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**D E C I S I O N**  
**of 24 April 2002**

**Case Number:** T 0118/98 - 3.4.1

**Application Number:** 90308765.8

**Publication Number:** 0412815

**IPC:** G21F 9/00

**Language of the proceedings:** EN

**Title of invention:**

Method and apparatus for concentrating dissolved and solid radioactive materials carried in a waste water solution

**Patentee:**

WESTINGHOUSE ELECTRIC CORPORATION

**Opponent:**

Framatome ANP GmbH

**Headword:**

Treatment of radioactive waste water/WESTINGHOUSE ELECTRIC CORPORATION

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

"Inventive step (no)"

**Decisions cited:**

-

**Catchword:**

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Boards of Appeal

Chambres de recours

**Case Number:** T 0118/98 - 3.4.1

**D E C I S I O N**  
**of the Technical Board of Appeal 3.4.1**  
**of 24 April 2002**

**Appellant:** Framatome ANP GmbH  
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**Representative:** Tergau & Pohl Patentanwälte  
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**Respondent:** WESTINGHOUSE ELECTRIC CORPORATION  
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**Representative:** van Berlyn, Ronald Gilbert  
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**Decision under appeal:** Interlocutory decision of the Opposition Division  
of the European Patent Office posted 26 November  
1997 concerning maintenance of European patent  
No. 0 412 815 in amended form.

**Composition of the Board:**

**Chairman:** G. Davies  
**Members:** H. K. Wolfrum  
G. Assi

## Summary of Facts and Submissions

I. The appellant (opponent) lodged an appeal against the interlocutory decision of the opposition division, dispatched on 26 November 1997 maintaining the European patent No. 0 412 815 in amended form. The notice of appeal was received on 23 January 1998 and the appeal fee was paid on the same day. On 26 March 1998 a statement of grounds of appeal was filed.

II. Pursuant to Article 100(a) EPC, the opposition was based on the ground of lack of inventive step (Articles 52(1) and 56 EPC).

III. In reaction to a summons to oral proceedings, the respondent (patent proprietor) announced in a letter dated 15 February 2002 that it would not attend the oral proceedings scheduled for 16 April 2002.

The respondent requests that the appeal be dismissed and the patent be confirmed in amended form, as maintained by the opposition division.

IV. The appellant requests that the contested decision be set aside and the patent be revoked in its entirety.

By letter dated 18 March 2002, the appellant drew the Board's attention to the fact that it did not insist on its auxiliary request for oral proceedings in case the Board could allow the appeal already on the basis of the state of the file.

V. By a notification dated 25 March 2002, the parties were informed that the oral proceedings were cancelled.

VI. In the opposition and appeal proceedings reference was made to the following documents:

**E1:** US-A-4 693 833, and

**E2:** DE-C-28 51 231.

VII. Independent **claim 1** on file reads as follows:

*"1. System (10) for concentrating dissolved and solid radioactive materials carried in a waste water solution (12) containing a hazardous chelating agent used for cleaning nuclear equipment, comprising:*

*an oxidizing chamber (14) for receiving the waste water (12) containing the radioactive materials and hazardous chelating agent in the presence of an oxidizing agent (18) for oxidizing the chelating agent into a stream of non-hazardous material including gasses and water and for causing additional solids (24) to precipitate out of the solution (12); characterized by further comprising*

*a centrifugal separator (34) coupled to said oxidizing chamber (14) for receiving the waste water containing the radioactive material and for separating radioactive solids from the waste water containing dissolved radioactive materials;*

*an ion exchange chamber (40) containing an ion exchange resin for receiving the waste water containing the dissolved radioactive materials and for removing the same from the waste water by ion exchange with the resin;*

*a dryer (56) for receiving the radioactive solids from said separator (34) for producing dry solids; and*

*a canister station (52) for receiving the dry solids and spent ion exchange resins containing the removed dissolved radioactive materials for packaging them in solid form."*

Independent method **claim 16** reads as follows:

*"16. A method for concentrating dissolved and solid radioactive materials carried in a waste water solution containing a hazardous chelating agent used for cleaning nuclear equipment, comprising the step of oxidizing the waste water (12) containing the radioactive materials and hazardous chelating agent in the presence of an oxidizing agent (18) for oxidizing the chelating agent into a stream of non-hazardous material including gasses and water and for causing additional solids to precipitate out of the solution characterized by the steps of:*

*centrifugally separating the waste water containing the radioactive material and radioactive solids from the waste water containing dissolved radioactive materials;*

*ion exchanging the waste water containing the dissolved radioactive materials with an ion exchange resin for removing the dissolved radioactive materials from the waste water;*

*drying the radioactive solids from the separator for producing dry solids; and*

*packaging the dry solids and spent ion exchange resins containing the removed dissolved radioactive materials for packaging them in solid form."*

- IX. The appellant essentially relied on the following submissions:

The subject-matter of claims 1 and 16 was rendered obvious by the combined teachings of documents E1 and E2 when taking into consideration the background knowledge of the skilled person in the technical field at issue.

Document E2 related to a system/method for concentrating dissolved and solid radioactive materials carried in a waste water solution and comprised the steps of separating solid materials from the waste water, ion exchanging the waste water, drying the solid materials and packaging the dry solids. In case the waste water additionally contained hazardous chelating agents, document E1 taught the step of oxidizing the waste water in the presence of an oxidizing agent for oxidizing the chelating agent into non-hazardous material. Hence, the method according to claim 16 differed from the combined teachings of E1 and E2 only in that the separation was made centrifugally. This feature, however, had to be regarded as a standard measure for the separation of liquid and solid materials which had been known in the respective art for a long time.

- X. The respondent's submissions may be summarized as follows:

The present invention related to a method for

concentrating dissolved and solid radioactive materials in a waste water solution containing a hazardous chelating agent such as EDTA. The materials were oxidized with hydrogen peroxide, which precipitated a hydroxide sludge in a solution containing unreacted EDTA and aromatic byproducts.

The appellant's argumentation was based on hindsight. Documents E1 and E2 did not deal with the principal problem of separation of radioactive solids from the chelate destruction step. Known chelate destruction steps and separation technologies did not produce a viable process to deal with the problem. E1 merely oxidized the chelate but did not teach how to separate the sludge from the solution other than suggesting evaporation. E2 disclosed a method of treating a slurry of granular (as opposed to a hydroxide sludge), radioactive ion exchange resin particles. The ion exchange resins and filter aids were merely dewatered and the materials pulverized in a thin film evaporator. The inventors had found that it was feasible and cost effective to centrifugally separate the radioactive solids/sludge from the oxidized chelate solution and then dry and package.

XI. In the contested decision, the opposition division held that a skilled person would have readily combined the methods known from E1 and E2. However, the subject-matter of method claim 16 of the patent did still differ from such a combination by the features that

- (a) the separation was made centrifugally, and
- (b) the spent ion exchange resins were directly packaged without drying.

The skilled person would not have got from the prior art any incentive to deviate from the simple combination of the methods known from E1 and E2.

## **Reasons for the Decision**

### 1. *Amendments*

Amended claims 1 and 16 are based on claims 1 and 16 of the patent as granted, respectively, with claim 1 having the word "centrifugal" inserted before the word "separator" and claim 16 having the word "centrifugally" inserted before the word "separating". Furthermore, as an amendment of purely editorial nature, in claim 1 the reference numerals "44" are replaced by "14".

The original application documents refer to a centrifugal separator in Figure 1 and the corresponding description (cf. page 4, lines 54 and 56, and page 5, line 10, of the A-publication) and thus provide a basis of disclosure for the substantive amendments.

Moreover, since the substantive amendments limit the scope of protection, the Board is satisfied that the amended claims comply with the requirements of Articles 123(2) and (3) EPC.

### 2. *Inventive step*

#### 2.1 Subject-matter of independent claims 1 and 16

Claim 1 is directed to a system for concentrating dissolved and solid radioactive materials carried in a



waste water solution and claim 16 refers to a method of concentrating such materials.

According to the invention, a waste water solution/slurry containing radioactive materials is processed in five major steps:

- (1) hazardous chelating agents contained in the solution/slurry and binding radioactive agents are decomposed by oxidation (with hydrogen peroxide);
- (2) solid materials and precipitates of step (1) are centrifugally separated from the waste water;
- (3) radioactive materials/ions still dissolved in the remaining waste water are removed therefrom by means of ion exchanging;
- (4) the radioactive solids from the separator are dried; and
- (5) the spent ion exchange resin (contaminated by the removed radioactive ions) from step (3) and the dried solids from step (4) are packaged in solid form.

## 2.2 Prior art

### 2.2.1 Document **E1** (cf. in particular Figure 1 and the corresponding description; and

column 1, lines 12 to 25 and 48 to 68) discusses a method and system of removing decontamination agents (including the chelating agents EDTA and citric acid) from radioactive waste water. The method consists in decomposing the agents by oxidation (with hydrogen

peroxide) in the presence of a catalyst (either Cu or Cu and Fe) and promises improved properties of the final solidified nuclear waste. The document is silent on the details of a further treatment of the waste water, except for a general indication as to evaporation and concentration of the waste water and solidification of remaining solid materials.

Hence document E1 discloses a method and system operating according to aforementioned step (1) followed by a step of separating solid materials from the waste water, ie step (2), with the exception of **centrifugal** separation.

