

# TABLES 9/4-1

Table 1 CASINGS

| Diameter | Depth below KB |      |
|----------|----------------|------|
|          | m              | ft   |
| 36"      | 145            | 475  |
| 20"      | 334            | 1097 |
| 13 3/8"  | 1092           | 3584 |

Table 2 HOLE DEVIATION

| Depth below KB |      | Degrees |
|----------------|------|---------|
| m              | ft   |         |
| 97             | 317  | 0.5     |
| 116            | 380  | 1.0     |
| 914            | 3000 | 0.5     |
| 1106           | 3629 | 1.25    |
| 1345           | 4412 | 0.5     |
| 1589           | 5212 | 1.0     |
| 1945           | 6380 | 3.25    |
| 2098           | 6883 | 4.25    |
| 2270           | 7446 | 5.25    |
| 2401           | 7877 | 3.0     |
| 2420           | 7939 | 2.25    |
| 2519           | 8265 | 1.75    |
| 2655           | 8709 | 2.0     |
| 2754           | 9036 | 2.0     |
| 2804           | 9200 | 2.5     |

Table 3 MUD PROPERTIES

| Depth below KB |      | Weight<br>ppg | Funnel<br>visc<br>sec | Filt.<br>loss<br>cm <sup>3</sup> | %<br>oil | Remarks   |
|----------------|------|---------------|-----------------------|----------------------------------|----------|---|
| m              | ft   |               |                       |                                  |          |   |
| 117            | 368  |               |                       |                                  |          | Sea water, no returns   |
| 427            | 1400 |               |                       |                                  |          | Sea water, no circulation   |
| 282            | 924  |               |                       |                                  |          | Sea water, 26" hole-opener  |
| 427            | 1400 |               |                       |                                  |          | Sea water, redrilled casing hole  |
| 257            | 842  |               |                       |                                  |          | Sea water, redrilled  |
| 139            | 456  |               |                       |                                  |          | Sea water, redrilled casing hole  |
| 191            | 625  |               |                       |                                  |          | Sea water gel, redrilled, lost circ.  |
| 375            | 1230 |               |                       |                                  |          | Sea water, redrilled, no circ.  |
| 914            | 3000 | 9.2           | 39                    | 14                               |          | Sea water   |
| 1106           | 3629 | 9.3           | 38                    |                                  |          | At 3565' mud changed from sea water to Sper-sene XP-20 Lignosulphonate type                       |
| 1345           | 4412 | 9.7           | 37                    | 12                               |          |   |
| 1589           | 5212 | 9.8           | 42                    |                                  |          |   |
| 1684           | 5526 | 10.1          | 47                    | 6.9                              |          |   |
| 2519           | 8265 | 10.5          | 48                    |                                  |          |   |
| 2804           | 9200 | 10.5          | 43                    | 6.2                              |          |   |
| 2963           | 9720 | 10.5          | 40                    | 9.8                              |          |   |
| 2963           | 9720 | 10.5          |                       |                                  |          | Pipe stuck in flowing salt, converted to salt saturated mud.                                      |
| 2963           | 9720 | 13.2          |                       |                                  |          | Mud wt. was increased to 13.2 ppg. Three bbls. lost to formation. Added Pipe Lax and fresh water. |

ID/OLJE

00273 \*25.4.68

SAKSB:  
ARKIV:

