Esso 25/11-1

GEOLOGIC SUMMARY

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ESSO 25/11-1

GEOLOGIC SUMMARY

I. INTRODUCTION

A. Well designation: ESSO 25/11-1

B. Classification: New Field Wildcat

C. Location: Latitude 59°10'53" North - Longitude 02°24'49" 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 Licenses.

E. Results: encouraging but noncommercial gas and oil shows were found in the Tertiary Eocene clastic sedimentary rocks. The prospective reservoir rocks were too thin to justify further tests.

F. Status: Esso 25/11-1 was plugged and abandoned 9 July 1967 at a total depth of ~~8609~~ 9067 feet (-7980 feet).

II. DRILLING HISTORY

A. General

1. Spud date: 18 October 1966
2. Completion date: 9 July 1967
3. Status: plugged and abandoned
4. Total depth: 8069 feet (-7980 feet)

B. Contractor and rig: ODECO-semi-submersible Ocean Traveler

C. Casing : 30" at 587 feet

20" at 1192 feet

13 3/8" at 4045 feet

D. Mud program: initial drilling from the sea floor to 1213 feet was with sea water and gel without casing. Returns were to the sea floor. Below 1213 feet to total depth at 8069 feet, a sea water slurry with Bentonite, Zeogel, Spersene, XP-20 Caustic Soda, and 0-12% diesel oil was used.

E. Drilling problems: Although Esso 25/11-1 had more than its share of bad weather and attendant mechanical problems, actual drilling problems were few.

On November 6, 1967 while at a depth of 3296 feet, the Smit-Lloyd 8 workboat bumped the number 2 column of the Ocean Traveler and drove a fender brace through the column skin below the waterline. The Ocean Traveler began taking water and it was November 18 before conditions were sufficiently stable to begin towing the Ocean Traveler into the Rosenberg shipyard in Stavanger for repairs and extensive modifications.

The Ocean Traveler was released from the Rosenberg repair dock on February 24, 1967 was prepared for tow back to the Esso 25/11-1 location. On February 25, the tow back to the Esso 25/11-1 location began. A storm caught the Ocean Traveler enroute and anchors were dropped and the barge

ballasted to ride out the storm. It was April 3 before the Ocean Traveler finally began ballasting over the Esso 25/11-1 location. The severe weather continued and it was April 14 before the Ocean Traveler was completely rigged up, cement plugs drilled, hole cleaned and mud circulated and conditioned, and drilling resumed. It should be noted that the hole was still in good condition after the long downtime period. On April 17 the Ocean Traveler was blown off location while at a depth of 3798 feet. Again, inclement weather hampered operations and it was May 10 before drilling could be continued.

The mud showed some gas while logging at 4080 feet. The hole was reamed, the mud circulated and conditioned until a stable system was reached and logging completed. At a depth of 5653 feet, the pipe began sticking and the well began to show slight amounts of gas in the mud. Again, the hole was reamed, pipe worked, and mud conditioned until the system again reached equilibrium.

From June 2 until abandonment on July 9 drilling operations were routine with no particular operational problems.

F. Cores

1. Conventional

Number	Interval (ft)	Recovery Length (ft)	Recovery Percent (%)
1	3252-3282	6	20
2	3600-3625	0	0
3	3625 3640	8	53
4	5665-5695	21	70
5	5695-5714	14	74
6	5714-5728	6	43
7	6158-6196	26	69
8	6196-6247	51	100
9	6420-6432.5	12.5	100
10	6606-6636	21	70
11	7175-7212	37	100
12	7709-7753	44	100
13	7845-7858	11	85
14	8030-8069	33.2	89

