



BlackGold Oil Sands Project

Directive 054 2020 Annual Performance Report

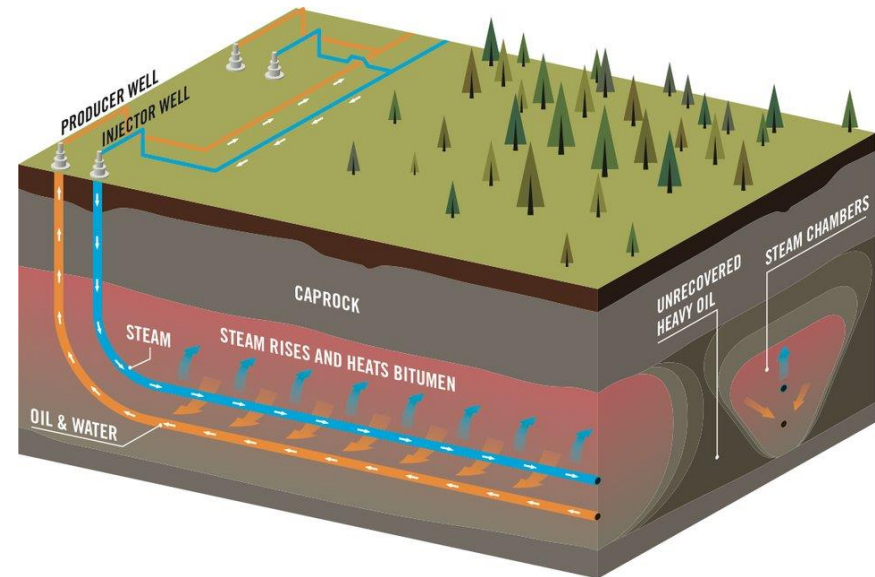
Commercial Scheme Approval No. 11387

Update - January 31, 2022



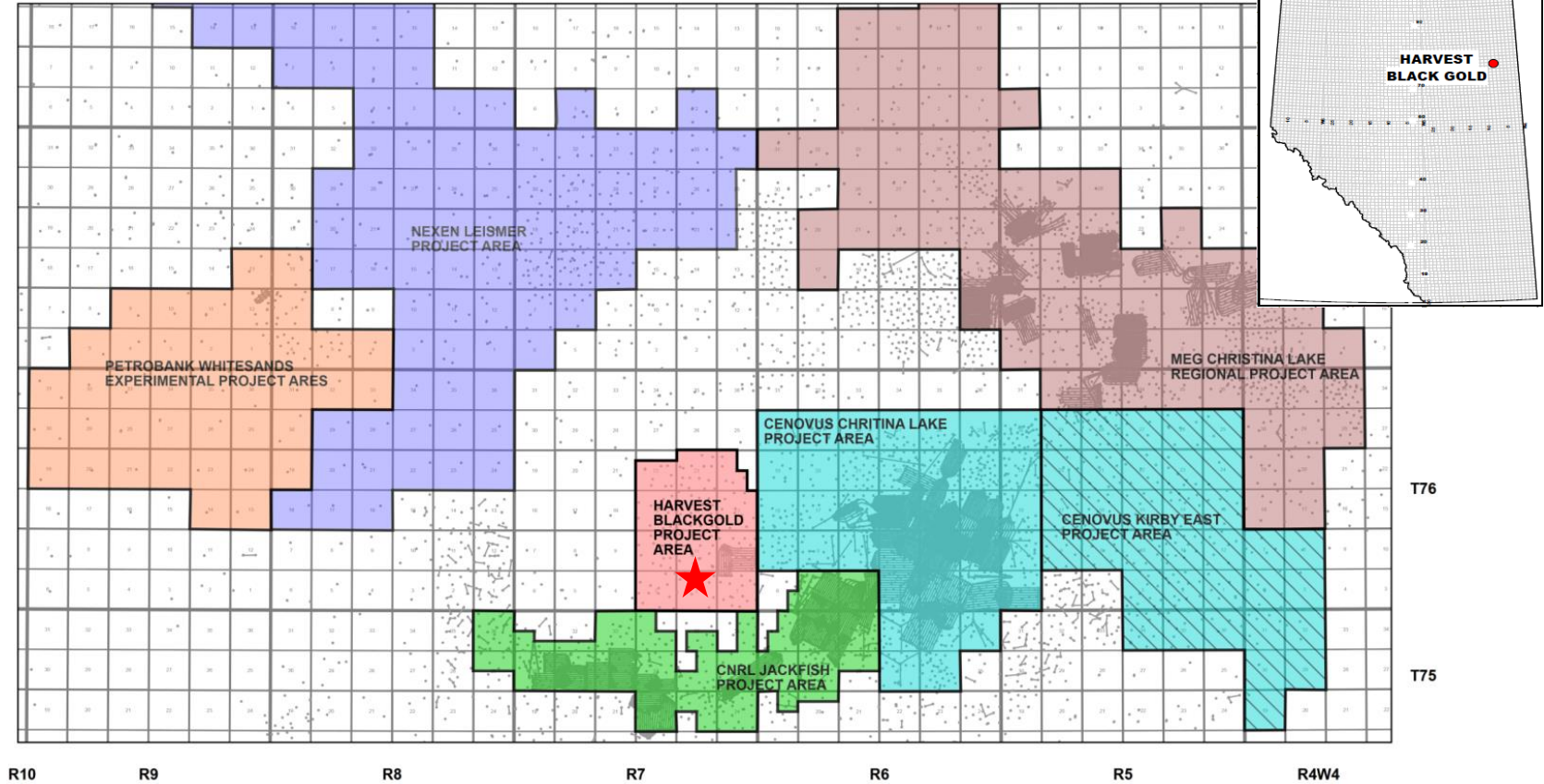
Introduction

- BlackGold is a steam-assisted gravity drainage (SAGD) project owned and operated by Harvest Operations Corp.
- Phase 1 Commercial Scheme Approval received in 2010 for 1,590 m³/d bitumen production on an annual average basis
- Phase 2 approved in 2013 for an additional 3,180 m³/d (4,770 m³/d total) bitumen production
- Phase 1 became operational in 2018
- Phase 2 has not yet received final investment decision (FID)



SAGD Recovery Process

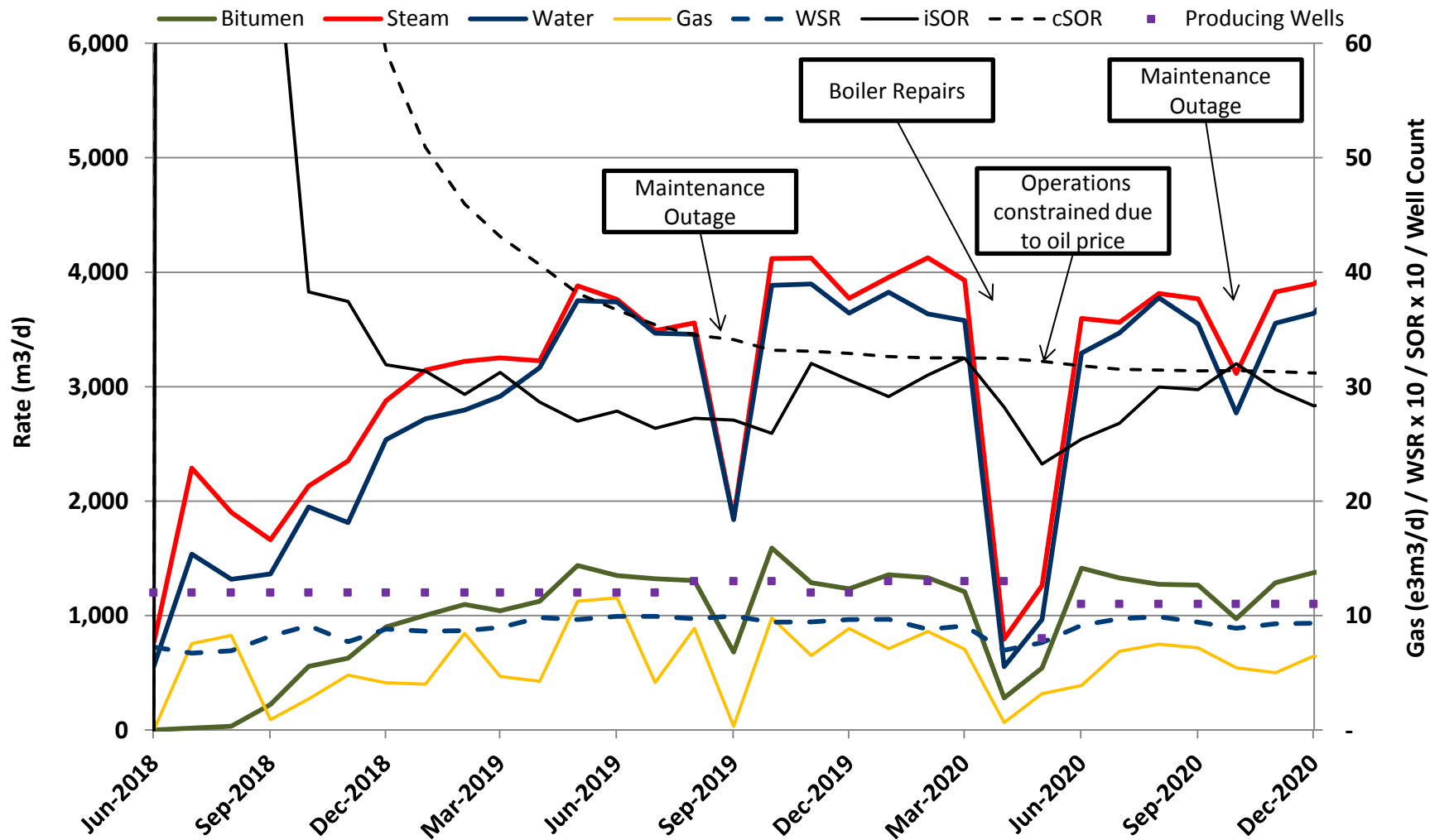
- Project area covers 12 sections of land in 76-7-W4M, approximately 10km southeast of Conklin, Alberta



