

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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SYNTROLEUM CORPORATION,  
Petitioner,

v.

NESTE OIL OYJ,  
Patent Owner.

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Case IPR2013-00178 (MT)  
Patent No. 8,212,094

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Before MICHAEL P. TIERNEY, JONI Y. CHANG, and  
CHRISTOPHER L. CRUMBLEY, *Administrative Patent Judges*.

CRUMBLEY, *Administrative Patent Judge*.

DECISION  
Institution of *Inter Partes* Review  
*37 C.F.R. § 42.108*

## I. INTRODUCTION

On March 8, 2013, Syntroleum Corporation (“Syntroleum”) filed a Petition For *Inter Partes* Review of claims 1-20 of U.S. Patent No. 8,212,094 (Ex. 1001, “the ’094 patent”). Paper 1. Syntroleum subsequently filed an Amended Petition on March 21, 2013. Paper 7, “Am. Pet.” The owner of the ’094 patent, Neste Oil, Oyj (“Neste”) filed a Patent Owner’s Preliminary Response on June 14, 2013. Paper 11, “Prelim. Resp.” We have jurisdiction under 35 U.S.C. § 314.

The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a) which provides as follows:

THRESHOLD -- The Director may not authorize an *inter partes* review to be instituted unless the Director determines that the information presented in the petition filed under section 311 and any response filed under section 313 shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.

Upon consideration of the petition, we determine that the information presented establishes that there is a reasonable likelihood that Syntroleum would prevail with respect to claims 1-20 of the ’094 patent. Accordingly, pursuant to 35 U.S.C. § 314, we authorize an *inter partes* review to be instituted as to claims 1-20 of the ’094 patent.

### *A. Related Proceedings*

Syntroleum discloses that the ’094 patent is involved in co-pending litigation captioned *Neste Oil, Oyj v. Dynamic Fuels, LLC, Syntroleum Corporation, and Tyson Foods Inc.*, Case No. 1:2012cv01744 (D. Del.). Am. Pet. 1. According to

Syntroleum, Dynamic Fuels, LLC is a joint venture of Syntroleum Corporation and Tyson Foods. *Id.*

### *B. The '094 Patent*

The '094 patent is directed to a process for the manufacture of diesel range hydrocarbons from bio oils and fats, commonly called “biodiesel.” Ex. 1001, Abstract; 1:15-17. In particular, the '094 patent discloses a two-step process in which a feed stream of biological origin, diluted with a hydrocarbon, is first hydrodeoxygenated and then isomerized. *Id.* at 5:25-40. The feed stream is low in impurities such as alkali and alkaline earth metals, other metals, and phosphorous, which, if present, may poison or deactivate the catalysts used in the hydrodeoxygenation (“HDO”) and isomerization steps. *Id.* at 7:66-8:9. According to the '094 patent, dilution of the feed stream reduces the formation of undesirable high molecular weight compounds in the resulting product, thereby improving on prior art processes. *Id.* at 10:66-11:5.

### *C. Exemplary Claims*

Of the challenged claims, only claim 1 is independent, while claims 2-20 depend directly or indirectly from claim 1. Claim 1 is exemplary of the claimed subject matter of the '094 patent and is reproduced as follows:

1. A process for the manufacture of diesel range hydrocarbons comprising:
  - combining a fresh feed stream of biological origin and a stream of diluting agent containing hydrocarbons to form a total feed stream,
  - introducing the total feed stream to a hydrodeoxygenation step, hydrodeoxygenating the total feed, in the hydrodeoxygenating step,
  - introducing the hydro deoxygenated product to an isomerization step, and
  - isomerizing the hydrodeoxygenated product in the isomerization step,wherein
  - the total feed stream contains less than 10w-ppm alkali and alkaline earth metals, calculated as elemental alkali and alkaline earth metals, less than 10 w-ppm other metals, calculated as elemental metals, and less than 30 w-ppm phosphorous, calculated as elemental phosphorous.

*D. Prior Art Relied Upon*

Syntroleum relies upon the following prior art references:

Reid	U.S. Patent 4,512,878	Apr. 23, 1985	(Ex. 1010)
Craig	U.S. Patent 4,992,605	Feb. 12, 1991	(Ex. 1013)
Harrison	U.S. Patent 5,093,535	Mar. 3, 1992	(Ex. 1014)
Monnier	U.S. Patent 5,705,722	Jan. 6, 1998	(Ex. 1031)
Oldřich	CZ Patent 283575	Mar. 5, 1998	(Ex. 1007 <sup>1</sup> )
Aalto	SE Patent 520633	Aug. 5, 2003	(Ex. 1016 <sup>2</sup> )
Jakkula	EP Pub. App. 1396531 A2	Mar. 10, 2004	(Ex. 1006 <sup>3</sup> )

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<sup>1</sup> An English translation of Oldřich was submitted as Ex. 1008.

