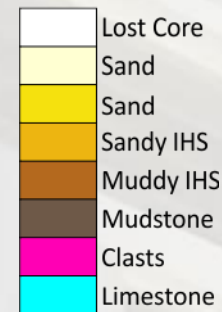
Pad B OBS Well Thermocouple Data

00/04-14-085-12W4/0

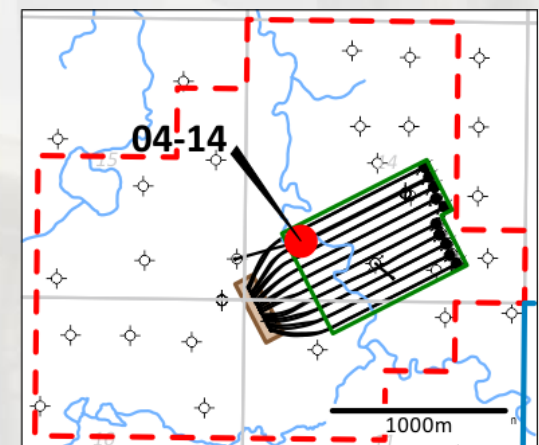
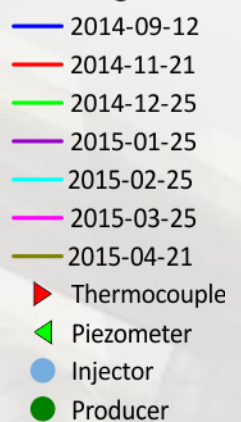
(12m North of B9 Heel)



Lithofacies



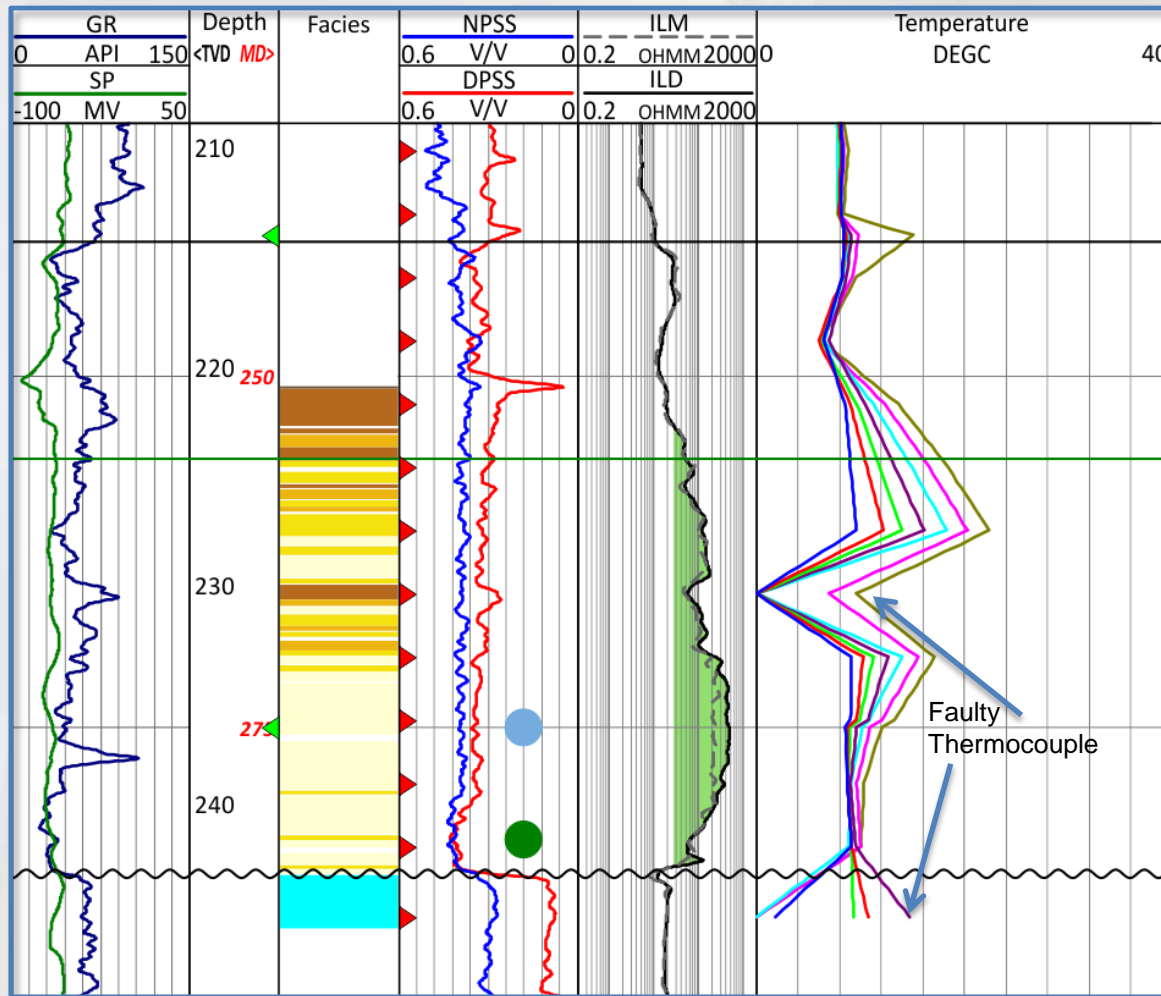
Legend



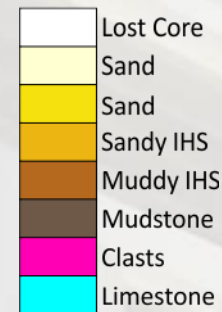
Pad B OBS Well Thermocouple Data

00/03-14-085-12W4/0 – Directional Well

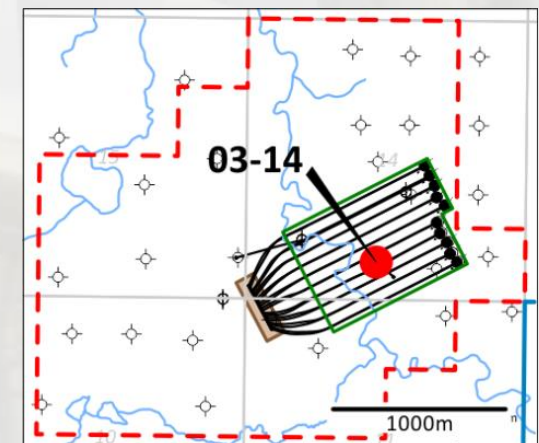
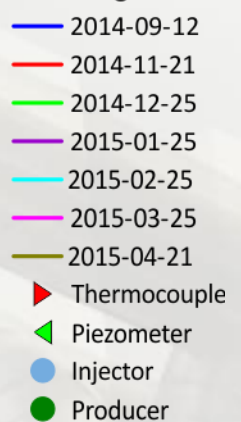
(~4m North of Middle B4)