## BIT RECORD

| Bit No.        | 1-RR             | 2      | 1-HO-RR                   | 2-RR                                | 2-HO-RR                       |
|----------------|------------------|--------|---------------------------|-------------------------------------|-------------------------------|
| Size           | 26               | 17½    | 48                        | 17½                                 | 26                            |
| Make           | HTC              | SEC    | SEC                       | SEC                                 | SEC                           |
| Type           | OSC              | S3T    | Hole Opener               | S3T                                 | Hole Opener                   |
| Serial No.     | 260130           | 945248 | Custom                    | 945248                              | Custom                        |
| Jets           | REG              | 3 x 24 | -                         | 3 x 24                              | -                             |
| Depth Out      | 368              | 380    | 380                       | 1400                                | 924                           |
| Footage        | 51               | 12     | -                         | 1020                                | -                             |
| Hours          | 1.5              | 1.0    | 2.0                       | 13.5                                | 4.5                           |
| ROP Ft./Hr.    | 34.0             | 12.0   | -                         | 75.6                                | -                             |
| Cum. Hours     | 1.5              | 2.5    | 2.5                       | 16.0                                | 16.0                          |
| Weight Kip     | 0.5              | 0.5    | 0.5                       | 10                                  | 5-10                          |
| Rotary RPM     | 50               | 50     | 50                        | 140                                 | 90                            |
| Rotary Ft-Lbs. | 100              | 100    | 100                       | 140A                                | 200A                          |
| Pump PSI       | 600              | 600    | 600                       | 1600                                | 600                           |
| Pump GPM       | 970              | 970    | 970                       | 1150                                | 1150                          |
| Ann. Vel.      | -                | -      | -                         | 100                                 | -                             |
| DP Bit         | -                | -      | -                         | 600                                 | -                             |
| Bit HHd        | -                | -      | -                         | 403                                 | -                             |
| Liner          | 7½               | 7½     | 7½                        | 7½                                  | 7½                            |
| SPM            | 84               | 84     | 84                        | 100                                 | 100                           |
| Deviation      | ½°-317           | 1°-380 | -                         | 0°-1400                             | -                             |
| Dull BTG       | 4-2-0            | 1-1-0  | -                         | 1-1-0                               | -                             |
| Mud Type       | SW               | SW     | SW                        | SW                                  | SW                            |
| Wt./Vis.       | -                | -      | -                         | -                                   | -                             |
| Remarks        | Cones<br>locked. |        | 17½ YT3A-RR<br>Pilot Bit. | Drilling<br>with no<br>circulation. | Storm<br>stopped<br>progress. |
| Jet. Vel.      |                  | 235    |                           | 275                                 |                               |

BIT RECORD

| Bit No.        | 3                             | 2-HO-RR                    | 3-RR                          | 4                                  | 5                   |
|----------------|-------------------------------|----------------------------|-------------------------------|------------------------------------|---------------------|
| Size           | 17½                           | 26                         | 17½                           | 17½                                | 26                  |
| Make           | HTC                           | SEC                        | HTC                           | HTC                                | HTC                 |
| Type           | OSC-3                         | Hole opener                | OSC-3                         | OSC-3                              | OSC-3               |
| Serial No.     | 471208                        | Custom                     | 471208                        | 47772                              | XJ048               |
| Jets           | -                             | -                          | -                             | 3x24                               | REG                 |
| Depth Out      | 1400                          | 842                        | 456                           | 625                                | 1230                |
| Footage        | ReDrill                       | ReDrill                    | ReDrill                       | ReDrill                            | ReDrill             |
| Hours          | 14.5                          | 2.5                        | 10.5                          | 4.0                                | 12.5                |
| ROP Ft./Hr.    | -                             | -                          | -                             | -                                  | -                   |
| Cum. Hours     | 16.0                          | 16.0                       | 16.0                          | 16.0                               | 16.0                |
| Weight Kip     | 10-20                         | 10-20                      | 10-20                         | 5-10                               | 15-20               |
| Rotary RPM     | 80                            | 90                         | 80                            | 60                                 | 140                 |
| Rotary Ft-Lbs. | 150A                          | 200A                       | 150A                          | 100A                               | -                   |
| Pump PSI       | 900                           | 1000                       | 900                           | 1000                               | 1200                |
| Pump GPM       | 1280                          | 1280                       | 1280                          | 1150                               | 1380                |
| Ann. Vel.      | -                             | -                          | -                             | -                                  | -                   |
| DP Bit         | -                             | -                          | -                             | -                                  | -                   |
| Bit HHd        | -                             | -                          | -                             | -                                  | -                   |
| Liner          | 7½                            | 7½                         | 7½                            | 7½                                 | 7½                  |
| SPM            | 110                           | 110                        | 110                           | 100                                | 120                 |
| Deviation      | -                             | -                          | -                             | -                                  | -                   |
| Dull BTG       | 1-1-0                         | -                          | 4-1-0                         | 1-1-0                              | 1-1-0               |
| Mud Type       | SW                            | SW                         | -                             | SWGel                              | SW                  |
| Wt./Vis.       | -                             | -                          | -                             | 9.0/43                             | -                   |
| Remarks        | Redrill<br>caving<br>hole NC. | Rotary<br>table<br>failed. | Redrill<br>caving<br>hole NC. | Redrill<br>lost<br>circ at<br>625. | Redrill<br>no circ. |