<sup>2</sup> An English translation of Aalto was submitted as Ex. 1017.

<sup>3</sup> On July 27, 2013, we granted Syntroleum's Motion to Correct, which resulted in

M.D. Edgar et al., “Analysis is key to hydrotreater troubleshooting” Oil & Gas Journal (Jun. 4, 1984) (Ex. 1009)

M.D. Garrido et al., “Concentrations of metals in vegetable edible oils,” 50 Food Chemistry 237-243 (1994) (Ex. 1015)

T. Mag, Canola Council of Canada, Canola Seed and Oil Processing (1999) (Ex. 1011)

J.A. Muñoz Arroyo et al., “Hydrocracking and isomerization of *n*-paraffin mixtures and a hydrotreated gasoil on Pt/ZSM-22: confirmation of pore mouth and key-lock catalysis in liquid phase,” Applied Catalysis A: General 9-22 (2000) (Ex. 1012)

*E. The Asserted Grounds*

Syntroleum asserts the following grounds of unpatentability:

<b>Claims Challenged</b>	<b>Basis</b>	<b>References</b>
1, 4, 7, and 9-20	§ 102	Jakkula
1-7 and 9-20	§ 103	Jakkula
1-3 and 5-19	§ 102	Oldřich
1-19	§ 103	Oldřich
1-20	§ 103	Jakkula and Oldřich
1-3 and 5-19	§ 103	Oldřich, Edgar, Reid, and Mag
20	§ 103	Oldřich, Edgar, Reid, Mag, and Muñoz Arroyo
1-20	§ 103	Jakkula, Craig, Harrison, Monnier, and Garrido
1-4 and 7-20	§ 103	Aalto and Oldřich

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the substitution of Ex. 1038 (EP 1396531 A2) for originally-filed Ex. 1006 (1396531 B1). *See* Decision – Motion to Correct Petition, Paper 21.

## II. ANALYSIS

### *A. Threshold Issues*

Before addressing the merits of Syntroleum’s petition, we first consider two threshold issues raised by Neste in the preliminary response.

#### *1. Failure to Identify All Real Parties in Interest*

Neste alleges that Syntroleum has failed to identify all real parties in interest, and therefore, the petition should be denied in its entirety. Prelim. Resp. 5-7. The requirement to identify real parties in interest is found in 35 U.S.C. § 312(a), which reads in relevant part:

A petition filed under section 311 may be considered only if ...  
(2) the petition identifies all real parties in interest....

35 U.S.C. § 312(a)(2). According to Neste, both Tyson Foods, Inc. (“Tyson”) and Dynamic Fuels, LLC (“Dynamic”) are real parties in interest and, therefore, should have been identified in the petition. Prelim. Resp. 5.

Whether a party that is not named in an *inter partes* review proceeding is a “real party-in-interest” or “privy” is a “highly fact-dependent question,” taking into account various factors such as whether the non-party “exercised or could have exercised control over a party’s participation in a proceeding” and the degree to which a non-party funds, directs, and controls the proceeding. Office Patent Trial Practice Guide, 77 Fed. Reg. 48756, 48759-60 (Aug. 14, 2012). Put another way, our inquiry seeks to identify whether there is a non-party “at whose behest the petition has been filed” or a relationship “sufficient to justify applying conventional principles of estoppel and preclusion.” *Id.*

Neste contends that both Tyson and Dynamic have the ability to provide direction or control over the *inter partes* review proceeding by virtue of the joint venture undertaken by the parties, their status as co-defendants in a District Court action brought by Neste, and Syntroleum's alleged contractual obligation to indemnify Tyson and Dynamic. Prelim. Resp. 6-7. In support of this argument, Neste provides evidence that Syntroleum and Tyson formed Dynamic as "a fifty-fifty joint venture" to manufacture renewable diesel fuel in which Tyson provides biological feedstock while Syntroleum provides engineering services and technical support. *Id.* at 6 (citing Exs. 2001-2003, 2007). Neste also alleges that, in the District Court action, all three co-defendants are represented by the same counsel "and effectively act as one party in the litigation." *Id.* (citing Exs. 2001-2005). Finally, Neste claims that Syntroleum's interest in challenging the '094 patent before the Board "derives from its contractual obligations to indemnify Tyson and Dynamic Fuels." *Id.*

