

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BAKER HUGHES INCORPORATED,
Petitioner,

v.

LIQUIDPOWER SPECIALTY PRODUCTS INC.
(f/k/a/ LUBRIZOL SPECIALTY PRODUCTS, INC.),¹
Patent Owner.

Case IPR2016-01905
Patent 8,450,250 B2

Before KRISTINA M. KALAN, CHRISTOPHER M. KAISER, and
MICHELLE N. ANKENBRAND, *Administrative Patent Judges*.

KALAN, *Administrative Patent Judge*.

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

¹ Patent Owner represents that its name has changed from Lubrizol Specialty Products, Inc. to LiquidPower Specialty Products Inc., and that LiquidPower Specialty Products Inc. is the owner of U.S. Patent No. 8,450,250 B2 by assignment, holding all rights, title, and interest to that patent. Paper 8, 2. Accordingly, we modify the original case caption to reflect that change.

I. INTRODUCTION

Baker Hughes Inc. (“Petitioner”) requests an *inter partes* review of claims 1–9 of U.S. Patent No. 8,450,250 B2 (“the ’250 patent,” Ex. 1004). Paper 2 (“Pet.”). LiquidPower Specialty Products Inc. (f/k/a/ Lubrizol Specialty Products, Inc.) (“Patent Owner”) filed a Preliminary Response. Paper 9 (“Prelim. Resp.”). We have jurisdiction under 35 U.S.C. § 314, which provides that an *inter partes* review may not be instituted “unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” Applying that standard, and upon consideration of the information presented in the Petition and the Preliminary Response, we institute an *inter partes* review of claims 1–9.

A. *Related Proceedings*

Petitioner identifies the following pending litigation involving the ’250 patent: *Lubrizol Specialty Products, Inc. v. Baker Hughes Inc.*, No. 4:15-cv-02915 (S.D. Tex.). Pet. 3. Petitioner also identifies U.S. Patent Application No. 13/209,119, filed on August 12, 2011, as pending (Notice of Allowance issued September 20, 2016), and represents that the ’119 application claims benefit to, and is a continuation in part of, U.S. Patent Application No. 11/615,539 (now U.S. Patent No. 8,022,118, “the ’118 patent”) to which the ’250 patent claims priority. *Id.*

Concurrently with the Petition in this proceeding, Petitioner filed petitions requesting an *inter partes* review of three patents related to the ’250 patent: the ’118 patent (IPR2016-01896); U.S. Patent No. 8,426,498 B2 (Case IPR2016-01903); and U.S. Patent No. 8,450,249 B2 (Case IPR2016-01901). *See* Pet. 2; Paper 8, 3. Petitioner also filed an earlier

Petition requesting an *inter partes* review of the '118 patent. *Baker Hughes Inc. v. Lubrizol Specialty Prods., Inc.*, Case IPR2016-00734 ("734 IPR"), Paper 2. We instituted a review in the 734 IPR on October 4, 2016. 734 IPR, Paper 9.

B. The '250 Patent

The '250 patent, titled "Drag reduction of asphaltenic crude oils," issued on May 28, 2013. The '250 patent relates to a "method of preparing a drag reducing polymer wherein the drag reducing polymer is able to be injected into a pipeline, such that the friction loss associated with the turbulent flow through the pipeline is reduced by suppressing the growth of turbulent eddies," in which the "drag reducing polymer is injected into a pipeline of liquid hydrocarbon [] having an asphaltene content of at least 3 weight percent and an API gravity of less than about 26° to thereby produce a treated liquid hydrocarbon." Ex. 1004, Abstract.

According to the specification, "[w]hen fluids are transported by a pipeline, there is typically a drop in fluid pressure due to the friction between the wall of the pipeline and the fluid." *Id.* at 1:20–22. The pressure drop increases with increasing flow rate, resulting in energy losses and inefficiencies that increase equipment and operation costs. *Id.* at 1:24–32. The problems associated with pressure drop are most acute when fluids are transported over long distances. *Id.* at 1:29–31.

Before the '250 patent, it was known to use drag reducing polymers in the fluid flowing through a pipeline to alleviate the problems resulting from pressure drop. *Id.* at 1:33–35. A drag reducing polymer "is a composition capable of substantially reducing friction loss associated with the turbulent flow of a fluid through a pipeline" and such a composition works by

“suppress[ing] the growth of turbulent eddies, which results in higher flow rate at a constant pumping pressure.” *Id.* at 1:37–42. Drag reduction generally “depends in part upon the molecular weight of the polymer additive and its ability to dissolve in the hydrocarbon under turbulent flow.” *Id.* at 1:44–46.

According to the specification, because conventional drag reducing polymers do not perform well in crude oils having a low API gravity² and/or a high asphaltene content (i.e., heavy crude oils), there exists a need for improved drag reducing polymers capable of reducing the pressure drop associated with the turbulent flow of heavy crude oils through pipelines. *Id.* at 1:49–54. The subject matter of the disclosed invention, therefore, “relates generally to high molecular weight drag reducers for use in crude oils.” *Id.* at 1:15–16. More specifically, the ’250 patent discloses a method for reducing the pressure drop associated with flowing a liquid hydrocarbon through a conduit, such as a pipeline. *Id.* at 2:66–3:1. The method comprises preparing a drag reducing polymer, wherein the drag reducing polymer is able to be injected into a liquid hydrocarbon having an asphaltene content of at least 3 weight percent and an API gravity of less than about 26° (i.e., heavy crude oil) to produce a treated liquid hydrocarbon wherein the viscosity is not less than the viscosity of the liquid hydrocarbon prior to treatment with the drag reducing polymer. *Id.* at 19:30–44. The ’250 patent provides several examples of suitable heavy crude oils and blended heavy crude oils. *Id.* at 4:44–53, Table 1.

² The specification defines API gravity as “the specific gravity scale developed by the American Petroleum Institute for measuring the relative density of various petroleum liquids.” *Id.* at 4:3–6.

The specification further explains that, “[i]n order for the drag reducing polymer to function as a drag reducer, the polymer should dissolve or be substantially solvated in the liquid hydrocarbon.” *Id.* at 11:45–47. The liquid hydrocarbon and the drag reducing polymer, therefore, have solubility parameters that can be determined according to known methods. *Id.* at 4:25–40 (setting forth known methods for determining the solubility parameter of the liquid hydrocarbon), 11:53–12:25 (setting forth known methods for determining the solubility parameter of the drag reducing polymer).