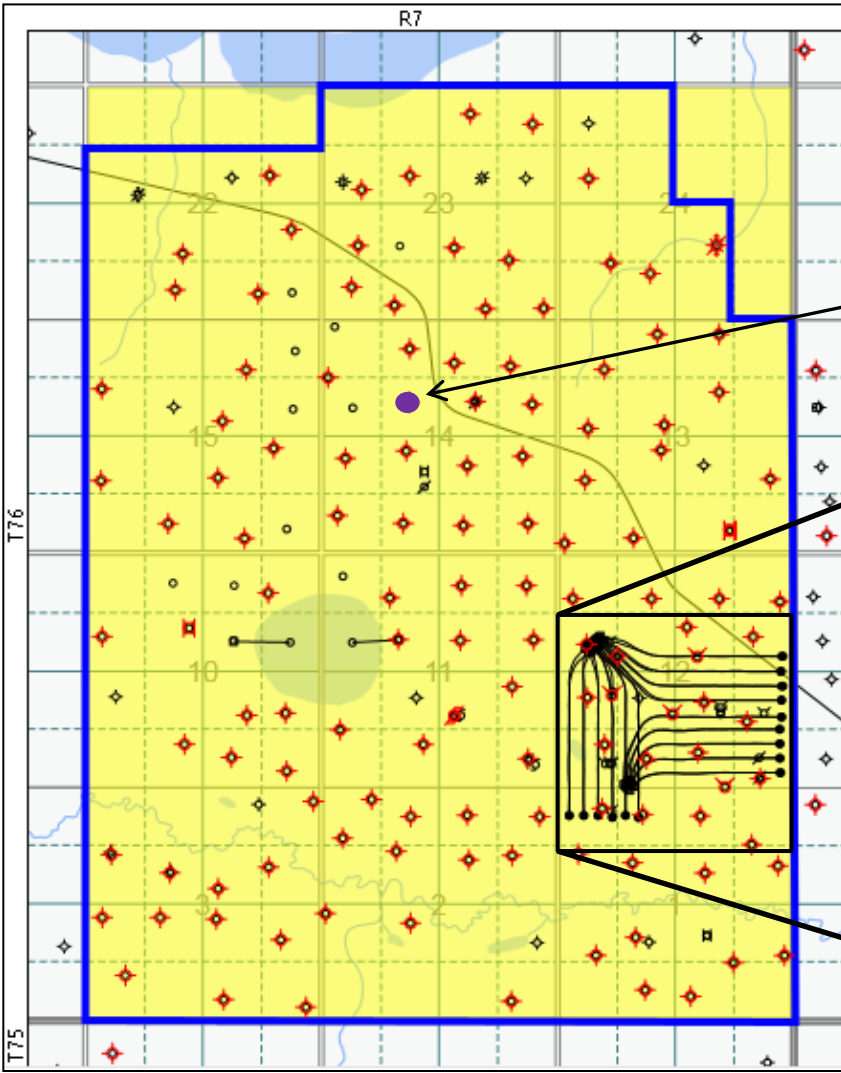


Subsurface

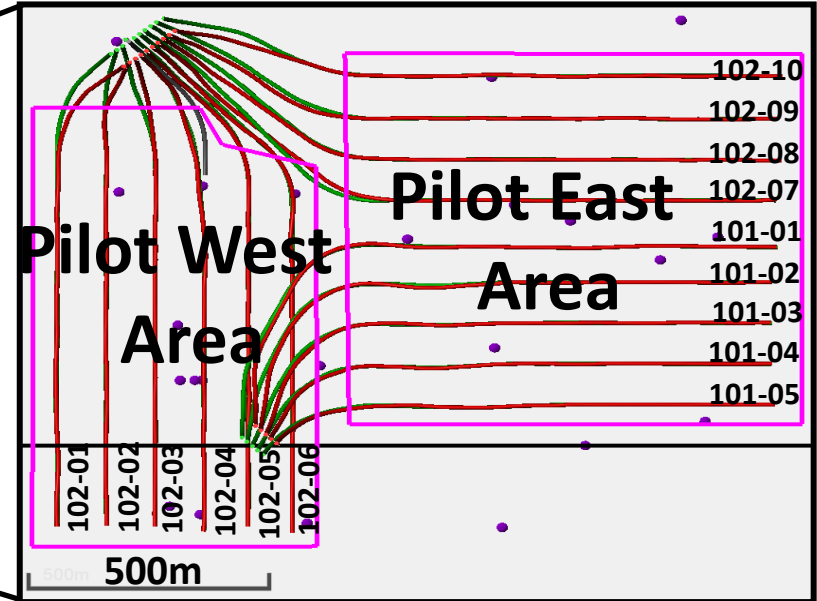
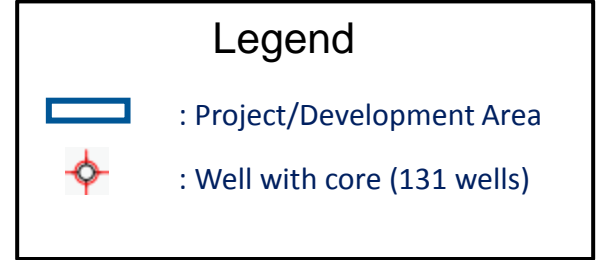
Scheme Performance



