## 3 .3 Wireline pressure measurements/sampling

Table 3.3.1 Formation pressure run 1A

| No. | Depth. m MD RKB | Depth. m TVD RKB | Hydrost. pressure before Bar | Hydrost. pressure after Bar | Formation pressure Bar | Mobility mD/cp | Remarks |
|---|---|---|---|---|---|---|---|
| 1 | 2641,2 | 2639,8 | 414,57 | 414,45 | - | 0,4 | Tight |
| 2 | 2647,0 | 2645,6 | 415,46 | 415,35 | - | 0,5 | Tight |
| 3 | 2646,8 | 2645,6 | 415,32 | 415,22 | - | 0,5 | Tight |
| 4 | 2688,2 | 2684,5 | 421,85 | 421,64 | 353 | 1 | Very poor |
| 5 | 2731,2 | 2729,1 | 429,04 | 428,80 | 371 | 0,6 | Very poor |
| 6 | 3365,5 | 3358,5 | 525,88 | 525,64 | - | 0,5 | Tight |
| 7 | 3368,4 | 3361,4 | 525,96 | 525,93 | 369 | 110,8 | Excellent |
| 8 | 3372,5 | 3365,5 | 526,37 | 526,33 | 369 | 402,1 | Excellent |
| 9 | 3366,0 | 3358,5 | 525,31 | 525,32 | 369 | 275,5 | Excellent |
| 11 | 2686,1 | 2684,5 | 421,58 | | - | 0,9 | Poor/sample |
| 12 | 3468,0 | 3460,5 | | 421,55 | 349 | | Poor |
| 14 | 2686,0 | 2684,5 | 421,88 | 421,86 | 351 | 2 | Poor |

Table 3.3.2 MDT run 2A

| No. | Depth. m MD RKB | Depth. m TVD RKB | Hydrost. pressure before kPa | Hydrost. pressure after kPa | Formation pressure kPa | Mobility mD/cp | Remarks |
|---|---|---|---|---|---|---|---|
| 1 | 3376,1 | 3369,0 | 421,25 | 421,25 | 368,29 | 427,34 | Excellent |
| 2 | 3380,0 | 3372,9 | 421,73 | 421,73 | 368,38 | 576,9 | Excellent |
| 3 | 3390,0 | 3382,8 | 422,99 | 422,97 | 368,57 | 990,3 | Excellent |
| 4 | 3399,0 | 3391,8 | 424,09 | 424,08 | 368,75 | 982,9 | Excellent |
| 5 | 3404,5 | 3397,3 | 424,76 | 424,76 | 368,84 | 150,2 | Excellent |
| 6 | 3413,0 | 3405,7 | 425,82 | 425,81 | 369,01 | 73,1 | Very Good |
| 7 | 3416,5 | 3409,2 | 426,27 | 426,25 | 369,07 | 47,3 | Very Good |
| 8 | 3425,5 | 3418,2 | 427,39 | 427,38 | 369,28 | 402,1 | Excellent |
| 9 | 3450,0 | 3442,5 | 430,39 | 430,38 | 371.23? | Tight | Tight |
| 10 | 3459,0 | 3451,5 | 431,48 | 431,48 | 370,19 | 8,5 | Poor |
| 11 | 3466,0 | 3458,5 | 432,39 | 432,37 | 370,26 | 11,8 | Poor |
| 12 | 3468,0 | 3460,5 | 432,63 | 432,61 | 370,22 | 98,3 | Poor |
| 13 | 3471,0 | 3463,4 | 433,01 | 433,00 | 370,32 | 17,4 | Poor |
| 14 | 3476,0 | 3468,4 | 433,62 | 433,61 | 370,67 | 3,9 | Poor |
| 15 | 3541,5 | 3533,6 | 441,61 | 441,58 | 371,97 | 17,5 | Good |
| 16 | 3544,0 | 3536,1 | 441,91 | 441,90 | 371,99 | 57,3 | Very Good |
| 17 | 3551,0 | 3543,0 | 442,80 | 442,79 | 372,14 | 236,8 | Excellent |
| 18 | 3556,0 | 3548,0 | 443,42 | 443,43 | 372,25 | 167 | Excellent |
| 19 | 3564,3 | 3556,3 | 444,49 | 444,48 | 372,48 | 40,5 | Good |
| 20 | 3567,5 | 3559,5 | 444,88 | 444,88 | 372,47 | 13,1 | Poor |
| 21 | 3575,2 | 3567,2 | 445,83 | 445,81 | 372,57 | 72,6 | Good |
| 22 | 3578,5 | 3585,5 | 446,25 | 446,23 | 372,71 | 167,1 | Excellent |
| 23 | 3585,5 | 3577,4 | 447,13 | 447,11 | 372,87 | 138,6 | Very Good |
| 24 | 3596,8 | 3588,7 | 448,52 | 448,49 | 373,06 | 304,7 | Excellent |
| 25 | 3599,5 | 3591,4 | 448,87 | 448,84 | 373,19 | 7,4 | Poor |
| 26 | 3607,5 | 3599,4 | 449,80 | 449,78 | 373,25 | 170,1 | Excellent |
| 27 | 3612,5 | 3604,3 | 450,42 | 450,42 | 373,37 | 119,9 | Very Good |
| 28 | 3615,4 | 3607,2 | 450,80 | 450,78 | 373,41 | 34,9 | Good |
| 29 | 3618,0 | 3609,8 | 451,07 | 451,05 | 373,49 | 24,8 | Good |
| 30 | 3632,2 | 3623,9 | 452,86 | 452,82 | 377,01 | 0,8 | Poor/supercharged |
| 31 | 3647,2 | 3638,9 | 454,72 | 454,69 | 380,12 | - | Tight |
| 32 | 3668,9 | 3660,4 | 457,33 | 457,31 | 378,97 | 216 | Excellent |
| 33 | 3670,0 | 3661,6 | 457,46 | 457,45 | 379,00 | 123,9 | Very Good |
| 34 | 3672,8 | 3664,4 | 457,81 | 457,71 | 379,05 | 125,6 | Very Good |
| 36 | 3700,0 | 3691,4 | 461,24 | 461,21 | 379,92 | 217,6 | Excellent |

| No. | Depth. m MD RKB | Depth. m TVD RKB | Hydrost. pressure before kPa | Hydrost. pressure after kPa | Formation pressure kPa | Mobility mD/cp | Remarks |
|---|---|---|---|---|---|---|---|
| 37 | 3702,0 | 3693,4 | 461,45 | 461,50 | 379,98 | 31,4 | Good |
| 38 | 3705,0 | 3696,4 | 461,87 | 461,87 | 380,19 | 220,9 | Excellent |
| 39 | 3709,0 | 3700,4 | 462,38 | 462,38 | 380,62 | 168,6 | Excellent |
| 40 | 3713,7 | 3705,1 | | 462,38 | 405,96 | 0,1 | Tight/supercharged |
| 41 | 3720,1 | 3711,5 | 463,81 | 463,79 | - | - | Tight |
| 43 | 3741,0 | 3732,3 | 466,47 | 466,45 | - | 2,6 | Tight/supercharged |
| 45 | 3768,0 | 3759,2 | 469,95 | 469,93 | - | - | Tight |
| 46 | 3779,0 | 3770,1 | 471,40 | 471,38 | - | 0,2 | Tight/supercharged |
| 47 | 3795,7 | 3786,8 | 473,70 | 473,65 | 400,13 | 0,9 | Tight/supercharged |
| 48 | 3468,0 | 3460,5 | 432,26 | 432,23 | 370,19 | 30,1 | Good |
| 49 | 3469,0 | 3461,4 | 432,41 | 432,38 | 370,24 | 15,3 | Poor |
| 50 | 3471,2 | 3463,6 | 432,67 | 432,65 | 370,35 | 8,3 | Poor |
| 51 | 3472,2 | 3464,6 | 432,79 | 432,77 | 370,35 | 9,7 | Poor |
| 51 | 3474,2 | 3466,6 | 433,04 | 433,03 | 370,47 | 6,6 | Poor |
| 53 | 3476,9 | 3469,3 | 433,38 | 433,39 | 371,00 | 3,7 | Tight/supercharged |
| 54 | 3632,0 | 3623,8 | 452,76 | 452,75 | - | tight | Tight |
| 55 | 3632,3 | 3624,0 | 452,76 | 452,75 | 377,85 | tight | Tight |
| 56 | 3644,8 | 3636,5 | 454,37 | 454,36 | 375,44 | tight | Tight |
| 57 | 3646,0 | 3637,7 | 454,53 | 454,51 | 382,43 | 0,6 | Tight/supercharged |
| 58 | 3647,0 | 3638,7 | 454,65 | 454,64 | 382,25 | - | Tight |
| 56 | 3644,8 | 3636,5 | 454,37 | 454,36 | 375,44 | tight | |
| 57 | 3646,0 | 3637,7 | 454,53 | 454,51 | 382,43 | 0,6 | |
| 58 | 3647,0 | 3638,7 | 454,65 | 454,64 | 382,25 | Tight | |