2. Sidewall

Number	Depth (ft)	Recovery Length (in)
1	5567	1 3/4
2	5569	2
3	5570	2
4	5597	2
5	5619	1 3/4
6	5625	1½
7	5670	1½
8	5671	1½
9	5686	1 1/4
10	5688	2
11	5690	1
12	5693	1
13	5695	1
14	5711	1
15	5714	1
16	5722	1
17	5724	1½
18	5726	1½
19	5731	2
20	5734	1 1/4
21	5736	1 3/4
22	5738	1 3/4
23	5745	1
24	5747	1 1/4
25	5750	1
26	5752	1 1/4
27	5754	1 3/4
28	5756	1½
29	5758	1 1/4
30	5760	1½
31	5762	2
32	5764	1½
33	5766	1 3/4
34	5768	1 3/4
35	5770	1 3/4
36	5812	1 1/4
37	5815	2
38	5819	3/4
39	5821	2
40	5825	1 1/4
41	5828	1
42	5833	1 1/4
43	5839	1½
44	5915	1½
45	6139	1
46	6533	1½
47	6927	1
48	6931	1 1/4
49	6984	3/4
50	7051	3/4
51	7053	3/4
52	7391	1 1/4
53	7393	½
54	7395	3/4
55	7650	½
56	7655	1/4
57	7665	½

2. Sidewall (cont'd)

Number	Depth (ft)	Recovery Length (in)	
58	7675	½	
59	7685	----	No recovery
60	7755	½	
61	7760	1/4	
62	7765	½	
63	7770	½	
64	7775	----	No recovery
65	7780	½	
66	7785	½	
67	7790	----	No recovery
68	7795	1/4	
69	7800	½	
70	7805	----	No recovery
71	7810	½	
72	7815	½	
73	7820	½	
74	7825	½	
75	7830	½	
76	7835	½	
77	7840	3/4	
78	7922	½	
79	7930	3/4	
80	7940	½	
81	7945	½	
82	7960	½	
83	7985	3/4	

G. Logging

1. Baroid

	Interval (feet)
a. Drill Time	1215-8069
b. Lithology (%)	1215-8069
c. Cuttings gas	1215-8069
d. Mud gas	1215-8069
e. Chromatograph	1215 8069

2. Schlumberger

Type log	Depth (feet)	Run number
GR-BHC Sonic	590-1206 (180-367.5 m)	1
" "	1188-4079	2
" "	4042-5630	3
" "	5430-7442	4
" "	7242-8060	5
Induction Electric (IES)	1188-4086	1
" "	4042-5643	2
" "	5440-7450	3
" "	7250-8074	4
Laterolog (LL7)	1188-4087	1
"	4042-5642	2
"	5440-7456	3
"	7256-8067	4
Microlaterolog (MLL)	1188-4078	1
"	5430-5642	2
"	4040-7444	3
"	7244-8070	4
Formation Density (FDC)	2000-4084	1
"	4040-7448	2
"	7248-8071	3
Dipmeter (CDM)	4042-7433	1
"	7433-8038	2

Summary: Logging operations on Esso 25/11-1 were considered routine with no notable problems. The Microlaterolog failed after logging the lowermost 212 feet of hole on run number 2. The failure caused no inconvenience however as the logged section spanned the zone of interest. The entire interval was logged during a subsequent logging operation.

The Dipmeter (CDM) may be subject to question when run from a floating vessel, however, it is probable that the Rucker Motion Arrester used on Esso 25/11-1 eliminated any vertical motion which would induce error. The Esso representative on board the Ocean Traveler during the logging operations could observe no apparent motion of the logging cable relative to the fixed cable of the Rucker apparatus. It should be pointed out that the quality of the majority of the recorded dips was considered only "Fair" to "Possible" by the Schlumberger interpreter.

