PROPRIETARY
EXPLORESSO

GEOLOGIC SUMMARY

COMPLETION REPORT

NEW FIELD WILDCAT

ESSO 16/9-1

Esso Exploration Norway Inc.
Stavanger District
Geological Office

ESSO 16/9-1

Geologic Summary

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ESSO 16/9-1

GEOLOGIC SUMMARY

I. INTRODUCTION

A. Well designation: Esso 16/9-1

B. Classification: New Field Wildcat

C. Location: Latitude 58° 22' 41.5" North

Longitude 02° 48' 17" East

D. Objective: To test the oil and gas potential and investigate the lithology of the sedimentary section on an anticlinal structure between salt dome features. A relatively thick Jurassic/Triassic section was anticipated and was expected to contain porous sandstones.

To fulfill Esso's drilling obligation to the Norwegian Government incurred on behalf of Production License No. 002.

E. Results: A thick Jurassic/Triassic(?) section with some porous sandstones was present on structure but the sandstones had no hydrocarbon shows and were indicated to be water bearing on the electric logs.

The Danian and Cretaceous carbonates had no shows and the remaining sections penetrated were predominantly clays, shales or evaporites.

F. Status: Esso 16/9-1 was plugged and abandoned 12 July 1968 at a total depth 11,988 feet (-11,957).

II. DRILLING HISTORY

A. General

1. Spud date: 8 May 1968
2. Completion date: 12 July 1968
3. Status: Plugged and abandoned
4. Total depth: 11,988 feet (- 11,957 feet)

B. Contractor and rig: Global Marine "Glomar Grand Isle"

C. Casing: 30" at 417 feet
20" at 1103 feet
13 3/8" at 4610 feet

D. Mud Program: Initial drilling from the sea floor to 1320 feet was with sea water and gel. Returns were to the sea floor. Below 1320 to 11,138 feet, the mud system consisted of a sea water, Spersene, XP-20, Salinex mud with from 5-8% diesel oil. From 11,138 to T.D. at 11,988 a salt saturated mud system was used.

E. Drilling problems: Drilling operations were normal to 11,988 feet. While drilling at this depth on 24 June 1968, a sudden storm struck the "Glomar Grand Isle" causing the drill pipe to part and drop in the hole. The top of the fish was at 2817 feet. A jet cutter was run, the drill pipe was cut at 10,896 feet and recovered on 28, June. Attempts to recover the remaining fish failed and on 7-8 July final logs were run to the top of the fish at 10,896 feet. Following final logs, the well was prepared for abandonment.

F. Coring:

1. Conventional

Number	Interval (feet)	Recovery length (feet)	%
1	4025 - 4085	33	55
2	7861 - 7889	16	58

2. Sidewall

Number	Depth (feet	Recovery length (inches)
1	1485	2
2	1524	2
3	1585	2
4	1678	2
5	1750	Lost bullet
6	2751	1/4
7	2760	2
8	2781	1
9	3213	1
10	3227	1
11	3360	2
12	3370	2
13	3380	1
14	3390	2
15	3400	2
16	3410	2
17	3420	1 1/4
18	3434	1 1/4
19	3554	2
20	3650	1/2
21	3853	2
22	3954	1 1/2
23	4378	1 1/2
24	4589	1
25	6026	1
26	6118	1 3/4
27	6370	1 3/4
28	6410	1 1/2
29	6450	1 3/4
30	6593	3/4
31	6636	1/2
32	6690	1 3/4
33	6765	1 3/4
34	6863	1 3/4
35	6988	1 3/4
36	7167	1 3/4
37	7334	1 3/4
38	7519	1 3/4
39	7585	1 3/4
40	7652	1 1/2
41	7696	3/4
42	7749	1 1/4
43	7762	1/2
44	7772	1/2
45	7780	1 1/2
46	7800	3/4
47	7820	1
48	7843	1 1/4
49	7954	1
50	8072	1 1/4
51	8508	1 1/2
52	8587	1
53	8855	1 1/4
54	9025	1
55	9418(1)	1/2
56	9418(2)	1/2
57	9450(1)	1