BIT RECORD

|                |                          |                               |                                   |
|----------------|--------------------------|-------------------------------|-----------------------------------|
| Bit No.        | 4-RR                     | 6                             | 7                                 |
| Size           | 17½                      | 17½                           | 12-1/4                            |
| Make           | HTC                      | HTC                           | SEC                               |
| Type           | OSC-3                    | OSC-3                         | S3S                               |
| Serial No.     | 47772                    | 49092                         | 102298                            |
| Jets           | 3 x 24                   | 3 x 24                        | 3 x 13                            |
| Depth Out      | 3000                     | 3629                          | 4412                              |
| Footage        | 1600                     | 629                           | 783                               |
| Hours          | 19.5                     | 14.5                          | 9.0                               |
| ROP Ft./Hr.    | 82.2                     | 43.4                          | 87.0                              |
| Cum. Hours     | 35.5                     | 50.0                          | 59.0                              |
| Weight Kip.    | 15-20                    | 15-20                         | 20-35                             |
| Rotary RPM     | 180                      | 180                           | 90-160                            |
| Rotary Ft-Lbs. | 250A                     | 200A                          | 200A                              |
| Pump PSI       | 1900                     | 1900                          | 2800                              |
| Pump GPM       | 1150                     | 1150                          | 630                               |
| Ann. Vel.      | 100                      | 100                           | 120                               |
| DP Bit         | 600                      | 600                           | 2200                              |
| Bit Hhd        | 403                      | 403                           | 795                               |
| Liner          | 7½                       | 7½                            | 6-1/4                             |
| SPM            | 100                      | 100                           | 82                                |
| Deviation      | ½°-3000                  | 1-1/4°-<br>3629               | ½°-4412                           |
| Dull BTG       | 2-2-0                    | 1-2-0                         | 2-2-0                             |
| Mud Type       | SW                       | SW Gel                        | Spersene                          |
| Wt./Vis.       | -                        | 9.3/38                        | 9.7/37                            |
| Remarks        | Drill<br>gumbo<br>shales | Gumbo<br>plugging<br>flowline | Gumbo to<br>top Chalk<br>at 4380. |
| Jet Vel.       | 275                      | 275                           | 520                               |

