

Enhanced Oil Recovery and Advanced Completion Design for Tight Carbonate Reservoirs in Western North Dakota

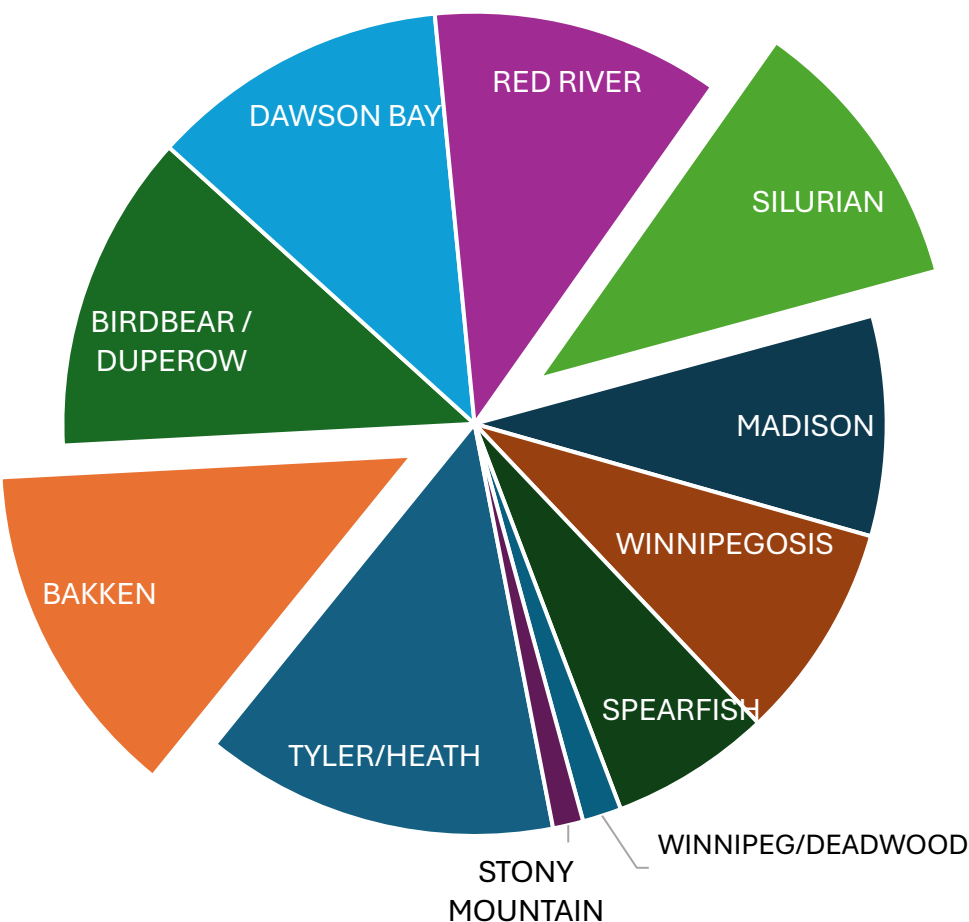
OGRP Review

October 17, 2025

Bismarck, ND

North Dakota Production