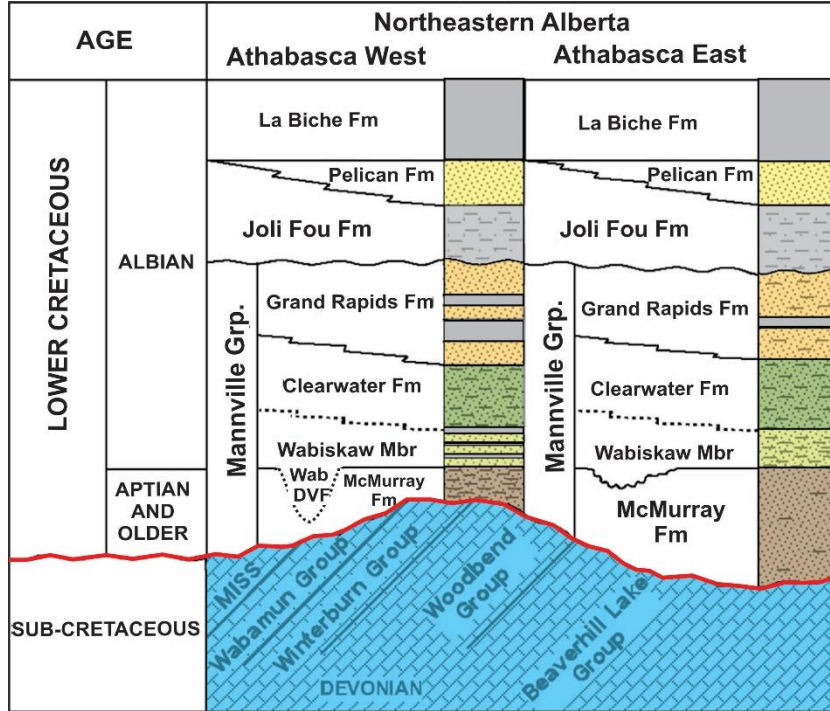
Drainage Patterns



Stratigraphic
Reference Well
1AA/11-14-76-7W4



Stratigraphic Column



Source: Wightman & Pemberton, 1997

Clearwater

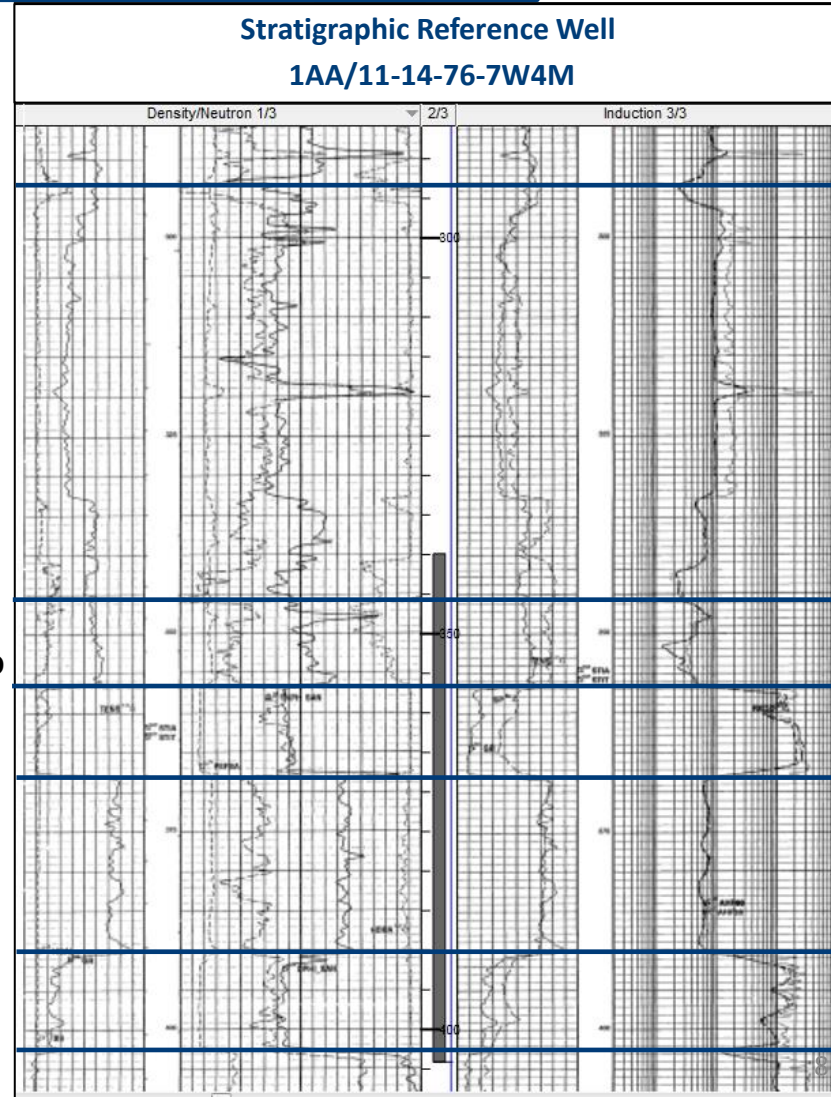
Wabiskaw

Wabiskaw D Sand

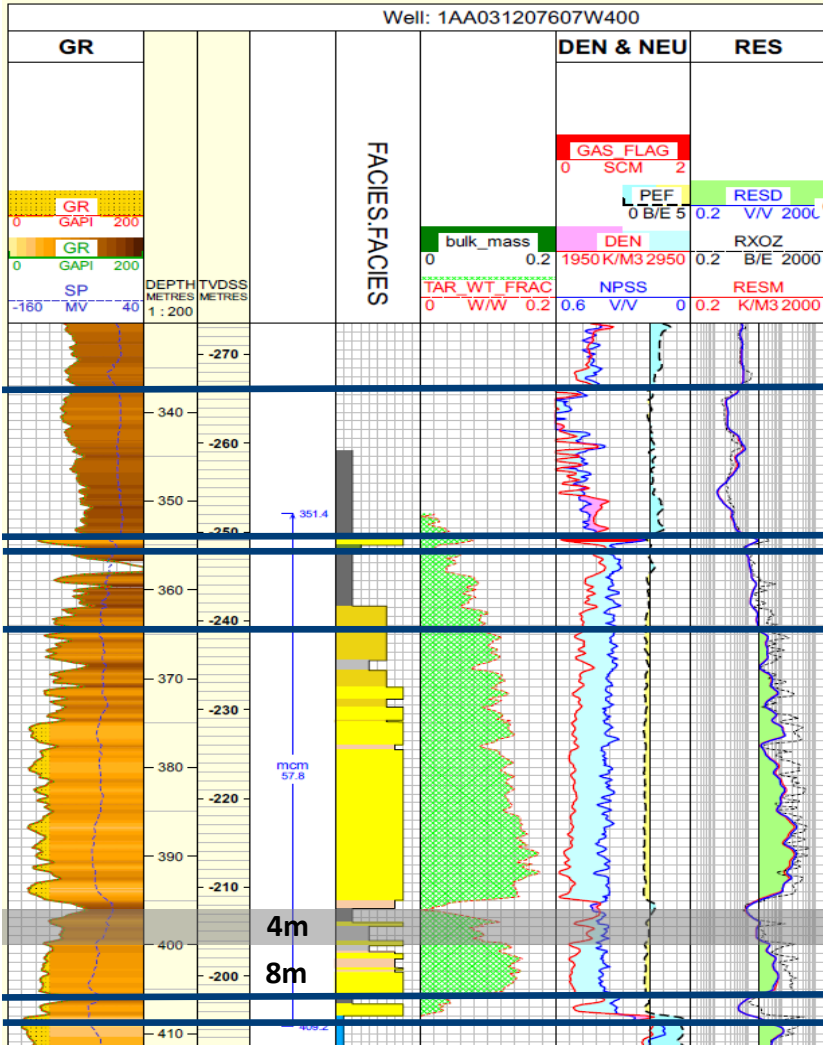
McMurray

McMurray Reservoir

Beaverhill Lake



BlackGold SAGDable Net Pay Definition



Net Pay Criteria:

Resistivity (RT) \geq 20 ohm-m

Porosity (DPSS) \geq 27%

> 10 m continuous net pay

No continuous breaks > 1 m

NOTE: 10m continuous pay is defined from cores, images and well logs. Not all shale breaks are continuous

Wabiskaw Formation

Wabiskaw Sand

McMurray Formation

Top Pay

SAGD able
Net Pay

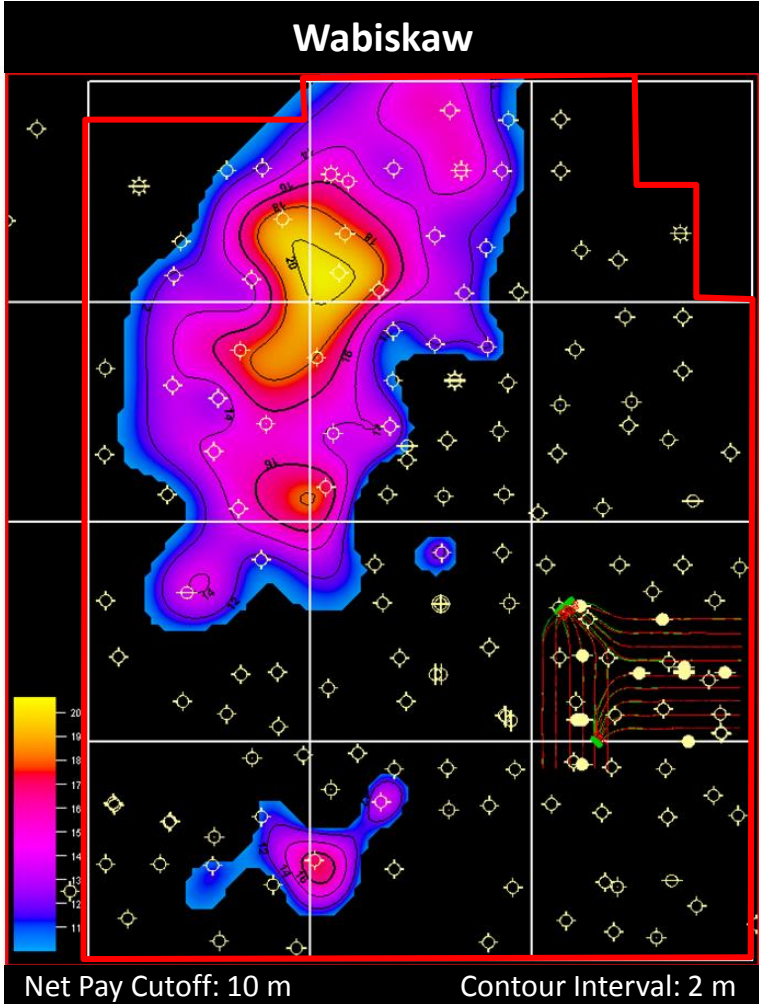
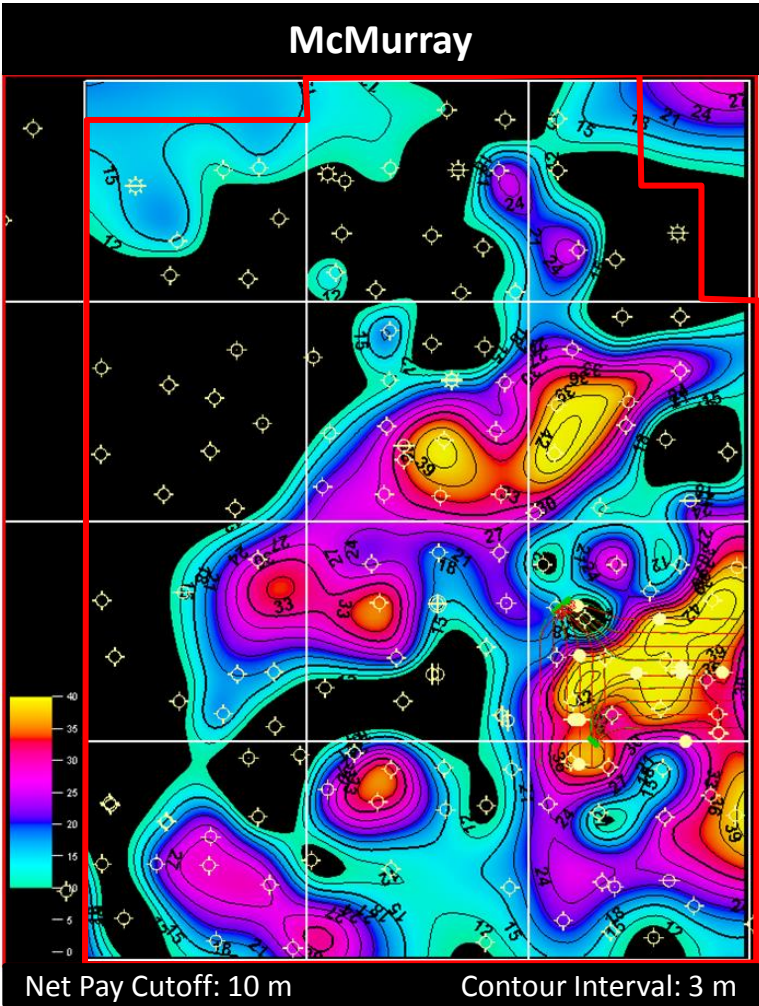
Gross Pay

