G E O L O G I C S U M M A R Y

COMPLETION REPORT

NEW FIELD WILDCAT

Esso 9/8-1

Esso Exploration Norway Inc.

Stavanger District

Geological Office

Esso 9/8-1

Geologic Summary

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ESSO 9/8-1

GEOLOGIC SUMMARY

I. INTRODUCTION

A. Well designation: Esso 9/8-1

The original estimated coordinates for this well placed the location in Field 9, Block 7, some 85 meters west of the 9/7-9/8 boundary, and the well was designated 9/7-1.

The Decca Navigator corrected coordinates (from seismic line and shot point), and also the Decca final coordinates after the rig was towed into position, place the location immediately east of the 9/7 - 9/8 boundary. The well therefore falls in Field 9, Block 8 and the designation was changed to Esso 9/8-1.

B. Classification: New Field Wildcat

C. Location: Latitude 57° 20' 34" North

Longitude 04° 20' 13" East

D. Objectives: To test the oil and gas potential of the sedimentary section present on the crest of a closed seismic structure interpreted to be a salt pillow at depth, typical of similar salt structures indicated by seismic data to underlie various Esso licences in Norwegian waters. To investigate the stratigraphic sequence and the lithologies present in this southerly Norwegian water area.

Prospective reservoir sands were anticipated towards the base of the Tertiary and Lower Cretaceous and in the Lower Triassic, especially if a typical Bunter section were present.

To partially fulfill drilling obligations to the Norwegian Government incurred on behalf of the Licences.

E. Results: The interpreted salt pillow structure was found to be a piercement which breached the Triassic with the result that the Triassic Bunter sand section was not present in this well. The Permian Zechstein evaporites were immediately overlain by the Middle Jurassic Dogger formation. The Dogger contained some porous sandstones but these had only weak shows in the uppermost few feet and the logs indicated high water saturation.

Both the Lower Cretaceous and the entire Tertiary section consisted mainly of clays. No sands were developed at the base of either the Lower Cretaceous or the Tertiary Eocene.

F. Status: Esso 9/8-1 was plugged and abandoned 29 June 1968 at a total depth of 7138 feet (-7038 feet).

II. DRILLING HISTORY

A. General

1. Spud date: 23 May 1968
2. Completion date: 29 June 1968
3. Status: Plugged and abandoned
4. Total depth: 7138 feet (- 7038 feet)

B. Contractor and rig: Zapata jack-up platform "Endeavour"

C. Casing: 36" at 451 feet
20" at 1180 feet
13 3/8" at 4148 feet

D. Mud Program: Initial drilling from the sea floor to 1350 feet was with sea water and gel without casing. Returns were to the sea floor.

Below 1350 to T.D. at 7138 feet, a Spersene, XP-20, Salinex mud with up to 10% diesel oil was used.

E. Drilling Problems: After the 36" conductor was set at 451 feet, the hole was drilled with a 17½" bit to 1350 feet. While reaming the hole to 26", cavings and fill of shell fragments and gravel caused problems from about 1000 feet, necessitating the 20" casing to be set high at 1180 feet.

The only additional drilling problem of note was a twist off while drilling at 5071 feet. The fish was recovered in a few hours without difficulty.

F. Coring:

1. Conventional

Number	Interval (feet)	Recovery length (feet)	%
1	6319 - 6343	24	100
2	6936 - 6990	54	100

2. Sidewall

Number	Depth	Recovery length (inches)
1	1766	1 3/4
2	1945	2
3	2025	2
4	2331	1/4
5	2379	1 3/4
6	2457	1 3/4
7	2538	No recovery - mud cake
8	2631	2
9	2676	No recovery - mud cake
10	2800	1/2
11	2961	2
12	3098	1 1/2
13	3116	2
14	3203	1 3/4
15	3228	2
16	3272	Bullet lost
17	3380	No recovery - mud cake
18	3468	2
19	3624	No recovery - mud cake
20	3698	1 1/2
21	3708	2
22	3718	1 1/2
23	3723	2
24	3731	1 3/4
25	3787	1 3/4
26	3841	1 3/4
27	3909	2
28	3997	1 1/2
29	4031	1 1/2
30	4043	2
31	4186	1 3/4
32	5270	2
33	5320	3/4
34	5420	1 3/4
35	5515	2
36	5761	1 3/4
37	5920	1 3/4
38	6050	1 1/4
39	6190	1 3/4
40	6270	2
41	6358	1 1/4
42	6400	1 1/2
43	6445	2
44	6458	1 1/4
45	6540	1 1/2
46	6574	1 3/4
47	6715	1 1/2
48	6760	1
49	6850	3/4
50	6925	1

