

United States Court of Appeals  
for the Federal Circuit

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REG SYNTHETIC FUELS, LLC,  
*Appellant*

v.

NESTE OIL OYJ,  
*Appellee*

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2015-1773

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Appeal from the United States Patent and Trademark  
Office, Patent Trial and Appeal Board in No. IPR2013-  
00578.

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Decided: November 8, 2016

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JEAN MARIE GILLS, Foley & Lardner LLP, Chicago, IL,  
argued for appellant. Also represented by MICHAEL  
ROBERT HOUSTON.

MICHAEL J. FLIBBERT, Finnegan, Henderson,  
Farabow, Garrett & Dunner, LLP, argued for appellee.  
Also represented by MAUREEN DONOVAN QUELER, KRISTI  
L. MCINTYRE.

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Before PROST, *Chief Judge*, TARANTO, and CHEN, *Circuit  
Judges*.

CHEN, *Circuit Judge*.

This appeal arises from a petition for *inter partes* review filed by Neste Oil Oyj (Neste) against claims 1–5 and 8 of U.S. Patent No. 8,231,804 ('804 patent), which is owned by REG Synthetic Fuels, LLC (REG). The United States Patent and Trademark Office, Patent Trial and Appeal Board (Board) instituted trial, and in its final written decision, the Board found claims 1, 3, 4, and 8 anticipated by U.S. Patent No. 4,992,605 (Craig), and claims 1–3, 5, and 8 anticipated by U.S. Published Patent Application No. 2008/0312480 (Dindi). *Neste Oil Oyj v. REG Synthetic Fuels, LLC*, No. IPR2013-00578, 2015 WL 1263029, at \*14, 17 (PTAB Mar. 12, 2015). During trial, both parties filed motions to exclude documentary evidence, and the Board excluded several REG exhibits based on hearsay and other grounds. REG appeals the Board's unpatentability determinations and its exclusion of certain REG exhibits. For the reasons stated herein, we affirm-in-part, reverse-in-part, vacate-in-part, and remand for further proceedings.

#### BACKGROUND

The '804 patent is directed to paraffin compositions containing primarily even-carbon-number paraffins and methods of making them. Paraffins are hydrocarbon chains that contain carbon and hydrogen atoms, and even-carbon-number paraffins are saturated hydrocarbon chains with the general chemical formula  $C_nH_{2n+2}$ ,<sup>1</sup> in which the "n" is an even number.

Even-carbon-number paraffins are useful as phase change materials (PCMs), which can be used as insulation

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<sup>1</sup> The parties use  $C_n$  or  $C_n$  as a shorthand for  $C_nH_{2n+2}$ . These notations refer to the same hydrocarbon chain.

in a house because they can absorb heat during the warm portions of the day by undergoing a solid-liquid phase transition and return the heat during the cooler portions of the day by re-freezing. The thermal storage capacity of PCMs is determined by their latent heat of fusion, which is higher for even-carbon-number paraffins than for odd-carbon-number paraffins. The '804 patent seeks to increase the production of compositions with higher percentages of even-carbon-number paraffins. One method disclosed in the '804 patent is the hydrogenation and deoxygenation of naturally occurring fatty acids and esters, such as bio-oils, to produce primarily even-carbon-number paraffins.

Claim 1 is representative for purposes of this appeal:

1. A phase change material composition comprising at least 75 wt% even carbon number paraffins, wherein the paraffins are produced by hydrogenation/hydrogenolysis of naturally occurring fatty acids and esters.

During trial, the Board provided several claim constructions, none of which are being appealed. It first found that the preamble of claim 1 was not limiting because the term “phase change material composition” expressed only an intended use, and did not limit the scope of the claim. It also found that the process of production (i.e., producing paraffins by “hydrogenation/hydrogenolysis of naturally occurring fatty acids and esters”) was not limiting. Because the Board found that the term “phase change material composition,” and the process of production were not limiting, and neither party challenges these constructions, we accept them. The key limitation for purposes of this appeal is the “at least 75 wt% even carbon number paraffins” limitation. The “wt%” limitation describes the percentage concentration, in units of weight percent, of even-carbon-number to odd-carbon-number paraffins in the claimed composition.

Claim 2 depends on claim 1, and it further recites that the composition comprises at least 80 wt% even-carbon-number paraffins. Claims 3–5 depend on claim 1, and they recite specific numbers of carbons. Claim 8 depends on claim 1 and recites the presence of a catalyst.

