



## Humble Geochemical Services

Division of Humble Instruments & Services, Inc.

P.O. Box 789 • Humble, Texas 77347

218 Higgins Street • Humble, Texas 77338

TELEPHONE: (713) 540-6050

FACSIMILE: (713) 540-2864

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Geochemical Services for Exploration, Development and Production

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October 14, 1994

Larry Tedesco  
Chevron USA  
1301 McKinney, Room 1830  
Houston, TX 77010

Enclosed are the kerogen results for the ~~Chevron~~ Buckhorn Fed. #2-24, sec. 24-6N-1E sample 7200-7336 ft. Kerogen observations are plotted on Table 1 attached. As can be seen, recovery was very poor, and there was no residue recovered to imbed for reflectance study. The sample is overly mature for gas or liquid hydrocarbon generation at TAI stage 5. I have logged the kerogen type a dominantly coaly (95%), but no characteristic wood structure was identified; so the black opaque fragments could be graphite?.

You asked if I could identify this sample as Cretaceous, but no fossils were identified; so no age designation could be made.

The kerogen slide will be returned to Ed Donovan at your Technical Center.

Jack D. Burgess

Table 1  
THERMAL ALTERATION, KEROGEN TYPE, AND PALYNOFACIES DATA

DATE 10-14-94 WELL CHEV. Buckhorn Fgd 22-24 LOCATION 24-6N-1E	DEPTH <input checked="" type="checkbox"/> FT <input type="checkbox"/> M 72.0	COLOR GREENISH LIGHT YELLOW YELLOW YELLOW-ORANGE ORANGE-BROWN LIGHT BROWN BROWN DARK BROWN-DARK GRAY DARK GRAY-BLACK 1 UNALTERED 2 LIGHT ALTERATION 3 MODERATE ALTERATION 4 STRONG ALTERATION 5 SEVERE ALTERATION 6 AMPHIBOL DEBRIS FINELY DISSEM. O.M. WOODY PLANT DEBRIS WOODY PLANT DEBRIS GOALY FRAGMENTS ALGAL DEBRIS PALYNOFORMS DIOC TAN POON VERY POOR RECOVERY BARREN OR O.M. MAVINE NEARSHORE-BRACKISH CONTINENTAL LACUSTRINE UNKNOWN YELLOW-ORANGE YELLOW-ORANGE ORANGE REFLECTANCE NEW IN %	THERMAL ALTERATION INDEX (TAI)	% SOURCE MATERIAL	PRESERVATION	RECOVERY	PALYNOFACIES	FLUORESCENCE	R <sub>0</sub>	REMARKS	
											1 2 3 4 5 6
											logged 25 coals because black irregular and opaque. No wood or coal FIBREURE VISIBLE No Fossils.
											No residue for in bedding for reflectance

Polynomorph Key  
A - Abundant  
C - Common  
V - Present  
R - Rare  
N - None Seen

CHEVRON USA

WELL NAME: Buckhorn #2-24 Federal  
 ATTN: Larry Tedesco

SAMPLE NO.	DEPTH 1 (ft)	DEPTH 2 (ft)	TOC AND ROCK-EVAL DATA				INTERPRETIVE RATIOS					NOTES		
			TOC	S1	S2	S3	TMAX	HI	OI	S2/S3	PI	SI/TOC	Check	Pyrogram
1	3500	3600	0.23	0.06	0.03	0.27	387 *	13	117	0.11	0.67	26	c	n
2	5440	5540	0.47	0.15	0.06	0.36	301 *	13	77	0.17	0.71	32	c	n
3	5600	5700	0.19	0.09	0.05	0.35	301 *	26	184	0.14	0.64	47	c	n
4	5700	5800	0.19	0.11	0.04	0.31	301 *	21	163	0.13	0.73	58	c	n
5	7200	7336	0.89	0.39	0.11	0.32	378 *	12	36	0.34	0.78	44	c	n

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\* Tmax data not reliable due to low S2 values

TOC = weight percent organic carbon  
 S1, S2 = mg hydrocarbons/g rock  
 S3 = mg carbon dioxide/g rock  
 Tmax = Degree C

HI = S2\*100/TOC  
 OI = S3\*100/TOC  
 PI = S1/(S1+S2)  
 SI/TOC = S1\*100/TOC

NOTES:  
 Check  
 c = sample analysis confirmed  
 Pyrogram  
 n = normal

October 31, 1994  
Houston, Texas

Palynological Assessment

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Norcen-Balcron #1-11 Kimpton (11-4N-2W, Jefferson County) and Buckhorn Petroleum #2-24 Federal (24-6N-1E, Broadwater), Montana.

G.T. Vaskey:

Standard preparation techniques were used in our San Ramon laboratory to produce the slides from the below-mentioned sampled intervals.

For the Buckhorn Federal all preparations contain a varied amount of black and degraded poorly-preserved altered amorphous debris (Inertinite) as well as a small amount of light-colored plant material and an occasional specimen of *Gleicheniidites*. I suspect that this lighter-colored and well preserved kerogen and few spores were extracted from the drilling muds. For that reason, I cannot establish an Early Cretaceous age for any section penetrated in this well.

Buckhorn samples: 3,000-3,500' at 100' intervals; 4,400-4,600'; 5,600-5,800'; and 6,600-7,336' at 100' intervals.

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The Norcen-Kimpton is a bit more complex to interpret. For study, I had available consultant palynological preparations and accompanying consultant report as well as slides made in-house at our laboratory. Both sets of slides (consultant and Chevron's) show a mix of degraded Inertinite similar to that in the Buckhorn Federal in addition to an Early Cretaceous mix of fairly well-preserved dinocysts.

The composition of the fossil mix and the level of their thermal alteration are very similar to what has been found in the drilling mud additives provided for study. I believe, at this time, that an age call of Early Cretaceous for penetrated section reflects drilling mud additive contamination. This is not a new problem for Western Interior palynologists and one easily overlooked if unaware of mud additives used in the drilling program. My interpretation is to favor a high thermal alteration for the rock package (Inertinite = indigenous kerogen).

Norcen-Kimpton samples: Twenty six composited samples from 1,530 to 14,846'.

  
R.P. Wright