

Exxon Production Research Company

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EPR.18ES.75

SOURCE CHARACTERISTICS OF CANNED CUTTINGS FROM
E556 THE 15/6-2 (RE) WELL, OFFSHORE NORWAY

Report by: R. E. Metter

Analyses by: H. M. Fry
R. R. Dudley
J. L. Morgan

Reservoir Evaluation Division

February 1975

EPR PROPRIETARY

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SUMMARY AND CONCLUSIONS

Canned cuttings from the interval 10,400-15,680 feet in the 15/6-2 reentry well were analyzed routinely for hydrocarbon source characteristics. Shallower samples from 15/6-2 were analyzed previously, and those results were reported in our service report EPR.9ES.72 of February 1972.

The recent work was billed to our Job No. 6798.

Interpretations of the analytical data are as follows:

<u>Approximate Interval (feet)</u>	<u>Source Richness</u>	<u>Maturity</u>	<u>Reservoired Hydrocarbons Expected, if Any</u>
10,400-11,250	Poor	Mature	Lean
by <i>11,250-12,400</i>	<i>Very Rich</i>	Mature	Oil, Gas
12,400-15,680	Poor	Mature	Lean

The analytical data are listed in detail in Tables I-III, and they are summarized graphically in Fig. 1. Source ratings based only on kerogen and total organic matter are given in Table II.

The rich interval beginning roughly at 11,200-11,300 ft appears to be the Malm (Fig. 1). The samples from this interval in 15/6-2 are very rich in organic matter, gas and gasolines, and they contain predominantly amorphous kerogen. They represent a richer and "oilier" facies than was noted in the comparable interval at 15/6-3.

Below 13,000 ft, the samples consisted almost entirely of organically-lean, bright-red clastics, forming a poor source interval to total depth (15,680 ft).

PROCEDURES

Compositions and concentrations of hydrocarbon gases in the air spaces above the cuttings in the sample cans were determined by gas chromatography. Similar data were obtained on gases released from a standard mixture of cuttings and tap water after two minutes of agitation in a Waring blender. Combined results on the air space gas plus the cuttings gas were calculated for each sample. The data were plotted graphically to show vertical variations in total gas (C₁-C₄) and wet gas (C₂-C₄), and a graphical plot was also made of the percent wet gas in total gas (Fig. 1). Detailed results of the analyses are listed in Table I.

Chips of uniform lithologies were picked by hand from the heterogenous mixtures of chips in 13 of the original samples. These are described in Table II. Our standard analytical procedures were used for determining the C₄-C₇ content and the total organic content of the "picked" chips. These results are given in Table III, and they are plotted graphically in Fig. 1. Visual kerogen characteristics of 11 of these samples were also determined (Table II and Fig. 1).

DISCUSSION

The geochemical patterns in Fig. 1 show a simple tripartite picture. The upper organically-lean portion dominated by carbonate beds is presumably the Cretaceous. The underlying interval of rich oil-source shales with a middle sand unit is presumably the Jurassic. The underlying red beds are presumably Triassic and possibly basal Lias.

The upper Jurassic oil-source samples from this well are notably richer than comparable samples from the 15/6-3 well. The 15/6-3 samples were rated as only fair gas sources, but these may have included cavings from the overlying Cretaceous beds.

RELATED SERVICE REPORTS

EPR.9ES.72 "Source Evaluation of Canned Cuttings from the 15/6-1 and 15/6-2 Wells, Norway" by R. Metter et al., February 1972.

EPR.13ES.75 "Hydrocarbon Source Characteristics of Canned Cuttings from the 15/6-3 Well, Norway" by R. E. Metter et al., February 1975.