Neste requested *inter partes* review of claims 1–5 and 8 of the '804 patent in September 2013. The Board instituted trial in March 2014, based on a reasonable likelihood of finding that Dindi and Craig anticipated the claims.

In its final decision, the Board found that Craig anticipated claims 1, 3, 4, and 8 because Craig disclosed a process for producing hydrocarbon products in the diesel boiling range ( $C_{15}H_{32}$  through  $C_{18}H_{38}$ ) that are effective in improving diesel fuel ignition. Craig disclosed hydrocarbon products obtained from naturally occurring feedstocks, and the results of a gas chromatography mass spectrometry (GC-MS) analysis of the products, shown as peak area percentages for each hydrocarbon. Although Craig did not disclose weight percentages, the Board found that Craig anticipated claims 1, 3, 4, and 8 because a person of ordinary skill in the art could readily convert the disclosed peak area percentages into their corresponding weight percentages, and the sum of the converted peak area percentages of Craig met the claim requirement that the overall weight percentage of even-carbon-number paraffins be at least 75 wt%.

The Board also found that Dindi anticipated claims 1–3, 5, and 8 because Dindi described a process for converting renewable resources, such as vegetable oil and animal fat, into paraffins, in which a renewable resource is processed using hydrogen and a molybdenum catalyst to produce a hydrocarbon product with a ratio of even-

carbon-numbered to odd-carbon-numbered hydrocarbons of at least 2:1.<sup>2</sup> At trial, REG sought to introduce certain exhibits to establish an earlier invention date that predated Dindi's filing date. These exhibits included, for example, test data from third parties, communications between REG's inventor, Mr. Abhari, and third parties on the invention and the test data, and minutes from meetings that Mr. Abhari had attended. Neste moved to exclude, and the Board agreed to exclude, these REG exhibits based on lack of authentication, hearsay, or improper reply evidence. REG contends that these exhibits show the mental thoughts of Mr. Abhari and that he communicated his invention to third parties prior to Dindi's filing date.

The Board issued its final written decision on March 12, 2015, finding that Neste established by a preponderance of evidence that Craig and Dindi anticipated all of the challenged claims. On appeal, REG challenges the Board's anticipation findings, and its rulings on REG's excluded exhibits. REG argues that Craig cannot anticipate claims 1, 3, 4, and 8 because Craig discloses area percentages rather than weight percentages, and that Dindi cannot anticipate claims 1–3, 5, and 8 because Mr. Abhari invented the subject matter of the '804 patent before Dindi's filing date. REG also argues that the Board's exclusion of its exhibits was prejudicial because REG relied on them to show that Mr. Abhari recognized and communicated his conception of the invention to a third party before Dindi's June 13, 2008 filing date.

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<sup>2</sup> This ratio of at least 2:1 appears to be less than 75%, but the parties do not dispute that Dindi meets the at least 75 wt% (and the at least 80 wt%) limitation for purposes of this appeal.

## ANALYSIS

We have jurisdiction over this appeal under 28 U.S.C. § 1295(a).

## I. Standard of Review

Anticipation is a question of fact, and decisions from the Board on factual matters are reviewed for substantial evidence. *Eli Lilly & Co. v. Bd. of Regents of Univ. of Wash.*, 334 F.3d 1264, 1267 (Fed. Cir. 2003).

“Priority of invention and its constituent issues of conception and reduction to practice are questions of law predicated on subsidiary factual findings.”<sup>3</sup> *Singh v. Brake*, 317 F.3d 1334, 1340 (Fed. Cir. 2003). Thus, we “review *de novo* the Board’s legal conclusions with respect to priority, conception, and reduction to practice.” *Id.* To show prior invention, REG must “either prove (1) a conception and reduction to practice before the filing date of [Dindi] or (2) a conception before the filing date of [Dindi] combined with diligence and reduction to practice after that date.” *Taurus IP, LLC v. DaimlerChrysler Corp.*, 726 F.3d 1306, 1323 (Fed. Cir. 2013). In appeals from the Board, corroboration is a subsidiary factual issue reviewed for substantial evidence. *In re Gartside*, 203 F.3d 1305, 1315 (Fed. Cir. 2000).

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<sup>3</sup> “Congress amended 35 U.S.C. § 102 in 2011 as part of the America Invents Act (‘AIA’).” *Medicines Co. v. Hospira, Inc.*, 827 F.3d 1363, 1372 n.1 (Fed. Cir. 2016) (en banc) (citing Leahy-Smith America Invents Act, 125 Stat. 84, 341 (2011)). “References to § 102 . . . in this opinion refer to the pre-AIA version of the statute, the version that applies here” because the claims at issue have an effective filing date prior to March 16, 2013. *Id.*

We review the Board's evidentiary rulings for abuse of discretion. *Chen v. Bouchard*, 347 F.3d 1299, 1307 (Fed. Cir. 2003).

