DUPLIKAT
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STATOIL
Dokumentsenter ST-FH
L.NR.: 85019850
INDEX: ST-FH AQ-185
RETURNERES ETTER BRUK

FORTROLIG
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REPORT TITLE/ TITTEL
APPENDIX TO SCREENING REPORT OF WELL 34/7-5
VITRINITE REFLECTANCE RESULTS

CLIENT/ OPPDRAGSGIVER
Saga Petroleum a.s.

PROJECT MANAGER/ PROSJEKTANSVARLIG
L. Leith

AUTHORS/ FORFATTERE
L. Leith and L. Husvik

DATE/ DATO	REPORT NO./ RAPPORT NR.	NO. OF PAGES/ ANT. SIDER	NO. OF ENCLOSURES/ ANT. BILAG
10.7.85	22.1771.00/02/85	28	1

SUMMARY/ SAMMENDRAG

See overleaf.

KEY WORDS	STIKKORD
Maturity	
34/7-5	
Vitrinite reflectance	
Fluorescence	

IKU
SINTEF-GRUPPEN

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SUMMARY/ SAMMENDRAG

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KEY WORDS	STIKKORD
Maturity	
34/7-5	
Vitrinite reflectance	
Fluorescence	

SUMMARY

A total of twenty-two sidewall core and conventional core samples was analysed for vitrinite reflectance from well 34/7-5. The samples were taken between 1921m at the top of the Upper Cretaceous Shetland group, and 2895m at the top of the Lower Jurassic Statfjord formation.

The six sidewall core samples from the Shetland group (1907-2488m) have a grey to reddish-brown siltstone or silty claystone lithology and are generally characterised by poor organic matter contents dominated by small particles of reworked vitrinite and traces of liptinites. The reflectance values from these samples are based on only a few measurements and cannot be considered wholly reliable.

The Cromer Knoll group was not sampled, but three core samples at 2516m, 2519.5n and 2520m were sampled from the Jurassic Brent group. The samples consisted of two coals and a carbonaceous claystone. These samples contain abundant organic matter dominated by vitrinite of variable purity, often contaminated by clay minerals or liptinites. Reflectance values vary from 0.39% to 0.46% indicating thermal immaturity, and are probably quite reliable.

Three core samples and nine sidewall core samples were analyzed from the Dunlin group (2624-2892m). The samples vary from brown or grey claystones to brown or grey siltstones and sandstones. Organic matter contents are quite variable, being fair to very good above 2693m. The samples at 2718m, 2782m, 2826m, 2858.2m and 2882m have poor organic matter contents, although locally liptinite-rich fragments occur in samples at 2782m and 2826m. An absence of good measureable vitrinite means that it is often difficult to obtain reliable reflectance measurements for the Dunlin group. Reliable reflectance values were obtained at 2626m, 2672.5m, 2782m, 2826m and 2882m, and vary from 0.37% at 2627m to 0.54% at 2826m, suggesting marginal to moderate thermal maturity.

Only one sidewall core sample at 2895m was taken from the top of the Statfjord formation and was found to be a clean quartz sandstone which is largely barren of organic matter. No vitrinite reflectance measurements were obtained from this sample.

MICROSCOPIC ANALYSIS - REFLECTED LIGHT (NORMAL + U.V)

Table no.: 1
Well no.: 34/7-5

IKU No.	Depth m/ft	Dominant lithology	Ro value (%)	Population size	Dominant maceral type	Liptinites		Additive	Bitumen	Cave
						UV Fluorescence	Content			
C-976 swc	1921	Siltstone	0.38	4	Reworked Vit.	5?	Trace			
C-977 swc	2007	Siltstone	0.44 0.72	2 3	Reworked Vit.	4-6	Trace			
C-978 swc	2093	Claystone	0.41 0.87	2	Reworked Vit.	3-4	Poor			
C-979 swc	2179	Claystone	0.28!	1	Reworked Vit.	4-5	Poor			
C-980 swc	2308	Claystone	0.40 0.81	3 3	Liptinite + Reworked Vit.	3-4	Poor-Fair			
C-981 swc	2480	Claystone	0.48 0.68	7 8	Reworked Vit.	4	poor			
C-970 core	2516	Coal	0.40*	30	Vitrinite	3-4	Poor			
C-971 core	2519.5	Carbonaceous Claystone	0.39*	20	Vitrinite	2-4	Good			
C-972 core	2520.5	Coal	0.46*	30	Vitrinite	2-4	Fair-Good			
C-973 core	2626	Claystone	0.39* 0.26!	14 5	Liptinite	3-4	Abundant			
C-974 core	2627	Claystone	0.37*	18	Reworked Vit.	3-4	Poor			
C-975 core	2630.5	Siltstone	0.34 0.70	4 6	Reworked Vit.	4	Fair-Good			
C-982 swc	2632.5	Siltstone	0.36 0.59	8 9	Reworked Vit. + Liptinite	3-4	Good			
C-983 swc	2652.5	Siltstone	0.38 0.67	7 3	Reworked Vit. + Liptinite	3-4	Good-Abundant			
C-984 swc	2672.5	Claystone	0.48* 0.71	17 3	Vitrinite + Liptinite	3-4	Good-Abundant			
C-985 swc	2693	Siltstone	0.42 0.72	6 4	Liptinite + Reworked Vit.	4	Fair-Good			
C-986 swc	2718	Sandstone	0.47 0.29! 0.92	2 2 2	Reworked Vit.	4	Poor-Fair			

* Reasonably reliable values.
! Obvious bitumen staining present.