C. *Illustrative Claim*

Claims 1, 8, and 9 are independent claims of the ’250 patent. Claim 1 is illustrative of the challenged claims and recites:

1. A method of preparing a drag reducing polymer comprising:

preparing the drag reducing polymer with a solubility parameter within $4 \text{ MPa}^{1/2}$ of the solubility parameter of a liquid hydrocarbon;

wherein the drag reducing polymer is able to be injected into a pipeline, such that the friction loss associated with the turbulent flow through the pipeline is reduced by suppressing the growth of turbulent eddies, into a liquid hydrocarbon having an asphaltene content of at least 3 weight percent and an API gravity of less than about 26° to thereby produce a treated liquid hydrocarbon wherein the viscosity of the treated liquid hydrocarbon is not less than the viscosity of the liquid hydrocarbon prior to treatment with the drag reducing polymer;

the drag reducing polymer is added to the liquid hydrocarbon in the range from about 0.1 to about 500 ppmw; and

a plurality of the repeating units comprise a heteroatom.

Ex. 1004, 19:30–47.

D. Proposed Grounds of Unpatentability

Petitioner asserts that the challenged claims of the '250 patent are unpatentable based upon the following grounds:

Reference(s)	Statutory Basis	Claims Challenged
Holtmyer Publication, ³ Holtmyer Patent, ⁴ and Strausz ⁵	§ 103(a)	1–9
Inaoka ⁶ and Strausz	§ 103(a)	1–9
Inaoka	§ 102(a)	1–9

The Petition is supported by the Declaration of Thomas H. Epps, III, Ph.D. (Ex. 1041).

II. ANALYSIS

We address below whether the Petition meets the threshold showing for institution of an *inter partes* review under 35 U.S.C. § 314(a). We consider each ground of unpatentability in view of the understanding of a person of ordinary skill in the art. Petitioner's declarant, Dr. Epps, testifies that a person of ordinary skill in the art would have had familiarity with basic principles related to polymers and polymer synthesis, including chemical composition of monomers and polymers, common types of polymerization processes, types of polymerization catalysts, and solubility

³ Marlin D. Holtmyer & Jiten Chatterji, *Study of Oil Soluble Polymers as Drag Reducers*, 20 POLYMER ENGINEERING & SCI. 473, 473–77 (1980) (“Holtmyer Publication”) (Ex. 1005).

⁴ U.S. Patent No. 3,758,406, issued September 11, 1973 (“Holtmyer Patent”) (Ex. 1006).

⁵ OTTO P. STRAUZ & ELIZABETH M. LOWN, *The Chemistry of Alberta Oil Sands, Bitumens and Heavy Oils* 464–480 (2003) (“Strausz”) (Ex. 1009).

⁶ European Pat. App. No. EP 0,882,739 A2, published December 9, 1998 (“Inaoka”) (Ex. 1007).

properties of polymers. Ex. 1041 ¶ 18. The ordinarily skilled artisan, according to Dr. Epps, also would have been aware of and consulted technical publications directed to the physical and chemical properties of drag reducing polymers and the study of polymer flow properties in solution, and utilized the techniques in those publications to determine properties such as the solubility parameters of polymers. *Id.* ¶ 19–20 (citing Ex. 1014–1016). Moreover, such a person typically would have had a Bachelor of Science degree in chemical engineering, polymer science and engineering, or a closely related field and at least two years of work experience or further academic experience with drag reducing polymers or polymer flow properties in solution for any fluid. *Id.* ¶ 22.

Patent Owner does not provide a definition or testimony regarding the level of ordinary skill in the art. At this stage of the proceeding, we find that the prior art itself is sufficient to demonstrate the level of ordinary skill in the art at the time of the invention. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (the prior art, itself, can reflect appropriate level of ordinary skill in art).

A. *Claim Construction*

The Board interprets claims in an unexpired patent using the “broadest reasonable construction in light of the specification of the patent.” 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016). Under that standard, claim terms are given their ordinary and customary meaning in view of the specification, as would be understood by one of ordinary skill in the art at the time of the invention. *In re Translogic Tech., Inc.*, 504 F.3d 1250, 1257 (Fed. Cir. 2007). Any special definitions for claim terms must be set forth with reasonable clarity, deliberateness, and

precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). Only those terms which are in controversy need be construed, and only to the extent necessary to resolve the controversy. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

Petitioner submits that we need not construe any claim term for purposes of this decision. Pet. 14. Patent Owner proposes that we construe the term “asphaltene.” Prelim. Resp. 29–30. On the present record, we determine that no claim term requires express construction for purposes of this decision.

B. Overview of the Asserted References

1. Holtmyer Publication

The Holtmyer Publication, titled “Study of Oil Soluble Polymers as Drag Reducers,” was published in 1980. Ex. 1005, 473. The Holtmyer Publication is directed to an investigation “undertaken to find the most effective material which would reduce the friction coefficient in turbulent flow when added in small quantities to oil pipelines.” *Id.* at Abstract. A decrease in friction loss “would allow lower energy consumption or alternatively an increased flow rate under the original pumping conditions,” making a decrease in friction loss “desirable” and “economically profitable to industrial organizations engaged in movement of large volumes of liquid at high flow rates for considerable distance as in hydraulic fracturing of oil and gas wells.” *Id.* at 473. Among the polymers for drag reduction synthesized and described by the Holtmyer Publication is poly(isodecyl

methacrylate) (“iDMA”), which was tested for drag reduction in kerosene, QC-1156, Cardium, and Ellenberger. *Id.* at 476, Table 9.