## II. Anticipation by Craig

We begin with REG's argument that Craig does not anticipate claims 1, 3, 4, and 8 of the '804 patent because Craig discloses area percentages rather than weight percentages.

The Board determined that Table 9 of Craig discloses naturally occurring feedstocks, including canola oil, rapeseed oil, and palm oil, and the hydrocarbon products produced from each of these feedstocks. Table 9 shows the results of a GC-MS analysis of the hydrocarbon products produced by Craig, shown in peak area percentages for each hydrocarbon, e.g., C<sub>16</sub>.

| Quantitative Analysis of the Hydrocarbon Product Resulting From the Hydrotreating of a Variety of Feedstocks |                       |                 |                 |                   |                   |                      |                 |                   |                 |                                   |
|--|-----------------------|-----------------|-----------------|-------------------|-------------------|----------------------|-----------------|-------------------|-----------------|-----------------------------------|
| Sample   | Peak Area Percentage* |                 |                 |                   |                   |                      |                 |                   |                 | Original Distillation Yield (%)** |
|  | C <sub>15</sub>       | C <sub>16</sub> | C <sub>17</sub> | C <sub>18</sub>   | C <sub>19</sub>   | C <sub>20</sub>      | C <sub>21</sub> | C <sub>22</sub>   | C <sub>24</sub> |                                   |
| <b>(a) Canola Oil</b>  |                       |                 |                 |                   |                   |                      |                 |                   |                 |                                   |
| Premium Quality (210-343° C. cut)  | —                     | 3.10            | 15.79           | 78.28             | —                 | 1.38                 | —               | —                 | —               | —                                 |
| Sample Seed Oil (210-343° C. cut)  | 0.53                  | 3.28            | 20.40           | 74.69             | —                 | —                    | —               | —                 | —               | 74.5                              |
| Green Seed Oil (210-343° C. cut)   | 1.88                  | 5.14            | 22.98           | 62.28             | 0.65              | 0.87                 | 0.22            | 0.21              | —               | 70.1                              |
| <b>(b) High Erucic Acid Rapeseed Oil</b>   |                       |                 |                 |                   |                   |                      |                 |                   |                 |                                   |
| 210-343° C. cut  | 1.35                  | 8.27            | 6.85            | 34.73             | 1.68              | 8.09                 | 3.71            | 19.66             | —               | —                                 |
| 343° C. + cut  | —                     | 0.26            | 0.68            | 10.29             | 0.80              | 8.12                 | 7.42            | 60.62             | 2.57            | —                                 |
| <b>(c) Sunflower Oil (210-343° C. cut)</b>   |                       |                 |                 |                   |                   |                      |                 |                   |                 |                                   |
|  | 0.73                  | 8.02            | 5.41            | 70.28             | 3.04              | 0.63                 | 1.17            | 0.49              | —               | —                                 |
| <b>(d) Palm Oil (210-343° C. cut)</b>  |                       |                 |                 |                   |                   |                      |                 |                   |                 |                                   |
|  | 8.62                  | 33.53           | 11.88           | 38.75             | 0.31              | 0.22                 | 0.23            | —                 | —               | 71.1                              |
| <b>(e) Fatty Acid Fraction of Crude Tall Oil (210-343° C. cut)</b>   |                       |                 |                 |                   |                   |                      |                 |                   |                 |                                   |
|  | 0.40                  | 1.27            | 18.89           | 64.28             | 0.83              | 1.57                 | —               | —                 | —               | 69.9                              |
| Fatty Acid Composition of Hydrotreating Feedstocks   |                       |                 |                 |                   |                   |                      |                 |                   |                 |                                   |
| Sample   | C <sub>14</sub>       | C <sub>16</sub> | C <sub>18</sub> | C <sub>18:1</sub> | C <sub>18:2</sub> | C <sub>20:18:3</sub> | C <sub>22</sub> | C <sub>22:1</sub> |                 |                                   |
| <b>(a) Canola Oil</b>  |                       |                 |                 |                   |                   |                      |                 |                   |                 |                                   |
| Premium Quality  | 0.1                   | 4.0             | 1.8             | 62.5              | 20.7              | 10.3                 | 0.4             | 0.1               |                 |                                   |
| Sample Seed Oil  | —                     | 4.6             | 1.8             | 59.2              | 20.2              | 12.4                 | 0.4             | 0.6               |                 |                                   |
| Green Seed Oil   | —                     | 4.8             | 1.9             | 58.4              | 19.7              | 13.2                 | 0.5             | 0.6               |                 |                                   |
| <b>(b) High Erucic Acid</b>  |                       |                 |                 |                   |                   |                      |                 |                   |                 |                                   |
|  | 0.1                   | 1.8             | 1.0             | 13.4              | 12.8              | 15.0                 | 0.3             | 55.0              |                 |                                   |