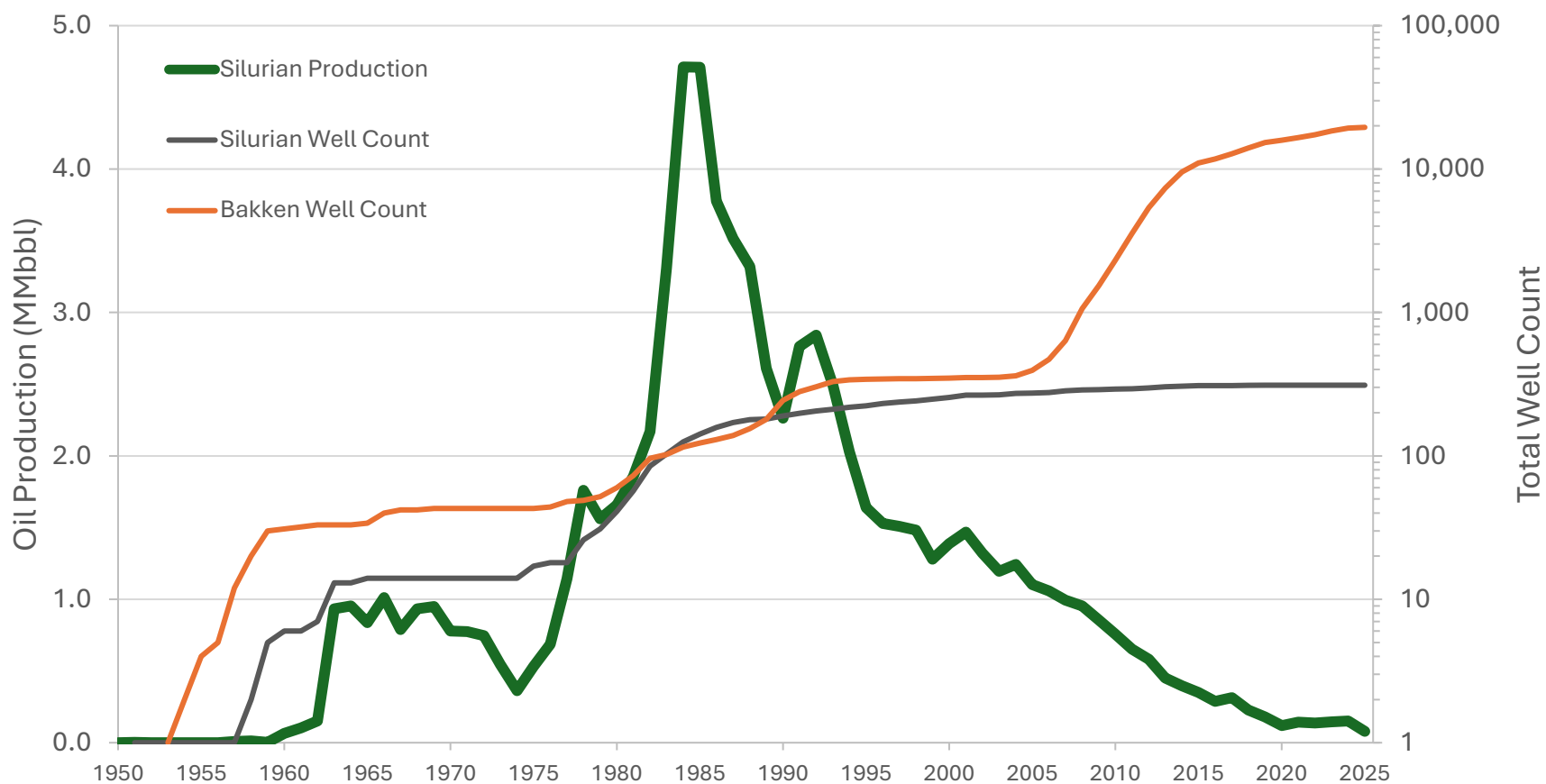
Average Cumulative Oil per Well



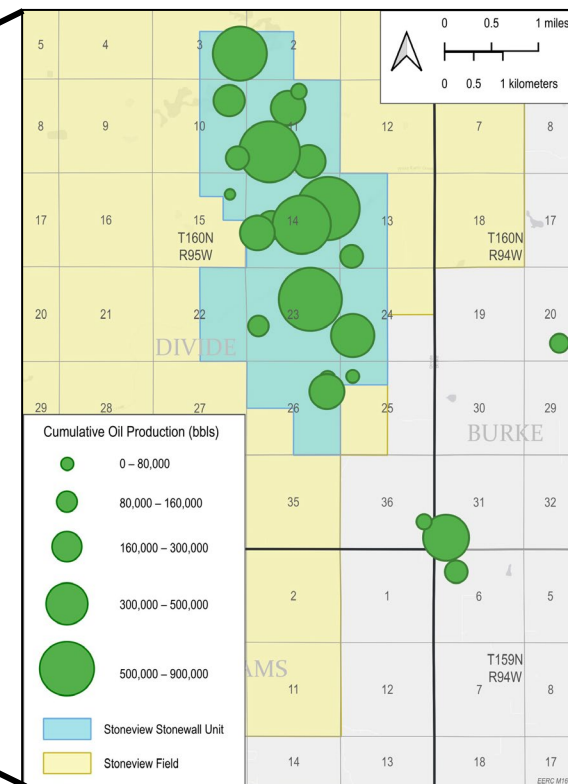
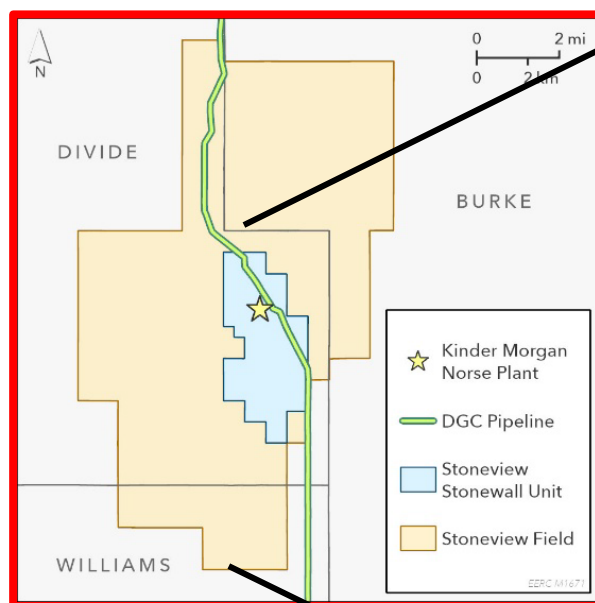
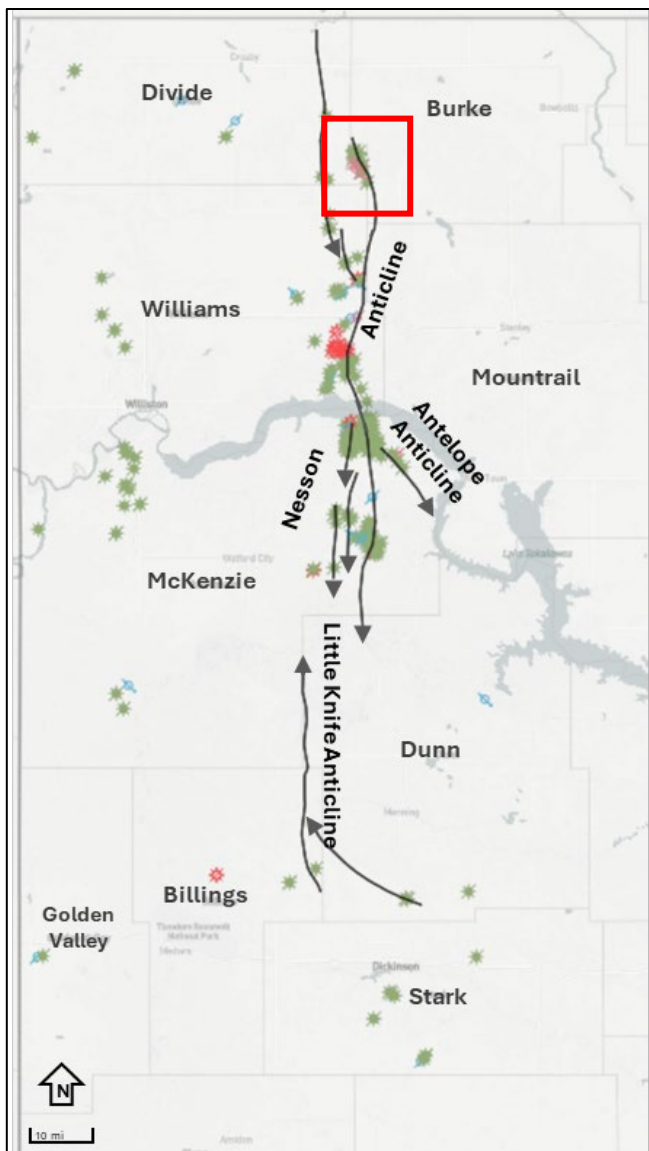
Pool	Avg. bbl/well	Well Count
TYLER/HEATH	297,561	296
BAKKEN	285,512	19726
BIRDBEAR/ DUPEROW	268,838	679
DAWSON BAY	251,725	17
RED RIVER	242,396	1485
SILURIAN	235,674	355
MADISON	184,807	5796
WINNIPEG/DEADWOOD	182,699	59
SPEARFISH	134,994	488
WINNIPEG/ DEADWOOD	32,720	21
STONY MOUNTAIN	25,495	12

