GEOLOGIC SUMMARY

COMPLETION REPORT

NEW FIELD WILDCAT

ESSO 16/7-1

Esso Exploration Norway Inc.

Stavanger District

Geological Office

ESSO 16/7-1

GEOLOGIC SUMMARY

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ESSO 16/7-1

GEOLOGIC SUMMARY

I. INTRODUCTION

A. **Well designation:** ESSO 16/7-1

B. **Classification:** New Field Wildcat

C. **Location:** Latitude 58°20'22.5" North
Longitude 02°18'50" East

D. **Objective:** To test the hydrocarbon potential of the sedimentary section; investigate the lithology and sequence in this portion of the North Sea basin; and to partially fulfill Esso's drilling obligation to the Norwegian Government incurred on behalf of the Licences.

E. **Results:** No shows were encountered in Esso 16/7-1. There were no sands in the Tertiary Eocene and the pre-Zechstein section was not penetrated because of severe hole problems in the Zechstein salt.

F. **Status:** Esso 16/7-1 was plugged and abandoned 24 September 1967 at a total depth of 9122 feet.

II. DRILLING HISTORY:

A. General

1. Spud date: 11 August 1967
2. Completion date: 24 September 1967
3. Status: Plugged and abandoned
4. Total depth: 9122'(-8859' Subsea True Vertical Depth)

B. Contractor and rig: ODECO Semi-submersible OCEAN TRAVELER

C. Casing: 30" at 431 feet
13 3/8" at 1207 feet
9 5/8" at 4282 feet

D. Mud program: Initial drilling from the sea floor to 1250 feet was with sea water and gel without casing. Returns were to the sea floor.

Below 1250 feet to a depth of 7055 feet, a Spersene XP-20 Ligno-sulphonate mud with 3 to 8% diesel oil was used. From 7055 feet to 9122 feet, the mud system contained salt saturated Spersene XP-20 Lignosulphonate mud with 5 to 9% diesel oil.

E. Drilling problems: After cementing the 30 inch casing at 431 feet, the well was drilled to 700 feet. On pulling out of the hole, it was found that the guide structure had sunk 15 feet into the sea bed or 8 feet below the mud line. The ocean floor structures were retrieved and the platform was moved 100 feet southwest and the well was respudded. The 30 inch casing was again cemented at 431 feet. No abnormal drilling problems were encountered until a depth of 7055 feet was reached. At this depth, high cloride and high viscosity mud indicated that salt had been encountered. The mud was converted to a salt saturate system and drilling was resumed. The well was drilled to 9122 feet where the pipe stuck and a twist off occurred

leaving two drill collars, two stabilizers, one reamer and the bit in the hole. Top of the fish was at 9040 feet. Fishing operations failed and a 125 sack plug was set at 9039 feet with the top of the plug at 8690 feet. Electrical logs were run at this depth. A deviation survey computed from the continuous dipmeter disclosed that there was an excessive natural deviation in the salt section. Plug was set at 7250 feet in preparation for redrilling operations in the straight hole to sidetrack the fish. On going back into the hole, the hole caved and the hole was reamed to 6172 feet. While again reaming the caving hole, a second twist off occurred at 5229 feet leaving nine drill collars, the bottom hole assembly and part of a single in the hole. No further attempts to fish were made and the final cement plugs were set.

F. Coring.

1. Conventional Cores

Core No. 1, 5883-5935 feet recovered 48 feet (93%)

2. Sidewall Cores

No Sidewall cores were taken.