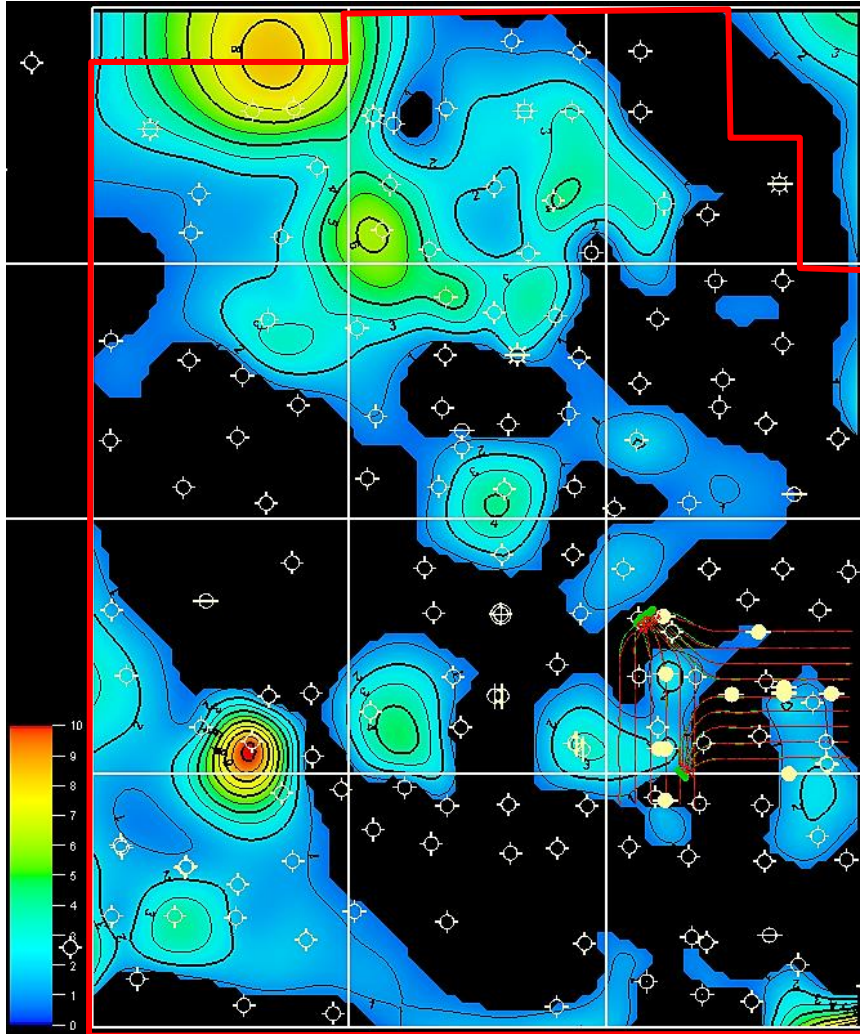
Non Pay

Base Pay

Top of Beaverhill Lake Formation

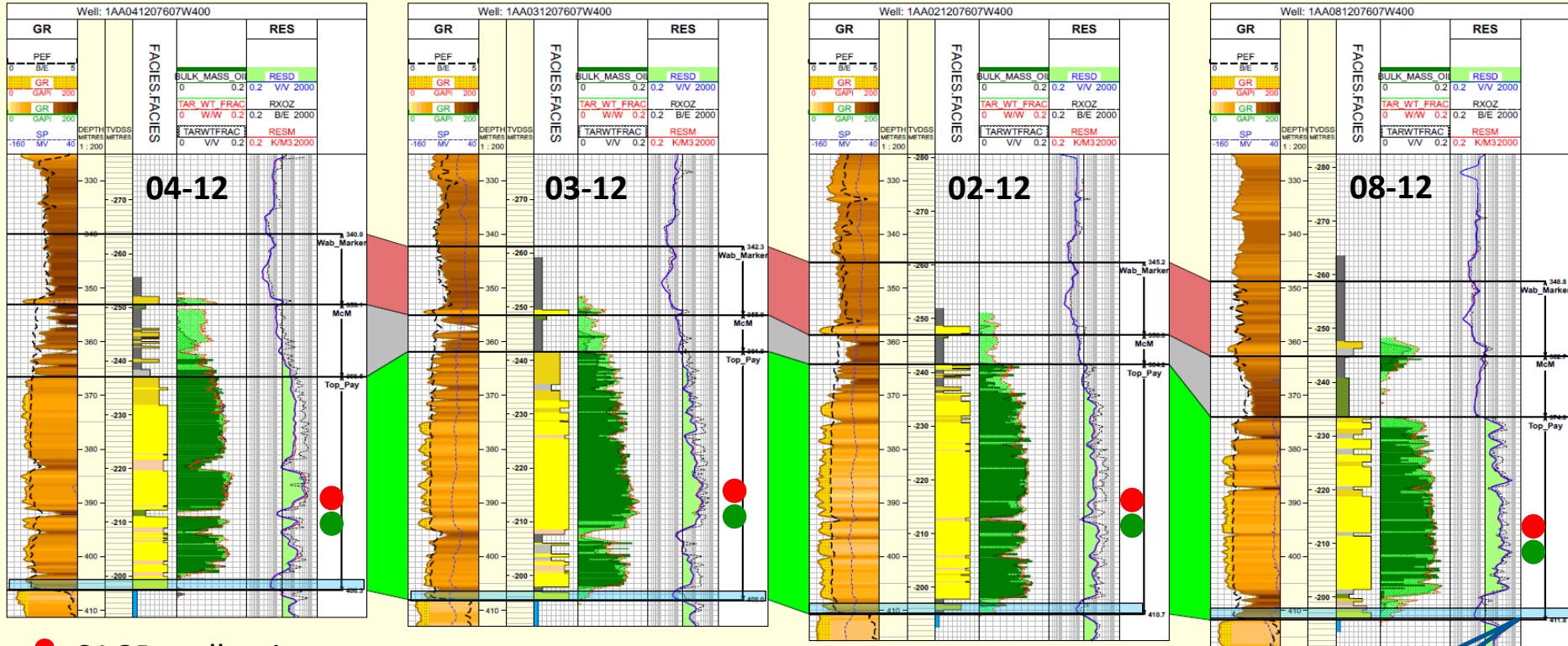
McMurray and Wabiskaw SAGDable Net Pay





- Localized bottom water present over project/development area
- No McMurray formation top gas identified