. **Testing:** The Schlumberger wireline formation tester (FIT) was used to test potentially hydrocarbon-yielding beds with the following results:

'est umber	Depth (feet)	Pressure (psi) Hydrostatic - HP -	Initial Shut In - ISIP -	Flowing - FP -	Final Shut In - FSIP -	Surface - SP -	Recovery Gas (ft^3)	Oil cc	Gravity (°API)	Water (cc)	Rw/°F	Mud (cc)	Comment
1	5762	3450						3					Seal failure
2	5760	3400											Sea failure
3	5687	3450											Seal failure
4	5758	3450		1900	2500	1400	11.4	6000	22.3			1000	
5	5829	2950	2950										Tool plugged
6	5619	3400											Seal failure
7	5829	3500		2500	2600	1200	18.9	7000	20.2			1000	
8	5619	3450											Tool plugged
9	7206	4750		3150		300				20,000	0.16/66°		
0	6586	4150		2900		300				19,000	0.135/65°	1000	
1	6154	4000		250									Tool plugge
2	5714	3450		3450								7000	Seal failure
3	5910	3500		2750		100				16,000	0.19/65°	2500	
4	6154	3750								3,000		6000	Tool malfunction
5	6146	3550		2300						7,000	0.20/65°	2000	

I. Abandonment: The first stage of the bottom plug consisted of 250 sacks of cement set at 5997 feet. The second stage was 450 sacks of cement set at 5641 feet. After setting, the plug was tagged at 5350 feet. An intermediate plug of 300 sacks was set at 4134 feet and later tagged at 3855 feet. The final and top plug consisted of 142 sacks of cement with 2% calcium chloride added. The top plug was set at 751 feet and tagged at 615 feet.

After setting the plugs the riser, choke and kill lines, and 13 5/8" blowout preventer were retrieved and the barge moved 400 feet off location. The divers placed a 25 pound shaped charge 16 feet 8 inches below the top of the 13 5/8" housing. The charge was fired, the barge moved back over the location, and all sub-sea equipment recovered.

An observation dive was made and it was determined that no equipment remained protruding above the sea floor.

III. STRATIGRAPHY

A. Table of Stratigraphy

ESSO 25/11-1

Stratigraphic Units	Drill Depths (Feet)	Subsea Top (Feet)	Thickness (Feet)
QUATERNARY	504- 669	(- 415)	165
Pleistocene/Recent	504- 669	(- 415)	165
TERTIARY	669-6262	(- 580)	5593
Pliocene	669-2020	(- 580)	1351
Miocene	2020-3334	(-1931)	1314
Upper Miocene	2020-3334	(-1931)	1314
----------? Unconformity? ----------	3334	(-3245)	---
Oligocene	3334-4257	(-3245)	923
---------- Unconformity ----------	4257	(-4172)	---
Eocene	4257-6118	(-4172)	1861
Lower Eocene	4257-6118	(-4172)	1861
Paleocene	6118-6262	(-6029)	144
---------- Unconformity ----------	6217	(-6128)	---
Danian	6217-6262	(-6128)	45
CRETACEOUS	6262-6477	(-6173)	215
Upper Cretaceous	6262-6370	(-6173)	108
Lower Cretaceous	6370-6477	(-6281)	107
---------- Unconformity ----------	6447	(-6358)	---
JURASSIC	6447-6927	(-6358)	480
Upper Jurassic	6447-6508	(-6358)	61
---------- Kimmerian Unconformity ----------	6508	(-6419)	---
Lower Jurassic	6508-6927	(-6419)	419
Lias	6508-6850	(-6419)	342
Rhaetic	6850-7020	(-6761)	170
---------- Unconformity ----------	7020	(-6931)	---
TRIASSIC	7020-7474	(-6931)	454
Upper Triassic (Keuper)	7020-7474	(-6931)	454
---------- Unconformity ----------	7474	(-7385)	---
PRE-TRIASSIC	7474-7839	(-7385)	365
---------- Unconformity ----------	7839	(-7750)	---
SILURIAN (?) metamorphic basement rock	7839-8069	(-7750)	230

B. Lithologic description

QUATERNARY

Pleistocene/Recent (165 feet)

Grab samples were taken from each anchor point and these consisted of predominantly quartz sand, olive-gray when wet and light to green-gray when dry, very fine- to fine-grained with rare coarse grains, subangular to subrounded with fair sorting. There were also grains of feldspar, gypsum, mica, and chert plus glauconite, micro- and macrofauna.

