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S. A. Miles

2/7-13 well file 97
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Study 1005

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INTER-OFFICE CORRESPONDENCE / SUBJECT:
BARTLESVILLE, OKLAHOMA

North Sea, Norwegian Sector
Gamma 2/7-13X Residual Oil
in Chalk

JRD-105-80

J. E. Jennings
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Attn: S. A. Miles

This letter reports completion of a geochemical search for residual hydrocarbons (migrated oil) in chalk from the Gamma structure 2/7-13X. Norwegian Sector, North Sea. This study was initiated at the request of J. P. S. Burton (letter RDZ/nms-319-79). Preliminary data were reported in my Telex of February 6, 1980.

The following conclusions are supported by data displayed in Table I and Figures 1 - 4.

1. Migrated oil is present in cuttings from 9050 - 9350, 9950 - 10250, and 10650 - 10750 feet, as indicated by a ratio of soluble organic matter to total organic matter greater than 0.1. More oil is present in these intervals than could have been generated in situ under even the most favorable conditions.
2. The oil in the above intervals is volumetrically insignificant: the highest concentration is only 0.1 weight percent of the rock.
3. The oil extracted from the 2/7-13X cuttings was generated in a source rock deposited in a marine environment.
4. The oil extracted from the 2/7-13X cuttings is similar in composition and probable origin to oils from the West Ekofisk 2/4-5X and Flyndre 1/5-2X, and to extracts from sidewall cores recovered from the Eldfisk 2/7-1X well.
5. Recent studies in the Geological Branch have confirmed the Kimmeridge Clay as the source of Ekofisk Area oils, suggesting that migration has been primarily vertical through the chalk. It is therefore likely that the migrated oil in the 2/7-13X represents residual oil from an accumulation lost through a leaky seal in the Gamma piercement structure, rather than oil moving laterally to some potential trap.

J. R. Davis / C. R. Bennett
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Attachments

Attachment JRD-105-80

TABLE I
SOURCE ROCK EVALUATION DATA
N. SEA, NORWEGIAN SECTOR, 2/7-13X

GEOCHEM- ISTRY BRANCH CODE	DEPTH		CARB- ONATE CARBON WT. %	OR- GANIC CARBON WT. %	RATIO SOLUBLE /TOTAL CARBON	SOLUBLE ORGANIC MATTER								ODD-EVEN PREDOM- INANCE OEP											
	METERS	FEET				TOTAL		#SATURATES		#AROMATICS		#ASPHALTICS													
						WT. %	C-13	WT. %	C-13	WT. %	C-13	WT. %	C-13												
GI79-BYR	2697.5	-728.0	8850	-950	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
GI79-BYS	2758.4	-788.9	9050	-150	10.03	0.32	0.331	0.132	-27.7	57.4	-28.2	31.2	-27.2	11.3	-27.2										1.010
GI79-BYT	2788.9	-819.4	9150	-350	8.43	0.18	0.189	0.042	-27.5	46.0	-27.3	33.7	-27.1	10.0	-26.9										1.010
GI79-BYU	2819.4	-849.9	9250	-350	10.35	0.12	0.536	0.080	-27.9	46.0	-28.0	33.7	-26.7	10.0	-26.7										*
GI79-BYV	2849.9	-880.4	9350	-450	11.39	0.10	0.062	0.008	*	45.8	-28.2	32.9	-26.8	10.0	-26.8										*
GI79-BYW	2880.4	-910.8	9450	-550	11.56	0.09	0.070	0.008	-27.0	53.1	-28.1	33.2	-26.7	10.0	-26.7										*
GI79-BYX	2910.8	-941.3	9550	-650	11.17	0.16	0.052	0.010	-26.9	43.3	-28.2	33.2	-26.5	10.0	-26.5										*
GI79-BYY	2941.3	-971.8	9650	-750	10.95	0.13	0.060	0.010	-27.0	41.8	-28.0	32.6	-26.6	10.0	-26.6										*
GI79-BYZ	2971.8	-1002.3	9750	-850	11.45	0.18	0.064	0.015	-27.0	45.1	-27.7	32.9	-26.5	10.0	-26.5										*
GI79-BZA	3002.3	-1032.8	9850	-950	11.32	0.16	0.062	0.012	-27.3	47.3	-26.6	32.9	-26.8	10.0	-26.8										*
GI79-BZB	3032.8	-1063.2	9950	-1050	9.29	0.14	0.155	0.027	-26.9	38.0	-27.8	32.1	-26.8	10.0	-26.8										*
GI79-BZC	3063.2	-1093.7	10050	-1150	9.34	0.10	0.147	0.018	-26.7	36.7	-27.9	32.1	-26.5	10.0	-26.5										*
GI79-BZD	3093.7	-1124.2	10150	-1250	9.69	0.13	0.122	0.020	-27.0	32.8	-27.8	32.1	-26.4	10.0	-26.4										*
GI79-BZE	3124.2	-1154.7	10250	-1350	8.43	0.52	0.046	0.030	-26.5	32.7	-27.9	32.1	-26.4	10.0	-26.4										*
GI79-BZF	3154.7	-1185.2	10350	-1450	*	*	*	*	*	*	*	*	*	*	*										*
GI79-BZG	3185.2	-1215.6	10450	-1550	*	*	*	*	*	*	*	*	*	*	*										*
GI79-BZH	3215.6	-1246.1	10550	-1650	*	*	*	*	*	*	*	*	*	*	*										*
GI79-BZI	3246.1	-1276.6	10650	-1750	8.24	0.36	0.142	0.064	-27.0	52.9	-27.7	32.1	-26.8	15.0	-26.4										1.020
GI79-BZJ	3276.6	-1307.1	10750	-1850	*	*	*	*	*	*	*	*	*	*	*										*

