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MOBIL EXPLORATION NORWAY INC.
FINAL GEOLOGICAL SUMMARY
33/9-6

17 FEB 1977
REGISTRERT
OLIEDHEKTORATET

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| :--- | :--- | :--- |
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# NORWAY OFFSHORE <br> LICENSE 037 <br> WILDCAT WELL 33/9-6 

WELL DATA
WELL NAME: 33/9-6
LOCATION: $\quad 67^{\circ} 25^{\prime} 12.80^{\prime \prime} \mathrm{N}$ $01^{\circ} 48^{\prime} 43.09^{\prime \prime}$

CLASSIFICATION:
DRILLING PERIOD
SPUDDED:
COMPLETED DRILLING:
RIG RELEASED
KB ELEVATION
WATER DEPTH:
RIG:
STATUS:

TOTAL DEPTH:
PLANNED:
ACTUAL:
OBJECTIVE:

COST (\$)
Planned:
Actual:

3300m (kb)
WILDCAT

23 JUNE 1976
15 AUGUST 1976
3 SEPTEMBER 1976
25.5 m

153m
"Dyvi Alpha"
Plugged and abandoned
Dry hole with oil shows

3354m (kb)
Middle \& Lower Jurassic sands

4,400,000
4,743,000

## INTRODUCTION

33/9-6 was plugged and abandoned with oil shows on 3 September 1976.
It was the seventh of eight. obligation wildcats in License 037. 33/9-6 was drilled on the 9-Delta prospect located on the regional Murchison structural trend which extends accross the northern portion of Block 33/9. The trend consists of a series of horsts and grabens oriented southwestnortheast, bounded on the southeast by a major normal fault zone downthrown to the southeast. The $33 / 9$ Delta prospect is mapped as a northwestward tilted horst block within a large graben between the Murchison Field and the 9-Beta prospect. Murchison Field contains significant reserves in the Middle Jurassic Brent sand. 33/9-6 was the first wildcat in the Norwegian sector of the Murchison trend.

The prospect was mapped seismically on two horizons: Near Top Triassic and Kimmerian Unconformity. The primary objective was the Brent sand which is oil reservoir of the adjacent Murchison Field. The sand was interpreted to subcrop beneath the Kimmerian Unconformity near the crest of the structure and Lower Cretaceous shales were expected to provide seal. Downdip the sand was interpreted to subcrop a thin and sealing wedge of Upper/ Middle Jurassic shales.

The wildcat located near the crest of the structure was programmed to reach a total depth of 3,300 meters, approximately 30 meters into the Lower Jurassic Statfjord Formation.

## RESULTS

33/9-6 was plugged and abandoned after reaching a total depth of 3,354 (-3328.5) meters, 32 meters into the Lower Jurassic Statfjord Formation. $0 i 1$ shows observed in the Brent sand were confirmed with core and log analysis. The shows were not drillstem tested due to mechanical problems. Four FIT's (Formation Interval Tests) were run; none of these tests are believed to have recovered formation fluid.
(Brent Formation)
The objective Brent Formation was topped at 2995 (-2969.5) meters, 7.5 meters low to prognosis. Two cores were cut from 2997 meters to 3033.4 meters. The sand was described as clear to white, fine grained and very micaceous. Porosity was poor to fair; and poor to fair oil shows and scattered thin zones of bleeding oil were described down to 3023 meters. No shows occurred below 3023 meters. An oil/water contact was interpreted at 3019.5 meters from the Schlumberger Coriband Log which is in close agreement with the inferred fluid contact in the cores. The interpretation of the Coriband Log is summarized below.

## 33/9-6 Brent Formation

| Interval: | 2995.0-3139.5m (kb) |
| :---: | :---: |
| Thickness: | 144.5m |
| Assuming cutoff parameters of: | $12 \%$ porosity 40\% clay volume |
| Net Sand: | 103.0 m |
| Net/Gross Sand Ratio: | 0.71 |
| Average Porosity Net Sand: | 20.5\% |
| 0il/Water Contact | 3019.5 m |
| Gross Pay Interval: | 2995-3019.5m (kb) |

