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**Datasheet for the decision  
of 11 July 2022**

**Case Number:** T 0812/21 - 3.2.01

**Application Number:** 10848086.4

**Publication Number:** 2547862

**IPC:** E21B43/24, E21B43/30

**Language of the proceedings:** EN

**Title of invention:**

SYSTEMS AND METHODS FOR POSITIONING HORIZONTAL WELLS WITHIN  
BOUNDARIES

**Applicant:**

Landmark Graphics Corporation

**Headword:**

**Relevant legal provisions:**

EPC Art. 123(2)  
RPBA 2020 Art. 11

**Keyword:**

Amendments - added subject-matter (no)  
Remittal - special reasons for remittal - (yes)

**Decisions cited:**

**Catchword:**



**Beschwerdekammern**  
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Case Number: T 0812/21 - 3.2.01

**D E C I S I O N**  
**of Technical Board of Appeal 3.2.01**  
**of 11 July 2022**

**Appellant:** Landmark Graphics Corporation  
(Applicant) 2107 CityWest Boulevard  
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Houston, TX 77042-3021 (US)

**Representative:** Hoffmann Eitle  
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**Decision under appeal:** **Decision of the Examining Division of the  
European Patent Office posted on 20 January 2021  
refusing European patent application No.  
10848086.4 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chairman** G. Pricolo  
**Members:** A. Wagner  
P. Guntz

## **Summary of Facts and Submissions**

- I. The appeal was filed by the applicant against the decision of the examining division to refuse European patent application No. 10848086.4 pursuant to Article 97(2) EPC.
- II. In the decision under appeal the examining division concluded that the main request as well as auxiliary requests 1 to 3, all requests filed with letter dated 13 July 2020 in preparation to oral proceedings, contravene the requirement of Article 123(2) EPC. Auxiliary request 4, filed during oral proceedings, was not admitted into the proceedings due to lack of clear allowability.
- III. The appellant requested to set aside the decision under appeal and to remit the case to the first instance, or, as an auxiliary measure, to grant a patent on the basis of the main request underlying the impugned decision, or on the basis of one of the auxiliary requests 1 to 4 as filed in the first instance, or on the basis of one of the auxiliary requests 5 to 10, filed with the statement of grounds of appeal.
- IV. The main request consists of two claims: a computer-implemented method claim 1 and a program carrier device claim 2. The claims read as follows. Amendments to claim 1 as original filed, to claim 2 respectively, are indicated by underlines and strike-through by the board.

**Claim 1:**

A computer-implemented method of determining subsurface target locations for horizontal wells to be drilled within a predetermined boundary, which comprises:

selecting a reference well within the predetermined boundary;

~~determining~~ ~~computing~~ a first point and an azimuth direction ~~and an offset distance based on a point at total depth for~~ of the reference well;

creating a first line that is perpendicular to the azimuth direction and passes through a center location of the predetermined boundary,

creating a second point on the first line at a maximum distance from the center location within the predetermined boundary;

determining an offset distance, based on a predetermined well spacing distance and an initial offset distance along the first line between the second point and a third point defined by an intersection of the first line and a second line running along the azimuth direction from the first point, by subtracting the predetermined well spacing distance from the offset distance until the offset distance is less than the predetermined well spacing distance,

creating a series of points along the first line beginning at ~~the offset distance~~ a point which is offset by the offset distance from the second point on the first line ~~and passing through the center location~~ until reaching twice the maximum distance, each point

in the series of points being separated from another point in the series of points by a the predetermined well spacing distance; and

computing a list of heel/toe pairs for each point in the series of points and adding the list for each point in the series of points to a collection of lists comprising heel/toe pairs as each list is computed, the collection of lists representing the target locations within the predetermined boundary, each heel and toe pair representing a horizontal lateral section of a horizontal well to be drilled,  
wherein computing a list of heel/toe pairs for a selected point in the series of points comprises creating a third line through the selected point along the azimuth direction,  
extracting points at which the third line intersects the predetermined boundary'; and  
dividing the interval between the points at which the third line intersects the predetermined boundary into a set of equal length heel/toe pairs according to a spacing rule.