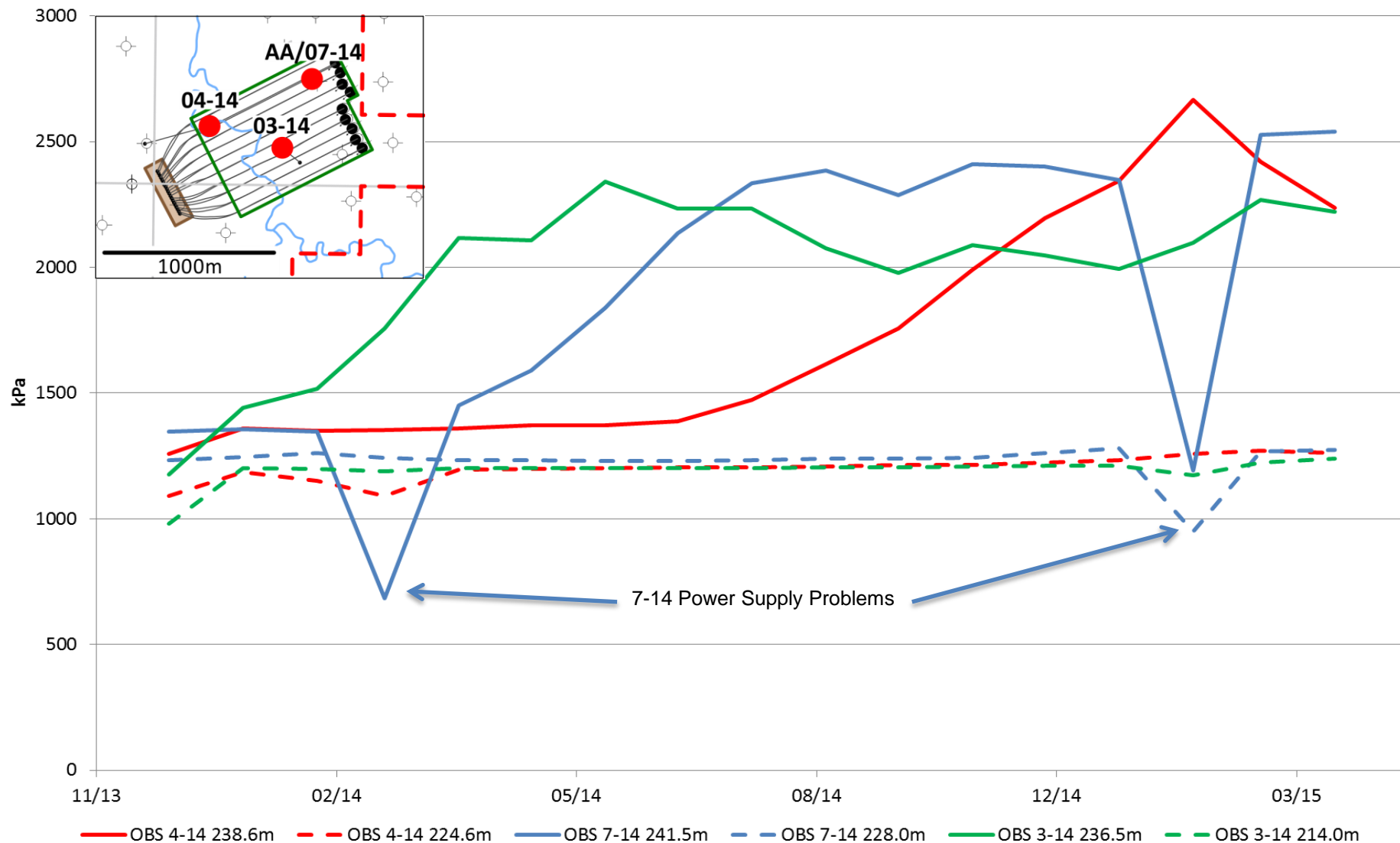
Lithofacies



Legend



Observation Well Pressure Data



OBIP per Pad

Pad Bitumen Resources and Recoveries – To April 23rd 2015

Zone	No. of Well Pairs	OBIP (E ³ M ³)	Bitumen Production (E ³ M ³)	Bitumen Recovery (%)	Bitumen Ultimate Recovery (%)
PAD B	10				
Total McMurray C Sand		2787			47
Total McM C Below Producers		178			
Total McM C Sand Above Producers		2609	61.9	2.4%	
PAD A	10				
Total McMurray C Sand		2470.3			48
PAD C	10				
Total McMurray C Sand		2427.1			49
PAD D	10				
Total McMurray C Sand		2878.6			45
Pad A+B+C+D Total		10563			47

Key Learnings

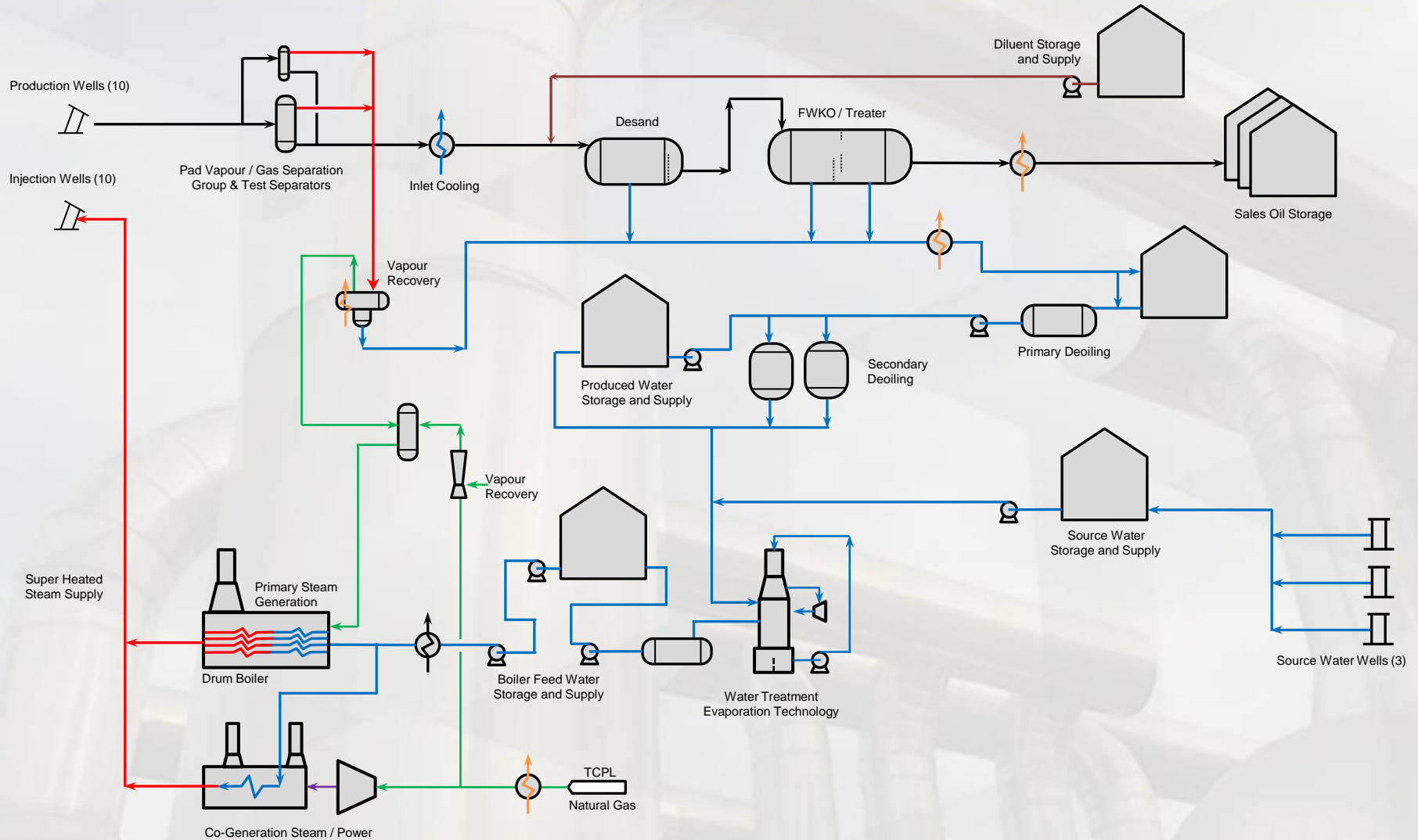
- Limited water mobility in the reservoir reduced the effectiveness of convective heating, heating principally from conductive heating
- Slower rate of heating and oil drainage resulting slower steam chamber growth
- Formation sand fines upward, results in lower permeability higher in the pay column
- Areas with relatively coarser, higher permeability sand between injectors and producers likely created pathways for a steam short circuit
- Heel and toe injection and production capability on all wells was beneficial to help manage steam breakthroughs
- Good steam chamber containment, no evidence of thief zones
- Overall better well performance at steam chamber operating pressures greater than 2,500 kPa

Key Learnings

- Slotted liner design was not ideal given the variability of grain sizes along the horizontal trajectories. Additional study needed on alternative sand control technologies to be incorporated into future completion or recompletion designs
- All wells have produced some sand at times, including B7P
- Sand and fines production created surface operational challenges
- Variable conformance along most horizontal wells was observed based on temperature fall-off data
- Recompletions incorporating inflow control and/or steam diverter technology are being evaluated