TABLE IA

C₁-C₄ HYDROCARBON ANALYSES - AIR SPACE AT TOP OF CANS

SAMPLE NUMBER	R	DEPTH	GAS CONCENTRATION (VOLUME GAS PER MILLION VOLUMES CUTTINGS)							GAS COMPOSITION (PERCENT)								NOTES			
			METHANE (C ₁)	ETHANE (C ₂)	PROPANE (C ₃)	ISO-BUTANE (iC ₄)	NORMAL BUTANE (nC ₄)	WET (C ₂ -C ₄)	TOTAL (C ₁ -C ₄)	TOTAL GAS					WET GAS						
										C ₂ -C ₄	C ₁	C ₂	C ₃	iC ₄	nC ₄	C ₂	C ₃		iC ₄	nC ₄	
62187A	4	10400	3.75	0.77	0.82	0.10	0.41	2.10	5.85	35.8974	64.13.14.	2. 7.	37.38.	5.20.							
62187B	4	10500	2.76	0.36	0.44	0.04	0.69	1.53	4.29	35.6643	65. 8.10.	1.16.	24.29.	3.44.							
62187C	4	10600	17.03	2.61	2.50	0.50	2.15	7.76	24.79	31.3029	68.11.10.	2. 9.	34.32.	6.28.							
62187D	4	10700	14.44	2.63	2.31	0.83	2.06	7.83	22.27	35.1593	65.12.10.	4. 9.	33.30.	11.26.							
62187E	4	10800	4.58	1.80	2.40	1.26	1.82	7.28	11.86	61.3828	39.15.20.	11.15.	25.33.	17.25.							
62187F	4	10900	31.20	12.05	11.06	4.36	4.52	31.99	63.19	50.6251	49.19.18.	7. 7.	37.35.	14.14.							
62187G	4	11000	10.32	4.34	4.35	1.29	1.70	11.68	22.00	53.0909	46.20.20.	6. 8.	37.37.	11.15.							
62187H	4	11100	3.36	4.38	8.00	0.58	1.28	14.24	17.60	80.9091	19.25.46.	3. 7.	31.56.	4. 9.							
62187I	4	11200	22.58	17.78	100.83	11.74	41.33	171.68	194.26	88.3764	12. 9.52.	6.21.	10.59.	7.24.							
62187J	4	11300	1156.16	756.90	1408.70	260.92	851.70	3280.22	4436.38	73.9391	26.17.32.	6.19.	23.43.	8.26.							
62187K	4	11400	3994.56	3532.80	12833.99	2745.40	8024.00	27136.18	31130.75	87.1684	13.11.41.	9.26.	13.47.	10.30.							
62187L	4	11500	9.81	15.50	80.14	20.34	97.89	203.87	213.68	95.4090	5. 7.38.	10.40.	8.39.	10.43.							
62187M	4	11600	3679.20	2184.00	5007.74	815.85	2626.68	10634.26	14313.46	74.2955	26.15.35.	6.18.	21.46.	8.25.							
62187N	4	11700	4230.44	3910.24	6276.64	994.31	2509.66	13690.84	17921.28	76.3943	24.22.34.	6.14.	29.46.	7.18.							
62187O	4	11978	2486.71	1114.84	852.57	154.06	394.35	2515.81	5002.52	50.2909	50.22.17.	3. 8.	44.34.	6.16.							
62187P	4	12070	42448.44	8228.57	4731.42	821.40	1743.03	15524.41	57972.85	26.7787	74.14. 8. 1. 3.	54.30.	5.11.								
62187Q	4	12000	1432.26	1140.00	596.16	66.04	168.15	1970.35	3402.61	57.9070	41.34.18.	2. 5.	58.30.	3. 9.							
62187R	4	12400	278.09	589.21	625.81	80.25	203.78	1499.05	1777.14	84.3518	16.33.35.	5.11.	39.42.	5.14.							
62188A	4	12400	230.04	159.58	154.59	26.96	46.62	387.75	617.79	62.7640	37.26.25.	4. 8.	41.40.	7.12.							
62188B	4	12700	67.06	32.15	32.26	6.94	11.29	82.64	149.70	55.2037	44.21.22.	5. 8.	39.39.	8.14.							
62188C	4	12800	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0. 0. 0. 0. 0.	0. 0. 0. 0.	0. 0.							*C*	
62188D	4	12900	7.97	4.51	5.34	0.93	1.59	12.37	20.34	60.8161	39.22.26.	5. 8.	36.43.	8.13.							