147/R/jbl/1

MICROSCOPIC ANALYSIS - REFLECTED LIGHT (NORMAL + U.V)

Table no.: 1
Well no.: 34/7-5

IKU No.	Depth m/ft	Dominant lithology	Ro value (%)	Popu-lation size	Dominant maceral type	Liptinites		Additive	Bitumen	Cave
						UV Fluorescence	Content			
C-987 swc	2782	Claystone	0.51* 0.31!	9 8	Liptinite + Vitrinite	4	Fair-Good			
C-988 swc	2826	Siltstone	0.54* 0.75	10 2	Reworked Vit.	4	Good			
C-989 swc	2855.2	Claystone	0.25! 0.84	1 2	Reworked Vit.	5-6	Trace-Poor			
C-990 swc	2882	Sandstone + Claystone	0.52* 0.91	8 6	Reworked Vit.	5-6	Trace-Poor			
C-991 swc	2895	Sandstone	NDP	-	Virtually barren	5-6	Trace			

* Reasonably reliable values.
! Obvious bitumen staining present.

147/R/jbl/2

Table 2.

Well Identification: 34/7-5
Reference number: 22.1771
(1/2)

VITRINITE REFLECTANCE DATA

IKU NO	LOCATION	DEPTH (M)	VITRINITE REFLECTANCE	PP	STANDARD DEVIATION	FLUORESCENCE
C 976	----	1921	0.38 (4)	Y	0.12	5?
C 977	----	2007	0.44 (2)	Y	0.06	4-6
			0.72 (3)	N	0.03	
C 978	----	2093	0.41 (2)	Y	0.08	3-4
			0.87 (5)	N	0.03	
C 979	----	2179	0.28 (1)!	Y	0.00	4-5
C 980	----	2308	0.40 (3)	Y	0.03	3-4
			0.81 (3)	N	0.21	
C 981	----	2480	0.48 (7)	Y	0.03	4
			0.68 (8)	N	0.06	
C 970	----	2516	0.40 (30)*	Y	0.03	3-4
C 971	----	2519.5	0.39 (20)*	Y	0.06	2-4
C 972	----	2520.5	0.46 (30)*	Y	0.07	2-4
C 973	----	2626	0.39 (14)*	Y	0.05	3-4
			0.26 (5)!	N	0.01	
C 974	----	2627	0.37 (18)*	Y	0.07	3-4
C 975	----	2630.5	0.34 (4)	Y	0.06	4
			0.70 (6)	N	0.06	
C 982	----	2632.5	0.36 (8)	Y	0.04	3-4
			0.59 (9)	N	0.05	
C 983	----	2652.5	0.38 (7)	Y	0.07	3-4
			0.67 (3)	N	0.03	
C 984	----	2672.5	0.48 (17)*	Y	0.07	3-4
			0.71 (3)	N	0.03	

*=Readings are reasonably representative
!=Obvious bitumen staining present

Table 2.

Well Identification: 34/7-5
Reference number: 22.1771
(2/2)

VITRINITE REFLECTANCE DATA

IKU NO	LOCATION	DEPTH (M)	VITRINITE REFLECTANCE	PP	STANDARD DEVIATION	FLUORE-SCENCE
C 985	----	2693	0.42 (6)	Y	0.05	4
			0.72 (4)	N	0.12	
C 986	----	2718	0.47 (2)	Y	0.09	4
			0.29 (2)!	N	0.06	
			0.92 (2)	N	0.04	
C 987	----	2782	0.51 (9)*	Y	0.07	4
			0.31 (8)!	N	0.06	
C 988	----	2826	0.54 (10)*	Y	0.10	4
			0.75 (2)	N	0.05	
C 989	----	2855.2	0.25 (1)!	N	0.00	5-6
			0.84 (2)	N	0.04	
C 990	----	2882	0.52 (8)*	Y	0.07	5-6
			0.91 (6)	N	0.12	
C 991	----	2895	N.D.P.	-	----	5-6

*=Readings are reasonably representative
!=Obvious bitumen staining is present

VITRINITE REFLECTANCE HISTOGRAMS

Key:- A = Grey-black-brown claystone.
Lower case letter is used when there is some uncertainty about whether the value is representative.

PP = Primary population
Y = Relevant population considered reasonably representative.
N = Not representative (caving, reworked, contaminant, drilling effects).

