

Denne rapport  
tilhører

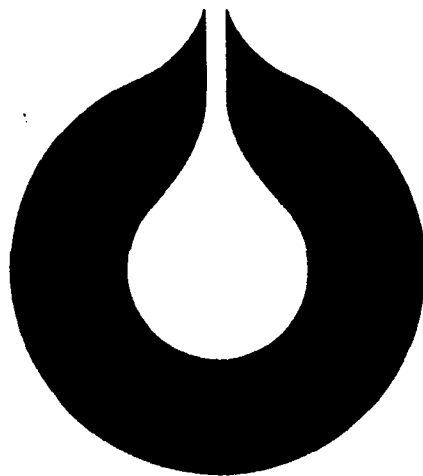
 **STATOIL**

**UND DOK.SENTER**

L.NR. 06084350011

KODE Well 15/9-18 nr 17

**Returneres etter bruk**



**statoil**

Comments to Geco's report:

Special Core Analysis,

well 15/9-18

STATOIL  
EXPLORATION & PRODUCTION  
LABORATORY

August 84

LAB.84.

**Den norske stats oljeselskap a.s**



Classification

Requested by

Roald Riise

Subtitle

Co-workers

Title

Comments to Geco's report:  
Special Core Analysis,  
well 15/9-18

STATOIL  
EXPLORATION & PRODUCTION  
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Prepared

9/8-84

*Reidun Furdal*  
Reidun Furdal

Approved

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*K. Sørheim*  
Kåre Sørheim

## 1. INTRODUCTION

Special core analysis on 7 x 1 1/2" plug samples from well 15/9-18 were performed by Geco, in July 1984.

When performing the analysis, problems occurred. It was found that when water was injected through these plug samples, the permeability properties changed. The water permeabilities obtained were higher than the Klinkenberg permeabilities. The formation factors determined at room conditions were higher than the formation factors determined with 15 bars net confining pressure. Trying to find an explanation to these phenomena, Geco thoroughly repeated some of their measurements.

The following sections give a summary of this work and Geco's comments, including Prolab's recommendations.

## 2. CONTROL MEASUREMENTS

The apparatus was checked and was found to be reliable, then the following properties were remeasured:

- porosity
- grain density
- air permeability
- water permeability
- formation factor in clamp
- formation factor in triaxial cell.

Water permeabilities were measured on the first four samples in the list in connection with the overburden measurements. After this, these samples got permanently higher air permeabilities and porosities. The rest of the samples, which were not flushed with water have now lower permeabilities. This could indicate that particles have been dissolved or flushed out of the first plug samples.

The water permeabilities to the first four samples were controlled after flushing with methanol and new saturation, and these values were lower than the values first obtained.

The air permeabilities were measured again and gave satisfactory correlation to the last water permeabilities, therefore table 2.5 should be used for Klinkenberg permeabilities and water permeabilities.

Table 2.9 should be used for permeability reduction factors. For porosity and grain density it is recommended to use table 2.1, and for formation factor table 2.3.

The results first obtained for the formation factors were confirmed by the control measurements, and there has not been found any satisfactory explanation to the irregularities.

Table 2.1. Porosity and Grain Density. Original measurements.

Sample no.	Depth (m)	Porosity (%)	Grain density (g/cm <sup>3</sup> )
42.1	3236.05	21.1	2.64
45.1	3237.05	20.8	2.62
48.1	3238.05	18.6	2.61
51.1	3239.05	21.2	2.63
56.1R	3241.05	16.2	2.64
62.1	3245.25	18.4	2.66
80.1	3252.05	24.6	2.64
111.1	3263.05	23.7	2.64

Table 2.2. Klinkenberg corrected permeability and water permeability. Original measurements.

Sample no	Depth (m)	K1 (md)	Kw (md)
42.1	3236.05	285	361
45.1	3237.05	154	180
48.1	3238.05	113	135
51.1	3239.05	494	579
56.1R	3241.05	33.3	
62.1	3245.25	152	
80.1	3252.05	1072	
111.1	3263.05	468	

Table 2.3. Formation factors measured in clamp and triaxial cell.  
Original measurements.

Sample no.	Depth (m)	FF Clamp	FF Triax
42.1	3236.05	19.0	16.7
45.1	3237.05	20.1	19.1
48.1	3238.05	21.5	20.8
51.1	3239.05	18.9	16.1
62.1	3245.25	21.1	
80.1	3252.05	13.0	
111.1	3263.05	13.8	

Table 2.4. Porosity and grain density. 1. control after flushing with methanol, and drying.

Sample no.	Depth (m)	Porosity (%)	Grain density (g/cm <sup>3</sup> )
42.1	3236.05	21.5	2.64
45.1	3237.05	21.1	2.63
48.1	3238.05	19.3	2.62
51.1	3239.05	21.3	2.64



Table 2.5. Klinkenberg permeability and water permeability  
1. control after flushing with methanol  
and drying.

Sample no.	Depth (m)	Kl (md)	Kw (md)
42.1	3236.05	334	315
45.1	3237.05	170	150
48.1	3238.05	121	108
51.1	3239.05	542	468

Table 2.6. Formation factors measured in clamp and triaxial cell  
1. control after flushing with methanol and drying

Sample no	Depth (m)	FF Clamp	FF Triax
42.1	3236.05	17.6	15.7
45.1	3237.05	19.0	17.4
48.1	3238.05	20.5	19.6
51.1	3239.05	17.4	16.1
62.1	3245.25	20.0	19.3
80.1	3252.05	12.8	11.5
111.1	3263.05	13.3	12.6

Table 2.7. Porosity and grain density. 2. control after flushing and extraction with methanol, and drying.

Sample no	Depth (m)	Porosity (%)	Grain density (g/cm)
42.1	3236.05	21.7	2.64
45.1	3237.05	21.3	2.63
48.1	3238.05	19.7	2.62
51.1	3239.05	21.2	2.63
56.1R	3241.05	16.3	2.64
62.1	3245.25	18.3	2.66
80.1	3252.05	24.6	2.65
111.1	3263.05	23.7	2.64

Table 2.8. Klinkenberg permeability and water permeability  
2. control after flushing and extraction with  
methanol and drying.

Sample no.	Depth (m)	KL (md)
42.1	3236.05	349
45.1	3237.05	171
48.1	3238.05	128
51.1	3239.05	511
56.1R	3241.05	33.6
62.1	3245.25	120
80.1	3252.05	1016
111.1	3263.05	464