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# D E C I S I O N
## of 17 December 2002

**Case Number:** T 1119/97 - 3.4.1

**Application Number:** 91909834.3

**Publication Number:** 0509062

**IPC:** G01V 1/20

**Language of the proceedings:** EN

**Title of invention:**
A method for acquisition of seismic data at sea

**Patentee:**
GECO A.S.

**Opponent:**
Petroleum Geo-Services AS
Western Atlas International, Inc.

**Headword:**
-

**Relevant legal provisions:**
EPC Art. 52(1), 54(1),(2), 56, 123(2),(3), 69(1)

**Keyword:**
"Novelty, inventive step (yes) - after amendment disclaimer not admissible"

**Decisions cited:**
G 0002/88, T 0528/93, T 0857/91, T 1071/97

**Catchword:**
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**Case Number:** T 1119/97 - 3.4.1

# D E C I S I O N
## of the Technical Board of Appeal 3.4.1
## of 17 December 2002

**Appellant:** (Opponent)
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**Decision under appeal:** **Interlocutory decision of the Opposition Division of the European Patent Office posted 11 September 1997 concerning maintenance of European patent No. 0 509 062 in amended form.**

**Composition of the Board:**

**Chairman:** G. Davies
**Members:** R. Q. Bekkering
M. G. L. Rognoni

## Summary of Facts and Submissions

I. The appeals of the patentee as well as of opponent 1 and opponent 2 lie from the decision of the opposition division, dispatched on 11 September 1997, according to which the European patent No. EP-A-0 509 062 as amended according to the main request was not considered to conform to the requirements of inventive step, whereas the amended patent according to the auxiliary request was considered to meet the requirements of the EPC.

II. The patentee's notice of appeal was received on 11 November 1997, the appeal fee being paid on 10 November 1997, and the statement of grounds of appeal was received on 12 January 1998.

III. The notices of appeal of opponent 1 and opponent 2 were both received on 21 November 1997, the appeal fees being paid on the same day, and identical statements of grounds of appeal on behalf of both opponents were received on 14 January 1998.

IV. With a letter of 16 October 2002 the opponent 2 withdrew its appeal.

V. Oral proceedings were held on 17 December 2002.

VI. The patentee requested that the decision under appeal be set aside and the patent be maintained in amended form on the basis of:

**Main request:**

Claims: Claim 1 filed in the oral proceedings on 17 June 1997;
Claims 2 to 17 of the third request filed with letter of 15 September 1995

Description: Pages 4,7,8 of the third request filed with letter of 15 September 1995;
Remaining description as granted

Drawings: Sheets 11 to 21 as granted

**First auxiliary request:**

Claims: Claims 1 to 18 filed in the oral proceedings on 17 June 1997

Description: Columns 1 to 8 filed in the oral proceedings on 17 June 1997

Drawings: Sheets 11,13 to 17,20,21 as granted
Sheets 12,18,19 filed in the oral proceedings on 17 June 1997

**Second auxiliary request:**

Claims: Claims 1 to 17 filed on 18 November 2002;
Claim 18 as granted

Description and figures to be adapted

**Third auxiliary request:**

Claims: Claims 1 to 13 filed in the oral proceedings on 17 December 2002

Description: Columns 1 to 8 filed in the oral proceedings on 17 December 2002

Drawings: Sheets 11 to 20 filed in the oral proceedings on 17 December 2002

**Fourth auxiliary request:**

Claims: Claims 1 to 13 filed in the oral proceedings on 17 December 2002

Description and figures to be adapted

**Fifth auxiliary request:**

Claims: Claims 1 to 6 filed in the oral proceedings on 17 December 2002

Description and figures to be adapted

VII. The opponent 1 requested that the decision under appeal be set aside and that the patent be revoked.

VIII. Reference was made to the following documents:

D2: "Introduction to Geophysical prospecting" Milton B. Dobrin, Carl H. Savit, 4th edition, McGraw-Hill, 1988, pages 135 to 137

D5: GB-A-1 580 835

D8: "Improving the accuracy of marine 3-D seismic surveys", M.H. Houston, Ocean Industry, January 1987, pages 17 to 22

IX. Claim 1 of the **main request** reads as follows:

"1. *A method of acquisition of seismic data from a marine area which is to be surveyed by towing at least two seismic energy sources and at least two streamers, characterised in that the energy sources and streamers are arranged in accordance with only two groups which form part of the following series:*

*a first group comprising at least two elements of a first type in a linear array arranged substantially transversely to the direction of travel with a spacing X between all adjacent elements, wherein the first elements are either sources or streamers;*

*a second group comprising at least two elements of a second type different to the first type arranged in a linear array arranged substantially transversely to the direction of travel with a spacing between all adjacent elements equal to the product of X and the number of elements in the first group;*

*an Nth group where N is greater than 2, comprising a linear array of elements of the first type when N is odd and of the second type when N is even, arranged substantially transversely to the direction of travel, the array having at least two*

*subgroups each consisting of the N-2th group and the spacing between all mid-points of adjacent subgroups being equal to the spacing between adjacent elements of the N-1th group multiplied by the number of elements in the N-1th group,*

*wherein the sources and streamers are arranged in accordance with the positions determined by a Jth and a J+1th group where J is a number between 1 and N-1 and, in the case of deploying sources and cables according to the first and second groups only, each group comprises at least three elements but excluding an arrangement in which the first group comprises three sources, the second group comprises three streamer cables, adjacent pairs of sources of the first group are laterally spaced apart by 10 metres, and adjacent pairs of streamer cables of the second group are laterally spaced apart by 30 metres."*

X. Claim 1 of the **first auxiliary request** reads as follows:

*"1. Use of a towed marine seismic data acquisition arrangement to avoid duplication of CDP lines, the acquisition arrangement comprising at least two seismic energy sources and at least two streamers arranged in accordance with only two groups which form part of the following series:*

*a first group comprising at least two elements of a first type in a linear array arranged substantially transversely to the direction of travel with a spacing X between all adjacent elements, wherein the first elements are either sources or streamers;*

*a second group comprising at least two elements of a second type different to the first type arranged in a linear array arranged substantially transversely to the direction of travel with a spacing between all adjacent elements equal to the product of X and the number of elements in the first group;*

*an Nth group where N is greater than 2, comprising a linear array of elements of the first type when N is odd and of the second type when N is even, arranged substantially transversely to the direction of travel, the array having at least two subgroups each consisting of the N-2th group and the spacing between all mid-points of adjacent subgroups being equal to the spacing between adjacent elements of the N-1th group multiplied by the number of elements in the N-1th group,*

*wherein the sources and streamers are arranged in accordance with the positions determined by a Jth and a J+1th group where J is a number between 1 and N-1 and, in the case of deploying sources and cables according to the first and second groups only, each group comprises at least three elements."*

XI. Claim 1 of the **second auxiliary request** corresponds to claim 1 of the main request, with the last feature being replaced by the following:

*"in the case of deploying sources and cables according to the first and second groups only, each group comprises at least three elements but excluding an arrangement in which the first group comprises three sources and the second group comprises three streamer cables"*

XII. Claim 1 of the **third auxiliary request** reads as follows:

"1. *A method of acquisition of seismic data from a marine area which is to be surveyed by towing at least two seismic energy sources and at least two streamer cables, wherein the energy sources and streamer cables are arranged in accordance with only two groups which form part of the following series:*

*a first group comprising at least two elements of a first type in a linear array arranged substantially transversely to the direction of travel with a spacing X between all adjacent elements, wherein the first elements are either sources or streamer cables;*

*a second group comprising at least two elements of a second type different to the first type arranged in a linear array arranged substantially transversely to the direction of travel with a spacing between all adjacent elements equal to the product of X and the number of elements in the first group;*

*an Nth group where N is greater than 2, comprising a linear array of elements of the first type when N is odd and of the second type when N is even, arranged substantially transversely to the direction of travel, the array having at least two subgroups each consisting of the N-2th group and the spacing between all mid-points of adjacent subgroups being equal to the spacing between adjacent elements of the N-1th group multiplied by the number of elements in the N-1th group for N=3, or to the spacing between the mid-points of*

*adjacent subgroups of the N-1th group multiplied by the number of subgroups in the N-1th group for N=4,*
*characterised in that the sources and streamer cables are arranged in accordance with the positions determined by the second and third groups or by the third and fourth groups."*

XIII. Claims 1 of the fourth and fifth auxiliary request are based on claim 1 of the third auxiliary request and contain further limitations.

XIV. The patentee argued essentially as follows:

Main request:

Claim 1 contained a disclaimer excluding the pertinent arrangement perpendicular to the direction of travel disclosed in document D5 with three sources with a spacing of 10 metres and three streamer cables with a spacing of 30 metres. The subject-matter of claim 1 was novel over document D5 by virtue of the disclaimer, as well as over the remaining cited prior art, in particular documents D2 and D8. Furthermore, since none of the available prior art documents addressed the problem of avoidance of CDP line duplication, the subject-matter of claim 1 also involved an inventive step.

First auxiliary request:

Claim 1 was directed to the use of the arrangement to avoid CDP line duplication. In accordance with the principles laid down in the Decision of the Enlarged Board of Appeal G 2/88 (OJ 1990, 93), the attaining of the technical effect underlying the use had to be considered as a technical feature of the claimed invention. Since the avoidance of CDP line duplication

was not known from document D5, the claimed subject-matter had to be considered novel over D5. The subject-matter of claim 1 was also novel with respect to the remaining cited prior art. Furthermore, it also involved an inventive step in substance for the same reasons given with respect to the main request.

Second auxiliary request:

Claim 1 contained a disclaimer excluding the arrangement perpendicular to the direction of travel disclosed in document D5 with three sources and three streamer cables.

The disclaimer was admissible since document D5 was not concerned with the avoidance of CDP line duplication and thus the disclaimed subject-matter constituted an "accidental disclosure".

The subject-matter of claim 1 was also novel with respect to the remaining cited prior art. Furthermore, it also involved an inventive step in substance for the same reasons given with respect to the main request.

Third auxiliary request:

Claim 1 was directed to a method involving towing more complex arrays of sources and streamers without CDP line duplication. These arrangements were neither known nor rendered obvious by any of the available prior art documents.

XV. The arguments of the opponent 1 may be summarised as follows:

Main request:

The disclaimer in claim 1 only excluded the arrangement perpendicular to the direction of travel disclosed in document D5 with three sources and three streamer cables with spacings of 10 metres and 30 metres, respectively. However, the spacings of 10 and 30 metres were only exemplary and document D5 taught in more general terms that the spacing between the sources was a third of the spacing between the streamer cables. Since the subject-matter of claim 1 included this more general teaching of D5 it lacked novelty.

First auxiliary request:

The Decision of the Enlarged Board of Appeal G 2/88 merely concerned the use of a compound and therefore had no bearing on the present claimed subject-matter.

Moreover, even if the principles laid down in this decision were to be applied to the present case, it was a prerequisite for novelty that the technical effect underlying the claimed use was not made available to the public. However, the technical effect of preventing CDP line duplication as a result of a judicious deployment of sources and streamer cables was part of the general knowledge of the skilled person as also exemplified by documents D2 and D8. Therefore, the skilled reader of D5 must have been aware of the fact that with the described arrangement CDP line duplication did not occur.

Second auxiliary request:

The request corresponded in substance to the fourth auxiliary request already withdrawn in the opposition proceedings and should therefore not be admitted in the appeal proceedings (cf T 528/93).

Moreover, document D5 also disclosed an arrangement perpendicular to the direction of travel with three sources and six streamer cables. Accordingly, the subject-matter of claim 1 lacked novelty.

Third auxiliary request:

The amendments to claim 1 infringed Article 123(2) EPC as the originally filed application documents did not provide a basis for the claimed selection of groups.

Furthermore, the amendments also infringed Article 123(3) EPC as claim 1 as granted provided a clear teaching yielding a different array than the one defined by the claim as amended.

Furthermore, the subject-matter of claim 1 was rendered obvious by document D5 together with documents D2 and D8. In particular, document D5 disclosed the principle of relating the spacing between the elements in one group to the product of the number of elements and their spacing in another group. There would be no difference to apply this principle to elements or subgroups. Accordingly the skilled person would have arrived at the claimed subject-matter without the exercise of inventive skills.

## Reasons for the Decision

1. The appeal complies with the requirements of Articles 106 to 108 and Rule 64 EPC and is therefore admissible.

2. *Main request*

2.1 Novelty (Articles 52(1), 54(1),(2) EPC)

Document D5 (cf page 4, lines 66 to 95, Figure 3) discloses as one of the embodiments, in analogy with the wording of claim 1, a method of acquisition of seismic data from a marine area which is to be surveyed by towing an arrangement of energy sources and streamer cables, with three sources arranged in a linear array substantially transversely to the direction of travel and three streamer cables arranged in a linear array substantially transversely to the direction of travel.

The streamer cables are separated by an intertrace spacing $i_t$. Furthermore, each of the streamer cables comprises a row of 24 receivers separated by the same spacing $i_t$. The spacing $i_t$ is defined by $i_s=K.i_t/n$ with $K\neq n$, wherein $i_s$ is the intersource spacing between the sources, n is the number of sources and K is a coefficient. Accordingly for an arrangement with three sources, $i_s=K.i_t/3$ with $K\neq 3$.

In particular, an arrangement is mentioned with $i_s=i_t/3$ (i.e. K=1), where the distance between the streamer cables ($i_t$) is 30 metres when the distance between the sources ($i_s$) is 10 metres. However, as stated, these

indications of distance are merely given to enable better understanding of the invention. In the exploration zone other actual and normally used distances are selected.

Since the subject-matter of claim 1 encompasses these known arrangements, it lacks novelty over document D5.

The main request is therefore not allowable.

3. *First auxiliary request*

3.1 Novelty (Articles 52(1), 54(1),(2) EPC)

Although the Decision of the Enlarged Board of Appeal G 2/88 specifically addresses the use of a known compound, the expounded principle is applicable to any physical entity.

Claim 1 is directed to the use of a towed marine seismic data acquisition arrangement to avoid duplication of CDP lines, the arrangement *per se* being known from document D5 (see section 2.1 above).

In accordance with the principles laid down in G 2/88, claim 1 is to be interpreted as implicitly including the functional technical feature that the arrangement, when used, in fact achieves the effect of avoiding CDP line duplication.

Document D5 discloses the use of a towed marine seismic data acquisition arrangement with the sources and streamer cables arranged on a line perpendicular to the direction of travel in order to improve the coverage (cf page 2, lines 66 to 77). The collected data provide information about the geological constitution of the seabed at the reflection points, whereby a reflection point, or Common Depth Point (CDP), is defined as the

point in the stratum or interface where reflection of the wave emitted by the source occurs which is located on the right bisector of the line connecting a source to a receiver of a streamer cable. Due to the fact that the arrangement is towed, the reflection points form lines (CDP lines) along the direction of travel. In order to correlate the collected data to the prospected seabed, it is indispensable to know where the precise location of the CDP-lines is and with that whether CDP-lines coincide. Accordingly, it would be implicit to the skilled reader of document D5 that the disclosed arrangement with three sources and three streamer cables arranged on a line perpendicular to the direction of travel with an intertrace corresponding to a third of the spacing between the sources avoids CDP-line duplication.

Accordingly, the functional technical feature that the arrangement, when used, achieves the effect of avoiding CDP line duplication was already made available by document D5. The subject-matter of claim 1 therefore lacks novelty.

The first auxiliary request is therefore not allowable.

4. *Second auxiliary request*

4.1 Admittance in the proceedings

The second auxiliary request constitutes in the board's view an earnest attempt on the side of the patentee to overcome the issues addressed in the annex to the summons to the oral proceedings and is therefore admitted into the proceedings.

As far as the objections of opponent 1 against the admittance of this request are concerned, it is noted that the request as such is not identical to the one presented and later withdrawn in the first instance opposition proceedings. Furthermore, unlike in the case underlying decision T 528/93 referred to, where a higher ranking, broader request than the one on which eventually the patent was maintained in amended form, was withdrawn and subsequently resubmitted in appeal, in the present case a lower ranking (fourth auxiliary) request was withdrawn. The principle expounded in the referred decision that by withdrawing a request the patentee waives the opportunity of obtaining a first instance ruling on it with the corresponding opportunity of rendering it the subject of an appeal, is not applicable on lower ranking requests which at any rate would not have been considered in the first instance decision.

4.2 Admissibility of the amendments (Article 123(2) EPC)

Claim 1 as amended contains a disclaimer excluding an arrangement in which the first group comprises three sources and the second group comprises three streamer cables based on the disclosure of document D5.

According to T 857/91, a prerequisite for the admissibility of a disclaimer is that the disclaimed subject-matter constituted an "accidental disclosure", which means that "the disclosure is directed to a different purpose, solves a different problem and has no bearing on the problem and solution addressed by the invention". However, in the present case the disclaimed disclosure is equally well directed to a method of

acquisition of seismic data from a marine area and comprises towing an arrangement of sources and streamer cables in which, as discussed above, it is implicit to the skilled reader that no duplication of CDP lines is present (see also T 1071/97).

Accordingly, the disclaimed subject-matter cannot be considered to be an accidental disclosure which has no bearing on the problem and solution addressed by the invention. The disclaimer is therefore not admissible (Article 123(2) EPC).

The second auxiliary request is therefore not allowable.

5. *Third auxiliary request*

5.1 Admissibility of the amendments (Article 123(2),(3) EPC)

5.1.1 Claim 1 as amended contains the limitation that the sources and streamer cables are arranged in accordance with the positions determined by the second and third groups or by the third and fourth groups. According to the application documents as originally filed, the positions of the sources and streamer cables may be determined by two or more successive groups (cf original claim 2). Moreover, in a number of specific embodiments the positions are determined either by the second and third groups or by the third and fourth groups. Accordingly, the limitation is not considered to introduce subject-matter extending beyond the content of the application as filed.

Furthermore, claim 1 has been amended by clarifying the definition of the spacing between the mid-points of adjacent subgroups in the fourth group. The amendment is derivable from step III of claim 1 as originally filed as well as from the description corresponding to Figure 4 (cf page 8, first paragraph). Accordingly, the amendment finds proper support in the originally filed application documents.

Amended claim 1 is therefore admissible under Article 123(2) EPC.

5.1.2 The above-mentioned limitation in amended claim 1 does not give rise either to any objection under Article 123(3) EPC.