2. *Holtmyer Patent*

The Holtmyer Patent, titled “Methods and compositions for reducing frictional pressure loss in the flow of hydrocarbon liquids,” issued in 1973. Ex. 1006. The Holtmyer Patent relates to “methods and compositions for reducing the frictional pressure loss encountered in the turbulent flow of hydrocarbon liquids through a conduit.” *Id.* at 1:15–18. Regarding frictional pressure loss encountered in the turbulent flow of hydrocarbon liquids, the Holtmyer Patent provides that “considerable energy generally in the form of pumping horsepower must be expended” in order to compensate and, thus, “reduction of the frictional pressure loss in the flow of such hydrocarbon liquids brings about an advantageous reduction in horsepower requirements, or alternatively, an increased flow rate of the hydrocarbon liquids under the same pumping conditions.” *Id.* at 1:56–65. The Holtmyer Patent provides examples of “suitable monomers which may be utilized to form the polymer additives of the present invention.” *Id.* at 3:3–20. When using the polymer additive “with a well-treating fluid containing sand or other solid agent suspended therein,” the Holtmyer Patent states that “it is preferable to use a somewhat larger amount of the polymer additive.” *Id.* at 4:63–67.

3. *Inaoka*

Inaoka, titled “High molecular weight polymer and producing method the same and drag reducer,” relates to a method of producing a high molecular weight polymer in which “dissolved oxygen existing in a solvent in a radical polymerization reaction is removed, and to a high molecular

weight polymer obtained by the same, and to a drag reducer.” Ex. 1007, 2:5–7. Inaoka describes, generally, the problems with transporting “an organic liquid such as crude oil” through a pipeline, caused by “the fact that transporting pressure on the liquid is lost by the friction generated between the liquid and the conduit.” *Id.* at 3:9–11. To suppress such pressure loss, Inaoka states that “a drag reducer has been used conventionally,” and the drag reducer includes a high molecular weight polymer. *Id.* at 3:14–15. Regarding production of such polymers, Inaoka states that “a method disclosed in USP No. 3,758,406 [the Holtmyer Patent] is known.” *Id.* at 3:27. Regarding specific polymer additives, Inaoka states that “2-ethylhexylacrylate (2EHA (carbon number of 8)) and 2-ethylhexylmethacrylate (2EHMA (carbon number of 8)) are particularly preferable.” *Id.* at 4:48–50.

4. *Strausz*

Strausz, titled “The Chemistry of Alberta Oil Sands, Bitumens, and Heavy Oils,” is a book containing relationships and parameters that would have been useful to one working to solubilize materials, such as polymers, in crude oil. Strausz discloses that “[t]he ability of a solvent to solubilize asphaltene or, in general, to dissolve a solid or to form a homogeneous solution with another liquid, may be expressed in terms of solubility parameters.” Ex. 1009, 465. Strausz provides several equations for determining solubility parameters, including the equation provided in the specification of the ’250 patent for determining the solubility parameter of a liquid hydrocarbon. *Id.* at 465–67. Strausz explains that, although the solubility parameter theory “would not be expected to be applicable for colloidal aggregate solutions of polar, random, polydispersed

macromolecules like asphaltene . . . the correlation between the solubility of asphaltene and solvent solubility parameter is quite good for nonpolar and low-polarity solvents.” *Id.* at 466.

In that regard, Strausz describes a study of the correlation between asphaltene solubility and solubility parameters. *Id.* at 467. The study determined that “asphaltene becomes completely soluble in hydrocarbons with [a solubility parameter] $\geq 17.1 \text{ MPa}^{1/2}$ ” and that the solvation energy of hydrocarbon solvents with a solubility parameter “in the $17.1\text{--}22.1 \text{ MPa}^{1/2}$ range is sufficiently large to overcome the cohesion energy of asphaltene and cause solubilization.” *Id.* The study also established the solubility parameter of asphaltene “as not less than $19.6 \text{ MPa}^{1/2}$.” *Id.*

C. *Exercise of Discretion*

Institution of *inter partes* review is discretionary. *See* 35 U.S.C. § 314(a); 37 C.F.R. § 42.108. Our discretion on whether to institute is guided in part by 35 U.S.C. § 325(d), which states that “the Director may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office.” Patent Owner requests that the Board exercise its discretion and deny the Petition for several reasons. Prelim. Resp. 13–26.

First, Patent Owner argues that the Petition is “primarily based upon prior art and arguments that were presented to the examiner throughout the prosecution of the patent family containing the 250 Patent.” *Id.* at 13–20. More particularly, Patent Owner argues that the substance of the Holtmyer Publication and Inaoka have “already been considered by the PTO throughout prosecution of the patent family containing the 250 Patent.” *Id.* at 14.

The permissive language of § 325(d) does not prohibit instituting an *inter partes* review based on prior art or arguments previously presented to the Office. Although the Examiner relied upon Inaoka during prosecution, Petitioner's arguments here are not necessarily those Patent Owner was faced with during prosecution. Moreover, Petitioner in this proceeding also relies on the Holtmyer Publication, which, notwithstanding Patent Owner's allegation that the Holtmyer Publication "is merely cumulative of the Holtmyer Patent," is a different reference not relied upon during prosecution. *Id.* at 16. We also acknowledge that Patent Owner listed the Holtmyer Patent in an Information Disclosure Statement that was submitted during the prosecution of the '250 patent. Ex. 2005. It does not appear, however, that the Examiner or Patent Owner discussed the Holtmyer Patent substantively during that prosecution. Thus, Petitioner is relying on prior art (the Holtmyer Patent, the Holtmyer Publication (collectively, "Holtmyer References"), and Strausz) and combinations of prior art (the Holtmyer references and Strausz, Inaoka and Strausz) that were not asserted to reject the claims during prosecution. Petitioner further relies on Dr. Epps's Declaration, which Patent Owner does not allege is duplicative of evidence previously presented to the Office. Although there is some burden on Patent Owner and the Office in hearing arguments based in part on the same or substantially the same prior art previously presented to the Office, we are persuaded, on this record and for the reasons that follow, that Petitioner's arguments have merit.

Second, Patent Owner argues that "this Petition was strategically filed" after Petitioner received Patent Owner's Preliminary Response and the Board's Institution Decision on a petition for *inter partes* review of the '118

patent (the parent application of the '250 patent) in the 734 IPR. Prelim. Resp. 13, 20–26. Patent Owner notes that the Patent Owner Preliminary Response in the 734 IPR was filed on July 6, 2016, and the Board's Institution Decision in the 734 IPR issued on October 4, 2016. *Id.* at 1. The present Petition was filed on October 6, 2016.