Contour Interval: 1 m
Project Area: —

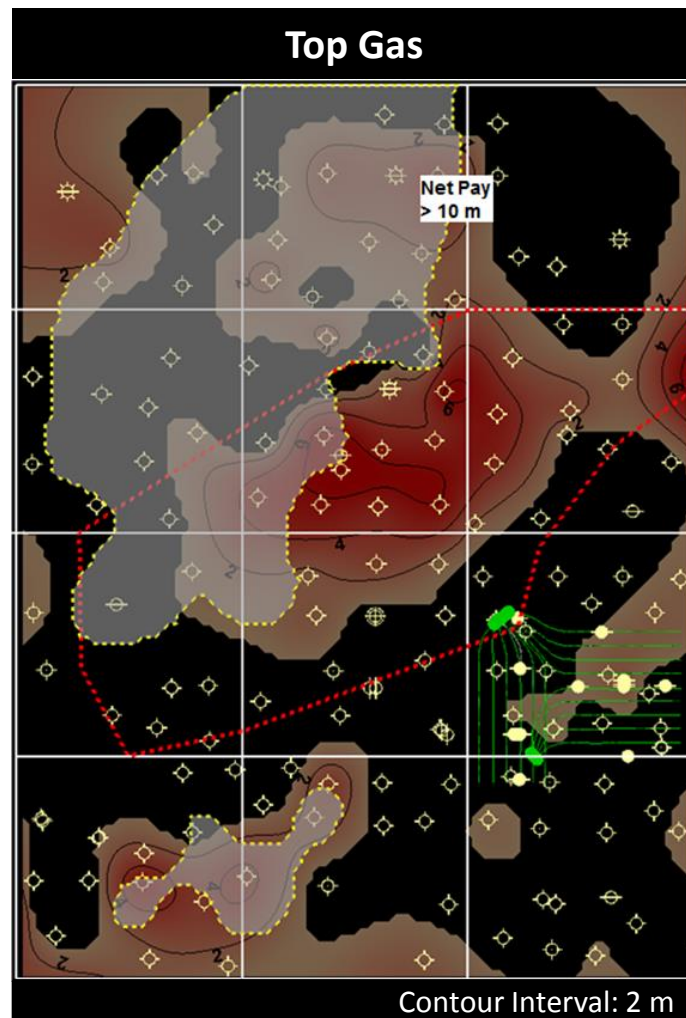
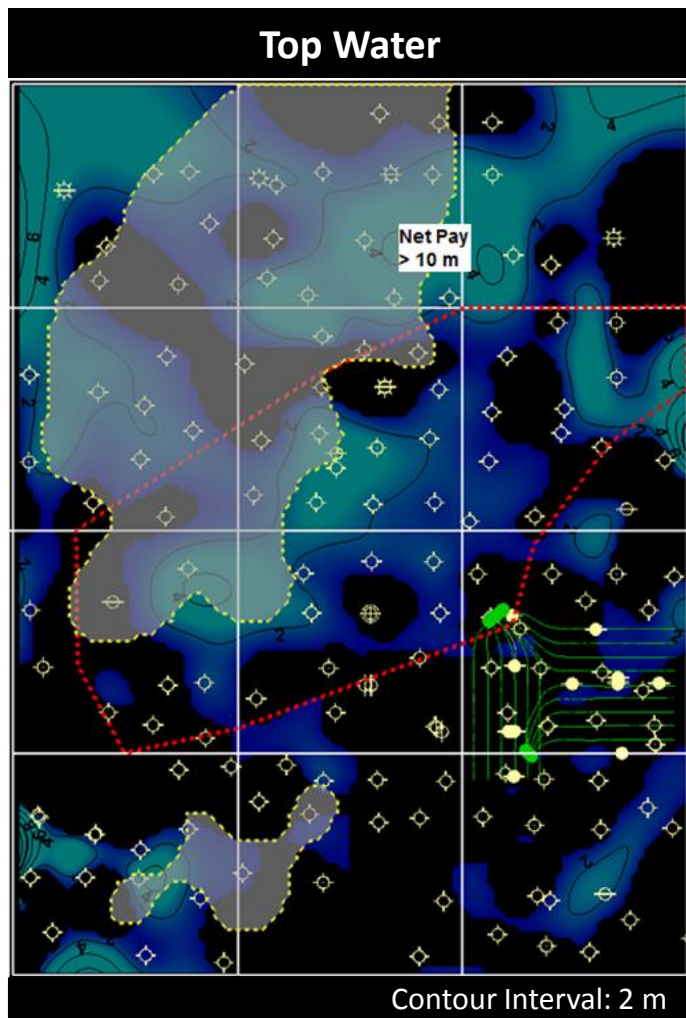


● ● SAGD well-pair

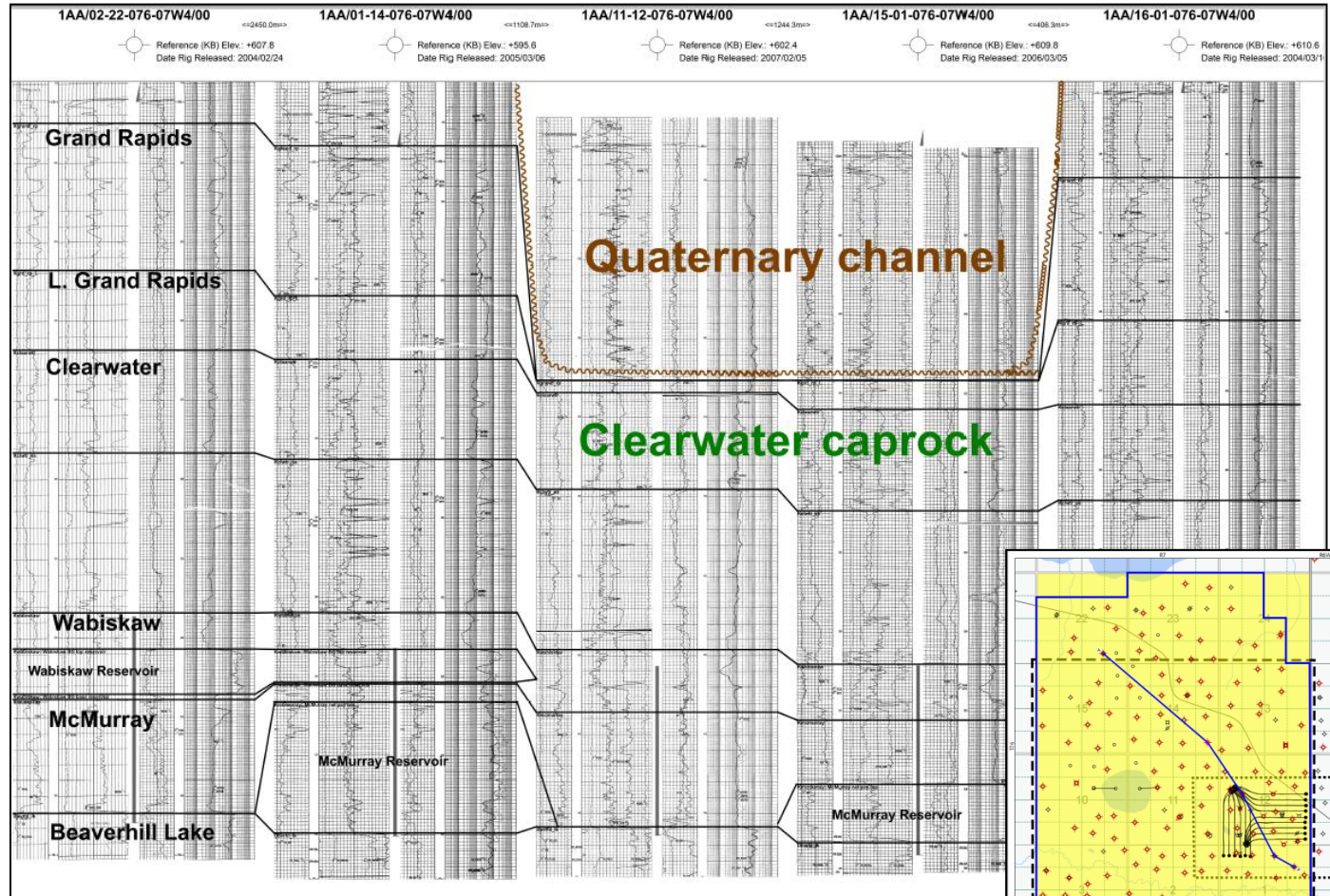
- Bottom water is generally localized and thin, and is either vertically distant or stratigraphically separate from identified SAGDable pay
- Stand off from well-pairs is often >10m

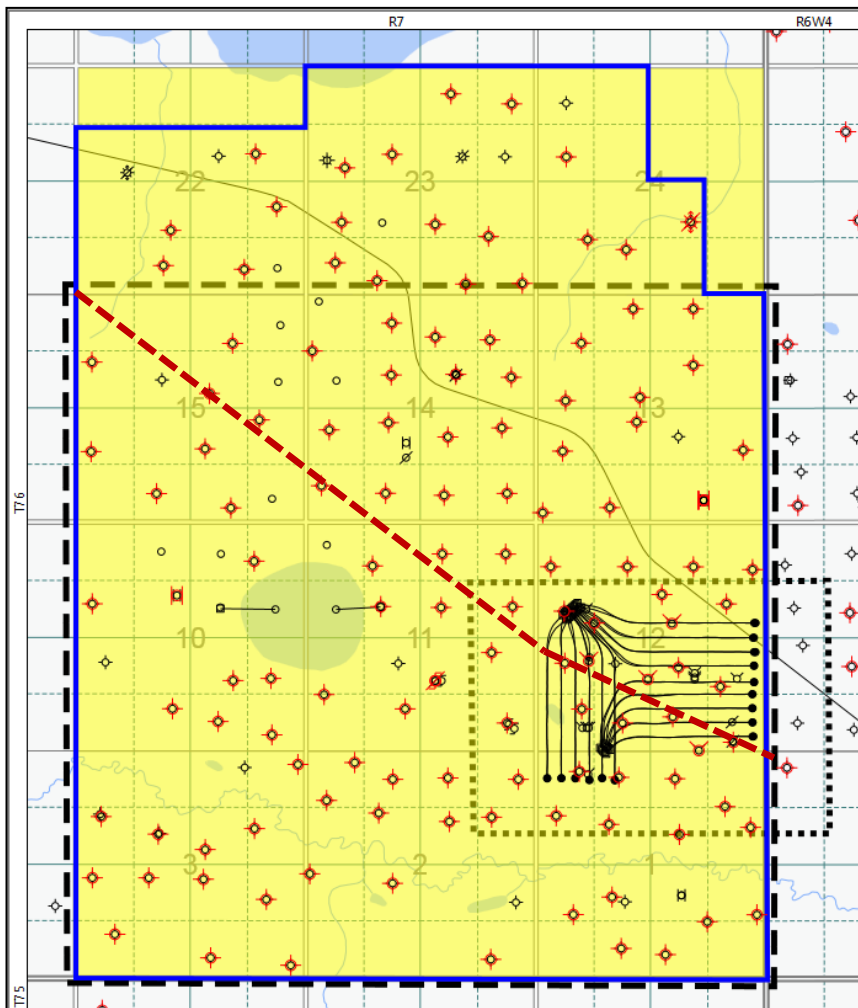
Localized bottom water

Wabiskaw Top Water and Top Gas Isopach



- No karsting
- No salt dissolution
- Quaternary channel does not incise Clearwater caprock





Project Area —————

3D Seismic (23 km²) 2009 - - - - -

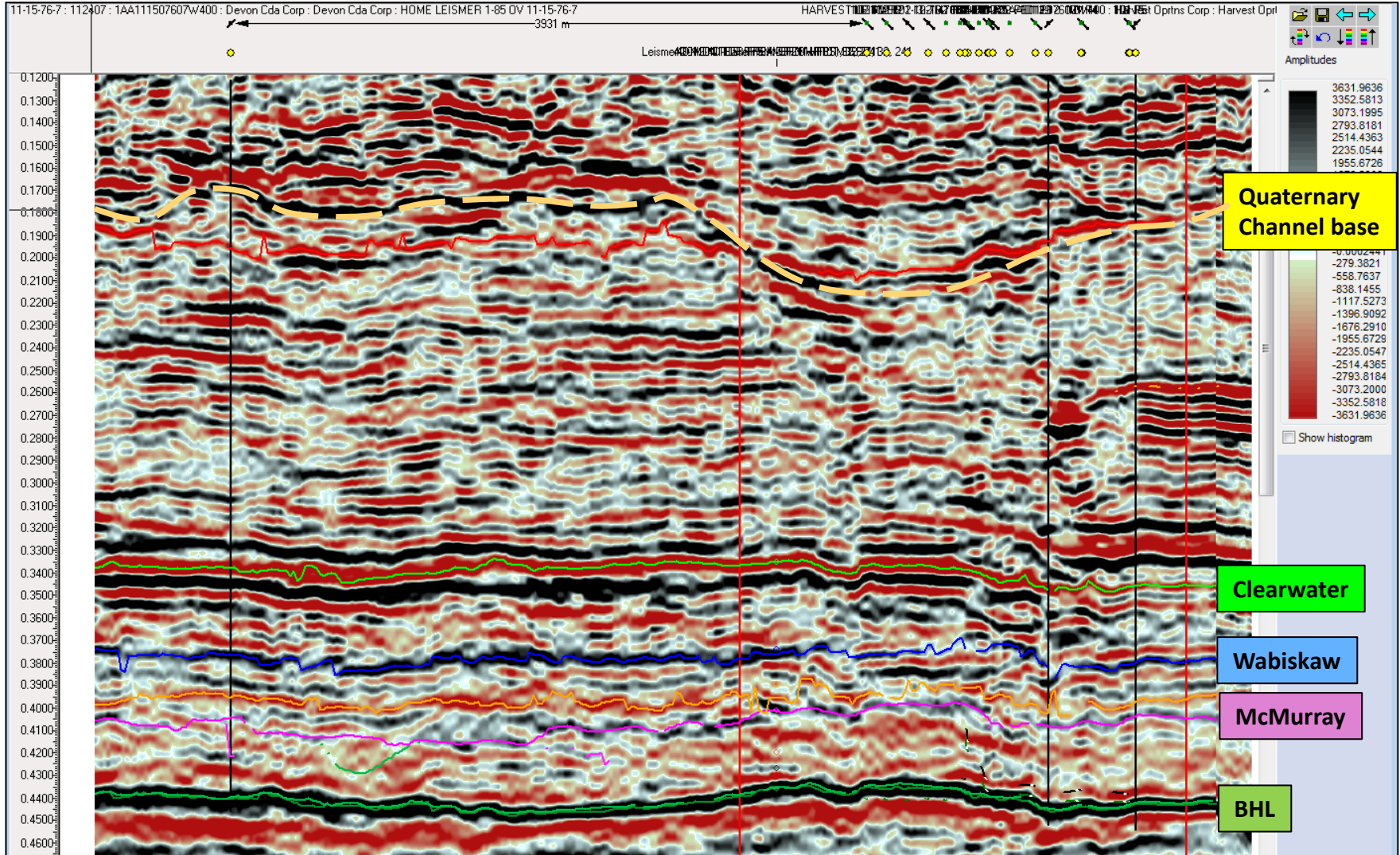
4D Seismic (4.5 km²)

Baseline: 2012

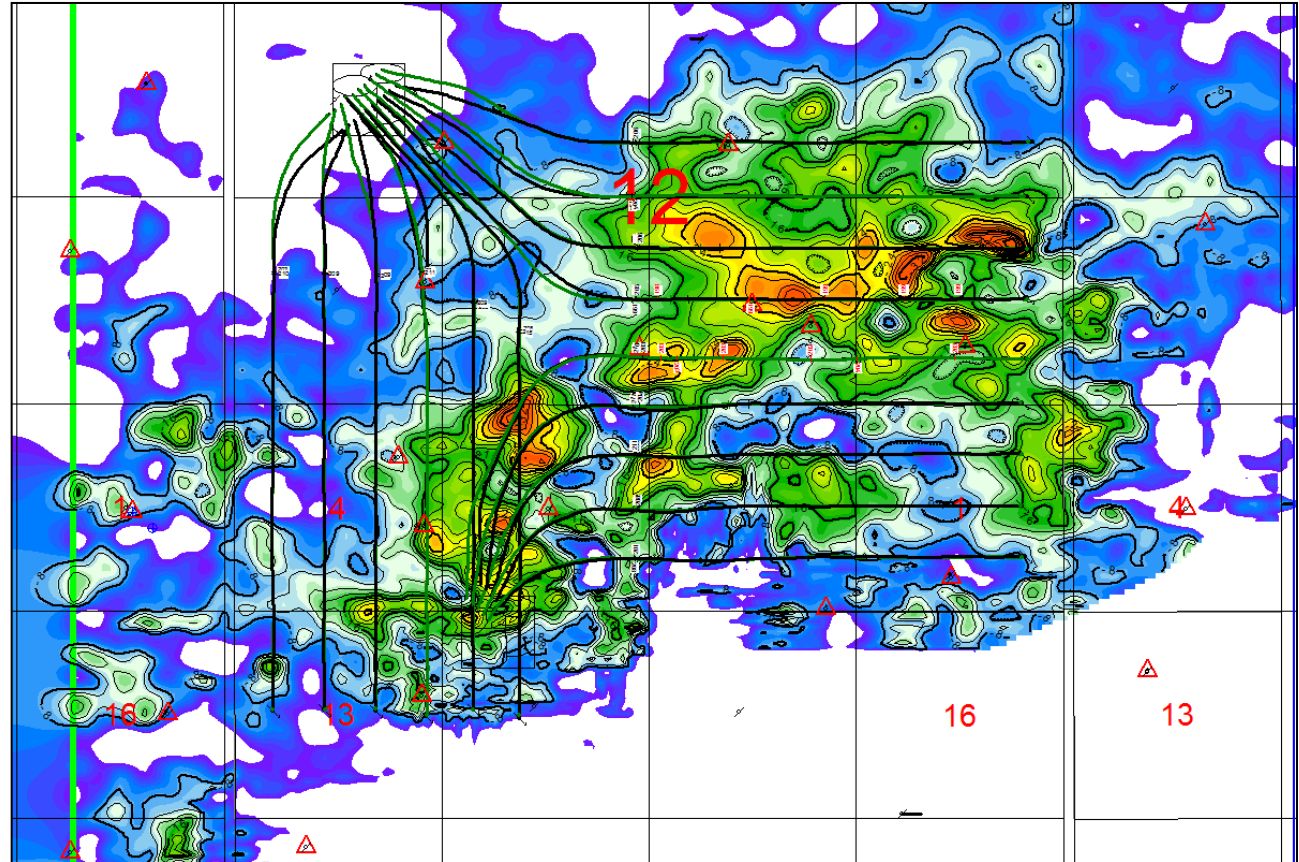
Monitor: 2020

Seismic example - - - - -

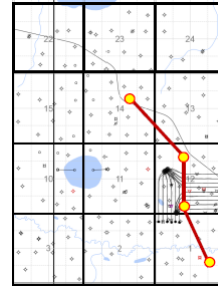
Example Seismic Line from 3D



- 4D seismic shot in 2020
- Reservoir heating by steam injection decreases sonic velocity of “heated zone”, resulting in depressed Beaverhill Lake formation top in time domain



