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Via Altinn

August 22, 2017

Regarding: Patent Application in Norway No. 20161910
Applicant: Hydrophilic AS
Title: A probe arrangement for pressure measurement of a water phase inside a hydrocarbon reservoir
Our ref.: P27764NO00 -

With reference to the office action dated June 28, 2017 in above application, we provide a new set of claim 1-13, to which we would like to provide our observations.

We would also request the continued processing of the application to be conducted in English.

Introduction

The present invention relates to a probe arrangement for selective pressure measurements of a water phase inside a hydrocarbon reservoir. In particular, the invention relates an improved probe arrangement used for determining the free water level (FWL) of a hydrocarbon reservoir by means of a single measurement. "Single measurement" shall here mean that multiple measurements at different depths are not required in order to determine the FWL.

The invention relies on the feature of a probe comprising hydrophilic characteristic as defined by independent claim 1. The invention further relies on the understanding that the measurement using such a probe will only provide valuable information if positioned in an unperturbed region of the reservoir as pollution by surface active components, or introduction of water, will make the measurement of the water phase pressure incorrect or impossible to capture.

Amendments

New claim 1 has been amended in regards to a typo relating to the concentration of the surface active components at the position to which the probe is to be displaced. New claim 1 has been amended to "a concentration less than 0.1 millimole/liter.

Original claim 1 state the concentration as "less than 0.1 millimole". However, millimole is a quantity, not a concentration. The skilled person would when studying the claims and description interpret the typo as 0.1 millimole/liter in that this is a commonly used measure in the art of

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concentration for surface active components in the field of the invention. Accordingly, we are of the opinion that correction of the typo is within the content of the application as filed. New claim 8 has been amended correspondingly in regards to the concentration.

New claim 12 has been amended by introducing a two-part divider into the claim. However, in that the method already refer to the probe arrangement in claim 1-11, it is hard to see that the two-part division of the method would provide further information to the reader.

The references of new claim 7, 9 and 10 have been corrected in regards to the formality objections.

There was an antecedent objection to claim 12. However, claim 12 refer to the probe arrangement in claim 1-11 and accordingly includes the feature of claim 1-11, 'the sealing member' will accordingly have antecedent. Claim 12 is therefore maintained unchanged in respect to this.

The identified remarks to description have been corrected.

Novelty

WO01/09483A1 (D1) discloses a probe and a method for determining the depth of a fluid contact level between two fluids, such as oil and water, at a borehole in a formation.

D1 lacks the feature of a displacement mechanism for displacing the probe from a first position outside the formation to a second position inside the formation. In particular, D1 lacks the feature of displacing the probe to a position where the concentration of the surface active components is less than 0.1 millimole/liter.

Accordingly, new claim 1 is novel in view of D1.

US6164126A (D2) discloses an apparatus and a method for measurement on a subsurface formation.

D2 lacks the feature of a probe comprising a body with an opening to a pressure measuring chamber, where the surface at the opening is arranged with a hydrophilic characteristic. D2 disclosed a probe for measurements of formation pressure and permeability during drilling operation, and on basis thereof controlling the drilling operation.

Accordingly, new claim 1 is novel in view of D2.

US4438654A (D3) discloses a device for taking samples of ground water in soil and rock.

US2012199368 (D4) discloses a method and device for deploying a cable and an apparatus in a ground formation.

D3 and D4 lack the features of a probe having the hydrophilic characteristic at the surface of openings to a pressure measuring chamber. D3 and D4 also lack the feature relating to a displacement mechanism for displacing the probe from a first position outside a formation to a second position inside the formation.

Accordingly, new claim 1 is novel in view of D3 or D4.

D3 and D4 lack the feature of a displacement mechanism and are accordingly not relevant for the following discussion on inventive step.

Inventive step

D1 is regarded as the closest prior art for the invention, in that it relates to a probe with hydrophilic characteristic to be used for determining the depth of a fluid contact level between

oil and water at a borehole in a formation.

Starting from the probe in D1, the skilled person would not be prompted to modify the probe with the feature of a displacement mechanism for displacing the probe from a first position outside the formation to a second position inside the formation, such as by the mechanism in D2.

Firstly, there is no indication in D1 that repositioning of the probe away from the borehole into the formation would be desirable. D1 defines that the probe is to be pressed against the borehole wall during a predetermined time, see D1 p. 3, l. 19-34.

Secondly, the invention relies on the understanding that the measurement needs to be positioned in an unperturbed region of the reservoir to provide valuable information for the determination of the free water level by a single measurement. This understanding is defined in technical features by means of the displacement mechanism for displacing the probe to such position.

Accordingly, there is no information suggesting the feature of a displacement mechanism. Moreover, the combination of D1 with D2 would be based on hindsight in that the core of the invention relates to the understanding of the displacement of the probe into the reservoir to a position where surface active components is less than 0.1 millimole/liter.

It shall also be considered that the probe in D2 is related to measurement for determining the formation pressure, which is used for optimizing the drilling operation. This is a completely different measurement using a different type of probe, and in which surface active components have no influence on the measurement as such. Accordingly, the skilled person would not have incitement to combine the probe in D1 with the mechanism in D2 more than combining the probe in D1 with any known mechanism for displacement of a probe in general.

Thus, the skilled person, starting from D1, would not be prompted to combine the features of D1 and D2, or D1 with any known mechanism for displacement of a probe in general.

Accordingly, new independent claim 1 involves an inventive step in view of D1 or D1 in combination with D2.

Concluding remarks

Accordingly, it is our opinion that the present application is now brought into a state in which it meets the requirements of the Norwegian Patents Act and is ready for grant. Should some objection still remain, the examiner is welcome to contact the undersigned via telephone or to issue a new communication.

Yours faithfully
HÅMSØ PATENTBYRÅ AS

A handwritten signature in blue ink that reads 'J. Arborelius'.

Jakob Arborelius

Enclosures: Amended set of claims (incl. mark-up copy)
Amended description (incl. mark-up copy)