LOW+ HIGH = Population limits

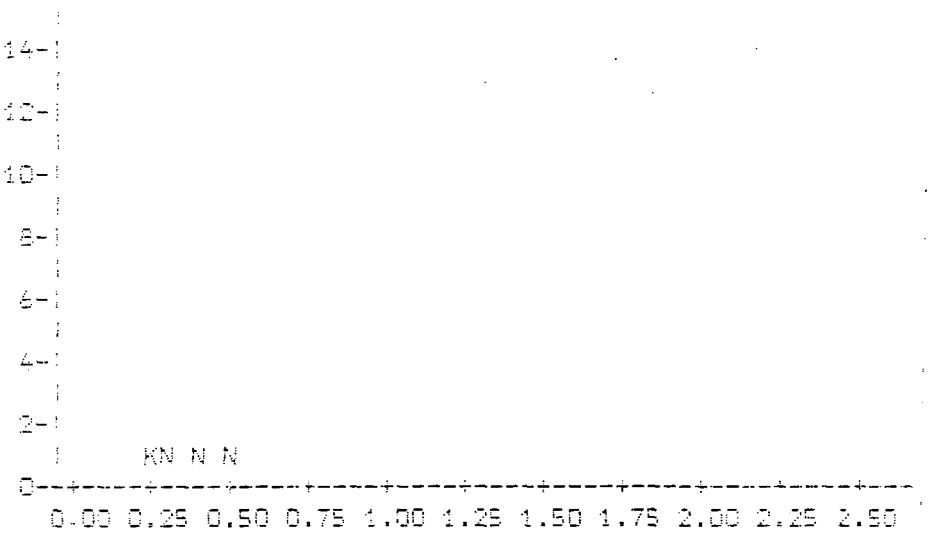
VAL. = Number of measurements in that population.

Lithology cross-reference table

A = Clst. gy
B = Clst. dk gy
C = Clst. gn
D = Clst. bn
E = Clst. rd
F = Clst. calc.
G = Clst. carb.
H = Shale
I = Sandstone
J = Limestone
K = Coal
L = Lignite
M = Carbargillite
N = Siltstone
O = Bit
P = X

a,b etc. = same lithology as above but value not included in any population, possibly because suspected caving, reworking, contamination or other erroneous recordings.

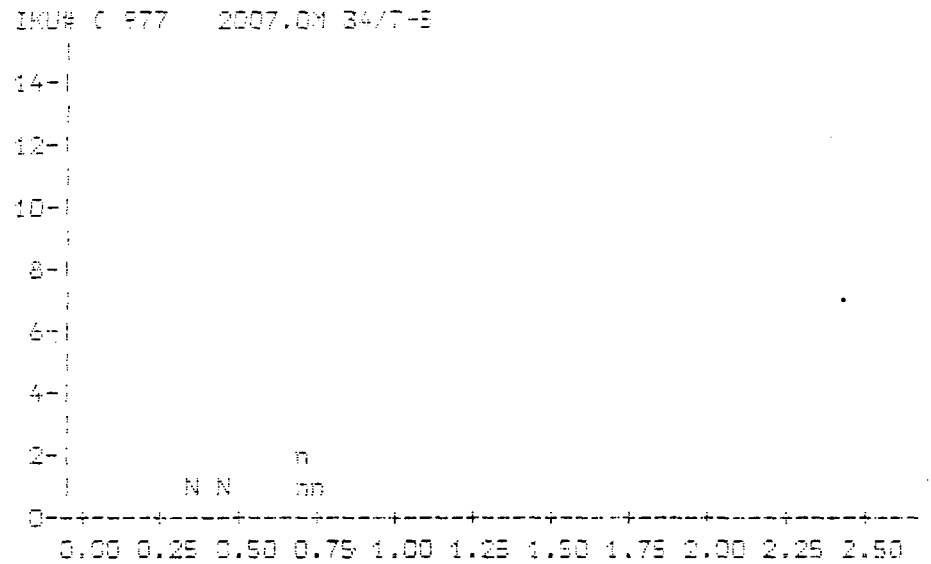
IKU# 0 976 1921.0M 34/7-5



PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.29	0.55	ALL	4	0.38	0.12
			OVERALL	4	0.38	0.12

ORDERED VALUES FOLLOW:

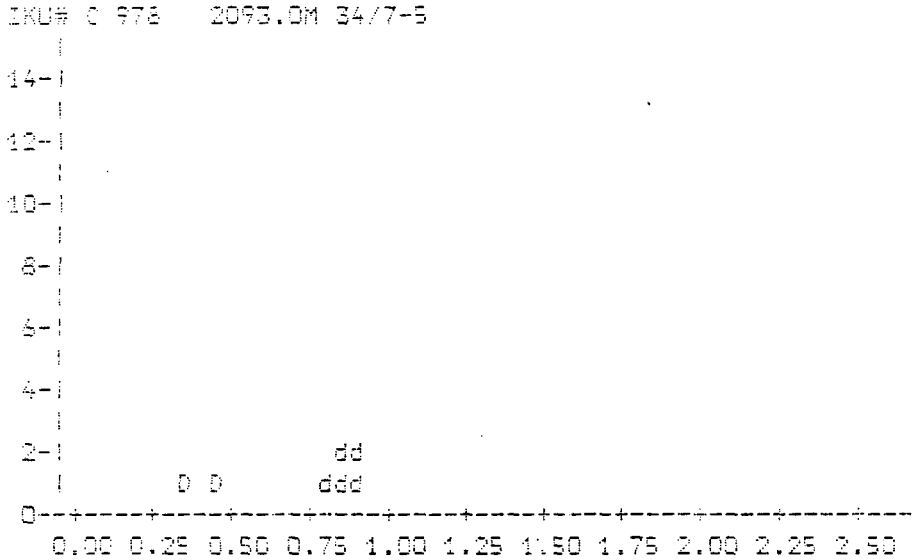
0.29K 0.30N 0.40N 0.54N



PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.39	0.49	ALL	2	0.44	0.06
N	0.70	0.76	ALL	3	0.72	0.03
			OVERALL	5	0.61	0.16