*--AS WEIGHT PERCENT OF TOTAL SOLUBLE ORGANIC MATTER.

*--SAMPLE INSUFFICIENT OR UNSUITABLE FOR THIS DETERMINATION.

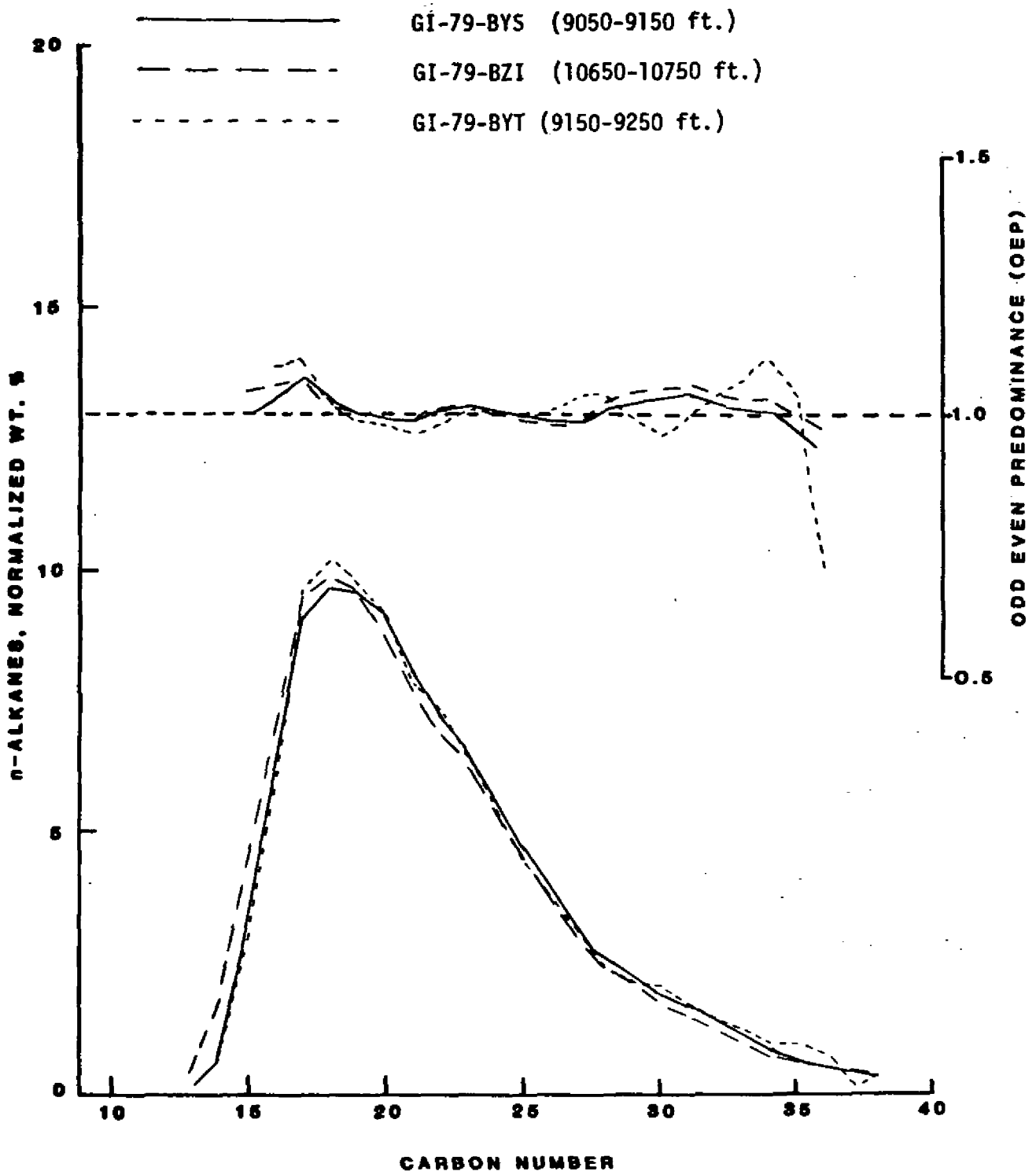


Figure 1. Distribution of normal alkanes and Odd-Even Predominance as functions of carbon number for extracts from cuttings recovered from the Gamma 2/7-13X, Norwegian Sector, North Sea.