BIT RECORD

| Bit No.        | 4-RR                     | 6                             | 7                                 | 8                | 9                |
|----------------|--------------------------|-------------------------------|-----------------------------------|------------------|------------------|
| Size           | 17½                      | 17½                           | 12-1/4                            | 12-1/4           | 12-1/4           |
| Make           | HTC                      | HTC                           | SEC                               | SEC              | SEC              |
| Type           | OSC-3                    | OSC-3                         | S3S                               | S4TG             | S6G              |
| Serial No.     | 47772                    | 49092                         | 102298                            | 98819            | 104095           |
| Jets           | 3 x 24                   | 3 x 24                        | 3 x 13                            | 3 x 14           | 3 x 14           |
| Depth Out      | 3000                     | 3629                          | 4412                              | 4741             | 4977             |
| Footage        | 1600                     | 629                           | 783                               | 329              | 236              |
| Hours          | 19.5                     | 14.5                          | 9.0                               | 13.0             | 10.0             |
| ROP Ft./Hr.    | 82.2                     | 43.4                          | 87.0                              | 25.3             | 23.6             |
| Cum. Hours     | 35.5                     | 50.0                          | 59.0                              | 72.0             | 82.0             |
| Weight Kip     | 15-20                    | 15-20                         | 20-35                             | 40               | 30/40            |
| Rotary RPM     | 180                      | 180                           | 90-160                            | 90               | 90/140           |
| Rotary Ft-Lbs. | 250A                     | 200A                          | 200A                              | 200A             | 175A             |
| Pump PSI       | 1900                     | 1900                          | 2800                              | 2800             | 2800             |
| Pump GPM       | 1150                     | 1150                          | 630                               | 690              | 670              |
| Ann. Vel.      | 100                      | 100                           | 120                               | 130              | 125              |
| DP Bit         | 600                      | 600                           | 2200                              | 2150             | 2050             |
| Bit HHd        | 403                      | 403                           | 795                               | 865              | 800              |
| Liner          | 7½                       | 7½                            | 6-1/4                             | 6-1/4            | 6-1/4            |
| SPM            | 100                      | 100                           | 82                                | 90               | 88               |
| Deviation      | ½°-3000                  | 1-1/4°-<br>3629               | ½°-4412                           | 2°-4741          | 1°-4977          |
| Dull BTG       | 2-2-0                    | 1-2-0                         | 2-2-0                             | 4-4-0            | 3-2-0            |
| Mud Type       | SW                       | SW Gel                        | Spersene                          | Spersene         | Spersene         |
| Wt./Vis.       | -                        | 9.3/38                        | 9.7/37                            | 10.0/52          | 10.0/52          |
| Remarks        | Drill<br>gumbo<br>shales | Gumbo<br>plugging<br>flowline | Gumbo to<br>top Chalk<br>at 4380. | Chalk<br>w/chert | Chalk<br>w/chert |
| Jet Vel.       | 275                      | 275                           | 520                               | 490              | 480              |

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SAKSB:  
ARKIV:BIT RECORD

| Bit No.        | 20              | 21         |
|----------------|-----------------|------------|
| Size           | 12-1/4          | 12-1/4     |
| Make           | SEC             | SEC        |
| Type           | S4TG            | S4TG       |
| Serial No.     | 111775          | 116334     |
| Jets           | 3 x 16          | 3 x 16     |
| Depth Out      | 8265            | 8709       |
| Footage        | 326             | 444        |
| Hours          | 14.0            | 17.0       |
| ROP Ft./Hr.    | 23.3            | 26.1       |
| Cum. Hours     | 230.0           | 247.0      |
| Weight Kip     | 45              | 30/45      |
| Rotary RPM     | 150             | 150        |
| Rotary Ft-Lbs. | 200A            | 220A       |
| Pump PSI       | 2800            | 2800       |
| Pump GPM       | 650             | 650        |
| Ann. Vel.      | 125             | 125        |
| DP Bit         | 1170            | 1170       |
| Bit HHd        | 445             | 445        |
| Liner          | 6-1/4           | 6-1/4      |
| SPM            | 84              | 84         |
| Deviation      | 1-3/4°<br>-8265 | 2°<br>8709 |
| Dull BTG       | 3-4-0           | 4-4-0      |
| Mud Type       | Spersene XP-20  |            |
| Wt./Vis.       | 10.5/48         | 10.5/48    |
| Remarks        | Triassic        | Triassic   |
|                | clay/sand       | clay/sand  |
| Jet Vel        | 355             | 355        |