TABLE 9-continued

|   |     |      |     |      |      |     |   |   |
|---|-----|------|-----|------|------|-----|---|---|
| Rapeseed                                      |     |      |     |      |      |     |   |   |
| (c) Sunflower Oil                             | —   | 7.0  | 3.3 | 14.3 | 75.4 | —   | — | — |
| (d) Palm Oil                                  | 1.2 | 46.8 | 3.8 | 37.6 | 10.0 | 0.5 | — | — |
| (e) Fatty Acid Fraction*<br>of Crude Tall Oil | —   | 0.9  | 1.7 | 22.5 | 37.2 | 0.6 | — | — |

\*Percentage of Total GCMS Peak Area. The summation of yields of C<sub>13</sub>-C<sub>24</sub> accounts for on average 90% of the total peak area.

\*\*Distillation yield of the respective sample expressed as original weight fed to the HT reactor.

\*35 additional nonidentifiable peaks totalling 37.1% of the overall fatty acid composition.

Table 9 discloses, for example, that hydrotreating “Canola Oil, Premium Quantity, 210-343 °C cut” results in a hydrocarbon product with peak area percentages of 3.1% C<sub>16</sub>, 78.28% C<sub>18</sub> and 1.38% C<sub>20</sub>. The Board noted that the GC-MS area percentages do not by themselves establish, by a preponderance of evidence, weight percentages within the claimed ranges of the ’804 patent. The Board agreed, however, with Neste’s expert (Dr. Klein) that a person of ordinary skill in the art could use relative response factors to convert GC-MS area percentages into weight percentages.

REG argued to the Board that Craig does not provide enough information to accurately convert the GC-MS peak area percentages to weight percentages using relative response factors, but the Board disagreed. The Board found that Dr. Klein’s Table 2 illustrated that Craig’s Table 9 disclosed products containing even-carbon-number paraffins sufficiently within the weight percentage range of 75 wt% recited in claim 1 of the ’804 patent.



Table 2

|  | Craig<br>Area<br>% | Hsu        | Gorocs     | Chaurasia  |
|--|--------------------|------------|------------|------------|
| <b>Canola Premium</b>                  | 82.76%             | 82.31 wt.% | 82.57 wt.% | 82.32 wt.% |
| <b>Canola Sample Seed</b>              | 77.97%             | 77.48 wt.% | 77.77 wt.% | 77.50 wt.% |
| <b>Canola Green Seed</b>               | 68.29%             | 67.63 wt.% | 68.09 wt.% | 67.54 wt.% |
| <b>Rapeseed Oil 210-343 °C<br/>cut</b> | 70.75%             | 68.86 wt.% | 69.87 wt.% | 68.70 wt.% |
| <b>Rapeseed Oil 343 °C + cut</b>       | 81.86%             | 80.03 wt.% | 81.14 wt.% | 80.17 wt.% |
| <b>Sunflower Oil</b>                   | 79.42%             | 78.49 wt.% | 78.91 wt.% | 78.19 wt.% |
| <b>Palm Oil</b>                        | 72.5%              | 71.75 wt.% | 72.11 wt.% | 71.58 wt.% |
| <b>Fatty Acid Fraction</b>             | 67.12%             | 65.78 wt.% | 66.45 wt.% | 65.54 wt.% |

Table 2 shows Dr. Klein's calculation of the weight percentages for various feedstocks from Craig's Table 9, using three sets of relative response factors, which Dr. Klein obtained from the prior art references in the record (Hsu, Göröcs, and Chaurasia). J.A. 1316. The Board found that the lowest calculated weight for Canola Premium, for instance, was 82.31 wt%, which was more than 7% higher than the 75 wt% recited in claim 1 of the '804 patent. Although Dr. Klein calculated different weight percentages when he used each of the three relative response factors, the differences in calculated wt% values among the uses of the three relative response factors were very small, as shown in Table 2. Thus, the Board found it unlikely that any correction required by the experimental conditions would result in a weight percentage of less than the 75 wt% recited in claim 1.<sup>4</sup>