Surface Operations

Algar Lake Facility Simplified Process Schematic

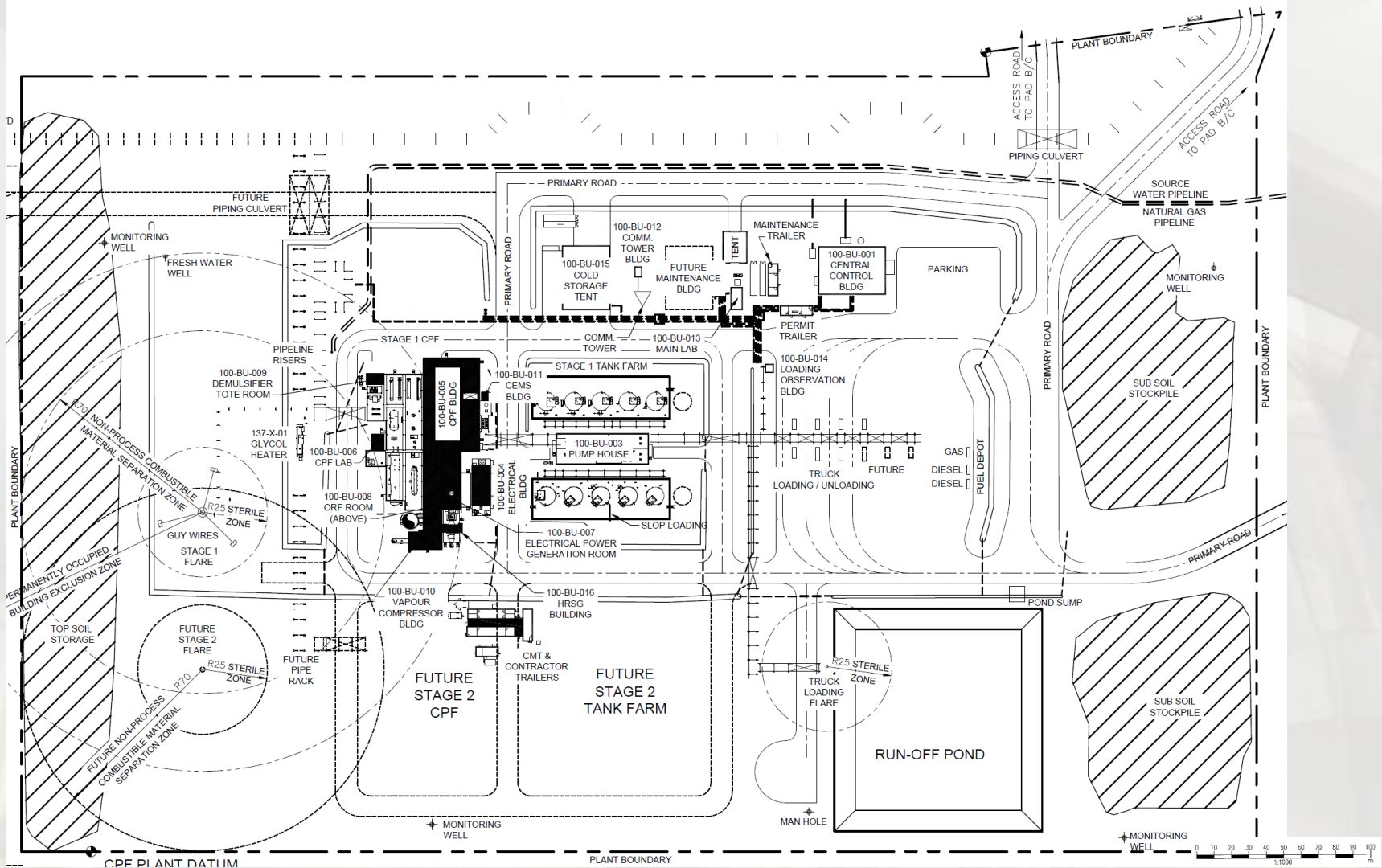


Algar Lake Facility Modifications



- Addition of a permanent glycol heater
 - Utilized for supplemental heating during power loss scenarios.
- Sand and solids management
 - Addition of a de-sand system, utilizing boiler feed water (BFW) as the flush fluid, to the Desand and FWKO/Treater vessel
 - Stinger ports for Slop/Surge tanks
 - Temporary addition of a produced water filtration system, and centrifuge

Algar Lake Facility Plot Plan



Algar Lake Facility Performance and Reliability



- Plant reliability, utilizing boiler uptime as the performance indicator, from May 1st 2014 to April 19th 2015 was 94%
- Primary reliability and processing issues:
 - Boiler mechanical and ancillary system deficiencies
 - Boiler tube failure – manufacturing defect
 - Boiler force draft fan failure
 - Steam meter failure
 - Solids handling and management issues
 - High voltage switchgear (4160V) electrical issues

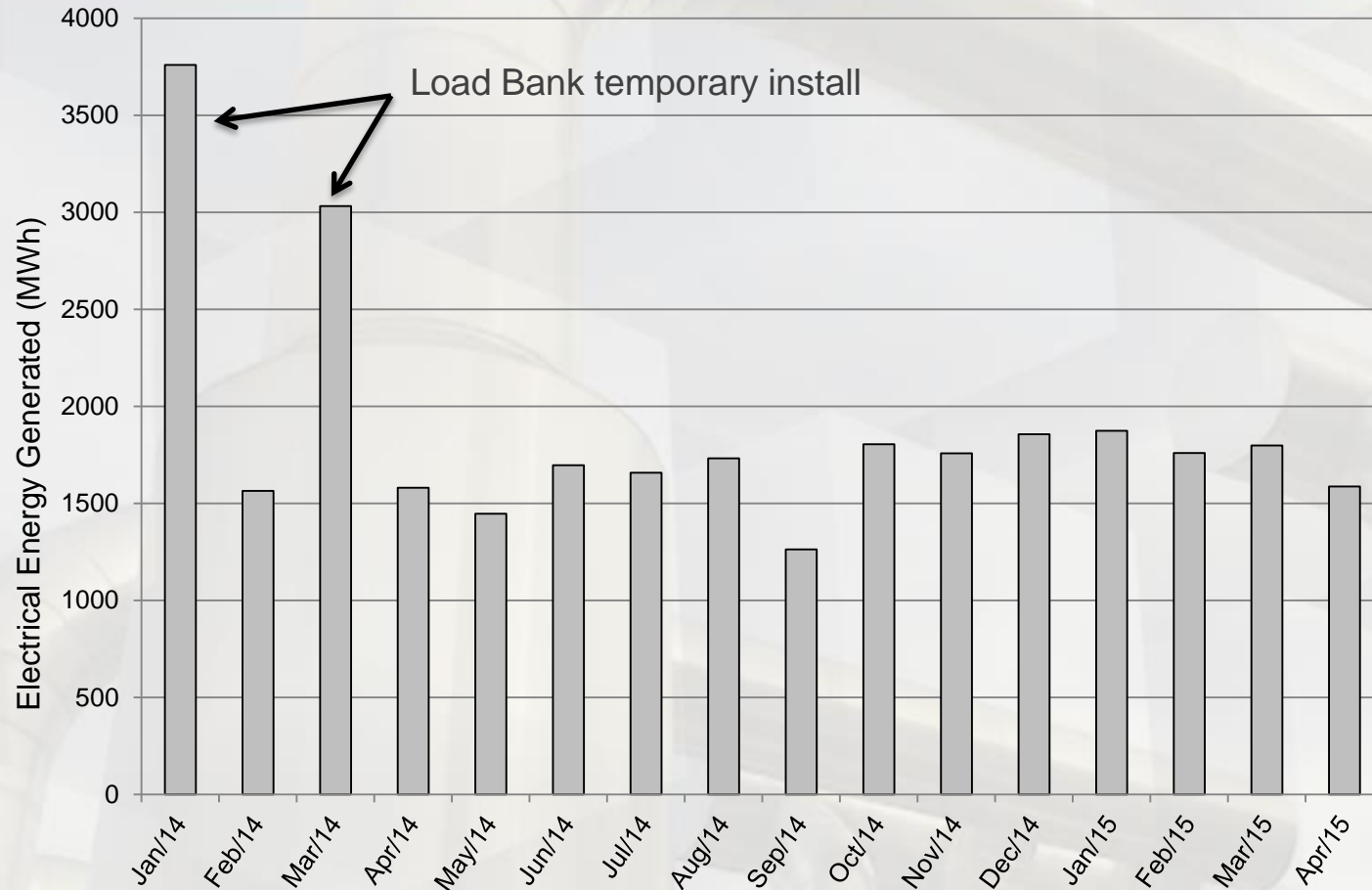
Algar Lake Facility

Performance and Reliability



- Bitumen treating met trucking specification <1% BSW
 - Rag / Slop production was greater than expected due to high solids loading, causing treating issues
 - Slop generation has been reduced over time due to facility upgrades and chemistry adjustments
- Water treatment achieved quality targets
 - Early evaporator and vapour compressor issues resolved
 - Early oil / solids transfer to evaporator eliminated
- Steam generation has been well (injection) limited
 - Boiler working as designed
 - HRSG working well at current limits

