



COMPLETION INTERVAL

COMPANY STATOIL A/S Well No. 7120/7-2 Page 1 of 6

Casing Size 30 " from 263 m to 325 m (Bit Size) 36 " hole from 263 m to 326 m Meters

Material Consumption for Interval:

Product	Units	Size	Cost/Unit	Total Cost
Barite	31	MT	\$ 151.20	\$ 4,687.20
Wyoming Bentonite	27	MT	403.60	10,897.20
Caustic Soda	18	25 kg	22.47	404.46
Soda Ash	8	50 kg	22.79	182.32

Material Cost for Interval \$ 16,171.18 Average Cost per meter \$ 260.83

Number of Days 4 Average Cost per Day \$ 2,042.80

Comments

Drilled this section with seawater, and 6 m³ of spud mud was spotted at each connection. The hole was displaced with mud, 40 m³ of 1.23 s.g. prior to running 30" casing.



COMPLETION INTERVAL

COMPANY STATOIL A/S Well No. 7120/7-2 Page 2 of 6

Casing Size 20 " from 263 m to 365 m (Bit Size) 26 " hole from 326 m to 370 m Meters

Material Consumption for Interval:

Product	Units	Size	Cost/Unit	Total Cost
Barite	65	MT	\$ 151.20	\$ 9,828.00
Wyoming Bentonite	21	MT	403.60	8,475.60
Caustic Soda	17	25 kg	22.47	381.99
Bicarbonate of Soda	12	50 kg	26.57	318.84
Pro - Defoamer	1	25 ltr	72.19	72.19
Soda Ash	5	50 kg	22.79	113.95

Material Cost for Interval \$ 19,190.57 Average Cost per meter \$ 436.15

Number of Days 5 Average Cost per Day \$ 3,838.00

Comments

Drilled 12 1/4" pilot hole to 410 m. Cemented back to 350 m. Drilled 26" hole to 370 m using underreamer.



COMPLETION INTERVAL

COMPANY STATOIL A/S Well No. 7120/7-2 Page 3 of 6

Casing Size 13 3/8 " from 263 m to 800 m (Bit Size) 17 1/2 " hole from 365 m to 815 m Meters

Material Consumption for Interval:

Product	Units	Size	Cost/Unit	Total Cost
Barite	36	MT	\$ 151.20	\$ 5443.20
Wyoming Bentonite	7	MT	403.60	2825.20
Caustic Soda	10	25 kg	22.47	224.70
Bicarbonate of Soda	12	50 kg	26.57	318.84
Unical	8	25 kg	22.60	180.80

Material Cost for Interval \$ 8992.74 Average Cost per meter \$ 19.98

Number of Days 3 Average Cost per Day \$ 2997.58

Comments

Drilling of this interval commenced after a 10 day industrial dispute, 20" csg. having been set at 365 m. The interval was drilled in 3 days with prehydrated bentonite. Logs were run satisfactorily and csg. set at 800 m.



COMPLETION INTERVAL

COMPANY STATOIL Well No. 7120/7-2 Page 4 of 6

Casing Size 9.5/8" Meters " from 263 to 1502 (Bit Size) 12 1/4" hole from 800 Meters to 1515

Material Consumption for Interval:

Product	Units	Size	Cost/Unit	Total Cost
BARITE	95	MT	151,20	14364,00
CAUSTIC SODA	31	25 kg	22,47	696,57
GYPSUM	142	40 kg	10,82	1536,44
MILPOLYMER 302	128	25 kg	252,71	32346,88
DRISPAC REGULAR	30	50 lbs	199,00	5970,00
DRISPAC SUPERLO	15	50 lbs	208,00	3120,00
PRODEFOAMER	7	25 l	72,19	505,33
WYOMING BENTONITE	1	MT	403,60	403,60
SODA ASH	1	50 kg	22,79	22,79
DETERGENT	1	55 gal	495,00	495,00
UNICAL	10	25 kg	22,60	226,00

Material Cost for Interval \$ 59686,61 Average Cost per meter \$ 83,48

Number of Days 11 Average Cost per Day \$ 5426,06

Comments
 Drilled this section with GYP/Polymer mud.
 No problems encountered.



COMPLETION INTERVAL

COMPANY STATOIL A/S Well No. 7120/7-2 Page 5 of 6

Casing Size 7 " from 1349 m to 2519 m (Bit Size) 8 1/2 " hole from 1502 m to 2523 m Meters

Material Consumption for Interval:

Product	Units	Size	Cost/Unit	Total Cost
Barite	62	MT	\$ 151.20	\$ 9,374.40
Bentonite	1	MT	403.60	403.60
Caustic Soda	88	25 kg	22.47	1,977.36
Bicarbonate of Soda	5	50 kg	26.57	132.85
Unical	230	25 kg	22.60	5,198.00
Drispac Superlo	105	50 lb	208.00	21,840.00
Pro - Defoamer	1	25 ltr	72.19	72.19
Soltex	10	50 lb	103.95	1,039.50
W.O. 21	1	25 kg	273.26	273.26

Material Cost for Interval \$ 40,311.16 Average Cost per meter \$ 39.48

Number of Days 24 Average Cost per Day \$ 1,679.63

Comments

After drilling out 9 5/8" casing shoe, the mud system was gradually converted from a gyp-polymer to a dispersed Cel-Lignosulfonate system. No problems encountered while drilling this section.



COMPLETION INTERVAL

COMPANY STATOIL A/S Well No. 7120/7-2 Page 6 of 6

Casing Size _____ Meters (Bit Size) _____ Meters
 " from _____ to _____ " hole from _____ to _____

Material Consumption for Interval:

Product	Units	Size	Cost/Unit	Total Cost
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Materials used during logging and testing. Including correction on inventory when well finished.