BIT RECORD

| Bit No.        | 10               | 11                | 12                | 13                | 14                             |
|----------------|------------------|-------------------|-------------------|-------------------|--------------------------------|
| Size           | 12-1/4           | 12-1/4            | 12-1/4            | 12-1/4            | 12-1/4                         |
| Make           | SEC              | SEC               | SEC               | SEC               | SEC                            |
| Type           | M4NG             | M4NG              | S6G               | M4NG              | S4TG                           |
| Serial No.     | 102216           | 102217            | 945918            | 99602             | 103208                         |
| Jets           | 3 x 14           | 3 x 14            | 3 x 14            | 3 x 14            | 3 x 14                         |
| Depth Out      | 5212             | 5526              | 5600              | 5783              | 6039                           |
| Footage        | 235              | 314               | 74                | 183               | 256                            |
| Hours          | 15.0             | 15.0              | 7.0               | 16                | 15                             |
| ROP Ft./Hr.    | 15.7             | 20.9              | 10.6              | 11.4              | 17.1                           |
| Cum. Hours     | 97.0             | 112.0             | 119               | 135               | 150                            |
| Weight Kip     | 40145            | 55                | 45/55             | 55/60             | 35/45                          |
| Rotary RPM     | 140              | 100/140           | 80/140            | 80/140            | 145/170                        |
| Rotary Ft-Lbs. | 200A             | 200A              | 200A              | 200               | 200                            |
| Pump PSI       | 2800             | 2800              | 2800              | 2800              | 2800                           |
| Pump GPM       | 675              | 675               | 675               | 630               | 630                            |
| Ann. Vel.      | 125              | 125               | 125               | 120               | 120                            |
| DP Bit         | 2100             | 2100              | 2100              | 1800              | 1800                           |
| Bit HHd        | 825              | 825               | 825               | 660               | 660                            |
| Liner          | 6-1/4            | 6-1/4             | 6-1/4             | 6-1/4             | 6-1/4                          |
| SPM            | 88               | 88                | 88                | 82                | 82                             |
| Deviation      | 1°-5212          | -                 | -                 | 1°-5783           | -                              |
| Dull BTG       | 4-2-0            | 3-2-0             | 1-1-0             | 3-2-0             | 3-3-0                          |
| Mud Type       | XP-20 Spersene → |                   |                   |                   |                                |
| Wt./Vis.       | 9.8/42           | 10.1/47           | 10.1/47           | 10.1/45           | 10.1/45                        |
| Remarks        | Chalk            | Limestone         | Limestone         | Limestone         | Limestone                      |
|                | ls w/chert       | chalk w/<br>chert | chalk w/<br>chert | chalk w/<br>chert | chalk w/<br>chert              |
|                |                  |                   |                   |                   | 5913 top<br>lr. cret.<br>clay. |
| Jet Vel.       | 480              | 480               | 480               | 450               | 450                            |

