

October 23, 1984

Reply To: 10703 E. BETHANY DRIVE AURORA, COLORADO 80014

Woods Petroleum Corporation 3817 Northwest Expressway, Suite 700 Oklahoma City, Oklahoma 73112

Attention: Mr. Jeff Callard

#### Subject:

Preliminary Phase Determination USA-Federal 22-1 Well Wildcat Converse County, Wyoming File Number: ARFL-840138

#### Gentlemen:

On October 11, 1984 duplicate subsurface samples were collected from the subject well by a representative of Cable, Inc. The samples were forwarded to our Aurora laboratory for phase determination. The results of these determinations are presented in this preliminary report.

A portion of each bottom-hole sample was charged to a high pressure, windowed cell at room temperature and a visual bubble point was then measured. This data is shown on page two. The samples were then expanded to the reported reservoir temperature of 253°F. During constant composition expansions at this temperature both samples were observed to have bubble points. The pressure-volume relations and liquid volume data is presented on pages three and four.

If you should have any questions pertaining to these test results or if we can be of further assistance, please do not hesitate to contact us at (303)751-9334.

Very truly yours,

CORE LABORATORIES, Inc.

Craig L. Gromley
Reservoir Fluid Supervisor

CLB/sss 4 cc addressee

Reservoir Fluid Analysis

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Company	Woods Petroleu	m Corporation	Date Samp	oled	October	11, 1984
Well	USA-Federal 22-	1	County		Converse	
Field	Wildcat		State		Wyoming	<del></del>
		FORMATION CHAI	RACTERISTIC	os Os		
Formation	Name		.*			
Date Firs	t Well Completed					
	Reservoir Pressure	1	-		PSIG @	Ft.
	Produced Gas/Oil F				•	SCF/Bb1
	ction Rate					Bb1/Day
Separ	ator Pressure and	Temperature			PSIG	°F.
011 G	ravity at 60°F.	2 7 7 1 2 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1				°API
Datum	ternium Catalant (1990) - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 -					Ft. Subsea
Original	Gas Cap					
		WELL CHARA	CTERISTICS			
Elevation						Ft.
Total Dep	th					Ft.
Producing						Ft.
	ze and Depth				In. to	Ft
	ity Index			Вь1/1	O/PSI @	Bb1/Day
Last Rese	rvoir Pressure		5112		PSIG @	Ft.
Statu	voir Temperature s of Well		253		°F. @	Ft.
	ure Gauge					
	oduction Rate					Bb1/Day
1.5	il Ratio					SCF/Bb1
	ator Pressure and	Temperature			PSIG,	°F.
	Pressure					PSLA
Well Maki	ng water					% Cut
	1964	SAMPLING C	ONDITIONS			
Sampled a						Ft.
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	il Ratio	m			DOTO	SCF/Bb]
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Sampled b				e, Inc.		
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REMARKS:

These analyses, opinions or interpretations are based on observations and material supplied by the client to whom, and for whose exclusive and confidential use, this report is made. The interpretations or opinions expressed represent the best judgement of Core Laboratories, Inc. (all errors and omissions excepted); but Core Laboratories, Inc. and its officers and employees, assume no responsibility and make no warrenty or representations as to the productions of profitable page of any oil, was or other mineral usell or sand in connection with which such report is used or relied upon.

Reservoir Fluid Analysis

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#### SUMMARY OF SAMPLES RECEIVED IN LABORATORY

# Subsurface Fluid Samples

#### Laboratory Bubble Point Pressure\*

Cylinder Number	Pressure, PSIG	Temperature, °F.	
259691	4258	72	
259756	4246	72	

\*Visual Bubble Point in Windowed Cell

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# VOLUMETRIC DATA OF RESERVOIR FLUID SAMPLE\*

Saturation pressure (bubble point pressure) = 4879 PSIG @ 253°F.

Specific volume at saturation pressure = 0.03496 ft<sup>3</sup>/1b @ 253°F.

Thermal expansion @ 6000 PSIG = 1.20750 V @ 253°F./V @ 76°F.