Silurian Production

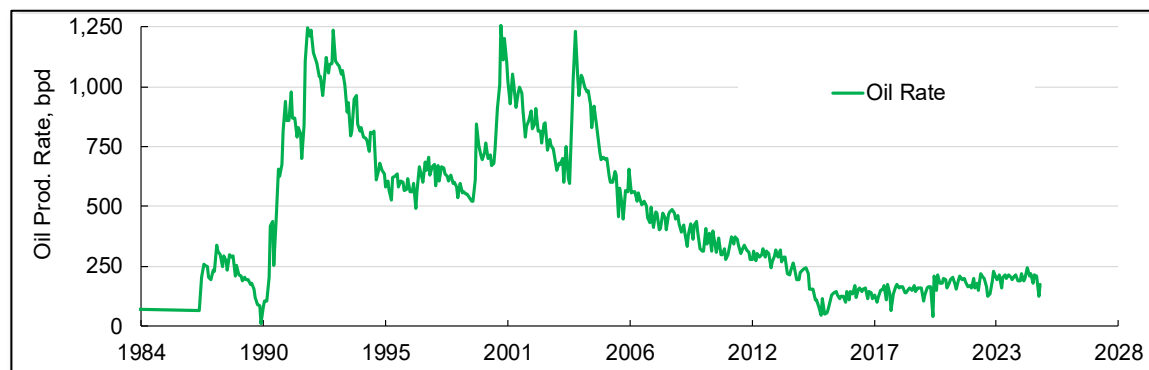
Silurian Oil Production and Well Count



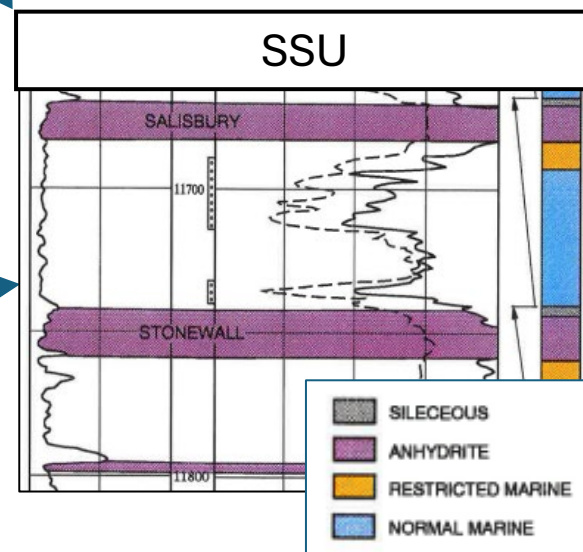
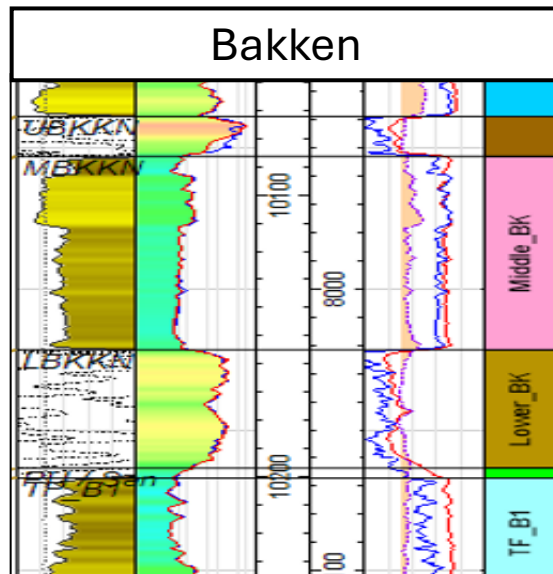
Stoneview Stonewall Unit



