Legacy Well Innovations & Opportunities

COBRA OIL & GAS CORPORATION

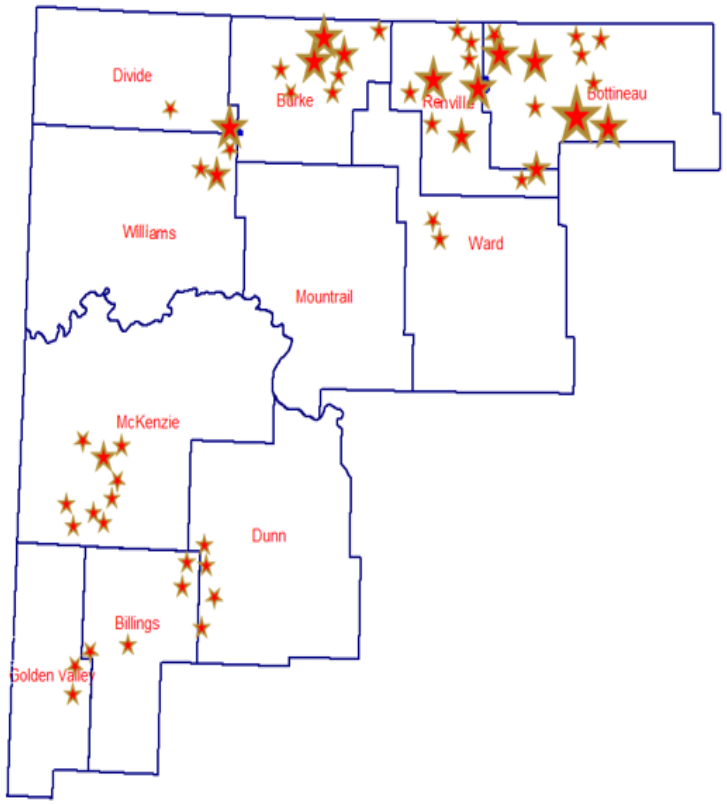
House Bill 1272

Testimonial Presentation of Kyle Gardner

House Energy and Natural Resources Committee

January 27, 2023

Cobra Oil & Gas Corporation



Williston Basin Fun Facts

- According to NDGS production/well count data, all ND productive formations that have produced more than 1MM BO, average 221,411 BO/well.
- Bakken/Three Forks Cumulative Production/Total Well Count yields an average 233,910 BO/well.
- Bakken/Three Forks made 1,078,594 BOPD in September-2022.
- Bakken /Three Forks currently produce 96% daily production in ND.
- The Madison Formation links every Bakken well to a historically prolific conventional reservoir.

SO WHAT IS NEXT?

Madison Formation Fun Facts

- Conventional carbonate reservoir.
- Contains reservoir quality rock throughout the basin.
- Can source its own hydrocarbon.
- Has been identified as a Residual Oil Zone (ROZ) formation via academic research and empirical production data.

