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D E C I S I O N
of 18 May 2005

Case Number: T 0237/02 - 3.4.1

Application Number: 95302387.6

Publication Number: 0677853

IPC: G21C 17/07

Language of the proceedings: EN

Title of invention:
System for detection of defective nuclear fuel rod

Patentee:
GENERAL ELECTRIC COMPANY

Opponent:
Framatome ANP GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 56, 100(a)

Keyword:
"Admissibility of new arguments submitted in the oral proceedings (yes)"
"Admissibility of auxiliary requests (yes)"
"Inventive step -main request (no), auxiliary request 1 (yes)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0237/02 - 3.4.1

D E C I S I O N
of the Technical Board of Appeal 3.4.1
of 18 May 2005

Appellant: (Opponent)
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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office posted 22 January 2002 concerning maintenance of European patent No. 0677853 in amended form.**

Composition of the Board:

Chairman: B. J. Schachenmann
Members: M. G. L. Rognoni
H. K. Wolfrum

Summary of Facts and Submissions

I. The appellant (opponent) lodged an appeal, received on 27 February 2002, against the interlocutory decision of the opposition division, posted on 22 January 2002, maintaining the European patent No. 0 677 853 in amended form. The fee for the appeal was paid on 27 February 2002 and the statement of grounds of appeal was received on 17 May 2002.

II. The opposition had been filed against the patent as a whole, based on Article 100(a) EPC.

III. Referring, *inter alia,* to the following documents:

D1: US-A-4 034 599
D2: US-A-3 617 709
D7: US-A-4 248 666,

the opposition division found that the subject-matter of claim 1 according to the auxiliary request then on file involved an inventive step over the combination of D1 and D2, and that the subject-matter of independent claim 9 also involved an inventive step over D7.

IV. In response to a communication from the Board accompanying the summons to oral proceedings, the respondent (patentee) filed by letter dated 18 April 2005 four sets of claims by way of auxiliary requests 1 to 4, and, *inter alia,* contested the finding of the opposition division concerning the disclosure in D1 of the following feature recited in claim 1 of the patent in suit:

"*means for accumulating mainly/substantially a fission gas sample from coolant trapped under*" a sipping hood.

V. Oral proceedings were held on 18 May 2005.

VI. The appellant requested that the decision under appeal be set aside and that the patent be revoked.

VII. The respondent requested that the appeal be dismissed and that the patent be maintained as amended according to the interlocutory decision of the opposition division (main request), or on the basis of one of the sets of claims filed in the oral proceedings as auxiliary requests 1 to 3 respectively.

The wording of claim 1 according to the main request reads as follows:

"1. A system for in situ detecting a defective fuel rod in a fuel assembly (4) comprising a sipping hood (2) which fits on top of the fuel assembly, characterized by:

means (14) for accumulating mainly/substantially a fission gas sample from coolant trapped under said sipping hood; and

means (30, 46) for detecting the presence of krypton in said gas sample comprising separation column (30) containing material for adsorbing xenon and passing krypton in a gas sample flowing through said separation column, and a beta detector (46) for detecting the beta activity in said gas sample after removal of xenon by said separation column."

Claims 1 to 8 are dependent on claim 1.

The wording of claim 9 according to the main request reads as follows:

"9. A system for detecting a defective fuel rod in first and second fuel assemblies (4), characterized by: first and second sipping hood means (1,2) arranged on top of said first and second fuel assemblies respectively;

first and second bundle selection valve means (74,78) respectively coupled to said first and second sipping hood means;

means (46) for detecting the level of beta activity in a gas sample; first and second gas sample valve means respectively coupled to said beta activity level detecting means;

first and second separation channels (22A, 30A, 38A and 22B, 30B, 38B) having respective inlets selectively coupled to said first and second sipping hood means by said first and second bundle selection valve means respectively, and having respective outlets selectively coupled at different times to said beta activity level detecting means by said first and second gas sample valve means respectively; and

programmable logic control means (90) coupled to said first and second bundle selection valve means and to said first and second gas sample valve means for controlling said valve means to multiplex respective gas samples from said first and second sipping hoods through said first and second separation channels respectively."

The wording of claim 1 according to auxiliary request 1 reads as follows:

"1. A system for in situ detecting a defective fuel rod in a fuel assembly (4) comprising a sipping hood (2) which fits on top of the fuel assembly, characterized by:

means (14) for accumulating mainly/substantially a fission gas sample from coolant trapped under said sipping hood; and

means (30, 46) for detecting the presence of krypton in said gas sample comprising a separation column (30) containing material for adsorbing xenon and passing krypton in a gas sample flowing through said separation column, and a beta detector (46) for detecting the beta activity in said gas sample after removal of xenon by said separation column, and wherein said separation column contains material for adsorbing moisture in a gas sample flowing through said separation column, said moisture-adsorbing material being placed upstream of said xenon-adsorbing material."

Claims 2 to 7 are dependent on claim 1.

The wording of claim 8 according to the auxiliary request 1 reads as follows:

"8. A system for detecting a defective fuel rod in first and second fuel assemblies (4), characterized by:

first and second sipping hood means (1,2) arranged on top of said first and second fuel assemblies respectively;

first and second bundle selection valve means (74,78) respectively coupled to said first and second sipping hood means;

means (46) for detecting the level of beta activity in a gas sample;

first and second gas sample valve means respectively coupled to said beta activity level detecting means;

first and second separation channels (22A, 30A, 38A and 22B, 30B, 38B), each separation channel comprising a separation column containing material for adsorbing xenon and passing krypton in a gas sample flowing through said separation column, the separation channels having respective inlets selectively coupled to said first and second sipping hood means by said first and second bundle selection valve means respectively, and having respective outlets selectively coupled at different times to said beta activity level detecting means by said first and second gas sample valve means respectively; and

programmable logic control means (90) coupled to said first and second bundle selection valve means and to said first and second gas sample valve means for controlling said valve means to multiplex respective gas samples from said first and second sipping hoods through said first and second separation channels respectively."

Claim 1 according to the auxiliary request 2 is identical to claim 1 of the auxiliary request 1.

Claim 8 according to auxiliary request 2 differs from the corresponding claim of auxiliary request 1 in that it further specifies that each separation channel comprises "*material for adsorbing moisture in a gas sample flowing through said separation column, said*

moisture-adsorbing material being placed upstream of said xenon-adsorbing material".

Claim 1 according to auxiliary request 3 differs from the corresponding claim of auxiliary requests 1 and 2 in that it further comprises the following feature:

– the system further including means (34) for heating said separation column and means (32) for cooling said separation column."

The same feature is specified in claim 7 of auxiliary request 3 as follows:

– "the first and second channels further include respective means (34) for heating said separation column and means (32) for cooling said separation column".

VIII. The arguments of the appellant may be summarised as follows.

The respondent submitted auxiliary requests only one month before the date of the oral proceedings. These requests should be regarded as late-filed and thus not be admitted into the appeal proceedings.

Claim 1 according to the main request comprised features which were directed to the solution of the problem of collecting a fission gas sample and features which related to the detection of krypton in such a gas sample in order to determine whether a fuel rod was defective. All the features recited in claim 1 were known either from D7 or from D2, whereby D7 disclosed a

system for collecting fission gases released by defective fuel rods and D2 showed a system for detecting fission gases, in particular krypton. As it would have been obvious to the person skilled in the art to combine these two documents, the subject-matter of claim 1 did not involve an inventive step within the meaning of Article 56 EPC.

Claim 1 according to auxiliary request 1 differed from claim 1 of the main request in that it further comprised means for removing moisture from fission gases. It was generally known in the art that, due to the polarity of water molecules, moisture would be more easily adsorbed than xenon by the adsorbant in a separation column and thus negatively affect the separation of xenon from the fission gas sample in such a column. In view of this background knowledge, it would have been obvious to the person skilled in the art to make provision for removing moisture from the fission gases prior to passing them though the separation column. In fact, D1 taught to remove moisture from fission gases by means of a gas chiller before measuring their beta activity. The choice of a moisture-adsorbent located upstream of the xenon-adsorbent was a straightforward technical measure which did not involve any inventive activity on the part of the skilled person. Thus, the subject-matter of claim 1 did not satisfy the requirement of Article 56 EPC.

As to claim 8 according to auxiliary request 1, document D7 disclosed a system for collecting fission gas samples comprising a plurality of sipping hoods arranged on top of fuel assemblies, gas sample collecting chambers and valves for coupling the sipping

hoods to the corresponding gas sample collecting chambers. Starting from the system according to D7, a person skilled in the art was faced with the problem of providing a beta radiation detector means and connecting it to the known gas sample collecting system. Simply for reasons of economy, the skilled person would have discarded the possibility of providing a detector for each sipping hood and would have opted for the solution of selectively connecting the sipping hoods to a single beta radiation detector. In doing so, the skilled person would have arrived at a system falling within the terms of claim 8 without exercising any inventive activity.

IX. The respondent argued essentially as follows:

The appellant's arguments against the inventive step of claim 1 according to the main request, based on the combination of D7 and D2, had never been submitted in writing and were first put forward by the appellant in the oral proceedings before the Board. A line of argument based on a new combination of documents constituted "new facts" which should not be admitted at such a late stage of the appeal proceedings. If, however, the Board considered that this combination of documents was relevant to the outcome of the appeal, the proceedings should be continued in writing, or the case should be remitted back to the first instance for further prosecution.

As to the substance of the new objections raised by the appellant against the inventive step of claim 1 of the main request, they were based on two documents which could not be combined. In fact, D7 suggested analysing

fission gases either by removing the gas sample collecting chambers and sending them to a laboratory or by passing the gas sample through a circulation circuit including a circulating pump and a radioactivity detector. However, a detection performed by continuously circulating a gas sample was not compatible with the detection of fission gases taught in D2. In fact, this document relied on the temporal separation of different gases within a separation column and did not suggest that xenon was effectively removed. If the gas sample was continually circulated, as taught in D7, and xenon was adsorbed but not removed by the separation column, it would eventually pass through the separation column, reach the detector and make the separate detection of krypton impossible. Thus, the subject-matter of claim 1 of the main request involved an inventive step over the cited prior art.

As to claim 1 according to auxiliary request 1, the addition of this feature constituted a measure which was not obvious to the person skilled in the art. As none of the prior art documents suggested that it would be advantageous to remove moisture from a fission gas sample by introducing a moisture-absorbing material upstream of the xenon-absorbing material, the subject-matter of this claim involved an inventive step.

As to claim 8 of auxiliary request 1, D7 did not teach to use a single detecting unit and to selectively couple different sipping hoods with such unit in order to sequentially analyse gas samples released by predetermined bundles of a fuel assembly. Hence, also the subject-matter of this claim involved an inventive step.

Reasons for the Decision

1. The appeal is admissible.

Main Request

2.1 The patent in suit relates to a system for *in situ* identifying a defective fuel rod in a fuel assembly based on the detection of krypton escaping from leaks in the fuel rod cladding. As pointed out in the description (see published patent specification, column 4, lines 1 to 10), the system of the invention comprises a first subsystem for collecting fission gases released by defective fuel rods and a second subsystem for determining the presence of krypton, in particular of Kr_{85}, in a fission gas sample.

2.2 Claim 1 comprises the following features for collecting fission gases (and thus relating to the first subsystem identified in the description):

(a) "a sipping hood (2) which fits on top of the fuel assembly",

(b) "means (14) for accumulating mainly/substantially a fission gas sample from coolant trapped under said sipping hood",

and the following features for determining the presence of krypton (and thus constituting a second subsystem):

(c) "means (30, 46) for detecting the presence of krypton in said gas sample comprising separation column (30) containing material for adsorbing xenon and passing krypton in a gas sample flowing through said separation column",

(d) "a beta detector (46) for detecting the beta activity in said gas sample after removal of xenon by said separation column".

2.3 According to the appellant, D7 related to a system for collecting fission gases released by defective fuel rods which comprised features (a) and (b) of claim 1, whereas D2 was concerned with the detection of specific fission gases and thus disclosed features (c) and (d). As it was straightforward to a person skilled in the art to combine the subsystem shown in D7 with the subsystem according to D2, the subject-matter of claim 1 of the main request did not involve an inventive step.

2.4 As to the objection raised by the respondent against the introduction of a new line of argument by the appellant at a late stage of the appeal proceedings, the Board notes that both D7 and D2 had been filed with the statement of grounds of opposition, and that the opposition division considered D7 to be prior art relevant to the subject-matter of claim 9 of the main request then on file (corresponding to claim 10 of the patent as granted), which related to a subsystem for collecting fission gases. Thus, documents D2 and D7 must not, as such, be disregarded under Article 114(2) EPC as being late filed.

Moreover, it seems fair to assume that, at the time of the oral proceedings before the Board, the respondent was not only already familiar with the content of D7 but should also have been aware of its possible relevance to the subject-matter of claim 1 of the present main request, as far as it disclosed features for collecting fission gases released by defective fuel rods. In effect, in its communication accompanying the summons to oral proceedings, the Board had drawn the parties' attention to some aspects of D7 concerning the *in situ* collection and analysis of fission gases.

Finally, the appellant's reliance on a new combination of documents, already referred to in the statement of grounds of opposition and discussed in the contested decision, cannot be regarded as an attempt to introduce "new facts" into the appeal proceedings. It should rather be considered as a legitimate reappraisal of the known prior art in the light of the respondent's counterarguments and, in particular, of an objection raised by the respondent one month before the date of the oral proceedings (see letter dated 18 April 2005) against the disclosure of feature (b) of claim 1 in document D1.

Under these circumstances, the Board sees no need to continue the procedure in writing or to remit the case to the first instance for further prosecution pursuant to Article 111(1) EPC, as requested by the respondent.

3.1 Document D7 (see column 1, lines 28 to 37) relates, *inter alia,* to a system for detecting the leakage of radioactive gas from a fuel assembly located in the nuclear core. As shown in Figure 4, the system of D7

comprises the following features recited in claim 1 of the main request:

-- a sipping hood (11) which fits on top of the fuel assembly (12), and

-- means (13,19) for accumulating mainly/substantially a fission gas sample from coolant trapped under said sipping hood (see column 3, lines 50 to 56).

Document D7 does not show any means for detecting the presence of fission gases in the gas samples collected in the chambers (19) and merely suggests that the gas could be led to a radioactivity detector by means of "*a circulation circuit including a gas circulating pump and a radioactivity detector*", or that the "*chambers forming collecting spaces 19*" could be separated and transported to a laboratory for examination (see column 3, line 64 to column 4, line 5).

Hence, the person skilled in the art, starting from the teaching of D7 and wishing to develop a viable system for *in situ* collecting and detecting fission gases released by defective fuel rod assemblies, is faced with the problem of finding a suitable subsystem capable of detecting the presence of such gases.

3.2 Document D2 is essentially concerned with the detection of krypton and xenon as fission gases released from defective fuel rods and teaches, inter alia, that a gas mixture of argon, krypton and xenon can be separated into individual gases by passing it through a column filled with a molecular sieve material consisting of

"*synthesized inorganic absorbents*", or charcoal (column 1, lines 40 to 48). As pointed out in D2, krypton and xenon can be separated from each other for individual detection so that it is *"possible to detect fuel failures without any danger of misconception"* (column 1, lines 60 to 64). A carrier gas transports the fission gases stored in the sampling tubes 5, 6 and including argon, krypton and xenon, through respective separation columns 21 and 22. The molecular sieve or activated charcoal located in column 22 separates argon and krypton from each other. *"That is, Ar is first detected and then Kr is detected after an appropriate time of approximately three minutes. On the other hand, Xe, having a higher absorption characteristic to either filler material, is held therein for an extremely long period of time as compared to Ar and Kr and issues considerably later"* (D2, column 2, lines 29 to 33). The fact that Xe is held *"for an extremely long period of time"* within the separation column 22 implies that it is effectively removed from the gas sample which enters the detector for the separate detection of argon and krypton.

Thus, document D2 shows a subsystem for detecting the presence of krypton in a sample of fission gases released from a defective fuel rod which comprises the following features recited in claim 1 according to the main request (the terms *"absorption*" and "*adsorption*" being used as synonymous in the patent in suit):

-- a separation column (22) containing material for adsorbing xenon and passing krypton in a gas sample flowing through said separation column,

-- a beta detector (28) for detecting the beta activity in said gas sample after removal of xenon by said separation column.

3.3 All the features recited in claim 1 according to the main request are therefore known from D7 or D2. The decisive question to be considered, however, is whether such a combination of documents would be obvious to a person skilled in the art.

3.4 The respondent essentially argued that the subsystem for detecting krypton shown in D2 was not compatible with the subsystem for collecting the fission gas samples according to D7 and that the skilled person would have had no incentive to combine the teachings of these two documents. In particular, the respondent argued that the system of D2 did not remove xenon from the gas fission sample but simply slowed its flow to the beta detector. As also xenon eventually reached the detector, a separate measurement of krypton and xenon was not possible. Furthermore, D2 required the presence of Q-gas as carrier gas. As a mixture of helium and methane, Q-gas was, however, not suitable for use in the core of a nuclear reactor.

On the other hand, D7 specifically indicated that, in the case of *in situ* detection, fission gases were continuously passed through a circulating circuit including a gas pump. This mode of operation excluded the use of a separation column which merely delayed the passage of xenon through adsorption.

3.5 As to the first objection raised by the respondent, the Board cannot see any difference between the concept of

delaying the passage of xenon through a separation column "*for an extremely long period of time*", as compared to argon and krypton, and the "*removal*" of xenon from a gas sample that reaches the detector. In effect, both the contested patent and D2 rely on the same means, *i.e.* a separation column filled with a gas adsorbant, for separating xenon and krypton.

As to the presence of a carrier gas in the system of D2, the claim under consideration does not exclude the possibility that a carrier gas may also be used. On the contrary, it is explicitly indicated in the description of the contested patent (column 9, lines 16 to 18) that the *"gas sample in the ampoule 38 is transported to the beta detector 46 by an inert carrier gas, e.g., nitrogen"*.

As to the objection that D7 implied the detection of fission gases by circulating them through a detector, this document merely specifies (column 3, lines 64 to 68) that in "*order to investigate the gas contained within collecting spaces 19 for radioactivity, valves 20 and 21 may be opened with the gas passing through a circulation circuit including a gas circulating pump and a radioactivity detector*". This, however, does not imply that the detection of krypton in the gas sample must be carried out by continuously circulating the gas sample through a separation column and the detector. According to a plausible interpretation of the cited passage, D7 would simply suggest that a circuit comprising a pump may be used to transport the gas sample from the chamber 19 to the radiation detector and possibly back to the chamber 19 before being disposed of in an unspecified manner. Furthermore, as

pointed out by the appellant, it would not present any technical problem to combine the arrangement known from D7 with the system shown in Figure 1 of D2 which comprises an inlet 4 for the fission gas sample and an outlet 30 from the detector which could be coupled to the valves 20 and 21 of the chamber 19 shown in Figure 2 of D7 so as to form a "*circuit*" as specified in this document.

3.6 In summary, the Board finds that it would be obvious to a person skilled in the art to apply the teaching of D2 to a system for collecting fission gases escaping from a defective fuel rod as known from D7. As the combination of D7 and D2 covers all the features recited in claim 1, the subject-matter of this claim does not involve an inventive step within the meaning of Article 56 EPC.

Hence, the respondent's main request is not allowable.

Admissibility of the respondent's auxiliary requests

4.1 The auxiliary requests 1 to 4 filed by the respondent one month before the date of the oral proceedings were based on claims 1 to 9 of the patent as maintained by the opposition division, whereby some of the features of the dependent claims were recited in the independent claims. Obviously, these amendments were occasioned by a ground of opposition (Rule 57a EPC). The Board regards the filing of such requests within the time limit indicated in the communication accompanying the summons to the oral proceedings as a legitimate attempt on the part of the patent proprietor to defend its patent within the framework of the opposition.

Furthermore, as these requests did not introduce any subject-matter which had not been claimed before, and, as submitted by the respondent, were sent directly by the respondent to the appellant within the given time limit, the appellant should have had ample opportunity to deal with such requests.

In conclusion, the Board has no objection against admitting the respondent's auxiliary requests into the appeal proceedings.

4.2 In the oral proceedings, the respondent replaced the auxiliary requests 1 to 4 with new auxiliary requests 1 to 3 based on the same sets of claims of the previous requests. In particular, claims 1 to 7 of auxiliary request 1 correspond to claims 1 to 7 of the previous auxiliary request 1, and claim 8 to claim 9 of the previous auxiliary request 2.

The appellant raised no objections in the oral proceedings against the admission into the proceeding of the new amended auxiliary requests, and the Board is satisfied that the latest requests, which are based on claims as granted, are also admissible under Article 123(2) and (3) EPC.

Auxiliary request 1

5.1 Claim 1 according to auxiliary request 1 differs from the corresponding claim of the main request in that it comprises the following additional features:

-- "*and wherein said separation column contains material for adsorbing moisture in a gas sample*

flowing through said separation column, said moisture-adsorbing material being placed upstream of said xenon-adsorbing material."

In the opinion of the Board, these features imply that the separation column comprises a first section with material for adsorbing moisture in a gas sample and a second section comprising material for adsorbing xenon, whereby the first section is placed upstream of the second section. This interpretation is confirmed by the description (column 8, lines 49 to 52) which specifies the following:

-- *"The moisture/separation column 30 contains two packings: a first packing which absorbs moisture and a second packing which absorbs xenon gas but passes krypton gas."*

5.2 As pointed out by the respondent, the purpose of this feature is to remove moisture at the molecular level from the gas sample before it reaches the xenon adsorbing material. The absence of water molecules in the gas sample would favour the adsorption of xenon in the separation column.

5.3 As submitted by the appellant, it could be regarded as generally known that the presence of moisture in the gas sample passing through the separation column would reduce the adsorption of xenon, and that the concentration of moisture in a gas sample should be limited. However, the appellant has not provided any evidence suggesting that it would be obvious to a person skilled in the art to remove moisture at the molecular level by means of a moisture adsorbing

material located in the separation column upstream of the xenon adsorbing material, as specified in claim 1. The only document (D1) referred to by the appellant relies on a gas chiller and water traps 13 and 22 and points out that *"use of the gas chiller 11 is not essential but it is desirable to prevent condensation of water vapor in other portions of the test apparatus"* (D1, column 3, lines 41 to 44). Furthermore, the system of D1 does not comprise a separation column for removing xenon from a fission gas sample and thus does not present the problem of reduced xenon adsorption due to the presence of water molecules in the gas sample.

5.4 Hence, in the opinion of the Board, it would not be obvious to a person skilled in the art, starting from D7 and relying on the combination of the teachings of D7 and D2 for developing a system for detecting a defective fuel rod, to consider the possibility of improving the separation of krypton from xenon, by removing moisture from the fission gas sample, as specified in claim 1 according to auxiliary request 1. The subject matter of this claim thus involves an inventive step within the meaning of Article 56 EPC.

5.5 As claims 2 to 7 are dependent on claim 1, their subject-matter also fulfils the requirement of inventive step.

6.1 Independent claim 8 relates to a system for detecting a defective fuel rod in first and second fuel assemblies, which comprises, *inter alia,* the following features:

-- first and second sipping hood means arranged on top of said first and second fuel assemblies respectively;

-- first and second bundle selection valve means respectively coupled to said first and second sipping hood means;

-- first and second separation channels, each separation channel comprising a separation column containing material for adsorbing xenon and passing krypton in a gas sample flowing through said separation column, the separation channels having respective inlets selectively coupled to said first and second sipping hood means by said first and second bundle selection valve means respectively.

In the opinion of the Board, the above features imply that each hood means and each bundle selection valve means are so configured and arranged as to direct fission gases released by a predetermined bundle of rods of the first or second fuel assembly to the inlet of the first or the second separation channel.