62229A	4	13000	2.86	0.95	0.36	0.02	0.12	1.45	4.31	33.6427	67.22. 8. 0. 3.	66.25.	1. 8.								
62229B	4	13100	40.65	5.88	3.37	0.47	1.19	10.91	51.54	21.1680	79.11. 7. 1. 2.	54.31.	4.11.								
62229C	4	13200	21.08	2.02	0.70	0.15	0.29	3.16	24.24	13.0362	87. 8. 3. 1. 1.	64.22.	5. 9.								
62229D	4	13300	14.55	4.31	2.53	0.46	0.95	8.19	22.74	36.0157	64.19.11.	2. 4.	52.31.	5.12.							
62229E	4	13400	20.51	4.70	2.73	0.48	1.22	9.13	29.64	30.8029	69.16. 9. 2. 4.	52.30.	5.13.								
62229F	4	13500	8.87	2.51	0.97	0.20	0.42	4.10	12.97	31.6114	69.19. 7. 2. 3.	61.24.	5.10.								
62229G	4	13600	105.89	16.97	9.48	1.54	3.71	31.70	137.59	23.0394	77.12. 7. 1. 3.	53.30.	5.12.								
62229H	4	13700	65.96	10.34	6.07	0.82	2.56	19.79	85.75	23.0787	77.12. 7. 1. 3.	52.31.	4.13.								
62229I	4	13800	8.71	1.35	0.61	0.09	0.27	2.32	11.03	21.0335	79.12. 6. 1. 2.	58.26.	4.12.								
62229J	4	13900	28.51	4.53	2.71	0.38	2.26	9.88	38.39	25.7358	74.12. 7. 1. 6.	46.27.	4.23.								
62229K	4	14000	11.55	4.43	1.61	0.23	1.48	7.75	19.30	40.1554	60.23. 8. 1. 8.	57.21.	3.19.								
62229L	4	14100	7.52	1.47	0.41	0.20	0.69	2.77	10.29	26.9193	73.14. 4. 2. 7.	53.15.	7.25.								
62229M	4	14200	8.18	1.65	0.52	0.21	0.67	3.05	11.23	27.1594	72.15. 5. 2. 6.	54.17.	7.22.								
62229N	4	14300	21.29	5.85	1.90	0.59	1.21	9.55	30.84	30.9662	69.19. 6. 2. 4.	61.20.	6.13.								
62229O	4	14400	20.98	4.13	0.79	0.34	0.69	5.95	26.93	22.0942	78.15. 3. 1. 3.	69.13.	6.12.								
62229P	4	14500	8.82	1.09	0.36	0.08	0.34	1.87	10.69	17.4930	83.10. 3. 1. 3.	59.19.	4.18.								
62229Q	4	14600	14.47	2.50	1.36	0.20	1.22	5.28	19.75	26.7340	73.13. 7. 1. 6.	47.26.	4.23.								
62229R	4	14700	3.70	2.39	0.85	0.15	0.47	3.86	7.56	51.0582	49.32.11.	2. 6.	62.22.	4.12.							
62229S	4	14800	30.85	2.38	1.91	0.45	2.33	7.07	37.92	18.6444	82. 6. 5. 1. 6.	34.27.	6.33.								
62229T	4	14900	28.55	8.45	2.94	0.51	2.47	14.37	42.92	33.4808	66.20. 7. 1. 6.	59.20.	4.17.								
62230A	4	15000	56.74	5.13	3.85	0.76	4.71	14.45	71.19	20.2977	80. 7. 5. 1. 7.	35.27.	5.33.								
62230B	4	15100	46.12	8.39	4.60	0.79	1.91	15.69	61.81	25.3842	75.14. 7. 1. 3.	54.29.	5.12.								
62230C	4	15200	23.76	3.77	2.67	0.46	0.98	7.88	31.64	24.9051	76.12. 8. 1. 3.	48.34.	6.12.								
62230D	4	15300	9.80	2.13	1.59	0.58	1.44	5.74	15.54	36.9369	63.14.10.	4. 9.	37.28.	10.25.							
62230E	4	15400	53.45	6.49	4.58	1.19	3.64	15.90	69.35	22.9271	77. 9. 7. 2. 5.	41.29.	7.23.								
62230F	4	15550	72.19	2.04	1.38	0.50	1.28	5.20	77.39	6.7192	92. 3. 2. 1. 2.	38.27.	10.25.								
62230G	4	15680	35.17	1.59	1.10	0.47	1.27	4.43	39.60	11.1868	89. 4. 3. 1. 3.	35.25.	11.29.								