On this record, we are not convinced that Tyson or Dynamic are real parties in interest with respect to this proceeding. The fact that the parties share counsel in the copending District Court litigation does not establish that Tyson or Dynamic have the ability to control Syntroleum's conduct in the proceeding before the Board. Nor does the existence of a joint venture or indemnification agreement, without any evidence of the contractual obligations of the parties, prove that any party is able to control the actions of another. Syntroleum has not attempted to conceal from the Board the existence of its joint venture with Tyson and Dynamic, disclosing it in the section of its petition immediately following the identification of the real party in interest. Am. Pet. 1.

We, therefore, decline to deny Syntroleum’s petition for failure to comply with the requirement of 35 U.S.C. § 312(a)(2) for instituting an *inter partes* review.

*2. Failure to Provide All Prior Art Relied Upon*

Neste also requests that we reject Syntroleum’s petition for failure to submit the correct version of Jakkula as required by 35 U.S.C. § 312(a), or at the very least deny all grounds of unpatentability that rely on Jakkula. Prelim. Resp. 7-8. The relevant section of 35 U.S.C. § 312(a) reads as follows:

- A petition filed under section 311 may be considered only if . . .
- (3) the petition identifies . . . the evidence that supports the grounds for the challenge to each claim, including . . .
- (A) copies of patents and printed publications that the petitioner relies upon in support of the petition;

35 U.S.C. § 312(a)(3)(A). Neste points out that the petition cites the “A2” version of Jakkula (EP 1396531 A2), but Syntroleum instead submitted the “B1” version of the reference (EP 1396531 B1) as Exhibit 1006. Prelim. Resp. 7. Further discussion of this issue is set forth in our Decision – Motion to Correct Petition (Paper 21), July 22, 2013. As we have granted Syntroleum’s Motion to Correct and substituted the “A2” version of Jakkula as Exhibit 1006, we deny as moot Neste’s request that we reject the petition for failure to submit the correct copy of Jakkula.

*B. Claim Construction*

In an *inter partes* review, claim terms in an unexpired patent are given their broadest reasonable construction in light of the specification of the patent in which



they appear. 37 C.F.R. § 42.100(b). Claim terms are presumed to be given their ordinary and customary meaning, defined as “the meaning a term would have to a person of ordinary skill in the art at the time of the invention.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). An inventor may rebut that presumption by providing a definition of the term in the specification with “reasonable clarity, deliberateness, and precision.” *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

Syntroleum proffers interpretations for seven claim terms: 1) *hydrocarbons*; 2) *diesel range hydrocarbons*; 3) *fresh feed stream of biological origin*; 4) *diluting agent*; 5) *hydrodeoxygenation*; 6) *isomerization*; and 7) *molecular sieve*. Am. Pet. 5-7. Neste also submits proposed interpretations for the claim terms *fresh feed stream of biological origin* and *isomerization*, and identifies an additional claim term for construction: *a process for the manufacture of*. Prelim. Resp. 10-12. We consider the proposed constructions below, taking into account the plain meaning of the terms and their usage in the specification.

#### *1. A Process for the Manufacture Of (Claim 1)*

Neste asks that we interpret *a process for the manufacture of*, a phrase that appears only in the preamble of claim 1, to mean “a process for the commercial-scale production of.” Prelim. Resp. 10. Syntroleum proffers no construction for this phrase.

We will only construe a claim term that appears in the preamble of a claim if it is necessary to “give life, meaning, or vitality” to the claim. *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999) (citing *Kropa v.*

*Robie*, 187 F.2d 150, 152 (CCPA 1951)). Even if we were to consider construction of the preamble necessary in this case, however, we would not construe it as Neste proposes. The sole support for Neste’s proffered construction is a dictionary definition of “manufacture” as “to make or process (a raw material) into a finished product, esp. by large-scale industrial operations.” Ex. 2008 (American Heritage College Dictionary). Neste’s inclusion of “commercial-scale production” in its construction appears to rest on the final portion of this definition, “esp[ecially] by large-scale industrial operations.”

By its very nature, the “especially” portion of the dictionary definition upon which Neste relies is a limited subset of the definition as a whole, and therefore, cannot be the broadest reasonable interpretation of the term. Neste does not cite, nor can we discern, any portion of the ‘094 specification that requires a narrower definition. Limiting *a process for the manufacture of* to commercial-scale production is not the broadest reasonable interpretation of the phrase, and for this reason we decline to adopt Neste’s proffered construction.