ORDERED VALUES FOLLOW:

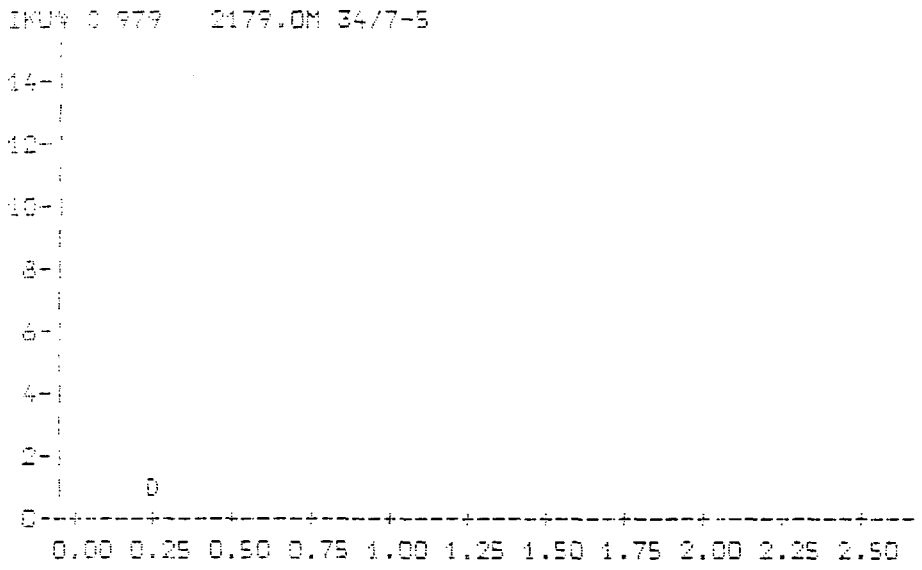
0.39N 0.48N 0.70n 0.72n 0.75n



PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.35	0.48	ALL	2	0.41	0.08
N	0.82	0.91	ALL	5	0.87	0.03
			OVERALL	7	0.74	0.23

ORDERED VALUES FOLLOW:

0.350 0.470 0.82d 0.85d 0.87d 0.90d 0.90d

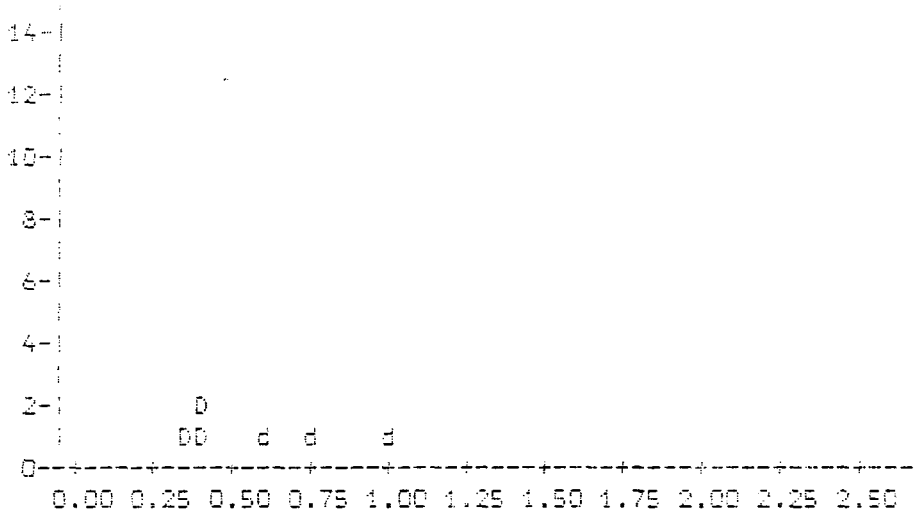


PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.28	0.29	ALL	1	0.28	0.00
			OVERALL	1	0.28	0.00

ORDERED VALUES FOLLOW:

0.280

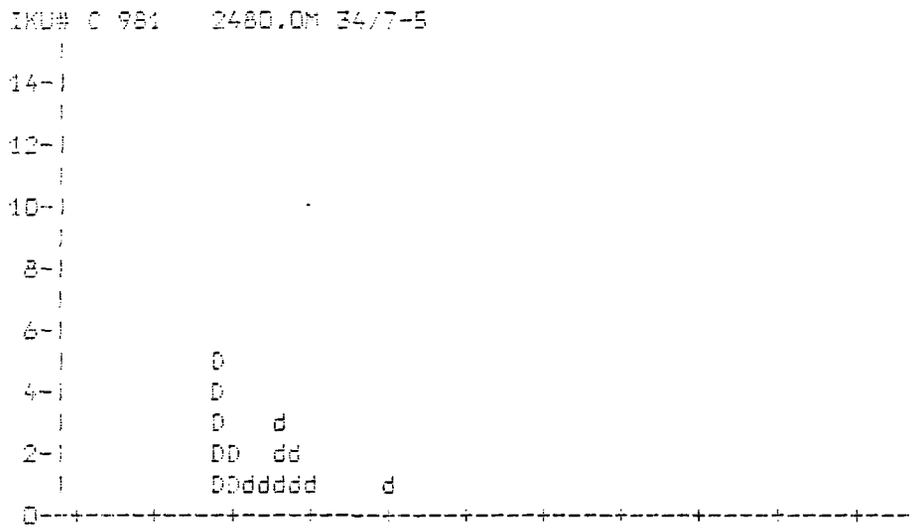
IKU# C 960 2308.0M 34/7-6



FP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.37	0.44	ALL	3	0.40	0.03
N	0.62	1.05	ALL	3	0.81	0.21
			OVERALL	6	0.60	0.26