Table 3.4.3 Samples collected

| No | Depth | Pumped volume litre | Formation Fluid | Sampled | Remarks |
|---|---|---|---|---|---|
| 1 | 2686,1 | - | Gas? | 2 ¾ Gallon<br>1 Gallon | Contain mainly mud filtrate (oil) |
| 2 | 3543,8 | 35 | Gas | 1 MS+ 1SF<br>2 3/4 Gallon | Good sample in 1 Gallon. MDT stuck |
| 3 | 3468,0 | 89 | Gas | 1 MS+ 1SF<br>2 3/4 Gallon | Good sample in 1 Gallon. MDT stuck |
| 4 | 3700,5 | 79,5 | Gas | 1 MS+ 1SF<br>1 Gallon | No pumping due to tight formation |
| 5 | 3388,0 | 17,5 | Gas | 2 MS+ 1SF<br>1 Gallon | In separate run. |

MS: Schlumberger multisampler chamber 450 ml
SF: Oilphase single phase sample chamber 250 ml.

Well: 6507/3-3
Field: Idun
Rig: Byford Dolphin

# DRILLING FLUIDS PROGRAM

| HOLE SIZE | HOLE TVD MD | CASING SIZE | CASING TVD MD | MUD TYPE | MW [SG] | LGS [%] | 10 sec. [Pa] | 10 min. [Pa] | Fann 100 rpm | Fann 3 rpm | O / W ratio | PV [mPa] | API FL [ml] | HTHP FL [ml] | MBT [KG/m³] | pH | Kcl [KG/m³] | Glyc. [%] | ES [KV] | DFE [%] | Total Volume<br>Old Volume<br>New Volume<br>Usage<br>[m³] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36" | 476 | 30" | 476 | Bentonite/ PAC | 1,35 | | | | | 12-20 | | | | | | 8-9 | | | | | 362,7<br>0<br>362<br>221,7 |
| | | | | Comments | *Hole swept with pre hydrated bentonite and 2,5 kg/m3 Lampac reg*<br>*For details refer to "Well Summary Byford Dolphin, Dowell Schlumberger"* | | | | | | | | | | | | | | | | |
| 26" | 667 | 20" | 667 | Bentonite/ PAC | 1,35 | | | | | 12-20 | | | | | | 8-9 | | | | | 572,6<br>141<br>455<br>572,6 |
| | | | | Comments | *Kill mud was prepared and used in 9 7/8" pilot hole, thereafter opened to 26" with return to sea floor*<br>*For details refer to "Well Summary Byford Dolphin, Dowell Schlumberger"* | | | | | | | | | | | | | | | | |
| 17 1/2" | 1752 | 13 3/8" | 1752 | Quadrill | 1,20-1,25 | < 12 | < 6 | < 18 | 30 - 38 | 7 - 12 | | < 26 | <5 | | 40-55 | 7,5-8 | 90 | | | | 904<br>24<br>880,7<br>904,7 |
| | | | | Comments | *New unhibited polymer mud was built with and 24 m3 PAC /bentonite mud from the previous section was included in the mix*<br>*This system was a reduced version of a fully KCL mud system with 6,5 kg/m3 PAC Polymer, 0 5 kg/m3 IDVIS polymer and barite*<br>*For details refer to "Well Summary Byford Dolphin, Dowell Schlumberger"* | | | | | | | | | | | | | | | | |
| 12 1/4" | 3321<br>3356 | 9 5/8" | 3321<br>3356 | Interdrill NT | 1,58 | < 7 | 6-11 | < 18 | 32 - 50 | 12 - 17 | 75/25 - 85/15 | <32 | | < 2,8 | | | | | 0 74-1,45 | | 757,2<br>0<br>757,2<br>321,2 |
| | | | | Comments | *For details refer to "Well Summary Byford Dolphin, Dowell Schlumberger"* | | | | | | | | | | | | | | | | |
| 8 1/2" | 3821<br>3830 | | 3821<br>3830 | Quadrill | 1,25 | | 2 | < 4 | 27 - 35 | 3 - 4 | | 30-37 | <1,4 | < 2 | | 8,1-9,5 | 125 | | | | 615,8<br>0<br>615,8<br>615 8 |
| | | | | Comments | *For details refer to "Well Summary Byford Dolphin, Dowell Schlumberger"* | | | | | | | | | | | | | | | | |

## 3 .3 Wireline pressure measurements/sampling

Table 3.3.1 6507/3-3A. Formation pressure run 1A well.

| No. | Depth. m MD RKB | Depth. m TVD RKB | Hydrost. pressure before Bar | Hydrost. pressure after Bar | Formation pressure Bar | Mobility mD/cp | | Remarks |
|---|---|---|---|---|---|---|---|---|
| 1 | 3800,0 | 3521,9 | 441,47 | 441,32 | - | - | | No seal, set in 12 1/4" rat hole |
| 2 | 3805,0 | 3524,5 | 441,66 | 441,53 | 371,450 | 980,1 | | Excellent |
| 3 | 3810,0 | 3527,1 | 441,98 | 441,90 | 371,519 | 1671,9 | | Excellent |
| 4 | 3820,0 | 3532,3 | 442,65 | 442,54 | 371,626 | 367,5 | | Excellent |
| 5 | 3830,0 | 3537,5 | 443,35 | 443,22 | 371,729 | 19,6 | | Good |
| 6 | 3850,0 | 3547,8 | 444,82 | 444,63 | 371,907 | 20,9 | | Good |
| 7 | 3875,0 | 3560,7 | 446,55 | 446,37 | 372,167 | 1088 | | Excellent |

Table 3.3.2 Well 6507/3-3B MDT run 1A

| No. | Depth. m MD RKB | Depth. m TVD RKB | Hydrost. pressure before kPa | Hydrost. pressure after kPa | Formation pressure kPa | Mobility mD/cp | | Remarks |
|---|---|---|---|---|---|---|---|---|
| 1 | 3920,0 | 3579,8 | 440,30 | 440,40 | 372,59 | 296,7 | | Excellent |
| 2 | 3935,0 | 3587,9 | 441,30 | 441,50 | 372,73 | 33,8 | | Good |
| 3 | 3946,0 | 3594,0 | 442,10 | 442,40 | 372,83 | 13,7 | | Good |
| 4 | 3953,5 | 3598,2 | 442,70 | 442,90 | 372,94 | 7,4 | | Good |
| 5 | 3914,8 | 3577,1 | 437,20 | 437,50 | 372,49 | 3,4 | | Fair |
| 6 | 3912,4 | 3575,8 | 437,50 | 437,70 | 372,52 | 1,3 | | Good, probe 2 |
| 7 | 3958,4 | 3601,0 | 440,50 | 440,50 | 373,01 | 3,5 | | Poor |
| 8 | 3961,5 | 3602,7 | 440,70 | 440,70 | 373,18 | 1,5 | | Poor |
| 9 | 4075,5 | 3679,2 | 450,70 | 450,90 | 375,07 | 8,7 | | Fair |
| 10 | 4089,0 | 3689,1 | 452,70 | 452,70 | 389,14 | 0,7 | | Poor, supercharged |
| 11 | 4220,0 | 3794,4 | 467,40 | 467,40 | 387,98 | 2 | | Poor, probe 2 |
| 12 | 4223,0 | 3797,0 | 468,30 | 468,40 | 406,69 | 1 | | Poor/supercharged |
| 13 | 4227,9 | 3801,1 | 469,00 | 469,00 | 389,27 | 1,4 | | Poor |
| 14 | 3920,0 | 3579,8 | 437,70 | 437,70 | 372,46 | 0,9 | | Fair, testing probe 1 |
| 15 | 3917,5 | 3578,5 | 437,20 | 437,20 | 372,45 | 91,7 | | Good testing probe 2 |