## 2. *Fresh Feed Stream of Biological Origin (Claim 1)*

Syntroleum asserts that the term *fresh feed stream of biological origin* “at least includes but is not limited to a fresh feed stream of ‘fats and oils from plants and/or animals and/or fish and compounds derived from them.’” Am. Pet. 6. To support this construction, Syntroleum cites the ‘094 specification, which reads as follows:

The bio oil and/or fat used as the fresh feed in the process of the present invention originates from renewable sources, such as fats and

oils from plants and/or animals and/or fish and compounds derived from them.

Ex. 1001, 7:21-24.

Neste counters that the term must be construed in the full context of the claims, specifically a “commercial-scale, production process.” Prelim. Resp. 10. According to Neste, the fresh feed stream must be “viable for a commercial production process and not just a bench-top experiment,” meaning it cannot consist entirely of store-bought, highly purified edible oils such as Wesson Oil. *Id.* at 10-11. Therefore, Neste asserts that *fresh feed stream of biological origin* means “a stream that includes, but is not limited to, fats and oils from plants and/or animals and/or fish and compounds derived from them, *but does not consist entirely of highly purified edible or store-bought oils.*” *Id.* at 11 (emphasis added to highlight difference between parties’ proffered constructions).

Neste’s interpretation rests on the faulty premise that the claims are limited to commercial-scale production processes by the preamble, an argument we reject above. Nor is there evidence in the specification that the inventors intended to exclude from the scope of the claims feed streams that “consist entirely of highly purified edible or store-bought oils,” a phrasing that appears nowhere in the ’094 specification. We, therefore, decline to adopt Neste’s narrow construction, as it imports a limitation into the claim and is not consistent with the specification.

Syntroleum’s proffered construction is reasonable and supported by explicit language in the ’094 specification; therefore, on this record we will interpret *fresh feed stream of biological origin* to mean “a stream that includes a fresh feed stream

of fats and oils from plants and/or animals and/or fish and compounds derived from them.”

### 3. *Isomerization (Claim 1)*

The parties disagree as to the proper interpretation of the term *isomerization*. Syntroleum asserts that the term means “a process which causes branching of a hydrocarbon chain,” citing the ’094 specification. Am. Pet. 7 (citing Ex. 1001, 10:9-11). Neste contends that Syntroleum’s definition ignores the plain meaning of the term and proffers the construction “a process that *predominantly* causes branching of a hydrocarbon chain *while maintaining the total number of carbon atoms*.” Prelim. Resp. 12 (emphasis added to highlight differences).

As Neste notes, the chemical term “isomer” is by definition a molecule that has the same number and kind of atoms as another molecule, but the two molecules differ in arrangement or configuration of the atoms. *Id.* (citing Ex. 2009, Hawley’s Condensed Chemical Dictionary 629 (John Wiley & Sons, Inc. 1997)). *Isomerization* is, therefore, a process that converts a molecule into at least one isomer, thereby maintaining the number and kind of atoms in the molecule. Syntroleum’s proposed construction is deficient to the extent it omits this requirement.

Neste’s inclusion of “predominantly” in its construction also is supported by the ’094 specification, which notes that the isomerization process “produces predominantly methyl branches.” Ex. 1001, 10:13-15. This is in contrast to processes that incidentally create isomers as a small portion of the product, but which primarily produce molecules having a different number of carbon atoms.

We conclude that Neste's construction is consistent with the plain meaning of the term and the specification of the '094 patent, and therefore, on this record we will interpret *isomerization* as "a process that predominantly causes branching of a hydrocarbon chain while maintaining the total number of carbon atoms."

#### *4. Remaining Terms*

Syntroleum has proffered constructions for several other claim terms, but Neste does not dispute at this stage of the proceedings that these additional limitations are met by the prior art. We, therefore, decline to provide express constructions of these remaining terms, as they are immaterial to our decision.

#### *C. Anticipation By Jakkula*

Syntroleum asserts that claims 1, 4, 7, and 9-20 are unpatentable under 35 U.S.C. § 102(b) as anticipated by Jakkula. Am. Pet. 7-18. In support of this asserted ground of unpatentability, Syntroleum provides explanations as to how each claim limitation is met by Jakkula and a detailed claim chart applying Jakkula to the challenged claims. *Id.* Syntroleum also submits the declarations of Dr. Edward L. Sughrue II and Dr. Nelson E. Lawson. Ex. 1002 (Sughrue Decl.), ¶¶ 85-92; Ex. 1003 (Lawson Decl.), ¶¶ 11-16. Upon review of Syntroleum's analysis and supporting evidence, we determine that Syntroleum has demonstrated that there is a reasonable likelihood that it would prevail with respect to claims 1, 4, 7, and 9-20 on the ground that these claims are anticipated by Jakkula.