G. Logging

1. Baroid Mud Log 1250 to 9122 feet
2. Schlumberger logs

Type log	Depth	Run Number
Induction Electrical (IES)	1207-4737	1
Laterolog 7 (LL7)	4684-8625	1
Microlaterolog-Caliper (MLL)	1209-4737 4684-8672	1 2
BHC Sonic-Caliper-Gamma Ray	1209-4727 4684-8625	1 2
Gamma Ray	327-4727	1
Compensation Formation Density (FDC)	4684-8670	1
Continuous Dipmeter (CDM)	4684-8681	1

The Continuous Dipmeter indicated that there was excessive natural deviation probably due to contorted bedding in the salt section. A directional survey was computed from the dipmeter. Deviation below 7300 feet increased at the rate of 1° per 50 feet to a depth of 8650 feet where the deviation was 27°. Extrapolating this deviation results in a deviation of 36 degrees at 9122 feet (8944 True Vertical Depth). At total depth of 9122 feet, the direction of deviation was $S83^{o}$ E.

H. Testing: No tests were made in Esso 16/7-1.

I. Abandonment:

In preparation for redrilling past a drill pipe fish, a 125 sack cement plug was set at 9039 feet. The top of this plug was tagged at 8690 feet. A 160 sack plug was set at 7950 feet and a 155 sack plug was set at 7600 feet. Top of this plug was found at 7250 feet. Redrilling operations failed and a second fish was left in the hole at 5229 feet. Final abandonment was made by setting a 125 sack neat cement plug at 4784 feet. Hard cement was tagged at 4534 feet. A 75 sack neat cement plug was set at 582 feet and hard cement was tagged at 382 feet. A well head demolition shot was stabbed into the well head and detonated. The guide structure was recovered leaving the ocean floor clear. Esso 16/7-1 was plugged and abandoned as of 1300 hours 24 September 1967.

STRATIGRAPHY

A. Table of stratigraphy

Esso 16/7-1

Stratigraphic Units	Drill Depths (Feet)	Subsea Top (Feet)	Thickness (Feet)
QUATERNARY	349- 914	(- 264)	565
Pleistocene/Recent	349- 914	(- 264)	565
TERTIARY	914-6100	(- 829)	5186
Pliocene	914-2656	(- 829)	1742
Miocene	2656-3520	(-2571)	864
Upper Miocene	2656-3113	(-2571)	457
Middle Miocene	3113-3520	(-3028)	407
---------- Unconformity ----------	3520	(-3435)	----
Oligocene	3520-4534	(-3435)	1014
---------- Unconformity ---------	4534	(-4449)	----
Eocene	4534-6080	(-4449)	1546
Paleocene	6080-6100	(-5995)	20
---------- Unconformity ---------	6100	(-6015)	----
CRETACEOUS	6100-6820	(-6015)	720
Upper Cretaceous	6100-6549	(-6015)	449
Lower Cretaceous	6549-6820	(-6464)	271
---------- Unconformity ----------	6820	(-6735)	----
PERMIAN	6820-9122	(-6735)	2302+
Zechstein	6820-9122	(-6735)	2302+

B. Lithologic description

QUATERNARY

Pleistocene/Recent (565 feet)

Returns were to the sea floor during the drilling of this interval but the drillers reported drilling numerous boulders to 840 feet. The Sonic Gamma-Ray log indicates unconsolidated, fine grained sand, pebbles, gravels and clays similar to Esso 25/11-1 and Esso 16/2-1.

TERTIARY

Pliocene (1742 feet)

Again, samples were to the sea floor to a depth of 1250 feet. However, the Sonic Gamma-Ray log and drilling rate suggest a lithology similar to that above. Cuttings samples from 1250 to 2656 feet were composed of clays, medium light gray, calcareous, soft, sticky with commom microfossils. There were no shows.

Miocene (864 feet)

Upper Miocene (457 feet)

The Upper Miocene was predominantly clay, medium gray, silty, calcareous and soft with abundant macrofossil fragments and coarse-grained quartzose sands. Clays near the base were dark green, glauconitic.

Middle Miocene (407 feet)

The Middle Miocene was predominantly shale, olive-green- to gray, slightly calcareous; shale, yellow-gray, clayey, silty, glauconitic, non-calcareous; clay, yellow-brown, slightly calcareous soft, glauconitic, and sands, very fine-to medium-grained, sub-rounded-to rounded quartz with a trace of weathered, tuffaceous sand. There were no shows in the Miocene section.

