STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

Alaska Geologic Materials Center

Data Report #435

Redoubt Unit 2 KCL Salinity & Core Sensitivity Testing Results

Received Oct 2016

ADVANCED CORE ANALYSIS STUDY

Glacier Oil & Gas
Redoubt #2 Well

INTERIM DATA

Submitted to:

Glacier Oil & Gas

September 23, 2016

Performed by:

Core Laboratories
Petroleum Services Division
6316 Windfern
Houston, Texas 77040

HOU-160554

Company: **Glacier Oil & Gas**
Well: Redoubt #2

File: HOU-160554
Date: 23-Sep-2016

Convection Dried

CMS-300™ CONVENTIONAL PLUG ANALYSIS

Sample Number	Depth (ft)	Confining Stress (psi)	Porosity fraction	Permeability, millidarcies		b(air) psi	Beta ft (-1)	Alpha (microns)	Grain Density (g/cm^3)
				Klinkenberg	Kair				
1A	14432.00	800	0.116	15.5	17.0	1.83	2.24E+09	1.12E+02	2.64
		4225	0.105	10.8	11.9	1.91	4.77E+09	1.67E+02	
2A	14441.50	800	0.134	85.8	104.	3.55	2.68E+08	7.45E+01	2.64
		4225	0.123	72.6	86.1	3.16	4.16E+08	9.79E+01	
3A	14477.00	800	0.098	0.304	0.462	12.29	2.28E+10	2.24E+01	2.65
		4225	0.087	0.083	0.167	25.82	4.62E+10	1.24E+01	
4A	14808.50	800	0.084	2.89	3.39	3.50	3.26E+10	3.06E+02	2.63
		4225	0.073	0.930	1.14	5.04	2.26E+11	6.79E+02	

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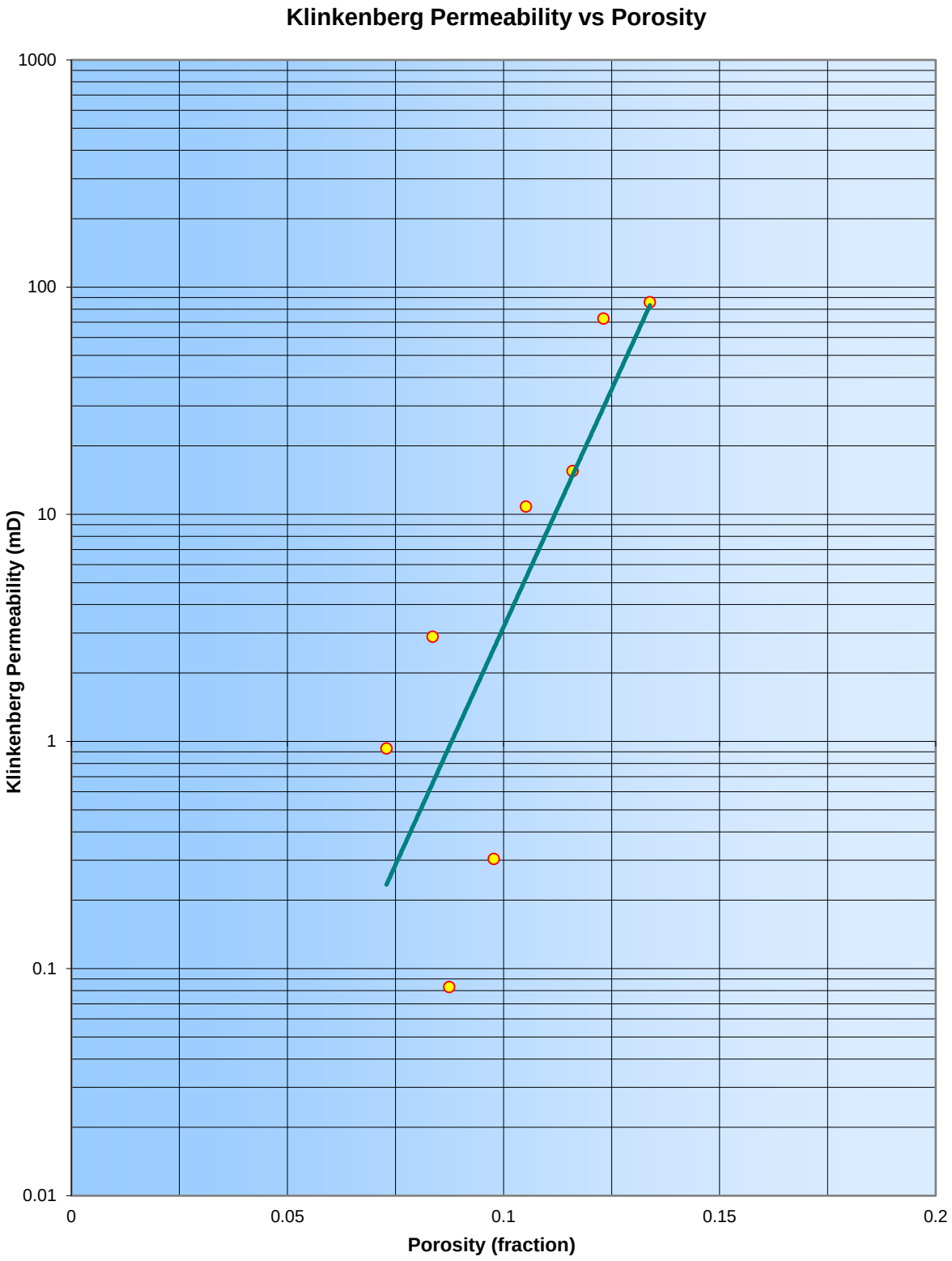
CMS-300™ CONVENTIONAL PLUG ANALYSIS – SCAL REPORT