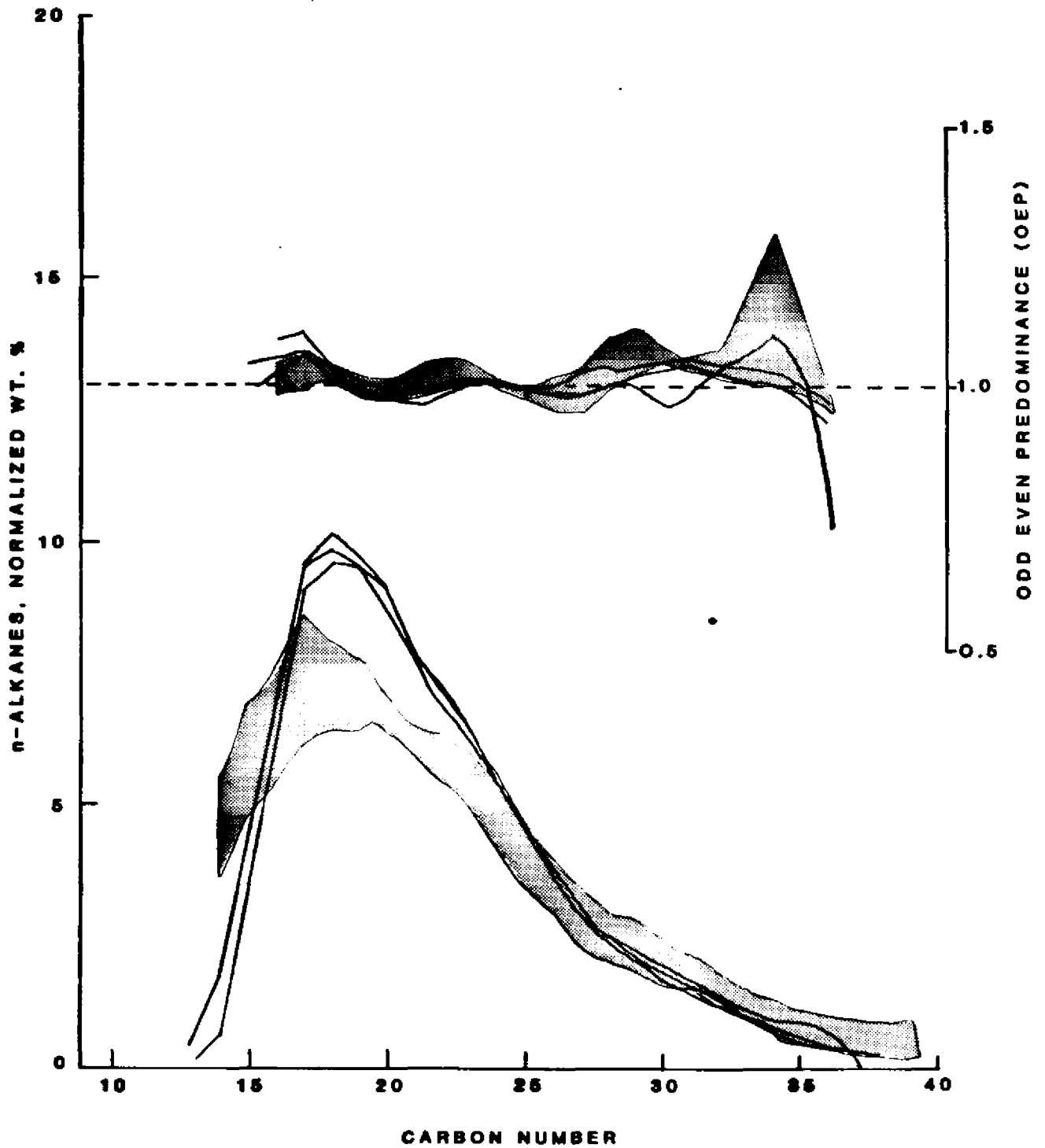


Figure 2. Comparison of OEP and n-alkane curves from Figure 1 (2/7-13X data - solid lines) with envelopes of similar curves from oils recovered in the West Ekofisk 2/4-5X (shaded pattern).

