

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To: CARSON, Matt Baker Hughes, a GE company, LLC 2001 Rankin Road Houston, Texas 77073-5114 USA		Date of mailing (day/month/year) 29 October 2018 (29.10.2018)	
Applicant's or agent's file reference SLG4-62497WO		FOR FURTHER ACTION See paragraph 2 below	
International application No. PCT/US2018/039469	International filing date (day/month/year) 26 June 2018 (26.06.2018)	Priority date(day/month/year) 30 June 2017 (30.06.2017)	
International Patent Classification (IPC) or both national classification and IPC E21B 49/00(2006.01)i, E21B 47/12(2006.01)i			
Applicant BAKER HUGHES, A GE COMPANY, LLC			


1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR International Application Division Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea Facsimile No. +82-42-481-8578	Date of completion of this opinion 29 October 2018 (29.10.2018)	Authorized officer LEE, Jong Kyung Telephone No. +82-42-481-3360	
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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US2018/039469

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

- the international application in the language in which it was filed
- a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.I(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

- a. forming part of the international application as filed:
- in the form of an Annex C/ST.25 text file.
 - on paper or in the form of an image file.
- b. furnished together with the international application under PCT Rule 13*ter*.I(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
- c. furnished subsequent to the international filing date for the purposes of international search only:
- in the form of an Annex C/ST.25 text file (Rule 13*ter*.I(a)).
 - on paper or in the form of an image file (Rule 13*ter*.I(b) and Administrative Instructions, Section 713).

4. In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2018/039469

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

the entire international application

claims Nos. 4-8, 13-15

because:

the said international application, or the said claims Nos. _____
relate to the following subject matter which does not require an international search (*specify*):

the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 7
are so unclear that no meaningful opinion could be formed (*specify*):

Claim 7 is not clear under PCT Article 6 because claim 7 refers to claim 6 which does not comply with PCT Rule 6.4(a).

the claims, or said claims Nos. _____ are so inadequately supported
by the description that no meaningful opinion could be formed (*specify*):

no international search report has been established for said claims Nos. 4-8, 13-15

a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

furnish a sequence listing in the form of an Annex C/ST.25 text file, and such listing was not available to the International Searching Authority in the form and manner acceptable to it; or the sequence listing furnished did not comply with the standard provided for in Annex C of the Administrative Instructions.

furnish a sequence listing on paper or in the form of an image file complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in the form and manner acceptable to it; or the sequence listing furnished did not comply with the standard provided for in Annex C of the Administrative Instructions.

pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rule 13ter.1(a) or (b).

See Supplemental Box for further details.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US2018/039469

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-3,9-12</u>	YES
	Claims	<u>NONE</u>	NO
Inventive step (IS)	Claims	<u>NONE</u>	YES
	Claims	<u>1-3,9-12</u>	NO
Industrial applicability (IA)	Claims	<u>1-3,9-12</u>	YES
	Claims	<u>NONE</u>	NO

2. Citations and explanations :

Reference is made to the following document:

D1: WO 2016-025672 A1 (SCHLUMBERGER CANADA LIMITED et al.) 18 February 2016

1. Novelty and Inventive Step

1.1 Independent Claim 1

D1, which is considered to be the closest prior art to the subject matter of claim 1, discloses a method for treating an underground formation, the method comprising the steps of: collecting mud logging data while drilling, wherein the drilling forms a wellbore through the formation; generating zone characterization of one or more zones along the wellbore based on the collected mud logging data; and defining targeted zones of the one or more zones along the wellbore (see paragraphs [0003], [0034], [0037]; and claim 1).

The subject matter of claim 1 differs from D1 in that a method comprises the steps of: generating a treatment characterization for each targeted zone based on collected mud-logging data; and generating an intervention treatment design based on the targeted zones and associated the treatment characterizations.

However, these features would be easily conceived from the disclosures of D1 considering that logging operations may be used to define formation characteristics for at least one section of a drilled well; and a multi-stage single-point treatment may be designed on pre-determined zonal characteristics (see paragraphs [0034], [0037]).

Accordingly, claim 1 would have been obvious over D1. Therefore, claim 1 does not involve an inventive step under PCT Article 33(3).