Sample Number	Depth (ft)	Confining Stress (psi)	Pore Volume (cm^3)	Porosity fraction	Permeability, millidarcies		Grain Volume (cm^3)	Grain Density (g/cm^3)	Dry Weight (g)	Length (cm)	Diameter (cm)
					Klinkenberg	Kair					
1A	14432.00	800	2.100	0.116	15.5	17.0	16.012	2.64	42.297	3.668	2.522
		4225	1.882	0.105	10.8	11.9					
2A	14441.50	800	2.031	0.134	85.8	104.	13.144	2.64	34.657	3.024	2.546
		4225	1.845	0.123	72.6	86.1					
3A	14477.00	800	2.104	0.098	0.304	0.462	19.417	2.65	51.461	4.286	2.540
		4225	1.860	0.087	0.083	0.167					
4A	14808.50	800	1.521	0.084	2.89	3.39	16.680	2.63	43.946	3.684	2.528
		4225	1.312	0.073	0.930	1.14					

Glacier Oil & Gas
Redoubt #2
HOU-160554



ADVANCED CORE ANALYSIS STUDY

Glacier Oil & Gas
Redoubt #2

INTERIM DATA

Submitted to:

Glacier Oil & Gas

September 30, 2016

Performed by:

Core Laboratories
Petroleum Services Division
6316 Windfern
Houston, Texas 77040

HOU-160554

BRINE SENSITIVITY: PERMEABILITY AS A FUNCTION OF THROUGHPUT

Extracted State Sample

Temperature: 195 °F Net Confining Stress: 4225 psi Flow Rate: 0.200 cm^3/min

Fluids: 6% Potassium Chloride, 5% Potassium Chloride,
4% Potassium Chloride, 3% Potassium Chloride, 2% Potassium Chloride

		Sample Number:	4A
Company:	Glacier Oil & Gas	Sample Depth, feet:	14808.50
Well:	Redoubt #2	Klinkenberg Permeability, md:	0.930
File:	HOU-160554	Porosity, fraction:	0.073