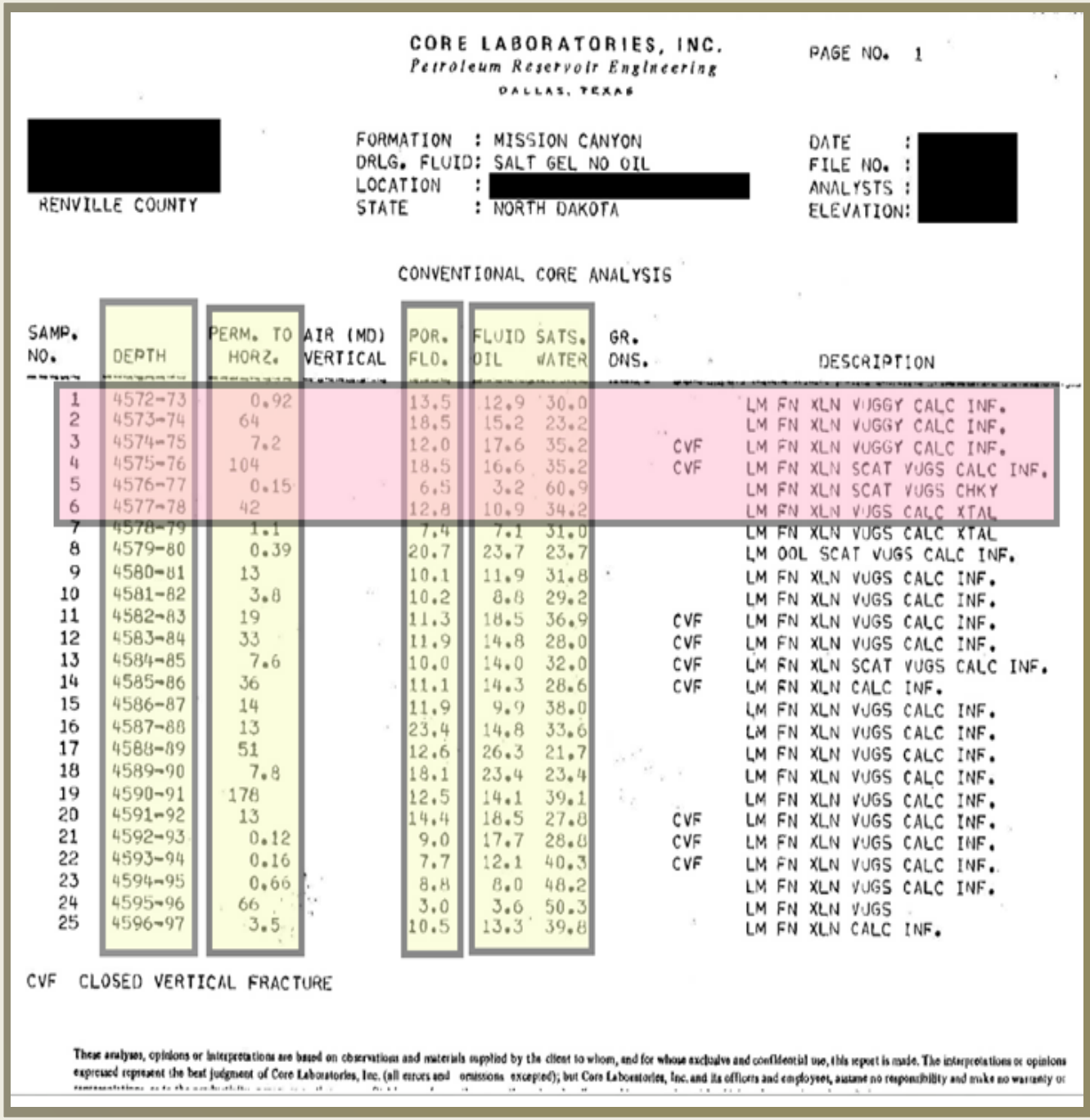
What is a Residual Oil Zone (ROZ)?

- A section within the stratigraphic column of a formation that exists below the “oil-water contact” of a reservoir which contains “immobile oil.”
- These sections of reservoirs have been naturally water flooded by 3 different criteria.
- In result, remnants of oil are stranded within sections of rock that the oil once migrated through.

Methods to Exploit the ROZ

- CO2 Injection into the ROZ allows the CO2 to become miscible within the oil droplets which in result lowers the oil interfacial surface tension, reduces viscosity and helps vacate the oil from the rock.

- Depressurizing the ROZ lowers the reservoir pressure within a radius around the wellbore to the bubble point pressure which allows the oil droplets to swell from gas expansion within the oil and helps vacate the oil from the rock.



CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

PAGE NO. 1

[redacted]
RENVILLE COUNTY

FORMATION : MISSION CANYON
DRLG. FLUID: SALT GEL NO OIL
LOCATION : [redacted]
STATE : NORTH DAKOTA

DATE :
FILE NO. : [redacted]
ANALYSTS :
ELEVATION:

CONVENTIONAL CORE ANALYSIS

SAMP. NO.	DEPTH	PERM. TO AIR (MD) HORZ.	VERTICAL	POR. FLO.	FLUID SATS. OIL	WATER	GR. DNS.	DESCRIPTION
1	4572-73	0.92		13.5	12.9	30.0		LM FN XLN VUGGY CALC INF.
2	4573-74	64		18.5	15.2	23.2		LM FN XLN VUGGY CALC INF.
3	4574-75	7.2		12.0	17.6	35.2	CVF	LM FN XLN VUGGY CALC INF.
4	4575-76	104		18.5	16.6	35.2	CVF	LM FN XLN SCAT VUGS CALC INF.
5	4576-77	0.15		6.5	3.2	60.9		LM FN XLN SCAT VUGS CHKY
6	4577-78	42		12.8	10.9	34.2		LM FN XLN VUGS CALC XTAL
7	4578-79	1.1		7.4	7.1	31.0		LM FN XLN VUGS CALC XTAL
8	4579-80	0.39		20.7	23.7	23.7		LM OOL SCAT VUGS CALC INF.
9	4580-81	13		10.1	11.9	31.8		LM FN XLN VUGS CALC INF.
10	4581-82	3.8		10.2	8.8	29.2		LM FN XLN VUGS CALC INF.
11	4582-83	19		11.3	18.5	36.9	CVF	LM FN XLN VUGS CALC INF.
12	4583-84	33		11.9	14.8	28.0	CVF	LM FN XLN VUGS CALC INF.
13	4584-85	7.6		10.0	14.0	32.0	CVF	LM FN XLN SCAT VUGS CALC INF.
14	4585-86	36		11.1	14.3	28.6	CVF	LM FN XLN CALC INF.
15	4586-87	14		11.9	9.9	38.0		LM FN XLN VUGS CALC INF.
16	4587-88	13		23.4	14.8	33.6		LM FN XLN VUGS CALC INF.
17	4588-89	51		12.6	26.3	21.7		LM FN XLN VUGS CALC INF.
18	4589-90	7.8		18.1	23.4	23.4		LM FN XLN VUGS CALC INF.
19	4590-91	178		12.5	14.1	39.1		LM FN XLN VUGS CALC INF.
20	4591-92	13		14.4	18.5	27.8	CVF	LM FN XLN VUGS CALC INF.
21	4592-93	0.12		9.0	17.7	28.8	CVF	LM FN XLN VUGS CALC INF.
22	4593-94	0.16		7.7	12.1	40.3	CVF	LM FN XLN VUGS CALC INF.
23	4594-95	0.66		8.8	8.0	48.2		LM FN XLN VUGS CALC INF.
24	4595-96	66		3.0	3.6	50.3		LM FN XLN VUGS
25	4596-97	3.5		10.5	13.3	39.8		LM FN XLN CALC INF.

CVF CLOSED VERTICAL FRACTURE

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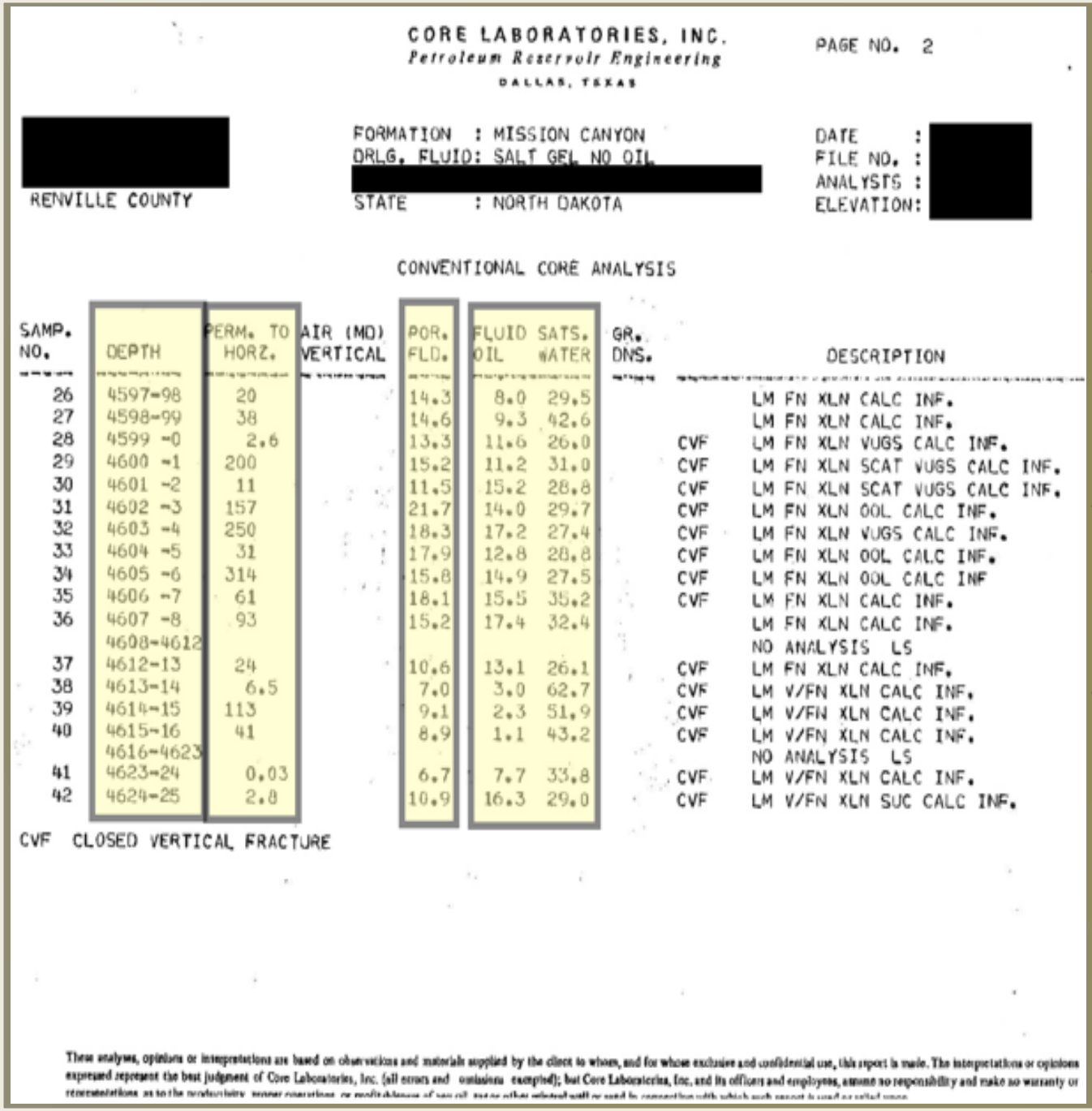
Type II ROZ