B = CUTTINGS NOT ANALYZED

C = AIR SPACE GAS NOT RUN

BC = NO ANALYSES RUN

TABLE 1B

C₁-C₄ HYDROCARBON ANALYSES - CUTTINGS ONLY

SAMPLE NUMBER	R	DEPTH	GAS CONCENTRATION (VOLUME GAS PER MILLION VOLUMES CUTTINGS)							GAS COMPOSITION (PERCENT)								NOTES	
			METHANE	ETHANE	PROPANE	ISO-BUTANE	NORMAL BUTANE	WET	TOTAL	TOTAL GAS					WET GAS				
			(C ₁)	(C ₂)	(C ₃)	(iC ₄)	(nC ₄)	(C ₂ -C ₄)	(C ₁ -C ₄)	C ₂ -C ₄	C ₁	C ₂	C ₃	iC ₄	nC ₄	C ₂	C ₃		iC ₄
62187A	4	10400	1568.39	8.25	3.59	0.72	2.25	14.81	1583.20	0.9354	99.	1.	0.	0.	0.	56.24.	5.15.		
62187B	4	10500	1770.22	18.36	5.70	2.26	3.99	30.31	1800.53	1.6834	99.	1.	0.	0.	0.	61.19.	7.13.		
62187C	4	10600	1557.88	20.52	6.54	3.25	5.01	35.32	1593.20	2.2169	99.	1.	0.	0.	0.	58.19.	9.14.		
62187D	4	10700	1593.62	16.98	5.98	4.41	4.75	32.12	1625.74	1.9757	99.	1.	0.	0.	0.	52.19.	14.15.		
62187E	4	10800	1555.78	17.10	13.91	12.53	12.90	56.44	1612.22	3.5007	96.	1.	1.	1.	1.	30.25.	22.23.		
62187F	4	10900	1639.87	22.38	24.53	17.95	17.92	82.78	1722.65	4.8054	96.	1.	1.	1.	1.	27.29.	22.22.		
62187G	4	11000	1660.90	41.04	45.83	21.60	24.56	133.03	1793.93	7.4155	93.	2.	3.	1.	1.	31.35.	16.18.		
62187H	4	11100	1316.10	22.98	77.50	11.99	28.54	141.01	1457.11	9.6774	90.	2.	5.	1.	2.	16.55.	9.20.		
62187I	4	11200	1728.17	19.08	175.37	49.57	189.74	433.76	2161.93	20.0635	80.	1.	8.	2.	9.	4.40.	11.45.		
62187J	4	11300	6485.90	10425.58	46964.58	13923.82	47124.45	120438.31	126924.25	94.8899	5.	8.	39.	11.	37.	9.40.	12.39.		
62187K	4	11400	2223.29	4022.40	36167.02	14445.96	52108.78	106744.13	108967.44	97.9596	2.	4.	33.	13.	48.	4.34.	14.48.		
62187L	4	11500	3553.05	3801.60	27622.06	8727.26	36815.98	76966.88	80519.94	95.5873	4.	5.	34.	11.	46.	5.36.	11.48.		
62187M	4	11600	4425.55	4934.39	18918.13	3866.35	18861.09	46579.95	51005.50	91.3234	9.	10.	37.	8.	36.	11.41.	8.40.		
62187N	4	11700	4898.59	4771.20	21223.28	7446.76	26224.30	59665.53	64564.12	92.4128	8.	7.	33.	12.	40.	8.36.	12.44.		
62187O	4	11978	1400.72	1437.60	537.79	235.43	397.36	2608.18	4008.90	65.0597	35.	36.	13.	6.	10.	55.21.	9.15.		
62187P	4	12070	10028.44	5184.00	6955.20	1442.11	4177.20	17758.51	27786.95	63.9095	36.	19.	25.	5.	15.	29.39.	8.24.		
62187Q	4	12000	2233.80	684.00	696.76	146.85	424.80	1952.41	4186.21	46.6390	53.	16.	17.	4.	10.	35.35.	8.22.		
62187R	4	12400	1742.36	717.60	634.66	127.82	359.31	1839.39	3581.75	51.3545	48.	20.	18.	4.	10.	38.35.	7.20.		
62188A	4	12400	2144.45	468.00	329.13	130.15	238.95	1166.23	3310.68	35.2263	65.	14.	10.	4.	7.	41.28.	11.20.		
62188B	4	12700	2049.84	289.80	122.03	48.56	102.88	563.27	2613.11	21.5555	78.	11.	5.	2.	4.	51.22.	9.18.		
62188C	4	12800	1949.97	43.05	55.73	24.38	50.00	173.16	2123.13	8.1559	92.	2.	3.	1.	2.	25.32.	14.29.		