Neste argues that Syntroleum fails to establish a reasonable likelihood that claims 1, 4, 7, and 9-20 are anticipated by Jakkula. Prelim. Resp. 15-19.

Specifically, Neste asserts that Jakkula does not disclose the *fresh feed stream of biological origin* or the maximum levels of impurities required in claim 1 or the fatty acid content level of claim 4. *Id.*

*1. Jakkula*

Jakkula discloses a process for converting a biological starting material such as vegetable oil or animal fat into a hydrocarbon suitable for use as diesel fuel. Ex. 1006 (Jakkula), ¶¶ 1, 13. The process comprises two steps: an HDO (hydrodeoxygenation) step followed by an isomerization step. *Id.* at ¶ 16. Jakkula notes that the biological starting material may be selected from the group consisting of vegetable oils/fats, animal fats, fish oils and mixtures thereof. *Id.* at ¶ 17. The feed stock for the process also may be a biological starting material mixed with a hydrocarbon, including recycled hydrocarbon that is produced by the process itself. *Id.* at ¶ 19. Jakkula teaches that recycling the produced hydrocarbon back into the feed helps to control the exothermic character of the reactions. *Id.*

The reference also notes the importance of removing impurities from the process prior to the isomerization step, before the hydrocarbons are contacted with the isomerization catalyst. Ex. 1006, ¶ 26.

Jakkula sets forth two exemplary processes. In Example 1, hydrocarbon is produced from tall oil fatty acid fraction (“TOFA”) by subjecting the feed stock to an HDO step followed by an isomerization step. *Id.* at ¶¶ 68-73. Jakkula notes that the resulting product “is very suitable as a component in diesel fuels without any blending restrictions.” *Id.* at ¶ 73. In Example 2, alkali-refined rapeseed oil is

prehydrogenated, which Jakkula discloses is an optional step that may be performed prior to the HDO step. *Id.* at ¶¶ 74, 21.

## 2. *Feed Stream Contaminant Levels*

Neste contends that Jakkula fails to disclose a feed stream having the maximum levels of less than 10 w-ppm alkali and alkaline-earth metals, less than 10 w-ppm other metals, and less than 30 w-ppm phosphorous required by claim 1. Prelim. Resp. 16-17. Indeed, Jakkula is silent as to the level of these elements in its feed streams. However, Syntroleum argues that the claimed contaminant levels are inherent in at least two of the oils disclosed in Jakkula – namely, alkali-refined rapeseed oil and TOFA. Am. Pet. 9-11.

The Federal Circuit has set forth the standard for determining whether a reference inherently discloses a claim limitation:

To establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.

*In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999) (citations and internal quotation marks omitted).

To establish that the TOFA of Jakkula inherently discloses the contaminant levels of claim 1, Syntroleum relies primarily on the declaration of its expert, Dr. Lawson. To determine the contaminant levels found in TOFA, Dr. Lawson obtained a sample from Arizona Chemical, a major producer of TOFA. Ex. 1003 ¶ 11. Analysis of the TOFA detected no phosphorous, sodium at a level of 4.1

ppm, calcium at a level of 3.8 ppm, and no other metals. *Id.* at 12. The sample of TOFA obtained by Dr. Lawson, therefore, falls within the contaminant levels required by claim 1. Dr. Lawson also collected historical data from various other TOFA suppliers for the years 2005, 2008, 2010, and 2012-2013, which show that contaminant levels are consistent across suppliers and have remained consistent over the years. *Id.* ¶¶ 13-14, Table A.

In its preliminary response, Neste provides no arguments or data to contradict Dr. Lawson's testimony regarding the contaminant levels in TOFA. On the record before us, we, therefore, conclude that Dr. Lawson's testimony is credible and supports Syntroleum's contention that the contaminant levels of TOFA are inherently within those recited in claim 1.<sup>4</sup> Furthermore, as Dr. Sughrue notes, any dilution of TOFA with diluting agent (as required by the claims) would result in a total feed stream having even lower contaminant levels. Ex. 1002 ¶ 66.