Although returns were to the sea floor over this interval, samples scraped from the sides of the square drill collar and bumper subs consisted of clay, gray, non-calcareous and plastic with traces of pyrite, quartz sand, gray, fine-grained, subangular to subrounded, plus pebbles of igneous and metamorphic rocks, rounded and exhibiting glacial striae.

TERTIARY

Pliocene (1351 feet)

Again, samples were to the sea floor to a depth of 1213 feet. However, the drilling rate suggested lithology similar to that above. Cuttings from 1213 to 2020 feet, containing rich foraminiferal assemblages, consisted of clay, medium to dark gray, non-calcareous to slightly calcareous, plastic, interbedded with minor beds of sand, white to gray, silty to very coarse, subangular and composed of quartz, chert granite, and metamorphic rock fragments (MFR's), and mudstone, medium gray, slightly calcareous, firm to hard and with traces of fossil fragments. There were no shows.

Upper Miocene (1314 feet)

The uppermost Upper Miocene was predominantly a medium gray clay, silty, calcareous, and glauconitic. Cuttings samples of black sand, fine- to medium-grained, subangular to subrounded, occurred between 2180 and 2300 feet. There were no shows.

The clastic material of the lowermost Upper Miocene was primarily silt to medium-grained sand, white to gray to black, subangular to subrounded, and contained appreciable amounts of brown lignite. Macrofossil fragments were noted throughout. There were no shows.

Oligocene (923 feet)

The upper part of the section was predominantly siltstone, medium gray to brown-gray, carbonaceous, with beds of quartz sand, very fine to medium, subangular to subrounded, with traces of silica cement. In its lower part, the Oligocene consisted of interbedded clay, pale yellow-brown, soft and plastic containing green glauconite; shale, dark olive-gray, micaceous, silty and calcareous, soft to firm; and stringers of limestone, brown, hard. There were no shows.

Lower Eocene (1861 feet)

The upper 350 feet of the Lower Eocene was predominantly clay, pale yellow-brown, soft, consisting green glauconite and minor amounts of shale, brown to gray, silty, slightly calcareous, and sand, fine to medium.

The following 900 feet was mostly shale, blue-gray to brown-gray to light olive-gray, silty, splintery, non-to slightly calcareous with minor amounts of mudstone, gray-green, clayey to silty, non-calcareous, pyritic and glauconitic, and traces of quartz sand grains and limestone or dolomite, white to light brown, chalky to hard.

The section from 5550 to 5960 feet consisted of an interesting sequence of shale, siltstone,and sandstone. In this interval, the drilling mud showed some gas, and cuttings and cores exhibited live oil stain, cut and fluorescence. The shale was green-gray to light olive gray to medium dark gray firm, and in cores developed an oil film on fractures as well as evidencing bleeding gas. The siltstone was light gray, clayey, firm and bled gas. The quartz sandstone was pale yellow, very fine-to medium-grained, subangular and with fair sorting, loosely to non-cemented, and exhibited fair to excellent visual porosity as well as oil stain, cut and fluorescence.

The lowermost Lower Eocene was a shale, greenish gray, soft and non-calcareous.

Paleocene (144 feet including Danian)

The uppermost Paleocene, exclusive of the Danian Limestone which receives separate treatment below, consisted of a quartz sandstone, fine to very coarse, subangular to subrounded, having coarsely crystalline calcite fracture-fillings which exhibited cut and fluorescence, and lesser interbedded green-gray to light brown clay and green-gray to pale yellow-brown shale .

Danian (45 feet)

The Danian Limestone was cream, chalky and micritic, firm to hard, and in core number 8 disclosed burrowing and weathering of its uppermost surface plus clay-filled stylolitic fractures throughout. There were also pyrite concretions one to two inches in diameter. There were no shows.

