

L.NR. 12884260031
 KODE Well 31/3-1 nr. 61

Returneres etter bruk

Statoil
 P.O. Box 300
 4001 STAVANGER

attn.: Per Furmyr

U

Your ref.	Your letter of	Our ref.	Date
		Olje & Gass Grp.	27.6.84
		ef/rf	

Som avtalt har F-Bergen utformet et detaljert prosjektforslag for det foreslåtte enkeltbrønnstudiet på Troll.

Vedlagte prosjektforslag er ment som et diskusjonsgrunnlag.

Kommentarer til forslaget ønskes så snart som mulig slik at linjene for det endelige prosjektet kan trekkes opp.

Beste hilsen
 for Norsk Hydro a.s
Egil Finnerud
 Egil Finnerud

~~PF~~
~~OJA~~
~~RKO~~
~~KJS~~

Vedlegg

L nr. 1288426-0031	Statoil
Avd LET	Seniorrådg.
S.bh	
Mott. 28 JUNI 84	
Kode SHS1-P5.17-03-01-1	
Dor. 31/3-1	
SYG utkop TROLL ✓	

To: Egil Finnerud
Sandvika

From: Geochemistry Group
F-Bergen

SUBJECT: TROLL SINGLE WELL GEOCHEMICAL STUDY

The following notes provide a detailed outline of Norsk Hydro's proposed "single" well geochemical study. These should be sufficient for discussions with Statoil and Saga.

A. Objectives/Justification of Studies

- 1) To determine the composition and amount of residual oil in the gas column of the reservoir and its relationship to any permeability barriers. This study will attempt to check on Shell's theory that the reservoir was originally filled with oil.
- 2) examination of the composition of any residual hydrocarbons below the OWC. This study may provide indications on hydrocarbon migration and source, but the effects could be influenced by biodegradation.
- 3) To study the vertical variation of oil quality within the oil column. This will determine the extent of biodegradation and possible influence of water washing on oil properties. These effects are also considered important from a production viewpoint, as the extent of biodegradation could have a significant effect on water and/or gas drive and hence primary oil recovery.

- 4) Determination of maturity/compositional variations in the reservoir gas column. These investigations will include hydrocarbon isotopic variation and an examination of any significant results in relation to permeability variations which may exist within the reservoir.
- 5) To determine the rates of light hydrocarbon diffusion in the reservoir cap rock to assess the extent of hydrocarbon loss from the reservoir. This will provide a better understanding of the occurrence of 'mature' light hydrocarbons in the formations overlying the reservoir.
- 6) To examine reservoir rocks for the presence of any fluid inclusions and to determine if hydrocarbons are present. These studies may provide indications of palaeotemperatures and timing of hydrocarbon generation as a check on modelling studies.

B. Program Outline

- 1) Study of residual reservoir oil will involve high density sampling from the cap rock down to the gas/oil contact and will require core material, again preferably well preserved. Possible contamination from drilling mud filtrate will need to be carefully evaluated, as well as any material trapped within unconnected pore spaces within the reservoir. The suggested well for these studies is 31/3-1.
- 2) Residual hydrocarbons below the OWC can be studied using core material (if available) or cuttings. Examinations would concentrate on biomarker variations in relation to lithology and comparison with reservoir oil. The proposed well for these investigations is 31/3-1.

- 3) Study of vertical quality variations in the oil column will also require reservoir core material for extraction. This should, again, preferably be well preserved, but unsealed core material could still be used for this type of work. It is proposed that residual oil composition is studied in conjunction with the Organic Geochemistry Group at Newcastle University, who have recently developed some additional biodegradation "markers". Attempts will be made to unequivocally distinguish between biodegradation and maturation effects on crude oil biomarker distributions..

If suitable data is available, results from the above studies will be related to core analysis data. As well 31/3-1 has only a very thin oil column, samples from 31/5-3 are proposed for this work.

- 4) Maturity/compositional studies in the gas column would concentrate on lighter hydrocarbons and isotopic variations. Samples should be preserved cores but, if the latter are unavailable, residual absorbed gases on unsealed material may be satisfactory. Sufficient samples would be taken to see if present observed effects are real, or related to permeability variations within the reservoir. Samples from 31/3-1 are proposed for this work.
- 5) Diffusion studies will require core material from the cap rock/reservoir boundary, preferably well preserved, and will be carried out in conjunction with Dr. Leythaeuser from KFA, Julich, W.Germany. Possible isotopic effects during migration will also be examined. Sample selection would depend on availability of suitable material.

6) If fluid inclusions are present in the reservoir, then estimates of palaeotemperatures will be attempted by microscopic procedures. If hydrocarbons are present in some inclusions then indirect estimates of the timing of hydrocarbon migration may be possible. Some problems may arise with the influence of hydrous pyrolysis on hydrocarbon composition, but this effect is considered unlikely at the temperatures involved. Well 31/3-1 is again considered suitable for these studies.

C. Timing

Sample material should preferably be derived from a single well, if suitable material is available to undertake all the studies envisaged and a reasonable chance exists of estimating potential contamination e.g. from drilling mud. If more than one well is used to supply samples ie a composite "single" well is to be made up, then sample quality is again of crucial importance.

If suitable material is already available, then studies 1), 2) and 3) could commence by end July. Some results may then be available for inclusion in the Troll October review.

Assuming work is commenced at end July or in August then the entire project would last approx 8 months, with completion by March 1985.

D. Costs

	NOK
Total internal Norsk Hydro costs	650,000
External costs (Service companies, Research Centres and Universities)	550,000
	<hr/>
Total	1,200,000
	=====



G.C. Speers.

cc: E. Wathne
E. Roaldset
G.C. Speers
B. Dahl
N. Telnæs