Table 3.3.2 Well 6507/3-3B MDT run 1B

| No. | Depth. m MD RKB | Depth. m TVD RKB | Hydrost. pressure before kPa | Hydrost. pressure after kPa | Formation pressure kPa | Mobility mD/cp | | Remarks |
|---|---|---|---|---|---|---|---|---|
| 1 | 4075,4 | 3679,1 | 451,00 | 451,00 | 375,05 | 5,2 | | Fair |
| 2 | 4075,6 | 3679,2 | 451,20 | 451,20 | 375,02 | 7,2 | | Good |
| 3 | 4075,8 | 3679,4 | 451,40 | 451,40 | 375,06 | 5,1 | | Good |
| 4 | 4076,1 | 3679,6 | 451,50 | 451,50 | 375,07 | 4,8 | | Fair |
| 5 | 4075,6 | 3679,2 | 451,20 | 451,20 | 375,00 | 7,7 | | Sample |
| 6 | 4244,5 | 3815,1 | 482,60 | 482,70 | 389,00 | 4,2 | | Poor |
| 7 | 4245,0 | 3815,5 | 482,90 | 482,90 | 389,00 | 4,5 | | Poor |
| 8 | 3953,6 | 3598,3 | 447,60 | 447,60 | 372,86 | 4,3 | | Poor |
| 9 | 3953,4 | 3598,2 | 447,20 | 447,30 | 372,91 | 9,1 | | Fair |
| 10 | 3953,2 | 3598,1 | 447,00 | 446,90 | 372,93 | 8,1 | | Fair |
| 11 | 3953,0 | 3597,9 | 446,80 | 446,80 | 372,89 | 2,1 | | Poor |
| 12 | 3952,7 | 3597,8 | 445,80 | 445,80 | 373,00 | 2,1 | | Poor |
| 13 | 3953,1 | 3598,0 | 445,70 | 445,70 | 372,91 | 3,5 | | Good |
| 14 | 3953,3 | 3598,1 | 445,70 | 445,70 | 373,00 | 4,1 | | Confirming gas |

Table 3.4.3 Samples collected

| Well | Depth. m MD RKB | Depth. m TVD RKB | | Pumped volume litre | FormationFluid | Sampled | Remarks |
|---|---|---|---|---|---|---|---|
| 6507/3-3 A | 3807,0 | 3525,6 | | 68 | Gas | 3 MS<br>2 3/4 Gallon | Good sample |
| 6507/3-3 B | 3805,0 | 3679,2 | | 239 | Gas/Water | 1 MS<br>1 Gallon | Poor quality |

MS: Schlumberger multisampler chamber 450 ml

Well: 6507/3-3A & B
Field: Idun
Rig: Byford Dolphin

# DRILLING FLUIDS PROGRAM

| HOLE SIZE | HOLE TVD MD | CASING SIZE | CASING TVD MD | MUD TYPE | MW [SG] | LGS [%] | 10 sec. [Pa] | 10 min. [Pa] | Fann 100 rpm | Fann 3 rpm | O / W ratio | PV [mPa] | API FL [ml] | HTHP FL [ml] | MBT [KG/m³] | pH | Kcl [KG/m³] | Glyc. [%] | ES [KV] | DFE [%] | Total Volume<br>Old Volume<br>New Volume<br>Usage [m³] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 1/4" | 3518 | 9 5/8" | 3518 | Interdrill NT | 1,58 | | 6-8 | < 15 | 30 - 35 | 9 - 11 | 80/20 | <38 | | < 2 | | | | | 0.87-1,2 | | 876,8<br>0<br>876,8<br>342,8 |
| A | 3805 | | 3805 | | | | | | | | | | | | | | | | | | |
| | | | | *Comments:* *For details refer to "Well Summary Byford Dolphin, Dowell Schlumberger"* | | | | | | | | | | | | | | | | | |
| 8 1/2" | 3717 | | 3717 | Interdrill NT | 1,25 | | <7 | < 13 | 23 - 27 | 8-10 | 80/20 | 21-28 | | < 2 | | 8,1-9,5 | 125 | | 0.87-1,2 | | 419<br>337<br>82<br>69,2 |
| A | 4528 | | 4528 | | | | | | | | | | | | | | | | | | |
| | | | | *Comments:* *For details refer to "Well Summary Byford Dolphin, Dowell Schlumberger"* | | | | | | | | | | | | | | | | | |
| 8 1/2" | 0 | | 0 | Interdrill NT | 1,25 | | <7 | < 13 | 23 - 27 | 8-10 | 80/20 | 21-28 | | < 2 | | 8,1-9,5 | 125 | | 0.87-1,2 | | 97,5 |
| B | 0 | | 0 | | | | | | | | | | | | | | | | | | |
| | | | | *Comments:* *For details refer to "Well Summary Byford Dolphin, Dowell Schlumberger"* | | | | | | | | | | | | | | | | | |

STATOIL

| Title: |
|---|
| **Geochemical evaluation of well 6507/3-3** |

| Document no.: | Contract no./project no.: | Filing no.: |
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| **LUT-GEO0200** | | |

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Author(s)/Source(s):

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Subjects:

**Idun, Dønna Terrace,**
**thermal maturity, source rocks,**
**gas, condensate,**
**oil-based mud contamination, Marcol-82**

Remarks:

**See Summary on page i**

| Valid from: | Updated: |
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| Approved: **LUT-GEO** | Name: **Frode Fasteland** | Date/Signature: 21/2/00 |

# 1 INTRODUCTION

This report presents the results of a geochemical evaluation of the 6507/3-3 gas discovery well, drilled on the Dønna Terrace, offshore mid-Norway (Figure 1).

The well section is near vertical with only a 9.1m difference between MD and TVD at TD. Water-based (KCl/Staplex) mud was used to drill the 17 1/2" section (681-1752m MDRT), with glycol added below 1550m MDRT. Interdrill NT oil-based mud was used to drill the 12 1/4" section from 1752m to 3375m MDRT. Before coring of the Jurassic reservoirs commenced, the mud system was changed to water-based mud (Quadrill), and this mud system was used for the rest of the 8 1/2" hole section (3375-3830m MDRT (TD)).

The total numbers of analyses carried out during the course of the study are as follows:

| Analysis | Cuttings | Core | Gas | Condensate | Mud | Total |
|---|---|---|---|---|---|---|
| Sample preparation | 83 | 60 | | | | 143 |
| TOC content | 78 | 11 | | | 1 | 90 |
| Rock-Eval | 78 | 52 | | | 2 | 132 |
| Vitrinite reflectance | 19 | 2 | | | | 21 |
| Spore colouration | 11 | 2 | | | | 13 |
| Thermal extraction GC | 1 | 4 | | | | 5 |
| Pyrolysis-GC | 14 | 3 | | | 1 | 18 |
| Solvent extraction | 6 | 19 | | | 2 | 27 |
| Asphaltene precipitation | 4 | 9 | | 4 | | 17 |
| Iatroscan | | | | 4 | | 4 |
| MPLC separation | 4 | 9 | | 4 | | 17 |
| Whole extract/oil GC | | 10 | | 4 | 2 | 16 |
| Saturates GC | 4 | 9 | | 4 | | 17 |
| Aromatic GC | | | | 4 | | 4 |
| Saturates GC-MS | 1 | | | 4 | | 5 |
| Aromatic GC-MS | | | | 4 | | 4 |
| Carbon isotopes | | | | 4 | | 4 |
| Gas composition | | | 5 | | | 5 |
| Gas isotopes | | | 5 | | | 5 |

Full details of the analytical programme on a sample-by-sample basis are presented in Table 1. The analyses were carried out by Geolab Nor a.s., with the exceptions of the vitrinite reflectance and gas analyses, which were carried out by IFE. All analytical work was performed in accordance with the guidelines given in "The Norwegian Industry Guide to Organic Geochemical Analyses, 3rd edition (1993)". The analytical data are presented in Appendices 1 (rock samples and gases) and 2 (condensates).