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<sup>4</sup> The Board found that Dr. Klein's calculated values were too close to claim 2's limitation of at least 80 wt% to conclude that Neste established, by a preponder-

REG argues that the Board used an erroneous inherency standard because the Board found it *unlikely* that Craig did not disclose the claimed limitations of “weight percentages.” REG believes that the Board relied on Dr. Klein’s testimony to “fill the gap” in Craig by estimating weight percentages using the area percentages of Craig, and in REG’s view, this conversion is not so straightforward. REG points to evidence that converting weight and area percentages requires calibration of the instrument to account for actual instrument operating conditions. Dr. Klein did not perform this calibration, and instead used several different estimates to suggest precision. REG contends that precision does not mean accuracy, absent calibration.

Neste responds that the Board did not use inherency because Craig expressly discloses the concentration of even-carbon-number paraffins in area percentages. Neste argues that substantial evidence supports the Board’s finding that a person of ordinary skill could readily convert Craig’s area percentages to the weight percentages recited in the claims using Dr. Klein’s calculations.

We agree with Neste. Dr. Klein converted the area percentages of Craig into the weight percentages recited in the ’804 patent using several different relative response factors from the prior art, including Göröcs and Chaurasia, which REG’s own expert, Dr. Lamb, cited in his expert declaration. J.A. 2895–98. Dr. Lamb agreed that relative response factors could be used to convert area percentages to weight percentages, and that Göröcs and Chaurasia disclosed that response factors increase linearly with carbon number, but he concluded that Craig

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ance of the evidence, that Table 9 discloses compounds within the scope of claim 2. Neste does not appeal this finding.

did not provide any calibration data or other indicia of reliability.<sup>5</sup> J.A.2897–98. This is not an inherency issue, however, because the challenged limitation is not missing from Craig. See *Cont'l Can Co. USA v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991) (“To serve as an anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence.”). Craig is not silent as to the concentration of even-carbon-number paraffins because it expressly discloses this concentration in area percentage. Dr. Klein simply converted one unit of measurement (area percent) into another unit of measurement (weight percent) by using relative response factors from the prior art. Dr. Klein explained that this conversion was a reliable technique given the very similar weight percentage results after using three different sets of relative response factors. J.A. 1309–17. On this record,

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<sup>5</sup> At oral argument, REG agreed that its argument to predate the Dindi reference relied on exhibits that show area percents rather than weight percents. REG concluded, however, that the essential distinction was that Craig used a GC-MS detector, whereas Mr. Abhari used a gas chromatography analyzer with flame ionization detector (GC-FID). REG’s expert Dr. Lamb testified that unlike for a GC-MS detector, a paraffin’s weight percent can be reliably calculated from the GC-FID area percent and the relative response factor for that paraffin because GC-FID response factors for paraffins in the C<sub>14</sub>-C<sub>22</sub> range are equivalent within ~1%. J.A. 2895–98. Neste responded that per Dr. Klein’s testimony, a person of ordinary skill in the art would have readily recognized that quantitative data from a GC-MS detector could be reliably converted to weight percentages using the relative response factors, and weight percentages were all that the claims required. J.A. 1309–17.

substantial evidence supports the Board's factual finding that the area percent disclosed in Craig could be reliably translated to the weight percent recited in the '804 patent.

REG argues that Chaurasia discloses an average error of 3–5% with a range of +/- 20% of the observed values. This error range, however, does not arise from Chaurasia's own analysis, but it is Chaurasia's description of an error range from a separate study by Fitch and Sauter, i.e., it is a reference within a reference. Fitch and Sauter itself is not part of the record. Furthermore, the Fitch and Sauter error range applies to the calculation of the atomic or molecular cross-section of a specific molecule, not the percentage concentration of even-to-odd carbon number paraffins in a mixture of paraffins. Another distinction is that Fitch and Sauter's error range applies to polycyclic aromatic hydrocarbons and polychlorinated biphenyl products (i.e., they contain chlorine, phenyl, and other pollutants), which are more complex molecules than the even-carbon-number paraffins (i.e., linear straight chain alkanes containing only carbons and hydrogens) at issue in this case. Thus, REG fails to establish that the error range of Fitch and Sauter is applicable to Dr. Klein's calculations.

In view of the foregoing, we affirm the Board's finding that Craig anticipates claims 1, 3, 4 and 8 of the '804 patent.