62188D	4	12900	1490.07	34.80	51.47	21.02	34.51	141.80	1631.87	8.6894	92.	2.	3.	1.	2.	25.36.	15.24.		
62229A	4	13000	1597.82	36.60	28.83	11.03	23.01	99.27	1697.09	5.8494	94.	2.	2.	1.	1.	37.29.	11.23.		
62229B	4	13100	630.72	12.48	9.78	3.50	7.08	32.84	663.56	4.9490	95.	2.	1.	1.	1.	37.30.	11.22.		
62229C	4	13200	1660.90	20.40	17.95	11.13	25.53	75.01	1735.91	4.3210	96.	1.	1.	1.	1.	27.24.	15.34.		
62229D	4	13300	1505.32	54.48	82.84	14.49	36.73	188.54	1693.86	11.1308	89.	3.	5.	1.	2.	29.44.	8.19.		
62229E	4	13400	708.51	13.68	10.00	3.83	8.34	35.85	744.36	4.8162	95.	2.	1.	1.	1.	38.28.	11.23.		
62229F	4	13500	1576.80	33.78	24.09	10.76	23.89	92.52	1669.32	5.5423	95.	2.	1.	1.	1.	36.26.	12.26.		
62229G	4	13600	1665.10	29.46	22.54	5.82	17.08	74.90	1740.00	4.3046	96.	2.	1.	0.	1.	39.30.	8.23.		
62229H	4	13700	698.00	13.98	11.89	3.66	22.08	51.61	749.61	6.8849	93.	2.	2.	0.	3.	27.23.	7.43.		
62229I	4	13800	1732.38	59.16	66.20	9.54	22.43	157.33	1889.71	8.3256	91.	3.	4.	1.	1.	38.42.	6.14.		
62229J	4	13900	1833.29	23.64	18.69	11.62	40.27	94.22	1927.51	4.8881	95.	1.	1.	1.	2.	25.20.	12.43.		
62229K	4	14000	723.23	14.64	11.36	4.29	12.97	43.26	766.49	5.6438	94.	2.	1.	1.	2.	34.26.	10.30.		
62229L	4	14100	653.85	25.38	18.07	3.94	14.74	62.13	715.98	8.6776	90.	4.	3.	1.	2.	41.29.	6.24.		
62229M	4	14200	1677.71	71.76	67.56	10.99	36.37	186.68	1864.39	10.0129	89.	4.	4.	1.	2.	39.36.	6.19.		
62229N	4	14300	1635.67	61.56	57.88	5.89	17.39	142.72	1778.39	8.0252	93.	3.	3.	0.	1.	43.41.	4.12.		
62229O	4	14400	1862.72	31.02	26.21	11.42	32.83	101.48	1964.20	5.1665	94.	2.	1.	1.	2.	31.26.	11.32.		
62229P	4	14500	2047.74	38.64	52.41	7.50	38.50	137.05	2184.79	6.2729	94.	2.	2.	0.	2.	28.39.	5.28.		
62229Q	4	14600	2194.90	21.96	30.68	12.51	27.43	92.58	2287.48	4.0472	96.	1.	1.	1.	1.	24.32.	14.30.		
62229R	4	14700	1774.42	12.54	10.90	3.86	29.47	56.77	1831.19	3.1001	96.	1.	1.	0.	2.	22.19.	7.52.		
62229S	4	14800	651.74	27.66	20.00	3.83	12.97	64.46	716.20	9.0002	90.	4.	3.	1.	2.	43.31.	6.20.		
62229T	4	14900	1585.21	12.18	11.86	4.10	23.76	51.90	1637.11	3.1702	97.	1.	1.	0.	1.	23.23.	8.46.		
62230A	4	15000	1812.27	15.69	14.07	12.51	34.34	76.61	1888.88	4.0558	95.	1.	1.	1.	2.	20.18.	16.46.		
62230B	4	15100	1656.69	24.18	19.44	7.07	30.53	81.22	1737.91	4.6734	96.	1.	1.	0.	2.	30.24.	9.37.		
62230C	4	15200	1959.44	22.08	26.27	15.31	40.53	104.19	2063.63	5.0488	95.	1.	1.	1.	2.	21.25.	15.39.		
62230D	4	15300	1576.80	11.19	7.30	5.54	10.47	34.50	1611.30	2.1411	98.	1.	0.	0.	1.	33.21.	16.30.		
62230E	4	15400	1501.11	23.10	18.75	8.99	23.28	74.12	1575.23	4.7053	96.	1.	1.	1.	1.	31.25.	12.32.		
62230F	4	15550	1757.60	14.70	8.31	5.68	19.56	48.25	1805.85	2.6718	98.	1.	0.	0.	1.	30.17.	12.41.		
62230G	4	15680	1736.58	20.43	15.87	12.12	33.45	81.87	1818.45	4.5022	95.	1.	1.	1.	2.	25.19.	15.41.		