Barite	32	MT	\$ 151.30	\$ 4,838.40
Caustic Soda	5	25 kg	22.47	112.35
Drispac Regular	34	50 lb	199.00	6,766.00
Bicarbonate of Soda	48	50 kg	26.57	1,275.36
Salt	195	50 kg	11.55	2,252.25
XC - Polymer	5	50 lb	393.80	1,969.00
Soda Ash	5	50 kg	22.79	113.95
Lime	1	40 kg	10.82	10.82
W.O. 21	3	25 kg	273.26	819.78

Material Cost for Interval \$ 18,157.91 Average Cost per meter \$ _____

Number of Days 24 Average Cost per Day \$ 756.58

Comments



DAILY DRILLING MUD ADDITIONS

Contractor SMEDVIG OPERATOR STATOIL A/S LEGAL DESCRIPTION _____
 Rig No. WEST VANGUARD Well Name And No. 7120/7-2 Field TRIMSØFLAKET COUNTRY NORWAY
 Promud a/s Warehouse TANANGER Spud Date 26/5/83 No. Drilling Days To T.D. _____ DATE T.D. REACHED 21/7/83 TOTAL DEPTH 2523 m. TOTAL COST \$ 162,510.17

DATE (1983)	DEPTH meters	Barite		Wyoming Bentonite		Caustic Soda		Soda Ash		Bicarbonate		Unical		Pro-Defoamer										DAILY COST	CUMULATIVE COST	
		Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost			
25/5																								3,341.15	3,341.15	
26/5	300	3	2	5																				1,305.74	4,646.89	
27/5	296	5	5	3																				2,841.41	7,488.30	
28/5	326	21	6	4	4																			5,777.84	13,266.14	
29/5	325	2	6	4	4																			2,905.04	16,171.18	
		31	27	18	8																				16,171.18	
		30" CSG SET AT 325 M																								
30/5	325	9	2	1	1																				2,213.26	18,384.44
31/5	410	16		4		4				1															2,687.44	21,071.99
1/6	370		8	5		8																			3,553.71	24,625.70
2/6	370	23	4	1																					5,114.47	29,740.17
3/6	365	17	7	6	4																				5,621.58	35,361.75
		65	21	17	5	12				1															19,190.57	35,361.75
		20" CSG SET AT 365 M																								
4/6	365	31																							4,687.20	40,048.95
5/6	365																								NIL	40,048.95
6/6	365																								NIL	40,048.95
7/6	365																								NIL	40,048.95
STRIKE																										
17/6	365																								NIL	40,048.95
18/6	365	1	1																						554.80	40,603.75

Date 18/6/83 Promud a/s Technical Representative Sorbø/Berglind/Gravdal/Sola/ District North Sea Region Norway PAGE 1 OF 5



DAILY DRILLING MUD ADDITIONS

Contractor SMEDVIG OPERATOR STATOIL LEGAL DESCRIPTION _____
 Rig No. WEST VANGUARD Well Name And No. 7120/7-2 Field TROMSØFLAKET COUNTRY NORWAY
 Promud a/s Warehouse TANANGER Spud Date 26/5/83. No. Drilling Days To T.D. _____ DATE T.D. REACHED 21/7/83. TOTAL DEPTH 2523 m. TOTAL COST \$ 162,510.17

DATE (1983)	DEPTH meters	Barite		Caustic Soda		Unical		Drisspac		Superlo		Promud		Defoamer		Soltex		Bicarbonate		Bentonite		W.O. 21		DAILY COST	CUMULATIVE COST
		Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost		
5/7	1955	3	6	22	5	1																		2,197.81	110,861.38
6/7	2021		6	23	3																			1,278.62	112,140.00
7/7	2115	20																						3,024.00	115,164.00
8/7	2163		10	20	10									10										3,796.20	118,960.20
9/7	2174				3																			624.00	119,584.20
10/7	2184		5	18	5																			1,559.15	121,143.35
11/7	2208		5	10	3																			962.35	122,105.70
12/7	2226		3	10																				293.41	122,399.11
13/7	2245	5	2		7																			2,256.94	124,656.05
14/7	2285	5	4	10	12																			3,567.88	128,223.93
15/7	2360	3	5	10																				791.95	129,015.88
16/7	2394	2	5		3																			1,038.75	130,054.63
17/7	2412	3	2		3																			1,122.54	131,177.17
18/7	2455		6	11	13																			3,087.42	134,264.59
19/7	2470		7	11	3											2								1,083.04	135,347.63
20/7	2521		2		12												1							4,154.14	139,501.77
21/7	2523		2	5																				157.94	139,659.71
22/7	2523		2	10																				270.94	139,930.64
23/7	2523		2		2																			460.94	140,391.58
24/7	2523	7	5	10	5												1							2,710.01	143,101.59
25/7	2523	6	1	5	1																			1,250.67	144,352.26
TOTAL:		62	88	230	105	1	10	5	1	1														40,311.16	

Date 25/7/83. Promud a/s Technical Representative McKenzie/Sola/Sørbo. District North Sea. Region Norway. PAGE 3 OF 5



DRILLING MUD RECAP

Contractor SMEDVIG OPERATOR STATOIL LEGAL DESCRIPTION _____
 Rig No. WEST VANGUARD Well Name 7120/7-2 Field TROMSØFLAKET COUNTRY NORWAY
 Promud a/s TANANGER Spud Date 26/5/83 No. Drilling Days To T.D. _____ DATE T.D. REACHED 21/7/83 TOTAL DEPTH 2523 m. TOTAL COST \$ 162,510.17