- Standard conventional approach “Pop the Top”
- Cobra Oil & Gas ROZ approach (full yellow section)
- Rock data, petrophysical data, mudlog data, & production data support a Type II ROZ.



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26	4597-98	20		14.3	8.0	29.5		LM FN XLN CALC INF.
27	4598-99	38		14.6	9.3	42.6		LM FN XLN CALC INF.
28	4599 -0	2.6		13.3	11.6	26.0	CVF	LM FN XLN VUGS CALC INF.
29	4600 -1	200		15.2	11.2	31.0	CVF	LM FN XLN SCAT VUGS CALC INF.
30	4601 -2	11		11.5	15.2	28.8	CVF	LM FN XLN SCAT VUGS CALC INF.
31	4602 -3	157		21.7	14.0	29.7	CVF	LM FN XLN OOL CALC INF.
32	4603 -4	250		18.3	17.2	27.4	CVF	LM FN XLN VUGS CALC INF.
33	4604 -5	31		17.9	12.8	28.8	CVF	LM FN XLN OOL CALC INF.
34	4605 -6	314		15.8	14.9	27.5	CVF	LM FN XLN OOL CALC INF
35	4606 -7	61		18.1	15.5	35.2	CVF	LM FN XLN CALC INF.
36	4607 -8	93		15.2	17.4	32.4		LM FN XLN CALC INF.
	4608-4612							NO ANALYSIS LS
37	4612-13	24		10.6	13.1	26.1	CVF	LM FN XLN CALC INF.
38	4613-14	6.5		7.0	3.0	62.7	CVF	LM V/FN XLN CALC INF.
39	4614-15	113		9.1	2.3	51.9	CVF	LM V/FN XLN CALC INF.
40	4615-16	41		8.9	1.1	43.2	CVF	LM V/FN XLN CALC INF.
	4616-4623							NO ANALYSIS LS
41	4623-24	0.03		6.7	7.7	33.8	CVF	LM V/FN XLN CALC INF.
42	4624-25	2.8		10.9	16.3	29.0	CVF	LM V/FN XLN SUC CALC INF.