BIT RECORD

| Bit No.        | 15                | 16                | 17                     | 18   | 19  |
|----------------|-------------------|-------------------|------------------------|--|---|
| Size           | 12-1/4            | 12-1/4            | 12-1/4                 | 12-1/4   | 12-1/4  |
| Make           | SEC               | SEC               | SEC                    | SEC  | SEC   |
| Type           | S3S               | S3S               | S3S                    | S3S  | S4TG  |
| Serial No.     | 110980            | 102284            | 103146                 | 946629   | 103119  |
| Jets           | 3 x 14            | 3 x 14            | 3 x 14                 | 3 x 14   | 3 x 16  |
| Depth Out      | 6380              | 6883              | 7446                   | 7877   | 7939  |
| Footage        | 341               | 503               | 563                    | 431  | 62  |
| Hours          | 13                | 17.5              | 16.5                   | 16.0   | 3.0   |
| ROP Ft./Hr.    | 26.2              | 28.8              | 34.1                   | 27.0   | 20.7  |
| Cum. Hours     | 163               | 180.5             | 197.0                  | 213.0  | 216.0   |
| Weight Kip     | 35/40             | 35                | 35                     | 45   | 45  |
| Rotary RPM     | 165               | 170               | 170                    | 150  | 150   |
| Rotary Ft-Lbs. | 200               | 200A              | 200A                   | 200A   | 200A  |
| Pump PSI       | 2800              | 2800              | 2800                   | 2800   | 2800  |
| Pump GPM       | 630               | 600               | 600                    | 585  | 710   |
| Ann. Vel.      | 120               | 115               | 115                    | 112  | 135   |
| DP Bit         | 1800              | 1650              | 1650                   | 1600   | 1400  |
| Bit Hhd        | 660               | 575               | 575                    | 545  | 580   |
| Liner          | 6-1/4             | 6-1/4             | 6-1/4                  | 6-1/4  | 6-1/4   |
| SPM            | 82                | 78                | 78                     | 76   | 92  |
| Deviation      | 3-1/4°-6380       | 4 1/2°-6883       | 5-1/4°-7446            | 3°-7877  | 2 1/2°-7939   |
| Dull BTG       | 2-2-0             | 2-2-0             | 2-2-0                  | 3-2-0  | 1-1-0   |
| Mud Type       | XP-20-Spersene →  |                   |                        |  |   |
| Wt./Vis.       | 10.1/46           | 10.3/50           | 10.3/50                | 10.4/49  | 10.4/49   |
| Remarks        | Cret/Jur<br>clays | Cret/Jur<br>clays | Top mid Jur<br>LS-7386 | Top mid Jur<br>SS-7507<br>top triass-<br>ic clay<br>7646 | Pulled<br>green to<br>log due<br>to drilling<br>break |
| Jet Vel        | 450               | 430               | 430                    | 415  | 385   |



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## BIT RECORD

| Bit No.        | 20                          | 21                     | 22                      | 23                          | 24             |
|----------------|-----------------------------|------------------------|-------------------------|-----------------------------|----------------|
| Size           | 12-1/4                      | 12-1/4                 | 12-1/4                  | 12-1/4                      | 12-1/4         |
| Make           | SEC                         | SEC                    | SEC                     | SEC                         | SEC            |
| Type           | S4TG                        | S4TG                   | S4TG                    | M4NG                        | M4NG           |
| Serial No.     | 111775                      | 116334                 | 102337                  | 99643                       | 102200         |
| Jets           | 3 x 16                      | 3 x 16                 | 16x16x18                | 16x16x18                    | 16x16x18       |
| Depth Out      | 8265                        | 8709                   | 9036                    | 9200                        | 9417           |
| Footage        | 326                         | 444                    | 327                     | 164                         | 217            |
| Hours          | 14.0                        | 17.0                   | 12.0                    | 10.5                        | 12.0           |
| ROP Ft./Hr.    | 23.3                        | 26.1                   | 27.2                    | 15.6                        | 18.1           |
| Cum. Hours     | 230.0                       | 247.0                  | 257.5                   | 268.0                       | 280.0          |
| Weight Kip     | 45                          | 30/45                  | 30/45                   | 45/55                       | 40/50          |
| Rotary RPM     | 150                         | 150                    | 150                     | 90/140                      | 90             |
| Rotary Ft-Lbs. | 200A                        | 220A                   | 250A                    | 200A                        | 200A           |
| Pump PSI       | 2800                        | 2800                   | 2800                    | 2800                        | 2800           |
| Pump GPM       | 650                         | 650                    | 650                     | 630                         | 630            |
| Ann. Vel.      | 125                         | 125                    | 125                     | 120                         | 120            |
| DP Bit         | 1170                        | 1170                   | 990                     | 940                         | 940            |
| Bit Hhd        | 445                         | 445                    | 376                     | 345                         | 345            |
| Liner          | 6-1/4                       | 6-1/4                  | 6-1/4                   | 6-1/4                       | 6-1/4          |
| SPM            | 84                          | 84                     | 84                      | 82                          | 82             |
| Deviation      | 1-3/4 <sup>o</sup><br>-8265 | 2 <sup>o</sup><br>8709 | 2 <sup>o</sup><br>-9036 | 2-1/2 <sup>o</sup><br>-9200 | -              |
| Dull BTG       | 3-4-0                       | 4-4-0                  | 3-3-0                   | 3-3-0                       | 4-3-0          |
| Mud Type       | Spersene XP-20              |                        | Spersene XP-20          |                             | Spersene XP-20 |
| Wt./Vis.       | 10.5/48                     | 10.5/48                | 10.6/43                 | 10.6/43                     | 10.5/40        |
| Remarks        | Triassic                    | Triassic               | Triassic                | Triassic                    | Triassic       |
|                | clay/sand                   | clay/sand              |                         |                             | clay/sand      |
|                |                             |                        |                         |                             | locked cone    |
| Jet Vel        | 355                         | 355                    | 325                     | 315                         | 315            |

