

24 JAN 1979

MEMORANDUM NO. 2800

WELLFILE

PETROGRAPHIC ANALYSIS OF FOUR SIDEWALL
CORES FROM THE NORSKE GULF 3/5-2 WELL,
NORWEGIAN NORTH SEA

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I

INTRODUCTION

This memorandum contains the results of petrographic analyses of 4 sidewall cores from the Norske Gulf 3/5-2 well. The sidewall cores were from the following depths:

<u>Depth</u>	<u>Age</u>
10420'	Volgian
10424'	Volgian
10905'	Oxfordian
10970'	Oxfordian

At the request of Gulf, a routine petrographic analysis was carried out on each sample, and a comparison has been attempted with the lithologies encountered in the Norske Gulf 3/5-1 well. A thin section was prepared for each sample using a blue dyed impregnating medium to allow a more accurate assessment of porosity. However, because of the poor condition of the samples we have been unable to make a realistic estimate of visible porosity. The samples were also stained using alizarin red S and potassium ferricyanide to facilitate the identification of dolomite, and ferroan and non-ferroan calcite in thin section.

PETROGRAPHYSidewall cores 10420' and 10424' (Volgian)

These sidewall cores comprise very fine grained, moderate to moderately well sorted, argillaceous sandstones, interlaminated with mudstones. The sandstones are composed of angular to subrounded detrital grains of quartz (46-48%), feldspar (6%; microcline, orthoclase and lesser plagioclase), mica (3%; mainly muscovite), glauconite (1 to 4%), rock fragments (trace to 1%; volcanic, metamorphic and granitic) and traces of zircon, rutile and opaques. An abundant matrix of detrital clay and microcrystalline dolomite cement is also present. The detrital clay was probably formerly more abundant, but has since been extensively replaced by the dolomite.

Other than dolomite, diagenetic minerals are rare, although minor anhedral calcite cement (2-3%) occurs scattered throughout the matrix, and traces of quartz overgrowths and kaolinite are present. Visible porosities are small (2-5%) owing to the abundant detrital clay/microcrystalline dolomite matrix.

The interlaminated dolomitic mudstones occupy a subequal area to the sandstones. The mudstones resemble the matrix of the sandstones, and contain 10-15% of detrital grains (quartz and lesser feldspar with traces of glauconite). The mudstones are fossiliferous; sidewall core 10420' contains minor foraminifera tests, and sidewall core 10424' abundant sponge spicules and foraminifera tests (12%).

Diagenetic minerals in the mudstones, other than the microcrystalline dolomite, include small quantities of ferroan (2%) and non-ferroan (3%) calcite. Both occur as anhedral crystals scattered in the matrix, but the ferroan calcite also fills foraminiferal tests and sometimes partially replaces sponge spicules.

Sidewall core 10905' (Oxfordian)

This well sorted, siltstone - very fine grained sandstone is interlaminated with detrital clay. The predominant mineral is quartz (72%), with minor mica (4%; often concentrated in laminae) and feldspar (2%; orthoclase and plagioclase), and traces of opaque heavy minerals, zircon and tourmaline. A common detrital clay matrix (15%) is distributed throughout the sandstone, as well as being concentrated into laminae and occasional burrows.

The sidewall core contains few authigenic minerals except for minor (3%) syntaxial quartz overgrowths and scattered anhedral calcite crystals. Compaction has been quite severe in this rock, probably because of its fine grain size and abundant detrital clay content. The latter factor is especially responsible for the very poor (2%) visible porosity of this rock.

Sidewall core 10970' (Oxfordian)

This rock consists of a silty and sometimes sandy sideritised detrital clay matrix. The silt and sand sized detritals consist mainly of quartz (10%) with

rare mica and traces of glauconite. Organic material (4-5%) is also present.

The main authigenic mineral is microcrystalline siderite (30%), accompanied by minor (3-4%) pyrite and traces of kaolinite. The latter has replaced pre-existing mica. The visible porosity of this rock is very poor.

The poor quality of the sample has prevented the positive identification of any rootlets which were reported by the client.

III

COMPARISON WITH 3/5-1 WELL

At the request of Gulf, hand specimens of sidewall cores 10420' and 10424' (Volgian) from the 3/5-2 well have been compared with ditch cuttings from the interval 9060' to 9200' in the 3/5-1 well. They showed little similarity. However, thin sections of the two sidewall cores from 3/5-2 compared well with the mid-Volgian sidewall cores from 3/5-1 (depths 9150' and 9158'; RRI Report No. 4237P). All four sidewall cores contain glauconite and foraminifera, and one sidewall core from each of the wells also contains sponge spicules. These samples were therefore probably deposited in similar environments of deposition, in a moderately deep marine environment. In addition to the detrital mineralogy, the diagenetic mineral assemblage also shows similarities.

Sidewall core 10905' from the Oxfordian of the 3/5-2 well is similar to many of the Oxfordian - early Volgian sandstones of the 3/5-1 well, and it was probably deposited in a similar marine environment.

IV

REFERENCE

ROBERTSON RESEARCH INTERNATIONAL REPORT NO. 4237P. The petrology, palynofacies and grain density of sidewall core samples from The Norske Gulf Production Company 3/5-1 well, Norwegian North Sea by D. J. Stewart and C. N. Denison.