### III. Anticipation by Dindi

Because claims 2 and 5 of the '804 patent remain at issue, we must still address REG's arguments with respect to anticipation of claims 2 and 5 by Dindi. Claim 2 depends on claim 1, and recites that the composition comprises at least 80 wt% even-carbon-number paraffins. Claim 5 depends on claim 1, and it recites that the even-carbon-number paraffins include n-dodecane and n-tetradecane.

REG argued before the Board that Dindi was not prior art to the '804 patent because Mr. Abhari invented the subject matter of the '804 patent before the June 13, 2008 filing date of Dindi. The Board recognized that to ante-date Dindi, REG had to “prove (1) a conception and reduction to practice before the filing date of [Dindi] or (2) a conception before the filing date of [Dindi] combined with diligence and reduction to practice after that date.” *Taurus IP*, 726 F.3d at 1323. In either case, REG had to prove conception prior to the June 13, 2008 filing date of Dindi. *Id.*

Conception is “the formation, in the mind of the inventor of a *definite and permanent idea of the complete and operative invention, as it is thereafter to be applied in practice.*” *Coleman v. Dines*, 754 F.2d 353, 359 (Fed. Cir. 1985) (emphasis in original) (quoting *Gunter v. Stream*, 573 F.2d 77, 80 (C.C.P.A. 1978)). Conception must include every feature or limitation of the claimed invention. *Davis v. Reddy*, 620 F.2d 885, 889 (C.C.P.A. 1980). “Conception must be proved by corroborating evidence which shows that the inventor disclosed to others his ‘completed thought expressed in such clear terms as to enable those skilled in the art’ to make the invention.” *Coleman*, 754 F.2d at 359 (quoting *Field v. Knowles*, 183 F.2d 593, 600 (C.C.P.A. 1950)). However, “there is no final single formula that must be followed in proving corroboration.” *Kridl v. McCormick*, 105 F.3d 1446, 1450 (Fed. Cir. 1997) (quoting *Berry v. Webb*, 412 F.2d 261, 266 (C.C.P.A. 1969)).

We agree with REG that it has proven conception prior to the filing date of Dindi, based on Exhibits 2011 and 2058, both already admitted in evidence, and the content of Exhibit 2061, which the Board incorrectly excluded from evidence based on hearsay. These three exhibits provide documentary evidence that, by April 2008, Mr. Abhari conceived of a definite and permanent idea of the complete and operative invention, and that he had dis-

closed to a third party his complete thoughts in such clear terms that the third party was able to make his invention using his process.

We first review the documentary evidence already admitted in evidence. Exhibit 2011 contains an email dated October 19, 2007 from Mr. Abhari to SwRI, a third party, with an objective to “[c]onvert 1,200 gallons of bio-feedstock to synthetic diesel product using SwRI’s large (2 gal/h) fixed-bed hydrogenation unit.” J.A. 2722. This email discloses a process for making the invention because it contains instructions for the reaction conditions and for conducting the sampling and analysis. Exhibit 2011 broadly describes Mr. Abhari’s process as a way to produce synthetic diesel product, which is sufficient to show that Mr. Abhari disclosed his completed thought to SwRI in such clear terms as to enable SwRI to make the invention. *See Coleman*, 754 F.2d at 359. We agree, however, that Exhibit 2011 is not sufficient by itself to show conception because it does not show that Mr. Abhari knew that his process would create at least 75 wt% even-carbon-number paraffins.

We turn next to Exhibit 2058, also admitted in evidence, which contains an email dated April 2, 2008 from SwRI back to Mr. Abhari, describing the results of the latest test runs. SwRI’s email expressly identifies one of the test runs as Sample “084.” The GC data for Sample “084” contains both a graph and a table showing peak results with the following area percentages: C<sub>14</sub> (1.218%), C<sub>16</sub> (21.926%), C<sub>18</sub> (56.773%), and C<sub>20</sub> (0.871%). J.A. 3454. The sum of the area percentages for these four even-carbon-number paraffins is 80.788%. Mr. Abhari quickly replied to SwRI by email, inquiring about the results of a second sample. J.A. 3443. SwRI responded that same day, writing that the second sample contained area percentages of C<sub>16</sub> (22%), C<sub>17</sub> (11%), and C<sub>18</sub> (55%).

