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**Datasheet for the decision  
of 2 February 2012**

**Case Number:** T 1196/10 - 3.2.08

**Application Number:** 03753717.2

**Publication Number:** 1558773

**IPC:** C22B 3/08, C22B 23/00

**Language of the proceedings:** EN

**Title of invention:**  
Heap leaching base metals from laterite ores

**Patentee:**  
European Nickel Plc

**Opponent:**  
Minara Resources Ltd.

**Headword:**  
-

**Relevant legal provisions:**  
EPC Art. 54

**Relevant legal provisions (EPC 1973):**  
-

**Keyword:**  
"Novelty (no)"

**Decisions cited:**  
-

**Catchword:**  
-



Case Number: T 1196/10 - 3.2.08

**D E C I S I O N**  
of the Technical Board of Appeal 3.2.08  
of 2 February 2012

**Appellant:** European Nickel Plc  
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**Respondent:** Minara Resources Ltd.  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 25 March 2010  
revoking European patent No. 1558773 pursuant  
to Article 101(3)(b) EPC.

**Composition of the Board:**

**Chairman:** T. Kriner  
**Members:** R. Ries  
A. Pignatelli

## Summary of Facts and Submissions

- I. Opposition was filed against European patent No. 1558773 as a whole and was based on Article 100(a) EPC.

The opposition division held that the subject-matter of claim 1 lacked an inventive step with respect to the technical disclosure of document

D12: AU 199856367 B2.

The decision to revoke the patent was dispatched on 25 March 2010.

- II. The appellant (patent proprietor) lodged an appeal against this decision. The notice of appeal was received at the European Patent Office on 2 June 2010 and the appeal fee was paid on 28 May 2010. The statement setting out the grounds of appeal was received on 30 July 2010.

- III. In its reply dated 11 February 2011 to the appellant's statement setting out the grounds of appeal, the respondent (opponent) referred, in addition to D12, to the documents:

D1: G. K. Das et al.: "Acid leaching of nickel laterites in the presence of sulphur dioxide at atmospheric pressure", Proceedings of the Nickel-Cobalt 97 International Symposium, Volume 1, August 17-20, 1997, pages 471 to 488, Sudbury, Ontario, Canada, 27th Annual Hydrometallurgical Meeting of CIM, "Hydrometallurgy and Refining of

Nickel and Cobalt", Editor: W. C. Cooper, The University of British Columbia, Vancouver, British Columbia, Canada;

- D13: M. Chowdhury et al.: "Recent Concepts on the Origin of Indian Laterite", Geological Survey of India, Calcutta, Report 11 May 1965 (online version);
- D14: W. J. McGee: "The laterite of the Indian Peninsula, Geological Magazine, (Decade II), copyright Cambridge University Press, 1880, May, Volume 7, Issue 07, pages 310 to 313;
- D15: Encyclopaedia of Environmental Science, ed. by D. E. Alexander et al.; Kluwer Academic Publishers, 1999, pages 619 to 621;
- D16: S. Kanungo et al.: "Preferential Extraction of Cobalt from Laterite Ore or Concentrate by Leaching an Aqueous Sulphur Dioxide Solution", Transaction of the Indian Institute of Metals, Volume 41, No. 6, December 1988, pages 527 to 533;
- D17: D. H. Rubisov et al.: "Sulphuric acid pressure leaching of laterites - a comprehensive model of a continuous autoclave", Elsevier (publisher), Hydrometallurgy 58, (2000), pages 89 to 101.

IV. The appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of claims 1 to 11 according to the main request enclosed with the grounds of appeal and corresponding to the main request refused by the opposition division.

Should the Board be minded to dismiss the appeal, oral proceedings were requested.

The respondent requested that the appeal be dismissed. Oral proceedings were requested in the event that the Board was likely to come to a decision other than complete revocation of the patent.

V. In its letter filed on 21 September 2011, the appellant withdrew its request for oral proceedings and requested that the Board's decision be made on the basis of the written submissions. The appellant gave no comments on the respondent's evidence enclosed with its letter dated 11 February 2011 or the arguments submitted therewith.