CRETACEOUS

Upper Cretaceous (108 feet)

The Upper Cretaceous section was composed of chalky limestone, similar to the overlying Danian, above clay, pale red-brown, soft, sticky and calcareous. There were no shows.

Lower Cretaceous (107 feet)

The Lower Cretaceous section was predominantly shale, green-gray to brown, firm and calcareous, and siltstone, brown with green-gray mottles, calcareous, hard and splintery. There were also minor amounts of silty claystone containing Belemnite, Inoceramus prisms, and pyrite plus buff limestone concretions. There were no shows.

JURASSIC

Upper Jurassic (61 feet)

The thin, uppermost Jurassic interval consisted of interbedded limestone, cream, soft, and chalky; clay, white to light brown, soft and calcareous; and shale, darh gray and soft. There were no shows.

Lower Jurassic - Lias (342 feet)

The Lias was primarily a quartz sandstone, very fine- to very coarse-grained, subangular, containing abundant lignite and pyrite. There were minor beds of clay, white to buff, calcareous, silty, soft and sticky. There were no shows.

Lower Jurassic - Rhaetic (170 feet)

The Rhaetic consisted of silty clay, white to buff, calcareous, soft and sticky. There were no shows.

TRIASSIC

Upper Triassic - Keuper (454 feet)

The Keuper upper section was either a silty sandy clay or a clayey, silty sandstone, greenish gray to brown. The samples appeared to be 90% clay whereas a core from within the interval was predominantly sandstone. It is believed the clay in the cuttings hydrated and underwent such volume expansion as to provide an unrealistic picture of the lithology and that the interval from 7020 to 7474 feet was a clayey, silty sandstone. The lower part of the section, from 7390 to 7474 feet, was probably a sandy conglomerate containing pebbles and boulders of limestone. The sandy beds exhibited good porosity but there were no shows.

PRE-TRIASSIC

Devonian? (365 feet)

The pale red-brown siltstone, sandstone and shale section underlying the Triassic Keuper consisted of soft, calcareous silstone and sandstones generally gray to red-brown, very fine to medium, subangular, tight, poor porosity, while the shale beds were variegated and firm. There were no shows.

Silurian? Metamorphic Basement Rock (230 ± feet)

A metamorphosed gneissic quartz chlorite schist was topped at 7839 feet (-7750 feet) and continued to 7990 feet (-7901 feet) where it was underlain by marble to a total depth of 8069 feet (-7980 feet). The schist was markedly similar to the basement rock encountered in Esso 8/3-1.

Core Description Esso 25/11-1

No.	Interval	Recovery	
1	3252-3282	6'	Upper portion consists of assorted loose cobbles and pebbles regarded as cavings. Lower 4 feet siltstone fragments, olive to dark gray, sandy, micaceous, soft-firm-brittle with indications of bedding with dips 5° to 7°.
2	3600-3625	No recovery	
3	3625-3640	8'	Shale, dark olive gray, micaceous, with poor bedding 6° dip.
4, 5 & 6	5665-5728	41'	

Summary of Cores 4, 5, and 6

Recovery for the 63 foot interval (5665-5728 feet) represented by cores 4, 5, and 6 was 41 feet or 65%. The recovered core was a predominantly shale section containing interbedded tuffaceous siltstone and sandstone. The shale bled gas throughout and developed a film of oil along fractured surfaces. The siltstone, though tight, bled oil at the base of most beds. The sandstone, whether ½ inch or three feet thick, was saturated with live oil which gave a yellow fluorescence and a streaming yellow-white or blue-white cut.

Dips near the top of the core averaged 8° whereas at the base the dips increased to $20-35^{\circ}$. The shale, siltstone, and sandstone beds generally exhibited sharp contacts and occasionally size gradation within a bed.