G. Logging

1. Exploration Logging Robertson Ltd.

	Interval (feet)
a. Drilling rate and data	1350 - 7138
b. Lithology (%)	" "
c. Continuous ditch gas	" "
d. Chromatograph	" "
e. Cuttings gas	" "

2. Schlumberger

Type log	Depth	Run number
Induction Electric (IES)	1180-4202	1
	4151-6997	2
Gamma Ray-BHC Sonic (GR only)	1180-4196 (100-1350)	1
	4050-6988	2
	6800-7139	3
Microlaterolog-Microlog Caliper (MLL-ML)	1362-4203	1
	4151-6996	2
Formation Density (FDC)	4151-6995	1
Continuous Dipmeter (CDM) (High Resolution)	4151-6990	1
Temperature Survey	145-4108	1

These logging operations were considered normal with the exception that the Microlog did not function between 5988 and 4200 feet.

H. Testing: The Schlumberger wireline formation tester (FIT) was used with the following results:

	Test No. 1 6762'	Test No. 2 6764'	Test No. 3 6535'	Test No. 4 6320'
Pressure Data -				
Initial shut in	-	-	-	-
Shut in time	-	-	-	-
Sampling	-	-	0 psi.	1000 psi.
Sampling time	-	-	15 min.	20 min.
Final shut in	-	-	0	3590 psi.
Shut in time	-	-	15 min.	15 min.
Hydrostatic	-	-	3680 psi.	3660 psi.
Surface chamber	-	-	0 psi.	0 psi.
Recovery Data				
Gas (Total	-	-	- -	-
Condensate	-	-	-	-
Oil	-	-	-	-
Water	-	-	-	14,550 cc
Mud	15,400 cc	12,200 cc	200 cc	200 cc
Sand	Traces	Traces	-	Traces
Remarks	Immediate seal failure	Immediate seal failure	Tight formation	Resistivity of water 0.12 at 59° F Rmf was 0.24 at 64° F.

I. Abandonment: The bottom plug was set across the 13 3/8" surface casing seat from 4250 feet to 3950 feet, using 300 sx common Class A sement with 2% calcium chloride. This plug was tagged at 3981 feet (167 feet above the casing shoe). The top plug, 200 sx of common Class A cement with 2% calcium chloride, was set from 665 to 365 feet and also tagged for confirmation.

The 13 3/8" and 20" casings were cut at 325 feet (12 feet below the sea bed) and pulled. The 36" conductor was cut at 318 feet (7 feet below the sea bed) and pulled.

After all obstructions above the sea bed were removed, the "Endeavour" was jacked down and towed to Dutch waters. Esso 9/8-1 was abandoned on 29 June 1968.

A. Table of Stratigraphy

Esso 9/8-1

STRATIGRAPHIC UNITS	Drill Depths (feet)	Subsea Top (feet)	Thickness (feet)
QUATERNARY	322- 490	(- 222)	168
Pleistocene/Recent	322- 490	(- 222)	168
TERTIARY	490-4300	(- 390)	3810
Pliocene	490- 710	(- 390)	220
Miocene	710-2100	(- 610)	1390
Miocene Undiff.	710-1800	(- 610)	1090
Middle Miocene	1800-2100	(-1700)	300
---------- Unconformity ----------	2100-	(-2000)	-----
Oligocene	2100-3350	(-2000)	1250
---------- Unconformity ----------	3350-	(-3250)	-----
Eocene	3350-3990	(-3250)	640
Paleocene	3990-4300	(-3890)	310
Danian	4050-4300	(-3950)	250
CRETACEOUS	4300-5825	(-4200)	1525
Upper Cretaceous	4300-5230	(-4200)	930
Maastrichtian	4300-5020	(-4200)	720
Campanian	5020-5230	(-4920)	210
---------- Unconformity ----------	5230	(-5130)	----
Lower Cretaceous	5230-5825	(-5130)	595
Aptian to Barremian	5230-5280	(-5130)	50
Hauterivian	5280-5825	(-5180)	545
---------- Unconformity?----------	5825	(-5725)	-----
JURASSIC	5825-6927	(-5725)	1102
Upper Jurassic - Malm	5825-6165	(-5725)	340
Portlandian or Kimmerdigian	5825-5985	(-5725)	160
Kimmeridgian - Oxfordian	5985-6165	(-5885)	180
Middle Jurassic - Dogger	6165-6927	(-6065)	762
---------- Unconformity ----------	6927	(-6827)	----
PERMIAN	6927-7138+	(-6827)	211+
Upper Permian - Zechstein	6927-7138+	(-6827)	211+

B. Lithologic Description

QUATERNARY (168 feet)

Pleistocene/Recent (168 feet)

Anchor point samples taken of the sea floor consisted of sand, tan, medium-grained, fairly well sorted, primarily frosted and clear quartz; tan to dark brown rounded grains of metamorphic rock types; megafossils fragments (pelecypods, echinoderm spines) and rare foraminifera.