DATE (1983)	TIME	DEPTH meters	WT (ppm)	V	P	YIELD POINT (lb/100ft ²)	GELS (lb/100ft ³)	pH	FILTRATE (ml/30 min)			CART (32nd in)	Alkalinity			Chloride (ppm)	Calcium (ppm)	Sand (lb by Vol)	Solids (lb by Vol)	Oil (lb by Vol)	Water (lb by Vol)	Methy. Blue (ppb)	Excess Gyp (lb/bbl)	Circ. Volume (m ³)	REMARKS									
									API	HT	HP		P _m	P _i	M _i																			
25/5	2400		1.05	100+		SPUD	MUD																	Mix spud mud.										
26/5	2400	300	1.05	100+		SPUD	MUD																	Drill 17 1/2" pilot hole.										
27/5	2400	296	1.05	100+		SPUD	MUD																	Drill 36" hole.										
28/5	2403	326	1.05	100+		SPUD	MUD																	Ream 36" hole.										
29/5	2400	325	1.05	60		SPUD	MUD																	Run and cmt. 30" casing.										
30/5	2400	325	1.10	65	18	25	23/40	10.3	N/C				.7	.4/.9	800	20	TR	5		95	22.5		Run riser.											
31/5	2400	410	1.10	47	9	29	20/31	9.4	N/C				.2	.15/35	7500	100	TR	5		95	20.0	118	Drill 12 1/4" pilot hole.											
1/6	2400	370	1.10	45	9	15	16/43	10.5	N/C				1.2	.7/1.4	4500	80	TR	5		95	20.0		Open hole to 26".											
2/6	2400	370	1.10	45	8	26	24/41	10.5	N/C				.55	.2/.4	7100	100	TR	5		95	20.0		Pull riser. Ream with 26" bit.											
3/6	2400	365	1.10	45	10	20	30/51	10.5	18		3	.55	.3/.6	800	0	TR	4		96	20.0			Run casing. Cmt. Run riser.											
4/6	2400	365	1.10	45	10	20	30/51	10.5	18		3	.55	.3/.6	800	0	TR	4		96	20.0			Pull riser. Shut down.											
5/6	2400	365	1.10	45	10	20	30/51	10.5	18		3	.55	.3/.6	800	0	TR	4		96	20.0				Rig shut down.										
6/6	2400	365	1.10	45	10	20	30/51	10.5	18		3	.55	.3/.6	800	0	TR	4		96	20.0				Rig shut down.										
7/6	2400	365	1.10	45	10	20	30/51	10.5	18		3	.55	.3/.6	800	0	TR	4		96	20.0				Rig shut down.										
						INDUSTRIAL DISPUTE.																												
17/6	2400	365	1.10	40	10	10	10/26	10.6	18		3	.3	.15/35	4500	40	TR	4		96	20.0				Return to rig.										
18/6	2400	365	1.10	48	13	23	17/40	10.6	15		2	.33	.18/40	5500	160	TR	4		96	27.5				Test BOP.										
19/6	2400	385	1.11	49	12	15	13/52	10.7	20		3	.48	.22/51	8300	240	1/4	5		95	17.5		131		Drill cmt. plug to 385 m.										
20/6	2400	668	1.12	52	11	37	23/36	10.2	22.5		3	.31	.12/37	11000	150	1/4	7		93	22.5		157		Drill to 668 m.										
21/6	2400	815	1.14	48	7	40	30/35	9.8	32		3	.18	.05/23	13000	280	1/4	7		93	25.0		190		Logging.										
22/6	2400	815	1.03	47	10	24	6/9	10.8	10		1	.55	.1/.3	15200	1200	0	4		96	-	2.0	128		Set 13 3/8" casing.										
23/6	2400	777	1.10	48	9	20	6/8	10.5	10		1	.30	.1/.3	19500	1200	0	6		94	-	2.0	158		Cmt. 13 3/8" csg. Drill cmt.										
24/6	2400	997	1.10	48	10	22	6/7	10.3	8		1	.60	.05/30	19500	1600	.2	6		94	5.0	3.4	130		Displ. to Gyp mud. Drill 12 1/4" hole.										
25/6	2400	1227	1.15	43	10	21	6/14	10	7.5		1	.2	.1/.3	20000	1600	TR	7		93	10.0	3.0	147		Drill 12 1/4" hole.										
26/6	2400	1390	1.25	46	13	23	11/22	9.1	9.5		2	.15	.05/25	20000	1520	TR	10		90	17.5	2.6	155		Drill. Increase mw. to 1.25.										
27/6	2400	1515	1.25	50	12	19	11/25	9.8	11.5		2	.15	.05/25	20000	1300	TR	10		90	17.5	2.2	163		Drill 12 1/4" hole.										
28/6	2400	1515	1.25	55	15	25	15/51	9.8	8.0		2	.1	.05/3	20000	1400	TR	11		89	20.0	2.1	165		Ream and wash wiper trips.										
29/6	2400	1515	1.25	52	13	21	14/45	9.8	7.5		2	.1	.05/3	20000	1460	TR	11		89	20.0	2.1	176		Logging. Run 9 5/8" casing.										