As to the second, above-mentioned amendment, it is noted that claim 1 as granted contains an ambiguous definition as far as the spacing between the mid-points of adjacent subgroups in the Nth group is concerned for N greater than 3. In particular, for N=4, claim 1 as granted defines that the spacing between all mid-points of adjacent subgroups is equal to the **spacing between adjacent elements** of the third (N-1th) group multiplied by the number of elements in the third group. However, in accordance with claim 1 as granted, the third group consists of a linear array of elements, which are either sources or streamer cables, the array having at least two subgroups each consisting of the first group and the spacing between all mid-points of adjacent subgroups being equal to the spacing between adjacent elements of the second group multiplied by the number of elements in the second group. The spacing between the elements in the first group is X and the spacing in

the second group is equal to the product of X and the number of elements in the first group. Hence, the third group consists of subgroups with a spacing X between the elements within the subgroups, and with a spacing between the midpoints of the subgroups equal to the product of X, the number of elements in the first group and the number of elements in the second group. Accordingly, the elements in the third group are not equidistant and therefore there is no unambiguously defined "spacing between adjacent elements".

Hence, in order to determine the extent of protection conferred by the patent as granted, reference has to be made to the description and drawings in order to resolve the ambiguity found in claim 1 as granted (Article 69(1) EPC and the Protocol on the Interpretation of Article 69 of the Convention).

From the description and the drawings of the granted patent (see in particular Figure 4a and the description column 5, line 43 to column 6, line 11) it becomes apparent that in the fourth group the spacing between all mid-points of adjacent subgroups is equal to the **spacing between the mid-points of adjacent subgroups** of the third group multiplied by the number of elements in the third group.

Claim 1 according to the third request resolves the ambiguity in claim 1 as granted by an amendment corresponding to the above.

Accordingly, the board is satisfied that the amendment to claim 1 does not extend the protection conferred (Article 123(3) EPC).

5.2 Novelty, inventive step (Articles 52(1), 54(1),(2), 56 EPC)

As discussed above, the arrangements used in document D5 have equidistant sources and equidistant streamer cables.

In contrast thereto, the subject-matter of claim 1 under consideration defines methods involving towing arrays wherein the elements arranged in accordance with the third and/or fourth groups are not equidistant. Still, the arrangements are such that no duplication of CDP lines occurs.

Since document D5 does not disclose such more complex arrangements, the subject-matter of claim 1 is novel over D5.

The subject-matter of claim 1 is also novel over the remaining cited prior art. Both document D2 (cf Figures 5 to 11 and corresponding text) and document D8 (cf Figure 2 and corresponding description) merely disclose the use of simple arrays with two sources and two receivers.

Furthermore, none of the available prior art provides any suggestion allowing to arrive at the method according to claim 1. Yet, towing arrangements in which the elements are not equidistant may offer advantages under certain circumstances where for instance two or more towing vessels are used each towing a subgroup of the elements or where obstacles are present in the towing area.

The opponent 1 argued in this respect that the skilled person would have arrived at the claimed subject-matter in an obvious manner by replacing the elements in the arrangements suggested in document D5 by groups of elements. However, there is no suggestion in D5 or in any of the remaining prior art to do so. Furthermore, the teaching of document D5 is based on a selection of the intersource and intertrace distances based on the equation discussed above. However, it is not apparent how this equation should be applied in case of substitution of elements by groups of elements. Moreover, the spacing between the elements in the subgroups would largely affect the positioning of the elements. There is however no indication as to how account should be taken of this spacing.

In view of the above, the subject-matter of claim 1 is considered to involve an inventive step.

The remaining claims 2 to 13 are dependent on claim 1 and directed to further developments of the subject-matter of claim 1. Therefore, the subject-matter of these claims also involves an inventive step.

Thus, the third auxiliary request is allowable.

6. As a consequence, a discussion of the remaining auxiliary requests is not necessary.

## Order

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

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent on the basis of the following documents in accordance with the patentee's third auxiliary request:

| | |
|---|---|
| Claims: | Claims 1 to 13 filed in the oral proceedings on 17 December 2002 |
| Description: | Columns 1 to 8 filed in the oral proceedings on 17 December 2002 |
| Drawings: | Sheets 11 to 20 filed in the oral proceedings on 17 December 2002 |

The Registrar: The Chairman:

R. Schumacher G. Davies