Algar Lake Facility Energy



Grizzly Algar energy is generated and consumed onsite using a Solar Turbine

Algar Lake Facility

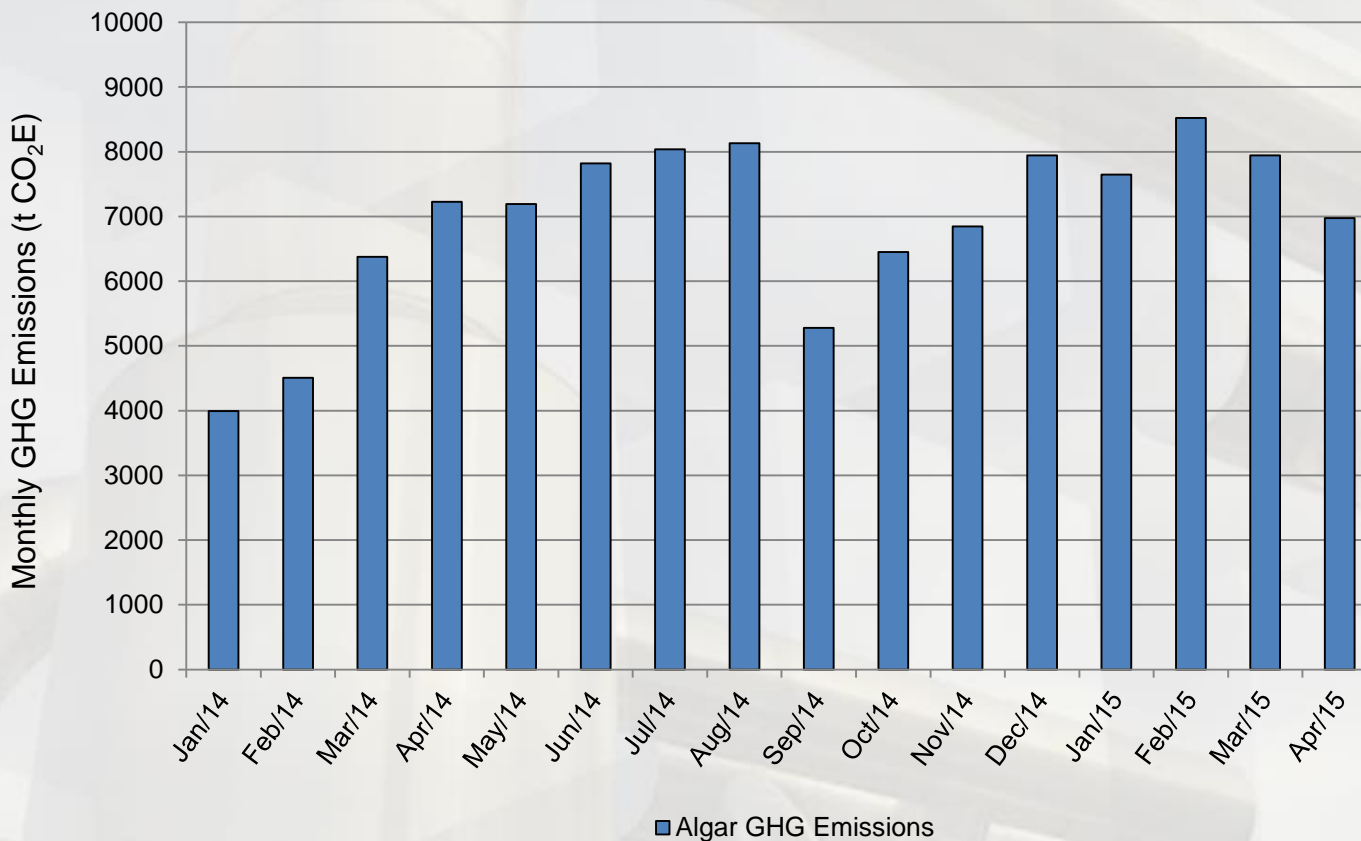
Gas Balance



	Total Purchased Gas	Produced Gas Consumed	Total Gas Vented	Total Gas Flared	Solution Gas Recovery
Date	e3m3	e3m3	e3m3	e3m3	(%)
Jan-14	1792	0	0	207.3	--
Feb-14	2158	0	0	22.6	--
Mar-14	3243.4	1.4	0	19.8	100.00
Apr-14	3653.5	4.5	0	41.6	97.83
May-14	3494.6	2.9	0	41.5	100.00
Jun-14	3724.3	13.7	0	44	98.56
Jul-14	3695	17.7	0	168.6	95.68
Aug-14	3691.2	28.9	0	3.6	100.00
Sep-14	2618.3	15.5	0	50.2	98.10
Oct-14	3729.8	17.3	0	39.3	98.86
Nov-14	3823.2	26.6	0	28.7	99.25
Dec-14	3612.1	24	0	80.4	97.96
Jan-15	3494.9	13.2	0	42.5	98.51
Feb-15	3467.5	11.4	0	26.4	99.13
Mar-15	3563.7	18.9	0	20.4	99.47
Apr-15**	2960.1	13.8	0	54.6	98.15

** April 2015 Volumes estimated

Algar Lake Facility GHG



2014 GHG Emission Total: 79,800 t CO₂E

Measurement and Reporting

Measurement and Reporting Overview



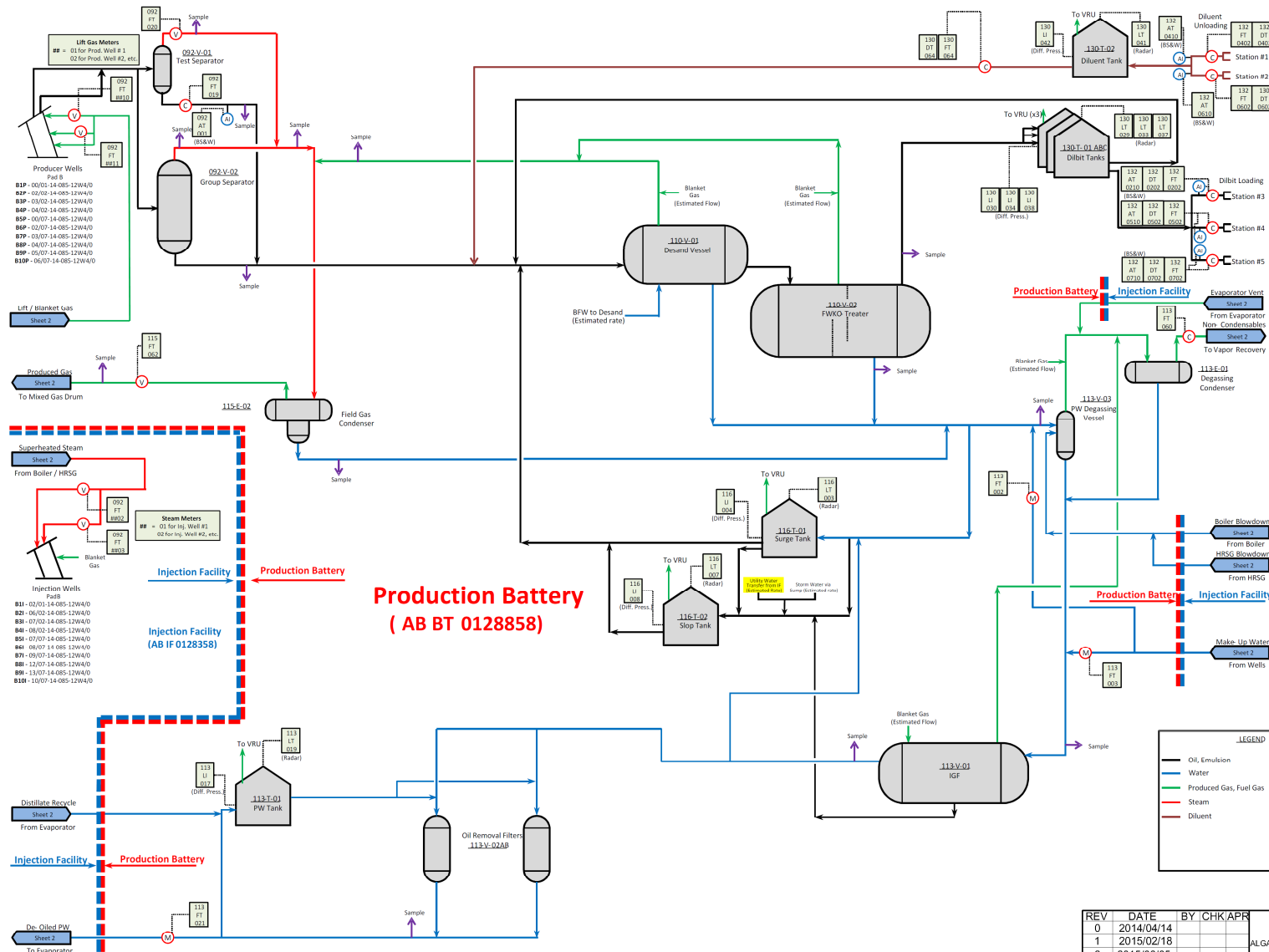
- Grizzly Algar is separated into a In-Situ Oil Sands Battery and an In-Situ Oil Sands Injection Facility
- MARP initial approval January 2012. Minor updates February 2013, 2014, 2015
 - Last update included:
 - Addition of Fuel Gas to Glycol Heater meter
 - Addition of BFW to desand flow path (estimated flow)
 - Calculation adjustment of Battery/Injection facility Gas balance
 - Future replacement of two meters due to sizing issues
- Well Testing
 - One test separator for 10 production wells
 - 9 hour tests up to October 2014
 - 3 hour tests from October 2014 with manual sampling on every test late in year for solids information and allow for increased well performance monitoring
 - Times stated do not include purge time before start of test
 - Monthly test requirements have been consistently met
 - Stable periods were chosen from the gross test time interval to ensure accurate results
 - A tolerance of +/-10% on volume and water cut was used to flag test results for further review

