

Denne rapport  
tilhører

 **STATOIL**

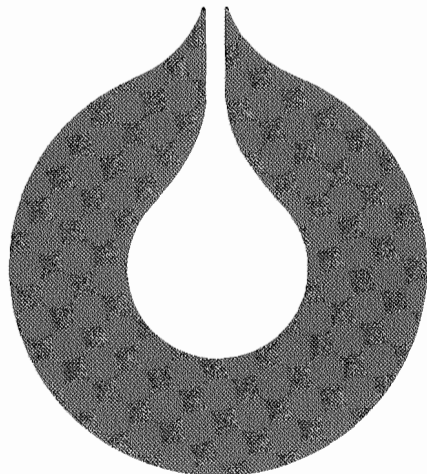
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**L&U DOK. SENTER**

L. NR. 12483040148

KODE Well 34/10-15 nr 9

Returneres etter bruk



**statoil**



Classification

Requested by

Bengt Hultberg, LET Bergen

Subtitle

Co-workers

Title

Water analysis  
RFT sample  
34/10-15  
depth 1875.5 m  
**STATOIL**  
**EXPLORATION & PRODUCTION**  
**LABORATORY**  
Aud Lykling Berge

Des. 82

Lab 82.53

Prepared

28/12-82 Aud Lykling Berge

Approved

28/12-82 Per Thomassen

## 1. INTRODUCTION

Statoil production laboratory (PROLAB) received one 5 l bottle with water from RFT samples, sampled from well 34/10-15 date 12/11-82, depth 1875.5 cm, and 1 l plastic bottle with drill water and 2 l plastic bottle with mud.

PROLAB was asked to see if the water was representativ for the formation, and to see to what extent they were diluted with mud filtrate or drillwater.

The water analysis was performed by West Lab a/s. appendix 1. PROLAB has done some controll analysis Table 1.

## 2. SAMPLE DESCRIPTION

The RFT sample contained particles and had a brown colour and smelled oil. All samples had been added 1:1000 with concentrated  $\text{HNO}_3$ .

## 3. METHODS OF ANALYSIS

The samples were filtrated through 0.45  $\mu\text{m}$  millipore filter. Most of the analysis were carried out according to ASTM methods using atomic absorption. The following ions were determined by wet chemistry.

Ions	Methods
$\text{Cl}^-$ (including Brand I)	ASM D512

Density was measured by PAAR 401 densitometer.

Conductivety was determined by using a Philips Conductivity meter PW 9501/01. The measurements were done at carefully controlled temperatures.

Table 1. Analysis performed by PROLAB.

Sample		RFT Water	Drill water
Density	20°C, g/cm <sup>3</sup>	1.0303	
pH*	20°C	7.86	1.76
Conductivity	20°C, mmho/cm	54.19	7.38
Ion		concentration (mg/e)	
Cl <sup>-</sup>		23.473	619

\* RFT water and Drill water has been added 1:1000 ml.  
HNO<sub>3</sub>.

## 5. DISCUSSION

### 5.1 Ionanalysis

As can be seen from Table 1 and in West Labs report appendix 1 the Cl<sup>-</sup> concentration in RFT sample are low and the sulphate concentration are high, this may be due to infiltration of mudfiltrate or drillwater. Since it is no ions in the drillwater which can be used as a marker for estimation of dilution we can not calculated to what extent the formation water have been diluted, by either mudfiltrate or drillwater.

### 5.2 Comparison between total dissolved solids measured and calculated:

The consistency of the analysis can also be checqued by comparing measured and calculated numbers for total dissolved solids. (TDS). The results in table 2 shows that there is good agreement between calculated TDS from Cl<sup>-</sup> and conductivity. The TDS calculated from summation are higher than TDS correlated from density.

Table 2. Comparison of calculated and measured total dissolved solids

Calculated from $\text{Cl}^-$ ( $\text{Cl}^-$ 1.65)	39.6
Correlated from density	46.2
Correlated from conductivity	39.4
Equivalent NaCl, appendix 2	49.7
Calculated by summation (West Labs report)	51.2

#### 6. CONCLUSION

The RFT sample is probably contaminated with both mudfiltrate and drillwater. To what extent the RFT sample has been diluted with drillwater is difficult to establish since there was no ions which could be used as a masker.

#### 7. REFERENCES

1. Crc Handbook of Chemistry and Physics 60 th edition page D-261.
2. Schlumberger Log interpretation chart 1978 edition.

## Appendix 2.

A transformation of ionic concentrations from appendix 1 into "equivalent NaCl concentration.

Ion	Factor*	Concentration mg/l.
Na <sup>+</sup>	1	23000
Ca <sup>2+</sup>	0.8	1312
Mg <sup>2+</sup>	0.91	237
Ba <sup>2+</sup>		4.7
Fe <sup>np</sup>		2.8
Sr <sup>2p</sup>		196
K <sup>+</sup>	1.02	287.6
Cl <sup>-</sup>	1	23975
So <sub>4</sub> <sup>2-</sup>	0.39	702

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Ion "eq. NaCl." g/l.	49.72
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The reference 2.

APPENDIX 1.

Water analysis performed by West Lab a/s.

**WEST·LAB<sup>A</sup><sub>S</sub>**  
Analytical Services

Statoil  
P.O.Box 300  
4001 Stavanger

Tananger 13/12-82  
Report: Statoil-01

Analysis of 3 fluid samples  
in acc. to request by Aud L.Berg.

Att: Aud L.Berg



Report: Statoil-01

Sample description:

Sample labeled:

- Sample no.:
- 1) "34/10-15 RFT, Depth: 1875,5"
  - 2) "Drilling water (RFT cushion) 34/10-15"
  - 3) "34/10-15 Mud"

ANALYSIS REPORT

Sample:	1) RFT	2) Drilling water	3) Mud
<u>Requested analysis:</u>			
pH/20°C	7,33	1,80	9,77
Conductivity/20°C (milli Siemens/cm)	55,21 mS/cm	7,35 mS/cm	54,52 mS/cm
Total dissolved solids	51200 mg/l	1033 mg/l	50100 mg/l
<u>Elements:</u>			
Sodium,Na	23000 mg/l	245 mg/l	23000 mg/l
Calcium,Ca	1640 "	15 "	69 "
Magnesium,Mg	260 "	35 "	11 "
Barium,Ba	4,7 "	0 "	5,7 "
Iron,Fe	2,8 "	13 "	3,1 "
Strontium,Sr	196 "	0,4 "	1,3 "
Potassium,K	282 "	13 "	317 "
Chloride,Cl	23975 "	573 "	20397 "
Sulphate,SO <sub>4</sub>	1800 "	85 "	6250 "
<p>Remarks: Analysis of iron and strontium performed in addition to request,just as a service.</p>			

Analyst: A.Osvåg