BIT RECORD

| Bit No.        | 25                    | 26  |
|----------------|-----------------------|---|
| Size           | 12-1/4                | 12-1/4                                      |
| Make           | HTC                   | Reed  |
| Type           | XV                    | YS-1  |
| Serial No.     | 59044                 | NDB118                                      |
| Jets           | 3 x 18                | 3 x 14                                      |
| Depth Out      | 9606                  | 9720  |
| Footage        | 189                   | 114   |
| Hours          | 12.5                  | 6.0   |
| ROP Ft./Hr.    | 14.6                  | 19.0  |
| Cum. Hours     | 292.5                 | 298.5                                       |
| Weight Kip     | 40/50                 | 30/45                                       |
| Rotary RPM     | 90/150                | 80  |
| Rotary Ft-Lbs. | 250A                  | 200A  |
| Pump PSI       | 2800                  | 2800  |
| Pump GPM       | 680                   | 546   |
| Ann. Vel.      | 125                   | 104   |
| DP Bit         | 800                   | 1400  |
| Bit HHd        | 320                   | 515   |
| Liner          | 6-1/4                 | 6-1/4                                       |
| SPM            | 88                    | 70  |
| Deviation      | -                     | -   |
| Dull BTG       | 4-3-0                 | -   |
| Mud Type       | Spersene XP-20        | -   |
| Wt./Vis.       | 10.5/40               | 10.5/40                                     |
| Remarks        | Triassic<br>clay/sand | Top Salt<br>9642. Stuck<br>locked cone Pipe |
| Jet Vel.       | 295                   | 385   |

ROBERTSON RESEARCH COMPANY LIMITEDMEMORANDUM NO. 578CLAY MINERALOGY OF SHALE SAMPLES

This report describes the clay mineralogy of seven samples of shale submitted by American Overseas Petroleum Limited from their Norwegian North Sea Well 9/4-1.

Each of the shale samples was prepared by dispersing in water with ultrasonic treatment, and the  $\leq 5 \mu$  fraction was then separated by sedimentation. Aliquots were pipetted onto glass slides and infra-red dried.

The semi-quantitative composition of the clay mineral fraction of the shales is shown in table 1. This table shows that illite is present in all the samples. Mixed-layer clay minerals comprise about half the percentage given for illite in samples 7718', 7820' and 7922'. Kaolinite is present in all the samples. Kaolinite and chlorite are present in samples 7718', 7820' and 7922' but cannot be separated without more detailed work.

TABLE 1 Semi-quantitative composition of the clay mineral fraction of seven shales submitted by American Overseas Petroleum Ltd.

| Sample | Illite           | Kaolinite        | Other Minerals                             |
|--------|------------------|------------------|--|
| 7258   | 85%              | 15               | quartz, calcite.                           |
| 7437   | 23%              | 77               | quartz.                                    |
| 7540   | 37%              | 63               | quartz, possible apatite.                  |
| 7610   | 46%              | 54               | quartz.                                    |
| 7718   | 63% <sup>x</sup> | 37 <sup>xx</sup> | quartz, possible apatite.                  |
| 7820   | 77% <sup>x</sup> | 23 <sup>xx</sup> | quartz, alkali feldspar, possible apatite. |
| 7922   | 58% <sup>x</sup> | 42 <sup>xx</sup> | quartz, calcite                            |

<sup>x</sup> Mixed-layer minerals comprise about half the percentage given for illite in these samples.