Taken together, Exhibits 2011 and 2058 disclose all the limitations of claims 1 and 2 because Exhibit 2058 discloses a diesel product composition<sup>6</sup> that contained at least 80 wt% even-carbon-number paraffins.<sup>7</sup> Exhibit 2011 shows that SwRI created the claimed composition using a “hydrogenation” process of naturally occurring fatty acids and esters, as recited by claim 1, because Mr. Abhari sent an email to SwRI stating that the objective was to convert “biofeedstock” to “diesel fuel,” using SwRI’s “fixed-bed hydrogenation unit.” J.A. 2722. Mr. Abhari knew that SwRI had created the composition because he responded to SwRI’s email describing the results. He disclosed his invention to others because Exhibit 2058 shows that SwRI made the composition using Mr. Abhari’s instructions from Exhibit 2011.

Neste argues that nothing in Exhibits 2011 and 2058 discloses the process that Mr. Abhari attempted to test. This is incorrect because Exhibit 2011 shows that in October 2007, Mr. Abhari emailed SwRI a description of a process, and Exhibit 2058 shows that in April 2008, SwRI emailed Mr. Abhari the results of that process. Neste provides no reason to suggest that SwRI would not have followed Mr. Abhari’s express instructions.

Neste also asserts that nothing in Exhibits 2011 and 2058 shows that Mr. Abhari knew that the sum of the weight percentages of the even-carbon-number paraffins met claim 2’s limitation of “at least 80 wt%.” The sum of

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<sup>6</sup> As noted earlier, the Board’s construction of claim 1 does not require the claimed composition to be a PCM material, nor does it require the compositions to be made by any particular process.

<sup>7</sup> Although Exhibit 2058 discloses area percentages rather than weight percentages, Neste does not argue that Exhibit 2058 is ineffective for that reason.

the four percentages for C<sub>14</sub> (1.218%), C<sub>16</sub> (21.926%), C<sub>18</sub> (56.773%), and C<sub>20</sub> (0.871%) is more than 80%, but it is true that nothing from Mr. Abhari in Exhibits 2011 and 2058 expressly stated that the percentages of even-carbon-number paraffins should be summed up or that the sum of these percentages met claim 2's limitation of "at least 80 wt%." This "knowledge" of Mr. Abhari is supplied by Exhibit 2061, which contains an email dated April 29, 2008 from Mr. Abhari to Microtek, another third party who specialized in PCM materials, stating that he could achieve an 80% purity C<sub>18</sub> product.<sup>8</sup>

Exhibit 2061 is a set of two emails between Mr. Abhari and Microtek. The first email is from Dawn Mantz of Microtek to Mr. Abhari on March 6, 2008, in which Ms. Mantz thanks Mr. Abhari for sending a sample and informs Mr. Abhari that Microtek had already begun its preliminary testing on the sample in the lab. The second email is from Mr. Abhari to Amy Damewood and Ms. Mantz on April 29, 2008, in which Mr. Abhari informs Ms. Damewood and Ms. Mantz that he has "had more difficulty than [he] expected trying to recover a 90+% purity nC<sub>18</sub> product using [his] lab distillation glassware (80% purity C<sub>18</sub> is the best [they] got)." J.A. 7868. Neste argued before the Board that these emails were hearsay because they contain out of court statements by Ms. Mantz. REG responded that these emails were not hearsay, because it did not offer the emails to prove the truth of the matter asserted. Rather, REG contended that it offered the emails to show that Mr. Abhari recognized the usefulness of high even-carbon-number paraffins as a PCM material and that he would not have otherwise

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<sup>8</sup> Exhibit 2061 also discloses percentages rather than weight percentages, but Neste does not argue that Exhibit 2061 is ineffective for that reason.



contacted Microtek. The Board agreed with REG, in part, finding that the fact that Mr. Abhari contacted Microtek was a non-hearsay use of Exhibit 2061, and the Board admitted Exhibit 2061 for that limited purpose. The Board did not consider the content of Exhibit 2061, which it found to be hearsay.

We find that the Board erred to the extent that it excluded the content of Exhibit 2061 based on hearsay because REG offered Exhibit 2061 for the non-hearsay purpose to show that Mr. Abhari thought he had achieved 80 wt% purity C<sub>18</sub> product.<sup>9</sup> The act of writing and sending the email is, by itself, probative evidence on whether Mr. Abhari recognized—at the time that he had written the email—that the sum of the weight percentages of even-carbon-number paraffins in his compositions was at least 80 wt% and communicated this to a third party. In *Knorr v. Pearson*, 671 F.2d 1368, 1372–73 (C.C.P.A. 1982), the U.S. Court of Customs and Patent Appeals found that a statement was not hearsay if “the communication (as opposed to the truth) ha[d] legal significance.” *Knorr* involved a telephone call, in which two co-inventors, Buergin and Pearson, discussed an invention, and which was overheard by a third party, Rutkowski. *Id.* at 1370. The court held that Rutkowski’s testimony on what he heard Buergin say to Pearson was not hearsay because the communication of the idea had legal significance as the basis for the conception of the invention. *Id.* at 1373–74. By contrast, Rutkowski’s testimony on “Buergin’s statements to Rutkowski regarding what Pearson said” was hearsay. *Id.* at 1373.