Core No. 7. 6158 - 6196' Rec. 26' (69%)

6158-65'	Sandstone, medium-gray to greenish-gray, friable glassy quartz with minor muscovite, medium-to coarse-grained, subangular to subrounded, poorly sorted with a silty-clayey plastic matrix. Good porosity. Lower one foot is calcite cemented, firm with good porosity. No shows.
6165-76'	Shale, green-gray, clayey, calcareous, conchoidal fractures, hard and brittle to firm. Light gray dolomite concretion 6166.5 to 6167. Buff calcite in fractures - scattered to common dark gray mudstone inclusions. Poor dips of 9 to 18° on mudstone inclusions. Bottom one foot (6175-6176) has irregular but nearly horizontal slickensides and 0.5 to 1 mm secondary calcite veinlets in fracture. (Badly crumbled during slabbing).
6176-6184'	Sandstone as above but slightly finer grained. Upper two feet (6176-78') has calcite cement weathered chalk pebbles ½ to 1" in diameter at base of core. No shows.

Core No. 8: 6196-6247' Rec. 51' (100%)

6196-6201.5 Shale, gray green with pale brown mottles, calcareous, chalky limestone granules and pebbles 6201 to 6201.5 feet. At 6197.5 slickensides dipping 40° - striations inclined 17° from vertical. At 6201-6201.3 slickensides dipping 56° - striations inclined 8° from vertical.

6201.5-6247 Limestone, cream, chalky, micritic, firm to hard. Top 6201.5 to 6202.5 is weathered and burrowed. Stylolitic fractures containing clay/shale throughout. Pyritic concretions one to two inches in diameter 6224, 6224.5 and 6126.5. Fossil fragments ? at 6129.5'.

Dip on shale/limestone contact 10°.
Dips on shale partings in the limestone average 10° in the top and poor 20° near bottom. No shows.

Core No. 9: 6420-6432.5 ft.: recovered 12.5 ft. (100%)

6420-6426 Siltstone, brown with green-gray mottles, clayey, calcareous, hard and brittle, splinters into fragments, no apparent bedding, no porosity, no shows.

6426-6432 Silty claystone, green-gray, calcareous, pyritic, Belemnite and Inoceramus prisms, buff lithographic limestone concertions or pebbles in lower six inches, clay swells upon wetting, no porosity, no show.

6432- Siltstone, brown, clayey, calcareous, hard, buff, calcareous clay pebbles in lower three inches plus buffclay-filled filagree-like worm burrows (?), no porosity, no shos.

Core No. 10: 6606-6636 ft.: recovered 21 ft. (70%)

- Core description given assuming missing section at base -

6606-6623 Sandstone, glassy quartz with minor muscovite, medium-grained angular to subangular, well sorted, non-calcareous, unconsolidated to friable, very thin lignite layers, cross bedding at 6622 ft. excellent visual porosity, possible sulfur odor, no show.

6623-6626 Shale, medium dark gray, non-calcareous, micaceous, pyritic, silty, firm to hard, irregular bedding, no porosity, no show.

6626-6627 Sandstone, as above but with buff color.

Core No. 11: 7175-7512 feet: recovered 37 feet (100%)