**Muds and contamination**

Gas chromatography indicates the presence of oil-based mud-derived contamination in samples throughout the section, including core samples from the top of the reservoir and cuttings samples from the 8½" section, where a water-based mud system was used. This contamination has limited the information gained from the source rock evaluation and the analysis of reservoir samples to investigate the presence of oil stain.

Gas chromatography of core samples also indicate the presence of contamination by Marcol-82, a mineral oil used to drill core plugs at the well site.

| Sample Depth (m MDRT) | Sample Type | Vitrinite Reflectance | Kerogen Description | TOC Content | Rock-Eval | Thermal Extraction GC | Pyrolysis-GC | Solvent Extraction | Whole Oil/ Extract GC | Bulk Composition | Saturate GC | Aromatic GC | Saturate GC-MS | Aromatic GC-MS | Carbon Isotopes | Gas Composition | Gas Isotopes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| es | | | | | | | | | | | | | | | | | |
| 710 | Ctgs | x | x | | | | | | | | | | | | | | |
| 910 | Ctgs | x | | | | | | | | | | | | | | | |
| 1120 | Ctgs | x | | | | | | | | | | | | | | | |
| 1320 | Ctgs | x | x | | | | | | | | | | | | | | |
| 1520 | Ctgs | x | | | | | | | | | | | | | | | |
| 1730 | Ctgs-clyst | x | | | | | | | | | | | | | | | |
| 1940 | Ctgs-clyst | x | x | | | | | | | | | | | | | | |
| 2130 | Ctgs-clyst | x | | | | | | | | | | | | | | | |
| 2330 | Ctgs-clyst | x | x | | | | | | | | | | | | | | |
| 2523 | Ctgs-clyst | x | | | | | | | | | | | | | | | |
| 2726,34 | Core-clyst | x | | | | | | | | | | | | | | | |
| 2734,11 | Core-sst | | | | x | x | | | | | | | | | | | |
| 2745,09 | Core-sst | | | | x | x | | | | | | | | | | | |
| 2922 | Ctgs-clyst | x | x | | | | | | | | | | | | | | |
| 3012 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3015 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3018 | Ctgs-clyst | | | x | x | | x | | | | | | | | | | |
| 3021 | Ctgs-clyst | x | x | x | x | | | | | | | | | | | | |
| 3024 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3027 | Ctgs-clyst | | | x | x | | x | | | | | | | | | | |
| 3030 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3033 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3036 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3039 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3042 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3045 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3048 | Ctgs-clyst | | | x | x | | x | | | | | | | | | | |
| 3051 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3054 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3057 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3060 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3063 | Ctgs-clyst | | | x | x | | x | | | | | | | | | | |
| 3066 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3069 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3072 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3075 | Ctgs-clyst | | | x | x | | x | | | | | | | | | | |
| 3078 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3081 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3084 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3087 | Ctgs-clyst | | | x | x | | x | | | | | | | | | | |
| 3090 | Ctgs-clyst | x | x | x | x | | | | | | | | | | | | |
| 3093 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3096 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3102 | Ctgs-clyst | | | x | x | | x | | | | | | | | | | |
| 3117 | Ctgs-clyst | | | x | x | | x | | | | | | | | | | |
| 3126 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3144 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3165 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3180 | Ctgs-clyst | | | x | x | | x | | | | | | | | | | |
| 3201 | Ctgs-clyst | x | x | x | x | | | | | | | | | | | | |
| 3216 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |

Table 1 Geochemical analytical programme

| Sample Depth (m MDRT) | Sample Type | Vitrinite Reflectance | Kerogen Description | TOC Content | Rock-Eval | Thermal Extraction GC | Pyrolysis-GC | Solvent Extraction | Whole Oil/ Extract GC | Bulk Composition | Saturate GC | Aromatic GC | Saturate GC-MS | Aromatic GC-MS | Carbon Isotopes | Gas Composition | Gas Isotopes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3228 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3255 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3282 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3333 | Ctgs-clyst | x | x | x | x | | | | | | | | | | | | |
| 3342 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3345 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3375,14 | Core-sst | | | | | | | x | x | | | | | | | | |
| 3375,19 | Core-sst | | | | x | | | x | | x | x | | | | | | |
| 3380,62 | Core-sst | | | | x | | | x | | x | x | | | | | | |
| 3381,37 | Core-clyst | | | x | x | | | x | | x | x | | | | | | |
| 3381,37 | Core-ext | | | x | x | | | | | | | | | | | | |
| 3381,61 | Core-coal | | | x | x | | | x | | x | x | | | | | | |
| 3381,61 | Core-ext | | | x | x | | x | | | | | | | | | | |
| 3381,66 | Core-sst | | | | x | | | x | | x | x | | | | | | |
| 3383,83 | Core-clyst | | | x | x | | | x | | x | x | | | | | | |
| 3383,83 | Core-ext | | | x | x | | x | | | | | | | | | | |
| 3384,86 | Core-sst | | | | x | | | | | | | | | | | | |
| 3386,51 | Core-sst | | | | x | | | | | | | | | | | | |
| 3389,83 | Core-sst | | | | x | | | | | | | | | | | | |
| 3391 | Core-sst | | | | | | | x | x | | | | | | | | |
| 3392,63 | Core-sst | | | | x | | | | | | | | | | | | |
| 3394,82 | Core-sst | | | | x | | | x | | x | x | | | | | | |
| 3398,85 | Core-sst | | | | x | | | x | | x | x | | | | | | |
| 3400,74 | Core-sst | | | | x | | | x | | x | x | | | | | | |
| 3404,66 | Core-sst | | | | x | | | | | | | | | | | | |
| 3405 | Core-sst | | | | | | | x | x | | | | | | | | |
| 3408,06 | Core-sst | | | | x | | | | | | | | | | | | |
| 3411,05 | Core-sst | | | | x | | | | | | | | | | | | |
| 3415,07 | Core-sst | | | | | | | x | x | | | | | | | | |
| 3415,51 | Core-sst | | | | x | | | | | | | | | | | | |
| 3418,20 | Core-sst | | | | x | | | | | | | | | | | | |
| 3420,61 | Core-sst | | | | x | | | | | | | | | | | | |
| 3424,62 | Core-sst | | | | x | | | | | | | | | | | | |
| 3426,10 | Core-sst | | | | | | | x | x | | | | | | | | |
| 3426,81 | Core-sst | | | | x | | | | | | | | | | | | |
| 3429,58 | Core-sst | | | | x | | | | | | | | | | | | |
| 3434,85 | Core-clyst | | x | x | x | | | | | | | | | | | | |
| 3438 | Ctgs-clyst | x | | x | x | | x | x | | x | x | | | | | | |
| 3438 | Ctgs-ext | | | x | x | | | | | | | | | | | | |
| 3441 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3444 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3466,73 | Core-sst | | | | x | | | | | | | | | | | | |
| 3467 | Core-sst | | | | | | | x | x | | | | | | | | |
| 3470,72 | Core-sst | | | | x | | | | | | | | | | | | |
| 3472,38 | Core-sst | | | | x | | | | | | | | | | | | |
| 3473 | Core-sst | | | | | | | x | x | | | | | | | | |
| 3476,95 | Core-sst | | | | x | | | | | | | | | | | | |
| 3479 | Core-sst | | | | | | | x | x | | | | | | | | |
| 3479,05 | Core-sst | | | | x | | | | | | | | | | | | |
| 3483,38 | Core-clyst | | | x | x | | | | | | | | | | | | |
| 3534 | Ctgs-siltst | x | | x | x | x | x | | | | | | | | | | |
| 3546,69 | Core-sst | | | | x | | | | | | | | | | | | |