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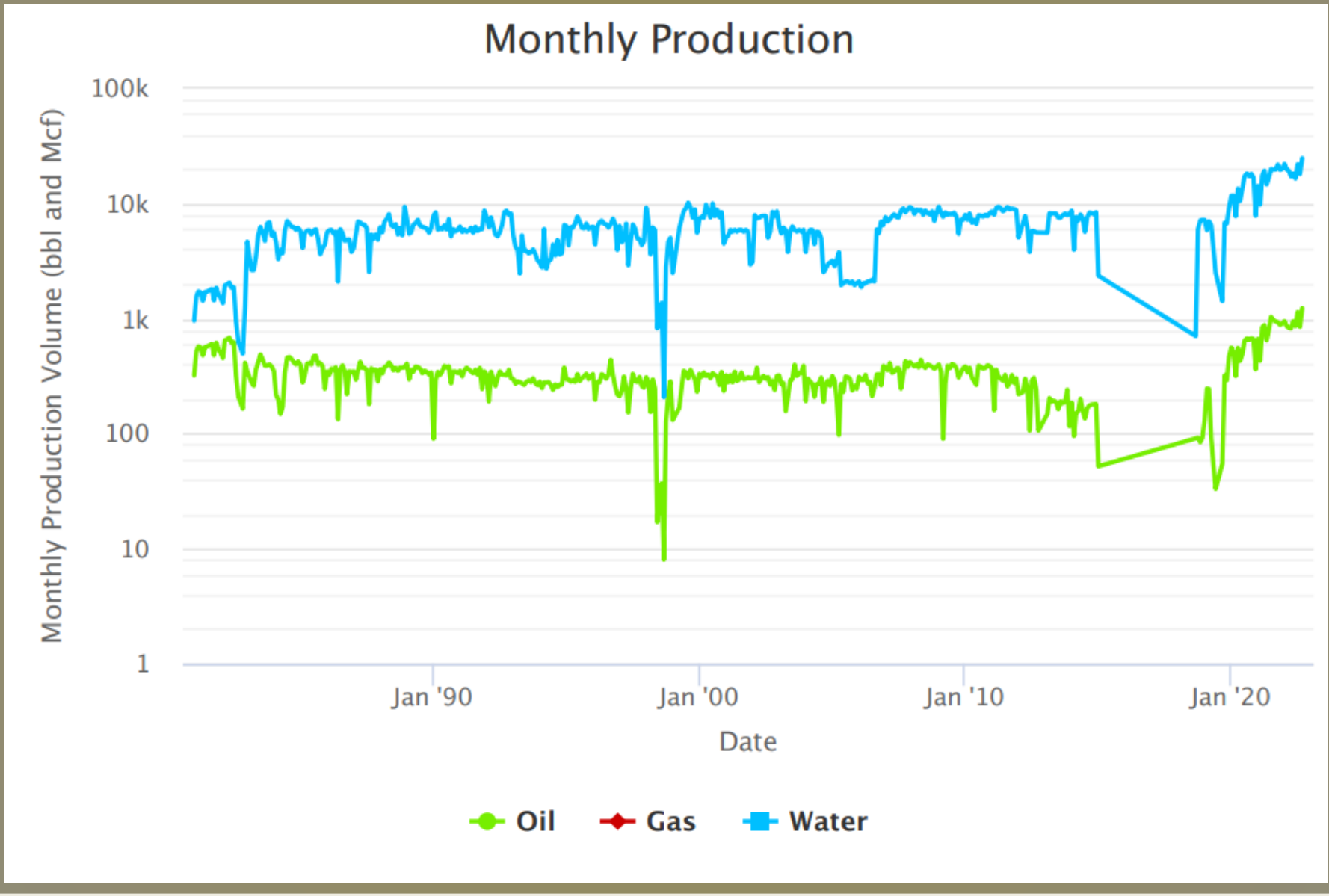
Monthly Production
Monthly Production Volume (bbl and Mcf)
100k
10k
1k
100
10
1
Jan '90
Jan '00
Jan '10
Jan '20
Date
Oil
Gas
Water

Type II ROZ Results (Mission Canyon – Renville County, ND)

- After completing the full section of the productive Mission Canyon bed, oil cut increased with increased takeaway from increased reservoir deliverability.
- Cobra Oil & Gas deems this a method of reservoir depressurization. CO2 injection would yield better results with managing less total water.
- Like the San Andres ROZ plays of the Permian Basin, Cobra Oil & Gas believes the Mission Canyon ROZ potential could cover large areas of the Williston Basin.

Needs for Bakken EOR & Madison ROZ Potential

- Available & affordable CO2.
- Available wells with mechanical integrity.
  - Wells of mechanical integrity within areas of Bakken EOR or Madison ROZ potential should be viewed as resources at a State level, not liabilities.
- Fluid handling systems.

References

1. Melzer, S., (2006) “Stranded Oil in the Residual Zone.” U.S. Department of Energy Report, February.
2. Melzer, S., Trentham, R., (2016) “San Andres Formation Residual Oil Zones and Their Relationships to the Horizontal Carbonate Play On the Northern Shelf.” Society of Independent Professional Earth Scientists, April.
3. Burton-Kelly, M., Dotzenrod, N., Feole, I., Peck, W., He, J., Butler, S., Kurz, M., Kurz, B., Smith, S., Gorecki, C., Energy & Environmental Research Center, (2018) “Identification of Residual Oil Zones in the Williston and Powder River Basins” U.S. Department of Energy, March.

Thank You!

I will gladly answer any questions for further discussion.