SSU Oil Production



Stratigraphy

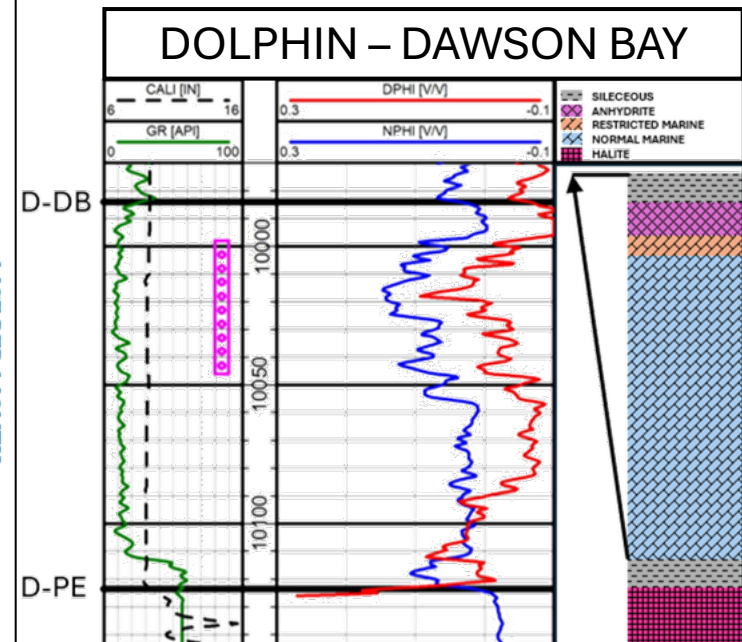
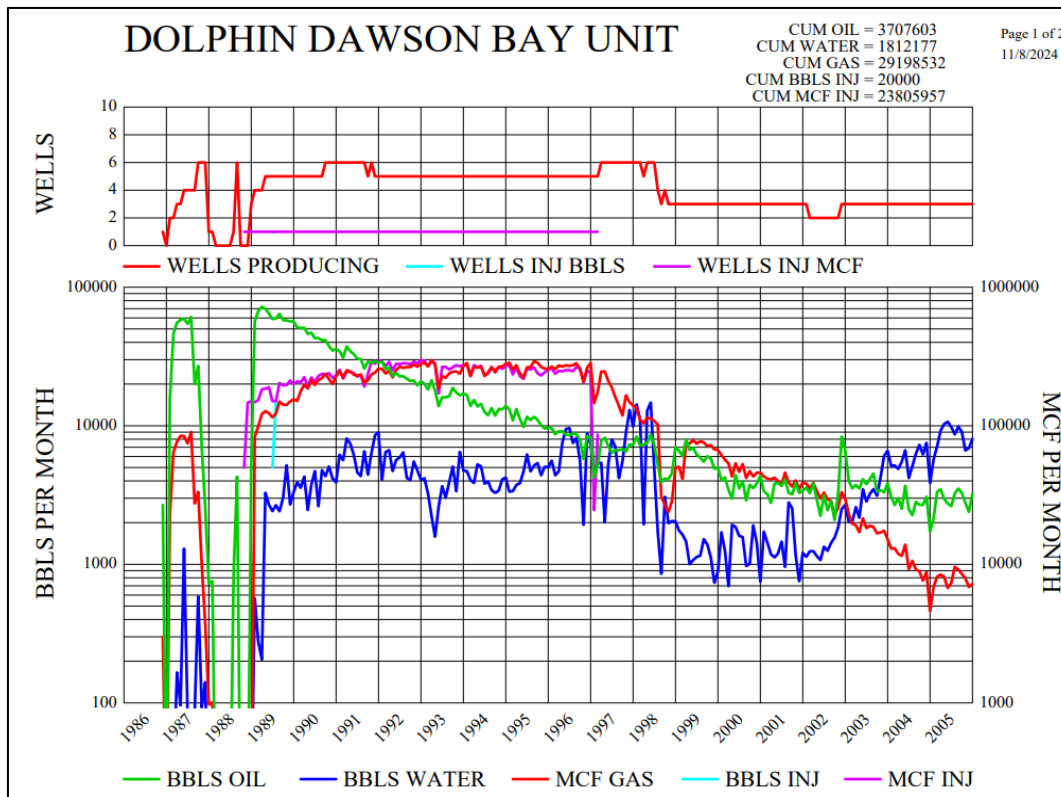
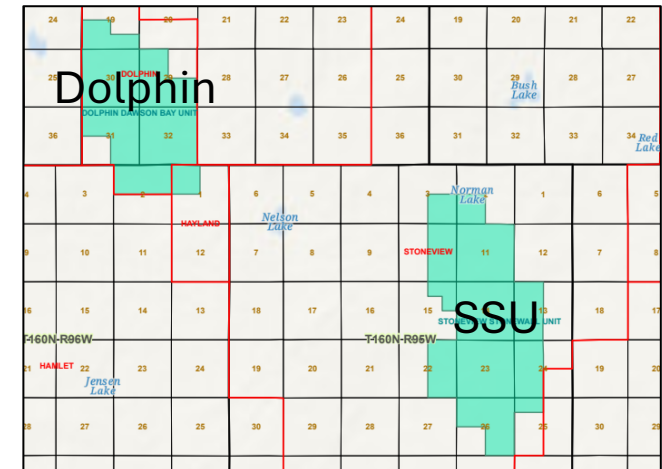