Measurement and Reporting Profacs and Discussion

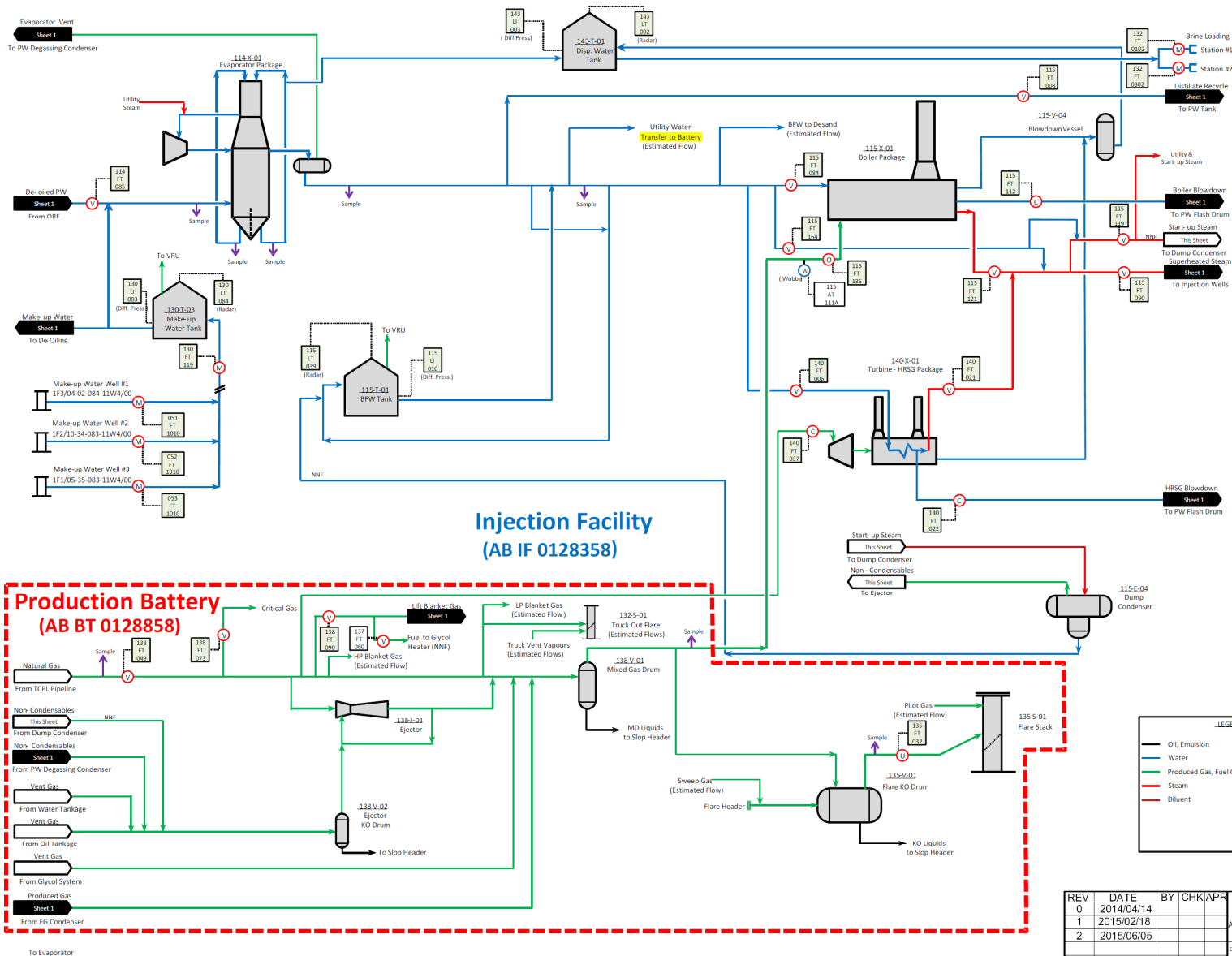


- Oil and Water Proration factors poor until AGAR calibrations done in June and October 2014
- Some AGAR water cut analyzer readings were affected by solids production and were adjusted using manual sampling results
- Sand detection monitor installed on inlet to Test separator (February 2014-April 2014)
 - Good correlation between sampling, AGAR response and sand monitoring device as long as fluid velocities above minimum
 - Secondary monitor also installed on group inlet and 1 production well tubing outlet with mixed results
- Main steam meter from Plant was pulled due to SCC failure (late December 2014)
 - Secondary measurement (as per MARP) will be used until replacement installed
 - No impact on measurement
- Water Injection facility water balance consistently within +/- 5% limits
 - Quality metering and consistent backups give confidence to numbers

Measurement and Reporting Algar Metering Schematics



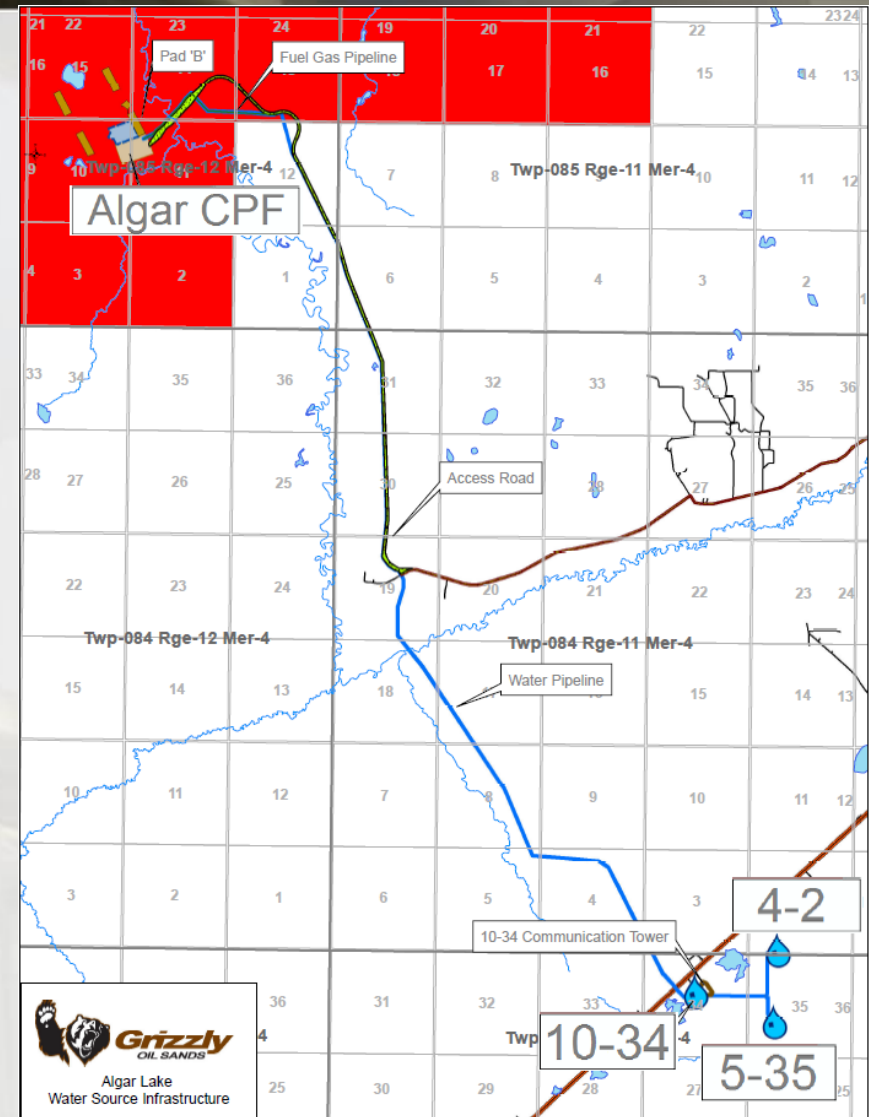
Measurement and Reporting Algar Metering Schematics