**Claim 2:**

A program carrier device ~~for~~ carrying computer executable instructions for determining subsurface target locations for horizontal wells to be drilled within a predetermined boundary, the instructions being executable by a computer system to implement:

selecting a reference well within the predetermined boundary;

determining ~~computing~~ a first point and an azimuth direction and an offset distance based on a point at

total depth for of the reference well;

creating a first line that is perpendicular to the azimuth direction and passes through a center location of the predetermined boundary;

creating a second point on the first line at a maximum distance from the center location within the predetermined boundary;

determining an offset distance, based on a predetermined well spacing distance and an initial offset distance along the first line between the second point and a third point defined by an intersection of the first line and a second line running along the azimuth direction from the first point, by subtracting the predetermined well spacing distance from the offset distance until the offset distance is less than the predetermined well spacing distance;

creating a series of points along the first line a point which is offset by beginning at the offset distance from the second point on the first line ~~and passing through the center location~~ until reaching twice the maximum distance, each point in the series of points being separated from another point in the series of points by a the predetermined well spacing distance, and

computing a list of heel/toe pairs for each point in the series of points and adding the list of each point in the series of points to a collection of lists comprising heel/toe pairs as each list is computed, the collection of lists representing the target locations within the predetermined boundary, each heel and toe

pair representing a horizontal lateral section of a horizontal well to be drilled,  
wherein computing a list of heel/toe pairs for a selected point in the series of points comprises:  
creating a third line through the selected point along the azimuth direction;  
extracting points at which the third line intersects the predetermined boundary; and  
dividing the interval between the points at which the third line intersects the predetermined boundary into a set of equal length heel/toe pairs according to a spacing rule.

## **Reasons for the Decision**

### **1. Article 123(2) EPC**

1.1 The board judges that the requirements of Article 123(2) EPC are met. The passages referred to in the following statement refer to the A1-publication WO2011/115600.

1.2 The examining division was of the opinion that the following amendments in claim 1 and in claim 2, respectively, define added subject-matter:

a) "for horizontal wells to be drilled"

b) "dividing the interval between the points at which the third line intersects the predetermined boundary into a set of equal length heel/toe pairs according to a spacing rule".

### **1.3 Amendment a**



1.3.1 The examining division argued that (decision, point 16.4) "*there is no direct and unambiguous indication in the application as filed, from which the skilled person would induce that said planning of horizontal wells ought to be part of the oil/gas project production development i.e. to be drilled and nothing else.*"

1.3.2 The board does not agree. The method is about determining subsurface target locations. The result is a plan, a pattern (see figure 20) for horizontal wells that are, if put in practice, typically drilled. Basis for the amendment can be found in paras. [0004, 0005, 0006, 0036]. Therein it is unambiguously disclosed that the planning of wells is performed before drilling has commenced, and once the drilling operation has commenced and information from wells being drilled is coming in from the field, the plan is updated. Therefore, the plan with which the application is concerned is a plan for wells, and in particular a plan for wells to be drilled. The claim does not require that the wells are finally drilled. Irrespective of whether the wells are finally drilled or not, the application does not contemplate any other process than the planning of the drilling of the wells.

1.3.3 Adding the feature "for horizontal wells to be drilled" rather constitutes a limitation to the kind of wells that are to be planned.

#### **1.4 Amendment b**

1.4.1 The examining division was of the opinion (decision, point 17.2) that the description in para. [0210] only referred to some interval between two generic points, which was not the same as the interval between two specific points as defined in amendment b, being the

intersections of the third line with the boundary. As there was no basis for this very specific amended feature in the application, said amendment contravened the requirements of Art 123(2) EPC.

1.4.2 The board does not agree. Para. [0210] refers to an algorithm which is applied in step 1220 of figure 12. Para. [0210] has to be seen in context with paras. [0154, 0158, 0164]. Therein it is explained that the input for step 1220 is the result of applying the algorithm of step 1208. In this algorithm, according to para. [0154], the points where a line "intersects the boundary of the area that will be filled" are extracted.

1.4.3 Starting with para. [0154] and figure 12, *"The method 1200 generally creates a line through point at azimuth orientation. Points are extracted where this line intersects the boundary of the area that will be filled using the algorithm in step 1208."*

The last step of the method 1200 shown in figure 12 is step 1220 executing an algorithm. According to para. [0164], this *"algorithm is illustrated in figure 16."* The algorithm of figure 16 is described in para. [0210]. This paragraph refers to a generic method which is applied in step 910 of figure 9 and in step 1220 of figure 12: *"The method 1600 generally takes some interval between two points and divides it into a set of equal length heel/toe pairs that follow certain spacing rules."*

When applied to step 1220, the interval mentioned in para. [0210] corresponds to *"the interval between the points at which the third line intersects the predetermined boundary"* as defined in the claim. This is made clear in paras. [0161, 0158, 0154]. Therein it is described that in the method 1200 *"Location1 is set*