Oligocene (1014 feet)

The Oligocene was primarily clay. Near the top, the clays were light olive-gray, silty, calcareous, soft, sticky, glauconitic. From 3815 to 3835 feet a sandstone, white, fine-grained, rounded, cherty with calcareous cement was found. Below the sandstone, the clays were pale yellow-brown, soft, sticky and non-calcareous. There were no shows.

Eocene (1546 feet)

The Eocene section of Esso 16/7-1 was primarily shale and claystone with minor interbeds of sand and limestone.

The shales were olive gray, dark gray-to green-gray, primarily non-calcareous except for local calcareous intervals. Near the base of the Eocene, the shales were greenish- to brownish gray with some blue-gray and minor pale red-brown shales. The clays were olive-gray, soft and non-calcareous near the top and rust-brown- to red-brown, calcareous near the base. The limestones near the top were micritic, buff and firm. The limestones near the base were cryptocrystalline-to calcarenite, white-to brown and ranged from hard- to soft. The minor sands were fine- to medium-grained, angular, quartzose. There were no shows.

Paleocene (20 feet)

The Paleocene was shale, green-gray- to brown-gray, calcareous with a trace of clay, red-brown. There were no shows.

CRETACEOUS (720 feet)

Upper Cretaceous (449 feet)

The Upper Cretaceous was composed of limestone, micritic, chalky, white- to very light buff or gray with thin interbeds of shale, green-gray, light gray and brown, non-calcareous. Near the base, the limestone contained pyrite and chert inclusions. There were no shows.

Lower Cretaceous (2311 feet)

The Lower Cretaceous was composed primarily of clay, light greenish gray- to light brown, soft, mushy and glauconitic with interbedded shale, greenish gray and dark gray, slightly silty. There were no shows.

Permian (2302 + feet) Zechstein

The upper 163 feet of the Permian Zechstein formation consisted of limestone, white- to very light tan, chalky; clay light greenish gray - to light brown; shale, greenish gray, dark gray and light brown and siltstone, white and red-brown, glauconitic. Slightly anhydritic and sandy siltstone overlies halite at 6983 feet. From 6983 feet to total depth of 9122 feet, the Permian Zechstein consisted of halite, clean and glassy with numerous interbeds of anhydrite, white-to light cream. There were no shows.

Esso 16/7-1: Detailed Core Description

CORE NO. 1: 5883 to 5935 feet: recovered 48 feet (93%); actually, might have recovered 100 per cent but core badly broken up and put into 16 3-foot boxes.

5883-86: Shale, greenish gray and pale red brown (variegated), non-calcareous, splintery fracture; dips 10°, fractures dip 40-65°.

5886-88: Shale, brownish gray, non-calcareous, dips 5-10°.

5888-89: Dolomite, yellow-gray, algal?

5889-92: Shale, green-gray to brownish gray, non-calcareous, splintery fracture, dips 12-18°.

5892-95: Shale, as above

5895-98: Shale, as above

5898-01: Shale, blue-gray, non-calcaerous, splintery fracture

5901-04: Shale, brownish gray, as above, bedding plane fractures 8°

5904-07: Shale, greenish gray to brownish gray, fragmented, non-calcerous

5907-10: Shale, brownish gray, non-calcareous, fragmented

5910-13: Shale, as above

5913-16: Shale, as above

5916-19: Shale, as above except non-fragmented, bedding dips 4-8°

5919-22: Shale, as above

5922-25: Shale, as above

5925-28: Shale, as above

5928-31: Shale, blue-gray; non-calcerous, bedding dips 8-11°, firm-hard

Note: This is the only conventional (diamond) core taken in this well; no sidewall cores were attempted.

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PROPRIETARY EXPLORER

Plugged and Abandoned

COMPANY NAME:			
WELL NAME:			
LOCATION:			