Date 29/6/83 Promud a/s West/Sola. District North Sea. Region Norway. PAGE 1 OF 3
 Technical Representative _____



DRILLING MUD RECAP

Contractor SMEDVIC OPERATOR STATOIL LEGAL DESCRIPTION _____
 Rig No. WEST VANGUARD Well Name 7120/7-2 Field TROMSØFLAKET COUNTRY NORWAY
 Promud a/s TANANGER Spud Date 26/5/83 No. Drilling Days To T.D. _____ DATE T.D. REACHED 21/7/83 TOTAL DEPTH 2523 m. TOTAL COST \$ 162,510.17

DATE (1983)	TIME	DEPTH meters	Wt (ppm)	F.	F.	YIELD POINT (100%)	GELS (100%)	FILTRATE (ml 30 min)			Cap. (30m)	Alkalinity			Chloride (ppm)	Calcium (ppm)	Sand (% by Vol.)	Solids (% by Vol.)	Oil (% by Vol.)	Water (% by Vol.)	Methy. Blue (me ml mud)	Excess Gyp.	Circ. Volume (dl)	REMARKS
								API	HT	HT		P ₁	P ₂	M ₁										
30/6	2400	1515	1.26	60	16	24	13/42	95	8.0			2	.15	.1/4	20000	1460	TR	11		89	20	2.1	176	Logging. Run 9 5/8" casing.
1/7	2400	1515	1.25	54	14	24	10/35	95	7.9			1	.15	.1/4	20000	1480	TR	10		90	20	2.0	160	Set and cmt. 9 5/8" casing.
2/7	2400	1610	1.25	48	19	21	7/36	103	7.7			1	.7	.2/35	20000	1480	TR	11		89	20	2.25	154	Drill 8 1/2" hole.
3/7	2400	1734	1.25	53	17	20	9/38	95	7.5			1	.4	.2/35	20000	1480	TR	11		89	21	2.0	158	Drill 8 1/2" hole.
4/7	2400	1850	1.25	54	18	20	9/38	99	8.0	20	250	1	.4	.2/35	20000	1420	TR	11.5		88.5	21		162	" "
5/7	2400	1955	1.25	53	16	18	9/36	96	7.6	22	250	1	.35	.15/35	20000	1440	TR	11.5		88.5	22.5		165	" "
6/7	2400	2021	1.25	51	14	15	5/32	101	7.7	22	250	1	.4	.15/4	20000	1360	TR	11.5		88.5	22.5		163	" "
7/7	2400	2115	1.32	58	18	18	9/39	96	8.2	21	250	1	.4	.15/4	20000	1360	TR	13		87	22.5		166	" "
8/7	2400	2163	1.32	54	18	16	8/37	99	7.2	23	250	1	.35	.1/4	19500	1300	TR	13		87	22.5		168	" "
9/7	2400	2174	1.32	58	18	16	8/37	98	5.8	20	250	1	.35	.1/35	19500	1280	TR	13.5		86.5	22.5		168	Coring.
10/7	2400	2184	1.32	58	16	16	8/37	98	5.7	22	250	1	.4	.1/35	19500	1260	TR	13.5		86.5	22.5		169	" "
11/7	2400	2208	1.32	55	18	16	5/32	97	5.8	22	250	1	.35	.1/4	19500	1120	TR	13		87	20		165	" "
12/7	2400	2226	1.32	50	16	15	5/27	99	5.8	23	250	1	.4	.15/4	19500	1040	TR	13		87	20		166	" "
13/7	2400	2246	1.32	50	17	15	6/25	98	5.2	22	250	1	.35	.1/4	19500	1000	TR	13		87	20		167	" "
14/7	2400	2225	1.32	58	19	17	5/24	97	4.4	22	250	1	.4	.15/4	19500	960	TR	13		87	20		173	Drill ahead.
15/7	2400	2360	1.32	54	18	14	5/21	98	4.5	21	250	1	.4	.1/4	20000	600	TR	13		87	20		176	" "
16/7	2400	2394	1.32	55	18	14	4/20	10	4.4	21	250	1	.45	.12/45	20000	520	TR	13.5		86.5	20		177	" "
17/7	2400	2412	1.32	54	17	14	5/19	99	4.9	22	250	1	.6	.1/5	19500	480	TR	13.5		86.5	20		177	" "
18/7	2400	2455	1.32	64	20	18	5/19	10	4.4	21	250	1	.9	.1/5	19000	460	TR	13.5		86.5	20		178	" "
19/7	2400	2470	1.32	56	18	14	4/17	10	4.7	21	250	1	.65	.12/55	18500	440	TR	13		87	20		180	" "
20/7	2400	2521	1.32	59	20	15	4/15	98	4.6	21	250	1	1.0	.1/55	18500	300	TR	13.5		86.5	20		182	" "
21/7	2400	2523	1.32	59	20	15	4/15	97	4.8	21	250	1	.9	.1/5	18500	300	TR	13.5		86.5	20		182	Logging.
22/7	2400	2523	1.32	56	18	15	5/14	97	4.8	21	250	1	.9	.05/6	18000	300	TR	13.5		86.5	20		182	" "
23/7	2400	2523	1.32	54	15	13	3/13	95	4.8	21	250	1	.8	.05/6	18000	300	TR	13		87	20		167	" "
24/7	2400	2523	1.32	54	15	13	4/12	99	4.8	21	250	1	1.0	.05/7	18000	300	TR	13		87	20		179	" "
25/7	2400	2523	1.32	55	15	12	4/12	98	4.8	21	250	1	1.0	.05/65	18000	300	TR	13		87	20		183	Cementing.
26/7	2400	2523	1.33	60	16	12	4/15	97	5.2	22	250	1	.9	.07/7	18000	240	TR	13		87	20		163	" "
27/7	2400	2523	1.33	56	17	13	4/18	118	6.4	26	250	1	5	.14/28	18000	80	TR	13		87	20		171	" "