VI. Claim 1 of the main request reads as follows:

"1. A method for the heap leaching of base metals from a laterite ore containing nickel and cobalt, the method characterized by the steps of:

- a) Establishing at least one heap of the laterite ore containing the base metals to be leached;
- b) Irrigating at least one of the or each heaps with a leach solution consisting essentially of sulphuric acid and dissolved sulphur dioxide; and
- c) Providing at least one leach solution pond or other suitable container to which pregnant leach solution recovered at or near a base of the or each heap may be fed."

VII. The appellant's arguments are summarized as follows:

The central plank on which the opposition division based its decision was document D12, which was late filed by the opponent. Document D12 was, however, neither relevant for novelty, as confirmed by the opposition division in the impugned decision, nor did it qualify as the closest prior art for inventive step since it did not deal with the extraction of cobalt and nickel from laterite ore. Given this situation, D12 should not be allowed into the proceedings.

In case D12 was allowed, the significant difference between the patent in suit and D12 was that this document did not disclose a laterite ore as feed material.

Page 2, paragraph 2 of D12 stated that the feed material was defined as being "derived from the alteration of non-oxide mineral species such as sulphidic material", which meant copper-bearing ores. Contrary to the sulphidic ores referred to in D12, laterites did not contain copper in any appreciable amount.

In contrast to the feed used in D12, it was generally known that laterites were comprised of oxides formed from the leaching of parent sedimentary rocks (sandstones, clays, limestone), metamorphic rocks (schist, gneisses, migmatites), volcanic rocks (granites, basalts, gabbros, peridotites), and mineralized proto-ores, which left the more insoluble ions, predominantly iron and aluminium.

Four of the six ores (samples A to F) discussed in D12 on pages 6 and 7 were described as containing limonite-goethite, but without giving an explanation of what this term was supposed to mean. It was true that in nature limonite was essentially goethite, had the same generic formula as goethite ( $\text{FeO}(\text{OH})_n\text{H}_2\text{O}$ ) and was one of the main types of laterite. It was however not true to say that all occurrences of limonite-goethite in rocks denoted a laterite. Moreover, there was no teaching in D12 suggesting that any of the base metals nickel, cobalt or copper were in any way associated with the so-called limonite-goethite content of the ores referred to in D12.

Furthermore, the teaching of D12 was dependent essentially on manganese oxide ( $\text{MnO}_2$ ) being present in the ore (see for instance samples A, B, D to F). D12 explicitly stated that the cobalt values which were sought were intimately associated with  $\text{MnO}_2$  (D12, page 3, line 26 to page 5, claim 1).

The claimed process was therefore novel over D12.

VIII. The respondent's arguments are summarized as follows:

After due consideration, the opposition division found document D12 highly relevant and revoked the patent on the basis of this document. Hence, there was no reason to disregard this document on appeal.

D12 was concerned with the recovery of cobalt values from oxidic cobalt-containing feed in which, for example, cobalt values were associated with manganese oxide (D12, title and abstract). Further, D12 was

concerned with the leaching of oxidic cobalt-containing feed under reducing conditions as achieved when using sodium metabisulphite (SMS), and not simply with weathered sulphide as alleged by the appellant.

In the opposition division's view, a "laterite ore" was not implied in document D12 and this lack was identified as the only difference between D12 and the patent in suit. It was therefore important to consider the nature of the term "laterite".

Since the patent itself did not contain any definition of the "laterite ore" used for the claimed process, the meaning of this term must be construed in its broadest sense. As to the definition of this term, the appellant made certain assertions, which were however not supported by any evidence.

It was true that the words "laterite ore" were not explicitly used as such in D12, but a qualitative description of each of the ore samples A, E and F was given on pages 6 and 7:

sample A contained *clays, limonite-goethite, MnO<sub>2</sub>*,  
sample E contained *ferruginous clays, MnO<sub>2</sub>, quarts*, and  
sample F contained *abundant MnO<sub>2</sub>, clays, limonite-goethite*.

As conceded by the appellant in its statement of the grounds of appeal, laterites contained iron oxides in the form of limonite-goethite. Nickel was, however, typically associated with the iron oxide fraction of this mineral (D1, page 472, Introduction). D16, page 527, last sentence to page 528 disclosed that



cobalt occurred primarily in manganese mineral phases in laterite soils.

Moreover, D14 stated towards the bottom of page 310 that "*laterite is essentially a highly ferruginous clay*". The ferruginous nature of laterites was also confirmed by document D15, page 619, first paragraph, last sentence. Contrary to the appellant's allegations, for example documents D15 and D17 showed that "laterites" contained iron oxides, clay, silica, manganese and copper, etc.