B = CUTTINGS NOT ANALYZED

C = AIR SPACE GAS NOT RUN

BC = NO ANALYSES RUN

TABLE IC

C₁-C₄ HYDROCARBON ANALYSES - CUTTINGS AND AIR SPACE

SAMPLE NUMBER	R	DEPTH	GAS CONCENTRATION (VOLUME GAS PER MILLION VOLUMES CUTTINGS)							GAS COMPOSITION (PERCENT)								NOTES
			METHANE	ETHANE	PROPANE	ISO-BUTANE	NORMAL BUTANE	WET	TOTAL	TOTAL GAS					WET GAS			
			(C ₁)	(C ₂)	(C ₃)	(C ₄)	(nC ₄)	(C ₂ -C ₄)	(C ₁ -C ₄)	C ₂ -C ₄	C ₁	C ₂	C ₃	iC ₄	nC ₄	C ₂	C ₃	
62187A	4	10400	1572.14	9.02	4.41	0.62	2.66	16.91	1589.05	1.0641	99.1	0.0	0.0	0.0	53.26	5.16		
62187B	4	10500	1772.98	18.72	6.14	2.30	4.68	31.84	1804.82	1.7641	99.1	0.0	0.0	0.0	59.19	7.15		
62187C	4	10600	1574.91	23.13	9.04	3.75	7.16	43.08	1617.99	2.6625	98.1	1.0	0.0	0.0	53.21	9.17		
62187D	4	10700	1608.06	19.61	8.29	5.24	6.81	39.95	1648.01	2.4241	98.1	1.0	0.0	0.0	49.21	13.17		
62187E	4	10800	1560.36	18.90	16.31	13.79	14.72	63.72	1624.08	3.9234	96.1	1.1	1.1	1.1	29.26	22.23		
62187F	4	10900	1671.07	34.43	35.59	22.31	22.44	114.77	1785.84	6.4266	94.2	2.1	1.1	1.1	30.31	19.20		
62187G	4	11000	1671.22	45.38	50.18	22.89	26.26	144.71	1815.93	7.9689	93.2	3.1	1.1	1.1	31.35	16.18		
62187H	4	11100	1319.46	27.36	85.50	12.57	29.82	155.25	1474.71	10.5275	89.2	6.1	1.2	1.2	18.55	8.19		
62187I	4	11200	1750.75	36.86	276.20	61.31	231.07	605.44	2356.19	25.6957	73.2	12.3	10.3	10.3	6.46	10.38		
62187J	4	11300	7641.05	11184.48	50373.28	14184.73	47976.15	123718.50	131360.63	94.1823	6.9	38.11	37.7	9.41	11.39			
62187K	4	11400	6218.85	7555.20	49001.01	17191.36	60132.78	133880.25	140098.13	95.5618	4.5	35.12	43.6	6.37	13.44			
62187L	4	11500	3562.86	3817.10	27792.20	8747.60	36903.86	77170.69	80733.56	95.5869	4.5	34.11	46.5	5.36	11.48			
62187M	4	11600	8104.75	7118.39	23925.87	4682.20	21487.77	57214.21	65318.96	87.5920	12.11	37.7	33.7	12.42	8.38			
62187N	4	11700	9129.03	8681.44	27499.91	8441.07	28733.95	73356.31	82485.38	88.9325	11.11	33.10	35.12	12.37	12.39			
62187O	4	11978	3888.43	2552.44	1390.36	389.49	791.71	5123.99	9011.42	56.8611	43.28	15.4	9.9	50.27	8.15			
62187P	4	12070	52476.88	13412.57	11686.62	2263.51	5920.23	33282.92	85759.75	38.8095	60.16	14.3	7.7	40.35	7.18			
62187Q	4	12000	3666.06	1824.00	1292.92	212.89	592.95	3922.76	7588.82	51.6913	48.24	17.3	8.8	47.33	5.15			
62187R	4	12400	2019.45	1306.81	1260.47	208.07	563.09	3338.44	5358.89	62.2972	38.24	24.4	11.4	39.38	6.17			
62188A	4	12400	2374.49	627.58	483.72	157.11	285.57	1553.98	3928.47	39.5569	61.16	12.4	7.7	41.31	10.18			
62188B	4	12700	2116.90	321.95	154.29	55.50	114.17	645.91	2762.81	23.3787	76.12	6.2	4.4	49.24	9.18			
62188C	4	12800	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			*C*
62188D	4	12900	1498.04	39.31	56.81	21.95	36.10	154.17	1652.21	9.3311	92.2	3.1	2.2	25.38	14.23			
62229A	4	13000	1600.68	37.55	26.99	11.05	23.13	100.72	1701.40	5.9198	94.2	2.1	1.1	37.29	11.23			
62229B	4	13100	671.35	18.36	13.15	3.97	8.27	43.75	715.10	6.1180	93.3	2.1	1.1	42.30	9.19			
62229C	4	13200	1681.98	22.42	18.65	11.28	25.82	78.17	1760.15	4.4411	96.1	1.1	1.1	29.24	14.33			
62229D	4	13300	1519.87	58.79	85.37	14.89	37.68	196.73	1716.60	11.4604	89.3	5.1	2.2	30.43	8.19			
62229E	4	13400	729.02	18.38	12.73	4.31	9.56	44.98	774.00	5.8113	94.2	2.1	1.1	41.28	10.21			
62229F	4	13500	1585.67	36.29	25.06	10.96	24.31	96.62	1682.29	5.7433	95.2	1.1	1.1	38.26	11.25			
62229G	4	13600	1770.99	46.43	32.02	7.36	20.79	106.60	1877.59	5.6775	95.2	2.0	1.1	43.30	7.20			
62229H	4	13700	763.96	24.32	17.96	4.48	24.64	71.40	835.36	8.5472	91.3	2.1	3.3	34.25	6.35			
62229I	4	13800	1741.09	60.51	66.81	9.63	22.70	159.65	1900.74	8.3993	91.3	4.1	1.1	38.42	6.14			
62229J	4	13900	1861.80	28.17	21.40	12.00	42.53	104.10	1965.90	5.2953	95.1	1.1	1.2	27.21	12.40			
62229K	4	14000	734.78	19.07	12.97	4.52	14.45	51.01	785.79	6.4915	93.2	2.1	1.2	38.25	9.28			
62229L	4	14100	661.37	26.85	18.48	4.14	15.43	64.90	726.27	8.9360	90.4	3.1	2.2	42.28	6.24			
62229M	4	14200	1685.89	73.41	68.08	11.20	37.04	189.73	1875.62	10.1156	89.4	4.1	1.2	38.36	6.20			
62229N	4	14300	1656.96	67.41	59.78	6.48	18.60	152.27	1809.23	8.4163	92.4	3.0	1.1	45.39	4.12			
62229O	4	14400	1883.70	35.15	27.00	11.76	33.52	107.43	1991.13	5.3954	94.2	1.1	1.2	33.25	11.31			
62229P	4	14500	2056.56	39.73	52.77	7.58	38.84	138.92	2195.48	6.3275	94.2	2.0	2.2	29.38	5.28			
62229Q	4	14600	2209.37	24.46	32.04	12.71	28.65	97.86	2307.23	4.2414	96.1	1.1	1.1	25.33	13.29			
62229R	4	14700	1778.12	14.93	11.75	4.01	29.94	60.63	1838.75	3.2973	96.1	1.0	2.2	25.19	7.49			
62229S	4	14800	682.59	30.04	21.91	4.28	15.30	71.53	754.12	9.4852	90.4	3.1	2.2	42.31	6.21			
62229T	4	14900	1613.76	20.63	14.80	4.61	26.23	66.27	1680.03	3.9445	96.1	1.0	2.2	31.22	7.40			
62230A	4	15000	1869.01	20.82	17.92	13.27	39.05	91.06	1960.07	4.6457	95.1	1.1	1.2	23.20	15.42			
62230B	4	15100	1702.81	32.57	24.04	7.86	32.44	96.91	1799.72	5.3847	95.2	1.0	2.2	34.25	8.33			
62230C	4	15200	1983.20	25.85	28.94	15.77	41.51	112.07	2095.27	5.3487	95.1	1.1	1.2	23.26	14.37			
62230D	4	15300	1586.60	13.32	8.89	6.12	11.91	40.24	1626.84	2.4735	97.1	1.0	1.1	33.22	15.30			
62230E	4	15400	1554.56	29.59	23.33	10.18	26.92	90.02	1644.58	5.4737	94.2	1.1	1.2	33.26	11.30			
62230F	4	15550	1829.79	16.74	9.69	6.18	20.84	53.45	1883.24	2.8382	97.1	1.0	1.1	31.18	12.39			
62230G	4	15680	1771.75	22.02	16.97	12.59	34.72	86.30	1858.05	4.6446	95.1	1.1	1.2	26.20	15.39			