Table 1 Geochemical analytical programme

| Sample Depth (m MDRT) | Sample Type | Vitrinite Reflectance | Kerogen Description | TOC Content | Rock-Eval | Thermal Extraction GC | Pyrolysis-GC | Solvent Extraction | Whole Oil/ Extract GC | Bulk Composition | Saturate GC | Aromatic GC | Saturate GC-MS | Aromatic GC-MS | Carbon Isotopes | Gas Composition | Gas Isotopes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3547,08 | Core-sst | | | | x | | | | | | | | | | | | |
| 3552,60 | Core-sst | | | | x | | | | | | | | | | | | |
| 3557,54 | Core-sst | | | | x | | | | | | | | | | | | |
| 3568,40 | Core-sst | | | | x | | | | | | | | | | | | |
| 3572,19 | Core-sst | | | | x | | | | | | | | | | | | |
| 3572,56 | Core-clyst | | | x | x | x | x | | | | | | | | | | |
| 3583 | Core-sst | | | | | | | x | x | | | | | | | | |
| 3584,94 | Core-sst | | | | x | | | | | | | | | | | | |
| 3588,63 | Core-sst | | | | x | | | | | | | | | | | | |
| 3597,87 | Core-sst | | | | x | | | | | | | | | | | | |
| 3601,33 | Core-sst | | | | x | | | | | | | | | | | | |
| 3609,15 | Core-sst | | | | x | | | | | | | | | | | | |
| 3622,45 | Core-sst | | | | x | | | | | | | | | | | | |
| 3629,95 | Core-sst | | | | x | x | | | | | | | | | | | |
| 3632,95 | Core-clyst | | | x | x | | | | | | | | | | | | |
| 3634,74 | Core-sst | | | | x | | | | | | | | | | | | |
| 3637 | Core-sst | | | | | | | x | x | | | | | | | | |
| 3640,81 | Core-clyst | x | x | x | x | | | | | | | | | | | | |
| 3647,33 | Core-sst | | | | x | | | | | | | | | | | | |
| 3657 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3660 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3663 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3666 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3669 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3690 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3693 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3696 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3699 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3702 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3705 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3720 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3723 | Ctgs-clyst | x | x | x | x | | | x | | | | | | | | | |
| 3723 | Ctgs-ext | | | x | x | | | | | | | | | | | | |
| 3729 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3744 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3750 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3786 | Ctgs-clyst | | | x | x | | x | x | | x | x | | | | | | |
| 3786 | Ctgs-ext | | | x | x | | | | | | | | | | | | |
| 3789 | Ctgs-clyst | | | x | x | | | x | | x | x | | x | | | | |
| 3789 | Ctgs-ext | | | x | x | | | | | | | | | | | | |
| 3792 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3795 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3798 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3816 | Ctgs-clyst | | | x | x | | x | x | | | | | | | | | |
| 3816 | Ctgs-ext | | | x | x | | | | | | | | | | | | |
| 3819 | Ctgs-clyst | | | x | x | | | | | | | | | | | | |
| 3822 | Ctgs-clyst | | | x | x | | x | x | | x | x | | | | | | |
| 3822 | Ctgs-ext | | | x | x | | | | | | | | | | | | |
| 3825 | Ctgs-clyst | x | x | x | x | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| 2686.1 | Gas/cond. | | | | | | | | | | | | | | | x | x |
| 3388 | Gas/cond. | | | | | | | | x | x | x | x | x | x | x | x | x |

Table 1 Geochemical analytical programme

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3463 2 | Gas/cond | | | | | | | | x | x | x | x | x | x | x | x | x |
| | 3543 8 | Gas/cond | | | | | | | | x | x | x | x | x | x | x | x | x |
| | 3700 5 | Gas/cond | | | | | | | | x | x | x | x | x | x | x | x | x |
| Mud Samples | | | | | | | | | | | | | | | | | | |
| | 2724 | | | | | | | | x | x | | | | | | | | |
| | 3100 | | | | x | x | | | x | x | | | | | | | | |
| | 3400 | | | | | x | | x | | | | | | | | | | |
| Totals | | | 21 | 13 | 90 | 132 | 5 | 18 | 27 | 16 | 17 | 17 | 4 | 5 | 4 | 4 | 5 | 5 |

Table 1 Geochemical analytical programme

| Depth | Sample Type | 22S | TSTM | TTX | 30D | 30AB-HOP | 28AB | TRICY | TETRACY | 35H_34H | 29H_30H | DEMET | GAMMA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3388 | Cond. | 0.60 | 0.79 | 1.75 | 0.13 | 0.89 | 0.05 | 0.16 | 0.15 | 0.60 | 0.55 | 0.05 | 0 |
| 3468.2 | Cond. | 0.61 | 0.69 | 0.90 | 0.09 | 0.90 | 0.05 | 0.10 | 0.12 | 0.53 | 0.85 | 0.06 | 0.03 |
| 3543.8 | Cond. | 0.59 | 0.81 | 1.88 | 0.12 | 0.90 | 0.04 | 0.10 | 0.13 | 0.39 | 0.48 | 0.04 | - |
| 3700.5 | Cond. | 0.59 | 0.52 | 0.76 | 0.09 | 0.90 | 0.04 | 0.11 | 0.16 | 0.62 | 1.01 | 0.06 | 0.02 |
| 3789 | SR | 0.60 | 0.24 | 2.51 | 0.14 | 0.92 | 0.02 | 0.02 | 0.14 | 0.28 | 0.63 | 0.02 | - |

| Depth | Sample Type | 20S | BB | C27BB | C28BB | C29BB | C30BB | DIAST |
|---|---|---|---|---|---|---|---|---|
| 3 388 | Cond. | 0.50 | 0.60 | 30 | 24 | 45 | 0.05 | 1.23 |
| 3 468.2 | Cond. | 0.46 | 0.63 | 33 | 23 | 44 | 0.05 | 1.30 |
| 3 543.8 | Cond. | 0.51 | 0.62 | 31 | 22 | 46 | 0.05 | 0.98 |
| 3 700.5 | Cond. | 0.45 | 0.64 | 30 | 22 | 48 | 0.04 | 0.75 |
| 3 789 | SR | 0.53 | 0.54 | 16 | 11 | 73 | 0.02 | 1.08 |