	SSU	Bakken
Porosity (%)	2-15	0-12
Permeability	Micro to milli Darcy	Nano to micro Darcy
Oil Gravity (° API)	46	38-42
Wettability	Oil	Mixed
Composition	Tight Carbonate	Tight Carbonate
Confining Zones	Anhydrites	Shales

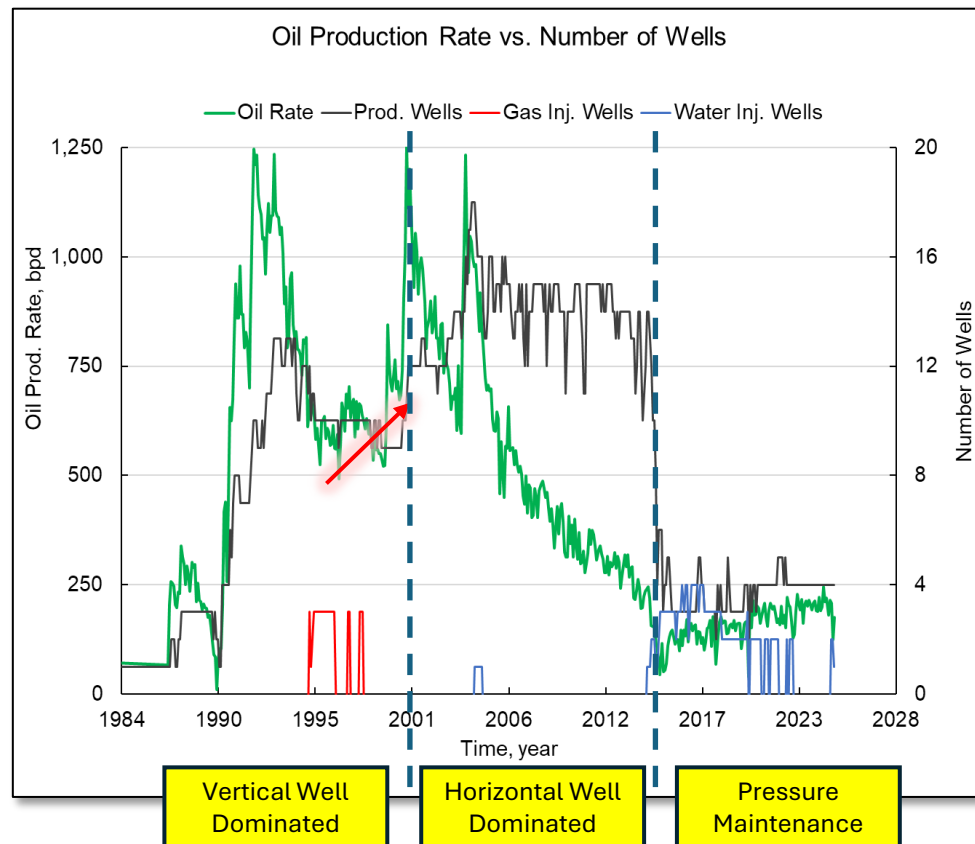
EOR ANOLOGY: DOLPHIN FIELD



- Dawson Bay Formation
 - Porous dolomite capped with anhydrite
 - Similar GOR and oil gravity
- Primary Recovery: ~19%
- EUR: ~51% with gas injection
- 1.7x EOR over primary