B = CUTTINGS NOT ANALYZED

C = AIR SPACE GAS NOT RUN

BC = NO ANALYSES RUN

Colt

2. TOC = 2.0 TOM
1.22

Table II Descriptions of Samples and Visual Kerogen Characteristics,
"Picked" Cuttings from the 15/6-2 (SE) Well
(Kerogen by J. L. Morgan)

Depth (ft)	EPR No.	Gross Lithology	GSA Color Code	Total Organic Matter	Kerogen Alteration	Types of Kerogen*			Kerogen Source Ratings		
						Predominant	Secondary	Other	Maturity	Richness	Source Type at Maturity
10,500	62187-B	Shale, med. dark gray to med. gray; some is calc. or dol.	N4-N5	.20	2+	(ab) C	(co) M	(tr) W	Mature	Poor	Lean
10,900	-F	Sandstone, fine grained, v. lt. gray to med. gray, calc.; and limestone, sandy, silty, some glauc.	N8-N5	.20	2+	C	A	W	Mature	Poor	Lean
11,200	-I	Mixture of limestone and med. calc. shale, med. gray to v. lt. gray.	N5-N8	.44	2+	C	W	M	Mature	Poor	Gas
11,400	-K	Shale, olive black to dk. olive gray, looks very organic rich.	5Y 2/1-3/1	12.20	2-	A	A1,C	H	Mature	Very Rich	Oil
11,700	-N	Shale, some as above, plus dk. gray to med. dk. gray shale.	N3-N4 5Y 3/1	7.17	2-	A	C	W	Mature	Very Rich	Oil, Gas
12,070	-P	Shales, as above.	N3-N4 5Y 3/1	4.50	2	A,W	C	H	Mature	Rich	Oil, Gas
12,400	-R	Shale mixture, as above, plus dk. olive gray to olive gray shales.	5YR 3/1-4/1	2.94	--	--	--	--	--	Good	--
12,400	62188-A	Mixture of red beds, greenish gray shales, and minor sandstone; trace of pyrite; chips all sand sized.	--	.56	2	A1	W,C	H	Mature	Marginal	Oil, Gas
12,900	-D	Mixture, as above, red beds more Predominant.	--	.15	2	A1?	W	C	Mature	Poor	Lean
13,000	62229-A	Shale, siltstone, and fine grained sandstone: interlaminated, greenish gray; some is slightly dolomitic.	5GY 6/1	.07	2+	N	W	H**	Mature	Poor	Lean
14,000	-K	Red beds: claystones, mudstones and sandstones.	5R 3/4; 10R 4/2	.07	2+	A1?,H	W	C	Mature	Poor	Lean
15,000	62230-A	Red beds, as above (chips are finer grained).	--	.07	2+	A1?	W	C	Mature	Poor	Lean
15,680	-G	Red beds and loose quartz grains.	--	--	2+	W	C	A1?	Mature	Poor	Lean

* A - Amorphous
A1 - Algal
H - Herbaceous

W - Woody
C - Coaly
M - Microplankton

**Kerogen from 62229-B

Table III Total Organic Matter and Light
 Gasolines (C₄-C₇), 15/6-2 (RE) Samples
 (Analyses by H. M. Fry, R. R. Dudley)

Depth (ft)	EPR No.	Total Organic Matter (%)	Total C ₄ -C ₇ (ppm)	(See Table III-A) Correlation Ratios			CH/MCP*
				C ₁ /C ₂	A/D ₂	C ₁ /D ₂	
10,500	62187-B	.20	0.	--	--	--	--
10,900	-F	.20	0.	--	--	--	--
11,200	-I	.44	0.	--	--	--	--
11,400	-K	12.20	740.	.94	4.99	3.91	.44
11,700	-N	7.17	533.	1.03	4.85	4.59	.52
12,070	-P	4.50	219.	1.18	4.94	7.19	.64
12,400	-R	2.94	148.	1.12	4.98	5.78	.63
12,400	62188-A	.56	7.2	1.07	5.37	7.18	.57
12,900	-D	.15	0.	--	--	--	--
13,000	62229-A	.07	0.	--	--	--	--
14,000	-K	.07	0.	--	--	--	--
15,000	62230-A	.07	0.	--	--	--	--

* CH - Cyclohexane
 MCP - Methylcyclopentane

TABLE III-A

DEFINITION OF SIGNIFICANT GASOLINE RATIOS

Light Gasoline Compounds Determined by Gas Chromatography

1. Pentane
2. Hexane
3. Heptane
4. Iso-Pentane
5. 2-Methylpentane
6. 3-Methylpentane
7. 2,3-Dimethylbutane
8. 2,2-Dimethylbutane
9. 3-Methylhexane
10. 2-Methylhexane + 1,1-Dimethylcyclopentane
11. 2,3-Dimethylpentane
12. 2,4-Dimethylpentane
13. 2,2-Dimethylpentane
14. 2,2,3-Trimethylbutane
15. 2,2,4-Trimethylpentane
16. Cyclopentane
17. Methylcyclopentane
18. 1-c-3-Dimethylcyclopentane
19. 1-t-3-Dimethylcyclopentane
20. 1-c-2-Dimethylcyclopentane
21. 1-t-2-Dimethylcyclopentane + 3-Ethylpentane*
22. Cyclohexane + 3,3-Dimethylpentane*
23. Methylcyclohexane
24. Benzene
25. Toluene