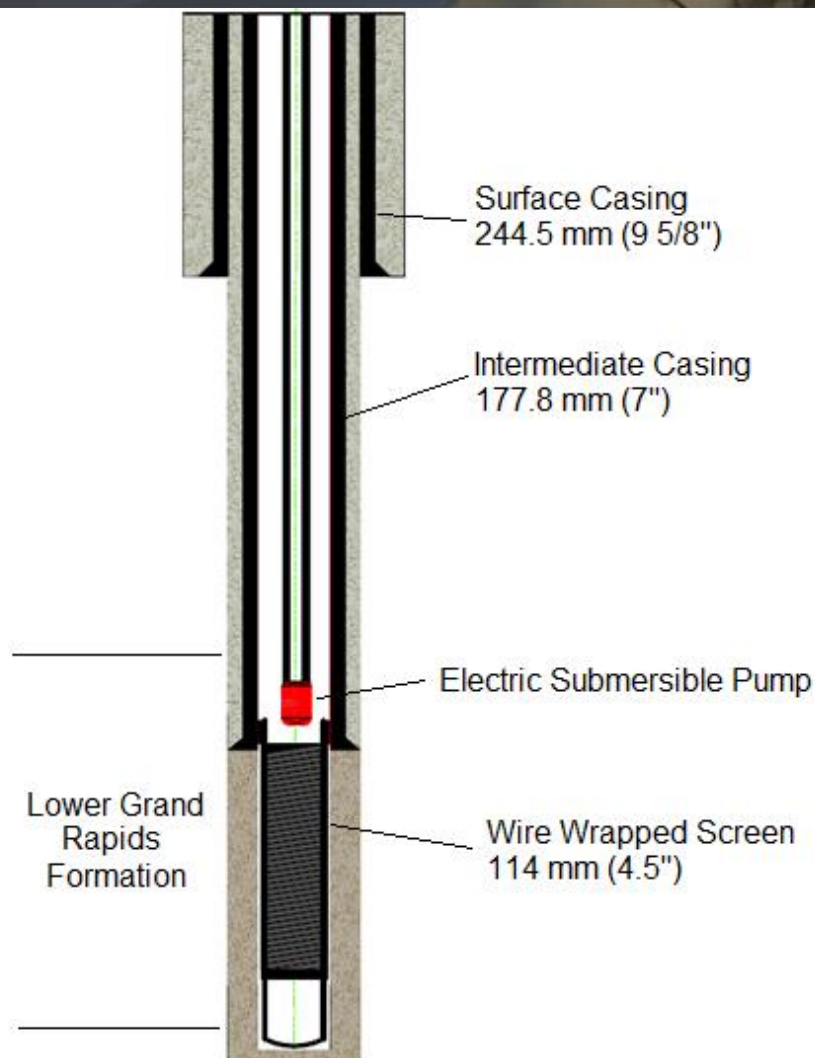
Water

Water Source Wells

- Three Lower Grand Rapids non-saline water source wells
 - 04-02-84-11W4
 - 10-34-83-11W4
 - 05-35-83-11W4
- Diversion Permit No. 00267123-00-00 issued January 13, 2013
 - Annual withdrawal limits:
 - 230,610 m³ from source wells
 - 30,000 m³ from the storm water retention pond

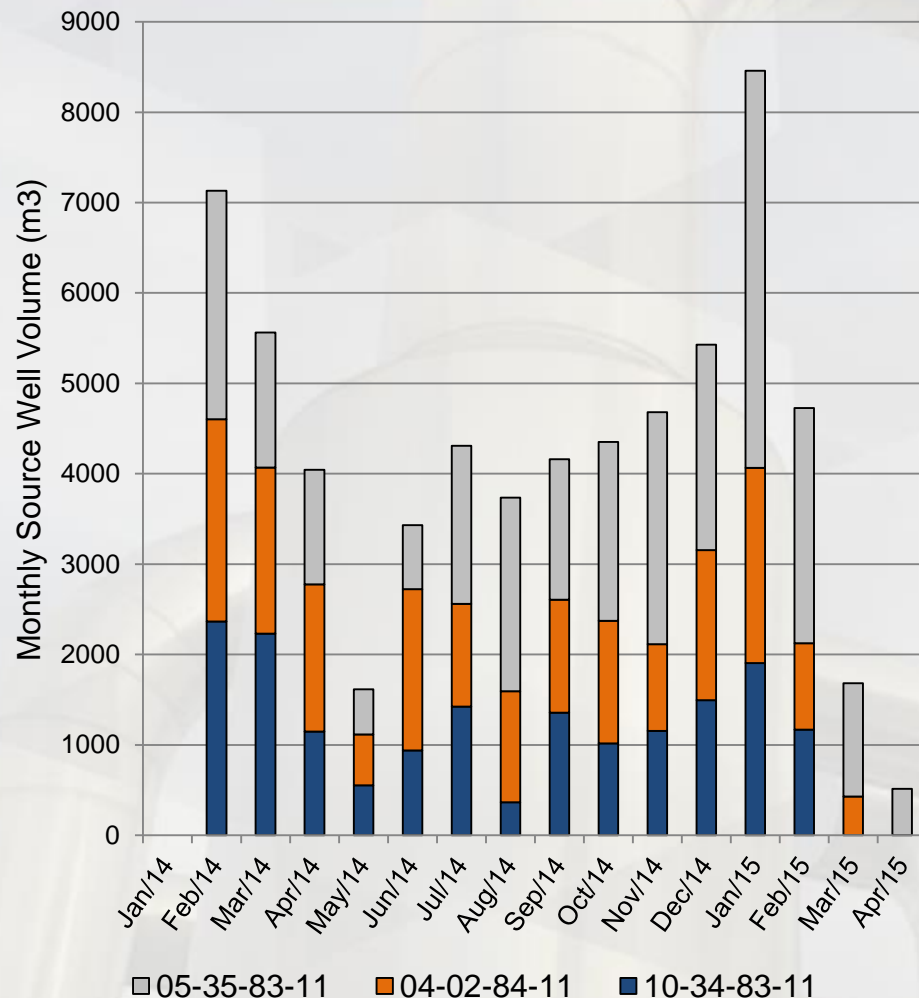


Water Source Well Typical Completion



Source Well	Approved Maximum Daily Withdrawal Rate
04-02-084-11W4	260 m ³ /d
10-34-083-11W4	263 m ³ /d
05-35-083-11W4	375 m ³ /d

Water Source Usage



	Water Withdrawal Volume	Annual Limit
2014 (Full Year)	46,849 m ³	230,610 m ³
Last 12 months	47,095 m ³	

- No daily rate exceedances
- No retention pond withdrawals (source well usage only)

** April 2015 Volumes estimated

Water Recycle Ratio and Typical Water Composition

	Monthly WRR	Last 12 Mo Cum WRR
January 2014	1.124	--
February 2014	0.174	--
March 2014	0.695	--
April 2014	0.840	--
May 2014	0.934	0.934
June 2014	0.917	0.926
July 2014	0.871	0.907
August 2014	0.920	0.911
September 2014	0.823	0.900
October 2014	0.858	0.892
November 2014	0.896	0.893
December 2014	0.859	0.889
January 2015	0.833	0.884
February 2015	0.920	0.887
March 2015	0.967	0.895
April 2015**	0.921	0.897

$$\text{WRR} = [\text{Steam} - \text{Source (Fresh)}] / \text{Produced} * 100$$

- WRR slightly below expectations due to higher disposal rates (process instability and reservoir pressurization)
- Last 3 months show improvement