*equal to V[i-1] and Location2 is set equal to V[i]" (figure 12, step 1214). Location1 and Location2 are the values assigned to the algorithm of step 1220. Vector V is the result of applying the algorithm of step 1208 (see figure 12, step 1210). The purpose of step 1208 is to extract points where a line "intersects the boundary of the area that will be filled" (para. [0154]).*

1.4.4 Hence, following the logic of the algorithms amendment b is originally disclosed in the application as filed.

## **1.5 Further amendments**

1.5.1 Claim 1, claim 2 respectively, comprises further amendments:

c) 'computer-implemented' in claim 1 and 'the instructions being executable by a computer system to implement' in claim 2.

d) determining computing a first point and an azimuth direction ~~and an offset distance based on a point at total depth for~~ of the reference well;

e) determining an offset distance, based on a predetermined well spacing distance and an initial offset distance along the first line between the second point and a third point defined by an intersection of the first line and a second line running along the azimuth direction from the first point, by subtracting the predetermined well spacing distance from the offset distance until the offset distance is less than the predetermined well spacing distance,

f) creating a series of points along the first line beginning at ~~the offset distance~~ a point which is offset by the offset distance from the second point on the first line and ~~passing through the center location~~

g1) each heel and toe pair representing a horizontal lateral section of a horizontal well to be drilled,

g2) wherein computing a list of heel/toe pairs for a selected point in the series of points comprises creating a third line through the selected point along the azimuth direction, extracting points at which the third line intersects the predetermined boundary.

Furthermore the claim is provided with clarifying labels (first, second, third) not adding any subject-matter.

1.5.2 The amendments c to g2 were not objected by the examining division and are allowable under Article 123(2) EPC. The basis for the amendments can be found in the A1-publication WO2011/115600 as follows:

ad c) The amendment is disclosed substantially literally in paras. [0008, 0313].

ad d) The method step is disclosed in para. [0127]. The omitted wording is shifted to feature e.

ad e) The wording 'determining an offset distance' is a redrafting of the omitted wording of amendment d. The method step is based on para. [0127] (from the second line on on page 25) and original claims 2, 3, 4.

ad f) Basis can be found in para. [0141] with para. [0127]. The feature defines the algorithm 1100 (figure 11) for step 1024 being "FindTargetLocations (Offset, Azimuth)" as described in para. [0141]. From para. [0127] (last sentence) it is clear that the start point for creating the series of point is the point which is offset by the offset distance from the second point on the first line.

ad g1) That the heel/toe pair represents a 'lateral section of a horizontal well' is disclosed in para. [0037] on page 10, lines 7 to 15.

ad g2) The amendment is substantially literally disclosed in para. [0154] and refers to figure 12. The wording of para. [0154] "creates a line through point at azimuth orientation" corresponds to the claim wording "creating a third line through the selected point along azimuth direction" and describes step 1202 in figure 12. Feature "extracting points" describes step 1208.

1.5.3 In the summons to oral proceedings before the examining division, points 9, 10, a further objection under Article 123(2) EPC was raised. The feature in claim 1 "using a computer processor" causing the objection is deleted in the main request on file. Thus, this objection became obsolete.

## **2. Remittal pursuant to Article 11 RPBA 2020**

2.1 The board remits the case to the first instance for further processing. In the present case the following facts constitute special reasons for granting the appellants request for remittal pursuant to Article 11 RPBA 2020 (statement of grounds of appeal, page 2,

first 2 lines).

- 2.1.1 For the main request on file, the impugned decision only dealt with Article 123(2) EPC.
- 2.1.2 In the summons to oral proceedings, the examining division raised further objections. However these objections referred to a request preceding the main request on file. Claim 1 and claim 2 of the main request on file differ essentially from the previous version. To examine the further requirements of the EPC, a remittal to the first instance for further prosecution is thus appropriate.

3. **Further remark**

It appears that the wording of claim 2 "*creating a series of points along the first line a point which is offset by beginning at the offset distance from the second point on the first line*" is incorrect and that it should read "*creating a series of points along the first line beginning at a point which is offset by the offset distance from the second point on the first line*".

However, this is a point to be dealt with by the examining division during further prosecution.

**Order**

**For these reasons it is decided that:**

1. The decision is set aside.

2. The case is remitted to the department of first instance for further prosecution on the basis of the main request as filed on 13 July 2020.

The Registrar:

The Chairman:



A. Voyé

G. Pricolo

Decision electronically authenticated