Date 21/7/83 Promud a/s McKenzie/Sola/Sørbo District North Sea Region Norway PAGE 2 OF 3



DRILLING MUD RECAP

Contractor SMEDVIG OPERATOR STATOIL LEGAL DESCRIPTION _____

Rig No. WEST VANGUARD Well Name And No. 7120/7-2 Field TROMSØFLAKET COUNTRY NORWAY

Promud a/s TANANGER Spud 26/5/83 No. Drilling Days To T.D. DATE T.D. 21/7/83 TOTAL DEPTH 2523 m. TOTAL COST \$ 162,510.17

DATE (1983)	TIME	DEPTH Metres	WT (PPM)	F ₁	F ₂	YIELD POINT (lit/100lit)	CELL THICKNESS (mm)	pH	FILTRATE (ml/30min)			Capl (300g lit)	ANALYSIS			Calcium (ppm)	Sand (% by Vol.)	Solids (% by Vol.)	Oil (% by Vol.)	Water (% by Vol.)	Methy. blue (meq/ml mud)	Circ. Volume (bar)	REMARKS
									API	RT-100	FE		F ₁	F ₂	M ₁								
28/7	2400	2523	1.20	52	13	11	3/19	11.1	8.8	28	250	1	2.5	2/7.8	17000	150	TR	9	91	17.5	158	Cementing.	
29/7	2400	2523	1.20	50	12	10	3/19	11	7.2	26	200	1	2.3	2/7.7	17000	140	TR	9	91	17.5	155	Attempt to squeeze.	
30/7	2400	2523	1.20	51	10	11	3/18	11.3	7.0	29	200	1	2.2	2/5.8	17000	260	TR	9	91	17.5	157	"	
31/7	2400	2523	1.20	56	13	15	5/16	11.3	7.1	29	200	1	2.0	2/7.7	17000	220	TR	9	91	17.5	157	"	
1/8	2400	2523	1.20	53	11	13	4/12	12	6.6	30	200	1	6.6	2/2.9	17000	100	TR	10	90	15	157	"	
2/8	2400	2523	1.20	50	9	10	3/8	11.8	6.0	27	200	1	6.9	1/2.5	16500	80	TR	10	90	15	156	Squeezed cement.	
3/8	2400	2523	1.20	52	10	12	2/9	12	6.8	29	200	1	6.8	1/2.9	17000	120	TR	10	90	15	162	Drilled cement.	
4/8	2400	2523	1.20	50	11	10	3/8	12	6.2	27	200	1	6.7	1/2.9	17000	140	TR	10	90	15	154	Run test string.	
5/8	2400	2523	1.20	50	10	12	2/9	12	6.3	27	200	1	6.7	1/2.9	28000	120	TR	10	90	15	154	Perforating.	
6/8	2400	2523	1.20	51	12	13	3/9	11.6	6.0	27	200	1	6.7	1/2.9	28000	120	TR	10	90	15	154	Perforated. Ran bit & scraper.	
7/8	2400	2523	1.20	51	11	13	3/9	11.6	6.0	27	200	1	6.7	1/2.9	28000	120	TR	10	90	15	154	Run junk sub. Circ. packer.	
8/8	2400	2523	1.20	50	11	12	2/9	11.6	6.0	27	200	1	6.7	1/2.9	28000	120	TR	10	90	15	154	Make up test equipment.	
9/8	2400	2523	1.20	50	11	13	2/9	11.6	6.0	27	200	1	6.7	1/2.9	28000	120	TR	10	90	15	154	Started flowing.	
10/8	2400	2523	1.20	50	11	12	3/9	11.6	6.0	27	200	1	6.7	1/2.9	28000	120	TR	10	90	15	154	Flowing.	
11/8	2400	2523	1.20	50	10	12	3/9	11.6	6.0	27	200	1	6.7	1/2.9	28000	120	TR	10	90	15	154	Shut in well to build pressure.	
12/8	2400	2523	1.20	49	10	11	2/9	11.6	6.0	27	200	1	6.7	1/2.9	28000	120	TR	10	90	15	154	" "	
13/8	2400	2523	1.20	48	12	14	3/10	11.8	6.0	27	200	1	6.5	1/1.7	28000	140	TR	10	90	15	139	Bullheading. Break down foam.	
14/8	2400	2523	1.20	47	11	14	3/9	11.8	6.0	27	200	1	6.5	1/1.7	28000	140	TR	10	90	15	139	Tag packer - Run stinger.	
15/8	2400	2523	1.20	47	10	12	3/9	11.8	6.0	27	200	1	6.5	1/1.7	28000	140	TR	10	90	15	119	Plug and abandon program.	
16/8	2400	2523	1.20	47	11	13	3/9	11.6	6.0	27	200	1	6.5	1/1.6	28000	140	TR	10	90	15	119	" "	
17/8	2400	2523	1.20	40	10	10	3/8	11	6.0	27	200	1	5.8	7/1.1	25000	180	TR	10	90	15	99	" "	
18/8	2400	2523	1.20	40	10	11	3/8	10.8	6.2	27	200	1	5.0	0.5/9	25000	180	TR	10	90	15		" "	
19/8	2400	2523	1.20	40	10	10	3/8	10.8	6.2	27	200	1	5.0	5/9	25000	180	TR	10	90	15	S.W.	" "	

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RFT-summary

Four RFT-runs were performed 22 July 1983. The first run resulted in 19 pretest pressure points out of 24 attempts, from 2150m to 2491m RKB, table 1. Ten of these 19 successful pretest pressure points were in the hydrocarbon zone.