2. Sidewall cont'd

Number	Depth (feet)	Recovery length (inches)
58	9450(2)	1
59	9483	1/4
60	9485	1
61	9536	1
62	9560	1
63	9610	No Recovery
64	9648	1 1/4
65	9684	1 1/4
66	9746	1 1/4
67	9800	1/2
68	9848	1
69	9896	1
70	9926	1/4
71	9964	1/2
72	9990	1
73	10038	1
74	10040	1/2
75	10072	1/2
76	10126	1/2
77	10143	1/2
78	10430	1
79	10506	1/4
80	10508	No Recovery
81	10512	1
82	10578	1/2
83	10908	No Recovery
84	10910	No Recovery

G. Logging:

1. Baroid	Interval (feet)
a. Drilling rate	1171-11,988
b. Lithology (%)	1320-11,988
c. Cuttings gas	1320-11,988
d. Mud gas	1320-11,988
e. Chromatograph	1320-11,988

2. Schlumberger

Type log	Depth (feet)	Run number
Induction Electric (IES)	1100-4646	1
	4618-9412	2
Gamma Ray-BHC Sonic (GR run to 30 feet)	1100-4640	1
	4618-9411	2
	9300-10,896	3
Microlaterolog-Caliper (MLL) with Microlog (ML)	1100-4647	1
	4618-9419	2
	9300-10,896	3
Formation Density (FDC)	4618-9390	1
	9370-10,875	2
Continuous Dipmeter (HDT) (High Resolution)	4618-9410	1
	9300-10,840	2
Laterolog (LL)	9300-11,000	1
Free Point Indicator	± 11,500	1

Logging operations were routine and trouble free.

H. Testing

There were no significant hydrocarbon shows in this well and no tests were run.

I. Abandonment

The bottom cement plug was set across the 13 3/8 surface casing seat from 4717 to 4435 feet, using 350 sx of common Class A cement. This plug was tagged for confirmation. A second plug, 100 sx common Class A cement, was set from 4200 to 4075 feet; and a third plug, 250 sx common Class A cement with 2% calcium chloride, was set across the 30" conductor shoe from 675 to 410 feet. The top cement plug was also tagged for confirmation.

An explosive charge was placed in the 13 3/8 casing below the sea bed and detonated. The subsea well head equipment was then pulled leaving the ocean floor free of all obstructions.

III. STRATIGRAPHY

A. Table of Stratigraphy

Esso 16/9-1

STRATIGRAPHIC UNITS	Drill Depths (feet)	Subsea Top (feet)	Thickness (feet)
QUATERNARY	323- 440	(- 292)	117
Pleistocene/Recent	323- 440	(- 292)	117
TERTIARY	440- 4680	(- 409)	4240
Pliocene	440- 2010	(- 409)	1570
Pliocene/Miocene	2010- 2465	(- 1979)	455
Middle Miocene	2465- 3030	(- 2434)	565
---------- Unconformity ----------	3030	(- 2999)	----
Oligocene	3030- 3950	(- 2999)	920
---------- Unconformity ----------	3950	(- 3919)	-----
Eocene	3950- 4480	(- 3919)	530
Paleocene	4480- 4680	(- 4449)	200
Danian	4580- 4680	(- 4549)	100
CRETACEOUS	4680- 7520	(- 4649)	2840
Upper Cretaceous	4680- 6015	(- 4649)	1335
Maastrichtian	4680- 5340	(- 4649)	660
Campanian	5340- 6015	(- 5309)	675
---------- Unconformity ----------	6015	(- 5984)	-----
Lower Cretaceous	6015- 7520	(- 5984)	1505
Albian to Aptian	6015- 6350	(- 5984)	335
Barremian	6350- 6425	(- 6319)	75
Hauterivian	6425- 7260	(- 6394)	835
Valanginian	7260- 7520	(- 7229)	260
---------- Unconformity? ----------	7520	(- 7489)	-----
JURASSIC	7520- 8090	(- 7489)	570
Upper Jurassic - Malm	7520- 8090	(- 7489)	570
Kimmeridgian to Oxfordian	7520- 8090	(- 7489)	570
JURASSIC-TRIASSIC(?) UNDIFFERENTIATED	8090-10,500	(- 8059)	2410
---------- Unconformity? ----------	10,500	(-10,469)	-----
PERMIAN	10,500-11,988+	(-10,469)	1488+
Upper Permian - Zechstein	10,500-11,988+	(-10,469)	1488+