7175-7177.1	Pebbly, sandstone, brown, mottled, very fine - to fine-grained quartz with minor muscovite, calcareous cement, pebbles of calcareous claystone plus concretion-like sparry limestone pebbles, irregular bedding, poor-good visual porosity, no show.
7177.1-7184	Pebbly, sandstone as above, green-gray, good-excellent visual porosity, no show.
7184-7185	Sandstone, green-gray and brown mottled, fine-grained, good porosity, no show.
7185-7186.8	Sandstone, greenish-gray with buff mottles, fine-grained, contains sparry calcite concretions, good porosity, no show.
7186.8-7197	Sandstone, fine - to coarse-grained, poorly sorted, quartz with minor muscovite, calcareous cement, 8-10° dips indicated by very thin beds of black sand, green clay pebbles at 7191-7192', green-gray calcareous clay and buff limestone pebbles in lower one foot, green-gray color for bottom six inches, good visual porosity, no show.
7197-7200	Sandstone, brown with green-gray mottles, fine quartz sand with buff clay pebbles - color gradational through bottom two inches with underlying unit, good porosity, no show.
7200-7201.6	Sandstone, green-gray, very fine-to fine-grained quartz, few clay pebbles, good visual porosity, no show.
7201.6-7202.6	Sandstone, as above, brown.
7202.6-7206	Sandstone, as above, green gray, gradational to clay at base
7206-7209	Claystone, brown with green mottles, non-calcareous, no show
7209-7209.4	Claystone, green-gray, non-calcareous, gradational contact one inch with sandstone below.
7209.4-7210.6	Sandstone, green-gray, fine-grained quartz with minor muscovite non-calcareous, fair visual porosity, no shows.
7210.6-7211.8	Sandstone, brown, fine-grained quartz, minor muscovite, calcareous, fair porosity, no show
7211.8-7211.10	Sandstone, as above, green-gray
7211.10-7212	Sandstone, as above, non-calcareous, with piece non-calcareous green-gray clay on bottom surface.

Conventional Core Description

Core No. 12: 7709-7753 feet: recovered 44 feet (100%)

Siltstone, red-brown, well-laminated, sandy to clayey (70 per cent of core), occurs in a calcareous, slightly fractured section dipping 35 to 55 degrees and containing very thin to thin irregular interbeds of mostly light gray, very fine-grained angular Sandstone (30 per cent of core).

The top 15 feet (7709-7724') contain 50 per cent Siltstone, 50 per cent Sandstone; the middle 15 feet (7724'-7739'), 80 per cent Siltstone, 20 per cent Sandstone; and the bottom 14 feet (7739'-7753'), essentially Siltstone with a few beds of Sandstone.

The Siltstone is pale to light red-brown, well-laminated, with light and dark laminae generally corresponding to size variations; grading is poor, laminae contacts and those with Sandstone interbeds are fairly distinct to sharp. The Siltstone is very finely sandy to clayey and is hard, dense and tight, although hydrates easily to form a sticky sandy silt; it is slightly to moderately calcareous, slightly micaceous, and had no shows of any kind. Toward the base of the core the Siltstone contains a 3-inch subangular cobble of hard, dark greenish gray Mica Schist, a typical basement type for southwestern Norway.

Sandstone exists in 1/2 - to 9 - inch irregular to even beds that are primarily light gray with some red-brown strata and which are mostly concentrated a few inches to a foot apart in the upper third of the core; this lithology is glassy in places, mostly very fine to occasionally fine-grained, equi-granular, angular to subangular, slightly micaceous, and tight to slightly porous. It contains a slightly calcareous matrix, is clayey in spots, and is hard and dense; like the Siltstone, it also becomes soft upon hydration, and no shows occurred.

Core No. 13: 7845-7858 feet: recovered 11 feet (84%)

Core No. 13 consists of quartz - mica Schist (50 per cent) interbedded with schistose quartz Gneiss (50 per cent). The Schist is a greenish gray to occasionally rust brown quartz - muscovite - biotite variety, with calcite veining, chlorite (?), and red oxidized stained fracture zones. The Gneiss is light gray to greenish gray, contains considerable quartz, is variably schictose, has calcite, talc (?), small altered lenticular Sandstone bodies, and numerous black streaks. The core is fractured and crumbly, but individual pieces appear fairly fresh. Dips vary between 30 and 40 degrees. Detailed descriptions are as follows:

7845-7848	100% Schist, with calcite veining, quartz, muscovite, some biotite, chlorite (?); generally greenish gray, but occasionally red-brown, particularly along beddibg planes and fractures, where Schist splits and crumbles despite fresh appearance of individual pieces; unit dips 30 to 40 degrees, appears to be an altered silty to sandy Shale.
7848-7854	80% Gneiss, light gray to greenish gray, partly red-streaked; schistose, with abundant quartz, some calcite, chlorite (?), biotite, and muscovite; also black laminae, and abundant meta-quartzite lenticles; crumbly, breaks along bedding planes; individual pieces hard and fresh looking; dip 30 to 40 degrees; probably altered Sand-Shale sequence.
	20% Schist, as above in 7845-7848 feet, interbedded with the Gneiss.
7854-7856	100% Schist, as above in 7845-7848 feet; base of recovered core is in hard, green gray schist.