### *3. Fresh Feed Stream of Biological Origin*

Neste argues that regardless of whether Jakkula discloses TOFA, alkali-refined rapeseed oil, or some other purified oil having contaminant levels within the ranges claimed, the limitations of claim 1 are not met because “[t]he claimed process uses commercially viable feedstocks for its fresh feed stream.”

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<sup>4</sup> We do not reach Neste's argument that, because Jakkula only discloses the use of alkali-refined rapeseed oil in an optional prehydrogenation step, Syntroleum's reliance on alkali-refined rapeseed oil is improper. Prelim. Resp. 18; *see* Ex. 1006 ¶ 74. For the same reason, we need not address Neste's evidence that some instances of alkali-refined rapeseed oil have contaminant levels that fall outside the claimed ranges. *Id.*



Prelim. Resp. 18. As this argument relies on Neste's overly narrow proposed constructions for *process for the manufacture of* and *fresh feed stream of biological origin* that we decline to adopt, we are not persuaded on this point.

#### *4. Free Fatty Acid Content (Claim 4)*

Neste separately argues claim 4, contending that none of the oils disclosed in Jakkula would result in a total feed stream that inherently contains more than 5 wt-% of free fatty acids. Prelim. Resp. 19. We are not persuaded, as this argument explicitly excludes the disclosure of TOFA. *Id.* Dr. Sughrue and Dr. Lawson both credibly testify that TOFA contains nearly 100% free fatty acids, well above the amount required in claim 4. Ex. 1002 ¶ 63; Ex. 1003 ¶ 10.

#### *5. Other Dependent Claims*

Neste does not set forth separate arguments regarding claims 7 and 9-20. Syntroleum has provided a detailed claim chart applying the teachings of Jakkula to these claims, which we determine to be persuasive at this stage of the proceeding.

#### *D. Obviousness Over Jakkula*

Syntroleum also contends that claims 1-7 and 9-20 are unpatentable under 35 U.S.C. § 103(a) as obvious over Jakkula. Pet. 18-20. In particular, Syntroleum alleges that even if the contaminant levels of claim 1 are not inherent in the disclosure of Jakkula, they would have been obvious to one of ordinary skill in the art seeking to reduce the levels of known contaminants to avoid poisoning the reaction catalysts. Am. Pet. 18-19. In addition, according to Syntroleum the

dilution ratios of claims 5 and 6 would have been obvious over Jakkula's teaching that dilution can be used to control the exothermic nature of the reaction. *Id.* at 20. Syntroleum supports this argument with the declaration of Dr. Sughrue, who testifies that using diluting agents to control reaction temperature was known in the art and that proper dilution ratios could be determined through routine chemical engineering techniques. Ex. 1002 ¶¶ 30-33.

With respect to claims 1-3, Neste responds by making an argument based on its overly narrow construction of *fresh feed stream*, identical to the argument we considered and determined to be unpersuasive *supra* in our discussion of the anticipatory ground. Prelim. Resp. 21. Neste also argues that Jakkula provides no rationale for the person of ordinary skill in the art to select a feed stock having low contaminants. *Id.* We consider this argument unpersuasive, for as Neste concedes, Jakkula "discloses concerns regarding catalyst poisons in fresh feed streams." *Id.* Given the concerns of Jakkula and Dr. Sughrue's testimony regarding the knowledge a person of ordinary skill in the art would have of the effects of catalyst poisons (Ex. 1002 ¶ 47), we determine that, on this record, Syntroleum demonstrates sufficiently that it would have been obvious to reduce the levels of such poisons in fresh feed streams to the levels claimed.

Nor do we agree with Neste's challenge to Dr. Sughrue's testimony regarding claims 5 and 6, which argues that Dr. Sughrue used hindsight to pick starting points for his calculations that would result in dilution ratios within the claimed ranges. Prelim. Resp. 23. Neste argues that Dr. Sughrue "provides no rationale for a person of ordinary skill in the art to restrict the temperature rise to 30 or 60 °C." *Id.* We do not consider this to be the case, as Dr. Sughrue notes that

“restricting the temperature rise to these levels is known in the art to be generally desirable to avoid overheating within the reactor, and thereby minimize coking and other side reactions while improving catalyst life. . . . [S]uch effects are well-known to one of ordinary skill in the art.” Ex. 1002, ¶ 33. On the record before us, Syntroleum has provided sufficient rationale for a person of ordinary skill in the art to select the dilution ratios of the claims.