We do not view this proceeding as a “second bite at the apple” over the 734 IPR, or the Petition filed in this proceeding as a serial petition. The 734 IPR concerns a different patent (the '118 patent) than the patent challenged in the present proceeding and, thus, there is no overlap in the claims in the petition filed in the 734 IPR and the petition filed in this proceeding. In view of the particular circumstances of this case, we determine that Petitioner had a legitimate reason to file its petition in the present case, in that Petitioner had not yet challenged the patentability of the '250 patent, which is being asserted in co-pending litigation, before the Board, and that Petitioner has gained no unfair advantage by doing so.

Therefore, considering the totality of the circumstances, we do not exercise our authority to decline to institute an *inter partes* review of the '250 patent.

D. Ground 1 – Asserted Obviousness Based on the Holtmyer Publication, the Holtmyer Patent, and Strausz

Petitioner asserts that a person of ordinary skill in the art would have been led from the above-referenced disclosures of the Holtmyer Publication, the Holtmyer Patent, and Strausz, to a method comprising all of the elements recited in claims 1–9. Pet. 20–36, 50–60.

Petitioner argues that the “Holtmyer Publication discloses most of the limitations of claim 1.” *Id.* at 21. In the section of the Petition summarizing the Holtmyer Publication, Petitioner characterizes the Holtmyer Publication

as describing an investigation “to find the most effective material which would reduce the friction coefficient in turbulent flow when added in small quantities to oil pipelines” and as describing “the problem of frictional pressure losses associated with the turbulent flow of a fluid through a conduit.” *Id.* at 15 (citing Ex. 1005, 473, Abstract). Petitioner further notes that the Holtmyer Publication describes the drag reduction properties of “a series of homo- and copolymers of alkyl styrenes, acrylates, and methacrylates in hydrocarbon solvents.” *Id.* (citing Ex. 1005, 474, Table 1). Specifically, Petitioner focuses on the Holtmyer Publication’s preparation and testing of iDMA, which test results are presented in Table 9 of the Holtmyer Publication. *Id.* at 16 (citing Ex. 1005, Table 9). The test results demonstrate iDMA’s drag reduction in kerosene, in two types of crude oil (Cardium and Ellenberger), and in QC-1156 (primarily an aromatic hydrocarbon with an API gravity of 22.5°). *Id.* (citing Ex. 1005, Table 9).

Petitioner relies on Dr. Epps’s testimony that “a person of ordinary skill in the art would have known in 2005 that a plurality of the repeating units of the iDMA polymer comprise oxygen heteroatoms.” *Id.* at 22 (citing Ex. 1041 ¶ 57). Petitioner further relies on Dr. Epps’s testimony that “a person of ordinary skill in the art would have understood that introduction of the iDMA polymer into a liquid hydrocarbon” would reduce “friction loss associated with the turbulent flow through the pipeline . . . by suppressing the growth of turbulent eddies” as recited in claim 1. *Id.* at 22–23 (citing Ex. 1041 ¶ 71). Regarding the claim 1 requirement that “the viscosity of the treated liquid hydrocarbon is not less than the viscosity of the liquid hydrocarbon prior to treatment with the drag reducing polymer,” Petitioner relies on Dr. Epps’s testimony that adding the iDMA drag reducing polymer

of the Holtmyer Publication to a liquid hydrocarbon would achieve this effect. *Id.* at 23 (citing Ex. 1041 ¶¶ 76–77). Finally, Petitioner relies on Dr. Epps’s testimony that the Holtmyer Publication would have directed a person of ordinary skill in the art to add iDMA to a liquid hydrocarbon, such as that defined by the claims of the 250 patent, “at a concentration within the ‘about 0.1 ppmw to about 500 ppmw’ range recited by claim 1.” *Id.* at 24 (citing Ex. 1041 ¶¶ 72–75; Ex. 1005, Table 6).

Petitioner posits that the only limitation of claim 1 that the Holtmyer Publication does not disclose explicitly is the introduction of the iDMA drag reducing polymer “into a liquid hydrocarbon having the following properties: (i) an asphaltene content of at least 3 weight percent and (ii) a solubility parameter that is within $4 \text{ MPa}^{1/2}$ of the solubility parameter of the iDMA polymer.” *Id.* at 25. Petitioner argues, however, that (i) crude oils having the claimed properties were well known, as acknowledged in the ’250 patent itself and other contemporaneous publications (*id.* at 25–26 (citing Ex. 1004, Table 1; Ex. 1017, 12; Ex. 1018, 557–58)); (ii) one of ordinary skill would have been motivated by the known economic benefits associated with drag reduction to introduce the iDMA polymer into a crude oil having the claimed properties (*id.* at 26–27 (citing Ex. 1005, 473; Ex. 1041 ¶¶ 114–116)); (iii) one of ordinary skill would have had a reasonable expectation that the iDMA polymer would be effective at reducing drag in a crude oil having the claimed properties (*id.* at 27–34 (citing Ex. 1041 ¶¶ 118–139)); and (iv) one of ordinary skill would have been motivated to utilize the iDMA polymer in crude oils in which it was expected to be most effective, based on an understanding that a fairly large proportion of heavy, asphaltenic crude oils would have solubility parameters

within 4 MPa^{1/2} of the solubility parameter of the iDMA homopolymer (*id.* at 34–36 (citing Ex. 1041 ¶¶ 140–44)).

Regarding asphaltene, Petitioner argues the Holtmyer Patent addresses the effect of asphaltene content on the ability of the iDMA polymer to achieve drag reduction, relying on Dr. Epps’s testimony that “the optimum quantity of polymer to be introduced to a hydrocarbon liquid may vary depending on the type of liquid hydrocarbon involved” and that “when a solid agent is suspended in the liquid hydrocarbon, it is preferable to use a somewhat larger amount of the polymer additive.” *Id.* at 29 (citing Ex. 1040 ¶ 121 (citing Ex. 1006, 4:51–59, 4:63–75)). Regarding solubility, Petitioner argues that solubility parameters “were (and are) commonly consulted in order to predict solubility of one compound in another.” *Id.* at 30 (citing Ex. 1041 ¶ 124). Petitioner relies on Strausz (Ex. 1009, 467–68) and Dr. Epps’s calculations of the solubility parameters of heavy, asphaltenic crude oils (“within the disclosed range of about 17.1 MPa^{1/2} to about 22.1 MPa^{1/2},” Ex. 1041 ¶¶ 136–37) and the iDMA polymer (“about 17.84 MPa^{1/2},” Ex. 1041 ¶¶ 125–27) to argue that because the solubility parameter of the iDMA polymer falls squarely within the range disclosed by Strausz, a person of ordinary skill in the art “would have had a reasonable expectation that the iDMA drag reducing polymer would be effective at achieving drag reduction in a liquid hydrocarbon having both an API gravity of less than about 26° and an asphaltene content of at least 3 weight percent undergoing turbulent flow through a pipeline.” Pet. 33–34 (citing Ex. 1041 ¶ 139).