Four samples were taken, one at each run. Sampling levels were:

Sample no. 1 at 2150.5m RKB. The 1 gallon chamber was opened on the rig, containing 0.164 cubic m (5.8 cuft) gas and 1.8 liter mudfiltrate with a film of condensate. Opening pressure was 137.9 barg (2000 psig). 2 3/4 gallon chamber failed.

Sample no. 2 at 2151 m RKB was a segregated sample. The 2 3/4 gallon chamber contained 1.40 cubic m (49.6 cuft) gas, 3 liter of

mudfiltrate and condensate. The 1 gallon chamber had an opening pressure of 158.6 barg (2300 psig) and was sent onshore of laboratory analysis.

Sample no. 3 at 2225m RKB was a segregated sample. Both chambers had an opening pressure of 0 barg and contained only mudfiltrate/water. The 2 3/4 gallon chamber contained 10.5 liter and the 1 gallon chamber 3.75 liter (no gas).

Sample no. 4 at 2220m RKB was a segregated sample. The 2 3/4 gallon chamber contained 10.75 liter mudfiltrate/water and a minor gas content. The 1 gallon chamber had an opening pressure of 89.6 barg (1300 psig) and was sent onshore for laboratory analysis.

Table 1

RFT pressure points 7120/7-2

Depth m RKB	Pressure psia	kPa	g/cc	comments
2150	3502	24145	1.145	
2158	3517	24249	1.146	
2170	3512	24214	1.138	
2171	3517	24248	1.139	
2178	3517	24248	1.136	
2188	3518	24255	1.131	
2200	3524	24297	1.126	
2207	3525	24304	1.123	
2215	3528	24324	1.120	
2225	3530	24339	1.116	
2230	3538	24393	1.116	
2234	3546	24449	1.116*	
2240	3548	24463	1.114	
2244	3540	24407	1.109*	
2250	3563	24566	1.114	
2291	3627	25007	1.113	
2420	3825	26372	1.112	
2470	3894	26848	1.109	
2491	3922	27041	1.107	
2158	3514	24228	1.145*	

* pretest pressure points not included in evaluation

Gas gradient linear fit: $R^2 = 0.848$

Water gradient linear fit $R^2 = 1.00$

Table 3

Ion analysis of water samples from well 7120/7-2

Other properties	RFT(sample no.4)	DST(separator sample)
pH	:6.92 at 20 deg. C	6.35 at 20 deg. C
Specific gravity 60/60 F	:1.022	1.012
Resistivity, ohm meters	:0.275 at 20 deg. C	0.560 at 20 deg. C
Resistivity, calc. from eq. NaCl	:0.270	0.478
Suspended solids, mg/l	:2542.94	1407.08

<u>Cations</u>	mg/l	mg/l
Sodium, Na (calc)	:8900	4400
Calcium, Ca	: 272	242
Magnesium, Mg	: 34	90
Barium, Ba	: 1	0.4
Iron, Fe	: 11	0.5
Strontium	: 5.1	3.6
Potassium	: 214	157

Anions

Chloride, Cl	:13963	6213
Sulfate, SO4	: 4200	1400
Carbonate, CO3	: 0	0
Bicarbonate, HCO3	: 805	966
Hydroxide	: 0	0
Total dissolved solids (calc)	:<u>28405</u>	<u>13473</u>

7120/7-2 DST nr.1: 2153-2164.8 & 2168-2179.8 m RKB

FLOW PERIOD	DURATION Min	WHP kPa	WHT C ^o	BHP kPa *	BHT C ^o *	GASRATE Sm 3 **	CONDRATE Sm 3 ***	CHOKE Inch
Initial flow	5.5	3342	-	21893	78.2	-	-	32/64
Initial build-up	66	-	-	24160	78.8	-	-	-
Main flow	3000	6900	29	22361	84.9	702450	31.5	64/64
Build-up	2880	-	-	24127	83.3	-	-	-

Gas gravity = .68

Condensate gravity = .77

CO₂ = 5%

H₂S = None

Bs & W = 8%

* Flopetrol SDP 83065

** Average last 6 hrs

*** Measured in tank

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REPORT TYPE	REPORT NO. IFE/KR/F-84/008	DATE 1984-01-17
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SUMMARY <p>The gas components CH_4, C_2H_6, C_3H_8, $i\text{-C}_4\text{H}_{10}$, $n\text{-C}_4\text{H}_{10}$ and CO_2 have been separated from natural gases of well 7120/7-2, and the $\delta^{13}\text{C}$-values of these components have been measured. The isotopic composition of hydrogen which was made from the H_2O during the combustion of CH_4 have also been measured.</p> <p>Both samples from well 7120/7-2 have been formed at a high maturity situation in the condensate field of the oil window. A source LOM of about 13 is indicated for the gases. A high maturity source is also inferred from the combined use of the $\delta^{13}\text{C}$ methane value and the δD methane value.</p> <p style="text-align: center;">21 FEB 1984</p> <p style="text-align: center;">REGISTRERT OLJEREGISTRATET</p>		DISTRIBUTION Oppdragsgiver 10 Andresen, B. Brevik, E. Garder, K. Gaudernack, B. Råheim, A. Berg, J.O.
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REPORT ON STABLE ISOTOPES ($\delta^{13}\text{C}$ AND δD) ON NATURAL GASES FROM
WELL 7120/7-2

ANALYTICAL PROCEDURE

The natural gas has been separated into the different gas components by a Carlo-Erba 4200 instrument. The hydrocarbon gas components were oxydized in separate CuO-ovens, which enables us to collect several times when the concentration of a gas component is low. The combustion products CO_2 and H_2O were frozen into collection vessels and separated. The isotopic measurements were performed on a Finnigan Mat 251 mass spectrometer. Our $\delta^{13}\text{C}$ -value on NBS-22 is -29.77 ± 0.06 ‰.