Cuttings returns were to the sea floor during the drilling of this interval. Lithology probably clay, sand, boulders and fossil fragments.

TERTIARY (3810 feet)

Pliocene (220 feet)

No cuttings samples from this interval. Lithology is assumed similar to that above, with probably fewer boulders.

Miocene (1390 feet)

Miocene Undifferentiated (1090 feet)

The first cuttings samples from 1350 feet consisted of 70% shell material and 30% pebbles. These are considered as chiefly cavings, with most of the pebbles probably coming from the Quaternary and the shells, both pelecypod fragments and whole gastropods, from Miocene unconsolidated coguina beds between 1000 and 1300 feet.

From 1380 to the base of the Miocene Undifferentiated at 1800 feet the lithology is predominantly clay, medium gray, slightly calcareous, with some thick and thin walled shell fragments, occasional pebbles of quartz, quartzite and meta-rock types, and traces of very fine grained silty sand, non-calcareous. An increase in fossil content, both fragments and whole, was noted between 1680 and 1770 feet.

There were no shows in the interval.

Middle Miocene (300 feet)

The Middle Miocene is composed of clay, brownish-gray, soft, sticky, silty, with some pyritized worm tubes and traces of glauconite. Some fossil fragments, pebbles and traces of silty sand were also present in the cuttings.

There were no shows in this section.

Oligocene (1250 feet)

The cuttings of upper part of the Oligocene, from 2100 to 2900 feet, consisted of clay, brownish-gray to light brownish-gray, soft and sticky, with traces of fine sand, silt and glauconite. From 2900 feet to the Oligocene base at 3350 feet, the clay is all light brownish-gray, soft and sticky, with stringers of limestone, tan-brown, micritic, dense, and traces of very fine grained quartz sand, pale green siltstone, pyrite and glauconite.

Some of the side wall cores throughout the Oligocene section were dark olive gray clay shales and siltstones.

There were no shows.

Eocene (640 feet)

From 3350 to about 3650 feet, the Eocene cuttings are chiefly clay, light brownish-green, dark olive green, green gray and medium gray, soft and sticky, very silty, glauconitic, calcareous, with traces of very fine grained quartz sand, siltstone, gray and glauconitic, and limestone, cream, micritic, and glauconitic, and dark brown, dense, micritic.

Below 3650 feet, there is a transition from clay to silty shale and siltstone. The shale is green-gray, silty, slightly calcareous, and the siltstone is green-gray, gray-red, sandy and hard. There are a few thin limestone stringers in this interval, tan-brown, micritic, hard and dense, and traces of sand, very fine grained, silty, silica cemented.

Between 3650 and 3750 feet there is a tuffaceous zone indicated by the presence of white volcanic ash and black glass shards.

One silty sand cuttings chip just below 3700 feet bubbled gas. There were no other show indications.

Paleocene (310 feet)

Upper (60 feet)

From the top of the Paleocene at 3990 feet to a depth of 4050 feet, the flow line was plugged and samples were lost while cleaning out. However, three sidewall cores from this interval (3997, 4031 and 4043) are shaly siltstone, green-gray to medium and dark gray, calcareous, with traces of white volcanic ash.

Danian (250 feet)

Between 4050 - 4095 feet the Paleocene Danian cuttings samples are primarily clay, light gray, very calcareous - probably marl. From 4095 to 4170 feet the calcareous clay is interbedded with stringers of limestone, tan, micritic, dense and hard. From 4170 to 4300 feet the cuttings consist of chalk, cream colored, medium-hard, and white, soft, with up to 30% cream and smoky gray chert.

One limestone chip had a tar streak, and one chalk chip had a dead oil stain and weak cut. There were no other shows.

CRETACEOUS - (1525 feet)

Upper Cretaceous (930 feet)

Maastrichtian (720 feet)

The Maastrichtian is composed of chalk very similar to the overlying Danian - cream to white in color and firm to soft. Up to 15% smoky gray chert occurs in the top 200 feet. Zones of common to abundant "calcispheres" are present down to about 5000 feet.