Table 2 Saturated hydrocarbon biomarker ratios

**Derivation of biomarker ratios reported in Table 2**

| Ratio | Derivation | m/z |
|---|---|---|
| Triterpanes | | |
| 22S | 32αβS/(32αβS+32αβR) | 191 |
| TSTM | 27Ts/27Tm | 191 |
| TTX | 30d/29βα | 191 |
| 30D | 30d/30αβ | 191 |
| 29H_30H | 29αβ/30αβ | 191 |
| 30AB–HOP | 30αβ/(30αβ+30βα) | 191 |
| C28AB | 28αβ/30αβ | 191 |
| TRICY | (23/3)/30αβ | 191 |
| TETRACY | (24/4)/30αβ | 191 |
| 35H_34H | (35αβR+35αβS)/(34αβR+34αβS) | 191 |
| DEMET | 25nor30αβ/30αβ | 191 |
| OLEANAN | 30O/30αβ | 191 |
| GAMMA | 30G/30αβ | 191 |
| PPMH* | ppm 27Ts+27Tm+29αβ+29βα+30αβ+30βα+31αβS+31αβR+32αβS+32αβR+33αβS+33αβR +34αβS+34αβR+35αβS+35αβR | 191 |
| Steranes | | |
| 20S | 29ααS/(29ααR+29ααS) | 217 |
| BB | (29ββR+29ββS)/(29ββR+29ββS+29ααR+29ααS) | 217 |
| C27BB | 100*(27ββR+27ββS)/(27ββR+27ββS+28ββR+28ββS+29ββR+29ββS) | 218 |
| C28BB | 100*(28ββR+28ββS)/(27ββR+27ββS+28ββR+28ββS+29ββR+29ββS) | 218 |
| C29BB | 100*(29ββR+29ββS)/(27ββR+27ββS+28ββR+28ββS+29ββR+29ββS) | 218 |
| C30BB | (30ββR+30ββS)/(27ββR+27ββS+28ββR+28ββS+29ββR+29ββS) | 218 |
| DIAST | (27dβR+27dβS)/(27ααR+27ααS) | 217 |
| PPMS* | ppm 27ββR+27ββS+28ββR+28ββS+29ββR+29ββS | 218 |
| HOPST | Intensities(27Ts+27Tm+29αβ+29βα+30αβ+30βα+31αβS+31αβR+32αβS+32αβR+33αβS+33αβR+34αβS+34αβR +35αβS+35αβR)/Intensities(27ββR+27ββS+28ββR+28ββS+29ββR+29ββS) | |

* ppm calculated from comparison with m/z 219 intensity for D2-cholestane

**Biomarker codes used in derivation of ratios**

| Compound name | Old code | NEW CODE |
|---|---|---|
| Triterpanes | | |
| $C_{23}H_{42}$ tricyclic terpane | P | 23/3 |
| $C_{24}H_{44}$ tricyclic terpane | Q | 24/3 |
| $C_{25}H_{46}$ tricyclic terpane[1] | R | 25/3 |
| $C_{24}H_{42}$ tetracyclic terpane | S | 24/4 |
| $C_{26}H_{48}$ tricyclic terpane[2] | T | 26/3 |
| 18α(H)-22,29,30-trisnorneohopane | 27A | 27Ts |
| 17α(H)-22,29,30-trisnorhopane | 27B | 27Tm |
| 17α(H), 21β(H)-25,28,30-trisnorhopane | | 25nor28αβ |
| 17α(H), 21β(H)-28,30-bisnorhopane | 28A | 28αβ |
| 17α(H), 21β(H)-25-norhopane | | 25nor30αβ[3] |
| 17α(H), 21β(H)-30-norhopane | C29A | 29αβ |
| 18α(H)-30-norneohopane | | 29Ts |
| 15α-methyl-17α(H)-27-norhopane (TtX) | X | 30D |
| 17β(H), 21α(H)-30-norhopane (normoretane) | C29B | 29βα |
| 18α(H)-oleanane | | 30O |
| 17α(H), 21β(H)-hopane | C30A | 30αβ |
| 17β(H), 21α(H)-hopane (moretane) | C30B | 30βα |
| Gammacerane | | 30G |
| 17α(H), 21β(H), 22(S)-homohopane | C31S | 31αβS |
| 17α(H), 21β(H), 22(R)-homohopane | C31R | 31αβR |
| 17α(H), 21β(H), 22(S)-bishomohopane | C32S | 32αβS |
| 17α(H), 21β(H), 22(R)-bishomohopane | C32R | 32αβR |
| 17α(H), 21β(H), 22(S)-trishomohopane | C33S | 33αβS |
| 17α(H), 21β(H), 22(R)-trishomohopane | C33R | 33αβR |
| 17α(H), 21β(H), 22(S)-tetrakishomohopane | C34S | 34αβS |
| 17α(H), 21β(H), 22(R)-tetrakishomohopane | C34R | 34αβR |
| 17α(H), 21β(H), 22(S)-pentakishomohopane | C35S | 35αβS |
| 17α(H), 21β(H), 22(R)-pentakishomohopane | C35R | 35αβR |

1 may be broad peak or doublet  2 may be doublet  3 listed in Statoil spreadsheats as "nor30" for convenience

Steranes

| | | |
|---|---|---|
| 13β(H), 17α(H), 20(S)-cholestane (diasterane) | 27a | 27dβS |
| 13β(H), 17α(H), 20(R)-cholestane (diasterane) | 27b | 27dβR |
| 13α(H), 17β(H), 20(R)-cholestane (diasterane) | 27c | 27dαR |
| 13α(H), 17β(H), 20(S)-cholestane (diasterane) | 27d | 27dαS |
| 5α(H), 14α(H), 17α(H), 20(S)-cholestane | 27e | 27ααS |
| 5α(H), 14β(H), 17β(H), 20(R)-cholestane | 27f | 27ββR |
| 5α(H), 14β(H), 17β(H), 20(S)-cholestane | 27g | 27ββS |
| 5α(H), 14α(H), 17α(H), 20(R)-cholestane | 27h | 27ααR |
| 24-methyl-13β(H), 17α(H), 20(S)-cholestane (diasterane) | 28a | 28dβS |
| 24-methyl-13β(H), 17α(H), 20(R)-cholestane (diasterane) | 28b | 28dβR |
| 24-methyl-13α(H), 17β(H), 20(R)-cholestane (diasterane) | 28c | 28dαR |
| 24-methyl-13α(H), 17β(H), 20(S)-cholestane (diasterane) | 28d | 28dαS |
| 24-methyl-5α(H), 14α(H), 17α(H), 20(S)-cholestane | 28e | 28ααS |
| 24-methyl-5α(H), 14β(H), 17β(H), 20(R)-cholestane | 28f | 28ββR |
| 24-methyl-5α(H), 14β(H), 17β(H), 20(S)-cholestane | 28g | 28ββS |
| 24-methyl-5α(H), 14α(H), 17α(H), 20(R)-cholestane | 28h | 28ααR |
| 24-ethyl-13β(H), 17α(H), 20(S)-cholestane (diasterane) | 29a | 29dβS |
| 24-ethyl-13β(H), 17α(H), 20(R)-cholestane (diasterane) | 29b | 29dβR |
| 24-ethyl-13α(H), 17β(H), 20(R)-cholestane (diasterane) | 29c | 29dαR |
| 24-ethyl-13α(H), 17β(H), 20(S)-cholestane (diasterane) | 29d | 29dαS |
| 24-ethyl-5α(H), 14α(H), 17α(H), 20(S)-cholestane | 29e | 29ααS |
| 24-ethyl-5α(H), 14β(H), 17β(H), 20(R)-cholestane | 29f | 29ββR |
| 24-ethyl-5α(H), 14β(H), 17β(H), 20(S)-cholestane | 29g | 29ββS |
| 24-ethyl-5α(H), 14α(H), 17α(H), 20(R)-cholestane | 29h | 29ααR |
| 24-propyl-5α(H), 14α(H), 17α(H), 20(S)-cholestane | 30e | 30ααS |
| 24-propyl-5α(H), 14β(H), 17β(H), 20(R)-cholestane | 30f | 30ββR |
| 24-propyl-5α(H), 14β(H), 17β(H), 20(S)-cholestane | 30g | 30ββS |
| 24-propyl-5α(H), 14α(H), 17α(H), 20(R)-cholestane | 30h | 30ααR |
| 4-methyl-14α(H), 17α(H)-cholestanes | | M28αα |
| 4,24-dimethyl-14α(H), 17α(H)-cholestanes | | M29αα |
| 4-methyl-24-ethyl-14α(H), 17α(H)-cholestanes | | M30αα |
| 4,23,24-trimethyl-14α(H), 17α(H)-cholestanes (dinosteranes) | | M30D |