B. Lithologic Description

QUATERNARY (Interval 323-440 feet) (Thickness 117 feet)

Pleistocene/Recent	(Interval 323-440 feet)	(Thickness 117 feet)

The anchor point samples consist of fine sand, and a bit sample of the interval sea floor to 100 feet is composed of sand, mud pebbles and shell fragments. The sand is fine-grained, medium gray with a greenish hue, subangular to subrounded. Common echinoid spines were noted, and fragments of pelecypod shells with wall thicknesses from 0.5 to 4 mm. Igneous and metamorphic rock types were present as pebbles and fragments, angular to subrounded, including gray to pink "granite", dark gray to black basalt, pink-gray quartzite and gray mica-schist.

Samples were to the sea floor during the drilling of this interval. Lithology probably clay, sand, pebbles and boulders, and shell fragments.

TERTIARY (Interval 440-4680 feet) (Thickness 4240 feet)

Pliocene	(Interval 440-2010 feet)	(Thickness 1570 feet)

The first cuttings samples were obtained at 1320 feet. From this depth to 1920 feet the samples are clay, light to medium gray, soft, calcareous; siltstone, light to medium gray, firm, slightly calcareous, slightly sandy with traces of mica; and little sand, fine-grained, clear quartz and varicolored grains, unconsolidated. Rare consolidated fine-grained sandstone.

From 1920-2010 feet the cuttings are similar except that the clay is non-calcareous, soft and sticky.

No shows in this interval.

Pliocene/Miocene Undifferentiated	(Interval 2010-2465 feet)	(Thickness 455 feet)

The predominantly clay lithology continues into this undifferentiated section. Clay, light to medium gray, soft, sticky, non-calcareous, with traces of sand, very fine to medium grained, and green to black glauconite grains. Also traces of black accessory minerals (Mica?) and red clay.

No shows.

Middle Miocene	(Interval 2465-3030 feet)	(Thickness 565 feet)

The definite Miocene consists of clay, light to medium gray and brown gray, non-calcareous, soft, sticky but with an occasional suggestion of lamination. Also present are traces of sand, very fine to fine, quartz and glauconite grains; and siltstone, brown gray, sandy.

The Middle Miocene had no shows.

Oligocene	(Interval 3030-3950 feet)	(Thickness 920 feet)

From 3030 to 3650 the Oligocene samples are composed of medium gray to brown gray clay, silty, soft, sticky, non- to slightly calcareous, with traces of siltstone, brown gray, and sand, very fine to fine grained, glauconitic, rare pyrite nodules. From 3650 feet this lithology continues but also includes traces of pale green-gray silt, and limestone, black, green-gray, tan, silty, sandy, and glauconitic, becoming tan, micritic, dense and hard from 3900 to the Oligocene base at 3950 feet.

No shows in the Oligocene section.

Eocene	(Interval 3950-4480 feet)	(Thickness 530 feet)

At 3950 feet and continuing until Core No. 1 was cut at 4025 feet, the cuttings samples contain 50-60% clay as in the Oligocene, and also 30% sand, fine to medium-grained, composed of unconsolidated grains of quartz and glauconite and 10-20% limestone, brown, micritic, dense and hard. However, the electric logs do not indicate this amount of either

sand or limestone. The clay and shale Core No. 1 from 4025-4085 feet contains traces of sand, glauconite and limestone. Above the core, the limestone probably occurs as very thin stringers, and the quartz sand and glauconite as individual grains embedded in the clay.

Between 4085 and 4305 feet the Eocene is composed of shale, green-gray, silty, soft, slightly calcareous, and siltstone, light to medium gray, soft, non-calcareous, with traces of glauconite, limestone and rounded quartz grains.

From 4305 to about 4400 feet the shale is medium to dark gray firm, dense and the siltstone is as above. This zone also contains volcanic ash and basaltic vitric tuff. Between 4400 and the Paleocene top at 4480 feet the Eocene is predominantly shale, medium to dark gray and green, firm with some siltstone, light green, soft, sandy, and traces of sand and glauconite.

The Eocene had no shows.