E. Ground 2 – Asserted Obviousness Based on Inaoka and Strausz

Petitioner asserts that a person of ordinary skill in the art would have been led from the above-referenced disclosures of Inaoka and Strausz to a

method comprising all of the elements recited in claims 1–9. Pet. 36–47, 50–60.

Petitioner argues that “Inaoka discloses most of the limitations of claim 1.” *Id.* at 36. In the section of the Petition summarizing Inaoka, Petitioner characterizes Inaoka as describing a high molecular weight polymer having a straight-chain structure and being soluble in an organic solvent, and “suitably adopted as a drag reducer.” *Id.* at 17 (quoting Ex. 1007, Abstract). Petitioner further characterizes Inaoka as describing the problem of frictional pressure losses associated with the turbulent flow of fluid through a conduit and the conventional use of drag reducers to address the problem of pressure loss. *Id.* at 17–18 (quoting Ex. 1007, 3:9–13, 14–21). Petitioner notes that Inaoka refers to drag reducing polymers that may be produced by “a method disclosed in USP No. 3,758,406 [the Holtmyer Patent].” *Id.* at 18 (quoting Ex. 1007, 3:27). Inaoka’s drag reducing polymer “can be suitably adopted in transporting of an organic liquid such as crude oil through a conduit, such as a pipeline.” *Id.* at 19 (quoting Ex. 1007, 17:1–5). Inaoka’s two “particularly preferable” drag reducing polymers are 2-ethylhexylacrylate and 2-ethylhexylmethacrylate (“2EHMA”); the latter, according to Dr. Epps, is the same as Polymer A of the ’250 patent. *Id.* at 20 (citing Ex. 1007, 4:48–50; Ex. 1041 ¶ 155).

Petitioner relies on Dr. Epps’s testimony that “a person of ordinary skill in the art would have known that a plurality of the repeating units of the 2EHMA polymer comprise oxygen heteroatoms.” *Id.* at 37 (citing Ex. 1041 ¶ 156). Petitioner further relies on Dr. Epps’s testimony that “a person of ordinary skill in the art would have understood that introducing the 2EHMA polymer into crude oil flowing through a pipeline would reduce drag by

suppressing the growth of turbulent eddies” as recited in claim 1. *Id.* at 37–38 (citing Ex. 1041 ¶ 167). Regarding the claim 1 requirement that “the viscosity of the treated liquid hydrocarbon is not less than the viscosity of the liquid hydrocarbon prior to treatment with the drag reducing polymer,” Petitioner relies on Dr. Epps’s testimony that adding the 2EHMA drag reducing polymer of Inaoka to a liquid hydrocarbon would achieve this effect. *Id.* at 38 (citing Ex. 1041 ¶¶ 169–71). Finally, Petitioner relies on Dr. Epps’s testimony that Inaoka would have directed a person of ordinary skill in the art to add 2EHMA to a liquid hydrocarbon “at a concentration within the ‘about 0.1 ppmw to about 500 ppmw’ range recited by claim 1.” *Id.* at 39 (citing Ex. 1041 ¶ 168; Ex. 1007, 8:18–20).

Petitioner argues that although Inaoka does not disclose “introducing the 2EHMA drag reducing polymer into a crude oil having (i) an asphaltene content of at least 3 weight percent and an API gravity of less than 26° and (ii) a solubility parameter that is within 4 MPa^{1/2} of the solubility parameter of the 2EHMA polymer,” it would have been obvious to a person of ordinary skill in the art to do so. *Id.* at 40. Petitioner argues that (i) crude oils having the claimed properties were well known, as acknowledged in the ’250 patent itself (*id.* (citing Ex. 1004, Table 1; Ex. 1017, 12; Ex. 1018, 557–58)); (ii) one of ordinary skill would have been motivated by the known economic benefits associated with drag reduction to introduce the 2EHMA polymer into a crude oil having the claimed properties (*id.* at 40–41 (citing Ex. 1041 ¶¶ 195–97)); (iii) one of ordinary skill would have had a reasonable expectation that the 2EHMA polymer would be effective at reducing drag in a crude oil having the claimed properties (*id.* at 42–47 (citing Ex. 1041 ¶¶ 199–216)); and (iv) one of ordinary skill would have

been motivated to utilize the 2EHMA polymer in crude oils in which it was expected to be most effective, based on an understanding that a fairly large proportion of heavy, asphaltenic crude oils would have solubility parameters within $4 \text{ MPa}^{1/2}$ of the solubility parameter of the 2EHMA polymer (*id.* at 47–48 (citing Ex. 1041 ¶¶ 217–21)).

Regarding solubility, Petitioner argues that solubility parameters “were (and are) commonly consulted in order to predict solubility of one compound in another.” *Id.* at 43 (citing Ex. 1041 ¶ 201). Petitioner relies on Strausz (Ex. 1009, 467–68) and Dr. Epps’s calculations of the solubility parameters of heavy, asphaltenic crude oils (“within the disclosed range of about $17.1 \text{ MPa}^{1/2}$ to about $22.1 \text{ MPa}^{1/2}$,” Ex. 1041 ¶¶ 213–14) and the 2EHMA polymer (“about $18.04 \text{ MPa}^{1/2}$,” Ex. 1041 ¶¶ 202–04) to argue that, because the solubility parameter of the 2EHMA polymer falls squarely within the range disclosed by Strausz, a person of ordinary skill in the art would have had a reasonable expectation that the 2EHMA drag reducing polymer of Inaoka “would be effective at achieving drag reduction in a crude oil having an asphaltene content of at least 3 weight percent and an API gravity less than about 26° undergoing turbulent flow through a pipeline.” Pet. 46–47 (citing Ex. 1041 ¶ 216).

F. Patent Owner’s Arguments

Preliminarily, Patent Owner argues that Petitioner fails to provide a limitation-by-limitation analysis or claim chart showing where each and every element of the challenged claims is present in the prior art for Grounds 1 and 2. Prelim. Resp. 26–29; *see* 37 C.F.R. § 42.104(b). As discussed above in our summary of Petitioner’s Ground 1 and Ground 2, the elements of the challenged claims appear to be sufficiently identified in the

Petition, although not conventionally presented in claim charts or the like. Petitioner also relies heavily on Dr. Epps's testimony to present its arguments about certain challenged claim limitations not specifically delineated in the prior art, such as the presence of heteroatoms or the viscosity limitation; at this stage in the proceeding, we find Petitioner's reliance sufficient as to Grounds 1 and 2. We discuss Petitioner's Ground 3 (asserted anticipation based on Inaoka) below.

Patent Owner argues, in connection with both Petitioner's Ground 1 and Ground 2 involving obviousness, that none of the prior art discloses the step of "the drag reducing polymer" being "added to the liquid hydrocarbon" having "an asphaltene content of at least 3 weight percent and an API gravity of less than about 26°" such that "suppressing the growth of turbulent eddies" can occur. Prelim. Resp. 30–39. Patent Owner expounds upon this argument later in its Preliminary Response, arguing that Petitioner has "provided no showing that the hypothetical prior art combination would have satisfied the claim limitations (*e.g.*, 'suppressing the growth of turbulent eddies') for a heavy, asphaltenic liquid hydrocarbon." *Id.* at 44–46.

The "suppressing the growth of turbulent eddies" limitation, however, appears to be directed to the mechanism by which the drag reducing agent operates. *In re Swinehart*, 439 F.2d 210, 212 (CCPA 1971). The '250 patent recognizes this mechanism as an acknowledged mechanism, existing in the prior art. Ex. 1004, 1:39–42 ("The role of these additives [drag reducing agents] is to suppress the growth of turbulent eddies, which results in higher flow rate at a constant pumping pressure."), 19:35–44; 20:19–28; 20:39–48. With respect to Ground 1, Dr. Epps testifies that the reduction in

frictional pressure loss demonstrated by Table 9 of the Holtmyer Publication is brought about by the ability of the iDMA drag reducing polymer to suppress the growth of turbulent eddies, that suppression being the mechanism by which drag reducing polymers were (and are) understood to function in turbulent flow by persons of ordinary skill in the art. *See* Pet. 22–23 (citing Ex. 1041 ¶ 71). Similarly, for Ground 2, Dr. Epps testifies that a person of ordinary skill in the art would have understood that the drag reducing polymers of Inaoka achieve a reduction in frictional pressure losses associated with turbulent flow by suppressing the growth of turbulent eddies, that suppression being the mechanism by which drag reducing polymers were (and are) understood to function in turbulent flow by persons of ordinary skill in the art. *See id.* at 37–38 (citing Ex. 1041 ¶ 167). Accordingly, Petitioner shows sufficiently, on this record, that the primary references disclose introducing a drag reducing polymer into a pipeline, such that the friction loss associated with the turbulent flow through the pipeline is reduced by suppressing the growth of turbulent eddies.

Neither party has asked us to determine whether the phrase “such that the friction loss associated with the turbulent flow through the pipeline is reduced by suppressing the growth of turbulent eddies” is a claim limitation, or an intended result. We invite the parties to present arguments on this matter in their post-institution briefs.

Patent Owner also argues that none of the references disclose drag reducing a “liquid hydrocarbon having an asphaltene content of at least 3 weight percent and an API gravity of less than about 26°,” critiquing Petitioner’s reliance on the “mere existence” of heavy, asphaltenic liquid

hydrocarbons and the “supposedly ‘well-known economic benefits’ of drag reducing the claimed liquid hydrocarbons.” Prelim. Resp. 31–32 (citing Pet. 25–26, 40). First, Patent Owner argues that Petitioner’s arguments do not meet the “common sense” standard, and are based on hindsight. *Id.* at 32–34. On this record, Petitioner has demonstrated adequately that (a) the Holtmyer Publication, the Holtmyer Patent, and Strausz, and (b) Inaoka and Strausz disclose the elements of the challenged claims. Pet. 14–48, 50–60. Petitioner also has offered the testimony of Dr. Epps to support its argument that one of ordinary skill in the art would have been motivated to combine the elements of references to achieve the inventions of the claims. For purposes of this Decision, we credit the testimony of Dr. Epps on these matters. Patent Owner’s arguments raise issues of material fact to be resolved during the course of a trial.

Second, Patent Owner argues that “Petitioner’s analysis is divorced from the prior art references and thus rests entirely on a conclusory declaration.” Prelim. Resp. 34. Patent Owner argues that one of ordinary skill in the art “would not have used the claimed heavy, asphaltenic liquid hydrocarbon as part of the fracking process in Holtmyer.” *Id.* at 35. Bodily incorporation, however, is not the standard for obviousness. *In re Keller*, 642 F.2d 413, 425 (CCPA 1981) (“The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.”). We do not understand Petitioner’s position as requiring bodily introduction of asphaltene into the liquid hydrocarbons of the Holtmyer references, but rather, as using the drag reducing agent of the Holtmyer

Publication in the crude oil having the properties delineated in the challenged claims. Moreover, the statement in the Holtmyer Publication upon which Petitioner relies for its “economic profitability” argument uses hydraulic fracturing as an example, rather than as an exclusive focus. Ex. 1005, 473 (“it is economically profitable to industrial organizations engaged in movement of large volumes of liquid at high flow rates for considerable distance as in hydraulic fracturing of oil and gas wells.”).

Third, Patent Owner argues that Petitioner fails to address the conventional wisdom of one of ordinary skill in the art that “drag reduction of heavy crudes was generally not believed to be a viable option.” Prelim. Resp. 37–39. Patent Owner presents articles purporting to demonstrate the conventional wisdom of the time, but no testimonial evidence of its own supporting or explaining the same. Ex. 2018, 460; Ex. 2019, 80; Ex. 2028. We weigh Patent Owner’s evidence against the evidence presented by Petitioner on this matter, indicating that Patent Owner acknowledged, in its own promotional material and in arguments presented to the Office, that use of a drag reducing agent in heavy crude oil was viable. Pet. 9–10 n.1 (citing Exs. 1020, 1028, 1029, 1030, 1040). At this stage in the proceeding, and on the current record, we are persuaded by Petitioner’s evidence.