Core No. 14 8032-8069 feet: recovered 33.2 feet (90%)

Dolomitic limestone (Marble), light to medium gray, fine to coarsely crystalline with no visible intercrystalline porosity, interbedded with dark gray siltstone and rare, thin sandstone beds. Top three feet is slightly brecciated fractured, and recemented with calcite-some near vertical calcite veins. 19.2 to 23.4 feet from the top of the core is nearly pure calcite, massive; gray limestone breccia and rust brown, dark gray and green siltstone breccia. Dips in the top of the core on silt interbeds are 31 degrees. Dips near the bottom of the core are 22-28 degrees. One 77 degrees fracture at 16.5 feet has a pinkish red mineral stain.

Aside from the recrystallization of the lime, no metamorphic minerals were noted.

PROPRIETARY EXPLORESO

ESSO EXPLORATION INC.

COMPLETION LOG

Scale 1:500

Well Name: ESSO Ex Nerada No.		Proposed Ld. Well Name:	
Field: Wildcat		Operator: Esso Exploration Inc.	
Location: Lat. 34°15'S Long. 115°15'E		Elevation: KB 25.0 m	
Spud Date: 1 Jan 1900	Completion Date: 1 Jan 1900	Total Depth: 3000 m	
Casing Shoe: 1 m		Drilling Fluid: Water	
Perforations:			
Remarks:			

Hole Size: 26 in	Casing Size: 20 in	Cement Top: 1 m	Cement Bottom: 1 m	Cement Method:	Casing Shoe: 1 m
Hole Size: 17½ in	Casing Size: 13⅜ in	Cement Top: 1 m	Cement Bottom: 1 m	Cement Method:	Casing Shoe: 1 m
Hole Size: 12¼ in	Casing Size: 9⅝ in	Cement Top: 1 m	Cement Bottom: 1 m	Cement Method:	Casing Shoe: 1 m
Hole Size: 8½ in	Casing Size: 7 in	Cement Top: 1 m	Cement Bottom: 1 m	Cement Method:	Casing Shoe: 1 m
Hole Size: 6 in	Casing Size:	Cement Top:	Cement Bottom:	Cement Method:	Casing Shoe:

Remarks: Casing Shoe: 1 m

LITHOLOGY SYMBOLS

- Limestone
- Dolomite
- Sandstone
- Siltstone
- Shale
- Coal
- Chert
- Tuff
- Volcanic
- Granite
- Basement
- Cement
- Core
- Cuttings
- Sidewall Core
- Fossil
- Glauconite
- Pyrite
- Mica
- Gas Show
- Oil Show
- Fault
- Unconformity
- Casing Shoe
- Perforation
- Lost Circulation
- Stuck Pipe
- Fish
- Cement Plug
- Bridge Plug
- Drill Stem Test
- Formation Test
- Log Run
- Hole Deviation
- Casing Shoe
- Cement Top
- Cement Bottom
- Cement Method
- Casing Shoe

Remarks: Casing Shoe: 1 m

Hole Size: 26 in	Casing Size: 20 in	Cement Top: 1 m	Cement Bottom: 1 m
Hole Size: 17½ in	Casing Size: 13⅜ in	Cement Top: 1 m	Cement Bottom: 1 m
Hole Size: 12¼ in	Casing Size: 9⅝ in	Cement Top: 1 m	Cement Bottom: 1 m
Hole Size: 8½ in	Casing Size: 7 in	Cement Top: 1 m	Cement Bottom: 1 m
Hole Size: 6 in	Casing Size:	Cement Top:	Cement Bottom: