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# D E C I S I O N
# of 7 August 2002

**Case Number:** T 0088/00 - 3.3.5

**Application Number:** 96930924.4

**Publication Number:** 0793547

**IPC:** B09C 1/10

**Language of the proceedings:** EN

**Title of invention:**
Compost decontamination of DDT contaminated soil

**Applicant:**
Stauffer Management Company

**Opponent:**
-

**Headword:**
Decontamiation of soil / Stauffer

**Relevant legal provisions:**
EPC Art. 56

**Keyword:**
"Inventive step - no, obvious modifications of a known process"

**Decisions cited:**
-

**Catchword:**
-

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**Case Number:** T 0088/00 - 3.3.5

**D E C I S I O N**
**of the Technical Board of Appeal 3.3.5**
**of 7 August 2002**

**Appellant:** Stauffer Management Company
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**Decision under appeal:** **Decision of the Examining Division of the European Patent Office posted 7 September 1999 refusing European patent application No. 96 930 924.4 pursuant to Article 97(1) EPC.**

**Composition of the Board:**

**Chairman:** R. K. Spangenberg
**Members:** G. J. Wassenaar
J. H. van Moer

## Summary of Facts and Submissions

I. European patent application No. 96 930 924.4, publication No. 0 793 547, was refused by a decision of the Examining Division. The decision was based on two sets of claims.

Claim 1 of the main request read as follows:

"The process of decontamination of soil containing DDT type contaminants which soil contains populations of viable anaerobic and aerobic microbes capable of transforming DDT type contaminants into harmless materials and being viable under both anaerobic and aerobic conditions comprising:

(a) admixing said soil with amendment material to form a solid compost mixture containing organic nutrient materials;
(b) composting said soil while maintaining the temperature of the compost mixture in the range of about 20°C to 65°C and the water content of the compost mixture in the range of about 40% to 100% WHC;
(c) during said composting maintaining the redox potential level of the compost mixture below about negative 200 mV until a significant amount of DDT type contaminants is degraded; and
(d) thereafter oxygenating the compost mixture to raise the redox potential level of the compost mixture to above about positive 100 mV, and maintaining the redox potential level above about 100 until a significant amount of DDT type contaminants is degraded; and

repeating steps (b) through (d) as necessary until the desired level of decontamination is achieved."

Claim 1 of the auxiliary request differed therefrom essentially only in that "as necessary" in the repetition of steps (b) through (d) was deleted.

II. The Examining Division held that the subject-matter of claim 1 according to the main request lacked novelty and that of claim 1 according to the auxiliary request lacked an inventive step. The arguments were supported, inter alia, by the following documents:

D1: CA-A-2 079 282
D2: DE-A-4 202 132 and
D3: DE-A-3 818 398.

According to the Examining Division D1 disclosed all the features of steps (a) through (d). With reference to D2 it was argued that a skilled person will interpret the expression "strong negative redox potential" used in D1 as one having a value of -200 mV or lower. The repetition requirement in claim 1 of the main request was regarded to be only an optional feature without limiting effect. The mandatory presence of said feature in claim 1 of the auxiliary request made the subject-matter of claim 1 novel, but the repetition of earlier steps to improve the result was regarded to be a matter of normal life experience and obvious in view of D3, disclosing a repetition of anaerobic and aerobic steps in a remediation process of contaminated soil.

III. The appellant lodged an appeal against this decision. With the statement of grounds of the appeal the

appellant filed a new claim 1 as first auxiliary request. The set of claims forming the main request in the decision under appeal was maintained as main request. Claim 1 of the auxiliary request differed from claim 1 of the main request only in that the expression "as necessary" in the repetition requirement was replaced with "at least once and", making this requirement mandatory.

With respect to novelty it was argued that D1 neither disclosed maintaining the redox potential at below -200 mV in the anaerobic step for the degradation of DDT and its metabolites nor maintaining the redox potential at above +100 mV by subsequently oxygenating the mixture. Moreover D1 was not directed to a process for degrading DDT type contaminants.

With respect to inventive step D1 was considered to represent the closest prior art and the problem underlying the invention was to provide a process of decontaminating soil and/or sediments containing DDT type contaminants by converting these contaminants into harmless materials thereby decontaminating the soil to whatever extent desired, as described on page 1, lines 20 to 24, of the present application. The solution by the claimed process steps was not obvious in view of D1 taken alone or in combination with any of the other citations.

D1 comprised no pointer to the specified redox potentials for the anaerobic or aerobic step in combination with the other steps. It was shown by the graphs filed with the letter of 22 June 1999 that between 0 and -200 mV the metabolites of DDT were not reduced. Only below -200 mV DDD and DDE were degraded

together with DDT. In the aerobic step sufficient degradation was also only achieved with a redox potential above +100 mV. The limits were thus not arbitrary. D1 would in fact teach away from the present invention because from a comparison of the tables on pages 10 and 12 of D1 it followed that the degradation did not depend on the redox potential. Moreover, contrary to the teaching of the present application, D1 required the addition of a metal, a further contaminant, to maintain a strong negative redox potential.

Although D2 disclosed the combination of anaerobic and aerobic degradation steps at values of 0 to -400 mV and 0 to +200 mV respectively, it contained no pointer to the relevance of maintaining the levels below -200 or above +100 mV respectively.

D3 did not disclose specific redox potentials. Although it disclosed the repetition of the anaerobic and aerobic steps, no relation with a higher and faster degree of degradation was established as surprisingly found by the appellant. In this respect reference was made to the graph attached to the decision under appeal but not considered during the hearing before the Examining Division. It showed that during the anaerobic step the temperature dropped, but before ambient temperatures were reached, the aerobic step started, whereby the temperature was increased. In this way a higher degradation could be obtained. Such a repetition of process steps would not be possible in the process according to D3 where the repetition was not done on the same site or in the same reactor but at two different places.

The commercial success of the present process was a further indication for the presence of an inventive step. It was in fact the only commercial process which could be applied on a large scale. Reference was made to a publication of Stauffer Management Company dated June 1999.

The invention also satisfied a long-felt need. Alone in the United States there were about 7 millions of tons of soil comprising DDT, used from the second world war up to about 1975, to be decontaminated. There was thus a strong support from the US authorities for developing a process which could be run on a large scale basis to deal with this vast problem.

Reimbursement of the appeal fee was requested because substantial procedural violations had occurred during the examining proceedings. The Examining Division indicated in the summons for oral proceedings that the subject-matter of the application was obvious in view of DE-C-4 001 558, but during the hearing this document was not discussed at all. Instead the Examining Division changed its position completely without informing the applicant and took D1 as anticipation taking away the novelty, whereby lack of novelty was introduced for the first time as a new ground during oral proceedings. Moreover, D3 was cited for the first time during oral proceedings towards the end of the hearing. D2, used in the decision under appeal, was never discussed during the oral proceedings. While also some other irregularities took place during the oral proceedings it had to be concluded that the proceedings were carried out in an arbitrary manner under violation of Article 113 EPC.

IV. In the annex to the summons to attend oral proceedings, the Board indicated that the main issues to be discussed during the oral proceedings would be the novelty in view of D1 and inventive step in view of D1, D2 and D3. By letter dated 30 July 2002 the appellant informed the Board that he would not attend the hearing and that the earlier request for oral proceedings was withdrawn. Oral proceedings took place on 7 August 2002 in the absence of the appellant.

V. The appellant requested in writing that the decision under appeal be set aside and a patent be granted on the basis of claims 1 to 12 and 14 to 22 of 25 June 1997 and claim 13 of 1 February 1999 as the main request or, subsidiarily, on the basis of claims 1 according to the first auxiliary request, filed with the grounds of the appeal on 17 January 2000 together with claims 2 to 22 according to the main request.

## Reasons for the Decision

1. The appeal is admissible.

2. The process of claim 1 according to the main request was considered to lack novelty over D1 by the Opposition Division. In the Board's opinion, however, it is doubtful whether D1 actually discloses step (d) in combination with the decontamination of soil comprising DDT type contaminants. Since this issue is not relevant to the outcome of the present appeal, the Board assumes in the appellant's favour that the subject-matter of claim 1 is novel.