Specific to Ground 1, Patent Owner argues that Petitioner’s assertion that the Holtmyer Patent “address[es] the effect of asphaltene content on the ability of the iDMA polymer to achieve drag reduction” is erroneous, instead arguing that the Holtmyer Patent “does not even mention asphaltene.” Prelim. Resp. 40. Patent Owner targets the statement in the Holtmyer Patent that “the polymer additive is used with a well-treating fluid containing sand or other solid agent suspended therein.” *Id.* at 41 (citing Ex. 1006, 4:63–65).

Patent Owner argues that the “‘sand or other solid agent’ refers to ‘propping agents’” rather than asphaltenes, but provides no support for its argument. *Id.* Relying on this premise, Patent Owner argues that a person of ordinary skill in the art “would not have injected asphaltene into a well as a ‘propping agent’ as part of the fracking process in Holtmyer.” *Id.*

As a preliminary matter, Patent Owner’s statement that “the ‘sand or other solid agent’ refers to ‘propping agents’” is an unsupported statement from which Patent Owner pivots to the remainder of its arguments on this topic. Nevertheless, Patent Owner does not direct us to persuasive evidence indicating that the Holtmyer Patent’s statement is so restrictive. The Holtmyer Patent may or may not effectively equate “sand or other solid agent” with “propping agents,” but, on this record, and at this stage in the proceeding, we cannot conclusively determine what the Holtmyer Patent’s phrase means based on the arguments of counsel. Moreover, as discussed above, we do not understand Petitioner’s position as requiring injection of asphaltenes into a well as part of a fracking process, but rather, as introducing the drag reducing agent of Holtmyer into a crude oil in a pipeline.

Patent Owner also argues that we should not credit Dr. Epps’s testimony regarding the Holtmyer Patent in this proceeding based on testimony he presented in the 734 IPR, which Patent Owner asserts is contradictory. Prelim. Resp. 42–43. At this stage in the proceeding, we credit Dr. Epps’s testimony as it pertains to the challenged claims and the relevant prior art. Dr. Epps’s testimony in the 734 IPR involves a different, albeit related, patent, different claims, different prior art, and a different combination of prior art references. *See generally* Ex. 2026. Patent Owner

has not explained why this testimony would necessarily apply to Dr. Epps's analysis with respect to the Holtmyer Patent and its use in Petitioner's obviousness arguments as set forth in this proceeding.

Also specific to Ground 1, Patent Owner argues that the Holtmyer Publication does not disclose the limitation of having a drag reducing polymer in the liquid hydrocarbon present "in the range from about 0.1 to about 500 ppmw." Prelim. Resp. 52. More particularly, Patent Owner argues that the iDMA polymer was introduced at 600 ppmw into QC-1156, which is the only fluid in the Holtmyer references with an API gravity in the claimed range. *Id.* Petitioner, however, relies on Dr. Epps's testimony that the Holtmyer Publication's Table 6, in which iDMA demonstrates essentially the same degree of drag reduction at 300 ppm and 600 ppm, would have directed a person of ordinary skill in the art to add iDMA to a liquid hydrocarbon at a concentration of 300 ppm to make efficient use of the material. Pet. 24 (citing Ex. 1041 ¶¶ 72–75; Ex. 1005, Table 6). At this stage of the proceeding, and on the present record, we are persuaded by Petitioner's presentation of evidence on this matter.

Patent Owner also critiques Petitioner's obviousness analysis as depending on hindsight reconstruction. Prelim. Resp. 46–50. At this stage in the proceeding, we do not perceive that Petitioner has employed hindsight reasoning. Petitioner has articulated a reason having rational underpinnings for making a proposed combination of the prior art teachings of the Holtmyer Publication, the Holtmyer Patent, and Strausz, as well as Inaoka and Strausz, namely, that crude oils having the claimed properties were well known, and that one of ordinary skill would have been motivated by known economic benefits and would have had a reasonable expectation that the

identified polymers would be effective. Pet. 21–48. On this record, Patent Owner has not explained sufficiently why Petitioner’s articulated reasoning is ineffective to support its contentions of obviousness. *In re McLaughlin*, 443 F.2d 1392, 1395 (CCPA 1971) (“Any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning, but so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made and does not include knowledge gleaned only from applicant’s disclosure, such a reconstruction is proper.”).

Finally, Patent Owner argues that the prior art teaches away from using heavy, asphaltenic liquid hydrocarbon. Prelim. Resp. 50–51. In particular, Patent Owner asserts that the Holtmyer references focus on hydraulic fracturing and drag reducers for the fracturing fluid that is injected into the well. *Id.* at 51. On this record, we are persuaded by Petitioner’s presentation of its arguments and evidence. As noted above, the Holtmyer references use the term “movement of large volumes of liquid at high flow rates for considerable distance as in hydraulic fracturing of oil and gas wells.” Ex. 1005, 473; *see* Ex. 1006, 1:45–55. Thus, fracking appears to be an exemplary process discussed in the Holtmyer references, but the broader disclosure of each reference suggests that the methods described therein may apply to any hydrocarbon liquids flowing through a conduit. A reference does not teach away if it merely expresses a general preference for an alternative invention from amongst the options available to the ordinarily skilled artisan, and the reference does not criticize, discredit or discourage investigation into the invention claimed. *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004). Patent Owner does not point to any statements in the

Holtmyer references criticizing or discrediting the use of drag reducing agents in heavy, asphaltenic crude oils. In other words, the fact that the Holtmyer references discuss hydraulic fracturing does not mean that they teach away from drag reduction as applied to a heavy, asphaltenic liquid hydrocarbon.

At this stage in the proceeding, and on the current record, we are persuaded by Petitioner's evidence and find Petitioner shows sufficiently that (a) the Holtmyer Publication, the Holtmyer Patent, and Strausz, and (b) Inaoka and Strausz disclose the limitations of claim 1. We also are persuaded that Petitioner has demonstrated a reasonable likelihood that one of ordinary skill in the art would have been motivated to combine the elements of the references to achieve the invention of claim 1.

G. Additional Claims

We also find, on this record, and for purposes of this decision, that Petitioner shows sufficiently how (a) the Holtmyer Publication, the Holtmyer Patent, and Strausz, and (b) Inaoka and Strausz disclose the additional limitations of claims 2–9, which Patent Owner does not contest separately at this stage of the proceeding. Pet. 50–60 (citing Ex. 1005, 475–76; Ex. 1007, 8:5–12; Ex. 1009, 467–68; Ex. 1041 ¶¶ 57, 61–67, 125–37, 141–44, 156–65, 202–14, 218–21). At this stage of the proceeding, and based on the current record, Petitioner establishes a reasonable likelihood that it would prevail in showing that claims 2–9 would have been obvious over (a) the Holtmyer Publication, the Holtmyer Patent, and Strausz, and (b) Inaoka and Strausz.

Accordingly, on this record, Petitioner establishes a reasonable likelihood that it would prevail in showing that the subject matter of

claims 1–9 would have been obvious over (a) the Holtmyer Publication, the Holtmyer Patent, and Strausz, and (b) Inaoka and Strausz.

H. Ground 3 – Asserted Anticipation Based on Inaoka

To establish anticipation, each limitation in a claim must be found in a single prior art reference, arranged as recited in the claim. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008). When an anticipatory reference “is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence,” which “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.” *Cont’l Can Co. USA v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991).

Petitioner argues that Inaoka discloses every limitation of claims 1–9. Pet. 60–61. More particularly, Petitioner argues that claims 1–9, directed to a “method of preparing a drag reducing polymer,” do not recite any particular steps for preparing the drag reducing polymer and, therefore, seek to cover any method of preparing a polymer that is suitable for the recited use. *Id.* at 60. Petitioner refers to its earlier obviousness arguments in which Petitioner argues that Inaoka discloses a method of preparing a 2EHMA drag reducing polymer having the properties of a plurality of the repeating units comprising oxygen heteroatoms, a solubility parameter that is at least about 17 MPa^{1/2}, at least about 25,000 repeating units, and a weight average molecular weight of at least 1x10⁶ g/mol. *Id.* at 61 (citing Pet. VIII.1, X.A; X.B; X.C.).

Patent Owner argues that Petitioner’s failure to propose a claim construction for any claim term, let alone the preamble, ignores other

claimed method steps in the body of the claims, including that “the drag reducing polymer is added to the liquid hydrocarbon.” Prelim. Resp. 55–56. Patent Owner takes the position that the claim language “makes clear that, as part of the method claim, the drag reducing polymer must be added to the claimed heavy, asphaltenic liquid hydrocarbon that is in the pipeline.” *Id.* at 56. Accordingly, Patent Owner argues, “Inaoka cannot anticipate because it does not disclose, among other things, the method step that ‘the drag reducing polymer is added to the liquid hydrocarbon in the range from about 0.1 to about 500 ppmw.’” *Id.* at 57.

“In general, a preamble limits the invention if it recites essential structure or steps, or if it is ‘necessary to give life, meaning, and vitality’ to the claim.” *Catalina Mktg. Int’l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (citing *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999)). The preamble of the independent claims challenged here recites: “A method of preparing a drag reducing polymer comprising” The preamble of the challenged claims, however, is somewhat disjointed from the body of the claims.

The body of each of the independent claims recites one “preparing” step; the remainder of each of the independent claims largely follows one or more “wherein” clauses directed to properties of the polymer rather than to steps taken to prepare the polymer. *See Griffin v. Bertina*, 285 F.3d 1029, 1034 (Fed. Cir. 2002) (finding that a “wherein” clause limited a process claim where the clause gave “meaning and purpose to the manipulative steps”); *cf. Minton v. Nat’l Ass’n of Securities Dealers, Inc.*, 336 F.3d 1373, 1381 (Fed. Cir. 2003) (a whereby “clause in a method claim is not given weight when it simply expresses the intended result of a process step

positively recited”). Patent Owner is correct that Petitioner does not argue that the preamble is limiting. Prelim. Resp. 56 n.16. Nor does Petitioner argue whether the wherein clause or clauses should be construed as limiting. Without setting the stage before presenting its arguments, Petitioner provides insufficient clarity as to which of the limitations of the claims Inaoka would have to meet to anticipate.

Nevertheless, even without resolving questions of claim construction, namely, whether the preamble and the wherein clause should be viewed as limiting, Petitioner has not made an adequate case as to anticipation. *See* 37 CFR § 42.104(b)(4) (requiring that the Petition “specify where each element of the [challenged] claim is found in the prior art patents or printed publications relied upon”). Petitioner’s Ground 3 is characterized by its brevity and its reference to arguments made in connection with its obviousness grounds. As the criteria for obviousness and the criteria for anticipation differ in many material respects, the lack of acknowledgment and discussion as to this difference is a further detriment to Petitioner’s anticipation case. We also do not find, within Petitioner’s brief anticipation argument, adequate explanation to support Petitioner’s allegations of anticipation of every limitation of claims 1–9 by Inaoka.

Accordingly, at this stage of the proceeding, and based on the current record, Petitioner fails to establish a reasonable likelihood that it would prevail in showing that claims 1–9 are anticipated by Inaoka.

III. CONCLUSION

Taking account of the information presented in the Petition and the Preliminary Response, and the evidence of record, we determine that Petitioner establishes a reasonable likelihood that it will prevail in showing

that claims 1–9 of the '250 patent are unpatentable. Our factual findings and conclusions at this stage of the proceeding are based on the evidentiary record developed thus far, and may change upon consideration of the full record developed during trial. This decision is not a final decision as to the patentability of any claim for which *inter partes* review is instituted. Our final decision will be based on the full record developed during trial.

IV. ORDER

In consideration of the foregoing, it is hereby

ORDERED that an *inter partes* review is instituted as to:

Claims 1–9 of the '250 patent, on the ground of unpatentability over the Holtmyer Publication, the Holtmyer Patent, and Strausz, under 35 U.S.C. § 103;

Claims 1–9 of the '250 patent on the ground of unpatentability over Inaoka and Strausz under 35 U.S.C. § 103;

FURTHER ORDERED that no other ground of unpatentability is authorized; and

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

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