Paleocene (Interval 4480-4680 feet) (Thickness 200 feet)

Upper (Interval 4480-4580 feet) (Thickness 100 feet)

The basal Eocene lithology continues into the Upper Paleocene. No samples were obtained from 4530-4600 feet due to the bit balling up causing lost circulation, but a sidewall core at 4589 feet indicated Danian chalk.

Danian (Interval 4580-4680 feet) (Thickness 100 feet)

Danian cuttings consist of chalk, white, dense, firm with sparse milky chert.

There were no shows in the Paleocene.

CRETACEOUS (Interval 4680-7520 feet) (Thickness 2840 feet)

Upper Cretaceous (Interval 4680-6015 feet) (Thickness 1335 feet)

The Maastrichtian is composed of limestone, chalky, micritic, cream to buff, soft to firm, with chert, milky and opaque, and pyrite.

Campanian (Interval 5340-6015 feet) (Thickness 675 feet)

The lithology of the Upper Cretaceous Campanian is also chalky limestone. Below 5400 feet the limestone is softer, more argillaceous. At about 5800 feet the chert is milky to light brwon. From 5860 feet to the base of the Campanian there are traces to 10% shale, green-gray, calcareous, firm, and, in the basal 50 feet, an influx of interbedded siltstone, tan to gray, soft, glauconitic.

The Upper Cretaceous had no shows.

Lower Cretaceous (Interval 6015-7520 feet) (Thickness 1505 feet)

Albian to Aptian (Interval 6015-6350 feet) (Thickness 335 feet)

Definite Aptian 6200 feet

The cuttings samples of the Albian to Aptian consist of siltstone, light to medium gray, soft to firm, calcareous with a thin interval of red clay in the vicinity of 6300 feet. Sidewall cores at 6026 and 6118 feet, in electric log intervals characteristic of the Albian-Aptian, are composed of shale, micaceous, dark gray, calcareous, firm. On interpretive lithology, it is assumed that the Albian-Aptian is an interbedded shaly siltstone-silty shale sequence.

Barremian (Interval 6350-6425 feet) (Thickness 75 feet)

In the relatively thin Barremian section, the sidewall cores indicate shale, dark gray, micaceous, slightly to non-calcareous.

Hauterivian (Interval 6425-7260 feet) (Thickness 835 feet)

The dark gray shale lithology continues into the Hauterivian to about 6600 feet. From this depth to 6740 feet the lithology is

shale, medium to dark gray, and claystone, light olive gray and pale red-brown. Traces of tight calcareous cemented glauconite occur from 6600 to the Hauterivian base.

Below 6740 feet the section is all shale, medium-dark gray to black, silty, calcareous, firm and dense, with some red, tan and gray shales from 7140 to the base of the Hauterivian at 7260 feet.

Valanginian (Interval 7260-7520 feet) (Thickness 260 feet)

The Valanginian is composed of shale, medium-dark gray, calcareous, silty, firm, fissle, and siltstone, light to medium gray, firm, glauconitic, with traces of little clay, red and white, very soft.

There were no shows in the Lower Cretaceous.

JURASSIC (Interval 7520-8090 feet) (Thickness 570 feet)

Upper Jurassic-Malm (Interval 7520-8090 feet) (Thickness 570 feet)

Kimmeridgian to Oxfordian (Interval 7520-8090 feet) (Thickness 570 feet)

From 7520 to 7730 feet the Upper Jurassic is predominantly shale, medium to dark gray, calcareous, firm, dense. Between 7730-7850 feet the lithology is chiefly sandstone, white to pale green quartz grains, very fine to medium, some coarse-pebbly, some feldspar and glauconite(?), calcareous clay cement, friable. A ten foot limestone bed occurs from 7755-7765 feet, micritic, cream to pale green soft.

The cuttings samples from 7850 to 8090 consist of white, medium grained sandstone and soft white clay. Core No. 2, cut from 7861 to 7889 feet, recovered 16 feet of quartz sandstone, very fine to medium grained to pebbly, white to light green, subangular to subrounded; thin bands of limestone and dolomite, white to gray, dense, biotite, green siltstone and dense green shale; sandstone glauconitic in part, calcareous to non-calcareous, soft to hard, fair to good porosity. There were no shows in the core or cuttings.