3. It is undisputed that D1, published two years before

the priority date of the present application, represents the closest prior art. It discloses a process for the degradation of halogenated organic contaminants, whereby soil contaminated with DDT is mixed with 10% by weight of wheat straw and water to 100% water holding capacity and the mixture is held at 62 days at 25°C whereby a reducing environment is established at least for some time (example 3). Apart from the presence of DDT these conditions are identical to that of experiment 3 of example 1 of D1. According to the table on page 10 of D1 the redox potential in experiment 3 of example 1 after 1 day incubation at 25°C is -464 mV. The Board does not dispute that the presence of DDT might have an influence on the redox potential, but since the amount of DDT, although not specified in example 3 of D1, is much lower than the amount of added organic matter (according to the present application (page 8, line 14) a contaminated soil contains typically up to 600 ppm of DDT) the redox potential in example 3 of D1 must have been at least of the same order of magnitude and certainly below -200 mV as required by step (c) of present claim 1. According to example 3 of D1 the addition of only wheat straw resulted in a 61% loss of DDT after 62 days. Since the decomposition of DDT is due to the action of anaerobic bacteria in an environment having a strong negative redox potential (D1, page 5, lines 22-27) as also testified by the present application (page 5, lines 11-16), the redox potential in said example 3 of D1 must have been below -200 mV for a substantial part of said 62 day period in order to degrade the DDT to the quoted degree. Thus D1 discloses at least steps (a), (b) and (c) of present claim 1. The graphs filed with the appellant's letter of 22 June 1999, showing that only below -200 mV DDT type contaminants are degraded,

simply confirm the teaching of D1.

4. In agreement with the objectives mentioned in the summary of the invention in the present application (page 1, lines 20 to 24), starting from D1 the problem underlying the invention can be seen in further reducing the amount of contaminants in a soil contaminated with DDT. According to claim 1 of the main request it is proposed to solve this problem by oxygenating the product of step (c) according to step (d). The actual conditions used in the examples of the present application deviate substantially from those mentioned in example 3 of D1 so that the results mentioned in the present application cannot be directly compared with the results mentioned in D1. It is however credible that by this further treatment the amount of DDT type contaminants can be further reduced so that the Board accepts in the appellant's favour that the process according to claim 1 actually solves the above-mentioned problem.

5. It remains to be decided whether the claimed solution was obvious to a person skilled in the art. D1 itself discloses that after the dehalogenation under strong reducing conditions the organic contaminants tend to be more readily degradable, and will thus rapidly decompose or decay by natural processes in the environment, particularly if aerobic conditions are subsequently maintained (page 5, line 22 to page 6, line 2). In the Board's view this is a clear hint to the skilled person trying to further reduce the amount of DDT type contaminants to add to the anaerobic treatment step (c) an aerobic treatment step. It is common general knowledge to create and maintain aerobic conditions by feeding air through the compost mixture

(aeration), the preferred form of oxygenation according to the present application (page 5, lines 27-31 and page 9, lines 17-20). According to the present application oxygenation is sufficient for the redox potential level during the aerobic step to be maintained above about +100 mV (page 5, line 31 to page 6, line 1). Thus the feature in step (d) of claim 1, of maintaining the redox potential level above +100 mV, is not an additional measure but the mere result of the aeration and cannot contribute anything to the issue of inventive step.

6. The Board cannot accept the appellant's argument that D1 teaches away from the present invention because it required the addition of a metal and would teach that the degradation did not depend on the redox potential. D1 teaches that the addition of a metal such as iron improves the maintenance of a low redox potential during the anaerobic treatment and improves the degradation of chlorinated pesticides such as dieldrin, endrin and DDT (Examples 1 to 3 and tables on pages 10 and 12). The examples show therefore a clear relationship between redox potential and degradation. From the examples it is further evident that degradation of said pesticides also takes place without added iron, although less efficiently. Moreover, present claim 1 does not exclude the addition of iron. It is true that the table on page 12 shows a lower remaining amount of pesticide by using wheat straw instead of alfalfa as nutrient whereas the table on page 10 shows that with alfalfa a lower redox potential remains at the end of the incubation period. It should, however, be taken into consideration that the amount of alfalfa was only half of the amount of wheat straw. Comparison of the tables on pages 10 and 12 shows that

for the decomposition of dieldrin and endrin the amount of nutrient is apparently more important than the property of the nutrient to maintain a low redox potential at the end of the incubation period. This is not surprising because even if the redox potential remains very low the number of microbes necessary for the degradation must decrease if most of the nutrient is consumed. The tables simply confirm the skilled person's expectation that with a leguminous nutrient such as alfalfa, comprising nitrogen binding bacteria, it is easier to maintain a reductive environment than with wheat straw, which has no nitrogen binding properties. From the comparison of the tables it cannot be derived that the redox potential should not be maintained as low as possible, eg below -200 mV for a sufficient period of time to degrade a substantial amount of the contaminant.

7. A further hint to the use of an additional aerobic treatment in conformity with present step (d) is provided by D2. This document, published less than a year before D1, also relates to the biological decontamination of soil contaminated with halogenated organic compounds. A skilled person trying to improve processes according to D1 should therefore be familiar with its content. D2 discloses that the soil can be economically decontaminated by a composting treatment, whereby an anaerobic treatment is followed by an aerobic treatment. The aerobic conditions are maintained by aeration (column 1, line 65 to column 2, line 37). During the aerobic treatment the redox potential can be increased to above +200 mV (column 3, lines 59-62).

For these reasons the Board holds that in view of D1

and D2 it was obvious to a skilled person to solve the above-mentioned problem with the combination of process steps according to claim 1 of the main request.

8. If a cleaning treatment is not completely satisfactory it is common general knowledge, based on daily life experience (washing of clothes), that the result might be improved by repeating the treatment. Such a repetition of cleaning steps is also explicitly disclosed in D3 for the biological decontamination of soil by subsequent anaerobic and aerobic treatment steps. According to D3 the subsequent anaerobic and aerobic biodegradation steps can be followed by two further biodegradation steps of different nature (column 3, lines 6-13).

9. The appellant's argument that according to D3 the repetition was not done on the same site or in the same reactor so that the advantage of an improved temperature regulation of the process as demonstrated by the filed graph, is irrelevant for the subject-matter of claim 1 of the auxiliary request, because the claim is not limited to a treatment on the same site or in the same reactor. Although in the examples of D3 the anaerobic and aerobic process steps are performed locally separated from each other, the general teaching of D3 requires only a timely separation of the treatment steps (column 2, lines 15-20). Moreover, the advantage of improved temperature regulation is not supported by the application as originally filed. It is not mentioned therein and none of the examples is performed in agreement with a process as indicated in said graph. In the Board's view, therefore, the repetition of steps (b) through (d) as required by claim 1 of the auxiliary request is an obvious measure

for further reducing the amount of DDT type contaminants.

10. In agreement with standard jurisprudence of the Boards of Appeal, the Board holds that commercial success and "long-felt need" are only secondary indicia for inventive step which are only of importance in cases when after the evaluation of the prior art teachings in a problem solution approach there remains any doubt whether an inventive step is involved in the claimed subject-matter; see Case Law of the Boards of Appeal of the European Patent Office 4th edition 2001, points I.D. 7.1, 7.4 and 7.5 (pages 133 to 137). In the present case there is no room for such doubt. Moreover, in view of the short time between the publication of D1 and D2 at the one hand and the priority date of the present application on the other hand, the presence of a "long-felt need" is not convincing. No convincing evidence has been provided for a commercial success either. The leaflet of Stauffer Management Company of June 1999, submitted by the appellant, only mentions that "Onsite Bioremediation" is certain and economic but does not show a commercial success. Moreover, onsite bioremediation is not the subject of the present application but the subject of appellant's European application Nr. 96 930 927.7, now patent Nr. 0 793 548.

11. For these reasons the Board holds that the subject-matter of claim 1 of the main request and claim 1 of the auxiliary request, lacks an inventive step within the meaning of Article 56 EPC, so that both the main and auxiliary request must fail.

12. According to Rule 67 EPC reimbursement of the appeal fee can only be ordered if the appeal is allowable.

Since that is not the case here, the request cannot be taken into consideration.

## Order

## For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

P. Martorana R. Spangenberg