It was therefore clear from the above analysis that at least the ores A, E and F were "laterites" within the meaning of the patent in suit.

The process set out in claim 1 of the patent in suit therefore lacked novelty over D12.

## **Reasons for the Decision**

1. The appeal is admissible.
2. Admission of documents D12 and D13 to D17 into the appeal proceedings
  - 2.1 The appellant requested that document D12 should not be admitted to the appeal proceedings since it was late filed and not relevant.
  - 2.2 Despite the fact that it was late filed, document D12 was already admitted into the opposition proceedings since it was found *prima facie* highly relevant to the

claimed subject matter. As is evident from paragraph 2.1 of the impugned decision, the appellant did not object to the introduction of document D12 into the opposition proceedings, since it was already aware of the disclosure of D12 and its possible implications and had enough time to read and understand it. Hence, the discretionary power of the opposition division was exercised in the correct way. Moreover, D12 was the essential document for the opposition division's decision and was introduced again in the appeal proceedings with the reply to the statement of the grounds of appeal. According to Article 12(2) RPBA, D12 forms part of the appeal proceedings and, therefore has to be considered.

The appellant's request that this document be disregarded thus cannot be allowed.

2.3 As to documents D13 to D18, these documents were filed with the reply to the statement of the grounds of appeal and are therefore to be admitted under Article 12(2) RPBA. Furthermore, the appellant neither challenged the admittance of these documents into the proceedings nor submitted any comments on the respondent's arguments based on these documents. Given that at least D13 to D17 are helpful to understand the meaning of the term "laterite" and therefore could be classified as general technical knowledge, the Board does not see any reason to disregard these documents.

3. The meaning of the term "laterite ore"

Since the nature of the term "laterite" is a specific point of difference between the position of the

appellant and that of the respondent, the question arises what this term is supposed to mean.

3.1 In that respect, the patent in suit fails to provide a clear mineralogical characterisation. In its grounds of appeal, the appellant made certain assertions concerning the definition of the term. In its view, it was generally known that laterites were comprised of oxides formed from the leaching of parent sedimentary rocks (sandstones, clays, limestones), metamorphic rocks (schist, gneisses, migmatites), volcanic rocks (granites, basalts, gabbros, peridotites), and mineralized proto-ores, which left the more insoluble ions, predominantly iron and aluminium. However, this assertion of general knowledge was not supported by any evidence.

3.2 The mineralogical designation "laterites" is a broad description for a class of minerals formed by weathering. The term is not a narrow or specific term. It is frequently described as a "*highly ferruginous clay material*" (D14, page 310, last paragraph). The ferruginous nature of the clays comes from the presence of iron oxides and therefore it is also called "ironstone" (D15, page 619, first paragraph, last sentence). In D15 a general description of laterite is given in the first column, paragraph entitled "Environment of laterite (ironstone)": "*In spite of these difficulties, modern researchers now apply the term laterite (plinthite, petroplinthite) to a soil horizon with is hard or will harden on exposure and is composed mainly of the oxides, oxyhydroxides of iron and aluminum which varying amounts of kaolinite and quartz and sometimes oxides of manganese*". The presence

of manganese is confirmed by document D13, page 3, 5<sup>th</sup> paragraph.

As to the presence of cobalt in laterite ores, D16 teaches on page 527, last paragraph to page 528, line 5: *"Mineralogical studies reveal that cobalt occurs primarily in manganese mineral phases such as bimesite, lithiophorite, cryptomelane etc. in lateritic soils. Therefore leaching under reducing conditions would selectively attack these manganese mineral phases leading to the extraction of cobalt"*.

Contrary to the appellant's position, according to which the presence of manganese is not a defining feature of a laterite ore, "laterites" typically contain a manganese oxide fraction.