1.2 Dependent Claims 2 and 3

Continued on Supplemental Box

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US2018/039469

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Claims 4-6, 8, and 13-15 do not comply with the third sentence of PCT Rule 6.4(a), because multiple dependent claims should not serve as a basis for any other multiple dependent claim.

Supplemental Box

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Continuation of : Box No. V

1.2.1 Concerning Claim 2

The additional feature of claim 2 is identical to the disclosures of D1 in that the multi-stage single-point treatment is designed based on a generated reservoir model and executed on distinct zones of the well, wherein the treatment may include fracturing operations, matrix acidizing fracturing, and injection of chelating agents (see paragraphs [0002], [0027]). Accordingly, claim 2 would have been obvious over D1. Therefore, claim 2 does not involve an inventive step under PCT Article 33(3).

1.2.2 Concerning Claim 3

The additional features of claim 3, characterized in that each zone within a formation has a unique geologic property, wherein the treatment characterization is based on the geologic property of the respective targeted zone, and the geologic property comprises at least one of porosity, permeability, density, rock property, and fluid property, are not explicitly disclosed in D1. However, these features would be easily conceived from the disclosures of D1 considering that: the plurality of zones have a different mineralogical composition; the logging operations may be used to define the formation characteristics for the at least one section of the drilled well; and the multi-stage single-point treatment may be designed on the pre-determined zonal characteristics (see paragraphs [0034], [0037]; and claim 7). Accordingly, claim 3 would have been obvious over D1. Therefore, claim 3 does not involve an inventive step under PCT Article 33(3).

1.3 Independent Claim 9

D1, which is considered to be the closest prior art to the subject matter of claim 9, discloses a system for treating an underground formation, the system comprising: a drill string operable within the formation to drill a wellbore through the formation; and a computer-based system arranged to control the drill string and configured to: collect mud logging data while drilling; generate zone characterization of one or more zones along the wellbore based on the collected mud logging data; and define targeted zones of the one or more zones along the wellbore (see paragraphs [0003], [0020], [0026], [0034], [0037]; and claims 1, 8).

The subject matter of claim 9 differs from D1 in that a system comprises a control unit configured to: generate a treatment characterization for each targeted zone based on collected mud-logging data; and generate an intervention treatment design based on the targeted zones and associated the treatment characterizations.

However, these features would be easily conceived from the disclosures of D1 considering

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that logging operations may be used to define formation characteristics for at least one section of a drilled well; and a multi-stage single-point treatment may be designed on pre-determined zonal characteristics (see paragraphs [0034], [0037]).

Accordingly, claim 9 would have been obvious over D1. Therefore, claim 9 does not involve an inventive step under PCT Article 33(3).

1.4 Dependent Claims 10-12

1.4.1 Concerning Claim 10

The additional features of claim 10, characterized in that the intervention treatment design comprises a plurality of stages, wherein each stage is associated with the targeted zone, and the plurality of stages are arranged to perform an intervention operation on the associated targeted zone, are not explicitly disclosed in D1. However, these features would be easily conceived from the disclosures of D1 considering that: the multi-stage single-point treatment may be designed on the pre-determined zonal characteristics; and a method comprises the step of treating the section using single-point fracturing methodology (treating one zone per stage) (see paragraphs [0019], [0037]). Accordingly, claim 10 would have been obvious over D1. Therefore, claim 10 does not involve an inventive step under PCT Article 33(3).

1.4.2 Concerning Claim 11

The additional feature of claim 11, characterized in that each stage has a length equal to a length of the associated targeted zone, is not explicitly disclosed in D1. However, this feature would be easily conceived from the disclosures of D1 considering that: the multi-stage single-point treatment may be designed on the pre-determined zonal characteristics; and the method comprises the step of treating the section using the single-point fracturing methodology (treating one zone per stage) (see paragraphs [0019], [0037]). Accordingly, claim 11 would have been obvious over D1. Therefore, claim 11 does not involve an inventive step under PCT Article 33(3).

1.4.3 Concerning Claim 12

The additional feature of claim 12 is identical to the disclosure of D1 in that the multi-stage single-point treatment may be designed on the pre-determined zonal characteristics (see paragraph [0037]). Accordingly, claim 12 would have been obvious over D1. Therefore, claim 12 does not involve an inventive step under PCT Article 33(3).

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2. Industrial Applicability

Claims 1-3 and 9-12 are industrially applicable under PCT Article 33(4).