

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)**

To:

see form PCT/ISA/220

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/B2019/059442

International filing date (day/month/year)
04.11.2019

Priority date (day/month/year)
28.11.2018

International Patent Classification (IPC) or both national classification and IPC
INV. E21B7/04 E21B44/00 E21B47/024

Applicant
CHEVRON USA INC.

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 usually 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:



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Date of completion of this opinion

see form
PCT/ISA/210

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Box No. I Basis of the 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 43bis.1(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 13ter.1(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 13ter.1(a)).
 - on paper or in the form of an image file (Rule 13ter.1(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:

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)	Yes: Claims	<u>2, 6, 8</u>
	No: Claims	<u>1, 3-5, 7</u>
Inventive step (IS)	Yes: Claims	<u>2, 6, 8</u>
	No: Claims	<u>1, 3-5, 7</u>
Industrial applicability (IA)	Yes: Claims	<u>1-8</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

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

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

1 **Re Item V**

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1.1 Reference is made to the following documents:

D1 WO 2017/116436 A1 (LANDMARK GRAPHICS CORP [US]) 6 July 2017

D2 US 2017/081953 A1 (BENSON TODD W [US] ET AL) 23 March 2017

D3 US 10 012 028 B2 (LANDMARK GRAPHICS CORP [US]) 3 July 2018

1.2 The present application does not meet the criteria of Article 33(2) PCT, because the subject-matter of claim 1 is not new.

D1 discloses (see e.g. paragraphs [0001], [0059] - [0073], [0084]; figures 1-7):

A computer-implemented method of automated post-geosteering, comprising:
a. receiving, at a computer processor, a pilot well log (see e.g. [0063]) and a lateral well log (see e.g. [0061]) with an initial lateral well path (see e.g. [0061]);
b. performing, via the computer processor, automated post-geosteering using the pilot well log, lateral well log, and initial lateral well path as input to generate a corrected lateral well path image (see e.g. [0063]-[0065]); and
c. displaying, on a graphical display, the corrected lateral well path image (see e.g. [0067],[0072]).

1.3 The present application does not meet the criteria of Article 33(2) PCT, because the subject-matter of claim 1 is not new.

D2 discloses (see e.g. paragraphs [0004], [0061], [0144], [0178] - [0184]; figures 1, 40):

A computer-implemented method of automated post-geosteering, comprising:
a. receiving, at a computer processor, a pilot well log and a lateral well log with an initial lateral well path (see e.g. [0144], [0173]);
b. performing, via the computer processor, automated post-geosteering using the pilot well log, lateral well log, and initial lateral well path as input to generate

- a corrected lateral well path image (see e.g. [0183]); and
c. displaying, on a graphical display, the corrected lateral well path image (see e.g. [0181]).
- 1.4 The same reasoning as for independent claim 1 applies mutatis mutandis to the related independent computer system claim 5 and computer readable storage medium claim 7, which therefore also do not meet the criteria of Article 33(2) PCT, because the subject-matter of claims 5 and 7 is not new.
- 1.5 Dependent claims 3 and 4 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step:
- 1.5.1 Claim 3 identifies action based on the corrected lateral well path image, some possible actions given in claim 4. D1 discloses as actions e.g. an alternative geosteering solution (see e.g. [0067]-[0071]). D2 discloses as actions e.g. an alternative geosteering solution (see e.g. [0183]) and a dip angle correction (see e.g. [0179]).
- 1.6 The combination of the features of dependent claims 2, 6 and 8 is neither known from, nor rendered obvious by, the available prior art. The reasons are as follows: Although it is known to correlate the data of the pilot well log and the lateral well log, there is no hint in the prior art to do so using a cost matrix, and adjusting the well path based on this cost matrix, smoothness and adherence to the initial well path.

2 **Re Item VII**

Certain defects in the international application

- 2.1 Independent claims 1, 5 and 7 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (D1) being placed in the preamble (Rule 6.3(b)(i) PCT) and the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).
- 2.2 The unit "feet" employed in the description in [0019] is not recognised in international practice /generally used, contrary to the requirements of Rule 10.1(d) PCT.
- 2.3 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in D1 is not mentioned in the description, nor are these documents identified therein.

3 **Re Item VIII**

Certain observations on the international application

3.1 The application does not meet the requirements of Article 6 PCT, because claim 4 is not clear.

3.1.1 The following terms used in claim 4 for the actions are vague and have no well recognized meaning:

"a recycle warning": it is not clear what feature is encompassed by the word recycle in regard of a warning.

"a shift change rationalization": from the claim itself it is not clear what is meant by the term, nor does the description make it clear how the rationalization between the two opinions is done.

"an alternative geosteering solution from an interpretation at an earlier time": it is not clear to which geosteering solution this alternative is to be taken, and to what earlier interpretation.

3.1.2 The reader is therefore left in doubt as to the meaning of the technical feature to which they refer, thereby rendering the definition of the subject-matter of said claim unclear, Article 6 PCT.