*E. Obviousness Over Combination of Jakkula and Monnier*

Syntroleum asserts that claim 8 is unpatentable under 35 U.S.C. § 103(a) as obvious over the combined teachings of Jakkula and Monnier. Am. Pet. 49-50. Claim 8 depends from claim 1 and requires that the total feed stream contains 50-20000 w-ppm of sulfur, calculated as elemental sulfur. Syntroleum concedes that Jakkula does not teach the sulfur content of the total feed stream. *Id.* at 46. However, Syntroleum contends that Monnier discloses spiking a feed stream with 1000 ppm sulfur and directs our attention to Dr. Sughrue’s testimony. *Id.* at 49-50, citing Ex. 1002 ¶¶ 123-24 (“[I]t is well known to those of ordinary skill in the art that nickel and molybdenum-based hydrogenation catalysts perform much better when sulfided. . . . Given the essentially identical processes being carried out and the catalysts being used, it would have been obvious to one of ordinary skill in the art to have spiked the feed stream in the process of EP’531 with 1000 ppm of sulfur, as taught by Monnier.”).

In response, Neste states that “Monnier . . . does not teach the required range for sulfur in the total feed stream.” Prelim. Resp. 41. We understand Neste’s argument to be that Monnier’s disclosure of 1000 ppm sulfur would not render

obvious claim 8's range of 50-20000 ppm sulfur. However, as our reviewing court has stated, "[i]t is . . . an elementary principle of patent law that when, as by a recitation of ranges or otherwise, a claim covers several compositions, the claim is 'anticipated' if *one* of them is in the prior art." *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 782 (Fed. Cir. 1985) (citing *In re Petering*, 301 F.2d 676, 682 (CCPA 1962)) (emphasis in original). The same rationale holds with respect to obviousness, absent a showing of unexpected results or teaching away. *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1311 (Fed. Cir. 2006); *In re Applied Materials, Inc.*, 692 F.3d 1289, 1295 (Fed. Cir. 2012) ("overlap itself provides sufficient motivation to optimize the ranges"). Neste has not provided any argument or evidence that would lead us to conclude that the disclosure of 1000 ppm sulfur does not teach or suggest the range of 50-20000 ppm sulfur.

*F. Obviousness Over Combination of Jakkula and Harrison*

Syntroleum contends that claims 5 and 6 are unpatentable under 35 U.S.C. § 103(a) as obvious over the combined teachings of Jakkula and Harrison. Am. Pet. 46. Syntroleum concedes that Jakkula does not disclose expressly the dilution ratios of recycled product to fresh feed as required in claims 5 and 6, but argues it would have been obvious to incorporate the teachings of Harrison to provide such ratios. *Id.* at 48.

Harrison teaches the use of dilution in hydrogenation reactions to control the temperature in the reactor. Ex. 1014, 10:66-11:2. Disclosed dilution ratios range from 1:3 to 1:99. Ex. 1014, 11:13-18. Dr. Sughrue concludes that:

Given the teaching in [Jakkula] of using a recycle stream to dilute the feed stock to help control the exothermic nature of the HDO reaction, it would have been obvious to one of skill in the art to have utilized the product recycle dilution ratios reported in Harrison in the HDO process of [Jakkula].

Ex. 1002 ¶ 121.

Neste argues that Harrison cannot provide a basis to modify Jakkula, as the process of Harrison is a hydrogenation reaction whereas Jakkula pertains to hydrodeoxygenation. Prelim. Resp. 40-41. However, this argument ignores the creativity and knowledge a person of ordinary skill in the art would apply to the problem. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007) (“[a] person of ordinary skill is also a person of ordinary creativity, not an automaton”). Both Harrison and Jakkula teach the use of dilution to control temperature rise within a catalyst reaction chamber. A person of ordinary skill in the art seeking dilution ratios to control temperature rise of the process of Jakkula would not limit a search to only HDO reactions, but would look to the dilution ratios of Harrison as well.

We find the testimony of Dr. Sughrue to be credible and to set forth articulated reasoning with rational underpinning to support the combination and his conclusion of obviousness. *See KSR*, 550 U.S. at 418. Syntroleum has, therefore, demonstrated that there is a reasonable likelihood that it would prevail with respect to claims 5 and 6 on the ground that these claims are obvious over the combination of Jakkula and Harrison.

### *G. Unexpected Results*

Neste contends that the invention of the '094 patent achieves unexpected results, which provide objective evidence of nonobviousness. Prelim. Resp. 44-46.

According to Neste, Example 7 of the '094 specification shows that the claimed process using a 5:1 recycle ratio permitted the catalyst to be run for at least nine months without any evidence of catalyst poisoning. *Id.* The process also is said to show improved results in accommodating high levels of free fatty acids in the feed stream. *Id.*

Neste does not provide any evidence that these results were unexpected, other than a statement in the '094 specification that the inventors “surprisingly observed” improved results. Ex. 1001, 9:62. Nor are these results commensurate with the scope of the claims or compared with the closest prior art. *See In re Peterson*, 315 F.3d 1325, 1330 (Fed. Cir. 2003); *In re Burckel*, 592 F.2d 1175, 1180 (CCPA 1979). We, therefore, determine Neste’s arguments to be insufficient to establish unexpected results.

#### *H. Grounds Relying on Oldřich*

Several of Syntroleum’s asserted grounds of unpatentability rely on Oldřich (see list of asserted grounds *supra*). For the following reasons, we determine that there is not a reasonable likelihood that Syntroleum will prevail on these grounds of unpatentability, and therefore, we deny these grounds.

Oldřich discloses a two-stage hydrogenation process for converting vegetable oil into fuel. Ex. 1008, 1. The first stage is an HDO stage, similar to that claimed in the '094 patent. *Id.* at 1-2. Syntroleum asserts that the second stage is an “isomerization step using the same catalyst support (zeolites) and essentially the same temperatures and pressures as in the '094 patent.” Am. Pet. 21. Neste disagrees, noting that Oldřich refers to the second step as

“hydrocracking” that results in “cracking of higher alkanes C<sub>14</sub>-C<sub>22</sub> to C<sub>3</sub>-C<sub>13</sub>.” Prelim. Resp. 25; Ex. 1008, 4, Table 2. Neste argues this hydrocracking step cannot be the isomerization step required in the '094 claims, as it does not maintain the same total number of carbon atoms. Prelim. Resp. 25-26.

Based on our interpretation of *isomerization*, we agree with Neste that Oldřich does not disclose an isomerization step. While Dr. Sughrue notes that “at least some isomerization occurs” (Ex. 1002 ¶ 40), the reference discloses that the amount of isomers created is 8.7 wt% of the medium distillate, which is only 42 wt% of the final product. Ex. 1008 Tables 3, 6. We disagree that this is sufficient to regard the hydrocracking of Oldřich as an isomerization step. We conclude that there is not a reasonable likelihood that Syntroleum will prevail on the grounds that rely on Oldřich, and therefore, we deny institution on these grounds.

### *I. Other Asserted Grounds*

Syntroleum sets forth one or more additional grounds of unpatentability. All such additional grounds are denied as redundant in light of the grounds on which we have instituted review. *See* 37 C.F.R. § 42.108(a); *see also* Order (Redundant Grounds), Case CBM2012-00003, Paper 7.

### III. CONCLUSION

For the forgoing reasons, we determine that the information presented in the petition establishes that there is a reasonable likelihood that Syntroleum would prevail with respect to claims 1-20 of the '094 patent.

At this stage of the proceeding, the Board has not made a final determination as to the patentability of any challenged claim.

#### IV. ORDER

Accordingly, it is

**ORDERED** that pursuant to 35 U.S.C. § 314, an *inter partes* review is hereby instituted as to claims 1-20 of the '094 patent for the following grounds:

1. Claims 1, 4, 7, and 9-20 are unpatentable under 35 U.S.C. § 102(b) as anticipated by Jakkula;
2. Claims 1-7 and 9-20 are unpatentable under 35 U.S.C. § 103(a) as obvious over Jakkula;
3. Claim 8 is unpatentable under 35 U.S.C. § 103(a) as obvious over the combined teachings of Jakkula and Monnier; and
4. Claims 5 and 6 are unpatentable under 35 U.S.C. § 103(a) as obvious over the combined teachings of Jakkula and Harrison.

**FURTHER ORDERED** that all other grounds raised in the petition are denied, either because they are deficient for reasons discussed above or because they are redundant in light of the grounds on the basis of which an *inter partes* review is being instituted;

**FURTHER ORDERED** that pursuant to 35 U.S.C. § 314(d) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial; the trial commencing on the entry date of this decision; and

**FURTHER ORDERED** that an initial conference call with the Board is scheduled for **2:00 pm** Eastern Time on **September 25, 2013**; the parties are



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directed to the Office Trial Practice Guide<sup>5</sup> for guidance in preparing for the initial conference call, and should come prepared to discuss any proposed changes to the Scheduling Order entered herewith and any motions the parties anticipate filing during the trial.

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<sup>5</sup> Office Patent Trial Practice Guide, 77 Fed. Reg. 48756, 48765-66 (Aug. 14, 2012).

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