Compressibility @ 253°F.:

From 8000 PSIG to 6000 PSIG =  $29.41 \times 10^{-6} \text{ V/V/PSI}$ From 6000 PSIG to 5111 PSIG =  $40.65 \times 10^{-6} \text{ V/V/PSI}$ From 5111 PSIG to  $4879 \text{ PSIG} = 52.16 \times 10^{-6} \text{ V/V/PSI}$ 

\*Cylinder Number 259691

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Reservoir Fluid Analysis

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#### PRESSURE-VOLUME RELATIONS OF RESERVOIR FLUID AT 253°F.\*

Pressure, PSIG	Relative Volume(1)	Liquid Volume Volume(1)	Liquid Volume Volume(2)
8000	0.8962		
7500	0.9096		
7000	0.9230		
6500	0.9367		
6000	0.9522		
5500	0.9709		
5200	0.9838		
5111(3)	0.9879		
5000	0.9939		
4879(4)	1.0000	100.0	100.0
4843	1.0028	85.1	85.3
4812	1.0053	65.9	66.2
4788	1.0072	62.5	63.0
4768	1.0089	61.0	61.5
4742	1.0110	59.7	60.4
4657	1.0184	56.1	57.1
4465	1.0366	51.5	53.4
4133 .	1.0742	47.0	50.5
3739	1.1307	44.1	49.9
3360	1.2070	40.9	49.4
2935	1.3229	36.3	48.1
2302	1.5955	28.7	45.8
1931	1.8698	23.9	44.7
1668	2.1447	20.2	43.3
1489	2.4005	17.8	42.6
1161	3.0927		
854	4.2568		
607	6.0955		

#### \*Cylinder Number 259691

- (1) Liquid volume is liquid phase volume expressed as a percent of the total volume of gas and liquid at the indicated pressure.
- (2) Liquid volume is liquid phase volume expressed as a percent of volume at saturation pressure.
- (3) Reservoir Pressure
- (4) Bubble Point Pressure

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Reservoir Fluid Analysis

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# VISCOSITY DATA AT 253°F.\*

Pressure, PSIG	Oil Viscosity Centipoise
	GENCIPOISE
8000	0.106
7500	0.103
7000	0.100
6500	0.097
6000	0.094
5500	0.092
5200	0.090
5111	0.089
4879	0.088
0	1.048

\*Cylinder Number 259691

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# CORE LABORATORIES, INC. Petroleum Rescruoir Engineering DALLAS, TEXAS

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# PARTIAL VISCOSITY OF RESERVOIR FLUID @ 2530F.

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	Well	USA-Federal			Converse	
	Field	Wildcat		County	Wyoming	
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300						
	4000	5000	600	00	7000	8000

Reservoir Fluid Analysis

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# VOLUMETRIC DATA OF RESERVOIR FLUID SAMPLE\*

Saturation pressure (bubble point pressure) = 4862 PSIG @ 253°F.

Specific volume at saturation pressure = 0.03504 ft<sup>3</sup>/1b @ 253°F.

Thermal expansion @ 6000 PSIG = 1.20764 V @ 253°F./V @ 76°F.

Compressibility @ 253°F.:

From 8000 PSIG to 6000 PSIG =  $28.87 \times 10^{-6} \text{ V/V/PSI}$ From 6000 PSIG to 5111 PSIG =  $39.72 \times 10^{-6} \text{ V/V/PSI}$ From 5111 PSIG to  $4862 \text{ PSIG} = 57.83 \times 10^{-6} \text{ V/V/PSI}$ 

\*Cylinder Number 259756

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Well	IISA-Federal	22-1

# PRESSURE-VOLUME RELATIONS OF RESERVOIR FLUID AT 253°F.\*

Pressure, PSIG	Relative Volume(1)	Liquid Volume Volume(1)	Liquid Volume Volume(2)
8000	0.8959		
7500	0.9091		
7000	0.9212		
6500	0.9350	5	
6000	0.9508		
5500	0.9689	180	
5200	0.9818		
5111(3)	0.9856		
5000	0.9918		
4900	0.9989		
4862(4)	1.0000	100.0	100.0
4838	1.0019	82.8	83.0
4818	1.0035	70.6	70.9
4795	1.0054	64.1	64.4
4773	1.0072	62.2	62.7
4752	1.0090	60.6	61.2
4750	1.0253	54.7	56.1
4229 .	1.0625	49.2	52.3
3812	1.1189	45.6	51.0
3407	1.1949	41.7	49.8
2968	1.3096	36.8	48.2
2562	1.4642	32.0	46.9
2211	1.6583	27.4	45.4
1912	1.8922	23.5	44.5
1629	2.2024	19.7	43.5
1343	2.6736		
1091	3.3052		
820	4.4621		
593	6.2790		

\*Cylinder Number 259756

- Liquid volume is liquid phase volume expressed as a percent of the total volume of gas and liquid at the indicated pressure.
- (2) Liquid volume is liquid phase volume expressed as a percent of volume at saturation pressure.
- (3) Reservoir Pressure
- (4) Bubble Point Pressure

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