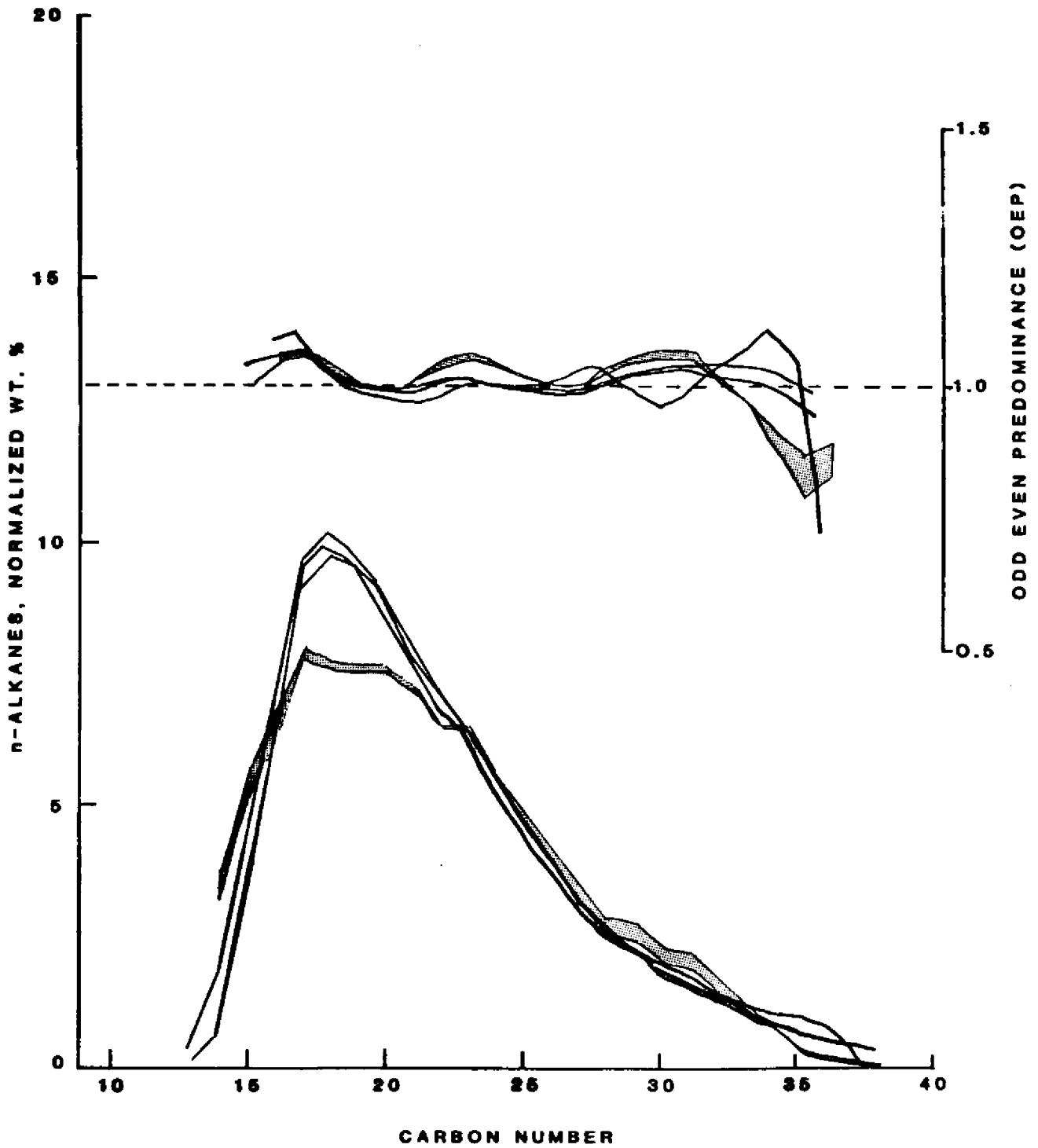


Figure 3. Comparison of OEP and n-alkane curves from Figure 1 (2/7-13X data - solid lines) with envelopes of similar curves from oils recovered in the Flyndre 1/5-2X (shaded pattern).