RESULTS

The results are given in the following table :

Sample No.	CH_4		C_2H_6	C_3H_8	$i\text{-C}_4\text{H}_{10}$	$n\text{-C}_4\text{H}_{10}$	CO_2
	$\delta^{13}\text{C}$	δD	$\delta^{13}\text{C}$	$\delta^{13}\text{C}$	$\delta^{13}\text{C}$	$\delta^{13}\text{C}$	$\delta^{13}\text{C}$
7120/7-2 RFT 2115 m	-40.8	-122	-28.8	-28.2	-26.4	-27.5	-10.5
7120/7-2 RFT 2219 m	-41.1	-149	-26.8	-26.6	-25.0	-26.4	-15.1

Our uncertainty on the $\delta^{13}\text{C}$ -value is estimated to be ± 0.3 ‰, and includes all the different analyses steps.

The uncertainty on the δD -value is about ± 5 ‰. The isotopic measurement has been performed in Mook's laboratory, Groningen, Netherland.

INTERPRETATION

THE $\delta^{13}\text{C}$ -values of methane, ethane, propane and n-butane for the two samples have been plotted on the maturity diagram by James (1983)* figure 1. A source LOM of about 13, eq. to a vitrinite reflectance of about 1.6 is indicated. The $\delta^{13}\text{C}$ -methane values plot above the methane line in the diagram. This is often the case for LOMs from 12 to 14, the range of maturities where condensates are common.

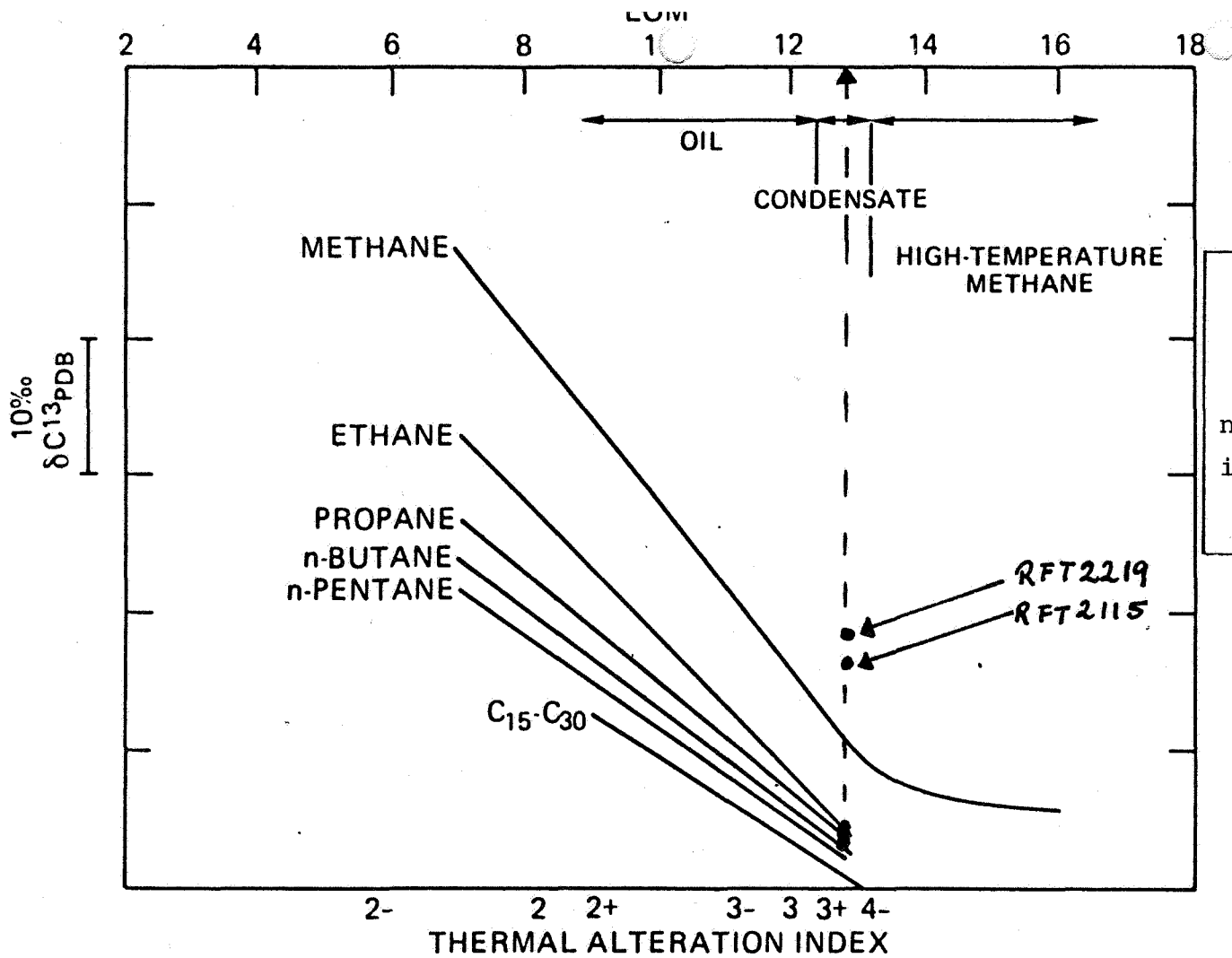
The carbon and hydrogen isotopic composition of the two samples have been plotted in a $\delta^{13}\text{C}$ methane vs. δD methane cross plot. (Schoell, 1983)** figure 2. This also indicates that the gases were formed at high maturity in the condensate field of the oil window.