ORDERED VALUES FOLLOW:

0.37D 0.40D 0.43D 0.62d 0.76d 1.04d



PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.45	0.54	ALL	7	0.48	0.03
N	0.57	0.78	ALL	8	0.68	0.06
			OVERALL	16	0.61	0.15

ORDERED VALUES FOLLOW:

0.45D 0.46D 0.46D 0.47D 0.48D 0.50D 0.53D 0.57d 0.62d 0.66d 0.67d
0.67d 0.71d 0.73d 0.77d 1.02d

```
IKU# C 970   2516.0M 34/7-5
    !
14-!       K
    !       K
12-!       K
    !       KK
10-!       KK
    !       KK
 8-!       KK
    !       KK
 6-!       KK
    !       KK
 4-!       KKK
    !       KKK
 2-!       KKK
    !      KKKK
 0--+----+----+----+----+----+----+----+----+----+----+---
   0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

PP LOW HIGH LIT #VAL MEAN STDV
Y 0.33 0.47 ALL   30 0.40 0.03
          OVERALL 30 0.40 0.03

ORDERED VALUES FOLLOW:

 0.33K 0.35K 0.37K 0.37K 0.37K 0.37K 0.37K 0.38K 0.38K 0.38K 0.38K
 0.38K 0.39K 0.39K 0.39K 0.40K 0.41K 0.41K 0.41K 0.42K 0.43K 0.43K
 0.43K 0.43K 0.44K 0.44K 0.45K 0.45K 0.45K 0.46K
```

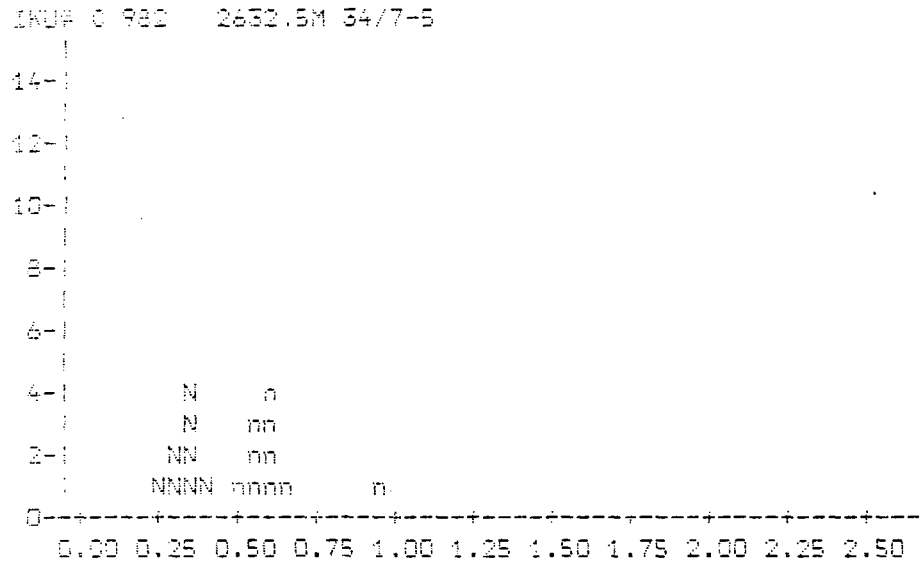
```
IKU# C 971   2519.5M 34/7-3
    !
14-!
    !
12-!
    !
10-!
    !        G
 8-!        G
    !        G
 6-!        G
    !        G
 4-!        GG
    !        GK
 2-!      GGKKG
    !      KKKKGG
 0--+----+----+----+----+----+----+----+----+----+----+---
   0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

PP LOW HIGH LIT #VAL MEAN STDV
Y 0.28 0.52 ALL   20 0.39 0.06
          OVERALL 20 0.39 0.06

ORDERED VALUES FOLLOW:

 0.28K 0.29G 0.32G 0.33K 0.35G 0.36K 0.37G 0.37G 0.37G 0.37G 0.38G
 0.38G 0.39K 0.40G 0.41K 0.41K 0.44K 0.49G 0.49G 0.51G
```

```
IKU# C 972    2520.5M 34/7-5
    |
14-|
    |
12-|
    |
10-|
    |           K
 8-|           K
    |          KK
 6-|         KKK
    |         KKK
 4-|         KKKKK
    |         KKKKK
 2-|         KKKKK
    |         KKKKK
 0--+----+----+----+----+----+----+----+----+----+----+---
   0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

PP LOW HIGH LIT #VAL MEAN STDV
Y 0.36 0.60 ALL   30 0.46 0.07
          OVERALL 30 0.46 0.07

ORDERED VALUES FOLLOW:

 0.36K 0.37K 0.38K 0.38K 0.39K 0.39K 0.40K 0.40K 0.40K 0.41K 0.41K
 0.42K 0.43K 0.45K 0.45K 0.46K 0.46K 0.47K 0.48K 0.48K 0.48K 0.49K
 0.51K 0.51K 0.52K 0.52K 0.56K 0.57K 0.58K 0.59K
```

```
IKU# 0 PTB   2626.0M 34/7-5
   !
14-!
   !
12-!
   !
10-!
   !
 8-!
   !
 6-!
   !      d D
 4-!      d DD
   !      dDDD
 2-!      dDDD
   !      dDDDDDd
 0-+----+----+----+----+----+----+----+----+----+----+---
   0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

PP LOW HIGH LIT #VAL MEAN STDV
Y 0.31 0.51 ALL   14 0.39 0.05
N 0.25 0.28 ALL    5 0.26 0.01
          OVERALL 20 0.37 0.09

ORDERED VALUES FOLLOW:

 0.25d 0.26d 0.26d 0.27d 0.27d 0.31D 0.31D 0.32D 0.36D 0.37D 0.37D
 0.38C 0.38D 0.41D 0.41D 0.42D 0.43D 0.45D 0.50D 0.57d
```

```
IKU# C 974    2627.0M 34/7-5
    |
14-|
    |
12-|
    |
10-|
    |
 8-|
    |        D
 6-|        D
    |        D
 4-|        DD
    |      DDDD
 2-|      dDDDD
    |      dDDDDD
 D--+----+----+----+----+----+----+----+----+----+----+---
   0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

PP LOW HIGH LIT #VAL MEAN STDV
Y 0.29 0.51 ALL   18 0.37 0.07
           OVERALL 20 0.36 0.07

ORDERED VALUES FOLLOW:

 0.26d 0.26d 0.290 0.300 0.300 0.310 0.310 0.340 0.340 0.340 0.350
 0.350 0.380 0.390 0.400 0.440 0.440 0.450 0.490 0.500
```