2.2.2 Document **E2** (cf. in particular Figure 1 and the corresponding description;

column 4, lines 6 to 10, 21 to 26, 57 to 59, and 63 to 66; and column 5, lines 23 to 47) relates to a method of treating radioactive waste water solutions containing solid and dissolved radioactive materials. Solid materials are separated from the waste water (which may originate from different sources) by means of filters 4 and 10 and the remaining dissolved radioactive materials are removed by an ion exchange resin in chambers 5 and 11. The spent ion exchange resin as well as the solid residues collected in filters 4 and 10 are further processed/dried under the action of centrifugal forces in a centrifugal thin film drier. Finally, the resulting dry solids are packaged in solid form (pellets filled in asphalt, plastic or cement).

Thus the process known from document E2 involves aforementioned steps (3) to (5) and, with the exception

of a **centrifugal** separation, also step (2).

2.3 The teachings of documents E1 and E2 relate to complementary processes of treating radioactive waste water for removing different types of radioactive substances, the first being concerned with the removal of decontaminating agents, such as chelating agents, from the radioactive waste water, whilst the other is concerned with the removal of dissolved radioactive ions (by means of ion exchange resins) from the waste water and the subsequent removal of the spent resins. Thus, whenever chelating agents have been used for decontamination of nuclear power plant equipment, it would appear immediately obvious to make combined use of the known processes.

2.4 The subject-matter of amended independent claims 1 and 16 nevertheless differs from such a straightforward combination by the use of a centrifugal separator and a centrifugal separation, respectively.

The Board notes that centrifugal separation constitutes in fact the sole difference between the claimed subject-matter and the combined teachings of documents E1 and E2 because neither the claims under consideration nor the invention as described by the patent specification would exclude the possibility of drying the spent ion exchange resin before packaging.

2.5 Hence, the decisive question left to be answered is whether or not a **centrifugal** separation of solid materials from the waste water would involve an inventive step.

In the absence of direct evidence from the available

prior art, the extent of the background knowledge of the person skilled in the field of radioactive waste disposal becomes decisive.

In this context, the Board finds that the opposition division, confronted with the substantial amendment concerning centrifugal separation, a feature which was not originally set out in the claims but only derived from the description, should have ascertained, at least on a *prima facie* basis, the technical knowledge of the skilled person in the respective technical field. Moreover, in the present circumstances, the "Guidelines for Examination in the European Patent Office" (cf. part D, chapter VI, point 5.) foresee the possibility of performing an additional search. It would be appropriate to at least check for a possible US family patent and to take into account the references cited on the front page thereof.

- 2.6 According to the Board's own expertise in the technical field at issue, centrifugation has to be regarded as a commonly-employed technique for treating slurries in order to separate solid materials from waste water.

Thus, an engineer in the field of radioactive waste disposal, when faced with the task of separating solid materials from waste water, would have taken into consideration, in addition to the options of evaporation/drying (as suggested by E1), filtration (as chosen in the process known from E2) or sedimentation (as indicated in lines 39 and 40 of page 5 of the patent specification), centrifugation as an equally suitable alternative.

Moreover, the skilled person would have even found in

document E2 a hint as to the alternative of treating waste water by centrifugation, although combined with heating for separating waste water from spent ion exchange resin. The respondent's argument put forward in this context that document E2 concerned a method of treating a slurry of granular particles as opposed to a hydroxide sludge according to the patent is not convincing. First of all, the treatment of a hydroxide slurry is not the subject of independent claims 1 and 16 under consideration. Secondly, the separating effect associated with centrifugation primarily depends on differences in the specific weight of the materials involved but not on their aggregation or chemical constitution.

Finally, the Board notes that, contrary to the respondent's submission, the beneficial effects of the claimed invention are not the result of a separation of solid materials by centrifugation but rather associated with the use of hydrogen peroxide for oxidising the chelates (cf. page 4, lines 10 to 15, and page 5, lines 41 to 45, of the patent specification). The patent description, taken as a whole, does not attribute any relevance to the specific choice of a centrifugal separation, nor does it provide any detailed technical information as to the means and circumstances of centrifugation. According to a "preferred embodiment", described on page 5, lines 33 to 45, the objects of the invention are even achieved by a "settling" of the hydroxide precipitate of the oxidation treatment (by hydrogen peroxide), ie without any centrifugation.

3. For these reasons, no exercise of inventive skill would have been required for a skilled practitioner to devise

a system and method according to present claims 1 and 16, respectively, so that these claims do not comply with the requirements of Articles 52(1) and 56 EPC.

4. In summary, having regard to the documents according to the appellant's sole request, the ground of lack of inventive step set out in Article 100(a) EPC prejudices the maintenance of the European patent.

## **Order**

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

1. The interlocutory decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:

R. Schumacher

G. Davies