Typical Water Composition

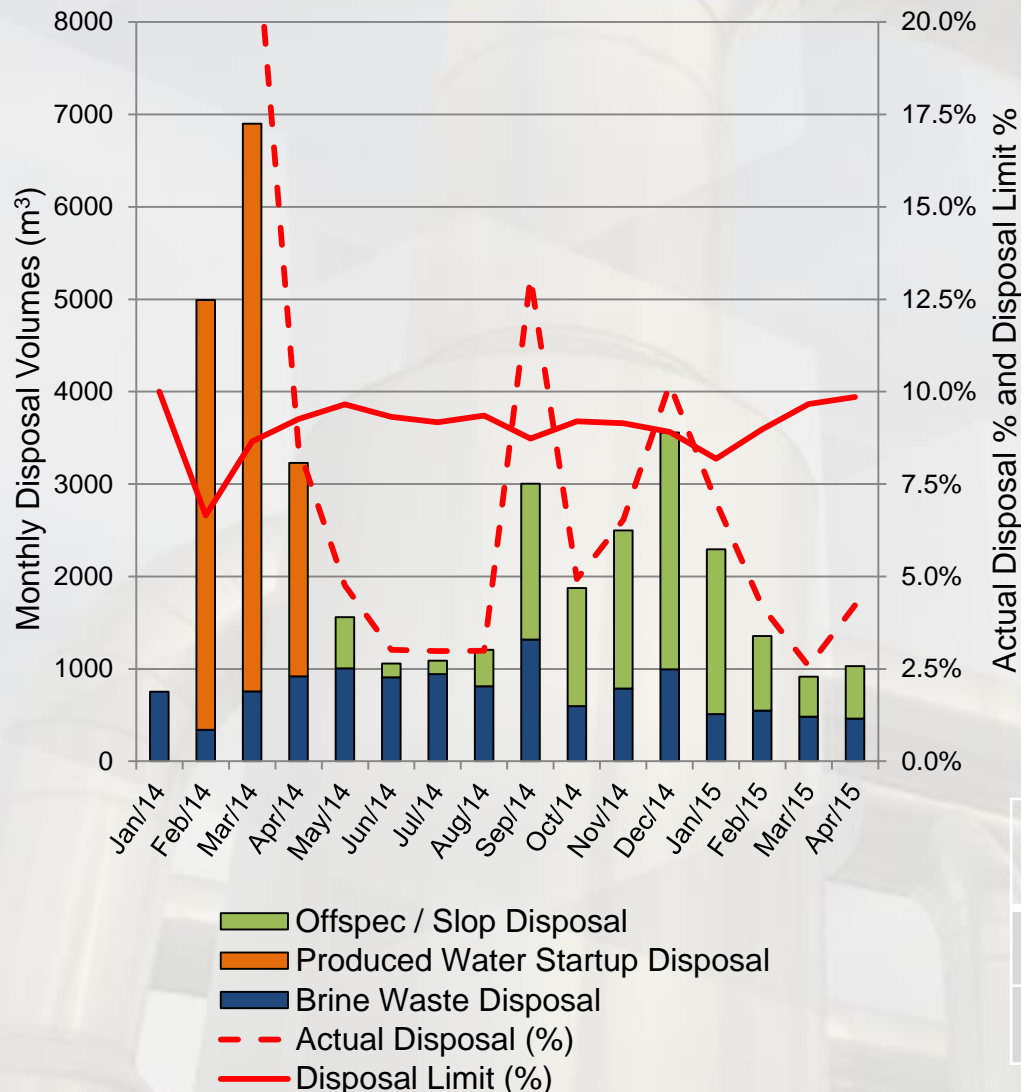
		Produced	Source (Fresh)	Disposal
TDS	mg/L	1500	1600	29000
Chlorides	mg/L	270	540	8600
pH		8.5	8.6	11
Hardness	mg/L	1.2	7.5	55

** April 2015 Volumes estimated

Water Disposal

- No onsite industrial wastewater disposal
- Concentrated brine and miscellaneous waste water trucked to AER approved third party waste water disposal facilities
- Drum boiler / evaporator system produces concentrated brine at low volumes (3% of boiler feed water volumes)
- Disposal volumes conform to Directive 81 limits

Water Disposal



- Offspec / Slop and Produced water waste is from Battery and is non-routine
- Slop volumes significantly reduced in last months due to process improvements
- Brine waste volumes have been consistent and lower than expected

Disposal Limit (%) = $\frac{[\text{Fresh} * 0.03 + \text{Produced} * 0.1]}{(\text{Fresh} + \text{Produced})} * 100$
 Actual Disposal (%) = $\frac{\text{Scheme Disposal}}{(\text{Fresh} + \text{Produced})} * 100$

	Actual Disposal (%)	Disposal Limit (%)
2014 (Full Year)	8.79	9.06
Last 12 months	5.31	9.18

** April 2015 Volumes estimated

Environmental and Regulatory Compliance

Environmental and Regulatory Compliance Approval Amendments



- ERCB Commercial Scheme Approval No. 11688 A, B, C
 - Amendment No. 11688A issued Nov. 15, 2012 – slightly expanded Development Area
 - Amendment No. 11688B issued Feb. 20, 2015 – MOP increase to 3,275 kPag (bottom hole)
 - Amendment No. 11688C issued Apr. 6, 2015 – Temporary elevated steam injection pressure increase to 4,000 kPag for three months on three injection wells (B7I, B9I, B10I).

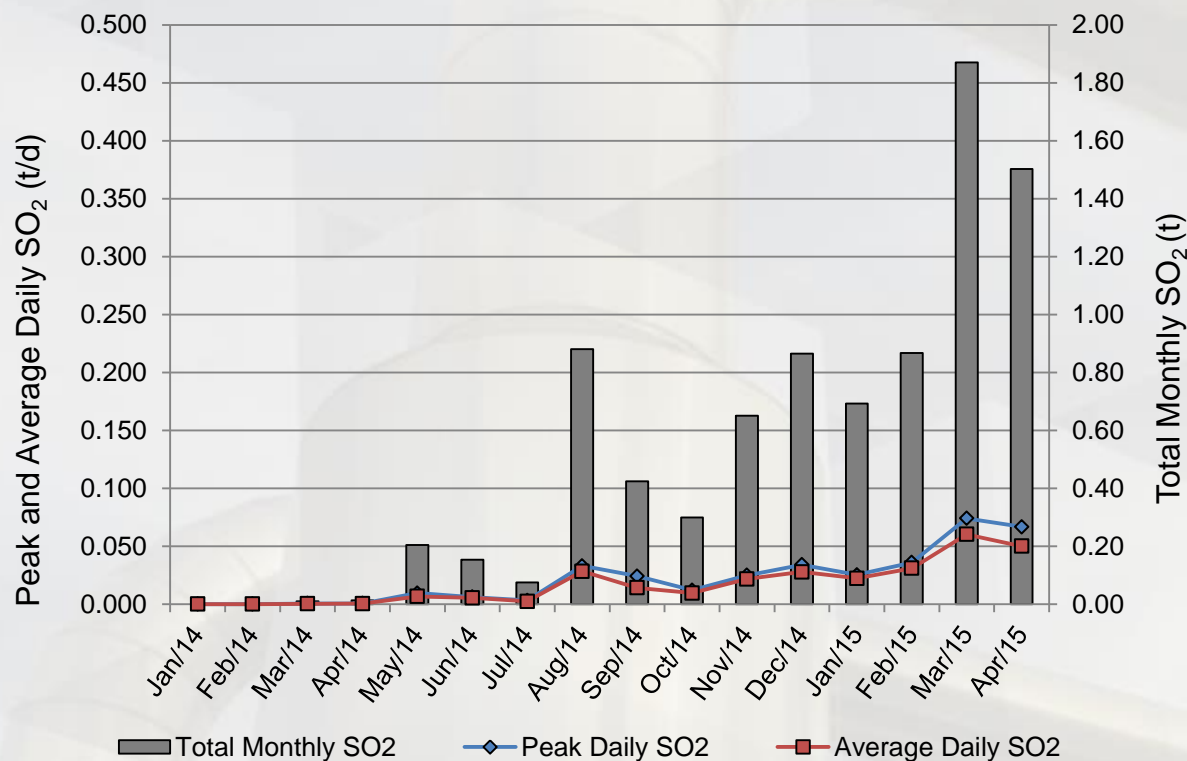
Environmental and Regulatory Compliance

Sulphur Emissions



- EPEA Approval No. 266433-00-00
- Plant Sulphur Dioxide emissions limit – 1.05 tonnes/day total for Stages 1 and 2 (only Stage 1 is constructed and operating).
- Grizzly's SO₂ emissions are under 1 tonnes/day on a quarterly average
- The Algar Lake facility is not required to have sulphur recovery equipment under our current approval
- There has been a slow increase in SO₂ tonnes/day quarterly average as the bitumen production ramps up