| Depth | Sample Type | $C_1$ | $C_2$-$C_5$ | $C_6$-$C_{14}$ | $C_{15+}$ | GOGI |
|---|---|---|---|---|---|---|
| 3018 | Ctgs-clyst | 8.73 | 14.03 | 34.06 | 43.18 | 0.29 |
| 3027 | Ctgs-clyst | 10.25 | 11.67 | 35.44 | 42.65 | 0.28 |
| 3048 | Ctgs-clyst | 7.08 | 15.66 | 34.03 | 43.24 | 0.29 |
| 3063 | Ctgs-clyst | 7.05 | 16.15 | 34.59 | 42.21 | 0.30 |
| 3075 | Ctgs-clyst | 12.48 | 12.53 | 34.17 | 40.81 | 0.33 |
| 3087 | Ctgs-clyst | 15.06 | 9.26 | 31.41 | 44.26 | 0.32 |
| 3102 | Ctgs-clyst | 16.50 | 9.86 | 30.33 | 43.31 | 0.36 |
| 3117 | Ctgs-clyst | 16.36 | 11.76 | 33.82 | 38.06 | 0.39 |
| 3180 | Ctgs-clyst | 15.15 | 12.69 | 39.57 | 32.59 | 0.39 |
| 3381.61 | Core-coal | 15.48 | 14.86 | 22.54 | 47.12 | 0.44 |
| 3383.33 | Core-clyst | 15.85 | 24.39 | 30.99 | 28.78 | 0.67 |
| 3438 | Ctgs-clyst | 13.49 | 36.66 | 33.37 | 16.48 | 1.01 |
| 3534 | Ctgs-sltst | 9.55 | 26.37 | 37.43 | 26.64 | 0.56 |
| 3572.56 | Core-shale | 17.38 | 10.67 | 31.93 | 40.02 | 0.39 |
| 3786 | Ctgs-clyst | 13.62 | 23.87 | 30.19 | 32.31 | 0.60 |
| 3816 | Ctgs-clyst | 16.61 | 35.48 | 33.91 | 14.00 | 1.09 |
| 3822 | Ctgs-clyst | 14.90 | 20.85 | 26.31 | 37.95 | 0.56 |

Table 3 Pyrolysis-GC data

| Depth | Sample Type | Arom1 | Arom2 | Crack1 | Crack2 |
|---|---|---|---|---|---|
| 3388 | Cond. | 0.53 | 0.59 | 0.72 | 0.46 |
| 3468 | Cond. | 0.32 | 0.38 | 0.78 | 0.50 |
| 3544 | Cond. | 0.52 | 0.61 | 0.80 | 0.55 |
| 3701 | Cond. | 0.47 | 0.61 | 0.85 | 0.63 |

Table 4 Aromatic hydrocarbon biomarker ratios

**Derivation of aromatic steroid ratios reported in Table 4**

Arom 1 = g1/((g1+H1b+I1) - (I1*f1/g1))

Arom 2 = (a1+b1+c1+d1+e1+f1+g1)/(a1+b1+c1+d1+e1+f1+g1+A1+B1+C1+D1+E1+F1+G1+H1+I1)

Crack 1 = a1/(a1+g1)

Crack 2 = (a1+b1)/(a1+b1+c1+d1+e1+f1+g1)

N.B. H1b refers to second eluting (split) peak of doublet corresponding to H1 in standard figure

**Codes for aromatic steroids**

ABC-RING TRIAROMATIC STEROID HYDROCARBONS (m/z 231)

| | Substituents | | |
|---|---|---|---|
| Peak | $R_1$ | $R_2$ | Abbreviation of Compound |
| a1 | $CH_3$ | H | $C_{20}TA$ |
| b1 | $CH_3$ | $CH_3$ | $C_{21}TA$ |
| c1 | $S(CH_3)$ | $C_6H_{13}$ | $SC_{26}TA$ |
| d1 | $R(CH_3)$ | $C_6H_{13}$ | $RC_{26}TA$ |
| | $S(CH_3)$ | $C_7H_{15}$ | $SC_{27}TA$ |
| e1 | $S(CH_3)$ | $C_8H_{17}$ | $SC_{28}TA$ |
| f1 | $R(CH_3)$ | $C_7H_{15}$ | $RC_{27}TA$ |
| g1 | $R(CH_3)$ | $C_8H_{17}$ | $RC_{28}TA$ |

C-RING MONOAROMATIC STEROID HYDROCARBONS (m/z 253)

| Peak | Substituents $R_1$ | $R_2$ | $R_3$ | $R_4$ | Abbreviation of Compound |
|---|---|---|---|---|---|
| A1 | | | | | $C_{21}M$ |
| B1 | | | | | $C_{22}MA$ |
| C1 | β(H) | $CH_3$ | S($CH_3$) | H | β$SC_{27}MA$ |
| | β($CH_3$) | H | S($CH_3$) | H | β$SC_{27}DMA$ |
| D1 | β($CH_3$) | H | R($CH_3$) | H | β$RC_{27}DMA$ |
| | β(H) | $CH_3$ | R($CH_3$) | H | β$RC_{27}MA$ |
| | α(H) | $CH_3$ | S($CH_3$) | H | α$SC_{27}MA$ |
| E1 | β(H) | $CH_3$ | S($CH_3$) | $CH_3$ | β$SC_{28}MA$ |
| | α($CH_3$) | H | R($CH_3$) | H | α$RC_{27}DMA$ |
| | β($CH_3$) | H | S($CH_3$) | $CH_3$ | β$SC_{28}DMA$ |
| F1 | α($CH_3$) | H | S($CH_3$) | $CH_3$ | α$SC_{27}DMA$ |
| | α(H) | $CH_3$ | R($CH_3$) | H | α$RC_{27}MA$ |
| | α(H) | $CH_3$ | S($CH_3$) | $CH_3$ | α$SC_{28}MA$ |
| G1 | β(H) | $CH_3$ | R($CH_3$) | $CH_3$ | β$RC_{28}MA$ |
| | β($CH_3$) | H | R($CH_3$) | $CH_3$ | β$RC_{28}DMA$ |
| | β(H) | $CH_3$ | S($CH_3$) | $C_2H_5$ | β$SC_{29}MA$ |
| | β$CH_3$ | H | S($CH_3$) | $C_2H_5$ | β$SC_{29}DMA$ |
| | α(H) | $CH_3$ | S($CH_3$) | $C_2H_5$ | α$SC_{29}MA$ |
| | α(H) | $CH_3$ | R($CH_3$) | $CH_3$ | α$RC_{28}MA$ |
| H1 | β(H) | $CH_3$ | R($CH_3$) | $C_2H_5$ | β$RC_{29}MA$ |
| | β$CH_3$ | H | R($CH_3$) | $C_2H_5$ | β$RC_{29}DMA$ |
| I1 | α(H) | $CH_3$ | R($CH_3$) | $C_2H_5$ | α$RC_{29}MA$ |

N.B. Not all possible DMA isomers are marked (rarely present in geological samples)

# GEOCHEMICAL DATA REPORT

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Contract No. DTJ 020215

TITLE

## Geochemical Data Report for Well NOCS 6507/3-3

AUTHOR(S)

Ian L. Ferriday

| GEOLAB PROJECT NO. | DATE |
|---|---|
| 62485 | February 5, 2000 |
| PROJECT MANAGER | QA RESPONSIBLE |
| Ian L. Ferriday, Sr. Scientist | Sunil Bharati, Laboratory Manager |
| REPORT NO./FILE<br>62485-1 | FRONT PAGE<br>1 of 1 |

## Comments

During the drilling of 6507/3-3, hot-shot core samples (3375.14 - 3637.00 m) were received for analysis of their solvent extracts by GC. Following the completion of this well, cuttings and core samples from 6507/3-3 (710 - 3825 m) were received for routine analysis. Gas samples collected from the well were analysed by IFE, and are reported here. All vitrinite analyses were performed by IFE.

The use of a pseudo-oil-based mud using the base oil EDC 95-11 in the 12¼".section of the well necessitated the solvent extraction cleaning of all samples due for source rock estimation in this interval prior to analysis. The effects of the base oil in the samples on the various analyses are still however evident in the various analyses. Core and cuttings samples from deeper in the section also showed evidence of contamination, despite water-based mud being used to drill the 8½" section, and thus screening analyses of some of the better quality source rocks were carried out both before and after solvent extraction. All sample selections were performed by Statoil. The analytical program took the form of several screening stages, followed by selection of 13 of the 15 soxtec-extracted samples from the well for saturated GC and final GC-MS analysis of one of these. Note that peak areas have not been calculated for the the saturated hydrocarbon GC analyses because of contamination. Limited analyses of 3 muds from the main hole were also performed and are reported along with the data for the other samples.