Campanian (210 feet)

The chalk continues into the Campanian but also includes skeletal chalky limestone, pale green and light gray, with traces of 10% clay/shale

pale green, light gray, glauconitic, silty and very calcareous.

There were no shows in the Upper Cretaceous.

Lower Cretaceous (595 feet)

Aptian to Barremian (50 feet)

The top of this zone comes in as a red-brown clay, soft and silty. The lithology of the lower 30 feet is variable and includes shale, gray to green to mustard yellow, gray silty clay, and 30% silt, gray and red-brown.

There were no shows in this section.

Hauterivian (545 feet)

The red-brown clay again predominates at the top of the Hauterivian, with planktonic forams appearing as loose sand grains. At about 5330 feet, and continuing to the base of the Lower Cretaceous at 5825 feet, the lithology is chiefly light to medium gray clay, soft, silty, slightly calcareous and pyritic, with little shale and silt, medium to dark gray.

There were no shows in the Hauterivian.

JURASSIC - (1102 feet)

Upper Jurassic - Malm (340 feet)

Portlandian or Kimmeridgian (160 feet)

The predominantly clay lithology of the Lower Cretaceous continues into the Upper Jurassic Malm. The Portlandian or Kimmeridgian clays are somewhat darker, medium gray to dark gray, but still soft, silty and slightly calcareous, with 10% siltstone, gray and tan-brown, and 10% shale medium to dark gray.

Kimmeridgian - Oxfordian (180 feet)

The lithology of this section of the Malm is similar to that above, but also includes traces of red claystone; limestone, dark gray and tan-cream, hard; shell debris ; and black carbonaceous material.

There were no shows in the Upper Jurassic.

Middle Jurassic - Dogger (762 feet)

The Dogger lithology is highly variable, with interbeds of sands, sandstones, siltstones, shales and clays.

The top 135 feet consists mainly of shale, medium to dark gray, silty, slightly calcareous. The following 250 feet (to 6550 feet) is predominantly sand and sandstone with interbedded siltstone and clay/shale. The sand grains are white-clear quartz, fine to very coarse, subangular to subrounded. The sandstone is light to medium gray, very fine to medium grained, sub-angular to subrounded, friable to moderately hard with calcareous cement, micaceous and pyritic. Lignite, both finely disseminated and larger fragments, plant debris, and hard, black, brittle coal stringers occur in this sand-sandstone zone. The siltstone is medium gray, micaceous, and red-brown, and the clay/shale is light to dark gray, red-brown, soft, silty and calcareous.

From 6550 to 6750 feet the cuttings samples are chiefly clay, red-brown, soft, silty, calcareous, with an increase of light gray to light brown clay, silty, sandy, very calcareous in the lower 50 feet. Interbedded with these clays are sands and siltstones. The sands are clear quartz grains, fine to coarse, subangular to subrounded, with some iron staining. The siltstones are light gray to red-brown. Just below 6700 feet there are traces of limestone, white-gray to red-brown, dense, hard, micritic.

The E-logs and a sidewall core at 6760 feet indicate that the 6750-6800 foot interval is composed of very fine grained sandstones, rust brown, calcareous, argillaceous and micaceous.

From 6800 to the Dogger base of 6927 feet, the cuttings lithology consists of clays, light to medium gray, red-brown, silty, and green-gray, very calcareous; sandstones, fine grained, silty, red-brown to mottled white, argillaceous and calcareous; and siltstones, white to light red-brown. Traces of anhydrite occur in this interval.

In core No. 1, from 6319-6343 feet at the top of the Dogger sands, ten feet in the upper part had weak, irregular pale yellow fluorescence but no cut with solvent. There were no other indications of shows in the Dogger interval.

PERMIAN (211^{+} feet)

Upper Permian - Zechstein (211^{+} feet)

The top 15 feet of the Zechstein is composed of limestone, dolomitic, light gray to light green, hard, dense, micritic. Underlying the limestone is anhydrite, white to light gray, soft, amorphous to very finely crystalline. This anhydrite extends to about 7050 feet and is underlain by clear salt to total depth at 7138 feet.

ESSO EXPLORATION NORWAY INC.

COMPLETION LOG

ESSO 1/9-1

LOCATION: 57° 20' 30.1" N 01° 57' 37.1" E
BLOCK 1/9 OFF SHORE
NORWAY
LOCATION: 1/9 - 1 ESSO EXPLORATION NORWAY INC. COORDINATES: 57° 20' 30.1" N 01° 57' 37.1" E
ELEVATIONS: KB: 25.0 m
DATUM: MEAN SEA LEVEL
DATE: 1 - 1 - 1 -