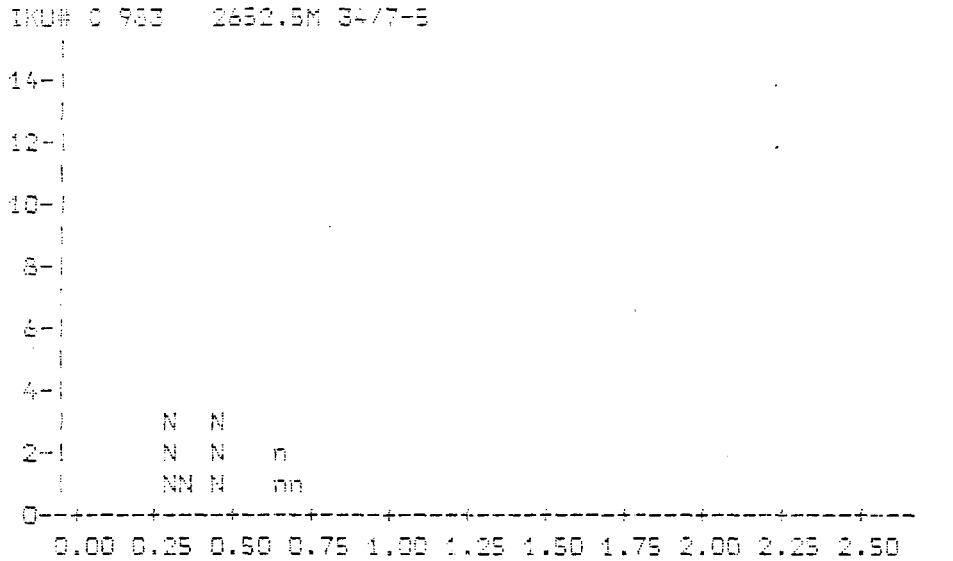
```
IKU# C 975    D=30.5M 34/7-5

14-|
   |
12-|
   |
10-|
   |
 8-|
   |
 6-|
   |
 4-|
   |              d
 2-|      D       d d
   |     DD D     dd d
 0-|-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+---
   0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

PP LOW HIGH LIT #VAL MEAN STDV
Y 0.28 0.43 ALL    4 0.34 0.06
N 0.62 0.79 ALL    6 0.70 0.06
          OVERALL 10 0.55 0.20

ORDERED VALUES FOLLOW:

 0.280 0.300 0.340 0.420 0.62d 0.65d 0.68d 0.69d 0.7ed 0.78d
```



PF	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.28	0.41	ALL	8	0.36	0.04
N	0.51	0.69	ALL	9	0.59	0.05
			OVERALL	18	0.51	0.17

ORDERED VALUES FOLLOW:

0.28N 0.34N 0.34N 0.35N 0.38N 0.38N 0.39N 0.40N 0.51n 0.57n 0.57n
0.59n 0.60n 0.60n 0.61n 0.62n 0.68n 0.99n



PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.31	0.48	ALL	7	0.38	0.07
N	0.65	0.72	ALL	3	0.67	0.03
			OVERALL	10	0.47	0.15