JURASSIC-TRIASSIC(?) UNDIFFERENTIATED (Interval 8090-10,500 feet) (Thickness 2410 feet)

The upper portion of this thick undifferentiated section, from 8090-9020 feet, contains interbedded sandstones, siltstones and clays. The sandstones are clear to pink and red, with medium to coarse quartz grains, small rounded pebbles and quartzite fragments, unconsolidated; the siltstones are red-brown, very sandy and argillaceous; and the clays are predominantly red, soft, slightly to non-calcareous.

From 9020 to about 10,150 feet there is an interbedded red-bed sequence of sandstones, siltstones, and shales. The sandstones are red to rust-brown, fine to coarse quartz grains, subangular to subrounded, silty, with clay cement; the siltstones are red, sandy, micaceous and soft; and the shales are red-brown, silty.

Below 10,150 to the base of the undifferentiated unit at 10,500 feet the grain size becomes finer, with siltstone as above alternating with shale, red-brown, silty. Traces of pyrite occur in this section.

The Jurassic-Triassic(?) Undifferentiated interval had no shows.

PERMIAN (Interval 10,500-11,988+ feet) (Thickness 1488+ feet)

Upper Permian-Zechstein (Interval 10,500-11,988+ft.) (Thickness 1488+ feet)

The upper 90 feet of the Permian Zechstein consists of anhydrite, white, firm, with a thin black shale between 10510-10515 feet.

Below the anhydrite to the drilled total depth at 11,988 feet, the Zechstein is primarily clear crystalline salt with interbeds of saliferous red shales and anhydrites, and, from 11,950 to TD, a dark gray shale, calcareous and firm.

There were no shows in this evaporite section.

SECRETARY EXPLORATION

Company	Secretary Exploration	Date	1-Jan-1900
Well	Test	Field	Test Field
County	Test County	State	Test State
Elevation	0.00	Log Date	1-Jan-1900
Permanent Datum	Test Datum	Run No.	Test Run
Log Measured From	Test Measured From	Depth Unit	Test Unit
Drilling Measured From	Test Drilling Measured From		

Comments:
Test Comments
Test Comments
Test Comments
Test Comments

Logging Date	Run No.	Depth Driller	Depth Logger	Bottom Log Interval	Top Log Interval	Casing Driller	Casing Logger	Bit Size
1-Jan-1900	Test Run	Test Depth Driller	Test Depth Logger	Test Bottom Log Interval	Test Top Log Interval	Test Casing Driller	Test Casing Logger	Test Bit Size

Type	Size	Weight	Grade	Top	Bottom
Test Type	Test Size	Test Weight	Test Grade	Test Top	Test Bottom

Type	Density	Viscosity	Fluid Loss	Source	Rm	Rmf	Rmc	Rm @ BHT
Test Type	Test Density	Test Viscosity	Test Fluid Loss	Test Source	Test Rm	Test Rmf	Test Rmc	Test Rm @ BHT

Max Rec Temp	Equipment	Location
Test Max Rec Temp	Test Equipment	Test Location

Recorded By	Witnessed By
Test Recorded By	Test Witnessed By

Curve Name
Scale
Color
Gamma Ray
0 - 150
Caliper
6 - 16
Bit Size
Deep Resistivity
0.2 - 2000
Medium Resistivity
Shallow Resistivity
Spontaneous Potential
-80 - 20
Neutron Porosity
0.45 - 0.15
Density
2 - 3
Density Correction
-0.25 - 0.25
Sonic Transit Time
140 - 40
Sonic Porosity
Delta T Compressional
Delta T Shear
Compressional Velocity
Shear Velocity
Vp/Vs Ratio
Poisson's Ratio
Dynamic Bulk Modulus
Dynamic Shear Modulus
Dynamic Young's Modulus
Acoustic Impedance
Shear Impedance
Lambda Rho
Mu Rho
Lithology Factor
Photoelectric Factor
Mud Resistivity
Mud Temperature
Mud Density
Mud Viscosity
Mud Pressure
Mud Flow
Mud Gas
Mud Pit Level
Mud Pit Volume
Mud Pit Temperature
Mud Pit Density
Mud Pit Viscosity
Mud Pit Pressure
Mud Pit Flow
Mud Pit