It is possible that the more negative $\delta^{13}\text{C}$ CO_2 value of the deepest sample (RFT 2219) suggests that this is closer to the source.

CONCLUSION

Both samples from well 7120/7-2 have been formed at a high maturity situation in the condensate field of the oil window. A source LOM of about 13 is indicated for the gases. A high maturity source is also inferred from the combined use of the $\delta^{13}\text{C}$ methane value and the $\delta^{13}\text{D}$ methane value.

- * James, Alan T. (1983) : Correlation of Natural Gas by Use of Carbon Isotopic Distribution Between Hydrocarbon Components, A.A.P.G. December, 1983
- ** Schoell, M. 1983 : Genetic Characertization of Natural Gases. A.A.P.G. December, 1983.



	RF 2115		RF 2219	
	$\delta^{13}\text{C}$	Vol %	$\delta^{13}\text{C}$	Vol %
C ₁	-40.8	71.0	-41.1	72.0
C ₂	-28.8	5.3	-26.8	4.2
C ₃	-28.2	2.2	-26.6	1.5
n-C ₄	-27.5	.5	-26.4	.4
i-C ₄	-26.4	.3	-25.0	.3
CO ₂	-10.5	5.7	-15.1	1.0

Figure 1. Carbon isotopic separations of the gases from well 7120/7-2 are plotted on the maturity diagram (after James, 1983). A source IOM of about 13 is indicated for the gases.

The calculated carbon isotopic separations between gas component are plotted on the vertical axis using a sliding scale that is simply the algebraic difference, in parts per mil, between the isotopic compositions of the natural gas components. The scale does not possess a fixed origin, but is oriented with the more depleted $\delta^{13}\text{C}$ values at the upper end. Use of this sliding scale allows the maturity of a gas to be assessed without prior knowledge of the isotopic composition of the gas' source.

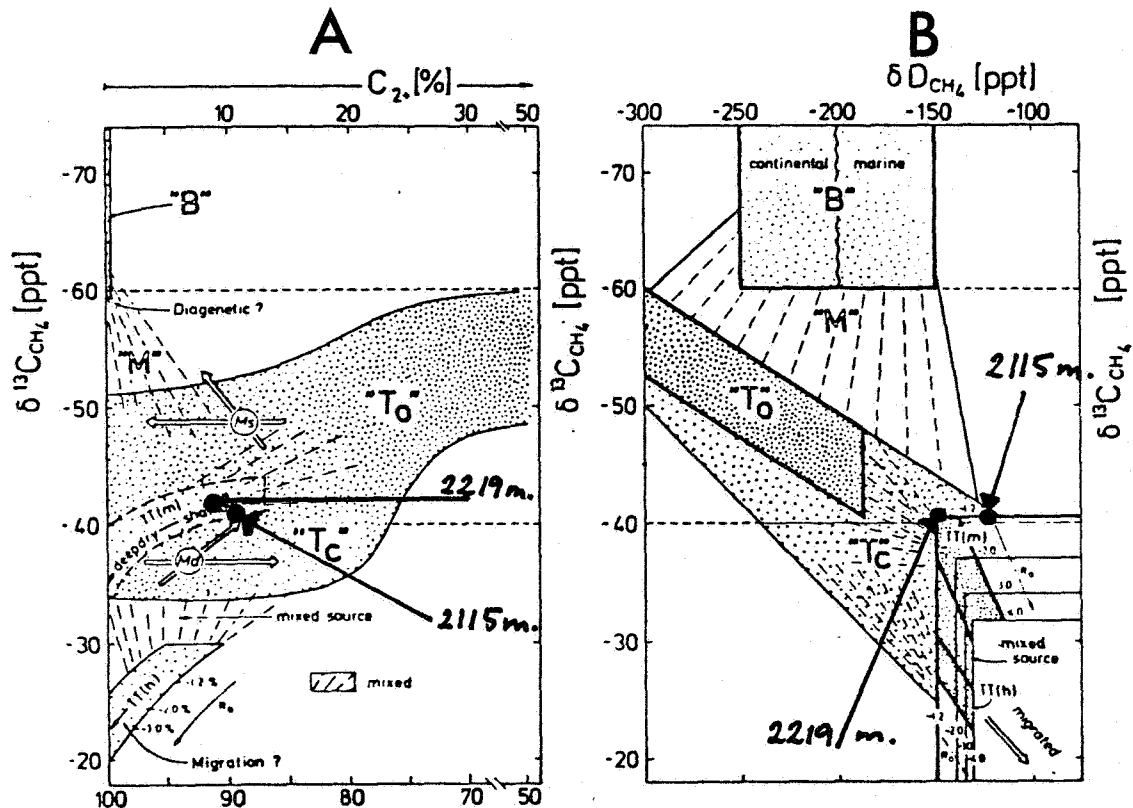


Figure 2 a. Variations of molecular composition in natural gases related to the isotope variations of methane.

Figure 2b. Carbon and hydrogen isotope variations in methanes.

The principle for the genetic characterization of natural gases is that the primary gases (B-biogenic gas, T-associated gas, TT-non-associated gas) are defined by fields of compositional variations. These primary gases may become mixed and form various mixtures "M" of intermediate composition. "TT(m)" and "TT(h)" are non associated gases from marine source rocks and coal gases from N.W. Germany respectively, compositional shifts due to migration are indicated by arrows M_d (deep migration) and M_s (shallow migration) respectively. "T" are gases associated with petroleum in an initial phase of formation. "T_c" are gases associated with condensates.

(Schoell, 1983).