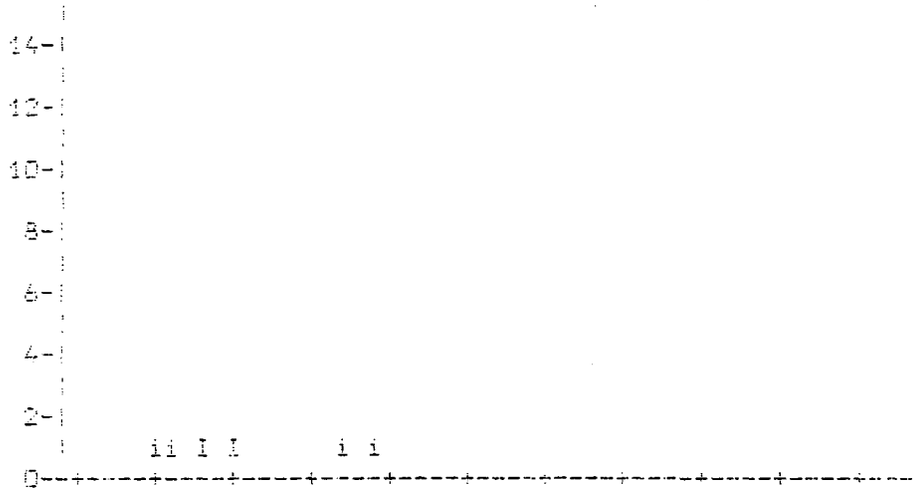
ORDERED VALUES FOLLOW:

0.31N 0.31N 0.32N 0.37N 0.45N 0.45N 0.47N 0.65n 0.65n 0.71n

```
INUM C 784   1672.5M 34/7-5
   |
14-|
   |
12-|
   |
10-|
   |
 8-|
   |
 6-|
   |          D
 4-|          D DD
   |          D DD
 2-|         DDDDD  d
   |         DDDDD dd
 0-+----+----+----+----+----+----+----+----+----+----+----+---
   0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

PP LOW HIGH LIT #VAL MEAN STDV
Y 0.37 0.60 ALL   17 0.48 0.07
N 0.68 0.74 ALL    3 0.71 0.03
          OVERALL 20 0.52 0.11

ORDERED VALUES FOLLOW:

 0.370 0.380 0.410 0.420 0.420 0.430 0.440 0.450 0.450 0.500 0.530
 0.530 0.540 0.560 0.560 0.590 0.590 0.680 0.730 0.730
```

```
IKU# C 985   0693.DM 84/7-5
   :
14-:
   :
12-:
   :
10-:
   :
 8-:
   :
 6-:
   :
 4-:
   :
 2-:        NNN
   :      n NNN  nnn  n
 0-:+----+----+----+----+----+----+----+----+----+----+---
   0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

PP LOW HIGH LIT #VAL MEAN STDV
Y 0.35 0.49 ALL    6 0.42 0.05
N 0.62 0.90 ALL    4 0.72 0.12
          OVERALL 11 0.51 0.19

ORDERED VALUES FOLLOW:

 0.29n 0.35N 0.37N 0.41N 0.44N 0.46N 0.48N 0.62n 0.65n 0.70n 0.89n
```

IKU# C 986 2710.0M 34/7-6



PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.40	0.54	ALL	2	0.47	0.09
N	0.25	0.34	ALL	2	0.29	0.06
N	0.89	0.96	ALL	2	0.92	0.04
			OVERALL	6	0.56	0.30

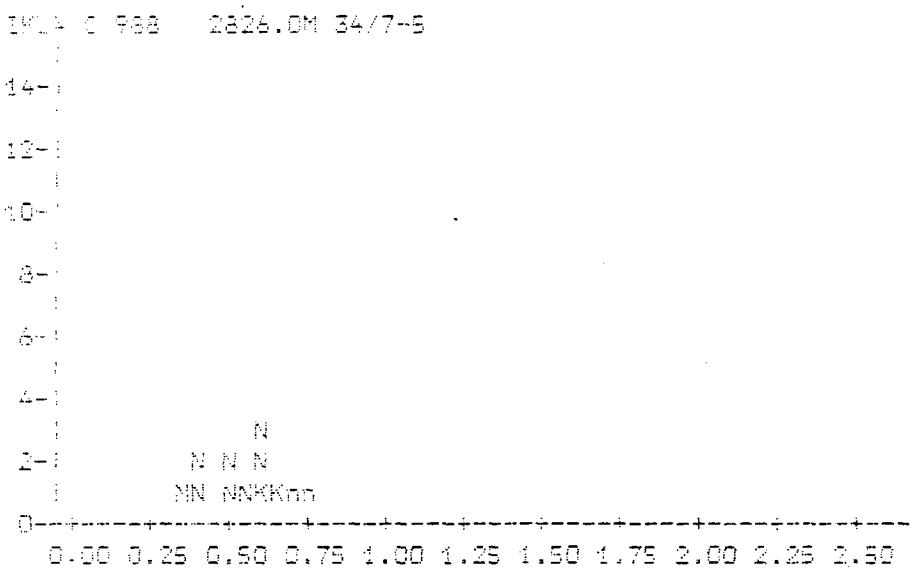
ORDERED VALUES FOLLOW:

0.25 0.33 0.40 0.53 0.89 0.95

IKU

SINTEF-GRUPPEN

```
IKU# 1 987   2782.0M 34/7-5
   !
14-!
   !
12-!
   !
10-!
   !
 8-!
   !
 6-!
   !
 4-!
   !        d   D
 2-!     d ddDDDD
   !     ddddDDDD
 0-+----+----+----+----+----+----+----+----+----+----+---
   0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

PP LOW HIGH LIT #VAL MEAN STDV
Y 0.41 0.60 ALL    9 0.51 0.07
N 0.23 0.38 ALL    8 0.31 0.06
          OVERALL 17 0.42 0.12

ORDERED VALUES FOLLOW:

 0.23d 0.24d 0.28d 0.32d 0.33d 0.36d 0.37d 0.37d 0.41D 0.43D 0.46D
 0.49D 0.50D 0.54D 0.56D 0.58D 0.59D
```

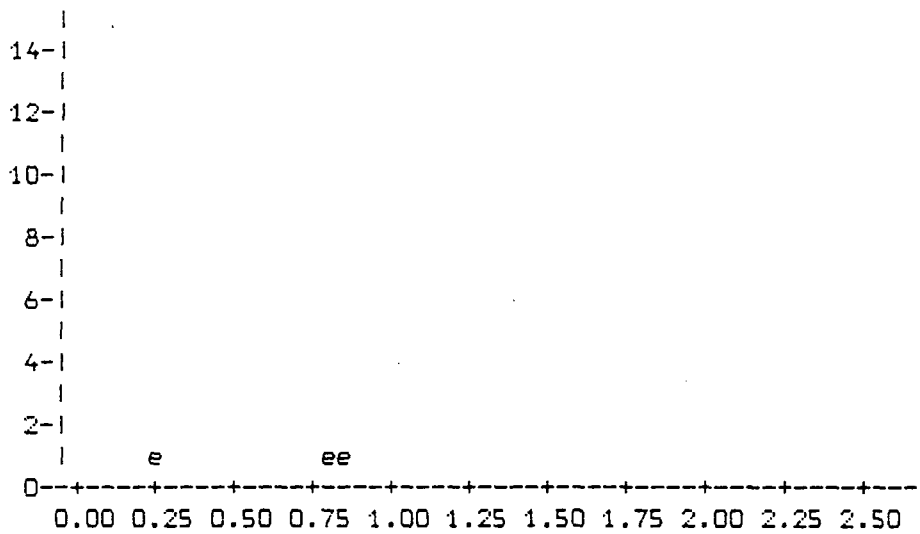


PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.39	0.68	ALL	10	0.54	0.10
N	0.71	0.79	ALL	2	0.75	0.05
			OVERALL	12	0.57	0.12

ORDERED VALUES FOLLOW:

0.39N 0.40N 0.43N 0.53N 0.54N 0.56N 0.61N 0.61N 0.64K 0.67K 0.71n
0.78n

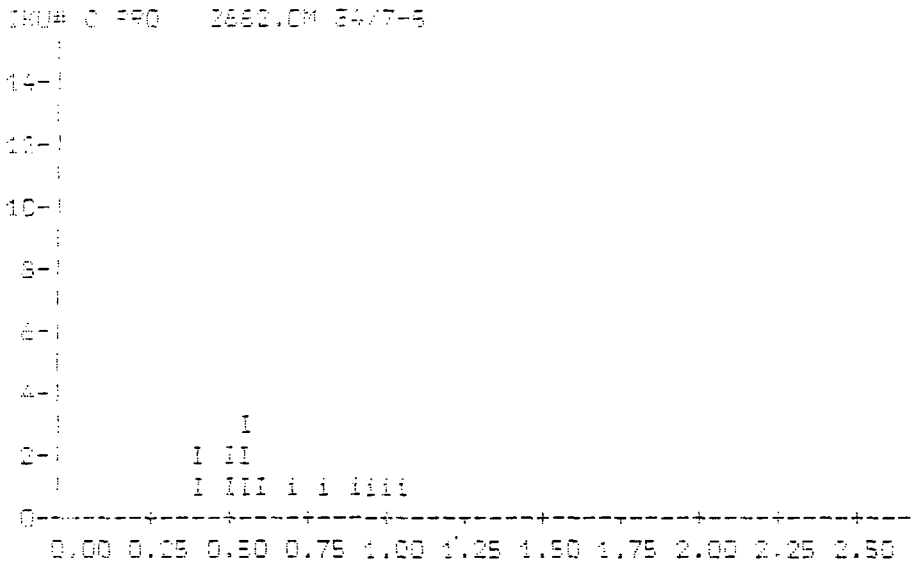
IKU# C 989 2855.2M 34/7-5



PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
N	0.25	0.26	ALL	1	0.25	0.00
N	0.81	0.87	ALL	2	0.84	0.04
			OVERALL	3	0.64	0.34

ORDERED VALUES FOLLOW:

0.25e 0.81e 0.86e



PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.43	0.65	ALL	8	0.52	0.07
N	0.72	1.06	ALL	6	0.91	0.12
			OVERALL	14	0.69	0.22

ORDERED VALUES FOLLOW:

0.43I 0.44I 0.60I 0.91I 0.55I 0.55I 0.38I 0.64I 0.72I 0.84I 0.90I
0.95I 1.00I 1.05I

IKU
SINTEF-GRUPPEN

MATURATION

Well no.: 34/7 – 5
Company: SAGA PETROLEUM A/S

VISUAL KEROGEN
COLORATION AND COMPOSITION OF ORGANIC RESIDUE