In addition to the above samples, 4 samples of liquid test fluids were requested analysed towards the end of the main program. These are the subject of a separate data report.

Regarding the reliability of data, the extraction / MPLC separation data for a number of the selected samples is affected by loss of 'asphaltenic' material which adhered to the sides of vessels and could not be fully recovered.

# Table 1: Analytical Program for Well NOCS 6507/3-3

GEOLAB NOR

| Sample Depth (m) | Sample Type | Sample Code | Extraction Clean-Up | Lithology Description | Picking for screening | Leco TOC | RockEval | Thermal Extraction | Pyrolysis GC | Picking for Extraction | Iatroscan | SOXTEC Extraction | MPLC & Deasphaltene | EOM GC | Whole Oil GC | Sat GC (Quantitative) | Aro GC (Non Quantitiative | Sat GCMS (Quantitative) | Aro GCMS (Non-Q) | Isotope of EOM/fractions | Vitrinite Reflectance | Visual kerogen |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Table nos. | | | | 3 | | 5 | 5 | | 6 | | 8 | 8 | 8 | | | 9 | 9 | 11 | 12 | | 4 | 7 |
| 710.00 | cS | | x | x | x | | | | | | | | | | | | | | | | x | x |
| 910.00 | cS | | x | x | | | | | | | | | | | | | | | | | x | |
| 1120.00 | cS | | x | x | | | | | | | | | | | | | | | | | x | |
| 1320.00 | cS | | x | x | x | | | | | | | | | | | | | | | | x | x |
| 1520.00 | cS | | x | x | | | | | | | | | | | | | | | | | x | |
| 1730.00 | cS | | x | x | | | | | | | | | | | | | | | | | x | |
| 1940.00 | cS | | x | x | x | | | | | | | | | | | | | | | | x | x |
| 2130.00 | cS | | x | x | | | | | | | | | | | | | | | | | x | |
| 2330.00 | cS | | x | x | x | | | | | | | | | | | | | | | | x | x |
| 2523.00 | cS | | x | x | | | | | | | | | | | | | | | | | x | |
| 2724.00 | mud | | | | | | | | | | | x | | x | | | | | | | | |
| 2726.34 | pS | | x | x | | | | | | | | | | | | | | | | | x | |
| 2734.11 | pR | | | x | | | x | x | | | | | | | | | | | | | | |
| 2745.09 | pR | | | x | | | x | x | | | | | | | | | | | | | | |
| 2922.00 | cS | | x | x | | | | | | | | | | | | | | | | | x | x |
| 3012.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3015.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3018.00 | cS | | x | x | x | x | x | | x | | | | | | | | | | | | | |
| 3021.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | x | x |
| 3024.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3027.00 | cS | | x | x | x | x | x | | x | | | | | | | | | | | | | |
| 3030.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3033.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3036.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3039.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3042.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3045.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3048.00 | cS | | x | x | x | x | x | | x | | | | | | | | | | | | | |
| 3051.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3054.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3057.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3060.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3063.00 | cS | | x | x | x | x | x | | x | | | | | | | | | | | | | |
| 3066.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3069.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3072.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3075.00 | cS | | x | x | x | x | x | | x | | | | | | | | | | | | | |
| 3078.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3081.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3084.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3087.00 | cS | | x | x | x | x | x | | x | | | | | | | | | | | | | |
| 3090.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | x | x |
| 3093.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3096.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3100.00 | mud | | | | | x | x | | | | | x | | x | | | | | | | | |
| 3102.00 | cS | | x | x | x | x | x | | x | | | | | | | | | | | | | |

# Table 1: Analytical Program for Well NOCS 6507/3-3

GEOLAB NOR

| Sample Depth (m) | Sample Type | Sample Code | Extraction Clean-Up | Lithology Description | Picking for screening | Leco TOC | RockEval | Thermal Extraction | Pyrolysis GC | Picking for Extraction | Iatroscan | SOXTEC Extraction | MPLC & Deasphaltene | EOM GC | Whole Oil GC | Sat GC (Quantitative) | Aro GC (Non Quantitiative | Sat GCMS (Quantitative) | Aro GCMS (Non-Q) | Isotope of EOM/fractions | Vitrinite Reflectance | Visual kerogen |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Table nos. | | | | 3 | | 5 | 5 | | 6 | | 8 | 8 | 8 | | | 9 | 9 | 11 | 12 | | 4 | 7 |
| 3117.00 | cS | | x | x | x | x | x | | x | | | | | | | | | | | | | |
| 3126.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3144.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3165.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3180.00 | cS | | x | x | x | x | x | | x | | | | | | | | | | | | | |
| 3201.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | x | x |
| 3216.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3228.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3255.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3282.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3333.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | x | x |
| 3342.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3345.00 | cS | | x | x | x | x | x | | | | | | | | | | | | | | | |
| 3375.14 | hR | | | | | | | | | | | | | x | | | | | | | | |
| 3375.19 | pR | | | | | | x | | | | | x | x | | | x | | | | | | |
| 3380.62 | pR | | | | | | x | | | | | x | x | | | x | | | | | | |
| 3381.37 | pS | | | | | xX | xX | | | | | x | x | | | x | | | | | | |
| 3381.61 | pS | | | | | xX | xX | | x | | | x | x | | | x | | | | | | |
| 3381.66 | pS | | | | | | x | | | | | x | x | | | x | | | | | | |
| 3383.83 | pS | | | | | xX | xX | | x | | | x | x | | | x | | | | | | |
| 3384.86 | pR | | | | | | x | | | | | | | | | | | | | | | |
| 3386.51 | pR | | | | | | x | | | | | | | | | | | | | | | |
| 3389.83 | pR | | | | | | x | | | | | | | | | | | | | | | |
| 3392.63 | pR | | | | | | x | | | | | | | | | | | | | | | |
| 3391.00 | hR | | | | | | | | | | | | | x | | | | | | | | |
| 3394.82 | pR | | | | | | x | | | | | x | x | | | x | | | | | | |
| 3398.85 | pR | | | | | | x | | | | | x | x | | | x | | | | | | |
| 3400.74 | pR | | | | | | x | | | | | x | x | | | x | | | | | | |
| 3400.00 | mud | | | | | | x | | | | | | | | | | | | | | | |
| 3404.66 | pR | | | | | | x | | | | | | | | | | | | | | | |
| 3405.00 | hR | | | | | | | | | | | | | x | | | | | | | | |
| 3408.06 | pR | | | | | | x | | | | | | | | | | | | | | | |
| 3411.05 | pR | | | | | | x | | | | | | | | | | | | | | | |
| 3415.07 | hR | | | | | | | | | | | | | x | | | | | | | | |
| 3415.51 | pR | | | | | | x | | | | | | | | | | | | | | | |
| 3418.20 | pR | | | | | | x | | | | | | | | | | | | | | | |
| 3420.61 | pR | | | | | | x | | | | | | | | | | | | | | | |
| 3424.62 | pR | | | | | | x | | | | | | | | | | | | | | | |
| 3426.10 | hR | | | | | | | | | | | | | x | | | | | | | | |
| 3426.81 | pR | | | | | | x | | | | | | | | | | | | | | | |
| 3429.58 | pR | | | | | | x | | | | | | | | | | | | | | | |
| 3434.85 | pS | | | | | x | x | | | | | | | | | | | | | | | x |
| 3438.00 | cS | | | x | x | xX | xX | | x | x | | x | x | | | x | | | | | x | |
| 3441.00 | cS | | | x | x | x | x | | | | | | | | | | | | | | | |
| 3444.00 | cS | | | x | x | x | x | | | | | | | | | | | | | | | |