Fluid	Flow Direction	Cumulative Fluid Injected, pore volumes		Differential Pressure, psi	Specific Permeability to Fluid, millidarcies	Permeability Ratio $K / K_{initial}$, percent
		fluid	total			
6% KCl	Production	1.01	1.01	30.8	0.404	1.00
		2.05	2.05	30.8	0.404	1.00
		3.07	3.07	30.8	0.404	1.00
		4.11	4.11	30.8	0.404	1.00
		5.10	5.10	30.8	0.404	1.00
		6.05	6.05	30.8	0.404	1.00
		7.04	7.04	30.8	0.404	1.00
		8.11	8.11	30.8	0.404	1.00
		9.06	9.06	30.8	0.404	1.00
		10.1	10.1	30.8	0.404	1.00
5% KCl	Production	0.95	11.0	30.4	0.402	0.995
		1.97	12.1	30.4	0.402	0.995
		3.01	13.1	30.4	0.402	0.995
		4.07	14.2	30.3	0.404	0.998
		5.07	15.2	30.3	0.404	0.998
		6.05	16.1	30.3	0.404	0.998
		7.08	17.2	30.3	0.404	0.998
		8.13	18.2	30.3	0.404	0.998
		9.20	19.3	30.3	0.404	0.998
		10.3	20.4	30.3	0.404	0.998

BRINE SENSITIVITY: PERMEABILITY AS A FUNCTION OF THROUGHPUT

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		Sample Number:	4A
Company:	Glacier Oil & Gas	Sample Depth, feet:	14808.50
Well:	Redoubt #2	Klinkenberg Permeability, md:	0.930
File:	HOU-160554	Porosity, fraction:	0.073

Fluid	Flow Direction	Cumulative Fluid Injected, pore volumes		Differential Pressure, psi	Specific Permeability to Fluid, millidarcies	Permeability Ratio $K / K_{initial}$, percent
		fluid	total			
4% KCl	Production	1.01	21.4	30.0	0.404	0.999
		2.10	22.5	30.0	0.404	0.999
		3.12	23.5	30.0	0.404	0.999
		4.10	24.5	30.0	0.404	0.999
		5.04	25.4	30.0	0.404	0.999
		5.99	26.4	30.0	0.404	0.999
		7.06	27.4	30.0	0.404	0.999
		8.15	28.5	30.0	0.404	0.999
		9.17	29.6	30.0	0.404	0.999
		10.2	30.6	30.0	0.404	0.999
3% KCl	Production	1.01	31.6	29.8	0.403	0.997
		2.00	32.6	29.8	0.403	0.997
		3.04	33.6	29.8	0.403	0.997
		4.06	34.6	29.8	0.403	0.997
		5.01	35.6	29.8	0.403	0.997
		6.09	36.7	29.8	0.403	0.997
		7.16	37.7	29.8	0.403	0.997
		8.23	38.8	29.8	0.403	0.997
		9.25	39.8	29.8	0.403	0.997
		10.3	40.9	29.8	0.403	0.997
2% KCl	Production	1.04	41.9	29.6	0.402	0.994
		2.06	42.9	29.6	0.402	0.994
		3.15	44.0	29.6	0.402	0.994
		4.10	45.0	29.6	0.402	0.994
		5.20	46.1	29.6	0.402	0.994
		6.16	47.0	29.6	0.402	0.994
		7.14	48.0	29.6	0.402	0.994
		8.15	49.0	29.6	0.402	0.994
		9.17	50.0	29.6	0.402	0.994
		10.2	51.1	29.6	0.402	0.994
	Injection	10.4	51.2	29.5	0.404	0.999