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<sup>9</sup> Neste did not challenge the authentication of Exhibit 2061, J.A. 546, 552, so we infer that Exhibit 2061 accurately shows the communications between Mr. Abhari and Microtek in March and April, 2008.

Here, *Knorr* supports REG's position that Mr. Abhari's communication with Microtek in Exhibit 2061 is legally significant because it shows that Mr. Abhari communicated the conception of his invention to a third party, Microtek. Thus, the documentary evidence contained in Exhibits 2011, 2058, and 2061 corroborate Mr. Abhari's conception of the claimed compositions as of April 2008. Exhibit 2011 shows that Mr. Abhari disclosed his process to a third party. Exhibit 2058 shows that the third party produced the claimed compositions using this process, and Exhibit 2061 shows that Mr. Abhari recognized and communicated to a third party that he could create a composition with the claimed property of at least 80 wt% even-carbon-number paraffins.

The Board also found that it could not determine from Exhibit 2061 the specific product or process that Mr. Abhari had in mind, or the fact that Mr. Abhari had recognized that he had created something new, when he had emailed Microtek that he could achieve at least 80 wt% purity C<sub>18</sub> product. Conception, however, does not require that Mr. Abhari recognize that he created a PCM material, or the specific process by which he had created 80 wt% purity C<sub>18</sub> product, because the Board's construction of the claims did not limit the invention based on these features. The only feature at issue here is whether Mr. Abhari disclosed a composition containing at least 80 wt% even-carbon-number paraffins to others, and we find that he did. Mr. Abhari's email to Microtek expressly states that he could achieve at least 80% purity C<sub>18</sub> product, which was new in April 2008 because this product did not exist in the prior art, given the record before us. Nor does Neste dispute that Mr. Abhari sent this email to Microtek because the Board admitted Exhibit 2061 to show that Mr. Abhari contacted Microtek, which Neste does not appeal.

We reverse the Board's findings on conception and its exclusion of the contents of Exhibit 2061 based on hearsay. We find that Exhibit 2061 shows that Mr. Abhari "disclosed to others," *see Coleman*, 754 F.2d at 359, a composition including every feature or limitation of the claimed invention, *see Davis*, 620 F.2d at 889. We also find that, based on Exhibits 2011, 2058, and 2061, Mr. Abhari's disclosure was a "completed thought expressed in such clear terms as to enable those skilled in the art' to make the invention." *Coleman*, 754 F.2d at 359. However, because the Board did not make factual findings on diligence or reduction to practice in the first instance, we remand for the Board to make these findings.

REG also appeals the Board's exclusion of Exhibits 2012, 2013, 2057 and 2062 based on hearsay. We do not address these rulings because we find that Exhibits 2011, 2058 and 2061 are sufficient to show conception, but because Exhibits 2012, 2013, 2057 and 2062 may be relevant for diligence and reduction to practice, we vacate the Board's exclusion of these exhibits and remand for further consideration consistent with this opinion.

We have considered REG's remaining arguments and find no abuse of discretion in the Board's decision to exclude Exhibits 2003 and 2006 for lack of authentication. We also find no abuse of discretion in its exclusion of Exhibit 2053 for improper reply evidence. Our affirmance of those exclusions should not be taken as necessarily approving of all of the Board's reasoning explaining the exclusions.

#### CONCLUSION

For the foregoing reasons, we affirm the Board's determination that Craig anticipates claims 1, 3, 4 and 8 of the '804 patent. However, we reverse the Board's finding that REG failed to establish conception of the invention prior to Dindi's filing date of June 13, 2008. Consequently, we vacate the Board's finding of anticipation of claims

2 and 5, and we remand for further fact finding on diligence and reduction to practice.

We reverse the Board's determination to exclude Exhibit 2061 for failure to consider its non-hearsay purpose. We vacate the Board's exclusion of Exhibits 2012, 2013, 2057 and 2062 for hearsay, and we affirm the Board's exclusion of Exhibits 2003, 2006 and 2053 based on lack of authentication and improper reply evidence.

**AFFIRMED-IN-PART, REVERSED-IN-PART,  
VACATED-IN-PART, AND REMANDED**

COSTS

No costs.