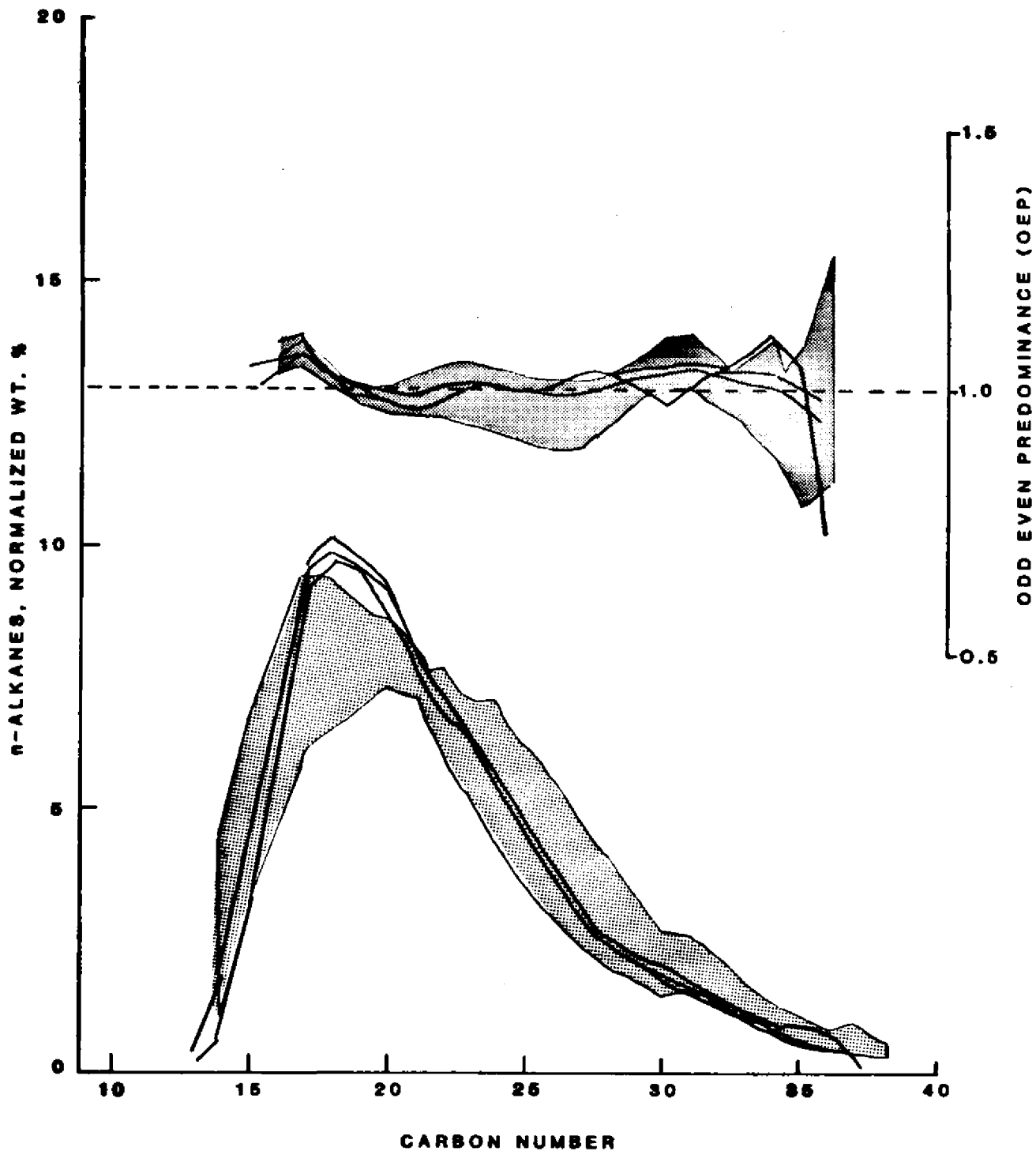


Figure 4. Comparison of OEP and n-alkane curves from Figure 1 (2/7-13X data - solid lines) with envelopes of similar curves from extracts of sidewall cores taken in the Eldfisk 2/7-1X (shaded pattern).