- 3.3 Moreover, and as set out in document D13, page 3, last paragraph, *"mineralogically, laterite is essentially a mixture of varying proportions of goethite, hematite, gibbsite, boehmite and kaolin and also rutile to a lesser content"*. A mixture of goethite and hematite is generally called limonite. As conceded by the appellant in its statement on page 4, second and third paragraphs from the bottom, limonite, which is essentially goethite and has the same generic formula  $\text{FeO}(\text{OH})_n\text{H}_2\text{O}$ , is one of the main types of laterite. D17, page 89, paragraph 1: "Introduction" teaches that *"high-temperature acid leaching is currently the process of choice to recover nickel and cobalt from limonite laterites"*. Moreover, D1 discloses on page 472, first paragraph, first sentence that *"nickel is predominantly bound in the iron oxide fraction of laterite ores and is only released upon the breakdown of the iron oxide*

*lattice sites*". Contrary to the appellant's allegations, this all shows that laterite ores and in particular limonite laterites comprise cobalt, manganese, nickel and iron.

The appellant further alleged that laterite ores do not contain copper in any appreciable amount, without giving any support for this allegation.

It is, however, noted that whether copper is included in the laterite ore will depend on the particular geological history of the ore body. If the laterite has formed in proximity to copper mineralisation, copper will be present.

In the absence of a clear definition, the term "laterite" therefore must be construed in its broadest sense, as has been shown above.

4. The teaching of document D12
  - 4.1 Document D12 discloses a method for the heap leaching of base metals from a oxidic cobalt-containing feed material comprising the steps of
    - a) establishing at least one heap of the feed material containing the base metals to be leached;
    - b) irrigating at least one of the leach heaps with a leach solution consisting essentially of sulphuric acid and dissolved sulphur oxide, and
    - c) providing at least one leach solution pond or other suitable container to which the pregnant leach solution recovered at or near a base of the or each heap may be fed (D12, claims 1, 2, 7).

The oxidic cobalt containing feed material could further contain copper and/or nickel values, which both are recovered in the pregnant solution (D12, claim 5). Like the preferred embodiment of the claimed process set out in claim 4 of the patent, the reducing agent added so as to provide acidic sulphur dioxide leaching conditions in the known process is sodium metabisulphite (SMS), which increases the yield of the metal values (D12, claim 4, Table 3).

5. Novelty

5.1 The appellant alleged that D12 was not at all concerned with "laterite ore" and therefore was novel. As shown in the following, the Board is, however, convinced that the claimed process lacks novelty with respect to the teaching of D12.

5.2 The process disclosed in D12 is concerned with the recovery of cobalt and also nickel values from oxidic cobalt-containing feed in which, for example, cobalt values are associated with manganese oxide (D12, page 3, last paragraph). The dissolution of manganese values is accompanied by enhanced dissolution of cobalt values and other metal values such as copper and/or nickel present in the feed are taken into solution during the acid leaching (D12, page 5, lines 1, 2; lines 5 to 7). As has been shown in paragraph 3.2 of this decision, manganese oxide is generally contained in laterites, and the presence of Mn-oxide in the ore of D12 cannot be a distinguishing feature.

With respect to the examples A to F, D12 states on page 7, lines 14 to 17: "*In general the ore samples*

were weathered, and oxidised and contained large amounts of clay, plus Fe hydroxides and/or Mn oxides. Clays can absorb heavy metals, and Fe/Mn oxides are "scavengers" of elements such as Cu, Co, Ni, Ag and others". In that respect document D12 clearly describes a laterisation process.

The samples A, E and F, cited by the respondent, all comprise limonite-goethite and clays or ferruginous clays, i.e. minerals which are typical in laterites, as has been previously shown. Sample E comprises ferruginous clays, MnO<sub>2</sub>, quartz, but copper minerals are not detected.

- 5.3 It is clear from the above analysis under point 3 of the present decision that the sample ores A, E and F as feed materials actually can be identified as "laterites" in nature. Contrary to the appellant's position, document D12 therefore describes the use of laterite ore starting materials in a heap leaching process. Given that all other features of the claimed process are also found in document D12, as was acknowledged by the appellant on page 2 of the statement of the grounds of appeal, it must be concluded that D12 is novelty-destroying for the process set out in claim 1 of the patent at issue.

The appellant's request that the decision under appeal be set aside and the patent be maintained unamended therefore cannot be allowed.

6. In its letter dated 21 September 2011, the appellant dispensed with commenting on the evidence and arguments of the respondent and withdrew its request for oral proceedings.

Since the request for oral proceedings submitted by the respondent was conditional on a negative outcome, which did not occur, no oral proceedings were necessary.

## **Order**

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

The appeal is dismissed.

The Registrar:

The Chairman:

V. Commare

T. Kriner.