Assuming a cutoff of $65 \%$ water saturation

```
Gross Pay: 24.5m
Net Pay: \ 13.5m
Net/Gross Sand Ratio (pay zone): }\quad0.5
Average Porosity Net Pay:
17%
Water Saturation:
25%-65%
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Mechanical problems precluded drillstem testing, and four FIT's were run to evaluate the shows at the following depths:
(1) 2998.5 meters,
(2) 2996.5 meters,
(3) 2997.5 meters and (4) 2995.5
meters. The FIT's were unsuccessful in recovering quantitative formation
fluid. With the exception of FIT No. 2 which recovered a trace of oil, only mud filtrate, mud, and a trace of gas were recovered. The NaCl content of recovered fluid ranged from $3,300-5,280$ pprin which was consistant with the salinity of the drilling mud. Further details of the tests are included in the Well Record Sheet. (Figure I.)

## (Statfjord Formation)

The Statfjord Formation was topped at 3322 (-3296.5) meters, 60.5 meters low to prognosis. No shows were observed and log analysis confirmed that the sand was wet.

## STRATIGRAPHY/STRUCTURE

The stratigraphic section was similar to that found in the Murchison Field wells. The Tertiary consisted primarily of clays, siltstones, and minor sands. The top of the Paleocene at 1669.5 ( -1644 ) meters was 4 meters high to prognosis. The tuffaceous red claystone typical of the Paleocene was encountered slightly above the log pick. This occurrence is common within the area. The sandy basal portion of the Paleocene was not well developed in 33/9-6. 0il and gas shows have occurred in this zone in both Statfjord and Murchison Field wells; however, no shows
were observed in 33/9-6.

The top of the Cretaceous was at 1890.2 ( -1864.2 ) meters. The Upper Cretaceous claystones and siltstones were 980.3 meters thick, the thickest thus far drilled in License 037. A disconformity, marked by a red marl of Albian age at 2870.5 ( -2845 ) meters, separates the Lower and Upper Cretaceous sections. This red marl is overlain by Coniacian/ Turonian aged sediments indicating that the Cenomanian and possibly a portion of the Turonian are absent. A detailed summary of paleontological interpretation is included in Enclosure 1. The distinctive Barremian Limestone which forms the base of the Lower Cretaceous is 16.3 meters thick.

The Kimmerian Unconformity was encountered at 2938.5 (-2913) meters, 11 meters high to prognosis. A 56.5 meter section of Upper/Middle Jurassic shale was preserved below the Unconformity. The objective Brent sand was topped at 2995 ( -2969.5 ) meters, 7.5 meters low to prognosis. The formation, 144.5 meters thick, is lithologically similar to the Brent in the Murchison Field wells. An Upper Brent sand recognized in the northern Statfjord Field area is not present in 33/9-6 or in the Murchison Field. The top of the Brent correlates with the Middle Brent sand recognized in the Statfjord and Murchison Fields.

The Lower Jurassic Durlin Formation was encountered at 3139.5 ( -3114 ) meters, 15 meters low to prognosis. It consisted of gray micaceous claystones and siltstones with scattered stringers of lime and sand toward the base. The Dunlin, 182.5 meters thick in $33 / 9-6$ was 45.5 meters thicker than prognosed.

The Statfjord Fomation was topped at $3322(-3296.5)$ meters. Due to the thickening of the Dunlin Formation the Statfjord was 60.5 meters low to prognosis. The sand was described as clear to white, conglomeratic and was interbedded with thin calciluties and calcarenites. No shows were encountered and the well was bottomed at 3354 (-3328.5) meters after penetrating 32 meters of the formation.

Fomation tops were essentially as predicted, (Figure II). The only exception being the Statfjord Formation which was 60.5 meters low to prognosis. Details of the lithologic description are presented on the Sumary Log (Enclosure 2) and on the Final Composite Log (Enclosure 3). SUMmARY AND CONCLUSIONS

33/9-6 was plugged and abandoned as a dry hole with oil shows. Schlumberger Coriband analysis and core data indicated 24.5 meters of gross pay and 13.5 meters of net pay in the Brent Formation. Although the shows were not successfully tested, they confirm the presence of hydrocarbons east of the Murchison Field. Based on an oil/water contact of 3019.5 (-2994) meters reserves for the horst block alone are estimated at 5.5 MASTB. Low reserves estimates are due to poor reservoir quality in the oil column. By assuming the same oil/water contact for the graben, area to the east addition reserves of 50.2 MMSTB could be present.

## Mobil Exploration Norway Inc.

WELL RECORD SHEET


NOTE: ALL LOG TOPS PICKED ON/OR CORRELATED TO THE IES OR ISF/SONIC LOG UNLESS OTHERWISE NOTED.

## Paleontology / Palynology



BY: .....R. Phares
DATE: .27...0ctober., ...1976.

WELL RECORD SHEET
WELL NAME


| UNIT | DEPTH | SUBSEA | THICKNESS / REMARKS |
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ADDITIONAL INFORMATION:

## Paleontology / Palynology

| Interval (meters) | Stage/Substage |
| :--- | :--- |
| $3136-3202$ | Toarcian |
| $3208-3286$ | Domerian |
| $3292-3316$ | Carixian-Late Sinemurian |
| $3322-3354$ | Sinemurian-?Rhaetian |
|  |  |
|  |  |
|  |  |



BY:
DATE:
REVISED:

## WELL 33/9-6 PROGNOSIS VS ACTUAL DEPTHS

PROGNOSED
ACTUAL


ALL DEPTHS IN METERSUBSEA VERTICAL SCALE: 1:20000


L-158 $725.3_{\text {ENCLOSURE 2 }}$

## 




$x=1$