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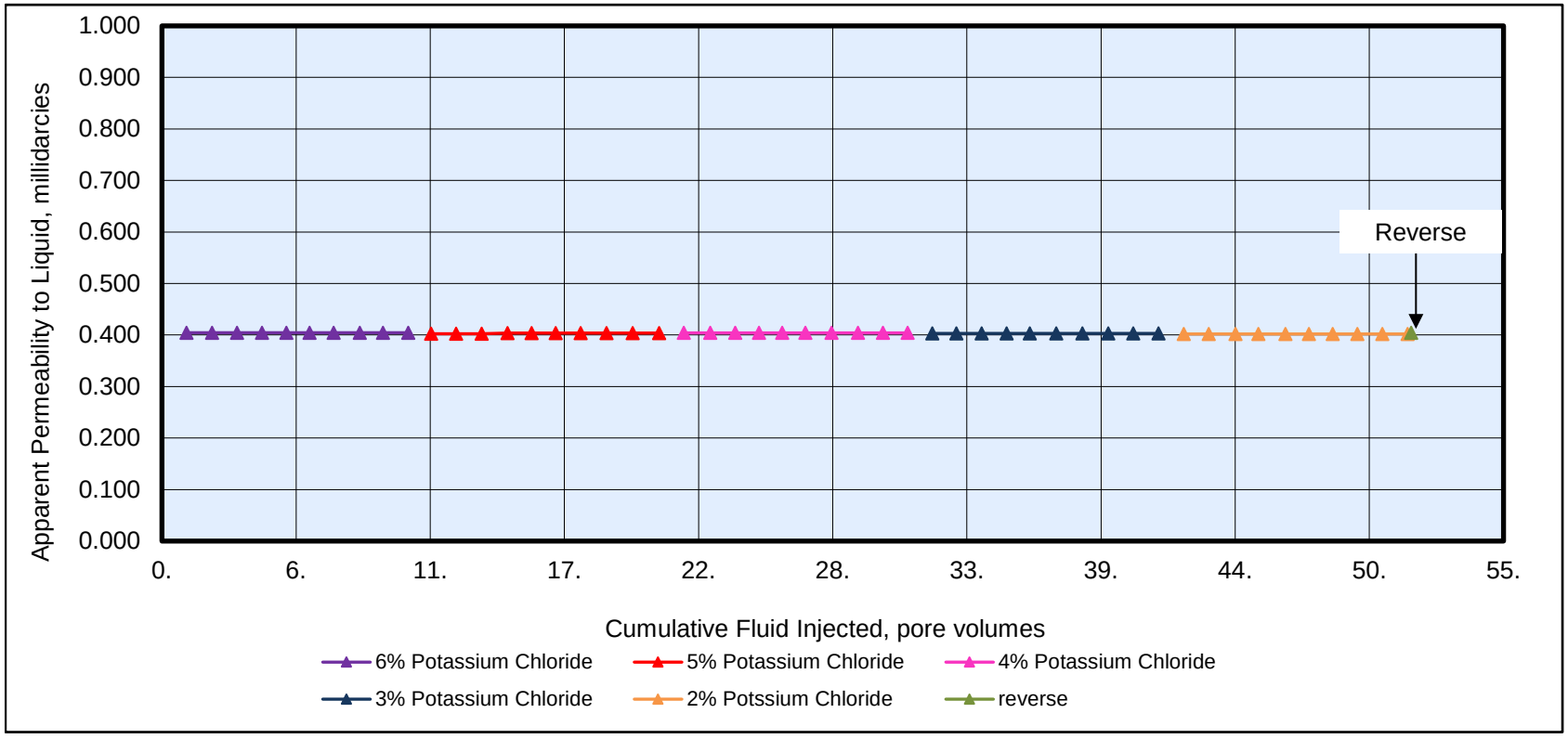
Company:	Glacier Oil & Gas
Well:	Redoubt #2
File:	HOU-160554

Sample Number:	4A
Sample Depth, feet:	14808.50
Klinkenberg Permeability, md:	0.930
Porosity, fraction:	0.073



SUMMARY OF FLUID PARAMETERS

		Sample Number:	4A
Company:	Glacier Oil & Gas	Sample Depth, feet:	14808.50
Well:	Redoubt #2	Klinkenberg Permeability, md:	0.930
File:	HOU-160554	Porosity, fraction:	0.073

Fluid	Temperature, °F	Viscosity, centipoise
6% Potassium Chloride	195.	0.332
5% Potassium Chloride	195.	0.329
4% Potassium Chloride	195.	0.326
3% Potassium Chloride	195.	0.323
2% Potassium Chloride	195.	0.320