Representative Well Cross Section



North

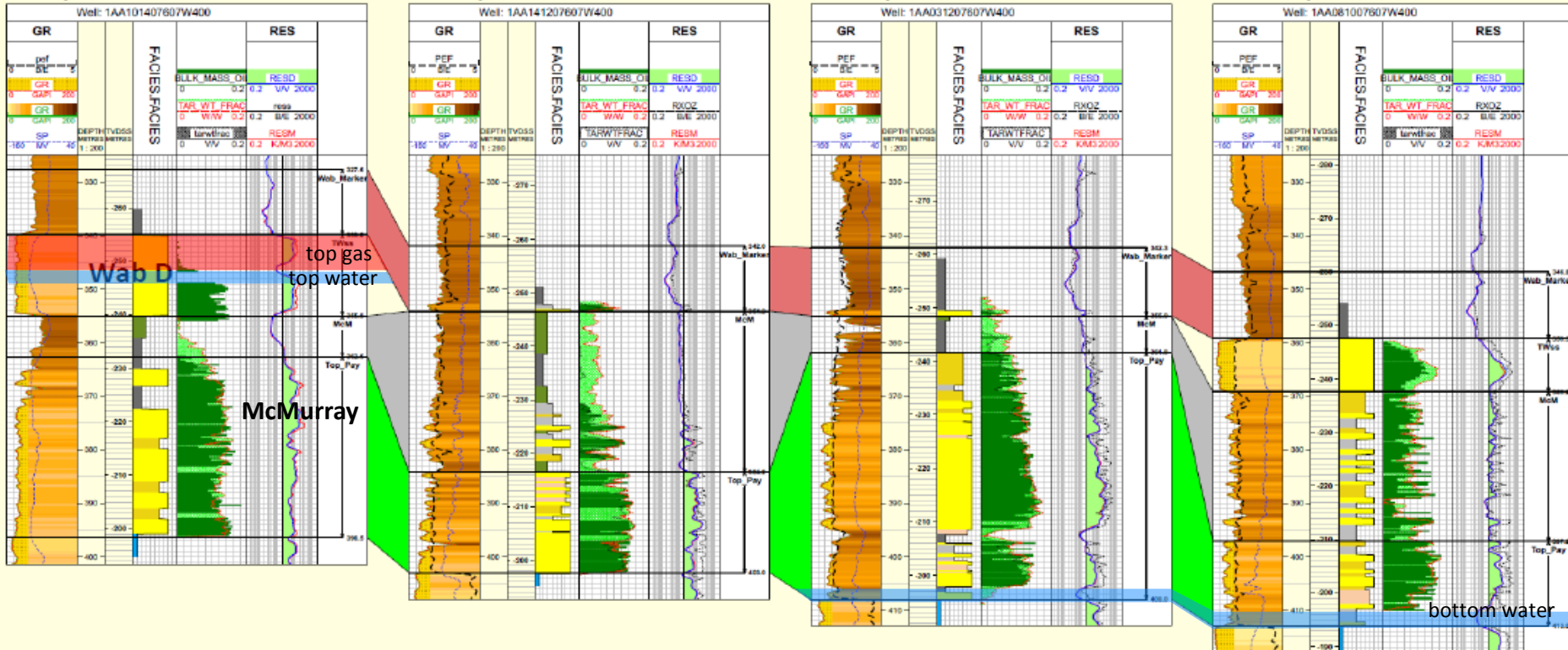
South

1AA/10-14-076-07W4

1AA/14-12-076-07W4

1AA/03-12-076-07W4

1AA/08-01-076-07W4



Original Bitumen in Place and Well Pattern Properties

Property	McMurray			Wabiskaw
	Project / Development Area	Pilot East	Pilot West	Project / Development Area
Area (ha)	2946	86.3	52.9	2946
Original bitumen in place (MM m ³)	68.8	6.7	3.7	17.7
Produced to date (MM m ³)*	0.93	0.78	0.15	0
Recovery to Date (%)*	1.4	11.6	4.1	0
Producible Bitumen (MM m ³)	32.8	3.5	1.4	7.5
Ultimate Recoverable (MM m ³)	33.7	4.3	1.5	7.5
Ultimate Recoverable (%)	49	64	41	42
Net Pay (m)	15.3	26.0	26.7	12.7
Porosity (%)	0.31	0.31	0.31	0.33
Oil Saturation	0.77	0.77	0.77	0.77
Vertical Permeability (mD)	2600	2600	2600	TBD
Horizontal Permeability (mD)	4500	4500	4500	5000

*Note: Recovered volumes as of Dec 31, 2020

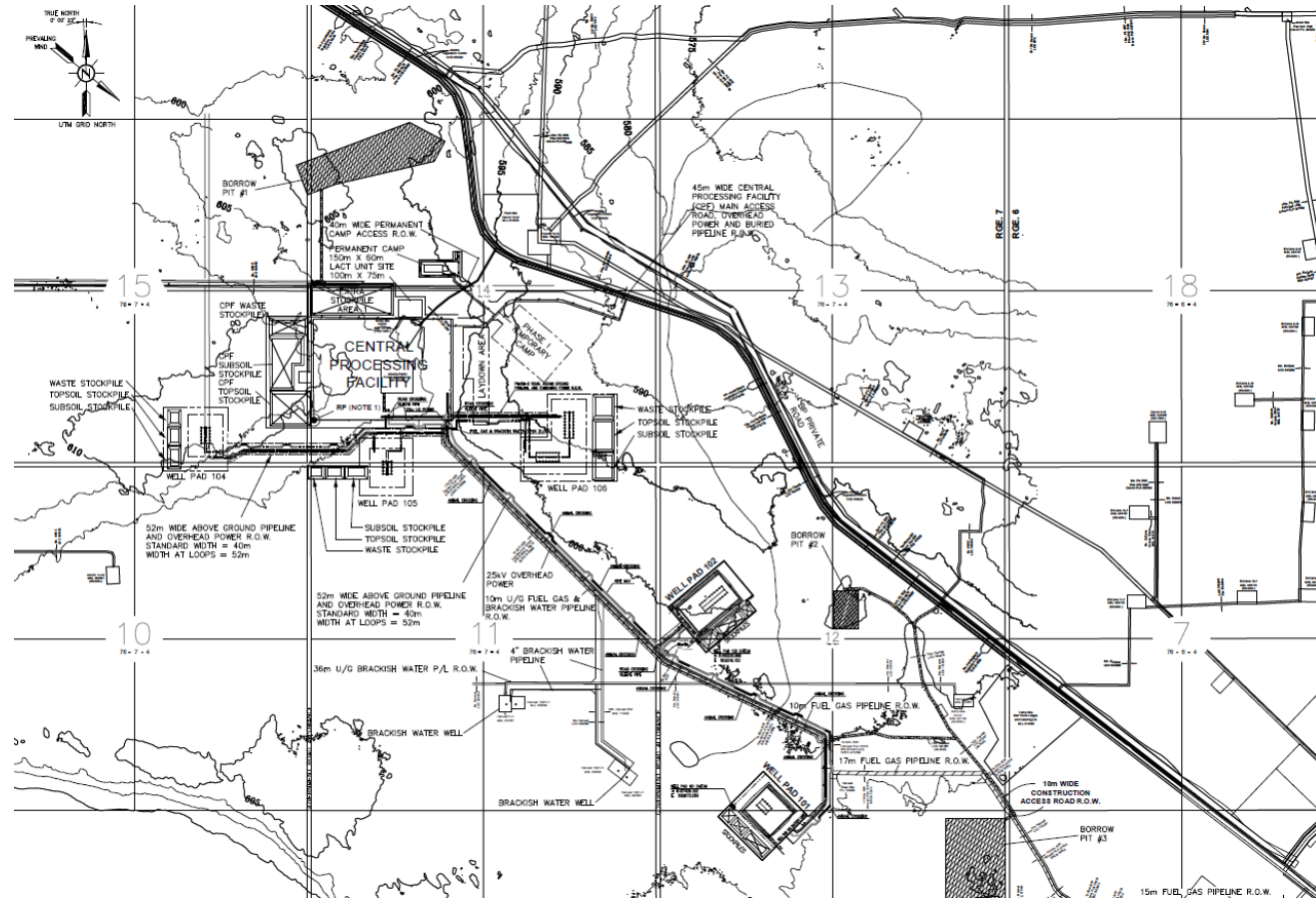
- Co-injection is not currently used at the BlackGold project
- Harvest is continuing to evaluate optimal timing to initiate NCG injection



Surface

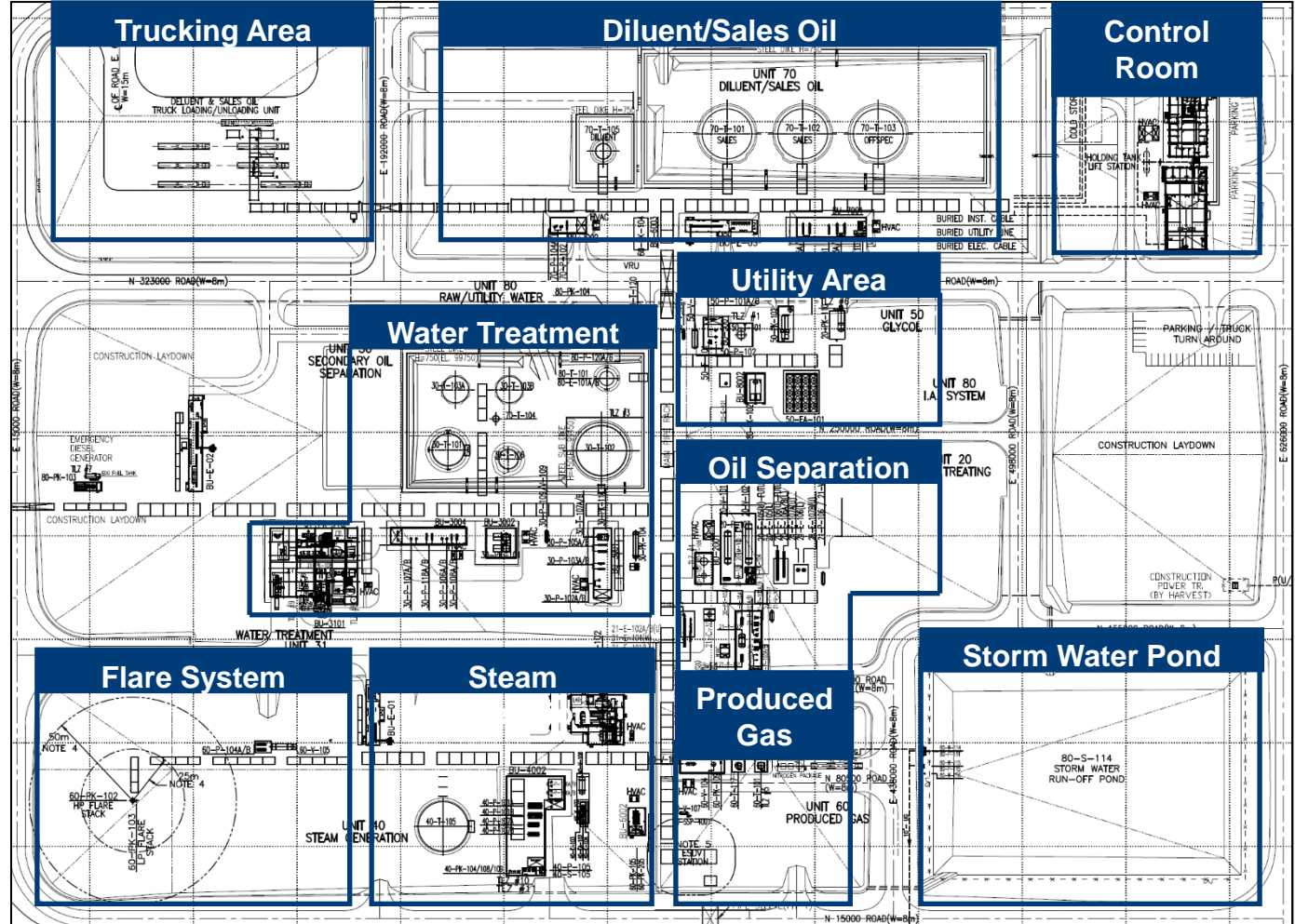
Built and Planned Surface Infrastructure