Furthermore, the system according to claim 8 comprises:

- first and second gas sample valve means respectively coupled to a beta activity level detecting means and

- respective outlets of the first and second separation channels selectively coupled at different times to said beta activity level

detecting means by said first and second gas sample valve means respectively.

- programmable logic control means coupled to said first and second bundle selection valve means and to said first and second gas sample valve means for controlling said valve means to multiplex respective gas samples from said first and second sipping hoods through said first and second separation channels respectively.

The above combination of features allows samples of fission gases released from predetermined sets ("*bundles*") of the fuel rods of the fuel assemblies to be sequentially directed through the first or the second separation channel to the beta activity detector.

6.2 This interpretation of the claim is confirmed by Figure 4 and the corresponding description of the patent specification. According to column 10, lines 9 to 13, of the patent specification, *"each degas tank is coupled to receive a first fluid sample from a respective head of one hood during a first cycle and then receive a second fluid sample from a respective head of the other hood during a second cycle*". In particular, a *"hood means*" may comprise four *"heads"* (cf Figure 4 and column 10, lines 1 to 5), and *"degas tank 14A (as well as degas tank 14B) can receive a flow sample from either head A or head B of sipping hood 1 via a sample valve 74 for bundle selection at hood 1 and a flowline 76 or from either head C or head D of sipping hood 2 via a sample valve 78 for bundle selection at hood 2 and a flowline 80"* (cf column 10,

lines 13 to 25). The arrangement shown in Figure 4 allows a single beta detector to process in sequence the gas samples collected from the four *"heads"* of each of the two sipping hoods.

6.3 Figure 4 of document D7 shows four fuel assemblies covered by individual sipping hoods, whereby each sipping hood is coupled by one valve means to a gas collecting chamber and constitutes a gas collecting channel. The appellant essentially argued that it would be obvious to a person skilled in the art to multiplex the four channels of the system of D7 in a manner that would allow a single detector to process the gas samples from all sipping hoods in sequence.

6.4 However, the valve means 17, 18 and 20, 21 shown in Figure 4 of D7 and identified by the appellant as "*bundle selection valve means*" have the function of connecting a sipping hood to a corresponding gas collecting chamber 19 (valves 17 and 18) and of opening or closing the two gas inlets/outlets of the chamber 19. They could at the most be used to open or close one of the channels formed by a sipping hood arranged on top of a fuel assembly and a respective gas collecting space 19. Thus, they do not correspond to the "*bundle selection valve means*" specified in claim 8 which allow the selection of predetermined sets ("*bundles*") of fuel rods among the rods covered by a "*sipping hood means*".

Furthermore, the combination of the system for collecting fission gases released from four fuel assemblies shown in Figure 4 of D7 with a system for separating xenon and detecting krypton in fission gas sample as known from D2 would result in a system

comprising four fission gas collecting channels connected in parallel with a krypton detecting system consisting of a separation column and a beta radiation detector. There is no suggestion in the cited prior art that it would be obvious to modify the system resulting by applying the teaching of D2 to the embodiment shown in Figure 4 of D7 so as to provide each fission gas collecting channel with a respective separation column and to provide additional gas sample valve means to selectively couple the outlets of these channels to the beta radiation detector, as specified in claim 8 of auxiliary request 1.

6.5 In summary, the Board considers that, in the light of the cited prior art, it would not be obvious to a person skilled in the art starting from document D7 to arrive at a system falling within the terms of claim 8 of the respondent's auxiliary request 1. Hence, the subject-matter of this claim involves an inventive step within the meaning of Article 56 EPC.

7. For the above reasons, the Board finds that, taking into consideration the amendments made to the patent documents according to the respondent's auxiliary request 1, the patent and the invention to which it relates meet the requirements of the EPC.

As the respondent's auxiliary request 1 is allowable, there is no need to consider auxiliary requests 2 and 3.

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 in amended form on the basis of:

   -- Claims 1 to 8 of auxiliary request 1 filed in the oral proceedings;

   -- Description columns 1 to 12, with an insert in column 2, line 25, filed in the oral proceedings;

   -- Drawings as in the patent as granted.

The Registrar: The Chairman:

R. Schumacher B. Schachenmann