Previous SSU EOR Response



Conoco EOR Study - Reservoir Data

Initial Reservoir Pressure: 5236 psia

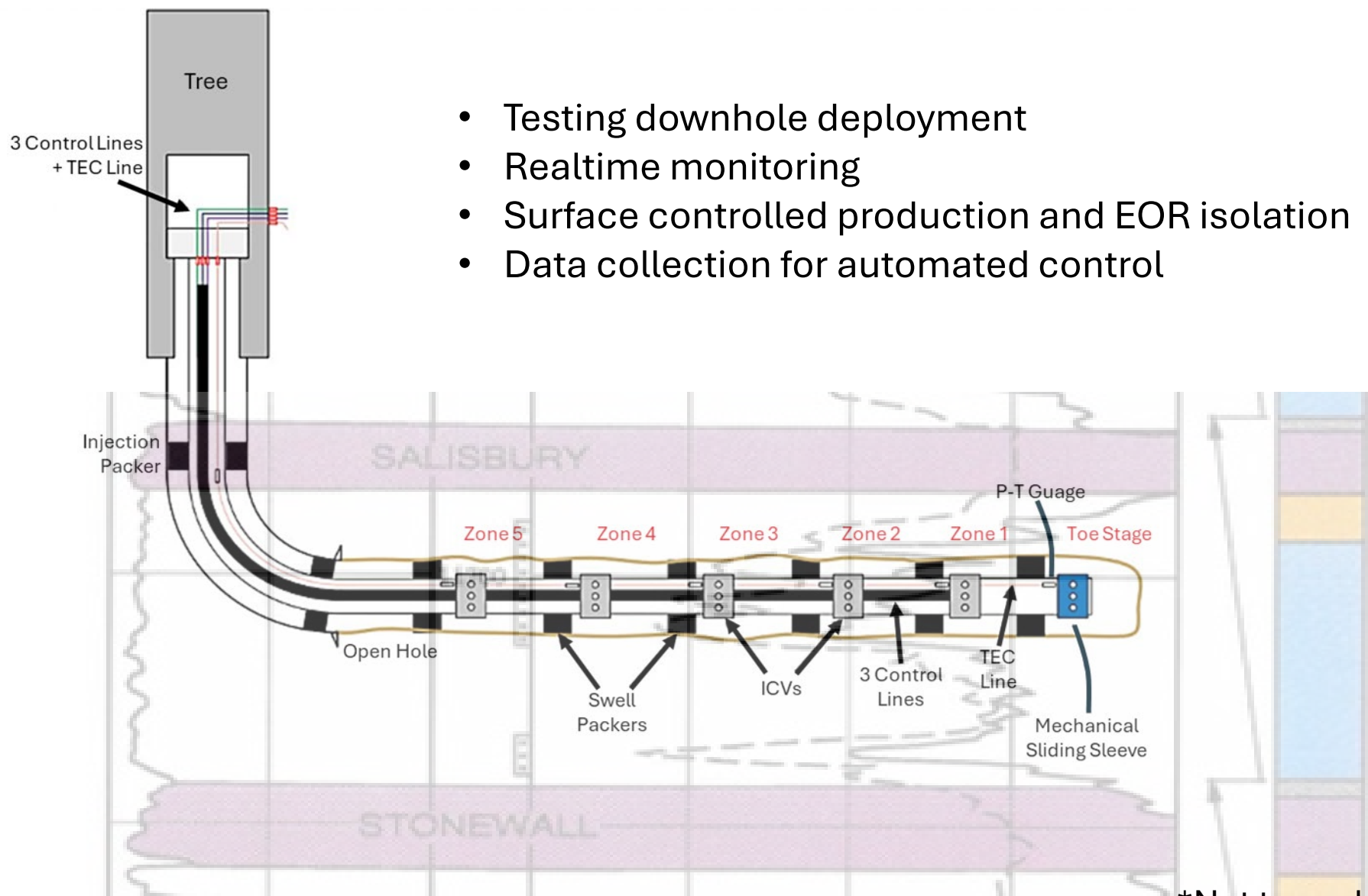
Bubble Point Pressure: 3273 psia

Current Reservoir Pressure: 3300 psia

Minimum Miscibility Pressure: 2900 psia

Water Saturation: 14%

Interval Control Valve System



*Not to scale

Data Collection and Field Tests



- Lab tests:
 - Gas chromatography, minimum miscibility pressure, rock wettability, and fluid interfacial tension
- Data to support downhole liner and packer system
 - FMI and Thru-Bit logs
- Potential Field Tests
 - Surfactants and miscible fluid flood based on lab work
 - Tracers for well connectivity or compartmentalization

Corrected			
Project-Associated Expense	NDIC Share	Cobra Share (cash)	Total Project
Labor – Engineering and Field	\$324,540	\$530,000	\$854,540
Facilities, Equipment, Gathering	--	\$470,000	\$470,000
Stimulation	--	\$1,500,000	\$1,500,000
Field Services – Rigs, Wireline, Testing, Coil	\$1,800,000	--	\$1,800,000
Downhole Production Equipment	--	\$2,500,000	\$2,500,000
Subcontractor – EERC	\$2,875,460	--	\$2,875,460
Total Project Cost	\$5,000,000	\$5,000,000	\$10,000,000



Conclusions

- Silurian has a wide range of development.
- Production is primary and underdeveloped.
- The reservoir setting is similar to other formations in North Dakota.
- The down-hole equipment results test will apply to other formations.
- The SSU is unitized and undergoing a pressure maintenance operation. Initiating a new EOR project within this unit could be expedited due to previous efforts.
- Since current Silurian trends and future development potential encompass a large geographic area within the state, there is potential to affect new socioeconomic development within the state that has not been previously affected by the Bakken Shale.