Significant Groupings of Molecular Data

- A. Hexane + Heptane
- B. Pentane + iso-Pentane + 2-Methylpentane + 3-Methylpentane
- C. Naphthenes
 - C₁ 2-Methylhexane + 1,1-Dimethylcyclopentane* + Cyclohexane + 3,3-Dimethylpentane* + Methylcyclohexane
 - C₂ Methylcyclopentane + 1-c-3-Dimethylcyclopentane + 1-t-3-Dimethylcyclopentane + 1-c-2-Dimethylcyclopentane + (1-t-2-Dimethylcyclopentane + 3-Ethylpentane)*
- D. Aromatics Plus 3-Methylhexane
 - D₁ Benzene + Toluene
 - D₂ 3-Methylhexane

*Analyzed together by gas chromatography.

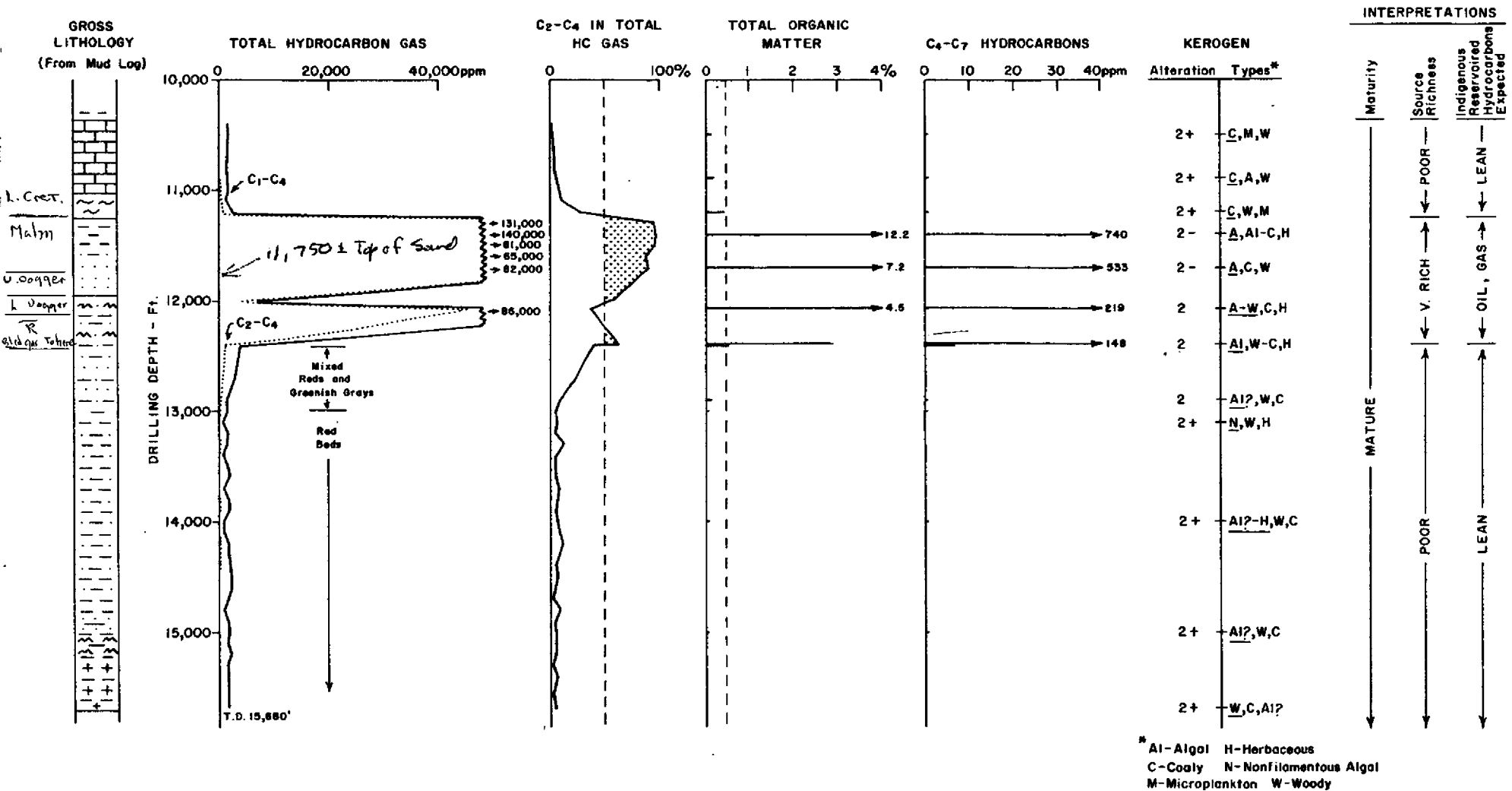


FIG. 1 - GEOCHEMICAL PATTERNS, 15/6-2 R.E. SAMPLES.