Environmental and Regulatory Compliance Sulphur Emission Summary

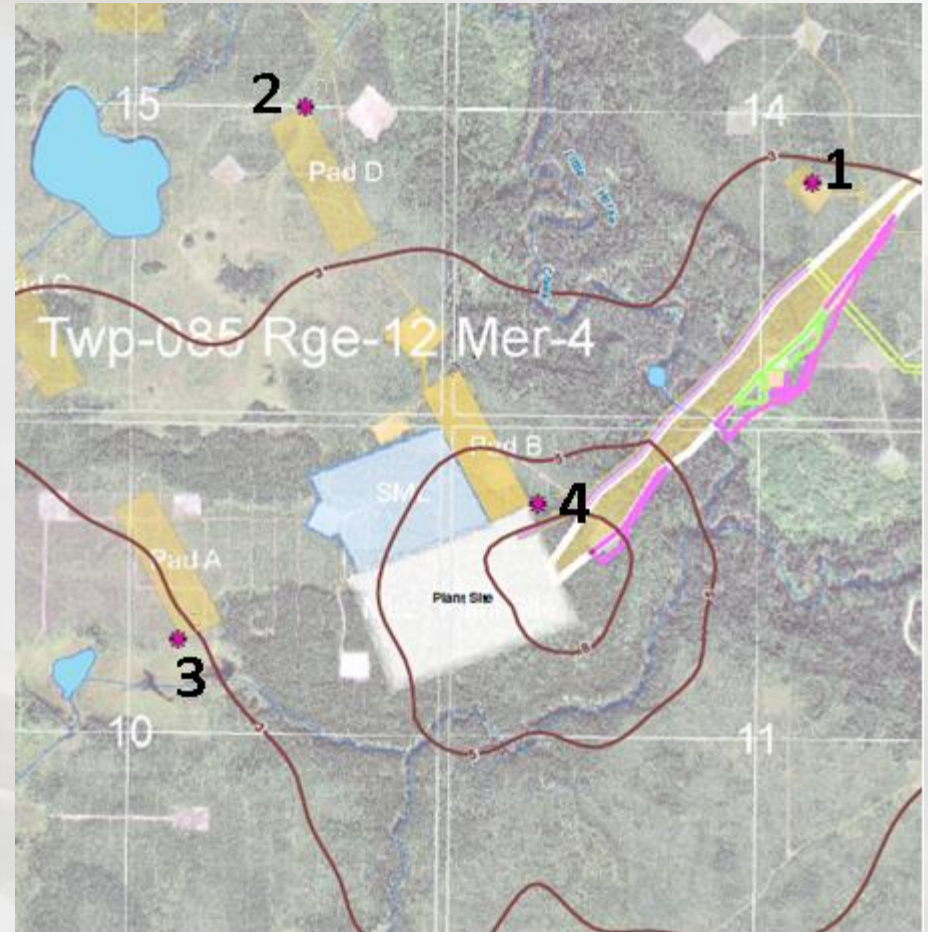
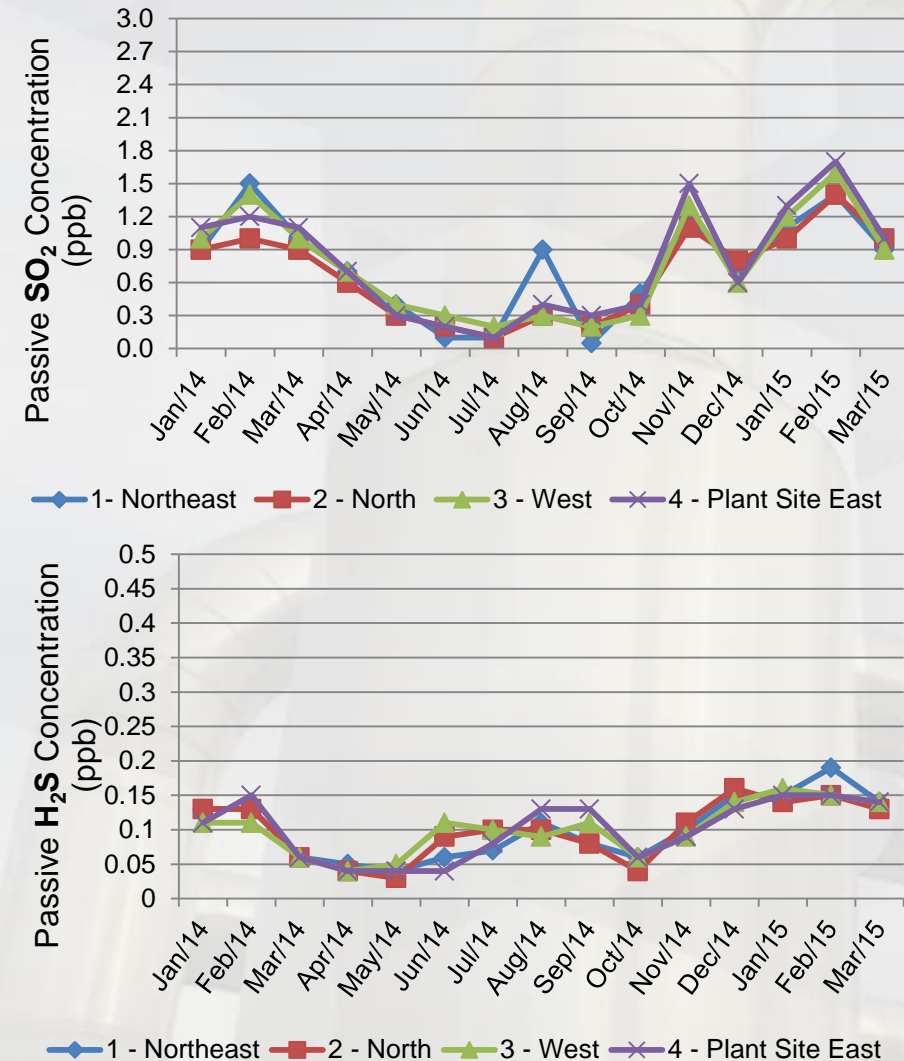


- Total SO₂ emissions well below limit of 1.05 tonnes per day

Total Emitted SO₂ = Boiler SO₂ + Flare SO₂

	Quarterly SO2 Emissions (tonnes)
Q1 2014	0.01
Q2 2014	0.37
Q3 2014	1.38
Q4 2014	1.81
Q1 2015	3.43

Environmental and Regulatory Compliance Sulphur - Passive Air Monitoring



- LOW SO₂ and H₂S. No anomalies or issues in passive monitoring for time period

Environmental and Regulatory Compliance

Boiler Emission Compliance



Boiler

The CEMS for the steam generator operated in “test mode” from January to May, 2014.

The following exceedances occurred during the test period:

- March 18-23, 2014 the emission rates on the steam generator were in excess of the limit of 5.9 kg/hr of NO₂.
 - Boiler operation capped at 50% load, not an efficient load for clean burning
 - Higher vapour recovery volumes from the tanks affected fuel gas quality during this time
- April 2-6, 10, 14, 21, and May 29, 2014 the CEMS unit recorded NO_x emission rates in excess of the approved 5.9 kg/hr oxides of Nitrogen expressed as NO₂.
 - A higher percentage of steam vapour in the fuel gas sent to the boiler, resulted in inefficient combustion.

There were no other contraventions to the generator exhaust stack limits in 2014

Environmental and Regulatory Compliance

Co-Gen Emission Compliance



Co-Generation Unit

- May 22 and October 24, 2014 a manual stack survey on the cogeneration unit indicated an average NO₂ emission rate of 4.6 kg/hr.
 - This was due to the cogeneration unit operating outside normal conditions as the test was executed during the commissioning period.
 - The cogeneration unit was operating at about 1/3 of design capacity which was not a sufficient power load capacity.
- Once the cogeneration unit reaches a load of 4 MW or greater, the low emissions technology will be triggered bringing the NO_x emissions to within the 2.9 kg/h oxides of Nitrogen limit expressed as NO₂.
- There were no other contraventions to the cogeneration unit limits in 2014. These issues were reported to the AER

Environmental and Regulatory Compliance Spills



- Grizzly had two reportable spills since March 2013
 - December 22, 2013
 - Spill of 0.5 m3 of boiler feed water from a temporary tank off lease
 - April 26, 2015
 - Release of less than 2m3 produced fluids on lease (steam and bitumen)
 - Minor hydrocarbon mist off-lease
 - AER was notified and subsequently inspected site May 1, 2015
 - No additional clean-up is required Initial and Final release report lodged.

Environmental and Regulatory Compliance

Woodland Caribou Mitigation and Monitoring

- Caribou Area signage:
- Millar Western (MW) Harvest cut block plans from 2014-2016 that overlap both the egg-pony Caribou Range and Grizzly's Linear disturbances;
- Grizzly has had discussions with MW regarding future roll back to create linear barriers within corridors, once harvest is completed.
- March-July 2015, 4 wildlife trail cameras.



Environmental and Regulatory Compliance Monitoring Programs



- Reclamation of Surface Materials License (SML's) 5 Borrow pits adjacent to LOC 100070.
- Grizzly Oil Sands confirms compliance with all conditions of the approval and regulatory requirements. The exception being the NOX emissions from the co-generation unit as detailed.

Grizzly Algar Lake SAGD Project

Future Plans



Due to the current oil price environment, Grizzly has temporarily suspended operations at the Algar Lake SAGD Project.

- Final steam injection and well production was on April 23, 2015
- Wells and equipment will be suspended in a safe manner that will comply with regulations
- Ongoing environmental monitoring and reporting will continue. Grizzly will be applying to the AER to relax certain EPEA and AER monitoring and reporting requirements to reflect the fact that plant equipment will not be in operation
- Grizzly will re-start operations when economic conditions are appropriate

Thank You