- As-Built infrastructure includes a central processing facility, two SAGD well pads, source water pads, pipelines, roads and operations camp
- Location of planned Phase 2 well pad locations (Pad 104, 105, 106) subject to change



Built and Planned Surface Infrastructure

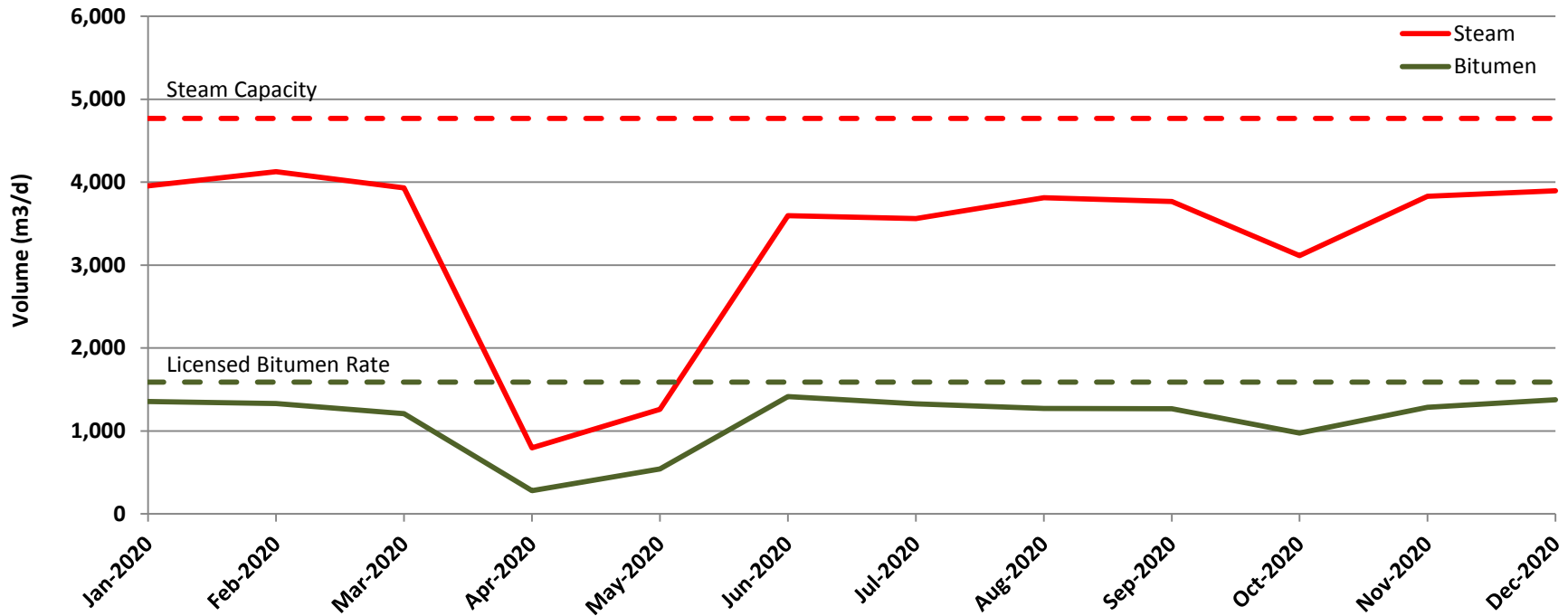
- Existing Phase 1 infrastructure shown
- Phase 2 infrastructure to be located within same plot space as Phase 1



- No modifications were made to the central processing facility in 2020 that required an AER application approval
- The following modifications, which did not require AER applications, were completed in 2020:
 - Tie-in of the 3rd 40,000bbl oil storage tank to improve optionality on market pricing and normalize trucking levels
 - A section of the makeup water pipeline's liner was replaced
 - Secondary containment upgrades to building sumps

Facility Bitumen and Steam Rates

- After a shutdown in April to complete boiler repairs the facility remained at reduced capacity for an extended period in response to market conditions
- Targeted wells were restarted as oil prices improved, with increasing bitumen and steam rates over the May to December period



An aerial photograph showing a pipeline construction site in a forested area. The pipeline is laid out in a zig-zag pattern across a cleared path, with several parallel lines visible. The surrounding area is densely wooded with tall trees. The image has a blue tint.

**Historical and
Upcoming Activity**

- On October 27, 2019, 101-02 ESP failed due to high solids loading and the well was later diagnosed with a compromised sand control liner
 - On March 2021, the injector was returned to service to provide pressure support for the neighboring well pairs
 - Harvest is continuing to evaluate when facility capacity and oil prices support a redrill of the producer well
 - The existing producer will be suspended as per Directive 13
- None of BlackGold's wells have reached the ramp-down or blow-down stage

- No applications were submitted, or changes made requiring regulatory approval, in 2020

- Completed 3 additional injector well recompletions with distributed passive flow control devices (FCDs)
 - Shiftable FCDs allow further optimization post installation and remain part of Harvest's future completion design strategy

- Facility taken offline in April to complete repairs on the boiler combustion fan motor bearing
 - Field remained shut-in for 3 weeks (COVID-19 / global oil price collapse)
- Facility taken offline in May to repair localized damage to internal membrane and exterior wall of the boiler
- Diluent Recovery Unit (DRU) continues to perform well
 - Capable of additional dehydration during oil treating excursions
 - Typical sales oil densities of 990 to 1005 kg/m³
- Q4 2020 required higher than typical steam injection to recover reservoir pressures after constrained operations, impairing SOR performance

2020 Compliance History

EDGE Reference	Date	Reportable Incident/ Voluntary Self-Disclosure/ Contravention	Remediation or Compliance Efforts
N/A	Jun 2019	D-55 non-compliance regarding secondary containment of building sumps	Sump modifications were completed in Q2 2020 and inspected to AER satisfaction in Aug 2020
362491	Jan 2020	Two 1-hr NO ₂ ambient air quality exceedances (174 ppb and 232 ppb) due to contractor vehicles parked and idling in close proximity to air monitoring trailer	Reminded contractors that parking on-site was not permitted and installed signage
363224	Feb 2020	CEMS did not meet 90% uptime requirement due to analyzer malfunction, preventative maintenance, calibration, CGA and a computer failure	Method 1 and Method 4 application approved for data backfill
367046	May 2020	102-04 Injector wellhead valve failed due to expansion of trapped fluid after restarting steaming operations. Resulted in steam & emulsion release.	Improved operating procedure as per valve supplier

2020 Compliance History

EDGE Reference	Date	Reportable Incident/ Voluntary Self-Disclosure/ Contravention	Remediation or Compliance Efforts
3668819	July 2020	Daily SO ₂ emissions exceeded 0.75t/d limit identified for March	Harvest applied May 12, 2021, to amend the SO ₂ limit
372079	Sep 2020	CGA audit demonstrated O ₂ analyzer was out of control as per CEMS code. Due to this, CEMS did not meet 90% uptime requirement for NO _x measurement.	Method 4 approved for data backfill. Vendor rep rectified analyzer issue.
375537	Dec 2020	SO ₂ daily limit exceeded 0.75t/d on Dec 4 th	Harvest applied May 12, 2021, to amend the SO ₂ limit
374494	Dec 2020	CEMS did not meet 90% uptime requirement. O ₂ sensor drift lead to failed RATA	Method 4 application for data backfill

Planned 2021 activities:

- Circulate well pairs 101-05 & 102-01
- Recomplete 2 additional injector wells to distributed passive flow control

Anticipated applications in 2021/2022:

- SO₂ limit increase to 2.0 T/d
- Re-drill 101-02 producer
- Non-Condensable Gas co-injection

Anticipated five-year development plan:

- Drill two additional wellpairs off Pad 102*
- Drill sustaining pad*
- Additional 4D seismic over pilot area
- Additional OSE wells to de-risk development
- Investment decision on Phase 2

*Note: Locations shown are approximate and subject to change