<sup>xx</sup> The figure given for kaolinite in these samples, is actually kaolinite plus chlorite, but the two samples cannot be separated without some detailed tests.



APPENDIX - 2  
 LLANDDULAS  
 ABERGEELE  
 DENBIGHSHIRE

**ROBERTSON RESEARCH COMPANY LIMITED**

DIRECTORS: DR. W. F. ROBERTSON J. C. ROBERTSON D.L.  
 DR. R. H. CUMMINGS DR. W. W. McB. BROWN

TELEPHONE: LLANDDULAS 424  
 (049-266 424)  
 Telex: 61218  
 Cable: Research Abergele

CERTIFICATE OF ANALYSIS

(comprising 2 sheets)

TAUSHEISPLIKT

Certificate Number: 689/68.  
 Project Number: ARP 689/144.  
 Your Reference:  
 Date: 29th May 1968.

Client: American Overseas Petroleum Ltd.,  
 Conradkade 178,  
 The Hague,  
 Netherlands.  
 For the attention of:

HYDROCARBON ANALYSES

Sample numbers 7437, 7525 and 7540 were extracted first with Di-ethyl Ether, to obtain lower Molecular Weight Hydrocarbons which were examined by Gas/Liquid Chromatography. The samples were then extracted with Trichloroethylene to obtain high Molecular Weight Hydrocarbons which were also examined by Gas/Liquid Chromatography. In each case Gravimetric Analysis was also conducted.

The Gas/Liquid Chromatography of all three samples was extremely complex, and contained a few hundred Isomers and Homologues, hence an adequate determination of chain lengths and relative abundances was not feasible in the time. Beyond C<sub>30</sub>, the results given are Tentative since the column was operating at its thermal limit (360°C), at which temperature bleeding caused considerable Base-Line drift. An approximate correction for this drift was made by running a number of Chromatographs without samples, and determining the average drift rate due to bleeding.

RESULTS:

Percentage Hydrocarbons present.

|                 |       |
|-----------------|-------|
| Sample No. 7437 | 0.15% |
| Sample No. 7525 | 0.37% |
| Sample No. 7540 | 0.22% |

Cont'd..../

for and on behalf of  
 ROBERTSON RESEARCH COMPANY LIMITED

|            |  |
|------------|--|
| Telexed on |  |
| Cabled on  |  |

*P. E. Brown*  
 Chief Analyst

## TAUSHETSPLIKT

## Percentage composition of Hydrocarbons contained.

|                                    | <u>Sample No. 7437</u> | <u>Sample No. 7525</u> | <u>Sample No. 7540</u> |
|------------------------------------|------------------------|------------------------|------------------------|
| Up to C <sub>14</sub>              | 4%                     | 11%                    | 7%                     |
| C <sub>14</sub> to C <sub>16</sub> | 8%                     | 17%                    | 10%                    |
| C <sub>16</sub> to C <sub>18</sub> | 38%                    | 31%                    | 27%                    |
| C <sub>18</sub> to C <sub>28</sub> | 9%                     | 11%                    | 14%                    |
| C <sub>28</sub> to C <sub>30</sub> | 32%                    | 19%                    | 32%                    |
| Above C <sub>30</sub>              | 9%                     | 11%                    | 10%                    |

In the case of C<sub>16</sub> to C<sub>18</sub> range, there was in fact one major constituent corresponding to either C<sub>16</sub>, C<sub>17</sub> or C<sub>18</sub>. In order to determine precisely which this is, it would be necessary to spend further time.

29.5.68.